VL

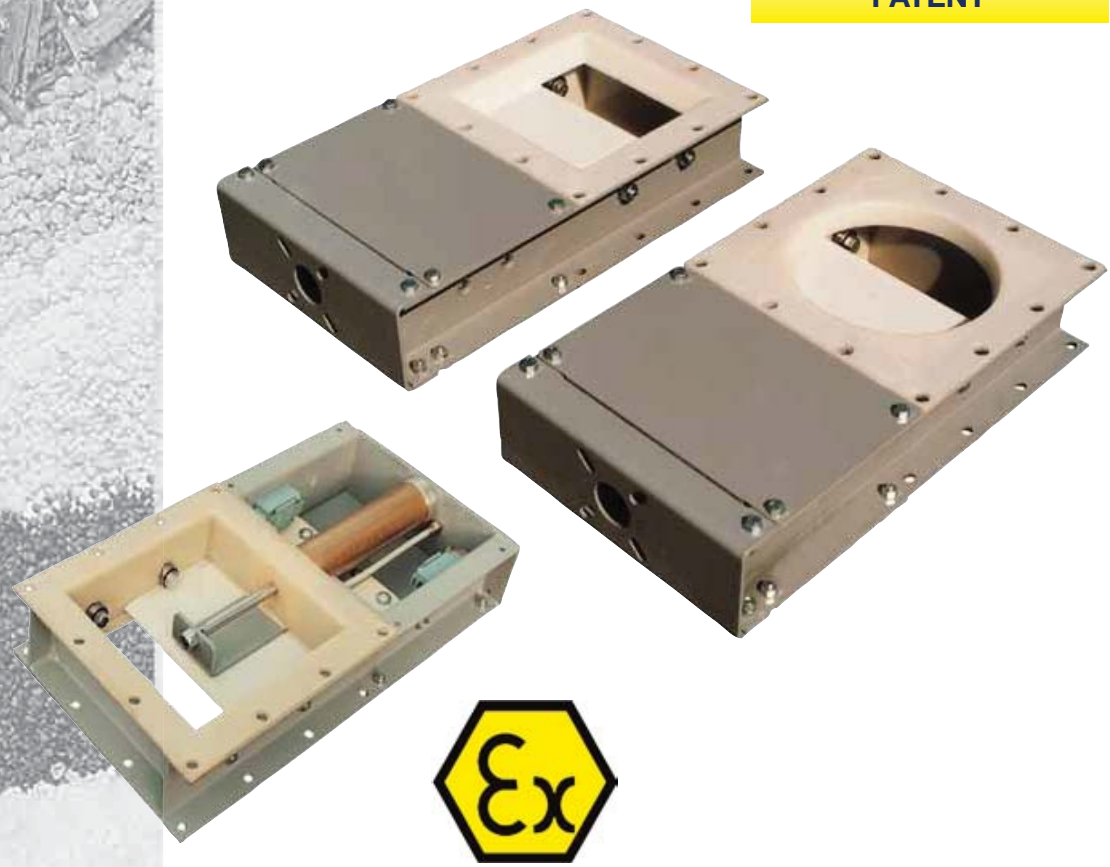
Slide Gate Valves

Flachschieber

Vannes Guillotine

Valvole a Ghigliottina

INTERNATIONAL PATENT



WAMGROUP

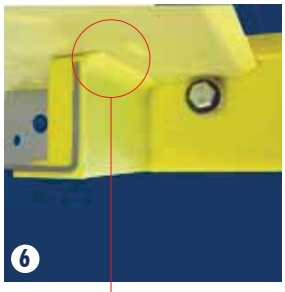
WAM®

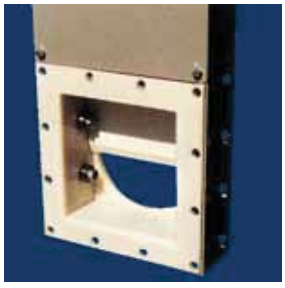
VL Slide Valves are used where the flow of a bulk solid caused by gravity or transport has to be intercepted. Valves may be fitted to hopper or silo outlets, to the inlets and outlets of mechanical conveyors and to the inlet of telescopic loading spouts.
VL-type Slide Valves consist of a two piece carbon or stainless steel frame, which is partly coated with WAM's unique SINT™ engineering polymer composite, and a sliding blade manufactured either in the same material or in stainless steel. The use of SINT™ engineering polymer considerably increases resistance to abrasion compared to traditional valves.
The special geometry of the Valve and the different options of blade design enable its application in virtually every sector including the food industry.

VL-Flachschieber finden überall dort Verwendung, wo ein durch Schwerkraft oder Förderung verursachter Schüttgutfluß unterbrochen werden soll. VL-Flachschieber können unter Silo- oder Trichterausläufen, über den Einläufen bzw. unter den Ausläufen von mechanischen Stetigförderern oder über dem Einlauf von Teleskop-Verladegarnituren eingebaut werden. VL-Flachschieber bestehen aus einem zweiteiligen, teilweise mit SINT™-Polymer ausgekleideten Stahl- oder Edelstahlrahmen und einem mit dem gleichen Polymer beschichteten oder aber ganz aus Edelstahl bestehenden Schieberblech. Die Verwendung von SINT™-Polymer erhöht die Abrasionsresistenz gegenüber traditionellen Flachschiebern beträchtlich.
Die spezielle Geomterie dieser Baureihe und diverse Schieberblechoptionen ermöglichen den Einsatz in allen industriellen Anwendungen inklusive der Nahrungsmittelindustrie.

Les Vannes Guillotine VL sont utilisées pour sectionner l'écoulement d'un flux de matériau vrac. Les Vannes Guillotine VL peuvent être installées sous silos ou trémies, au-dessus des bouches d'entrée et au-dessous des bouches de sortie des transporteurs mécaniques ou en tête des goulottes télescopiques.
Les Vannes Guillotine VL sont composées d'un châssis en deux parties qui est partiellement revêtu en polymère technique SINT™ et d'une lame revêtue du même matériau ou entièrement en acier inox. L'utilisation de SINT™ augmente considérablement la résistance à l'abrasion par rapport aux vannes de type traditionnel.
La géométrie spéciale de cette gamme et lesdiverses options de lames rendent possible leur utilisation dans toutes les industries y compris celles de l'alimentaire.

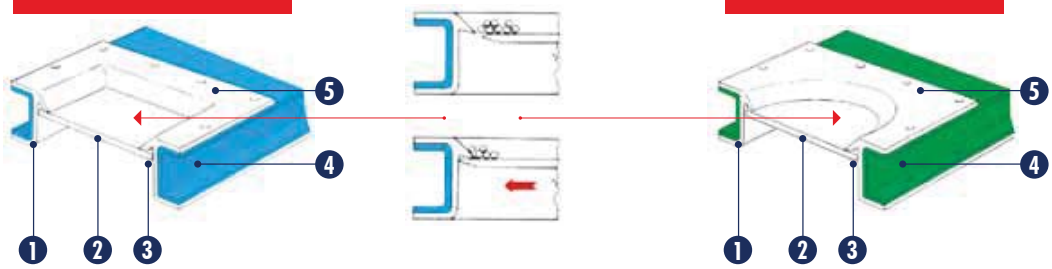
Le Valvole a Ghigliottina VL sono utilizzate laddove un flusso di materiale alla rinfusa causato o dalla gravità o da un trasporto deve essere intercettato. Le Valvole a Ghigliottina VL possono essere installate sotto le bocche di scarico di sili o tramogge, sulle bocche di carico e scarico dei trasportatori meccanici o sulle bocche di carico degli scaricatori telescopici.
Le Valvole a Ghigliottina VL sono costituite da un telaio in due pezzi che è parzialmente rivestito del tecnopolimero SINT™ e da una lama rivestita dello stesso materiale o interamente in acciaio inossidabile. L'utilizzo del SINT™ aumenta considerevolmente la resistenza all'abrasione rispetto alle valvole ti tipo tradizionale.
La speciale geometria di questa gamma e le diverse opzioni di lame rendono possibile la loro applicazione in tutte le industrie compresa quella alimentare.





VLQ - VLR - VLS

VLC



3 interchangeable actuators for valve types VLQ-VLC-VLR

3 Antriebsvarianten bei gleichem Schieberrahmen, Typ VLQ-VLC-VLR

3 actionneurs interchangeables pour les vannes VLQ-VLC-VLR

3 attuatori intercambiabili per tipi di valvole VLQ-VLC-VLR

(1) Valve body coated with SINT™MC or SINT™AL in order to avoid contact between product and body.

(2) Heavy-duty blade (SINT™MC / SINT™AL, carbon steel, 304 st.st.)

(3) Minimum friction contact

(4) No additional lateral seals required

(5) Dry food quality (coating in SINT™AL)

(6) Dustproof (scraper included)

(1) Schieberrahmen komplett mit SINT™MC bzw. SINT™AL ummantelt, damit Medium niemals direkt mit dem Rahmen in Kontakt treten kann.

(2) Robustes Schieberblech (SINT™MC / SINT™AL, Stahl, Edelstahl 1.4301)

(3) Reibungsarmer Werkstoffkontakt

(4) Keine zusätzlichen seitlichen Abdichtungen erforderlich

(5) Auf Wunsch auch in nahrungsmittelauglicher Ausführung (mit SINT™AL ummantelt)

(6) Staubdicht (inkl. Abstreifer)

(1) Vanne complètement revêtue en SINT™MC ou SINT™AL pour éviter le contact entre le produit et le corps.

(2) Lame de forte épaisseur (SINT®MC / SINT™AL, acier au carbone, acier inox 304)

(3) Résistance par friction minimum

(4) Aucun système d'étanchéité supplémentaire latéral

(5) Apte pour produits alimentaires secs (revêtements en SINT™AL)

(6) Etanche à la poussière (muni de racleur)

(1) Valvola completamente rivestita in SINT™MC o SINT™AL al fine di evitare il contatto tra il prodotto e il corpo.

(2) Lama a grosso spessore con smusso per invito (SINT™MC / SINT™AL, acciaio al carbonio, AISI 304).

(3) Contatto con minimo attrito

(4) Tenuta laterale non necessaria

(5) Idonea a prodotti alimentari secchi (rivestimento in SINT™AL)

(6) Tenuta polvere (provvista di raschiatore)

User Benefits
- Easy to handle
- Ex-stock delivery
- Highly abrasion-resistant
- Easy to fit
- Time-saving maintenance

Options
- Valve manufactured in carbon steel lined and coated with SINT™MC.
- Valve in 304 stainless steel lined and coated with SINT™AL (FDA-approved)

Vorteile für den Anwender
- *Einfaches Handling*
- *Ab Lager lieferbar*
- *Besonders verschleißresistent*
- *Einfacher Einbau*
- *Extrem wartungsfreundlich*

Optionen
- *Schieber aus Stahl, ausgekleidet mit SINT™MC.*
- *Schieber aus Edelstahl 1.4301, ausgekleidet mit SINT™AL (mit FDA-Zulassung)*

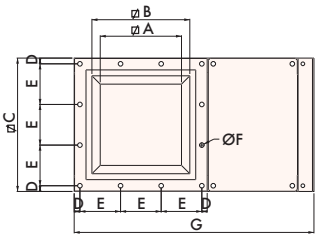
Avantages pour l'utilisateur
- *Légèreté et facilité de manutention*
- *Matériel disponible en stock*
- *Résistance élevée à l'usure*
- *Facilité d'installation*
- *Rapidité d'entretien*

Options
- *Vanne en acier au carbone revêtue en SINT™MC*
- *Vanne en inox 304 revêtue en SINT™AL (approuvée FDA)*

Vantaggi per l'utilizzatore
- *Leggerezza e facilità di movimentazione*
- *Materiale disponibile a magazzino*
- *Elevata resistenza all'usura*
- *Facilità di installazione*
- *Rapidità di manutenzione*

Opzioni
- *Valvola in acciaio al carbonio rivestita in SINT™MC.*
- *Valvola in AISI 304 rivestita in SINT™AL (approvata FDA)*

VLS



Slide Valve With Internal Actuator
Flachschieber mit innenliegendem Pneumatikantrieb
Vanne à Guillottine avec Vérin Incorporé
Valvola Ghigliottina con Cilindro Interno

TYPE	A	B	C	D	E	N°E	Ø F	Bolts Schrauben Boulons Bulloni	G	H	kg
VLS0150..	120	175	261	15,5	115,0	2	12,5	M10	455	113	16,5
VLS0200..	170	225	311	15,5	93,3	3	12,5	M10	555	113	21,0
VLS0250..	220	275	361	15,5	110,0	3	12,5	M10	650	113	25,5
VLS0300..	270	325	431	23,0	128,3	3	12,5	M10	765	113	34,0

1 Carbon Steel / *Stahl / Acier au carbone / Acciaio al carbonio*
3 304 Stainless Steel / *Edelstahl 1.4301 / Acier inox 304 / Acciaio inox AISI 304*

Valve with single type of actuator (pneumatic cylinder Ø 63 mm) mounted inside the valve frame.

Schieber mit innenliegendem Pneumatikantrieb (Pneumatikzylinder Ø 63 mm) (nur ein Modell)

Vanne commandée par un seul type d'actionneur (cylindre pneumatique Ø 63 mm) monté à l'intérieur du corps.

Valvola azionata da un solo tipo di.comando (cilindro pneumatico Ø 63 mm) situato internamente al corpo stesso.

Pneumatic Actuator Compatibility - *Kombinationen mit Pneumatikantrieb - Accouplements électropneumatiques - Abbinamenti elettropneumatici*

No headload allowed!
Keine Schieberlechbelastung gestattet!
Sans charge!
Senza battente!

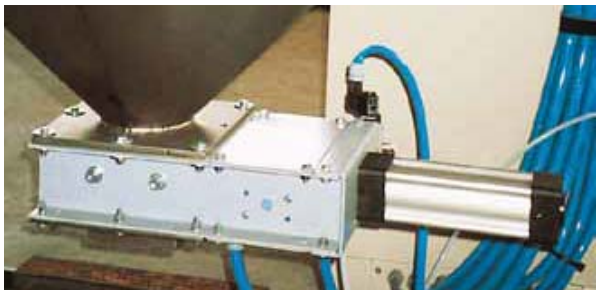
Valve viewed upside down
Ansicht Schieber-Unterseite
Vanne renversée
Valvola rovesciata

- VLS 0150 . .
- VLS 0200 . .
- VLS 0250 . .
- VLS 0300 . .

