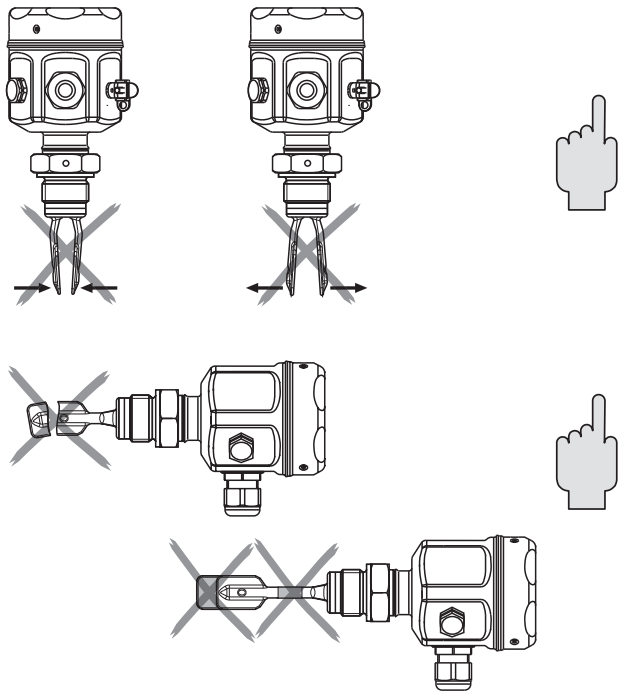


DE- **Nicht** verbiegen
Nicht kürzen
Nicht verlängern

EN- Do **not** bend
Do **not** shorten
Do **not** lengthen

FR - **Ne pas** déformer
Ne pas raccourcir
Ne pas rallonger

ES - **No** torcer
No acortar
No alargar

IT - **Non** stringere o allargare
Non accorciare o allungare
Non piegare

NL- **Niet** verbuigen
Niet inkorten
Niet verlengen

DE- Geräte-Identifikation

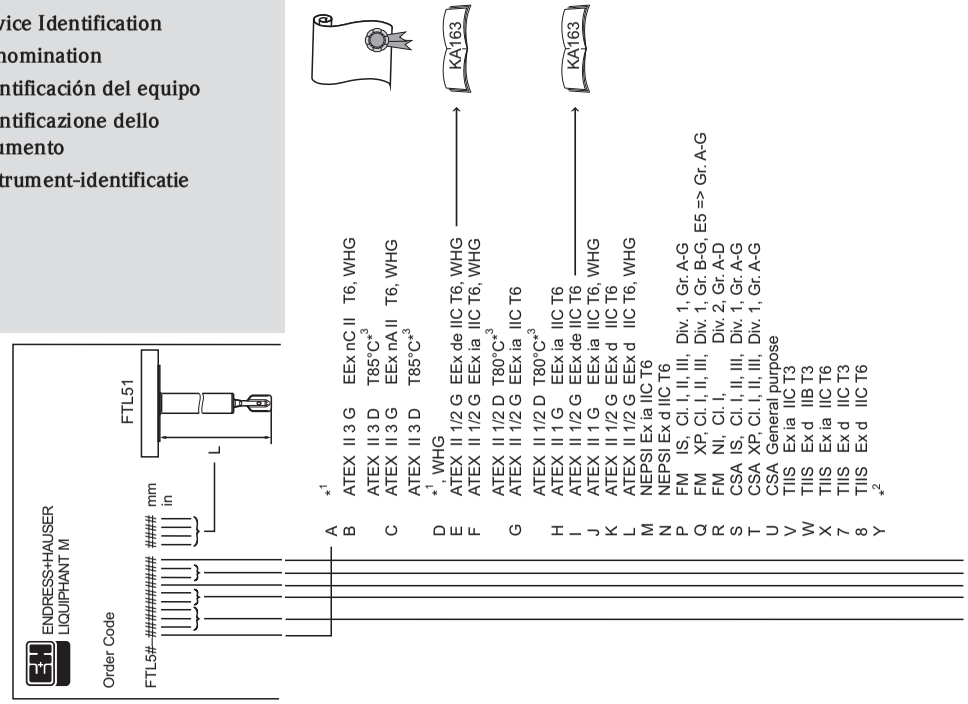
EN- Device Identification

FR - Dénomination

ES - Identificación del equipo

IT - Identificazione dello strumento

NL- Instrument-identificatie



A##	Flansche / Flanges / Brides / Brida / Flangia / Flens	→ 12 13	
B##			
C##			
D##			
F##			
K##			
N##			
GE2	R ¾,	DIN 2999, 316L	max. 100 bar, 150 °C
GE5	R ¾,	DIN 2999, AlloyC4	
GE6	R ¾,	DIN 2999, AlloyC22	
GF2	R 1,	DIN 2999, 316L	
GF5	R 1,	DIN 2999, AlloyC4	
GF6	R 1,	DIN 2999, AlloyC22	
GM2	NPT ¾, ANSI,	316L	
GM5	NPT ¾, ANSI,	AlloyC4	
GM6	NPT ¾, ANSI,	AlloyC22	
GN2	NPT 1, ANSI,	316L	
GN5	NPT 1, ANSI,	AlloyC4	
GN6	NPT 1, ANSI,	AlloyC22	
GQ2	G ¾,	ISO 228, 316L	max. 100 bar, 150 °C
GQ5	G ¾,	ISO 228, AlloyC4	
GQ6	G ¾,	ISO 228, AlloyC22	
GR2	G 1,	ISO 228, 316L	
GR5	G 1,	ISO 228, AlloyC4	
GR6	G 1,	ISO 228, AlloyC22	
GW2	G 1,	ISO 228, 316L	max. 25 bar, 150 °C max. 40 bar, 100 °C
TC2	DN25-38 (1...1½"), Tri-Clamp	ISO 2852, 316L	max. 16 bar, 120 °C max. 2 bar, 150 °C
TE2	DN40-51 (2"), Tri-Clamp	ISO 2852, 316L	
YY9	*[2]		

→ 10 11

*[1] ohne / without / sans / sin / senza / zonder

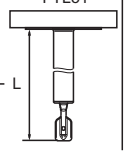
*[2] andere / others / autres / otros / altri / andere

*[3] nicht gültig für PBT / not valid for PBT / non valable pour PBT / no es válido para PBT / non valido per PBT / niet geldig voor PBT

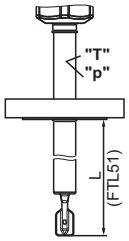
ENDRESS+HAUSER
LIQUIPHANT M

Order Code

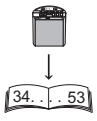
FTL5#-########## #### mm
in



AA	*[2],		Ra < 3.2 µm/80 grit (FTL50)
BB	..... mm,	316L,	Ra < 3.2 µm/80 grit
BE	..... mm,	AlloyC4,	Ra < 3.2 µm/80 grit
CB	..... in,	316L,	Ra < 3.2 µm/80 grit
CE	..... in,	AlloyC4,	Ra < 3.2 µm/80 grit
DB	"L II",	316L,	Ra < 3.2 µm/80 grit
DE	"L II",	AlloyC4,	Ra < 3.2 µm/80 grit
IA	*[2],		+ **"T"** (FTL50)
JB	..... mm,	316L	+ **"T"**
JE	..... mm,	AlloyC4	+ **"T"**
KB	..... in,	316L	+ **"T"**
KE	..... in,	AlloyC4	+ **"T"**
LB	"L II",	316L	+ **"T"**
LE	"L II",	AlloyC4	+ **"T"**
QA	*[2],		+ **"p"** (FTL50)
RB	..... mm,	316L	+ **"p"**
RE	..... mm,	AlloyC4	+ **"p"**
SB	..... in,	316L	+ **"p"**
SE	..... in,	AlloyC4	+ **"p"**
TB	"L II",	316L	+ **"p"**
TE	"L II",	AlloyC4	+ **"p"**
YY	*[2]		



A	FEL50A, PROFIBUS PA
1	FEL51, 19…253 V AC
2	FEL52, 10… 55 V DC, PNP
4	FEL54, 19…253 V AC, 19…55 V DC, DPDT
5	FEL55, 11… 36 V DC, 8/16 mA
6	FEL56, NAMUR, L-H
7	FEL57, PFM
8	FEL58, NAMUR, H-L
9	*[2]



E1	F27	NEMA6P,	NPT ¾
E4	F16,	NEMA4X,	NPT ½
E5	F13/17,	NEMA4X,	NPT ¾
E6	F15,	NEMA4X,	NPT ½
F1	F27,	IP68,	G ½
F4	F16,	IP66,	G ½
F5	F13/17,	IP66,	G ½
F6	F15,	IP66,	G ½
G1	F27,	IP68,	M20
G4	F16,	IP66,	M20
G5	F13/17,	IP66,	M20
G6	F15,	IP66,	M20
N4	F16,	IP66,	M12
N5	F13/17,	IP66,	M12
N6	F15,	IP66,	M12
Y9	*2		

F16 (PBT)

F13/17 (Alu)
F27 (316L)

F15 (316L)

#3 Kompakt-Gehäuse / compact housing / boîtier compact / cabezal compacto / testa compatta / compacte behuizing → KA220

#7 Alu/sep. → KA163

A	*1
B	PVIS free
C	EN 10204 - 3.1, 316L
K	Spec. adjustment density H20
L	Spec. adjustment density H20, EN10204-3.1
N	EN 10204 - 3.1, NACE MR0175, 316L
P	100 bar (FTL51)
R	100 bar, EN 10204 - 3.1, NACE MR0175, 316L (FTL51)
S	GL/ABS marine certificate (FTL51: max. 1600 mm)
Y	*2

*1 ohne / without / sans / sin / senza / zonder

*2 andere / others / autres / otros / altri / andere

"L II" Schaltpunkt / Switchpoint / Point de commutation / Punto de conmutación / Punto di commutazione / Schakelpunt

Liquiphant II FTL 360/365, FDL 30/35

"T" Temperaturdistanzstück / Temperature spacer / Elément de refroidissement / Tramo disipador detemperatura / Distanziale per temperatura / Temperatuurreductiestuk

"p" Druckdichte Durchführung / Pressure sealed bushing / Entrée résistant à la pression / Extensión resistente a la presión / Passacavo a tenutadi pressione / Gasdichte doorvoering

DE– Flansche
EN– Flanges
FR – Brides
ES – Brida
IT – Flangia
NL– Flens

ANSI B 16.5

AA2	1½",	150 lbs, RF,	316/316L
AB2	1½",	300 lbs, RF,	316/316L (FTL51)
AC2	1½",	150 lbs, RF,	316/316L
AD2	1½",	300 lbs, RF,	316/316L (FTL51)
AE2	2",	150 lbs, RF,	316/316L
AE5	2",	150 lbs, RF,	Alloy C4 >316/316L
AE6	2",	300 lbs, RF,	Alloy C22 >316/316L
AF2	2",	300 lbs, RF,	316/316L
AG2	2",	600 lbs, RF,	316/316L (FTL51)
AJ2	2½",	300 lbs, RF,	316/316L (FTL51)
AL2	3",	150 lbs, RF,	316/316L
AM2	3",	300 lbs, RF,	316/316L (FTL51)
AN2	3",	600 lbs, RF,	316/316L (FTL51)
AP2	4",	150 lbs, RF,	316/316L
AQ2	4",	300 lbs, RF,	316/316L (FTL51)
AR2	4",	600 lbs, RF,	316/316L (FTL51)
A82	1",	150 lbs, RF,	316/316L

EN 1092-1

BA2	DN32,	PN6 A,	316L
BB2	DN32,	PN25/40 A,	316L
BC2	DN40,	PN6 A,	316L
BD2	DN40,	PN25/40 A,	316L
BE2	DN50,	PN6 A,	316L
BG2	DN50,	PN25/40 A,	316L
BH2	DN65,	PN6 A,	316L
BJ2	DN50,	PN100 A,	316L (FTL51)
BK2	DN65,	PN25/40 A,	316L
BM2	DN80,	PN10/16 A,	316L
BN2	DN80,	PN25/40 A,	316L
BQ2	DN100,	PN10/16 A,	316L
BR2	DN100,	PN25/40 A,	316L

B12	DN80,	PN100 A,	316L (FTL51)
B82	DN25,	PN25/40 A,	316L
CA2	DN32,	PN6 B1,	316L
CA5	DN32,	PN6,	AlloyC4 >316L
CA6	DN32,	PN6,	AlloyC22 >316L
CE2	DN50,	PN6 B1,	316L
CE5	DN50,	PN6,	AlloyC4 >316L
CE6	DN50,	PN6,	AlloyC22 >316L
CG2	DN50,	PN25/40 B1,	316L
CG5	DN50,	PN25/40,	AlloyC4 >316L
CG6	DN50,	PN25/40,	AlloyC22 >316L
CJ2	DN50,	PN100 B2,	316L (FTL51)
CN2	DN80,	PN25/40 B1,	316L
CN5	DN80,	PN25/40,	AlloyC4 >316L
CN6	DN80,	PN25/40,	AlloyC22 >316L
CQ2	DN100,	PN10/16 B1,	316L
CQ5	DN100,	PN10/16,	AlloyC4 >316L
CQ6	DN100,	PN10/16,	AlloyC22 >316L
C12	DN80,	PN100 B2,	316L (FTL51)
C82	DN25,	PN25/40 B1,	316L
C85	DN25,	PN25/40,	AlloyC4 >316L
C86	DN25,	PN25/40,	AlloyC22 >316L
DG2	DN50,	PN40 B1,	316L
DN2	DN80,	PN40 B1,	316L
D82	DN25,	PN40 B1,	316L
FG2	DN50,	PN40 C,	316L
NG2	DN50,	PN40 D,	316L

JIS B2220

KA2	10K 25,	RF,	316L
KC2	10K 40,	RF,	316L
KE2	10K 50,	RF,	316L
KE5	10K 50,	RF,	AlloyC4 >316L
KE6	10K 50,	RF,	AlloyC22 >316L
KL2	10K 80,	RF,	316L
KP2	10K 100,	RF,	316L

DE- Verwendung
Grenzstanddetektion in Flüssigkeiten

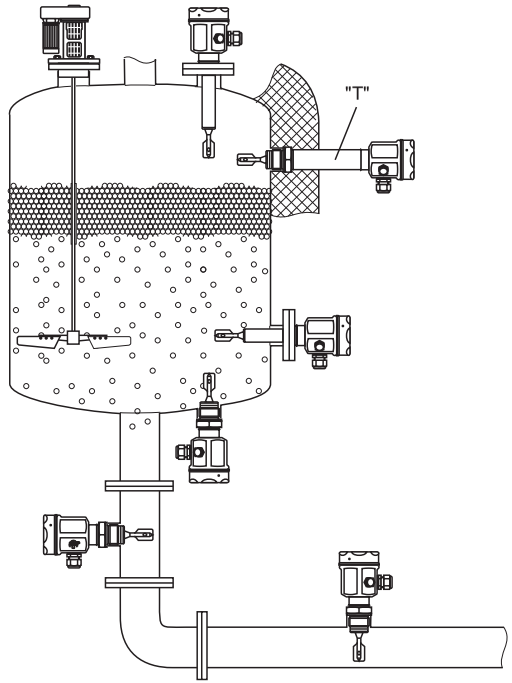
EN- Application
Point level detection in fluids

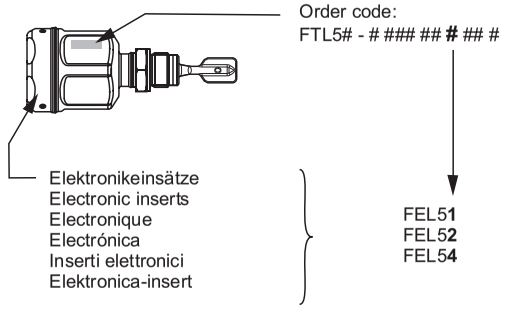
FR - Utilisation
Détection de niveau dans les liquids

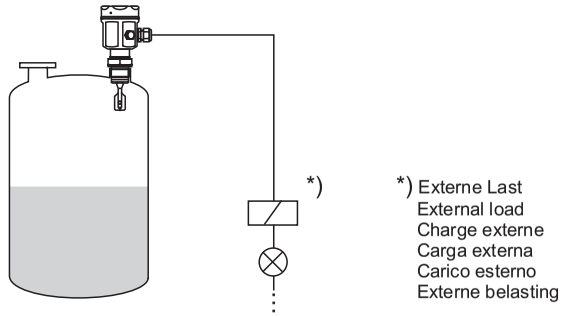
ES - Aplicación
Detección de nivel en líquidos agua

IT - Applicazione
Controllo livello nei liquidi

NL- Toepassing
Niveaudetectie in vloeistoffen







DE- Messeinrichtung
für direkten Anschluss

EN- Measuring system
for direct connection

FR- Ensemble de détection de niveau
pour raccordement direct

ES- Sistema de medida
para conexión directa

IT - Sistema di misura
per connessione diretta

NL- Meetopstelling
voor directe aansluiting

DE- Messeinrichtung
für Anschluss über Schaltgerät

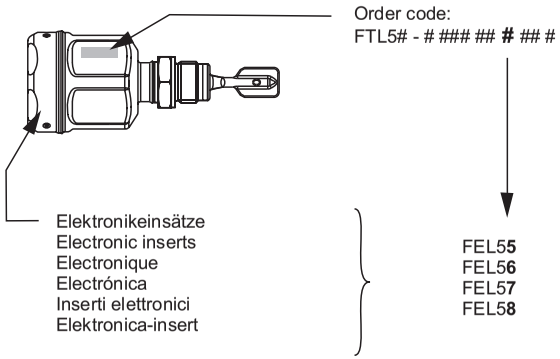
EN- Measuring system
for connection via switching unit

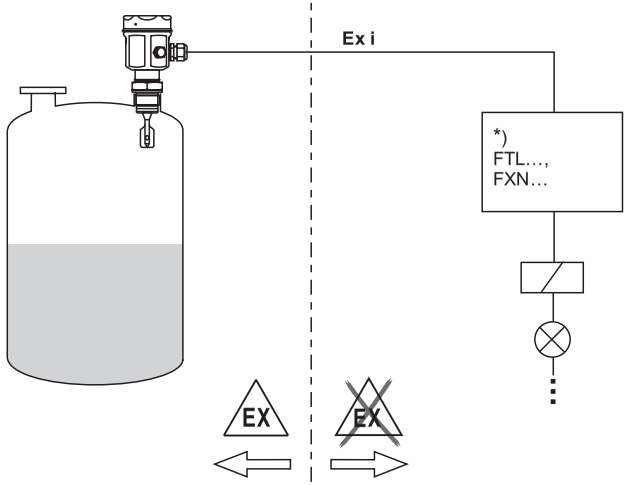
FR - Ensemble de détection de niveau
pour raccordement via détecteur

ES - Sistema de medida
para conexión vía interruptores

IT - Sistema di misura
per connessione mediante unità di commutazione

NL- Meetopstelling
voor aansluiting aan een schakelversterker





*) Schaltgerät, SPS, Trennverstärker
Switching unit, PLC, isolating amplifier
Détecteur, API, convertisseur/ séparateur
Interruptor, PLC, amplificador aislado
Unità di commutazione, PLC, barriera di separazione
Schakelversterker, PLC, scheidingsversterker

DE- Messeinrichtung
für Anschluss an PROFIBUS PA

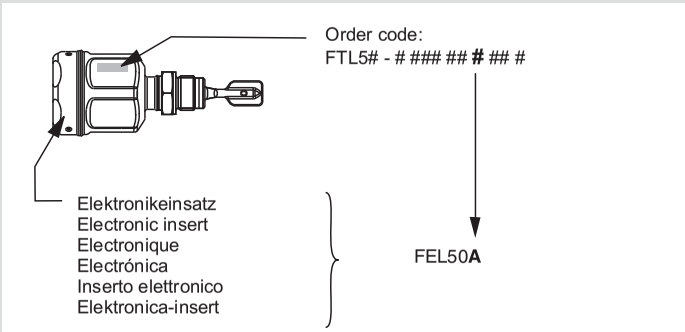
EN- Measuring system
for connection to PROFIBUS PA

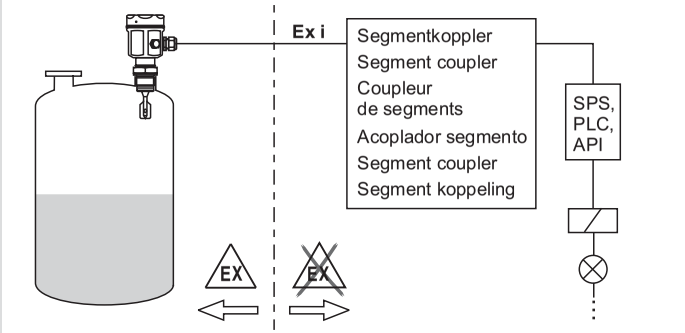
FR - Ensemble de détection de niveau
pour le raccordement à PROFIBUS PA

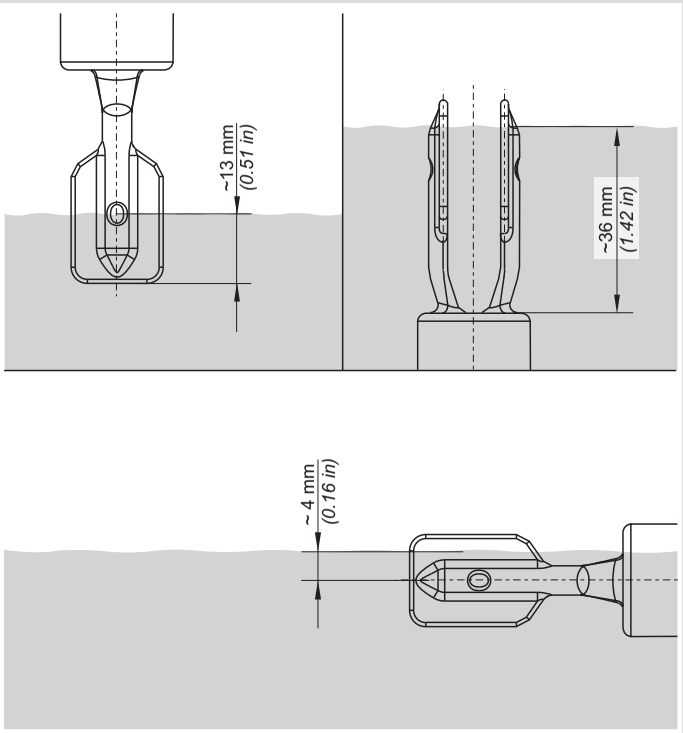
ES - Sistema de medida
para conexión a PROFIBUS PA

IT - Sistema di misura
per connessione a PROFIBUS PA

NL- Meetopstelling
voor aansluiting aan PROFIBUS PA







DE- Einbau
Schaltpunkt in Abhängigkeit vom Einbau

EN- Installation
Switchpoint depends on mounting position

FR- Montage
Point de commutation en fonction de l'implantation

ES - Montaje
Punto de conmutación dependiendo de la posición de montaje

IT - Montaggio
Punto di commutazione in funzione della posizione di montaggio

NL- Inbouw
Schakelpunt afhankelijk van inbouw

DE- Einbaubeispiele
in Abhängigkeit von der
Viskosität ν der Flüssigkeit

EN- Mounting examples
as a function of liquid viscosity ν

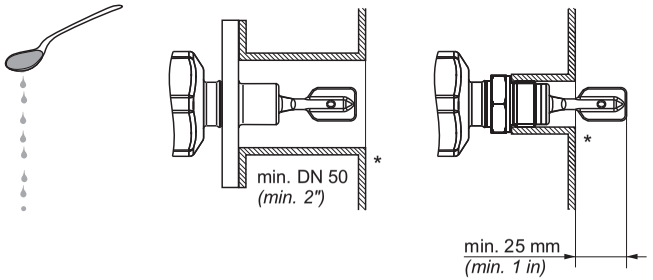
FR - Exemples d'implantation
dépendant de la viscosité ν
du liquide

ES - Ejemplos de montaje
dependiendo de la viscosidad ν
del líquido

IT - Esempi di montaggio
come funzione di viscosità ν
del liquido

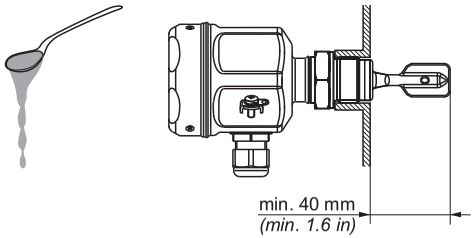
NL- Inbouwvoorbeelden
afhankelijk van de viscositeit ν
van de vloeistof

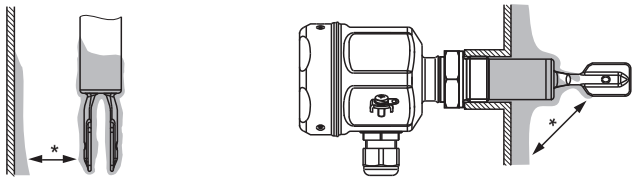
ν = 0…2000 mm²/s
(ν = 0…2000 cSt)



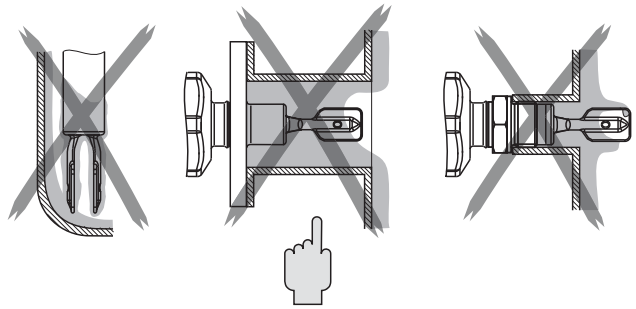
* entgraten / deburr / ébarber / libre / sbavare / ontbramen

ν = 0…10000 mm²/s
(ν = 0…10000 cSt)





* Abstand! / Distance! / Distance! / ¡Distancia! / Distanza! / Afstand!



DE- Ansatzbildung berücksichtigen.
Schwinggabel darf Ansatz nicht berühren.

EN- Consider build-up.
Fork may not contact the build-up.

FR - Tenir compte du colmatage.
Fourche ne doit pas entrer en contact avec le dépôt.

ES - Tener en cuenta las adherencias.
Las horquillas no deben estar en contacto con las adherencias.

IT - Tenere conto dei depositi.
La forcella non deve entrare in contatto con i depositi.

NL- Rekening houden met aangroei.
Trilvork mag de aangroei niet aanraken.

DE- Bei dynamischer Belastung abstützen

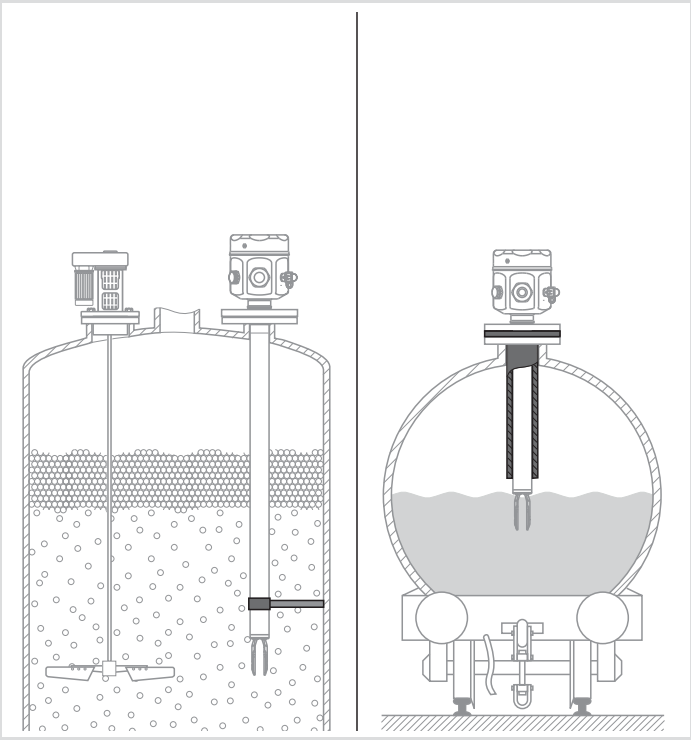
EN- In cases of dynamic forces support

FR - En cas de contraintes dynamiques, étayer le tube

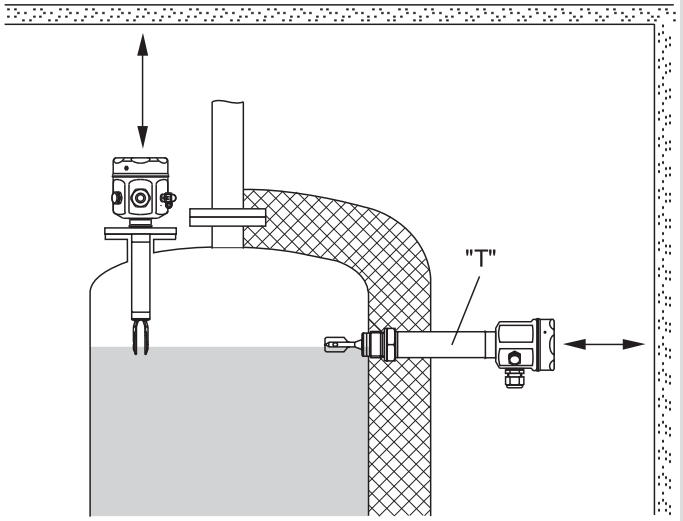
ES - En caso de cargas dinámicas altas debe ser apoyado

IT - In caso di carichi dinamici, rinforzare con un supporto meccanico

NL- Bij mechanische belasting verstevigen



"T" = mit Temperaturdistanzstück für isolierten Tank
"T" = with temperature spacer for insulated tanks
"T" = avec élément de refroidissement pour réservoir isolé
"T" = con tramo disipador de temperatura para tanques aislados
"T" = con distanziale di temperatura per serbatoi isolati
"T" = met temperatuurreductiestuk voor geïsoleerde tanks



DE- Freiraum vorsehen
EN- Allow clearance
FR - Prévoir un espace libre
ES - Prever espacio
IT - Lasciare spazio per estrazione
NL- Ruimte vrijhouden

DE- Schwinggabel ausrichten:
Markierung oben oder unten

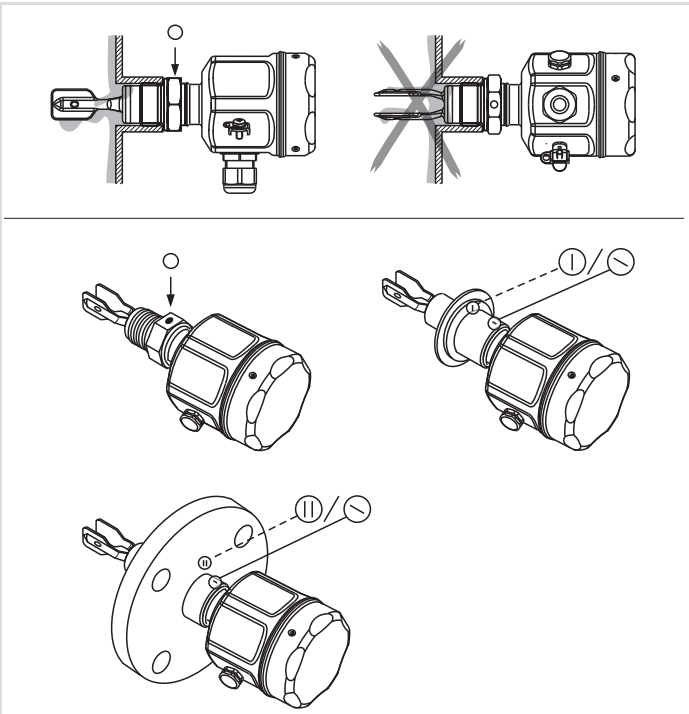
EN- Orientation of fork tines:
Marking above or below

FR - Orientation des lames vibrantes:
Repères en haut ou en bas

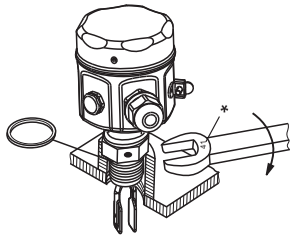
ES - Orientación de la horquilla:
Marca arriba o abajo

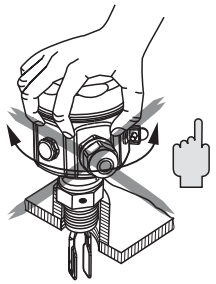
IT - Allineamento della forcella:
Marcatura in alto o in basso

NL- Vork uitrichten:
Markering boven of onder

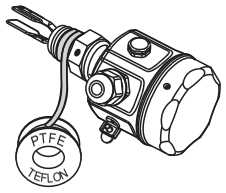


G ¾, 32 mm (1¼")*
G 1, 41 mm (1⅝")*

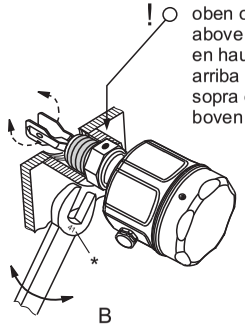




NPT ¾, R ¾, G ¾, 32 mm (1¼")*
NPT 1, R 1, G 1, 41 mm (1⅝")*



A



B

DE- Liquiphant einschrauben.
Nicht am Gehäuse drehen.

EN- Screw Liquiphant into process connection.
Don't use housing to turn.

FR - Visser le Liquiphant.
Ne pas se servir du boîtier.

ES - Roscar el Liquiphant a la conexión a proceso.
No girar el cabezal.

IT - Avvitare il Liquiphant all'attacco di processo.
Allo scopo **non** utilizzare la custodia.

NL- Schroef de Liquiphant in de procesaansluiting.
Draai hierbij **niet** aan de behuizing.

DE- Ausrichten in Rohrleitungen:
Markierung in Fließrichtung

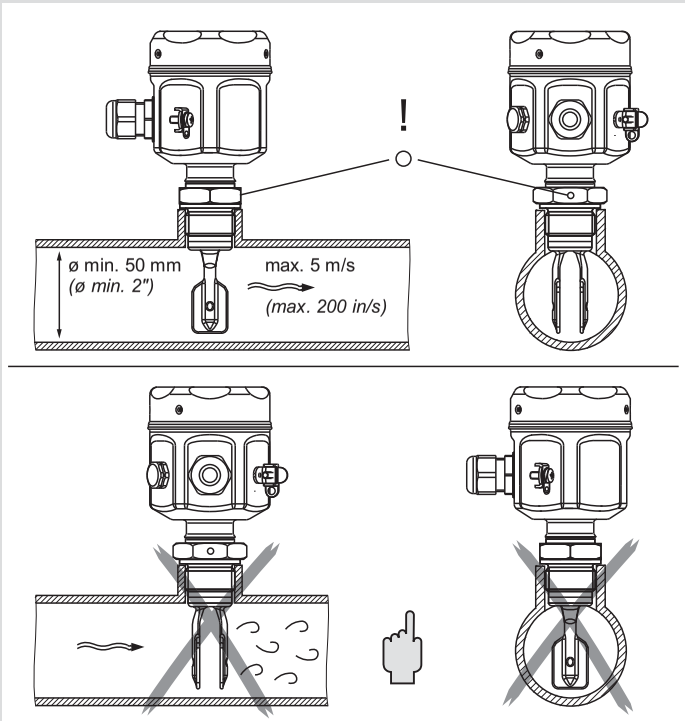
EN- Orientation in pipes:
Marking in direction of flow

FR - Orientation dans une conduite:
Repère dans le sens de l'écoulement

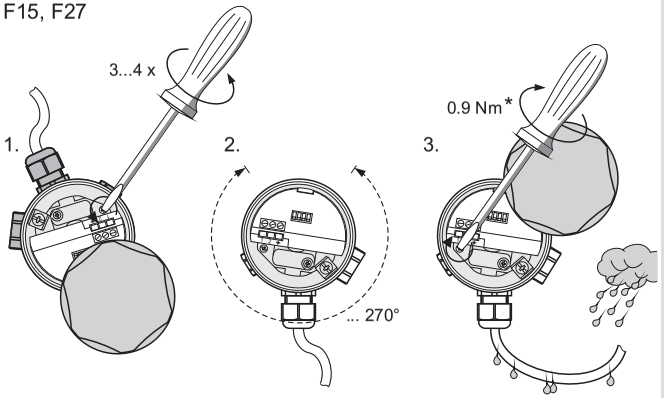
ES - Montaje y orientación dentro de tuberías:
Marca en dirección del caudal

IT - Allineamento per montaggio in tubazioni:
Marcatura nella direzione del flusso

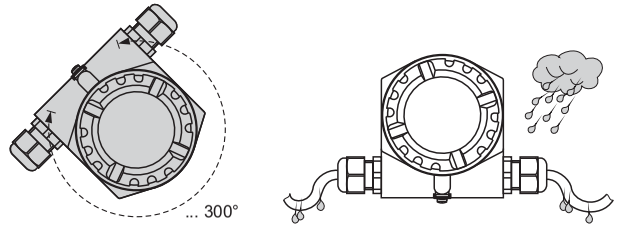
NL- Opstelling in leidingen:
Markering in de stroomrichting



F15, F27



F16, F13, F17



DE- Kabeleinführung ausrichten
EN- Cable gland orientation
FR - Positionnement de l'entrée de câble
ES - Ajuste del prensaestopa
IT - Posizionamento del passacavo
NL- Kabelinvoer uitrichten

* Anzugsdrehmoment /
Torque /
Couple de serrage /
Esfuerzo de torsión /
Coppia di torsione /
Aandraaimoment

DE- Einstellungen
Minimum-/Maximum-
Sicherheitsschaltung

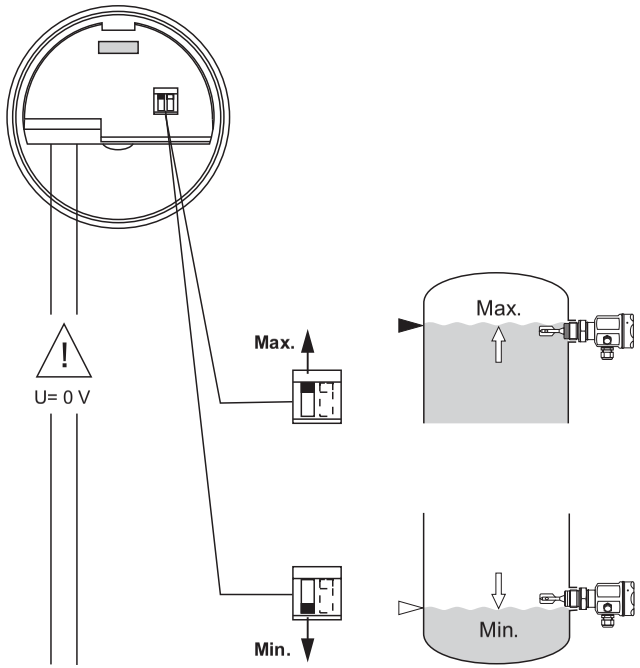
EN- Setting-up
Minimum/maximum
fail-safe mode

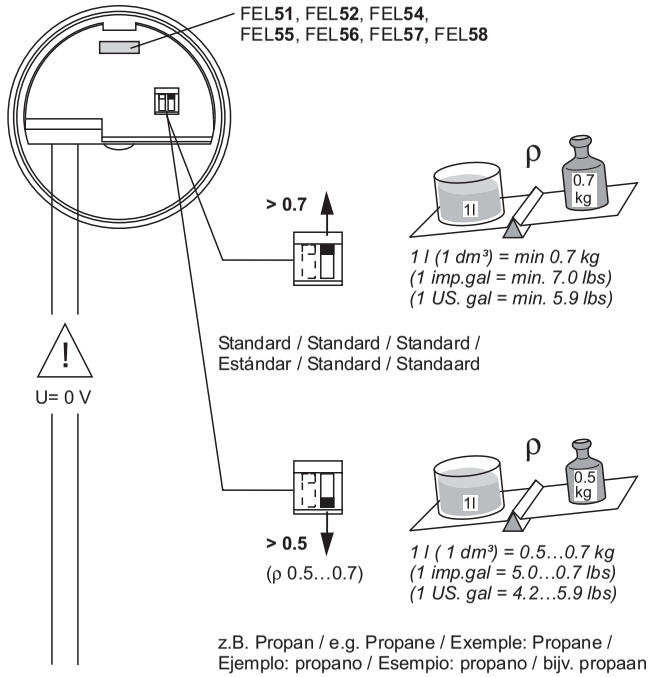
FR - Réglage
Sécurité minimum/maximum

ES - Ajuste
Conmutador de seguridad
mín./máx.

IT - Messa in servizio
Selezione della modalità
di sicurezza min./max.

NL- Instellingen
Minimum/maximum
veiligheidsschakeling





DE- Dichte der Flüssigkeit.
Dichte ρ gemessen in g/cm³
oder in kg/l.

EN- Liquid density.
Density ρ measured in g/cm³
or in kg/l.

FR - Densité du liquide.
Unité de mesure de la densité ρ :
g/cm³ ou kg/l.

ES - Densidad de líquidos.
Densidad ρ medida en g/cm³
o en kg/l.

IT - Densità del liquido.
Densità ρ misurata in g/cm³
o in kg/l.

NL- Dichtheid van de vloeistof.
Dichtheid ρ gemeten in g/cm³
of in kg/l.

DE- Selbsttest FEL57
(Funktion siehe Seite 46, 47
und Schaltgerät)

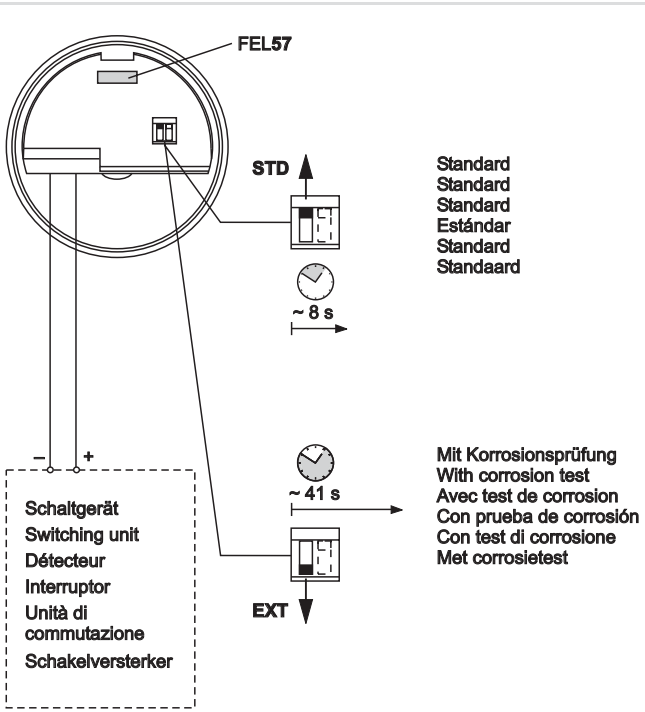
EN- Selftest FEL57
(see page 46, 47 and
switching unit for sequence)

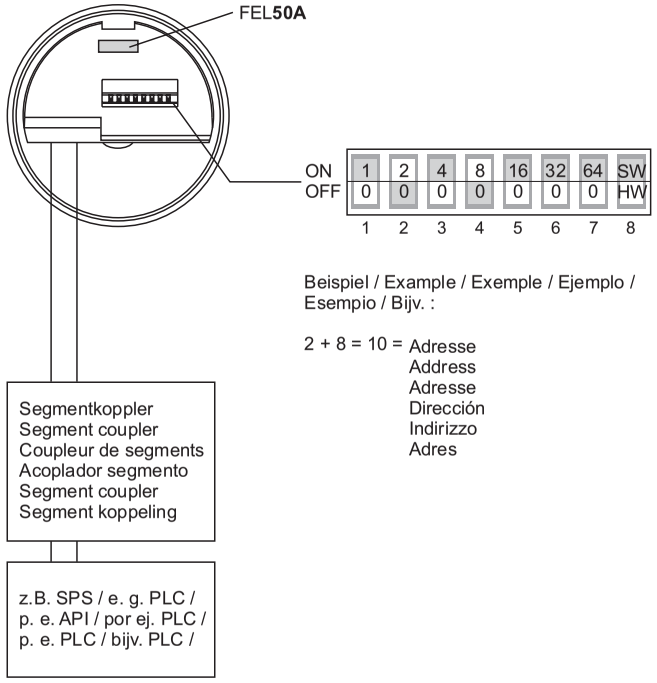
FR - Auto-test FEL57
(voir pages 46, 47 et détecteur)

ES - Prueba automática FEL57
(ver pág. 46, 47 e interruptor
para secuencia)

IT - Prova automatica FEL57
(vds. pag. 46, 47 e
unità di commutazione)

NL- Functietest FEL57
(zie voor functie pag 46, 47
en schakelversterker)





DE- Geräteadresse einstellen
(Einstellung der Parameter
siehe BA141F)

EN- Setting Device Address
(Setting the parameters,
see BA141F)

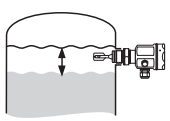
FR - Réglage de l'adresse d'appareil
(Réglage des paramètres
voir BA141F)

ES - Configuración de la dirección
del equipo
(Ver configuración parámetros
en BA141F)

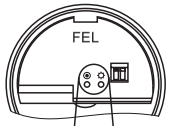
IT - Impostare indirizzo del dispositivo
(Per impostazione parametri
vds. BA141F)

NL- Instrumentadres instellen
(Parameter instelling zie BA141F)

DE- Lichtsignale
EN- Light signals
FR - Signaux lumineux
ES - Señales luminosas
IT - Segnali luminosi
NL- Lichtsignalen



Füllstand variieren
Vary level
Varier le niveau
Nivel variable
Variare livello
Niveau variëren



Leuchtdioden / LEDs / DEL / LEDs / LED / LED's

Betrieb / Stand-by / Fonctionnement /
Reposo / Attesa / stand-by

Schaltzustand / Switching status / Etat de commutation /
Estado conexión / Stato di commutazione / schakelstand

FEL57, FEL50A: Bedeckung / Covering / Recouvrement /
Cubierto / Copertura / bedekking

leuchtet / on / allumée / iluminado / on / aan

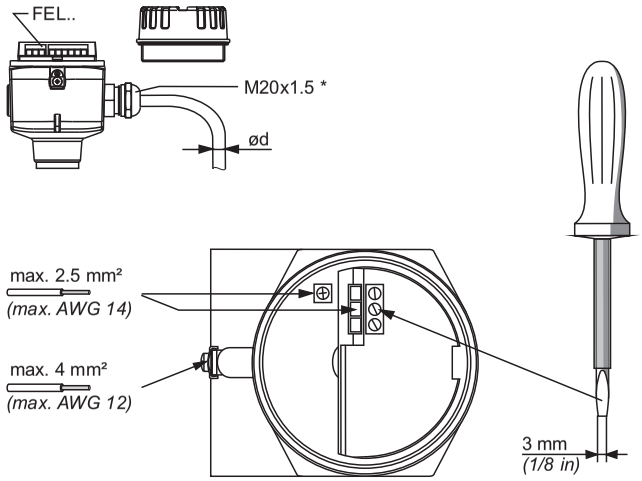
blinkt / flashes / clignote / parpadea / lampeggia / knippert

aus / off / éteinte / apagado / off / uit

Ausgangssignal / Output signal / Signal de sortie /
Señal de salida / Segnale uscita / uitgangssignaal

Störung / Fault / Défaut / Fallo / Guasto / storing

Nationale Normen und Vorschriften beachten!
Note national regulations!
Respecter les lois et règles locales en vigueur!
Considere reglamentaciones nacionales
Osservare le norme nazionali!
Nationale voorschriften in acht nemen!



DE- Anschluss
EN- Connections
FR- Raccordement
ES - Conexiones
IT - Collegamenti elettrici
NL- Aansluiting

***Cable entry**
Nickel-plated brass:
∅d = 7...10,5 mm (0,28...0,41 in)
Plastic:
∅d = 5...10 mm (0,2...0,38 in)
Stainless steel:
∅d = 7...12 mm (0,28...0,47 in)

DE- Anschluss FEL51
Zweileiter-
Wechselstromanschluss

EN- Connections FEL51
Two-wire AC connection

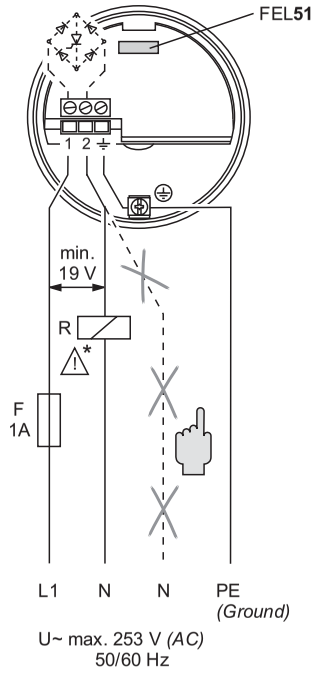
FR - Raccordement FEL51
Raccordement 2 fils
courant alternatif

ES - Conexiones FEL51
Conexión a corriente alterna
a dos hilos

IT - Collegamenti elettrici FEL51
Collegamento bifilare
con corrente alternata

NL- Aansluiting FEL51
2- draads
wisselspanningsaansluiting

Zerstörung
Destruction
Destruction
Destrucción
Distruzione
Storing



* Externe Last R **muss** angeschlossen werden

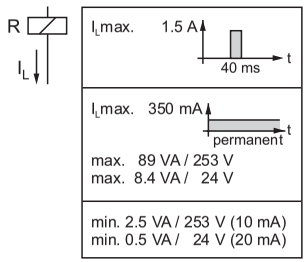
External load R **must** be connected

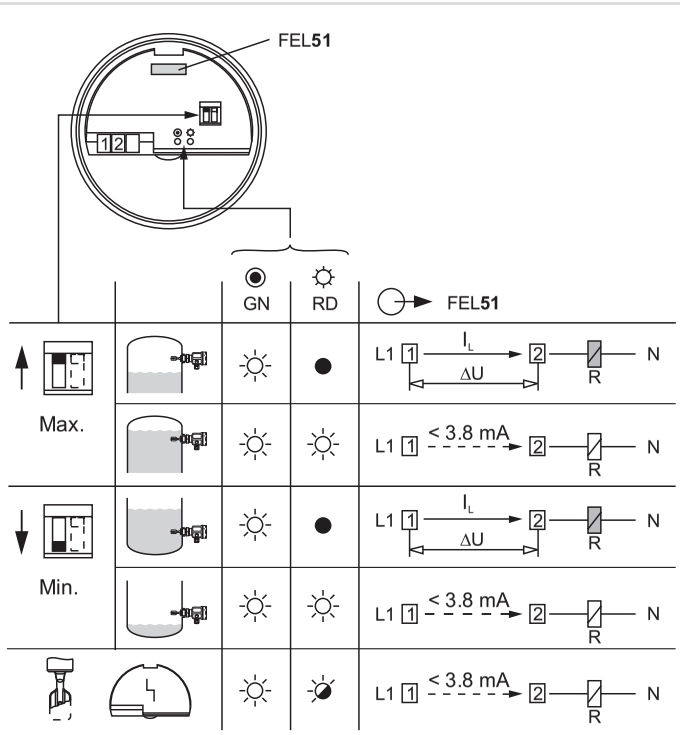
Charge externe R **doit** être raccordée

La carga externa R **debe** estar conectada

Il carico esterno R **deve** essere connesso

Externe belasting R **moet** aangesloten worden





DE- Funktion FEL51
EN- Function FEL51
FR - Fonction FEL51
ES - Funcionamiento FEL51
IT - Funzione FEL51
NL- Functie FEL51

ΔU_{FEL51} max. 12 V

DE- Anschluss FEL52
Gleichstromanschluss (PNP)

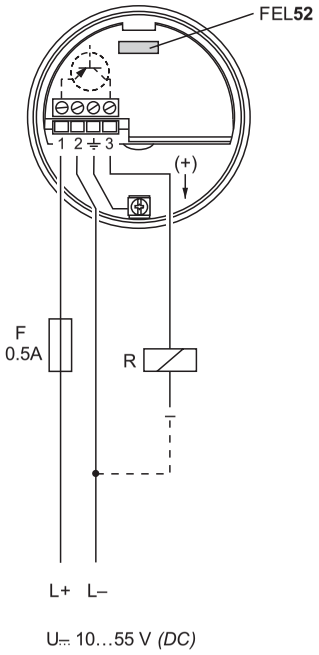
EN- Connections FEL52
DC connection (PNP)

FR - Raccordement FEL52
Courant continu (PNP)

ES - Conexiones FEL52
Alimentación CC (PNP)

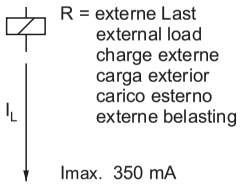
IT - Collegamenti elettrici FEL52
Collegamento CC (PNP)

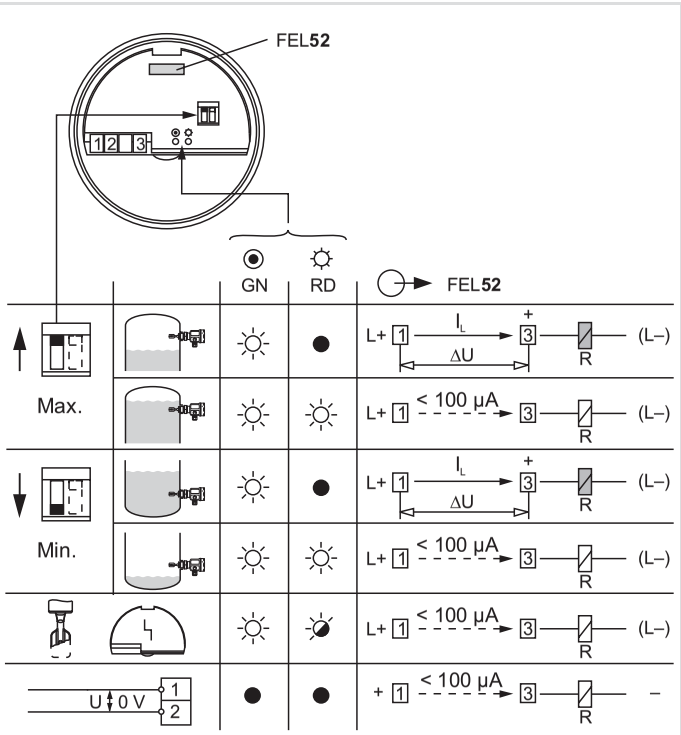
NL- Aansluiting FEL52
Gelijkspanningsaansluiting (PNP)



auch für DI-Module
also for DI modules
également pour des modules DI
también para módulos DI
anche per DI modules
aan de DI-module

EN 61131-2





DE- Funktion FEL52
EN- Function FEL52
FR - Fonction FEL52
ES - Funcionamiento FEL52
IT - Funzione FEL52
NL- Functie FEL52

ΔU_{FEL52} max. 3 V

DE- Anschluss FEL54
Allstromanschluss
Relaisausgang

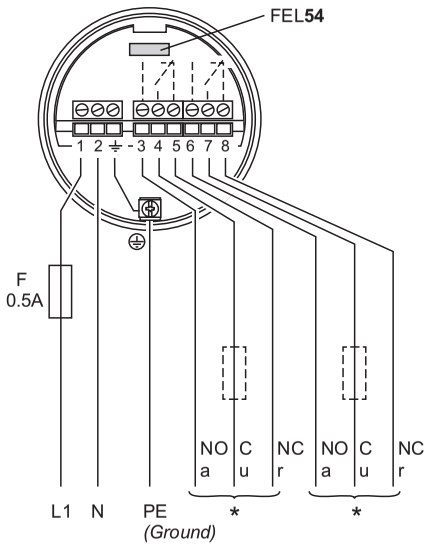
EN- Connections FEL54
Universal connection
Relay output

FR - Raccordement FEL54
Tous courants
Sorties relais

ES - Conexiones FEL54
Conexión universal
Salida por relé

IT - Collegamenti elettrici FEL54
Collegamento corrente universale
Uscita relè

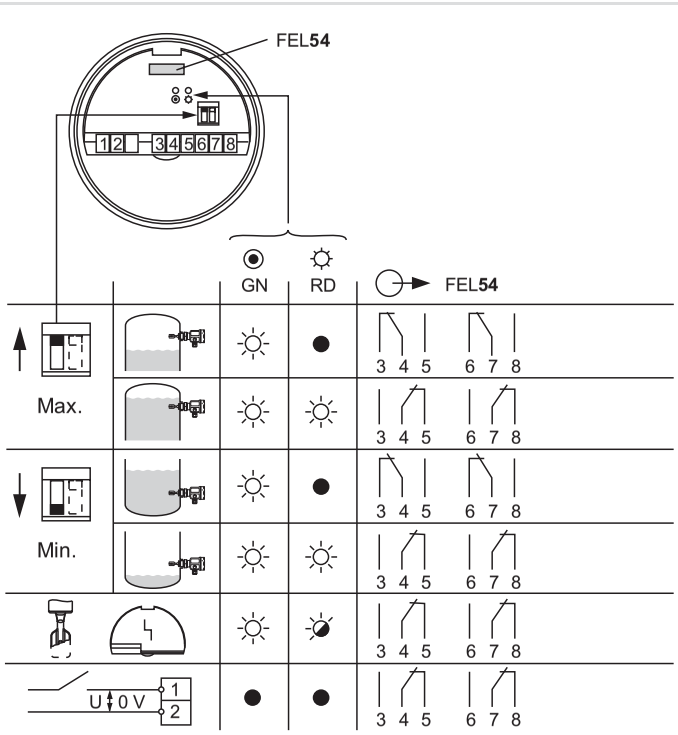
NL- Aansluiting FEL54
Universele spanningsaansluiting
Relaisuitgang



U~ 19…253 V *(AC)*

L+ L–
U⎓ 19… 55 V *(DC)*

* U~ max. 253 V, I~ max. 6 A
P~ max. 1500 VA, cos φ = 1
P~ max. 750 VA, cos φ > 0.7
I⎓ max. 6 A, U⎓ < 30 V
I⎓ max. 0.2 A, U⎓ < 125 V



DE- Funktion FEL54
EN- Function FEL54
FR - Fonction FEL54
ES - Funcionamiento FEL54
IT - Funzione FEL54
NL- Functie FEL54

DE- Anschluss FEL55
Ausgang 8/16 mA
* In nasser Umgebung.

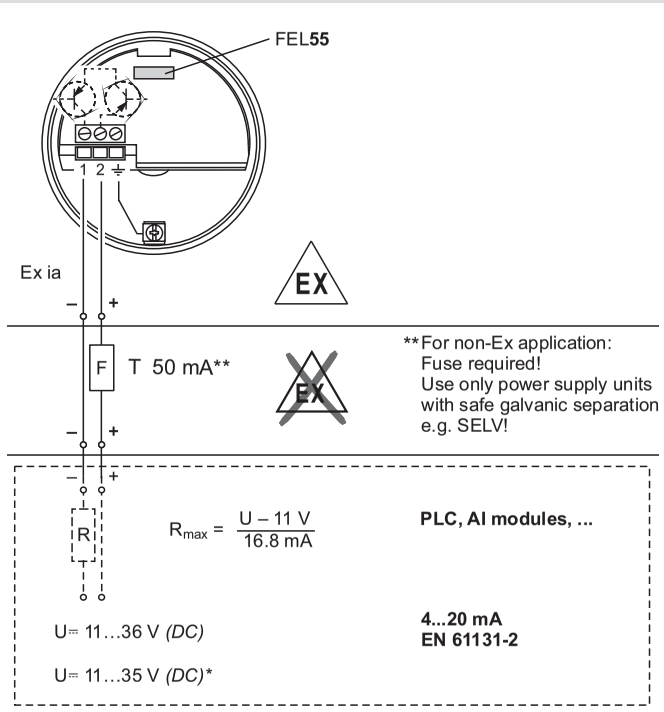
EN- Connections FEL55
Output 8/16 mA
* Wet location.

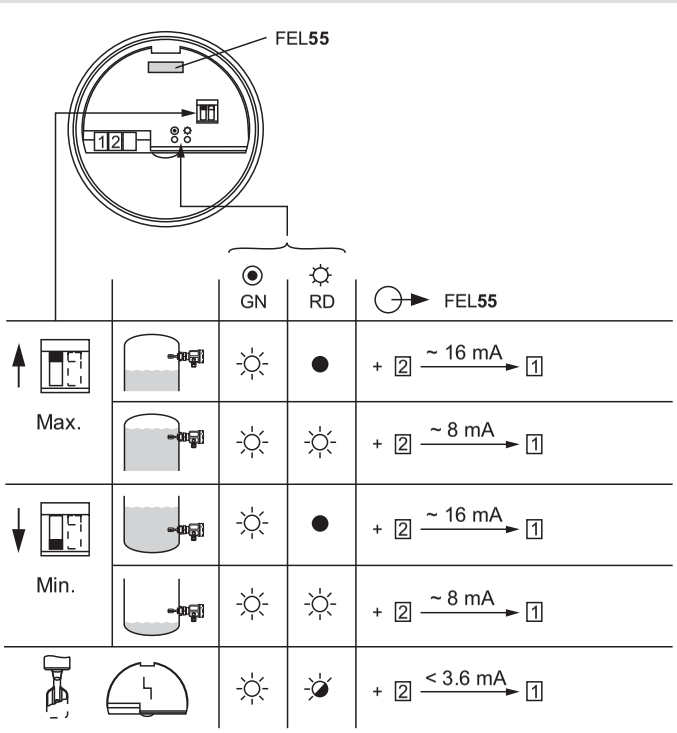
FR - Raccordement FEL55
Sortie 8/16 mA
* Dans les environnements humides.

ES - Conexiones FEL55
Salida 8/16 mA
* En ambientes húmedos.

IT - Collegamenti elettrici FEL55
Uscita 8/16 mA
* In ambienti umidi.

NL- Aansluiting FEL55
Uitgang 8/16 mA
* In vochtige omgevingen.





DE- Funktion FEL55
EN- Function FEL55
FR - Fonction FEL55
ES - Funcionamiento FEL55
IT - Funzione FEL55
NL- Functie FEL55

DE- Anschluss FEL56
NAMUR- Ausgang L-H
< 1,0 mA / > 2,2 mA

EN- Connections FEL56
NAMUR output L-H
< 1,0 mA / > 2,2 mA

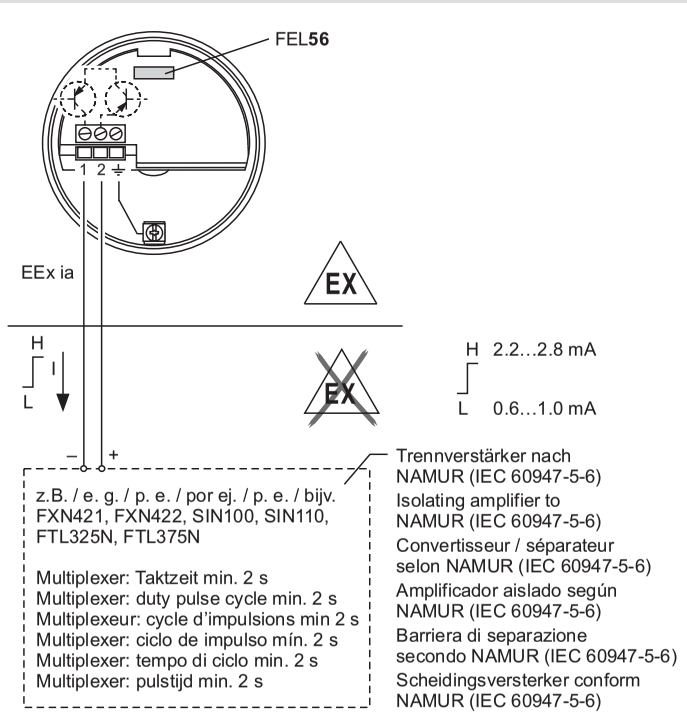
FR - Raccordement FEL56
Sortie NAMUR L-H
< 1,0 mA / > 2,2 mA

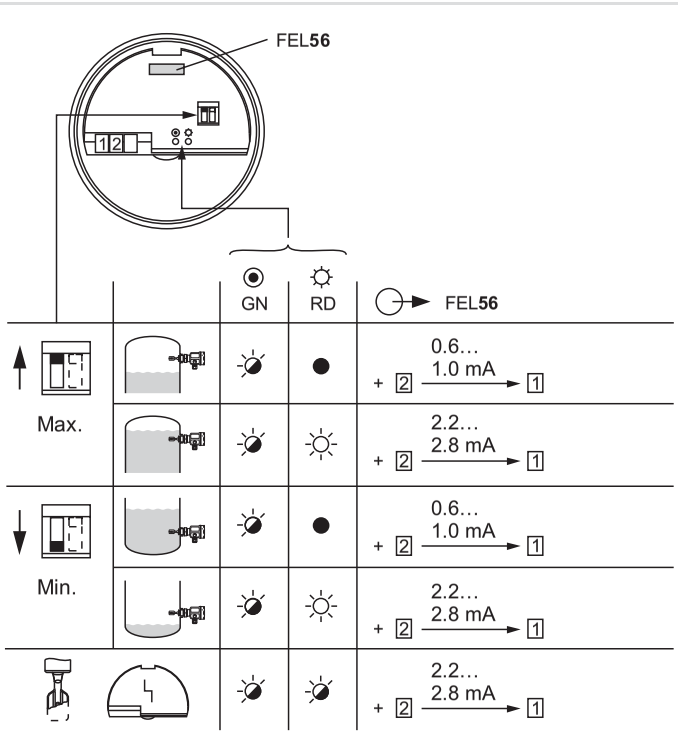
ES - Conexiones FEL56
Salida NAMUR L-H
< 1,0 mA / > 2,2 mA

IT - Collegamenti elettrici FEL56
NAMUR uscita L-H
< 1,0 mA / > 2,2 mA

NL- Aansluiting FEL56
NAMUR uitgang L-H
< 1,0 mA / > 2,2 mA

Power supply
DC: 8.2 V +/- 20%





DE- Funktion FEL56
EN- Function FEL56
FR - Fonction FEL56
ES - Funcionamiento FEL56
IT - Funzione FEL56
NL- Functie FEL56

DE- Anschluss FEL57
Ausgang PFM
150 Hz / 50 Hz

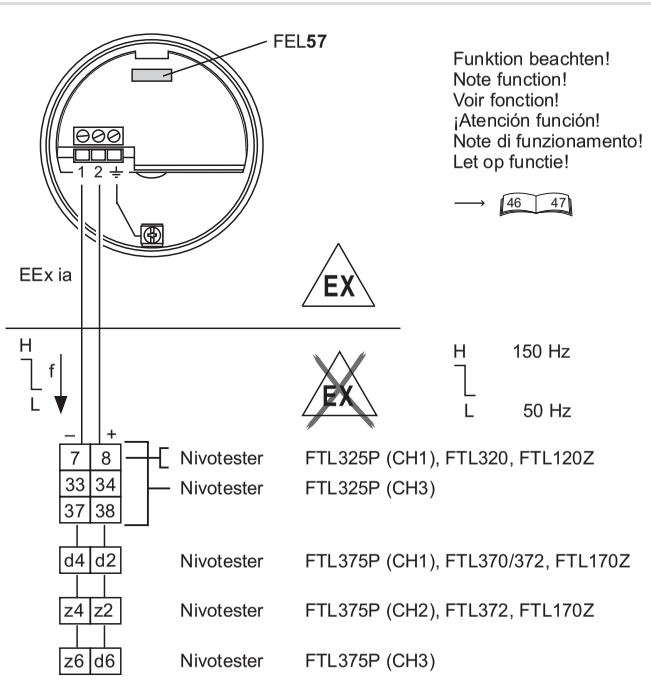
EN- ConnectionsFEL 57
PFM output
150 Hz / 50 Hz

FR - Raccordement FEL57
Sortie PFM
150 Hz / 50 Hz

ES - Conexiones FEL57
Salida PFM
150 Hz / 50 Hz

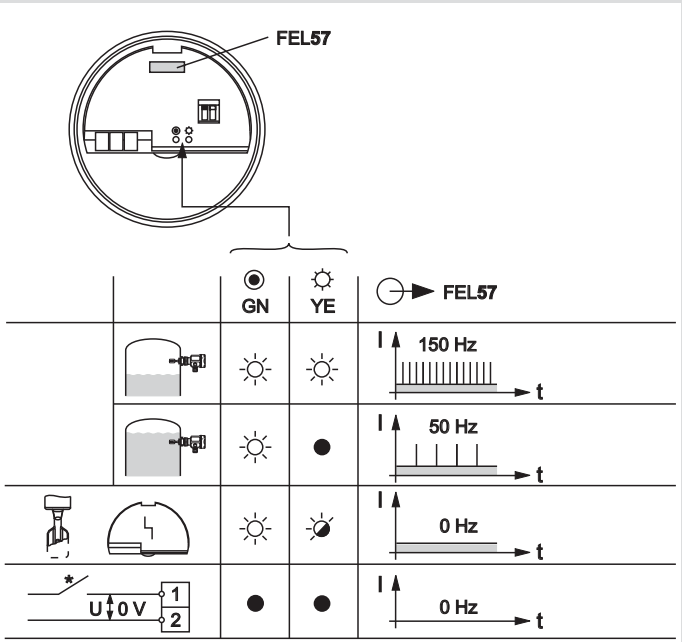
IT - Collegamenti elettrici FEL57
PFM uscita
150 Hz / 50 Hz

NL- Aansluiting FEL57
PFM uitgang
150 Hz / 50 Hz



Funktion beachten!
Note function!
Voir fonction!
¡Atención función!
Note di funzionamento!
Let op functie!

→ 46 47



* Einschaltverhalten / Switch-on behaviour / Comportement à la mise sous tension / Comportamiento del cambio de estado / Comportamento accensione / Inschakelgedrag

DE- Funktion FEL57
EN- Function FEL57
FR - Fonction FEL57
ES - Funcionamiento FEL57
IT - Funzione FEL57
NL- Functie FEL57

DE- Einschaltverhalten
Selbsttest (STD)

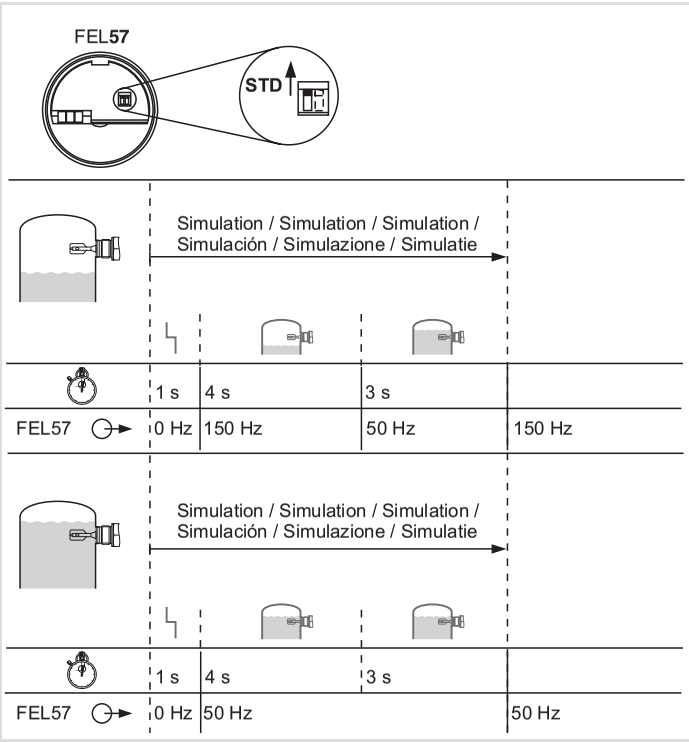
EN- Switch-on behaviour
Selftest (STD)

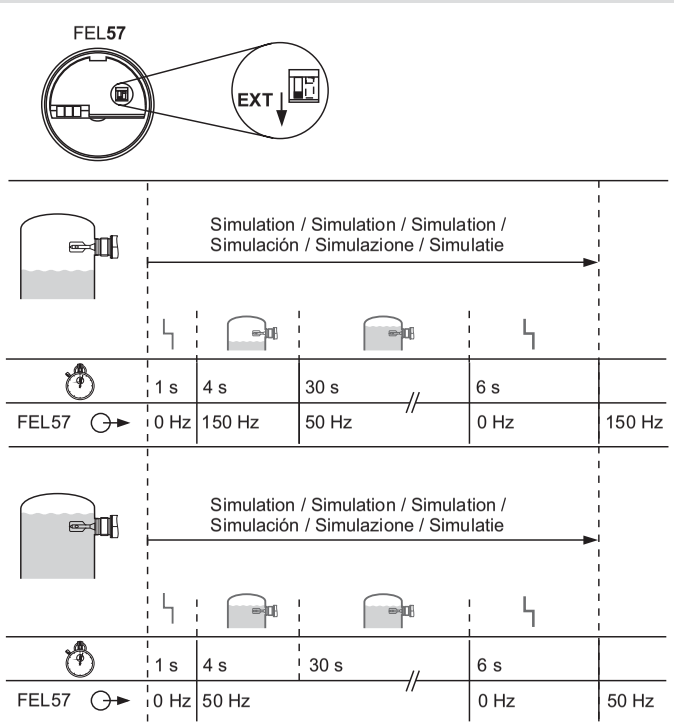
FR - Comportement à la mise sous tension
Auto-test (STD)

ES - Comportamiento del cambio de e stado
Prueba automática (STD)

IT - Comportamento in fase di accensione
Prova automatica (STD)

NL- Inschakelgedrag
Functietest (STD)





DE- Einschaltverhalten
Selbsttest (EXT)

EN- Switch-on behaviour
Selftest (EXT)

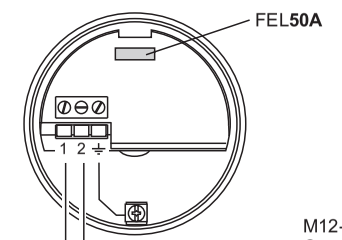
FR - Comportement à la mise sous tension
Auto-test (EXT)

ES - Comportamiento del cambio de e stado
Prueba automática (EXT)

IT - Comportamento in fase di accensione
Prova automatica (EXT)

NL- Inschakelgedrag
Functietest (EXT)

DE- Anschluss FEL50A
EN- Connections FEL50A
FR - Raccordement FEL50A
ES - Conexiones FEL50A
IT - Collegamenti elettrici FEL50A
NL- Aansluiting FEL50A

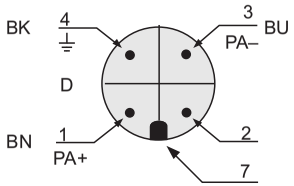


PA– PA+
U⎓ 9...32 V *(DC)*

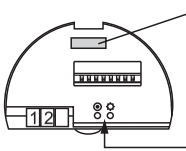
Segmentkoppler
Segment coupler
Coupleur de segments
Acoplador segmento
Segment coupler
Segment koppeling

z.B. SPS / e. g. PLC
p. e. API / por ej. PLC
p. e. PLC / bijv. PLC

M12-Stecker / M12 Plug /
Connecteur M12 / M12 Conector /
Connettore M12 / M12 Connector



Gerätestecker am Gehäuse (male)
Device plug on housing (male)
Connecteur d'appareil sur le boîtier (mâle)
Conector del equipo en cabezal (macho)
Connettore del dispositivo (maschio)
Instrumentsteker op behuizing (male)



		GN	YE	FEL50A PA-Bussignal / PA Bus Signal / Signal bus PA / Señal Bus PA / Segnale bus PA / PA bussignaal
nicht invertiert not inverted non inversé no invertido non invertito niet geïnverteerd		☼	●	OUT_D = 0
		☼	☼	OUT_D = 1
invertiert inverted inversé invertido invertito geïnverteerd		☼	☼	OUT_D = 0
		☼	●	OUT_D = 1
SPS Commuwin II		☼	–	Kommunikation/ Communication/ Communication / Comunicación / Comunicazione / Communicatie
		–	☼	Status siehe BA141F Status, see BA141F Etat, voir BA141F Estado, ver BA141F Stato, vedere BA141F Status, zie BA141F
U 0 V 1 2		●	●	../..

DE- Funktion FEL50A
EN- Function FEL50A
FR - Fonction FEL50A
ES - Funcionamiento FEL50A
IT - Funzione FEL50A
NL- Functie FEL50A

DE- Anschluss FEL58
NAMUR- Ausgang H-L
> 2,2 mA / < 1,0 mA

EN- Connections FEL58
NAMUR output H-L
> 2,2 mA / < 1,0 mA

FR - Raccordement FEL58
Sortie NAMUR H-L
> 2,2 mA / < 1,0 mA

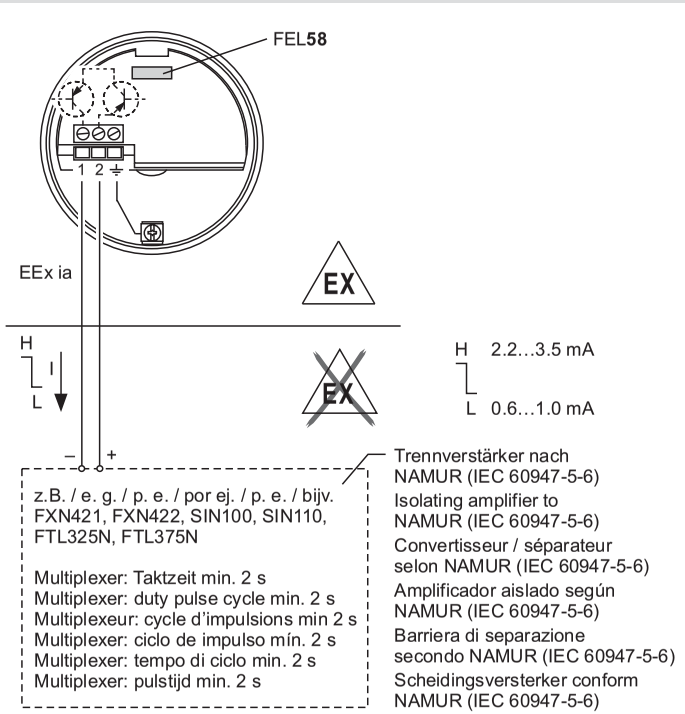
ES - Conexiones FEL58
Salida NAMUR H-L
> 2,2 mA / < 1,0 mA

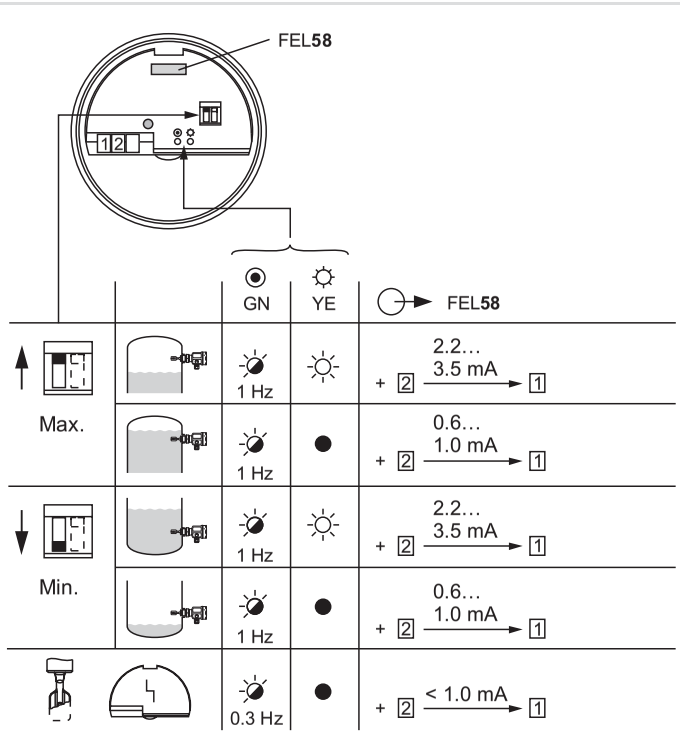
IT - Collegamenti elettrici FEL58
NAMUR uscita H-L
> 2,2 mA / < 1,0 mA

NL- Aansluiting FEL58
NAMUR uitgang H-L
> 2,2 mA / < 1,0 mA

Power supply

DC: 8.2 V +/- 20%





DE- Funktion FEL58
EN- Function FEL58
FR - Fonction FEL58
ES - Funcionamiento FEL58
IT - Funzione FEL58
NL- Functie FEL58

DE- Funktion Prüftaste FEL58
Sicherheitsschaltung MAX

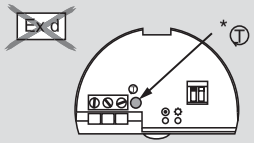
EN- Function test button FEL58
Fail-safe mode MAX

FR - Fonction touche test FEL58
Sécurité MAX

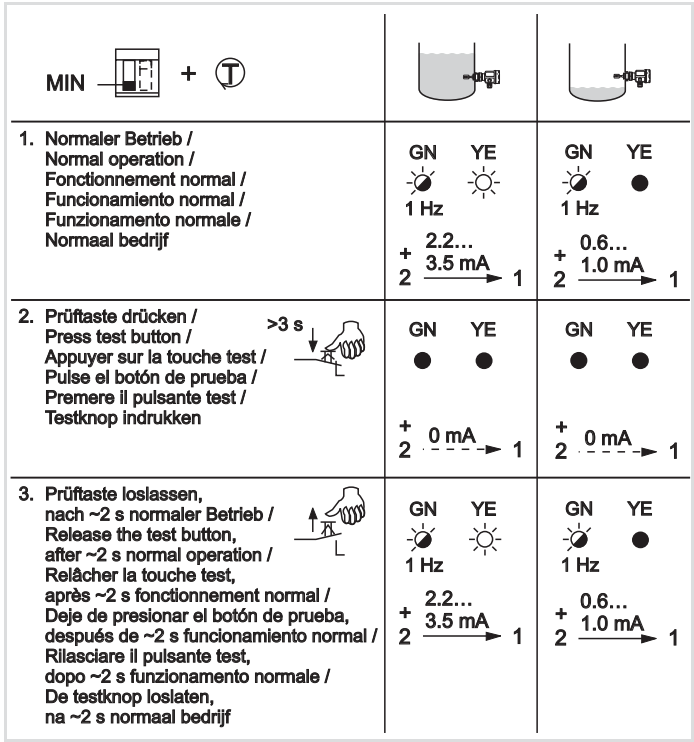
ES - Funcionamiento
botón de prueba FEL58
Conmutador de seguridad MAX

IT - Funzione pulsante test FEL58
Selezione della modalità di
sicurezza MAX

NL- Functie testknop FEL58
Veiligheidsschakeling MAX



MAX +		
1. Normaler Betrieb / Normal operation / Fonctionnement normal / Funcionamiento normal / Funzionamento normale / Normaal bedrijf	GN ● 1 Hz YE ☼ + 2 — 2.2…3.5 mA → 1	GN ● 1 Hz YE ● + 2 — 0.6…1.0 mA → 1
2. Prüftaste drücken / Press test button / Appuyer sur la touche test / Pulse el botón de prueba / Premere il pulsante test / Testknop indrukken (>3 s)	GN ● YE ● + 2 — 0 mA → 1	GN ● YE ● + 2 — 0 mA → 1
3. Prüftaste loslassen, nach ~2 s normaler Betrieb / Release the test button, after ~2 s normal operation / Relâcher la touche test, après ~2 s fonctionnement normal / Deje de presionar el botón de prueba, después de ~2 s funcionamiento normal / Rilasciare il pulsante test, dopo ~2 s funzionamento normale / De testknop loslaten, na ~2 s normaal bedrijf	GN ● 1 Hz YE ☼ + 2 — 2.2…3.5 mA → 1	GN ● 1 Hz YE ● + 2 — 0.6…1.0 mA → 1



DE- Funktion Prüftaste FEL58
Sicherheitsschaltung MIN

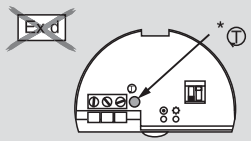
EN- Function test button FEL58
Fail-safe mode MIN

FR - Fonction touche test FEL58
Sécurité MIN

ES - Funcionamiento
botón de prueba FEL58
Conmutador de seguridad MIN

IT - Funzione pulsante test FEL58
Selezione della modalità di
sicurezza MIN

NL- Functie testknop FEL58
Veiligheidsschakeling MIN



DE- Wartung, Reinigung
Anbackungen entfernen

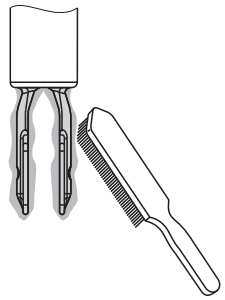
EN- Maintenance, Cleaning
Removal of encrustation

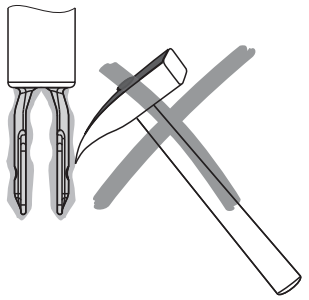
FR - Entretien, Nettoyage
Enlever les incrustations

ES - Mantenimiento, Limpieza
Eliminación de adherencias

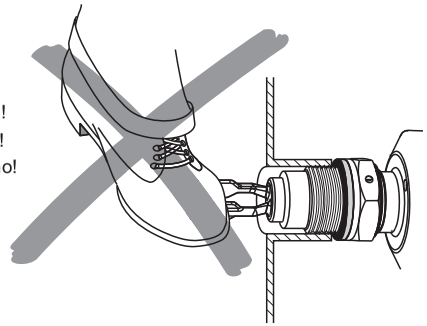
IT - Manutenzione, Pulizia
Rimozione dei depositi

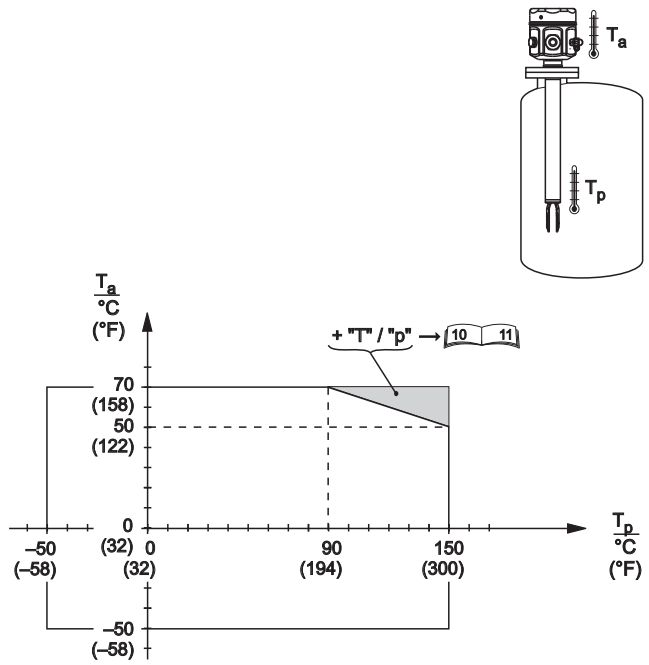
NL- Onderhoud, Reiniging
Aangroei verwijderen





Nicht besteigen!
Don't use as a step!
Ne pas marcher
sur les lames vibrantes!
No usar como peldaño!
Non usare come scalino!
Niet op staan!





DE- Technische Daten
Umgebungstemperatur T_a
Prozesstemperatur T_p

EN- Technical Data
Ambient temperature T_a
Process temperature T_p

FR- Caractéristiques techniques
Température ambiante T_a
Température de process T_p

ES - Datos técnicos
Temperatura ambiente T_a
Temperatura del proceso T_p

IT - Dati tecnici
Temperatura ambiente T_a
Temperatura di processo T_p

NL- Technische gegevens
Omgevingstemperatuur T_a
Procestemperatuur T_p

DE- Prozessdruck p_e
Prozesstemperatur T_p

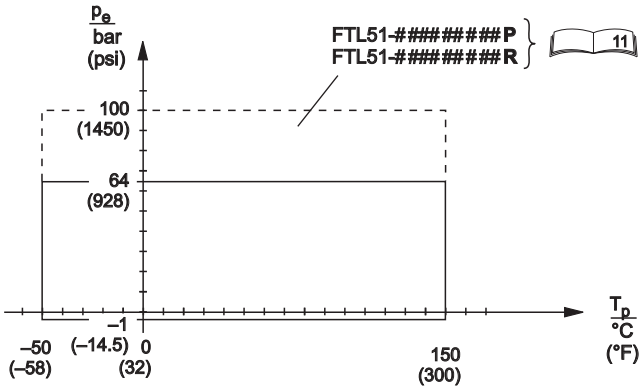
EN- Process pressure p_e
Process temperature T_p

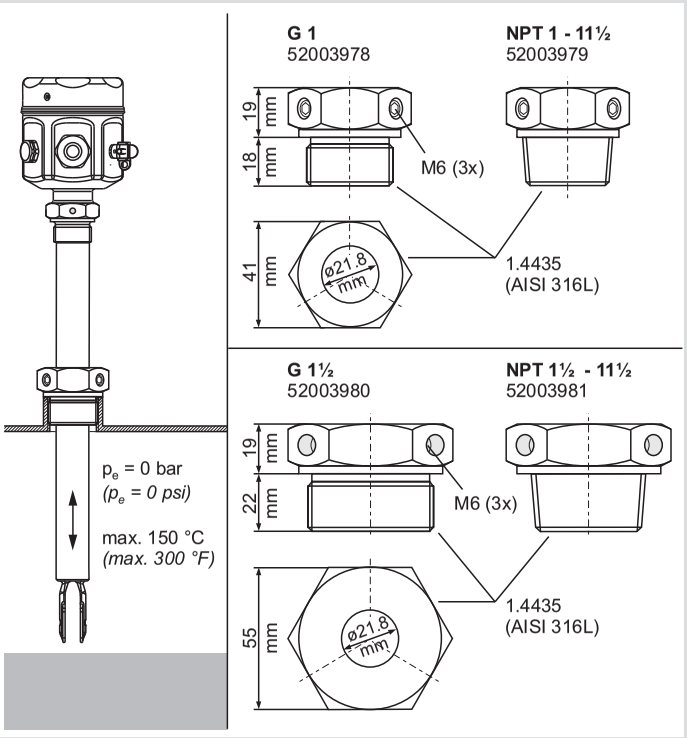
FR - Pression de process p_e
Température de process T_p

ES - Presión del proceso p_e
Temperatura del proceso T_p

IT - Pressione di processo p_e
Temperatura di processo T_p

NL- Procesdruk p_e
Procestemperatuur T_p





DE- Zubehör
Schiebemuffen für drucklosen Betrieb

EN- Accessories
Sliding sleeves for unpressurised operation

FR- Accessoires
Manchons coulissants pour applications sans pression

ES - Accesorios
Manguitos deslizantes para operación sin presión

IT - Accessori
Manicotto scorrevole per impieghi privi di pressione

NL- Toebehoren
Schuifmof voor drukloze toepassing

siehe / see / voir / ver / vedi / zie :
KA00151F (G 1, NPT 1)
KA00152F (G 1½, NPT 1½)

100 mm = 3. 94 in

DE- Hochdruck-Schiebemuffen

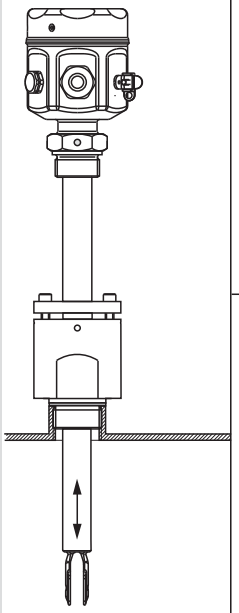
EN- High pressure sliding sleeves

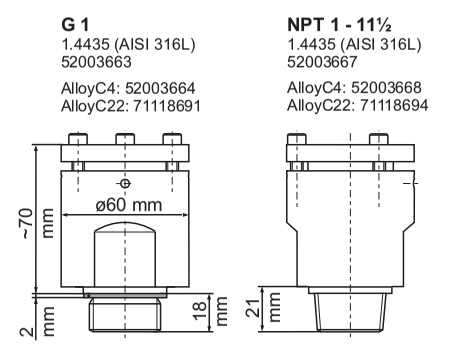
FR - Manchons coulissants haute pression

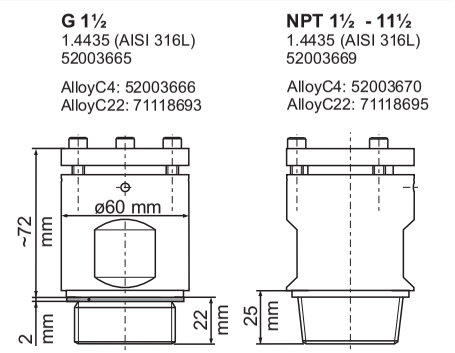
ES - Manguitos deslizantes para alta presión

IT - Manicotto scorrevole per impieghi ad alta pressione

NL- Schuifmof voor toepassing onder druk

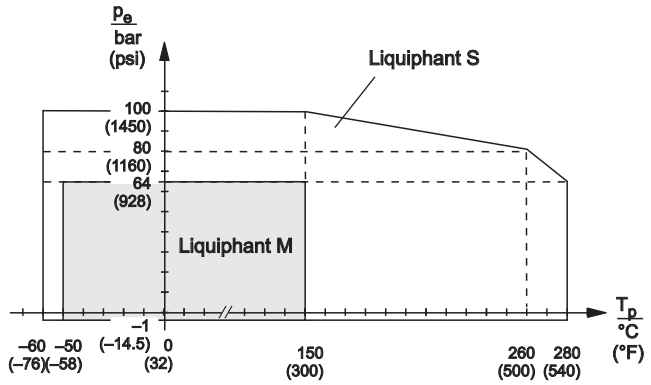






siehe / see / voir / ver / vedi / zie :
KA00153F (G 1, NPT 1)
KA00154F (G 1½, NPT 1½)

100 mm = 3. 94 in



DE- Hochdruck-Schiebemuffen:
Prozessdruck p_e
Prozesstemperatur T_p

EN- High pressure sliding sleeves:
Process pressure p_e
Process temperature T_p

FR - Manchons coulissants haute pression:
Pression de process p_e
Température de process T_p

ES - Manguitos deslizantes para alta presión:
Presión del proceso p_e
Temperatura del proceso T_p

IT - Manicotto scorrevole per impieghi ad alta pressione:
Pressione di processo p_e
Temperatura di processo T_p

NL- Schuifmof voor toepassing onder druk:
Procesdruk p_e
Procestemperatuur T_p

DE- Fehlersuche

Fehlfunktion	Ursache	Maßnahme
Schaltet nicht	Versorgungsspannung fehlt	Versorgung prüfen
	Signalleitung defekt	Signalleitung prüfen
	Elektronikeinsatz defekt - FEL51 direkt an L1 und N angeschlossen	Austauschen - FEL51 immer über externe Last anschließen
	Dichte der Flüssigkeit zu gering	Am Elektronikeinsatz Dichte auf > 0,5 einstellen
	Schwinggabel verkrustet	Schwinggabel säubern
	Schwinggabel korrodiert (Anzeige am FEL: rot/gelb blinkt, FEL58: grün blinkt 0,3 Hz)	Schwinggabel komplett mit Prozessanschluss austauschen
	FEL51: Relais mit zu großem Innenwiderstand angeschlossen	Geeignetes Relais anschließen
	FEL51: Relais mit zu geringem Haltestrom angeschlossen	Widerstand parallel zum Relais anschließen
	FEL54: Kontakte verschweißt (nach einem Kurzschluss)	FEL54 austauschen; Sicherung in den Kontaktstromkreis
Schaltet falsch	Minimum-/Maximum- Sicherheitsschaltung vertauscht	Am Elektronikeinsatz Sicherheitsschaltung richtig einstellen
Fehlschaltung, sporadisch	Dichter schwerer Schaum, wilde Turbulenzen, aufgeschäumte Flüssigkeit	Liquiphant im Bypass montieren
	Extreme Funkstörung	Verbindungskabel abschirmen
	Extreme Vibrationen	Entkoppeln, dämpfen, Schwinggabel 90° drehen
	Wasser im Gehäuse	Deckel und Kabeldurchführungen fest zuschrauben
	FEL52: Ausgang überlastet	Last, (Leitungs-) Kapazität verringern
Fehlschaltung nach Netzausfall	FEL57, Verhalten beim Einschalttest (wiederkehrende Prüfung)	Schaltverhalten FEL57 beachten; Anlagensteuerung nach Netzausfall bis ca. 45 s blockieren

Fault	Reason	Remedy
Does not switch	No power	Check power
	Faulty signal line	Check signal line
	Faulty electronic insert - FEL51 connected directly to L1 and N	Exchange - always connect FEL51 via external load
	Density of liquid too low	Set density to > 0.5 at electronic insert
	Fork encrusted	Clean fork
	Fork corroded (Indication on FEL: red/yellow flashes, FEL58: green flashes 0.3 Hz)	Exchange fork and process connection
	FEL51: Internal resistance of connected relay too large	Connect suitable relay
	FEL51: Holding current of connected relay too low	Connected resistor in parallel with relay
	FEL54: Contacts welded together (after short-circuit)	Exchange FEL54; put fuse in contact circuit
Switches incorrectly	Min-/Max- fail-safe mode set wrongly	Set correct mode at electronic insert
Sporadic faulty switching	Thick heavy foam, very turbulent conditions, foaming liquid	Mount Liquiphant in bypass
	Extreme RFI	Use screened cable
	Extreme vibration	Decouple, damp, turn fork 90°
	Water in housing	Screw cover and cable gland tight
	FEL52: Output overloaded	Reduce load,(cable) capacitance
Switches incorrectly after power failure	FEL57, behaviour during switch-on test (functional test)	Observe switching behaviour of FEL57; After power failure blockplant control for up to 45 s

FR - Recherche de défauts

Défaut	Cause	Mesure
Ne commute pas	Tension d'alimentation manquante	Vérifier la tension d'alimentation
	Câble de signal défectueux	Vérifier le câble de signal
	Electronique défectueuse - FEL51 relié directement á L1 et N	Remplacer - Relier FEL51 toujours via la charge externe
	Densité du liquide trop faible	Régler la densité sur > 0,5 sur l'électronique
	Lames vibrantes encroûtées	Nettoyer les lames vibrantes
	Lames vibrantes corrodées (Sur FEL: rouge/jaune clignote, FEL58: vert clignote 0,3 Hz)	Remplacer les lames vibrantes ainsi que le raccord process
	FEL51: relais avec résistance interne trop élevée	Raccorder un relais approprié
	FEL51: relais avec courant de maintien trop faible	Raccorder une résistance en parallèle au relais
	FEL54: contacts soudés (après un court-circuit)	Remplacer FEL54; fusible dans le circuit courant
Mauvaise commutation	Sécurité min/max inversée	Régler correctement le circuit de sécurité sur l'électronique
Mauvaise commutation, sporadique	Mousse dense et lourde, fortes turbulences, liquide émulsionné	Monter le Liquiphant en bypass
	Parasites puissants	Blinder le câble de liaison
	Vibrations importantes	Découpler, amortir, tourner la fourche de 90°
	Eau dans le boîtier	Visser fermement le couvercle et les entrées de câble
	FEL52: surcharge de la sortie	Réduire la charge et la capacité (de ligne)
Mauvaise commutation après coupure	FEL57, comportement lors du test de mise sous tension (test cyclique)	Observer le comportement du FEL57 à la mise sous tension; bloquer la commande de l'installation après coupure de courant pendant max. 45 s

Fallo	Causa	Solución
No conmuta	No hay alimentación	Comprobar alimentación
	Señal defectuosa	Comprobar cable de señal
	Electrónica defectuosa - FEL51 conectada directamente a L1 y N	Cambio - Siempre conectar FEL51 vía una carga externa
	Densidad del líquido demasiado baja	Fijar densidad a > 0.5 en la electrónica
	Horquillas con adherencias	Limpiar horquillas
	Horquillas corroidas (En FEL: rojo/amarillo parpadea, FEL58: verde parpadea 0.3 Hz)	Cambiar la horquilla y la conexión a proceso
	FEL51: Relé con resistencia interna demasiado grande	Conectar un relé adecuado
	FEL51: El relé conectado retiene muy poca corriente	Resistencia conectada en paralelo con el relé
	FEL54: Contactos soldados juntos (después del corto circuito)	Cambiar FEL54; poner fusible en el circuito de contacto
Conmuta incorrectamente	El modo de fallo mín./máx. está mal ajustado	Ajustar el modo correcto en la electrónica
Fallos de conmutación esporádicos	Espuma muy densa, turbulencias, líquidos espumosos	Montar el Liquiphant en bypass
	RFI extremo	Utilizar cable apantallado
	Vibraciones extremas	Desacoplar, amortiguar y girar las horquillas 90°
	Agua en el cabezal	Roscar la cubierta y el prensaestopas firmemente
	FEL52: Salida con sobretensión	Reducir carga, capacidad (cable)
Conmuta incorrectamente después de un fallo de alimentación	FEL57, comportamiento durante la comprobación de conmutación (test de funcionamiento)	Observar el comportamiento de conmutación del FEL57; del fallo de alimentación, bloqueo del control de la planta durante 45 s aprox.

IT - Individuazione e eliminazione delle anomalie

Guasto	Motivo	Rimedio
Non commuta	Mancanza alimentazione	Controllare l'alimentazione
	Linea segnale guasta	Controllare segnale linea
	Inserto elettronico guasto - FEL51 connesso direttamente a L1 e N	Sostituire - connettere sempre FEL51 mediante carico esterno
	Densità del liquido troppo bassa	Impostare la densità a > 0,5 sull'inserto elettronico
	Forcella incrostata	Pulire la forcella
	Forcella corrosa (Sul FEL: rosso/giallo lampeggiano, FEL58: verde lampeggiano 0,3 Hz)	Sostituire la forcella e la connessione al processo
	FEL51: resistenza interna del relè connesso troppo grande	Collegare il relè adeguato
	FEL51: corrente di mantenimento del relè connesso troppo grande	Connettere resistenza in parallelo al relè
	FEL54: contatti saldati insieme (dopo il corto circuito)	Sostituire FEL54; mettere il fusibile nel circuito di contatto
Commuta non correttamente	Modalità di sicurezza min-/max- impostata in modo errato	Impostare la modalità corretta nell'inserto elettronico
Commutazione sporadicamente difettosa	Schiuma pesante e torbida condizioni molto turbolente, liquido che produce schiuma	Montare il Liquiphant nel bypass
	RFI forte	Usare cavo schermato
	Forte vibrazione	Disaccoppiare, smorzare, ruotare la forcella di 90°
	Acqua nella custodia	Avvitare correttamente il coperchio e il passacavi
	FEL52: Uscita sovraccaricata	Ridurre il carico, capacità (cavo)
Commutazione non corretta dopo la mancanza alimentazione	FEL57, comportamento durante la fase di test all'accensione (test di funzionamento)	Osservare il comportamento di commutazione del FEL57; dopo il ripristino di una mancanza di alimentazione inibire il controllo dell'impianto per 45 s

Fout	Oorzaak	Maatregel
Schakelt niet	Voeding ontbreekt	Voeding kontroleren
	Signaalleiding defect	Signalleiding kontroleren
	Insert defect - FEL51 direct op L1 en N aangesloten	Ver vangen - FEL51 altijd via een belasting aansluiten
	Dichtheid van de vloeistof te gering	Op elektronica- insert dichtheid op > 0, 5 instellen
	Trilvork te veel vervuild	Trilvork reinigen
	Trilvork gecorrodeerd (LED op FEL knippert rood/geel, FEL58: groen knippert 0,3 Hz)	Trilvork compleet met procesaansluiting vervangen
	FEL51: Relais met te groteinwendige weerstand aangesloten	Passender relais aansluiten
	FEL51: Relais met te geringe houdstroom aangesloten	Weerstand parallel aan relais aansluiten
	FEL54: Contacten verkleeft (na een kortsluiting)	FEL54 vervangen; zekering in circuit aanbrengen
Schakelt foutief	Minimum- /Maximum- fail-safe instelling verwisseld	FEL fail-safe keuze correct instellen
Sporadische foutschakeling	Dik zwaar schuim, wilde turbulentie, opgeschuimde vloeistof	Liquiphant in by-pass monteren
	Extreme RFI invloed	Verbindingskabel afschermen
	Extreme vibraties	Ontkoppelen, dempen, vork 90° draaien
	Water in de behuizing	Deksel en wartels vast aandraaien
	FEL52: uitgang overbelast	Schakelbelasting verminderen
Foutmelding	FEL57, gedrag bij inschakelen na netuitval (periodieke testfunctie)	Schakelgedrag FEL57 controleren; procesherstart na netuitval ca. 45 s blokkeren

DE- Ergänzung Fehlersuche

Ist das Schaltverhalten der Gabel ungewöhnlich, kann an PIN 4 der Diagnosebuchse die Gabelfrequenz gemessen werden.
Bei den Elektronikeinsätzen FEL51/52/54/55/56/57/58 ist dies eine sinusförmige Schwingung deren Amplitude einen Rückschluss auf den Gabelzustand zulässt.
Bei FEL50A ist aufgrund eines Rechtecksignals nur noch die Gabelfrequenzmessung möglich.

EN- Trouble- shooting Supplement

If the switching behaviour of the fork is abnormal, the fork frequency can be measured at PIN 4 of the diagnosis socket.
With electronic inserts FEL51/52/54/55/56/57/58 this is a sinusoidal vibration whose amplitude makes it possible to determine the condition of the fork.
With FEL50A, only the fork frequency measurement is possible due to a rectangular pulse signal.

FR - Additif recherche de défauts

Si la commutation de la fourche est inhabituelle, il est possible de mesurer la fréquence de cette dernière au PIN 4 de la prise diagnostic.
Pour l es électroniques FEL51/52/54/55/56/57/58 il s'agit d'une oscillation sinusoïdale dont l'amplitude permet d'évaluer l'état de la fourche.
Pour FEL50A, le signal rectangulaire ne permet qu'une mesure de la fréquence de fourche.

ES - Suplemento para la identificación de fallos

Si el comportamiento de conmutación de la horquilla es anormal, puede medir la frecuencia de la misma en el PIN 4 del interruptor de diagnosis.
Con las electrónicas FEL51/52/54/55/56/57/58 se consigue una vibración sinusoidal cuya amplitud hace posible determinar la condición de la horquilla.
Con FEL50A, sólo es posible medir la frecuencia de la horquilla debido a una señal de impulsos rectangular.

IT - Supplemento alla ricerca dei malfunzionamenti

Se le condizioni di commutazione dei rebbi non è normale la frequenza di vibrazione può essere misurata al PIN 4 del connettore per la diagnosi.
Con gli inserti elettronici FEL51/52/54/55/56/57/58 è possibile determinare la condizione dei rebbi anche tramite l'ampiezza dell'onda sinusoidale.
Con FEL50A il segnale è un onda quadra, per cui è possibile valutare solo il valore di frequenza.

NL- Bijlage problemen oplossen

Indien het schakelgedrag van de trilvork niet normaal verloopt kan de frequentie van de vork gemeten worden op pen 4 van de diagnoseconnector.
Bij de elektronica inserts van de FEL51/52/54/55/56/57/58 is dit een sinusvormige trilling waarvan de amplitude een beeld geeft van de conditie van de vork.
Bij de FEL50A is alleen de vorkfrequentie te meten als gevolg van een rechthoekig pulssignaal.

DE- Ersatzteile
Elektronikeinsätze

EN- Spare parts
Electronic inserts

FR - Pièces de rechange
Electroniques

ES - Repuestos
Electrónicas

IT - Ricambi
Inserti elettronici

NL- Reserve-onderdelen
Elektronica inserts

FEL51	52002304
FEL52	52002305
FEL54	52002306
FEL55	52002307
FEL56	52002308
FEL57	52002309
FEL58	52006454
FEL50A	52010527

Installationsregel: Bei der Installation ist zu beachten, dass elektrische Betriebsmittel (Elektronikeinsätze) die mit nichteigensicheren Stromkreisen gespeist wurden, grundsätzlich **nicht** mehr mit eigensicheren Stromkreisen zusammengeschaltet werden dürfen.

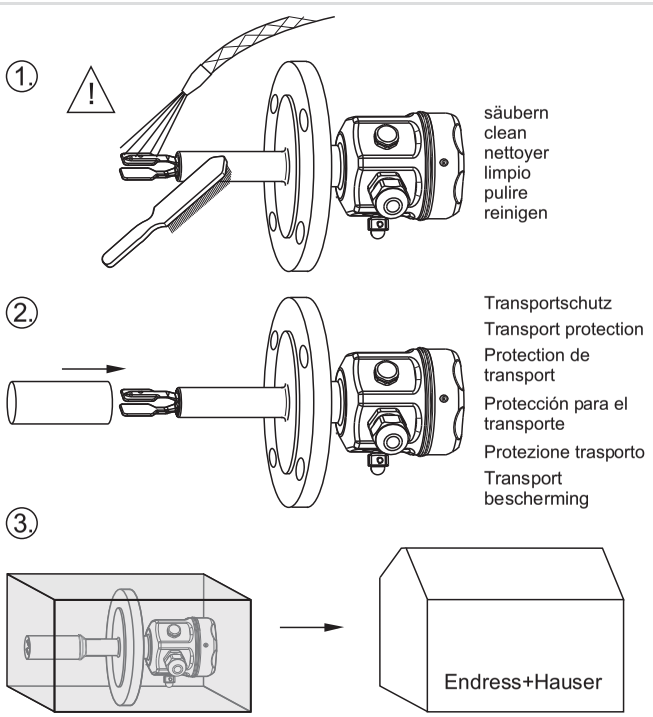
Installation specification: During installation, please keep in mind that electrical resources (electronic inserts) which are powered by non-intrinsically-safe circuits may **no** longer be interconnected with intrinsically-safe circuits.

Directive d'installation : Lors de l'installation, tenir compte du fait que les matériels électriques (électroniques) alimentés par des circuits sans sécurité intrinsèque **ne** doivent plus être connectés à des circuits à sécurité intrinsèque.

Normas de instalación: Durante la instalación, tenga en cuenta que los elementos eléctricos (electrónicas) alimentadas por circuitos no instrínsecamente seguros, **no** podrán estar interconectadas con circuitos intrínsecamente seguros.

Specifiche di installazione: Durante l'installazione è necessario tenere presente che gli impianti elettrici (inserti elettronici) alimentati da circuiti elettrici non a sicurezza intrinseca **non** possono più essere collegati con circuiti elettrici a sicurezza intrinseca.

Installatievoorschrift: Bij de installatie moet erop worden gelet, dat elektrisch materieel (elektronica-units) die via niet-intrinsiekveilige circuits worden gevoed, in principe **niet** meer met intrinsiekveilige circuits mogen worden samengeschakeld.



DE- Reparatur
bei Endress+Hauser

EN- Repair
at Endress+Hauser

FR- Réparations
chez Endress+Hauser

ES - Reparaciones
en Endress+Hauser

IT - Riparare
presso la Endress+Hauser

NL- Reparatie
bij Endress+Hauser

DE- Ergänzende Dokumentation

EN- Supplementary Documentation

FR - Documentation complémentaire

ES - Documentación adicional

IT - Documentazione supplementare

NL- Aanvullende documentatie

Technische Information / Technical Information / Information technique / Información técnica / Informazioni tecniche / Technische Informatie

TI328F	Liquiphant FTL50, FTL50H, FTL51, FTL51H
TI426F	Weld-in adapter, leven and pressure

Betriebsanleitung / Operating Instruction / Mise en service / Instrucciones de funcionamiento / Istruzioni operative / Inbedrijfstellingsvoorschrift

BA00141F FEL50A, PROFIBUS PA

Sicherheitshinweise / Notes on Safety / Conseils de sécurité / Notas sobre seguridad / Note sulla sicurezza / Veiligheidsinstructies

XA00031F	II 1/2 G,	Ex d	IIC/IIB
XA00063F	II 1/2 G, II 1/2 D,	Ex ia/ib	IIC/IIB
XA00064F	II 1 G,	Ex ia	IIC/IIB
XA00108F	II 1/2 G,	Ex de	IIC/IIB
XA00113F	II 1/2 G,	Ex ia/ib	IIC
XA00114F	II 1/2 G,	Ex d	IIC
XA00115F	II 1/2 G,	Ex de	IIC
XA00154F	II 1/2 G, II 1/2 D,	Ex ia/ib	IIC/IIB
XA00158F	II 1/2 G,	Ex ia/ib	IIC
XA00159F	II 1 G,	Ex ia	IIC/IIB
XA00182F	II 3 G, II 3 D,	Ex nA/nC	IIC/IIIC

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People for Process Automation

ENDRESS + HAUSER

SOLISWITCH FTE31, LEVEL LIMIT SWITCH (PADDLE TYPE)

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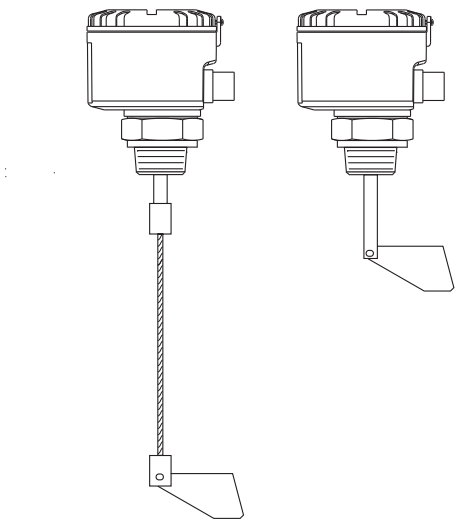
KA 094R/09/a3/01.09
No.: 510 00917

FTE 31



d Füllstandgrenzschalter
e Level Limit Switch
f Détecteur de niveau

Endress+Hauser
The Power of Know How

d Sicherheitshinweise

Der FTE 31 darf nur als Füllstandsgrenzschalter für spezifizierte Schüttgüter eingesetzt werden. Bei unsachgemäßem Gebrauch können Gefahren von ihm ausgehen.

Das Gerät darf nur von **qualifiziertem und autorisiertem Fachpersonal unter besonderer Beachtung dieser Betriebsanleitung**, der gesetzlichen Vorschriften und der Zertifikate (je nach Anwendung) eingebaut, angeschlossen, in Betrieb genommen und gewartet werden.

Achtung!
= verboten - führt zu fehlerhaftem Betrieb oder Zerstörung.

e Notes on safety

The FTE 31 paddle switch is a level limit switch, designed for use in fine-grained bulk solids in non-hazardous areas.
If used incorrectly it is possible that application-related dangers may arise.
The FTE 31 paddle switch may be installed, connected, commissioned, operated and maintained **by qualified and authorised personnel only,** under strict observance of these operating instructions, any relevant standards, legal requirements, and, where appropriate, the certificate.

Caution!
= forbidden - leads to incorrect operation or destruction.

f Conseils de sécurité

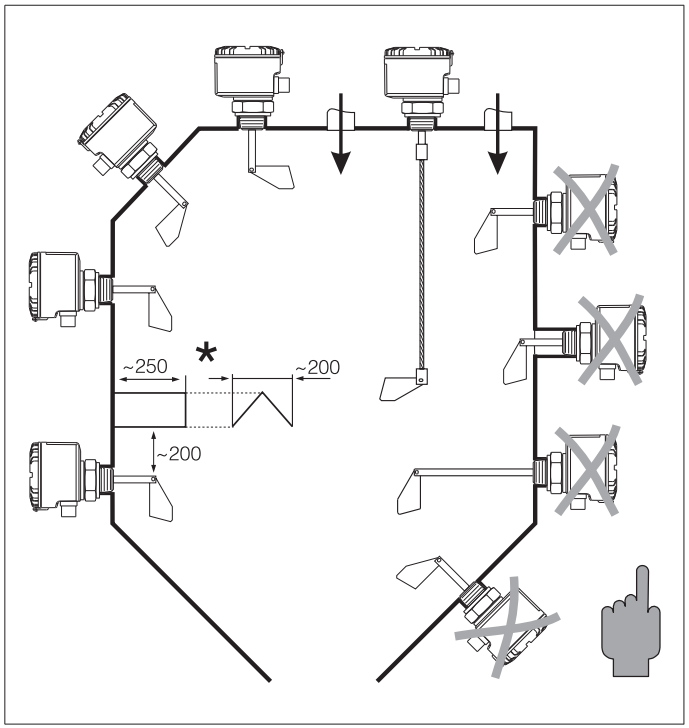
Le FTE 31 est un détecteur de niveau à palette rotative pour produits solides en vrac de faible granulométrie, utilisable en zones non explosibles. Il peut être source de danger en cas d´utilisation non conforme aux prescriptions. L´appareil ne doit être installé, raccordé, mis en service et maintenu **que par un personnel qualifié et autorisé,** qui tiendra compte des indications contenues dans la présente mise en service, des normes en vigueur et des certificats disponibles (selon l´application).

Attention!
= interdit - peut provoquer des dysfonctionnements ou la destruction.

d **Einbaubeispiele**
* Schutzdach

e **Mounting examples**
* Protective roof

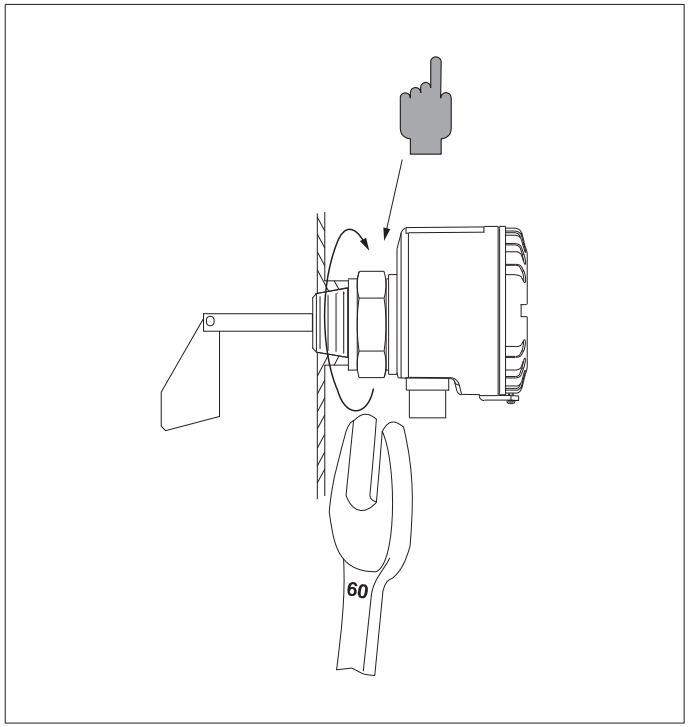
f **Exemples d´implantation**
* Déflecteur



d Füllstandgrenzschalter FTE 31 einschrauben
Nicht am Gehäuse drehen!

e Screw the FTE 31 paddle switch into the process connection
Don´t use housing to turn!

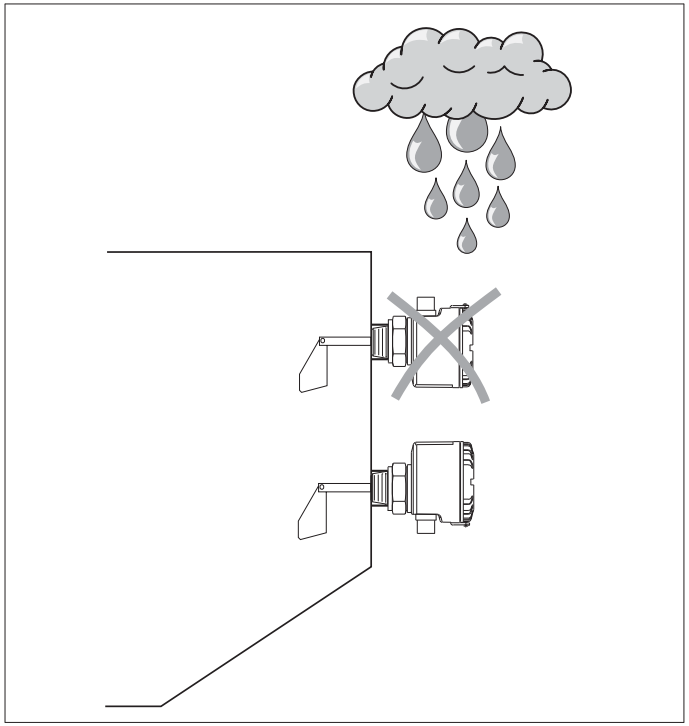
f Visser le détecteur à palette rotative FTE 31
Ne pas se servir du boîtier!

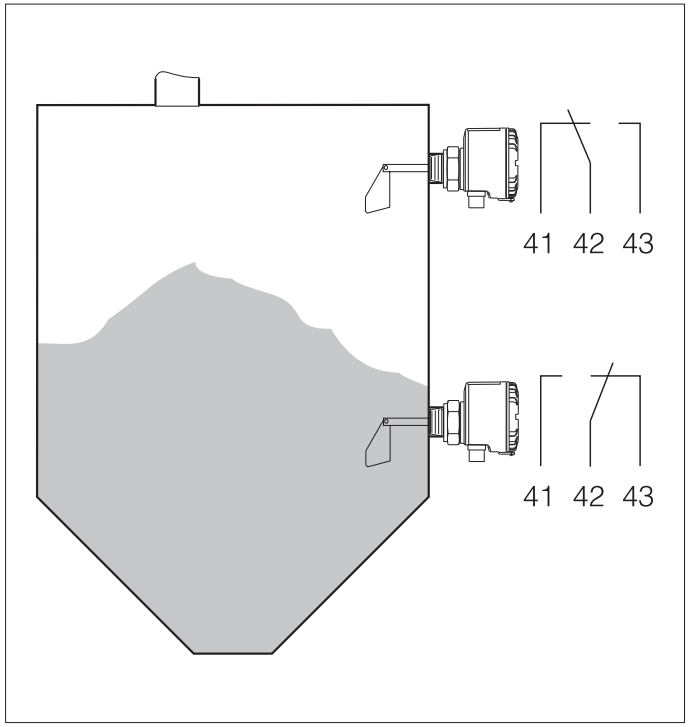


d Gehäuse in richtige Position drehen.

e Screw the housing to the correct position.

f Positionner le boîtier.





d **Funktion**

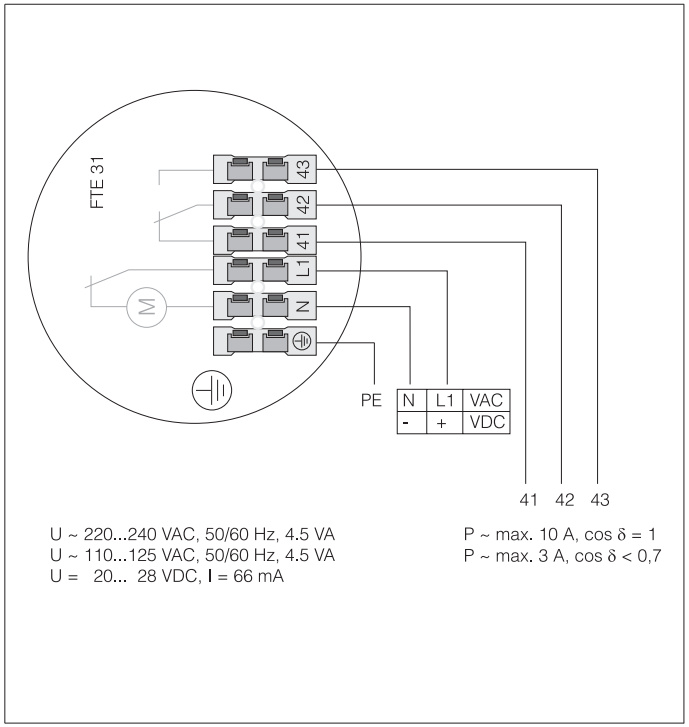
e **Function**

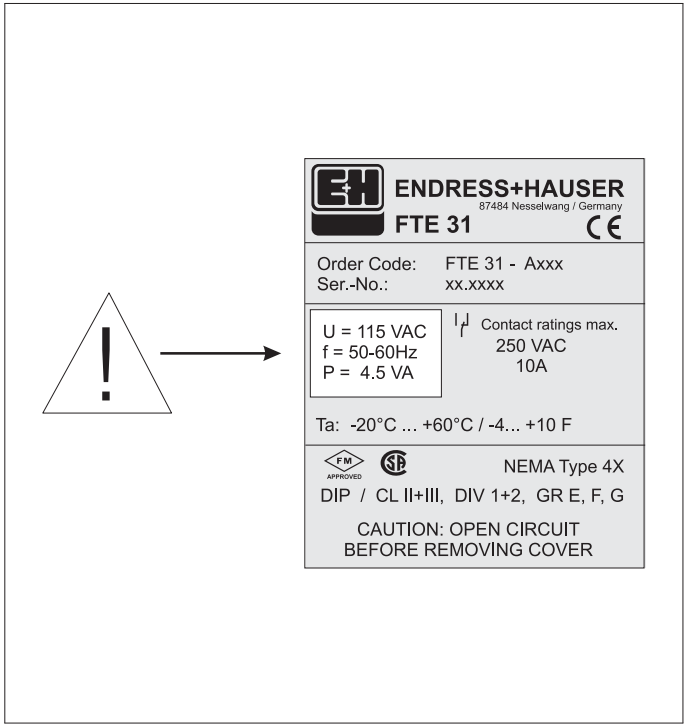
f **Fonction**

d **Anschluss FTE 31**

e **Connection FTE 31**

f **Raccordement FTE 31**





d Beachten Sie die Anschluss-spannung auf dem Typen-schild

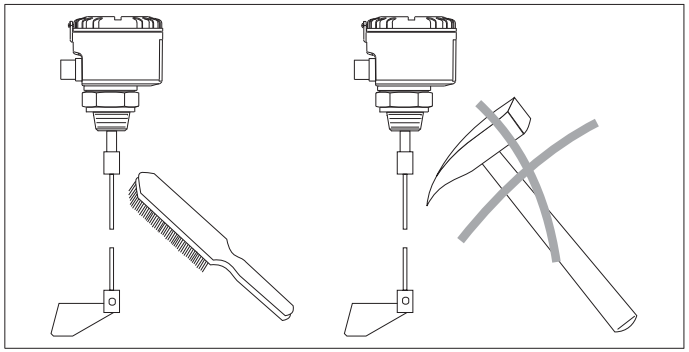
e Take note of the power supply indicated on the legend plate

f Tenir complete de la tension indiquée sur la plaque signalétique

d **Wartung**
Anbackungen entfernen

e **Maintenance**
Build up removal

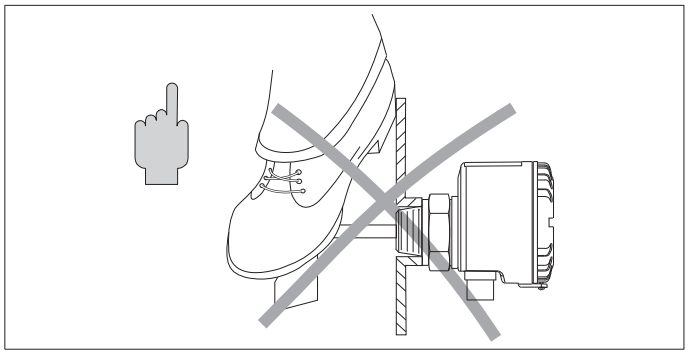
f **Entretien**
Enlever les incrustations

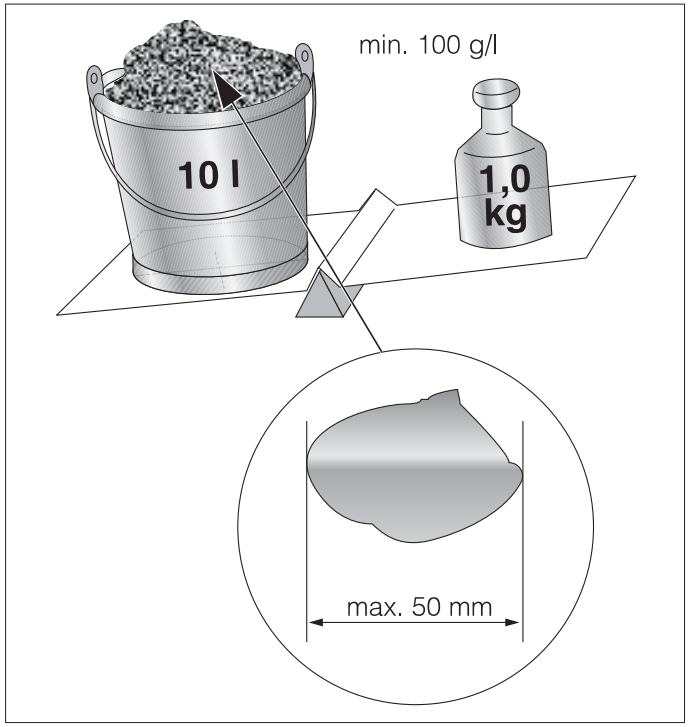


d **Nicht** besteigen!

e **Don´t** use as a step!

f **Ne pas** marcher sur les lames vibrantes!





d **Technische Daten**
Schüttgröße und
Korngewicht

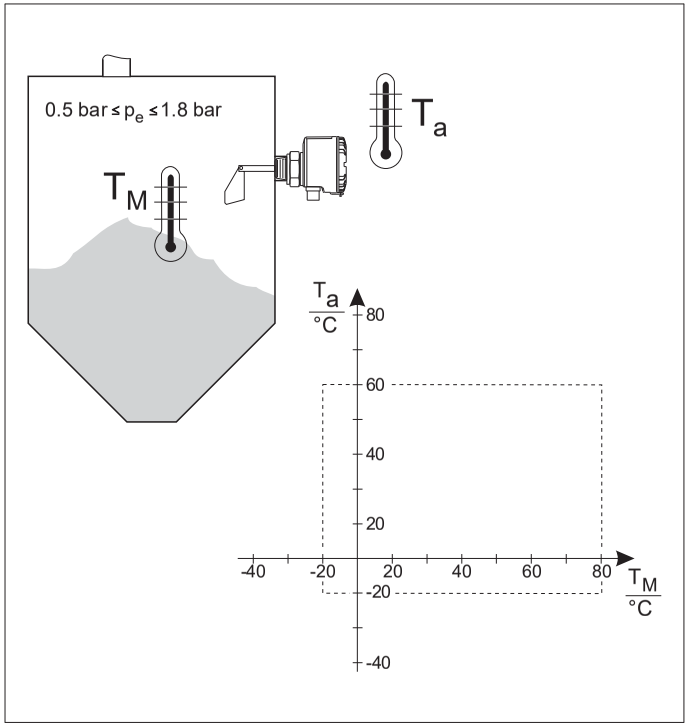
e **Technical data**
Solids density
and grain size in mm.

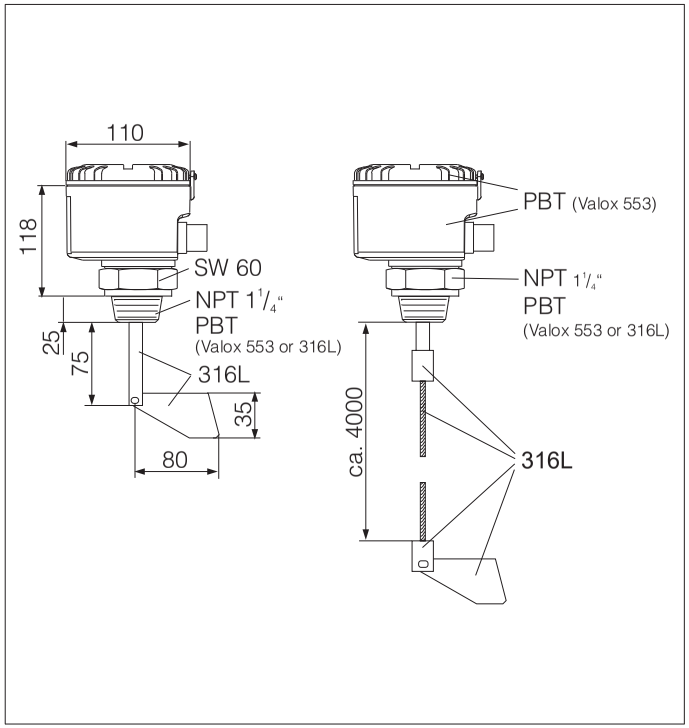
f **Caractéristiques techniques**
Densité apparente
et granulométrie en mm.

d Umgebungstemperatur T_a
Betriebstemperatur T_M
Betriebsdruck p_e

e Ambient temperature T_a
Operating temperature T_M
Operating pressure p_e

f Température ambiante T_a
Température de service T_M
Pression de service p_e





d **Abmessungen in mm und Werkstoffe**

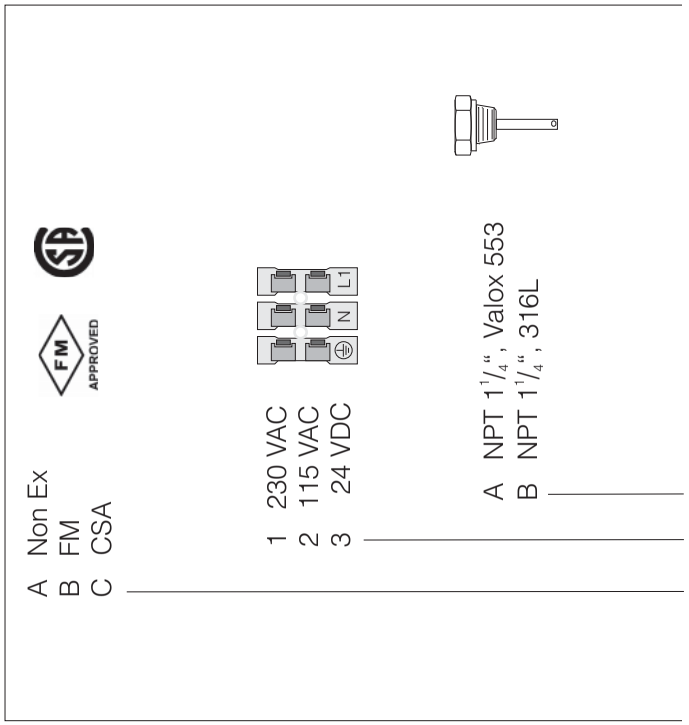
e **Dimensions in mm and materials**

f **Dimensions en mm et matériaux**

d **Geräte Identifikation**

e **Device identification**

f **Dénomination**



FTE31-
⇐ Order-Code
1 Standard (316L)
2 fold-down paddle (316L)
1
2
1,2/A-F = 316L
A-F
1 75 mm
2 4 m, 1.4571
A-F 100 mm - 600 mm

d **Ergänzende Dokumentation**	TI 068R/09/de	Technische Information Füllstandgrenzschalter FTE 31
e **Supplementary documentation**	TI 068R/09/en	Technical information Paddle limit switch FTE 31
f **Documentation complémentaire**		

d **Notizen:**

e **Notes:**

f **Notes:**

d	✎ **Hinweis!**	Mechanische Lebensdauer: min. 500 000 Schaltzyklen
e	✎ **Note!**	Mechanical life time: min. 500 000 switch cycles
f	✎ **Remarque !**	Durée de vie mécanique : min. 500 000 cycles de commutation
es	✎ **¡Nota!**	Vida estimada: mínimo 500 000 usos
i	✎ **Nota !**	Tempo di vita delle parti meccaniche: min. 500 000 cicli di commutazione
nl	✎ **Opmerking!**	Mechanische levensduur: min. 500 000 schakelcycli

d	**Reparatur**	Bei Austausch von Teilen nur original E+H Ersatzteile verwenden!
e	**Repairs**	When exchanging only use original E+H spare parts.
f	**Réparation**	Lors du remplacement de pièces, n'utiliser que des pièces de rechange d'origine E+H.
es	**Repuestos**	Cuando realice sustituciones utilice sólo recambios originales E+H.
i	**Riparazioni**	In caso di riparazione utilizzare solo ricambi originali E+H.
nl	**Reparatie**	Bij wisseling van onderdelen uitsluitend originele E+H service onderdelen toepassen

Austria
Endress+Hauser Ges.m.b.H.
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USA
Endress+Hauser Inc.
Greenwood, Indiana
Tel. (317) 535-7138, Fax (317) 535-1489

International
Endress+Hauser GmbH+Co.
Instruments International
Weil am Rhein
Tel. (07621) 97502, Fax (07621) 975345

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KA 094R/09/a3/01.09 Mat-Nr.: 510 00917 SS/CV5

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CERABAR T PMC131, PRESSURE TRANSDUCER

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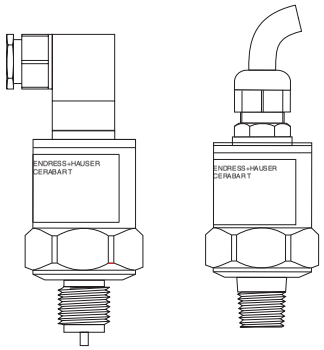
Level Pressure Flow Temperature Liquid Analysis Registration Systems Components Services Solutions

Operating Instructions

Cerabar T PMC131



de - Drucktransducer
en - Pressure Transducer
fr - Transducteur de pression
it - Trasduttore di pressione
es - Transmisorde presión
nl - Druk-transducer

KA00085P/00/A6/13.12
71158704

Endress+Hauser
People for Process Automation

de - Inhalt

en - Contents

fr - Sommaire

de - Sicherheitshinweise

Der Cerabar T dient der Absolut- und Relativdruckmessung in Gasen, Dämpfen, Flüssigkeiten und Stäuben. Bei unsachgemäßem Einsatz können Gefahren von ihm ausgehen. Das Gerät darf nur von qualifiziertem und autorisiertem Fachpersonal unter strenger Beachtung dieser Betriebsanleitung und der Technischen Information TI00415P, der einschlägigen Normen, gesetzlichen Vorschriften und Zertifikate eingebaut, angeschlossen, in Betrieb genommen und gewartet werden.

en - Notes on Safety

The Cerabar T is designed for measuring absolute and gauge pressure of gases, vapours, liquids and dusts. If used incorrectly it is possible that application related dangers may arise.The Cerabar T may be installed, commissioned, operated and maintained by qualified and authorised personnel only, under strict observance of these operating instructions and Technical Information TI00415P, any relevant standards, legal requirements, and, where appropriate, the certificate.

fr - Conseils de sécurité

Le Cerabar T est destiné à la mesure de pression absolue et relative dans les gaz, vapeurs, liquides et poussières. Il peut être source de danger en cas d'utilisation non conforme aux prescriptions. L'appareil ne doit être installé, raccordé, mis en service et maintenu que par un personnel qualifié et autorisé, qui tiendra compte des indications contenues dans la présente mise en service et de l' Information Technique TI00415P, des normes en vigueur et des certificats disponibles (selon l'application).

es - Indice

it - Indice

nl - Inhoud

es - Notas sobre seguridad

Cerabar T está diseñado para medir presión absoluta y relativa en gases, vapores, liquidos y sólidos pulvurulentos. Su empleo inapropiado puede resultar peligroso. El equipo deberá ser montado, conectado, instalado y mantenido única y exclusivamente por personal cualificado y autorizado, bajo rigurosa observación de las presentes instrucciones de servicio y de la Información Técnica TI00415P, de las normativas y legislaciones vigentes, así como de los certificados (dependiendo de la aplicación).

it - Note sulla sicurezza

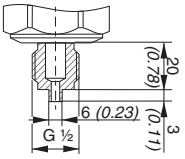
Il Cerabar T è stato progettato per la misura della pressione assoluta e relativa di gas, vapori, liquidi e polveri. Un'installazione non corretta può determinare pericolo per le persone e le cose. Lo strumento deve essere montato collegato e messo in servizio solamente da personale qualificato ed autorizzato, nel totale rispetto delle indicazioni operative qui riportate, delle prescrizioni presenti nelle informazioni tecniche TI00415P ed in accordo a tutte le norme e legislazioni vigenti e le certificazioni utilizzate.

nl - Veiligheidsinstructies

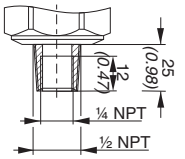
De Cerabar T is ontworpen voor het meten absoluut en overdruk van gassen, dampen, vloeistoffen en vaste stoffen. Bij niet correct gebruik kunnen gevaarlijke situaties onstaan. Het instrument mag uitsluitend door gekwalificeerd en geautoriseerd vakpersoneel geinstalleerd, aangesloten en inbedrijf genomen worden met inachtneming van dit inbedrij-fstellingsvoorschrift, het bijbehorende Technisch Informatie blad TI00415P en de betreffende normen, de wettelijke voorschriften en eventuele certificaten in acht.

de - Geräte-Identifikation
en - Device Identification
fr - Dénomination de l'appareil
es - Identificación del equipo
it - Identificazione dello strumento
nl - Instrument-identificatie

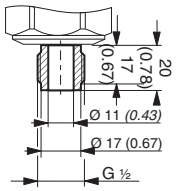
1 = G ½A, ISO 228
1.4301 (AISI 304)



2 = ½ MNPT, ¼ FNPT,
1.4301 (AISI 304)



5 = G ½A, ø11 mm, ISO228
1.4301 (AISI 304)



F = FKM Viton
S = FKM Viton, O_2

1 = ohne/without/sans/sin/senza/zonder
2 = Protokoll/Protocol/Protocole
S = German Lloyd

p

D10 = 0..100 mbar, 0...10 kPa
• • •
R4T = 0...500 psi a

de - Montage

- Die Funktion des Drucktransducers ist unabhängig von der Einbaulage.
- Zum Schutz des Gewindes und der Druckmembran darf die Schutzkappe am Gewindestutzen erst kurz vor dem Einbau entfernt werden.
- Der Drucktransducer ist nach den gleichen Richtlinien wie ein Manometer zu montieren. Wir empfehlen die Verwendung von Absperrhähnen und Wassersackrohren.
- Beim Einbau ist darauf zu achten, dass kein Tropfwasser in das Gehäuse eindringen kann.
- Einsatzgrenzen für Sauerstoff beachten (bei FKM Viton/O_2 gemäß BAM-Liste).
- Bei Anwendungen in explosionsfähiger Atmosphäre der Zone 2 (Zündschutzart Ex nA), Gehäuse vor Schlageinwirkung schützen.

en - Mounting

- The function of the transducer is independent of mounting orientation.
- To protect the thread and pressure diaphragm from damage, the protective cover on the threaded nozzle should be removed just before installation only.
- The pressure transducer is to be mounted like a manometer. The guidelines are identical. Isolating valves and water pocket pipes should be used.
- When installing, ensure that no water enters the housing.
- Note the application limits for oxygen (for FKM Viton/O_2 as per BAM list).
- In the event of applications in a Zone 2 explosive atmosphere (Ex nA explosion protection) protect the housing from impact.

fr - Montage

- Le fonctionnement du transducteur de pression est indépendant de son implantation.
- Afin de protéger le filetage et la membrane, ne retirer le capot de protection, placé sur le raccord fileté, qu'au moment du montage.
- Le transducteur de pression doit être monté conformément aux directives concernant les manomètres. Nous recommandons l'utilisation de robinets d'isolement et de siphons.
- Lors du montage, veiller à ce qu'il n'y ait pas d'infiltration d'eau dans le boîtier.
- Tenir compte des limites d'utilisation sur l'oxygène (pour FKP Viton/O_2 selon liste BAM).
- Les applications en atmosphère explosible de zone 2 (mode de protection antidéflagrant Ex nA), protéger le boîtier contre les chocs.

es - Montaje

- El funcionamiento del transmisor de presión es independiente de la orientación de montaje.
- No retirar la protección del casquillo roscado hasta el momento previo a su instalación para evitar dañar la rosca o el diafragma de presión.
- El transmisor de presión se deberá montar como un manómetro. El procedimiento es el mismo. Utilizar válvulas de corte y sifón.
- Durante la instalación asegurar que no entre agua en la caja.
- Observar los límites de utilización en oxígeno (para FKP Viton/O_2 según lista BAM).
- En las aplicaciones en atmósferas con riesgo de explosión de la zona 2 (tipo de protección contra ignición Ex nA) se debe proteger la carcasa contra el efecto de los impactos.

it - Montaggio

- Il funzionamento del trasduttore non dipende dalla posizione di montaggio.
- Per proteggere la filettatura e la membrana di pressione da eventuali danneggiamenti, eliminare il coperchio di protezione dell'ugello filettato solo immediatamente prima dell'installazione.
- Il trasduttore di pressione deve essere montato come un manometro. Utilizzare solo valvole di arresto e tubi separatori d'acqua.
- Durante l'installazione, assicurarsi che non entri acqua nella custodia.
- Osservare i limiti operativi per ossigeno (per FKM Viton/O_2 in accordo con lista BAM).
- Per l'utilizzo in ambienti a rischio di esplosione della zona 2 (Protezione antideflagrante Ex nA), proteggere le custodie contro gli urti.

nl - Montage

- Het functioneren van de Druk-transducer is onhafhankelijk van de montagepositie.
- Ter bescherming van de buitendraad en het membraan moet de beschermhuls pas vlak voor de montage verwijderd worden.
- De Druk-transducer moet identiek als een manometer gemonteerd worden. De richtlijnen t.a.v. gebruik van afsluitkranen, afstandsstukken en watersloten moeten worden aangehouden.
- Bij installatie ervoor zorgen dat er geen water in de behuizing kan komen, ook niet via de connector/wartel.
- Toepassingen in zuurstof bekijken (met FKM Viton/O_2 conform BAM lijst).
- Bescherm de behuizing tegen schokken bij toepassingen in explosiegevaarlijke atmosferen zone 2 (ontstekingsklasse Ex nA).

de - Elektrischer Anschluss
Stecker-Version

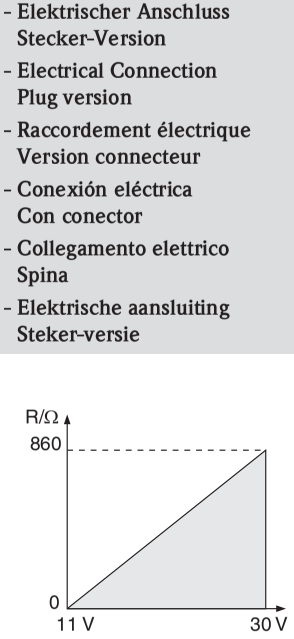
en - Electrical Connection
Plug version

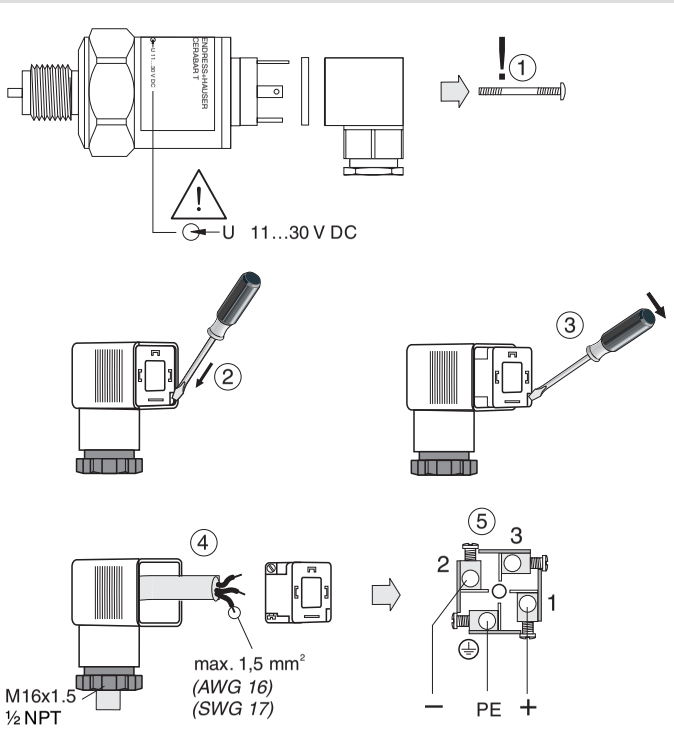
fr - Raccordement électrique
Version connecteur

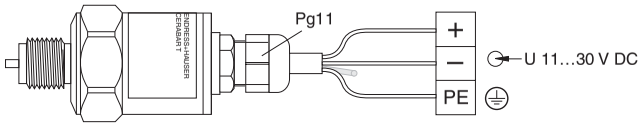
es - Conexión eléctrica
Con conector

it - Collegamento elettrico
Spina

nl - Elektrische aansluiting
Steker-versie

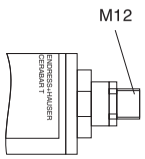






de - Referenzluft- Zuführung
Nicht verschließen! Vor Wasser schützen!

en - Reference air tube
Do not close! Protect from water!

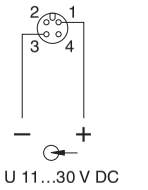


fr - Mise à l'atmosphère
Ne pas boucher! Prótéger de l'eau!

es - Tubo de compensación de presión atmosférica
No tapar! Proteger del agua!

it - Ingresso aria di riferimento
Non chiudere! Proteggere dall'acqua!

nl - Drukvereffening
Niet laten vervuilen en beschermen tegen vocht!



de + = rot; – = schwarz, PE = grün/gelb
en + = red; – = black, PE = green/yellow
fr + = rouge; – = noir, PE = vert/jaune
es + = rojo, – = negro, PE = verde/amarillo
it + = rosso, – = nero, PE = verde/giallo
nl + = rood; – = zwart, PE = groen/geel

de - Elektrischer Anschluß
Kabel-/Stecker-Version

en - Electrical Connection
Cable/plug version

fr - Raccordement électrique
Version câble/connecteur

es - Conexión eléctrica
Cable/conector

it - Collegamento elettrico
Cavo/spina

nl - Elektrische aansluiting
Kabel-/steker-versie

de - Einsatzbedingungen

- Umgebungstemperatur: –20…85 °C
- Lagerungstemperatur: –50…100 °C
- Meßstofftemperaturgrenze: max. 100 °C
- Meßstoffdruckgrenze: p_{max}
- Geräte mit CSA GP-Zulassung dürfen nur mit einer SELV oder Class 2 Spannungsversorgung betrieben werden.

en - Operating Conditions

- Ambient temperature range: –20…85°C
- Storage temperature range: –50…100°C
- Limiting temperature range: max. 100°C
- Limiting pressure range: p_{max}
- Devices with CSA GP approval may only be operated with a SELV or Class 2 power supply.

fr - Conditions d'utilisation

- Température ambiante: –20…85 °C
- Température de stockage: –50…100 °C
- Limite de température du produit: max. 100 °C
- Limite de pression du produit: p_{max}
- Les appareils avec agrément CSA GP ne doivent être utilisés qu'avec une tension d'alimentation SELV ou Class 2.

es - Condiciones de operación

- Rango de temperatura ambiental: –20…85 °C
- Rango de temperatura de almacenamiento: –50…100 °C
- Temperatura máxima de trabajo: máx. 100 °C
- Presión máx. de trabajo: p_{max}
- Los equipos con la certificación CSA GP sólo pueden trabajar con alimentación de clase 2 o SELV.

it - Condizioni operative

- Temperatura ambiente: –20…85 °C
- Temperatura per la conservazione in magazzino: –50…100 °C
- Temperatura limite del prodotto: max. 100 °C
- Pressione limite del prodotto: p_{max}
- Strumenti con approvazione CSA GP possono essere alimentati solo con unità tipo SELV o Classe 2

nl - Omgevingscondities

- Omgevingstemperatuur: –20…+85 °C
- Opslagtemperatuur: –50…100 °C
- Producttemp. : max. 100 °C
- max. procesdruk: p_{max}
- Instrumenten met een CSA GP certificaat mogen uitsluitend via een SELV of een klasse 2 voeding gevoed worden.

www.endress.com/worldwide

KA00085P/00/A6/13.12 71158704/CCS/FM9

71158704

ENDRESS + HAUSER

CERABAR S PMC71, PRESSURE TRANSMITTER

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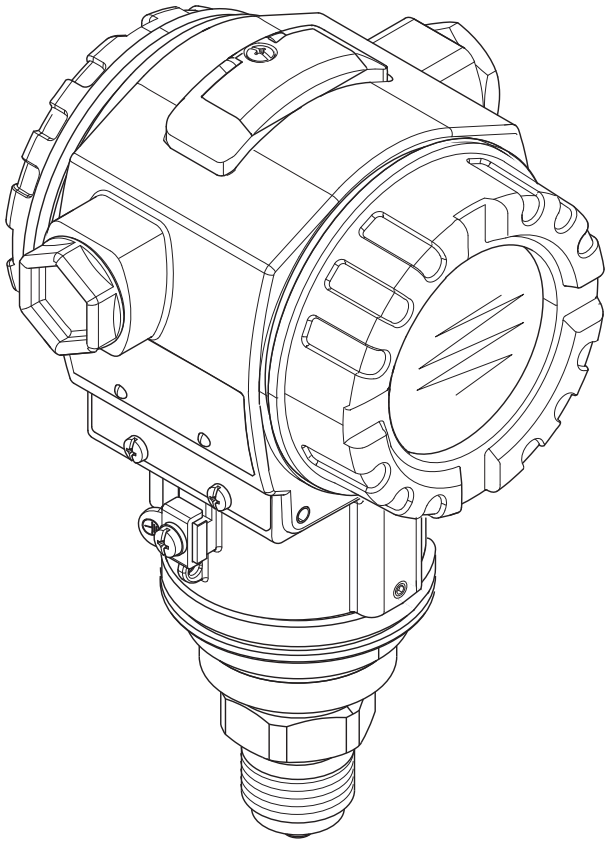
Level Pressure Flow Temperature Liquid Analysis Registration Systems Components Services Solutions

Operating Instructions

Cerabar S PMC71, PMP71, PMP75

Process pressure measurement

HART COMMUNICATION PROTOCOL



BA00271P/00/EN/18.14
71270361

valid from Software version:
02.20.zz

Endress+Hauser
People for Process Automation

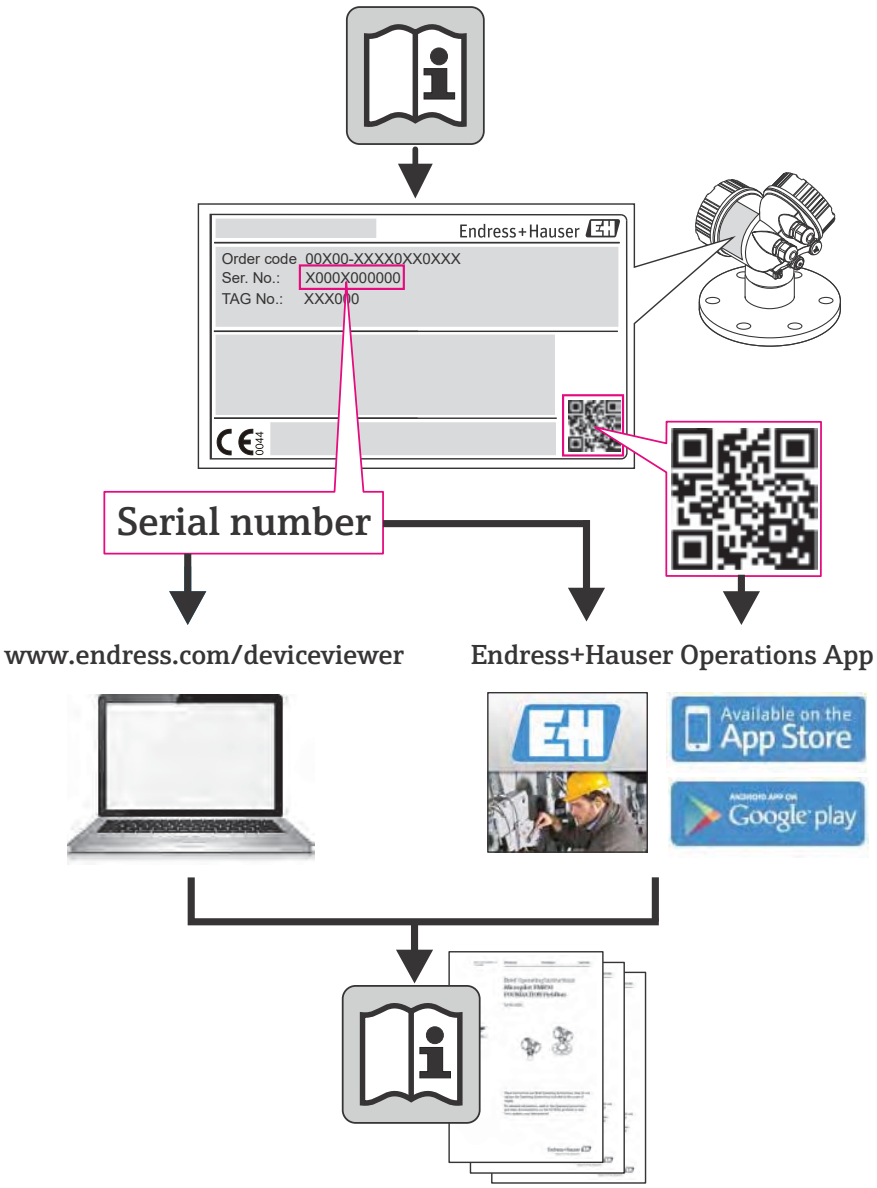

Endress+Hauser
Order code 00X00-XXXX0XX0XXX
Ser. No.: X000X000000
TAG No.: XXX000
Serial number
www.endress.com/deviceviewer
Endress+Hauser Operations App
Available on the App Store
Google play

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Table of contents

1 Safety instructions

1.1 Designated use

The Cerabar S is a pressure transmitter for measuring pressure and level.

The manufacturer accepts no liability for damages resulting from incorrect use or use other than that designated.

1.2 Installation, commissioning and operation

The device has been designed to operate safely in accordance with current technical, safety and EU standards. If installed incorrectly or used for applications for which it is not intended, however, it is possible that application-related dangers may arise, e.g. product overflow due to incorrect installation or calibration. For this reason, the instrument must be installed, connected, operated and maintained according to the instructions in this manual: personnel must be authorised and suitably qualified. The manual must have been read and understood, and the instructions followed. Modifications and repairs to the device are permissible only when they are expressly approved in the manual. Pay particular attention to the technical data on the nameplate.

1.3 Operational safety and process safety

Alternative monitoring measures must be taken to ensure operational safety and process safety during configuration, testing and maintenance work on the device.

1.3.1 Hazardous areas (optional)

Devices for use in hazardous areas are fitted with an additional nameplate (→ 🖹 6). If the device is to be installed in an explosion hazardous area, then the specifications in the certificate as well as all national and local regulations must be observed. The device is accompanied by separate "Ex documentation", which is an integral part of this Operating Instructions. The installation regulations, connection values and Safety Instructions listed in this Ex document must be observed. The documentation number of the related Safety Instructions is also indicated on the additional nameplate.

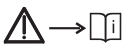
- Ensure that all personnel are suitably qualified.

1.3.2 Functional Safety SIL3 (optional)

If using devices for applications with safety integrity, the Functional Safety Manual (SD00190P) must be observed thoroughly.

1.4 Notes on safety conventions and icons

In order to highlight safety-relevant or alternative operating procedures in the manual, the following conventions have been used, each indicated by a corresponding icon in the margin.

Safety conventions	
	**Warning!** A warning highlights actions or procedures which, if not performed correctly, will lead to personal injury, a safety hazard or destruction of the instrument.
	**Caution!** Caution highlights actions or procedures which, if not performed correctly, may lead to personal injury or incorrect functioning of the instrument.
	**Note!** A note highlights actions or procedures which, if not performed correctly, may indirectly affect operation or may lead to an instrument response which is not planned.
	**Device certified for use in explosion hazardous area** If the device has this symbol embossed on its nameplate, it can be installed in an explosion hazardous area or a non-explosion hazardous area, according to the approval.
	**Explosion hazardous area** Symbol used in drawings to indicate explosion hazardous areas. – Devices used in hazardous areas must possess an appropriate type of protection.
	**Safe area (non-explosion hazardous area)** Symbol used in drawings to indicate, if necessary, non-explosion hazardous areas. – Devices used in hazardous areas must possess an appropriate type of protection. Lines used in hazardous areas must meet the necessary safety-related characteristic quantities.
	**Direct voltage** A terminal to which or from which a direct current or voltage may be applied or supplied.
	Alternating voltage A terminal to which or from which an alternating (sine-wave) current or voltage may be applied or supplied.
	**Grounded terminal** A grounded terminal, which as far as the operator is concerned, is already grounded by means of an earth grounding system.
	**Protective grounding (earth) terminal** A terminal which must be connected to earth ground prior to making any other connection to the equipment.
	**Equipotential connection (earth bonding)** A connection made to the plant grounding system which may be of type e.g. neutral star or equipotential line according to national or company practice.
	**Temperature resistance of the connection cables** States, that the connection cables must be resistant to a temperature of at least 85 °C (185 °F).
	**Safety instruction** For safety instructions refer to the manual for the appropriate instrument version.

2 Identification

2.1 Product identification

The following options are available for identification of the measuring device:
- Nameplate specifications
- Order code with breakdown of the device features on the delivery note
- Enter serial numbers from nameplates in W@M Device Viewer (www.endress.com/deviceviewer): All information about the measuring device is displayed.

For an overview of the technical documentation provided, enter the serial number from the nameplates in the W@M Device Viewer (www.endress.com/deviceviewer).

2.2 Device designation

2.2.1 Nameplate

Note!
- The MWP (maximum working pressure) is specified on the nameplate. This value refers to a reference temperature of 20°C (68°F) or 100°F (38 °C) for ASME flanges.
- The pressure values permitted at higher temperatures can be found in the following standards:
  – EN 1092-1: 2001 Tab. 18 [1)]
  – ASME B 16.5a – 1998 Tab. 2-2.2 F316
  – ASME B 16.5a – 1998 Tab. 2.3.8 N10276
  – JIS B 2220
- The test pressure corresponds to the over pressure limit (OPL) of the device = MWP x 1.5 [2)].
- The Pressure Equipment Directive (EC Directive 97/23/EC) uses the abbreviation "PS". The abbreviation "PS" corresponds to the MWP (maximum working pressure) of the measuring device.

1) With regard to their temperature stability properties, the materials 1.4404 and 1.4435 are grouped under 13E0 in EN 1092-1 Tab. 18. The chemical composition of the two materials can be identical.
2) The equation does not apply for PMP71 and PMP75 with a 40 bar (600 psi) or a 100 bar (1500 psi) measuring cell.

Aluminium and stainless steel housing (T14)

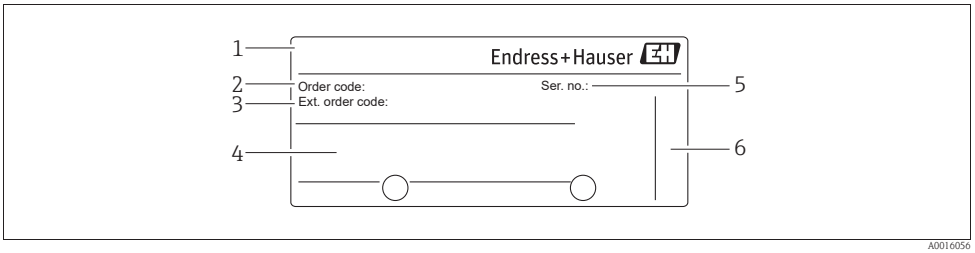


Fig. 1: Nameplate

1 Device name
2 Order code (for re-orders)
3 Extended order code (complete)
4 Technical data
5 Serial number (for identification)
6 Address of manufacturer

Devices for use in hazardous areas are fitted with an additional nameplate.

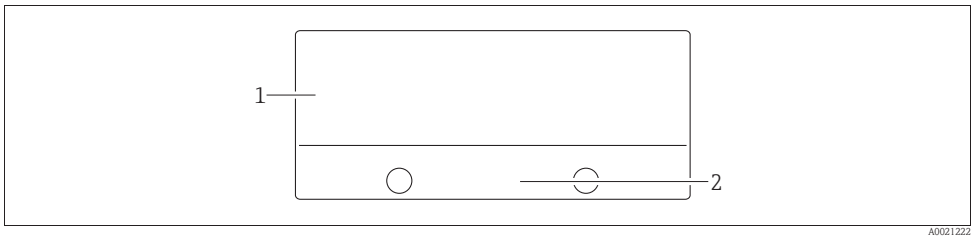


Fig. 2: Additional nameplate

1 Approval-specific information
2 Document number for safety instructions or drawing number

Devices suitable for oxygen applications or with PVDF process connection are fitted with an additional nameplate.

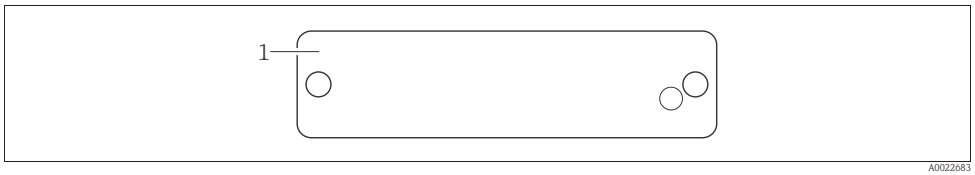


Fig. 3: Additional nameplate

1 Application limits

Hygenic stainless steel housing (T17)

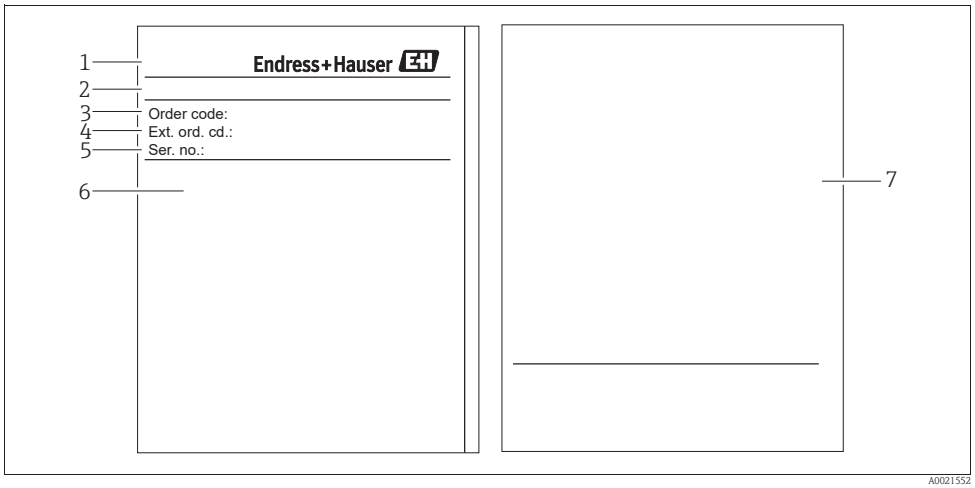


Fig. 4: Nameplate

1 Device name
2 Address of manufacturer
3 Order code (for re-orders)
4 Extended order code (complete)
5 Serial number (for identification)
6 Technical data
7 Approval-specific information and document number for safety instructions or drawing number

2.2.2 Identifying the sensor type

See parameter "Sensor Meas.Type" in Operating Instruction BA00274P.

2.3 Scope of delivery

The scope of delivery comprises:
- Cerabar S pressure transmitter
- For devices with the "HistoROM/M-DAT" option:
  CD-ROM with Endress+Hauser operating program
- Optional accessories

Documentation supplied:
- The Operating Instructions BA00271P and BA00274P are available via the Internet.
  → See: www.endress.com → Download.
- Brief Operating Instructions KA01019P
- Leporello KA00218P
- Final inspection report
- Also Safety Instructions with ATEX, IECEx and NEPSI devices
- Optional: factory calibration form, test certificates

2.4 Certificates and approvals

CE mark, declaration of conformity

The device is designed to meet state-of-the-art safety requirements, has been tested and left the factory in a condition in which it is safe to operate. The device complies with the applicable standards and regulations as listed in the EC declaration of conformity and thus complies with the statutory requirements of the EC Directives. Endress+Hauser confirms the successful testing of the device by affixing to it the CE mark.

2.5 Registered trademarks

KALREZ®, VITON®, TEFLON®
Registered trademarks of E.I. Du Pont de Nemours & Co., Wilmington, USA

TRI-CLAMP®
Registered trademark of Ladish & Co., Inc., Kenosha, USA

HART®
Registered trademark of the HART Communication Foundation, Austin, USA.

GORE-TEX®
Registered trademark of W.L. Gore & Associates, Inc., USA

3 Installation

3.1 Incoming acceptance, transport, storage

3.1.1 Incoming acceptance

- Check the packaging and the contents for damage.
- Check the shipment, make sure nothing is missing and that the scope of supply matches your order.

3.1.2 Transport

Caution!
Follow the safety instructions and transport conditions for devices of more than 18 kg (39.69 lbs). Transport the measuring device to the measuring point in its original packaging or at the process connection.

3.1.3 Storage

The device must be stored in a dry, clean area and protected against damage from impact (EN 837-2).

Storage temperature range:
- –40 °C to +90°C (–40 °F to +194°F)
- On-site display: –40 °C to +85°C (–40 °F to +185°F)
- Separate housing: –40 °C to +60°C (–40 °F to +140°F)

3.2 Installation conditions

3.2.1 Dimensions

For dimensions, please refer to "Mechanical construction" section in TI00383P.

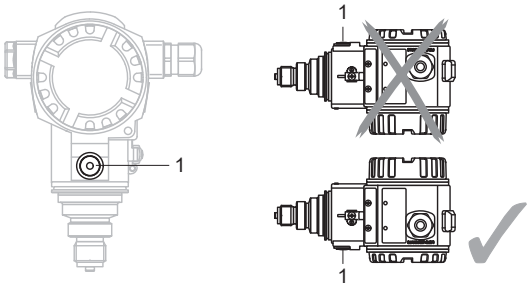
3.3 Installation instructions

Note!
- Due to the orientation of the Cerabar S, there may be a shift in the measured value, i.e. when the container is empty, the measured value does not display zero. You may correct this zero point shift either directly on the device using the "E"-key or by remote operation. See → 📄 26, "Function of the operating elements – on-site display not connected" or
→ 📄 41, "Position adjustment".
- For PMP75, please refer to → 📄 12, "Installation instructions for devices with diaphragm seals – PMP75".
- To ensure optimal readability of the on-site display, it is possible to rotate the housing up to 380°. → 📄 18, "Rotating the housing".
- Endress+Hauser offers a mounting bracket for installing on pipes or walls. → 📄 15, "Wall and pipe-mounting (optional)".

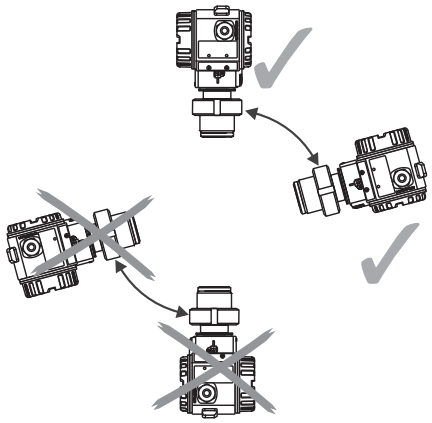
3.3.1 Installation instructions for devices without diaphragm seals – PMP71, PMC71

Note!
- If a heated Cerabar S is cooled during the cleaning (e.g. by cold water), a vacuum develops for a short time, whereby water can penetrate the sensor through the pressure compensation (1).

If this is the case, mount the sensor with the pressure compensation (1) pointing downwards.



- Keep the pressure compensation and GORE-TEX® filter (1) free from contaminations and water.
- Cerabar S without diaphragm seal are mounted as per the norms for a manometer (DIN EN 837-2). We recommend the use of shut-off devices and siphons. The orientation depends on the measuring application.
- Do not clean or touch process isolating diaphragm seals with hard or pointed objects.
- The device must be installed as follows in order to comply with the cleanability requirements of the ASME-BPE (Part SD Cleanability):



Pressure measurement in gases

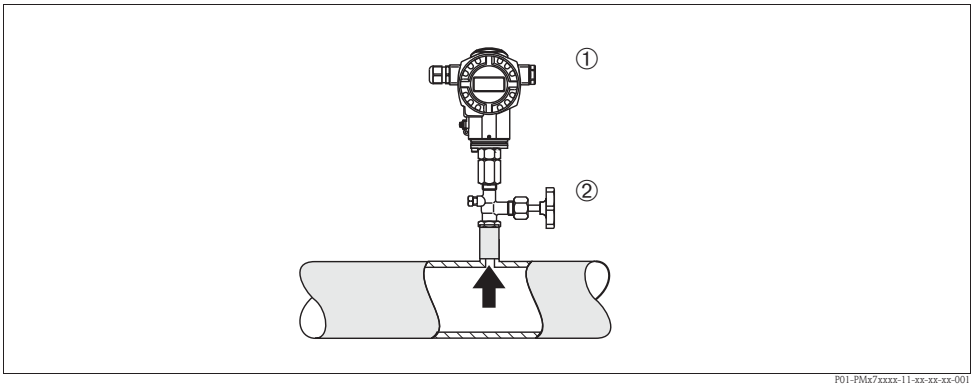


Fig. 5: Measuring arrangement for pressure measurement in gases

1 Cerabar S
2 Shut-off device

Mount Cerabar S with shut-off device above the tapping point so that any condensate can flow into the process.

Pressure measurement in steams

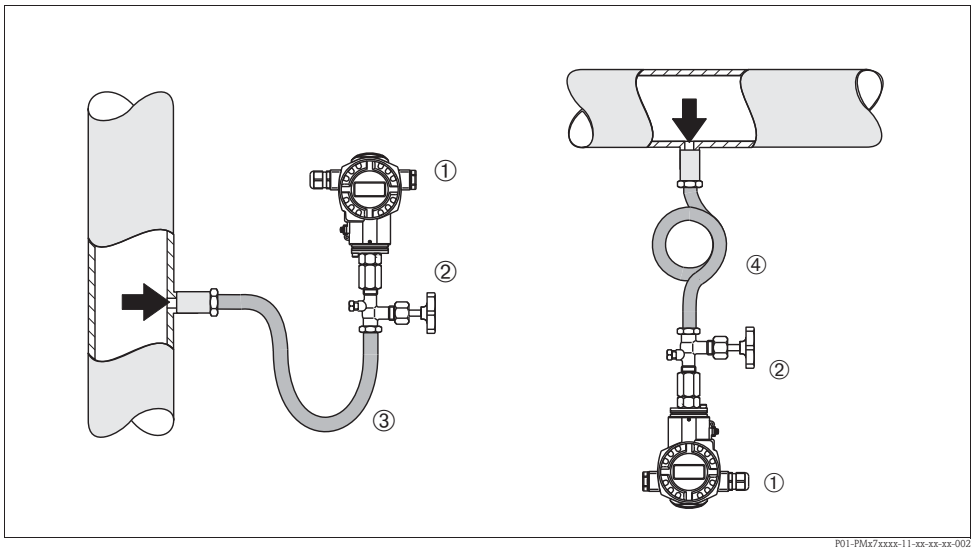


Fig. 6: Measuring arrangement for pressure measurement in steams

1 Cerabar S
2 Shut-off device
3 U-shaped siphon
4 Circular siphon

- Use siphons for pressure measurement in steam. The siphon reduces the temperature to almost ambient temperature. Preferably mount the Cerabar S with the siphon below the tapping point. Advantages:
  – defined water column only causes minimal/negligible measured errors
  – only minimal/negligible thermal effects on the device
  Mounting above the tapping point is also possible. Pay attention to the maximum permitted ambient temperature of the transmitter!
- Fill the siphon with liquid before commissioning.

Pressure measurement in liquids

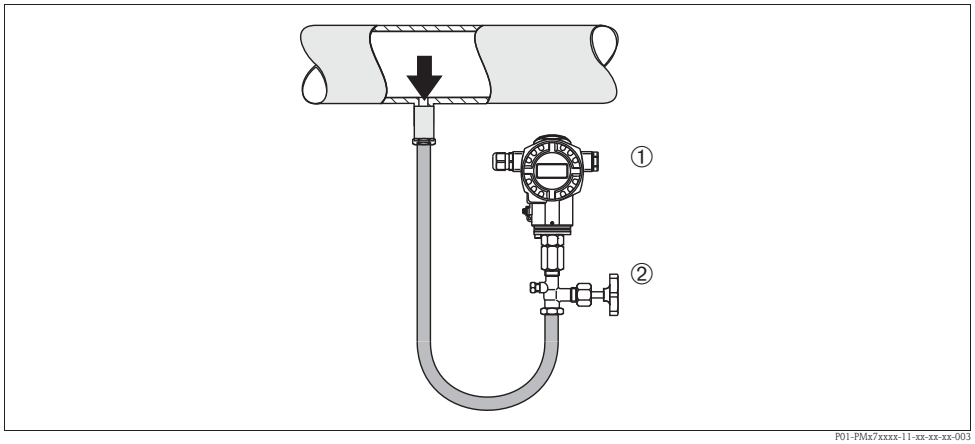


Fig. 7: Measuring arrangement for pressure measurement in liquids

1 Cerabar S
2 Shut-off device

Mount Cerabar S with shut-off device below or at the same level as the tapping point.

Level measurement

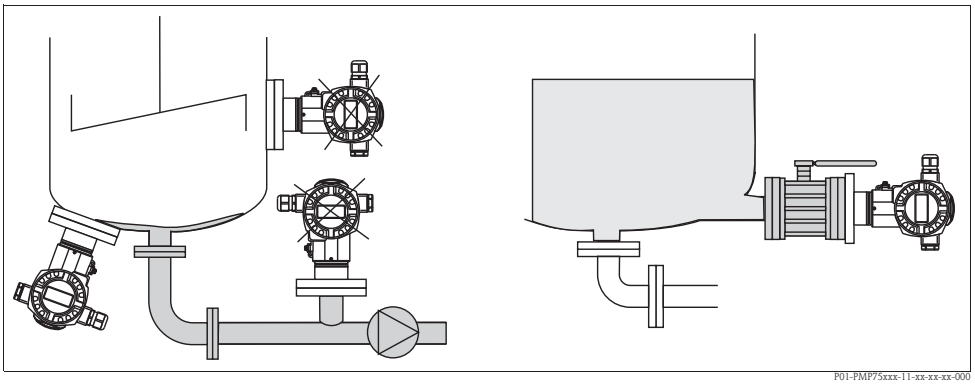


Fig. 8: Measuring arrangement for level

- Mount Cerabar S below the lowest measuring point.
- Do not mount the device at the following positions:
  In the fill flow, in the tank outlet or at a point in the container which could be affected by pressure pulses from an agitator.
- Do not mount the device in the suction area of a pump.
- The calibration and functional test can be carried out more easily if you mount the device after a shut-off device.

PVDF adapter

Note!
For instruments with PVDF adapter, a maximum torque of 7 Nm (5.16 lbf ft) is permitted.
The thread connection may become loose at high temperatures and pressures. This means that the integrity of the thread must be checked regularly and may need to be tightened using the torque given above. Teflon tape is recommended for sealing with the 1/2 NPT thread.

3.3.2 Installation instructions for devices with diaphragm seals – PMP75

Note!
- The Cerabar S with diaphragm seal is screwed in, flanged or clamped, depending on the type of diaphragm seal.
- The diaphragm seal and the pressure sensor together form a closed an calibrated system which is filled with filling fluid through a hole in the upper part. This hole is sealed and not to be opened.
- Do not clean or touch process isolating diaphragm of the diaphragm seals with hard or pointed objects.
- Do not remove the protection of the process isolating diaphragm until shortly before installation.
- When using a mounting bracket, sufficient strain relief must be ensured for the capillaries in order to prevent the capillary bending down (bending radius ≥ 100 mm (3.94 in)).
- Please note that the hydrostatic pressure of the liquid columns in the capillaries can cause zero point shift. The zero point shift can be corrected. → 41, "Position adjustment".
- Please note the application limits of the diaphragm seal filling oil as detailed in the Technical Information for Cerabar S TI00383P, Section "Planning instructions for diaphragm seal systems".

In order to obtain more precise measurement results and to avoid a defect in the device, mount the capillaries as follows:
- Vibration-free (in order to avoid additional pressure fluctuations)
- Not in the vicinity of heating or cooling lines
- Insulate if the ambient temperature is below ore above the reference temperature
- With a bending radius of ≥100 mm (3.94 in).

Vacuum application

For applications under vacuum, Endress+Hauser recommends mounting the pressure transmitter underneath the diaphragm seal. A vacuum load of the diaphragm seal caused by the presence of filling oil in the capillaries is hereby prevented.

When the pressure transmitter is mounted above the diaphragm seal, the maximum height difference H1 in accordance with the illustration below on the left must not be exceeded.
The maximum height difference is dependent on the density of the filling oil and the smallest ever pressure that is permitted to occur at the diaphragm seal (empty container), see illustration below, on the right.

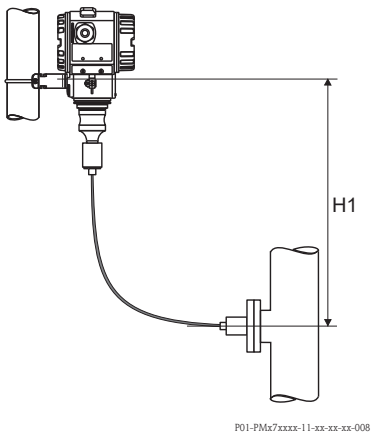


Fig. 9: Installation above the diaphragm seal

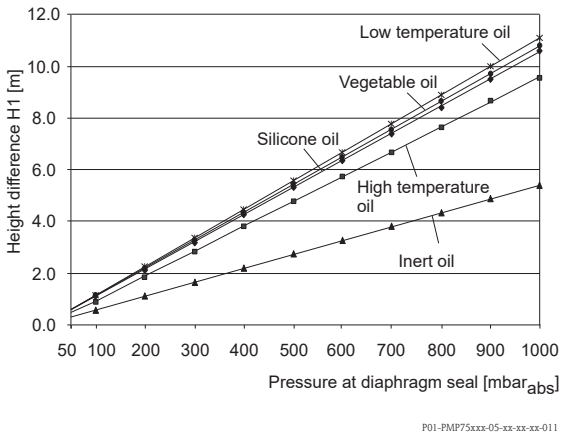
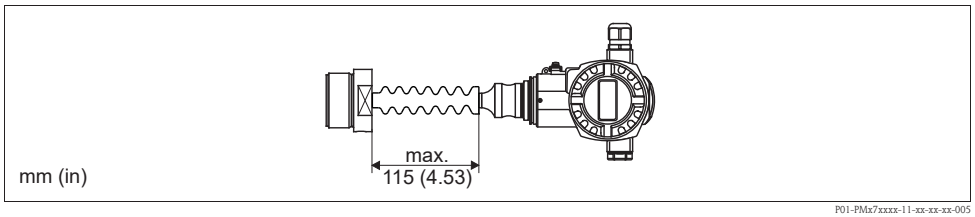


Fig. 10: Diagram of maximum installation height above the diaphragm seal for vacuum applications dependent on the pressure at the diaphragm seal

Mounting with temperature isolator



Endress+Hauser recommends the use of temperature separators in the event of constant extreme fluid temperatures which lead to the maximum permissible electronics temperature of +85 °C (+185 °F) being exceeded. To minimise the influence of rising heat, Endress+Hauser recommends the device be mounted horizontally or with the housing pointing downwards. The additional installation height also brings about a zero point shift of approx. 21 mbar (0.315 psi) due to the hydrostatic columns in the temperature isolator. You can correct this zero point shift. See also
→ 📄 26, "Function of the operating elements – on-site display not connected" or
→ 📄 41, "Position adjustment".

3.3.3 Seal for flange mounting

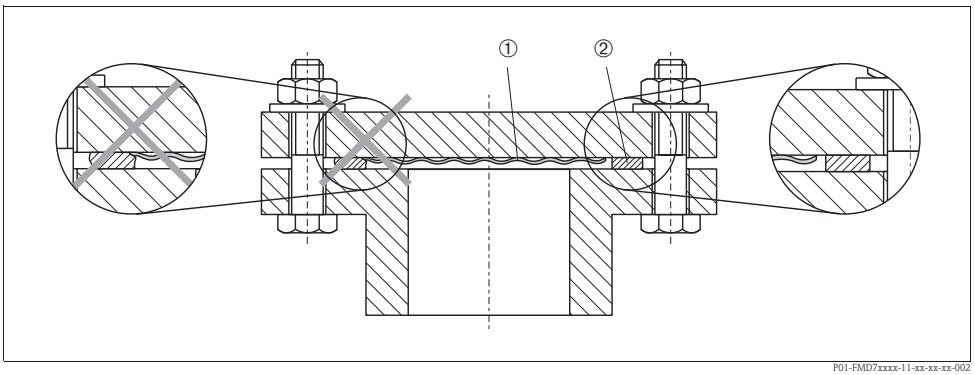


Fig. 11: Mounting the versions with flange or diaphragm seal

1 Process isolating diaphragm
2 Seal

Warning!
The seal is not allowed to press on the process isolating diaphragm as this could affect the measurement result.

3.3.4 Installation with heat insulation – PMC71 high temperature version and PMP75

The devices must only be insulated up to a certain height. The maximum permitted insulation height is labelled on the devices and applies to an insulation material with a specific heat conductivity and to the maximum permitted ambient and process temperature (see following table). The data were determined under the most critical application "quiescent air".

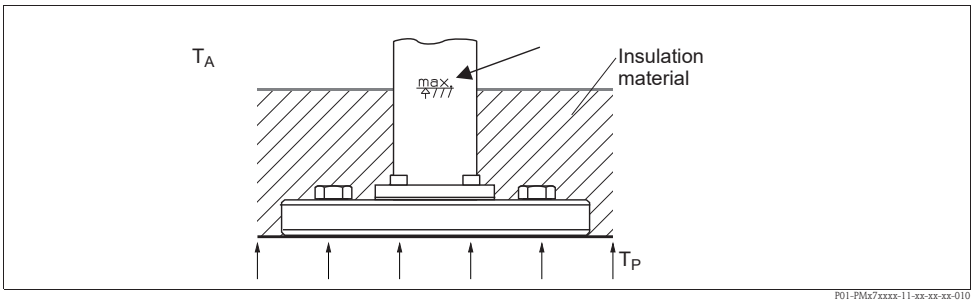


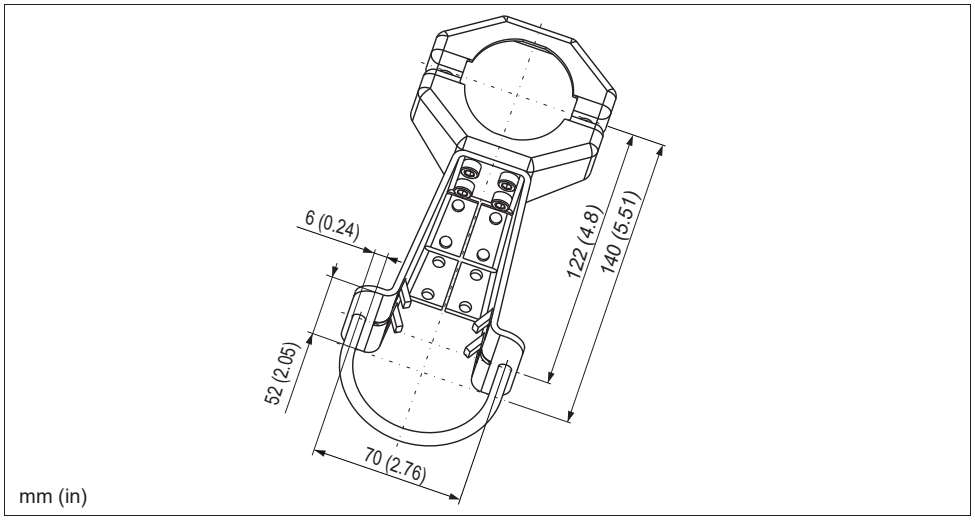
Fig. 12: Maximum insulation height, here e.g. PMC71 with flange

	PMC71	**PMP75**
Ambient temperature (T_A)	≤ 70°C (158°F)	≤ 70°C (158°F)
Process temperature (T_P)	≤ 150°C (302°F)	≤ 400°C (752°F) [1)]
Heat conductivity Insulation material	≤ 0,04 W/(m x K)	

1) Depending on the diaphragm seal filling oil used (see Technical Information TI00383P Cerabar S)

3.3.5 Wall and pipe-mounting (optional)

Endress+Hauser offers a mounting bracket for installing on pipes or walls.



Please note the following when mounting:
- Devices with capillary lines: mount capillaries with a bending radius of ≥ 100 mm (3.94 in).
- In the case of pipe mounting, the nuts on the bracket must be tightened uniformly with a torque of at least 5 Nm (3.69 lbf ft).

3.3.6 Assembling and mounting the "separate housing" version

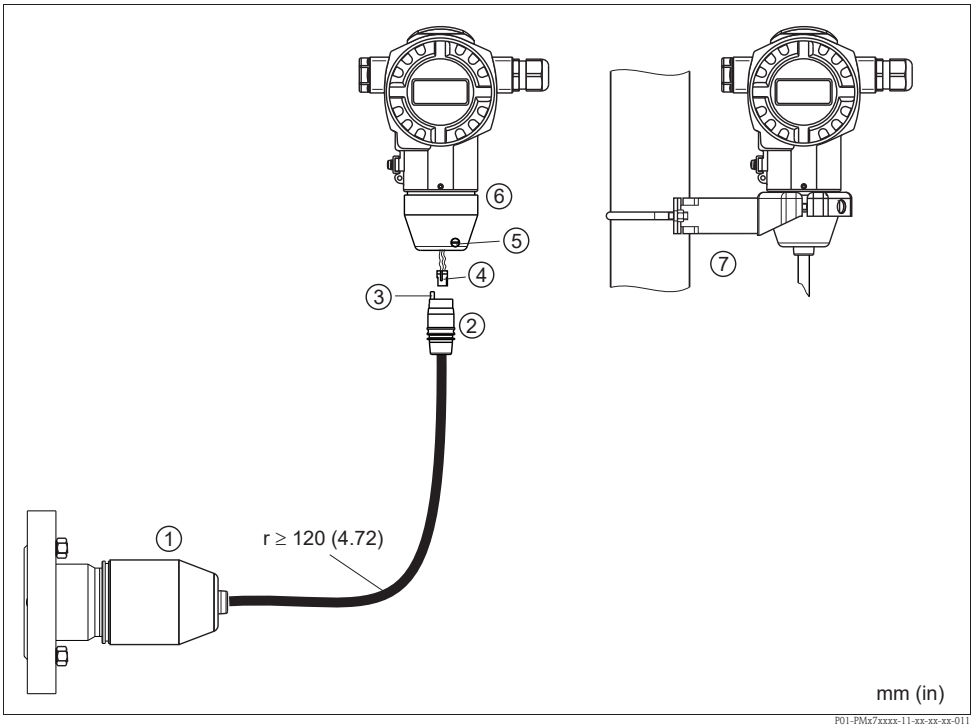


Fig. 13: "Separate housing" version

1 In the "separate housing" version, the sensor is supplied with process connection and cable fitted.
2 Cable with connection jack
3 Pressure compensation
4 Plug
5 Locking screw
6 Housing fitted with housing adapter, included
7 Mounting bracket suitable for wall and pipe mounting, included

Assembly and mounting

1. Connect plug (item 4) into the corresponding connection jack of the cable (item 2).
2. Plug the cable into the housing adapter (item 6).
3. Tighten the locking screw (item 5).
4. Mount the housing on a wall or pipe using the mounting bracket (item 7). When mounting on a pipe, tighten the nuts on the bracket uniformly with a torque of at least 5 Nm (3.69 lbf ft). Mount the cable with a bending radius (r) ≥ 120 mm (4.72 in).

3.3.7 PMP71, version prepared for diaphragm seal mount – welding recommendation

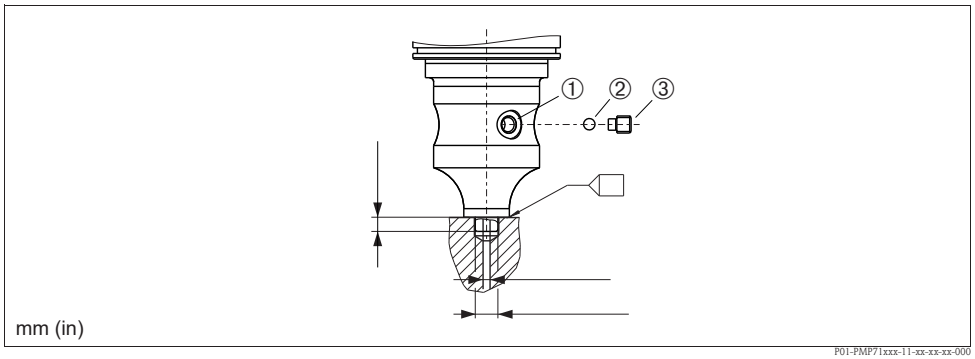
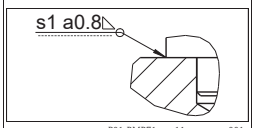


Fig. 14: Version U1: prepared for diaphragm seal mount

1 Hole for filling fluid
2 Bearing
3 Threaded pin
A1 See the following table "Welding recommendation"

Welding recommendation
For the "U1 Prepared for diaphragm seal mount" version in feature 70 "Process connection; Material" in the order code of up to including 40 bar (600 psi)-sensors, Endress+Hauser recommends welding on the diaphragm seal as follows: the total welding depth of the fillet weld is 1 mm (0.04 in) at an external diameter of 16 mm (0.63 in). Welding is performed according to the WIG method.

Consecutive seam no.	Sketch/welding groove shape, dimension as per DIN 8551	Base material matching	Welding process DIN EN ISO 24063	Welding position	Inert gas, additives
A1 for sensors ≤ 40 bar (600 psi)	 P01-PMP71xxx-11-xx-xx-xx-001	Adapter made of 316L (1.4435) to be welded to diaphragm seal made of 316L (1.4404/1.4435)	141	PB	Inert gas Ar/H 95/5 Additive: 1.4430 (ER 316L Si)

3.3.8 Rotating the housing

The housing can be rotated up to 380° by loosening the Allen screw.

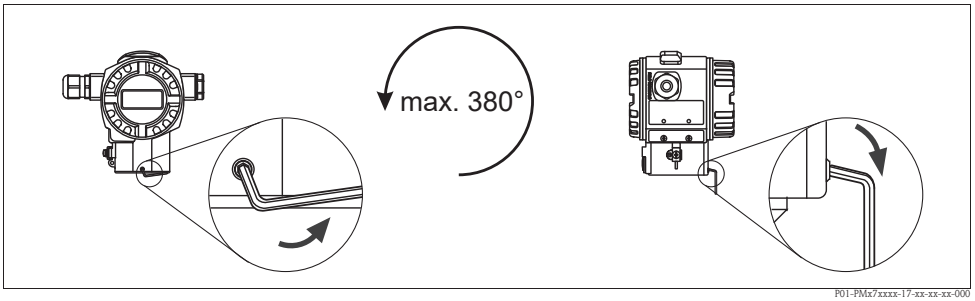


Fig. 15: Aligning the housing

– T14 housing: Loosen setscrew with a 2 mm (0.08 in) Allen key.
Hygenic T17 housing:Loosen setscrew with a 3 mm (0.12 in) Allen key.
– Rotate housing (max. up to 380°).
– Retighten setscrew with 1 Nm (0,74 lbf ft).

3.3.9 Closing the housing cover

Note!
When closing the housing cover, please ensure that the thread of the cover and housing are free from dirt, e.g. sand.If you feel any resistance when closing the cover, check the thread on both again to ensure that they are free from dirt.

Close cover on a hygenic stainless steel housing (T17)

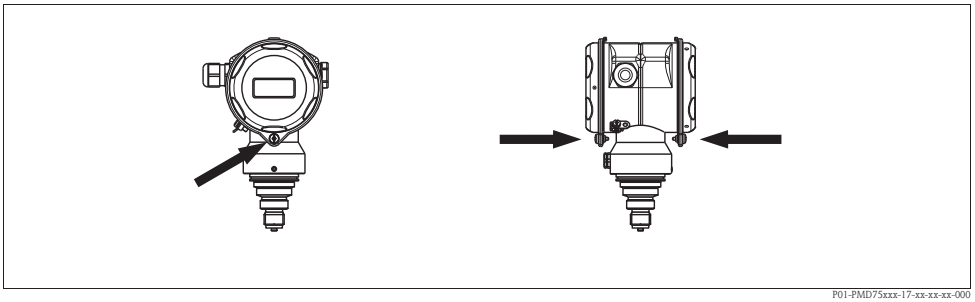


Fig. 16: Close cover

The covers for the terminal and electronics compartment are hooked into the casing and closed with a screw. These screws should be finger-tightened (2 Nm (1.48 lbf ft)) to the stop to ensure that the covers sit tightly.

3.4 Post-installation check

After installing the device, carry out the following checks:
- Are all screws firmly tightened?
- Are the housing covers screwed down tight?

4 Wiring

4.1 Connecting the device

Warning!
Risk of electric shock!
If the operating voltage is > 35 VDC: Dangerous contact voltage at terminals.
In a wet environment, do not open the cover if voltage is present.

Warning!
Limitation of electrical safety due to incorrect connection!

- Risk of electric shock and/or explosion in hazardous areas! In a wet environment, do not open the cover if voltage is present.
- When using the measuring device in hazardous areas, installation must comply with the corresponding national standards and regulations and the Safety Instructions or Installation or Control Drawings.
- Devices with integrated overvoltage protection must be earthed.
- Protective circuits against reverse polarity, HF influences and overvoltage peaks are installed.
- The supply voltage must match the supply voltage on the nameplate (→ 🖹 6, "Nameplate").
- Switch off the supply voltage before connecting the device.
- Remove housing cover of the terminal compartment.
- Guide cable through the gland. Preferably use twisted, screened two-wire cable.
- Connect device in accordance with the following diagram.
- Screw down housing cover.
- Switch on supply voltage.

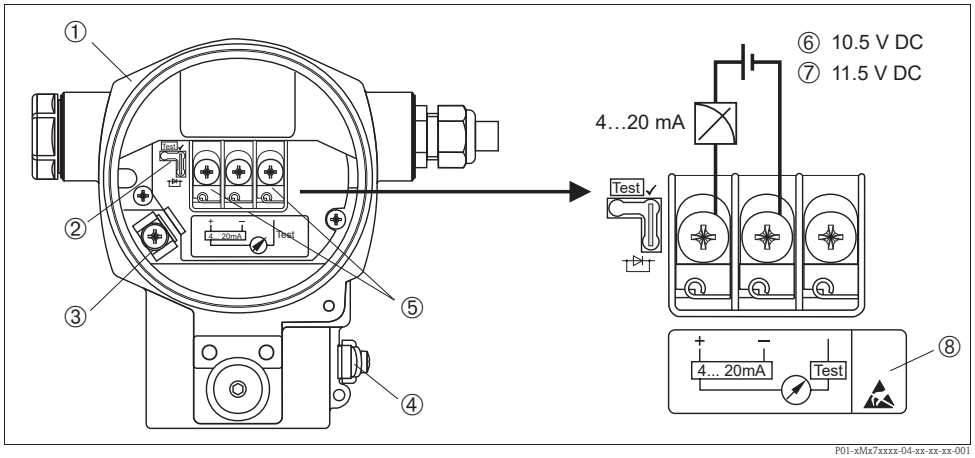


Fig. 17: Electrical connection 4 to 20 mA HART. Observe also → 🖹 21, "Supply voltage".