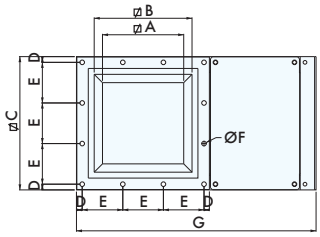
- V5VV8 + 2 BOB
  - • BOB 02450
  - • BOB 04850
  - • BOB 11050
  - • BOB 22050
  - Δ BOB 024CC
  - Δ BOB 048CC
  - Δ BOB 110CC
  - Δ BOB 220CC
- V5V8 + 1 BOB

• ALTERNATING CURRENT
• *WECHSELSTROM*
• *COURANT ALTERNATIF*
• *CORRENTE ALTERNATA*

Δ DIRECT CURRENT
Δ *GLEICHSTROM*
Δ *COURANT CONTINU*
Δ *CORRENTE CONTINUA*



VLQ

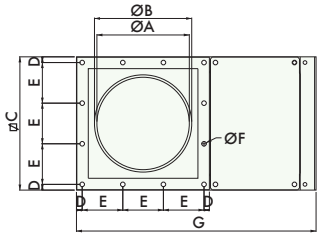


Square Cross Section Valves
Schieber mit quadratischem Querschnitt
Vannes à Section Carrée
Valvole con Sezione Quadrata

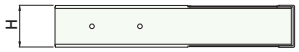
TYPE	A	B	C	D	E	N°E	Ø F	Bolts Schrauben Boulons Bulloni	G	H	kg
VLQ0150..	120	175	261	15,5	115,0	2	12,5	M10	455	113	14
VLQ0200..	170	225	311	15,5	93,3	3	12,5	M10	555	113	18
VLQ0250..	220	275	361	15,5	110,0	3	12,5	M10	650	113	22
VLQ0300..	270	325	431	23,0	128,3	3	12,5	M10	765	113	30
VLQ0350..	320	375	481	18,0	89,0	5	12,5	M10	900	125	40
VLQ0400..	370	425	531	15,5	100,0	5	12,5	M10	1.000	125	46

1 Carbon Steel */ Stahl / Acier au carbone / Acciaio al carbonio*
3 304 Stainless Steel */ Edelstahl 1.4301 / Acier inox 304 / Acciaio inox AISI 304*

VLC



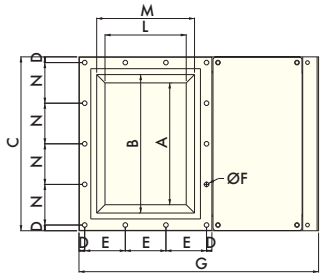
Round Cross Section Valves
Schieber mit rundem Querschnitt
Vannes à Section Circulaire
Valvole a Sezione Circolare



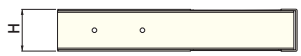
TYPE	A	Ø B	Ø C	D	E	N°E	Ø F	Screw Schrauben Boulons Bulloni	G	H	kg
VLC0150..	150	165	261	15,5	115,0	2	12,5	M10	455	113	14
VLC0200..	200	215	311	15,5	93,3	3	12,5	M10	555	113	18
VLC0250..	250	265	361	15,5	110,0	3	12,5	M10	650	113	22
VLC0300..	300	315	431	23,0	128,3	3	12,5	M10	765	113	30
VLC0350..	350	365	481	18,0	89,0	5	12,5	M10	900	125	40
VLC0400..	400	415	531	15,5	100,0	5	12,5	M10	1.000	125	46

1 Carbon Steel */ Stahl / Acier au carbone / Acciaio al carbonio*
3 304 Stainless Steel */ Edelstahl 1.4301 / Acier inox 304 / Acciaio inox AISI 304*

VLR



Rectangular Cross Section Valves
Schieber mit rechteckigem Querschnitt
Vannes à Section Rectangulaire
Valvole a Sezione Rettangolare



TYPE	A	B	C	D	E	N°E	Ø F	Bolts Schrauben Boulons Bulloni	G	H	L	M	N	N°N	kg
* VLR0150..	204	260	346	15,5	115,0	2	12,5	M10	455	109	119	175	105	3	18
* VLR0200..	281	337	423	15,5	93,3	3	12,5	M10	555	109	169	225	98	4	25
* VLR0250..	353	409	495	15,5	110,0	3	12,5	M10	650	109	219	275	116	4	30
VLR0300..	428	484	592	23,0	128,3	3	12,5	M10	765	109	269	325	136	4	40

1 Carbon Steel */ Stahl / Acier au carbone / Acciaio al carbonio*
3 304 Stainless Steel */ Edelstahl 1.4301 / Acier inox 304 / Acciaio inox AISI 304*

* Not yet in production */ Z. Z. nicht lieferbar / Pas encore en production / Non ancora in produzione*

HAND WHEEL COMPATIBILY
KOMBINATIONSMÖGLICHKEITEN MIT HANDRAD
ACCOUPLEMENTS D'ACTIONNEUR MANUEL
ABBINAMENTI DI ATTUATORE MANUALE

VLQ - VLC 0150 . .	-	CMG0150 I.
VLQ - VLC 0200 . .	-	CMG0200 I.
VLQ - VLC 0250 . .	-	CMG0250 I.
VLQ - VLR-VLC 0300 . .	-	CMG0300 I.
VLQ - VLC 0350 . .	-	CMG0350 I.
VLQ - VLC 0400 . .	-	CMG0400 I.

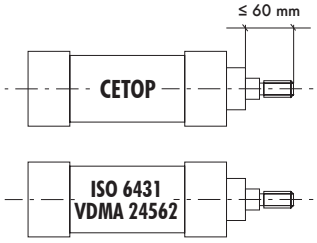
PNEUMATIC ACTUATOR COMPATIBILY
KOMBINATIOSMÖGLICHKEITEN MIT PNEUMATIKANTRIEB
ACCOUPLEMENTS D'ACTIONNEUR ELECTROPNEUMATIQUE
ABBINAMENTI DI ATTUATORE ELETTROPNEUMATICO

VLQ - VLC 0150 . .	◑ P.N. CYL. Ø 63	KCP 063 1525 - V5V80 - LSM6	• BOB 02450
VLQ - VLC 0200 . .			• BOB 04850
VLQ - VLC 0250 . .	◑ P.N. CYL. Ø 80	KCP 080 1530 - V5V80 - LSM6	• BOB 11050
VLQ - VLR-VLC 0300 . .			• BOB 22050
VLQ - VLC 0350 . .	◑ P.N. CYL. Ø 100	KCP 100 3540 - V5V40 - LSM6	△ BOB 024CC
VLQ - VLC 0400 . .			△ BOB 048CC
			△ BOB 110CC
			△ BOB 220CC

- • ALTERNATING CURRENT
- • *WECHSELSTROM*
- • *COURANT ALTERNATIF*
- • *CORRENTE ALTERNATA*

- △ DIRECT CURRENT
- △ *GLEICHSTROM*
- △ *COURANT CONTINU*
- △ *CORRENTE CONTINUA*

◑ No WAM supply
Fremdfabrikat beizustellen
Hors fourniture WAM
Non fornitura WAM



GEAR MOTOR COMPATIBILY
KOMBINATIONSMÖGLICHKEITEN MIT GETRIEBEMOTOR
ACCOUPLEMENTS D'ACTIONNEUR ELECTRIQUE
ABBINAMENTI DI ATTUATORE CON MOTORIDUTTORE

VLQ - VLC 0150 . .	-	CRG010A150 I	LSM6 *
VLQ - VLC 0200 . .	-	CRG010A200 I	
VLQ - VLC 0250 . .	-	CRG010B250 I	
VLQ - VLR - VLC 0300 . .	-	CRG010B300 I	
VLQ - VLC 0350 . .	-	CRG010B350 I	
VLQ - VLC 0400 . .	-	CRG010B400 I	

* Signalling system obligatory
Positionsanzeige erforderlich
Systeme de signalation indispensable
Sistema indispensabile di segnalazione

063001508 September 2012

Further Products - Weitere Produkte - Autre production - Altra produzione

063001436

063001487

063001505

063001513

063001410

063001519

063001591

Bulk Solids Handling Equipment Bulk Solids Handling Equipment Bulk Solids Handling Equipment Bulk Solids Handling Equipment Bulk Solids Handling Equipment

WAM®

UNI EN ISO 9001 Certified Company

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CS-910-406 : Identification sheet

VWTC PROJECT NUMBER:	5000218009	REV:	1
PROJECT NAME:	AEM AMARUQ	SUBMITTED TO (COMPANY):	AGNICO EAGLE MINES
ENGINEER:	Gabriel Hébert	SUBMITTED TO (RESPONSIBLE)	
PROJECT MANAGER:	Clément B	PROJECT NUM REFERENCE.:	
PHONE NUMBER:		LOT NUMBER:	

SUPPLIER	EQPT CODE	EQPT TAG NO	DIA	DESCRIPTION	INFO 1	INFO 2	INFO 3	APPLIC.	NOTE	REV
WAM	CMSPGU320684	FSM9-621-C001		CONE BIG BAG	CONE FOR SUPERSACK // Manuf: WAM // Model : SBB/Cone MS	Cone for Super Sack unloading station type SBB 1250M made of carbon steel, Discharge size D=273mm	avec bride compatible vanne à tiroir WAM VLC250. With stub for flexible hose connection. Comes with black rubber seal	HYDRAPOL 3500		

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Bulk Solids Handling Equipment Bulk Solids Handling Equipment Bulk Solids Handling Equipment Bulk Solids Handling Equipment Bulk Solids Handling Equipment

FIBC Dischargers

Big-Bag - Entleerstationen
Déchargeuses de Big-Bag
Svuota Big-Bag

SBB

WAMGROUP

EXTRAC®

When discharging an FIBC the following problems can be encountered:

- Dust is produced when the bag is opened;
- Difficulties occur when trying to remove substances from the bag which have been compressed during transportation or storage;
- Substances remain trapped in the corners of the bag, making it necessary for the subsequent discharging to be carried out by hand.

Beim Entleeren von Big-Bags treten oft Probleme auf wie:

- *Staubentwicklung beim Öffnen des Big-Bags;*
- *Big-Bag lässt sich nicht vollständig entleeren, weil sich der Inhalt durch Transport oder längere Lagerung stark verdichtet hat;*
- *In den Ecken des Big-Bags befinden sich Produktreste, die von Hand entfernt werden müssen.*

Au moment de la vidange des Big-Bags, il se posent généralement les problèmes suivants:

- *Dégagement des poussières à l'ouverture du sac;*
- *Extraction difficile des produits dûe au tassement généré par le transport ou le stockage;*
- *Opération manuelle supplémentaire pour vider complètement les sacs du produit restant dans les angles.*

Alcuni dei problemi che si manifestano durante le fasi di svuotamento dei Big-Bag sono:

- *Emissione di polvere durante l'apertura della bocca;*
- *Estrazione difficile del prodotto dovuto alla sua compattazione in seguito allo stoccaggio e a trasporto del Big-Bag;*
- *Svuotamento parziale dei sacconi che contengono prodotti compattati.*

In order to avoid such problems we suggest you use our modular FIBC Discharging System.

Our systems can be extended and a range of accessories is available to satisfy every individual requirement with unrivalled efficiency, simplicity and cost.

Standard material: carbon steel.

On request: 304 or 316 stainless steel.

Bei Big-Bag-Entleerstationen vom Typ SBB werden diese Probleme dank eines Konzepts, welches stark auf individuelle Kundenbedürfnisse ausgerichtet ist, bereits im Vorfeld vermieden.

Die Modulbauweise und eine breite Auswahl an Zubehör bieten effiziente und wirtschaftliche, vor allem aber anwenderfreundliche Lösungen.

Standardausführung aus Stahl.

Auf Wunsch Ausführungen aus Edelstahl 1.4301 oder 1.4401.

Pour éliminer ces inconvénients, nous vous proposons un système de déchargement modulaire et expansible, accompagné de toute une gamme d'accessoires qui permettent de satisfaire aux demandes spécifiques.

Ce système est efficace, simple et économique.

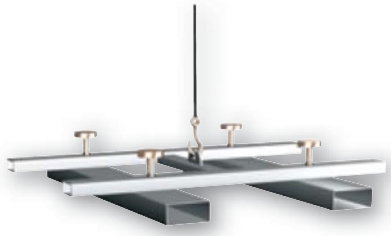
Fabrication de série: en acier au carbone.

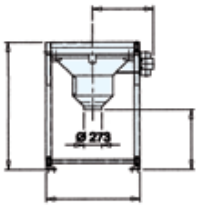
Sur demande: en inox AISI 304-316.

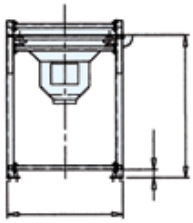
Al fine di evitare gli inconvenienti sopra esposti proponiamo un sistema di svuotamento modulare ed espandibile completo di una gamma di accessori che consente di soddisfare richieste specifiche con ineguagliabile efficienza, semplicità ed economicità.

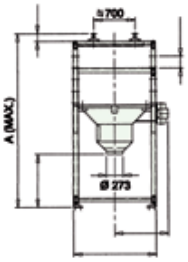
Esecuzione standard: acciaio al carbonio

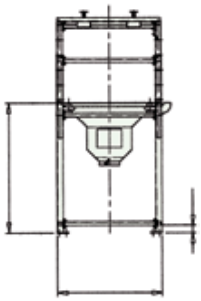
A richiesta: AISI 304-316





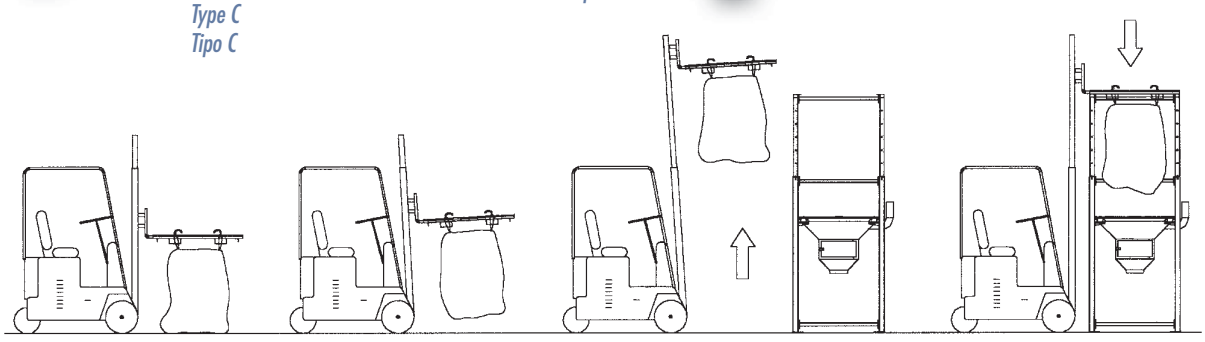






Type C
Typ C
Type C
Tipo C

Type S
Typ S
Type S
Tipo S



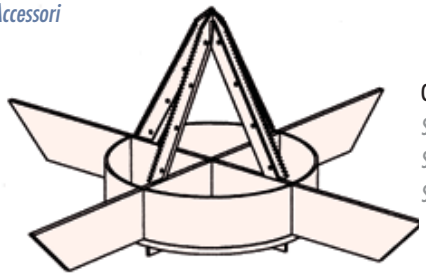
Type	A	B	C	E	F
SBB. 125. C	1.914	1.400	832	100	1.734
SBB. 150. C	2.490	1.800	1.047	160	1.880