1 Housing
2 Jumper for 4 to 20 mA test signal.
→ 🖹 21, "Taking 4 to 20 mA test signal" part.
3 Internal earth terminal
4 External earth terminal
5 4 to 20 mA test signal between plus and test terminal
6 Minimum supply voltage = 10.5 V DC, jumper is inserted in accordance with the illustration.
7 Minimum supply voltage = 11.5 V DC, jumper is inserted in "Test" position.
8 Devices with integrated overvoltage protection are labelled OVP (overvoltage protection) here.

4.1.1 Devices with Harting plug Han7D

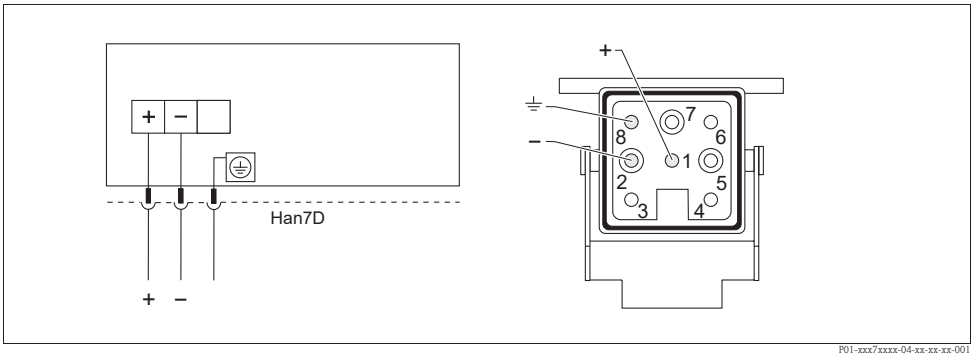
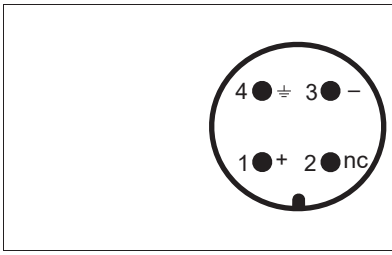


Fig. 18: Left: electrical connection for devices with Harting plug Han7D
Right: view of the plug connector at the device

4.1.2 Devices with M12 plug



PIN	Meaning
1	signal +
2	not used
3	signal –
4	ground

4.1.3 Connecting the cable version

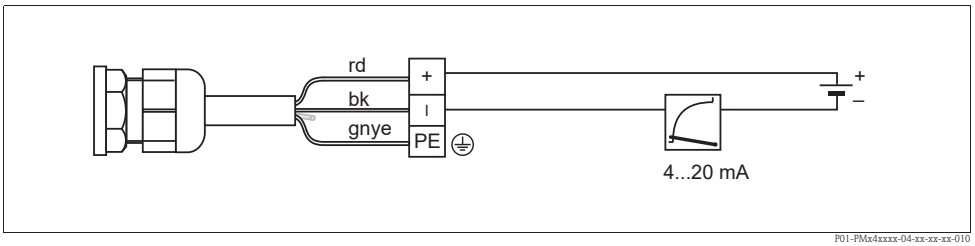


Fig. 19: rd = red, bk = black, gnye = green-yellow

4.2 Connecting the measuring unit

4.2.1 Supply voltage

Note!
- All explosion protection data are given in separate documentation which is available upon request. The Ex documentation is supplied as standard with all devices approved for use in explosion hazardous areas.
- When using the measuring device in hazardous areas, installation must comply with the corresponding national standards and regulations and the Safety Instructions or Installation or Control Drawings.

Electronic version	Jumper for 4 to 20 mA test signal in "Test" position (Delivery status)	Jumper for 4 to 20 mA test signal in "Non-Test" position
4 to 20 mA HART, for non-hazardous areas	11.5 to 45 V DC	10.5 to 45 V DC

Taking 4 to 20 mA test signal

A 4 to 20 mA signal may be measured via the positive and test terminal without interrupting the measurement. The minimum supply voltage of the device can be reduced by simply changing the position of the jumper. As a result, operation is also possible with lower voltage sources. To keep the measured error below 0.1 %, the current measuring device should display an internal resistance of $< 0.7\ \Omega$. Observe the position of the jumper in accordance with the following table.

Jumper position for test signal	Description
	– Taking 4 to 20 mA test signal via plus and test terminal: possible. (Thus, the output current can be measured without interruption via the diode.) – Delivery status – Minimum supply voltage: 11.5 V DC
	– Taking 4 to 20 mA test signal via plus and test terminal: not possible. – Minimum supply voltage: 10.5 V DC

4.2.2 Cable specification

- Endress+Hauser recommends using twisted, screened two-wire cables.
- Terminals for wire cross-sections 0.5 to 2.5 mm^2 (20 to 14 AWG)
- Cable external diameter: 5 to 9 mm (0.2 to 0.35 in)

4.2.3 Load

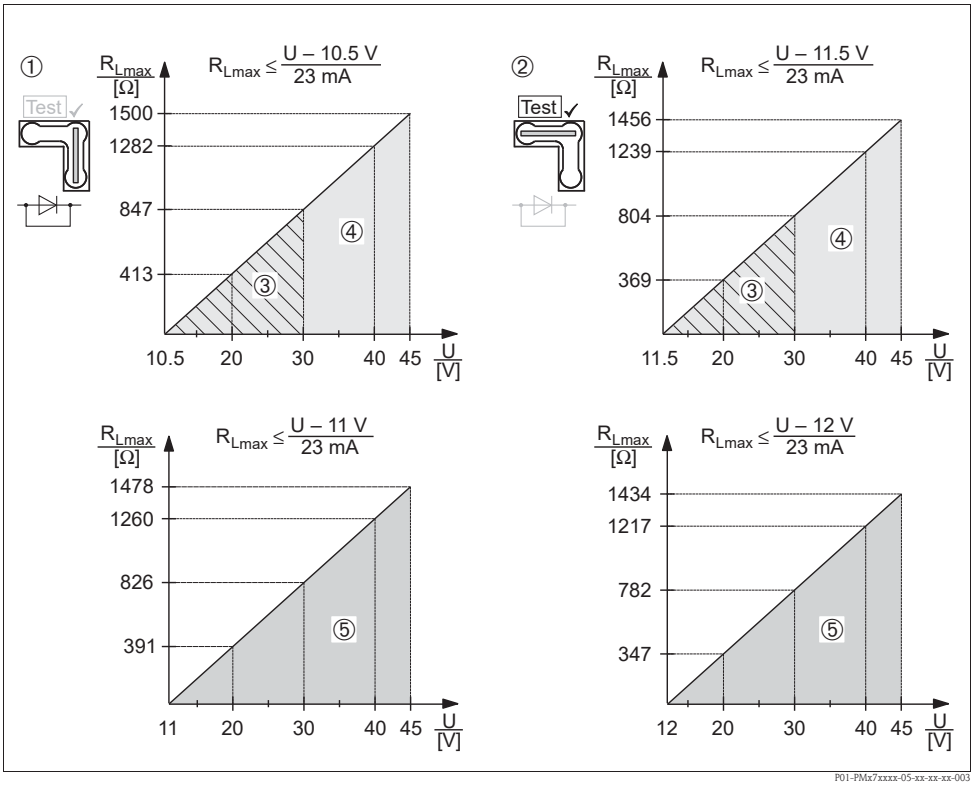


Fig. 20: Load diagram, observe the position of the jumper and the explosion protection. (→ 21, "Taking 4 to 20 mA test signal" part.)

1 Jumper for the 4 to 20 mA test signal inserted in "Non-Test" position
2 Jumper for the 4 to 20 mA test signal inserted in "Test" position
3 Supply voltage 10.5 (11.5) to 30 V DC for 1/2 G, 1 GD, 1/2 GD, FM IS , CSA IS, IECEx ia, NEPSI Ex ia
4 Supply voltage10.5 (11.5) to 45 V DC for devices for non-hazardous areas, 1/2 D, 1/3 D, 2 G Ex d, 3 G Ex nA, FM XP, FM DIP, FM NI, CSA XP and CSA Dust-Ex, NEPSI Ex d
5 Supply voltage 11 (12) to 45 V DC for PMC71, Ex d[ia], NEPSI Ex d[ia]
R_{Lmax} Maximum load resistance
U Supply voltage

Note!
When operating via a handheld terminal or via PC with an operating program, a minimum communication resistance of 250 Ω must exist within the loop.

4.2.4 Screening/potential matching

- You achieve optimum screening against disturbances if the screening is connected on both sides (in the cabinet and on the device). If you have to reckon with potential equalisation currents in the plant, only earth screening on one side, preferably at the transmitter.
- When using in hazardous areas, you must observe the applicable regulations. Separate Ex documentation with additional technical data and instructions is included with all Ex systems as standard.

4.2.5 Connecting Field Xpert SFX100

Compact, flexible and robust industry handheld terminal for remote parametrization and measured value inspection via the HART current output (4-20mA).
For details refer to Operating Instructions BA00060S/04/EN.

4.2.6 Connecting Commubox FXA195

The Commubox FXA195 connects intrinsically safe transmitters with the HART protocol to a computer's USB port. This allows remote operation of the transmitter using Endress+Hauser's FieldCare operating program. Power is supplied to the Commubox through the USB port. The Commubox is also suitable for connection to intrinsically safe circuits. → See Technical Information TI00404F for further information.

4.2.7 Connecting Commubox FXA291/ToF Adapter FXA291 for operation via FieldCare

Connecting Commubox FXA291

The Commubox FXA291 connects Endress+Hauser field instruments with CDI interface (= Endress+Hauser Common Data Interface) to the USB interface of a personal computer or a notebook. For details refer to TI00405C/07/EN.

Note!
For the device you need the "ToF Adapter FXA291" as an additional accessory.

Connecting ToF Adapter FXA291

The ToF Adapter FXA291 connects the Commubox FXA291 via the USB interface of a personal computer or a notebook to the device. For details refer to KA00271F/00/A2.

4.3 Potential matching

Ex applications: Connect all devices to the local potential matching.
Observe the applicable regulations.

4.4 Overvoltage protection (optional)

Devices showing version "M" in feature 100 "Additional options 1" or feature 110 "Additional options 2" in the order code are equipped with overvoltage protection (see also Technical Information TI00383P "Ordering information".

- Overvoltage protection:
  - Nominal functioning DC voltage: 600 V
  - Nominal discharge current: 10 kA
- Surge current check î = 20 kA as per DIN EN 60079-14: 8/20 µs satisfied
- Arrester AC current check I = 10 A satisfied

Warning!
Devices with integrated overvoltage protection must be earthed.

4.5 Post-connection check

Perform the following checks after completing electrical installation of the device:

- Does the supply voltage match the specifications on the nameplate?
- Is the device properly connected (→ 19)?
- Are all screws firmly tightened?
- Are the housing covers screwed down tight?

As soon as voltage is applied to the device, the green LED on the electronic insert lights up for a few seconds or the connected on-site display lights up.

5 Operation

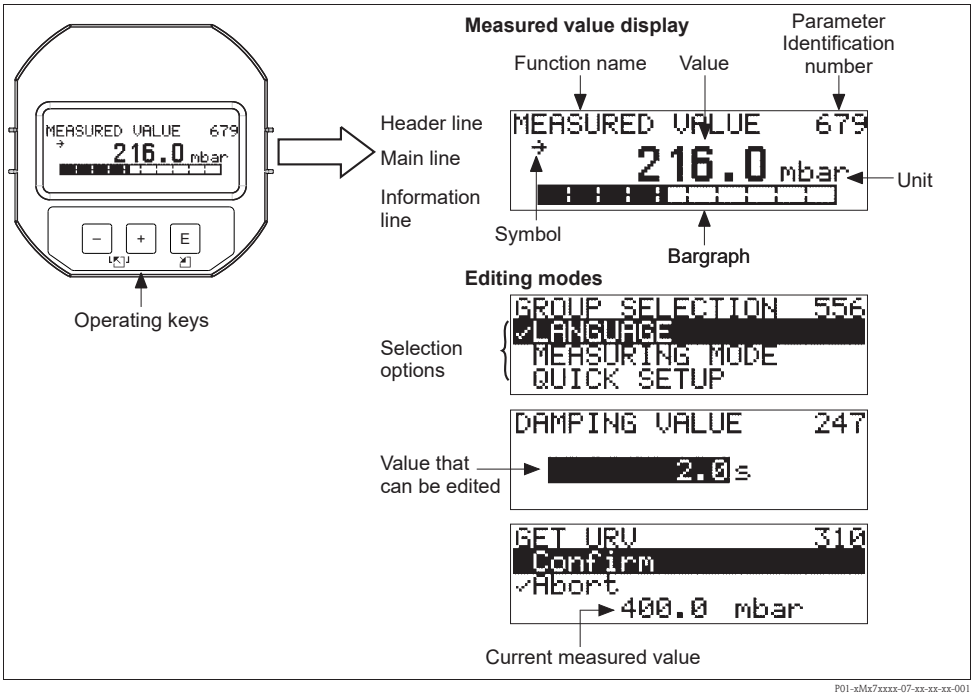
Feature 20 "Output; operation" in the order code provides you with information on the operating options available to you.

Versions in the order code		Operation
A	4 to 20 mA HART; external operation, LCD	Via on-site display and 3 keys on the exterior of the device
B	4 to 20 mA HART; internal operation, LCD	Via on-site display and 3 keys on the inside of the device
C	4 to 20 mA; internal operation	Without on-site display, 3 keys on the inside of the device

5.1 On-site display (optional)

A 4-line liquid crystal display (LCD) is used for display and operation.
The on-site display shows measured values, dialog texts, fault messages and notice messages.
The display of the device can be turned in 90° steps. Depending on the installation position of the device, this makes it easy to operate the device and read the measured values.

Functions:
- 8-digit measured value display including sign and decimal point, bargraph for current display
- Simple and complete menu guidance thanks to separation of the parameters into several levels and groups
- Each parameter is given a 3-digit ID number for easy navigation
- Option for configuring the display according to individual requirements and desires, such as language, alternating display, contrast setting, display of other measured values such as sensor temperature
- Comprehensive diagnostic functions (fault and warning message, peak-hold indicators, etc.)
- Rapid and safe commissioning with the Quick Setup menus



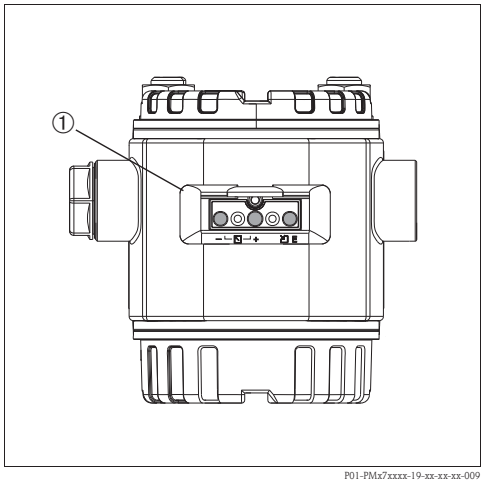
The following table illustrates the symbols that can appear on the on-site display. Four symbols can occur at one time.

Symbol	Meaning
	Alarm symbol – Symbol flashing: warning, device continues measuring. – Symbol permanently lit: error, device does not continue measuring. *Note:* The alarm symbol may overlie the tendency symbol.
	Lock symbol The operation of the device is locked. Unlock device, → 🖹 38.
	Communication symbol Data transfer via communication. *Note:* The alarm symbol may overlie the communication symbol.
	Tendency symbol (increasing) The measured value is increasing.
	Tendency symbol (decreasing) The measured value is decreasing.
	Tendency symbol (constant) The measured value has remained constant over the past few minutes.

5.2 Operating elements

5.2.1 Position of operating elements

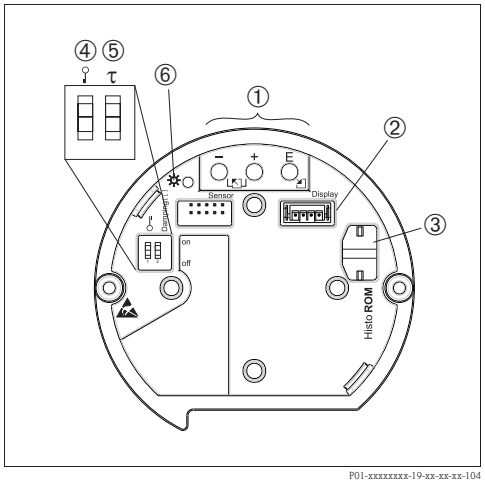
With regard to aluminium or stainless steel housings (T14), the operating keys are located either outside the device under the protection cap or inside on the electronic insert. In hygenic stainless steel housings (T17), the operating keys are always located inside on the electronic insert.



P01-PMx7xxxx-19-xx-xx-xx-009

Fig. 21: Operating keys, external

1 Operating keys on the exterior of the device under the protective flap



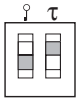
P01-xxxxxxxx-19-xx-xx-xx-104

Fig. 22: Operating keys, internal

1 Operating keys
2 Slot for optional display
3 Slot for optional HistoROM®/M-DAT
4 DIP-switch for locking/unlocking measured-value-relevant parameters
5 DIP-switch for damping on/off
6 Green LED to indicate value being accepted

5.2.2 Function of the operating elements – on-site display not connected

Press and hold the key or the key combination for at least 3 seconds to execute the corresponding function. Press the key combination for at least 6 seconds for a reset.

Operating key(s)	Meaning
–	Adopt lower range value. A reference pressure is present at the device. See also → 27, "Pressure measuring mode" or → 28, "Level measuring mode".
+	Adopt upper range value. A reference pressure is present at the device. See also → 27, "Pressure measuring mode" or → 28, "Level measuring mode".
E	Position adjustment
+ and – and E	Reset all parameters. The reset via operating keys corresponds to the software reset code 7864.
+ and E	Copy the configuration data from the optional HistoROM®/M-DAT module to the device.
– and E	Copy the configuration data from the device to the optional HistoROM®/M-DAT module.
 P01-xxxxxxxx-19-xx-xx-xx-057	– DIP-switch 1: for locking/unlocking measured-value-relevant parameters Factory setting: off (unlocked) – DIP-switch 2: damping on/off, Factory setting: on (damping on)

5.2.3 Function of the operating elements – on-site display connected

Operating key(s)	Meaning
+	– Navigate upwards in the picklist – Edit the numerical values and characters within a function
–	– Navigate downwards in the picklist – Edit the numerical values and characters within a function
E	– Confirm entry – Jump to the next item
+ and E	Contrast setting of on-site display: darker
– and E	Contrast setting of on-site display: brighter
+ and –	ESC functions: – Exit edit mode without saving the changed value. – You are in a menu within a function group. The first time you press the keys simultaneously, you go back a parameter within the function group. Each time you press the keys simultaneously after that, you go up a level in the menu. – You are in a menu at a selection level. Each time you press the keys simultaneously, you go up a level in the menu. *Note:* The terms function group, level and selection level are explained in → 30, "General structure of the operating menu".

5.3 On-site operation – on-site display not connected

Note!
To operate the device with a HistoROM®/M-DAT module see → 32, "HistoROM®/M-DAT (optional)".

5.3.1 Pressure measuring mode

If no on-site display is connected, the following functions are possible by means of the three keys on the electronic insert or on the exterior of the device:
- Position adjustment (zero point correction)
- Setting lower range value and upper range value
- Device reset, → 26, "Function of the operating elements – on-site display not connected".

Note!
- The operation must be unlocked. → 37, "Locking/unlocking operation".
- The device is configured for the Pressure measuring mode as standard. You can switch measuring modes by means of the MEASURING MODE parameter. → 40, "Selecting language and measuring mode".
- The pressure applied must be within the nominal pressure limits of the sensor. See information on the nameplate.

Warning!
If the measuring mode is changed, the span setting (URV) must be verified in the "Calibration" → "Basic Setup" operating menu and, if necessary, reconfigured.

Carry out position adjustment.[1)]	
Pressure is present at device.	
↓	
Press "E"-key for 3 s.	
↓	
Does the LED on the electronic insert light up briefly?	
Yes	No
↓	↓
Applied pressure for position adjustment has been accepted.	Applied pressure for position adjustment has not been accepted. Observe the input limits.

Setting lower range value.	
Desired pressure for lower range value is present at device.	
↓	
Press "–"-key for 3 s.	
↓	
Does the LED on the electronic insert light up briefly?	
Yes	No
↓	↓
Applied pressure for lower range value has been accepted.	Applied pressure for lower range value has not been accepted. Observe the input limits.

Setting upper range value.	
Desired pressure for upper range value is present at device.	
↓	
Press "+"-key for 3 s.	
↓	
Does the LED on the electronic insert light up briefly?	
Yes	No
↓	↓
Applied pressure for upper range value has been accepted.	Applied pressure for upper range value has not been accepted. Observe the input limits.

1) Observe "Warning", → 40, "Commissioning".

5.3.2 Level measuring mode

If no on-site display is connected, the following functions are possible by means of the three keys on the electronic insert or on the exterior of the device:
- Position adjustment (zero point correction)
- Set the lower and upper pressure value and assign to the lower and upper level value
- Device reset, → 📄 26, "Function of the operating elements – on-site display not connected".

Note!
- The "-" and "+"- keys only have a function in the following cases:
  – LEVEL SELECTION "Level Easy Pressure", CALIBRATION MODE "Wet"
  – LEVEL SELECTION "Level Standard", LEVEL MODE "Linear", CALIBRATION MODE "Wet"
  The keys have no function in other settings.
- The device is configured for the Pressure measuring mode as standard. You can switch measuring modes by means of the MEASURING MODE parameter. → 📄 40, "Selecting language and measuring mode".
  The following parameters are set to the following values in the factory:
  – LEVEL SELECTION: Level Easy Pressure
  – CALIBRATION MODE: Wet
  – OUTPUT UNIT or LIN. MEASURAND: %
  – EMPTY CALIB.: 0.0
  – FULL CALIB.: 100.0.
  – SET LRV: 0.0 (corresponds to 4 mA value)
  – SET URV: 100.0 (corresponds to 20 mA value)
  These parameters can only be modified by means of the on-site display or remote operation such as the FieldCare.
- The operation must be unlocked. → 📄 37, "Locking/unlocking operation".
- The pressure applied must be within the nominal pressure limits of the sensor. See information on the nameplate.
- See also → 📄 44, "Level measurement". For parameter description see Operating Instructions BA00274P.
- LEVEL SELECTION, CALIBRATION MODE, LEVEL MODE, EMPTY CALIB., FULL CALIB, SET LRV and SET URV are parameter names used for on-site display or remote operation such as FieldCare, for instance.

Warning!
If the measuring mode is changed, the span setting (URV) must be verified in the "Calibration" → "Basic Setup" operating menu and, if necessary, reconfigured.

Carry out position adjustment.[1)]		**Setting lower pressure value.**		**Setting upper pressure value.**	
Pressure is present at device.		Desired pressure for lower pressure value (EMPTY PRESSURE[2)]) is present at device.		Desired pressure for upper pressure value (FULL PRESSURE[1]) is present at device.	
↓		↓		↓	
Press "E"-key for 3 s.		Press "–"-key for 3 s.		Press "+"-key for 3 s.	
↓		↓		↓	
Does the LED on the electronic insert light up briefly?		Does the LED on the electronic insert light up briefly?		Does the LED on the electronic insert light up briefly?	
Yes	No	Yes	No	Yes	No
↓	↓	↓	↓	↓	↓
Applied pressure for position adjustment has been accepted.	Applied pressure for position adjustment has not been accepted. Observe the input limits.	The pressure present was saved as the lower pressure value (EMPTY PRESSURE[1]) and assigned to the lower level value (EMPTY CALIB.[1]).	The pressure present was not saved as the lower pressure value. Observe the input limits.	The pressure present was saved as the upper pressure value (FULL PRESSURE[1]) and assigned to the upper level value (FULL CALIB.[1]).	The pressure present was not saved as the upper pressure value. Observe the input limits.

1) Observe "Warning", → 📄 40, "Commissioning".

2) Parameter name used for the on-site display or remote operation such as the FieldCare.

5.4 On-site operation – on-site display connected

If the on-site display is connected, the three operating keys are used to navigate through the operating menu, → 📄 26, "Function of the operating elements – on-site display connected".

5.4.1 General structure of the operating menu

The menu is split into four levels. The three upper levels are used to navigate while you use the bottom level to enter numerical values, select options and save settings. The structure of the OPERATING MENU depends on the measuring mode selected, e.g. if the "Pressure" measuring mode is selected, only the functions necessary for this mode are displayed.

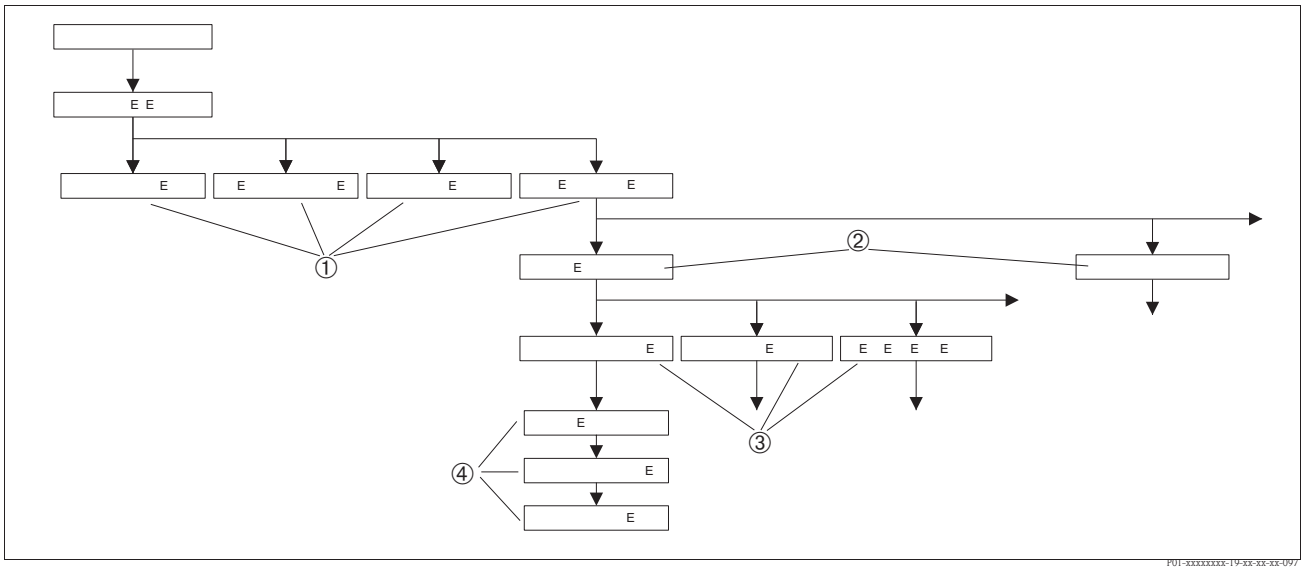


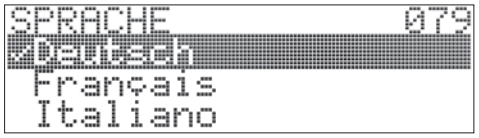
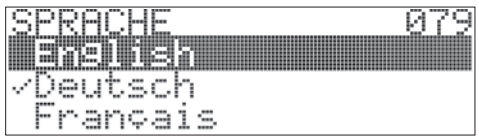
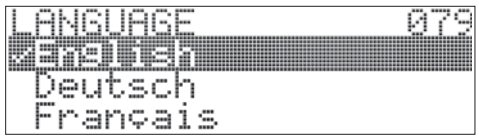
Fig. 23: Structure of the operating menu

1 1. Selection level
2 2. Selection level
3 Function groups
4 Parameter

Note!
The LANGUAGE and MEASURING MODE parameters are only displayed via the on-site display on the 1st selection level. In the digital communication, the LANGUAGE parameter is displayed in the DISPLAY group and the MEASURING MODE parameter is displayed in the QUICK SETUP menus or in the BASIC SETUP function group.

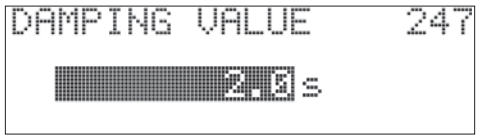
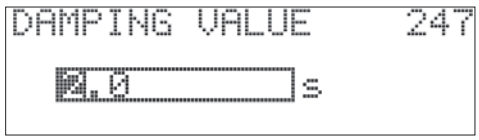
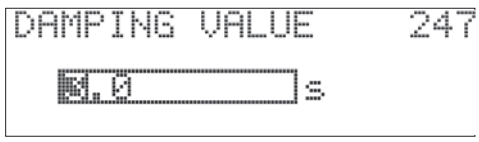
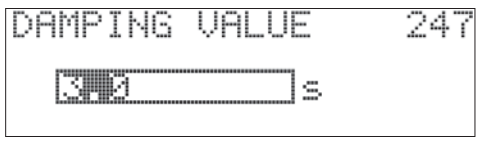
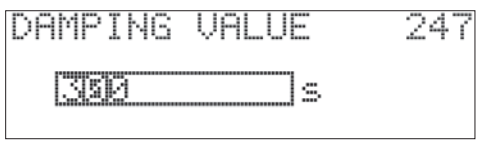
5.4.2 Selecting an option

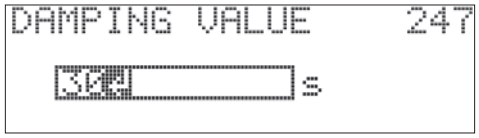
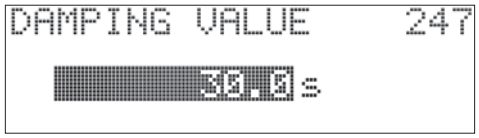
Example: select "English" as the language of the menu.

On-site display	Operation
 P01-xxxxxxxx-19-xx-xx-xx-017	German is selected as the language. A ✓in front of the menu text indicates the active option.
 P01-xxxxxxxx-19-xx-xx-xx-033	Select English with "+" or "–".
 P01-xxxxxxxx-19-xx-xx-xx-034	1. Confirm your choice with "E". A ✓ in front of the menu text indicates the active option. (English is now selected as the menu language.) 2. Jump to the next item with "E".

5.4.3 Editing a value

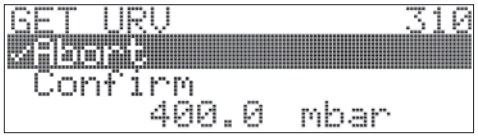
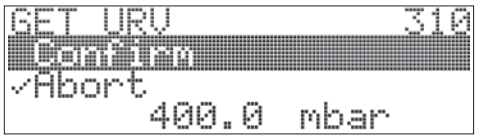
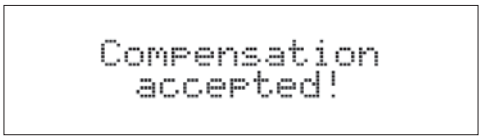
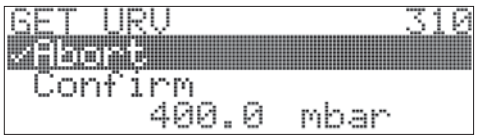
Example: adjusting DAMPING VALUE function from 2.0 s to 30.0 s.
→ 📄 26, "Function of the operating elements – on-site display connected".

On-site display	Operation
 P01-xxxxxxxx-19-xx-xx-xx-023	The on-site display shows the parameter to be changed. The value highlighted in black can be changed. The "s" unit is fixed and cannot be changed.
 P01-xxxxxxxx-19-xx-xx-xx-027	1. Press "+" or "–" to get to the editing mode. 2. The first digit is highlighted in black.
 P01-xxxxxxxx-19-xx-xx-xx-028	1. Use "+" to change "2" to "3". 2. Confirm "3" with "E". The cursor jumps to the next position (highlighted in black).
 P01-xxxxxxxx-19-xx-xx-xx-029	The decimal point is highlighted in black, i.e. you can now edit it.
 P01-xxxxxxxx-19-xx-xx-xx-030	1. Keep pressing "+" or "–" until "0" is displayed. 2. Confirm "0" with "E". The cursor jumps to the next position. ↵ is displayed and is highlighted in black. → See next graphic.

On-site display	Operation
 P01-xxxxxxxx-19-xx-xx-xx-031	Use "E" to save the new value and exit the editing mode. See next graphic.
 P01-xxxxxxxx-19-xx-xx-xx-032	The new value for the damping is now 30.0 s. – Jump to the next parameter with "E". – You can get back to the editing mode with "+" or "–".

5.4.4 Taking pressure applied at device as value

Example: configuring upper range value – assign 20 mA to the pressure value 400 mbar (6 psi).

On-site display	Operation
 P01-xxxxxxxx-19-xx-xx-xx-035	The bottom line on the on-site display displays the pressure present, here 400 mbar (6 psi).
 P01-xxxxxxxx-19-xx-xx-xx-036	Use "+" or "–" to switch to the "Confirm" option. The active selection is highlighted in black.
 P01-xxxxxxxx-19-xx-xx-xx-037	Use "E" to assign the value (400 mbar (6 psi)) to the GET URV parameter. The device confirms the calibration and jumps back to the parameter, here GET URV (see next graphic).
 P01-xxxxxxxx-19-xx-xx-xx-035	Switch to the next parameter with "E".

5.5 HistoROM®/M-DAT (optional)

HistoROM®/M-DAT is a memory module, which is attached to the electronic insert and fulfils the following functions:

- Back-up copy of configuration data
- Copying configuration data of a transmitter into another transmitter
- Cyclic recording of pressure and sensor-temperature measured values
- Recording diverse events, such as alarms, configuration changes, counters for measuring range undershooting and exceeding for pressure and temperature, exceeding and undershooting the user limits for pressure and temperature, etc.

⚠ Warning!
Detach HistoROM®/M-DAT from the electronic insert or attach it to the insert in a deenergised state only.

Note!
- The HistoROM®/M-DAT module may be retrofitted at any time (Order No.: 52027785).
- The HistoROM data and the data in the device are analysed once a HistoROM®/M-DAT is attached to the electronic insert and power is reestablished to the device. During the analysis, the messages "W702, HistoROM data not consistent" and "W706, Configuration in HistoROM and device not identical" can occur. For measures, → 49, "Messages."

5.5.1 Copying configuration data

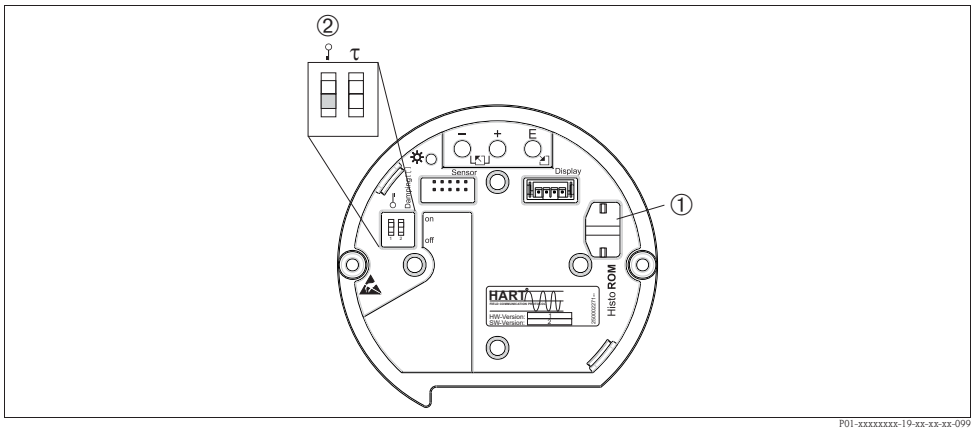


Abb. 24: Electronic insert with optional HistoROM®/M-DAT memory module

1 Optional HistoROM®/M-DAT
2 To copy configuration data from the HistoROM®/M-DAT module to a device or from a device to a HistoROM®/M-DAT, the operation must be unlocked DIP-switch 1, Position "off" ,parameter INSERT PIN NO. = 100). Observe → 37, "Locking/unlocking operation".

On-site operation – on-site display not connected

Copying configuration data from a device to a HistoROM®/M-DAT module:

Note!
The operation must be unlocked.

1. Disconnect device from supply voltage.
2. Attach the HistoROM®/M-DAT module to the electronic insert.
3. Reestablish supply voltage to the device.
4. Press "E" and "–"-keys (for at least 3 seconds) until the LED on the electronic insert lights up.
5. Wait approx. 20 seconds. Configuration data are loaded from the device to the HistoROM®/M-DAT. The device is not restarted.
6. Disconnect device from the supply voltage again.
7. Detach memory module.
8. Reestablish supply voltage to the device.

Copying configuration data from a HistoROM®/M-DAT to a device:

Note!
The operation must be unlocked.

1. Disconnect device from supply voltage.
2. Attach the HistoROM®/M-DAT module to the electronic insert. Configuration data from another device are stored in the HistoROM®/M-DAT.
3. Reestablish supply voltage to the device.
4. Press "E" und "+"-keys (for at least 3 seconds) until the LED on the electronic insert lights up.
5. Wait approx. 20 seconds. All parameters except DEVICE SERIAL No, DEVICE DESIGN., CUST. TAG NUMBER, LONG TAG NUMBER, DESCRIPTION, BUS ADDRESS, CURRENT MODE and the parameters in the POSITION ADJUSTMENT and PROCESS CONNECTION group are loaded into the device by HistoROM®/M-DAT. The device is restarted.
6. Before removing the HistoROM®/M-DAT again from the electronic insert, disconnect the device from supply voltage.

On-site operation via on-site display (optional) or remote operation

Copying configuration data from a device to a HistoROM®/M-DAT:

Note!
The operation must be unlocked.

1. Disconnect device from supply voltage.
2. Attach the HistoROM®/M-DAT module to the electronic insert.
3. Reestablish supply voltage to the device.
4. The DOWNLOAD SELECT. parameter setting has no influence on an upload from the device into HistoROM.
   (Menu path: (GROUP SELECTION →) OPERATING MENU → OPERATION)
5. Using the HistoROM CONTROL parameter select the option "Device → HistoROM" as the data transfer direction.
   (Menu path: GROUPSELECTION → OPERATING MENU → OPERATION)
6. Wait approx. 20 seconds. Configuration data are loaded from the device to the HistoROM®/M-DAT. The device is not restarted.
7. Disconnect device from the supply voltage again.
8. Detach memory module.
9. Reestablish supply voltage to the device.

Copying configuration data from a HistoROM®/M-DAT to a device:

Note!
The operation must be unlocked.

1. Disconnect device from supply voltage.
2. Attach the HistoROM®/M-DAT module to the electronic insert. Configuration data from another device are stored in the HistoROM®/M-DAT.
3. Reestablish supply voltage to the device.
4. Use the DOWNLOAD SELECT parameter to select which parameters are to be overwritten (Menu path: (GROUPS SELECTION →) OPERATING MENU → OPERATION).

   The following parameters are overwritten according to the selection:
   – **Configuration copy (factory setting):**
     all parameters except DEVICE SERIAL No., DEVICE DESIGN, CUST. TAG NUMBER, LONG TAG NUMBER, DESCRIPTION, BUS ADDRESS, CURRENT MODE and the parameters in the POSITION ADJUSTMENT, PROCESS CONNECTION, CURR. TRIM (SERVICE/SYSTEM 2), SENSOR TRIM and SENSOR DATA group.
   – **Device replacement:**
     all parameters except DEVICE SERIAL No., DEVICE DESIGN and the parameters in the POSITION ADJUSTMENT, PROCESS CONNECTION, CURR. TRIM (SERVICE/SYSTEM 2), SENSOR TRIM and SENSOR DATA group.
   – **Electronics replace**:
     all parameters except the parameters in the CURR. TRIM (SERVICE/SYSTEM 2) and SENSOR DATA group.

   Factory setting: Configuration copy
5. Using the HistoROM CONTROL parameter select the option "HistoROM → Device" as the data transfer direction.
   (Menu path: GROUP SELECTION → OPERATING MENU → OPERATION)
6. Wait approx. 20 seconds. Configuration data are loaded from the device to the HistoROM®/M-DAT. The device is restarted.
7. Before removing the HistoROM®/M-DAT again from the electronic insert, disconnect the device from supply voltage.

5.6 Operation via SFX100

Compact, flexible and robust industry handheld terminal for remote parametrization and measured value inspection via the HART current output (4-20mA).
For details refer to Operating Instructions BA00060S/04/EN.

5.7 Endress+Hauser operating program

The operating program FieldCare is an Endress+Hauser Plant Asset Management Tool based on FDT technology. You can use FieldCare to configure all your Endress+Hauser devices, as well as devices from other manufacturers that support the FDT standard. Hardware and software requirements you can find on the www.endress.com → select your country → Search: FieldCare → FieldCare → Technical Data.

FieldCare supports the following functions:
- Configuration of transmitters in online operation
- Loading and saving device data (upload/download)
- Tank linearization
- HistoROM®/M-DAT analysis
- Documentation of the measuring point

Connection options:
- HART via Fieldgate FXA520
- HART via Commubox FXA195 and USB interface of a computer
- Commubox FXA291 with ToF Adapter FXA291 via service interface

Note!
- See also → 📄 23, "Connecting Commubox FXA195".
- In the "Level Standard" measuring mode, the configuration data that were loaded with FDT upload cannot be written again (FDT download). These data are only used to document the measuring point.
- Further information on the FieldCare can be found on the Internet: http://www.endress.com → Download → Text Search: FieldCare.

5.8 Locking/unlocking operation

Once you have entered all the parameters, you can lock your entries against unauthorised and undesired access.

You have the following possibilities for locking/unlocking the operation:
- Via a DIP-switch on the electronic insert, locally on the display.
- Via the on-site display (optional)
- Via digital communication.

The -symbol on the on-site display indicates that operation is locked. Parameters which refer to how the display appears, e.g. LANGUAGE and DISPLAY CONTRAST can still be altered.

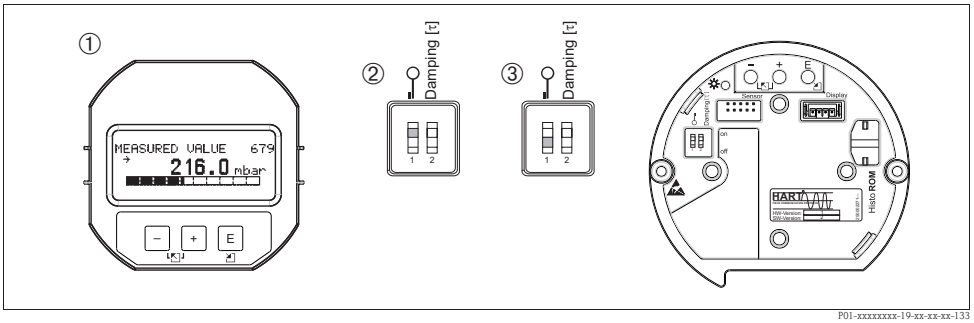
Note!
If operation is locked by means of the DIP-switch, you can only unlock operation again by means of the DIP-switch. If operation is locked by means of the on-site display or remote operation e.g. FieldCare, you can only unlock operation again by means of the on-site display or remote operation.

The table provides an overview of the locking functions:

Locking via	View/read parameter	Modify/write via[1)]		Unlocking via		
		On-site display	Remote operation	DIP-switch	On-site display	Remote operation
DIP-switch	Yes	No	No	Yes	No	No
On-site display	Yes	No	No	No	Yes	Yes
Remote operation	Yes	No	No	No	Yes	Yes

1) Parameters which refer to how the display appears, e.g. LANGUAGE and DISPLAY CONTRAST can still be altered.

5.8.1 Locking/unlocking operation locally via DIP-switch



P01-xxxxxxxx-19-xx-xx-xx-133

Fig. 25: DIP-switch position "Hardware locking" on the electronic insert

1 If necessary, remove on-site display (optional)
2 DIP-switch is at "on": operation is locked.
3 DIP-switch is at "off": operation is unlocked (operation possible)

5.8.2 Locking/unlocking operation via on-site display or remote operation

	Description
Locking operation	1. Select INSERT PIN NO. parameter, Menu path: OPERATING MENU → OPERATION → INSERT PIN NO. 2. To lock operation, enter a number for this parameter between 0 to 9999 that is ≠100.
Unlocking operation	1. Select INSERT PIN NO. parameter. 2. To unlock operation, enter "100" for the parameter.

5.9 Factory setting (reset)

By entering a certain code, you can completely, or partially, reset the entries for the parameters to the factory settings. (For factory settings refer to the Operating Instructions BA00274P "Cerabar S/ Deltabar S/Deltapilot S, Description of device functions".) Enter the code by means of the ENTER RESET CODE parameter (Menu path: (GROUP SELECTION →) OPERATING MENU → OPERATING).
There are various reset codes for the device. The following table illustrates which parameters are reset by the particular reset codes. Operation must be unlocked to reset parameters (→ 37, "Locking/unlocking operation").

Note!
Any customer-specific configuration carried out by the factory is not affected by a reset (customer-specific configuration remains). If, after a reset, you wish the parameters to be reset to the factory settings, please contact Endress+Hauser Service.

Reset code	Description and effect
1846	**Display reset** – This reset resets all parameters which have to do with how the display appears (DISPLAY group). – Any simulation which may be running is ended. – The device is restarted.
62	**PowerUp reset (warm start)** – This reset resets all the parameters in the RAM. Data are read back anew from the EEPROM (processor is initialised again). – Any simulation which may be running is ended. – The device is restarted.
2710	**Measuring mode level reset** – Depending on the settings for the LEVEL MODE, LIN MEASURAND, LINdMEASURAND or COMB. MEASURAND parameters, the parameters needed for this measuring task will be reset. – Any simulation which may be running is ended. – The device is restarted. Example LEVEL MODE = linear and LIN. MEASURAND = Height ■ HEIGHT UNIT = m ■ CALIBRATION MODE = wet ■ EMPTY CALIB. = 0 ■ FULL CALIB. = Sensor end value converted to mH_2O, e.g. 4.79 mH_2O for a 400 mbar (6 psi) sensor
333	**User reset** – Affects the following parameters: – Function group POSITION ADJUSTMENT – Function group BASIC SETUP, except for the customer-specific units – Function group EXTENDED SETUP – Group OUTPUT – Function group HART DATA: CURRENT MODE, BUS ADDRESS and PREAMBLE NUMBER – Any simulation which may be running is ended. – The device is restarted.

Reset code	Description and effect
7864	**Total reset** – Affects the following parameters: – Function group POSITION ADJUSTMENT – Function group BASIC SETUP – Function group EXTENDED SETUP – Function group LINEARISATION (an existing linearisation table is erased) – Group OUTPUT – Function group PEAK HOLD INDICATOR – Function group HART DATA – All configurable messages ("Error" type) are set to factory setting. → 49, "Messages" and → 57, "Response of outputs to errors". – Function group USER LIMITS – Function group SYSTEM 2 – Any simulation which may be running is ended. – The device is restarted.
8888	**HistoROM reset** The measured value memory and event memory are cleared. During the reset, the HistoROM must be attached to the electronic insert.

6 Commissioning

Warning!
- If a pressure smaller than the minimum permitted pressure is present at the device, the messages "E120 Sensor low pressure" and "E727 Sensor pressure error – overrange" are output in succession.
- If a pressure greater than the maximum permitted pressure is present at the device, the messages "E115 Sensor overpressure" and "E727 Sensor pressure error – overrange" are output in succession.
- Messages E727, E115 and E120 are "Error"-type messages and can be configured as a "Warning" or an "Alarm". These messages are configured as "Warning" messages at the factory. This setting prevents the current output from assuming the set alarm current value for applications (e.g. cascade measurement) where the user is consciously aware of the fact that the sensor range can be exceeded
- We recommend setting messages E727, E115 and E120 to "Alarm" in the following instances:
  – The sensor range does not have to be exceeded for the measuring application.
  – Position adjustment has to be carried out that has to correct a large measured error as a result of the orientation of the device (e.g. devices with a diaphragm seal).

Note!
The device is configured for the Pressure measuring mode as standard. The measuring range and the unit in which the measured value is transmitted correspond to the specifications on the nameplate.

6.1 Function check

Carry out a post-installation and a post-connection check as per the checklist before commissioning the device.

- "Post-installation check" checklist, → 📄 18.
- "Post-connection check" checklist, → 📄 23.

6.2 Selecting language and measuring mode

6.2.1 On-site operation

The LANGUAGE and MEASURING MODE parameters are located on the top menu level.
See also → 📄 30, "General structure of the operating menu".

The following measuring modes are available:
- Pressure
- Level

6.2.2 Digital communication

The MEASURING MODE parameter is displayed in the digital communication in the QUICK SETUP menus and in the BASIC SETUP function group (OPERATING MENU → SETTINGS → BASIC SETUP).

The following measuring modes are available:
- Pressure
- Level

The LANGUAGE parameter is arranged in the DISPLAY group (OPERATING MENU → DISPLAY).
- Use the LANGUAGE parameter to select the menu language for the on-site display.
- Select the menu language for FieldCare by means of the "Language Button" in the configuration window. Select the menu language for the FieldCare frame via the "Extra" menu → "Options" → "Display" → "Language".

6.3 Position adjustment

Due to the orientation of the device, there may be a shift in the measured value, i.e. when the container is empty or partly filled, the measured value parameter does not display zero. There are three options to choose from when performing position adjustment.
(Menu path: (GROUP SELECTION →) OPERATING MENU → SETTINGS → POSITION ADJUSTMENT)

Parameter name	Description
POS. ZERO ADJUST (685) Entry	Position adjustment – the pressure difference between zero (set point) and the measured pressure need not be known. **Example:** – MEASURED VALUE = 2.2 mbar (0.032 psi) – Correct the MEASURED VALUE via the POS. ZERO ADJUST parameter with the "Confirm" option. This means that you are assigning the value 0.0 to the pressure present. – MEASURED VALUE (after pos. zero adjust) = 0.0 mbar – The current value is also corrected. The CALIB. OFFSET parameter displays the resulting pressure difference (offset) by which the MEASURED VALUE was corrected. **Factory setting:** 0.0
POS. INPUT VALUE (563) Entry	Position adjustment – the pressure difference between zero (set point) and the measured pressure need not be known. To correct the pressure difference, you need a reference measurement value (e. g. from a reference device). **Example:** – MEASURED VALUE = 0.5 mbar (0.0073 psi) – For the POS. INPUT VALUE parameter, specify the desired set point for the MEASURED VALUE, e.g. 2.0 mbar (0.029 psi). (MEASURED $VALUE_{new}$ = POS. INPUT VALUE) – MEASURED VALUE (after entry for POS. INPUT VALUE) = 2.0 mbar (0.029 psi) – The CALIB. OFFSET parameter displays the resulting pressure difference (offset) by which the MEASURED VALUE was corrected. CALIB. OFFSET = MEASURED $VALUE_{old}$ – POS. INPUT VALUE, here: CALIB. OFFSET = 0.5 mbar (0.0073 psi) – 2.0 mbar (0.029 psi) = – 1.5 mbar (0.022 psi)) – The current value is also corrected. **Factory setting:** 0.0
CALIB. OFFSET (319) Entry	Position adjustment – the pressure difference between zero (set point) and the measured pressure is known. **Example:** – MEASURED VALUE = 2.2 mbar (0.032 psi) – Via the CALIB. OFFSET parameter, enter the value by which the MEASURED VALUE should be corrected. To correct the MEASURED VALUE to 0.0 mbar, you must enter the value 2.2 here. (MEASURED $VALUE_{new}$ = MEASURED $VALUE_{old}$ – CALIB. OFFSET) – MEASURED VALUE (after entry for calib. offset) = 0.0 mbar – The current value is also corrected. **Factory setting:** 0.0

6.4 Pressure measurement

6.4.1 Information on pressure measurement

Note!

- There is a Quick Setup menu for each of the measuring modes Pressure and Level which guides you through the most important basic functions. With the setting in the MEASURING MODE parameter, you specify which Quick Setup menu should be displayed.
  → 40, "Selecting language and measuring mode".
- For a detailed description of the parameters see the Operating Instructions BA00274P "Cerabar S/Deltabar S/Deltapilot S, Description of device functions"
  – Table 6, POSITION ADJUSTMENT
  – Table 7, BASIC SETUP
  – Table 15, EXTENDED SETUP
- For pressure measurement, select the "Pressure" option by means of the MEASURING MODE parameter. The operating menu is structured appropriately.

Warning!
If the measuring mode is changed, the span setting (URV) must be verified in the "Calibration" → "Basic Setup" operating menu and, if necessary, reconfigured.

6.4.2 Quick Setup menu for Pressure measuring mode

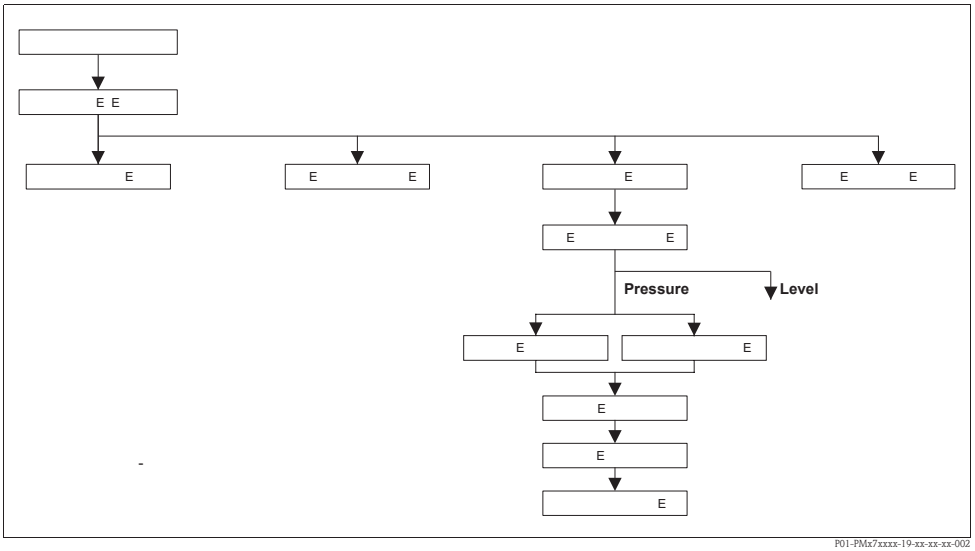


Fig. 26: Quick Setup menu for Pressure measuring mode

On-site operation
Measured value display On-site display: Switch from the measured value display to GROUP SELECTION with E.
GROUP SELECTION Select MEASURING MODE.
MEASURING MODE Select "Pressure" option.
GROUP SELECTION Select QUICK SETUP menu.

Digital communication
Measured value display Select QUICK SETUP menu.
MEASURING MODE Select "Pressure" option.

On-site operation	Digital communication
POS. ZERO ADJUST Due to orientation of the device, there may be a shift in the measured value. You correct the MEASURED VALUE via the POS. ZERO ADJUST parameter with the "Confirm" option, i. e. you assign the value 0.0 to the pressure present.	**POS. ZERO ADJUST** Due to orientation of the device, there may be a shift in the measured value. You correct the MEASURED VALUE via the POS. ZERO ADJUST parameter with the "Confirm" option, i. e. you assign the value 0.0 to the pressure present.
POS. INPUT VALUE Due to orientation of the device, there may be a shift in the measured value. For the POS. INPUT VALUE parameter, specify the desired set point for the MEASURED VALUE.	**POS. INPUT VALUE** Due to orientation of the device, there may be a shift in the measured value. For the POS. INPUT VALUE parameter, specify the desired set point for the MEASURED VALUE.
SET LRV Set the measuring range (enter 4 mA value). Specify a pressure value for the lower current value (4 mA value). A reference pressure does not have to be present at the device.	**SET LRV** Set the measuring range (enter 4 mA value). Specify a pressure value for the lower current value (4 mA value). A reference pressure does not have to be present at the device.
SET URV Set the measuring range (enter 20 mA value). Specify a pressure value for the upper current value (20 mA value). A reference pressure does not have to be present at the device.	**SET URV** Set the measuring range (enter 20 mA value). Specify a pressure value for the upper current value (20 mA value). A reference pressure does not have to be present at the device.
DAMPING TIME Enter damping time (time constant τ). The damping affects the speed at which all subsequent elements, such as the on-site display, measured value and current output react to a change in the pressure.	**DAMPING TIME** Enter damping time (time constant τ). The damping affects the speed at which all subsequent elements, such as the on-site display, measured value and current output react to a change in the pressure.

Note!
For on-site operation, see also
→ 📄 26, "Function of the operating elements – on-site display connected" and
→ 📄 30, "On-site operation – on-site display connected".

6.5 Level measurement

6.5.1 Information on level measurement

Note!

- The Pressure and Level operating modes each have a quick setup menu which guides you through the most important basic functions. → 46, "Quick Setup menu for Level measuring mode".
- Furthermore, the three level modes "Level Easy Pressure", "Level Easy Height" and "Level Standard" are available to you for level measurement. You can select from the "Linear", "Pressure linearized" and "Height linearized" level types for the "Level Standard" level mode. The table in the "Overview of level measurement" section below provides an overview of the various measuring tasks.
  - In the "Level Easy Pressure" and "Level Easy Height" level modes, the values entered are not tested as extensively as in the "Level Standard" level mode. The values entered for EMPTY CALIB./FULL CALIB., EMPTY PRESSURE/FULL PRESSURE, EMPTY HEIGHT/FULL HEIGHT and SET LRV/SET URV must have a minimum interval of 1 % for the "Level Easy Pressure" and "Level Easy Height" level modes. The value will be rejected with a warning message if the values are too close together. Further limit values are not checked; i.e. the values entered must be appropriate for the sensor and the measuring task so that the measuring device can measure correctly.
  - The "Level Easy Pressure" and "Level Easy Height" level modes encompass fewer parameters than the "Level Standard" mode and are used for quick and easy configuration of a level application.
  - Customer-specific units of fill level, volume and mass or a linearization table may only be entered in the "Level Standard" level mode.
  - Where the device is intended for use as a subsystem in a safety function (SIL), a "Device configuration with enhanced parameter security" (SAFETY CONFIRM.) is only possible for the "Level" operating mode in the "Level Easy Pressure" level mode. All parameters previously entered are checked after a password is entered. Once the "Level Easy Height" or "Level Standard" has been selected, the configuration will first have to be reset to the ex-works setting using the RESET parameter (menu path: (GROUP SELECTION →) OPERATING MENU → OPERATION) using the reset code "7864".
    For further information see the Cerabar S (SD00190P) Functional Safety Manual.
- See the Operating Instructions BA00274P "Cerabar S/Deltabar S/Deltapilot S, Description of device functions".

6.5.2 Overview of level measurement

Measuring task	LEVEL SELECTION/ LEVEL MODE	Measured variable options	Description	Comment	Measured value display
The measured variable is in direct proportion to the measured pressure. Calibration is performed by entering two pressure-level value pairs.	LEVEL SELECTION: Level Easy Pressure	Via OUTPUT UNIT parameter: %, level, volume or mass units.	– Calibration with reference pressure – wet calibration, see Operating Instructions BA00274P. – Calibration without reference pressure – dry calibration, see Operating Instructions BA00274P.	– Incorrect entries are possible – SIL mode possible – Customised units are not possible	The measured value display and the LEVEL BEFORE LIN parameter show the measured value.
The measured variable is in direct proportion to the measured pressure. Calibration is performed by entering the density and two height-level value pairs.	LEVEL SELECTION: Level Easy Height	Via OUTPUT UNIT parameter: %, level, volume or mass units.	– Calibration with reference pressure – wet calibration, see Operating Instructions BA00274P. – Calibration without reference pressure – dry calibration, see Operating Instructions BA00274P.	– Incorrect entries are possible – SIL mode not possible – Customised units are not possible	The measured value display and the LEVEL BEFORE LIN parameter show the measured value.
The measured variable is in direct proportion to the measured pressure.	LEVEL SELECTION: Level standard/ LEVEL MODE: Linear	Via LIN. MEASURAND parameter: – % (level) – Level – Volume – Mass	– Calibration with reference pressure – wet calibration, see Operating Instructions BA00274P. – Calibration without reference pressure – dry calibration, see Operating Instructions BA00274P.	– Incorrect entries are rejected by the device – SIL mode not possible – Customised level, volume and mass units are possible	The measured value display and the LEVEL BEFORE LIN parameter show the measured value.
The measured variable is not in direct proportion to the measured pressure as, for example, with containers with a conical outlet. A linearisation table must be entered for the calibration.	LEVEL SELECTION: Level standard/ LEVEL MODE: Pressure linearized	Via LINd MEASURAND parameter: – Pressure + % – Pressure + volume – Pressure + mass	– Calibration with reference pressure: semiautomatic entry of linearisation table, see Operating Instructions BA00274P. – Calibration without reference pressure: manual entry of linearisation table, see Operating Instructions BA00274P.	– Incorrect entries are rejected by the device – SIL mode not possible – Customised level, volume and mass units are possible	The measured value display and the TANK CONTENT parameter show the measured value.
– Two measured variables are required or – The container shape is given by value pairs, such as height and volume. The 1st measured variable %-height or height must be in direct proportion to the measured pressure. The 2nd measured variable volume, mass or % must not be in direct proportion to the measured pressure. A linearisation table must be entered for the 2nd measured variable. The 2nd measured variable is assigned to the 1st measured variable by means of this table.	LEVEL SELECTION: Level standard/ LEVEL MODE: Height linearized	Via COMB. MEASURAND parameter: – Height + volume – Height + mass – Height + % – %-Height + volume – %-Height + mass – %-Height + %	– Calibration with reference pressure: wet calibration and semiautomatic entry of linearisation table, see Operating Instructions BA00274P. – Calibration without reference pressure: dry calibration and manual entry of linearisation table, see Operating Instructions BA00274P.	– Incorrect entries are rejected by the device – SIL mode not possible – Customised level, volume and mass units are possible	The measured value display and the TANK CONTENT parameter show the 2nd measured value (volume, mass or %). The LEVEL BEFORE LIN parameter displays the 1st measured value (%-height or height).

6.5.3 Quick Setup menu for Level measuring mode

Note!

- Some parameters are only displayed if other parameters are appropriately configured. For example, the EMPTY CALIB. parameter is only displayed in the following cases:
  – LEVEL SELECTION "Level Easy Pressure" and CALIBRATION MODE "Wet"
  – LEVEL SELECTION "Level Standard", LEVEL MODE "Linear" and CALIBRATION MODE "WET"
  You can find the LEVEL MODE parameter in the BASIC SETTINGS function group (menu path: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETTINGS).
- The following parameters are set to the following values in the factory:
  – LEVEL SELETION: Level Easy Pressure
  – CALIBRATION MODE: Wet
  – OUTPUT UNIT or LIN. MEASURAND: %
  – EMPTY CALIB.: 0.0
  – FULL CALIB.: 100.0
  – SET LRV (BASIC SETTINGS group): 0.0 (corresponds to 4 mA value)
  – SET URV (BASIC SETTINGS group): 100.0 (corresponds to 20 mA value).
- The quick setup is suitable for simple and quick commissioning. If you wish to make more complex settings, e.g. change the unit from "%" to "m", you will have to calibrate using the BASIC SETTINGS group. See Operating Instructions BA00274P.

Warning!
If the measuring mode is changed, the span setting (URV) must be verified in the "Calibration" → "Basic Setup" operating menu and, if necessary, reconfigured.

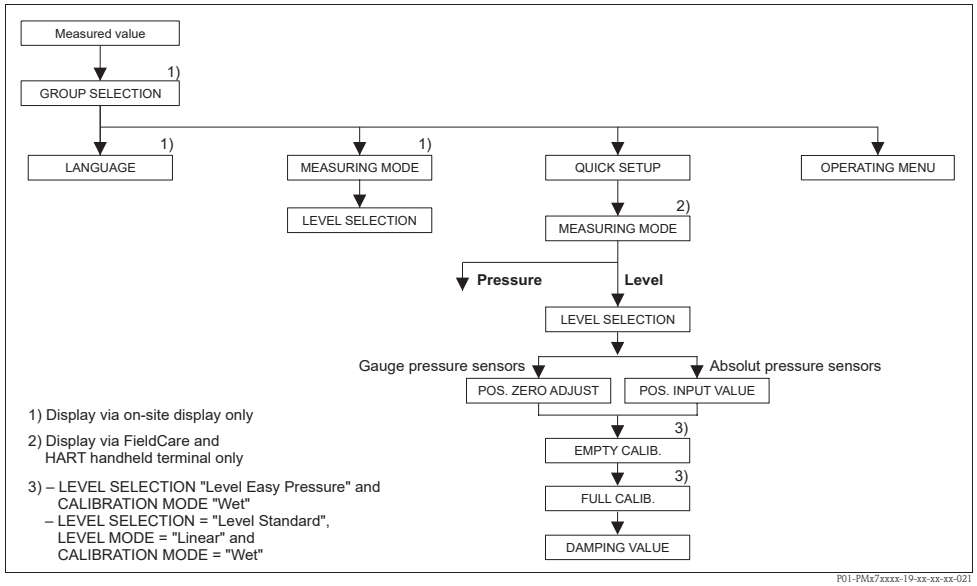


Fig. 27: Quick Setup menu for the Level measuring mode

On-site operation
Measured value display On-site display: Switch from the measured value display to GROUP SELECTION with E.
GROUP SELECTION Select MEASURING MODE.
MEASURING MODE Select "Level" option.

Digital communication
Measured value display Select QUICK SETUP menu.
MEASURING MODE Select "Level" option.

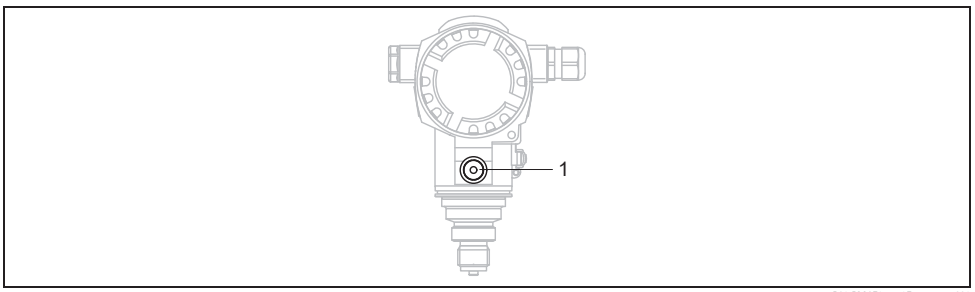
On-site operation	Digital communication
LEVEL SELECTION Select level mode. For an overview see → 45.	**LEVEL SELECTION** Select level mode. For an overview see → 45.
GROUP SELECTION Select QUICK SETUP menu.	
POS. ZERO ADJUST Due to orientation of the device, there may be a shift in the measured value. You correct the MEASURED VALUE via the POS. ZERO ADJUST parameter with the "Confirm" option, i. e. you assign the value 0.0 to the pressure present.	**POS. ZERO ADJUST** Due to orientation of the device, there may be a shift in the measured value. You correct the MEASURED VALUE via the POS. ZERO ADJUST parameter with the "Confirm" option, i. e. you assign the value 0.0 to the pressure present.
POS. INPUT VALUE Due to orientation of the device, there may be a shift in the measured value. For the POS. INPUT VALUE parameter, specify the desired set point for the MEASURED VALUE.	**POS. INPUT VALUE** Due to orientation of the device, there may be a shift in the measured value. For the POS. INPUT VALUE parameter, specify the desired set point for the MEASURED VALUE.
EMPTY CALIB. 1) Enter level for the lower calibration point. For this parameter, enter a level value which is assigned to the pressure present at the device.	**EMPTY CALIB.** 1 Enter level for the lower calibration point. For this parameter, enter a level value which is assigned to the pressure present at the device.
FULL CALIB. 1 Enter level for the upper calibration point. For this parameter, enter a level value which is assigned to the pressure present at the device.	**FULL CALIB.** 1 Enter level for the upper calibration point. For this parameter, enter a level value which is assigned to the pressure present at the device.
DAMPING TIME Enter damping time (time constant τ). The damping affects the speed at which all subsequent elements, such as the on-site display, measured value and current output react to a change in the pressure.	**DAMPING TIME** Enter damping time (time constant τ). The damping affects the speed at which all subsequent elements, such as the on-site display, measured value and current output react to a change in the pressure.

1) – LEVEL SELECTION "Level Easy Pressure" and CALIBRATION MODE "Wet"
– LEVEL SELECTION "Level Standard", LEVEL MODE "Linear" and CALIBRATION MODE "Wet"

Note!
For on-site operation, see also
→ 26, "Function of the operating elements – on-site display connected" and
→ 30, "On-site operation – on-site display connected".

7 Maintenance

Keep the pressure compensation and GORE-TEX® filter (1) free from contaminations and water.



P01-PMC71xxx-17-xx-xx-xx-001

7.1 Cleaning instructions

Endress+Hauser offer flushing rings as accessories to clean process isolating diaphragms without taking the transmitters out of the process.
For further information please contact your local Endress+Hauser Sales Center.

7.1.1 PMP75

We recommend you perform CIP (cleaning in place (hot water)) before SIP (sterilization in place (steam)) for pipe diaphragm seals.
A frequent use of sterilization in place (SIP) will increase the stress on the process isolating diaphragm. Under unfavorable circumstances in the long term view we cannot exclude that a frequent temperature change could lead to a material fatigue of the process isolating diaphragm and possibly to a leakage.

7.2 Exterior cleaning

Please note the following points when cleaning the device:
- The cleaning agents used should not attack the surface and the seals.
- Mechanical damage to the process isolating diaphragm, e.g. due to pointed objects, must be avoided.
- Observe degree of protection. See therefor nameplate if necessary (→ 🖹 6).

8 Trouble-shooting

8.1 Messages

The following table lists all the possible messages that can occur.
The device differentiates between the error types "Alarm", "Warning" and "Error". You may specify whether the instrument should react as if for an "Alarm" or "Warning" for "Error" messages.
→ See "Error type/NA 64" column and Section 8.2 "Response of outputs to errors".

In addition, the "Error type/NA 64" column classifies the messages in accordance with NAMUR Recommendation NA 64:
- Break down: indicated with "B"
- Maintenance need: indicated with "C" (check request)
- Function check: indicated with "I" (in service)

Error message display on the on-site display:
- The measured value display shows the message with the highest priority. → See "Priority" column.
- The ALARM STATUS parameter shows all the messages present in descending order of priority. You can scroll through all the messages present with the −-key or +-key.

Message display via the digital communication:
The ALARM STATUS parameter shows the message with the highest priority.
See "Priority" column.

Note!
- If the device detects a defect in the on-site display during initialization, special error messages are generated. For the error messages → 57, "On-site display error messages".
- For support and further information, please contact Endress+Hauser Service.
- See also Section "Repair", "Repair of Ex-certified devices" and "Spare Parts".

Code	Error type/ NA 64	Corresponds NE 107	Message/description	Cause	Measure	Prio rity
101 (A101)	Alarm B	Failure (F)	B>Sensor electronic EEPROM error	– Electromagnetic effects are greater than specifications in the technical data. (→ 63) This message normally only appears briefly. – Sensor defect.	– Wait a few minutes. – Restart the device. Perform reset (Code 62). – Block off electromagnetic effects or eliminate source of disturbance. – Replace sensor.	17
102 (W102)	Warning C	Maintenance request (M)	C>Checksum error in EEPROM: peakhold segment	– Main electronics defect. Correct measurement can continue as long as you do not need the peak hold indicator function.	– Replace main electronics.	53
106 (W106)	Warning C	Funktion check (C)	C>Downloading - please wait	– Downloading.	– Wait for download to complete.	52
110 (A110)	Alarm B	Failure (F)	B>Checksum error in EEPROM: configuration segment	– The supply voltage is disconnected when writing. – Electromagnetic effects are greater than specifications in the technical data. (→ 63) – Main electronics defect.	– Reestablish supply voltage. Perform reset (Code 7864) if necessary. Carry out calibration again. – Block off electromagnetic effects or eliminate sources of disturbance. – Replace main electronics.	6
113 (A113)	Alarm B	Failure (F)	B>ROM failure in transmitter electronic	– Main electronics defect.	– Replace main electronics.	1

Code	Error type/ NA 64	Corresponds NE 107	Message/description	Cause	Measure	Priority
115 (E115)	Error B factory setting: Warning C	Out of specification (S)	B>Sensor overpressure	– Overpressure present. – Sensor defect.	– Reduce pressure until message disappears. – Replace sensor.	29
116 (W116)	Warning C	Maintenance request (M)	C>Download error, repeat download	– The file is defect. – During the download, the data are not correctly transmitted to the processor, e.g. because of open cable connections, spikes (ripple) on the supply voltage or electromagnetic effects.	– Use another file. – Check cable connection PC – transmitter. – Block off electromagnetic effects or eliminate sources of disturbance. – Perform reset (Code 7864) and carry out calibration again. – Repeat download.	36
120 (E120)	Error B factory setting: Warning C	Out of specification (S)	B>Sensor low pressure	– Pressure too low. – Sensor defect.	– Increase pressure until message disappears. – Replace sensor.	30
121 (A121)	Alarm B	Failure (F)	B>Checksum error in factory segment of EEPROM	– Main electronics defect.	– Replace main electronics.	5
122 (A122)	Alarm B	Failure (F)	B>Sensor not connected	– Cable connection sensor –main electronics disconnected. – Electromagnetic effects are greater than specifications in the technical data. (→ 63) – Main electronics defect. – Sensor defect.	– Check cable connection and repair if necessary. – Block off electromagnetic effects or eliminate source of disturbance. – Replace main electronics. – Replace sensor.	13
130 (A130)	Alarm B	Failure (F)	B>EEPROM is defect.	– Main electronics defect.	– Replace main electronics.	10
131 (A131)	Alarm B	Failure (F)	B>Checksum error in EEPROM: min/max segment	– Main electronics defect.	– Replace main electronics.	9
132 (A132)	Alarm B	Failure (F)	B>Checksum error in totalizer EEPROM	– Main electronics defect.	– Replace main electronics.	7
133 (A133)	Alarm B	Failure (F)	B>Checksum error in History EEPROM	– An error occurred when writing. – Main electronics defect.	– Perform reset (Code 7864) and carry out calibration again. – Replace electronics.	8
602 (W602)	Warning C	Funktion check (C)	C>Linearisation curve not monoton	– The linearisation table is not monotonic increasing or decreasing.	– Add to linearisation table or perform linearisation again.	57

Code	Error type/ NA 64	Corresponds NE 107	Message/description	Cause	Measure	Priority
604 (W604)	Warning C	Funktion check (C)	C>Linearisation table not valid. Less than 2 points or points too close	– The linearisation table consists of less than 2 points. – At least 2 points in the linearisation table are too close together. A minimum gap of 0.5 % of the distance between two points must be maintained. Spans for the "Pressure linearized" option: HYDR. PRESS MAX. – HYDR. PRESS MIN.; TANK CONTENT MAX. – TANK CONTENT MIN. Spans for the "Height linearized" option: LEVEL MAX – LEVEL MIN; TANK CONTENT MAX. – TANK CONTENT MIN.	– Add to linearisation table. If necessary, perform linearisation again. – Correct linearisation table and accept again.	58
613 (W613)	Warning I	Funktion check (C)	I>Simulation is active	– Simulation is switched on, i.e. the device is not measuring at present.	– Switch off simulation.	60
620 (E620)	Error C Factory setting: Warning C	Out of specification (S)	C>Current output out of range	The current is outside the permitted range 3.8 to 20.5 mA. – The pressure applied is outside the set measuring range (but within the sensor range). – Loose connection at sensor cable	– Check pressure applied, reconfigure measuring range if necessary (See also Operating Instructions BA00274P, chapter 4 to 6 or these Operating Instructions) – Perform reset (Code 7864) and carry out calibration again. – Wait a short period of time and tighten the connection, or avoid loose connection.	49
700 (W700)	Warning C	Maintenance request (M)	C>Last configuration not stored	– An error occurred when writing or reading configuration data or the power supply was disconnected. – Main electronics defect.	– Perform reset (Code 7864) and carry out calibration again. – Replace main electronics.	54
701 (W701)	Warning C	Funktion check (C)	C>Measuring chain config. exceeds sensor range	– The calibration carried out would result in the sensor nominal operating range being undershot or overshot.	– Carry out calibration again.	50
702 (W702)	Warning C	Maintenance request (M)	C>HistoROM data not consistent.	– Data were not written correctly to the HistoROM, e.g. if the HistoROM was detached during the writing process. – HistoROM does not have any data.	– Repeat upload. – Perform reset (Code 7864) and carry out calibration again. – Copy suitable data to the HistoROM. (See also → 33, "Copying configuration data".)	55
703 (A703)	Alarm B	Failure (F)	B>Measurement error	– Fault in the main electronics. – Main electronics defect.	– Briefly disconnect device from the power supply. – Replace main electronics.	22
704 (A704)	Alarm B	Funktion check (C)	B>Measurement error	– Fault in the main electronics. – Main electronics defect.	– Briefly disconnect device from the power supply. – Replace main electronics.	12
705 (A705)	Alarm B	Failure (F)	B>Measurement error	– Fault in the main electronics. – Main electronics defect.	– Briefly disconnect device from the power supply. – Replace main electronics.	21

Code	Error type/ NA 64	Corresponds NE 107	Message/description	Cause	Measure	Priority
706 (W706)	Warning C	Maintenance request (M)	C>Configuration in HistoROM and device not identical	– Configuration (parameters) in the HistoROM and in the device is not identical.	– Copy data from the device to the HistoROM. (See also → 33, "Copying configuration data".) – Copy data from the HistoROM to the device. (See also → 33, "Copying configuration data".) The message remains if the HistoROM and the device have different software versions. The message goes out if you copy the data from the device to the HistoROM. – Device reset codes such as 7864 do not have any effect on the HistoROM. That means that if you do a reset, the configurations in the HistoROM and in the device may not be the same.	59
707 (A707)	Alarm B	Funktion check (C)	B>X-VAL. of lin. table out of edit limits.	– At least one X-VALUE in the linearisation table is either below the value for HYDR. PRESS MIN. or MIN. LEVEL or above the value for HYDR. PRESS. MAX. or LEVEL MAX.	– Carry out calibration again. (See also Operating Instructions BA00274P, chapter 5 or these Operating Instructions)	38
710 (W710)	Warning C	Funktion check (C)	B>Set span too small. Not allowed.	– Values for calibration (e.g. lower range value and upper range value) are too close together. – The sensor was replaced and the customer-specific configuration does not suit the sensor. – Unsuitable download carried out.	– Adjust calibration to suit sensor. (See also Operating Instructions BA00274P, parameter description MINIMUM SPAN or these Operating Instructions) – Adjust calibration to suit sensor. – Replace sensor with a suitable sensor. – Check configuration and perform download again.	51
711 (A711)	Alarm B	Funktion check (C)	B>LRV or URV out of edit limits	– Lower range value and/or upper range value undershoot or overshoot the sensor range limits. – The sensor was replaced and the customer-specific configuration does not suit the sensor. – Unsuitable download carried out.	– Reconfigure lower range value and/or upper range value to suit the sensor. Pay attention to position factor. – Reconfigure lower range value and/or upper range value to suit the sensor. Pay attention to position factor. – Replace sensor with a suitable sensor. – Check configuration and perform download again.	37
713 (A713)	Alarm B	Funktion check (C)	B>100% POINT level out of edit limits	– The sensor was replaced.	– Carry out calibration again.	39
715 (E715)	Error C Factory setting: Warning C	Out of specification (S)	C>Sensor over temperature	– The temperature measured in the sensor is greater than the upper nominal temperature of the sensor. (See also Operating Instructions BA00274P, parameter description Tmax SENSOR or these Operating Instructions) – Unsuitable download carried out.	– Reduce process temperature/ ambient temperature. – Check configuration and perform download again.	32

Code	Error type/ NA 64	Corresponds NE 107	Message/description	Cause	Measure	Prio rity
716 (E716)	Error B Factory setting: Alarm B	Failure (F)	B>Process isolating diaphragm broken	– Sensor defect.	– Replace Sensor. – Reduce pressure.	24
717 (E717)	Error C Factory setting: Warning C	Out of specification (S)	C>Transmitter over temperature	– The temperature measured in the electronics is greater than the upper nominal temperature of the electronics (+88 °C (+190 °F)). – Unsuitable download carried out.	– Reduce ambient temperature. – Check configuration and perform download again.	34
718 (E718)	Error C Factory setting: Warning C	Out of specification (S)	C>Transmitter under temperature	– The temperature measured in the electronics is smaller than the lower nominal temperature of the electronics (–43 °C (-45 °F)). – Unsuitable download carried out.	– Increase ambient temperature. Insulate device if necessary. – Check configuration and perform download again.	35
719 (A719)	Alarm B	Funktion check (C)	B>Y-VAL of lin. table out of edit limits	– At least on Y-VALUE in the linearisation table is below the MIN. TANK CONTANT or above the MAX. TANK CONTENT.	– Carry out calibration again. (See also Operating Instructions BA00274P, chapter 5 or these Operating Instructions)	40
720 (E720)	Error C Factory setting: Warning C	Out of specification (S)	C>Sensor under temperature	– The temperature measured in the sensor is smaller than the lower nominal temperature of the sensor. (See also Operating Instructions BA00274P, parameter description Tmin SENSOR or Operating Instructions) – Unsuitable download carried out. – Loose connection at sensor cable	– Increase process temperature/ ambient temperature. – Check configuration and perform download again. – Wait a short period of time and tighten the connection, or avoid loose connection.	33
721 (A721)	Alarm B	Funktion check (C)	B>ZERO POSITION level out of edit limits	– LEVEL MIN or LEVEL MAX has been changed.	– Perform reset (Code 2710) and carry out calibration again.	41
722 (A722)	Alarm B	Funktion check (C)	B>EMPTY CALIB. or FULL CALIB. out of edit limits	– LEVEL MIN or LEVEL MAX has been changed.	– Perform reset (Code 2710) and carry out calibration again.	42
723 (A723)	Alarm B	Funktion check (C)	B>MAX. FLOW out of edit limits	– FLOW-MEAS. TYPE has been changed.	– Carry out calibration again.	43
725 (A725)	Alarm B	Failure (F)	B>Sensor connection error, cycle disturbance	– Electromagnetic effects are greater than specifications in the technical data. (→ See Section 9.) – Setscrew loose. – Sensor or main electronics defect.	– Block off electromagnetic effects or eliminate source of disturbance. – Retighten setscrew with 1 Nm (0,74 lbf ft) (see Chap. 3.3.8). – Replace sensor or main electronics.	25

Code	Error type/ NA 64	Corresponds NE 107	Message/description	Cause	Measure	Prio rity
726 (E726)	Error C Factory setting: Warning C	Out of specification (S)	C>Sensor temperature error - overrange	– Electromagnetic effects are greater than specifications in the technical data. (→ 63) – Process temperature is outside permitted range. – Sensor defect.	– Block off electromagnetic effects or eliminate source of disturbance. – Check temperature present, reduce or increase if necessary. – If the process temperature is within the permitted range, replace sensor.	31
727 (E727)	Error C Factory setting: Warning C	Out of specification (S)	C>Sensor pressure error - overrange	– Electromagnetic effects are greater than specifications in the technical data. (→ 63) – Pressure is outside permitted range. – Sensor defect.	– Block off electromagnetic effects or eliminate source of disturbance. – Check pressure present, reduce or increase if necessary. – If the pressure is within the permitted range, replace sensor.	28
728 (A728)	Alarm B	Failure (F)	B>RAM error	– Fault in the main electronics. – Main electronics defect.	– Briefly disconnect device from the power supply. – Replace main electronics.	2
729 (A729)	Alarm B	Failure (F)	B>RAM error	– Fault in the main electronics. – Main electronics defect.	– Briefly disconnect device from the power supply. – Replace main electronics.	3
730 (E730)	Error C Factory setting: Warning C	Out of specification (S)	C>LRV user limits exceeded	– Pressure measured value has undershot the value specified for the Pmin ALARM WINDOW parameter. – Loose connection at sensor cable	– Check system/pressure measured value. – Change value for Pmin ALARM WINDOW if necessary. (See also Operating Instructions BA00274P, parameter description Pmin ALARM WINDOW or these Operating Instructions) – Wait a short period of time and tighten the connection, or avoid loose connection.	46
731 (E731)	Error C Factory setting: Warning C	Out of specification (S)	C>URV user limits exceeded	– Pressure measured value has overshot the value specified for the Pmax ALARM WINDOW parameter.	– Check system/pressure measured value. – Change value for Pmax ALARM WINDOW if necessary. (See also Operating Instructions BA00274P, parameter description Pmax ALARM WINDOW or these Operating Instructions)	45
		Out of specification (S)		– Loose connection at sensor cable	– Wait a short period of time and tighten the connection, or avoid loose connection.	
732 (E732)	Error C Factory setting: Warning C		C>LRV Temp. User limits exceeded	– Temperature measured value has undershot the value specified for the Tmin ALARM WINDOW parameter.	– Check system/temperature measured value. – Change value for Tmin ALARM WINDOW if necessary. (See also Operating Instructions BA00274P, parameter description Tmin ALARM WINDOW or these Operating Instructions)	48
733 (E733)	Error C Factory setting: Warning C	Out of specification (S)	C>URV Temp. User limits exceeded	– Temperature measured value has overshot the value specified for the Tmax ALARM WINDOW parameter.	– Check system/temperature measured value. – Change value for Tmax ALARM WINDOW if necessary. (See also Operating Instructions BA00274P, parameter description Tmax ALARM WINDOW or these Operating Instructions)	47

Code	Error type/ NA 64	Corresponds NE 107	Message/description	Cause	Measure	Prio rity
736 (A736)	Alarm B	Failure (F)	B>RAM error	– Fault in the main electronics. – Main electronics defect.	– Briefly disconnect device from the power supply. – Replace main electronics.	4
737 (A737)	Alarm B	Failure (F)	B>Measurement error	– Fault in the main electronics. – Main electronics defect.	– Briefly disconnect device from the power supply. – Replace main electronics.	20
738 (A738)	Alarm B	Failure (F)	B>Measurement error	– Fault in the main electronics. – Main electronics defect.	– Briefly disconnect device from the power supply. – Replace main electronics.	19
739 (A739)	Alarm B	Failure (F)	B>Measurement error	– Fault in the main electronics. – Main electronics defect.	– Briefly disconnect device from the power supply. – Replace main electronics.	23
740 (E740)	Error C Factory setting: Warning C	Maintenance request (M)	C>Calculation overflow, bad configuration, hardware defect	– Level measuring mode: the measured pressure has undershot the value for HYDR. PRESS. MIN. or overshot the value for HYDR. PRESS MAX. – Level measuring mode: The measured level did not reach the LEVEL MIN value or exceeded the LEVEL MAX value. – Flow measuring mode: the measured pressure has undershot the value for MAX. PRESS FLOW.	– Check configuration and carry out calibration again if necessary. – Select a device with a suitable measuring range. – Check configuration and carry out calibration again if necessary. (See also Operating Instructions BA00274P, parameter description LEVEL MIN. these Operating Instructions) – Check configuration and carry out calibration again if necessary. – Select a device with a suitable measuring range.	27
741 (A741)	Alarm B	Funktion check (C)	B>TANK HEIGHT out of edit limits	– LEVEL MIN or LEVEL MAX has been changed.	– Perform reset (Code 2710) and carry out calibration again.	44
742 (A742)	Alarm B	Failure (F)	B>Sensor connection error (upload)	– Electromagnetic effects are greater than specifications in the technical data. (→ 63) This message normally only appears briefly. – Cable connection sensor –main electronics disconnected. – Sensor defect.	– Wait a few minutes. – Perform reset (Code 7864) and carry out calibration again. – Check cable connection and repair if necessary. – Replace sensor.	18
743 (E743)	Alarm B	Failure (F)	B>Electronic PCB error during initialisation	– This message normally only appears briefly. – Main electronics defect.	– Wait a few minutes. – Restart the device. Perform reset (Code 62). – Replace main electronics.	14
744 (A744)	Alarm B	Failure (F)	B>Main electronic PCB error	– Electromagnetic effects are greater than specifications in the technical data. (→ 63) – Main electronics defect.	– Restart the device. Perform reset (Code 62). – Block off electromagnetic effects or eliminate source of disturbance. – Replace main electronics.	11
745 (W745)	Warning C	Maintenance request (M)	C>Sensor data unknown	– Sensor does not suit the device (electronic sensor nameplate). Device continues measuring.	– Replace sensor with a suitable sensor.	56

Code	Error type/ NA 64	Corresponds NE 107	Message/description	Cause	Measure	Priority
746 (W746)	Warning C	Funktion check (C)	C>Sensor connection error - initialising	– Electromagnetic effects are greater than specifications in the technical data. (→ 63) This message normally only appears briefly. – Overpressure or low pressure present.	– Wait a few minutes. – Restart the device. Perform reset (Code 7864). – Block off electromagnetic effects or eliminate source of disturbance. – Reduce or increase pressure.	26
747 (A747)	Alarm B	Failure (F)	B>Sensor software not compatible to electronics	– Sensor does not suit the device (electronic sensor nameplate).	– Replace sensor with a suitable sensor.	16
748 (A748)	Alarm B	Failure (F)	B>Memory failure in signal processor	– Electromagnetic effects are greater than specifications in the technical data. (→ 63) – Main electronics defect.	– Block off electromagnetic effects or eliminate source of disturbance. – Replace main electronics.	15

8.1.1 On-site display error messages

If the device detects a defect in the on-site display during initialization, the following error messages can be displayed:

Message	Measure
Initialization, VU Electr. Defect A110	Exchange on-site display.
Initialization, VU Electr. Defect A114	
Initialization, VU Electr. Defect A281	
Initialization, VU Checksum Err. A110	
Initialization, VU Checksum Err. A112	
Initialization, VU Checksum Err. A171	

8.2 Response of outputs to errors

The device differentiates between the error types Alarm, Warning and Error.
See the following table and → 📄 49, "Messages".

Output	A (Alarm)	W (Warning)	E (Error: Alarm/Warning)
Current output	Assumes the value specified via the OUTPUT FAIL MODE[1)], ALT. CURR. OUTPUT[1] and SET MAX. ALARM[1] parameter. See also the following section "Configuring current output for an alarm".	Device continues measuring.	For this error, you can enter whether the device should react as in the event of an alarm or as in the event of a warning. See corresponding "Alarm" or "Warning" column. (See also Operating Instructions BA00274P, parameter description SELECT ALARM TYPE or these Operating Instructions)
Bargraph (on-site display)	The bargraph adopts the value defined by the OUTPUT FAIL MODE [1] parameter.	The bargraph adopts the value which corresponds to the current value.	See this table, "Alarm" or "Warning" column, depending on selection.
On-site display	– The measured value and message are displayed alternately – Measured value display: ↯ -symbol is permanently displayed. Message display – 3-digit number such as A122 and description	– The measured value and message are displayed alternately – Measured value display: ↯ -symbol flashes. Message display: – 3-digit number such as W613 and description	– The measured value and message are displayed alternately – Measured value display: see corresponding "Alarm" or "Warning" column Message display: – 3-digit number such as E731 and description
Remote operation (digital communication)	In the case of an alarm, the ALARM STATUS[2)] parameter displays a 3-digit number such as 122 for "Sensor not connected".	In the case of a warning, the ALARM STATUS[2] parameter displays a 3-digit number such as 613 for "Simulation is active".	In the case of an error, the ALARM STATUS[2] parameter displays a 3-digit number such as 731 for "URV user limits exceeded".

1) Menu path: (GROUP SELECTION →) OPERATING MENU → OUTPUT

2) Menu path: (GROUP SELECTION →) OPERATING MENU → MESSAGES

8.2.1 Configuring current output for an alarm

You can configure the current output for the event of an alarm by means of the OUTPUT FAIL MODE, ALT. CURR. OUTPUT and SET MAX. ALARM parameters. These parameters are displayed in the OUTPUT group (menu path: (GROUP SELECTION →) OPERATING MENU → OUTPUT).

In the event of an alarm, the current and the bargraph assume the value entered with the OUTPUT FAIL MODE parameter.

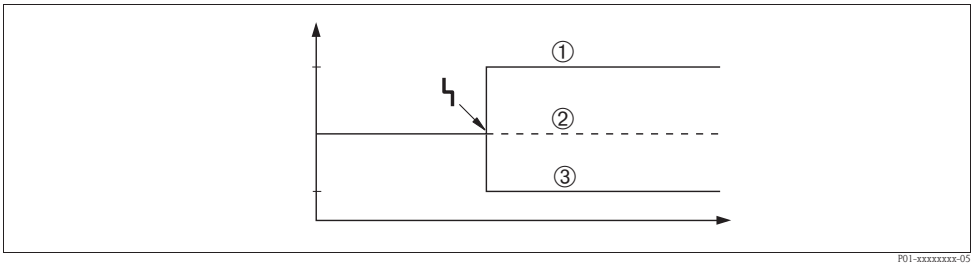


Fig. 28: Current output in the event of an alarm

Options:
1 Max. alarm (110%): can be set between 21 to 23 mA via the SET MAX. ALARM parameter
2 Hold meas. value: last measured value is kept
3 Min. alarm (–10%): 3.6 mA

Factory setting:
- OUTPUT FAIL MODE: Max. Alarm (110%)
- SET MAX. ALARM: 22 mA

Use the ALT. CURR. OUTPUT parameter to set the current output value for the error messages E 120 "Sensor low pressure" and E 115 "Sensor overpressure". You have the following options:
- Normal: the current output assumes the value set via the OUTPUT FAIL MODE and SET MAX. ALARM parameters.
- Special
  – Lower sensor limit undershot (E 120 "Sensor low pressure"): 3.6 mA
  – Upper sensor limit overshot (E 115 "Sensor overpressure") overshot: current output assumes the value set via the SET MAX ALARM parameter.

  Attention : when using the case "special", the behavior is limited to an over/underpressure in a range LRL -10% up to LRL -30% and URL +10% up to URL +30%.

Factory setting:
ALT. CURR. OUTPUT: normal

8.3 Confirming messages

Depending on the settings for the ALARM DISPL. TIME and ACK. ALARM MODE parameters, the following measures should be taken to clear a message:

Settings [1]	**Measures**
– ALARM DISPL. TIME = 0 s – ACK. ALARM MODE = off	– Rectify cause of the message (→ 📄 49).
– ALARM DISPL. TIME > 0 s – ACK. ALARM MODE = off	– Rectify cause of the message (→ 📄 49). – Wait for the alarm display time to elapse.
– ALARM DISPL. TIME = 0 s – ACK. ALARM MODE = on	– Rectify cause of the message (→ 📄 49). – Confirm message using ACK. ALARM parameter.
– ALARM DISPL. TIME > 0 s – ACK. ALARM MODE = on	– Rectify cause of the message (→ 📄 49). – Confirm message using ACK. ALARM parameter. – Wait for the alarm display time to elapse. If a message appears and the alarm display time elapses before the message has been acknowledged, the message will be cleared once it has been acknowledged.

1) Menu path for ALARM DISPL. TIME and ACK. ALARM MODE: (GROUP SELECTION →) OPERATING MENU → DIAGNOSTICS → MESSAGES

If the on-site display displays a message, you can suppress it with the E-key.
If there are several messages, the on-site display shows the message which has the highest priority (→ 📄 49). Once you have suppressed this message using the E-key, the message with the next highest priority is displayed. You can use the E-key to suppress each message, one after the other. The ALARM STATUS parameter continues to display all the messages present.

8.4 Repair

The Endress+Hauser repairs concept provides for measuring devices to have a modular design and also the customer may carry out repairs (→ 60, "Spare Parts").

Note!
- For certified devices, please consult Chapter "Repair of Ex-certified devices".
- For more information on service and spare parts contact the Endress+Hauser Service. See www.endress.com/worldwide.

8.5 Repair of Ex-certified devices

Warning!
When repairing Ex-certified devices, please note the following:
- Only specialist personnel or Endress+Hauser may undertake repairs of certified devices.
- Relevant standards, national hazardous area regulations and Safety Instructions and Certificates must be observed.
- Only genuine Endress+Hauser spare parts may be used.
- When ordering spare parts, please check the device designation on the nameplate. Identical parts may only be used as replacements.
- Electronic inserts or sensors already in use in a standard instrument may not be used as spare parts for a certified device.
- Carry out repairs according to the instructions. After repairs, the device must fulfil the requirements of the specified individual tests.
- A certified device may only be converted into another certified variant by Endress+Hauser.
- All repairs and modifications must be documented.

8.6 Spare Parts

- Some replaceable measuring device components are identified by means of a spare part nameplate. This contains information about the spare part.
- All the spare parts for the measuring device along with the order code are listed In the W@M Device Viewer (www.endress.com/deviceviewer) and can be ordered. If available, users can also download the associated Installation Instructions.

Note!
Measuring device serial number:
- Located on the device and spare part nameplate.
- Can be read out via the "DEVICE SERIAL No" parameter in the "TRANSMITTER DATA" submenu.

8.7 Return

The measuring device must be returned if repairs or a factory calibration are required, or if the wrong measuring device has been ordered or delivered. According to legal regulations, Endress+Hauser, as a ISO-certified company, is required to follow certain procedures when handling returned products that are in contact with process fluids.
To ensure swift, safe and professional device returns, please read the return procedures and conditions on the Endress+Hauser website at www.services.endress.com/return-material.

8.8 Disposal

When disposing, separate and recycle the device components based on the materials.

8.9 Software history

Date	Software version	Changes software	Documentation	
			Operating Instructions	Description of Instrument Functions
11.2003	01.00.zz	Original software. Compatible with: – ToF Tool Field Tool Package, version 1.04.00 or higher – Commuwin II version 2.08.-1, Update G or higher – HART Communicator 375 with Device Rev.: 10, DD Rev.: 1	BA271P/00/EN/10.03 52020517	—
06.2004	02.00.zz	– Number of parameters in the Quick Setup menus has been reduced. – On-site operation: LANGUAGE and MEASURING MODE parameters have been moved to the top level. – New SAFETY CONFIRM. group implemented for SIL. → See also SD00190P Safety Manual Cerabar S. – MEASURING MODE "Level", LEVEL MODE "Linear": AREA UNIT and TANK SECTION parameters have been replaced with the TANK VOLUME and TANK HEIGHT parameters. – Function of the UNIT FLOW parameter has been split across four parameters. – Function of the SIMULATED VALUE parameter has been split across six parameters. – SENSOR TRIM and CURRENT TRIM groups have been removed. – Sensor adapt reset, code 1209 and sensor calibration reset, code 2509 have been removed. – Quick Setup menus are available via ToF Tool. Compatible with: – ToF Tool Field Tool Package version 2.00.00 or higher – Commuwin II version 2.08.-1, Update > G – HART Communicator 375/475 with Device Rev.: 20, DD Rev.: 1	BA271P/00/EN/05.04 52022795	BA274P/00/EN/05.04 52021469
06.2005	02.01.zz	– Operating keys also integrated on the optional on-site display. – Chinese and Japanese are available as the menu language on request. Compatible with: – ToF Tool Field Tool Package version 3.00.00 or higher – FieldCare version 2.01.00, DTM Library version 2.06.00, DTM: Deltabar S/MD7x/V02.00 V 1.4.98.74* – HART Communicator 375/475 with Device Rev.: 20, DD Rev.: 1* * Menu languages Chinese and Japanese not selectable	BA271P/00/EN/06.05 71000115 BA271P/00/EN/11.05 71009589	BA274P/00/EN/05.04 52021469 BA274P/00/EN/05.04 52021469

Date	Software version	Changes software	Documentation	
			Operating Instructions	**Description of Instrument Functions**
06.2006	02.10.zz	– New "Level Easy Pressure" and "Level Easy Height" level modes implemented. New LEVEL SELECTION parameter implemented. – OPERATION group with DOWNLOAD SELECT parameter extended. – SAFETY CONFIRM group extended for the "Level" operating mode in the "Level Easy Pressure" level selection. → See also SD00190P Safety Manual Cerabar S. – Factory setting for the "Error" messages redefined. – Chinese and Japanese included as menu languages by default. Compatible with: – ToF Tool Field Tool Package version 4.0 – FieldCare version 2.02.00 – HART Communicator 375/475 with Device Rev.: 21, DD Rev.: 1	BA271P/00/EN/07.06 71027246	BA274P/00/EN/07.06 71027249
			BA271P/00/EN/08.06 71027246	BA274P/00/EN/07.06 71027249
			BA271P/00/EN/10.07 71043296	BA274P/00/EN/07.07 71061022
			BA271P/00/EN/12.07 71043296	BA274P/00/EN/07.07 71061022
			BA271P/00/EN/05.08 71071770	BA274P/00/EN/05.08 71071855
			BA271P/00/EN/08.08 71077544	BA274P/00/EN/05.08 71071855
			BA271P/00/EN/06.09 71095434	BA274P/00/EN/06.09 71095452
			BA271P/00/EN/05.10 71111792	BA274P/00/EN/05.10 71118244
			BA00271P/00/EN/13.11 71139779	BA00274P/00/EN/13.11 71139795
			BA00271P/00/EN/14.12 71161896	BA00274P/00/EN/13.11 71139795
01.2013	02.11.zz	"Russian" is included as a menu language by default. The menu language "Nederlands" is no longer supported.	BA00271P/00/EN/15.13 71204567	BA00274P/00/EN/14.13 71204628
			BA00271P/00/EN/16.14 71254295	BA00274P/00/EN/15.14 71254474
06.2014	02.20.zz	HART7 protocole revision has been implemented.	BA00271P/00/EN/17.14 71260306	BA00274P/00/EN/16.14 71260321
			BA00271P/00/EN/18.14 71270361	BA00274P/00/EN/17.14 71270402

9 Technical data

For technical data, please refer to TI00383P.