Dimensions in mm

Type	A max.	B	C	D	E	F
SBB. 125. S	3.960	1.400	832	130	100	1.734
SBB. 150. S	4.307	1.800	1.047	180	160	1.800

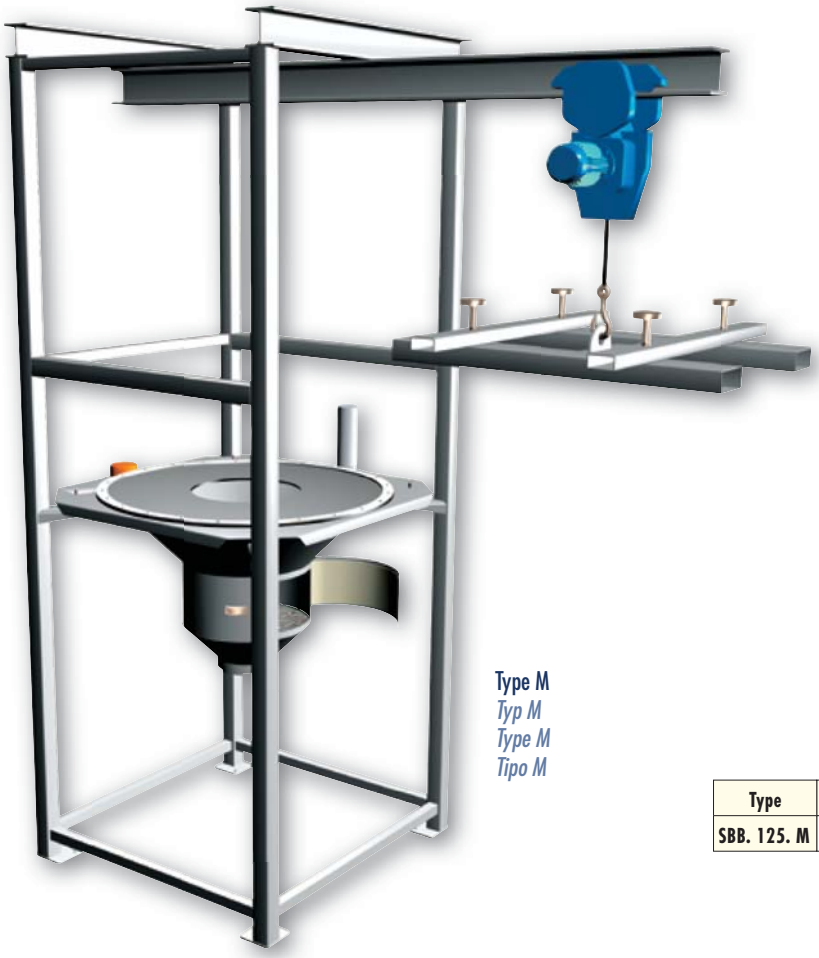
Dimensions in mm

Accessories
Zubehör
Accessoires
Accessori

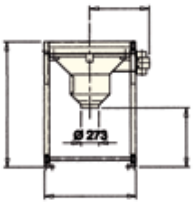


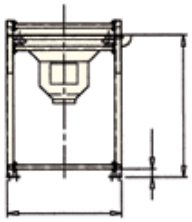
Cutting System
Schnittvorrichtung
Système de coupe
Sistema di taglio

Pneumatic Shaking System
Pneumatische Schüttelvorrichtung
Système pneumatique de secouement
Sistema di scuotimento pneumatico



Type M
Typ M
Type M
Tipo M



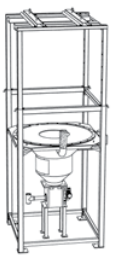


Type	A	B	C	E	F	G	H	L
SBB. 125. M	4.810	1.400	832	160	1.734	2.150	750	3.765

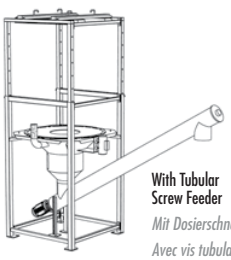
Dimensions in mm

With Rotary Valve
Mit Zellenradschleuse
Avec sas alvéolaire
Con rotovalvola

With Pneumatic Conveying System
Mit pneumatischem Fördersystem
Avec transport pneumatique
Con trasporto pneumatico



With Micro-Batch Feeder
Mit Mikrodosierer
Avec microdoseur
Con microdosatore



With Tubular Screw Feeder
Mit Dosierschnecke
Avec vis tubulaire
Con coclea tubolare

With Flexible Helix Conveyor
Mit flexibler Schnecke
Avec vis flexible
Con coclea flessibile

063001479 September 2012

Further Products - Outra produção - Otros Productos - Altra produzione

063001569

063001499

063001436

063001963

063001505

063001508

063002238

Bulk Solids Handling Equipment Bulk Solids Handling Equipment Bulk Solids Handling Equipment Bulk Solids Handling Equipment

EXTRAC®

UNI EN ISO 9001
Certified Company

www.wamgroup.com

CS-910-511 : Identification sheet

VWTC PROJECT NUMBER:	5000218009			REV:	1
PROJECT NAME:	AEM AMARUQ	SUBMITTED TO (COMPANY):	AGNICO EAGLE MINES		
ENGINEER:	Gabriel Hébert	SUBMITTED TO (RESPONSIBLE)			
PROJECT MANAGER:	Clément B	PROJECT NUM REFERENCE.:			
PHONE NUMBER:		LOT NUMBER:			

SUPPLIER	EQPT CODE	EQPT TAG NO	DIA	DESCRIPTION	INFO 1	INFO 2	INFO 3	APPLIC.	NOTE	REV
ENVIREQUIP	CMSPMI319908	M9-621	N/A	MATURATION MIXER	HP3500 (2016) MIXER // Manuf : Envirequip // EVG1-0.75// Mtl : 304L SS	Impeller Dia : 26.75" //99.36 RPM // Shaft lg : 53.625"	Nord Motor 0.75 HP / 575/3/60	HYDRAPOL 3500		

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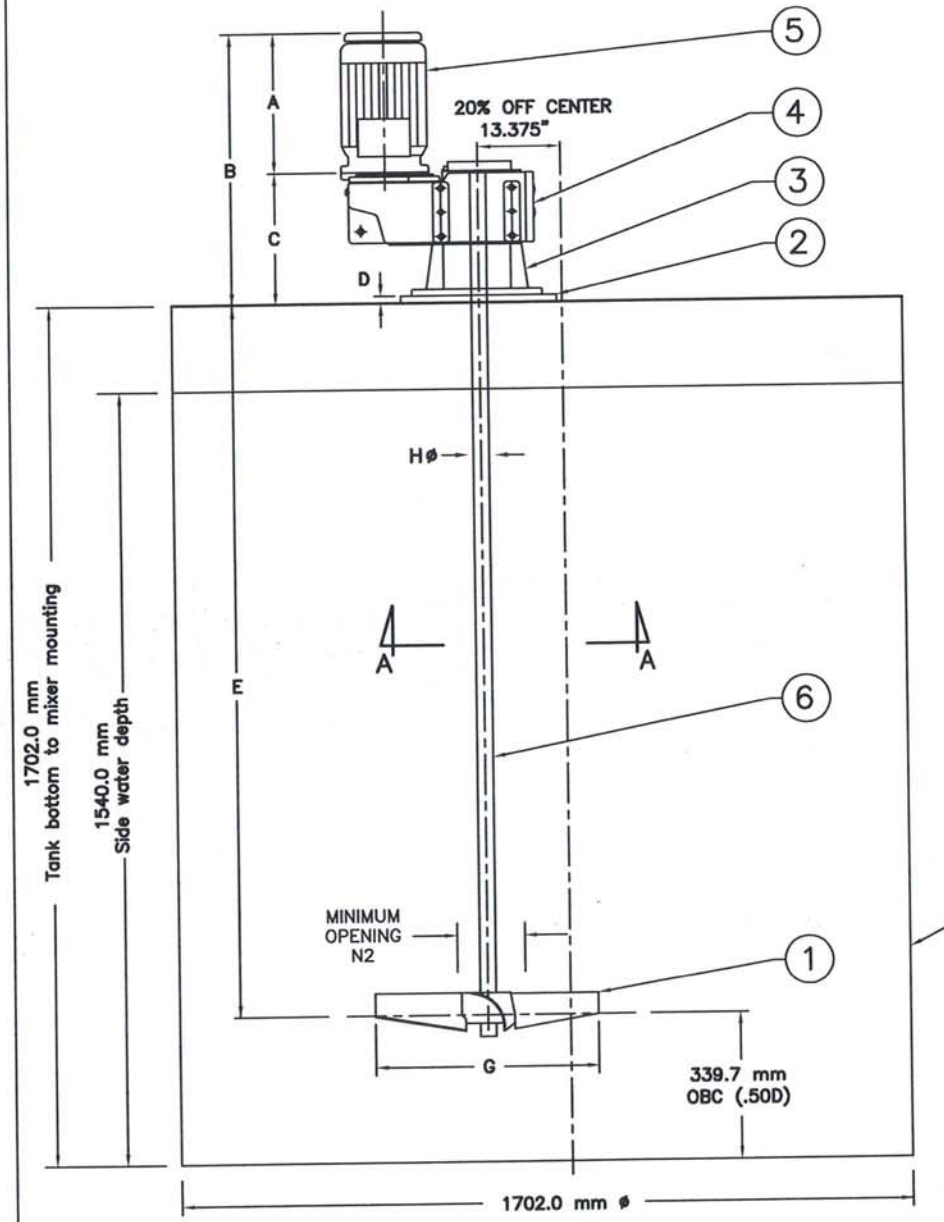

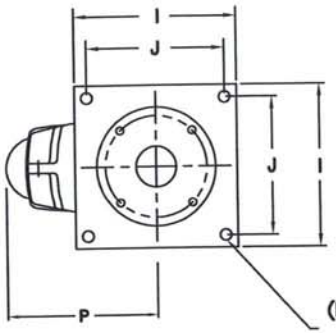

"A–A"

ITEM	DESCRIPTION	MATERIAL
1	Envirofoil impeller 679.4 mm (26.75") ø ⊙13.5°	304L
2	Base 355.6 mm x 355.6 mm (14.0" X 14.0")	Steel
3	Pedestal <B5 Flange>	
4	NORD reducer 99.36 RPM	
5	NORD motor 0.75 Hp, 575/3/60, TEFC	
6	Shaft: (1) section 1365.2 mm (53.75") ⊙ 1.25"ø	304L

APPL'N: POLYMER (QTY 1)
MIX–TECH MIXERS
MODEL: EVG1–0.75
0.56 kW @ 99.36 RPM
S/N
Rotation: Clockwise
Thrust: Down
Tag #:

Poids: 125 Lbs
Mounting loads
Torque reaction = 1,190 in lb
Bending moment = 3,036 in lb
Estimated beam: 6C @ 8.2 # up to 6 ft.

ST #: 910–511
LATIS #: CMSPMI319908

HP 3500

NO	DATE	REVISION	P/B

PROJET/PROJECT
EVG1–0.75/304/575 (CIRT)

ENVIREQUIP WTEM INC.
490 Bord du Lac – Suite 2
Dorval, QC H9S 3A8
Montreal Tel: (514) 338-1043
RR1 (21484 Little Russels Rd.)
Glen Robertson, Ont K0B 1H0
Ontario Tel: (613) 874-2518
Fax: (613) 874-2329
E-mail: envireqp@glen-net.ca

TITRE/TITLE
"MIX–TECH" Mixers
Veolia Water Technologies
EVG SERIES

DESSINÉ PAR: DRAWN BY: PJ	DATE: Jan 2018
DESS. NO: DWG NO: EVG	ECH./SCALE: N.T.S
VÉRIFIÉ PAR: CHECKED BY: PJ	PROJ.NO:
APPROUVÉ PAR: APPROVED BY: RJ	REV. 01

Dimensions: Inches																
MOD.:	A	B	C	D	E	E2	F	Gø	Hø SHAFT	I	J	Kø	Lø	M	N2	P
EVG1	9.15	15.96	6.18	.63	53.75	–	–	26.75	1.25	14.0	12.0	.56	.50	6.20	7.0	7.87

Dimensions: mm																
MOD.:	A	B	C	D	E	E2	F	Gø	Hø SHAFT	I	J	Kø	Lø	M	N2	P
EVG1	232.4	405.3	157.0	16.0	1365.2	–	–	679.4	31.8	355.6	304.8	14.3	12.7	157.5	177.8	200.0

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4 – DETAILED TECHNICAL DOCUMENTATION

4.3 – SHOP DRAWINGS

4.3.6 – $KMnO_4$ PREPARATION SYSTEM – HYDRA-POL 500

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Project name:	AMARUQ
Project#:	5000218009
Document #:	SPK_0006_HYDP
by:	GH
chkd:	GP
appvd:	CB

SUBMITTAL PACKAGE

KMnO4 PREP SYSTEM

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Project name:	AMARUQ
Project#:	5000218009
Document #:	SPK_0006_HYDP
by:	GH
chkd:	GP
appvd:	CB

KMnO4 PREP SYSTEM

PROCESS DATASHEET

OIM manual section: 4.3.6.1

REEFER TO 5000218009_PSDS_0006_HYDP_VWT

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Project name: AMARUQ

Project#: 5000218009

Document #: SPK_0006_HYDP

by: GH

chkd: GP

appvd: CB

KMnO4 PREP SYSTEM

GENERAL ARRANGEMENT DRAWING

OIM manual section: 4.3.6.2

REEFER TO 5000218009_GA_0006_HYDP_VWT

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Project name: AMARUQ

Project#: 5000218009

Document #: SPK_0006_HYDP

by: GH

chkd: GP

appvd: CB

KMnO4 PREP SYSTEM

SUPPLIER TECHNICAL DATASHEETS

OIM manual section: 4.3.6.3

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CS-300-2003 : Identification sheet

VWTC PROJECT NUMBER:	5000218009	REV:	1
PROJECT NAME:	AEM AMARUQ	SUBMITTED TO (COMPANY):	AGNICO EAGLE MINES
ENGINEER:	Gabriel Hébert	SUBMITTED TO (RESPONSIBLE)	
PROJECT MANAGER:	Clément B	PROJECT NUM REFERENCE.:	
PHONE NUMBER:		LOT NUMBER:	

SUPPLIER	EQPT CODE	EQPT TAG NO	DIA	DESCRIPTION	INFO 1	INFO 2	INFO 3	APPLIC.	NOTE	REV
CHEMLINE	VABFPV352256	T9-591-V002	50 mm (2")	Actuated Transfer Valve	TYPE: BUTTERFLY | 150 PSI//MANUFACTURER : CHEMLINE//MODEL : 57A020AEL-A / ER20.12//CONNECTION TYPE : WAFER | //BODY : PVC// SEAL | SEAT :EPDM | EPDM// STEM : 403 SS	ACTUATOR TYPE : ELECTRIC// MANUFACTURER : CHEMLINE// MODEL # :ER20.12// 115/220 VAC		KMnO4 PREP SYSTEM		

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PDF Published December 13, 2017

Type 57α/56/75 Wafer Elastomer Seated Butterfly Valves

CHEMLINE PLASTICS
SUPERIOR FLOW SOLUTIONS

Chemline elastomer seated butterfly valves have a successful history of over 40 years and have replaced metal valves in many difficult process applications. Type 57α body, disc and seat are designed to offer excellent flow characteristics and low closing torques. Stem torques are unaffected by excessive flange bolt torques. Valves up to 16" have corrosion resistant FRP gear operators. Top flange and shaft dimensions are to ISO 5211 standard for easy mounting of actuators. A large selection of body, disc and seat materials permit these valves into a wide range of on/off and throttling control applications in lines up to 24" size.