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People for Process Automation

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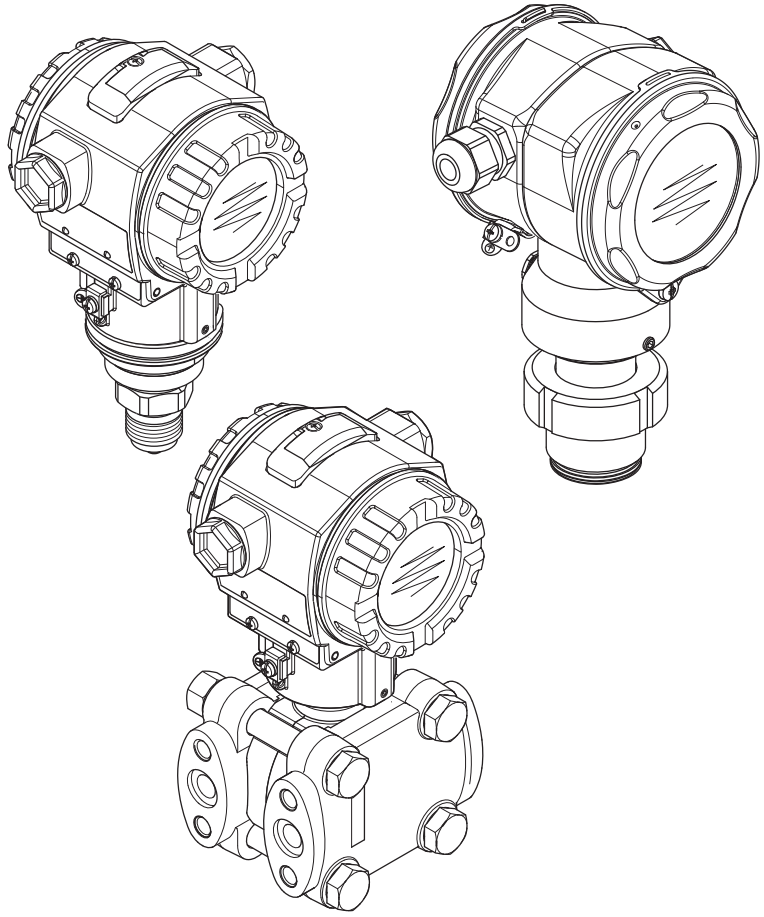
Level Pressure Flow Temperature Liquid Analysis Registration Systems Components Services Solutions

Operating Instructions – Description of Instrument Functions

Cerabar S PMC71, PMP71/75
Deltabar S FMD77, FMD78, PMD75
Deltapilot S FMB70

Process pressure / Differential pressure, Flow / Hydrostatic

HART COMMUNICATION PROTOCOL



BA00274P/00/EN/17.14
71270402

valid from Software version:
02.20.zz

Endress+Hauser
People for Process Automation

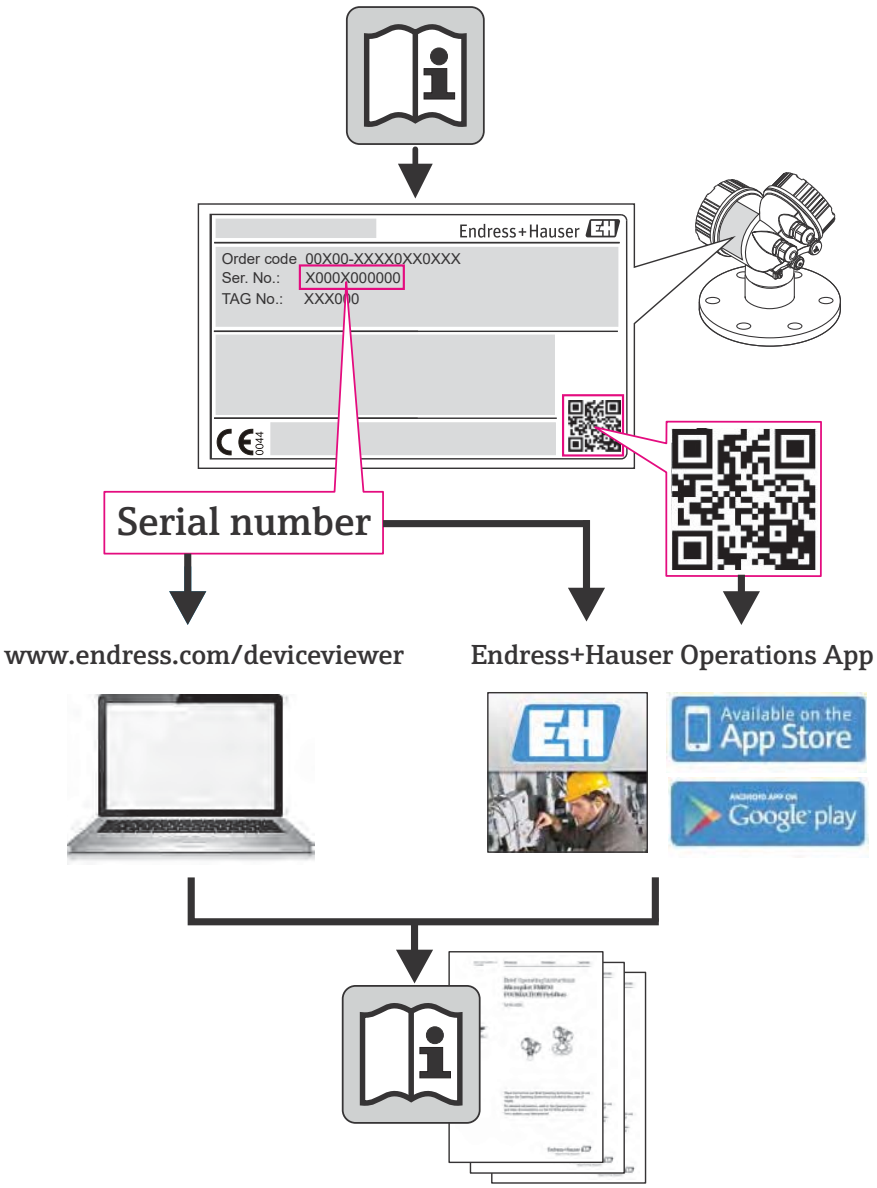

Endress+Hauser
Order code 00X00-XXXX0XX0XXX
Ser. No.: X000X000000
TAG No.: XXX000
Serial number
www.endress.com/deviceviewer
Endress+Hauser Operations App
Available on the App Store
Google play

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Table of contents

1 Notes on use

Section 7 describes all the parameters in order of how they appear in the menu. Sections 4 to 6 provide typical examples of configuration.

Sections 1.1 to 1.3 describe ways of finding a certain parameter description more easily.

1.1 Finding parameter description using ID numbers

Each parameter is shown on the on-site display with a unique identification number (ID). Section 2 lists all the parameters in numerical order. The page reference/link takes you to the parameter in question.
In the Operating program, additional parameters and, to an extent, other parameters are displayed. These parameters are not listed in Section 2. You can find these parameters by means of the index.
→ See also Section 1.3.

1.2 Finding function group using graphic representation

All the function groups are shown in table form in Section 3. The page reference/link takes you to the function group in question. In Section 7, all the parameters of a function group are compiled in a table.

1.3 Finding parameter description using parameter names (index)

The index lists all the parameters in alphabetical order. The page reference/link takes you to the parameter in question.

2 Finding parameter description using ID numbers

ID number	Parameter name	Description, see page
001	DENSITY UNIT – Level Selection "Level Easy Pressure"	64 or 97
003	HEIGHT UNIT	64
004	FULL CALIB. – QUICK SETUP	51
004	FULL CALIB. – Level Selection "Level Easy Pressure"	61
004	FULL CALIB. – Level Selection "Level Easy Height"	65
005	FULL PRESSURE	61
006	FULL HEIGHT	66
007	ADJUST DENSITY – Level Selection "Level Easy Height"	64 or 97
008	CALIBRATION MODE – Level Selection "Level Easy Pressure"	60
008	CALIBRATION MODE – Level Selection "Level Easy Height"	64
009	EMPTY HEIGHT	65
010	EMPTY CALIB. – QUICK SETUP	50
010	EMPTY CALIB. – Level Selection "Level Easy Pressure"	60 or 61
010	EMPTY CALIB. – Level Selection "Level Easy Height"	65
011	EMPTY PRESSURE	61
012	SET URV – Level Selection "Level Easy Pressure"	61
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075	CUSTOMER UNIT P	56, 59, 63, 68 or 92
079	LANGUAGE	44
245	SET LRV – "Pressure" measuring mode	48 or 56
246	SET URV – "Pressure" measuring mode	48 or 57
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301	PRESSURE – "Pressure" measuring mode	122
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305	LONG TAG NUMBER	117

1) See Safety Manual SD00189P for Deltabar S, SD00190P for Cerabar S and SD00213P for Deltapilot S.

ID number	Parameter name	Description, see page
309	GET LRV	57
310	GET URV	57
311	MAX. FLOW	52 or 95
313	UNIT VOLUME – "Linear" level type	71 or 75
	UNIT VOLUME – "Pressure Linearized" level type	79
	UNIT VOLUME – "Height Linearized" level type	84
314	EMPTY CALIB. – QUICK SETUP	50
	EMPTY CALIB. – "Linear" level type	73
	EMPTY CALIB. – "Height Linearized" level type	87
315	FULL CALIB. – QUICK SETUP	51
	FULL CALIB. – "Pressure Linearized" level type	74
	FULL CALIB. – "Height Linearized" level type	87
316	ADJUST DENSITY – "Linear" level type	74
	ADJUST DENSITY – "Height Linearized" level type	88
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317	CUST. UNIT FACT. P	56, 68 or 93
318	TEMP. ENG. UNIT – "Pressure" measuring mode	96
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323	SET. L. FL. CUT-OFF	99
329	FACT. U. U. TOTAL. 1	108
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331	RESET TOTALIZER1	109
332	Pmin ALARM WINDOW	130
333	Pmax ALARM WINDOW	130
334	Tmin ALARM WINDOW	130
335	Tmax ALARM WINDOW	130
336	ALARM DELAY	129
339	DISPLAY CONTRAST	111
342	SET MAX. ALARM	113
343	SET MIN. CURRENT	113
345	BUS ADDRESS	115
350	DEVICE DESIGN.	117
351	DEVICE TYPE, Deltabar S	115
352	CONFIG RECORDER	117
354	DEVICE SERIAL No	117
357	PCB TEMPERATURE	117
358	ALLOWED MIN. TEMP	117
359	ALLOWED MAX. TEMP	117
360	MAT. PROC. CONN. +	118
361	MAT. PROC. CONN. -	118
362	SEAL TYPE	118
363	DIP STATUS	117
365	MAT. MEMBRANE	120
366	FILLING FLUID	120
367	SENSOR TEMP.	122 or 123
368	Tmin SENSOR	120
369	Tmax SENSOR	120
370	TANK CONTENT	123
375	SUPPRESSED FLOW	123
378	MEAS. VAL. TREND	122 or 123
380	COUNTER:P > Pmax	124
382	RESET PEAKHOLD	125
383	MAX. MEAS. PRESS.	124
386	ELECTR. SERIAL No	117
388	OUTPUT FAIL MODE	112
389	MEASURING MODE	45
390	LINEAR/SQROOT	113
391	UNIT FLOW	93
392	CALIBRATION MODE – "Linear" level type	73
	CALIBRATION MODE – "Height Linearized" level type	87
397	LIN. EDIT MODE	101
398	TOTALIZER 1 UNIT – "Volume p. cond." flow type	108
399	TOTALIZER 2 UNIT – "Volume p. cond." flow type	109
400	NEG. FLOW TOT. 1	108
401	ACK. ALARM MODE	128

ID number	Parameter name	Description, see page
404	COUNTER:T > Tmax	124
409	OPERATING HOURS	126
413	SIMULATION MODE	127
414	SIM. PRESSURE	127
416	NEG. FLOW TOT. 2	109
419	MENU DESCRIPTOR	110
423	ALTERNATE DATA	110
432	MANUFACTOR ID	116
434	CORRECTED PRESS. – "Pressure" measuring mode	122
	CORRECTED PRESS. – "Level" measuring mode	122
	CORRECTED PRESS. – "Flow" measuring mode	123
442	LOW FLOW CUT-OFF	99
467	COUNTER:P < Pmin	124
469	MIN. MEAS. PRESS.	124
471	MAX. MEAS. TEMP.	124
472	COUNTER:T < Tmin	124
474	MIN. MEAS. TEMP.	124
476	SIM. ERROR NO.	128
480	ALARM DISPL. TIME	129
481	HART DATE	116
482	PROC. CONN. TYPE	118
484	PRESS. SENS LOLIM	119
485	PRESS. SENS HILIM	119
487	SENS H/WARE REV	120
488	PCB COUNT:T > Tmax	124
490	PCB MAX. TEMP.	124
492	PCB COUNT:T < Tmin	124
494	PCB MIN. TEMP.	124
500	ACK. ALARM	129
052	CURRENT MODE	115
549	MEASURING TABLE (display)	103
549	EDITOR TABLE, LINE-NUMB (enter values)	102
550	EDITOR TABLE, X-VAL. (enter values)	102
551	EDITOR TABLE, Y-VAL. (enter values)	102, 102
563	POS. INPUT VALUE	48, 50 or 54
564	LAST DIAG. CODE	128
570	Pmax PROC. CONN.	117
571	MASS FLOW UNIT	94
581	SENSOR MEAS.TYPE	120
584	SENSOR PRESSURE – "Pressure" measuring mode	122
	SENSOR PRESSURE – "Level" measuring mode	122
	SENSOR PRESSURE – "Flow" measuring mode	123
585	HART VERSION	114
591	MINIMUM SPAN	119
595	SELECT ALARMTYPE	129
597	ALT. CURR. OUTPUT	113
600	SELECT ALARMTYPE	129
603	RESET ALL ALARMS	129
607	CUST. UNIT FACT. V – "Linear" level type	72
	CUST. UNIT FACT. V – "Pressure Linearized" level type	79
	CUST. UNIT FACT. V – "Height Linearized" level type	85
608	CUSTOMER UNIT V – "Linear" level type	71
	CUSTOMER UNIT V – "Pressure Linearized" level type	79
	CUSTOMER UNIT V – "Height Linearized" level type	85
609	CUST. UNIT FACT. F	95
610	CUSTOMER UNIT F	94
627	TOT. 1 USER UNIT	108
628	TOT. 2 USER UNIT	109
634	MAX PRESS. FLOW	53 or 95
637	SET LRV – "Flow" extended setup	99
638	SET URV – "Flow" extended setup	100
639	SIM.FLOW VALUE	127
640	FLOW-MEAS. TYPE	93
652	TOTALIZER 1	124
655	TOTAL. 1 OVERFLOW	124
657	TOTALIZER 2	124
658	TOTAL. 2 OVERFLOW	124
660	STD. FLOW UNIT	94

661	NORM FLOW UNIT	93

ID number	Parameter name	Description, see page
662	TOTALIZER 1 UNIT – "Mass" flow type	108
663	TOTALIZER 2 UNIT – "Mass" flow type	109
664	TOTALIZER 1 UNIT – "Gas. std. conditions" flow type	108
665	TOTALIZER 2 UNIT – "Gas. std. conditions" flow type	109
666	TOTALIZER 1 UNIT – "Gas. norm conditions" flow type	108
667	TOTALIZER 2 UNIT – "Gas. norm conditions" flow type	109
679	MEASURED VALUE – "Pressure"	121
	MEASURED VALUE – "Level"	122
	MEASURED VALUE – "Flow"	123
685	POS. ZERO ADJUST	48, 50, 52 or 54
688	MAIN DATA FORMAT	110
694	CURR. CHARACT. – "Pressure"	112
695	CURR. CHARACT. – "Flow"	112
696	CURR. CHARACT. – "Height"	112
699	DEVICE REVISION	115
703	CUST. UNIT FACT. M – "Linear" level type	73
	CUST. UNIT FACT. M – "Pressure Linearized" level type	80
	CUST. UNIT FACT. M – "Height Linearized" level type	86
704	CUSTOMER UNIT M – "Linear" level type	72
	CUSTOMER UNIT M – "Pressure Linearized" level type	80
	CUSTOMER UNIT M – "Height Linearized" level type	86
705	CUST. UNIT FACT. H – "Linear" level type	71 or 76
	CUST. UNIT FACT. H – "Height Linearized" level type	84 or 89
706	CUSTOMER UNIT H – "Linear" level type	70 or 76
	CUSTOMER UNIT H – "Height Linearized" level type	84 or 89
708	HEIGHT UNIT – "Linear" level type	70 or 76
	HEIGHT UNIT – "Height Linearized" level type	83 or 88
709	MASS UNIT – "Linear" level type	72
	MASS UNIT – "Pressure Linearized" level type	80
	MASS UNIT – "Height Linearized" level type	85
710	EMPTY PRESSURE – "Linear" level type	74
	EMPTY PRESSURE – "Height Linearized" level type	87
711	FULL PRESSURE – "Linear" level type	74
	FULL PRESSURE – "Height Linearized" level type	87
712	LEVEL MAX	86
713	TANK CONTENT MAX	101
714	SIM. LEVEL	127
715	SIM. TANK CONT.	128
717	MEASURING TABLE (selection)	103
718	LEVEL MODE	68
719	SET LRV – "Level" basic setup	77
720	SET URV – "Level" basic setup	77
755	LEVEL MIN	86
759	TANK CONTENT MIN	101
760	ASSIGN CURRENT	113
761	HYDR. PRESS MAX.	81
762	SET LRV – "Level" extended setup	98
763	SET URV – "Level" extended setup	98
764	CURR. CHARACT. – "Tank content"	112
770	EDITOR TABLE (continue entry)	103
775	HYDR. PRESS MIN.	80
802	DEVICE TYPE, Cerabar S	115
804	LIN. MEASURAND	70
805	LINd. MEASURAND	79
806	COMB. MEASURAND	83
808	TABLE SELECTION	101
809	EDITOR TABLE (select table)	102
810	ADJUSTED DENSITY – "Linear" level type	74
	ADJUSTED DENSITY – "Height Linearized" level type	87
811	PROCESS DENSITY	97
812	DENSITY UNIT – "Linear" level type	74
	DENSITY UNIT – "Height Linearized" level type	88
813	100 % POINT – "Linear" level type	77
	100 % POINT – "Height Linearized" level type	89

ID number	Parameter name	Description, see page
814	ZERO POSITION – "Linear" level type ZERO POSITION – "Height Linearized" level type	77 90
815	TANK DESCRIPTION	103
831	HistoROM AVAIL.	126
832	HistoROM CONTROL	127
836	SAFETY LOCKSTATE SAFETY LOCK	See [1)]
838	SAFETY PASSWORD	See [1]
840	DIGIT SETS	111
841	DIGIT SETS	See [1]
844	ACK. ALARM MODE	See [1]
845	MEASURING MODE	See [1]
847	CALIB. OFFSET	See [1]
848	MAX. FLOW	See [1]
849	MAX PRESS. FLOW	See [1]
850	LOW FLOW CUT-OFF	See [1]
851	SET. L. FL. CUT-OFF	See [1]
852	SET LRV	See [1]
853	SET URV	See [1]
854	LINEAR/SQROOT.	See [1]
855	DAMPING VALUE	See [1]
856	CONF. PASSWORD	See [1]
858	TANK VOLUME	75
859	TANK HEIGHT	76
875	CURRENT OUTPUT	See [1]

1) See Safety Manual SD00189P for Deltabar S, SD00190P for Cerabar S and SD00213P for Deltapilot S.

3 Graphic representation of function groups

Note!
The "Flow" measuring mode is only available for the Deltabar S differential pressure transmitter. The groups marked with "*" are only displayed for Deltabar S.

1st selection level	2nd selection level (groups)	Function groups	Description, see page
LANGUAGE	LANGUAGE (079)		→ 44
MEASURING MODE	MEASURING MODE (389)		→ 45
QUICK SETUP pressure			→ 47
QUICK SETUP level			→ 49
QUICK SETUP flow*			→ 52
OPERATING MENU (555)	→ SETTINGS (557)	→ POSITION ADJUSTMENT	→ 53
		→ BASIC SETUP pressure	→ 55
		→ BASIC SETUP level, "Level Easy Pressure"	→ 58
		→ BASIC SETUP level, "Level Easy Height"	→ 62
		→ BASIC SETUP level, "Level Easy Standard"	→ 67
		→ BASIC SETUP flow*	→ 91
		→ EXTENDED SETUP pressure	→ 96
		→ EXTENDED SETUP level	→ 96
		→ EXTENDED SETUP flow*	→ 98
		→ LINEARISATION – on-site display	→ 100
		→ LINEARISATION – Digital communication	→ 104
		→ TOTALIZER SETUP *	→ 107
	→ SAFETY CONFIRM.		→ See [1]
	→ DISPLAY (558)		→ 110
	→ OUTPUT (559)		→ 111
	→ TRANSMITTER INFO (560)	→ HART DATA	→ 114
		→ TRANSMITTER DATA	→ 117
		→ PROCESS CONNECTION	→ 117
		→ SENSOR DATA	→ 119
	→ PROCESSINFO (561)	→ PROCESS VALUES pressure	→ 121
		→ PROCESS VALUES level	→ 122
		→ PROCESS VALUES flow*	→ 123
		→ PEAK HOLD INDICATOR	→ 124
	→ OPERATING		→ 126
	→ DIAGNOSTICS (562)	→ SIMULATION	→ 127
		→ MESSAGES	→ 128
		→ USER LIMITS	→ 130
	→ SERVICE (561)	→ SYSTEM 2	→ 131

1) See Safety Manual SD00189P for Deltabar S, SD00190P for Cerabar S and for SD00213P Deltapilot S.

4 Pressure measurement

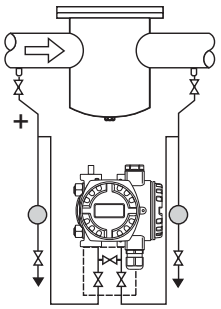
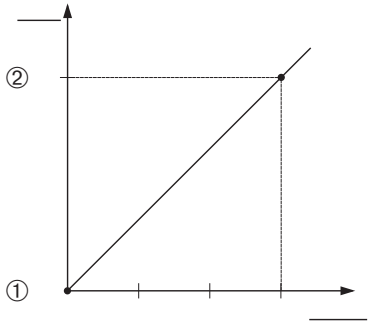
4.1 Calibration with reference pressure

Example:
In this example, a device with a 500 mbar (7.5 psi) sensor is configured for the 0...+300 mbar (4.5 psi)measuring range, i.e. 0 mbar and 300 mbar (4.5 psi) are assigned to the 4 mA value and 20 mA value respectively.

Prerequisite:
- The pressure values 0 mbar and 300 mbar (4.5 psi) can be specified. The device is already installed, for example.

Note!
- See also Operating Instructions Deltabar S (BA00270P), Section 6.6 "Differential pressure measurement", Cerabar S (BA00271P), Section 6.4 "Pressure measurement" or Deltapilot S (BA00332P), Section 6.5 "Pressure measurement".
- For a description of the parameters mentioned, see
  - Page 45, Table 2: MEASURING MODE
  - Page 53, Table 6: POSITION ADJUSTMENT
  - Page 55, Table 7: BASIC SETUP.
- For a description of further relevant parameters, see
  - Page 96, Table 15: EXTENDED SETUP
  - Page 121, Table 25: PROCESS VALUES.

Warning!
If the measuring mode is changed, the span setting (URV) must be verified in the "Calibration" → "Basic Setup" operating menu and, if necessary, reconfigured.

	Description	
1	Deltabar S: before configuring the device for your application, the pressure piping must be cleaned and filled with fluid. See Operating Instructions BA00270P, Section 6.6.	 P01-PMD75xxx-19-xx-xx-xx-000  P01-xxxxxxxx-05-xx-xx-xx-010 *Fig. 1: Calibration with reference pressure* *1 See table, step 6.* *2 See table, step 7.*
2	Carry out position adjustment if necessary. See Page 53, Table 6: POSITION ADJUSTMENT.	
3	If necessary, select the "Pressure" measuring mode via the MEASURING MODE parameter. On-site display: Menu path: GROUP SELECTION → MEASURING MODE Digital communication: Menu path: OPERATING MENU → SETTINGS → BASIC SETUP → MEASURING MODE	
4	On-site display: Select BASIC SETUP function group. Menu path: GROUP SELECTION → OPERATING MENU → SETTINGS → BASIC SETUP	
5	Select a pressure unit via the PRESS. ENG. UNIT parameter, here mbar for example.	
6	The pressure for the lower range value (4 mA value) is present at the device, here 0 mbar for example.	
	Select GET LRV parameter.	
	Confirm value present. The pressure value present is assigned to the lower current value (4 mA).	
7	The pressure for the upper range value (20 mA value) is present at the device, here 300 mbar (4.5 psi) for example.	
	Select GET URV parameter.	
	Confirm value present. The pressure value present is assigned to the upper current value (20 mA).	
8	Result: The measuring range is set for 0...+300 mbar (4.5 psi).	

Note!
- You can also specify a customer-specific unit. See parameter description for PRESS. ENG. UNIT (→ Page 56).

4.2 Calibration without reference pressure

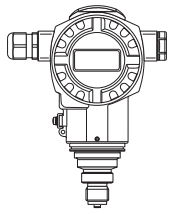
Example:
In this example, a device with a 400 mbar (6 psi) sensor is configured for the 0...+300 mbar (4.5 psi) measuring range, i.e. 0 mbar and 300 mbar (4.5 psi) are assigned to the 4 mA value and 20 mA value respectively.

Prerequisite:
- This is a theoretical calibration, i.e. the pressure values for the lower range and upper range value are known.

Note!
- See also Operating Instructions Deltabar S (BA00270P), Section 6.6 "Differential pressure measurement", Cerabar S (BA00271P), Section 6.4 "Pressure measurement" or Deltapilot S (BA00332P), Section 6.5 "Pressure measurement".
- Due to the orientation of the device, there may be a shift in the measured value, i.e. when the container is empty or partly filled, the MEASURED VALUE parameter does not display zero. → To perform a position adjustment see also Page 53, Table 6: Position adjustment.
- For a description of the parameters mentioned, see
  – Page 45, Table 2: MEASURING MODE
  – Page 53, Table 6: POSITION ADJUSTMENT
  – Page 55, Table 7: BASIC SETUP.
- For a description of further relevant parameters, see
  – Page 96, Table 15: EXTENDED SETUP
  – Page 121, Table 27: PROCESS VALUES.

Warning!
If the measuring mode is changed, the span setting (URV) must be verified in the "Calibration" → "Basic Setup" operating menu and, if necessary, reconfigured.

	Description
1	If necessary, select the "Pressure" measuring mode via the MEASURING MODE parameter. On-site display: Menu path: GROUP SELECTION → MEASURING MODE Digital communication: Menu path: OPERATING MENU → SETTINGS → BASIC SETUP → MEASURING MODE
2	On-site display: Select BASIC SETUP function group. Menu path: GROUP SELECTION → OPERATING MENU → SETTINGS → BASIC SETUP
3	Select a pressure unit via the PRESS. ENG. UNIT parameter, here mbar for example.
4	Select SET LRV parameter.
	Enter value, here 0 mbar, for the SET LRV parameter and confirm. This pressure value is assigned to the lower current value (4 mA).
5	Select SET URV parameter.
	Enter value, here 300 mbar (4.5 psi), for the SET URV parameter and confirm. This pressure value is assigned to the upper current value (20 mA).
6	Result: The measuring range is set for 0...+300 mbar (4.5 psi).



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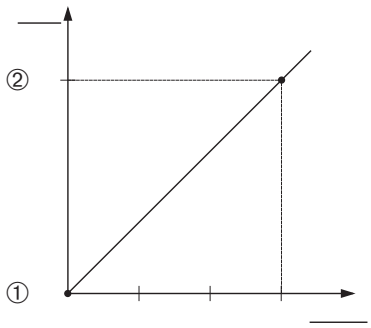

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Fig. 2: Calibration without reference pressure

1 See table, step 4.
2 See table, step 5.

Note!
- You can also perform calibration without reference pressure by means of the QUICK SETUP menu. → See Page 47 ff, Table 3: QUICK SETUP menu.
- You can also specify a customer-specific unit. See parameter description for PRESS. ENG. UNIT (→ Page 56).

5 Level measurement

5.1 Overview of level measurement

Measuring task	LEVEL SELECTION/ LEVEL MODE	Measured variable options	Description	Comment	Measured value display
The measured variable is in direct proportion to the measured pressure. Calibration is performed by entering two pressure-level value pairs.	LEVEL SELECTION: Level Easy Pressure	Via OUTPUT UNIT parameter: %, level, volume or mass units.	– Calibration with reference pressure – wet calibration, see Page 15, Section 5.2.1 – Calibration without reference pressure – dry calibration, see Page 17, Section 5.2.2	– Incorrect entries are possible – SIL mode possible – Customised units are not possible	The measured value display and the LEVEL BEFORE LIN parameter show the measured value.
The measured variable is in direct proportion to the measured pressure. Calibration is performed by entering the density and two height-level value pairs.	LEVEL SELECTION: Level Easy Height	Via OUTPUT UNIT parameter: %, level, volume or mass units.	– Calibration with reference pressure – wet calibration, see Page 19, Section 5.3.1 – Calibration without reference pressure – dry calibration, see Page 22, Section 5.3.2	– Incorrect entries are possible – SIL mode not possible – Customised units are not possible	The measured value display and the LEVEL BEFORE LIN parameter show the measured value.
The measured variable is in direct proportion to the measured pressure.	LEVEL SELECTION: Level standard/ LEVEL MODE: Linear	Via LIN. MEASURAND parameter: – % (Level) – Level – Volume – Mass	– Calibration with reference pressure – wet calibration, see Page 24, Section 5.4.1 – Calibration without reference pressure – dry calibration, see Page 26, Section 5.4.2	– Incorrect entries are rejected by the device – SIL mode not possible – Customised level, volume and mass units are possible	The measured value display and the LEVEL BEFORE LIN parameter show the measured value.
The measured variable is not in direct proportion to the measured pressure as, for example, with containers with a conical outlet. A linearisation table must be entered for the calibration.	LEVEL SELECTION: Level standard/ LEVEL MODE: Pressure Linearized	Via LINd MEASURAND parameter: – Pressure + % – Pressure + Volume – Pressure + Mass	– Calibration with reference pressure: semiautomatic entry of linearisation table, see Page 28, Section 5.5.1 – Calibration without reference pressure: manual entry of linearisation table, see Page 31, Section 5.5.2	– Incorrect entries are rejected by the device – SIL mode not possible – Customised level, volume and mass units are possible	The measured value display and the TANK CONTENT parameter show the measured value.
– Two measured variables are required or – The container shape is given by value pairs, such as height and volume. The 1st measured variable %-height or height must be in direct proportion to the measured pressure. The 2nd measured variable volume, mass or % must not be in direct proportion to the measured pressure. A linearisation table must be entered for the 2nd measured variable. The 2nd measured variable is assigned to the 1st measured variable by means of this table.	LEVEL SELECTION: Level standard/ LEVEL MODE: Height Linearized	Via COMB. MEASURAND parameter: – Height + Volume – Height + Mass – Height + % – %-Height + Volume – %-Height + Mass – %-Height + %	– Calibration with reference pressure: wet calibration and semiautomatic entry of linearisation table, see Page 33, Section 5.6.1 – Calibration without reference pressure: dry calibration and manual entry of linearisation table, see Page 37, Section 5.6.2	– Incorrect entries are rejected by the device – SIL mode not possible – Customised level, volume and mass units are possible	The measured value display and the TANK CONTENT parameter show the 2nd measured value (volume, mass or %). The LEVEL BEFORE LIN parameter displays the 1st measured value (%-height or height).

5.2 "Level Easy Pressure" level selection

5.2.1 Calibration with reference pressure – wet calibration

Example:
In this example, the level in a tank should be measured in m. The maximum level is 3 m (9.8 ft). The pressure range is set to 0 to 300 mbar (4.5 psi).

Prerequisite:
- The measured variable is in direct proportion to the pressure.
- The tank can be filled or emptied.

Note!
- See also Operating Instructions for Deltabar S (BA00270P) or Cerabar S (BA00271P), Section 6.5 "Level measurement" or Deltapilot S (BA00332P), Section 6.4 "Level measurement".
- The values entered for EMPTY CALIB./FULL CALIB. and SET LRV/SET URV must have a minimum interval of 1% for the "Level Easy Pressure" level mode. The value will be rejected with a warning message if the values are too close together. Further limit values are not checked; i.e. the values entered must be appropriate for the sensor and the measuring task so that the measuring device can measure correctly.
- For a description of the parameters mentioned, see
  – Page 45, Table 2: MEASURING MODE
  – Page 53, Table 6: POSITION ADJUSTMENT
  – Page 58, Table 8: LEVEL SELECTION "Level Easy Pressure"
- For a description of further relevant parameters, see
  – Page 96, Table 16: EXTENDED SETUP
  – Page 122, Table 28: PROCESS VALUES.

Warning!
If the measuring mode is changed, the span setting (URV) must be verified in the "Calibration" → "Basic Setup" operating menu and, if necessary, reconfigured.

	Description
1	Deltabar S: Before you configure the device for your application, the pressure piping must be cleaned and filled with medium. See Operating Instructions BA00270P, Section 6.5.1
2	Carry out position adjustment if necessary. See Page 53, Table 6: POSITION ADJUSTMENT.
3	If necessary, select the "Level" measuring mode via the MEASURING MODE parameter. On-site display: Menu path: GROUP SELECTION → MEASURING MODE Digital communication: Menu path: OPERATING MENU → SETTINGS → BASIC SETUP→ MEASURING MODE
4	If necessary, select "Level Easy Pressure" level mode using the LEVEL SELECTION parameter. On-site display: Menu path: GROUP SELECTION → MEASURING MODE "Level" → LEVEL SELECTION Digital communication: Menu path: OPERATING MENU → SETTINGS → BASIC SETUP → MEASURING MODE "Level" → LEVEL SELECTION

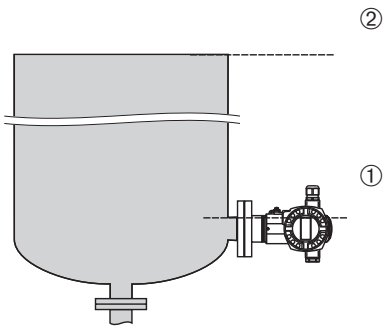
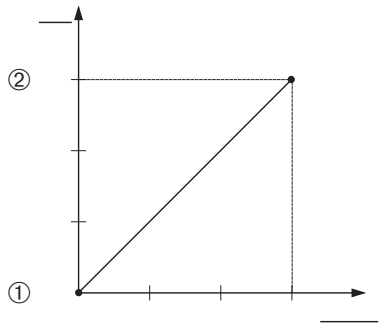


Fig. 3: Calibration with reference pressure – wet calibration

1 See Table, Step 9.
2 See Table, Step 10.

	Description
5	On-site display: Select BASIC SETUP function group. Menu path: GROUP SELECTION → OPERATING MENU → SETTINGS → BASIC SETUP
6	Select a pressure unit via the PRESS. ENG. UNIT parameter, here mbar for example.
7	Select a level unit via the OUTPUT UNIT parameter, here m for example.
8	Select the "Wet" option by means of the CALIBRATION MODE parameter.
9	Hydrostatic pressure for the lower calibration point is present at the device, here 0 mbar for example.
	Select EMPTY CALIB. parameter.
	Enter the level value, here 0 m for example. Confirm the value to assign the pressure value present to the lower level value. ✎ Note! To accept the value displayed you must first switch to the Edit mode (see the "Editing values" section) and then press the "E" button to save the value.
10	Hydrostatic pressure for the upper calibration point is present at the device, here 300 mbar (4.5 psi) for example.
	Select FULL CALIB. parameter.
	Enter the level value, here 3 m (9.8 ft) for example. Confirm the value to assign the pressure value present to the upper level value. ✎ Note! To accept the value displayed you must first switch to the Edit mode (see the "Editing values" section) and then press the "E" button to save the value.
11	Set the value for the lower current value (4 mA) by means of the SET LRV parameter.
12	Set the value for the upper current value (20 mA) by means of the SET URV parameter.
13	Result: The measuring range is set for 0 to 3 m (9.8 ft).



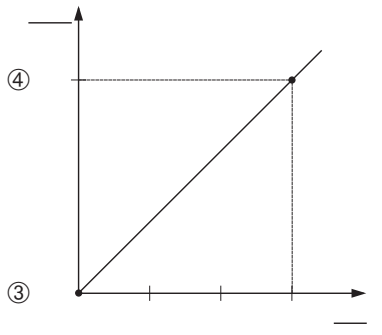


Fig. 4: Calibration with reference pressure – wet calibration

1 See Table, Step 9.
2 See Table, Step 10.
3 See Table, Step 11.
4 See Table, Step 12.

✎ Note!

1. You can also perform calibration with reference pressure by means of the QUICK SETUP menu. → See Page 49 ff, Table 4: QUICK SETUP menu.
2. For this level mode, the measured variables %, level, volume and mass are available. → See also parameter description for OUTPUT UNIT, Page 60.
3. For operation using the on-site display, the parameters EMPTY CALIB. (→ Page 61) and FULL CALIB. (→ Page 61) also show the respective pressure present at the device. For operation using Digital communication, the pressure present at the device is displayed in the PROCESS VALUES group (menu path: OPERATING MENU→ PROCESSINFO → PROCESS VALUES).

5.2.2 Calibration without reference pressure – dry calibration

Example:
In this example, the volume in a tank should be measured in litres.The maximum volume of 1000 litres (264 US gal) corresponds to a pressure of 450 mbar (6.75 psi). The minimum volume of 0 litres corresponds to a pressure of 50 mbar (0.75 psi), as the device is mounted below the level lower range value. The device is mounted below the level lower range value.

Prerequisite:
- The measured variable is in direct proportion to the pressure.
- This is a theoretical calibration i.e. the pressure and volume values for the lower and upper calibration point must be known.

Note!
- See also Operating Instructions for Deltabar S (BA00270P) or Cerabar S (BA00271P), Section 6.5 "Level measurement" or Deltapilot S (BA00332P), Section 6.4 "Level measurement".
- The values entered for EMPTY CALIB./FULL CALIB. and SET LRV/SET URV must have a minimum interval of 1% for the "Level Easy Pressure" level mode. The value will be rejected with a warning message if the values are too close together. Further limit values are not checked; i.e. the values entered must be appropriate for the sensor and the measuring task so that the measuring device can measure correctly.
- Due to the orientation of the device, there may be a shift in the measured value, i.e. when the container is empty or partly filled, the MEASURED VALUE parameter does not display zero. → To perform a position adjustment see also Page 53, Table 6: Position adjustment.
- For a description of the parameters mentioned, see
  – Page 45, Table 2: MEASURING MODE
  – Page 58, Table 8: LEVEL SELECTION "Level Easy Pressure"
- For a description of further relevant parameters, see
  – Page 96, Table 16: EXTENDED SETUP
  – Page 122, Table 28: PROCESS VALUES.

Warning!
If the measuring mode is changed, the span setting (URV) must be verified in the "Calibration" → "Basic Setup" operating menu and, if necessary, reconfigured.

	Description
1	Select the "Level" measuring mode via the MEASURING MODE parameter. On-site display: Menu path: GROUP SELECTION → MEASURING MODE Digital communication: Menu path: OPERATING MENU → SETTINGS → BASIC SETUP→ MEASURING MODE
2	If necessary, select "Level Easy Pressure" level mode using the LEVEL SELECTION parameter. On-site display: Menu path: GROUP SELECTION → MEASURING MODE "Level" → LEVEL SELECTION Digital communication: Menu path: OPERATING MENU → SETTINGS → BASIC SETUP → MEASURING MODE "Level" → LEVEL SELECTION
3	On-site display: Select BASIC SETUP function group. Menu path: GROUP SELECTION → OPERATING MENU → SETTINGS → BASIC SETUP

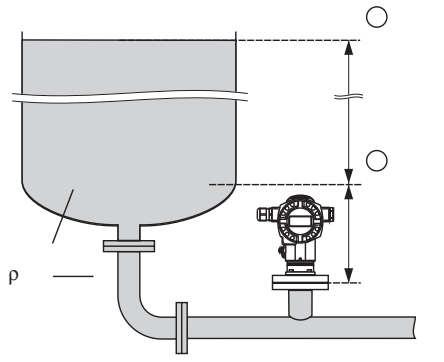


Fig. 5: Calibration without reference pressure – dry calibration

1 See Table, Steps 7 and 8.
2 See Table, Steps 9 and 10.

	Description
4	Select a pressure unit via the PRESS. ENG. UNIT parameter, here mbar for example.
5	Select a volume unit via the OUTPUT UNIT parameter, here l (litres) for example..
6	Select the "Dry" option by means of the CALIBRATION MODE parameter.
7	Enter the volume value for the lower calibration point via the EMPTY CALIB. parameter, here 0 l for example.
8	Enter the pressure value for the lower calibration point via the EMPTY PRESSURE parameter, here 50 mbar (0.75 psi) for example.
9	Enter the volume value for the upper calibration point via the FULL CALIB. parameter, here 1000 l (264 gal) for example.
10	Enter the pressure value for the upper calibration point via the FULL PRESSURE parameter, here 450 mbar (6.75 psi) for example.
11	Set the value for the lower current value (4 mA) by means of the SET LRV parameter.
12	Set the value for the upper current value (20 mA) by means of the SET URV parameter.
13	Result: The measuring range is set for 0 to 1000 l (264 gal).

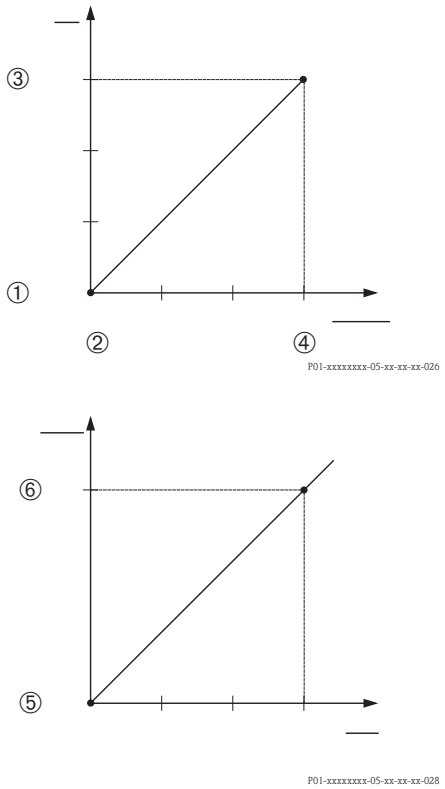


Fig. 6: Calibration with reference pressure – wet calibration

1 See Table, Step 7.
2 See Table, Step 8.
3 See Table, Step 9.
4 See Table, Step 10.
5 See Table, Step 11.
6 See Table, Step 12.

Note!

1. For this level mode, the measured variables %, level, volume and mass are available. → See also parameter description for OUTPUT UNIT, Page 60.

5.3 "Level Easy Height" level selection

5.3.1 Calibration with reference pressure – wet calibration

Example:
In this example, the volume in a tank should be measured in litres. The maximum volume of 1000 litres (264 US gal) corresponds to a level of 4.5 m (15 ft). The minimum volume of 0 litres corresponds to a level of 0.5 m (1.6 ft), as the device is mounted below the level lower range value. The density of the medium is 1 kg/dm^3.

Prerequisite:
- The measured variable is in direct proportion to the pressure.
- The tank can be filled or emptied.

Note!
- See also Operating Instructions for Deltabar S (BA00270P) or Cerabar S (BA00271P), Section 6.5 "Level measurement" or Deltapilot S (BA00332P), Section 6.4 "Level measurement".
- The values entered for EMPTY CALIB./FULL CALIB., EMPTY PRESSURE/FULL PRESSURE, EMPTY HEIGHT/FULL HEIGHT and SET LRV/SET URV must have a minimum interval of 1% for the "Level Easy Height" level mode. The value will be rejected with a warning message if the values are too close together. Further limit values are not checked; i.e. the values entered must be appropriate for the sensor and the measuring task so that the measuring device can measure correctly.
- For a description of the parameters mentioned, see
  – Page 45, Table 2: MEASURING MODE
  – Page 53, Table 6: POSITION ADJUSTMENT
  – Page 62, Table 9: LEVEL SELECTION "Level Easy Height"
- For a description of further relevant parameters, see
  – Page 96, Table 16: EXTENDED SETUP
  – Page 122, Table 28: PROCESS VALUES.

Warning!
If the measuring mode is changed, the span setting (URV) must be verified in the "Calibration" → "Basic Setup" operating menu and, if necessary, reconfigured.

	Description
1	Deltabar S: Before you configure the device for your application, the pressure piping must be cleaned and filled with medium. See Operating Instructions BA00270P, Section 6.5.1
2	Carry out position adjustment if necessary. See Page 53, Table 6: POSITION ADJUSTMENT.
3	Select the "Level" measuring mode via the MEASURING MODE parameter. On-site display: Menu path: GROUP SELECTION → MEASURING MODE Digital communication: Menu path: OPERATING MENU → SETTINGS → BASIC SETUP→ MEASURING MODE
4	If necessary, select the "Level Easy Height" level mode using the LEVEL SELECTION parameter. On-site display: Menu path: GROUP SELECTION → MEASURING MODE "Level" → LEVEL SELECTION Digital communication: Menu path: OPERATING MENU → SETTINGS → BASIC SETUP → MEASURING MODE "Level" → LEVEL SELECTION
5	On-site display: Select BASIC SETUP function group. Menu path: GROUP SELECTION → OPERATING MENU → SETTINGS → BASIC SETUP

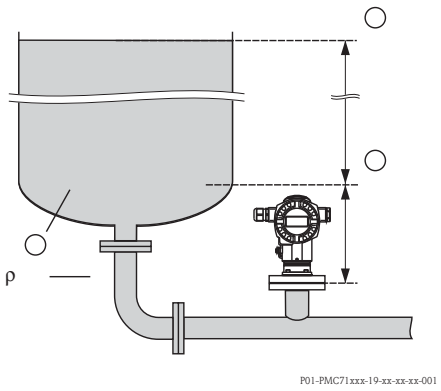
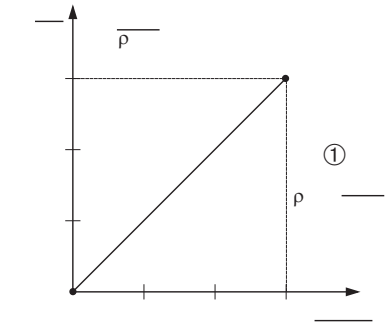


Fig. 7: Calibration with reference pressure – wet calibration

1 See Table, Steps 10 and 11.
2 See Table, Step 12.
3 See Table, Step 13.

	Description
6	Select a pressure unit via the PRESS. ENG. UNIT parameter, here mbar for example.
7	Select a volume unit via the OUTPUT UNIT parameter, here l (litres) for example..
8	Select a height unit via the HEIGHT UNIT parameter, here m for example.
9	Select the "Wet" option via the CALIBRATION MODE parameter.
10	Select a density unit via the DENSITY UNIT parameter, here kg/dm^3 for example.
11	Enter the density of the fluid using the ADJUST DENSITY parameter, here kg/dm^3 for example.
12	Enter the volume value for the lower calibration point via the EMPTY CALIB. parameter, here 0 l for example. (The currently measured hydrostatic pressure is displayed as height, here 0.5 m (1.6 ft) for example.) Note! To accept the value displayed you must first switch to the Edit mode (see the "Editing values" section) and then press the "E" button to save the value.
13	Enter the volume value for the upper calibration point via the FULL CALIB. parameter, here 1000 l (264 US gal) for example. (The currently measured hydrostatic pressure is displayed as height, here 4.5 m (15 ft) for example.) Note! To accept the value displayed you must first switch to the Edit mode (see the "Editing values" section) and then press the "E" button to save the value.
14	Set the value for the lower current value (4 mA) by means of the SET LRV parameter.
15	Set the value for the upper current value (20 mA) by means of the SET URV parameter.
16	Result: The measuring range is set for 0 to 1000 l (264 US gal).



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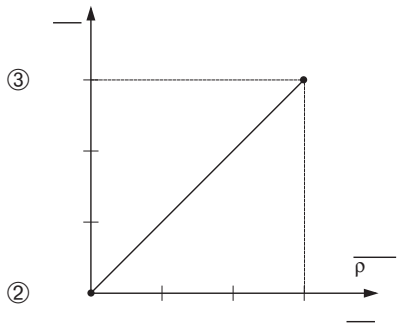

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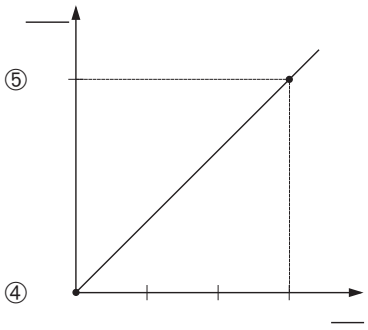

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Fig. 8: Calibration with reference pressure – wet calibration

1 See Table, Steps 10 and 11.
2 See Table, Step 12.
3 See Table, Step 13.
4 See Table, Step 14.
5 See Table, Step 15.

Note!

1. For this level mode, the measured variables %, level, volume and mass are available. → See also parameter description for OUTPUT UNIT, Page 64.

5.3.2 Calibration without reference pressure – dry calibration

Example:
In this example, the volume in a tank should be measured in litres. The maximum volume is 1000 l (264 US gal), and the maximum height is 4.5 m (15 ft). The minimum volume of 0 litres corresponds to a level of 0.5 m (1.6 ft), as the device is mounted below the level lower range value. The density of the fluid is 1 kg/dm^3.

Prerequisite:
- The measured variable is in direct proportion to the pressure.
- This is a theoretical calibration i.e. the height and volume values for the lower and upper calibration point must be known.

Note!
- See also Operating Instructions for Deltabar S (BA00270P) or Cerabar S (BA00271P), Section 6.5 "Level measurement" or Deltapilot S (BA00332P), Section 6.4 "Level measurement".
- The values entered for EMPTY CALIB./FULL CALIB., EMPTY PRESSURE/FULL PRESSURE, EMPTY HEIGHT/FULL HEIGHT and SET LRV/SET URV must have a minimum interval of 1% for the "Level Easy Height" level mode. The value will be rejected with a warning message if the values are too close together. Further limit values are not checked; i.e. the values entered must be appropriate for the sensor and the measuring task so that the measuring device can measure correctly.
- Due to the orientation of the device, there may be a shift in the measured value, i.e. when the container is empty or partly filled, the MEASURED VALUE parameter does not display zero. → To perform a position adjustment see also Page , Table 6: Position adjustment.
- For a description of the parameters mentioned, see
  – Page 45, Table 2: MEASURING MODE
  – Page 62, Table 9: LEVEL SELECTION "Level Easy Height"
- For a description of further relevant parameters, see
  – Page 96, Table 16: EXTENDED SETUP
  – Page 122, Table 28: PROCESS VALUES.

Warning!
If the measuring mode is changed, the span setting (URV) must be verified in the "Calibration" → "Basic Setup" operating menu and, if necessary, reconfigured.

	Description
1	Select the "Level" measuring mode via the MEASURING MODE parameter. On-site display: Menu path: GROUP SELECTION → MEASURING MODE Digital communication: Menu path: OPERATING MENU → SETTINGS → BASIC SETUP→ MEASURING MODE
2	If necessary, select "Level Easy Height" level mode using the LEVEL SELECTION parameter. On-site display: Menu path: GROUP SELECTION → MEASURING MODE "Level" → LEVEL SELECTION Digital communication: Menu path: OPERATING MENU → SETTINGS → BASIC SETUP → MEASURING MODE "Level" → LEVEL SELECTION
3	On-site display: Select BASIC SETUP function group. Menu path: GROUP SELECTION → OPERATING MENU → SETTINGS → BASIC SETUP

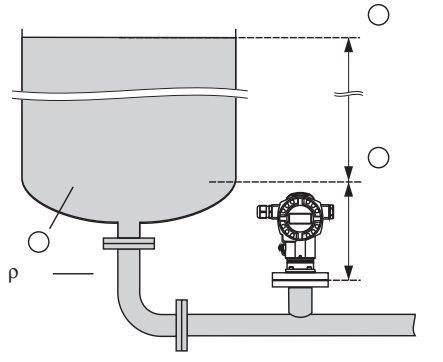
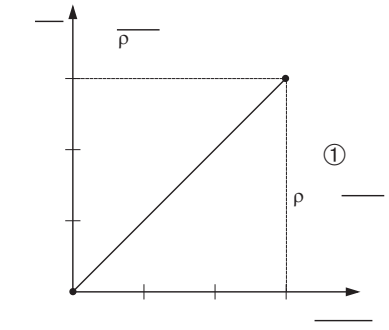


Fig. 9: Calibration without reference pressure – dry calibration

1 See Table, Steps 8 and 9.
2 See Table, Steps 10 and 11.
3 See Table, Steps 12 and 13.

	Description
4	Select a pressure unit via the PRESS. ENG. UNIT parameter, here mbar for example.
5	Select a volume unit via the OUTPUT UNIT parameter, here l (litres) for example.
6	Select a height unit via the HEIGHT UNIT parameter, here m for example.
7	Select the "Dry" option via the CALIBRATION MODE parameter.
8	Select a density unit via the DENSITY UNIT parameter, here kg/dm^3 for example.
9	Enter the density of the fluid using the ADJUST DENSITY parameter, here kg/dm^3 for example.
10	Enter the volume value for the lower calibration point via the EMPTY CALIB. parameter, here 0 l for example.
11	Enter the height value for the lower calibration point via the EMPTY HEIGHT parameter, here 0.5 m (1.6 ft) for example.
12	Enter the volume value for the upper calibration point via the FULL CALIB. parameter, here 1000 l (litres) (264 US gal) for example.
13	Enter the height value for the upper calibration point via the FULL HEIGHT parameter, here 4.5 m (15 ft) for example.
14	Set the value for the lower current value (4 mA) by means of the SET LRV parameter.
15	Set the value for the upper current value (20 mA) by means of the SET URV parameter.
16	Result: The measuring range is set for 0 to 1000 l (litres) (264 US gal).



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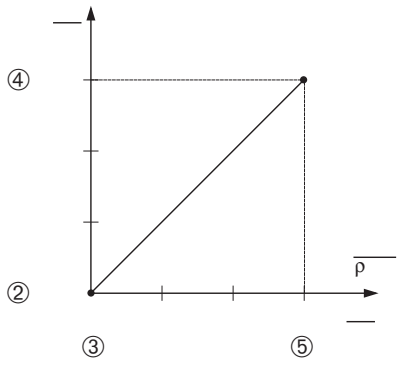

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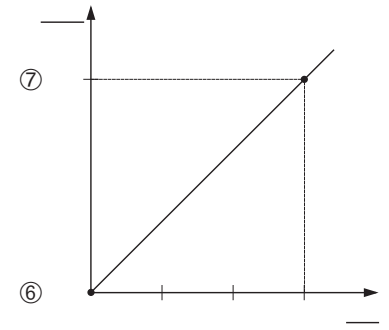

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Fig. 10: Calibration with reference pressure – wet calibration

1 See Table, Steps 8 and 9.
2 See Table, Step 10.
3 See Table, Step 11.
4 See Table, Step 12.
5 See Table, Step 13.
6 See Table, Step 14.
7 See Table, Step 15.

Note!

1. For this level mode, the measured variables %, level, volume and mass are available. → See also parameter description for OUTPUT UNIT, Page 64.

5.4 "Level Standard" level selection, "Linear" level type

5.4.1 Calibration with reference pressure – wet calibration

Example:
In this example, the level in a tank should be measured in m. The maximum level is 3 m (9.8 ft). The pressure range is set to 0 to 300 mbar (4.5 psi).

Prerequisite:
- The measured variable is in direct proportion to the pressure.
- The tank can be filled or emptied.

Note!
- See also Operating Instructions for Deltabar S (BA00270P) or Cerabar S (BA00271P), Section 6.5 "Level measurement" or Deltapilot S (BA00332P), Section 6.4 "Level measurement".
- For a description of the parameters mentioned, see
  – Page 45, Table 2: MEASURING MODE
  – Page 53, Table 6: POSITION ADJUSTMENT
  – Page 67, Table 10: BASIC SETUP
  – Page 70, Table 11: BASIC SETUP – "Linear" level type.
- For a description of further relevant parameters, see
  – Page 96, Table 16: EXTENDED SETUP
  – Page 122, Table 28: PROCESS VALUES.

Warning!
If the measuring mode is changed, the span setting (URV) must be verified in the "Calibration" → "Basic Setup" operating menu and, if necessary, reconfigured.

	Description
1	Deltabar S: before configuring the device for your application, the pressure piping must be cleaned and the device filled with fluid. See Operating Instructions BA00270P, Section 6.5.1
2	Carry out position adjustment if necessary. See Page 53, Table 6: POSITION ADJUSTMENT.
3	If necessary, select the "Level" measuring mode via the MEASURING MODE parameter. On-site display: Menu path: GROUP SELECTION → MEASURING MODE Digital communication: Menu path: OPERATING MENU → SETTINGS → BASIC SETUP → MEASURING MODE
4	If necessary, select "Level Standard" level mode using the LEVEL SELECTION parameter. On-site display: Menu path: GROUP SELECTION → MEASURING MODE "Level" → LEVEL SELECTION Digital communication: Menu path: OPERATING MENU → SETTINGS → BASIC SETUP → MEASURING MODE "Level" → LEVEL SELECTION

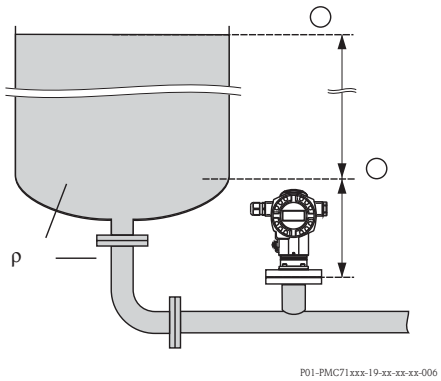
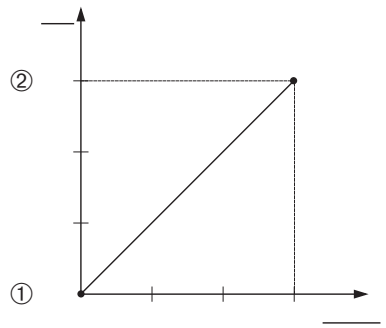


Fig. 11: Calibration with reference pressure – wet calibration

1 See table, step 11.
2 See table, step 12.

	Description
5	On-site display: Select BASIC SETUP function group. Menu path: GROUP SELECTION → OPERATING MENU → SETTINGS → BASIC SETUP
6	Select a pressure unit via the PRESS. ENG. UNIT parameter, here mbar for example.
7	Select the "Linear" option by means of the LEVEL MODE parameter.
8	Select the "Level" option by means of the LIN. MEASURAND parameter.
9	Select a level unit via the HEIGHT UNIT parameter, here m for example.
10	Select the "Wet" option by means of the CALIBRATION MODE parameter.
11	The pressure for the lower calibration point is present at the device, here 0 mbar for example.
	Select EMPTY CALIB. parameter.
	Enter the level value, here 0 m for example. Confirm the value to assign the pressure value present to the lower level value.
12	The pressure for the upper calibration point is present at the device, here 450 mbar (6.75 psi) for example.
	Select FULL CALIB. parameter.
	Enter the level value, here 3 m (9.8 ft) for example. Confirm the value to assign the pressure value present to the upper level value.
13	Set the value for the lower current value (4 mA) by means of the SET LRV parameter.
14	Set the value for the upper current value (20 mA) by means of the SET URV parameter.
15	Result: The measuring range is set for 0...3 m (9.8 ft).



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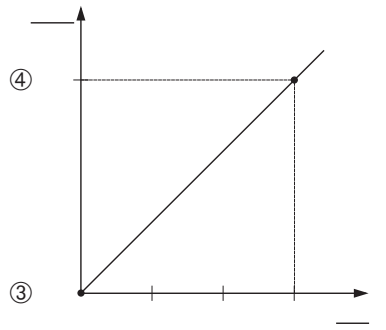

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Fig. 12: Calibration with reference pressure – wet calibration

1 See table, step 11.
2 See table, step 12.
3 See table, step 13.
4 See table, step 14.

Note!

1. You can also perform calibration with reference pressure by means of the QUICK SETUP menu. → See Page 49 ff, Table 4: QUICK SETUP menu.
2. You can also specify customer-specific units. See parameter description for PRESS. ENG. UNIT (→ Page 67), HEIGHT UNIT (→ Page 70), UNIT VOLUME (→ Page 71) and MASS UNIT (→ Page 72).
3. For this level type, the measured variables %, level, volume and mass are available. → See Page 70 ff.
4. The EMPTY PRESSURE (→ Page 74) and FULL PRESSURE (→ Page 74) parameters display the pressure values belonging to the EMPTY CALIB. and FULL CALIB. parameters.

5.4.2 Calibration without reference pressure – dry calibration

Example:
In this example, the volume in a tank should be measured in m^3. The maximum volume is 5 m^3 and the maximum height 4 m (13 ft). The density of the fluid is 1 kg/dm^3. The device is mounted below the level lower range value.

Prerequisite:
- The measured variable is in direct proportion to the pressure.
- This is a theoretical calibration, i.e. the tank volume, tank height and density of the fluid are known.

Note!
- See also Operating Instructions for Deltabar S (BA00270P) or Cerabar S (BA00271P), Section 6.5 "Level measurement" or Deltapilot S (BA00332P), Section 6.4 "Level measurement".
- Due to the orientation of the device, there may be a shift in the measured value, i.e. when the container is empty or partly filled, the MEASURED VALUE parameter does not display zero. → To perform a position adjustment see also Page , Table 6: Position adjustment.
- For a description of the parameters mentioned, see
  – Page 45, Table 2: MEASURING MODE
  – Page 67, Table 10: BASIC SETUP
  – Page 70, Table 11: BASIC SETUP – "Linear" level type.
- For a description of further relevant parameters, see
  – Page 96, Table 16: EXTENDED SETUP
  – Page 122, Table 26: PROCESS VALUES.

Warning!
If the measuring mode is changed, the span setting (URV) must be verified in the "Calibration" → "Basic Setup" operating menu and, if necessary, reconfigured.

	Description
1	Select the "Level" measuring mode via the MEASURING MODE parameter. On-site display: Menu path: GROUP SELECTION → MEASURING MODE Digital communication: Menu path: OPERATING MENU → SETTINGS → BASIC SETUP → MEASURING MODE
2	If necessary, select "Level Standard" level mode using the LEVEL SELECTION parameter. On-site display: Menu path: GROUP SELECTION → MEASURING MODE "Level" → LEVEL SELECTION Digital communication: Menu path: OPERATING MENU → SETTINGS → BASIC SETUP → MEASURING MODE "Level" → LEVEL SELECTION
3	On-site display: Select BASIC SETUP function group. Menu path: GROUP SELECTION → OPERATING MENU → SETTINGS → BASIC SETUP

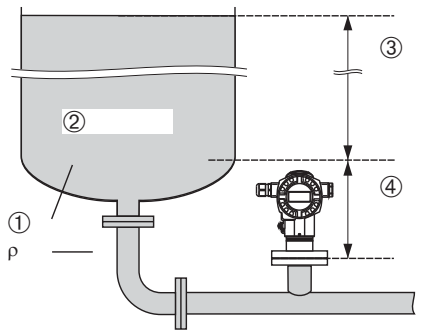


Fig. 13: Calibration without reference pressure – dry calibration

1 See table, step 9.
2 See table, step 10.
3 See table, step 11.
4 See table, step 12.

	Description
4	Select a pressure unit via the PRESS. ENG. UNIT parameter, here mbar for example.
5	Select the "Linear" option by means of the LEVEL MODE parameter.
6	Select the "Volume" option by means of the LIN. MEASURAND parameter.
7	Select a volume unit via the UNIT VOLUME parameter, here m^3 for example.
8	Select the "Dry" option by means of the CALIBRATION MODE parameter. See also the following note, point 3.
9	Enter the value for density via the ADJUST DENSITY parameter, here 1 kg/dm^3 for example.
10	Enter the tank volume via the TANK VOLUME parameter, here 5 m^3 for example.
11	Enter the tank height via the TANK HEIGHT parameter, here 4 m (13 ft) for example.
12	Enter the level offset via the ZERO POSITION parameter, here –0.5 m (-1,6 ft) for example.
13	Set the value for the lower current value (4 mA) by means of the SET LRV parameter.
14	Set the value for the upper current value (20 mA) by means of the SET URV parameter.
15	Result: The measuring range is set for 0...5 m^3.

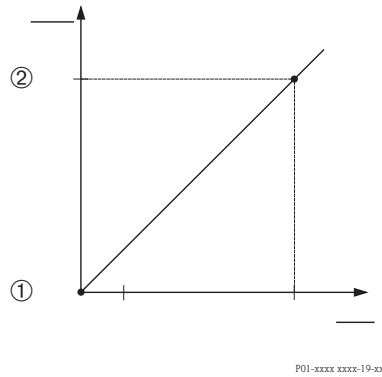


Fig. 14: Current output calibration

5 See table, step 13.
6 See table, step 14.

Note!

1. For this level type, the measured variables %, level, volume and mass are available.
→ See Page 70 ff.
2. You can also specify customer-specific units. See parameter description for PRESS. ENG. UNIT (→ Page 67), HEIGHT UNIT (→ Page 70), UNIT VOLUME (→ Page 71) and MASS UNIT (→ Page 72).
3. A level value is assigned to the lower and upper current value by means of the SET LRV (→ Page 77) and SET URV (→ Page 77) parameters respectively. Once you have selected the "Dry" calibration mode, the error message A711 "LRV or URV out of edit limits" can appear. The error message goes out as soon as level values which are within the editing limits are entered for the SET LRV and SET URV parameters.
By means of the ENTER RESET CODE parameter (→ Page 126), you can use the code 2710 to automatically set the SET LRV and SET URV parameters to level values which are within the editing limits.

5.5 "Level Standard" level selection, "Pressure Linearized" level type

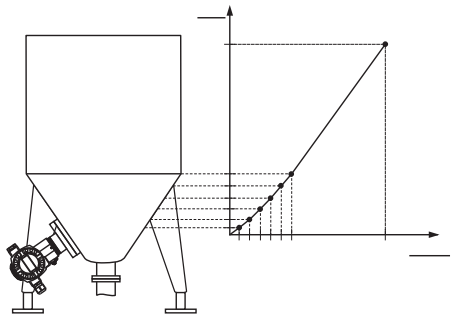
5.5.1 Semiautomatic entry of the linearisation table

Example:
In this example, the volume in a tank with a conical outlet should be measured in m^3.

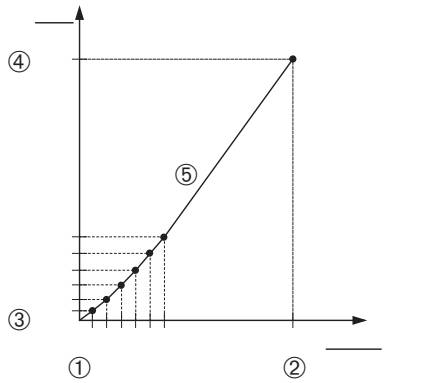
Prerequisite:
- The tank can be filled. The linearisation characteristic must rise continuously.
- A minimum gap of 0.5 % of the distance between two points must be maintained. Spans for the "Pressure linearized" option: HYDR. PRESS MAX. – HYDR. PRESS MIN.; TANK CONTENT MAX. – TANK CONTENT MIN. Spans for the "Height linearized" option: LEVEL MAX – LEVEL MIN; TANK CONTENT MAX. – TANK CONTENT MIN.

Note!
- See also Operating Instructions for Deltabar S (BA00270P) or Cerabar S (BA00271P), Section 6.5 "Level measurement" or Deltapilot S (BA00332P), Section 6.4 "Level measurement".
- For a description of the parameters mentioned, see
  – Page 45, Table 2: MEASURING MODE
  – Page 53, Table 6: POSITION ADJUSTMENT
  – Page 67, Table 10: BASIC SETUP
  – Page 78, Table 11: BASIC SETUP – "Pressure Linearized" level type
  – Page 100, Table 18: LINEARISATION – on-site operation
  – Page 104, Table 19: LINEARISATION – Digital communication.
- For a description of further relevant parameters, see
  – Page 96, Table 16: EXTENDED SETUP
  – Page 122, Table 26: PROCESS VALUES.

Warning!
If the measuring mode is changed, the span setting (URV) must be verified in the "Calibration" → "Basic Setup" operating menu and, if necessary, reconfigured.

	Description	
1	Deltabar S: before configuring the device for your application, the pressure piping must be cleaned and filled with fluid. See Operating Instructions BA00270P, Section 6.5.1.	 P01-PMP75xxx-19-xx-xx-xx-002
2	Carry out position adjustment if necessary. See Page 53, Table 6: POSITION ADJUSTMENT.	
	Carry out basic setup:	
3	If necessary, select the "Level" measuring mode via the MEASURING MODE parameter. On-site display: Menu path: GROUP SELECTION → MEASURING MODE Digital communication: Menu path: OPERATING MENU → SETTINGS → BASIC SETUP → MEASURING MODE	
4	If necessary, select "Level Standard" level mode using the LEVEL SELECTION parameter. On-site display: Menu path: GROUP SELECTION → MEASURING MODE "Level" → LEVEL SELECTION Digital communication: Menu path: OPERATING MENU → SETTINGS → BASIC SETUP → MEASURING MODE "Level" → LEVEL SELECTION	

	Description	
5	On-site display: Select BASIC SETUP function group. Menu path: GROUP SELECTION → OPERATING MENU → SETTINGS → BASIC SETUP	
6	Select a pressure unit via the PRESS. ENG. UNIT parameter, here mbar for example.	
7	Select the "Pressure Linearized" option by means of the LEVEL MODE parameter. See also the following note, point 3.	
8	Select the "Volume" option by means of the LINd. MEASURAND parameter.	
9	Select a volume unit via the UNIT VOLUME parameter, here m^3 for example.	
10	Select HYDR. PRESS MIN. parameter.	
	Enter the minimum hydrostatic pressure to be expected, here 0 mbar for example.	
11	Select HYDR. PRESS MAX .	
	Enter the maximum hydrostatic pressure to be expected.	
	Carry out linearisation:	
12	Change the function group: Menu path: (GROUP SELECTION →) OPERATING MENU → SETTINGS → LINEARISATION	
13	Select TANK CONTENT MIN parameter.	
	Specify the minimum tank contents to be expected, here 0 m^3 for example.	
14	Select TANK CONTENT MAX parameter.	
	Specify the maximum tank contents to be expected, here 3.5 m^3 for example.	
15	On-site display: Select the "Editor table" option by means of the TABLE SELECTION parameter.	
16	Select the "Semiautomatic" option by means of the LIN. EDIT MODE parameter.	
17	Select the "New table" option by means of the EDITOR TABLE parameter.	

	Description	
18	Enter linearisation table (min. 2 points, max. 32 points).	
	Fill the tank to the height of the 1st point.	
	LINE-NUMB: confirm value displayed.	
	X-VAL.: the hydrostatic pressure present is displayed. On-site display, Digital communication: The X-VAL. displayed is saved by confirming the Y-value. See following line, Y-VAL. HART handheld terminal: Confirm X-VAL. displayed.	
	Y-VAL.: enter the volume value, here 0 m^3 for example, and confirm the value.	
19	On-site display: If you want to enter another point for the linearisation table, select the "Next point" option and enter the point as described in step 18. If you want to finish entering the values and activate the linearisation table, select the "Accept input table" option. Digital communication: You can enter further points for the linearisation table as explained in step 18. Once all the points have been entered, the table must be activated by means of the TAB. ACTIVATE parameter.	
19	Result: The linearisation table has been entered.	

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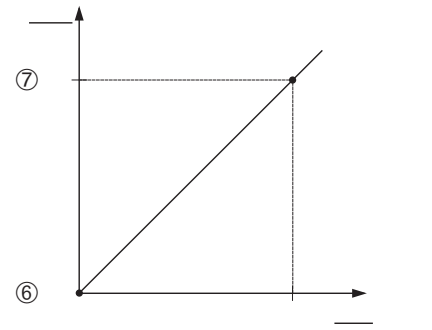

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Fig. 15: Semiautomatic entry of the linearisation table

1 See table, step 10.
2 See table, step 11.
3 See table, step 13.
4 See table, step 14.
5 See table, steps 15 – 19.
6 See the following note, point 4.
7 See the following note, point 4

Note!

1. For this level type, the measured variables %, volume and mass are available.
→ See Page 78 ff.
2. You can also specify customer-specific units. See parameter description for PRESS. ENG. UNIT (→ Page 67), HEIGHT UNIT (→ Page 79), UNIT VOLUME (→ Page 79) and MASS UNIT (→ Page 80).

3. Once you have selected the "Pressure Linearized" level type, the warning message "W710 Set span too small. Not allowed." can appear. At this stage the linearisation table already consists of two points as standard. It could be the case that the 2nd value, and thus the highest X-VAL. of the linearisation table, is smaller than the minimum span permitted (→ MINIMUM SPAN, Page 119). The message goes out as soon as the highest X-VAL. is larger than the minimum span.
4. A level value is assigned to both the lower and upper current value with the SET LRV (→ Page 98) and SET URV (→ Page 98) parameters. If you enter values for TANK CONTENT MIN (→ Page 101 or 104) and TANK CONTENT MAX (→ Page 101 or 105), the SET LRV and SET URV parameters are also changed. If you want to assign values other than those for TANK CONTENT MIN and TANK CONTENT MAX to the lower and upper current values, the desired values must be entered for SET LRV and SET URV.

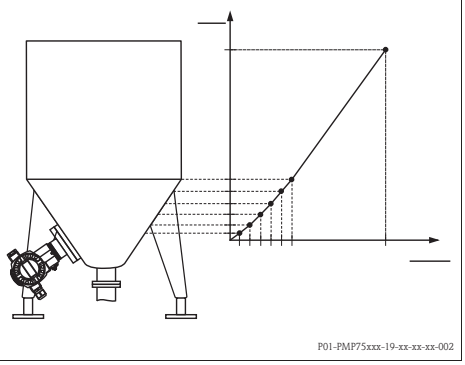
5.5.2 Manual entry of the linearisation table

Example:
In this example, the volume in a tank with a conical outlet should be measured in m^3.

Prerequisite:
- This is a theoretical calibration, i.e. the points for the linearisation table are known.
- A minimum gap of 0.5 % of the distance between two points must be maintained. Spans for the "Pressure linearized" option: HYDR. PRESS MAX. – HYDR. PRESS MIN.; TANK CONTENT MAX. – TANK CONTENT MIN. Spans for the "Height linearized" option: LEVEL MAX – LEVEL MIN; TANK CONTENT MAX. – TANK CONTENT MIN.

Note!
- See also Operating Instructions for Deltabar S (BA00270P) or Cerabar S (BA00271P), Section 6.5 "Level measurement" or Deltapilot S (BA00332P), Section 6.4 "Level measurement".
- For a description of the parameters mentioned, see
  – Page 45, Table 2: MEASURING MODE
  – Page 53, Table 6: POSITION ADJUSTMENT
  – Page 67, Table 10: BASIC SETUP
  – Page 78, Table 12: BASIC SETUP – "Pressure Linearized" level type
  – Page 100, Table 18: LINEARISATION – on-site operation
  – Page 104, Table 19: LINEARISATION – Digital communication.
- For a description of further relevant parameters, see
  – Page 96, Table 16: EXTENDED SETUP
  – Page 122, Table 28: PROCESS VALUES.

Warning!
If the measuring mode is changed, the span setting (URV) must be verified in the "Calibration" → "Basic Setup" operating menu and, if necessary, reconfigured.

	Description	
1	Perform basic setup as per Section 5.3.1, steps 2 to 10.	 P01-PMP75xxx-19-xx-xx-xx-002
	Carry out linearisation:	
2	Change the function group: Menu path: (GROUP SELECTION →) OPERATING MENU → SETTINGS → LINEARISATION	
3	Select TANK CONTENT MIN parameter .	
	Specify the minimum tank contents to be expected, here 0 m^3 for example.	
4	Select TANK CONTENT MAX parameter .	
	Specify the maximum tank contents to be expected, here 3.5 m^3 for example.	

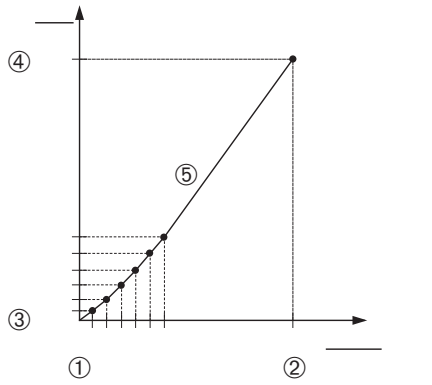
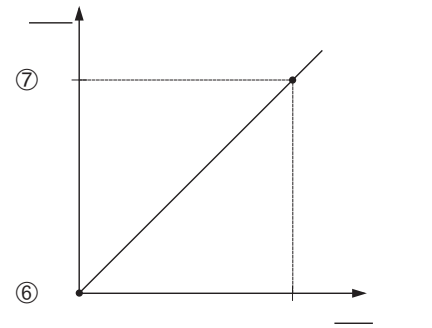
	Description	
5	On-site display: Select the "Editor table" option by means of the TABLE SELECTION parameter.	 P01-xxxxxxxx-05-xx-xx-xx-015  P01-xxxxxxxx-05-xx-xx-xx-016
6	Select the "Manual" option by means of the LIN. EDIT MODE parameter.	
7	Select the "New table" option by means of the EDITOR TABLE parameter.	
8	Enter linearisation table (min. 2 points, max. 32 points).	
	LINE-NUMB: confirm value displayed.	
	X-VAL.: enter the pressure value and confirm.	
	Y-VAL.: enter the volume value, here 0 m^3 for example, and confirm.	
9	On-site display If you want to enter another point for the linearisation table, select the "Next point" option and enter the point as described in step 8. If you want to finish entering the values and activate the linearisation table, select the "Accept input table" option. Digital communication: You can enter further points for the linearisation table as explained in step 8. Once all the points have been entered, the table must be activated by means of the TAB. ACTIVATE parameter.	
10	Result: The linearisation table has been entered.	

Fig. 16: Manual entry of the linearisation table

1 See Section 5.3.1, table, step 9.
2 See Section 5.3.1, table, step 10.
3 See table, step 3.
4 See table, step 4.
5 See table, steps 5 – 9.
6 See the following note, point 4.
7 See the following note, point 4.

Note!

1. For this level type, the measured variables %, volume and mass are available.
→ See Page 78 ff.
2. You can also specify customer-specific units. See parameter description for PRESS. ENG. UNIT (→ Page 67), HEIGHT UNIT (→ Page 79), UNIT VOLUME (→ Page 79) and MASS UNIT (→ Page 80).
3. Once you have selected the "Pressure Linearized" level type, the warning message "W710 Set span too small. Not allowed." can appear. At this stage the linearisation table already consists of two points as standard. It could be the case that the 2nd value, and thus the highest X-VAL. of the linearisation table, is smaller than the minimum span permitted (→ MINIMUM SPAN, Page 119). The message goes out as soon as the highest X-VAL. is larger than the minimum span.
4. A level value is assigned to both the lower and upper current value with the SET LRV (→ Page 98) and SET URV (→ Page 98) parameters. If you enter values for TANK CONTENT MIN (→ Page 101 or 104) and TANK CONTENT MAX (→ Page 101 or 105), the SET LRV and SET URV parameters are also changed. If you want to assign values other than those for TANK CONTENT MIN and TANK CONTENT MAX to the lower and upper current values, the desired values must be entered for SET LRV and SET URV.

5.6 "Level Standard" level selection, "Height Linearized" level type

5.6.1 Wet calibration and semiautomatic entry of the linearisation table

Example:
In this example, the height and the volume should be measured at the same time.

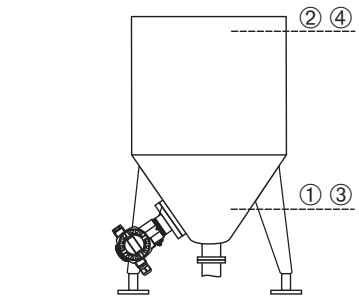
Prerequisite:
- The tank can be filled. The linearisation characteristic must rise continuously.
- A minimum gap of 0.5 % of the distance between two points must be maintained. Spans for the "Pressure linearized" option: HYDR. PRESS MAX. – HYDR. PRESS MIN.; TANK CONTENT MAX. – TANK CONTENT MIN. Spans for the "Height linearized" option: LEVEL MAX – LEVEL MIN; TANK CONTENT MAX. – TANK CONTENT MIN.

Note!
- See also Operating Instructions for Deltabar S (BA00270P) or Cerabar S (BA00271P), Section 6.5 "Level measurement" or Deltapilot S (BA00332P), Section 6.4 "Level measurement".
- For a description of the parameters mentioned, see
  – Page 45, Table 2: MEASURING MODE
  – Page 53, Table 6: POSITION ADJUSTMENT
  – Page 67, Table 10: BASIC SETUP
  – Page 83, Table 13: BASIC SETUP – "Height Linearized" level type
  – Page 100, Table 18: LINEARISATION – on-site operation
  – Page 104, Table 19: LINEARISATION – Digital communication.
- For a description of further parameters, see
  – Page 96, Table 16: EXTENDED SETUP
  – Page 122, Table 28: PROCESS VALUES.

Warning!
If the measuring mode is changed, the span setting (URV) must be verified in the "Calibration" → "Basic Setup" operating menu and, if necessary, reconfigured.

	Description	
1	Deltabar S: before configuring the device for your application, the pressure piping must be cleaned and filled with fluid. See Operating Instructions BA00270P, Section 6.5.1	
2	Carry out position adjustment if necessary. See Page 53, Table 6: POSITION ADJUSTMENT.	
	Perform calibration for the 1st measured variable:	
3	If necessary, select the "Level" measuring mode via the MEASURING MODE parameter. On-site display: Menu path: GROUP SELECTION → MEASURING MODE Digital communication: Menu path: OPERATING MENU → SETTINGS → BASIC SETUP → MEASURING MODE	
4	If necessary, select "Level Standard" level mode using the LEVEL SELECTION parameter. On-site display: Menu path: GROUP SELECTION → MEASURING MODE "Level" → LEVEL SELECTION Digital communication: Menu path: OPERATING MENU → SETTINGS → BASIC SETUP → MEASURING MODE "Level" → LEVEL SELECTION	

	Description
5	On-site display: Select BASIC SETUP function group. Menu path: GROUP SELECTION →OPERATING MENU → SETTINGS → BASIC SETUP
6	Select a pressure unit via the PRESS. ENG. UNIT parameter, here mbar for example.
7	Select the "Height Linearized" option by means of the LEVEL MODE parameter.
8	Select the "Height + Volume" option by means of the COMB. MEASURAND parameter.
9	Select the unit for the 1st measured value via the HEIGHT UNIT parameter, here m for example.
10	Select the unit for the 2nd measured variable via the UNIT VOLUME parameter, here m3 for example.
11	Select LEVEL MIN parameter.
	Enter the minimum level to be expected, here 0 m for example.
12	Select LEVEL MAX parameter.
	Enter the maximum level to be expected, here 3 m (9.8 ft) for example.
13	Select the "Wet" option via the CALIBRATION MODE parameter (calibration mode for the 1st measured variable).
14	The pressure for the lower calibration point is present at the device, here 0 mbar for example.
	Select EMPTY CALIB. parameter.
	Enter the level value, here 0 m for example. Confirm the value to assign the pressure value present to the lower level value.
15	The pressure for the upper calibration point is present at the device, here 300 mbar (4.5 psi) for example.
	Select FULL CALIB. parameter.
	Enter the level value, here 3 m (9.8 ft) for example. Confirm the value to assign the pressure value present to the upper level value.
16	Result: The calibration for the 1st measured variable is carried out.



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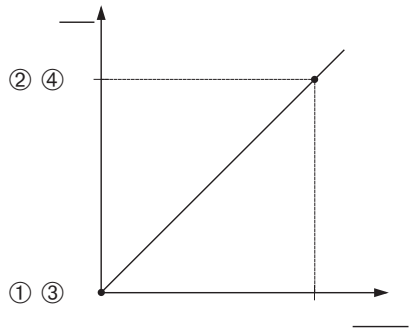

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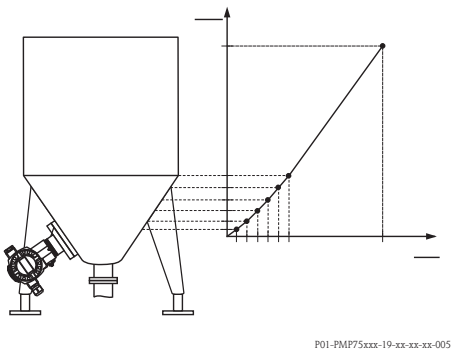
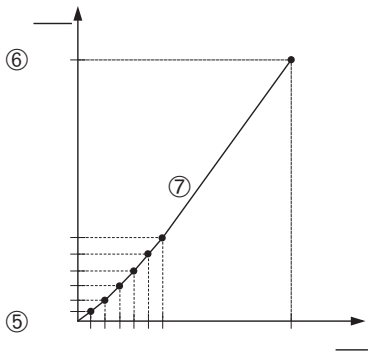
Fig. 17: Calibrating the 1st measured variable

1 See table, step 11.
2 See table, step 12.
3 See table, step 14.
4 See Table, step 15.

	Description
	Perform linearisation (calibration for the 2nd measured variable)
17	Change the function group. Menu path: (GROUP SELECTION →) OPERATING MENU → SETTINGS → LINEARISATION
18	Select TANK CONTENT MIN parameter.
	Specify the minimum tank contents to be expected, here 0 m^3 for example.
19	Select TANK CONTENT MAX parameter.
	Specify the maximum tank contents to be expected, here 5 m^3 for example.
20	On-site display: Select the "Editor table" option by means of the TABLE SELECTION parameter.
21	Select the "Semiautomatic" option by means of the LIN. EDIT MODE parameter.
22	Select the "New table" option by means of the EDITOR TABLE parameter.
23	Enter linearisation table (min. 2 points, max. 32 points).
	Fill the tank to the height of the 1st point.
	LINE-NUMB: confirm value displayed.
	X-VAL.: the hydrostatic pressure present is measured and converted to the corresponding level and displayed. On-site display, Digital communication: The X-VAL. displayed is saved by confirming the Y-value. See following line, Y-VAL. HART handheld terminal: Confirm X-VAL. displayed.
	Y-VAL.: enter the volume value, here 0 m^3 for example, and confirm the value.
24	On-site display If you want to enter another point for the linearisation table, select the "Next point" option and enter the point as described in step 23. If you want to finish entering the values and activate the linearisation table, select the "Accept input table" option. Digital communication: You can enter further points for the linearisation table as explained in step 23. Once all the points have been entered, the table must be activated by means of the TAB. ACTIVATE parameter.
25	Result: – The linearisation table has been entered. – The measured value display and the TANK CONTENT parameter display the 2nd measured value (here the volume). – The LEVEL BEFORE LIN parameter displays the 1st measured value (here the height). See also the following note, point 5.



P01-PMP75xxx-19-xx-xx-xx-005



P01-xxxxxxxx-05-xx-xx-xx-018

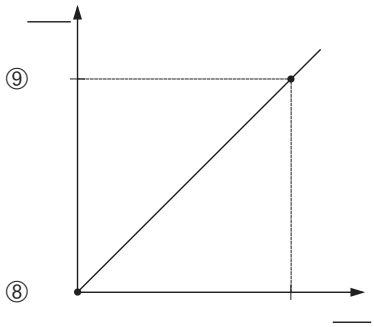


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Fig. 18: Calibrating the 2nd measured variable

5 See table, step 18.
6 See table, step 19.
7 See table, steps 20 – 24.
8 See the following note, point 4.
9 See the following note, point 4.

Note!

1. For this level type, the measured variables "Height + %", "Height + Volume", "Height + Mass", "%-Height + %", "%-Height + Volume" and "%-Height + Mass" are available. → See Page 79 ff.
2. You can also specify customer-specific units. See parameter description for PRESS. ENG. UNIT (→ Page 67), HEIGHT UNIT (→ Page 83), UNIT VOLUME (→ Page 84) and MASS UNIT (→ Page 85).
3. Once you have selected the "Pressure Linearized" level type, the warning message "W710 Set span too small. Not allowed." can appear. At this stage the linearisation table already consists of two points as standard. It could be the case that the 2nd value, and thus the highest X-VAL. of the linearisation table, is smaller than the minimum span permitted (→ MINIMUM SPAN, Page 119). The message goes out as soon as the highest X-VAL. is larger than the minimum span.
4. A level value is assigned to both the lower and upper current value with the SET LRV (→ Page 98) and SET URV (→ Page 98) parameters.
   You can use the ASSIGN CURRENT parameter (→ Page 113) to specify whether the current output should depict the 1st or 2nd measured variable. Depending on the setting of the ASSIGN CURRENT parameter, enter the following values for SET LRV and SET URV:
   – ASSIGN CURRENT = tank content (factory setting) ⇒ %-value, volume value or mass value
   – ASSIGNMENT = height ⇒ level value

   The following applies for the setting ASSIGN CURRENT "Tank content":
   If you enter values for TANK CONTENT MIN (→ Page 101 or 104) and TANK CONTENT MAX (→ Page 101 or 105), the SET LRV and SET URV parameters are also changed. If you want to assign values other than those for TANK CONTENT MIN and TANK CONTENT MAX to the lower and upper current values, the desired values must be entered for SET LRV and SET URV.

   The following applies for the setting ASSIGN CURRENT "Height":
   If you enter values for LEVEL MIN (→ Page 86) and LEVEL MAX (→ Page 86), the SET LRV and SET URV parameters are also changed. If you want to assign values other than those for LEVEL MIN and LEVEL MAX to the lower and upper current values, the desired values must be entered for SET LRV and SET URV.

5. You can use the MENU DESCRIPTOR parameter (→ Page 110) to specify which measured value should be displayed on the on-site display.

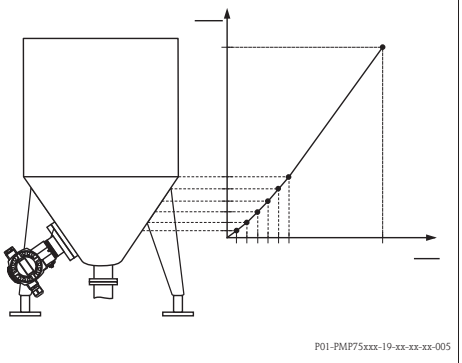
5.6.2 Dry calibration and manual entry of the linearisation table

Example:
In this example, the height and the volume should be measured at the same time.

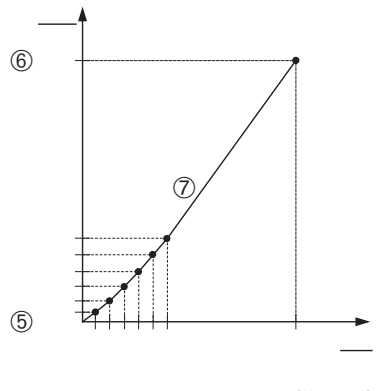
Prerequisite:
- This is a theoretical calibration, i.e. the points for the linearisation table are known.
- A minimum gap of 0.5 % of the distance between two points must be maintained. Spans for the "Pressure linearized" option: HYDR. PRESS MAX. – HYDR. PRESS MIN.; TANK CONTENT MAX. – TANK CONTENT MIN. Spans for the "Height linearized" option: LEVEL MAX – LEVEL MIN; TANK CONTENT MAX. – TANK CONTENT MIN.

Note!
- See also Operating Instructions for Deltabar S (BA00270P) or Cerabar S (BA00271P), Section 6.5 "Level measurement" or Deltapilot S (BA00332P), Section 6.4 "Level measurement".
- For a description of the parameters mentioned, see
  – Page 45, Table 2: MEASURING MODE
  – Page 67, Table 10: BASIC SETUP
  – Page 83, Table 12: BASIC SETUP – "Height Linearized" level type
  – Page 100, Table 18: LINEARISATION – on-site operation
  – Page 104, Table 19: LINEARISATION – Digital communication.
- For a description of further parameters, see
  – Page 96, Table 16: EXTENDED SETUP
  – Page 122, Table 28: PROCESS VALUES.

Warning!
If the measuring mode is changed, the span setting (URV) must be verified in the "Calibration" → "Basic Setup" operating menu and, if necessary, reconfigured.

	Description	
	Perform calibration for the 1st measured variable:	 P01-PMP75xxx-19-xx-xx-xx-005
1	Perform calibration as per Section 5.4.1, steps 3 to 12.	
2	Select the "Dry" option via the CALIBRATION MODE parameter (calibration mode for the 1st measured variable).	
3	Enter the density of the fluid via the ADJUST DENSITY parameter, here 1 kg/dm^3 for example.	
4	If necessary, enter a level offset via the ZERO POSITION parameter, here 0 m for example.	
5	Result: The calibration for the 1st measured variable is carried out.	

	Description
	Perform linearisation (calibration for the 2nd measured variable)
6	Change the function group. Menu path: (GROUP SELECTION →) OPERATING MENU → SETTINGS → LINEARISATION
7	Select TANK CONTENT MIN parameter.
	Specify the minimum tank contents to be expected, here 0 m^3 for example.
8	Select TANK CONTENT MAX parameter.
	Specify the maximum tank contents to be expected, here 5 m^3 for example.
9	On-site display: Select the "Editor table" option by means of the TABLE SELECTION parameter.
10	Select the "Manual" option by means of the LIN. EDIT MODE parameter.
11	Select the "New table" option by means of the EDITOR TABLE parameter.
12	Enter linearisation table (min. 2 points, max. 32 points).
	LINE-NUMB: confirm value displayed.
	X-VAL.: enter the height value and confirm.
	Y-VAL.: enter the volume value, here 0 m^3 for example, and confirm.
13	On-site display If you want to enter another point for the linearisation table, select the "Next point" option and enter the point as described in step 12. If you want to finish entering the values and activate the linearisation table, select the "Accept input table" option. Digital communication: You can enter further points for the linearisation table as explained in step 12. Once all the points have been entered, the table must be activated by means of the TAB. ACTIVATE parameter.
14	Result: – The linearisation table has been entered. – The measured value display and the TANK CONTENT parameter display the 2nd measured value (here the volume). – The LEVEL BEFORE LIN parameter displays the 1st measured value (here the height). See also the following note, point 5.



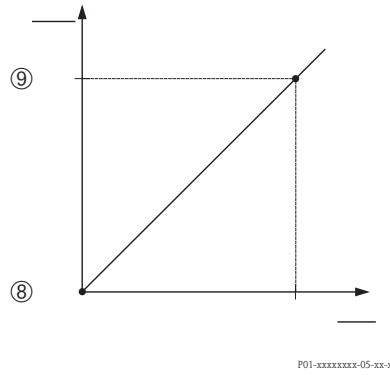


Fig. 19: Calibrating the 2nd measured variable

5 See table, step 7.
6 See table, step 8.
7 See table, steps 9 – 13.
8 See the following note, point 4.
9 See the following note, point 4.

Note!

1. For this level type, the measured variables "Height + %", "Height + Volume", "Height + Mass", "%-Height + %", "%-Height + Volume" and "%-Height + Mass" are available. → See Page 79 ff.
2. You can also specify customer-specific units. See parameter description for PRESS. ENG. UNIT (→ Page 67), HEIGHT UNIT (→ Page 83), UNIT VOLUME (→ Page 84) and MASS UNIT (→ Page 85).
3. Once you have selected the "Pressure Linearized" level type, the warning message "W710 Set span too small. Not allowed." can appear. At this stage the linearisation table already consists of two points as standard. It could be the case that the 2nd value, and thus the highest X-VAL. of the linearisation table, is smaller than the minimum span permitted (→ MINIMUM SPAN, Page 119). The message goes out as soon as the highest X-VAL. is larger than the minimum span.

4. A level value is assigned to both the lower and upper current value with the SET LRV (→ Page 98) and SET URV (→ Page 98) parameters.
   You can use the ASSIGN CURRENT parameter (→ Page 113) to specify whether the current output should depict the 1st or 2nd measured variable. Depending on the setting of the ASSIGN CURRENT parameter, enter the following values for SET LRV and SET URV:
   – ASSIGN CURRENT = tank content (factory setting) ⇒ %- value, volume value or mass value
   – ASSIGNMENT = height ⇒ level value

   The following applies for the setting ASSIGN CURRENT "Tank content":
   If you enter values for TANK CONTENT MIN (→ Page 101 or 104) and TANK CONTENT MAX (→ Page 101 or 105), the SET LRV and SET URV parameters are also changed. If you want to assign values other than those for TANK CONTENT MIN and TANK CONTENT MAX to the lower and upper current values, the desired values must be entered for SET LRV and SET URV.

   The following applies for the setting ASSIGN CURRENT "Height":
   If you enter values for LEVEL MIN (→ Page 86) and LEVEL MAX (→ Page 86), the SET LRV and SET URV parameters are also changed. If you want to assign values other than those for LEVEL MIN and LEVEL MAX to the lower and upper current values, the desired values must be entered for SET LRV and SET URV.

5. You can use the MENU DESCRIPTOR parameter (→ Page 110) to specify which measured value should be displayed on the on-site display.

6 Flow measurement

6.1 Calibration

Example:
In this example, a volume flow should be measured in m^3/s.