PVC PP PVDF PDCPD[1]

CRN Registered Consult Chemline

NSF[3] Certified to NSF/ANSI 61

BODY TYPE: Type 57α: 1-1/2" – 14"
Type 56: 16"
Type 75: 18" – 24"

MATERIALS: Body: PVC, PP, PVDF, PDCPD[1]
Disc: PP (standard), PVC, PVDF

SEAT & O-RINGS: EPDM, FKM (Viton®)[2]

Gear Operated
- 8" to 24"

Lever Operated
- 1-1/2" to 8"

features

Compact and Light Weight

High Corrosion Resistance
- Solid plastic body and disc
- Polypropylene hand levers up to 8"
- FRP gear operators up to 16"

Abrasion Resistant
- Solid plastic disc
- PVDF disc available for high abrasion resistance

Easy Actuator Mounting
- Valves up to 16" have standard ISO 5211 top flange and shaft dimensions

Easily Installed
- Full bolt hole circle makes installation and alignment easy

Better Sealing
- Spherical disc/seat seal design offers effective sealing at lower stem torques, and long life for the seat

Better Flow
- Streamlined disc offers higher C_V values

Protection against Flange Bolt Over Tightening
- Body gussets and new seat design prevent excessive flange bolt torques from affecting valve stem torques

CRN Registration numbers by province
- Ontario: OC11045.5
- Newfoundland: OC11045.50
- Saskatchewan/Manitoba/Quebec: OC11045.56
- New Brunswick: OC11045.57
- Nova Scotia: OC11045.58
- P.E.I.: OC11045.59
- British Columbia: not required
- Alberta: not required[4]

[1] PDCPD=Polydicyclopenthadiene.
[2] Other materials are available.
[3] Type 57α PVC valves are certified under NSF/ANSI Standard 61 for contact with drinking water.
[4] Not required for non-expandable fluids.

Type 57α Butterfly Valves 1-1/4" to 14"

engineered for superior performance

Polypropylene Hand Lever
- Lockable

Sturdy PPG Position Lock
- 19 stops for fine flow control
- Resists high torque loads

Deluxe FRP Gear Operator
- Yellow position indicator is NAMUR design for easy mounting of a limit switch box
- IP 67 enclosure resists short term immersion

Full Bolt Circle
- For easy installation

Gussets on Body
- Prevent excessive compression of seat

Moulded Elastomer Seat
- Easily replaceable
- Flange face has raised "o-ring" profile
  – *Low flange bolt torques to seal*

PP Bushing with Double O-Rings
- Proven superior shaft seal design

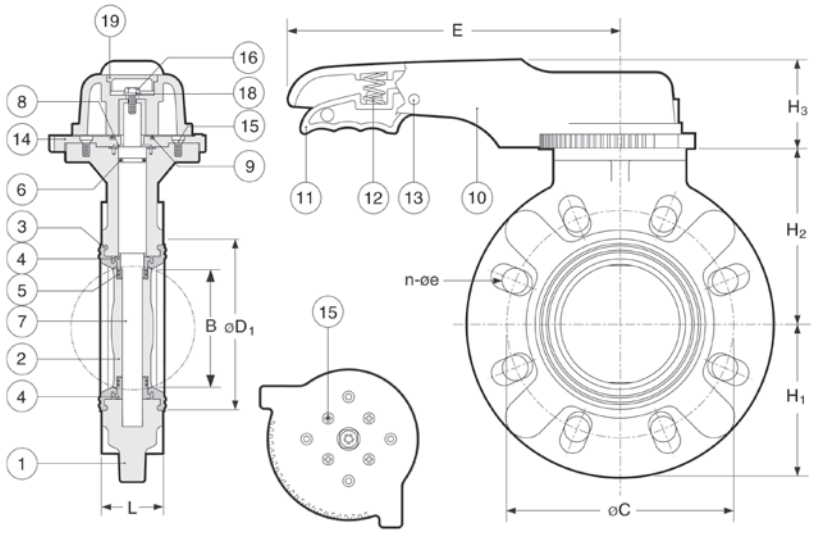
Special Sealing Design
- Seals and disc have spherical sealing surfaces
  – *Lower stem torques to seal*
  – *Longer seat life compared to conventional designs*

Streamlined Disc
- High C_V values
- Good flow characteristics, important for control applications

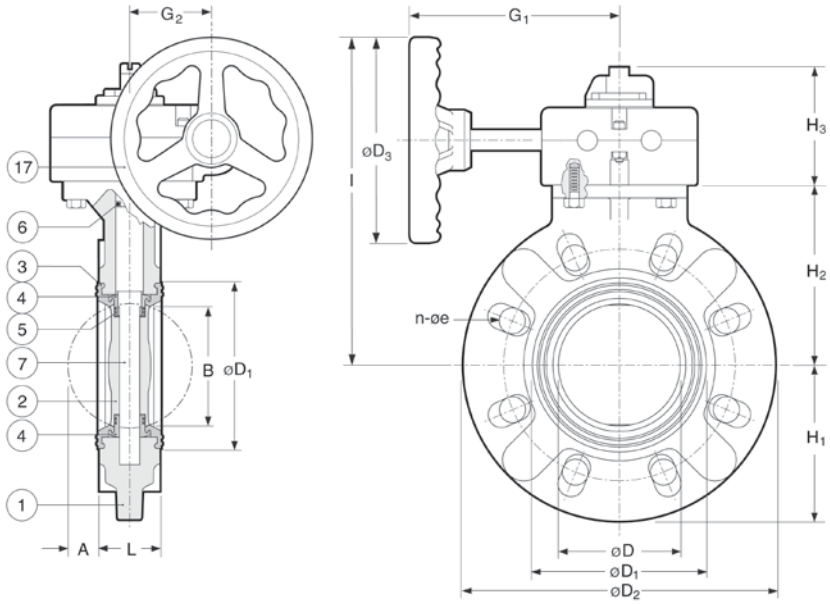
Shaft O-Ring
- For vacuum resistance

Stainless Steel Shaft
- Not wetted
- Engagement over full length of the disc

Type 57α Butterfly Valves 1-1/4" to 14"



1-1/2" – 8" Lever Operated



8" to 14" Gear Operated

PARTS

▲ Recommended Spare Parts

No.	Part	Pcs.	Materials
1	Body	1	PVC, PP PVDF, PDCPD[1]
2	Disc	1	PP, PVC, PVDF
3▲	Seat	1	EPDM, FKM (Viton®)
4	Seat Bushing	2	PP, PVC, PVDF
5▲	Bushing O-Ring	4	EPDM, FKM (Viton®)
6▲	Shaft O-Ring	1	EPDM, FKM (Viton®)
7	Shaft	1	403 SS
8	Shaft Retainer	1	PP
9▲	Plate O-Ring	1	EPDM, FKM (Viton®)
10	Hand Lever	1	PP
11	Trigger	1	PPG
12	Spring	1	304 SS
13	Pin	1	PPG
14	Position Lock Plate	1	PPG
15	Plate Screw	4	304 SS
16	Hand Lever Bolt	1	304 SS
17	Gear Operator	1	FRP housing, PP handwheel & 304 SS shaft
18	Handle Lever Washer	1	304 SS
19	Hand Lever Cap	1	PPG

[1] PDCPD=Polydicyclopenthadiene.

DIMENSIONS INCHES

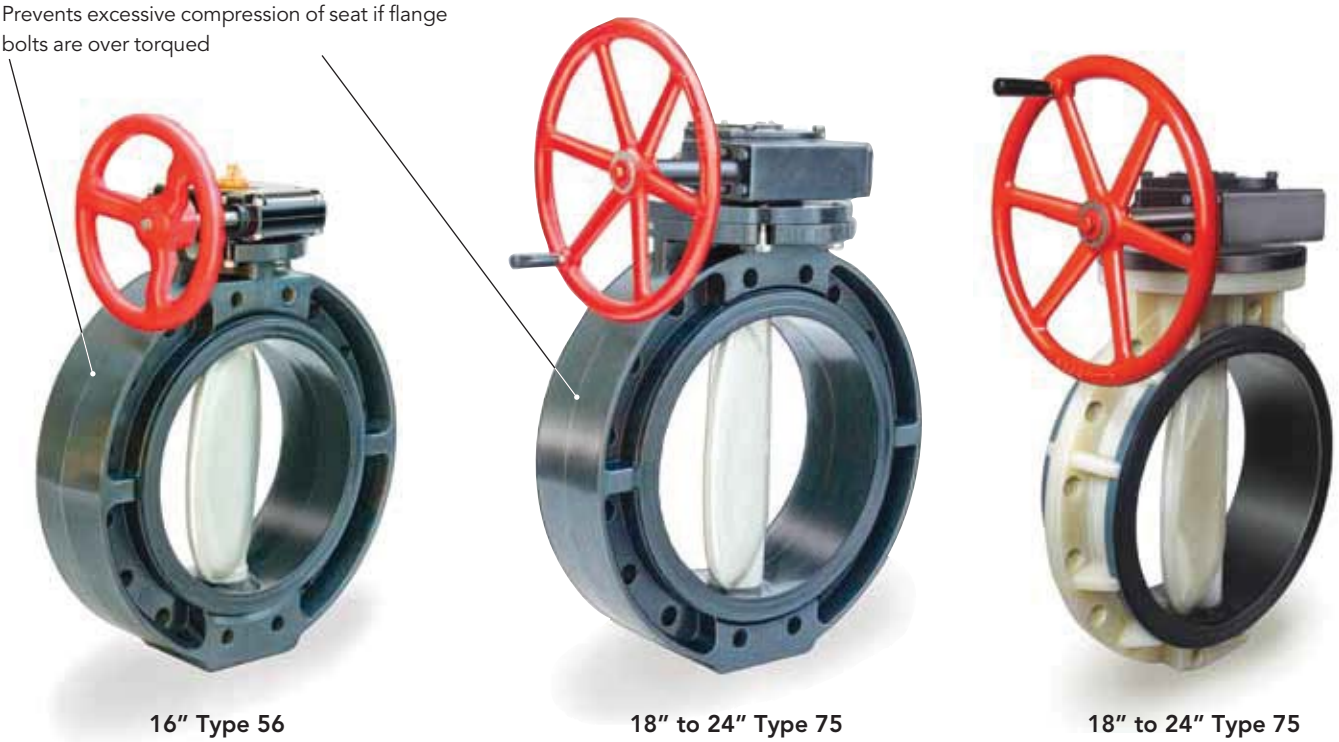
Size	L	A	B*	C	n	e	D	D_1	D_2	D_3	E/G_1	G_2	H_1	H_2	H_3	I
1-1/2"	1.54	0.12	0.87	3.88	4	0.62	1.77	2.80	5.91	–	8.7	–	3.0	3.9	2.2	–
2"	1.65	0.28	1.46	4.75	4	0.75	2.20	3.19	6.50	–	8.7	–	3.3	4.3	2.2	–
2-1/2"	1.81	0.46	2.03	5.50	4	0.75	2.72	3.74	7.28	–	8.7	–	3.6	4.7	2.2	–
3"	1.81	0.61	2.43	6.00	4	0.75	3.03	4.13	8.31	–	9.8	–	4.2	5.3	2.2	–
4"	2.20	0.91	3.36	7.50	8	0.75	4.02	5.28	9.37	–	9.8	–	4.7	5.9	2.2	–
5"	2.60	1.24	4.36	8.50	8	0.88	5.08	6.65	10.35	–	12.6	–	5.2	6.6	2.7	–
6"	2.80	1.56	5.20	9.51	8	0.88	5.91	7.48	11.22	–	12.6	–	5.6	7.2	2.7	–
8" Lever	3.43	2.13	6.87	11.75	8	0.88	7.68	9.53	13.39	–	15.8	–	6.7	8.4	2.7	–
8" Gear	3.43	2.13	6.87	11.75	8	0.88	7.68	9.53	13.39	6.3	6.6	2.5	6.7	8.1	3.6	12.64
10"	4.41	2.72	8.80	14.25	12	1.00	9.84	11.89	16.57	6.3	6.6	2.5	8.3	9.5	3.6	14.02
12"	5.08	3.43	10.79	17.00	12	1.00	11.93	14.17	19.21	11.8	9.5	3.9	9.6	11.7	4.3	19.29
14"	5.08	4.37	12.85	18.75	12	1.12	13.82	15.47	21.22	11.8	9.5	3.9	10.6	12.8	4.3	20.35

* **B**=Minimum inside diameter (I.D.) of mating pipe. If I.D. of pipe is **B** dimension or less, the inside of pipe and must be chamfered or spacers provided. Consult Chemline.

Type 56/75 Series Butterfly Valves 16" to 24"

New PDCPD bodies have full thickness design

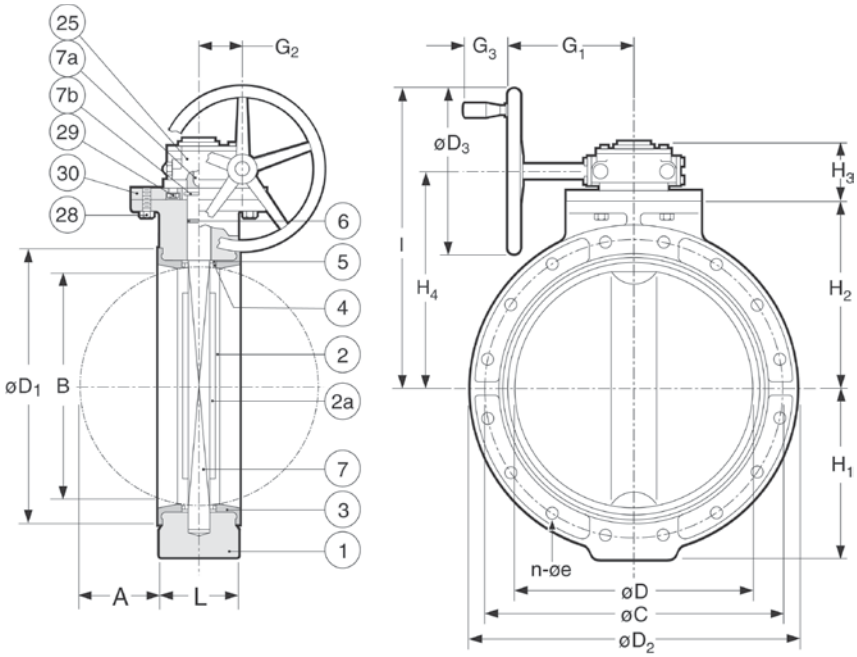
- Prevents excessive compression of seat if flange bolts are over torqued



16" Type 56 with PDCPD body, PP disc

18" to 24" Type 75 with PDCPD body, PP disc

18" to 24" Type 75 with PVDF body, PVDF disc



Drawing body detail is for PDCPD version. Detail for PP and PVDF body versions are slightly different. Consult Chemline.

PARTS

▲ Recommended Spare Parts

No.	Part	Pcs.	Materials
1	Body	1	PDCPD[1], PP, PVDF
2	Disc	1	PP, PVDF
2a	Disc Insert	1	Carbon Steel
3▲	Seat	1	EPDM, FKM (Viton®)
4▲	Large Disc O-Ring	2	EPDM, FKM (Viton®)
5▲	Small Disc O-Ring	2	EPDM, FKM (Viton®)
6▲	Shaft O-Ring	1	EPDM, FKM (Viton®)
7	Shaft	1	403 SS
7a	Shaft Key	1	Carbon Steel
7b	Snap Ring	1	304 SS
17	Gear Operator[2]	1	Cast Aluminum Epoxy Coated
28	Bolt	4	304 SS
29	Bolt	4	304 SS
30	Gear Operator Stand	1	400 SS

[1] PDCPD=Polydicyclopenthadiene.

[2] Gear Operator for 16" only is FRP with PP hand wheel and 304 SS shaft.

DIMENSIONS INCHES

Size	Type	L	A	B*	C	n	e	D	D_1	D_2	D_3	G_1	G_2	G_3	H_1	H_2	H_3	H_4	I
16"	56	6.65	4.67	14.53	21.25	16	1.12	15.98	18.50	24.41	11.81	10.7	3.9	–	12.4	13.8	4.3	15.35	21.3
18"	75	7.05	5.38	16.34	22.75	16	1.26	17.80	20.67	26.18	16.14	12.6	4.3	3.4	13.2	14.6	5.5	17.44	25.6
20"	75	7.48	6.15	18.29	25.00	20	1.26	19.76	22.64	28.35	16.14	12.6	4.3	3.4	14.4	15.8	5.5	18.62	26.8
24"	75	8.23	7.76	22.27	29.50	20	1.38	23.74	27.01	32.01	16.14	12.6	4.3	3.4	16.7	18.3	5.5	21.18	29.3

* **B**=Minimum inside diameter (I.D.) of mating pipe. If I.D. of pipe is **B** dimension or less, the inside of pipe and must be chamfered or spacers provided. Consult Chemline. **Note:** Type 75 was formerly referred to as TB Series.

Elastomer Seated Butterfly Valves

WORKING PRESSURES PSI

NET WEIGHTS LB.

Size	Valve Type	PVC Body/PP Disc			PP Body/PP Disc		PVDF Body/PVDF Disc/FKM(Viton®)				Body/Disc		
		0-50°C 32-122°F	60°C 140°F	83°C 181°F	–20-60°C –4-140°F	80°C 176°F	–20-60°C –4-140°F	79°C 175°F	100°C 212°F	121°C 250°F	PVC/ PP	PP/ PP	PVDF/ PVDF
1-1/2″	57α	150	70	30	150	105	150	105	90	75	2.9	2.4	3.1
2″	57α	150	70	30	150	105	150	105	90	75	3.3	2.6	3.7
2-1/2″	57α	150	70	30	150	105	150	105	90	75	3.7	3.1	4.2
3″	57α	150	70	30	150	105	150	105	90	75	4.2	3.5	4.9
4″	57α	150	45	30	150	105	150	105	90	75	5.5	4.4	6.4
5″	57α	150	45	30	150	105	150	105	90	75	10.8	8.8	12.6
6″	57α	150	45	30	150	105	150	105	90	75	12.8	10.1	15.2
8″ Lever	57α	150	40	20	150	90	150	90	75	60	20.5	16.3	24.3
8″ Gear	57α	150	40	20	150	90	150	90	75	60	23.6	19.6	27.6
10″	57α	150	40	20	150	90	150	90	75	60	32.4	26.9	41.0
12″	57α	112	30	15	112	60	112	60	45	30	61.7	52.9	76.1
14″	57α	112	30	7	112	60	112	60	45	30	66.6	58.0	81.1

WORKING PRESSURES PSI

NET WEIGHTS[1] LB.

Size	Valve Type	PDCPD Body/ PP Disc			PDCPD Body/ PVDF Disc/FKM(Viton®)				PP Body/ PP Disc		PVDF Body/ PVDF Disc/FKM(Viton®)				Body/Disc		
		0-50°C 32-122°F	60°C 140°F	83°C 181°F	0-30°C 32-86°F	60°C 140°F	80°C 176°F	100°C 212°F	–20-60°C –4-140°F	80°C 176°F	–20-60°C –4-140°F	79°C 175°F	100°C 212°F	121°C 250°F	PDCPD/ PP	PDCPD/ PVDF	PVDF/ PVDF
16″	56	110	90	15	110	90	45	30	90	45	90	45	30	15	79.4	103	101
18″	75	110	90	15	110	90	45	30	75	45	70	45	30	15	140.	221	227
20″	75	110	90	15	110	90	45	30	50	45	50	30	20	15	170.	252	273
24″	75	110	90	15	110	90	45	30	50	45	50	30	20	15	251.	309	346

Note: Type 75 was formerly referred to as TB Series.

[1] Weights are for valves excluding lugs.

Cv VALUES VS. DISC ANGLE

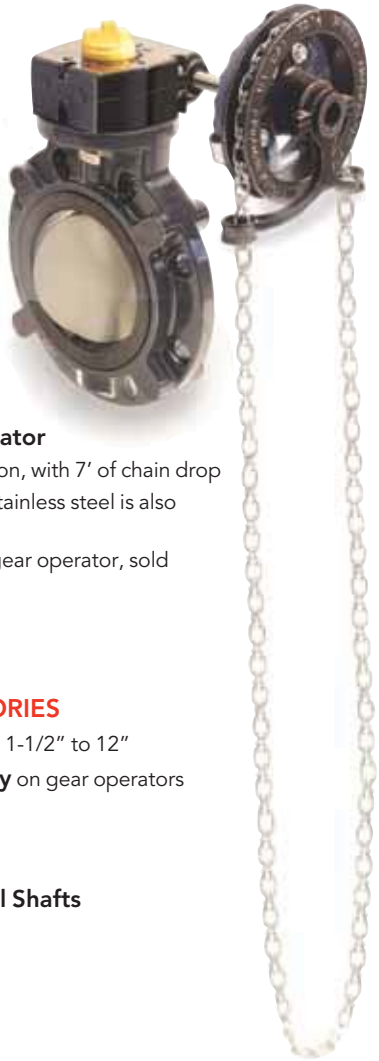
BOLT TORQUES

Size	15°	30°	45°	60°	75°	90°	Recommended Flange Bolt Torques Foot-Lbs.
1-1/2″	0	3.6	14.2	30.5	49.7	71.	15
2″	0	6.0	24.	51.6	84.	120.	17
2-1/2″	0	12.5	50.	108.	175.	250.	17
3″	0	15.0	60.	129.	210.	300.	22
4″	0	23.5	94.	202.	329.	470.	22
5″	0	41.5	166.	357.	581.	830.	30
6″	0	55.	220.	473.	770.	1,100.	30
8″	0	125.	500.	1,075.	1,750.	2,500.	41
10″	0	193.	772.	1,660.	2,702.	3,860.	41
12″	0	285.	1,140.	2,451.	3,990.	5,700.	44
14″	0	322.	1,288.	2,769.	4,508.	6,440.	44
16″	0	300.	2,277.	4929.	6,822.	8,340.	58
18″	0	392.	2,973.	6436.	8,908.	10,890.	58
20″	0	506.	3,838.	8309.	11,501.	14,060.	72
24″	0	666.	5,051.	10,934.	15,133.	18,500.	72

options + accessories

Shaft Extensions

- Different materials and lengths are available
- Several designs:
  - with no housing for indoors
  - with waterproofed PVC housing for indoors or outdoors
  - with stainless steel housing for buried services



Chain Wheel Operator

- For overhead opeation, with 7' of chain drop
- Cast iron standard, stainless steel is also available
- Requires the use of gear operator, sold separately

OTHER ACCESSORIES

- **Gear Operator** on 1-1/2" to 12"
- **Locking Capability** on gear operators

OPTIONS

- **Different Seats**
- **Different Material Shafts**

Optional Lock-out Handle & Hasp

- To prevent unauthorized operation of the valve during maintenance shut-downs
- Padlocks go through holes in hasp

Limit Switches

- Available for lever and gear operated valves
- Electrical feedback of manual valve position
- NEMA 4X enclosure, position indicator beacon, 2x SPDT switches, stainless steel hardware

Municipal Operating Nut

- For buried service

electric + pneumatic actuation

Pneumatic and Electric Actuators

- A complete range of actuators and control accessories are available, mounted to valves using PPG plastic brackets and 304 stainless steel couplings. Refer to separate data sheets.
- All actuators are CSA approved, have NEMA 4S enclosures, stainless steel hardware and permanently lubricated gear train

A Series Electric

- butterfly valves up to 6″
- up to 2000 in-lbs torque
- On-Off (3 wire) adjustable travel, optional On-Off (2 wire), failsafe multi-turn, 3 position modulating, BUS
- Visual feedback, optional 2 feedback switches, feedback potentiometer and feedback transmitter

Q Series Electric

- butterfly valves up to 3″
- 300 in-lbs torque
- On-Off (3 wire) adjustable travel, optional On-Off (2 wire), failsafe 3-position, modulating
- Visual feedback, optional 2 feedback switches, feedback potentiometer and feedback transmitter

V Series Electric

- butterfly valves up to 20″
- up to 8850 in-lbs torque
- On-Off (2/3 wire) adjustable travel, optional failsafe, modulating, BUS
- Visual feedback, 2 feedback switches, optional 2 extra feedback switches, feedback potentiometer and feedback transmitter

Pneumatic Actuators

PA Series

- butterfly valves up to 24″
- up to 40,660 in-lbs torque
- industrial process, submerged
- bleach/water washdown
- Rilsan-coated aluminum

PP Series

- butterfly valves up to 6″
- up to 1,335 in-lbs torque
- industrial process with minimal use of metal
- Glass-filled Polyamide

P3 Series

- butterfly valves up to 10″
- up to 8,850 in-lbs torque
- corrosive, submerged and off-shore applications
- 316 stainless steel

ORDERING EXAMPLE

Chemline Butterfly Valves	57	A	060	B	E	L
Type 57α 1-1/2″ to 14″: **57** **Type 56** 16″: **56** **Type 75** 18″ to 24″: **75**						

Body	**A** – PVC	**B** – PP	**K** – PVDF	**D** – PDCPD[1]				
Size	**015** – 1-1/2″	**020** – 2″	**025** – 2-1/2″	**030** – 3″	**040** – 4″	**050** – 5″	**060** – 6″	**080** – 8″
	100– 10″	**120** – 12″	**140** – 14″	**160** – 16″	**180** – 18″	**200** – 20″	**240** – 24″	
Disc	**B** – PP	**K** – PVDF		**A** – PVC				
Seat	**E** – EPDM	**V** – FKM (Viton®)		**N** – Nitrile		**F** – FKM-F (Viton®)[2]	**C** – FKM-C (Viton®)[2]	
Operator		**L** – Hand Lever		**G** – Gear Operator				

Example: Chemline Type 57α Butterfly Valve, PVC body, 6″, with PP disc, EPDM seat, hand lever.

[1] PDCPD=Polydicyclopenthadiene. [2] FKM-F is special "Viton®" for concentrated acids and FKM-C is special "Viton®" for chlorines.

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PDF Published January 10, 2018

E Series Electric Actuators

CHEMLINE PLASTICS
SUPERIOR FLOW SOLUTIONS

The Chemline E Series Electric Actuator is a reversible rotary unit with output torques up to 880 in.-lb. These units are ideal for all Chemline ball and butterfly valves up to 4". The E Series is compact, light weight and has a plastic housing. A large black handle provides manual override and position indicator.

Chemline also offers complete actuated ball, butterfly and diaphragm valves, assembled and bench tested. Actuation service is also available for all quarter-turn metal valves.

for Chemline ball & butterfly valves up to 4"

SERIES: ER10 – 90 in.lb.
ER20 – 180 in.lb.
ER35 – 310 in.lb.
ER60 – 530 in.lb.
ER100 – 880 in.lb.