Note!
- The "Flow measurement" measuring mode is only available for the Deltabar S differential pressure transmitter.
- See also Operating Instructions BA00270P Deltabar S, Section 6.4 "Flow measurement".
- For a description of the parameters mentioned, see
  - Page 45, Table 2: MEASURING MODE
  - Page 53, Table 6: POSITION ADJUSTMENT
  - Page 91 ff, Table 12: BASIC SETUP
  - Page 98 ff, Table 15: EXTENDED SETUP.
- For a description of further parameters, see
  - Page 98, Table 15: EXTENDED SETUP
  - Page 123, Table 29: PROCESS VALUES.

Warning!
If the measuring mode is changed, the span setting (URV) must be verified in the "Calibration" → "Basic Setup" operating menu and, if necessary, reconfigured.

	Description
1	Before configuring the device for your application, the pressure piping must be cleaned and the device filled with fluid. See Operating Instructions BA00270P, Section 6.4.1.
2	Carry out position adjustment if necessary. See Page 53, Table 6: POSITION ADJUSTMENT.
3	If necessary, select the "Flow" measuring mode via the MEASURING MODE parameter. On-site display: Menu path: GROUP SELECTION → MEASURING MODE Digital communication: Menu path: OPERATING MENU → SETTINGS → BASIC SETUP → MEASURING MODE
4	On-site display: Select BASIC SETUP function group. Menu path: GROUP SELECTION → OPERATING MENU → SETTINGS → BASIC SETUP
5	Select a pressure unit via the PRESS. ENG. UNIT parameter, here mbar for example.
6	Select the "Volume p. cond." option by means of the FLOW-MEAS. TYPE parameter.
7	Select a flow unit via the UNIT FLOW parameter, here m^3/h for example.
8	Select MAX. FLOW parameter.
	Enter the maximum flow value of the primary element, here 6000 m^3/h for example. See also layout sheet of primary element.
9	Select MAX PRESS. FLOW parameter.
	Enter the maximum pressure, here 400 mbar (6 psi) for example. See also layout sheet of primary element.
10	Result: The device is configured for flow measurement.

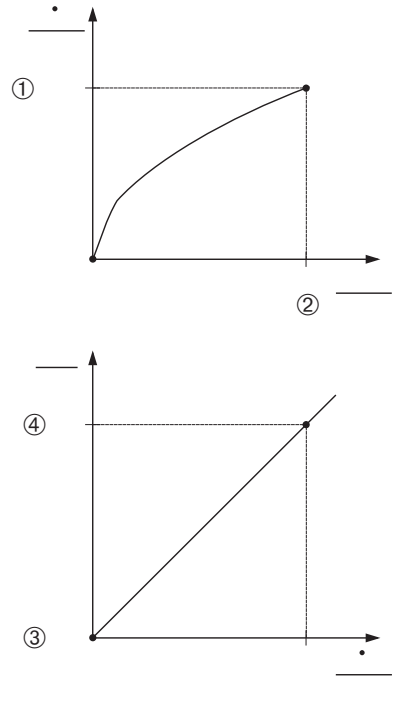


Fig. 20: Flow measurement calibration

1 See table, step 8.
2 See table, step 9.
3 See the following note, point 4.
4 See the following note, point 4.

Note!

1. You can also perform calibration by means of the QUICK SETUP menu. → See Page 52 ff, Table 5: QUICK SETUP menu.
2. Using the FLOW-MEAS. TYPE parameter, you can choose between the following flow types:
   – Volume p. cond. (volume under operating conditions)
   – Gas norm. cond. (norm volume under norm conditions in Europe: 1013.25 mbar and 273.15 K (0°C))
   – Gas std. cond. (standard volume under standard conditions in USA: 1013.25 mbar (14.7 psi) and 288. 15 K (15°C/59°F))
   – Mass
3. Depending on the flow type selected, you can choose between various units. You can also specify a customer-specific unit.
   See parameter description for PRESS. ENG. UNIT (→ Page 92), UNIT FLOW (→ Page 93), NORM FLOW UNIT (→ Page 93), STD. FLOW UNIT (→ Page 94) and MASS FLOW UNIT (→ Page 94).
4. A flow value or a pressure value is assigned to both the lower and upper current value with the SET LRV (→ Page 99) and SET URV (→ Page 100) parameters.

You can use the LINEAR/SQROOT parameter (→ Page 113) to specify whether the current output should depict the linear pressure signal or the Flow (square root) flow signal. Depending on the setting of the LINEAR/SQROOT parameter, enter the following values for SET LRV and SET URV:
– LINEAR/SQROOT = Flow (square root) (factory setting) ⇒ flow value
– LINEAR/SQROOT = Differential pres. ⇒ pressure value

The following applies for the setting LINEAR/SQROOT "Flow (square root)":
As per the factory settings, the lower current value is set to equal zero and the upper current value is set to the MAX. FLOW value. If you enter a value for MAX. FLOW, the SET URV parameter is also changed. If you want to assign values other than zero and MAX. FLOW to the lower and upper current values, the desired values must be entered for SET LRV and SET URV.

The following applies for the setting LINEAR/SQROOT "Differential pres.":
As per the factory settings, the lower current value is set to equal zero and the upper current value is set to the MAX. PRESS. FLOW value. If you enter a value for MAX PRESS. FLOW, the SET URV parameter is also changed. If you want to assign values other than zero and MAX PRESS. FLOW to the lower and upper current values, the desired values must be entered for SET LRV and SET URV.

5. In the lower measuring range, small flow quantities (creepages) can lead to large measured value fluctuations. You can activate low flow cut-off via the LOW FLOW CUT-OFF parameter (→ Page 99).

6.2 Totalizers

Example:
In this example, the volume flow should be totalised and displayed in the unit m^3E^3. Negative flows should be added to the flow rate.

Note!
- For a description of the parameters mentioned, see
  - Page 107 ff, Table 18: TOTALIZER SETUP
  - Page 123 ff, Table 29: PROCESS VALUES
- Totalizer 1 can be reset. Totalizer 2 cannot be reset.

	Description
1	Calibrate the device as per Section 6.1.
2	Change the function group: (GROUP SELECTION →) OPERATING MENU → SETTINGS → TOTALIZER SETUP
3	Select a flow unit via the TOTALIZER 1 UNIT parameter, here m^3 E^3 for example.
4	Use the NEG. FLOW TOT. 1 parameter to specify the totalising mode for negative flows, here the "Positive" option for example.
5	Reset totalizer 1 to zero via the RESET TOTALIZER parameter.
6	Result: The TOTALIZER 1 and TOTAL. 1 OVERFLOW parameters display the totalised volume flow.

Note!
- You can also specify a customer-specific unit. → See parameter description for TOTALIZER 1 UNIT (→ Page 108) and TOTALIZER 2 UNIT (→ Page 109).
- The TOTALIZER 1 and TOTAL. 1 OVERFLOW parameters display the totalised flow value of the first totalizer. The TOTALIZER 2 and TOTAL. 2 OVERFLOW parameters display the totalised flow value of the second totalizer. → See Page 123 ff, PROCESS VALUES function group.
- You can use the MENU DESCRIPTOR parameter (→ Page 110) to specify which measured value should be displayed on the on-site display.

7 Description of parameters

Note!

- The following tables list all the parameters as per the menu structure. Each table corresponds to a function group in the menu tree. The overall menu structure is illustrated in Section 9.1.
- The menu structure for on-site operation and the digital communication are slightly different. The differences mainly affect the MEASURING MODE and LANGUAGE parameters and the LINEARISATION function group.
- In the operating program or HART handheld terminal, additional parameters are displayed. These parameters are marked accordingly.
- The menu path is indicated in the header of each table. You can use this path to get to the parameters in question.
- The menu has a different structure depending on the measuring mode selected. This means that some function groups are only displayed for one measuring mode, e.g. the "LINEARISATION" function group for the "Level" measuring mode. If certain requirements have to be met for a function group, these are listed in the first row of the table.
- Some parameters are only displayed if other parameters are appropriately configured. For example, the EMPTY CALIB. parameter is not displayed in the Quick Setup menu ("Level" measuring mode) unless the "Linear" option was selected for the LEVEL MODE parameter and the "Wet" option was selected for the CALIBRATION MODE parameter. There is a comment in the parameter description here stating: Note: prerequisite: LEVEL MODE = Linear and CALIBRATION MODE = Wet.
- Parameter names are written in upper case in the text.
- In the "Parameter name" column, the unique identification number (ID) of the parameter is indicated in brackets. This ID only appears on the on-site display.

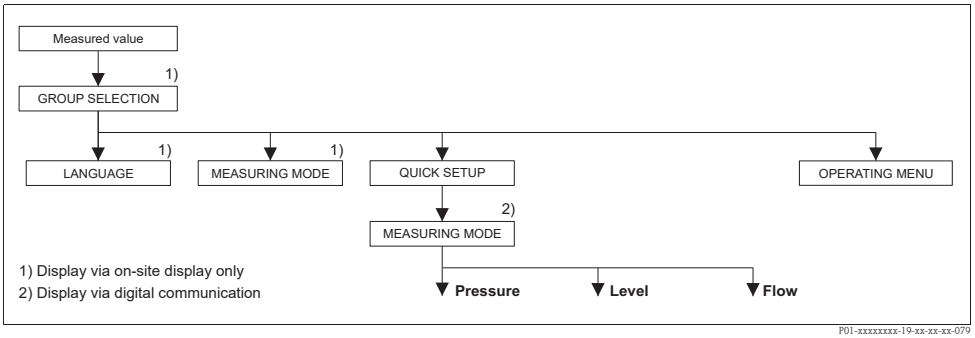


Fig. 21: 1st selection level in menu, LANGUAGE (→ see Page 44, Table 1) and MEASURING MODE (→ see Page 45, Table 2)

Table 1: GROUP SELECTION → LANGUAGE – on-site operation	
Parameter name	**Description**
LANGUAGE (079) Selection	Select the menu language for the on-site display. Note! ■ In the operating program and in the HART handheld terminal, the LANGUAGE parameter is arranged in the DISPLAY function group. ■ Select the menu language for FieldCare via the "Options" menu → "Settings" → "Language" tab → "Tool language" field. **Factory setting:** English

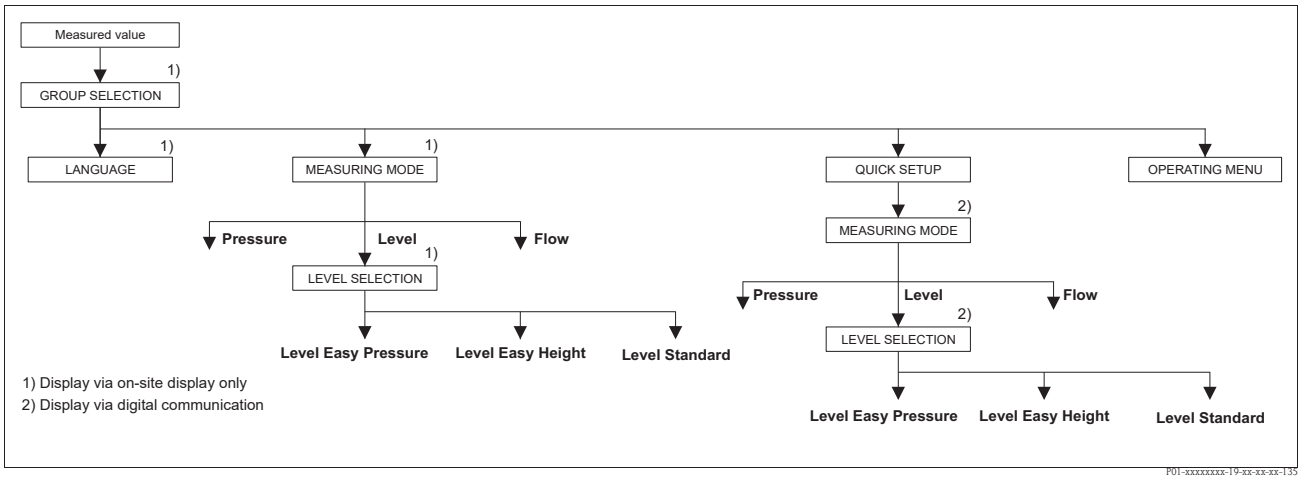


Fig. 22: "Level" measuring mode, LEVEL SELECTION parameter

Table 2: GROUP SELECTION → MEASURING MODE – on-site operation	
Parameter name	**Description**
MEASURING MODE (389) Selection	Select the measuring mode. The operating menu is structured according to the selected measuring mode. Note! ■ The MEASURING MODE parameter is displayed in the operating program and in the HART handheld terminal in the QUICK SETUP menus and in the BASIC SETUP function group (OPERATING MENU → SETTINGS → BASIC SETUP). Warning! If the measuring mode is changed, the span setting (URV) must be verified in the "Calibration" → "Basic Setup" operating menu and, if necessary, reconfigured. **Options:** ■ Pressure ■ Level ■ Deltabar S: Flow **Factory setting:** ■ Cerabar S and Deltabar S: Pressure ■ Deltapilot S: Level

Table 2: GROUP SELECTION → MEASURING MODE – on-site operation	
Parameter name	**Description**
LEVEL SELECTION (020) Options	Select level mode. **Prerequisite:** ■ MEASURING MODE = Level ✎ Note! ■ In the "Level Easy Pressure" and "Level Easy Height" level modes, the values entered are not tested as extensively as in the "Level Standard" level mode. The values entered for EMPTY CALIB./FULL CALIB., EMPTY PRESSURE/FULL PRESSURE, EMPTY HEIGHT/FULL HEIGHT and SET LRV/SET URV must have a minimum interval of 1% for the "Level Easy Pressure" and "Level Easy Height" level modes. The value will be rejected with a warning message if the values are too close together. Further limit values are not checked; i.e. the values entered must be appropriate for the sensor and the measuring task so that the measuring device can measure correctly. → For an overview of the different level modes and types, see Page 14, Section 5.1 "Overview of level measurement". ■ The "Level Easy Pressure" and "Level Easy Height" level modes encompass fewer parameters than the "Level Standard" mode and are used for quick and easy configuration of a level application. ■ Customer-specific units of fill level, volume and mass or a linearization table may only be entered in the "Level Standard" level mode. ■ Where the device is intended for use as a subsystem in a safety function (SIL), a "Device configuration with enhanced parameter security" (SAFETY CONFIRM.) is only possible for the "Level" operating mode in the "Level Easy Pressure" level mode. All parameters previously entered are checked after a password is entered. Once the "Level Easy Height" or "Level Standard" has been selected, the configuration will first have to be reset to the ex-works setting using the RESET parameter (menu path: (GROUP SELECTION →) OPERATING MENU → OPERATION) using the reset code "7864". → For additional information, see the Safety Manual for Deltabar S (SD00189), Cerabar S (SD00190) or Deltapilot S (SD00213P). **Options:** ■ Level Easy Pressure Specify two pressure-level value pairs for this level mode. The pressure measured value is converted directly to the unit which is selected via the OUTPUT UNIT parameter (→ Page 60). Two calibration modes, "Wet" and "Dry", are available. – Wet calibration takes place by filling and emptying the container. In the case of two different levels, the level, volume, mass or percentage value entered is assigned to the pressure measured at this point in time. – Dry calibration is a theoretical calibration. For this calibration, specify two pressure-level value pairs via the EMPTY CALIB., EMPTY PRESSURE, FULL CALIB. and FULL PRESSURE parameters. → Parameter descriptions see Page 61 ff. ■ Level Easy Height For this level mode, specify a height unit, density and two height-level value pairs. The pressure measured value is converted to a height value using the density entered and the height unit. Two calibration modes, "Wet" and "Dry", are available. – Wet calibration takes place by filling and emptying the container. In the case of two different levels, the level, volume, mass or percentage value entered is assigned to the converted height value. – Dry calibration is a theoretical calibration. For this calibration, specify two height-level value pairs via the EMPTY CALIB., EMPTY HEIGHT, FULL CALIB. and FULL HEIGHT parameters. → Parameter descriptions see Page 65 ff. ■ Level standard Once you have selected this level mode, you can use the LEVEL MODE parameter (→ Page 68) to choose between "Linear", "Pressure Linearized" and "Height Linearized". **Factory setting:** Level Easy Pressure
→ For LEVEL SELECTION = "Level Easy Pressure" see Page 58, Table 8. → For LEVEL SELECTION = "Level Easy Height" see Page 62, Table 9. → For LEVEL SELECTION = "Level standard" see Page 67, Table 10.	

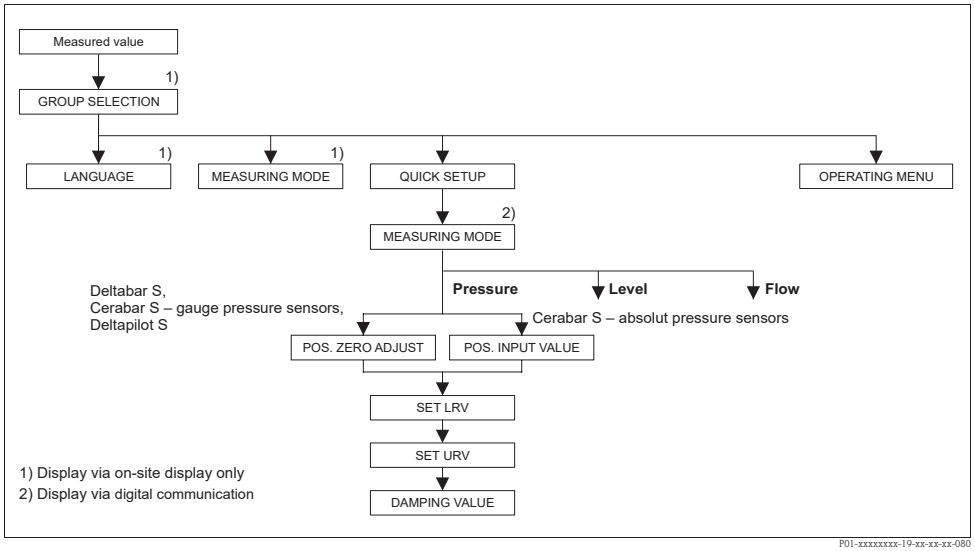


Fig. 23: Quick Setup menu for the "Pressure" measuring mode

Table 3: (GROUP SELECTION →) QUICK SETUP "Pressure"	
Parameter name	**Description**
This menu displays the most important parameters for the "Pressure" measuring mode. **Prerequisite:** ■ MEASURING MODE = Pressure (→ see also Page 45). **Note:** See also – Page 55 ff, Table 7: BASIC SETUP – Page 96, Table 15: EXTENDED SETUP – Page 121 ff, Table 27: PROCESS VALUES – Page 11 ff, Section 4 "Pressure measurement".	
MEASURING MODE Selection	Select the measuring mode. The operating menu is structured according to the selected measuring mode. ⚠ Warning! If the measuring mode is changed, the span setting (URV) must be verified in the "Calibration" → "Basic Setup" operating menu and, if necessary, reconfigured. **Prerequisite:** ■ Digital communication **Options:** ■ Pressure ■ Level ■ Deltabar S: Flow **Factory setting:** ■ Cerabar S and Deltabar S: Pressure ■ Deltapilot S: Level

Table 3: (GROUP SELECTION →) QUICK SETUP "Pressure"	
Parameter name	**Description**
POS. ZERO ADJUST (685) Entry	Position adjustment – the pressure difference between zero (set point) and the measured pressure need not be known. Due to the orientation of the device, there may be a shift in the measured value, i.e. for example, when the container is empty or partly filled, the MEASURED VALUE parameter does not display zero. **Example:** – MEASURED VALUE = 2.2 mbar (0.033 psi) – Correct the MEASURED VALUE via the POS. ZERO ADJUST parameter with the "Confirm" option. This means that you are assigning the value 0.0 to the pressure present. – MEASURED VALUE (after pos. zero adjust) = 0.0 mbar – The current value is also corrected. The CALIB. OFFSET parameter displays the resulting pressure difference (offset) by which the MEASURED VALUE was corrected. **Prerequisite:** ■ This parameter is displayed for Deltabar S, Cerabar S with gauge pressure sensor and Deltapilot S. **Options:** ■ Abort ■ Confirm **Factory setting:** 0.0
POS. INPUT VALUE (563) Entry	Position adjustment – the pressure difference between zero (set point) and the measured pressure need not be known. To correct the pressure difference, you need a reference measurement value (e. g. from a reference device). Due to the orientation of the device, there may be a shift in the measured value, i.e. for example, when the container is empty or partly filled, the MEASURED VALUE parameter does not display zero or the desired value. **Example:** – MEASURED VALUE = 0.5 mbar (0.0075 psi) – For the POS. INPUT VALUE parameter, specify the desired set point for the MEASURED VALUE, e.g. 2 mbar. (MEASURED VALUE$_{new}$ = POS. INPUT VALUE) – MEASURED VALUE (after entry for POS. INPUT VALUE) = 2.0 mbar (0.03 psi) – The CALIB. OFFSET parameter displays the resulting pressure difference (offset) by which the MEASURED VALUE was corrected. CALIB. OFFSET = MEASURED VALUE $_{old}$ – POS. INPUT VALUE, here: CALIB. OFFSET = 0.5 mbar (0.0075 psi) – 2.0 mbar (0.03 psi) = – 1.5 mbar (0.0225 psi)) – The current value is also corrected. **Prerequisite:** ■ This parameter is displayed for Cerabar S with absolute pressure sensors. **Factory setting:** 0.0
SET LRV (245) Entry	Set lower range value – without reference pressure. Enter pressure value for the lower current value (4 mA). **Factory setting:** 0.0 or as per order specifications
SET URV (246) Entry	Set upper range value – without reference pressure. Enter pressure value for the upper current value (20 mA). **Factory setting:** High sensor limit (→ see PRESS. SENS HILIM, Page 119) or as per order specifications
DAMPING VALUE (247) Entry	Enter damping time (time constant τ). The damping affects the speed at which all subsequent elements, such as the on-site display, measured value and current output react to a change in the pressure. **Input range:** 0.0...999.0 s **Factory setting:** 2.0 s or as per order specifications

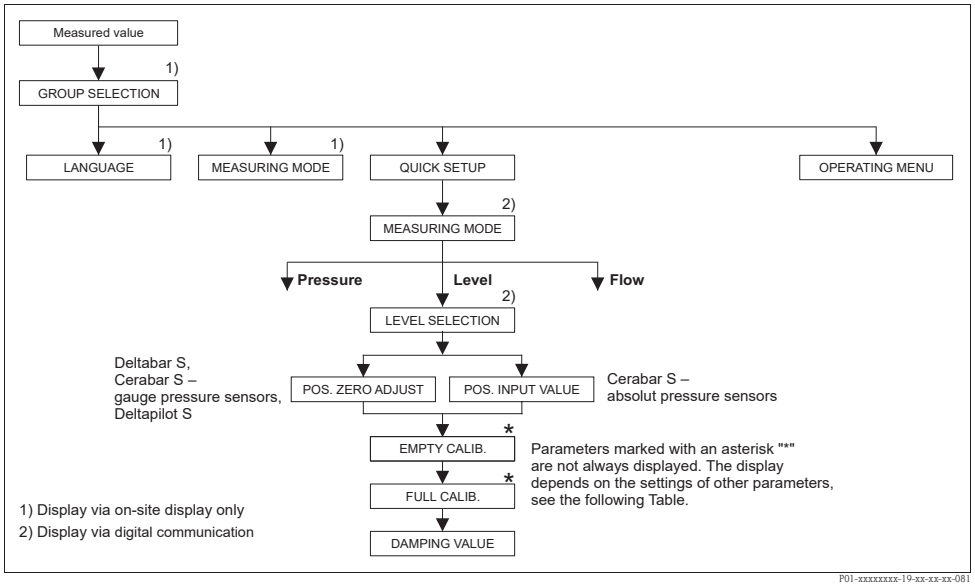


Fig. 24: Quick Setup menu for the "Level" measuring mode

Table 4: (GROUP SELECTION →) QUICK SETUP "Level"	
Parameter name	**Description**
This menu displays the most important parameters for the "Level" measuring mode. **Prerequisite**: ■ MEASURING MODE = Level (→ see also Page 45). **Note:** See also – Page 67 ff, Tables 10 to 13: BASIC SETUP – Page 96 ff, Table 16: EXTENDED SETUP – Page 100 ff, Table 18: LINEARISATION – on-site operation – Page 104 ff, Table 19: LINEARISATION – Digital communication – Page 122 ff, Table 28: PROCESS VALUES – Page 14 ff, Section 5 "Level measurement".	
MEASURING MODE Selection	Select the measuring mode. The operating menu is structured according to the selected measuring mode. ⚠ Warning! If the measuring mode is changed, the span setting (URV) must be verified in the "Calibration" → "Basic Setup" operating menu and, if necessary, reconfigured. **Prerequisite:** ■ Digital communication **Options**: ■ Pressure ■ Level ■ Deltabar S: Flow **Factory setting:** ■ Cerabar S and Deltabar S: Pressure ■ Deltapilot S: Level
LEVEL SELECTION (020) Options	Select level mode. → Parameter description, see Page 46. **Factory setting:** Level Easy Pressure

Table 4: (GROUP SELECTION →) QUICK SETUP "Level"	
Parameter name	**Description**
POS. ZERO ADJUST (685) Entry	Position adjustment – the pressure difference between zero (set point) and the measured pressure need not be known. Due to the orientation of the device, there may be a shift in the measured value, i.e. when the container is empty or partly filled, the MEASURED VALUE parameter does not display zero. **Example:** – MEASURED VALUE = 2.2 mbar (0.033 psi) – Correct the MEASURED VALUE via the POS. ZERO ADJUST parameter with the "Confirm" option. This means that you are assigning the value 0.0 to the pressure present. – MEASURED VALUE (after pos. zero adjust) = 0.0 mbar – The current value is also corrected. The CALIB. OFFSET parameter displays the resulting pressure difference (offset) by which the MEASURED VALUE was corrected. **Prerequisite:** ■ This parameter is displayed for Deltabar S, Cerabar S with gauge pressure sensor and Deltapilot S. **Options:** ■ Abort ■ Confirm **Factory setting:** 0.0
POS. INPUT VALUE (563) Entry	Position adjustment – the pressure difference between zero (set point) and the measured pressure need not be known. To correct the pressure difference, you need a reference measurement value (e. g. from a reference device). Due to the orientation of the device, there may be a shift in the measured value, i.e. when the container is empty or partly filled, the MEASURED VALUE parameter does not display zero or the desired value. **Example:** – MEASURED VALUE = 0.5 mbar (0.0075 psi) – For the POS. INPUT VALUE parameter, specify the desired set point for the MEASURED VALUE, e.g. 2.0 mbar (0.03 psi). (MEASURED VALUE $_{new}$ = POS. INPUT VALUE) – MEASURED VALUE (after entry for POS. INPUT VALUE) = 2.0 mbar (0.03 psi) – The CALIB. OFFSET parameter displays the resulting pressure difference (offset) by which the MEASURED VALUE was corrected. CALIB. OFFSET = MEASURED VALUE$_{old}$ – POS. INPUT VALUE, here: CALIB. OFFSET = 0.5 mbar (0.0075 psi) – 2.0 mbar (0.03 psi) = – 1.5 mbar (0.0225 psi)) – The current value is also corrected. **Prerequisite:** ■ This parameter is displayed for Cerabar S with absolute pressure sensors. **Factory setting:** 0.0
EMPTY CALIB. (314)/(010) Entry	Enter level value for the lower calibration point (container empty). The container is either empty or part full. By entering a value for this parameter, you are assigning a level value to the pressure present at the device. **Prerequisite:** ■ LEVEL SELECTION = Level Easy Pressure (→ see also Page 46), CALIBRATION MODE = Wet (→ see also Page 60) ■ LEVEL SELECTION = Level Standard (→ see also Page), LEVEL MODE = Linear (→ see also Page 68), CALIBRATION MODE = Wet (→ see also Page 73) ✎ Note! For this parameter, the on-site display shows the level value to be entered and the pressure present at the device. In order for the level value to be saved together with the pressure present at the device, the entry field for the level value must first be activated using the "+"- or "–" key before confirming with the "E" key. This applies also if the level value is to remain unchanged. **Factory setting:** 0.0

Table 4: (GROUP SELECTION →) QUICK SETUP "Level"	
Parameter name	**Description**
FULL CALIB. (315)/(004) Entry	Enter level value for the upper calibration point (container full). The container is either completely or almost full. By entering a value for this parameter, you are assigning a level value to the pressure present at the device. **Prerequisite:** ■ LEVEL SELECTION = Level Easy Pressure (→ see also Page 46), CALIBRATION MODE = Wet (→ see also Page 60) ■ LEVEL SELECTION = Level Standard, LEVEL MODE = Linear (→ see also Page 68), CALIBRATION MODE = Wet (→ see also Page 73) ✎ Note! For this parameter, the on-site display shows the level value to be entered and the pressure present at the device. In order for the level value to be saved together with the pressure present at the device, the entry field for the level value must first be activated using the "+"- or "–" key before confirming with the "E" key. This applies also if the level value is to remain unchanged. **Factory setting:** 100.0
DAMPING VALUE (247) Entry	Enter damping time (time constant τ). The damping affects the speed at which all subsequent elements, such as the on-site display, measured value and current output react to a change in the pressure. **Input range:** 0.0...999.0 s **Factory setting:** 2.0 s or as per order specifications

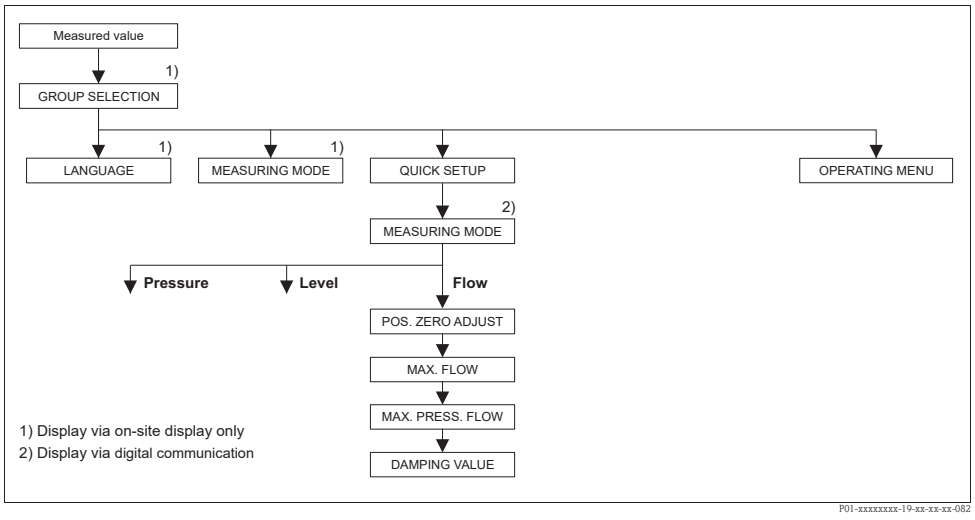


Fig. 25: Quick Setup menu, "Flow" measuring mode

Table 5: (GROUP SELECTION →) QUICK SETUP "Flow"	
Parameter name	**Description**
This menu displays the most important parameters for the "Flow" measuring mode. **Prerequisite**: ■ Deltabar S differential pressure transmitter ■ MEASURING MODE = Flow (→ see also Page 45). **Note:** See also – Page 91, Table 14: BASIC SETUP – Page 98, Table 17: EXTENDED SETUP – Page 107, Table 20: TOTALIZER SETUP – Page 40 ff, Section 6 "Flow measurement".	
MEASURING MODE Selection	Select the measuring mode. The operating menu is structured according to the selected measuring mode. ⚠ Warning! If the measuring mode is changed, the span setting (URV) must be verified in the "Calibration" → "Basic Setup" operating menu and, if necessary, reconfigured. **Prerequisites:** ■ Digital communication **Options**: ■ Pressure ■ Level ■ Deltabar S: Flow **Factory setting:** ■ Cerabar S and Deltabar S: Pressure ■ Deltapilot S: Level
POS. ZERO ADJUST (685) Entry	Position adjustment – the pressure difference between zero (set point) and the measured pressure need not be known. (A reference pressure is present at the device.) Due to the orientation of the device, there may be a shift in the measured value, i.e. when the container is empty or partly filled, the MEASURED VALUE parameter does not display zero. **Example:** – MEASURED VALUE = 2.2 mbar (0,033 psi) – Correct the MEASURED VALUE via the POS. ZERO ADJUST parameter with the "Confirm" option. This means that you are assigning the value 0.0 to the pressure present. – MEASURED VALUE (after pos. zero adjust) = 0.0 mbar – The current value is also corrected. The CALIB. OFFSET parameter displays the resulting pressure difference (offset) by which the MEASURED VALUE was corrected. **Selection:** ■ Abort ■ Confirm **Factory setting:** 0.0
MAX. FLOW (311) Entry	Enter maximum flow of primary element. See also layout sheet of primary element. The maximum flow is assigned to the maximum pressure which you enter via MAX PRESS. FLOW. ✎ Note! Use the LINEAR/SQROOT parameter (→ Page 113) to specify the current signal for the "Flow" measuring mode. The following applies for the "Flow (square root)" setting: If you enter a new value for MAX. FLOW, the value for SET URV is also changed. Use SET URV to assign a flow to the upper current value. If you want to assign the upper current value a value other than that for MAX. FLOW, you must enter the desired value for SET URV. (→ SET URV, Page 100). **Factory setting:** 1.0

Table 5: (GROUP SELECTION →) QUICK SETUP "Flow"	
Parameter name	**Description**
MAX PRESS. FLOW (634) Entry	Enter maximum pressure of primary element. → See layout sheet of primary element. This value is assigned to the maximum flow value (→ see MAX. FLOW). ✎ Note! Use the LINEAR/SQROOT parameter (→ Page 113) to specify the current signal for the "Flow" measuring mode. The following applies for the "Differential pres." setting: If you enter a new value for MAX PRESS. FLOW, the value for SET URV is also changed. Use SET URV to assign a pressure value to the upper current value. If you want to assign the upper current value a value other than that for MAX PRESS. FLOW, you must enter the desired value for SET URV. (→ SET URV, Page 100). **Factory setting:** High sensor limit (→ See PRESS. SENS HILIM, Page 119)
DAMPING VALUE (247) Entry	Enter damping time (time constant τ). The damping affects the speed at which all subsequent elements, such as the on-site display, measured value and current output react to a change in the pressure. **Input range:** 0.0...999.0 s **Factory setting:** 2.0 s or as per order specifications

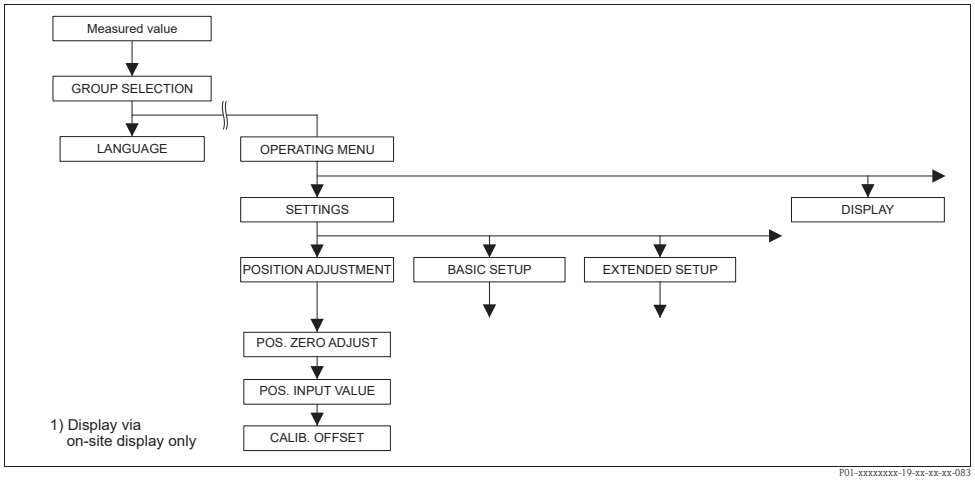


Fig. 26: POSITION ADJUSTMENT function group

Table 6: (GROUP SELECTION →) OPERATING MENU → SETTINGS → POSITION ADJUSTMENT	
Parameter name	**Description**
Due to the orientation of the device, there may be a shift in the measured value, i.e. when the container is empty or partly filled, the measured value does not display zero. Deltabar S and Cerabar S offer three different ways of performing a position adjustment. Recommendation: ■ The pressure difference between zero (set point) and the measured pressure need not be known. – POS. ZERO ADJUST: Deltabar S or Cerabar S with gauge pressure sensor or Deltapilot S. – POS. INPUT VALUE: Cerabar S with absolute pressure sensor. ■ The pressure difference between zero (set point) and the measured pressure is known. – CALIB. OFFSET: Deltabar S, Cerabar S with gauge pressure sensor, Cerabar S with absolute pressure sensor or Deltapilot S.	

Table 6: (GROUP SELECTION →) OPERATING MENU → SETTINGS → POSITION ADJUSTMENT	
Parameter name	**Description**
POS. ZERO ADJUST (685) Entry	Position adjustment – the pressure difference between zero (set point) and the measured pressure need not be known. **Example:** – MEASURED VALUE = 2.2 mbar (0.033 psi) – Correct the MEASURED VALUE via the POS. ZERO ADJUST parameter with the "Confirm" option. This means that you are assigning the value 0.0 to the pressure present. – MEASURED VALUE (after pos. zero adjust) = 0.0 mbar – The current value is also corrected. The CALIB. OFFSET parameter displays the resulting pressure difference (offset) by which the MEASURED VALUE was corrected. **Selection:** ■ Abort ■ Confirm **Factory setting:** 0.0
POS. INPUT VALUE (563) Entry	Position adjustment – the pressure difference between zero (set point) and the measured pressure need not be known. To correct the pressure difference, you need a reference measurement value (e. g. from a reference device). **Example:** – MEASURED VALUE = 0.5 mbar (0.0075 psi) – For the POS. INPUT VALUE parameter, specify the desired set point for the MEASURED VALUE, e.g. 2.0 mbar (0.03 psi). (MEASURED $VALUE_{new}$ = POS. INPUT VALUE) – MEASURED VALUE (after entry for POS. INPUT VALUE) = 2.0 mbar (0.03 psi) – The CALIB. OFFSET parameter displays the resulting pressure difference (offset) by which the MEASURED VALUE was corrected. CALIB. OFFSET = MEASURED $VALUE_{old}$ – POS. INPUT VALUE, here: CALIB. OFFSET = 0.5 mbar (0.0075 psi) – 2.0 mbar (0.03 psi) = – 1.5 mbar (0.0225 psi)) – The current value is also corrected. **Factory setting:** 0.0
CALIB. OFFSET (319) Entry	Position adjustment - the pressure difference between zero (set point) and the measured pressure is known. **Example:** – MEASURED VALUE = 2.2 mbar (0.033 psi) – Via the CALIB. OFFSET parameter, enter the value by which the MEASURED VALUE should be corrected. To correct the MEASURED VALUE to 0.0 mbar, you must enter the value 2.2 here. (MEASURED $VALUE_{new}$ = MEASURED $VALUE_{old}$ – CALIB. OFFSET) – MEASURED VALUE (after entry for calib. offset) = 0.0 mbar – The current value is also corrected. **Factory setting:** 0.0

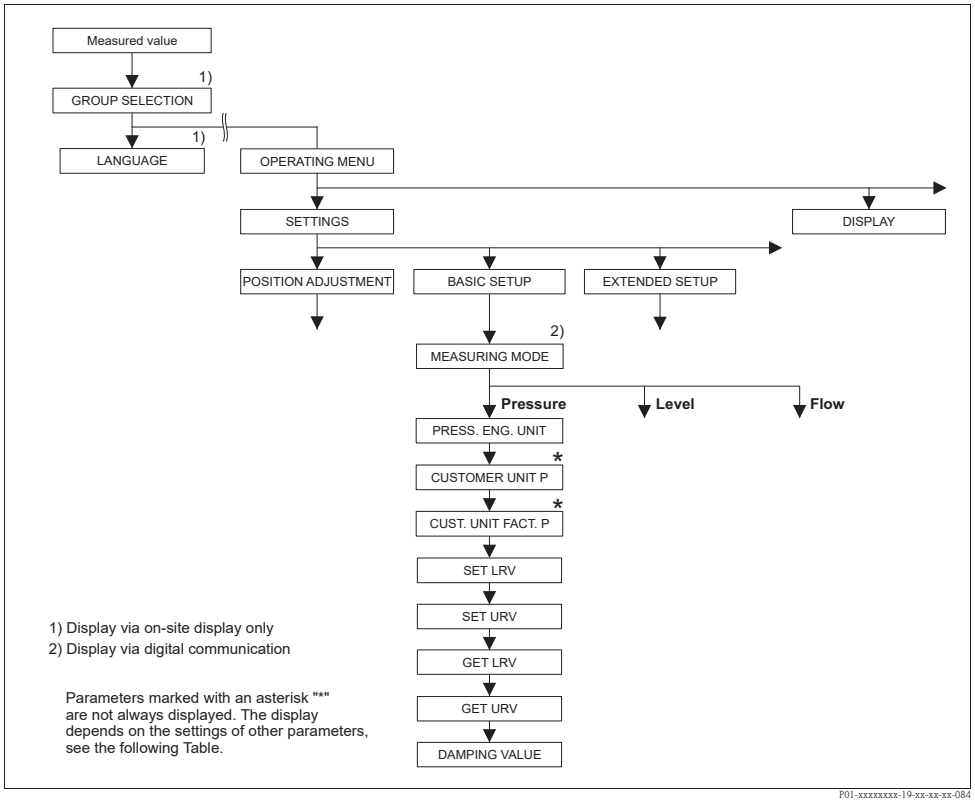


Fig. 27: BASIC SETUP function group for the "Pressure" measuring mode

Table 7: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Pressure"	
Parameter name	**Description**
Prerequisite: ■ MEASURING MODE = Pressure (→ see also Page 45). **Note:** See also – Page 47, Table 3: QUICK SETUP – Page 96, Table 15: EXTENDED SETUP – Page 121 ff, Table 27: PROCESS VALUES – Page 11 ff, Section 4 "Pressure measurement".	
MEASURING MODE Selection	Select the measuring mode. The operating menu is structured according to the selected measuring mode. ⚠ Warning! If the measuring mode is changed, the span setting (URV) must be verified in the "Calibration" → "Basic Setup" operating menu and, if necessary, reconfigured. **Prerequisite:** ■ Digital communication **Options:** ■ Pressure ■ Level ■ Deltabar S: Flow **Factory setting:** ■ Cerabar S and Deltabar S: Pressure ■ Deltapilot S: Level

Table 7: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Pressure"	
Parameter name	**Description**
PRESS. ENG. UNIT (060) Selection	Select pressure unit. If a new pressure unit is selected, all pressure-specific parameters are converted and displayed with the new unit. **Options:** ■ mbar, bar ■ mmH2O, mH2O, inH2O, ftH2O [1)] ■ Pa, hPa, kPa, MPa ■ psi ■ mmHg, inHg [2)] ■ Torr ■ g/cm^2, kg/cm^2 ■ lb/ft^2 ■ atm ■ gf/cm^2, kgf/cm^2 ■ User unit, → See also the following parameter description for CUSTOMER UNIT P and CUST. UNIT FACT. P. 1) The conversion factor of the pressure units refers to a reference temperature of 4 °C (39.2 °F). 2) The conversion factor of the pressure units refers to a reference temperature of 0 °C (32 °F). **Factory setting:** Depends on the sensor nominal measuring range mbar or bar or as per order specifications
CUSTOMER UNIT P (075) Entry	Enter text (unit) for customer-specific pressure unit. You can enter a maximum of eight alphanumeric characters here. → See also CUST. UNIT FACT. P. **Prerequisite:** ■ PRESS. ENG. UNIT = User unit Note! Only the first five characters are shown on the on-site display. For example, if "crates" is specified as the customer-specific unit, "crate" is displayed. If the unit contains a slash, up to eight characters can be shown on the on-site display. The maximum number of characters in the counter is again limited to five. For example, if "crates/m2" is specified as the customer-specific unit, "crate/m2" is displayed. In the FieldCare, all eight characters are displayed. In the HART handheld terminal, the customer-specific unit is only displayed in the CUSTOMER UNIT P parameter. The measured value is displayed with the additional text "User Unit". **Factory setting:** – – – – – – – –
CUST. UNIT FACT. P (317) Entry	Enter conversion factor for a customer-specific pressure unit. The conversion factor must be entered in relation to the SI unit "Pa". → See also CUSTOMER UNIT P. **Prerequisite:** ■ PRESS. ENG. UNIT = User unit **Example:** – You want the measured value to be displayed in "PU" (PU: packing unit). – MEASURED VALUE =10000 Pa ≙ 1 PU – Entry CUSTOMER UNIT P: PU – Entry CUST. UNIT FACT. P: 0.0001 – Result: MEASURED VALUE = 1 PU **Factory setting:** 1.0
SET LRV (245) Entry	Set lower range value – without reference pressure. Enter pressure value for the lower current value (4 mA). **Factory setting:** 0.0 or as per order specifications

Table 7: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Pressure"	
Parameter name	**Description**
SET URV (246) Entry	Set upper range value – without reference pressure. Enter pressure value for the upper current value (20 mA). **Factory setting:** High sensor limit (→ See PRESS. SENS HILIM, Page 119)
GET LRV (309) Entry	Set lower range value – reference pressure is present at device. The pressure for the lower current value (4 mA) is present at device. With the "Confirm" option, you assign the lower current value to the pressure value present. On-site display: the pressure value present is displayed in the bottom line. **Options:** ■ Abort ■ Confirm
GET URV (310) Entry	Set upper range value – reference pressure is present at device. The pressure for the upper current value (20 mA) is present at device. With the "Confirm" option, you assign the upper current value to the pressure value present. On-site display: the pressure value present is displayed in the bottom line. **Options:** ■ Abort ■ Confirm
DAMPING VALUE (247) Entry	Enter damping time (time constant τ). The damping affects the speed at which all subsequent elements, such as the on-site display, measured value and current output react to a change in the pressure. **Input range:** 0.0...999.0 s **Factory setting:** 2.0 s or as per order specifications

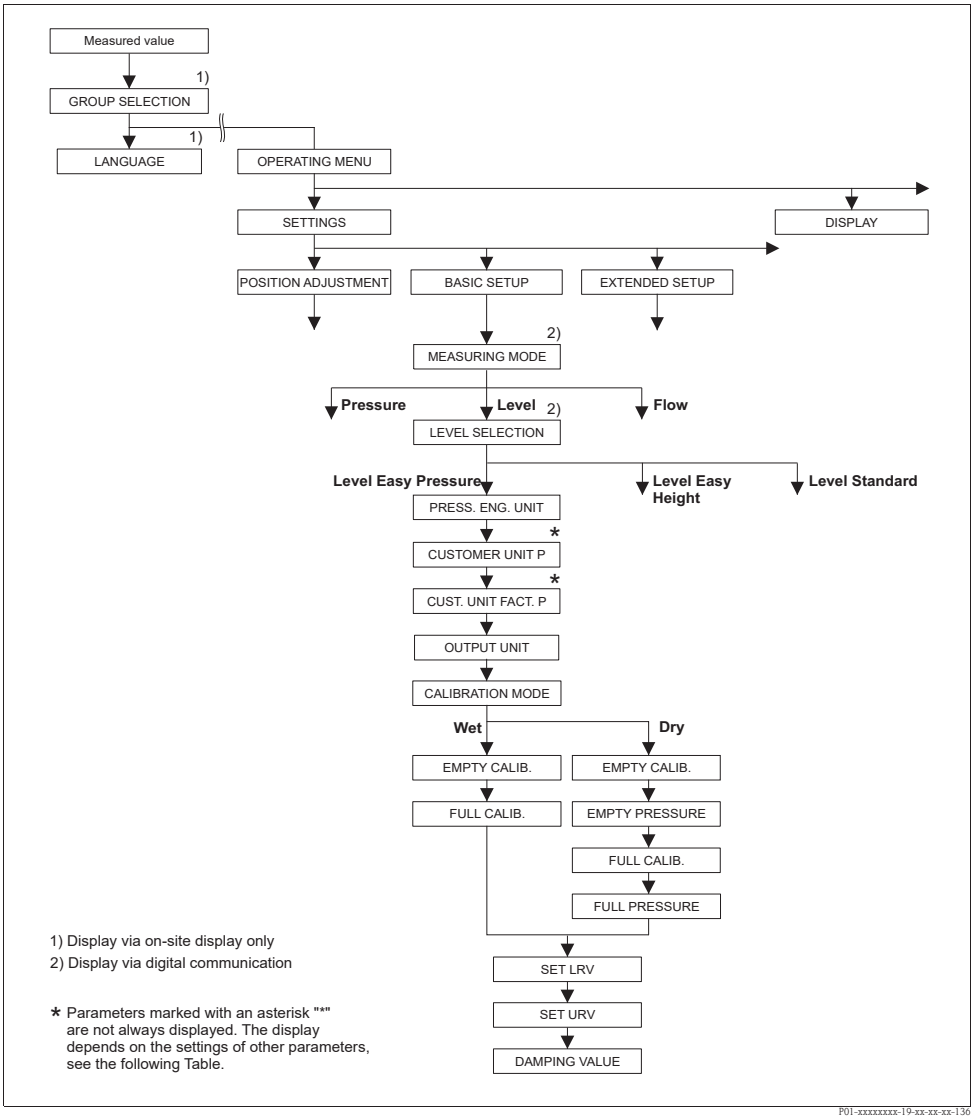


Fig. 28: BASIC SETUP function group for the "Level" measuring mode and "Level Easy Pressure" level selection

Table 8: (GROUP SELECTION→) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL SELECTION "Level Easy Pressure"

The following parameters are displayed if you have selected the "Level Easy Pressure" option for the LEVEL SELECTION parameter. Specify two pressure-level value pairs for this level mode. Two calibration modes, "Wet" and "Dry", are available.

Prerequisite:

- MEASURING MODE = Level (→ see also Page 45.)
- LEVEL SELECTION = Level Easy Pressure (→ See also Page 46.)

Table 8: (GROUP SELECTION→) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL SELECTION "Level Easy Pressure"	
PRESS. ENG. UNIT (060) Selection	Select pressure unit. If a new pressure unit is selected, all pressure-specific parameters are converted and displayed with the new unit. **Options:** ■ mbar, bar ■ mmH2O, mH2O, inH2O, ftH2O [1)] ■ Pa, hPa, kPa, MPa ■ psi ■ mmHg, inHg [2)] ■ Torr ■ g/cm^2, kg/cm^2 ■ lb/ft^2 ■ atm ■ gf/cm^2, kgf/cm^2 ■ User unit, → See also the following parameter description for CUSTOMER UNIT P and CUST. UNIT FACT. P. 1) The conversion factor of the pressure units refers to a reference temperature of 4 °C (39.2 °F). 2) The conversion factor of the pressure units refers to a reference temperature of 0 °C (32 °F). **Factory setting:** Depends on the sensor nominal measuring range mbar or bar or as per order specifications
CUSTOMER UNIT P (075) Entry	Enter text (unit) for customer-specific pressure unit. You can enter a maximum of eight alphanumeric characters here. → See also CUST. UNIT FACT. P. **Prerequisite:** ■ PRESS. ENG. UNIT = User unit ✎ Note! Only the first five characters are shown on the on-site display. For example, if "crates" is specified as the customer-specific unit, "crate" is displayed. If the unit contains a slash, up to eight characters can be shown on the on-site display. The maximum number of characters in the counter is again limited to five. For example, if "crates/m2" is specified as the customer-specific unit, "crate/m2" is displayed. In the FieldCare, all eight characters are displayed. In the HART handheld terminal, the customer-specific unit is only displayed in the CUSTOMER UNIT P parameter. The measured value is displayed with the additional text "User Unit". **Factory setting:** – – – – – – – –
CUST. UNIT FACT. P (317) Entry	Enter conversion factor for a customer-specific pressure unit. The conversion factor must be entered in relation to the SI unit "Pa". → See also CUSTOMER UNIT P. **Prerequisite:** ■ PRESS. ENG. UNIT = User unit **Example:** – You want the measured value to be displayed in "PU" (PU: packing unit). – MEASURED VALUE =10000 Pa ≙ 1 PU – Entry CUSTOMER UNIT P: PU – Entry CUST. UNIT FACT. P: 0.0001 – Result: MEASURED VALUE = 1 PU **Factory setting:** 1.0

Table 8: (GROUP SELECTION→) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL SELECTION "Level Easy Pressure"	
OUTPUT UNIT (023) Selection	Select unit for measured value display and MEASURED VALUE parameter (→ Page 122). ✎ Note! The selected unit is used only to describe the measured value. This means that when selecting a new output unit, the measured value is not converted. Example: ■ current measured value: 0.3 ft ■ new output unit: m ■ new measured value: 0.3 m (9.8 ft) **Options** ■ % ■ mm, cm, dm, m ■ ft, inch ■ cm^3, dm^3, m^3,m^3 E^3 ■ l, hl ■ ft^3, ft^3 E^3 ■ gal, bbl, Igal ■ g, kg, t ■ lb, ton, oz **Factory setting:** %
CALIBRATION MODE (008) Selection	Select calibration mode. **Options:** ■ Wet Wet calibration takes place by filling and emptying the container. In the case of two different levels, the level, volume, mass or percentage value entered is assigned to the pressure measured at this point in time. (→ See also this table, parameter descriptions for EMPTY CALIB. and FULL CALIB.) ■ Dry Dry calibration is a theoretical calibration. For this calibration, specify two pressure-level value pairs via the following parameters: EMPTY CALIB., EMPTY PRESSURE, FULL CALIB. and FULL PRESSURE. **Factory setting:** Wet
EMPTY CALIB. (010) Entry	Enter level, volume, mass or percentage value for the lower calibration point (container empty). The container is either empty or part full. By entering a value for this parameter, you assign a level, volume, mass or percentage value to the pressure present at the device. The unit is selected via the OUTPUT UNIT parameter (→ Page 60). **Prerequisite:** ■ CALIBRATION MODE = Wet ✎ Note! For this parameter, the on-site display shows the level value to be entered and the pressure present at the device. In order for the level value to be saved together with the pressure present at the device, the entry field for the level value must first be activated using the "+"- or "–" key before confirming with the "E" key. This applies also if the level value is to remain unchanged. **Factory setting:** 0.0
FULL CALIB. (004) Entry	Enter height, volume or mass value for the upper calibration point (container full). The container is either completely or almost full. By entering a value for this parameter, you assign a height, volume or mass value to the pressure present at the device. The unit is selected via the OUTPUT UNIT parameter (→ Page 60). **Prerequisite:** ■ CALIBRATION MODE = Wet ✎ Note! For this parameter, the on-site display shows the level value to be entered and the pressure present at the device. In order for the level value to be saved together with the pressure present at the device, the entry field for the level value must first be activated using the "+"- or "–" key before confirming with the "E" key. This applies also if the level value is to remain unchanged. **Factory setting:** 100.0

Table 8: (GROUP SELECTION→) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL SELECTION "Level Easy Pressure"	
EMPTY CALIB. (010) Entry	Enter level, volume, mass or percentage value for the lower calibration point (container empty). The values entered for the EMPTY CALIB. and EMPTY PRESSURE parameters form the pressure-level value pair for the lower calibration point. The unit is selected via the OUTPUT UNIT parameter (→ Page 60). **Prerequisite:** ■ CALIBRATION MODE = Dry **Factory setting:** 0.0
EMPTY PRESSURE (011) Entry	Enter pressure value for the lower calibration point (container empty). → See also EMPTY CALIB. **Prerequisite:** ■ CALIBRATION MODE = Dry **Factory setting:** 0.0
FULL CALIB. (004) Entry	Enter height, volume, mass or percentage value for the upper calibration point (container full). The values entered for the FULL CALIB. and FULL PRESSURE parameters form the pressure-level value pair for the upper calibration point. The unit is selected via the OUTPUT UNIT parameter (→ Page 60). **Prerequisite:** ■ CALIBRATION MODE = Dry **Factory setting:** 100.0
FULL PRESSURE (005) Entry	Enter pressure value for the upper calibration point (container full). → See also FULL CALIB. **Prerequisite:** ■ CALIBRATION MODE = Dry **Factory setting:** 100.0
SET LRV (013) Entry	Enter value for the lower current value (4 mA). The unit is selected via the OUTPUT UNIT parameter (→ Page 60). **Factory setting:** 0.0
SET URV (012) Entry	Enter value for the upper current value (20 mA). The unit is selected via the OUTPUT UNIT parameter (→ Page 60). **Factory setting:** 100.0
DAMPING VALUE (247) Entry	Enter damping time (time constant τ). The damping affects the speed at which all subsequent elements, such as the on-site display, measured value and current output react to a change in the pressure. **Input range:** 0.0 to 999.0 s **Factory setting:** 2.0 s or as per order specifications

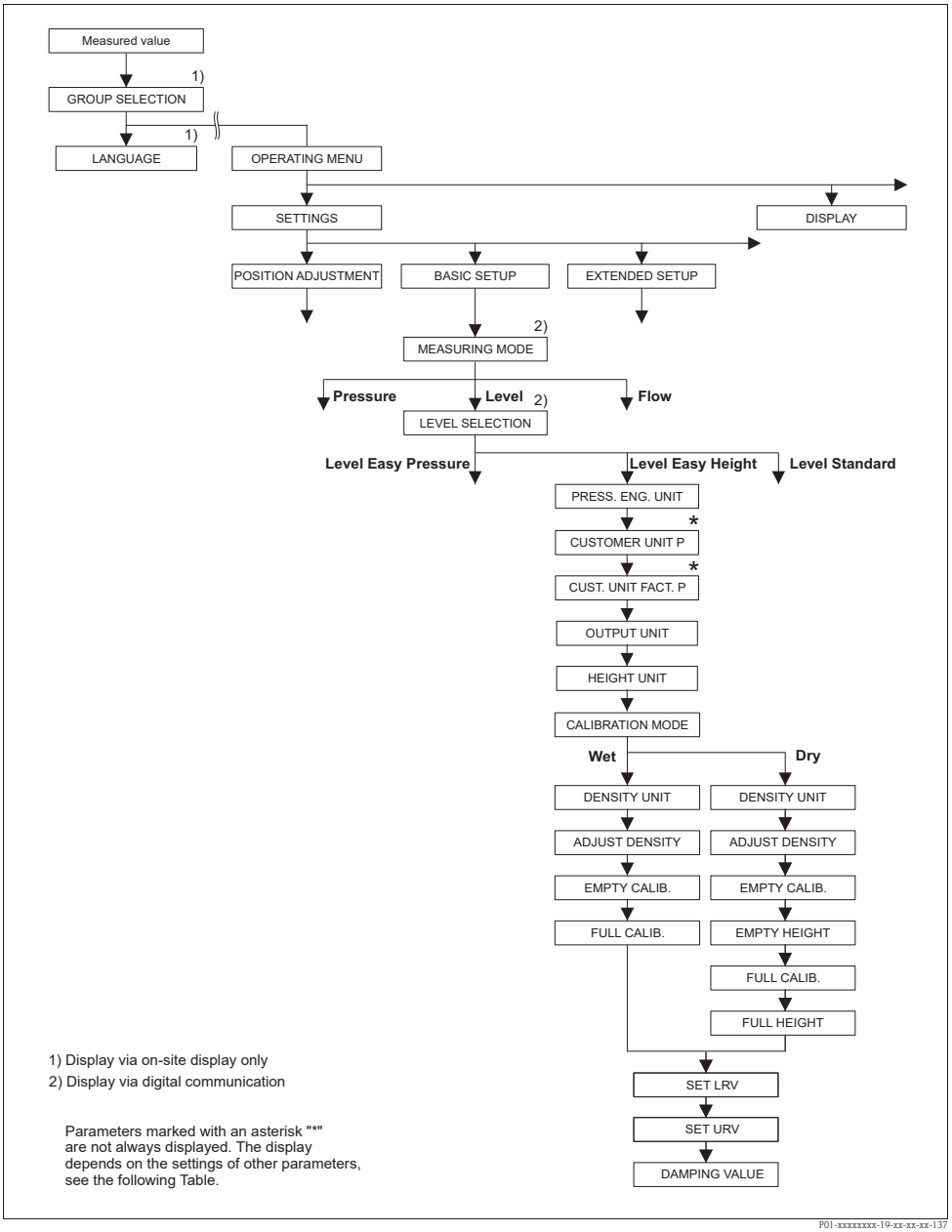


Fig. 29: BASIC SETUP function group for "Level" measuring mode and "Level Easy Height" level selection

Table 9: (GROUP SELECTION→) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL SELECTION "Level Easy Height"

The following parameters are displayed if you have selected the "Level Easy Height" option for the LEVEL SELECTION parameter. For this level mode, specify a height unit, density and two height-level value pairs. The pressure measured value is converted to a height value using the density entered and the height. Two calibration modes, "Wet" and "Dry", are available.

Prerequisite:

- MEASURING MODE = Level (→ see also Page 45.)
- LEVEL SELECTION = Level Easy Height (→ See also Page 46.)

Table 9: (GROUP SELECTION→) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL SELECTION "Level Easy Height"	
PRESS. ENG. UNIT (060) Options	Select pressure unit. If a new pressure unit is selected, all pressure-specific parameters are converted and displayed with the new unit. **Options:** ■ mbar, bar ■ mmH2O, mH2O, inH2O, ftH2O [1] ■ Pa, hPa, kPa, MPa ■ psi ■ mmHg, inHg [2] ■ Torr ■ g/cm^2, kg/cm^2 ■ lb/ft^2 ■ atm ■ gf/cm^2, kgf/cm^2 ■ User unit, → See also the following parameter description for CUSTOMER UNIT P and CUST. UNIT FACT. P. 1) The conversion factor of the pressure units refers to a reference temperature of 4 °C (39.2 °F). 2) The conversion factor of the pressure units refers to a reference temperature of 0 °C (32 °F). **Factory setting:** Depends on the sensor nominal measuring range mbar or bar or as per order specifications
CUSTOMER UNIT P (075) Entry	Enter text (unit) for customised pressure unit. You can enter a maximum of eight alphanumeric characters here. → See also CUST. UNIT FACT. P. **Prerequisite:** ■ PRESS. ENG. UNIT = User unit ✎ Note! Only the first five characters are shown on the on-site display. For example, if "crates" is specified as the customer-specific unit, "crate" is displayed. If the unit contains a slash, up to eight characters can be shown on the on-site display. The maximum number of characters in the counter is again limited to five. For example, if "crates/m2" is specified as the customer-specific unit, "crate/m2" is displayed. In the FieldCare, all eight characters are displayed. In the HART handheld terminal, the customised unit is displayed only in the CUSTOMER UNIT P parameter. The measured value is displayed with the additional text "User Unit". **Factory setting:** – – – – – – – –
CUST. UNIT FACT. P (317) Entry	Enter conversion factor for a customer-specific pressure unit. The conversion factor must be entered in relation to the SI unit "Pa". → See also CUSTOMER UNIT P. **Prerequisite:** ■ PRESS. ENG. UNIT = User unit **Example:** – You want the measured value to be displayed in "PU" (PU: packing unit). – MEASURED VALUE =10000 Pa ≙ 1 PU – Entry CUSTOMER UNIT P: PU – Entry CUST. UNIT FACT. P: 0.0001 – Result: MEASURED VALUE = 1 PU **Factory setting:** 1.0

Table 9: (GROUP SELECTION→) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL SELECTION "Level Easy Height"	
OUTPUT UNIT (023) Options	Select unit for measured value display and MEASURED VALUE parameter (→ Page 122). ✎ Note! The selected unit is used only to describe the measured value. This means that when selecting a new output unit, the measured value is not converted. Example: ■ current measured value: 0.3 ft ■ new output unit: m ■ new measured value: 0.3 m (9.8 ft) **Options:** ■ % ■ mm, cm, dm, m ■ ft, inch ■ cm^3, dm^3, m^3,m^3 E^3 ■ l, hl ■ ft^3, ft^3 E^3 ■ gal, bbl, Igal ■ g, kg, t ■ lb, ton, oz **Factory setting:** %
HEIGHT UNIT (003) Options	Select height unit. The measured pressure is converted to the chosen height unit using the DENSITY UNIT and ADJUST DENSITY parameters. **Options:** ■ mm ■ cm ■ dm ■ m ■ inch ■ ft **Factory setting:** m
CALIBRATION MODE (008) Options	Select calibration mode. **Options:** ■ Wet Wet calibration takes place by filling and emptying the container. The measured pressure is converted to the chosen height unit using the HEIGHT UNIT, DENSITY UNIT and ADJUST DENSITY parameters. In the case of two different levels, the level, volume, mass or percentage value entered is assigned to the converted height value. ■ Dry Dry calibration is a theoretical calibration. For this calibration, specify two height-level value pairs via the EMPTY CALIB., EMPTY HEIGHT, FULL CALIB. and FULL HEIGHT parameters. **Factory setting:** Dry
DENSITY UNIT (001) Options	Select density unit. The measured pressure is converted to a height using the HEIGHT UNIT, DENSITY UNIT and ADJUST DENSITY parameters. **Options:** ■ g/cm^3 ■ kg/dm^3 ■ kg/m^3 ■ US lb/in^3 ■ US lb/ft^3 **Factory setting:** kg/dm^3
ADJUST DENSITY (007) Entry	Enter density of fluid. The measured pressure is converted to a height using the HEIGHT UNIT, DENSITY UNIT and ADJUST DENSITY parameters. **Factory setting:** 1.0

Table 9: (GROUP SELECTION→) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL SELECTION "Level Easy Height"	
EMPTY CALIB. (010) Entry	Enter level, volume, mass or percentage value for the lower calibration point (container empty). The container is either empty or part full. The measured pressure is converted to a height value using the HEIGHT UNIT, DENSITY UNIT and ADJUST DENSITY parameters and displayed. Using the parameter EMPTY CALIB., you assign a level, volume, mass or percentage value to the height value. The unit is selected via the OUTPUT UNIT parameter (→ Page 64). **Prerequisite:** ■ CALIBRATION MODE = Wet ✎ Note! For this parameter, the on-site display shows the level value to be entered and the pressure present at the device. In order for the level value to be saved together with the pressure present at the device, the entry field for the level value must first be activated using the "+"- or "–" key before confirming with the "E" key. This applies also if the level value is to remain unchanged. **Factory setting:** 0.0
FULL CALIB. (004) Entry	Enter level, volume, mass or percentage value for the upper calibration point (container full). The container is either completely or almost full. Using the parameters HEIGHT UNIT, DENSITY UNIT and ADJUST DENSITY, the measured pressure is converted to a height value and displayed. Using the parameter FULL CALIB., you assign a level, volume, mass or percentage value to the height value. The unit is selected via the OUTPUT UNIT parameter (→ Page 64). **Prerequisite:** ■ CALIBRATION MODE = Wet ✎ Note! For this parameter, the on-site display shows the level value to be entered and the pressure present at the device. In order for the level value to be saved together with the pressure present at the device, the entry field for the level value must first be activated using the "+"- or "–" key before confirming with the "E" key. This applies also if the level value is to remain unchanged. **Factory setting:** 100.0
EMPTY CALIB. (010) Entry	Enter level, volume, mass or percentage value for the lower calibration point (container empty). The values entered for the EMPTY CALIB. and EMPTY HEIGHT parameters form the height-level value pair for the lower calibration point. The unit is selected via the OUTPUT UNIT parameter (→ Page 64). **Prerequisite:** ■ CALIBRATION MODE = Dry **Factory setting:** 0.0
EMPTY HEIGHT (009) Entry	Height value for the lower calibration point (container empty). The unit is selected via the HEIGHT UNIT parameter (→ Page 64). → See also EMPTY CALIB. **Prerequisite:** ■ CALIBRATION MODE = Dry **Factory setting:** Upper range limit (URL) coverted to an height unit
FULL CALIB. (004) Entry	Enter level, volume, mass or percentage value for the upper calibration point (container full). The values entered for the FULL CALIB. and FULL HEIGHT parameters form the height-level value pair for the upper calibration point. The unit is selected via the OUTPUT UNIT parameter (→ Page 64). **Prerequisite:** ■ CALIBRATION MODE = Dry **Factory setting:** 100.0

Table 9: (GROUP SELECTION→) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL SELECTION "Level Easy Height"	
FULL HEIGHT (006) Entry	Enter height value for the upper calibration point (container full). The unit is selected via the HEIGHT UNIT parameter (→ Page 64). → See also FULL CALIB. **Prerequisite:** ▪ CALIBRATION MODE = Dry **Factory setting:** 0.0
SET LRV (013) Entry	Enter level, volume, mass or percentage value for the lower current value (4 mA). The unit is selected via the OUTPUT UNIT parameter (→ Page 64). **Factory setting:** 0.0
SET URV (012) Entry	Enter level, volume, mass or percentage value for the upper current value (20 mA). The unit is selected via the OUTPUT UNIT parameter (→ Page 64). **Factory setting:** 100.0
DAMPING VALUE (247) Entry	Enter damping time (time constant τ). The damping affects the speed at which all subsequent elements, such as the on-site display, measured value and current output react to a change in the pressure. **Input range:** 0.0 to 999.0 s **Factory setting:** 2.0 s or as per order specifications

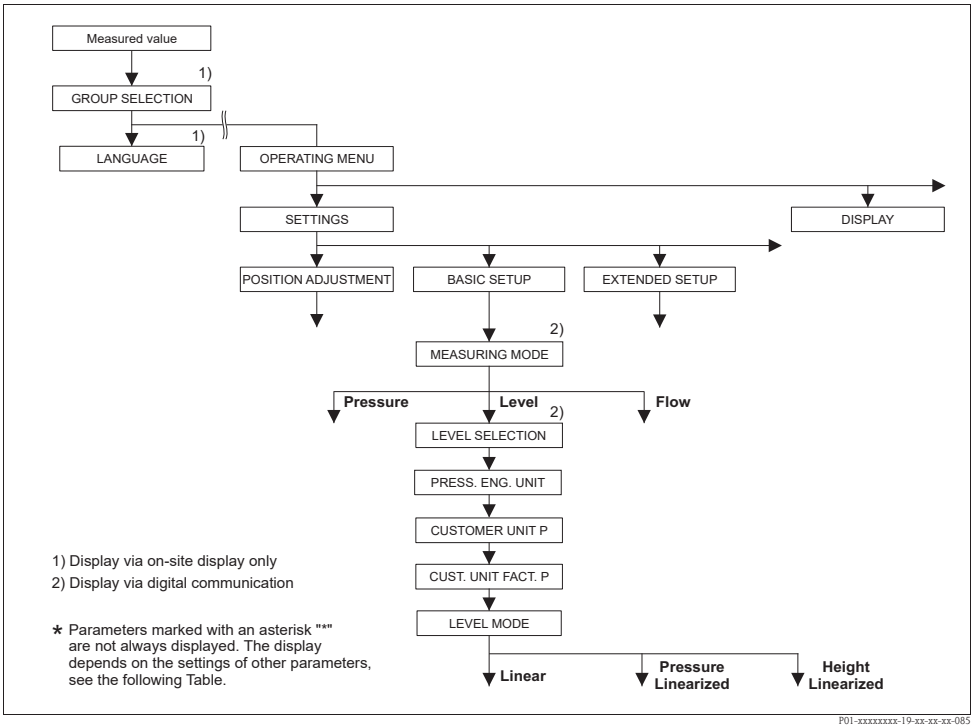


Fig. 30: BASIC SETUP function group for the "Level" measuring mode, depending on the setting for the LEVEL MODE parameter
→ See Page 69, Fig. 31 for LEVEL MODE = Linear,
→ See Page 78, Fig. 33 for LEVEL MODE = Pressure Linearized,
→ See Page 82, Fig. 34 for LEVEL MODE = Height Linearized

Table 10: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level"	
Parameter name	**Description**
Prerequisite: ■ MEASURING MODE = level (→ see also Page 45). **Note:** See also – Page 70 ff, Tables 11 to 13: BASIC SETUP – contd. – Page 96 ff, Table 16: EXTENDED SETUP – Page 100 ff, Table 18: LINEARISATION – on-site operation – Page 104 ff, Table 19: LINEARISATION – Digital communication – Page 122 ff, Table 28: PROCESS VALUES – Page 14 ff, Section 5 "Level measurement".	
MEASURING MODE Selection	Select the measuring mode. The operating menu is structured according to the selected measuring mode. ⚠ Warning! If the measuring mode is changed, the span setting (URV) must be verified in the "Calibration" → "Basic Setup" operating menu and, if necessary, reconfigured. **Prerequisite:** ■ Digital communication **Options**: ■ Pressure ■ Level ■ Deltabar S: Flow **Factory setting:** Pressure
PRESS. ENG. UNIT (060) Selection	Select pressure unit. If a new pressure unit is selected, all pressure-specific parameters are converted and displayed with the new unit. **Options:** ■ mbar, bar ■ mmH2O, mH2O, inH2O, ftH2O [1)] ■ Pa, hPa, kPa, MPa ■ psi ■ mmHg, inHg [2)] ■ Torr ■ g/cm^2, kg/cm^2 ■ lb/ft^2 ■ atm ■ gf/cm^2, kgf/cm^2 ■ User unit, → See also the following parameter description for CUSTOMER UNIT P and CUST. UNIT FACT. P. 1) The conversion factor of the pressure units refers to a reference temperature of 4 °C (39.2 °F). 2) The conversion factor of the pressure units refers to a reference temperature of 0 °C (32 °F). **Factory setting:** Depends on the sensor nominal measuring range mbar or bar or as per order specifications

Table 10: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level"	
Parameter name	**Description**
CUSTOMER UNIT P (075) Entry	Enter text (unit) for customer-specific pressure unit. You can enter a maximum of eight alphanumeric characters here. → See also CUST. UNIT FACT. P. **Prerequisite:** ■ PRESS. ENG. UNIT = User unit ✎ Note! Only the first five characters are shown on the on-site display. For example, if "crates" is specified as the customer-specific unit, "crate" is displayed. If the unit contains a slash, up to eight characters can be shown on the on-site display. The maximum number of characters in the counter is again limited to five. For example, if "crates/m2" is specified as the customer-specific unit, "crate/m2" is displayed. In the FieldCare, all eight characters are displayed. In the HART handheld terminal, the customer-specific unit is only displayed in the CUSTOMER UNIT P parameter. The measured value is displayed with the additional text "User Unit". **Factory setting:** _ _ _ _ _ _ _ _
CUST. UNIT FACT. P (317) Entry	Enter conversion factor for a customer-specific pressure unit. The conversion factor must be entered in relation to the SI unit "Pa". → See also CUSTOMER UNIT P. **Prerequisite:** ■ PRESS. ENG. UNIT = User unit **Example:** – You want the measured value to be displayed in "PU" (PU: packing unit). – MEASURED VALUE =10000 Pa ≙ 1 PU – Entry CUSTOMER UNIT P: PU – Entry CUST. UNIT FACT. P: 0.0001 – Result: MEASURED VALUE = 1 PU **Factory setting:** 1.0
LEVEL MODE (718) Selection	Select level type. **Options:** ■ Linear: the measured variable (level, volume, mass or %) is in direct proportion to the measured pressure. → See also Page 70 ff, Table 9. ■ Pressure Linearized: the measured variable (volume, mass or %) is not in direct proportion to the measured pressure such as in the case of containers with a conical outlet. For the calibration, enter a linearisation table with at least 2 and not more than 32 points. → See also Page 78 ff, Table 10. ■ Height Linearized: select this level type if you require two measured variables or if the container shape is given with value pairs, e.g. height and volume. The following combinations are possible: – Height + Volume – Height + Mass – Height + % – %-Height + Volume – %-Height + Mass – %-Height + % Perform two calibrations for this level type. First for the measured variable height or %-height like for the "Linear" option and then for the measured variable volume, mass or % like for the "Pressure Linearized" option. → See also Page 83 ff, Table 11. **Factory setting:** Linear
→ For LEVEL MODE = Linear, see Page 70, Table 9. → For LEVEL MODE = Pressure Linearized, see Page 78, Table 10. → For LEVEL MODE = Height Linearized, see Page 83, Table 11.	

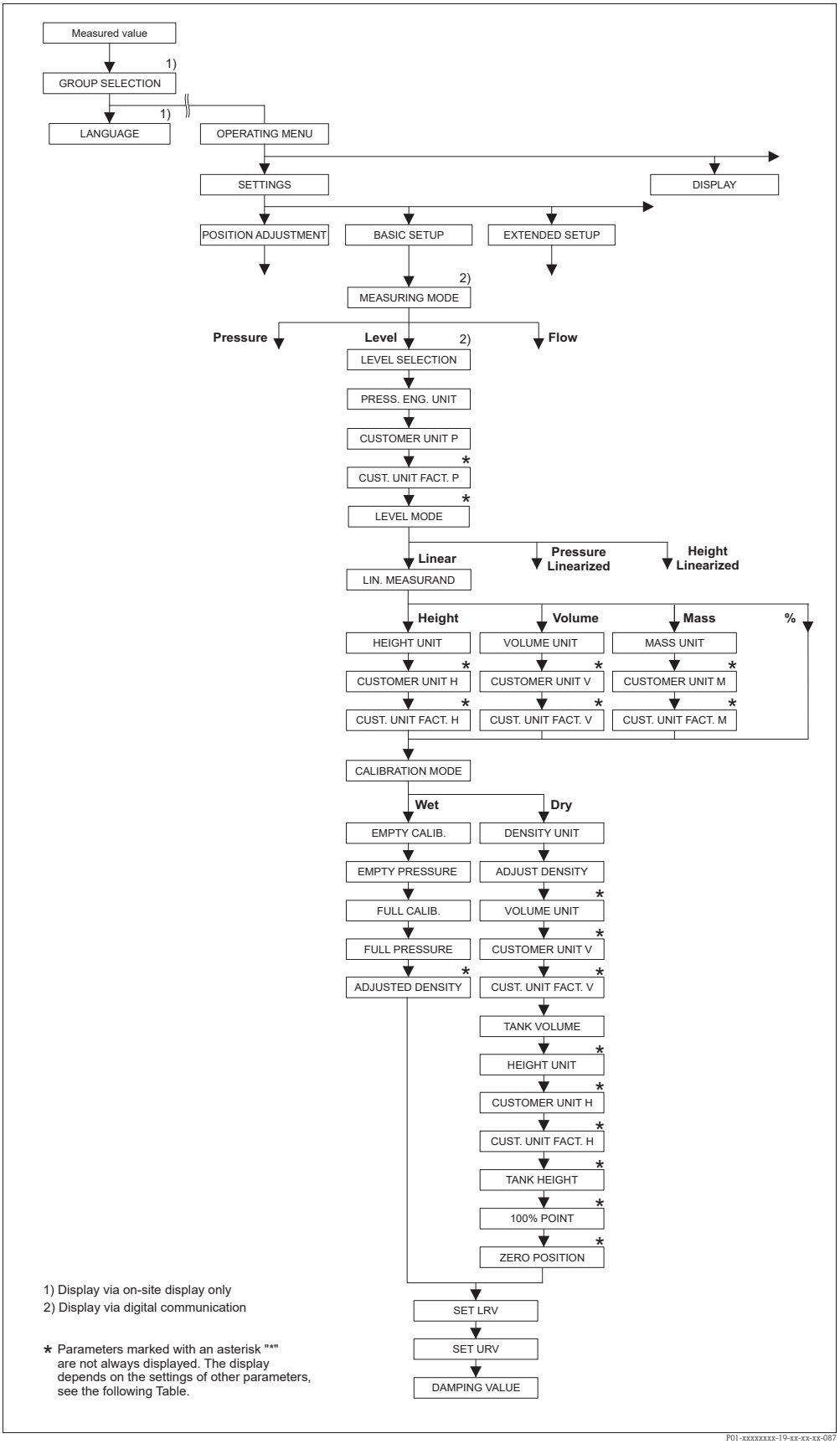


Fig. 31: BASIC SETUP function group for the "Level" measuring mode and "Linear" level type

Table 11: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL MODE "Linear"	
Parameter name	**Description**
The following parameters are displayed if you selected the "Linear" option for the LEVEL MODE parameter. For this level type, the measured variable (level, volume, mass or %) is in direct proportion to the measured pressure. **Prerequisite**: ■ MEASURING MODE = Level (→ see also Page 45). ■ LEVEL SELECTION = Level Standard (→ see also Page 46). ■ LEVEL MODE = Linear (→ see also Page 68). **Note:** See also – Page 67 ff, Table 10: BASIC SETUP – general – Page 96 ff, Table 16: EXTENDED SETUP – Page 122 ff, Table 28: PROCESS VALUES – Page 14 ff, Section 5 "Level measurement".	
LIN. MEASURAND (804) Selection	Select measured variable. **Options:** ■ Level ■ Volume ■ Mass ■ % (Level) **Factory setting:** % (Level)
HEIGHT UNIT (708) Selection	Select level unit. **Prerequisite:** ■ LIN. MEASURAND = Level **Options:** ■ mm ■ cm ■ dm ■ m ■ inch ■ ft ■ User unit, → see also the following parameter description for CUSTOMER UNIT H and CUST. UNIT FACT. H. **Factory setting:** m
CUSTOMER UNIT H (706) Entry	Enter text (unit) for customer-specific level unit. You can enter a maximum of eight alphanumeric characters here. → See also CUST. UNIT FACT. H. **Prerequisite:** ■ LIN. MEASURAND = Level, HEIGHT UNIT = User unit ✎ Note! Only the first five characters are shown on the on-site display. For example, if "crates" is specified as the customer-specific unit, "crate" is displayed. If the unit contains a slash, up to eight characters can be shown on the on-site display. The maximum number of characters in the counter is again limited to five. For example, if "crates/m2" is specified as the customer-specific unit, "crate/m2" is displayed. In the FieldCare, all eight characters are displayed. In the HART handheld terminal, the customer-specific unit is only displayed in the CUSTOMER UNIT H parameter. The measured value is displayed with the additional text "User Unit". **Factory setting:** _ _ _ _ _ _ _ _

Table 11: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL MODE "Linear"	
Parameter name	**Description**
CUST. UNIT FACT. H (705) Entry	Enter conversion factor for a customer-specific level unit. The conversion factor must be entered in relation to the SI unit "m". → See also CUSTOMER UNIT H. **Prerequisite:** ■ LIN. MEASURAND = Level, HEIGHT UNIT = User unit **Example:** – You want the measured value to be displayed in "PU" (PU: packing unit). – MEASURED VALUE = 0.5 m (1.6 ft) ≙ 1 PU – Entry CUSTOMER UNIT H: PU – Entry CUST. UNIT FACT. H: 2 – Result: MEASURED VALUE = 1 PU **Factory setting:** 1.0
UNIT VOLUME (313) Selection	Select volume unit. **Prerequisite:** ■ LIN. MEASURAND = Volume **Options:** ■ l ■ hl ■ cm^3 ■ dm^3 ■ m^3 ■ m^3 E^3 ■ ft ■ ft^3 E^3 ■ gal ■ Igal ■ bbl ■ User unit, → see also the following parameter description for CUSTOMER UNIT V and CUST. UNIT FACT. V. **Factory setting:** m^3
CUSTOMER UNIT V (608) Entry	Enter text (unit) for customer-specific volume unit. You can enter a maximum of eight alphanumeric characters here. → See also CUST. UNIT FACT. V **Prerequisite:** ■ LIN. MEASURAND = Volume, UNIT VOLUME = User unit ✎ Note! Only the first five characters are shown on the on-site display. For example, if "crates" is specified as the customer-specific unit, "crate" is displayed. If the unit contains a slash, up to eight characters can be shown on the on-site display. The maximum number of characters in the counter is again limited to five. For example, if "crates/m2" is specified as the customer-specific unit, "crate/m2" is displayed. In the FieldCare, all eight characters are displayed. In the HART handheld terminal, the customer-specific unit is only displayed in the CUSTOMER UNIT H parameter. The measured value is displayed with the additional text "User Unit". **Factory setting:** – – – – – – – –

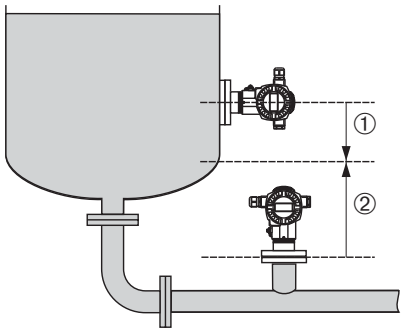
Table 11: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL MODE "Linear"	
Parameter name	**Description**
CUST. UNIT FACT. V (607) Entry	Enter conversion factor for a customer-specific volume unit. The conversion factor must be entered in relation to the SI unit "m^3". → See also CUSTOMER UNIT V. **Prerequisite:** ■ LIN. MEASURAND = Volume, UNIT VOLUME = User unit **Example:** – You want the measured value to be displayed in "buckets". – MEASURED VALUE = 0.01 m3 ≙ 1 bucket – Entry CUSTOMER UNIT V: bucket – Entry CUST. UNIT FACT. V: 100 – Result: MEASURED VALUE = 1 bucket **Factory setting:** 1.0
MASS UNIT (709) Selection	Select mass unit. **Prerequisite:** ■ LIN. MEASURAND = Mass **Options:** ■ g ■ kg ■ t ■ oz ■ lb ■ ton ■ User unit, → see also the following parameter description for CUSTOMER UNIT M and CUST. UNIT FACT. M. **Factory setting:** kg
CUSTOMER UNIT M (704) Entry	Enter text (unit) for customer-specific mass unit. You can enter a maximum of eight alphanumeric characters here. → See also CUST. UNIT FACT. M. **Prerequisite:** ■ LIN. MEASURAND = Mass, MASS UNIT = User unit ✎ Note! Only the first five characters are shown on the on-site display. For example, if "crates" is specified as the customer-specific unit, "crate" is displayed. If the unit contains a slash, up to eight characters can be shown on the on-site display. The maximum number of characters in the counter is again limited to five. For example, if "crates/m2" is specified as the customer-specific unit, "crate/m2" is displayed. In the FieldCare, all eight characters are displayed. In the HART handheld terminal, the customer-specific unit is only displayed in the CUSTOMER UNIT M parameter. The measured value is displayed with the additional text "User Unit". **Factory setting:** – – – – – – – –

Table 11: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL MODE "Linear"	
Parameter name	**Description**
CUST. UNIT FACT. M (703) Entry	Enter conversion factor for a customer-specific mass unit. The conversion factor must be entered in relation to the SI unit "kg". → See also CUSTOMER UNIT M. **Prerequisite:** ■ LIN. MEASURAND = Mass, MASS UNIT = User unit **Example:** – You want the measured value to be displayed in "buckets". – MEASURED VALUE = 10 kg ≙ 1 bucket – Entry CUSTOMER UNIT M: bucket – Entry CUST. UNIT FACT. M: 0.1 – Result: MEASURED VALUE = 1 bucket **Factory setting:** 1.0
CALIBRATION MODE (392) Selection	Select calibration mode. **Options:** ■ Wet Wet calibration takes place by filling and emptying the container. This calibration mode requires two pressure-level value pairs to be entered. In the case of two different levels, the level value is entered and the pressure measured at this moment is assigned to the level value. → See also the following parameter description for EMPTY CALIB., EMPTY PRESSURE, FULL CALIB. and FULL PRESSURE. ■ Dry Dry calibration is a theoretical calibration which you can carry out even if the device is not mounted or the container is empty. – For the "Level" measured variable, the density of the fluid (→ see Page 74, ADJUST DENSITY) must be entered. – For the "Volume" measured variable, the density of the fluid and the tank volume and tank height must be entered (→ see Page 74, ADJUST DENSITY, TANK VOLUME and TANK HEIGHT). – For the "Mass" measured variable, the tank volume and the tank height must be entered (→ see Page 75, TANK VOLUME and TANK HEIGHT). The density must also be entered in the case of a zero point shift (level offset) (→ see Page 74, ADJUST DENSITY). – For the "%" measured variable, the density of the fluid must be entered and a level assigned to the 100 % point (→ see Page 74 and 77, ADJUST DENSITY and 100% POINT). If the measurement should not start at the mounting location of the device, a level offset must be entered (→ see Page 77, ZERO POSITION). ✎ Note! LIN. MEASURAND: "% (Level)", "Mass" and "Volume": If the change to dry calibration is made after a wet calibration, the density must be entered correctly using the ADJUST DENSITY and DENSITY PROCESS parameter before changing the calibration mode. → See also Page 97. **Factory setting:** Wet
EMPTY CALIB. (314) Entry	Enter level value for the lower calibration point (container empty). The container is either empty or part full. By entering a value for this parameter, you are assigning a level value to the pressure present at the device. → See also EMPTY PRESSURE. **Prerequisite:** ■ CALIBRATION MODE = Wet ✎ Note! For this parameter, the on-site display shows the level value to be entered and the pressure present at the device. In order for the level value to be saved together with the pressure present at the device, the entry field for the level value must first be activated using the "+"- or "–" key before confirming with the "E" key. This applies also if the level value is to remain unchanged. **Factory setting:** 0.0

Table 11: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL MODE "Linear"	
Parameter name	**Description**
EMPTY PRESSURE (710) Display	Displays the pressure value for the lower calibration point (container empty). → See also EMPTY CALIB. **Prerequisite:** ■ CALIBRATION MODE = Wet **Factory setting:** 0.0
FULL CALIB. (315) Entry	Enter level value for the upper calibration point (container full). The container is either completely or almost full. By entering a value for this parameter, you are assigning a level value to the pressure present at the device. → See also FULL PRESSURE. **Prerequisite:** ■ CALIBRATION MODE = Wet ✎ Note! For this parameter, the on-site display shows the level value to be entered and the pressure present at the device. In order for the level value to be saved together with the pressure present at the device, the entry field for the level value must first be activated using the "+"- or "–" key before confirming with the "E" key. This applies also if the level value is to remain unchanged. **Factory setting:** 100.0
FULL PRESSURE (711) Display	Displays the pressure value for the upper calibration point (container full). → See also FULL CALIB. **Prerequisite:** ■ CALIBRATION MODE = Wet **Factory setting:** High sensor limit (→ see PRESS. SENS HILIM, Page 119)
ADJUSTED DENSITY (810) Display	Displays the density calculated from the upper and lower level point. **Prerequisite:** ■ CALIBRATION MODE = Wet, LIN. MEASURAND = Level
DENSITY UNIT (812) Selection	Select density unit. **Prerequisite:** ■ LIN. MEASURAND = Level, CALIBRATION MODE = Dry ■ LIN. MEASURAND = % (Level), CALIBRATION MODE = Dry ■ LIN. MEASURAND = Volume, CALIBRATION MODE = Dry ■ LIN. MEASURAND = Mass, CALIBRATION MODE = Dry **Options:** ■ g/cm^3 ■ kg/dm^3 ■ kg/m^3 ■ US lb/in^3 ■ US lb/ft^3 **Factory setting:** kg/dm^3
ADJUST DENSITY (316) Entry	Enter density of fluid. **Prerequisite:** ■ LIN. MEASURAND = Level, CALIBRATION MODE = Dry ■ LIN. MEASURAND = % (Level), CALIBRATION MODE = Dry ■ LIN. MEASURAND = Volume, CALIBRATION MODE = Dry ■ LIN. MEASURAND = Mass, CALIBRATION MODE = Dry **Factory setting:** 1000.0

Table 11: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL MODE "Linear"	
Parameter name	**Description**
UNIT VOLUME (313) Selection	Select volume unit. **Prerequisite:** ■ LIN. MEASURAND = Volume **Options:** ■ l ■ hl ■ cm^3 ■ dm^3 ■ m^3 ■ m^3 E^3 ■ ft ■ ft^3 E^3 ■ gal ■ Igal ■ bbl ■ User unit, → see also the following parameter description for CUSTOMER UNIT V and CUST. UNIT FACT. V. **Factory setting:** m^3
CUSTOMER UNIT V (608) Entry	Enter text (unit) for customer-specific volume unit. You can enter a maximum of eight alphanumeric characters here. → See also CUST. UNIT FACT. V **Prerequisite:** ■ LIN. MEASURAND = Volume, UNIT VOLUME = User unit ✎ Note! Only the first five characters are shown on the on-site display. For example, if "crates" is specified as the customer-specific unit, "crate" is displayed. If the unit contains a slash, up to eight characters can be shown on the on-site display. The maximum number of characters in the counter is again limited to five. For example, if "crates/m2" is specified as the customer-specific unit, "crate/m2" is displayed. In the FieldCare, all eight characters are displayed. In the HART handheld terminal, the customer-specific unit is only displayed in the CUSTOMER UNIT H parameter. The measured value is displayed with the additional text "User Unit". **Factory setting:** – – – – – – – –
CUST. UNIT FACT. V (607) Entry	Enter conversion factor for a customer-specific volume unit. The conversion factor must be entered in relation to the SI unit "m^3". → See also CUSTOMER UNIT V. **Prerequisite:** ■ LIN. MEASURAND = Volume, UNIT VOLUME = User unit **Example:** – You want the measured value to be displayed in "buckets". – MEASURED VALUE = 0.01 m3 ≙ 1 bucket – Entry CUSTOMER UNIT V: bucket – Entry CUST. UNIT FACT. V: 100 – Result: MEASURED VALUE = 1 bucket **Factory setting:** 1.0
TANK VOLUME (858) Entry	Enter tank volume. **Prerequisite:** ■ LIN. MEASURAND = Volume, CALIBRATION MODE = Dry ■ LIN. MEASURAND = Mass, CALIBRATION MODE = Dry **Factory setting:** 1.0 m^3

Table 11: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL MODE "Linear"	
Parameter name	**Description**
HEIGHT UNIT (708) Selection	Select level unit. **Prerequisite:** ■ LIN. MEASURAND = % (Level), CALIBRATION MODE = Dry **Options:** ■ mm ■ dm ■ cm ■ m ■ inch ■ ft ■ User unit, → see also the following parameter description for CUSTOMER UNIT H and CUST. UNIT FACT. H. **Factory setting:** m
CUSTOMER UNIT H (706) Entry	Enter text (unit) for customer-specific level unit. You can enter a maximum of eight alphanumeric characters here. → See also CUST. UNIT FACT. H. **Prerequisite:** ■ LIN. MEASURAND = % (Level), CALIBRATION MODE = Dry, HEIGHT UNIT = User unit ✎ Note! Only the first five characters are shown on the on-site display. For example, if "crates" is specified as the customer-specific unit, "crate" is displayed. If the unit contains a slash, up to eight characters can be shown on the on-site display. The maximum number of characters in the counter is again limited to five. For example, if "crates/m2" is specified as the customer-specific unit, "crate/m2" is displayed. In the FieldCare, all eight characters are displayed. In the HART handheld terminal, the customer-specific unit is only displayed in the CUSTOMER UNIT H parameter. The measured value is displayed with the additional text "User Unit". **Factory setting:** – – – – – – – –
CUST. UNIT FACT. H (705) Entry	Enter conversion factor for a customer-specific level unit. The conversion factor must be entered in relation to the SI unit "m". → See also CUSTOMER UNIT H. **Prerequisite:** ■ LIN. MEASURAND = % (Level), CALIBRATION MODE = Dry, HEIGHT UNIT = User unit **Example:** – You want the measured value to be displayed in "PU" (PU: packing unit). – MEASURED VALUE = 0.5 m (1.6 ft) ≙ 1 PU – Entry CUSTOMER UNIT H: PU – Entry CUST. UNIT FACT. H: 2 – Result: MEASURED VALUE = 1 PU **Factory setting:** 1.0
TANK HEIGHT (859) Entry	Enter tank height. **Prerequisite:** ■ LIN. MEASURAND = Volume, CALIBRATION MODE = Dry ■ LIN. MEASURAND = Mass, CALIBRATION MODE = Dry **Factory setting:** 1.0 m

Table 11: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL MODE "Linear"	
Parameter name	**Description**
100% POINT (813) Entry	Enter level value for 100% point. **Prerequisite:** ■ LIN. MEASURAND = % (Level), CALIBRATION MODE = Dry **Example:** – The 100 %-point should correspond to 4 m (13 ft). – Select the "m" unit via the HEIGHT UNIT parameter. – Enter the value "4" for this parameter (100% POINT). **Factory setting:** 1.0
ZERO POSITION (814) Entry	Enter value for level offset. If the measurement should not start at the mounting location of the device, e.g. for containers with a sump, carry out zero point shift (level offset). **Prerequisite:** ■ CALIBRATION MODE = Dry **Factory setting:** 0.0  P01-PMP75xxx-19-xx-xx-xx-001 *Fig. 32: Zero point shift* *1 Device is mounted above the level lower range value: a positive value has to be entered for ZERO POSITION.* *2 Device is mounted below the level lower range value: a negative value has to be entered for ZERO POSITION.*
SET LRV (719) Entry	Enter level value for the lower current value (4 mA). **Factory setting:** 0.0
SET URV (720) Entry	Enter level value for the upper current value (20 mA). **Factory setting:** 100.0
DAMPING VALUE (247) Entry	Enter damping time (time constant τ). The damping affects the speed at which all subsequent elements, such as the on-site display, measured value and current output react to a change in the pressure. **Input range:** 0.0...999.0 s **Factory setting:** 2.0 s or as per order specifications

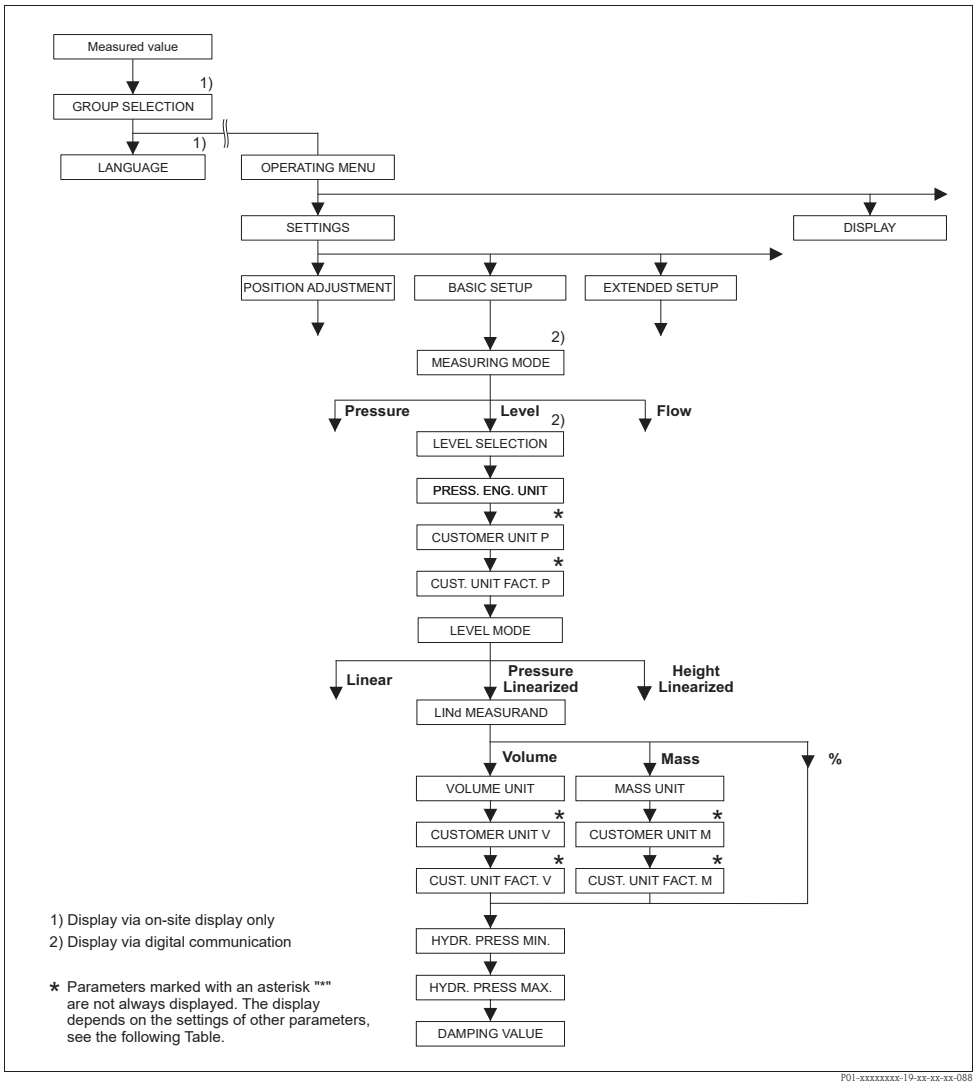


Fig. 33: BASIC SETUP function group for the "Level" measuring mode and the "Pressure Linearized" level type, continue calibration with LINEARISATION function group
→ See Page 100 ff for on-site operation and Page 104 ff for operation with digital communication.