VOLTAGES: 115/220 VAC, 12/24 VDC, 24 VAC

ENCLOSURE: Polyamide 6.6
NEMA 4X

E Series on SM2 Series True Union Ball Valve

features

Multiple Operation/Control Options
- 2 & 3-wire (standard)
- Adjustable Travel (standard)
- Manual Override (standard)
- Bus communication (optional)
- Digital Positioner (optional)
- Failsafe (optional)
- Cold Weather Heater/Thermostat (standard)

Multiple Feedback Options
- Visual (standard)
- Feedback Switches (standard)
- Extra Feedback Switches (optional)
- Feedback Potentiometer (optional)
- Feedback Transmitter (optional)

Special Inspection Labelled by CSA
(Canadian Standards Association)

NEMA 4X Enclosure
- Waterproof, corrosion proof with high impact Polyamide 6.6 housing and stainless steel fasteners

No Maintenance
- Permanently lubricated gear train
- Designed for 250,000 + cycles

Thermal Overload Protection
- Thermal switch embedded onto control board

Extended Operating Temperature Range
- –10 to 60C (15 to 140°F) (standard)

Standard Mounting Dimensions
- ISO-5211 mounting bolt circle and drive

technical

Operating Voltage
- 115/220 VAC (standard)
- 12/24 VDC or 12 VAC (optional)

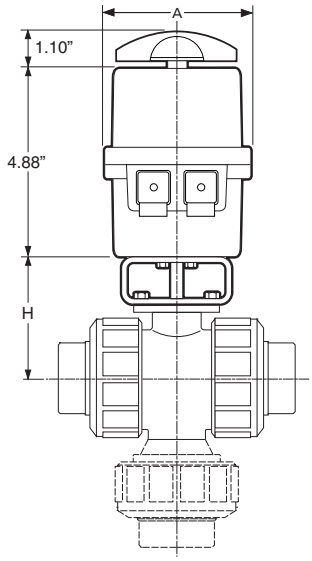
Electrical Conduit Entry
- 2 x 1/2" NPT

Motor Direction
- Reversing

Motor Cycle Time
- Fixed (standard)

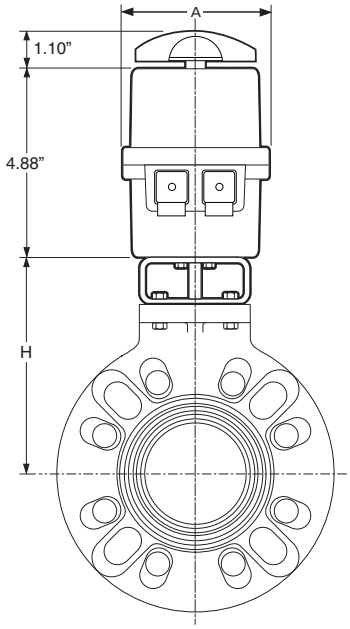
DIMENSIONS INCHES

Port View



Type 21 True Union and
Type 23 Multi Port Ball Valves

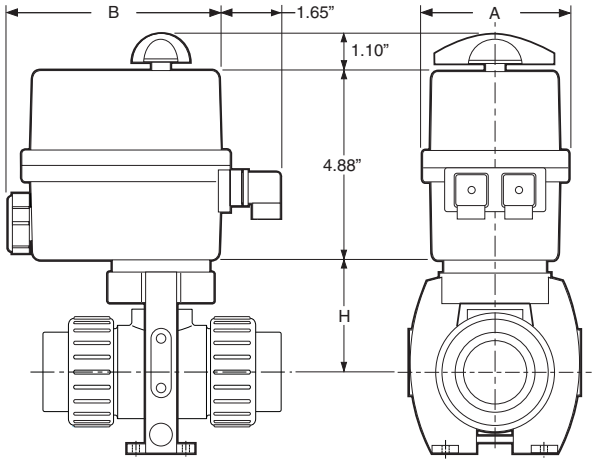
Port View



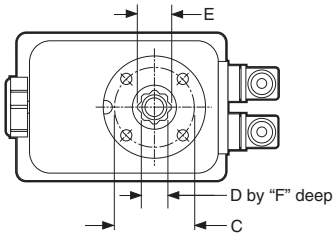
Type 57 Butterfly Valves

Side View

Port View



SM Metering and SP Proportional
True Union Ball Valves



Bottom View

DIMENSION INCHES

Model	A	B	C/Thread	D	E Inches (ISO)	F
ER10	3.62	5.35	1.42 (F03) M5	0.55	0.551” 14mm	0.640
ER20	3.62	5.35	1.65 (F04) M5	0.55	0.551” 14mm	0.640
ER35	5.04	5.94	1.97 (F05) M6	0.87	0.551” 14mm	0.945
ER60	5.04	5.94	1.97 (F05) M6	0.87	0.866” 22mm	0.945
ER100	5.04	5.94	2.76 (F07) M8	0.87	0.866” 22mm	0.945

DIMENSION “H” INCHES

Valve Size	Valve Type				
	Type 21 Ball	Type 23 Multiport Ball	SM Metering/SP Proportional Ball	Type 57 Butterfly	ChemValve Butterfly
1/2”	2.76	2.76	1.97	–	–
3/4”	3.01	3.01	2.36	–	–
1”	3.29	3.29	2.60	–	–
1-1/4”	3.64	3.98	2.91	–	–
1-1/2”	3.98	3.98	3.76	5.65	–
2”	4.43	4.43	4.90	5.95	6.89
2-1/2”	5.12	5.47	–	6.35	7.52
3”	5.47	5.47	–	6.65	8.27
4”	–	–	–	7.35	9.05

Valves not to scale. For valve dimensions and parts refer to separate valve data sheets.

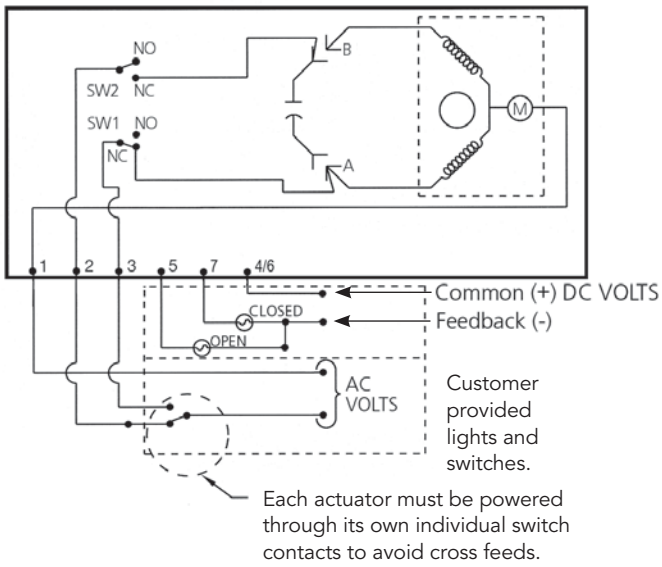
E Series Electric Actuators

SPECIFICATIONS

Model	Running Torques (in.-lbs.)	Nm	115 VAC / 220 VAC (x=12) Power Draw (Watts)[1]	115 VAC / 220 VAC (x=12) Duty Cycle	12 to 24 VDC & 24 VAC (x=346) Power Draw (Watts)[1]	12 to 24 VDC & 24 VAC (x=346) Duty Cycle	Cycle Time/90° (sec.)	Weight (lbs.)
ER10	90	10	15W	80%	15W	80%	11	3.0
ER20	180	20	15W	80%	15W	80%	12	3.0
ER35	310	35	15W	80%	15W	80%	7	6.2
ER60	530	60	45W	80%	45W	80%	12	6.9
ER100	880	100	45W	80%	45W	80%	23	6.9

[1] Power draw values are for actuators with locked rotors.

AC WIRING 115 VAC/220 VAC



VALVE OPERATION

Neutral – To Terminal 1
To Open – Power to Terminal 2
To Close – Power to Terminal 3

NOTES:

1. Actuator shown in counter clockwise extreme of travel, or 'open' position.
2. Motor has a thermal protector as shown by (M) in the diagram.

OPERATION/CONTROL OPTIONS

- **Bus Communication** – Proprietary bus communication/operation capability
- **Digital Positioner** – Onboard digital position controller accepts 4 to 20 mA, 0 to 20 mA, 0 to 10 VDC or other inputs. These units are easier to calibrate, have faster response and provide more precise proportional control.
- **Failsafe Capability** – Onboard backup battery pack powers actuator in case of power failure

FEEDBACK OPTIONS

- **Extra Feedback Switches** – For extra end-of-travel position feedback
- **Feedback Potentiometer** – To feedback the precise valve position to a remote location, or to allow "jogging" control
- **Feedback Transmitter** – A circuit board coupled with a feedback potentiometer provides 4 to 20 mA output used by other equipment (PLC, data logger, etc.)

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CS-301-100 : Identification sheet

VWTC PROJECT NUMBER:	5000218009	REV:	1
PROJECT NAME:	AEM AMARUQ	SUBMITTED TO (COMPANY):	AGNICO EAGLE MINES
ENGINEER:	Gabriel Hébert	SUBMITTED TO (RESPONSIBLE)	
PROJECT MANAGER:	Clément B	PROJECT NUM REFERENCE.:	
PHONE NUMBER:		LOT NUMBER:	

SUPPLIER	EQPT CODE	EQPT TAG NO	DIA	DESCRIPTION	INFO 1	INFO 2	INFO 3	APPLIC.	NOTE	REV
CHEMLINE	VABLPV200251	V15-041	DIA: 25 mm (1")	ISOLATION VALVE - DRIVING WATER	TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-A-010-E-S//CONNECTION TYPE : SOCKET | 25 mm (1")//BODY : PVC (ASTM D1784)// SEAL | SEAT :PTFE | EPDM// STEM : PVC			KMnO4 PREP SYSTEM		
CHEMLINE	VABLPV200253	T9-591-V001	DIA: 38 mm (1-1/2")	DRAIN VALVE	TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-A-015-E-S//CONNECTION TYPE : FLANGED | N/A//BODY : PVC (ASTM D1784)// SEAL | SEAT :PTFE | EPDM// STEM : PVC			KMnO4 PREP SYSTEM		
CHEMLINE	VABLPV200253	T9-592-V001	DIA: 38 mm (1-1/2")	DRAIN VALVE	TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-A-015-E-S//CONNECTION TYPE : FLANGED | N/A//BODY : PVC (ASTM D1784)// SEAL | SEAT :PTFE | EPDM// STEM : PVC			KMnO4 PREP SYSTEM		

SUPPLIER	EQPT CODE	EQPT TAG NO	DIA	DESCRIPTION	INFO 1	INFO 2	INFO 3	APPLIC.	NOTE	REV
CHEMLINE	VABLPV200253	T9-592-V002	DIA: 38 mm (1-1/2")	ISOLATION VALVE - TANK OUTLET	TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : Type21-A-015-E-S//CONNECTION TYPE : FLANGED | N/A//BODY : PVC (ASTM D1784)// SEAL | SEAT :PTFE | EPDM// STEM : PVC			KMnO4 PREP SYSTEM		

PDF Published March 1, 2013

Type 21 Ball Valves

CHEMLINE PLASTICS
SUPERIOR FLOW SOLUTIONS

The Chemline Type 21 True Union Ball valve incorporates state of the art features for long term performance. This is a full port, full blocking True Union valve pressure rated at 16 bar (230 psi)[4]. Double stem o-rings and Safety Shear stem design provide for a high degree of safety on hazardous fluid applications. All sizes have an ISO standard actuator mounting platform integral to the valve body. This provides for sturdy and secure mounting of pneumatic or electric actuators.

PVC | CPVC | PP | PVDF

CRN Registered Consult Chemline

NSF[5] Certified to NSF/ANSI 61

SERIES: Type 21

SIZES: 3/8" – 4"

ENDS: Socket, Threaded, Flanged, Butt[1] or ChemFlare™

SEATS: PTFE

SEALS[2]: EPDM, FKM (Viton®), CPE[3]

features

Pressure rated to 230 psi[4]
- Provides a high factor of safety

Integral Actuator Mounting Platform
- Actuation is easy. Electric or pneumatic actuators may be mounted in the field.

Full Port
- High capacity and low pressure drops

Fully Blocking
- Downstream union nut may be safely disassembled for piping maintenance while valve is closed off under full system pressure

Built-In Spanner Wrench
- Top of the handle is designed to be used as a tool for accessing internal parts

Safety Shear Stem Design
- Stem has double o-rings
- Designed to hold full pressure even if stem breaks due to excessive torque

High Chemical Resistant Material
- PVC and CPVC compounds have an "A" chemical resistance rating as per ASTM D-1784. They have outperformed other PVC and CPVC compounds on aggressive chemicals.

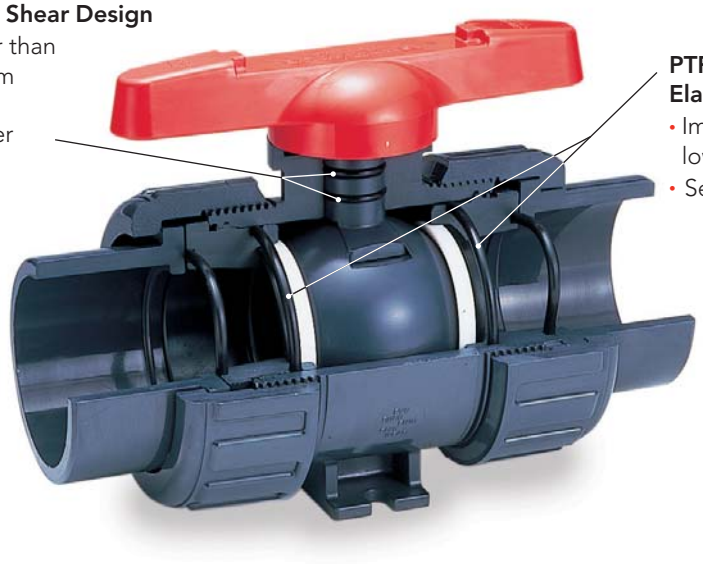
[1] Butt ends for fusion to Chemline metric PP, PVDF or ECTFE (Halar®) piping.
[2] Other materials are available.
[3] CPE=Chlorinated Polyethylene.
[4] PVC, CPVC and PVDF 1/2" to 2" are rated at 230 psi; 2-1/2" to 4" and all size PP valves are rated at 150 psi at 20°C.
[5] PVC valves with EPDM or FKM (Viton®) seals are certified under NSF/ANSI Standard 61 for contact with drinking water.

Type 21 Ball Valves

features

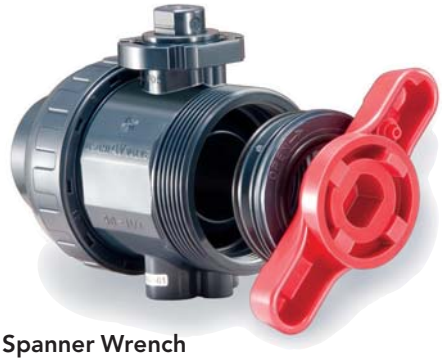
Double Stem O-Rings – Safety Shear Design

- Upper o-ring groove is deeper than lower. In case of excessive stem torque, stem will shear at the upper groove, leaving the inner o-ring intact to seal against full line pressure.



PTFE Seats have Elastomer Cushions

- Improved sealing while lowering stem torques
- Self adjusts for seat wear



Built in Spanner Wrench

- For removing or tightening the seat carrier
- All parts are replaceable

Integral Actuator Mounting Platform

- Actuation is easy. Electric or pneumatic actuators may be mounted in the field. Simply pull off the handle to reveal a standard ISO 5211 mounting platform which accepts bolt-on hardware.

Fully Blocking

- Downstream pipe may be removed while upstream side is still pressurized. This may be done with valve installed in either direction.

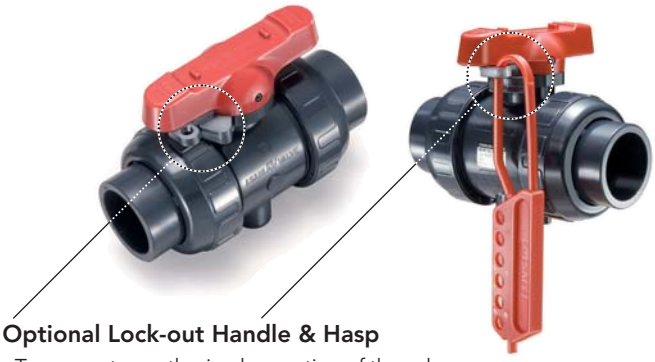
Base Mounting Pad

- Optional threaded inserts allow valves to be securely anchored
- Supplied standard with actuated valves

options + accessories

ChemFlare™ Ends

- For connection to PFA tube. Leak-free connections for difficult services such as sodium hypochlorite



Optional Lock-out Handle & Hasp

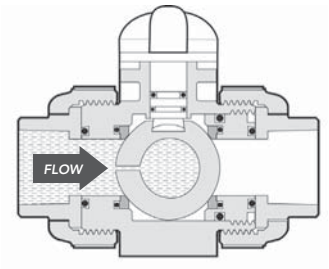
- To prevent unauthorized operation of the valve
- Used during maintenance shut-downs

One-piece moulded PVC and CPVC 6" socket ends

- Allows installation of 4" valve in 6" line
- Factory moulded, not fabricated with couplings and reducers cemented together
- Fixed to valve mechanically just like the one-piece moulded factory flanges

Different Colour Handles

- Choose a handle colour other than standard red for colour coding different services



Vented Ball

- For sodium hypochlorite services at any concentration
- Valve shown in closed position

electric + pneumatic actuation

Pneumatic and Electric Actuators

- A complete range of actuators and control accessories are available, mounted to valves using PPG plastic brackets and stainless steel couplings. Refer to separate data sheets.

Electromni® Electric

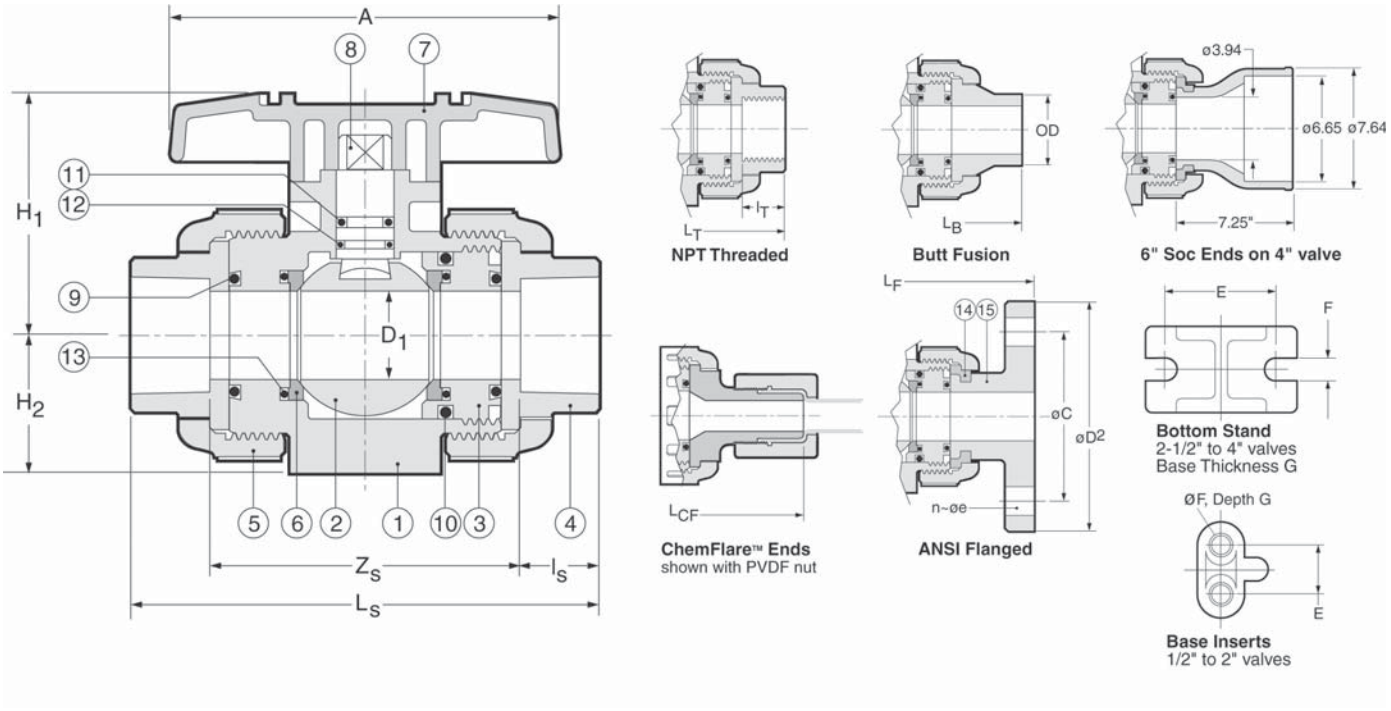
Q Series Electric

A Series Electric

V Series Electric
with Local Control Station

PA Series Pneumatic

Type 21 Ball Valves



PARTS

▲ Recommended Spare Parts

No.	Part	Pcs.	Materials
1	Body	1	PVC, CPVC, PP, PVDF
2	Ball	1	PVC, CPVC, PP, PVDF
3	Carrier[1]	1/2	PVC, CPVC, PP, PVDF
4	End Connector	2	PVC, CPVC, PP, PVDF
5	Union Nut	2	PVC, CPVC, PP, PVDF
6▲	Ball Seat	2	PTFE
7	Handle	1	ABS

[1] 1 carrier for sizes 1/2" to 2", 2 carriers for sizes 2-1/2" to 4"
[2] EPDM seals standard with PVC, CPVC, PP; FKM (Viton®) with PVDF valves
[3] 2 pcs 1/2" to 2", 6 pcs 2-1/2" to 4"

PARTS

▲ Recommended Spare Parts

No.	Part	Pcs.	Materials
8	Stem	1	PVC, CPVC, PP, PVDF
9▲	Face O-Ring[2]	2	EPDM, FKM (Viton®)
10▲	Carrier O-Ring[2]	2	EPDM, FKM (Viton®)
11▲	Upper Thicker Stem O-Ring[2]	1	EPDM, FKM (Viton®)
12▲	Lower Thinner Stem O-Ring[2]	1	EPDM, FKM (Viton®)
13	Seat Cushion[2]	2	EPDM, FKM (Viton®)
14	Flange Retainer[3]	2/6	PVDF
15	Flange	2	PVC, CPVC, PP, PVDF

DIMENSIONS INCHES

					End Connections														Valve Base		
					Socket			Threaded		Factory Flanged					Butt		ChemFlare™				
Size	D Bore	A	H_1	H_2	L_S	Z_S	l_S	l_T	L_T	L_F	D_2	C	n	e	L_B	OD	L_{CF}	Tube[4]	E	F[5]	G
1/2"	.59	3.6	2.03	1.14	4.45	2.70	.875	.64	4.02	5.63	3.50	2.38	4	.62	4.88	.79	6.12	1/2"	.75	.29	.43
3/4"	.79	3.9	2.34	1.38	5.08	3.08	1.00	.65	4.72	6.77	3.88	2.75	4	.62	5.67	.98	6.52	3/4"	.75	.29	.43
1"	.98	4.3	2.68	1.54	5.75	3.50	1.13	.81	5.16	7.36	4.25	3.12	4	.62	6.06	1.26	7.26	1"	.75	.29	.43
1-1/4"	1.22	4.8	3.17	1.85	6.46	5.21	1.25	.85	5.91	7.48	4.62	3.50	4	.62	6.85	1.57	9.58	1-1/4"	1.18	.35	.59
1-1/2"	1.57	5.2	3.50	2.17	7.24	4.49	1.38	.85	6.42	8.35	5.00	3.88	4	.62	7.64	1.97	–	–	1.18	.35	.59
2"	2.01	6.3	4.02	2.60	8.23	5.23	1.50	1.90	7.76	9.21	6.00	4.75	4	.75	8.82	2.48	–	–	1.18	.35	.59
2-1/2"	2.28	7.87	4.96	2.83	9.45	5.95	1.75	1.21	8.46	10.20	7.00	5.49	4	.75	9.72	2.95	–	–	1.89	.35	.23
3"	2.70	9.45	5.51	3.35	11.10	7.35	1.88	1.30	10.39	11.97	7.50	6.00	4	.75	11.61	3.54	–	–	2.17	.43	.28
4"	3.54	11.81	7.01	4.33	13.88	9.87	2.00	1.38	14.17	14.65	9.00	7.50	8	.75	14.76	4.33	–	–	2.56	.43	.32

[4] ChemFlare™ ends are available for reduced tube sizes down to 1/4".
[5] Optional threaded inserts: 1/2" to 1" valves – UNC 1/4"-20; 1-1/4" to 2" valves – UNC 5/16"-18. 'Recoil' brand inserts require drilling before insertion.

Type 21 Ball Valves

WORKING PRESSURES PSI, Water, Non-Shock

VACUUM RATING • 29.9 inches mercury

Size	PVC			CPVC						PP			PVDF				
	20°C 68°F	40°C 104°F	50°C 122°F	20°C 68°F	40°C 104°F	50°C 122°F	60°C 140°F	80°C 176°F	90°C 194°F	20°C 68°F	60°C 140°F	80°C 176°F	20°C 68°F	40°C 104°F	60°C 140°F	80°C 176°F	100°C 212°F
1/2"– 2"	230	165	150	230	165	150	120	75	55	150	85	55	230	185	150	110	85
2-1/2"– 4"	150	150	150	150	150	150	120	75	55	150	70	40	150	150	150	110	85

Temperature Ranges: PVC 0 to 60°C (32 to 140°F), **CPVC** 0 to 95°C (32 to 203°F), **PP** –20 to 80°C (–4 to 176°F), **PVDF** –40 to 100°C (–40 to 212°F)

WEIGHTS LB. THREADED or SOCKET

WEIGHTS LB. FLANGED

Size	PVC	CPVC	PP	PVDF	PVC	CPVC	PP	PVDF
1/2"	0.4	0.4	0.4	0.4	0.9	0.9	0.7	1.1
3/4"	0.7	0.7	0.7	0.9	1.3	1.5	1.1	1.5
1"	0.9	1.1	0.9	1.1	1.8	2.0	1.5	2.2
1-1/4"	1.5	1.5	1.3	1.8	2.6	2.9	2.0	3.3
1-1/2"	2.4	2.6	1.5	2.9	3.7	4.0	2.6	4.4
2"	4.0	4.4	2.6	4.9	5.5	6.0	4.0	8.2
2-1/2"	5.1	5.5	3.7	6.2	7.3	7.7	5.3	8.8
3"	8.2	8.8	5.5	9.9	10.1	11.0	7.5	12.6
4"	19.4	21.8	13.2	24.9	21.6	23.4	15.4	26.7

Cv VALUES VS. BALL ANGLE

Size	0%	25%	50%	75%	100%
1/2"	0	0.35	1.3	5.5	14.
3/4"	0	0.73	2.8	11.5	29.
1"	0	1.2	4.5	18.6	47.
1-1/4"	0	1.8	6.8	28.4	72.
1-1/2"	0	3.9	14.7	61.2	155.
2"	0	4.8	18.0	75.0	190.
2-1/2"	0	9.1	34.7	144.0	365.
3"	0	10.2	39.0	162.0	410.
4"	0	17.0	64.6	269.0	680.

SAMPLE SPECIFICATION

1. All True Union Ball Valves in PVC, CPVC, PP or PVDF shall be Chemline Type 21 or equal sizes 1/2" to 2" in PVC, CPVC, and PVDF rated at 230 psi and in PP 150 psi maximum working pressure. Sizes 2-1/2", 3" and 4" rated at 150 psi maximum working pressure with EPDM, FKM (Viton®) or CPE seals. Ball seats shall be PTFE with elastomer cushions for closure with minimum stem torques.
2. All valves will have Safety Shear stem design, blowout-proof with double o-rings for safety. The top o-ring groove shall be deeper so that if the stem breaks off under excessive torque the lower o-ring will remain intact and the valve will hold pressure.
3. All valves shall be full port and two-way blocking design.
4. All valves will be CRN (Canadian Registration Number) registered with TSSA.
5. PVC valves with EPDM or FKM (Viton®) seals shall be certified under NSF/ANSI Standard 61 for contact with drinking water.
6. All valves shall have chemical resistant labels permanently marked with manufacturing number to provide production level traceability.
7. PVC compound shall have an ASTM cell classification 12454-A with a minimum suffix "A" designation for chemical resistance as per ASTM D-1784 (CSA report LO 4000-172).
8. CPVC compound shall have an ASTM cell classification 23567-A with a minimum suffix "A" designation for chemical resistance as per ASTM D-1784.
9. PP material will conform to ASTM D-4101 PP 021 B 67272 material requirements.
10. PVDF material shall be unpigmented conforming to ASTM D-3222 material requirements and to be USDA Title 21 Chapter 1 Part 177. 2510 requirements for contact with food.
11. Socket ends in PVC and CPVC shall be Schedule 80 and conform to ASTM D-2467.
12. Threaded ends shall be Schedule 80 and conform to ASTM D-2464.
13. Butt fusion ends in PP or PVDF will be compatible with Chemline PP or PVDF metric piping systems.
14. Flanged ends shall be ANSI Class 150 one-piece factory moulded (not fabricated) to ensure maximum strength and close tolerance end to end dimensions.

ORDERING EXAMPLE

Chemline True Union Ball Valves	21	A	020	E	S
Body Material	**A** – PVC **B** – PP	**C** – CPVC **K** – PVDF			
Size[1]	**002** – 1/4" **010** – 1" **025** – 2-1/2"	**003** – 3/8" **012** – 1-1/4" **030** – 3"	**005** – 1/2" **015** – 1-1/2" **040** – 4"	**007** – 3/4" **020** – 2" **060** – 6"	
Seals	**E** – EPDM	**V** – FKM (Viton®)	**C** – CPE	**B** – Nitrile	**A** – Aflas®
Ends	**S** – Socket	**T** – Threaded	**F** – Flanged	**B** – Butt[2]	**CF** – ChemFlare™

Example: Chemline Type 21 True Union Ball Valve, PVC, 2", with EPDM seals, socket ends.

[1] 1/4" is normally the 3/8" valve reduced. 6" is 4" valve with 6" end connections.

[2] PP, PVDF and ECTFE (Halar®) metric butt fusion ends (1/2" to 4") connect to Chemline PP, PVDF and ECTFE (Halar®) piping systems.

OTHER OPTIONS & ACCESSORIES

- **Alternate O-Ring Seals**
- **Stem Extensions** made to any length
- **Limit Switches** – For open and/or closed position indication
- **Municipal Operating Nut**
- **Lubrication-free Valves** – Factory clean room assembled
- **Vented Ball** – For sodium hypochlorite applications

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CS-301-501 : Identification sheet

VWTC PROJECT NUMBER:	5000218009	REV:	1
PROJECT NAME:	AEM AMARUQ	SUBMITTED TO (COMPANY):	AGNICO EAGLE MINES
ENGINEER:	Gabriel Hébert	SUBMITTED TO (RESPONSIBLE)	
PROJECT MANAGER:	Clément B	PROJECT NUM REFERENCE.:	
PHONE NUMBER:		LOT NUMBER:	

SUPPLIER	EQPT CODE	EQPT TAG NO	DIA	DESCRIPTION	INFO 1	INFO 2	INFO 3	APPLIC.	NOTE	REV
CHEMLINE	VABLPV346917	V15-042	DIA: 13 mm (1/2")	METERING VALVE - WETTING CONE	TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : SM2-A-005-E-S//CONNECTION TYPE : SOCKET | 13 mm (1/2")//BODY : PVC (ASTM D1784)// SEAL | SEAT : | EPDM// STEM : N/A			KMnO4 PREP SYSTEM		
CHEMLINE	VABLPV346917	V15-043	DIA: 13 mm (1/2")	METERING VALVE - WETTING CONE	TYPE: BALL VALVE//MANUFACTURER : CHEMLINE//MODEL : SM2-A-005-E-S//CONNECTION TYPE : SOCKET | 13 mm (1/2")//BODY : PVC (ASTM D1784)// SEAL | SEAT : | EPDM// STEM : N/A			KMnO4 PREP SYSTEM		

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PDF Published October 18, 2017

Metering Ball Valves

CHEMLINE PLASTICS
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Chemline SM Series Metering Ball Valve is designed for fine linear flow control of chemicals or clean fluids. The ball is solid with graduated V-groove cut on the outside surface. Precise linear flow control is accomplished through 180° rotation of the handle. With a positioning electric actuator, this becomes an inexpensive control valve. If higher C_V values are required, refer to SP Series Proportional ball valves.