Table 12: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL MODE "Pressure Linearized"

Parameter name	Description
The following parameters are displayed if you selected the "Pressure Linearized" option for the LEVEL MODE parameter. For this level type, the measured variable (volume, mass or %) is not in direct proportion to the measured pressure. For the calibration, enter a linearisation table with at least 2 and not more than 32 points. **Prerequisite**: ■ MEASURING MODE = Level (→ see also Page 45). ■ LEVEL SELECTION = Level Standard (→ see also Page 46). ■ LEVEL MODE = Pressure Linearized (→ see also Page 68). **Note:** See also – Page 67 ff, Table 10: BASIC SETUP – general – Page 96 ff, Table 16: EXTENDED SETUP – Page 100 ff, Table 18: LINEARISATION – on-site operation – Page 104 ff, Table 19: LINEARISATION – Digital communication – Page 122 ff, Table 28: PROCESS VALUES – Page 14 ff, Section 5 "Level measurement".	

Table 12: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL MODE "Pressure Linearized"	
Parameter name	**Description**
LINd. MEASURAND (805) Selection	Select measured variable. **Options:** ■ Pressure and Volume ■ Pressure and Mass ■ Pressure and % **Factory setting:** Pressure and %
UNIT VOLUME (313) Selection	Select volume unit. **Prerequisite:** ■ LINd. MEASURAND = Pressure and Volume **Options:** ■ l ■ hl ■ cm^3 ■ dm^3 ■ m^3 ■ m^3 E^3 ■ ft ■ ft^3 E^3 ■ gal ■ Igal ■ bbl ■ User unit, → see also the following parameter description for CUSTOMER UNIT V and CUST. UNIT FACT. V. **Factory setting:** m^3
CUSTOMER UNIT V (608) Entry	Enter text (unit) for customer-specific volume unit. You can enter a maximum of eight alphanumeric characters here. → See also CUST. UNIT FACT. V **Prerequisite:** ■ LINd. MEASURAND = Pressure and Volume, UNIT VOLUME = User unit ✎ Note! Only the first five characters are shown on the on-site display. For example, if "crates" is specified as the customer-specific unit, "crate" is displayed. If the unit contains a slash, up to eight characters can be shown on the on-site display. The maximum number of characters in the counter is again limited to five. For example, if "crates/m2" is specified as the customer-specific unit, "crate/m2" is displayed. In the FieldCare, all eight characters are displayed. In the HART handheld terminal, the customer-specific unit is only displayed in the CUSTOMER UNIT V parameter. The measured value is displayed with the additional text "User Unit". **Factory setting:** – – – – – – – –
CUST. UNIT FACT. V (607) Entry	Enter conversion factor for a customer-specific volume unit. The conversion factor must be entered in relation to the SI unit "m^3". → See also CUSTOMER UNIT V. **Prerequisite:** ■ LINd. MEASURAND = Pressure and Volume, UNIT VOLUME = User unit **Example:** – You want the measured value to be displayed in "buckets". – MEASURED VALUE = 0.01 m3 ≙ 1 bucket – Entry CUSTOMER UNIT V: bucket – Entry CUST. UNIT FACT. V: 100 – Result: MEASURED VALUE = 1 bucket **Factory setting:** 1.0

Table 12: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL MODE "Pressure Linearized"	
Parameter name	**Description**
MASS UNIT (709) Selection	Select mass unit. **Prerequisite:** ■ LINd. MEASURAND = Pressure and Mass **Options:** ■ g ■ kg ■ t ■ oz ■ lb ■ ton ■ User unit, → see also the following parameter description for CUSTOMER UNIT M and CUST. UNIT FACT. M. **Factory setting:** kg
CUSTOMER UNIT M (704) Entry	Enter text (unit) for customer-specific mass unit. You can enter a maximum of eight alphanumeric characters here. → See also CUST. UNIT FACT. M. **Prerequisite:** ■ LINd. MEASURAND = Pressure and Mass, MASS UNIT = User unit ✎ Note! Only the first five characters are shown on the on-site display. For example, if "crates" is specified as the customer-specific unit, "crate" is displayed. If the unit contains a slash, up to eight characters can be shown on the on-site display. The maximum number of characters in the counter is again limited to five. For example, if "crates/m2" is specified as the customer-specific unit, "crate/m2" is displayed. In the FieldCare, all eight characters are displayed. In the HART handheld terminal, the customer-specific unit is only displayed in the CUSTOMER UNIT M parameter. The measured value is displayed with the additional text "User Unit". **Factory setting:** _ _ _ _ _ _ _ _
CUST. UNIT FACT. M (703) Entry	Enter conversion factor for a customer-specific mass unit. The conversion factor must be entered in relation to the SI unit "kg". → See also CUSTOMER UNIT M. **Prerequisite:** ■ LINd. MEASURAND = Pressure and Mass, MASS UNIT = User unit **Example:** – You want the measured value to be displayed in "buckets". – MEASURED VALUE = 10 kg ≙ 1 bucket – Entry CUSTOMER UNIT M: bucket – Entry CUST. UNIT FACT. M: 0.1 – Result: MEASURED VALUE = 1 bucket **Factory setting:** 1.0
HYDR. PRESS MIN. (775) Entry	Enter the minimum hydrostatic pressure to be expected. The input limits for the calibration (editing limits) are derived from the value entered. The closer the value entered corresponds to the minimum hydrostatic pressure to be expected, the more accurate the measurement result. **Factory setting:** 0.0

Table 12: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL MODE "Pressure Linearized"	
Parameter name	**Description**
HYDR. PRESS MAX. (761) Entry	Enter the maximum hydrostatic pressure to be expected. The input limits for the calibration (editing limits) are derived from the value entered. The closer the value entered corresponds to the maximum hydrostatic pressure to be expected, the more accurate the measurement result. **Factory setting:** High sensor limit (→ See PRESS. SENS HILIM, Page 119)
DAMPING VALUE (247) Entry	Enter damping time (time constant τ). The damping affects the speed at which all subsequent elements, such as the on-site display, measured value and current output react to a change in the pressure. **Input range:** 0.0...999.0 s **Factory setting:** 2.0 s or as per order specifications

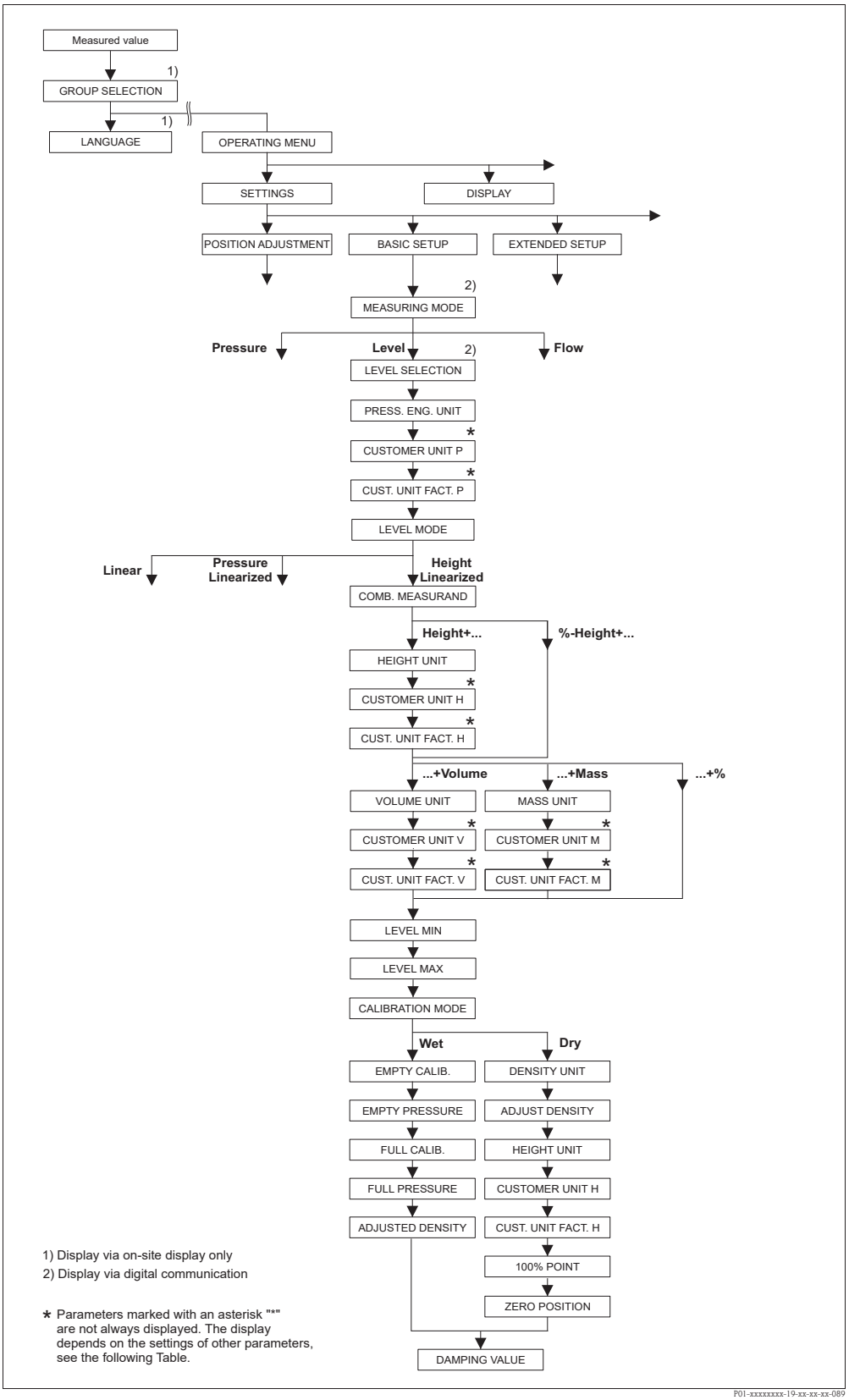


Fig. 34: BASIC SETUP function group for the "Level" measuring mode and the "Height Linearized" level type, continue calibration with LINEARISATION function group → See Page 100 ff for on-site operation and Page 104 ff for operation with digital communication.

Table 13: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL MODE "Height Linearized"	
Parameter name	**Description**
The following parameters are displayed if you selected the "Height Linearized" option for the LEVEL MODE parameter. Select this level type if you require two measured variables or if the container shape is given with value pairs, e.g. height and volume. The following combinations are possible: ■ Height + Volume ■ Height + Mass ■ Height + % ■ %-Height + Volume ■ %-Height + Mass ■ %-Height + % The 1st measured variable (%-Height or Height) must be in direct proportion to the measured pressure. The 2nd measured variable (Volume, Mass or %) must not be in direct proportion. A linearisation table must be entered for the 2nd measured variable. The 2nd measured variable is assigned to the 1st measured variable by means of this table. **Prerequisite**: ■ MEASURING MODE = Level (→ see also Page 45). ■ LEVEL SELECTION = Level Standard (→ see also Page 46). ■ LEVEL MODE = Height Linearized (→ see also Page 68). **Note:** See also – Page 67 ff, Table 10: BASIC SETUP – general – Page 96 ff, Table 16: EXTENDED SETUP – Page 100 ff, Table 18: LINEARISATION – on-site operation – Page 104 ff, Table 19: LINEARISATION – Digital communication – Page 122 ff, Table 28: PROCESS VALUES – Page 14 ff, Section 5 "Level measurement".	
COMB. MEASURAND (806) Selection	Select measured variable. **Options:** ■ Height and Volume ■ Height and Mass ■ Height and % ■ %-Height and Volume ■ %-Height and Mass ■ %-Height and % **Factory setting:** %-Height and %
HEIGHT UNIT (708) Selection	Select level unit for the 1st measured variable. **Prerequisite:** ■ COMB. MEASURAND = Height and Volume, Height and Mass or Height and % **Options:** ■ mm ■ dm ■ cm ■ m ■ inch ■ ft ■ User unit, → see also the following parameter description for CUSTOMER UNIT H and CUST. UNIT FACT. H. **Factory setting:** m

Table 13: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL MODE "Height Linearized"	
Parameter name	**Description**
CUSTOMER UNIT H (706) Entry	Enter text (unit) for customer-specific level unit. You can enter a maximum of eight alphanumeric characters here. → See also CUST. UNIT FACT. H. **Prerequisite:** ■ COMB. MEASURAND = Height and Volume, HEIGHT UNIT = User unit ■ COMB. MEASURAND = Height and Mass, HEIGHT UNIT = User unit ■ COMB. MEASURAND = Height and %, HEIGHT UNIT = User unit ✎ Note! Only the first five characters are shown on the on-site display. For example, if "crates" is specified as the customer-specific unit, "crate" is displayed. If the unit contains a slash, up to eight characters can be shown on the on-site display. The maximum number of characters in the counter is again limited to five. For example, if "crates/m2" is specified as the customer-specific unit, "crate/m2" is displayed. In the FieldCare, all eight characters are displayed. In the HART handheld terminal, the customer-specific unit is only displayed in the CUSTOMER UNIT H parameter. The measured value is displayed with the additional text "User Unit". **Factory setting:** – – – – – – – –
CUST. UNIT FACT. H (705) Entry	Enter conversion factor for a customer-specific level unit. The conversion factor must be entered in relation to the SI unit "m". → See also CUSTOMER UNIT H. **Prerequisite:** ■ COMB. MEASURAND = Height and Volume, HEIGHT UNIT = User unit ■ COMB. MEASURAND = Height and Mass, HEIGHT UNIT = User unit ■ COMB. MEASURAND = Height and %, HEIGHT UNIT = User unit **Example:** – You want the measured value to be displayed in "PU" (PU: packing unit). – MEASURED VALUE = 0.5 m (1,6 ft) ≙ 1 PU – Entry CUSTOMER UNIT H: PU – Entry CUST. UNIT FACT. H: 2 – Result: MEASURED VALUE = 1 PU **Factory setting:** 1.0
UNIT VOLUME (313) Selection	Select the volume unit for the 2nd measured value. **Prerequisite:** ■ COMB. MEASURAND = Height and Volume or %-Height and Volume **Options:** ■ l ■ hl ■ cm^3 ■ dm^3 ■ m^3 ■ m^3 E^3 ■ ft ■ ft^3 E^3 ■ gal ■ Igal ■ bbl ■ User unit, → see also the following parameter description for CUSTOMER UNIT V and CUST. UNIT FACT. V. **Factory setting:** m^3

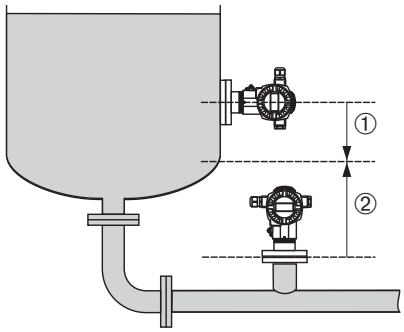
Table 13: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL MODE "Height Linearized"	
Parameter name	**Description**
CUSTOMER UNIT V (608) Entry	Enter text (unit) for customer-specific volume unit. You can enter a maximum of eight alphanumeric characters here. → See also CUST. UNIT FACT. V **Prerequisite:** ■ COMB. MEASURAND = Height and Volume, HEIGHT UNIT = User unit ■ COMB. MEASURAND = %-Height and Volume, HEIGHT UNIT = User unit ✎ Note! Only the first five characters are shown on the on-site display. For example, if "crates" is specified as the customer-specific unit, "crate" is displayed. If the unit contains a slash, up to eight characters can be shown on the on-site display. The maximum number of characters in the counter is again limited to five. For example, if "crates/m2" is specified as the customer-specific unit, "crate/m2" is displayed. In the FieldCare, all eight characters are displayed. In the HART handheld terminal, the customer-specific unit is only displayed in the CUSTOMER UNIT V parameter. The measured value is displayed with the additional text "User Unit". **Factory setting:** – – – – – – – –
CUST. UNIT FACT. V (607) Entry	Enter conversion factor for a customer-specific volume unit. The conversion factor must be entered in relation to the SI unit "m^3". → See also CUSTOMER UNIT V. **Prerequisite:** ■ COMB. MEASURAND = Height and Volume, HEIGHT UNIT = User unit ■ COMB. MEASURAND = %-Height and Volume, HEIGHT UNIT = User unit **Example:** – You want the measured value to be displayed in "buckets". – MEASURED VALUE = 0.01 m3 ≙ 1 bucket – Entry CUSTOMER UNIT V: bucket – Entry CUST. UNIT FACT. V: 100 – Result: MEASURED VALUE = 1 bucket **Factory setting:** 1.0
MASS UNIT (709) Selection	Select the mass unit for the 2nd measured value. **Prerequisite:** ■ COMB. MEASURAND = Height and Mass or %-Height and Mass **Options:** ■ g ■ kg ■ t ■ oz ■ lb ■ ton ■ User unit, → see also the following parameter description for CUSTOMER UNIT M and CUST. UNIT FACT. M. **Factory setting:** kg

Table 13: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL MODE "Height Linearized"	
Parameter name	**Description**
CUSTOMER UNIT M (704) Entry	Enter text (unit) for customer-specific mass unit. You can enter a maximum of eight alphanumeric characters here. → See also CUST. UNIT FACT. M. **Prerequisite:** ■ COMB. MEASURAND = Height and Mass, MASS UNIT = User unit ■ COMB. MEASURAND = %-Height and Mass, MASS UNIT = User unit ✎ Note! Only the first five characters are shown on the on-site display. For example, if "crates" is specified as the customer-specific unit, "crate" is displayed. If the unit contains a slash, up to eight characters can be shown on the on-site display. The maximum number of characters in the counter is again limited to five. For example, if "crates/m2" is specified as the customer-specific unit, "crate/m2" is displayed. In the FieldCare, all eight characters are displayed. In the HART handheld terminal, the customer-specific unit is only displayed in the CUSTOMER UNIT M parameter. The measured value is displayed with the additional text "User Unit". **Factory setting:** – – – – – – – –
CUST. UNIT FACT. M (703) Entry	Enter conversion factor for a customer-specific mass unit. The conversion factor must be entered in relation to the SI unit "kg". → See also CUSTOMER UNIT M. **Prerequisite:** ■ COMB. MEASURAND = Height and Mass, MASS UNIT = User unit ■ COMB. MEASURAND = %-Height and Mass, MASS UNIT = User unit **Example:** – You want the measured value to be displayed in "buckets". – MEASURED VALUE = 10 kg ≙ 1 bucket – Entry CUSTOMER UNIT M: bucket – Entry CUST. UNIT FACT. M: 0.1 – Result: MEASURED VALUE = 1 bucket **Factory setting:** 1.0
LEVEL MIN (755) Entry	Enter the minimum level to be expected. The input limits for the calibration (editing limits) are derived from the value entered. The closer the value entered corresponds to the minimum level to be expected, the more accurate the measurement result. ✎ Note! ■ The following applies for the setting LEVEL MODE "Height Linearized" and ASSIGN CURRENT "Linear": If you enter a new value for LEVEL MIN, the value for SET LRV is also changed. Use SET LRV to assign a height to the lower current value. If you want to assign the lower current value a value other than that for LEVEL MIN, you must enter the desired value for SET LRV. (→ SET LRV, Page 98 and ASSIGN CURRENT, Page 113) **Factory setting:** 0.0
LEVEL MAX (712) Entry	Enter the maximum level to be expected. The input limits for the calibration (editing limits) are derived from the value entered. The closer the value entered corresponds to the maximum level to be expected, the more accurate the measurement result. ✎ Note! ■ The following applies for the setting LEVEL MODE "Height Linearized" and ASSIGN CURRENT "Linear": If you enter a new value for LEVEL MAX, the value for SET URV is also changed. Use SET URV to assign a height to the upper current value. If you want to assign the upper current value a value other than that for LEVEL MAX, you must enter the desired value for SET URV. (→ SET URV, Page 98 and ASSIGN CURRENT, Page 113) **Factory setting:** 100.0

Table 13: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL MODE "Height Linearized"	
Parameter name	**Description**
CALIBRATION MODE (392) Selection	Select the calibration mode for the calibration of the 1st measured variable. **Options:** ■ Wet Wet calibration takes place by filling the container. This calibration mode requires two pressure-level value pairs to be entered. In the case of two different levels, the level value is entered and the pressure measured at this moment is assigned to the level value. → See also the following parameter description for EMPTY CALIB., EMPTY PRESSURE, FULL CALIB. and FULL PRESSURE. ■ Dry Dry calibration is a theoretical calibration which you can carry out even if the device is not mounted or the container is empty. – For the "Level" measured variable, the density of the fluid (→ see Page 88, ADJUST DENSITY) must be entered. – For the "%" measured variable, the density of the fluid must be entered and a level assigned to the 100 % point (→ see Page 88, ADJUST DENSITY and 100% POINT). If the measurement should not start at the mounting location of the device, a level offset must be entered (→ see Page 90, ZERO POSITION). ✎ Note! If the change to dry calibration is made after a wet calibration, the density must be entered correctly using the ADJUST DENSITY and DENSITY PROCESS parameter before changing the calibration mode. → See also Page 97. **Factory setting:** Wet
EMPTY CALIB. (314) Entry	Enter level value for the lower calibration point (container empty). The container is either empty or part full. By entering a value for this parameter, you are assigning a level value to the pressure present at the device. → See also EMPTY PRESSURE. **Prerequisite:** ■ CALIBRATION MODE = Wet **Factory setting:** 0.0
EMPTY PRESSURE (710) Display	Displays the pressure value for the lower calibration point (container empty). → See also EMPTY CALIB. **Prerequisite:** ■ CALIBRATION MODE = Wet
FULL CALIB. (315) Entry	Enter level value for the upper calibration point (container full). The container is either completely or almost full. By entering a value for this parameter, you are assigning a level value to the pressure present at the device. → See also FULL PRESSURE. **Prerequisite:** ■ CALIBRATION MODE = Wet **Factory setting:** 100.0
FULL PRESSURE (711) Display	Displays the pressure value for the upper calibration point (container full). → See also FULL CALIB. **Prerequisite:** ■ CALIBRATION MODE = Wet **Factory setting:** High sensor limit (→ see PRESS. SENS HILIM, Page 119)
ADJUSTED DENSITY (810) Display	Displays the density calculated from the upper and lower level point. **Prerequisite:** ■ COMB. MEASURAND = Height and Volume, CALIBRATION MODE = Wet ■ COMB. MEASURAND = Height and Mass, CALIBRATION MODE = Wet ■ COMB. MEASURAND = Height and %, CALIBRATION MODE = Wet

Table 13: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL MODE "Height Linearized"	
Parameter name	**Description**
DENSITY UNIT (812) Selection	Select density unit. **Prerequisite:** ■ COMB. MEASURAND = %-Height and %, CALIBRATION MODE = Dry ■ COMB. MEASURAND = %-Height and Volume, CALIBRATION MODE = Dry ■ COMB. MEASURAND = %-Height and Mass, CALIBRATION MODE = Dry ■ COMB. MEASURAND = Height and %, CALIBRATION MODE = Dry ■ COMB. MEASURAND = Height and Volume, CALIBRATION MODE = Dry ■ COMB. MEASURAND = Height and Mass, CALIBRATION MODE = Dry **Options:** ■ g/cm^3 ■ kg/dm^3 ■ kg/m^3 ■ US lb/in^3 ■ US lb/ft^3 **Factory setting:** kg/dm^3
ADJUST DENSITY (316) Entry	Enter density of fluid. **Prerequisite:** ■ COMB. MEASURAND = %-Height and %, CALIBRATION MODE = Dry ■ COMB. MEASURAND = %-Height and Volume, CALIBRATION MODE = Dry ■ COMB. MEASURAND = %-Height and Mass, CALIBRATION MODE = Dry ■ COMB. MEASURAND = Height and %, CALIBRATION MODE = Dry ■ COMB. MEASURAND = Height and Volume, CALIBRATION MODE = Dry ■ COMB. MEASURAND = Height and Mass, CALIBRATION MODE = Dry **Factory setting:** 1.0
HEIGHT UNIT (708) Selection	Select level unit. **Prerequisite:** ■ COMB. MEASURAND = %-Height and Volume, CALIBRATION MODE = Dry ■ COMB. MEASURAND = %-Height and Mass, CALIBRATION MODE = Dry ■ COMB. MEASURAND = %-Height + %, CALIBRATION MODE = Dry **Options:** ■ mm ■ dm ■ cm ■ m ■ inch ■ ft ■ User unit, → see also the following parameter description for CUSTOMER UNIT H and CUST. UNIT FACT. H. **Factory setting:** m

Table 13: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL MODE "Height Linearized"	
Parameter name	**Description**
CUSTOMER UNIT H (706) Entry	Enter text (unit) for customer-specific level unit. You can enter a maximum of eight alphanumeric characters here. → See also CUST. UNIT FACT. H. **Prerequisite:** ■ COMB. MEASURAND = %-Height and Volume, CALIBRATION MODE = Dry, HEIGHT UNIT = User unit ■ COMB. MEASURAND = %-Height and Mass, CALIBRATION MODE = Dry, HEIGHT UNIT = User unit ■ COMB. MEASURAND = %-Height and %, CALIBRATION MODE = Dry, HEIGHT UNIT = User unit ✎ Note! Only the first five characters are shown on the on-site display. For example, if "crates" is specified as the customer-specific unit, "crate" is displayed. If the unit contains a slash, up to eight characters can be shown on the on-site display. The maximum number of characters in the counter is again limited to five. For example, if "crates/m2" is specified as the customer-specific unit, "crate/m2" is displayed. In the FieldCare, all eight characters are displayed. In the HART handheld terminal, the customer-specific unit is only displayed in the CUSTOMER UNIT H parameter. The measured value is displayed with the additional text "User Unit". **Factory setting:** – – – – – – – –
CUST. UNIT FACT. H (705) Entry	Enter conversion factor for a customer-specific level unit. The conversion factor must be entered in relation to the SI unit "m". → See also CUSTOMER UNIT H. **Prerequisite:** ■ COMB. MEASURAND = %-Height and Volume, CALIBRATION MODE = Dry, HEIGHT UNIT = User unit ■ COMB. MEASURAND = %-Height and Mass, CALIBRATION MODE = Dry, HEIGHT UNIT = User unit ■ COMB. MEASURAND = %-Height and %, CALIBRATION MODE = Dry, HEIGHT UNIT = User unit **Example:** – You want the measured value to be displayed in "PU" (PU: packing unit). – MEASURED VALUE = 0.5 m (1.6 ft) ≙ 1 PU – Entry CUSTOMER UNIT H: PU – Entry CUST. UNIT FACT. H: 2 – Result: MEASURED VALUE = 1 PU **Factory setting:** 1.0
100% POINT (813) Entry	Enter level value for 100% point. **Prerequisite:** ■ COMB. MEASURAND = %-Height and Volume, CALIBRATION MODE = Dry ■ COMB. MEASURAND = %-Height and Mass, CALIBRATION MODE = Dry ■ COMB. MEASURAND = %-Height + %, CALIBRATION MODE = Dry **Example:** – The 100 %-point should correspond to 4 m (13 ft). – Select the "m" unit via the HEIGHT UNIT parameter. – Enter the value "4" for this parameter (100% POINT). **Factory setting:** 1.0

Table 13: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Level", LEVEL MODE "Height Linearized"	
Parameter name	**Description**
ZERO POSITION (814) Entry	Enter value for level offset. If the measurement should not start at the mounting location of the device, e.g. for containers with a sump, carry out zero point shift (level offset). **Prerequisite:** ■ CALIBRATION MODE = Dry  P01-PMP75xxx-19-xx-xx-xx-001 *Fig. 35: Zero point shift* *1 Device is mounted above the level lower range value: a positive value has to be entered for ZERO POSITION.* *2 Device is mounted below the level lower range value: a negative value has to be entered for ZERO POSITION.* **Factory setting:** 0.0
DAMPING VALUE (247) Entry	Enter damping time (time constant τ). The damping affects the speed at which all subsequent elements, such as the on-site display, measured value and current output react to a change in the pressure. **Input range:** 0.0...999.0 s **Factory setting:** 2.0 s or as per order specifications

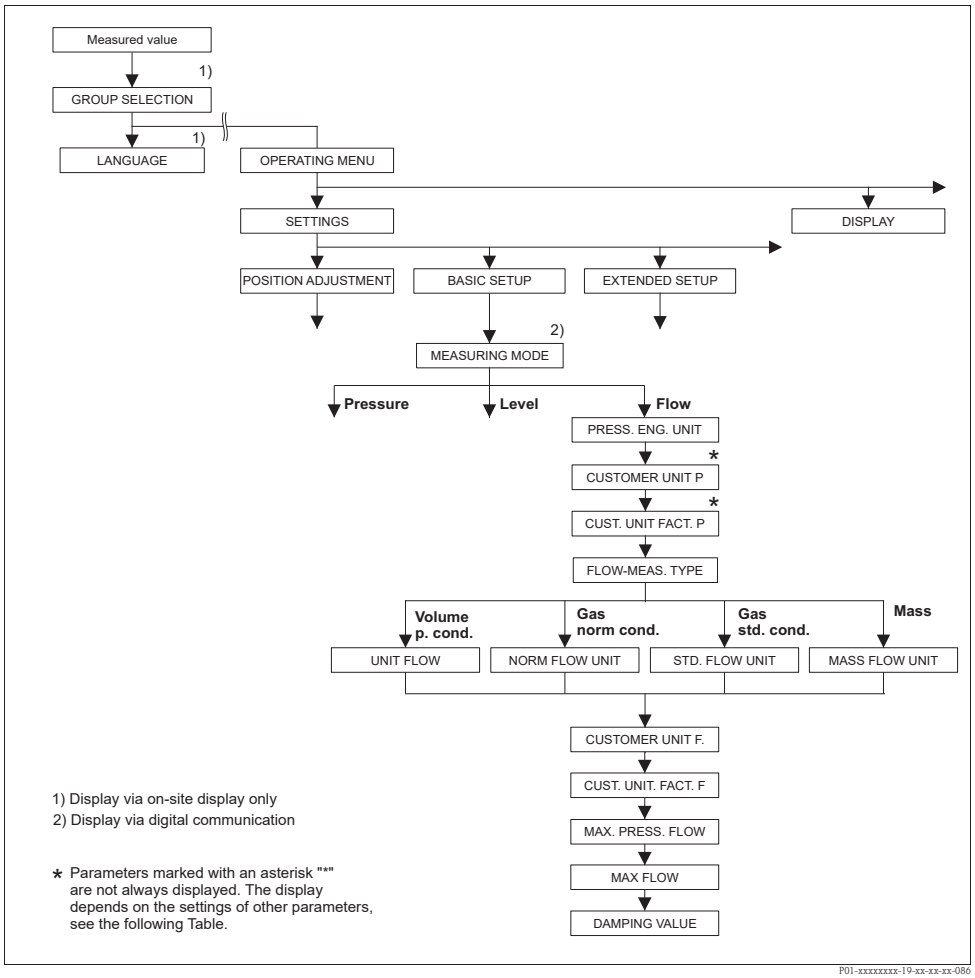


Fig. 36: BASIC SETUP function group for the "Flow" measuring mode

Table 14: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Flow"	
Parameter name	**Description**
Prerequisite: ■ MEASURING MODE = Flow (→ see also Page 45). **Note:** See also – Page 52, Table 5: QUICK SETUP – Page 98, Table 15: EXTENDED SETUP – Page 107, Table 18: TOTALIZER SETUP – Page 123, Table 27: PROCESS VALUES. – Page 40 ff, Section 6 "Flow measurement".	

Table 14: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Flow"	
Parameter name	**Description**
MEASURING MODE Selection	Select the measuring mode. The operating menu is structured according to the selected measuring mode. ⚠ Warning! If the measuring mode is changed, the span setting (URV) must be verified in the "Calibration" → "Basic Setup" operating menu and, if necessary, reconfigured. **Prerequisite:** ■ Digital communication **Options:** ■ Pressure ■ Level ■ Deltabar S: Flow **Factory setting:** ■ Cerabar S and Deltabar S: Pressure ■ Deltapilot S: Level
PRESS. ENG. UNIT (060) Selection	Select pressure unit. If a new pressure unit is selected, all pressure-specific parameters are converted and displayed with the new unit. **Options:** ■ mbar, bar ■ mmH2O, mH2O, inH2O, ftH2O [1)] ■ Pa, hPa, kPa, MPa ■ psi ■ mmHg, inHg [2)] ■ Torr ■ g/cm^2, kg/cm^2 ■ lb/ft^2 ■ atm ■ gf/cm^2, kgf/cm^2 ■ User unit, → See also the following parameter description for CUSTOMER UNIT P and CUST. UNIT FACT. P. 1) The conversion factor of the pressure units refers to a reference temperature of 4 °C (39.2 °F). 2) The conversion factor of the pressure units refers to a reference temperature of 0 °C (32 °F). **Factory setting:** Depends on the sensor nominal measuring range mbar or bar or as per order specifications
CUSTOMER UNIT P (075) Entry	Enter text (unit) for customer-specific pressure unit. You can enter a maximum of eight alphanumeric characters here. → See also CUST. UNIT FACT. P. **Prerequisite:** ■ PRESS. ENG. UNIT = User unit ✎ Note! Only the first five characters are shown on the on-site display. For example, if "crates" is specified as the customer-specific unit, "crate" is displayed. If the unit contains a slash, up to eight characters can be shown on the on-site display. The maximum number of characters in the counter is again limited to five. For example, if "crates/m2" is specified as the customer-specific unit, "crate/m2" is displayed. In the FieldCare, all eight characters are displayed. In the HART handheld terminal, the customer-specific unit is only displayed in the CUSTOMER UNIT P parameter. The measured value is displayed with the additional text "User Unit". **Factory setting:** – – – – – – – –

Table 14: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Flow"	
Parameter name	**Description**
CUST. UNIT FACT. P (317) Entry	Enter conversion factor for a customer-specific pressure unit. The conversion factor must be entered in relation to the SI unit "Pa". → See also CUSTOMER UNIT P. **Prerequisite:** ■ PRESS. ENG. UNIT = User unit **Example:** – You want the measured value to be displayed in "PU" (PU: packing unit). – MEASURED VALUE =10000 Pa ≙ 1 PU – Entry CUSTOMER UNIT P: PU – Entry CUST. UNIT FACT. P: 0.0001 – Result: MEASURED VALUE = 1 PU **Factory setting:** 1.0
FLOW-MEAS. TYPE (640) Selection	Select the flow type. **Options:** ■ Volume p. cond. (volume under operating conditions) ■ Gas norm. cond. (norm volume under norm conditions in Europe: 1013.25 mbar and 273.15 K (0°C)) ■ Gas std. cond. (standard volume under standard conditions in USA: 1013.25 mbar (14.7 psi) and 288.15 K (15°C/59°F)) ■ Mass (mass under operating conditions) **Factory setting:** Volume p. cond.
UNIT FLOW (391) Selection	Select volume flow unit. When a new flow unit is selected, all flow-specific parameters are converted and displayed with the new unit within a flow mode (FLOW-MEAS. TYPE). When the flow mode is changed, conversion is not possible. **Prerequisite:** ■ FLOW-MEAS. TYPE = Volume p. cond. **Options:** ■ m3/s, m3/min, m3/h, m3/day ■ l/s, l/min, l/h ■ hl/s, hl/min, hl/day ■ ft3/s, ft3/min, ft3/h, ft3/day ■ ACFS, ACFM, ACFH, ACFD ■ ozf/s, ozf/min ■ US Gal/s, US Gal/min, US Gal/h, US Gal/day ■ Imp. Gal/s, Imp. Gal/min, Imp. Gal/h ■ bbl/s, bbl/min, bbl/h, bbl/day ■ User unit, → see also this table, parameter description for CUSTOMER UNIT F and CUST. UNIT FACT. F **Factory setting:** m^3/s
NORM FLOW UNIT (661) Selection	Select norm volume flow unit. When a new flow unit is selected, all flow-specific parameters are converted and displayed with the new unit within a flow mode (FLOW-MEAS. TYPE). When the flow mode is changed, conversion is not possible. **Prerequisite:** ■ FLOW-MEAS. TYPE = Gas norm conditions **Options:** ■ Nm3/s, Nm3/min, Nm3/h, Nm3/day ■ User unit, → see also this table, parameter description for CUSTOMER UNIT F and CUST. UNIT FACT. F **Factory setting:** Nm^3/s

Table 14: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Flow"	
Parameter name	**Description**
STD. FLOW UNIT (660) Selection	Select standard volume flow unit. When a new flow unit is selected, all flow-specific parameters are converted and displayed with the new unit within a flow mode (FLOW-MEAS. TYPE). When the flow mode is changed, conversion is not possible. **Prerequisite:** ■ FLOW-MEAS. TYPE = Gas std. conditions **Options:** ■ Sm3/s, Sm3/min, Sm3/h, Sm3/day ■ SCFS, SCFM, SCFH, SCFD ■ User unit, → see also this table, parameter description for CUSTOMER UNIT F and CUST. UNIT FACT. F **Factory setting:** Sm^3/s
MASS FLOW UNIT (571) Selection	Select mass flow unit. When a new flow unit is selected, all flow-specific parameters are converted and displayed with the new unit within a flow mode (FLOW-MEAS. TYPE). When the flow mode is changed, conversion is not possible. **Prerequisite:** ■ FLOW-MEAS. TYPE = Mass **Options:** ■ g/s, kg/s, kg/min, kg/min, kg/h ■ t/s, t/min, t/h, t/day ■ oz/s, oz/min ■ lb/s, lb/min, lb/h ■ ton/s, ton/min, ton/h, ton/day ■ User unit, → see also the following parameter description for CUSTOMER UNIT F and CUST. UNIT FACT. F **Factory setting:** kg/s
CUSTOMER UNIT F (610) Entry	Enter text (unit) for customer-specific flow unit. You can enter a maximum of eight alphanumeric characters here. → See also CUST. UNIT FACT. F. **Prerequisite:** ■ UNIT FLOW = User unit ■ NORM FLOW UNIT = User unit ■ STD. FLOW UNIT = User unit ■ MASS FLOW UNIT = User unit ✎ Note! Only the first five characters are shown on the on-site display. For example, if "crates" is specified as the customer-specific unit, "crate" is displayed. If the unit contains a slash, up to eight characters can be shown on the on-site display. The maximum number of characters in the counter is again limited to five. For example, if "crates/m2" is specified as the customer-specific unit, "crate/m2" is displayed. In the FieldCare, all eight characters are displayed. In the HART handheld terminal, the customer-specific unit is only displayed in the CUSTOMER UNIT F parameter. The measured value is displayed with the additional text "User Unit". **Factory setting:** _ _ _ _ _ _ _ _

Table 14: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP "Flow"	
Parameter name	**Description**
CUST. UNIT FACT. F (609) Entry	Enter conversion factor for a customer-specific flow unit. The conversion factor must be entered in relation to an appropriate SI unit, e.g. m^3/s for the "Volume p. cond." flow mode. → See also CUSTOMER UNIT F. **Prerequisite:** ■ UNIT FLOW = User unit ■ NORM FLOW UNIT = User unit ■ STD. FLOW UNIT = User unit ■ MASS FLOW UNIT = User unit **Example:** – You want the measured value to be displayed in "bucket/h". – MEASURED VALUE =0.01 m3/s ≙ 3600 bucket/h – Entry CUSTOMER UNIT F: bucket/h – Entry CUST. UNIT FACT. F: 360000 – Result: MEASURED VALUE = 3600 bucket/h **Factory setting:** 1.0
MAX. FLOW (311) Entry	Enter maximum flow of primary element. → See also layout sheet of primary element. The maximum flow is assigned to the maximum pressure which you enter via MAX PRESS. FLOW. ✎ Note! Use the LINEAR/SQROOT parameter (→ Page 113) to specify the current signal for the "Flow" measuring mode. The following applies for the "Flow (square root)" setting: If you enter a new value for MAX. FLOW, the value for SET URV is also changed. Use SET URV to assign a flow to the upper current value. If you want to assign the upper current value a value other than that for MAX. FLOW, you must enter the desired value for SET URV. (→ SET URV, Page 100). **Factory setting:** 1.0
MAX PRESS. FLOW (634) Entry	Enter maximum pressure of primary element. → See layout sheet of primary element. This value is assigned to the maximum flow value (→ see MAX. FLOW). ✎ Note! Use the LINEAR/SQROOT parameter (→ Page 113) to specify the current signal for the "Flow" measuring mode. The following applies for the "Differential pres." setting: If you enter a new value for MAX PRESS. FLOW, the value for SET URV is also changed. Use SET URV to assign a pressure value to the upper current value. If you want to assign the upper current value a value other than that for MAX PRESS. FLOW, you must enter the desired value for SET URV. (→ SET URV, Page 100). **Factory setting:** High sensor limit (→ see PRESS. SENS HILIM, Page 119)
DAMPING VALUE (247) Entry	Enter damping time (time constant τ). The damping affects the speed at which all subsequent elements, such as the on-site display, measured value and current output react to a change in the pressure. **Input range:** 0.0...999.0 s **Factory setting:** 2.0 s or as per order specifications

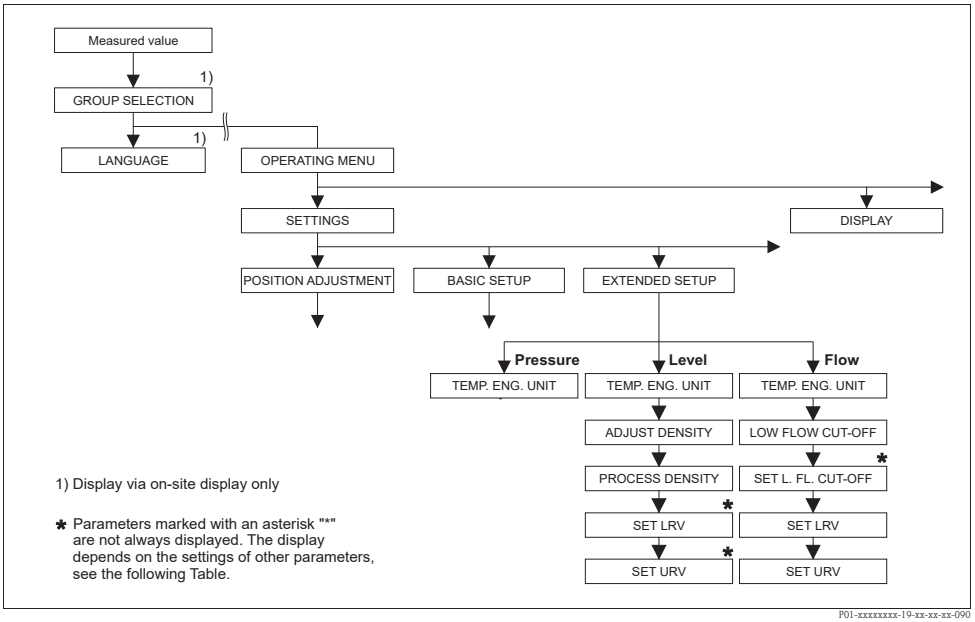


Fig. 37: EXTENDED SETUP function group
→ For the "Pressure" measuring mode, see Page 96, Table 15
→ For the "Level" measuring mode, see Page 96, Table 16
→ For the "Flow" measuring mode, see Page 98, Table 17

Table 15: (GROUP SELECTION →) OPERATING MENU → SETTINGS → EXTENDED SETUP "Pressure"	
Parameter name	**Description**
Prerequisite: ■ MEASURING MODE = Pressure (→ see also Page 45). **Note:** ■ See also Page 11 ff, Section 4 "Pressure measurement".	
TEMP. ENG. UNIT (318) Selection	Select the unit for the temperature measured values. → See also PCB TEMPERATURE (Page 117) and SENSOR TEMP. (Page 122). **Options:** ■ °C ■ °F ■ K ■ R **Factory setting:** °C

Table 16: (GROUP SELECTION →) OPERATING MENU → SETTINGS → EXTENDED SETUP "Level"	
Parameter name	**Description**
Prerequisite: ■ MEASURING MODE = Level (→ see also Page 45). **Note:** ■ See also Page 14 ff, Section 5 "Level measurement".	

Table 16: (GROUP SELECTION →) OPERATING MENU → SETTINGS → EXTENDED SETUP "Level"	
Parameter name	**Description**
TEMP. ENG. UNIT (318) Selection	Select the unit for the temperature measured values. → See also PCB TEMPERATURE (Page 117) and SENSOR TEMP. (Page 122). **Options:** ■ °C ■ °F ■ K ■ R **Factory setting:** °C
DENSITY UNIT (001)/(812) Options	Select density unit. **Options:** ■ g/cm^3 ■ kg/dm^3 ■ kg/m^3 ■ US lb/in^3 ■ US lb/ft^3 **Factory setting:** kg/dm^3
ADJUST DENSITY (007)/(316) Entry	Enter density of fluid. ✎ Note! LIN. MEASURAND: "% (Level)", "Mass" and "Volume" and MEASUAND KOMB.: If a change to dry calibration is made after a wet calibration using the CALIBRATION MODE parameter (→ Page 73 or 87), the density for this parameter must be entered correctly before changing the calibration mode. In the event that the pressure falls with increasing levels (LIN. MEASURED: Volume), such as in the case of a residual volume measurement, a negative value shall be entered for this parameter. **Factory setting:** 1.0
PROCESS DENSITY (025)/(811) Entry	Enter a new density value for density correction. The calibration was carried out with the medium water, for example. Now the container is to be used for another fluid with another density. The calibration is corrected appropriately by entering the new density value in the PROCESS DENSITY parameter. ✎ Note! LIN. MEASURAND: "% (Level)", "Mass" and "Volume" and MEASUAND KOMB.: If a change to dry calibration is made after a wet calibration using the CALIBRATION MODE parameter (→ Page 73 or 87), the density for this parameter must be entered correctly before changing the calibration mode. In the event that the pressure falls with increasing levels (LIN. MEASURED: Volume), such as in the case of a residual volume measurement, a negative value shall be entered for this parameter. **Factory setting:** 1.0

Table 16: (GROUP SELECTION →) OPERATING MENU → SETTINGS → EXTENDED SETUP "Level"	
Parameter name	**Description**
SET LRV (762) Entry	Enter value for the lower current value (4 mA). **Prerequisite:** ■ LEVEL MODE = Pressure Linearized or Height Linearized ✎ Note! ■ For the LEVEL MODE "Height Linearized", you can use the ASSIGN CURRENT parameter (→ Page 113) to specify whether the current output should depict the 1st or 2nd measured variable (height or tank content). Depending on the setting of the ASSIGN CURRENT parameter, enter the following value for SET LRV: – ASSIGN CURRENT = tank content (factory setting) ⇒ %- value, volume value or mass value – ASSIGN CURRENT = height ⇒ level value The following applies for the LEVEL MODE "Pressure Linearized" or LEVEL MODE "Height Linearized" + ASSIGN CURRENT "Tank content": ■ If you enter a new value for TANK CONTENT MIN, the value for SET LRV is also changed. If you want to assign the lower current value a value other than that for TANK CONTENT MIN, you must enter the desired value for SET LRV. (→ TANK CONTENT MIN, Page 101 or 104.) The following applies for the LEVEL MODE "Height Linearized" + ASSIGN CURRENT "Height": ■ If you enter a new value for LEVEL MIN, the value for SET LRV is also changed. If you want to assign the lower current value a value other than that for LEVEL MIN, you must enter the desired value for SET LRV. (→ LEVEL MIN, Page 86.) **Factory setting:** 0.0
SET URV (763) Entry	Enter value for the upper current value (20 mA). **Prerequisite:** ■ LEVEL MODE = Pressure Linearized or Height Linearized ✎ Note! ■ For the LEVEL MODE "Height Linearized", you can use the ASSIGN CURRENT parameter (→ Page 113) to specify whether the current output should depict the 1st or 2nd measured variable (height or tank content). Depending on the setting of the ASSIGN CURRENT parameter, enter the following value for SET URV: – ASSIGN CURRENT = tank content (factory setting) ⇒ %- value, volume value or mass value – ASSIGN CURRENT = height ⇒ level value The following applies for the LEVEL MODE "Pressure Linearized" or LEVEL MODE "Height Linearized" + ASSIGN CURRENT "Tank content": ■ If you enter a new value for TANK CONTENT MAX, the value for SET URV is also changed. If you want to assign the upper current value a value other than that for TANK CONTENT MAX, you must enter the desired value for SET URV. (→ TANK CONTENT MAX, Page 101 or 105.) The following applies for the LEVEL MODE "Height Linearized" + ASSIGN CURRENT "Height": ■ If you enter a new value for LEVEL MAX, the value for SET URV is also changed. If you want to assign the lower current value a value other than that for LEVEL MAX, you must enter the desired value for SET URV. (→ LEVEL MAX, Page 86.) **Factory setting:** 100.0

Table 17: (GROUP SELECTION →) OPERATING MENU → SETTINGS → EXTENDED SETUP "Flow"	
Parameter name	**Description**
Prerequisite: ■ MEASURING MODE = Flow (→ see also Page 45). **Note:** ■ See also Page 40 ff, Section 6 "Flow measurement".	

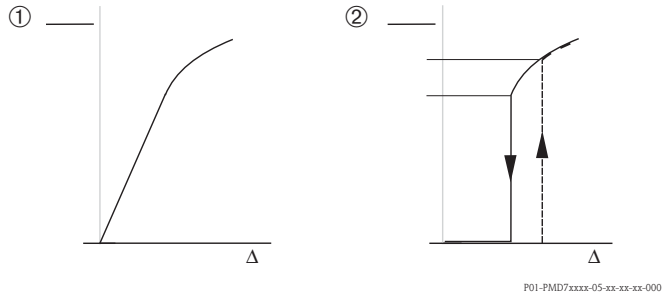
Table 17: (GROUP SELECTION →) OPERATING MENU → SETTINGS → EXTENDED SETUP "Flow"	
Parameter name	**Description**
TEMP. ENG. UNIT (318) Selection	Select the unit for the temperature measured value. → See also PCB TEMPERATURE (Page 117) and SENSOR TEMP. (Page 123). **Options:** ■ °C ■ °F ■ K ■ R **Factory setting:** °C
LOW FLOW CUT-OFF (442) Selection	Switches "low flow cut-off" function on and off. In the lower measuring range, small flow quantities (creepages) can lead to large measured value fluctuations. Switching on this function stops these flow quantities from being recorded. → See also SET. L. FL. CUT-OFF. **Options:** ■ Off ■ On **Factory setting:** Off
SET. L. FL. CUT-OFF (323) Entry	Enter switch-off point of low flow cut-off. The hysteresis between the switch-on point and the switch-off point is always 1 % of the end flow value. → See also LOW FLOW CUT-OFF. **Prerequisite:** ■ LOW FLOW CUT-OFF = on **Input range:** Switch-off point: 0...50 % of end flow value (→ MAX. FLOW).  P01-PMD7xxxx-05-xx-xx-xx-000 **Factory setting:** 5 % (of end flow value)
SET LRV (637) Entry	Depending on the setting in the LINEAR/SQROOT parameter (→ Page 113), enter a flow value or a pressure value for the lower current value (4 mA) here. ■ LINEAR/SQROOT = Flow (square root) (factory setting) ⇒ flow value ■ LINEAR/SQROOT = Differential pres. ⇒ pressure value **Factory setting:** 0

Table 17: (GROUP SELECTION →) OPERATING MENU → SETTINGS → EXTENDED SETUP "Flow"	
Parameter name	**Description**
SET URV (638) Entry	Depending on the setting in the LINEAR/SQROOT parameter (→ Page 113), enter a flow value or a pressure value for the upper current value (20 mA) here. ■ LINEAR/SQROOT = Flow (square root) (factory setting) ⇒ flow value ■ LINEAR/SQROOT = Differential pres. ⇒ pressure value The following applies for the setting LINEAR/SQROOT "Flow (square root)": ■ If you enter a new value for MAX. FLOW, the value for SET URV is also changed. If you want to assign the upper current value a value other than that for MAX. FLOW, you must enter the desired value for SET URV. (→ MAX. FLOW, Page 95). The following applies for the setting LINEAR/SQROOT "Differential pres.": ■ If you enter a new value for MAX PRESS. FLOW, the SET URV value is also changed. If you want to assign the upper current value a value other than that for MAX PRESS. FLOW, you must enter the desired value for SET URV. (→ MAX PRESS. FLOW, Page 95). **Factory setting:** MAX. FLOW

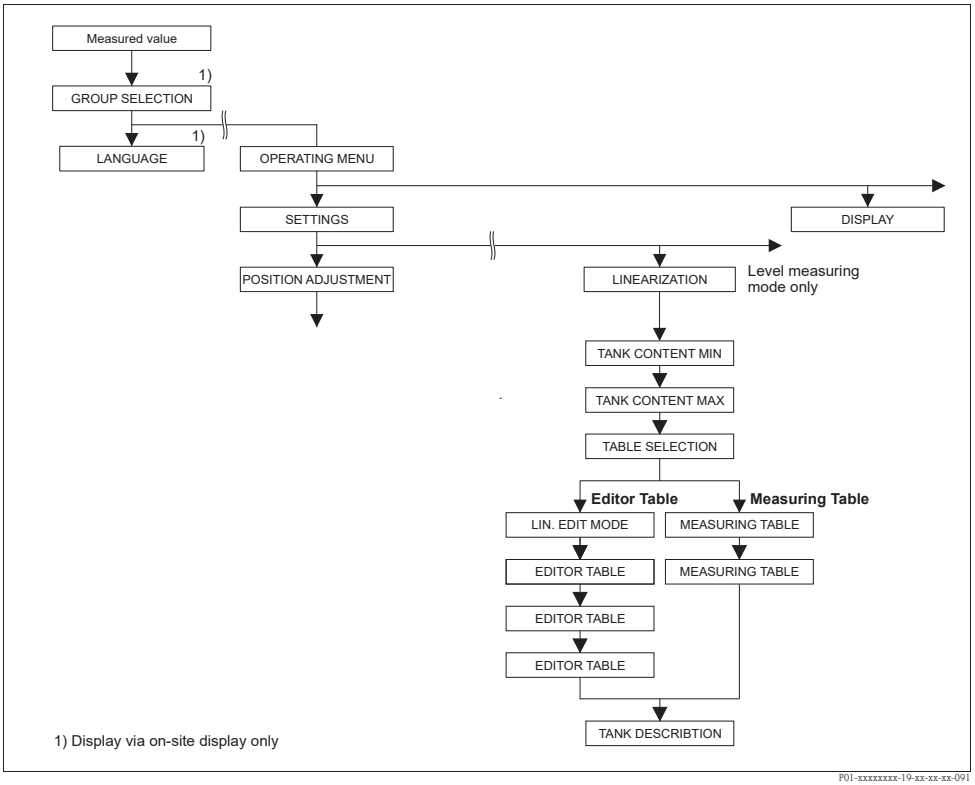


Fig. 38: LINEARISATION function group for on-site operation

Table 18: (GROUP SELECTION →) OPERATING MENU → SETTINGS → LINEARISATION – on-site operation	
Parameter name	**Description**
Prerequisite: ■ MEASURING MODE = Level (→ see also Page 45). ■ LEVEL MODE = Pressure Linearized or Height Linearized (→ see also Page 68). **Note:** – See also Page 14 ff, Section 5 "Level measurement".	

Table 18: (GROUP SELECTION →) OPERATING MENU → SETTINGS → LINEARISATION – on-site operation	
Parameter name	**Description**
TANK CONTENT MIN (759) Entry	Enter the minimum tank contents to be expected. The input limits for the calibration (editing limits) are derived from the value entered. The closer the value entered corresponds to the minimum tank content to be expected, the more accurate the measurement result. ✎ Note! ■ If you enter a new value for TANK CONTENT MIN, the value for SET LRV is also changed. Use SET LRV to assign a %-value, volume value or mass value to the lower current value. If you want to assign the lower current value a value other than that for TANK CONTENT MIN, you must enter the desired value for SET LRV. (→ SET LRV, Page 98). ■ For the setting LEVEL MODE "Height Linearized" and ASSIGN CURRENT "Linear", the TANK CONTENT MIN parameter does not affect the SET LRV parameter. (→ SET LRV, Page 98 and ASSIGN CURRENT, Page 113) **Factory setting:** 0.0
TANK CONTENT MAX (713) Entry	Enter the maximum tank contents to be expected. The input limits for the subsequent calibration (editing limits) are derived from the value entered. The closer the value entered corresponds to the maximum tank content to be expected, the more accurate the measurement result. ✎ Note! ■ If you enter a new value for TANK CONTENT MAX, the value for SET URV is also changed. Use SET URV to assign a %-value, volume value or mass value to the upper current value. If you want to assign the upper current value a value other than that for TANK CONTENT MAX, you must enter the desired value for SET URV. (→ SET URV, Page 98.) ■ For the setting LEVEL MODE "Height Linearized" and ASSIGN CURRENT "Linear", the TANK CONTENT MAX parameter does not affect the SET URV parameter. (→ SET URV, Page 98 and ASSIGN CURRENT, Page 113) **Factory setting:** 100.0
TABLE SELECTION (808) Selection	Select table. The device works with a measuring and an editor table. The measuring table is used to calculate the measured value. To make sure measuring also runs properly when entering a new table, there is another table, the editor table, for entering new values. **Options:** ■ View meas. table ■ Editor table **Factory setting:** View meas. table
LIN. EDIT MODE (397) Selection	Select the entry mode for the linearisation table. **Prerequisite:** ■ TABLE SELECTION = Editor table **Options:** ■ Manual: the container neither has to be filled nor emptied for this entry mode. Enter the value pairs for the linearisation table. ■ Semiautomatic: the container is filled or emptied in stages in this entry mode. The device automatically records the hydrostatic pressure. The associated volume, mass or %-value is entered. **Factory setting:** Manual

Table 18: (GROUP SELECTION →) OPERATING MENU → SETTINGS → LINEARISATION – on-site operation	
Parameter name	**Description**
EDITOR TABLE (809) Selection	Select table. **Prerequisite:** ■ TABLE SELECTION = editor table **Options:** ■ New table: enter new linearisation table. ■ Edit measure table: The measuring table is loaded as an editor table so that changes can be made. → See also TAB. SELECTION ■ Continue edit: Edit an editor table that already exists. → See also TABLE EDITOR (770) **Factory setting:** New table
EDITOR TABLE Entry ("Semiautomatic" edit mode) – LINE-NUMB (549) – Y-VAL. (551)	Enter table in the "Semiautomatic" editing mode. A linearisation table must have at least 2 points and may not have more than 32 points. A point consists of LINE-NUMB, X-VAL. and Y-VAL. For this editing mode, the container is filled or emptied in stages. **Example:** Enter point for LEVEL MODE = Pressure Linearized – LINE-NUMB: confirm value displayed. – Y-VAL.: depending on the setting in the LINd. MEASURAND parameter, enter the volume, mass or % value. – X-VAL.: the hydrostatic pressure present is displayed and saved by confirming the Y-value. **Example:** Enter point for LEVEL MODE = Height Linearized – LINE-NUMB: confirm value displayed. – Y-VAL.: depending on the setting in the COMB. MEASURAND parameter, enter the volume, mass or % value. – X-VAL.: the hydrostatic pressure present is measured. Depending on the setting in the COMB. MEASURAND parameter, the measured pressure is converted to a level unit or a % and displayed. The value is saved by confirming the Y-value. **Factory setting:** LINE-NUMB = 1, X-VAL. = 0.0, Y-VAL. = 0.0
EDITOR TABLE Entry ("manual" edit mode) – LINE-NUMB (549) – Y-VAL. (551) – X-VAL. (550)	Enter table in the "manual" editing mode. A linearisation table must have at least 2 points and may not have more than 32 points. A point consists of a line number, X-value and Y-value. The container neither has to be filled nor emptied for this editing mode. **Example:** Enter point for LEVEL MODE = Pressure Linearized – LINE-NUMB: confirm value displayed. – X-VAL.: enter pressure value. – Y-VAL.: depending on the setting in the LINd. MEASURAND parameter, enter the related volume, mass or % value. **Example:** Enter point for LEVEL MODE = Height Linearized – LINE-NUMB: confirm value displayed. – X-VAL.: the hydrostatic pressure present is measured. Depending on the setting in the COMB. MEASURAND parameter, enter a level value or % value. – Y-VAL.: depending on the setting in the COMB. MEASURAND parameter, enter the related volume, mass or % value. **Factory setting:** LINE-NUMB = 1, X-VAL. = 0.0, Y-VAL. = 0.0

Table 18: (GROUP SELECTION →) OPERATING MENU → SETTINGS → LINEARISATION – on-site operation	
Parameter name	**Description**
EDITOR TABLE (770) Options	Select the function for the editor table. **Options:** ■ Next point: enter next point. ■ Last input point: jump back to previous point to correct a mistake for example. ■ Accept input table: save editor table as measuring table. This overwrites the old measuring table. ■ Abort: save values entered up to this point for the editor table and display next parameter. The editor table is not activated as a measuring table. ■ Insert point: see example below. ■ Delete point: the current point is deleted. See example below. **Example:** Add point, in this case between the 4th and 5th point for example – Select point 5 via the EDITOR TABLE/LINE NUMB parameter. – Confirm current X and Y values with Enter. – Using the TABLE EDITOR (770) parameter, select the option "Insert point". – Point 5 is displayed for the TABLE EDITOR/LINE NUMB parameter. New values for the X-VAL and Y-VAL parameters. **Example:** delete point, in this case the 5th point for example – Select point 5 via the EDITOR TABLE/LINE NUMB parameter. – Using the TABLE EDITOR (770) parameter, select the option "Delete point". – The 5th point is deleted. All of the following points are pushed up one number i.e. following deletion, the 6th point becomes Point 5. **Factory setting:** Next point
MEASURING TABLE (549) Display	A point of the linearisation table saved (measuring table) appears on the display The parameter first displays the first point of the linearisation table. By entering a line number, you can directly display the corresponding point in the linearisation table.
MEASURING TABLE (717) Selection	Select the function for the measuring table. **Options:** ■ Next point: view next point of the measuring table. ■ Last input point: view previous point of the measuring table. ■ Abort: cancel measuring table display. Display next parameter. **Factory setting:** Next point
TANK DESCRIPTION (815) Entry	Enter tank description. (max. 32 alphanumeric characters) **Factory setting:** _

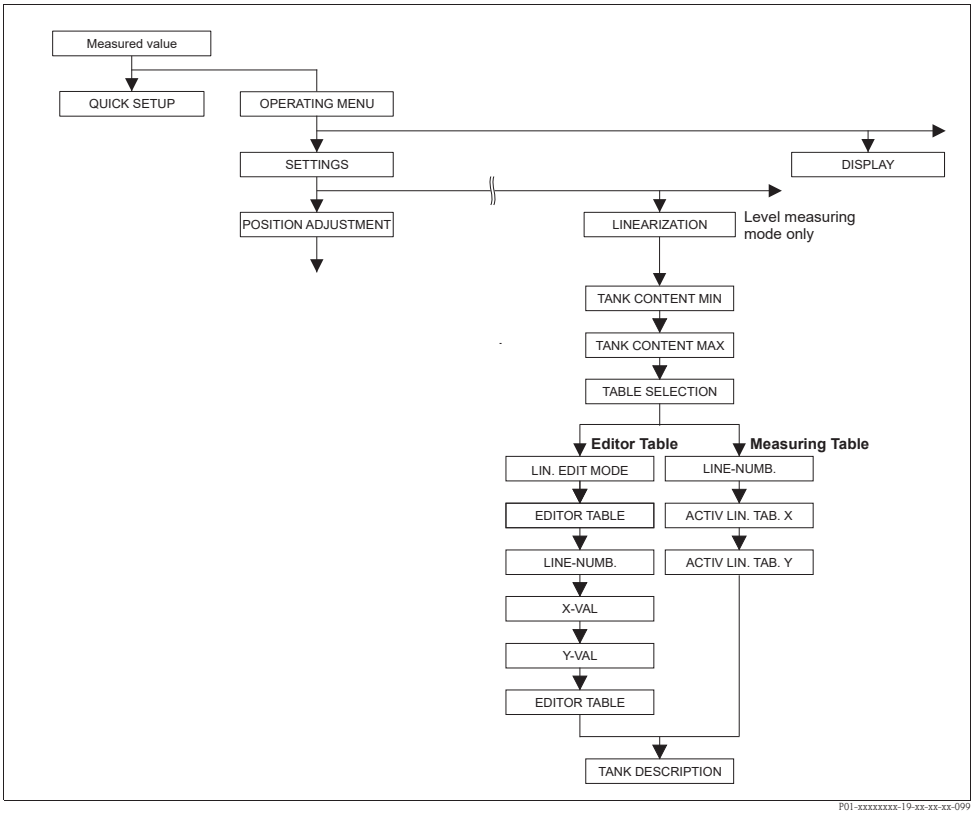


Fig. 39: LINEARISATION function group for digital communication

Table 19: (GROUP SELECTION →) OPERATING MENU → SETTINGS → LINEARISATION – Digital communication	
Parameter name	**Description**
Prerequisite: ■ MEASURING MODE = Level (→ see also Page 45). ■ LEVEL MODE = Pressure Linearized or Height Linearized (→ see also Page 68). **Note:** – See also Page 14 ff, Section 5 "Level measurement".	
TANK CONTENT MIN Entry	Enter the minimum tank contents to be expected. The input limits for the calibration (editing limits) are derived from the value entered. The closer the value entered corresponds to the minimum tank content to be expected, the more accurate the measurement result. ✎ Note! ■ If you enter a new value for TANK CONTENT MIN, the value for SET LRV is also changed. Use SET LRV to assign a %-value, volume value or mass value to the lower current value. If you want to assign the lower current value a value other than that for TANK CONTENT MIN, you must enter the desired value for SET LRV. (→ SET LRV, Page 98). ■ For the setting LEVEL MODE "Height Linearized" and ASSIGN CURRENT "Linear", the TANK CONTENT MIN parameter does not affect the SET LRV parameter. (→ SET LRV, Page 98 and ASSIGN CURRENT, Page 113) **Factory setting:** 0.0

Table 19: (GROUP SELECTION →) OPERATING MENU → SETTINGS → LINEARISATION – Digital communication	
Parameter name	**Description**
TANK CONTENT MAX Entry	Enter the maximum tank contents to be expected. The input limits for the subsequent calibration (editing limits) are derived from the value entered. The closer the value entered corresponds to the maximum tank content to be expected, the more accurate the measurement result. ✎ Note! ■ If you enter a new value for TANK CONTENT MAX, the value for SET URV is also changed. Use SET URV to assign a %-value, volume value or mass value to the upper current value. If you want to assign the upper current value a value other than that for TANK CONTENT MAX, you must enter the desired value for SET URV. (→ SET URV, Page 98.) ■ For the setting LEVEL MODE "Height Linearized" and ASSIGN CURRENT "Linear", the TANK CONTENT MAX parameter does not affect the SET URV parameter. (→ SET URV, Page 98 and ASSIGN CURRENT, Page 113) **Factory setting:** 100.0
TABLE SELECTION Selection	Select table. The device works with a measuring and an editor table. The measuring table is used to calculate the measured value. To make sure measuring also runs properly when entering a new table, there is another table, the editor table, for entering new values. **Options:** ■ View meas. table ■ Editor table **Factory setting:** View meas. table
LIN. EDIT MODE Selection	Select the entry mode for the linearisation table. **Prerequisite:** ■ TABLE SELECTION = Editor table **Options:** ■ Manual: The container neither has to be filled nor emptied for this entry mode. Enter the value pairs for the linearisation table. ■ Semiautomatic: the container is filled or emptied in stages in this entry mode. The device automatically records the hydrostatic pressure. The associated volume, mass or %-value is entered. **Factory setting:** Manual
EDITOR TABLE Selection	Select table. **Prerequisite:** ■ TABLE SELECTION = Editor table **Options:** ■ New table: Enter new linearisation table. ■ View meas. table: View saved linearisation table and change points if necessary. ■ Continue edit: Edit a linearisation table that already exists. ✎ Note! Operating program: ■ If you select the "View meas. table" option, the saved measuring table is loaded in the operating priogram. Use the "Lin.-Tab." window to view the entire table, change values if necessary and write the modified table to the device. ■ If you change a value via the X-VAL. or Y-VAL. parameters, the table in the "Lin.-Tab." window is not updated. To view the table saved in the device, this table must first be read out of the device. **Factory setting:** New table

Table 19: (GROUP SELECTION →) OPERATING MENU → SETTINGS → LINEARISATION – Digital communication	
Parameter name	**Description**
LINE-NUMB Entry	Enter the line number for the linearisation table. A linearisation table must have at least 2 points and may not have more than 32 points. ■ TABLE SELECTION = View meas. table Via this parameter you can select the point of the linearisation table which should be displayed. ■ TABLE SELECTION = Editor table Enter a point via the LINE-NUMB, X-VAL. and Y-VAL. parameters. → See also this table, parameter description for LIN. EDIT MODE, X-VAL. ("Manual" entry mode), X-VAL. ("Semiautomatic" entry mode) and Y-VAL. ✎ Note! In the operating program, you can enter a complete linearisation table in one go via the "Lin.-Tab." window.
X-VAL. ("Manual" entry mode) Entry	Enter the pressure value for the linearisation table. → See also LIN. EDIT MODE, LINE-NUMB and Y-VAL. **Prerequisite:** ■ TABLE SELECTION = Editor table
X-VAL. ("Semiautomatic" entry mode) Display	In the "Semiautomatic" entry mode, the container is filled or emptied in stages. The X-VAL. displays the measured hydrostatic pressure. **Prerequisite:** ■ TABLE SELECTION = Editor table **Operating program** The X-VAL. is saved by confirming the Y-value. **HART Handheld** Confirm X-VAL. displayed. → See also LIN. EDIT MODE, LINE-NUMB and Y-VAL.
Y-VAL. Entry	Enter the volume, mass or %-value belonging to the X-VAL. for the linearisation table. **Prerequisite:** ■ TABLE SELECTION = Editor table Depending on the setting in the LINd. MEASURAND or COMB. MEASURAND parameters, enter a volume, mass or %-value here. → See also this table, parameter description for LIN. EDIT MODE, LINE-NUMB, X-VAL. ("Manual" entry mode), X-VAL. ("Semiautomatic" entry mode).
EDITOR TABLE Options	Select the function for the editor table. **Prerequisite:** ■ TABLE SELECTION = Editor table **Options:** ■ Next point: without function ■ Last input point: without function ■ Accept input table: save editor table as measuring table. This overwrites the old measuring table. ■ Abort: save values entered up to this point for the editor table and display next parameter. The editor table is not activated as a measuring table. ■ Insert point: see example below. ■ Delete point: the current point is deleted. See example below. **Example:** Add point, in this case between the 4th and 5th point for example – Select point 5 via the LINE NUMB parameter. – Using the TABLE EDITOR parameter, select the option "Insert point". – Point 5 is displayed for the LINE NUMB parameter. New values for the X-VAL and Y-VAL parameters. **Example:** delete point, in this case the 5th point for example – Select point 5 via the LINE NUMB parameter. – Using the TABLE EDITOR parameter, select the option "Delete point". – The 5th point is deleted. All of the following points are pushed up one number i.e. following deletion, the 6th point becomes Point 5. **Factory setting:** Next point

Table 19: (GROUP SELECTION →) OPERATING MENU → SETTINGS → LINEARISATION – Digital communication	
Parameter name	**Description**
ACTIV LIN. TAB. X Display	An X-value of the linearisation table already saved appears on the display You can select a point of the linearisation table via the LINE-NUMB parameter. **Prerequisite:** ■ TABLE SELECTION = View meas. table ✎ Note! In the operating program, you can view the entire saved table in the "Tables" window.
ACTIV LIN. TAB. Y Display	A Y-value of the linearisation table already saved appears on the display You can select a point of the linearisation table via the LINE-NUMB parameter. **Prerequisite:** ■ TABLE SELECTION = View meas. table ✎ Note! In the operating program, you can view the entire saved table in the "Tables" window.
TANK DESCRIPTION Entry	Enter tank description. (max. 32 alphanumeric characters) **Factory setting:** _

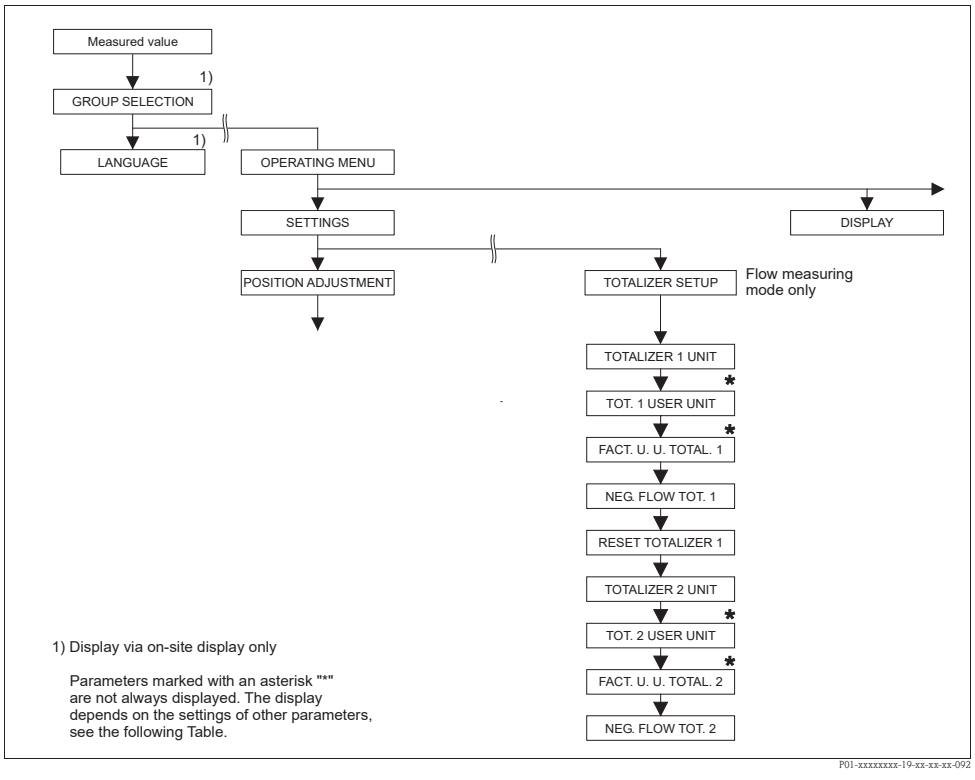


Fig. 40: TOTALIZER SETUP function group

Table 20: (GROUP SELECTION →) OPERATING MENU → SETTINGS → TOTALIZER SETUP	
Parameter name	**Description**
Prerequisite: ■ MEASURING MODE = Flow (→ see also Page 45). **Note:** ■ See also Page 40 ff, Section 6 "Flow measurement".	

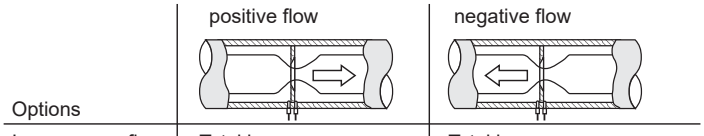
Table 20: (GROUP SELECTION →) OPERATING MENU → SETTINGS → TOTALIZER SETUP	
Parameter name	**Description**
TOTALIZER 1 UNIT (398), (666), (664), (662) Selection	Select unit for totalizer 1. Depending on the setting in the FLOW-MEAS. TYPE parameter (→ Page 93) this parameter offers a list of volume, norm volume, standard volume and mass units. When a new volume or mass unit is selected, totalizer-specific parameters are converted and displayed with the new unit within a unit group. When the flow mode is changed, the totalizer value is not converted. The 3-digit ID number on the on-site display depends on the FLOW-MEAS. TYPE selected: – (398): FLOW-MEAS. TYPE "Volume p. cond." – (662): FLOW-MEAS. TYPE "Mass" – (664): FLOW-MEAS. TYPE "Gas. std. cond." – (666): FLOW-MEAS. TYPE "Gas. norm conditions" **Factory setting:** m^3
TOT. 1 USER UNIT (627) Entry	Enter text (unit) for customer-specific unit for totalizer 1. You can enter a maximum of eight alphanumeric characters here. → See also FACT. U. U. TOTAL. 1. **Prerequisite:** ■ TOTALIZER 1 UNIT = User unit Note! Only the first five characters are shown on the on-site display. For example, if "crates" is specified as the customer-specific unit, "crate" is displayed. If the unit contains a slash, up to eight characters can be shown on the on-site display. The maximum number of characters in the counter is again limited to five. For example, if "crates/m2" is specified as the customer-specific unit, "crate/m2" is displayed. In the FieldCare, all eight characters are displayed. In the HART handheld terminal, the customer-specific unit is only displayed in the TOT. 1 USER UNIT parameter. The measured value is displayed with the additional text "User Unit". **Factory setting:** – – – – – – – –
FACT. U. U. TOTAL. 1 (329) Entry	Enter conversion factor for a customer-specific unit for totalizer 1. The conversion factor must be entered in relation to an appropriate SI unit, e.g. m^3 for the "Volume p. cond." FLOW-MEAS. TYPE. → See also TOT. 1 USER UNIT. **Prerequisite:** ■ TOTALIZER 1 UNIT = User unit **Example:** You want the measured value to be displayed in "buckets". – MEASURED VALUE =1 m3 ≙ 100 buckets – Entry TOT. 1 USER UNIT: bucket – Entry FACT. U. U. TOTAL. 1: 100 – Result: MEASURED VALUE = 100 buckets **Factory setting:** 1.0
NEG. FLOW TOT. 1 (400) Selection	Specify way of counting negative flows for totalizer 1.  Options / Inc. on. neg. flow: Total increases / Total increases Dec. on neg. flow: Total increases / Total decreases Stop on neg. flow: Total increases / Total remains constant P01-xMD7xxxx-16-xx-xx-xx-003 **Factory setting:** Inc. on neg. flow

Table 20: (GROUP SELECTION →) OPERATING MENU → SETTINGS → TOTALIZER SETUP	
Parameter name	**Description**
RESET TOTALIZER1 (331) Selection	You reset totalizer 1 to zero with this parameter. **Options:** ■ Abort (do not reset) ■ Reset **Factory setting:** Abort
TOTALIZER 2 UNIT (399), (663), (665), (667) Selection	Select unit for totalizer 2. → See also TOTAL 1. ENG. UNIT. The 3-digit ID number on the on-site display depends on the FLOW-MEAS. TYPE selected: – (399): FLOW-MEAS. TYPE "Volume p. cond." – (663): FLOW-MEAS. TYPE "Mass" – (665): FLOW-MEAS. TYPE "Gas. std. cond." – (667): FLOW-MEAS. TYPE "Gas. norm conditions" **Factory setting:** m^3
TOT. 2 USER UNIT (628) Entry	Enter text (unit) for customer-specific unit for totalizer 2. → See also TOT. 1 USER UNIT. **Prerequisite:** ■ TOTALIZER 2 UNIT = User unit **Factory setting:** _ _ _ _ _ _ _ _
FACT. U. U. TOTAL. 2 (330) Selection	Enter conversion factor for a customer-specific unit for totalizer 2. → See also FACT. U. U. TOTAL. 1. **Prerequisite:** ■ TOTALIZER 2 UNIT = User unit **Factory setting:** 1.0
NEG. FLOW TOT. 2 (416) Selection	Specify way of counting negative flows for totalizer 2. → See NEG. FLOW TOT. 1. **Factory setting:** Positive

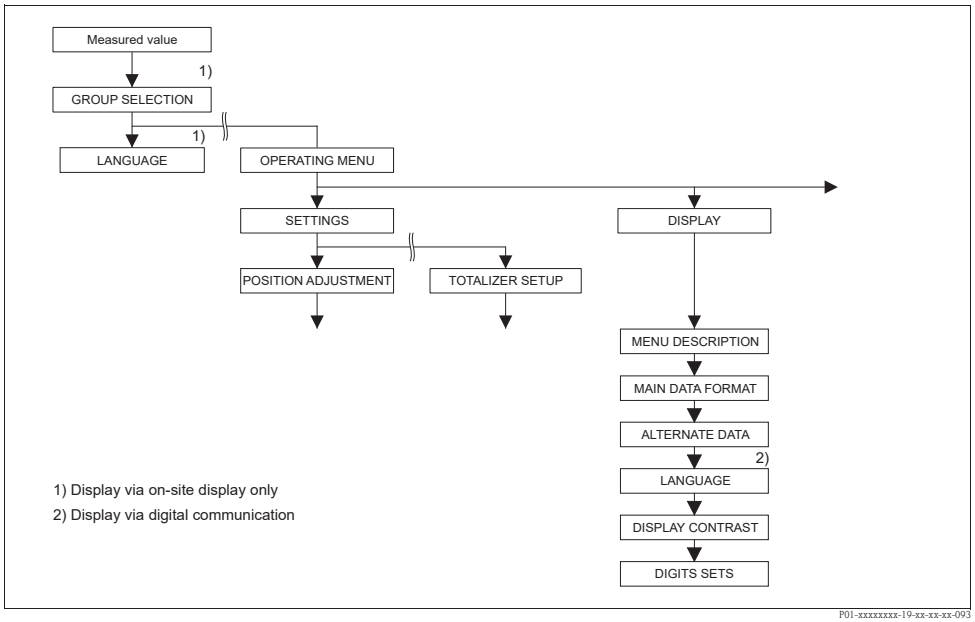


Fig. 41: DISPLAY group

Table 21: (GROUP SELECTION →) OPERATING MENU → DISPLAY	
Parameter name	**Description**
MENU DESCRIPTOR (419) Selection	Specify contents for the main line of the on-site display in the measuring mode. → See also Operating Instructions BA00270P (Deltabar S), BA00271P (Cerabar S) or BA00332P (Deltapilot S), Section 5.1 "On-site display". **Options:** ■ Main measured value (PV) ■ Main measured value (%) ■ Pressure ■ Flow ■ Level ■ Tank content ■ Current ■ Temperature ■ Error number ■ Totalizer 1 ■ Totalizer 2 The selection depends on the measuring mode chosen. **Factory setting:** Main measured value (PV)
MAIN DATA FORMAT (688) Selection	Specifies the number of places after the decimal point for the value displayed in the main line. → See also Operating Instructions BA00270P (Deltabar S), BA00271P (Cerabar S) or (BA00332P) Deltapilot S, Section 5.1 "On-site display". **Options:** ■ Auto ■ x.x ■ x.xx ■ x.xxx ■ x.xxxx ■ x.xxxxx **Factory setting:** Auto
ALTERNATE DATA (423) Selection	Switch on "Alternating display" mode. In this display mode, the on-site display alternates between the following measured values depending on the measuring mode selected. – Pressure: Main measured value (PV), Pressure, Temperature and Current – Level Standard: Main measured value (PV), Pressure, Level, Tank content, Temperature and Current – Level Easy: Main measured value (PV), Pressure, Temperature and Current – Flow: Main measured value (PV), Pressure, Flow, Temperature, Current, Totalizer 1 and Totalizer 2 **Options:** ■ Off ■ On **Factory setting:** Off
LANGUAGE Selection	Select the menu language for the on-site display. ✎ Note! ■ For on-site operation, the LANGUAGE parameter is arranged directly under GROUP SELECTION (menu path: GROUP SELECTION → LANGUAGE, see also Page 44). ■ Select the menu language for FieldCare via the "Options" menu → "Settings" → "Language" tab → "Tool language" field. **Factory setting**: English

Table 21: (GROUP SELECTION →) OPERATING MENU → DISPLAY	
Parameter name	**Description**
DISPLAY CONTRAST (339) Entry	Adjust contrast of on-site display. You specify the contrast of the display with a number. Changes are only accepted as single steps, i.e. to change the value from "8" to "4", you need to save four times. You can also adjust the contrast of the display by means of the keys on the electronic insert or at the device. → See also Operating Instructions BA00270P (Deltabar S), BA00271P (Cerabar S) or BA00332P (Deltapilot S), Section 5.2.3 "Function of operating keys". **Input range:** 4...13, 4: contrast weaker (brighter), 13: contrast stronger (darker). **Factory setting:** 8
DIGITS SETS (840) Display	This parameter is used to check the correct display of characters and digits on the user interface. If the characters and digits are displayed correctly, this parameter displays the string "0123456789.-".

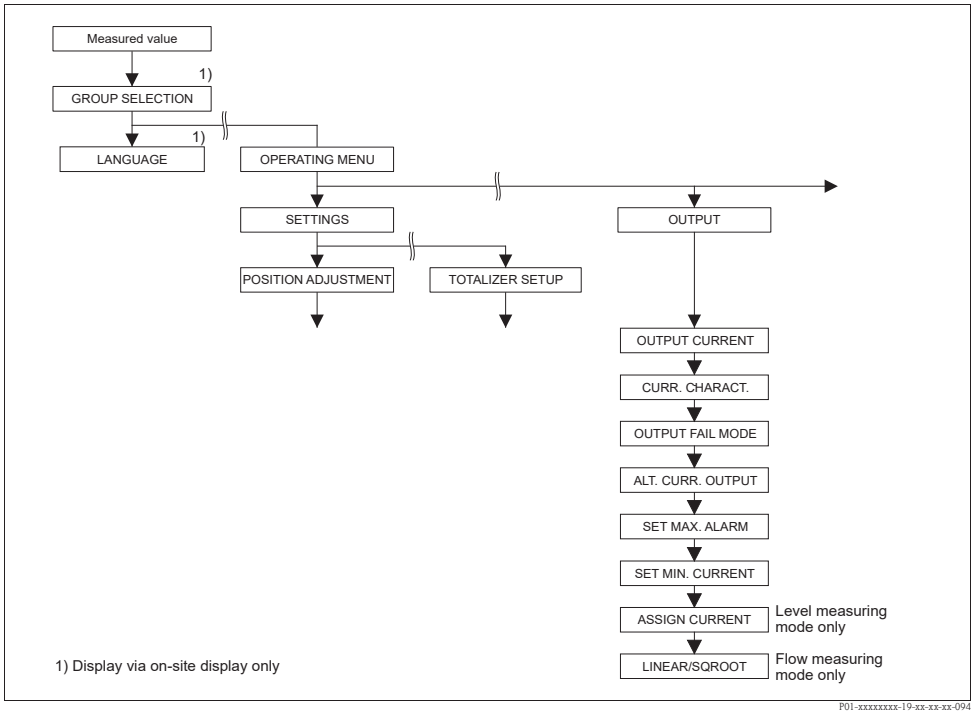


Fig. 42: OUTPUT group

Table 22: (GROUP SELECTION →) OPERATING MENU → OUTPUT	
Parameter name	**Description**
OUTPUT CURRENT (254) Display	Displays the current current value.

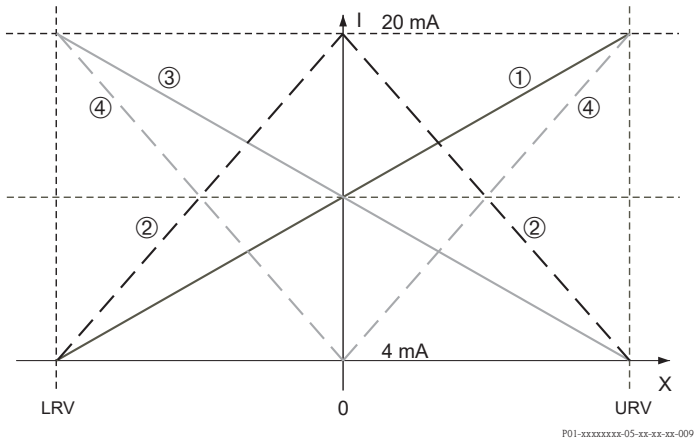
Table 22: (GROUP SELECTION →) OPERATING MENU → OUTPUT	
Parameter name	**Description**
CURR. CHARACT. (694), (695), (696), (764) Selection	Select curve of current output. **Options:**  *Fig. 43: Illustration of current output curves* *1 Linear: lower range value = 4 mA, upper range value = 20 mA* *2 Bi-linear: lower range value = 4 mA, centre or zero = 20 mA, upper range value = 4 mA* *3 Linear inverse: lower range value = 20 mA, upper range value = 4 mA* *4 Bi-linear inverse: lower range value = 20 mA, centre or zero = 4 mA, upper range value = 20 mA* *LRV Lower range value* *URV Upper range value* *I Current* *X Measured value (Pressure/Level/Flow)* *The "CURR. CHARACT." function refers to the operating mode previously selected.* The 3-digit ID number on the on-site display depends on the MEASURING MODE selected: – (694): MEASURING MODE "Pressure" or MEASURING MODE "Flow" with the setting for LINEAR/SQROOT "Differential pres. – (695): MEASURING MODE "Flow" with the setting LINEAR/SQROOT "Flow (square root)" – (696): MEASURING MODE "Level", LEVEL MODE "Linear" or "Pressure Linearized" and LEVEL MODE "Height Linearized" with the setting for ASSIGN CURRENT "Level" – (764): MEASURING MODE "Level", LEVEL MODE "Height Linearized" with the setting for ASSIGN CURRENT "Tank content" **Factory setting:** Linear
OUTPUT FAIL MODE (388) Entry	Select the current value in the event of an alarm. In the event of an alarm, the current and the bargraph assume the current value specified with this parameter. **Options:** ■ Max. alarm (110%): can be set between 21...23 mA ■ Hold meas. value: last measured value is kept. ■ Min. alarm (–10%): 3.6 mA → See also this table SET MAX. ALARM and Operating Instructions BA00270P (Deltabar S), BA00271P (Cerabar S) or BA00332P (Deltapilot S), Section 8.2.1. "Setting current output for alarm". **Factory setting:** Max. alarm 110% (22 mA)

Table 22: (GROUP SELECTION →) OPERATING MENU → OUTPUT	
Parameter name	**Description**
ALT. CURR. OUTPUT (597) Selection	Set current output if sensor limits undershot or overshot. **Options:** ■ Normal: the current output assumes the value set via the OUTPUT FAIL MODE and SET MAX. ALARM parameters. ■ Special: – Lower sensor limit undershot (E120): Current output = 3.6 mA – Upper sensor limit overshot (E115): current output assumes the value set via the SET MAX. ALARM parameter. Attention : when using the case "special", the behavior is limited to an over/ underpressure in a range LRL -10%, URL +10%. **Factory setting:** Normal
SET MAX. ALARM (342) Entry	Enter current value for maximum alarm current. → See also OUTPUT FAIL MODE. **Input range:** 21...23 mA **Factory setting:** 22 mA
SET MIN. CURRENT (343) Entry	Enter lower current limit. Some switching units sometimes do not accept currents less than 4.0 mA. **Options:** ■ 3.8 mA ■ 4.0 mA **Factory setting:** 3.8 mA
ASSIGN CURRENT (760) Selection	Specify current signal for the "Level" measuring mode. See also SET LRV (→ Page 98) and SET URV (→ Page 98). **Prerequisite:** ■ MEASURING MODE = Level, LEVEL MODE = Height Linearized **Options:** ■ Height ■ Tank content **Factory setting:** Tank content
LINEAR/SQROOT (390) Selection	Specify current signal for the "Flow" measuring mode. See also SET LRV (→ Page 99) and SET URV (→ Page 100). **Prerequisite:** ■ MEASURING MODE = Flow **Options:** ■ Differential pres.: the linear pressure signal is used for the current output. ■ Flow (square root): the root flow signal is used for the current output. The "Flow (square root)" current signal is indicated on the on-site display with a root symbol. **Factory setting:** Flow (square root)

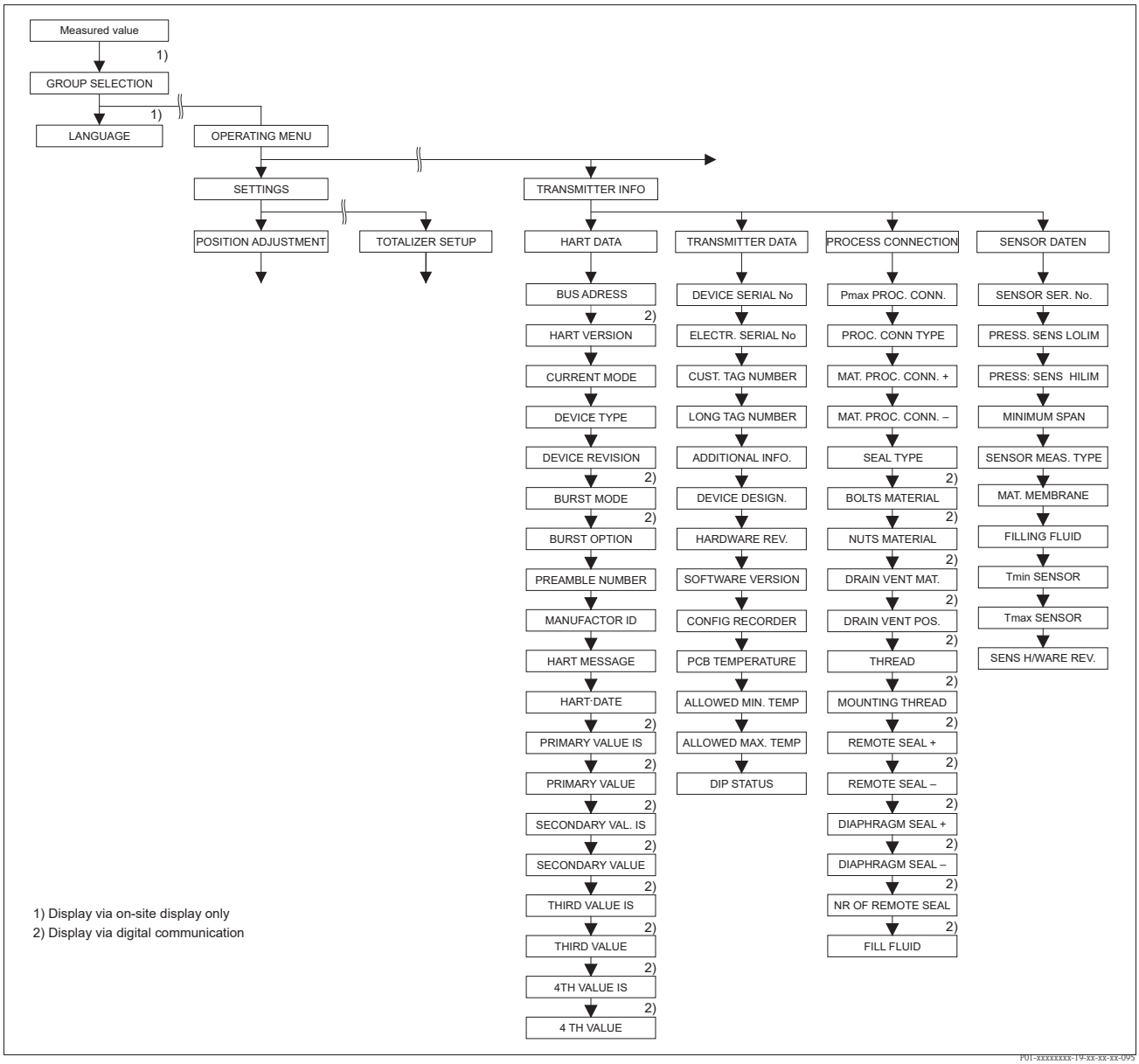


Fig. 44: TRANSMITTER INFO group
→ For the HART DATA function group, see Page 114, Table 23
→ For the TRANSMITTER DATA function group, see Page 117, Table 24
→ For the PROCESS CONNECTION function group, see Page 117, Table 25
→ For the SENSOR DATA function group, see Page 119, Table 26

Table 23: (GROUP SELECTION →) OPERATING MENU → TRANSMITTER INFO → HART DATA	
Parameter name	**Description**
HART VERSION (585) Display	Displays the HART Version.

Table 23: (GROUP SELECTION →) OPERATING MENU → TRANSMITTER INFO → HART DATA	
Parameter name	**Description**
CURRENT MODE (052) Selection	Set the current mode for HART communication. **Selection via on-site display and FieldCare:** ■ Signaling Measured value transmission by the current value ■ Fixed Fixed current 4.0 mA (multidrop mode) (Measured value transmission only via HART digital communication) **Factory setting:** Signaling **Selection via HART Handheld Terminal:** ■ enabled Measured value transmission by the current value ■ disabled Fixed current 4.0 mA (multidrop mode) (Measured value transmission only via HART digital communication) **Factory setting:** enabled
BUS ADDRESS (345) Entry	Enter the address for the exchange of data with the HART protocol. (HART 5.0: range 0 to 15, wherein if the address = 0 this produces the "Signaling" setting; HART 6.0/7.0: range 0 to 63) **Factory setting:** 0
DEVICE TYPE (351) Display	Displays the device type in decimal numerical format, here Deltabar S: 23 The extended device type is a composition of the manufacturer number (17) and the device type (23). **Prerequisite:** ■ Deltabar S differential pressure transmitter
DEVICE TYPE (802) Display	Displays the device type in decimal numerical format, here Cerabar S: 24 The extended device type is a composition of the manufacturer number (17) and the device type (24). **Prerequisite:** ■ Pressure transmitter Cerabar S
DEVICE TYPE (002) Display	Displays the device type in decimal numerical format, here Deltapilot S: 26 The extended device type is a composition of the manufacturer number (17) and the device type (26). **Prerequisite:** ■ Pressure transmitter Deltapilot S
DEVICE REVISION (699) Display	Displays the device revision
BURST MODE Selection	Switches "Burst Mode" function on and off. **Selection:** ■ On ■ Off **Prerequisite:** ■ Digital communication
BURST OPTION Entry	Use this parameter to specify which command is sent to the master. **Voraussetzung:** ■ Digital communication **Factory setting:** 3 (HART commando 3)
PREAMBLE NUMBER (036) Entry	Enter the number of preambles in the HART protocol. (Synchronisation of the modem modules along a transmission path, each modem module could "swallow" a byte – at least 2 bytes must arrive.) **Input range:** 2...20 **Factory setting:** 5

Table 23: (GROUP SELECTION →) OPERATING MENU → TRANSMITTER INFO → HART DATA	
Parameter name	**Description**
MANUFACTOR ID (432) Display	Displays the manufacturer number in a decimal numerical format. Here: 17 Endress+Hauser
HART MESSAGE (271) Entry	Enter message (max. 32 alphanumeric characters). On command from the master, this message is sent via the HART protocol. **Factory setting:** _ or as per order specifications
HART DATE (481) Entry	Enter the date of the last configuration change. **Factory setting:** DD.MM.YY (date of final test)
PRIMARY VALUE IS Display	This parameter displays the following measured value depending on the measuring mode selected: – Measuring mode "Pressure": PRESSURE – "Level" measuring mode, "Linear" or "Pressure Linearized" level type: LEVEL BEFORE LIN – Measuring mode "Level", level type "Height Linearized": TANK CONTENT – Measuring mode "Flow": SUPPRESSED FLOW → See also PRIMARY VALUE. **Prerequisite:** ■ Digital communication
PRIMARY VALUE Display	Displays the primary value. → See also PRIMARY VALUE IS. **Prerequisite:** ■ Digital communication
SECONDARY VAL. IS	Select second process value. You can choose between the following process values depending on the measuring mode selected: – PRESSURE – CORRECTED PRESS. – SENSOR PRESSURE – SENSOR TEMP. – PCB TEMPERATURE – SUPPRESSED FLOW – TOTALIZER 1 – TOTALIZER 2 – LEVEL BEFORE LIN – TANK CONTENT **Prerequisite:** ■ Digital communication
SECONDARY VALUE	Display second process value. → See also SECONDARY VAL. IS. **Prerequisite:** ■ Digital communication
THIRD VALUE IS	Select third process value. → See also SECONDARY VAL. IS. **Prerequisite:** ■ Digital communication
THIRD VALUE	Display third process value. → See also SECONDARY VAL. IS. **Prerequisite:** ■ Digital communication
4TH VALUE IS	Select fourth process value. → See also SECONDARY VAL. IS. **Prerequisite:** ■ Digital communication
4TH VALUE	Display fourth process value. → See also SECONDARY VAL. IS. **Prerequisite:** ■ Digital communication

Table 24: (GROUP SELECTION →) OPERATING MENU → TRANSMITTER INFO → TRANSMITTER DATA	
Parameter name	**Description**
DEVICE SERIAL No (354) Display	Displays the serial number of the device (11 alphanumeric characters).
ELECTR. SERIAL No (386) Display	Displays the serial number of the main electronics (11 alphanumeric characters).
CUST. TAG NUMBER (055) Entry	Enter TAG number (max. 8 alphanumeric characters). **Factory setting:** _ _ _ _ _ _ _ _ or as per order specifications
LONG TAG NUMBER (305) Entry	Enter TAG number (max. 32 alphanumeric characters). **Factory setting:** _ or as per order specifications
ADDITIONAL INFO. (272) Entry	Enter tag description (max. 16 alphanumeric characters). **Factory setting:** _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ or as per order specifications
DEVICE DESIGN. (350) Display	Displays the device designation and order code.
HARDWARE REV. (266) Display	Displays the revision number of the main electronics e.g.: V02.00
SOFTWARE VERSION (264) Display	Displays the software version e.g.: V02.10
CONFIG RECORDER (352) Display	Displays the configuration counter. This counter is increased by one with each change to a parameter or group. The counter counts to 65535 and then starts again at zero. Changes in the parameters of the DISPLAY function group do not increase the counter.
PCB TEMPERATURE (357) Display	Displays the measured temperature of the main electronics.
ALLOWED MIN. TEMP (358) Display	Displays the lower temperature limit of the main electronics.
ALLOWED MAX. TEMP (359) Display	Displays the upper temperature limit of the main electronics.
DIP STATUS (363) Display	Displays the status of DIP switch 1 on the electronic insert. You can lock or unlock parameters relevant to the measured value with DIP switch 1. If operation is locked by means of the INSERT PIN No. parameter, you can only unlock operation again by means of this parameter. (→ INSERT PIN NO, see Page 126.) → See also Operating Instructions BA00270P (Deltabar S), BA00271P (Cerabar S) or BA00332P (Deltapilot S), Section 5.9 "Locking/unlocking operation". **Display:** ■ On (locking switched on) ■ Off (locking switched off) **Factory setting:** Off (locking switched off)

Table 25: (GROUP SELECTION →) OPERATING MENU → TRANSMITTER INFO → PROCESS CONNECTION	
Parameter name	**Description**
Pmax PROC. CONN. (570) Entry	For entering and displaying the maximum permitted pressure of the process connection. **Factory setting:** In accordance with nameplate data (→ see also Operating Instructions BA00270P (Deltabar S), BA00271P (Cerabar S) or BA00332P (Deltapilot S), Section 2.1.1 nameplate)

Table 25: (GROUP SELECTION →) OPERATING MENU → TRANSMITTER INFO → PROCESS CONNECTION	
Parameter name	**Description**
PROC. CONN. TYPE (482) Selection	For selecting and displaying the process connection type. **Options:** ■ Not used ■ Unknown ■ Special ■ Oval flange ■ Thread female ■ Thread male ■ Flange ■ Remote seal
MAT. PROC. CONN. + (360) Selection	For selecting and displaying the material of the process connection (P+). → See also parameter description for MAT. PROC. CONN. - **Options:** ■ Not used ■ Unknown ■ Special ■ Steel ■ 304 st. steel ■ 316 st. steel ■ Alloy C ■ Monel ■ Tantalum ■ Titanium ■ PTFE (Teflon) ■ 316L st. steel ■ PVC ■ Inconel ■ PVDF ■ ECTFE **Factory setting:** As per order specifications
MAT. PROC. CONN. - (361) Selection	For selecting and displaying the material of the process connection (P–). → See also parameter description for MAT. PROC. CONN. + **Prerequisite:** ■ Deltabar S differential pressure transmitter
SEAL TYPE (362) Selection	For selecting and displaying the material of the process seal. **Options:** ■ Not used ■ Unknown ■ Special ■ FKM Viton ■ NBR ■ EPDM ■ Urethane ■ IIR ■ Kalrez ■ FKM Viton oxyg ■ CR ■ MVQ ■ PTFE glass ■ PTFE graphite ■ PTFE oxygen ■ Copper ■ Copper f. oxygen **Factory setting:** As per order specifications
BOLTS MATERIAL	For selecting and displaying the material of the bolts. **Prerequisite:** ■ Digital communication

Table 25: (GROUP SELECTION →) OPERATING MENU → TRANSMITTER INFO → PROCESS CONNECTION	
Parameter name	**Description**
NUTS MATERIAL	For selecting and displaying the material of the nuts. **Prerequisite:** ■ Digital communication
DRAIN VENT MAT.	For selecting and displaying the material of the vent valves. **Prerequisite:** ■ Digital communication
DRAIN VENT POS.	For selecting and displaying the position of the vent valves. **Prerequisite:** ■ Digital communication
THREAD	For selecting and displaying the process connection thread. **Prerequisite:** ■ Digital communication
MOUNTING THREAD	For selecting and displaying the ways of securing the device. **Prerequisite:** ■ Digital communication
REMOTE SEAL +	For selecting and displaying the diaphragm seal type on the positive side. **Prerequisite:** ■ Digital communication
REMOTE SEAL –	For selecting and displaying the diaphragm seal type on the negative side. **Prerequisite:** ■ Digital communication
DIAPHRAG. MAT. +	For selecting and displaying the material of the process isolating diaphragm on the positive side. **Prerequisite:** ■ Digital communication
DIAPHRAG. MAT. –	For selecting and displaying the material of the process isolating diaphragm on the negative side. **Prerequisite:** ■ Digital communication
NR OF REMOTE SEAL	For selecting and displaying the number of diaphragm seals. **Prerequisite:** ■ Digital communication
FILL FLUID	For selecting and displaying the diaphragm seal fill fluid. **Prerequisite:** ■ Digital communication

Table 26: (GROUP SELECTION →) OPERATING MENU → TRANSMITTER INFO → SENSOR DATA (all measuring modes)	
Parameter name	**Description**
SENSOR SER. No. (250) Display	Displays the serial number of the sensor (11 alphanumeric characters).
PRESS. SENS LOLIM (484) Display	Displays the lower measuring limit of the sensor.
PRESS. SENS HILIM (485) Display	Displays the upper measuring limit of the sensor.
MINIMUM SPAN (591) Display	Displays the smallest possible span.

Table 26: (GROUP SELECTION →) OPERATING MENU → TRANSMITTER INFO → SENSOR DATA (all measuring modes)	
Parameter name	**Description**
SENSOR MEAS.TYPE (581) Display	Displays the sensor type. ■ Deltabar S = differential ■ Cerabar S with gauge pressure sensor = relative ■ Cerabar S with absolute pressure sensor = absolute ■ Deltapilot S = relative
Pmin SENS. DAMAGE (251) Display	Displays the minimum permissible absolute pressure of the sensor (vacuum-proofing).
Pmax SENS. DAMAGE (252) Display	Displays the maximum permissible absolute pressure of the sensor (overpressure-proofing).
MAT. MEMBRANE (365) Display	Displays the material of the process isolating diaphragm. **Factory setting:** As per version in the order code → For Deltabar S, see Technical Information TI00382P, for Cerabar S, see Technical Information TI00383P or for Deltapilot S, see Technical Information TI00416P, "Ordering information" section.
FILLING FLUID (366) Display	Displays the filling fluid.
Tmin SENSOR (368) Display	Displays the lower nominal temperature limit of the sensor.
Tmax SENSOR (369) Display	Displays the upper nominal temperature limit of the sensor.
SENS H/WARE REV (487) Display	Displays the revision number of the sensor hardware. e.g.: 1

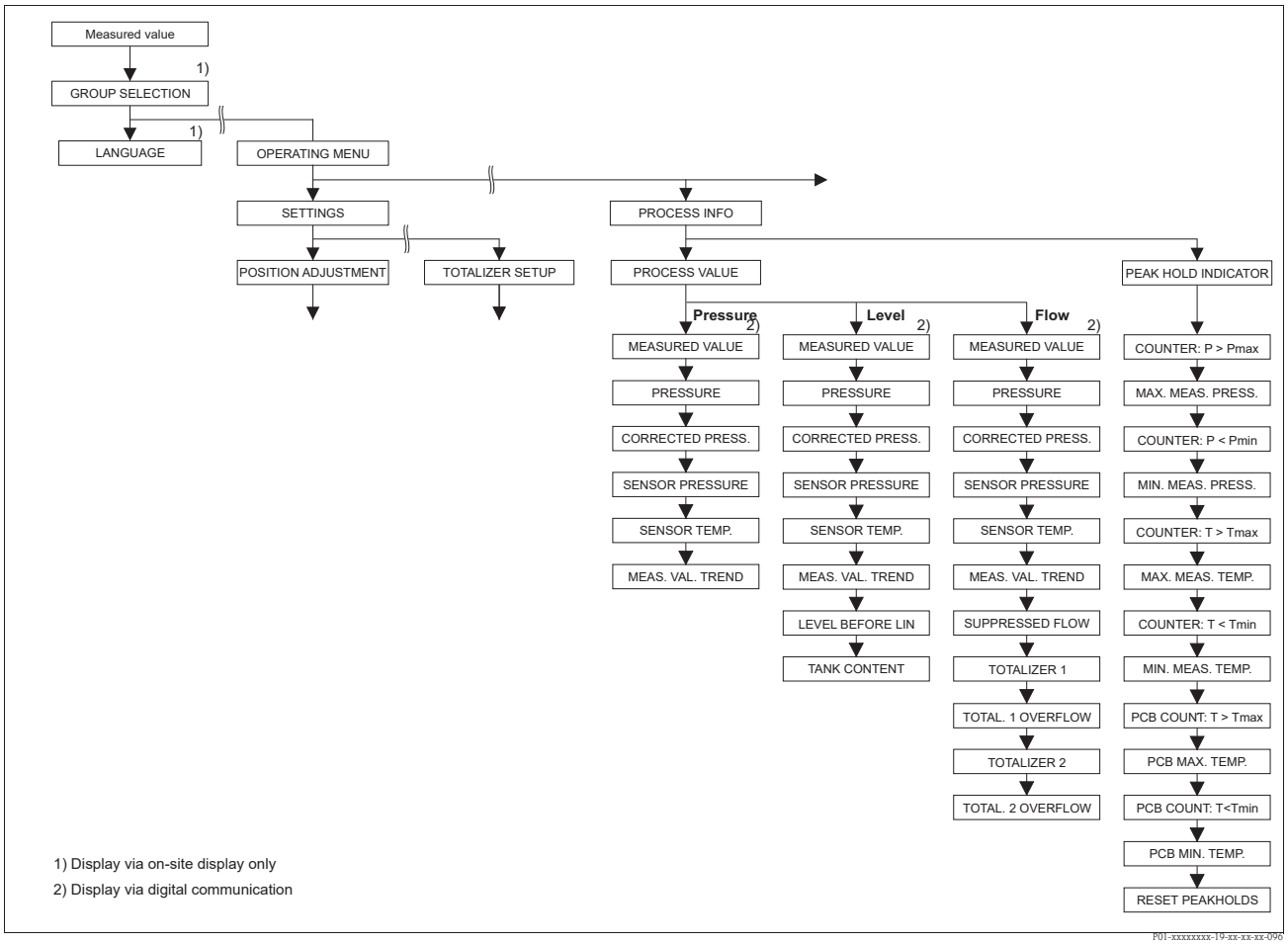


Fig. 45: PROCESSINFO group
→ For the PROCESS VALUES function group, "Pressure" measuring mode, see Page 121, Table 27
→ For the PROCESS VALUES function group, "Level" measuring mode, see Page 122, Table 28
→ For the PROCESS VALUES function group, "Flow" measuring mode, see Page 123, Table 29
→ For the PEAK HOLD INDICATOR function group, see Page 124, Table 30

Table 27: (GROUP SELECTION →) OPERATING MENU → PROCESSINFO → PROCESS VALUES "Pressure"	
Parameter name	**Description**
Prerequisite: ■ MEASURING MODE = pressure (→ see also Page 45).	
MEASURED VALUE (679)	Displays the measured value In the "Pressure" measuring mode, this value corresponds to the PRESSURE parameter. **Prerequisite:** ■ Digital communication **On-site operation:** ■ For on-site operation, the MEASURED VALUE parameter is displayed on the 1st level.

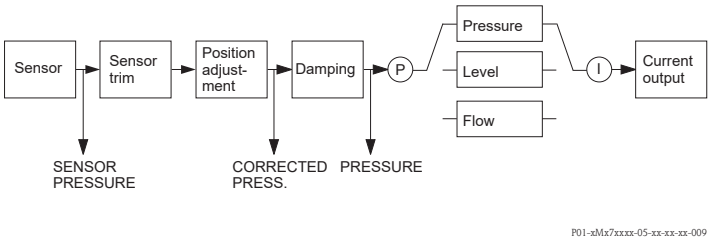
Table 27: (GROUP SELECTION →) OPERATING MENU → PROCESSINFO → PROCESS VALUES "Pressure"	
Parameter name	**Description**
PRESSURE (301) Display	Displays the measured pressure after sensor recalibration, position adjustment and damping. This value corresponds to the MEASURED VALUE parameter in the "Pressure" measuring mode.  P01-xMx7xxxx-05-xx-xx-xx-009
CORRECTED PRESS. (434) Display	Displays the measured pressure after sensor trim and position adjustment and before damping. → See also PRESSURE diagram.
SENSOR PRESSURE (584) Display	Displays the measured pressure before sensor trim, position adjustment and damping. → See also PRESSURE diagram.
SENSOR TEMP. (367) Display	Displays the temperature currently measured in the sensor. This temperature can deviate from the process temperature.
MEAS. VAL. TREND (378) Display	Displays the trend of the pressure measured value. Possibilities: increasing, decreasing, constant

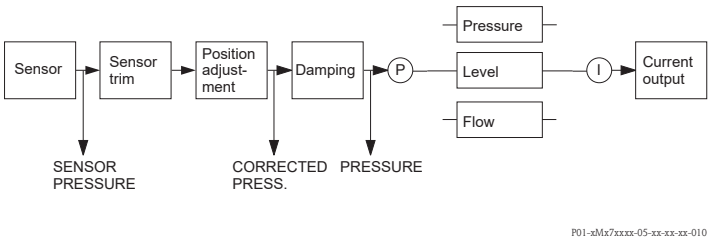
Table 28: (GROUP SELECTION →) OPERATING MENU → PROCESSINFO → PROCESS VALUES "Level"	
Parameter name	**Description**
Prerequisite: ■ MEASURING MODE = Level (→ see also Page 45).	
MEASURED VALUE (679)	Displays the measured value In the "Level" measuring mode with "Linear" or "Pressure Linearized" level type, this value corresponds to the LEVEL BEFORE LIN parameter In the "Level" measuring mode with "Height Linearized" level type, this value corresponds to the TANK CONTENT parameter. **Prerequisite:** ■ Digital communication **On-site operation:** ■ For on-site operation, the MEASURED VALUE parameter is displayed on the 1st level.
PRESSURE (301) Display	Displays the measured pressure after sensor recalibration, position adjustment and damping. This value corresponds to the MEASURED VALUE parameter in the "Pressure" measuring mode.  P01-xMx7xxxx-05-xx-xx-xx-010
CORRECTED PRESS. (434) Display	Displays the measured pressure after sensor trim and position adjustment and before damping. → See also PRESSURE diagram.
SENSOR PRESSURE (584) Display	Displays the measured pressure before sensor trim, position adjustment and damping. → See also PRESSURE diagram.
SENSOR TEMP. (367) Display	Displays the temperature currently measured in the sensor. This temperature can deviate from the process temperature.

Table 28: (GROUP SELECTION →) OPERATING MENU → PROCESSINFO → PROCESS VALUES "Level"	
Parameter name	**Description**
MEAS. VAL. TREND (378) Display	Displays the trend of the pressure measured value. Possibilities: increasing, decreasing, constant
LEVEL BEFORE LIN (050) Display	Displays the level value prior to linearisation. **Prerequisite:** ■ LEVEL MODE = Linear or Height Linearized Depending on the setting for the LIN. MEASURAND or COMB. MEASURAND parameter, this parameter displays the current level in % or in a unit of level.
TANK CONTENT (370) Display	Displays the level value after linearisation. **Prerequisite:** ■ LEVEL MODE = Pressure Linearized or Height Linearized Depending on the settings for the LINd. MEASURAND or COMB. MEASURAND parameter, the current tank content is displayed in % or in a unit of volume or mass. This value corresponds to the MEASURED VALUE.

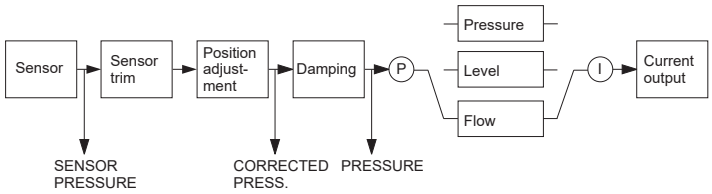
Table 29: (GROUP SELECTION →) OPERATING MENU → PROCESSINFO → PROCESS VALUES "Flow"	
Parameter name	**Description**
Prerequisite: ■ MEASURING MODE = Flow (→ see also Page 45).	
MEASURED VALUE (679)	Displays the measured value In the "Flow" measuring mode, this value corresponds to the SUPPRESSED FLOW parameter. **Prerequisite:** ■ Digital communication **On-site operation:** ■ For on-site operation, the MEASURED VALUE parameter is displayed on the 1st level.
PRESSURE (301) Display	Displays the measured pressure after sensor recalibration, position adjustment and damping. This value corresponds to the MEASURED VALUE parameter in the "Pressure" measuring mode.  P01-xMx7xxxx-05-xx-xx-xx-011
CORRECTED PRESS. (434) Display	Displays the measured pressure after sensor trim and position adjustment and before damping. → See also PRESSURE diagram.
SENSOR PRESSURE (584) Display	Displays the measured pressure before sensor trim, position adjustment and damping. → See also PRESSURE diagram.
SENSOR TEMP. (367) Display	Displays the temperature currently measured in the sensor. This temperature can deviate from the process temperature.
MEAS. VAL. TREND (378) Display	Displays the trend of the pressure measured value. Possibilities: increasing, decreasing, constant
SUPPRESSED FLOW (375) Display	Displays the current flow. Depending on the flow mode selected (→ FLOW-MEAS. TYPE), a volume flow, mass flow, standard volume flow or corrected volume flow is displayed.

Table 29: (GROUP SELECTION →) OPERATING MENU → PROCESSINFO → PROCESS VALUES "Flow"	
Parameter name	**Description**
TOTALIZER 1 (652) Display	Displays the total flow value of totalizer 1. You can reset the value with the RESET TOTALIZER 1 parameter. The TOTAL. 1 OVERFLOW parameter displays the overflow. **Example:** The value 123456789 m^3 is displayed as follows: – TOTALIZER 1: 3456789 m^3 – TOTAL. 1 OVERFLOW: 12 E7
TOTAL. 1 OVERFLOW (655) Display	Displays the overflow value of totalizer 1. → See also TOTALIZER 1.
TOTALIZER 2 (657) Display	Displays the total flow value of totalizer 2. You cannot reset totalizer 2. The TOTAL. 2 OVERFLOW parameter displays the overflow. → See also example for TOTALIZER 1.
TOTAL. 2 OVERFLOW (658) Display	Displays the overflow value of totalizer 2. → See also TOTALIZER 2 and example for TOTALIZER 1.

Table 30: (GROUP SELECTION →) OPERATING MENU → PROCESSINFO → PEAK HOLD INDICATOR	
Parameter name	**Description**
COUNTER:P > Pmax (380) Display	Displays the overpressure counter of the sensor The limit value is: upper nominal pressure limit of sensor + 10 % of upper nominal pressure limit of sensor. You can reset this counter by means of the RESET PEAKHOLD parameter.
MAX. MEAS. PRESS. (383) Display	Displays the largest measured pressure value (peak hold indicator). You can reset this indicator by means of the RESET PEAKHOLD parameter.
COUNTER P < Pmin (467) Display	Displays the vacuum pressure counter of the sensor The limit value is: lower nominal pressure limit of sensor – 10 % of upper nominal pressure limit of sensor. You can reset this counter by means of the RESET PEAKHOLD parameter.
MIN. MEAS. PRESS. (469) Display	Displays the smallest measured pressure value (peak hold indicator). You can reset this indicator by means of the RESET PEAKHOLD parameter.
COUNTER:T > Tmax (404) Display	Displays the number of times the specified temperature range of the sensor has been overshot. You can reset this counter by means of the RESET PEAKHOLD parameter.
MAX. MEAS. TEMP. (471) Display	Displays the largest measured temperature in the sensor (peak hold indicator). You can reset this indicator by means of the RESET PEAKHOLD parameter.
COUNTER:T < Tmin (472) Display	Displays the number of times the specified temperature range of the sensor has been undershot. You can reset this counter by means of the RESET PEAKHOLD parameter.
MIN. MEAS. TEMP. (474) Display	Displays the smallest measured temperature in the sensor (peak hold indicator). You can reset this indicator by means of the RESET PEAKHOLD parameter.
PCB COUNT:T > Tmax (488) Display	Displays the number of times the specified temperature range of the electronics has been overshot.
PCB MAX. TEMP. (490) Display	Displays the largest electronics temperature measured.
PCB COUNT:T < Tmin (492) Display	Displays the number of times the specified temperature range of the electronics has been undershot.
PCB MIN. TEMP. (494) Display	Displays the smallest electronics temperature measured.

Table 30: (GROUP SELECTION →) OPERATING MENU → PROCESSINFO → PEAK HOLD INDICATOR	
Parameter name	**Description**
RESET PEAKHOLD (382) Selection	This parameter lists all the peak hold indicator parameters that can be reset. You can select the peak hold indicators you want to reset. **Options:** ■ None ■ Max. pressure ■ Min. pressure ■ Pmax history ■ Pmin history ■ Max. temp. ■ Min. temp. ■ Tmax history ■ Tmin history ■ Reset all **Factory setting:** None

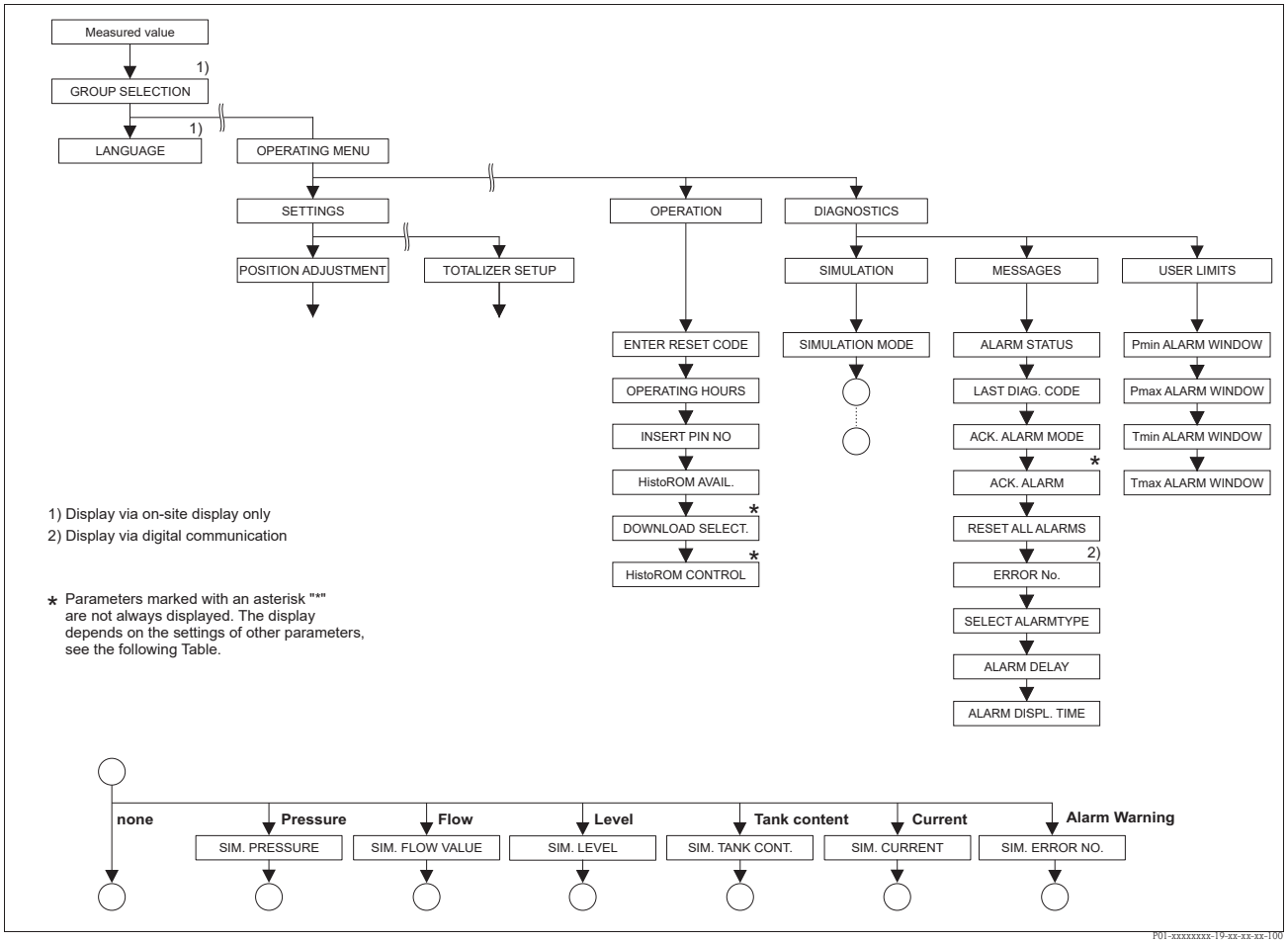


Fig. 46: OPERATING and DIAGNOSTICS group
→ For the OPERATING group, see Page 126, Table 31
→ For the SIMULATION function group, see Page 127, Table 32
→ For the MESSAGES function group, see Page 128, Table 33
→ For the USER LIMITS function group, see Page 130, Table 34

Table 31: (GROUP SELECTION →) OPERATING MENU → OPERATING	
Parameter name	**Description**
ENTER RESET CODE (047) Entry	Reset parameters completely or partially to factory values or delivery status. → See also Operating Instructions BA00270P (Deltabar S), BA00271P (Cerabar S) or BA00332P (Deltapilot S), Section 5.10 "Factory setting" (reset). **Factory setting:** 0
OPERATING HOURS (409) Display	Displays the hours of operation. This parameter cannot be reset.
INSERT PIN NO (048) Entry	For entering a code to lock or unlock operation. Note! ■ The -symbol on the on-site display indicates that operation is locked. Parameters which refer to how the display appears, e.g. LANGUAGE and DISPLAY CONTRAST can still be altered. ■ If operation is locked by means of the DIP-switch, you can only unlock operation again by means of the DIP-switch. If operation is locked by means of the on-site display or remote operation e.g. FieldCare, you can unlock operation again by means of the on-site display or using remote operation. → See also Operating Instructions BA00270P (Deltabar S), BA00271P (Cerabar S) or BA00332P (Deltapilot S), Section 5.9 "Locking/unlocking operation". **Options:** ■ Lock: enter a number between 0...9999 which is ≠100. ■ Unlock: enter the number 100. **Factory setting:** 100
HistoROM AVAIL. (831) Display	Indicates whether the optional HistoROM®/M-DAT memory module is connected to the electronic insert. → See also Operating Instructions BA00270P (Deltabar S), BA00271P (Cerabar S) or BA00332P (Deltapilot S), Section 5.5 "HistoROM®/M-DAT (optional)". **Options:** ■ Yes (HistoROM®/M-DAT is attached to the electronic insert) ■ No (HistoROM®/M-DAT is not attached to the electronic insert)
DOWNLOAD SELECT (014) Options	Select download function from HistoROM to device. The selection has no effect on an upload from the device to the HistoROM. **Prerequisite:** ■ A HistoROM®/M-DAT is attached to the electronic insert (HistoROM AVAIL. = yes) **Options:** ■ Configuration copy: For this option, all parameters apart from the DEVICE SERIAL No, DEVICE DESIGN., CUST. TAG NUMBER, LONG TAG NUMBER, ADDITIONAL INFO., BUS ADDRESS, CURRENT MODE and the parameters of the POSITION ADJUSTMENT and PROCESS CONNECTION group are overwritten. ■ Device replacement: With this option, all parameters except for DEVICE SERIAL No, DEVICE DESIGN. and the parameters of the POSITION ADJUSTMENT and PROCESS CONNECTION group are overwritten. ■ Electronics replace: With this option, all parameters except for the parameters of the POSITION ADJUSTMENT group are overwritten. **Factory setting:** Copy config. (if HistoROM®/M-DAT is attached to the electronic insert)

Table 31: (GROUP SELECTION →) OPERATING MENU → OPERATING	
Parameter name	**Description**
HistoROM CONTROL (832) Selection	For selecting the direction for copying the data. → See also Operating Instructions BA00270P (Deltabar S), BA00271P (Cerabar S) or BA00332P (Deltapilot S), Section 5.5. "HistoROM®/M-DAT (optional)". **Prerequisite:** ■ A HistoROM®/M-DAT is attached to the electronic insert (HistoROM AVAIL. = yes) **Options:** ■ Abort ■ HistoROM → Device ■ Device → HistoROM **Factory setting:** Abort (if HistoROM®/M-DAT is connected to the electronic insert)

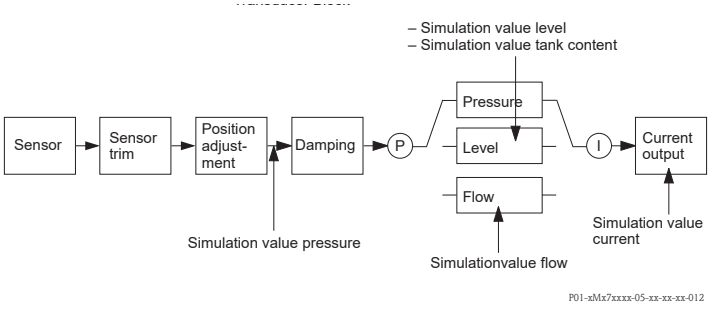
Table 32: (GROUP SELECTION →) OPERATING MENU → DIAGNOSTICS → SIMULATION	
Parameter name	**Description**
SIMULATION MODE (413) Selection	Switch on simulation and select simulation type. Any simulation running is switched off if the measuring mode or level type is changed. **Options**: ■ None ■ Pressure, → see also this table parameter description for SIM. PRESSURE ■ Flow (only differential pressure transmitter), → see also this table parameter description for SIM. FLOW VALUE ■ Level, → see also this table parameter description for SIM. LEVEL ■ Tank content, → see also this table parameter description for SIM. TANK CONT. ■ Current, → see also this table parameter description for SIM. CURRENT Note: The "Flow" measuring mode has to be selected in the LINEAR/SQROOT parameter to ensure the current output corresponds to the simulated flow value. ■ Alarm/warning, , → see also this table parameter description for SIM. ERROR NO.  **Factory setting:** None
SIM. PRESSURE (414) Entry	Enter simulation value. → See also SIMULATION MODE. **Prerequisite:** ■ SIMULATION MODE = Pressure **Factory setting:** Current pressure measured value
SIM. FLOW VALUE (639) Entry	Enter simulation value. → See also SIMULATION MODE. **Prerequisite:** ■ MEASURING MODE = Pressure and SIMULATION MODE = Flow ■ MEASURING MODE = Flow and SIMULATION MODE = Flow

Table 32: (GROUP SELECTION →) OPERATING MENU → DIAGNOSTICS → SIMULATION	
Parameter name	**Description**
SIM. LEVEL (714) Entry	Enter simulation value. → See also SIMULATION MODE. **Prerequisite:** ■ MEASURING MODE = Level and SIMULATION MODE = Level
SIM. TANK CONT. (715) Entry	Enter simulation value. → See also SIMULATION MODE. **Prerequisites:** ■ MEASURING MODE = Level, LEVEL MODE = Pressure Linearized and SIMULATION MODE = Tank content ■ MEASURING MODE = Level, LEVEL MODE = Height Linearized and SIMULATION MODE = Tank content
SIM. CURRENT (270) Entry	Enter simulation value. → See also SIMULATION MODE. **Prerequisite:** ■ SIMULATION MODE = Current value **Factory setting:** Current current value
SIM. ERROR NO. (476) Entry	⚠ Warning! The SIMULATION parameter overwrites fault states (alarm/warning) that are actually present. When the simulation is ended, the fault states (alarm/warning) still persist but are no longer displayed! When the device is restarted it returns to its fault state. Enter message number. → See also SIMULATION MODE. → See also these Operating Instructions, Section 8.1 "Messages", "Code" table column. **Prerequisite:** ■ SIMULATION MODE = Alarm/Warning **Factory setting:** 613 (simulation active)

Table 33: (GROUP SELECTION →) OPERATING MENU → DIAGNOSTICS → MESSAGES	
Parameter name	**Description**
ALARM STATUS (046) Display	Displays the current messages present. → See also these Operating Instructions, Section 8.1. "Messages" and Section 8.3 "Confirming messages". **On-site display** ■ The measured value display shows the message with the highest priority. ■ The ALARM STATUS parameter shows all the messages in descending order of priority. You can scroll through all the messages present with the ⊞ or ⊟ key. **Operating program** ■ The "Status" field and the ALARM STATUS parameter show the message with the highest priority.
LAST DIAG. CODE (564) Display	Displays the last messages that occurred and were eliminated. ✎ Note! ■ On-site display: you can scroll through the last 15 messages with the ⊞ or ⊟ key. ■ Digital communication: the last message appears on the display. ■ Use the RESET ALL ALARMS parameter to delete the messages listed in the LAST DIAG. CODE parameter.
ACK. ALARM MODE (401) Selection	Switch on acknowledge alarm mode. → See also ACK. ALARM. **Options:** ■ On ■ Off **Factory setting:** Off

Table 33: (GROUP SELECTION →) OPERATING MENU → DIAGNOSTICS → MESSAGES	
Parameter name	**Description**
ACK. ALARM (500) Selection	Acknowledge alarm. **Prerequisite:** ■ ACK. ALARM MODE = on **Options:** ■ Abort ■ Confirm The cause of the alarm must be eliminated, the message must be acknowledged via the ACK. ALARM parameter and, where applicable, the ALARM DISPL. TIME (→ Page 129) has to have elapsed before the device starts measuring again following an alarm. → See also these Operating Instructions, Section 8.3 "Confirming messages". **Factory setting:** Abort
RESET ALL ALARMS (603) Selection	Use this parameter to reset all the messages of the LAST DIAG. CODE parameter. **Options:** ■ Abort ■ Confirm **Factory setting:** Abort
ERROR No. Entry	For "Error"-type messages, you can decide whether the device should behave as in the event of an alarm (A) or as in the event of a warning (W). Enter the corresponding message number for this parameter. → See also SELECT ALARMTYPE. → See also these Operating Instructions, Section 8.1 "Messages" and Section 8.2 "Response of outputs to errors". **Prerequisite:** ■ Digital communication
SELECT ALARMTYPE (595) – Entry (600) – Selection	For "Error"-type messages, you can decide whether the device should behave as in the event of an alarm (A) or as in the event of a warning (W). → See also ERROR No. → See also these Operating Instructions, Section 8.2 "Response of outputs to errors". **Options**: ■ Alarm (A): output current assumes a defined value. ■ Warning (W): device continues measuring **On-site operation:** 1. Enter the corresponding message number for ERROR No. field. 2. Select "Alarm" or "Warning" option. **Digital communication:** 1. Enter the corresponding message number via the ERROR No. parameter. 2. Use the SELECT ALARMTYPE parameter to select the "Alarm" or "Warning" option.
ALARM DELAY (336) Entry	Enter alarm response time for all "Error" messages. Note! There is no alarm if the cause of the error is eliminated within the alarm delay time. **Input range:** 0...100 s **Factory setting:** 0.0 s
ALARM DISPL. TIME (480) Entry	Enter alarm display time for all "Error" messages. Once the cause of the error is rectified, the alarm display time starts running. Note! The following applies if the setting for ACK. ALARM MODE = on: If an alarm appears and the alarm display time elapses before the alarm has been acknowledged, the message will be cleared once it has been acknowledged. → See also these Operating Instructions, Section 8.3 "Confirming messages". **Input range:** 0...999.9 s **Factory setting:** 0.0 s

Table 34: (GROUP SELECTION →) OPERATING MENU → DIAGNOSTICS → USER LIMITS	
Parameter name	**Description**
Pmin ALARM WINDOW (332) Entry	Customer-specific process monitoring – enter lower pressure limit. You can use the SELECT ALARMTYPE parameter to enter how the device responds if the operating pressure undershoots the specified value. → See also these Operating Instructions, Section 8.1 "Messages", table, Code E730 and Section 8.2. "Response of outputs to errors". **Factory setting:** Low sensor limit ■1.1 (→ For the low sensor limit, see PRESS. SENS LOLIM.)
Pmax ALARM WINDOW (333) Entry	Customer-specific process monitoring – enter upper pressure limit. You can use the SELECT ALARMTYPE parameter to enter how the device responds if the operating pressure undershoots the specified value. → See also these Operating Instructions, Section 8.1 "Messages", table, Code E731 and Section 8.2. "Response of outputs to errors". **Factory setting:** High sensor limit ■1.1 (→ For the high sensor limit, see PRESS. SENS HILIM.)
Tmin ALARM WINDOW (334) Entry	Customer-specific process monitoring – enter lower temperature limit. You can use the SELECT ALARMTYPE parameter to enter how the device responds if the operating pressure undershoots the specified value. → See also these Operating Instructions, Section 8.1 "Messages", table, Code E732 and Section 8.2. "Response of outputs to errors". **Factory setting:** Lower sensor temperature application limit – 10 K (→ For the lower temperature application limit, see Tmin SENSOR)
Tmax ALARM WINDOW (335) Entry	Customer-specific process monitoring – enter upper temperature limit. You can use the SELECT ALARMTYPE parameter to enter how the device responds if the operating pressure undershoots the specified value. → See also these Operating Instructions, Section 8.1 "Messages", table, Code E733 and Section 8.2. "Response of outputs to errors". **Factory setting:** Upper sensor temperature application limit +10 K (→ For the upper temperature application limit, see Tmax SENSOR)

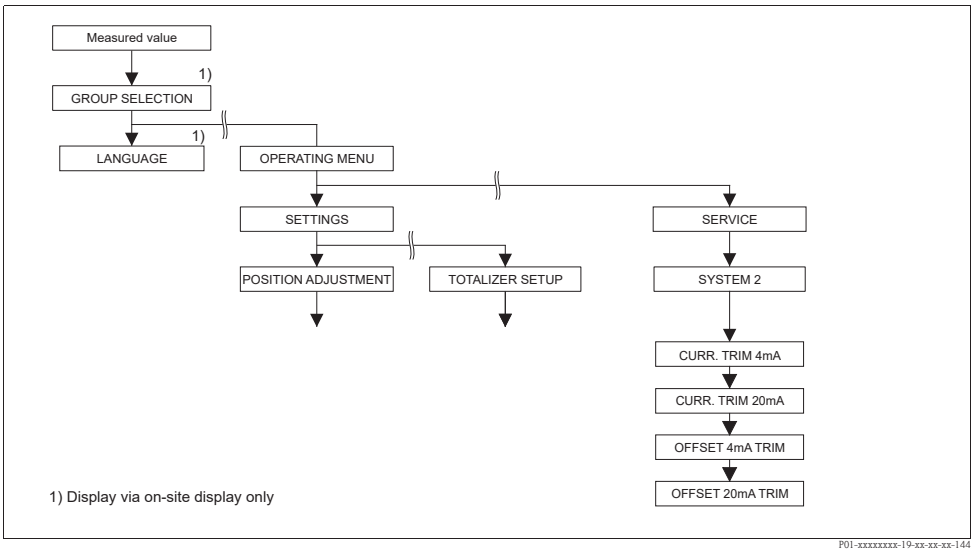


Fig. 47: SYSTEM 2 group

Table 35: (GROUP SELECTION →) OPERATING MENU → SERVICE → SYSTEM 2	
Parametername	**Beschreibung**
CURR. TRIM 4mA (045) Entry	Enter current value for the lower point (4 mA) of the current output trim line. You can adapt the current output to the transmission conditions with this parameter and CURR. TRIM 20mA. Perform current trim for the lower point as follows: 1. Select SIMULATION group. (Menu path: (GROUP SELECTION) → OPERATING MENU → DIAGNOSTICS → SIMULATION) 2. Select option "Current" via SIMULATION parameter. 3. Enter "4 mA" for SIM. CURRENT parameter. 4. Select SYSTEM 2 group. (Menu path: (GROUP SELECTION) → OPERATING MENU → SERVICE) 5. Enter the current value measured with the switching unit for the CURR. TRIM 4mA parameter. **Input range:** Measured current ±0.2 mA **Factory setting:** 4 mA
CURR. TRIM 20mA (042) Entry	Enter current value for the upper point (20 mA) of the current output trim line. You can adapt the current output to the transmission conditions with this parameter and CURR. TRIM 4mA. Perform current trim for the upper point as follows: 1. Select SIMULATION group. (Menu path: (GROUP SELECTION) → OPERATING MENU → DIAGNOSTICS → SIMULATION) 2. Select option "Current" via SIMULATION parameter. 3. Enter "20 mA" for SIM. CURRENT parameter. 4. Select SYSTEM 2 group. (Menu path: (GROUP SELECTION) → OPERATING MENU → SERVICE) 5. Enter the current value measured with the switching unit for the CURR. TRIM 20mA parameter. **Input range:** Measured current ±0.2 mA **Factory setting:** 20 mA
OFFSET 4mA TRIM (043) Display	Displays the difference between 4 mA and the value entered for the CURRENT TRIM 4mA parameter. **Factory setting:** 0
OFFSET 20mA TRIM (044) Display	Displays the difference between 20 mA and the value entered for the CURRENT TRIM 20mA parameter. **Factory setting:** 0

8 Trouble-shooting

8.1 Messages

The following table lists all the possible messages that can occur.
The device differentiates between the error types "Alarm", "Warning" and "Error". You may specify whether the instrument should react as if for an "Alarm" or "Warning" for "Error" messages.
→ See "Error type/NA 64" column and parameter descriptions for ERROR No. and SELECT ALARMTYPE (→ Page 129).

In addition, the "Error type/NA 64" column classifies the messages in accordance with NAMUR Recommendation NA 64:
- Break down: indicated with "B"
- Maintenance need: indicated with "C" (check request)
- Function check: indicated with "I" (in service)

Error message display on the on-site display:
- The measured value display shows the message with the highest priority. → See "Priority" column.
- The ALARM STATUS (→ Page 128) parameter shows all the messages present in descending order of priority. You can scroll through all the messages present with the ⊟-key or ⊞-key.

Message display via the digital communication:
- The ALARM STATUS (→ Page 128) parameter shows the message with the highest priority. → See "Priority" column.

Note!
- If the device detects a defect in the on-site display during initialization, special error messages are generated. → For the error messages, see Page 139, Section 8.1.1 "On-site display error messages".
- For support and further information, please contact Endress+Hauser Service.
- → See also Section 8.4, 8.5 and 8.6.

Code	Error type/ NA 64	Corresponds NE 107	Message/description	Cause	Measure	Prio rity
101 (A101)	Alarm B	Failure (F)	B>Sensor electronic EEPROM error	– Electromagnetic effects are greater than specifications in the technical data. → See Technical Information TI00382P (Deltabar S), TI00383P (Cerabar S) or TI00416P (Deltapilot S). This message normally only appears briefly. – Sensor defect.	– Wait a few minutes. – Restart the device. Perform reset (Code 62). – Block off electromagnetic effects or eliminate source of disturbance. – Replace sensor.	17
102 (W102)	Warning C	Maintenance request (M)	C>Checksum error in EEPROM: peakhold segment	– Main electronics defect. Correct measurement can continue as long as you do not need the peak hold indicator function.	– Replace main electronics.	53
106 (W106)	Warning C	Funktion check (C)	C>Downloading - please wait	– Downloading.	– Wait for download to complete.	52

Code	Error type/ NA 64	Corresponds NE 107	Message/description	Cause	Measure	Prio rity
110 (A110)	Alarm B	Failure (F)	B>Checksum error in EEPROM: configuration segment	– The supply voltage is disconnected when writing. – Electromagnetic effects are greater than specifications in the technical data. → See Technical Information TI00382P (Deltabar S), TI00383P (Cerabar S) or TI00416P (Deltapilot S). – Main electronics defect.	– Reestablish supply voltage. Perform reset (Code 7864) if necessary. Carry out calibration again. – Block off electromagnetic effects or eliminate sources of disturbance. – Replace main electronics.	6
113 (A113)	Alarm B	Failure (F)	B>ROM failure in transmitter electronic	– Main electronics defect.	– Replace main electronics.	1
115 (E115)	Error B factory setting: Warning C	Out of specification (S)	B>Sensor overpressure	– Overpressure present. – Sensor defect.	– Reduce pressure until message disappears. – Replace sensor.	29
116 (W116)	Warning C	Maintenance request (M)	C>Download error, repeat download	– The file is defect. – During the download, the data are not correctly transmitted to the processor, e.g. because of open cable connections, spikes (ripple) on the supply voltage or electromagnetic effects.	– Use another file. – Check cable connection PC – transmitter. – Block off electromagnetic effects or eliminate sources of disturbance. – Perform reset (Code 7864) and carry out calibration again. – Repeat download.	36
120 (E120)	Error B factory setting: Warning C	Out of specification (S)	B>Sensor low pressure	– Pressure too low. – Sensor defect.	– Increase pressure until message disappears. – Replace sensor.	30
121 (A121)	Alarm B	Failure (F)	B>Checksum error in factory segment of EEPROM	– Main electronics defect.	– Replace main electronics.	5
122 (A122)	Alarm B	Failure (F)	B>Sensor not connected	– Cable connection sensor –main electronics disconnected. – Electromagnetic effects are greater than specifications in the technical data. → See Technical Information TI00382P (Deltabar S), TI00383P (Cerabar S) or TI00416P (Deltapilot S). – Main electronics defect. – Sensor defect.	– Check cable connection and repair if necessary. – Block off electromagnetic effects or eliminate source of disturbance. – Replace main electronics. – Replace sensor.	13
130 (A130)	Alarm B	Failure (F)	B>EEPROM is defect.	– Main electronics defect.	– Replace main electronics.	10
131 (A131)	Alarm B	Failure (F)	B>Checksum error in EEPROM: min/max segment	– Main electronics defect.	– Replace main electronics.	9
132 (A132)	Alarm B	Failure (F)	B>Checksum error in totalizer EEPROM	– Main electronics defect.	– Replace main electronics.	7
133 (A133)	Alarm B	Failure (F)	B>Checksum error in History EEPROM	– An error occurred when writing. – Main electronics defect.	– Perform reset (Code 7864) and carry out calibration again. – Replace electronics.	8
602 (W602)	Warning C	Funktion check (C)	C>Linearisation curve not monotone	– The linearisation table is not monotonic increasing or decreasing.	– Add to linearisation table or perform linearisation again.	57

Code	Error type/ NA 64	Corresponds NE 107	Message/description	Cause	Measure	Prio rity
604 (W604)	Warning C	Funktion check (C)	C>Linearisation table not valid. Less than 2 points or points too close	✎ Note! From software version "02.10.xx" onwards, there is no min. span for the Y-points.		
				– The linearisation table consists of less than 2 points.	– Add to linearisation table. If necessary, perform linearisation again.	58
				– At least 2 points in the linearisation table are too close together. A minimum gap of 0.5 % of the distance between two points must be maintained. Spans for the "Pressure linearized" option: HYDR. PRESS MAX. – HYDR. PRESS MIN.; TANK CONTENT MAX. – TANK CONTENT MIN. Spans for the "Height linearized" option: LEVEL MAX – LEVEL MIN; TANK CONTENT MAX. – TANK CONTENT MIN.	– Correct linearisation table and accept again.	
613 (W613)	Warning I	Funktion check (C)	I>Simulation is active	– Simulation is switched on, i.e. the device is not measuring at present.	– Switch off simulation.	60
620 (E620)	Error C Factory setting: Warning C	Out of specification (S)	C>Current output out of range	The current is outside the permitted range 3.8 to 20.5 mA. – The pressure applied is outside the set measuring range (but within the sensor range).	– Check pressure applied, reconfigure measuring range if necessary (→ See also these Operating Instructions, chapter 4 to 6.) – Perform reset (Code 7864) and carry out calibration again.	49
				– Loose connection at sensor cable	– Wait a short period of time and tighten the connection, or avoid loose connection.	
700 (W700)	Warning C	Maintenance request (M)	C>Last configuration not stored	– An error occurred when writing or reading configuration data or the power supply was disconnected.	– Perform reset (Code 7864) and carry out calibration again.	54
				– Main electronics defect.	– Replace main electronics.	
701 (W701)	Warning C	Funktion check (C)	C>Measuring chain config. exceeds sensor range	– The calibration carried out would result in the sensor nominal operating range being undershot or overshot.	– Carry out calibration again.	50
702 (W702)	Warning C	Maintenance request (M)	C>HistoROM data not consistent.	– Data were not written correctly to the HistoROM, e.g. if the HistoROM was detached during the writing process.	– Repeat upload. – Perform reset (Code 7864) and carry out calibration again.	55
				– HistoROM does not have any data.	– Copy suitable data to the HistoROM. (→ See also Operating Instructions BA00270P (Deltabar S), BA00271P (Cerabar S) or BA00332P (Deltapilot S), Section 5.5.1 "Copying configuration data".)	
703 (A703)	Alarm B	Failure (F)	B>Measurement error	– Fault in the main electronics.	– Briefly disconnect device from the power supply.	22
				– Main electronics defect.	– Replace main electronics.	

Code	Error type/ NA 64	Corresponds NE 107	Message/description	Cause	Measure	Prio rity
704 (A704)	Alarm B	Funktion check (C)	B>Measurement error	– Fault in the main electronics. – Main electronics defect.	– Briefly disconnect device from the power supply. – Replace main electronics.	12
705 (A705)	Alarm B	Failure (F)	B>Measurement error	– Fault in the main electronics. – Main electronics defect.	– Briefly disconnect device from the power supply. – Replace main electronics.	21
706 (W706)	Warning C	Maintenance request (M)	C>Configuration in HistoROM and device not identical	– Configuration (parameters) in the HistoROM and in the device is not identical.	– Copy data from the device to the HistoROM. – Copy data from the HistoROM to the device. The message remains if the HistoROM and the device have different software versions. The message goes out if you copy the data from the device to the HistoROM. – Device reset codes such as 7864 do not have any effect on the HistoROM. That means that if you do a reset, the configurations in the HistoROM and in the device may not be the same. → See also Operating Instructions BA00270P (Deltabar S), BA00271P (Cerabar S), BA00332P (Deltapilot S) Section 5.5.1 "Copying configuration data".	59
707 (A707)	Alarm B	Funktion check (C)	B>X-VAL. of lin. table out of edit limits.	– At least one X-VALUE in the linearisation table is either below the value for HYDR. PRESS MIN. or MIN. LEVEL or above the value for HYDR. PRESS. MAX. or LEVEL MAX.	– Carry out calibration again. (→ See also these Operating Instructions, chapter 5.)	38
710 (W710)	Warning C	Funktion check (C)	B>Set span too small. Not allowed.	– Values for calibration (e.g. lower range value and upper range value) are too close together. – The sensor was replaced and the customer-specific configuration does not suit the sensor. – Unsuitable download carried out.	– Adjust calibration to suit sensor. (→ See also Page 119, parameter description MINIMUM SPAN.) – Adjust calibration to suit sensor. – Replace sensor with a suitable sensor. – Check configuration and perform download again.	51
711 (A711)	Alarm B	Funktion check (C)	B>LRV or URV out of edit limits	– Lower range value and/or upper range value undershoot or overshoot the sensor range limits. – The sensor was replaced and the customer-specific configuration does not suit the sensor. – Unsuitable download carried out.	– Reconfigure lower range value and/or upper range value to suit the sensor. Pay attention to position factor. – Reconfigure lower range value and/or upper range value to suit the sensor. Pay attention to position factor. – Replace sensor with a suitable sensor. – Check configuration and perform download again.	37
713 (A713)	Alarm B	Funktion check (C)	B>100% POINT level out of edit limits	– The sensor was replaced.	– Carry out calibration again.	39

Code	Error type/ NA 64	Corresponds NE 107	Message/description	Cause	Measure	Prio rity
715 (E715)	Error C Factory setting: Warning C	Out of specification (S)	C>Sensor over temperature	– The temperature measured in the sensor is greater than the upper nominal temperature of the sensor. (→ See also Page 120, parameter description Tmax SENSOR.) – Unsuitable download carried out.	– Reduce process temperature/ ambient temperature. – Check configuration and perform download again.	32
716 (E716)	Error B Factory setting: Alarm B	Failure (F)	B>Process isolating diaphragm broken	– Sensor defect.	– Replace sensor. – Reduce pressure.	24
717 (E717)	Error C Factory setting: Warning C	Out of specification (S)	C>Transmitter over temperature	– The temperature measured in the electronics is greater than the upper nominal temperature of the electronics (+88 °C). – Unsuitable download carried out.	– Reduce ambient temperature. – Check configuration and perform download again.	34
718 (E718)	Error C Factory setting: Warning C	Out of specification (S)	C>Transmitter under temperature	– The temperature measured in the electronics is smaller than the lower nominal temperature of the electronics (–43 °C). – Unsuitable download carried out.	– Increase ambient temperature. Insulate device if necessary. – Check configuration and perform download again.	35
719 (A719)	Alarm B	Funktion check (C)	B>Y-VAL of lin. table out of edit limits	– At least on Y-VALUE in the linearisation table is below the MIN. TANK CONTANT or above the MAX. TANK CONTENT.	– Carry out calibration again. (→ See also Operating Instructions BA00274P, chapter 5 or these Operating Instructions, Page 2.)	40
720 (E720)	Error C Factory setting: Warning C	Out of specification (S)	C>Sensor under temperature	– The temperature measured in the sensor is smaller than the lower nominal temperature of the sensor. (→ See also Page 120, parameter description Tmin SENSOR.) – Unsuitable download carried out. – Loose connection at sensor cable	– Increase process temperature/ ambient temperature. – Check configuration and perform download again. – Wait a short period of time and tighten the connection, or avoid loose connection.	33
721 (A721)	Alarm B	Funktion check (C)	B>ZERO POSITION level out of edit limits	– LEVEL MIN or LEVEL MAX has been changed.	– Perform reset (Code 2710) and carry out calibration again.	41
722 (A722)	Alarm B	Funktion check (C)	B>EMPTY CALIB. or FULL CALIB. out of edit limits	– LEVEL MIN or LEVEL MAX has been changed.	– Perform reset (Code 2710) and carry out calibration again.	42
723 (A723)	Alarm B	Funktion check (C)	B>MAX. FLOW out of edit limits	– FLOW-MEAS. TYPE has been changed.	– Carry out calibration again.	43

Code	Error type/ NA 64	Corresponds NE 107	Message/description	Cause	Measure	Prio rity
725 (A725)	Alarm B	Failure (F)	B>Sensor connection error, cycle disturbance	– Electromagnetic effects are greater than specifications in the technical data. → See Technical Information TI00382P (Deltabar S), TI00383P (Cerabar S) or TI00416P (Deltapilot S). – Setscrew loose. – Sensor or main electronics defect.	– Block off electromagnetic effects or eliminate source of disturbance. – Retighten setscrew with 1 Nm (0,74 lbf ft) (see chapter "Rotating the housing" in BA00270P (Deltabar S), BA00271P (Cerabar S), BA00332P (Deltapilot S). – Replace sensor or main electronics.	25
726 (E726)	Error C Factory setting: Warning C	Out of specification (S)	C>Sensor temperature error - overrange	– Electromagnetic effects are greater than specifications in the technical data. → See Technical Information TI00382P (Deltabar S), TI00383P (Cerabar S) or TI00416P (Deltapilot S). – Process temperature is outside permitted range. – Sensor defect.	– Block off electromagnetic effects or eliminate source of disturbance. – Check temperature present, reduce or increase if necessary. – If the process temperature is within the permitted range, replace sensor.	31
727 (E727)	Error C Factory setting: Warning C	Out of specification (S)	C>Sensor pressure error - overrange	– Electromagnetic effects are greater than specifications in the technical data. → See Technical Information TI00382P (Deltabar S), TI00383P (Cerabar S) or TI00416P (Deltapilot S). – Pressure is outside permitted range. – Sensor defect.	– Block off electromagnetic effects or eliminate source of disturbance. – Check pressure present, reduce or increase if necessary. – If the pressure is within the permitted range, replace sensor.	28
728 (A728)	Alarm B	Failure (F)	B>RAM error	– Fault in the main electronics. – Main electronics defect.	– Briefly disconnect device from the power supply. – Replace main electronics.	2
729 (A729)	Alarm B	Failure (F)	B>RAM error	– Fault in the main electronics. – Main electronics defect.	– Briefly disconnect device from the power supply. – Replace main electronics.	3
730 (E730)	Error C Factory setting: Warning C	Out of specification (S)	C>LRV user limits exceeded	– Pressure measured value has undershot the value specified for the Pmin ALARM WINDOW parameter. – Loose connection at sensor cable	– Check system/pressure measured value. – Change value for Pmin ALARM WINDOW if necessary. (→ See also Page 130, parameter description Pmin ALARM WINDOW.) – Wait a short period of time and tighten the connection, or avoid loose connection.	46

Code	Error type/ NA 64	Corresponds NE 107	Message/description	Cause	Measure	Prio rity
731 (E731)	Error C Factory setting: Warning C	Out of specification (S)	C>URV user limits exceeded	– Pressure measured value has overshot the value specified for the Pmax ALARM WINDOW parameter.	– Check system/pressure measured value. – Change value for Pmax ALARM WINDOW if necessary. (→ See also Page 130, parameter description Pmax ALARM WINDOW.)	45
		Out of specification (S)		– Loose connection at sensor cable	– Wait a short period of time and tighten the connection, or avoid loose connection.	
732 (E732)	Error C Factory setting: Warning C		C>LRV Temp. User limits exceeded	– Temperature measured value has undershot the value specified for the Tmin ALARM WINDOW parameter.	– Check system/temperature measured value. – Change value for Tmin ALARM WINDOW if necessary. (→ See also Page 130, parameter description Tmin ALARM WINDOW.)	48
733 (E733)	Error C Factory setting: Warning C	Out of specification (S)	C>URV Temp. User limits exceeded	– Temperature measured value has overshot the value specified for the Tmax ALARM WINDOW parameter.	– Check system/temperature measured value. – Change value for Tmax ALARM WINDOW if necessary. (→ See also Page 130, parameter description Tmax ALARM WINDOW.)	47
736 (A736)	Alarm B	Failure (F)	B>RAM error	– Fault in the main electronics. – Main electronics defect.	– Briefly disconnect device from the power supply. – Replace main electronics.	4
737 (A737)	Alarm B	Failure (F)	B>Measurement error	– Fault in the main electronics. – Main electronics defect.	– Briefly disconnect device from the power supply. – Replace main electronics.	20
738 (A738)	Alarm B	Failure (F)	B>Measurement error	– Fault in the main electronics. – Main electronics defect.	– Briefly disconnect device from the power supply. – Replace main electronics.	19
739 (A739)	Alarm B	Failure (F)	B>Measurement error	– Fault in the main electronics. – Main electronics defect.	– Briefly disconnect device from the power supply. – Replace main electronics.	23
740 (E740)	Error C Factory setting: Warning C	Maintenance request (M)	C>Calculation overflow, bad configuration	– Level measuring mode: the measured pressure has undershot the value for HYDR. PRESS. MIN. or overshot the value for HYDR. PRESS MAX. – Level measuring mode: The measured level did not reach the LEVEL MIN value or exceeded the LEVEL MAX value. – Flow measuring mode: the measured pressure has undershot the value for MAX. PRESS FLOW.	– Check configuration and carry out calibration again if necessary. – Select a device with a suitable measuring range. – Check configuration and carry out calibration again if necessary. (→ See also parameter description LEVEL MIN., Page 86.) – Check configuration and carry out calibration again if necessary. – Select a device with a suitable measuring range.	27
741 (A741)	Alarm B	Funktion check (C)	B>TANK HEIGHT out of edit limits	– LEVEL MIN or LEVEL MAX has been changed.	– Perform reset (Code 2710) and carry out calibration again.	44

Code	Error type/ NA 64	Corresponds NE 107	Message/description	Cause	Measure	Prio rity
742 (A742)	Alarm B	Failure (F)	B>Sensor connection error (upload)	– Electromagnetic effects are greater than specifications in the technical data. → See Technical Information TI00382P (Deltabar S), TI00383P (Cerabar S) or TI00416P (Deltapilot S). This message normally only appears briefly. – Cable connection sensor – main electronics disconnected. – Sensor defect.	– Wait a few minutes. – Perform reset (Code 7864) and carry out calibration again. – Check cable connection and repair if necessary. – Replace sensor.	18
743 (E743)	Alarm B	Failure (F)	B>Electronic PCB error during initialisation	– This message normally only appears briefly. – Main electronics defect.	– Wait a few minutes. – Restart the device. Perform reset (Code 62). – Replace main electronics.	14
744 (A744)	Alarm B	Failure (F)	B>Main electronic PCB error	– Electromagnetic effects are greater than specifications in the technical data. → See Technical Information TI00382P (Deltabar S), TI00383P (Cerabar S) or TI00416P (Deltapilot S). – Main electronics defect.	– Restart the device. Perform reset (Code 62). – Block off electromagnetic effects or eliminate source of disturbance. – Replace main electronics.	11
745 (W745)	Warning C	Maintenance request (M)	C>Sensor data unknown	– Sensor does not suit the device (electronic sensor nameplate). Device continues measuring.	– Replace sensor with a suitable sensor.	56
746 (W746)	Warning C	Funktion check (C)	C>Sensor connection error - initialising	– Electromagnetic effects are greater than specifications in the technical data. This message normally only appears briefly. → See Technical Information TI00382P (Deltabar S), TI00383P (Cerabar S) or TI00416P (Deltapilot S). – Overpressure or low pressure present.	– Wait a few minutes. – Restart the device. Perform reset (Code 7864). – Block off electromagnetic effects or eliminate source of disturbance. – Reduce or increase pressure.	26
747 (A747)	Alarm B	Failure (F)	B>Sensor software not compatible to electronics	– Sensor does not suit the device (electronic sensor nameplate).	– Replace sensor with a suitable sensor.	16
748 (A748)	Alarm B	Failure (F)	B>Memory failure in signal processor	– Electromagnetic effects are greater than specifications in the technical data. → See Technical Information TI00382P (Deltabar S), TI00383P (Cerabar S) or TI00416P (Deltapilot S). – Main electronics defect.	– Block off electromagnetic effects or eliminate source of disturbance. – Replace main electronics.	15

8.1.1 On-site display error messages

If the device detects a defect in the on-site display during initialization, the following error messages can be displayed:

Message	Measure
Initialization, VU Electr. Defect A110	Exchange on-site display.
Initialization, VU Electr. Defect A114	
Initialization, VU Electr. Defect A281	
Initialization, VU Checksum Err. A110	
Initialization, VU Checksum Err. A112	
Initialization, VU Checksum Err. A171	

8.2 Response of outputs to errors

The device differentiates between the error types Alarm, Warning and Error.
→ See also Section 8.1 "Messages" und Page 111 ff, Table 20: OUTPUT and Page 111 ff, Table 31: MESSAGES the following table and Page 132, Section 8.1 "Messages".

Output	**A (Alarm)**	**W (Warning)**	**E (Error: Alarm/Warning)**
Current output	Assumes the value specified via the OUTPUT FAIL MODE[1)], ALT. CURR. OUTPUT[1] and SET MAX. ALARM[1] parameter. → See also the following section "Configuring current output for an alarm".	Device continues measuring.	For this error, you can enter whether the device should react as in the event of an alarm or as in the event of a warning. See corresponding "Alarm" or "Warning" column. (→ See also these Operating Instructions, parameter description SELECT ALARM TYPE.)
Bargraph (on-site display)	The bargraph adopts the value defined by the OUTPUT FAIL MODE [1] parameter.	The bargraph adopts the value which corresponds to the current value.	→ See this table, column "Alarm" or "Warning".
On-site display	– The measured value and message are displayed alternately – Measured value display: ↯ -symbol is permanently displayed. Message display – 3-digit number such as A122 and description	– The measured value and message are displayed alternately – Measured value display: ↯ -symbol flashes. Message display: – 3-digit number such as W613 and description	– The measured value and message are displayed alternately – Measured value display: see corresponding "Alarm" or "Warning" column Message display: – 3-digit number such as E731 and description
Remote operation (Digital communication)	In the case of an alarm, the ALARM STATUS[2)] parameter displays a 3-digit number such as 122 for "Sensor not connected".	In the case of a warning, the ALARM STATUS[2] parameter displays a 3-digit number such as 613 for "Simulation is active".	In the case of an error, the ALARM STATUS[2] parameter displays a 3-digit number such as 731 for "URV user limits exceeded".

1) Menu path: (GROUP SELECTION →) OPERATING MENU → OUTPUT

2) Menu path: (GROUP SELECTION →) OPERATING MENU → MESSAGES

8.3 Confirming messages

Depending on the settings for the ALARM DISPL. TIME (→ Page 129) and ACK. ALARM MODE (→ Page 128) parameters, the following measures should be taken to clear a message:

Settings [1]	Measures
– ALARM DISPL. TIME = 0 s – ACK. ALARM MODE = off	– Rectify cause of the message (see also Section 8.1).
– ALARM DISPL. TIME > 0 s – ACK. ALARM MODE = off	– Rectify cause of the message (see also Section 8.1). – Wait for the alarm display time to elapse.
– ALARM DISPL. TIME = 0 s – ACK. ALARM MODE = on	– Rectify cause of the message (see also Section 8.1). – Confirm message using ACK. ALARM parameter.
– ALARM DISPL. TIME > 0 s – ACK. ALARM MODE = on	– Rectify cause of the message (see also Section 8.1). – Confirm message using ACK. ALARM parameter. – Wait for the alarm display time to elapse. If a message appears and the alarm display time elapses before the message has been acknowledged, the message will be cleared once it has been acknowledged.

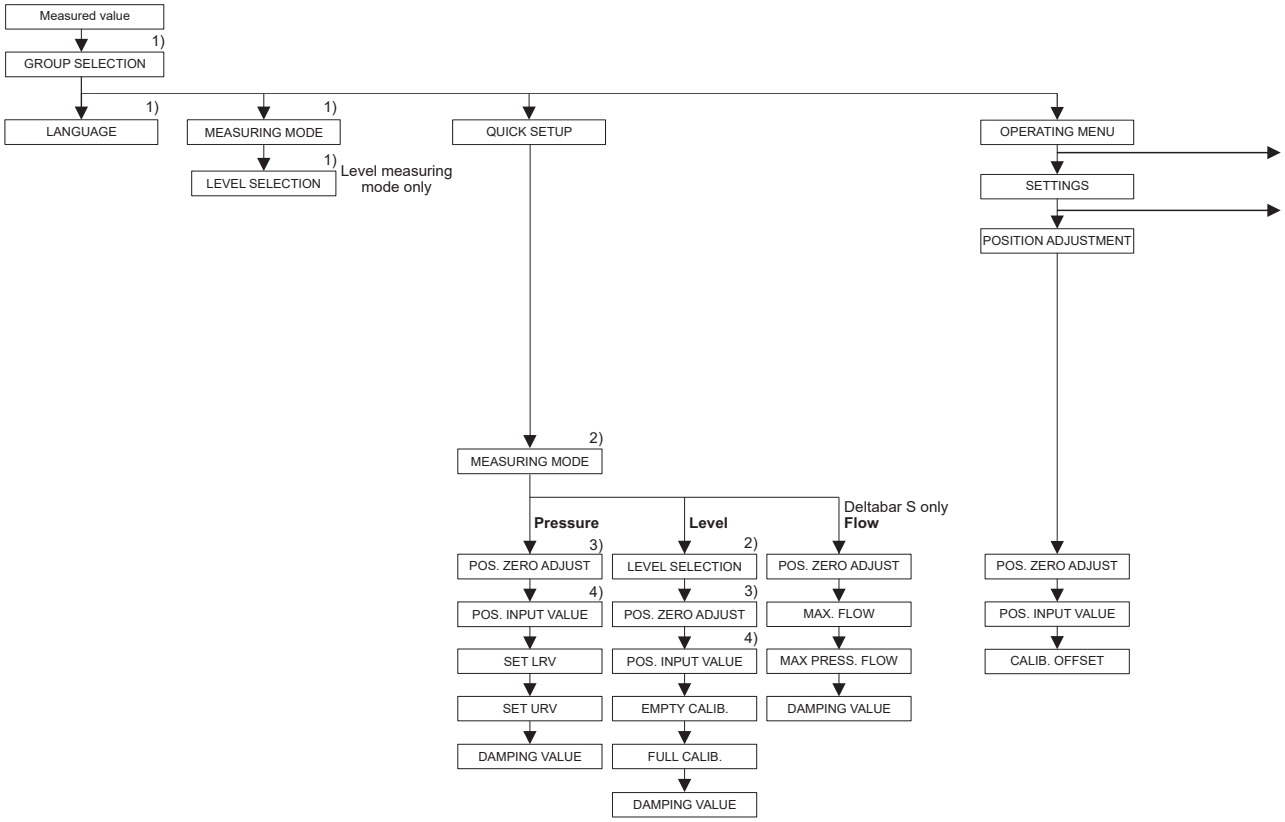
1) Menu path for ALARM DISPL. TIME and ACK. ALARM MODE: (GROUP SELECTION →) OPERATING MENU → DIAGNOSTICS → MESSAGES

If the on-site display displays a message, you can delete it with the E-key.
If there are several messages, the on-site display shows the message which has the highest priority (see also Section 8.1). Once you have deleted this message using the E-key, the message with the next highest priority is displayed. You can use the E-key to delete each message, one after the other. The ALARM STATUS parameter continues to display all the messages present.

9 Appendix

9.1 Operating menu for on-site display, Digital communication

Note!
- The entire menu is depicted on the following pages.
- The menu has a different structure depending on the measuring mode selected. This means that some function groups are only displayed for one measuring mode, e.g. "LINEARISATION" function group for the Level measuring mode (Menu path: (GROUP SELECTION →) OPERATING MENU → SETTINGS → BASIC SETUP).
- In addition, there are also parameters that are only displayed if other parameters are appropriately configured. For example the Customer Unit P parameter is only displayed if the "User unit" option was selected for the PRESS. ENG. UNIT parameter. These parameters are indicated with a "*".
- For a description of the parameters, please refer to chapter 7 "Description of parameters". The exact dependency of individual parameters on one another is explained here.



1) Display via on-site display only

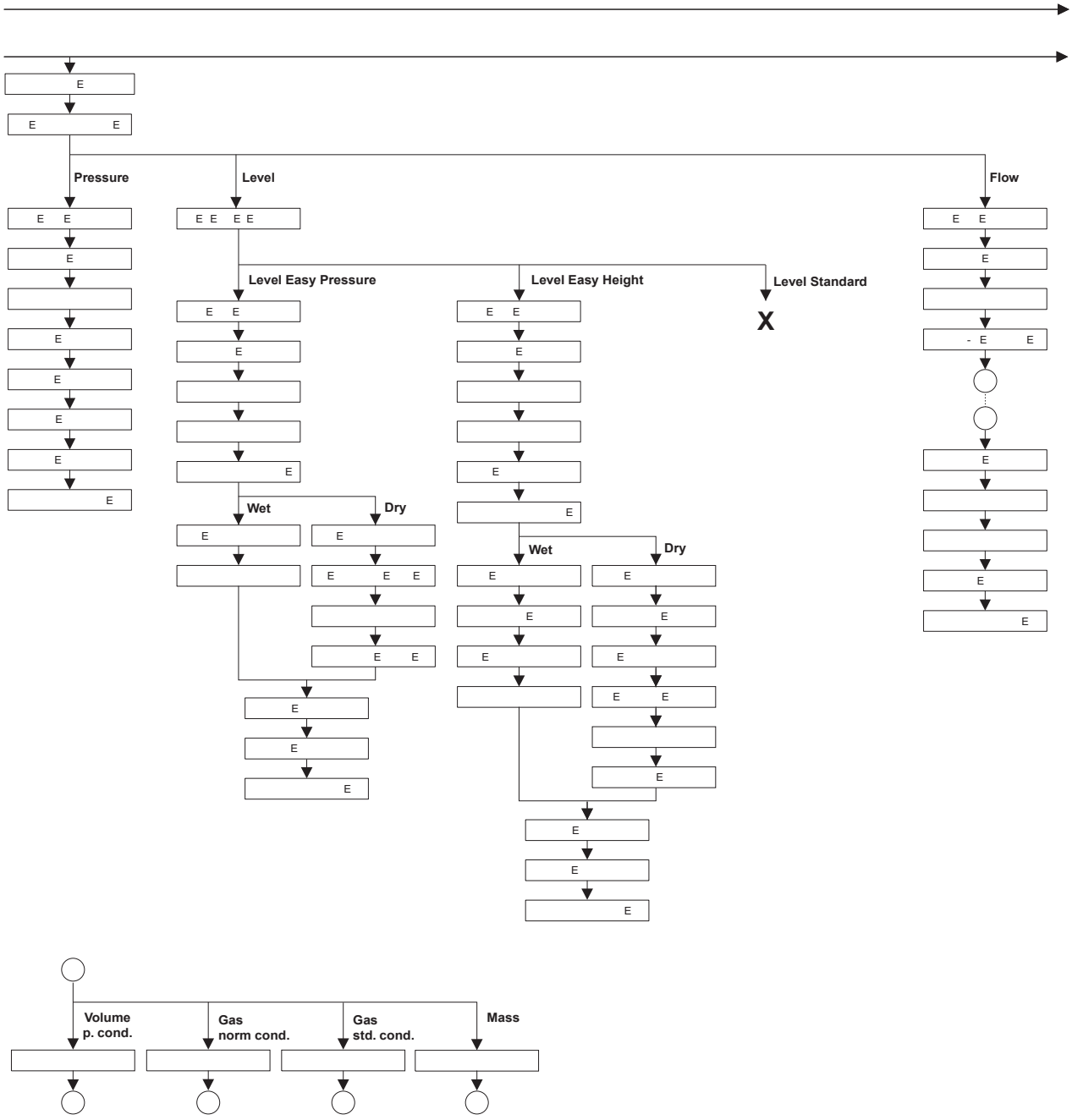
2) Display via digital communication

3) Cerabar S with gauge pressure sensor, Deltabar S or Deltapilot S

4) Cerabar S with absolut pressure sensor

There are parameters that are only displayed if other parameters are appropriately configured.
For example the CUSTOMER UNIT P parameter is only displayed if the "User unit" option was selected for the PRESS. ENG. UNIT parameter.
These parameters are indicated with a "*".

P01-xxxxxxxx-19-xx-xx-xx-138

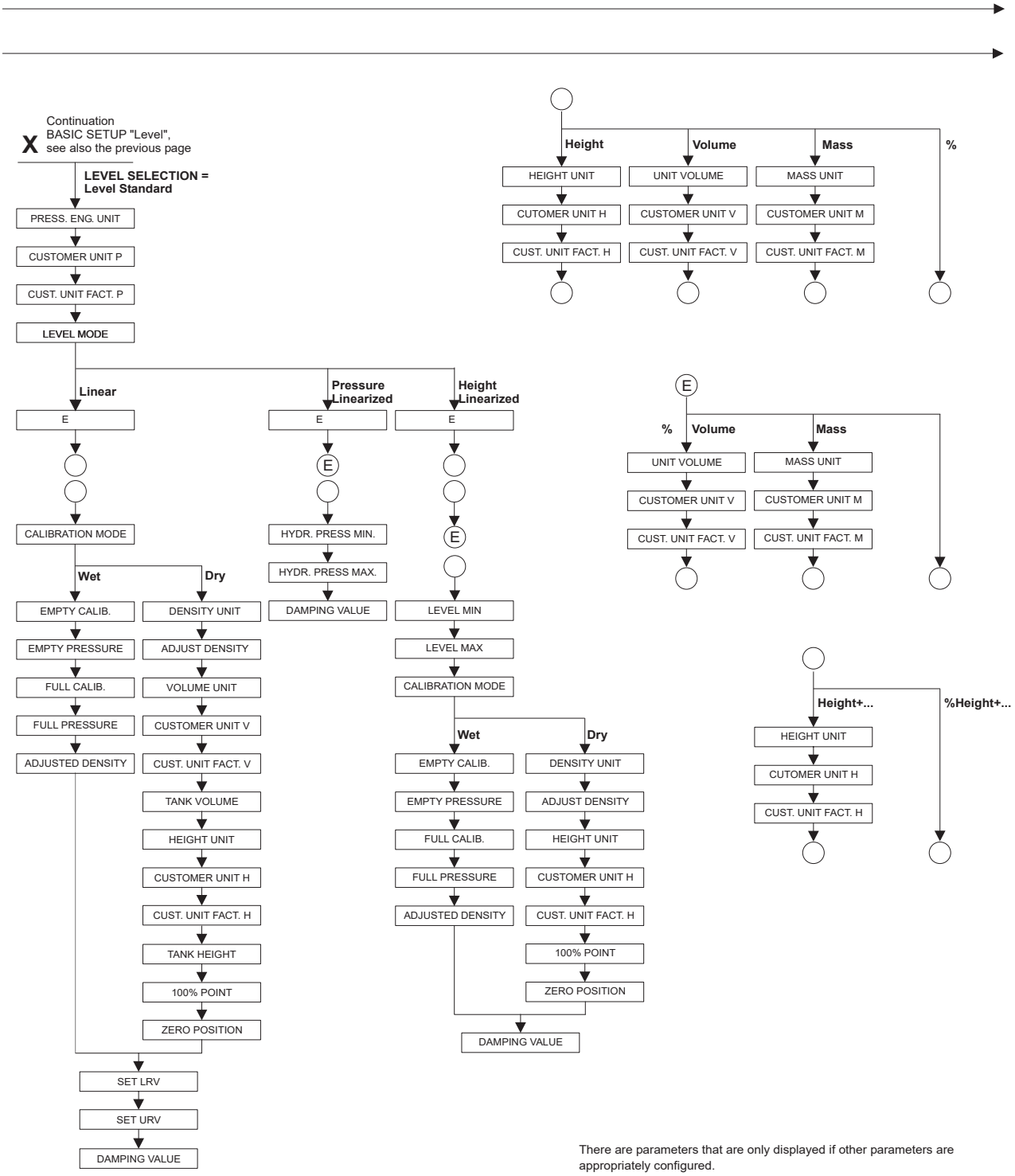


digital communication

E

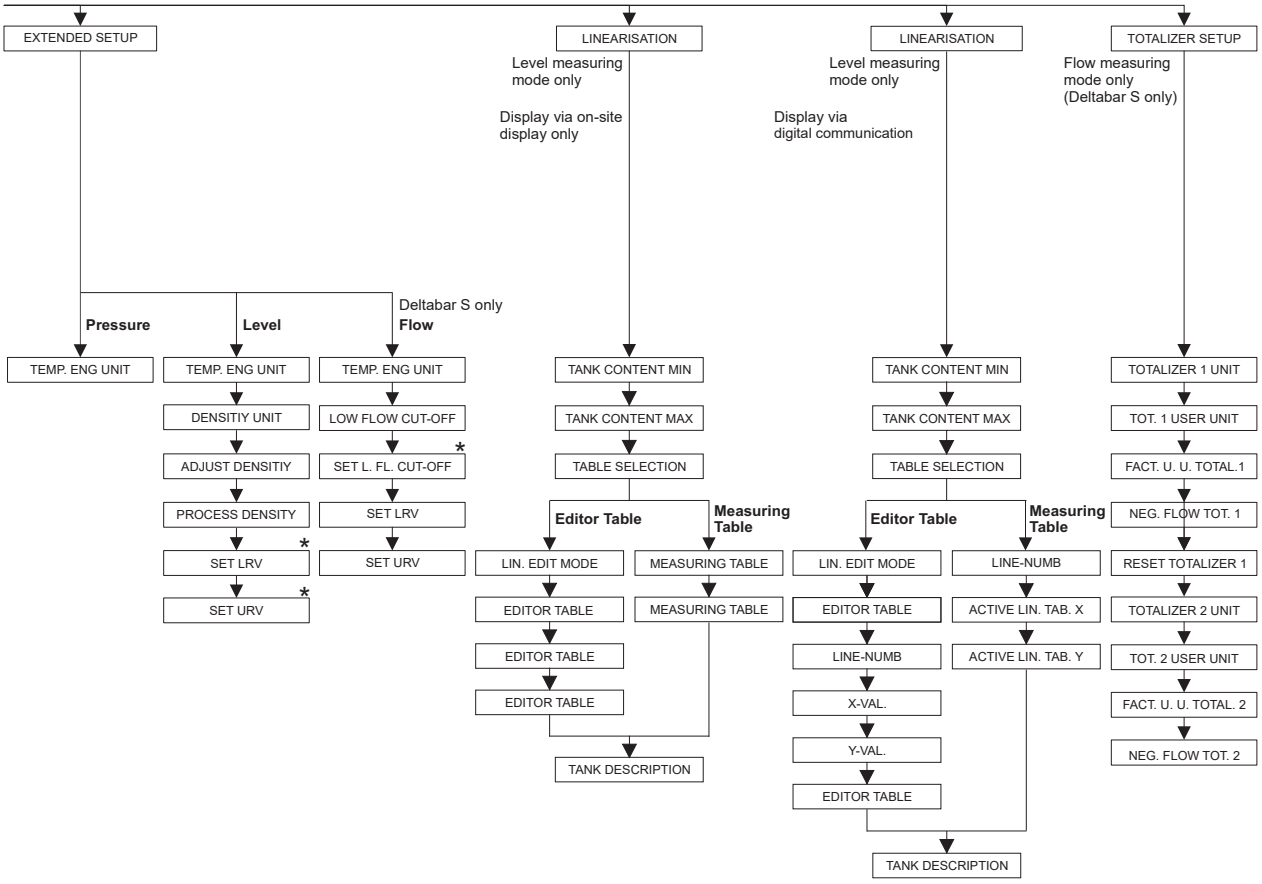
E E

P01-xxxxxxxx-19-xx-xx-xx-139



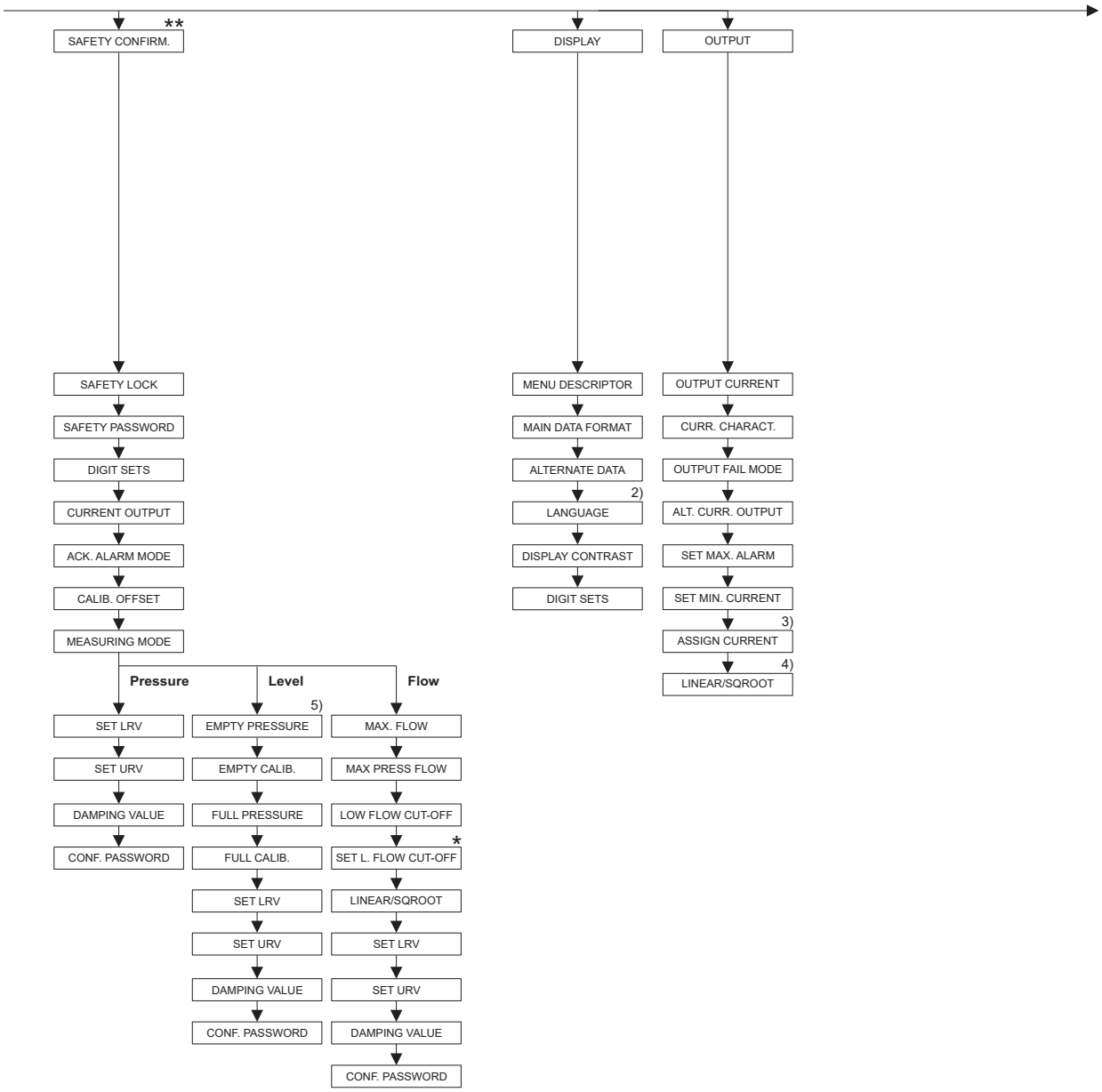
There are parameters that are only displayed if other parameters are appropriately configured.
For example the CUST. UNIT FACT. H parameter is only displayed if the "User unit" option was selected for the HEIGHT UNIT parameter. These parameters are indicated with a "*".

P01-xxxxxxxx-19-xx-xx-xx-140



There are parameters that are only displayed if other parameters are appropriately configured.
For example the TOT. 1 USER UNIT parameter is only displayed if the "User unit" option was selected for the TOTALIZER 1 UNIT parameter.
These parameters are indicated with a "*".

P01-xxxxxxxx-19-xx-xx-xx-101



2) Display via digital communication

3) Level measuring mode only

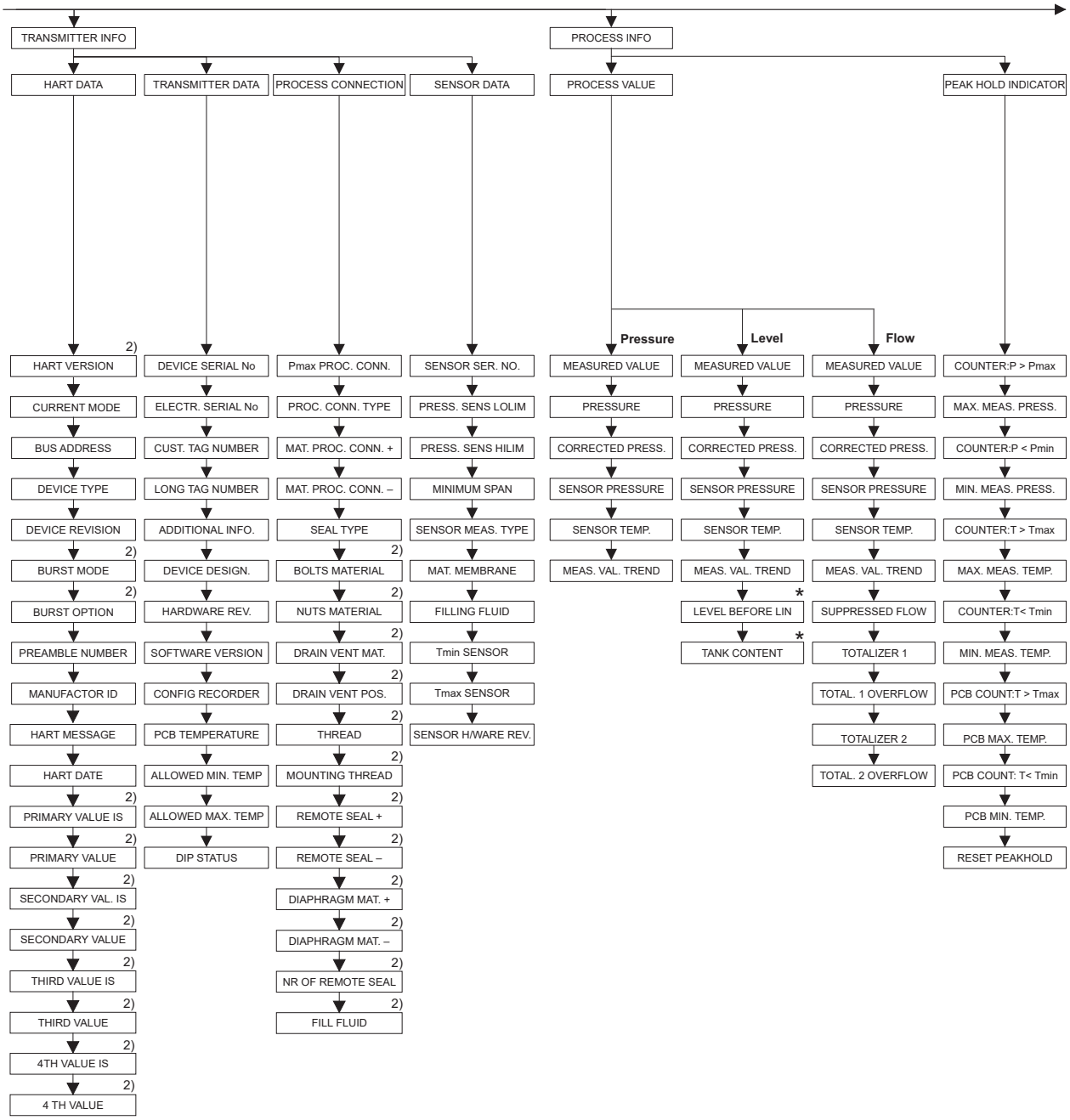
4) Flow measuring mode only

5) only LEVEL SELECTION = Level Easy Pressure

There are parameters that are only displayed if other parameters are appropriately configured.
These parameters are indicated with a "*".

** See Safety Manual SD190P for Cerabar S, SD189P for Deltabar S or SD213P for Deltapilot S.

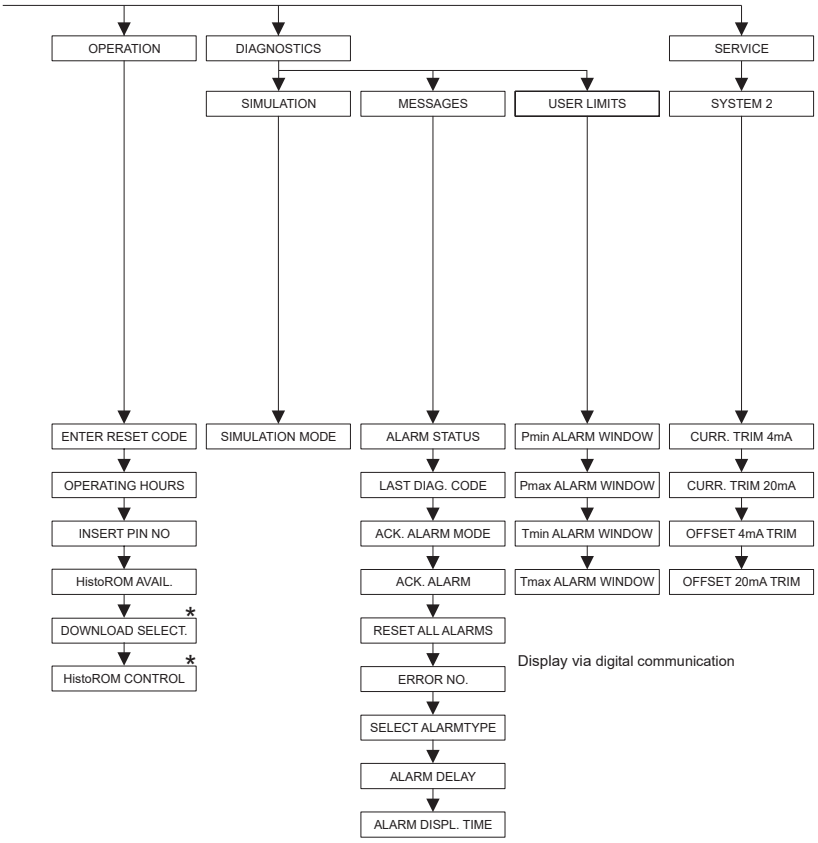
P01-xxxxxxxx-19-xx-xx-xx-141

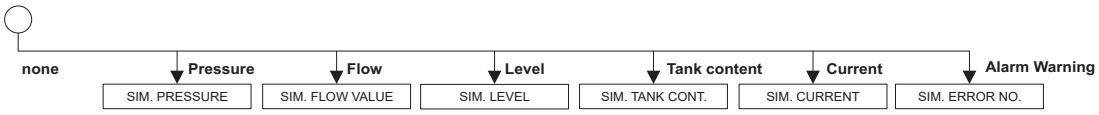


2) Display via digital communication

* There are parameters that are only displayed if other parameters are appropriately configured.
These parameters are indicated with a "*".

P01-xxxxxxxx-19-xx-xx-xx-142





* There are parameters that are only displayed if other parameters are appropriately configured.
These parameters are indicated with a "*".

P01-xxxxxxxx-19-xx-xx-xx-143

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People for Process Automation

BA00274P/00/EN/17.14
71270402
CCS/FM+SGML 9

ENVIREQUIP

SERIES EVG/EVGX, MIXERS

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ENVIREQUIP **(Division 6445772 Canada Inc)**
MIX-TECH DYNAMIC MIXERS
490, Bord du Lac - Suite 2
Dorval, Quebec, Canada H9S 2A8 ***mobile:*** 514.386.1043
710 Cotton Mill Road ***tel:*** 613.703.7930
Cornwall, Ontario, Canada K6H 7L3 ***Cell:*** 514.349.3116
e-mail: envirequip@cogeco.ca
internet: http://www.envirequip.com

INSTRUCTION & OPERATING MANUAL

ENVIREQUIP - MIX-TECH MIXERS

SEE SECTION FOR AGITATOR / GEAR REDUCER DESIGN: (at end of Manual)

EVG	**(Parallel Shafts with Hollow Output Shafts & Tapered Roller Bearings)**
EVGX	**(Parallel Shafts with Hollow Output Shafts & High Capacity Upper Cylindrical & Lower (2) - Row Spherical Roller Bearings**
EHG	**(Worm drives for Small Top Entry & Portable Mixers with Hollow Output Shafts)**
EHGB	**Helical / Bevel gearing with Hollow Output Shafts & Tapered Roller Bearings)**
EVGFS	**Helical in-line gears with Solid Output Shaft Tapered Roller or Spherical Roller Bearings - Refer to Nord Installation & Operation Manual**

NOTE: For Units with Solid Output Shafts, Refer to the Nord Manual

Env-IOM.EngJuly.2015.wpd

ENVIREQUIP / MIX-TECH MIXERS - INDEX I.O.M.

– For mixer(s) installed in OPEN TANKS -

– See Section for Mechanical seals & Packing (Stuffing boxes) at end of I.O.M. PAGE (S)

E N V I R E Q U I P **(Division 6445772 Canada Inc)** **Page 1**
MIX-TECH DYNAMIC MIXERS
490 Bord du Lac - Suite 2, ***toll free:*** 1.866.819.6123
Dorval, QC, Canada H9S 2A8 ***mobile:*** 514.386.1043
RR1, (21494 Little Russia Rd), ***tel:*** 613.874.2616
Glen Robertson, ON, CanadaK0B 1H0 ***fax:*** 613.874.2629
e-mail: envireqp@glen-net.ca
internet: http://www.envirequip.com

INSTALLATION & OPERATION MANUAL
MIX-TECH MIXERS

S E C T I O N 1 - INSPECTION

- Make sure that all mixer parts have been removed from the crate(s) before discarding.
- Each mixer should be carefully checked for any possible shipping damage. Any shipping damage should be reported to the TRANSPORT COMPANY immediately.
- Check the paint and make any necessary touch-ups.

S E C T I O N 2 - INSTALLATION

- Most mixer problems can be avoided by following proper installation and operation instructions. The following is a list of hints to help insure proper installation and therefore satisfactory mixer service.
- Please read all appropriate instruction manuals prior to proceeding with the installation of the mixers.

C AU T I O N

- Lock-out the motor starter if any person is in the tank.
- Remove wick from the breather vent plug.
- DO NOT Paint breather / vent plug

MOST COMMON PROBLEMS: Mixer Shaft(s) not vertical; Impeller going through liquid level

- Make sure the impeller blades have been installed onto the hubs in the proper position with regards Rotation and Direction of flow. Please also note that the impellers blades are installed with the hubs ears always backing the blade into the flow. Also be sure that the leading edge and not the trailing edge is presented into the flow and that the angle at the impeller tip (angle of attack) from the horizontal is closer to 15° rather than to 75°.

C A U T I O N

- If the angle of attack (at the impeller tip is closer to 75°, either an incorrect hub in combination with the correct impeller blade (OR VICE VERSA) has been incorrectly assembled to make an incorrect matching of possible hub and blade combinations. For help in determining what the correct combination should be, Please refer to the mixer nameplate that will have the Rotation and direction of thrust written. Once you know the combination, refer to the pictorial guide of impeller / hub installation positions A, B, C or D.

- Depending on whether the concave or the convex surface is facing the fluid, if the angle of attach at the impeller is closer to 75°, the HP drawn will be 2 to 3 times greater than what it should be. This could result in overloading the motor and damaging the mixer.

- Make sure that the impeller blades are installed in the correct position for the required rotation. e.g. if the impeller blades are installed up-side-down, the pumping capacity will be reduced by about 65%. Check the mixer nameplate for the flow direction and install the impeller blades to suit.

C A U T I O N

POTENTIALLY DAMAGING SITUATIONS FOR MIXERS

- Prolonged operation of the mixer (impeller) at the liquid interface causes increased stress on the shaft & impeller for which the system was not designed to accommodate. Damage could result.
- Installations where there is a large hydraulic flow (or Velocity) in the mixer reservoir. : Make sure that if should such a flow is present, that the flow is baffled or dispersed over a larger area (as opposed to directed flow via a pipe), or that the flow be re-directed away form the impeller/shaft assembly, or is introduced evenly e.g via a weir. If this cannot be done, this external hydraulic flow will exert additional un-designed for stress loads and deflection on the mixer shaft and impeller which could result in component failure.

C A U T I O N

- Before permanently wiring the motor, check for the correct rotation of the low speed shaft. Normal is Clock-wise looking down from the top of the tank, although the reverse may also be required. Please check mixer nameplate for other instructions. (e.g. Letters A, B, C or D)

- Read and follow the instructions of all tags and nameplates before operating.
- Check the mixer full load motor amperage and voltage before operating any mixer.
- It is recommended that the mixer impeller be rotated by hand in order to check for smooth operation. **N.B**: For crown & worm drives, remove the fan cover and rotate the fan manually.
- Always operate the mixer in a fluid which had a specific gravity and viscosity less than or equal to the design specific gravity and viscosity.
- Do not dump the contents of large bags of chemicals directly onto the rotating mixer impeller(s); but add the contents into the reservoir gradually. This will also promote better mixing.
- Before starting the mixer, make sure the impeller is not buried in solids or a "set-up" fluid Note: If solids have settled-out, then dilute or jog the mixer clockwise then counterclockwise
- Please check that there is no directed flow from an external source at the impeller or shaft unless the mixer was specifically designed to accommodate these additional stress loads, as mixers could be damaged.
- During START-UP, please listen for unusual noises and check for excessive vibration.
- Check the temperature of the motor and gear reducer. The temperature should not exceed 180º F. (82ºC) If they are too hot, please stop the operation of the mixer and contact MIX-TECH immediately.
- Measure the motor amperage. The measured amperage must be less than the nameplate rating nameplate value. If the amps are over, please check the rotational speed of the gear reducer/mixer output shaft. Place a piece of tape onto the shaft (or use an RPM counter if available, and count the number of revolutions for a period of e.g. 10 seconds using your watch second hand. Multiply the result by (6) for 60 Hz operation and this will provide you with the rotational speed of the mixer. Check Rotation, & impeller blade installation to be sure they are correct. If the power draw remains high, please check with MIX-TECH

Note: - Record the full load motor amperage (FLA) and measure them every (3) months.
- Some motor amperage readings are poor indicators at low loads

C A U T I O N:

- **DO NOT STAY IN THE TANK DURING MIXER ROTATION**
- Never use the mixer impeller as a foot stand or support for body weight - as such actions could damage the mixer as well as result in serious bodily injury.

- As with any rotating equipment, in order to avoid injury, extreme care should be taken to avoid contacting the rotating parts including not connecting the motors to the electrical power source until the mixer is completely assembled. Then, vacate the tank prior to operating the mixer.

- Before making field changes of motor horsepower, mixer speed, shaft length, impeller diameter or width, etc. be sure to consult with ENVIREQUIP, MIX TECH DIVISION.

- After any plant electrical work has been done, check that the mixer(s) rotation(s) are correct as power lines may have been reversed**.**

S E C T I O N 3 - MIXER ASSEMBLY: - Closed tanks are Flange Mounted

- Open tank models usually are mounted on a steel structure. Level the drive as closely as possible. This assures that the shaft will turn in a true vertical position. Incorrect mounting is often a cause of mechanical difficulty with a mixer. Unless specified on the mixer assembly drawing, the mixer extension shaft is designed to run in a true vertical position. Never angle or side mount the mixers.

- While operating, there is random fluid motion in the vessel that exerts great forces on the extension shaft of the mixer. The mixer accommodates these forces since they are transmitted directly to the support mounting(s). Therefore, the mounting system must be rigid. It must support the static mixer weight as well as live mixer reactions that result from Torque and Bending Moment. It is not enough to design the support system for acceptable levels of stress. It must be rigid enough to take care of Start-up torque load (2.5 times the Torque), and preclude large deflections that may result in mixer vibration.

- When designing the support structure to accommodate bending moments, be sure that the structure is sufficiently rigid so that the mixer extension shaft will not move more than 1/32" per (10) feet (0.8 m per 3.05 meters) of shaft length due to deflection of the support structure.

- After the gear drive (with the motor already flange mounted onto the drive) has been properly installed, the mixer extension shaft should be installed into the gear drive's hollow output shaft (quill shaft) and fastened in the quill shaft with the thrust plate and secured in position with the threaded bolt provided - use Locktite Blue (or equivalent), or in the case of an output shaft coupling, bolt the mating flanges together.

- Mixer blades over 20" in diameter are generally bolted to a welded hub. Check the welds on the hub on your yearly overall inspection.

- These mixers are supplied with the finest electric motors available. They are manufactured by a nationally known manufacturer, (e.g. NORD, WEG, Brook etc). Under normal operating conditions, within specified temperatures, proper installation and maintenance, these motors are guaranteed to deliver rated output.

- In order to get top performance from any electric motor, be sure that there is plenty of air circulation and a minimum of obstructions. On fan cooled motors, be sure not to choke off the suction inlets, also be sure to check the allowable temperature that's indicated on the motor nameplate. Don't decrease the service life of a motor by operating it at excessively high ambient temperature.

- In order to avoid damage to the motor during temporary overloads, jams, etc. be sure that correctly sized overload protection is provided. Starter overload heater elements can be sized from the full load current of the motor as shown on the motor nameplate. It is advisable to consult a supplier of motor control equipment when selecting thermal overload heaters.

- Before the motor is permanently wired, check to be sure that the output shaft rotation is correct (Normally clockwise looking down from the mixer drive, but sometimes counterclockwise depending on the process requirements)

C A U T I O N:

- Make sure to check rotation of the mixer before it is operated. To reverse the rotation of standard 3 phrase electric motors, simply switch any two power leads.

M O T O R S P E C I F I C A T I O N S: 1800 RPM - (4) pole

- NORD motors carry the CE mark in accordance with the Low Voltage Directive
- NORD motors are designed to operate at elevations up to 1000 m (3300 ft) above sea level

Altitude:		
up to 1000 m	= 100% output	Ambient Temp = 40° C
Above 1000 up to 2000 m	= 92% output	Ambient Temp.= 32° C
Above 2000 up to 3000 m	= 83% output	Ambient Temp = 24° C
Above 3000 up to 4000 m	= 74% output	Ambient Temp = 16° C

- NORD motors are designed to operate with a maximum ambient temperature of 40° C (104°F) - for higher temperatures, motors have to be de-rated or an upgraded insulation used.

Ambient Temperature:	(104°F)
	40° C = 100%
	45° C = 95%
	50° C = 89%
	55° C = 83%
	60° C = 67%
	70° C = 64%

EXAMPLE: A motor designed for an output of 100 HP to operate in the mining area of Bolivia (altitude 4000 m above sea level). **NOTE**: 1000 meters = 3281 Feet
Output reduction: the maximum allowable output of the motor would be 74% (74 HP)

Ambient temperature limit: the motor may operate at its rated output of 100 HP provided that the ambient temperature does not exceed 16° C

Note: You can operate over 3300 feet, but you have to de-rate the motor

– Voltages: Canada 575/3/60,TEFC; USA 460/3/60, TEFC; Europe 400/3/50, IP55 ; Australia 415/3/50

– **Tolerances Voltage & Frequency**: ± 10% based on rated voltage; Line frequency tolerance ± 5%. Combined **MAXIMUM** variation in voltage and frequency ± 10%

-- MG1 Part 31 suitable for inverter service

– Insulation Class is Class F (non organic)

-- High-efficiency design for motors 1 HP and up

– Service Factor 1.15

– The Standard Nord motor fan is a non-sparking

– Each Nord motor uses a terminal block

– Integral Nord motor (unless Nema motor with "C" flange)

S E C T I O N 5 - Pedestals: Shaft & Gearbox Removal - EVG SERIES

• Series EVG standard design of the dry-well pedestal and shaft catcher is one where the flinger (for the dry well) and the shaft catcher are one-in-the-same part serving both purposes.

SHAFT REMOVAL AND / OR TO REMOVE THE GEAR REDUCER:- **See assembly dwg**

i) Lock-out electrical power to the electric motor.

ii) If the electrical wiring is not long enough to allow removal of the gear reducer, dis-connect the motor wiring.

iii) Remove the safety cover located on top of the gear reducer exposing the bolt (# 3) and top plate (# 4) which holds the shaft (# 12).

iv) Slowly remove the top bolt.(# 3).

v) As the bolt is loosened, the shaft and impeller assembly will be lowered a distance of about 0.125" (3.175 mm).

vi) After the bolt has been loosened sufficiently, the flinger (# 8) will come into contact with the Pedestal to the inner support pipe (# 11) and stop there.

vii) Remove the bolts holding together the Adaptor plate Reducer to Pedestal top plate (# 7).

viii) Lift-off the complete gear reducer unit the gearbox clears the shaft.

ix) Inside of the Pedestal (# 10), you can now see the flinger (#8) which rests on the Collar / Clamp (2) Bolts / Shaft catcher (# 9).

x) Prior to un-doing the set screws on the collar / Clamp, make preparation to handle the shaft which will now fall through the dry well (# 11) and into the tank.

xi) Once the shaft is secured loosen the set screws on the Flinger assembly or Clamp bolts (# 9).

xii) **To Reinstall the shaft** (et al) follow the above procedure in Reverse.

Note: In older designs, the flinger was welded-onto the shaft. In that case, the shaft can only be removed vertically through the top of the Pedestal.

C A U T I O N:

- Prior to loosening the (3) set screws on the flinger/shaft-catcher, please ensure that there is some means of holding the shaft in-place (if no Clamp supplied, use (2) pieces of wood 4" x 4" or 6" x 6" with tightening bolts to hold the shaft in place via friction) IF NOT, THE SHAFT WILL DROP INTO THE TANK possible causing damage to the equipment or vessel and bodily injury. Shafts are often of sufficient weight to cause serious bodily injury or even death were it not properly secured.

- You may want to install a plastic hose in the pedestal so that you can monitor if the gear reducer is losing oil and collecting in the dry-well pedestal.

A Split Collar is used to prevent the shaft from accidentally falling from the gear reducer:

NOTE: On older Series EVG, there may not be a Split Ring but rather a flinger that rests on the dry well seal to hold the shaft in-place

– (i) Insert eye-bolt in top centre of the impeller shaft.
(ii) Slowly lift up the complete impeller shaft assembly a distance of 6 mm (0.25").
(iii) Remove the split collar that rests against the top of the quill shaft of the gearbox.
(iv) Slowly lower the complete shaft/impeller assembly a distance of 10 to 12 mm (0.375"to 0.50".
(v) At this point, the flinger/clamp ass'y will come into contact with the pedestal top inner support pipe/Dry-well
(vi) Remove bolts.
(vii) Lift off the complete gear reducer until the gearbox clears the shaft and eye-bolt.
(viii) The reinstall the gear drive, follow the above procedure in reverse

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S E C T I O N 5 - SHAFTS, IMPELLERS & FLANGED COUPLINGS

SHAFT - STRAIGHTNESS:

- When shipped, the mixer extension shaft was straight to within 0.003" per foot (0.25 mm per meter) of shaft length for mixers equipped with centre-less ground shafts (Special Order/ uncommonly used). If the shaft does not appear to be damaged, but the run-out is greater than the above standard, the shafting supplied may have been "smooth-turn" (more commonly used), which might not be dimensionally
the same over the entire length of the shaft. This is probably still acceptable. In such cases, or where it might be difficult to obtain an accurate shaft run-out value, we may apply another rule: 0.25 to 0.50% of the impeller diameter = the maximum shaft run-out at the bottom of the shaft. e.g:

50" diameter impeller	0.14 to 0.28"
100" diameter impeller	0.26 to 0.53"
150"diameter impeller	0.40 to 0.67"

S E C T I O N 5 - SHAFTS, IMPELLERS & FLANGED COUPLINGS

- Flanges are used as shaft couplings when shaft extensions exceed approx 12'-0" (3.65 m) Ensure that the bolts are tightened and that a product like Never Seize (or equivalent) is used. Refer to the table (in this manual) for torque tightening values

  Recheck bolt tightness after 1500 hours (or (3 months)

These couplings are welded onto the shafts with (4 to 6) gussets and are not removable.

C A U T I O N:

- Handle the shaft carefully to be sure that it is not bent.

- After the shaft has been installed, check it for straightness. Storage and handling may have resulted in a bend. To check it, an indicator is placed at the end of the shaft, and the high speed shaft is then rotated by hand. Runout of the total shaft should not be greater than the above \references values. If the runout is greater than the above values, the shaft can be re-straightened in the field. To re-straighten the shaft, follow this procedure:

- Where the maximum, positive readout is found, place the indicator on that side of the shaft.

- Heat the shaft at a point of 180° from the indicator, (and just below the first in-tank coupling if applicable), apply heat just below the mounting nozzle.

- The shaft will grow toward the indicator as heat is applied to it. However, DO NOT permit the surface temperature to go over 500° F (260° C). Use Tempilstics or equivalent

- The shaft will straighten since it will draw more than it grows.

- After each heating process, rotate the shaft and recheck until the straightness is within tolerance to meet the allowable tolerance

- To install any impeller, simply slide the impeller hub onto the extension shaft above the shaft keyway. Install Hook type (Gib) key into the keyway making sure that the pin is inserted into the

  correct hole for proper impeller location. Lower the hub (with or without blades bolted-on) down onto the key. Tighten set screw. Bolt -on blades if not already done.

NOTE: All MIX-TECH Portable mixers operate at least 35% below the 1st Critical speed or harmonic frequency - There is no danger of "hitting-on" or approaching the 1st Critical speed - (Unless specifically mentioned otherwise)

- Please refer to the specific manufacturer's installation and operating manual.
- Correct lubrication practices are essential to long life and satisfactory performance of a gear drive. Be sure to use the right lubricants as recommended. With proper lubrication

maintenance, the gear drive will carry its rated design load and provide years of satisfactory operation.

SECTION 6 - SHAFTS, IMPELLERS & COUPLINGS

IMPELLERS

- Make sure that the impeller blades have been installed onto the hubs in the proper position with regard Rotation and Direction of flow. Please also note that the impellers blades are installed with the hubs ears always backing the blade into the flow. Also be sure that the leading edge and not the trailing edge is presented into the flow and that the angle at the impeller tip (angle of attack) from the horizontal is closer to 15° rather than to 75°.

CAUTION

- If the angle of attack (at the impeller tip is closer to 75°, either an incorrect hub in combination with the correct impeller blade (OR VICE VERSA) has been incorrectly assembled to make an incorrect matching of possible hub and blade combinations. For help in determining what the correct combination should be, please refer to the mixer nameplate that will have the Rotation and direction of thrust written. Once you know the combination, refer to the pictorial guide of impeller / hub installation positions A, B, C or D.

- Depending on whether the concave or the convex surface is facing the fluid, if the angle of attach at the impeller is closer to 75°, the HP drawn will be 2 to 3 times greater than what it should be. This could result in overloading the motor and damaging the mixer.

- Make sure that the impeller blades are installed in the correct position for the required rotation. e.g. if the impeller blades are installed up-side-down, the pumping capacity will be reduced by about 65%. Check the mixer nameplate for the flow direction and install the blades to suit.

SECTION 7 - GEAR DRIVE MAINTENANCE

CAUTION:

- By following instructions, many premature gear and bearing failures can be avoided.

- Keeping a maintenance log is highly recommended.

- Lubricant used in the gear case must be free of dirt, metal particles and other contaminants. Use only new oil. Strain the oil if there is any possibility that it contains contaminants.

- To equalize pressure inside and outside the gear case, a breather vrnt is installed on top of the unit. This breather normally requires no maintenance, and must not be blocked. Check hole for free breathing.

PORTABLE MIXERS:

Lubrication For PORTABLE MIXERS (**Series "EHG"**), the Crown & worm gear reducers are filled for life (20,000 hours or (4) years) with synthetic oil

C A U T I O N:

- For shipment, the gear-case is drained of oil (EXCEPT FOR NORD drives) - Be sure to fill the gear case with the proper lubricant to the proper level. Install breather. DO NOT OVERFILL - N.B: if the reducer is already filled, (as is the case with NORD drives), Do not forget to install the breather(s) or the seals may fail.

- **RECOMMENDED LUBRICANTS FOR NORD HELICAL GEARING**:
  These Nord Gear reducers are factory-filled with Shell Omala 220 mineral oil or with Chevron ISO FM 220 food grade oil (if required), or equivalent:
  or with Shell Omala 220 regular mineral oil fill when the mixer is provided with a dry well seal unless otherwise specified:

  N.B: A reducer previously filled with Shell Omala 220 mineral can be drained (as much as practical to achieve), and Chevron ISO FM 220 substituted without any harmful chemical reactions or reduction to the lubricating quality of the new (or old) oil.

- Please note that the gear reducers for MIX-TECH'S "EVG" series are Nord Parallel shaft drives. The top output bearing is grease packed although there is not grease nipple. Please remove the seal and re-pack the bearing with grease. (please refer to NORD instruction attached)

- The output shaft seals are "Quadrilip" having (2) discrete grease filled pockets

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S E C T I O N 7 - GEAR DRIVE MAINTENANCE FOR SERIES EVG & EVGX parallel Shaft design gear reducers:

- **RECOMMENDED OIL CHANGE INTERVALS IN NORD IOM: -**
  Synthetic lubricants should be changed every 20,000 service hours or (4) years;
  Mineral oils should be changed every 10,000 service hours or after (2) years. See gear reducer service manual (IOM).

C A U T I O N:

Units should be checked out periodically for increased noise, surface temperature, vibration, shaft

movement, and amperage draw. Units with inspection covers should not be operated with the inspection covers removed.

PROCEDURE FOR RE-GREASING THE UPPER OUTPUT BEARING equipped with Tapered roller bearing option:

- Remove upper output shaft seal(s).
- Inspect bearing cavity for presence of grease. The bearing cavity should be packed to approximately 1/3 full with grease.
- If required, inject grease into the taper roller bearing until the cavity is filled to 1/3. A Needle Nozzle is generally required on the grease gun, because the shim(s) partially cover the access to the bearing cavity**.**
- Install new upper output seals**.**

Note: The other bearings in these gearboxes are open and are submerged in oil.

The recommended interval for changing the gearbox oil is every 10,000 hours of operation.

- The standard ambient temperature selected is 15 to 125° F (9 to 52° C) for the gear reducer**.**
- Some Gear reducers are equipped with bulls-eye oil level indicators**, others have a plug.**

S E C T I O N 8 - BOLTS

- Impeller blades & other in-tank fasteners are supplied as standard with lock-washers.

C A U T I O N:

- Extreme care should be taken to see that locking devices are properly installed and to be sure that the bolts/studs are properly tightened and lubricated.

It is recommended that all in-tank fasteners (and all other bolts), be rechecked for tightness after the first 1500 hours of operation and subsequently, at each scheduled shut-down and that a suitable lubricant be used e.g. Never seize or equivalent.

RECOMMENDED BOLT TORQUE VALUES:

BOLT SIZE	TIGHTENING TORQUE (Foot Pounds)		
½" - 13	50	1.25" - 7	580
5/8" - 11	100	7/8" - 9	190
3/4" - 10	190	1.50" - 6	1000
1" - 8	290		

NOTE: Tighten all bolts as specified. Lubricate all fasteners with an anti-seize product. If no lubrication is used when tightening the bolts as specified, multiply the table values by 1.3

GEAR REDUCER & MOUNTING PLATE BOLTS:

These bolts are also subject to high loads and should be properly torqued to prevent bolt stretch and/or reducer wobble. For situations with large reducers or long shafts with large reducers, use additional care to make sure that these bolts are installed and torqued properly

This "Turn of the nut Method" can be summed up in one sentence: "Turn the Nut ½ to 2/3 turns beyond the snug tight position, "this applies to any bolt of any size. However, fasteners should be clean, rust free and lightly oiled.

In cases where the nut is not accessible, the bolt may be turned ½ to 3/4 turn beyond snug tight.

LEVER ARM SYSTEM	Bolt size	Lever Arm
	1/4 - 3/8"	6" handle
	7/16" - 5/8"	12" handle
	3/4" - 1.125"	24" handle
	1.25" and over	36" handle

Note: This lever arm system should be used with or without lock-washers. If lock-washers show sign of splitting or fatigue, they must be replaced

S E C T I O N 9 - OPERATION

- The mixers that you have purchased have been designed to accommodate all the loads that will be encountered in the normal course of operation.

C A U T I O N:

- Care must be taken to avoid prolonged operation of the mixer impeller(s) at liquid interface. These mixers were not designed to operate under those severe conditions and could become damaged.

S E C T I O N 10 - MOTOR REMOVAL & INSTALLATION OF MOTORS:

- For Nema "C " Flanged motors (not integral motors)
  The motors supplied have been installed onto the reducers. In the event of motor maintenance, remove the bolts which hold the gear reducer's Nema "C" flange adaptor to the motor's "C" face. Remove the coupling half and service the standard NEMA motor as required. INSTALLATION: reverse the procedure. Please refer to **"COUPLING ENCLOSED"** cross sectional drawing which shows the mounting distance 1 13/16" (46.03 mm). Note that the coupling is keyed onto the motor shaft (key provided).

- In the case of NORD integral motors, remove the bolts. The motor can then be removed exposing the high speed pinion gear mounted on the motor shaft. The motor can then be serviced as required.

S E C T I O N 11 - TROUBLE-SHOOTING / MIXER PERFORMANCE

- **PERFORMANCE**: If you find that the mixer is not performing according to your expectations, one of the things that directly affects mixer performance is Baffles (or lack thereof)

Note: Also check that the impeller blades are in the correct configuration A, B, C or D, that the correct blades are matched to the correct hubs and that the rotation is correct.(Please refer to Section 6 Pages 7, 8 & 9 for more information.

N.B: Baffles always help any mixer application by providing the means to convert rotational motion into to top-to-bottom- pumping/mixing.

- If the viscosity of the fluid is over 25,000 cp, then baffles are not necessary.

- If the vessel is rectangular in shape, baffles may not be necessary.

- In circular or square vessels, the use of baffles is mandatory.

- OTHER METHODS of achieving top-to-bottom motion without using baffles:
  - Off-centering the mixer by 20% (uses the vessel as a baffle)
  - Angle mounting (into a quadrant)- often seen on Portable mixers. If you want to angle-mount a larger mixer, please check to be sure that the shaft was designed to accept these additional stress loads.

- **OIL LEAK(S)** problems with Nord Gear reducers: In order to be able to address the

- **OIL LEAK(S)** For Series EVG supplied with a flinger / shaft Catcher & dry well seal:

NOTE: For Series **EVGX**, There is an oil overflow plastic pipe indicating oil leak>

- If one of the (2) output oil seals were to fail (very rare), then the oil would migrate down the output shaft, and be pumped by the flinger into the moat surrounding the dry well pipe. Any such leak would be contained by our sealed pedestal. (access to it is by a plug). Any other oil leak will be visible on the outside of the gear reducer

SYMPTOM	REASON(S)	SOLUTION
Oil leak on the reducer	Vent plug not installed Vent plug painted over Vent plug failure	Clean up oil and remove the vent plug If this stops the leak, change the vent plug
Oil leak on top of the reducer	Motor and/or top bolts not tightened	Use Teflon tape and tighten bolts
Oil leak on top of reducer	Too much oil in the reducer will be forced out of the vent	Check oil level and adjust to site glass
Oil leak on end plate	Bolts loose	Tighten bolts
Oil leak on top of the reducer	Gasket between motor and the reducer failed	Replace gasket and silicone dealant
Sign of oil on the reducer	Drain pipe & valve damaged	Use Teflon tape /sealant to try to reseal
Oil leaking on reducers with "C" flanged motor(s)	if the vent was not installed, plugged or faulty, the oil presure in the reducer might have exceeded 2 psi causing the input oil seal to "blow-out"	Change the input oil seal

- **NOISE**: Under normal circumstances, Mix-Tech mixers operate quietly and without vibration. If there is a metal-on-metal noise, check to see if the top bolt # 3 is properly tightened to the shaft. If the bolt is not, the shaft will lower than it should be and the flinger/shaft catcher may be touching the dry well pipe

- **HEAT**: Check the temperature of the Reducer and motor. If hot, check the oil level.

NOTE: On Series EVG & EVGX, an oil expansion chamber is supplied to minimize problems with over-filling of oil into the gearcase

- These mixers should provide long and satisfactory service. Only the finest materials were employed in their manufacture. However, if any defects in materials or workmanship occur, the defective part(s) must be returned to ENVIREQUIP (div 6335772 Canada Inc), **MIX TECH Division**, freight prepaid. ENVIREQUIP reserves the right to repair or replace, at its discretion, any part that proves to have been defective in materials or workmanship.

- ENVIREQUIP is not responsible for the warranties on components purchased, e.g. motors, but will endeavour to help to obtain resolution of any problem(s) with any of our sub-supplier(s) as regards their warranties.

- ENVIREQUIP specifically excludes any liability as to loss of production, improper use of the equipment, abuse, any other liability expressed or implied that exceed the limited warranty given as applies to the equipment being free of defects in materials and/or workmanship.

- ENVIREQUIP's warranty is for (2) years against defects in materials or workmanship and also includes a process warranty.

- This Process warranty only applies to the actual conditions that were specified at the time of bidding.

- Please refer to the terms and conditions as well as to the warranty for complete details.

CONVERSION FACTORS

1 inch	=	25.4 mm
1 kilogram	=	2.205 lbs
1 U.S. gallon	=	3.785 litres
U.S. gallons x 0.2642	=	litres
1 m^3	=	264.2 U.S. gal
1 ft^3	=	7.481 usg
1 ft^3 of water	=	62.4 lbs
1 foot	=	0.3048 meters
1 psi	=	6.895 Kpa
1 Kpa	=	0.145 psi
1 K Cal	=	3.967 BTU
1 HP	=	0.7457 kW
1 kW	=	1.341 HP
1 Bar	=	14.5 psi
1 kg /m^2	=	14.22 psi
1 Newton	=	0.2248 pounds (force)
1 lb in	=	0.1129 Newton-meter (Nm) force
1 lb in	=	1.1519 kg-cm
1 kg/cm^2	=	14.23 psi

MAINTENANCE LOG

TASK	BY: DATE:				Signed
CHECK OIL					
CHANGE OIL					
CHECK PEDESTAL for OIL LEAKAGE					
CHECK FOR HEAT					
CHECK FOR NOISE					
CHECK FOR VIBRATION					
CHECK BOLT TIGHTNESS: Top bolt & Pedestal bolts Base bolts Clamp Coupling Hub & blades Reducer end cover bolts					
CHECK MOTOR AMPERAGE					
CHECK ROTATION AFTER ELECTRICAL WORK					
OTHER					

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MANUFACTURER INSTALLATION OPERATION AND MAINTENANCE MANUAL

AMARUQ WTP – NUNAVUT

VEOLIA PROJECT: 5000 218 009

FLOWROX

SERIES PVE, PINCH VALVE

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PVPVE-190911-EN

Installation, operation, and maintenance instructions for Flowrox valves Open Valve (PV) & Enclosed Valve (PVE)

NOTE	These instructions must be read carefully and understood prior to the installation, use, and servicing of this product.

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1 GENERAL

1.1 General safety instructions for PV & PVE valves

In this manual, the following symbols are used to highlight the parts requiring particular attention:

SYMBOL	DESCRIPTION
	**Risk to personal safety:** Neglecting the safety measures can cause serious personal injury or death.
	**Electrical safety:** Neglecting the safety measures can cause serious personal injury or death.
	**Machinery or environmental risk:** Incorrect maintenance or operation of the product can harm the environment or the product.
	**Read the operation and maintenance instructions:** Read and understand the operation and maintenance instructions before using the product.

2 INTRODUCTION TO DEVICE

2.1 Intended use

Open type PV.
The open body is available in diameters starting from 80mm.
The open body construction is designed for applications with:

- Low pressures
- Low temperatures
- Non-hazardous media

The open body construction is light and simple, which makes it easy to access for service. The open body also tolerates misalignment and vibration.

Enclosed type PVE.
The valve sleeve is covered by the body housing and thus protected from the environmental impacts and sunlight.

- Body construction prevents leakage of flowing media to the environment
- The valve body can be equipped with a gauge indicating pressure changes inside the body

2.2 Construction of device

Flowrox valves are made of three main components:

- flanged valve sleeve
- valve body, either open PV or enclosed PVE
- actuator and actuator control components, if applicable

The valve sleeve is the only part of the valve which is in contact with the medium flowing in the pipeline.
All valve bodies are flange ended. The standard flange drillings can be made to meet all standards (e.g. DIN, ANSI, BS, AS, JIS).
The face to face dimensions of Flowrox valves are according to ANSI/ISA 75.10.02:

- 165 mm for valves DN25…DN65
- 2 ½ times the nominal diameter for valves DN80 and bigger

2.2.1 Open body valve PV

In the open body model the body and the actuator are connected only to one of the end flanges (Fig. 1.). The construction allows a slight deviation in the pipe angle and the valve can act as a vibration absorber.

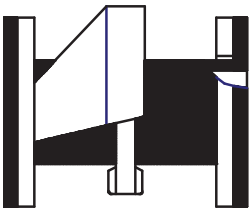


Fig. 1.

	Note that in case of a sleeve breakage, the flowing liquid will leak to the environment.

2.2.2 Enclosed body valve PVE

The body of the enclosed model prevents leakage of flowing media to the environment (Fig. 2.). The lower part of the body has a plug, which can be opened to check for sleeve failure.

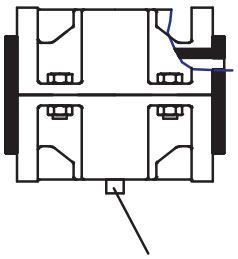


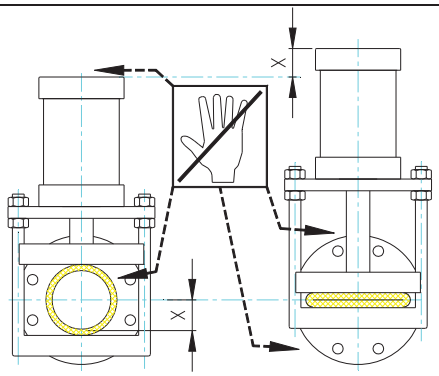
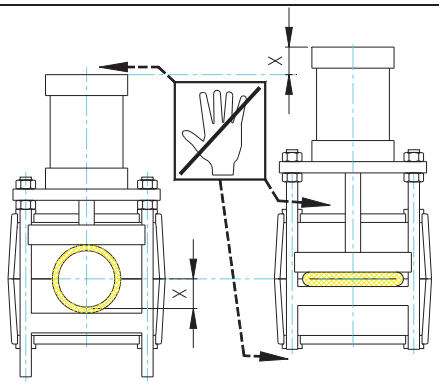
Fig. 2. plug

	In case of a sleeve failure, slight leakage will occur through the bushings. If you open the plug for checking, be careful as the medium may flow out.

	Changing the sleeve at appropriate intervals prevents leakages.

2.3 Valve function

DANGER	When the valve closes the actuator moves. Do not put tools or parts of your body between the moving valve parts. Note the injury risks (see drawings 3A and 3B).

Note the dangerous places (see drawings 3A and 3B)! When the pinch valve closes, two pinch bars, moved by the actuator, squeeze the sleeve, closing on the center line. As the valve is fully closed, the actuator has raised one half of the valve diameter. The actuator raises in both models (PV and PVE) 0.5 x valve nominal diameter (measure X). In the open model the space between the pinch bars, the space between the upper pinch bar and fixing plate of the actuator and the space below the lower pinch bar.	
	Fig. 3A - PV open model
In the enclosed model the space between the valve body and the fixing plate of the actuator and the ends of the guide bars of lower pinch bar below the valve body.	
	Fig. 3B - PVE enclosed model

Regarding the actuators, follow the instructions of the manufacturer.

NOTE	Note the possible remote control of automatic valves and turn it off before starting maintenance.

3 TRANSPORTATION, STORAGE AND LIFTING

3.1 Receiving

Check the condition of the valve package on arrival. If it shows signs of transport damage, check the operation of the valve carefully. Normally, a visual inspection of the valve is sufficient. However, if valve has been damaged during transport, contact your nearest Flowrox sales office immediately.

3.2 Storage

The sleeves must be stored as follows:

- The storing temperature should not exceed +25°C, preferably below +15°C but not under +5 °C. Keep the storage temperature as constant as possible.
- Store the sleeves in a dry place. Prevent water from condensing on sleeve surfaces.
- Avoid ultraviolet light. Protect the sleeves against straight sunlight. Use warehouse instead of storing outside.
- Remove all equipment generating ozone from the room where sleeves are stored. Minimize the store room ventilation.
- Store sleeves so that they are free from tension. Sleeves should be stored in vertical position on smooth support. Do not store sleeves one on top of another.
- Keep the sleeves off the chemical effect of solutions, semi-solids, impurities and solvent vapours during storing.
- Try to keep the storing time of sleeves as short as possible. Always use first the material which has been longest in stock.

3.3 Lifting

When lifting the valve, fasten the ropes to the valve body or around it. Note the center of gravity and support the valve to avoid it turning around. In some models the center of gravity is located towards the actuator.

4 INSTALLATION

4.1 Open body model (PV)

The sleeve has not been designed to withstand axial forces. The pipes must therefore be supported properly so that neither tension nor compression is caused. Use cross-tightening for flange bolts. Do not overtighten bolts.

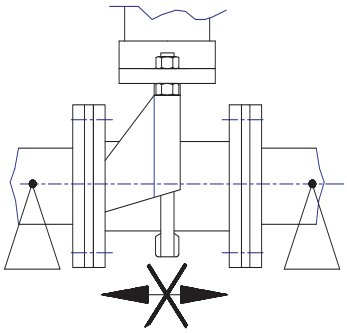


Fig. 4.

Make sure that no inappropriate items get between the pinch bars and the sleeve.

If possible, protect the sleeve from direct sunlight. Direct sunlight and UV light deteriorate certain rubber qualities; this must also be considered during normal use.

A lengthwise angle deviation of max. 5º in the pipe is allowed (Fig. 5).

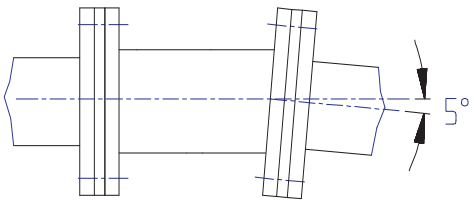


Fig. 5.

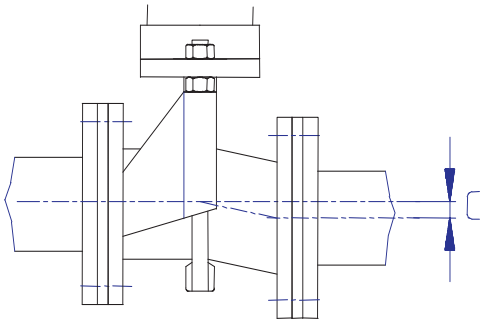


Fig. 6.

Deviation in the center line of the pipe (C), (Fig. 6):

PV 80...100	max. 5 mm
PV 125...250	max.10 mm
PV 300...500	max. 15 mm
PV 550...1000	max. 20 mm

4.2 Enclosed body model (PVE)

Make sure that no inappropriate items get between the valve body and the actuator.

4.3 Both models (PV and PVE)

The valve nominal size means the inner diameter of the sleeve. The pipe inner diameter should match this diameter as closely as possible. Whenever possible, install the actuator in a vertical position. Valve can be assembled either way in terms of flow direction.

If you have to install the actuator horizontally, it has to be supported to ensure the operation, especially if the actuator is heavy. Install a sliding surface under the actuator (Fig 7).

The support can be fixed on the wall (1), on the floor (2) or the pipeline (3).

The valve can be installed in either way depending on the flow direction.

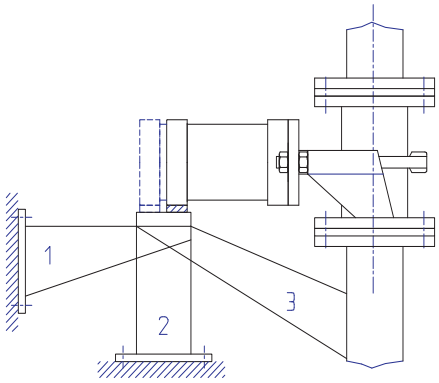


Fig. 7.

When installing the valve to the pipeline, it has to be in the open position. Tighten the flange bolts smoothly crosswise

	Do not fasten actuator or any part of it to the support.

5 OPERATION

5.1 First use

Flowrox valves are normally delivered fully assembled and ready to use. Check the condition of the valve visually.
After installation to the pipeline, check that all connections are leak-proof.

5.2 During operation

During the operation the valve does not normally require any maintenance. The sleeve change is described in 6.2.

To ensure smooth operation, it is recommended to change the valve sleeve regularly.

Regarding the actuators, follow the instructions of the manufacturer.

	Note the valve functions, see 2.3.

6 MAINTENANCE

6.1 Schedule

The sleeve is the only part of the valve which is in contact with the medium flowing in the pipeline. With regular sleeve changing, the likelihood of malfunctions in the process decreases. Wear resistance of the sleeve depends on the circumstances of the process and may vary a lot.
If there is a flow through closed valve or leakage through bushings (PVE) or through damaged sleeve (PV), change the sleeve immediately.

	PVE: In case of a sleeve failure, slight leakage can occur through bushings. PV: In case of a sleeve breakage, the flowing liquid will leak into the environment.

6.2 Changing the valve sleeve

	Control the valve functions (see 2.3) and follow the instructions for adjusting of valve (6.3) to prevent accidents and to ensure the correct operation of the valve.

6.2.1 Changing the valve sleeve in open model valve (PV)

See appendix A. Open the valve and detach it from the pipeline. If the valve is equipped with opening tags, loosen the fixing screws (8 pcs) at the pinch bars and pull out the opening tags (Fig. 8).

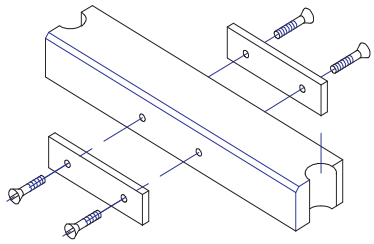


Fig. 8.

Remove the broken sleeve by bending the rubber flange of the sleeve and by wrenching it e.g. with a pry bar / bending iron.

Put in the new sleeve by pressing the rubber flange on the opposite sides together, pushing its edge as far as possible through the steel flange and wrenching the rest of the sleeve through the flange e.g. with a pry bar / bending iron (see Fig. 9).

NOTE	The rubber flange of the sleeve allows bending. Do not damage the sleeve with a sharp tool.

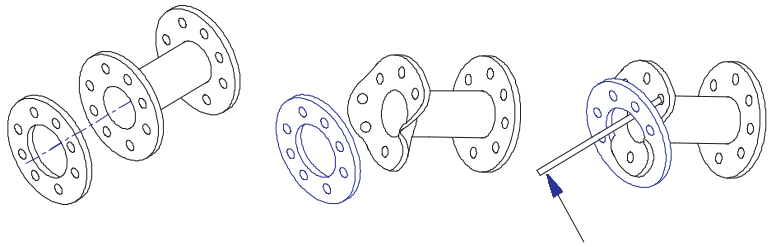


Fig. 9.

After putting in the new sleeve, fix the opening tags to the pinch bars. The excessive length of the tags can be cut away. Adjust the pinch bars before installing to the pipeline.

NOTE	At sleeve change, it is always important to check and adjust the position of the pinch bars. See 6.3.

6.2.2 Changing valve sleeve with enclosed model valve PVE

See appendix B. (Part numbers refer to drawing number 410006 in appendix A). Open the valve and detach it from the pipeline. Open the bolts (6.) between the valve body halves and detach the lower part of the body. If the valve has opening tags, detach them (16.) from upper (2.) and lower pinch bars (3.), 8 pcs screws (Fig.8). Take out the damaged sleeve and put in a new one. If the sleeve is stiff, detach the lower pinch bar. Remember to fix the opening tags if applicable. Check the body sealing (15.) between the body halves and the condition of the bushings (4.). A worn sealing and/or worn bushings may cause leakage to the environment in the event of a sleeve breakage. Assemble the valve and adjust the pinch bars before installing the valve to the pipeline.

NOTE	At sleeve change, it is always important to check and adjust the position of the pinch bars. See 6.3.

6.3 Adjusting the valve

After every sleeve change, the closing of the valve has to be checked and adjusted. A wrong adjustment may shorten the lifetime of the sleeve and cause leakage from the valve when the actuator is in the closed position.

	Control the valve functions (see 2.3). Do not put tools or parts of your body between the moving valve parts.

Before reinstallation of the valve into the pipeline:

- Close the valve by using the actuator. Adjust the pinch bars parallel to each other with the nuts, which are on both sides of actuator fixing plate (Fig.10, nuts 1 and 2), so that from one end of the sleeve an even, narrow light strip (appr. 0.5 mm) is shown on the whole squeezed point of the sleeve or symmetrically on both sides (Fig. 10.1).
- Tighten both nuts (1) equally so, that the strip of light disappears.
- Unscrew the lower nuts (Fig. 10.2, nut 2) X mm from the attachment plate (see the dimension X in the table, Fig. 11).
- When the nuts (Fig. 10.3, nut 1) on the upper side of the attachment plate are tightened, the lower pinch bar rises and causes a sufficient squeeze on the sleeve to close the flow against the pressure in the pipeline. After this has been done, open the valve and it is ready to be installed to the pipeline.

If the valve is hand wheel operated, it is enough to check that the pinch bars are parallel and the light slit is shown (Fig. 10.1). A sufficient squeeze is achieved by turning the hand wheel 1/3...3/4 rounds after the valve feels tight: if the pressure in the pipeline is 1 bar - appr. 1/3 of a hand wheel rotation; PN 10 bar - appr. 1/2 of a hand wheel rotation; PN 25 bar - appr. 3/4 of a hand wheel rotation. If the valve is supplied with a reduction gear, the number of rotations is multiplied by the gear ratio.

A. Attachment plate
B. Upper pinch bar
C. Sleeve
D. Lower pinch bar

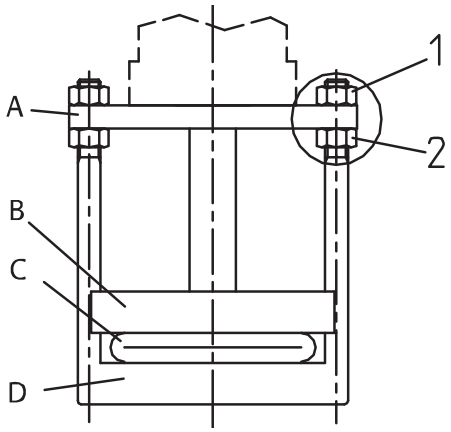


Fig. 10.

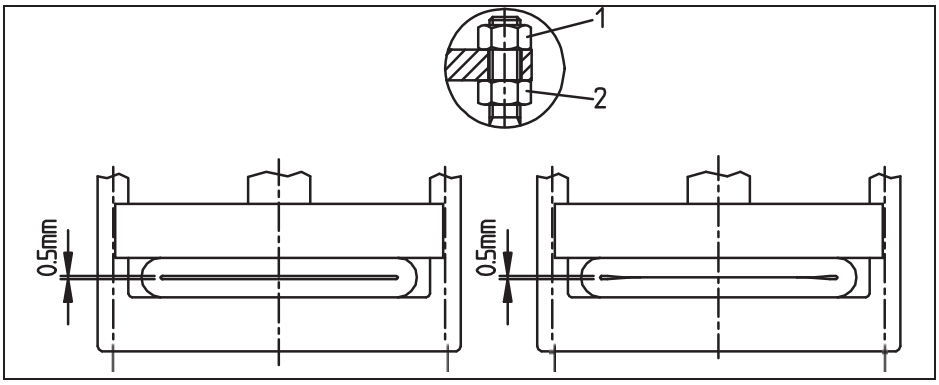


Fig. 10.1.

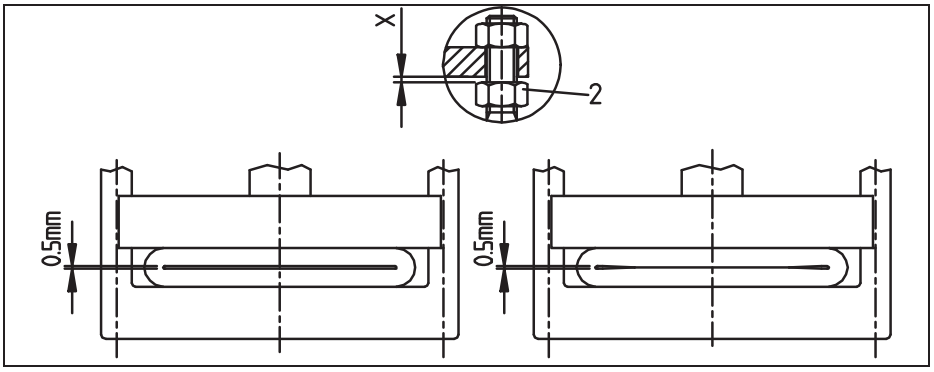


Fig. 10.2.

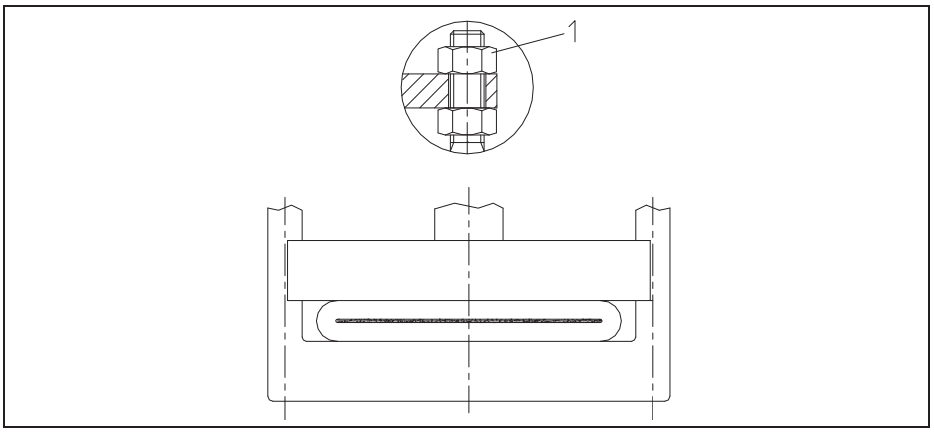


Fig. 10.3.

DIMENSION X [mm]

VALVE SIZE (mm)	PRESSURE CLASS (Bar)		
	1	6...10	16...25
25...100	1.5	2.5	3.5
125...250	2.0	3.0	4.0
300...500	3.0	4.0	
550...	4.0		

Fig. 11.

6.4 Troubleshooting

PROBLEM	POSSIBLE REASON	ACTION
Valve leaks into the environment.	1. Sleeve breakage. 2. End flanges loosely tightened.	1. Change and make adjustment of sleeve 2. Tighten the flange end screws
Leakage or flow through the valve when valve should be closed.	Sleeve breakage.	(models PVE, PVS): check by the plug - change and make adjustment of sleeve
	Sleeve is not closed with sufficient squeeze.	Manual valves - turn the hand wheel more tight. Pneum. and hydr. actuators - check the supply pressure for cylinder; if the pressure is too low, the sufficient squeeze for the sleeve cannot be reached. Check the compactness of the cylinder seals.
	Wrong adjustment of the sleeve.	Make the adjustment
Shorter lifetime of the sleeve than before.	Sleeve is not closed with sufficient squeeze.	Manual valves - turn the hand wheel more tight. Pneum. and hydr. actuators - check the supply pressure for cylinder; if the pressure is too low, the sufficient squeeze for the sleeve cannot be reached. Check the compactness of the cylinder sealings.
	Wrong adjustment of the sleeve.	Make the adjustment.
	1. Pneum. valves: wrong adjustment of the end cushioning in front end-block of cylinder. 2. Wrong adjustment of the pneum. spring.	1. End cushioning in front end-block of cylinder should be fully open. 2. Check adjustment of pneumatic spring .
	Changes in customer process e.g. * composition of medium / temperature * flow capacity	Check the best rubber qualityl with FLOWROX. Select another valve size with FLOWROX (particularly valves with positioners).
Sleeve is flapping and/or flow capacity is not sufficient.	Vacuum or pressure shocks in pipeline, rubber has hardened and does not open totally.	Check that the opening tags are fixed.

In case you cannot find the solution to your problem in the above table, please turn to the nearest Flowrox representative. The serial number and type identification of the valve in question will help getting the prompt answer.

7 TECHNICAL DATA

7.1 Model and spare part codes

7.1.1 Valve model selection

PVE	100	AK	10	-	2	0	3	L	R
TYPE	**SIZE (DN)**	**ACTUATOR**	**PRESSURE CLASSES (PN)**	-	**FLANGE DRILLINGS**	**BODY MATERIAL**	**SHAPE OF FLANGE**	**OPENING TAGS**	**AUXILIARIES**
PV = open PVE = enclosed PVS = sealed PVE/S = enclosed/sealed	25-1000	M=handwheel A=pneumatic AB=with manual override AK=with el.pneum. positioner AN=with pneum. positioner AU=with pneum. spring AV=with mech. spring H=hydraulic HP=with hydraulic positioner E=electro mechanical EO=electric for control	1= 1bar 6= 6 bar 10= 10 bar 16= 16 bar 25= 25 bar 40= 40bar 64= 64 bar 100 =100bar		1 = - 2 = DIN PN 10 3 = DIN PN 16 4 = DIN PN 25 5 = DIN PN 40 6 = ANSI 150 7 = ANSI 300 8 = BS TABLE D 9A = AS TABLE D 9B = AS TABLE E 9C = JIS 10 9D = JIS 16 Other on request	0 = Cast iron / Welded steel 1 = - 2 = AISI 316 3 = aluminium 4 = other 5 = plastic	types 1 - 4 Determined by the valve manufacturer	L = opening tags	Q = quick exhaust valve R= inductive limits S= magnetic proximity limits T= mechan. limits Z= solenoid valve X = must be specified

7.1.2 Sleeve model selection

SBRT	10	100	/	250	/	3	L	2
SLEEVE MATERIALS	**PRESSURE CLASSES (PN)**	**SLEEVE INNER DIA (mm)**		**SLEEVE LENGTH (mm)**		**SHAPE OF FLANGE**	**OPENING TAGS**	**FLANGE DRILLINGS**
SBRT = styrene butadiene EPDM=ethylene propylene CR = chloroprene CSM = chloro-sulphone-ethene FPM = fluorine rubber HNBR = hydrogenated nitrile IIR = butyl NBR = nitrile NBRF = nitrile foodstuff quality NR = natural rubber NRF = natural rubber foodstuff quality PU = polyurethane _/PU = PU-coating inside the sleeve _/M = Flowrox SensoMate sleeve _/VAC = Vacuum sleeve	1= 1bar 6= 6 bar 10= 10 bar 16= 16 bar 25= 25 bar 40= 40bar 64= 64 bar 100 =100bar	25-1000		Depend on the sleeve inner diameter according to ANSI/ISA 75.10.02:		type 1 - 4 Determined by the valve manufacturer (depending on the valve diameter / pressure class)	L = yes	1 = - 2 = DIN PN 10 3 = DIN PN 16 4 = DIN PN 25 5 = DIN PN 40 6 = ANSI 150 7 = ANSI 300 8 = BS TABLE D 9A = AS TABLE D 9B = AS TABLE E 9C = JIS 10 9D = JIS 16 X = Other, must be specified
In spare sleeve orders, please use 4- or 5- figure code marked on the sleeve.								

7.1.3 Sleeve materials for Flowrox valves

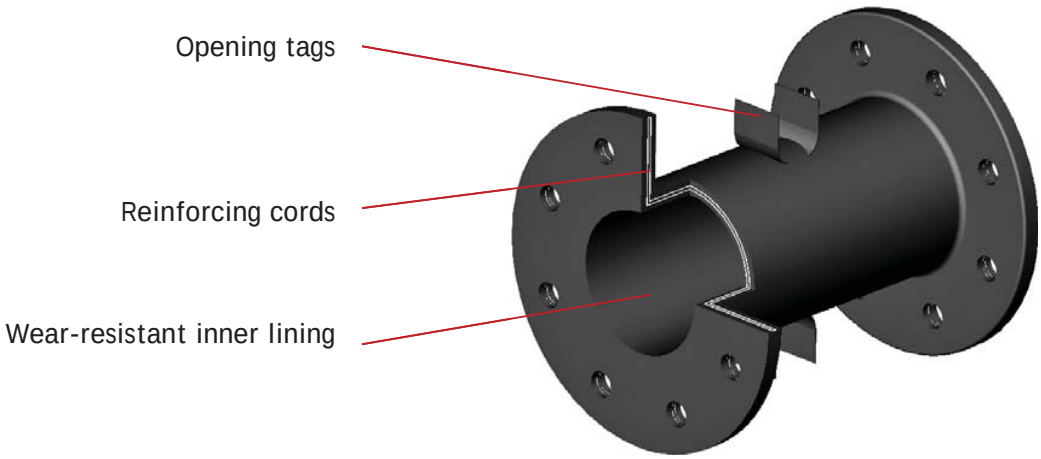
STANDARD SLEEVE MATERIALS FOR FLOWROX VALVES

RUBBER QUALITY	APPLICATION EXAMPLES	TEMPERATURE RANGE	TYPICAL MEDIA
SBRT Styrene Butadiene, Flowrox Blend	Heavy wearing High cycle frequency	-40°C - +110°C	Abrasive materials Diluted acid, alkali and chemical applications
EPDM Ethylene Propylene	Chemical applications • Applicable to 75% of all industrial chemical applications	-40°C - +120°C	Concentrated and oxidizing chemicals

OTHER SLEEVE MATERIAL OPTIONS

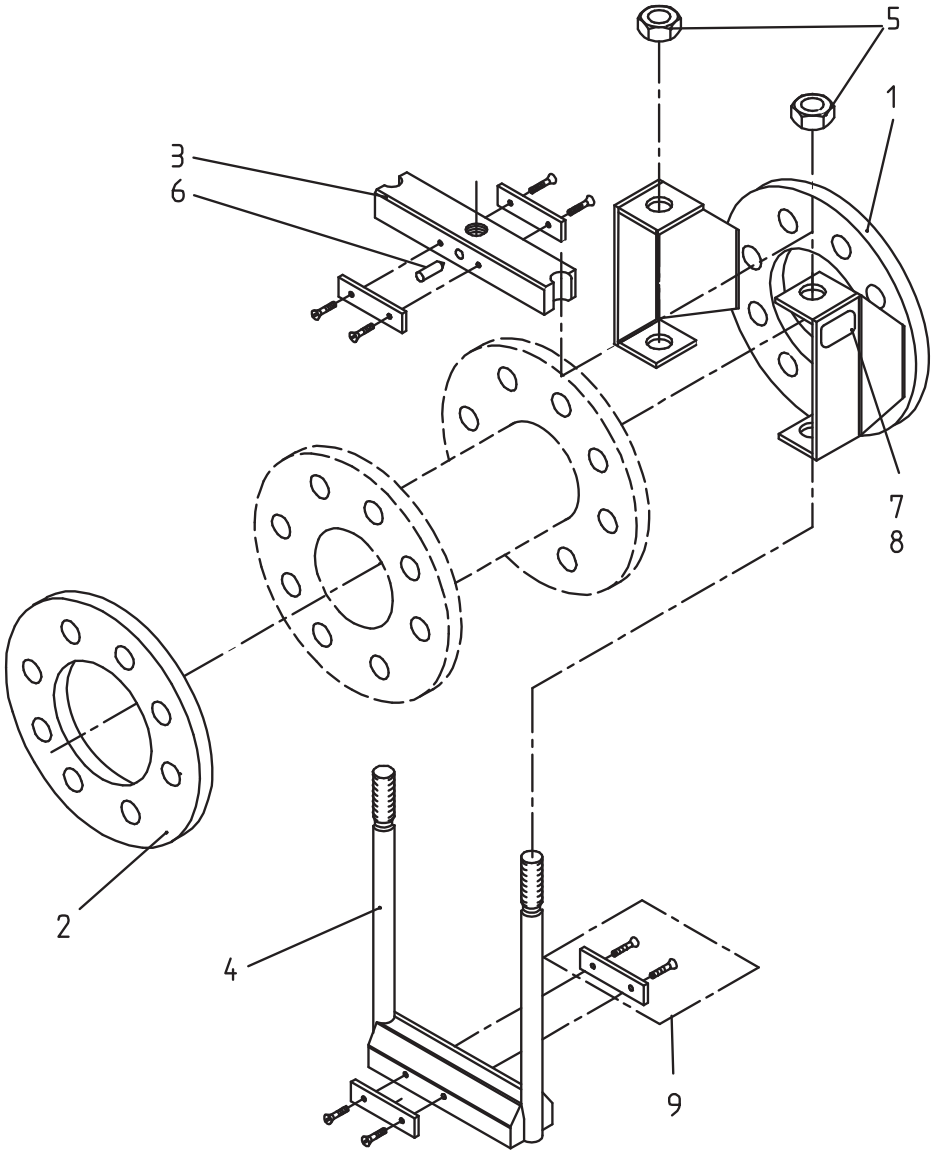
RUBBER QUALITY	APPLICATION EXAMPLES	TEMPERATURE RANGE	TYPICAL MEDIA
NBR Nitrile Rubber	Applications involving oils, fats and hydrocarbons	-30°C - +100°C	Oils, Fats, Fuels Hydrocarbon, Lubricants
NR Natural Rubber	High wear applications	-40°C - +75°C	Abrasive materials Diluted acids, alkali and chemicals
HNBR Hydrogenated Nitrile	High temperature Applications	-30°C - +160°C	Oils, Fats, Fuels Hydrocarbon, Lubricants
NRF Natural Rubber Foodstuff Quality White inner lining	Foodstuff applications Fulfils FDA (Food and Drug Administration) requirements	-40°C - +75°C	Media used in food and other CIP (clean-in-place) processes Alcohols
NBRF Nitrile Rubber White inner lining	Applications involving fatty foodstuff Fulfils FDA (Food and Drug Administration) requirements	-30°C - +100°C	Vegetable and animal oils and fats
EPDM/B Ethylene Propylene, Flowrox Blend	Pulp and paper industry's green liquor applications	-40°C - +100°C	Green liquor Alkaline and extraneous matter in green liquor processes
CR Chloroprene Rubber	Special-purpose chemical applications • Resilient to ozone and averse weather	-40°C - +100°C	Chemicals, Acids Several solvents Aliphatic oils Fats, Lubricants
FPM Fluorine Rubber (Viton®)	Special-purpose chemical applications • Resilient to ozone and averse weather	-20°C +120°C	Chemicals Aliphatic oils Aromatic and halogenated hydrocarbon
CSM Chloro-sulphone-ethylene (Hypalon®)	Special-purpose chemical applications • Resilient to ozone and averse weather	-40°C - +100°C	Chemicals, Acids Several solvents Aliphatic oils Fats, Lubricants
IIR Butyl	Special-purpose chemical applications • Impermeable to gas	-40°C - +100°C	Concentrated and acidic chemicals Vegetable oils
PU Polyurethane • With PU lining or solid PU	Abrasive media applications	-10°C - +80°C	Abrasive materials Diluted chemicals Hydrocarbons Oils, Lubricants

For more information on sleeve materials for Flowrox valves, contact your nearest Flowrox representative.


Opening tags
Reinforcing cords
Wear-resistant inner lining

8 APPENDIXES

8.1 APPENDIX A: PV- Open Body Assembled



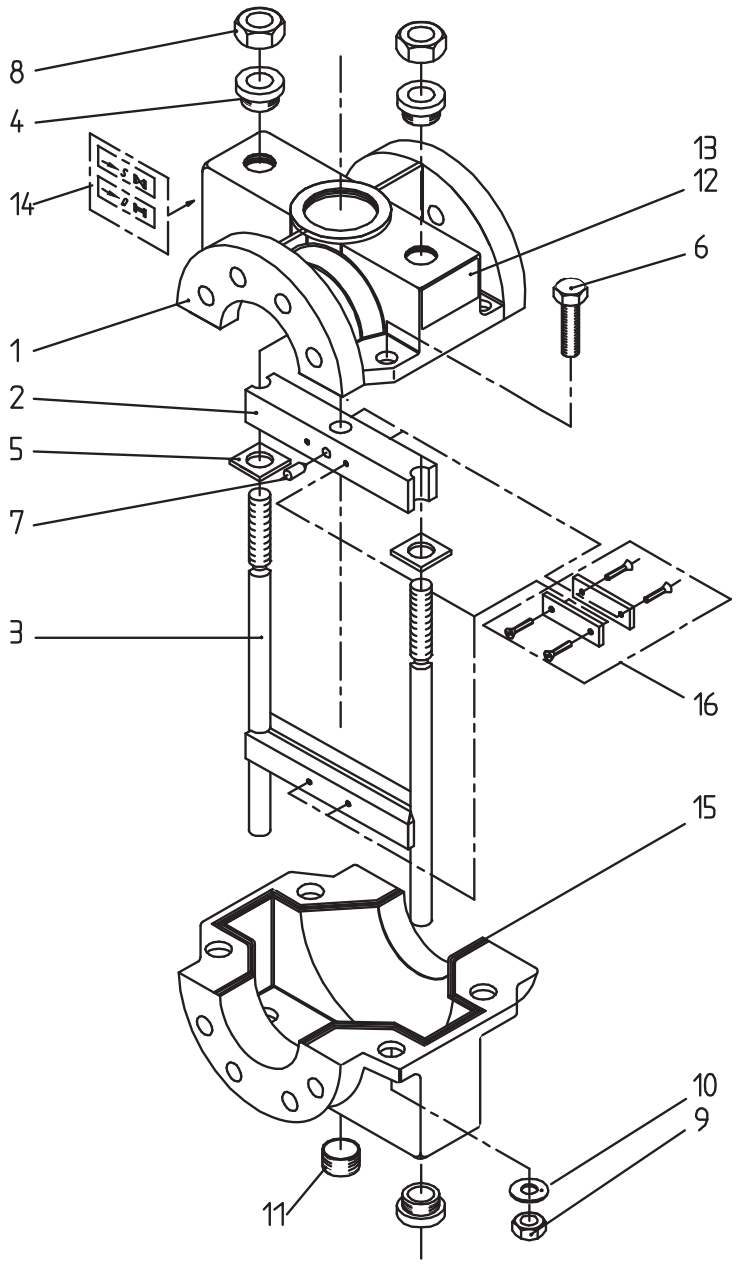
FLOWROX

PV-OPEN BODY ASSEMBLED

Dwg. no. 410158b

1. Valve body
2. Flange
3. Upper pinch bar
4. Lower pinch bar
5. Hex. nut
6. Allen screw
7. Valve plate
8. Drive screw
9. Fix. parts for opening tags

8.2 APPENDIX B: PVE-Enclosed Body Assembled



FLOWROX

PVE- ENCLOSED BODY ASSEMBLED

Dwg. no. 410006a

1. Valve body
2. Upper pinch bar
3. Lower pinch bar
4. RCH-bushing
5. Guide
6. Hex screw
7. Allen screw
8. Hex nut
9. Hex nut
10. Washer
11. Plug
12. Valve plate
13. Drive screw
14. Sticker open-closed
15. Sealing
16. Fix. parts for opening tags

LEFT BLANK

FLSMIDTH KREBS

MODEL U10-GMAX-9.5 SQIN, HYDROCYCLONE

LEFT BLANK

FLSmidth
5505 W Gillette Rd • Tucson, AZ 85743-9501 • USA
Tel +1 520 744 8200 • Fax +1 520 744 8300
www.flsmidth.com

INSTALLATION, OPERATION AND MAINTENANCE MANUAL

4 MODEL U10-GMAX-3037 KREBS® CYCLONES
SERIAL NUMBERS: g169408U – g169411U
EQUIPMENT TAG NUMBERS: C2-011, C2-012, C2-021, C2-022

FOR
VEOLIA WATER TECHNOLOGIES OF CANADA
PO NUMBER: 18000759 HD 05000
PROJECT NUMBER: 5000218009

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FLSMIDTH KREBS
URETHANE IOM

GENERAL

FLSmidth Krebs Cyclones are the result of an intensive research and development program initiated in 1950. Each unit represents a product of advanced design, careful engineering, quality materials and the finest workmanship.

The information in the following pages is directed toward a better understanding of cyclone principles and operation, so that the potential for every FLSmidth Krebs Cyclone is realized.

FLSmidth Krebs engineers cyclone installations by studying the operating data and customer objectives. The cyclone selections are based on the large amount of operating data accumulated by our staff of engineers and our continuing research. When data is not available or is incomplete, studies in our laboratory and pilot plant are recommended. The pilot plant is equipped for complete, full-scale cyclone classification studies. Predictable performances resulting from these studies have been proven in numerous subsequent field installations. An important part of this service is the analysis of the test results by our staff of metallurgical and chemical engineers as related to the overall plant operation.

You are invited to avail yourself of these facilities and services for the study of your classification problems.

Cyclone Identification

FLSmidth Krebs cyclones are designated by Model Numbers, Serial Numbers, size and style. This information is stamped on an identification plate.

Permanent records for this cyclone are kept by the serial number; therefore, the serial number must be used with all correspondence and spare parts orders.

Receiving Instructions

Smaller FLSmidth Krebs Urethane Cyclones are crated and shipped completely assembled. Larger units are generally shipped dismantled as two pieces in order to reduce the size of the shipping crate. When removing the cyclone from the shipping crate, care should be taken to account for all of the parts. This can be checked against the packing slip.

Storage Requirements

FLSmidth Krebs Cyclones, any items with elastomer or polymer components, and auxiliary equipment such as valves, should always be stored:

- out of direct sunlight;
- away from heat and;
- protected from extreme weather conditions.

The preferred storage area will be a cool, well-ventilated building.

If outside storage is mandatory, the equipment should be totally covered over with heavy, opaque, plastic weather covering. It is essential that the plastic be opaque so as to cut out direct sunlight. In addition, a light color opaque material is desirable, to avoid heat build-up under the covering.

The covering should be spread over the equipment with allowance for underside ventilation to avoid excessive heat build-up and moisture condensation. Elevating the equipment a minimum of 2 inches above ground level should ensure adequate ventilation and prevention of moisture condensation.

The polyurethane employed in the manufacture of the cyclones is adversely affected by heat. However, if stored exactly as described above, ambient temperatures of less than 120°F (preferably less than 100°F) can be maintained.

The equipment will not be damaged by freezing conditions as long as it is kept dry. If below freezing conditions are involved, care should be taken when handling to avoid damage to urethane components as they become brittle at very low temperatures.

Installation

Cyclone Mounting

Each cyclone should be securely mounted on a soundly constructed frame so that stresses on the overflow/underflow piping are minimized.

During assembly, care must be taken such that the urethane flanges are not stressed. Assemble the inlet flange to its mating piping without over torqueing to the point of urethane deformation. Follow the same procedure for the overflow connection and lastly the cyclone mounting plate. Do not force the urethane cyclone into an unnatural position.

Sump

Correct design of the pump sump is probably the most important factor in establishing an efficient cyclone operation.

Conversion of flow and velocity to kinetic energy in a cyclone is derived from the energy supplied from the pump. Each adjustment of the cyclone variables will influence the pumping to some degree. This will be discussed in the section entitled “Operation”. A constant volume to the cyclone is important. Momentary fluctuations are generally the result of entrained air in the slurry.

A constant level in the sump is critical, but by no means an indication that the cyclone is receiving a constant and uniform volume of feed. If the needle of the cyclone inlet pressure gauge fluctuates rapidly, it is a definite indication that there is entrained air in the pump discharge slurry. To correct this problem, the entering stream should be prevented from carrying entrapped air to the suction of the pump. This can be done by mounting a sloping plate in the sump, well below the normal level of the slurry. An annular opening between the plate and the edges of the sump of about one inch around its entire periphery will generally be sufficient to allow the total volume of slurry to pass from the upper compartment to the lower section.

It is permissible to return part or the entire overflow product to the sump to maintain a constant level. It should be noted that the greater the slime content of the feed slurry to a cyclone, the more difficult it becomes to make a given separation. The use of recycled overflow product should be handled with caution, as there is always a danger of recirculating an excess quantity and consequently increasing the slime content of the feed slurry.

Where water is available and the overflow product is an important consideration, fresh water should

be added to the feed as a means of volume control.

The overflow product should discharge to atmosphere as close to the cyclone as possible. If the overflow pipe is carried directly to an elevation below the inlet of the cyclone, a siphoning action can be created. This will cause coarser particles to be carried to the cyclone overflow product.

The underflow discharge should be open for visual inspection, as it is important to be able to observe the characteristics of this flow. The underflow should be maintained with a 20-30 degree spray discharge. A “rope” discharge is an indication that there is excess crowding of solids at the apex orifice. This will cause coarse oversize solids to be carried into the overflow product.

Both the overflow and underflow should be available for sampling.

Pumping

Pumping to a cyclone, or battery of cyclones, must be carefully engineered to the job both as to size and type of the pump, and to size and length of the pipe line. Wear results in a much higher pump maintenance cost than cyclone maintenance cost.

Wear on a pump varies approximately proportionately to the cube of the velocity. In order to minimize the pump speed and pump maintenance, the cyclone should be as near to the pump as possible. A certain inlet pressure at the cyclone will be required, so there is also a power saving by having the static and friction head as low as possible.

If adequate pressure is available in the cyclone feed line, a pump may not be required.

Piping

When designing cyclone piping, the most important consideration is to establish a velocity that will prevent particle segregation in the pipe line, and at the same time hold the velocity to a minimum to reduce wear, which increases rapidly with increase in velocity.

With a large majority of installations for pumping slurries, the velocity range falls between a low of 5 ft/s and a high of 15 ft/s.

Major factors in determining the optimum velocity in a pipeline are:

- particle size
- angularity of the coarser fractions
- specific gravity of solids
- slimes content
- pulp density
- viscosity

Multiple Installations

FLSmidth Krebs has the ability to design and fabricate cyclone manifolds as per the project

requirements, with various styles including: radial, “spider”, and inline.

A radial manifold system assures an even feed distribution to each cyclone. The take-offs should be equally spaced around the perimeter of the central distribution pot. The overflow and underflow launders must be properly sized to allow for collection and distribution of the streams.

An inline manifold system can be used if the feed is very dilute and not subject to segregating in the system. An inline system is generally easier to design and build than a radial system and consequently is less expensive. However, an inline system does not assure equal feed to each cyclone.

Operation

The FLSmidth Krebs Urethane Cyclones are chemical resistant in some cases. The maximum recommended operating temperature is 140 °F. Available sizes include: ½" up to 15" diameter.

The primary consideration in selecting the proper size and design of cyclone is the classification objective, not the capacity. The proper relationship between the inlet orifice size, the vortex finder diameter, and the apex diameter is engineered by the staff of FLSmidth Krebs for each specific classification objective.

There is seldom any necessity for changing the size of these orifices unless the classification objectives or plant operating conditions are altered.

Numerous factors influence the operation of a cyclone. Following is a brief discussion of some factors influencing cyclone operation (which the operator is normally able to control while the cyclone is operating).

Feed Dilution

Feed dilution is the most effective control available. The use of additional dilution water will always result in a finer and sharper separation. The dilution water can also be adjusted to maintain a constant level in the sump, although the operator must be aware of the potential change in the separation. For very dilute feeds, the change in the separation will be minimal.

Pressure Management

Pressure drop across the cyclone is the pressure differential between the cyclone inlet and overflow. When the cyclone discharges to atmosphere, a condition we usually recommend, the inlet pressure (gauge reading) is equal to the pressure drop.

The pressure drop is merely an indication of the energy required to force a given volume through the cyclone fitted with a certain combination of orifices. It is not an indication of a developed force-pattern or throughput, except as related to that one particular set of operating conditions. Excessive pressure results in high pump operating and maintenance costs and should be avoided. We generally do not recommend pressure drops above 40 psi.

In general, the higher the pressure drop, the greater the throughput capacity of the cyclone. A higher pressure drop will also produce a finer separation.

Cyclone Orifices

The following describes the effect the various orifices have on the cyclone performance. Changing

the orifice requires shutting down the system.

Inlet Orifice

The main function of the inlet orifice is to provide a smooth flow pattern at the point of entry into the cyclone. All FLSmidth Krebs Cyclones are designed with an involute entry that pre-orients the solids prior to reaching the tangential point of contact with the cylinder wall. This minimizes turbulence and allows FLSmidth Krebs Cyclones to produce finer and sharper separations.

An increase in the inlet area will increase the capacity of the cyclone. It will also coarsen the separation slightly. All of FLSmidth Krebs Urethane Cyclones, four inches and smaller in diameter, have fixed inlet areas. For larger diameter urethane cyclones, various inlet head sizes are available for each size cyclone. If a different inlet area is required, the complete inlet head can be replaced as the inlet area is integral to the part.

Vortex Finder

The vortex finder has the greatest impact on the operating results of all the orifices. The vortex finder size has a major effect on the cyclone capacity at a fixed pressure drop and also affects the cyclone separation significantly.

The larger the vortex finder diameter, the greater the cyclone capacity at a given pressure drop. A larger diameter vortex finder will also coarsen the cyclone separation and send a larger proportion of solids to the overflow. Various vortex finder sizes are available and the entire part can be replaced.

Apex Orifice

The main function of the apex orifice is to discharge the coarse solids in such a manner that the maximum underflow density and smoothness of discharge are obtained. The apex should be large enough to produce a 20-30 degree conical-shaped discharge, but should not be used to control the cyclone separation. The apex should never be so small that a “rope” discharge exists. A “rope” discharge is an indication that the apex is not allowing all of the coarse solids to exit out the underflow and consequently some are being forced out the cyclone overflow.

Both fixed and manually adjustable apexes are available on FLSmidth Krebs Urethane Cyclones, although fixed apexes are more common. Various apex sizes are available and the entire part can be easily replaced to optimize the underflow solids.

Maintenance

It is important to maintain smooth surfaces on the interior of the cyclone. If possible, the cyclones should be inspected on a regular basis. When the interior surfaces become worn or uneven, the part should be replaced. After experience has been gained in operating the cyclones under given conditions, a regular maintenance schedule can be determined.

Once the apex opens more than 10% of its original size, it should be replaced. Once worn, these urethane parts are 'disposable'.

Please note that for urethane cyclones, the entire part (i.e. cone section, vortex finder, and apex) can be replaced. This is opposed to the replaceable elastomer or ceramic liners used by standard cyclones with steel housing.

The FLSmidth Krebs Urethane cyclones are very lightweight which makes maintenance easier. For cyclone sizes 6" and smaller, the cone sections are generally connected by SS clamps for ease of connection by operators.

FLSmidth Krebs Urethane Cyclones are available in various materials of construction which include:

- Urethane (RU)
- Food-grade Urethane (RT90)
- High-Temp. Urethane (RI)
- Ultrane (RW)*
- Royal Cast (RC)*
- Natural Gum Rubber (apex liner and adjustable apex only)

*Multi-component urethane used for gMAX cyclone sizes 10" and larger

**Other urethane materials are available upon special request

Common Problems and Solutions

Problem 1:

There are very coarse solids in the cyclone overflow.

Solution:

This is normally an indication that the apex is too small and coarse solids are being forced to the cyclone overflow. The apex diameter should be increased until a constant 30 degree cone angle is obtained on the discharge. Certain styles of the urethane fixed apexes can be cut to increase the diameter. An adjustable apex will have to be replaced with a larger one if it is in the full open position.

Another possible solution is to reduce the pressure drop by reducing the flow to the cyclone or by operating additional cyclones (for multiple installations).

Problem 2:

The cyclone pressure drop fluctuates wildly.

Solution:

This is an indication that a constant level in the sump is not being maintained or that air is entrained in the slurry. If the pump is pumping more feed volume than is going to the slump, the sump level will go down. Eventually the pump will cavitate and the pressure drop across the cyclone will be very erratic. Slowing the pump down or increasing the dilution water to the sump will maintain a constant sump level.

Air usually enters the pump suction because the feed to the sump is pointing directly down into the pump suction. Change the feed so that it angles against a side wall of the sump or install a baffle plate as described in the installation section.

Problem 3:

The separation is not fine enough.

Solution:

Increase the dilution water to the feed. If the feed is already dilute or if diluting the feed is not possible, increase the cyclone pressure drop. This will require speeding up the pump and installing a smaller diameter vortex finder. If the separation is still not fine enough, smaller diameter cyclones will probably be required.

Problem 4:

The underflow is too dilute.

Solution:

This is an indication that the apex is too large. Decrease the apex diameter until a 30 degree cone discharge is obtained. Do not decrease the apex diameter to the point of “roping” the discharge. The adjustable apexes can be decreased by tightening the worm

driven clamp. The fixed apexes will have to be replaced with a smaller size.

If smaller apexes are not readily available, another option is to increase the pressure drop by increasing the flow to the cyclone or by operating fewer cyclones (for multiple installations).

Calculations

TONNAGE:

1) Solids: $TPH = GPM\ SLURRY \times S.G\ SLURRY \times \%\ SOLIDS$

Slurry: $\frac{TPH\ SOLIDS}{\%\ SOLIDS}$

2) PULP SPECIFIC GRAVITY:

S.G. PULP =

$$\frac{100 \times S.G.\ SOLIDS \times S.G.\ LIQUID}{100 \times S.G.\ SOLIDS - \%\ SOLIDS\ (S.G.\ SOLIDS - S.G.\ LIQUID)}$$

3) PERCENT SOLIDS IN PULP

$$\% = \frac{TPH\ SOLIDS}{TPH\ SLURRY} \times 100$$

4) GALLONS PER MINUTE:

$$GPM\ SLURRY = \frac{TPH\ SOLIDS \times 4}{S.G.\ SLURRY \times \%\ SOLIDS}$$

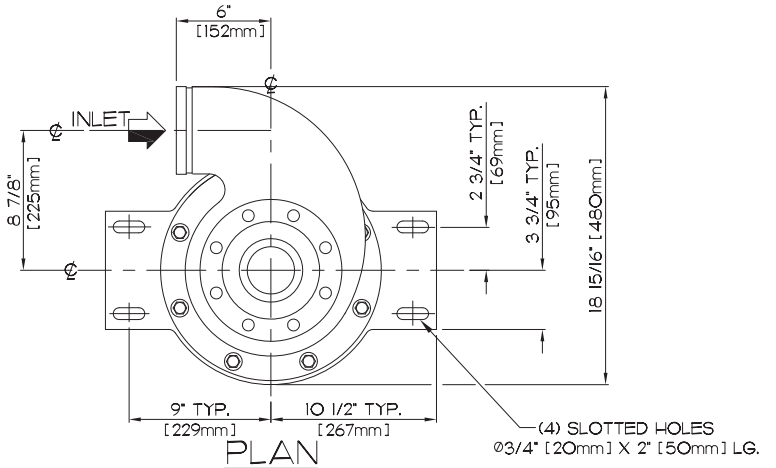
5) $$\%\ SOLIDS\ BY\ VOLUME = \frac{\%\ SOLIDS\ BY\ WEIGHT \times S.G.\ PULP}{S.G.\ SOLIDS}$$

6) $$\frac{GPM}{ONE\ TPH\ SOLIDS} = \frac{4}{\%\ SOLIDS \times S.G.\ PULP}$$

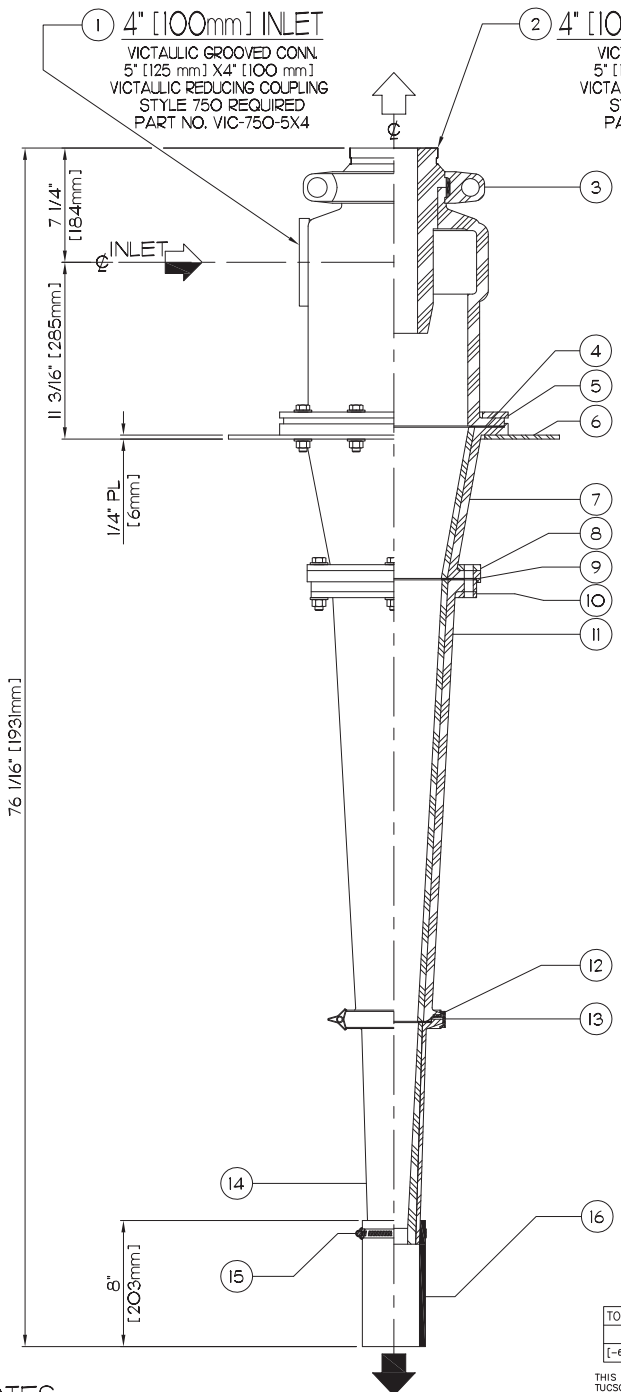
FASTENER REQUIREMENTS				
CONNECTION	DESCRIPTION	SIZE	LENGTH	QTY
1, 4 TO 6, 7	HEX BOLT & NUT	1/2-13	2 3/4"	8
7, 8 TO 10, 11	HEX BOLT & NUT	1/2-13	3"	4
	WASHER	1/2		24

FASTENER NOTES:

1. ALL BOLTS AND NUTS, TO BE SAE IMPERIAL 304 STAINLESS STEEL. (OTHER GRADE/PLATING CAN BE OFFERED)
2. NUTS SUPPLIED TO BE FINISH NUTS.
3. WASHERS TO BE USED ON ALL SLOTTED HOLES.
4. PLEASE NOTIFY CUSTOMER SERVICES OF ANY DEVIATION IN THIS LIST.
5. NO PAYMENT FOR CUSTOMER MODIFICATIONS, BACK CHARGES, OR ANY OTHER CHANGES WILL BE ACCEPTED, UNLESS PREVIOUSLY AUTHORIZED BY FLSmidth KREBS.
6. QUANTITIES SHOWN ARE FOR THE ASSEMBLY OF ONE CYCLONE.



PLAN
(VICTAULICS NOT SHOWN)



VEOLIA WATER TECHNOLOGIES OF CANADA
PROJECT NO: 5000218009 / SERIAL NO: GI69408U - GI6941IU

PART No : U10-GI69408

ITEM No.	PART NUMBER	DESCRIPTION
1.	C2293-RU-9.5	INLET HEAD WITH 4" VICTAULIC INLET CONNECTION, . 9.5 SQUARE INCH INLET NOZZLE ORIFICE SIZE, URETHANE.
2.	C2294-RU-3	VORTEX FINDER, 3" SIZE, URETHANE.
3.	VIC-75-6	VICTAULIC COUPLING, 6" SIZE, STEEL.
4.	G7-1004-RN	GASKET, NEOPRENE.
5.	C2176-ST	BACKING PLATE HALF RING, STEEL. (2=SET)
6.	C2175-ST-MF	BACKING PLATE / MOUNTING PLATE, STEEL.
7.	G65-209560-RCS	CONE SECTION, ROYAL CAST / ULTRANE II.
8.	C1846-ST	BACKING FLANGE HALF RING, STEEL. 2 = SET.
9.	G7-1005-RN	GASKET, NEOPRENE.
10.	G63-066130A-ST	BACKING FLANGE, STEEL.
11.	G65-066130-RCS	CONE SECTION, ROYAL CAST / ULTRANE II.
12.	G7-1006-RN	GASKET, NEOPRENE.
13.	C7712-SS	CLAMP WITH HAND WHEEL, STAINLESS STEEL.
14.	G85-30ARCS-1.75	APEX, 1.75" SIZE, ROYAL CAST / ULTRANE II.
15.	C7728-SS	CLAMP, STAINLESS STEEL.
16.	C8135R-RS-8	SPLASH SKIRT, 3.25" I.D. X 8" LONG, ULTRANE II.

TAG NO.
C2-011
C2-012
C2-021
C2-022

FINAL CERTIFICATION

CERTIFIED FOR Veolia Water Technologies of Canada
P.O. No. 18000759 HD 05000
S.O. No. 0219283
BY _____ DATE 31-August-2018
5505 WEST GILLETTE ROAD
TUCSON, ARIZONA 85743
PHONE: (520) 744-8200 FAX: (520) 744-8300
FLSmidth

NOTES:

1. PAINT: EN-SPEC-4-3041 (FOR STEEL PARTS ONLY)
2. BARE WEIGHT: 65# [30kg]

TOLERANCE SCHEDULE: UNLESS OTHERWISE SPECIFIED.		
-24"=±1/4"	+24" thru 100"=±1/2"	+100"=±1"
[-600mm = ±6mm]	[+600mm thru 2500mm = ±12mm]	[+2500mm = ±25mm]

REVISION
Rev. By: 6

FLSmidth KREBS
5505 WEST GILLETTE ROAD
TUCSON, AZ 85743
www.krebs.com

Rev. Date:	Scale:	Dwn. By:	Date Drawn:	Appvd. By:	Sheet:
04/27/2018	— — —	ISN	04-27-18	GS ADG	1 OF 1

Appvd. By: 0

GENERAL PARTS ARRANGMENT
KREBS CYCLONE MODEL U10-gMAX-3037
WITH FIXED APEX ASSEMBLY NO. G85-30A
(SO: 0219283)

C DWG. NO. S3037-G169408U

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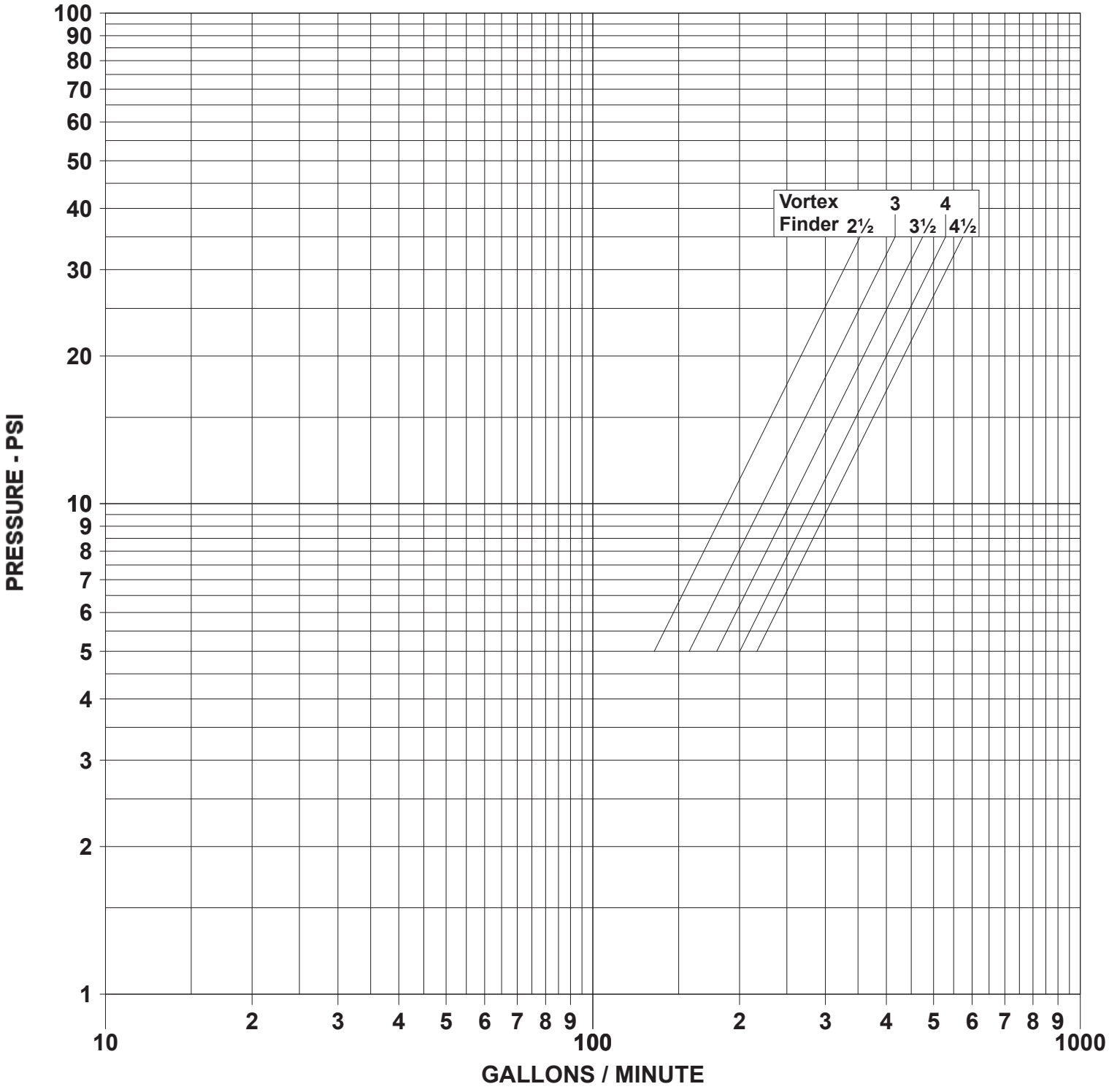
Krebs Cyclone
Model No.: U10-gMAX

CAPACITY CURVE
No.: U10-gMAX-950-601

9.50 SQ. IN. INLET ORIFICE



CAPACITY IS BASED ON WATER AT AMBIENT TEMPERATURE AND APEX DIAMETER EQUAL TO ONE HALF THE VORTEX FINDER DIAMETER, AND MAY VARY AT DIFFERENT RATIOS

KREBS ENGINEERS
5505 West Gillette Road
Tucson, AZ 85743
TEL: (520) 744-8200
FAX: (520) 744-8300
e-mail: www.krebs.com

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FLYGT

ENM-10, LEVEL SWITCH

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Installation, Operation
and Maintenace Manual

ENM 10

FLYGT
a xylem brand

Table of Contents

Introduction and Safety

Introduction

CAUTION:

- Read this manual carefully before installing and using the product. Improper use of the product can cause personal injury and damage to property, and may void the warranty.
- Observe accident prevention regulations in force.
- Save this manual for future reference, and keep it readily available at the location of the unit.

Purpose of this manual

The purpose of this manual is to provide the necessary information for:

- Installation
- Operation
- Maintenance

Safety

Precautions

WARNING:

- The operator must be aware of safety precautions to prevent physical injury.
- You must observe the instructions contained in this manual. Failure to do so could result in physical injury, damage, or delays.
- Before starting work on the unit, make sure that the unit and the control panel are isolated from the power supply and cannot be energized. This applies to the control circuit as well.[R]
- A certified electrician must supervise all electrical work. Comply with all local codes and regulations. [R]

Safety terminology and symbols

About safety messages

It is extremely important that you read, understand, and follow the safety messages and regulations carefully before handling the product. They are published to help prevent these hazards:

- Personal accidents and health problems
- Damage to the product
- Product malfunction

Hazard levels

Hazard level	Indication
 DANGER:	A hazardous situation which, if not avoided, will result in death or serious injury

Hazard level	Indication
WARNING:	A hazardous situation which, if not avoided, could result in death or serious injury
CAUTION:	A hazardous situation which, if not avoided, could result in minor or moderate injury
NOTICE:	• A potential situation which, if not avoided, could result in undesirable conditions • A practice not related to personal injury

Electrical hazards

Electrical hazards are indicated by the following specific symbol. This symbol warns for presence of a dangerous voltage.

Electrical Hazard:

User safety and health

Introduction

All government regulations, local health and safety directives must be observed.

Prevent danger due to electricity

All danger due to electricity must be avoided. Electrical connections must always be carried out in compliance with the following:

- The standard connections shown in the product documentation that is delivered together with the product
- All international, national, state, and local regulations. (For details, consult the regulations of your local electricity supplier.)

For more information about requirements, see sections dealing specifically with electrical connections.

Product warranty

Coverage

Xylem undertakes to remedy faults in products from Xylem under these conditions:

- The fault is due to defects in design, materials, or workmanship.
- The fault is reported to a Xylem representative within the warranty period.
- The product is used only under the conditions described in this manual.
- All service and repair work is done by qualified and authorized personnel. All modifications must be done by qualified technicians.
- Genuine Xylem parts are used.

Limitations

The warranty does not cover faults caused by these situations:

- Deficient maintenance
- Improper installation
- Modifications or changes to the product and installation made without consulting Xylem

- Incorrectly executed repair work
- Normal wear and tear

Xylem assumes no liability for these situations:

- Bodily injury
- Material damage
- Economic loss

Warranty claim

Xylem products are high quality products with expected reliable operation and long life. However, should the need arise for a warranty claim, then contact your Xylem representative.

Qualification of personnel

All work on the product should be carried out by certified electricians or Xylem authorized mechanics.

Xylem disclaims all responsibility for work done by untrained, unauthorized personnel.

Support

Xylem only supports products that have been tested and approved. Xylem does not support unapproved equipment.

Product Description

Introduction

Product description

The ENM-10 is the simplest possible method for level control. A mechanical switch in a plastic casing, freely suspended at the desired height from its own cable. When the liquid level reaches the regulator, the casing will tilt and the mechanical switch will close or break the circuit, thereby starting or stopping a pump or actuating an alarm device. No wear, no maintenance. In sewage pumping stations, for ground water and drainage pumping – in fact, for most level control applications – the ENM-10 is the ideal solution.

Liquid density

The product is available in different versions for different liquid densities.

Temperature limit

The regulator can withstand up to 60°C (140°F).

Manual coverage

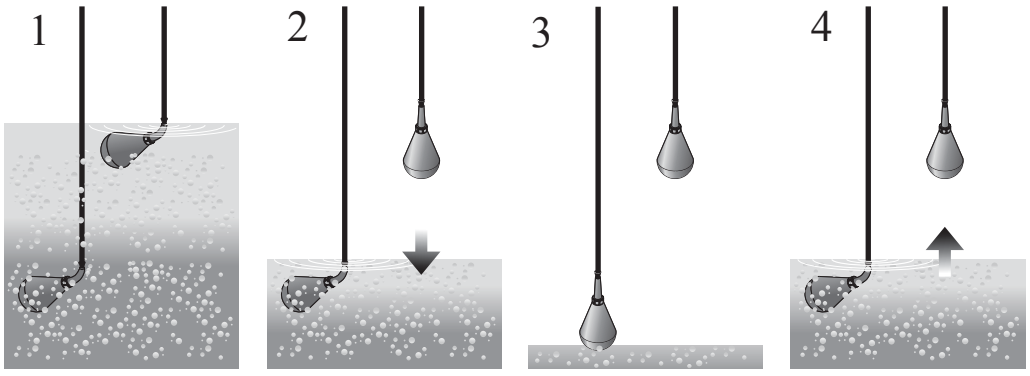
This manual is applicable to the following versions:

- Standard version Blue casing of ENM-10
- EX-version Black casing of ENM-10.

Available languages

For manuals in other languages, visit *tpi.xyleminc.com*

Process description



WS004996A

1. When the pumped media reaches a predetermined level, the upper level regulator tips over to horizontal position and the pump starts to drain the basin.
2. The basin is drained of fluid.
3. The pump stops when the lower level regulator returns to the vertical position.
4. The basin fills up again. The process restarts.

Material

Standard version

Part	Material
Regulator casing	Polypropylene
Cable sheath	PVC or Nitrile/PVC rubber compound

The plastic components are welded and screwed together. Adhesive is never used. Impurities and deposits will not adhere to the smooth casing.

EX-version

The version for Ex-applications has a black casing, made conductive by adding carbon to the polypropylene.

Cable lengths

For liquids with specific density between 0.95 and 1.10 g/cm^3, the following cables are available:

Version	Lengths m (ft)
Standard	• 6 m (20 ft) • 13 (42) • 20 (65) • 30 (100) • 50 (167)
Ex-version	• 6 m (20 ft) • 13 (42) • 20 (65) Nitrile/PVC rubber cable

Electrical data

Country	Electrical data
Canada	5 A, 250 V, DC 10 A, 250 V, AC
Denmark	10 A, 250 V, AC
Switzerland	6 A, 250 V, AC
Sweden	10 A, 230 V, AC Resistive load 3 A, 250 V, AC Inductive load 5 A, 30 V, DC Resistive load *1 mA, 5 V, DC, Gold Contact

* Part no: 594 79 19 and 594 79 20

Micro switch

The level regulator contains a micro switch, max rated 250 VAC/10 A.

Low-voltage supply

In many cases, local codes require that the regulator is connected to a low-voltage supply, even though it is approved for a higher voltage.

It is recommended that the regulator is connected to a low-voltage supply, 48 V or 24 V, and a protective transformer.

Electrical data for Ex-approved installation

Description	Data
Maximum input voltage, U_i	30 V
Maximum input current, I_i	100 mA
Maximum input power, P_i	1.2 W
Depth of immersion	Max 20 m

For cable

Description	Data
Maximum internal capacitance, C_i:	1.8 nF
Maximum internal inductance, L_i:	10 µH

Installation

There are special rules that apply to installation in an explosive atmosphere. Intrinsically safe circuits are normally required: Ex i. Use a EX-safety barrier, for example, Prod. No. 84 01 07.

Approvals

CE, CSA, SEMKO, NEMKO, DEMKO, EX

LVD approval according to EN61058

CSA approval: Cert No. 1330172

Cl.I Zone 0, Gr. IIC;

CL.I Div.1 Gr A, B, C and D

Cl.II Gr. E, F and G

Cl.III when installed to the certified Intrinsically Safe relay, Ex ia, rated for the locations per submitter control drawing and installation manual.

Ex-approvals

IECEx ia IIC T4 Ga: -20°C<Ta<60°C

IECEx NEMKO 09.008

ATEX II 1G ia IIC T4

NEMKO 10ATEX 1082

Applied standards

- EN 60079-0:2009/IEC 60079-0:2007
- EN 60079-11:2007/IEC 60079-0:2006
- EN 60079-26:2007/IEC 60079-26:2006

Intrinsically safe circuits are required for the automatic control system.

Use a Ex-safety barrier: For example, Prod. No. 84 01 07

0080

Mechanical Installation

Precautions

CAUTION:

- Read this manual carefully before installing and using the product. Improper use of the product can cause personal injury and damage to property, and may void the warranty.
- The operator must be aware of safety precautions to prevent physical injury.

General

To conform to local regulations, the regulators are normally connected through a transformer to a low-tension control circuit.

Make sure that two regulators are used, one for starting and one for stopping.

If an alarm is required at a given level, then connect a third regulator.

Identical regulators can be used for all functions.

Make sure that the cables do not become tangled during the installation.

The regulator cables must hang freely from each other.