PVC PP

SERIES: SM2
SIZES: 1/2" – 1"
ENDS: Threaded, Socket, Butt[1] or ChemFlare™ [2]
SEATS: PTFE
O-RINGS: EPDM, FPM (Viton®)

Integral 180° Scale with 5° Increments
- Linear flow control and settable flow rates

features

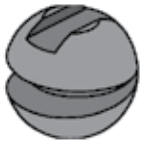
Precise Linear Flow Control
- Provided by a special V-groove ball and wide handle travel (0° to 180°)

Full Size Range
- 6 valves sizes 1/2" to 2" offers a large selection of C_V values

High End Ball Valve Features
- Full Blocking design
- Double Stem O-Rings for safety
- PTFE seats with elastomer cushion
  – Automatically compensates for seat wear or expansion
- 230 psi pressure rated (PVC)

Low Stem Torques
- Due to floating ball design and cushioned PTFE seats

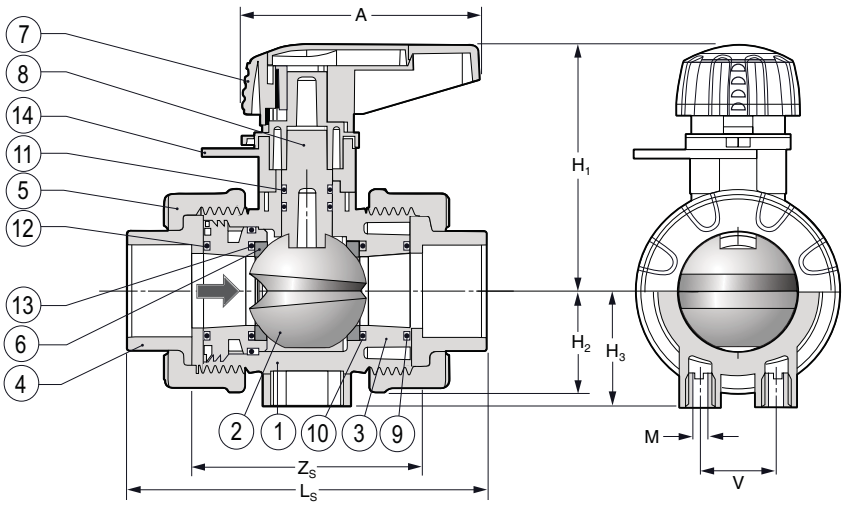
Bidirectional
- Works with flow in either direction



Ball Detail

[1]Butt ends for fusion to Chemline metric PP piping.
[2]For ChemFlare™ end connectors, consult Chemline.

Metering Ball Valves



PARTS

No.	Part	Pcs.	Materials
1	Body	1	PVC, PP, PVDF
2	Ball	1	PVC, PP, PVDF
3	Carrier	1	PVC, PP, PVDF
4	End Connector	2	PVC, PP, PVDF
5	Union Nut	5	PVC, PP, PVDF
6	Ball Seat	2	PTFE
7	Handle	1	PVC
8	Stem	1	PVC, PP, PVDF
9	Carrier Face O-Ring	1	EPDM, FPM(Viton®)
10	Carrier O-Ring	1	EPDM, FPM(Viton®)
11	Stem O-Ring[1]	2	EPDM, FPM(Viton®)
12	Face O-Ring	1	EPDM, FPM(Viton®)
13	Seat Cushion[1]	2	EPDM, FPM(Viton®)
14	Position Indicator Scale	1	PVC

DIMENSIONS INCHES

							PVC			PP		
Size	A	H_1	H_3	H	M	V	Z_s	L_s	H_2	Z_s	L_s	H_2
1/2″	2.62	2.48	1.10	2.50	M5	0.98	2.48	3.74	0.99	2.64	3.74	1.06
3/4″	3.21	3.03	1.20	2.70	M5	0.98	2.83	4.33	1.16	3.03	4.29	1.18
1″	3.21	3.39	1.60	3.00	M6	1.02	3.11	4.84	1.39	3.27	4.69	1.57

ELECTRICALLY OR PNEUMATICALLY ACTUATED

The metering ball valve becomes a proportional control valve with the addition of a Q or E Series electric or P Series pneumatic actuator with 4-20 mA positioner

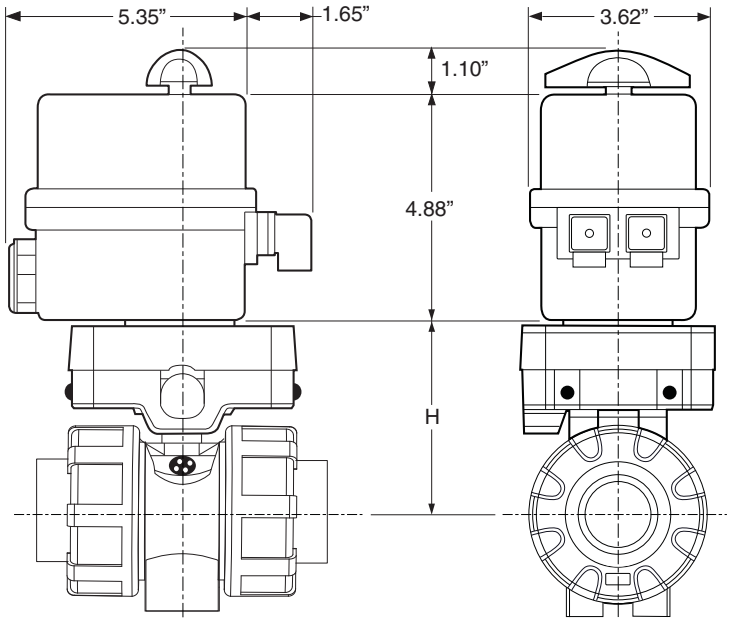
- Thermoplastic housing and mounting bracket
- Manual override
- Position indication
- Mechanical travel stops
- Different voltages are available

Q Series Electric

E Series Electric

P Series Pneumatic

E Series Electric Actuator on a SM2 Valve



Side View

Port View

Metering Ball Valves

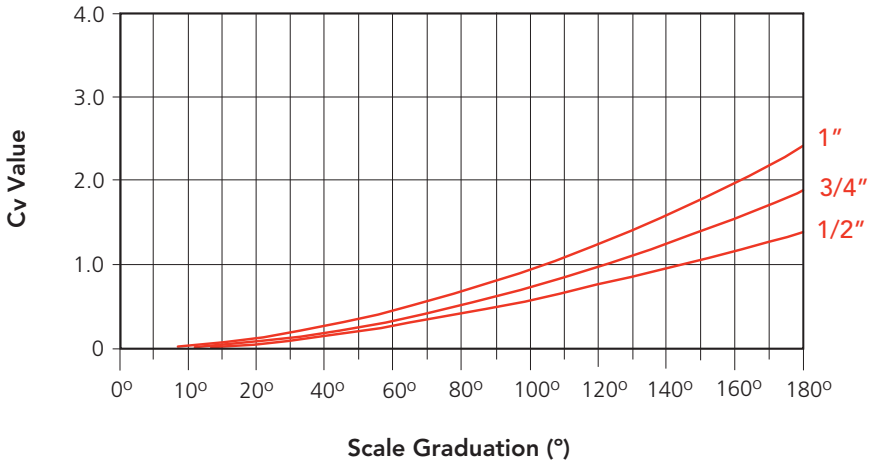
WORKING PRESSURES PSI

NET WEIGHTS LB. Cv VALUES

Size	PVC 20°C 68°F	PVC 40°C 104°F	PVC 60°C 140°F	PP 20°C 68°F	PP 40°C 104°F	PP 60°C 140°F	PP 80°C 176°F	PVC	PP	USGPM Flow at 1 psi △P
1/2″	230	130	30	150	100	65	20	0.35	0.29	1.4
3/4″	230	130	30	150	100	65	20	0.60	0.44	1.9
1″	230	130	30	150	100	65	20	0.84	0.64	2.3

Temperature Ranges: PVC 0 to 60°C (32 to 140°F), PP 0 to 95°C (32 to 203°F)

Cv VALUE vs. VALVE OPENING



SAMPLE SPECIFICATION

1. All low flow control valves, 1/2″ to 1″, will be Chemline SM Series metering ball valves.
2. Body material will be PVC or PP, and o-rings will be EPDM or FPM (Viton®).
3. Body will be full blocking design with double stem o-rings for safety, rated at 230 psi maximum working pressure for PVC and 150 psi for PP material.
4. Ball will be floating design, molded solid with a V-groove for linear flow control over a 180° range of handle rotation.
5. Seats will be PTFE with elastomer cushions for positive closure with minimum stem torques and automatic compensation for seat wear and expansion.
6. Position indicating scale will be 0° to 180° with 5° increments for fine flow control and settable flow rates.
7. End connections will be 1/2″ to 1″ ANSI socket or FNPT threaded or 150 lb flanged or butt fusion for Chemline metric PP pipe or ChemFlare™ for PFA tubing.

ORDERING EXAMPLE

Chemline Metering Ball Valves	SM2	A	010	E	S
Valve Material	**A** – PVC	**B** – PP			
Size	**005** – 1/2″	**007** – 3/4″	**010** – 1″		
Seals	**E** – EPDM	**V** – FPM (Viton®)			
Ends	**S** – Socket	**T** – Threaded	**B** – Butt[1]	**CF** – ChemFlare™	

Example: SM2 Series Ball Valve, PVC, 1″, EPDM seals, socket ends.

[1] PP metric butt fusion ends (1/2″ to 2″) connect to Chemline PP piping systems.

VACUUM RATING

- 29.9 inches mercury

OPTIONS & ACCESSORIES

- **Reduced Ends**
- **Electric or Pneumatic Actuator with Positioner**
  – Operates as a linear control valve

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CS-302-100 : Identification sheet

VWTC PROJECT NUMBER:	5000218009	REV:	1
PROJECT NAME:	AEM AMARUQ	SUBMITTED TO (COMPANY):	AGNICO EAGLE MINES
ENGINEER:	Gabriel Hébert	SUBMITTED TO (RESPONSIBLE)	
PROJECT MANAGER:	Clément B	PROJECT NUM REFERENCE.:	
PHONE NUMBER:		LOT NUMBER:	

SUPPLIER	EQPT CODE	EQPT TAG NO	DIA	DESCRIPTION	INFO 1	INFO 2	INFO 3	APPLIC.	NOTE	REV
CHEMLINE	VANRPV200667	CV9-591	DIA: 38 mm (1-1/2")	CHECK VALVE - LIQUID POLYMER	TYPE: CHECK | 150 PSI//MANUFACTURER : CHEMLINE//MODEL : BTA015EC//CONNECTION TYPE : COMBO | 1-1/2"//BODY : PVC// SEAL | SEAT :EPDM | // STEM : N/A			KMnO4 PREP SYSTEM		

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PDF Published March 1, 2013

Ball Check & Foot Valves

CHEMLINE PLASTICS
SUPERIOR FLOW SOLUTIONS

The economical and versatile Chemline Ball Check Valve is the most popular type of non-return valves for pipe sizes under 6". A wide selection of body and seat materials, and end connections are available for many different applications. It has good flow capacity and will handle many slurry and suspended solid services. This valve works in both horizontal and vertical lines. The Foot Valve is for end of line services such as sumps.

PVC | CPVC | PP | PVDF

CRN Registered Consult Chemline

NSF[3] Certified to NSF/ANSI 61

SERIES: BT: True Union Check
BC: Single Union Check
FT: True Union Check
FV: Single Union Check

SIZES: 1/2" – 4"

ENDS: Threaded, Socket, Flanged, Butt[1] or ChemFlare™[2]

SEAT/SEALS: EPDM, FKM (Viton®), PTFE coated FKM (Viton®)

features

- **True Union to 2"**
- **Full Port to 4"**
- **NSF Certified[3]**
- **Built-in Union Design** – For easy installation and maintenance
- **Free Floating Ball** – The only moving part
- **Uniseat/Seal** – Easily removable
- **May be used either horizontally or vertically**
- **Excellent flow characteristics**
- **Low seating and opening pressures**

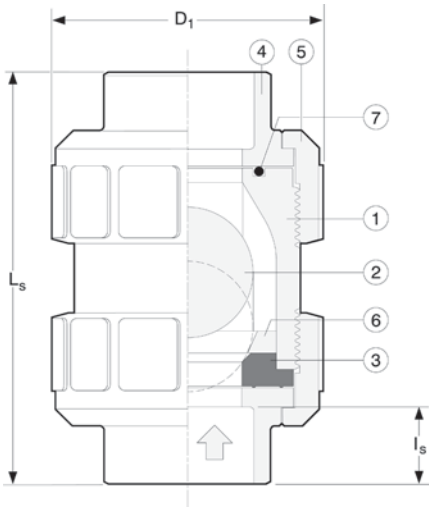
True Union Check
1/2" to 2" in all materials

Single Union Check
1/2" to 4" in PVC
2-1/2" to 4" in CPVC, PP and PVDF

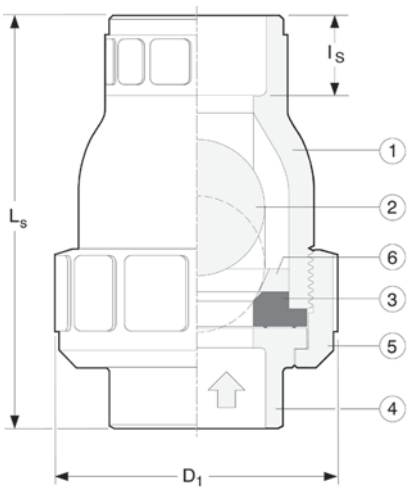
Foot Valve is light weight and has a low profile basket

[1] PP and PVDF Butt fusion ends (available 1/2" to 2") connect to Chemline PP and PVDF piping systems.
[2] For ChemFlare™ end connectors, consult Chemline.
[3] PVC valves with EPDM or FKM (Viton®) seals are certified under NSF/ANSI Standard 61 for contact with drinking water.

Ball Check Valves



True Union Valve



Single Union Valve

PARTS

▲ Recommended Spare Parts

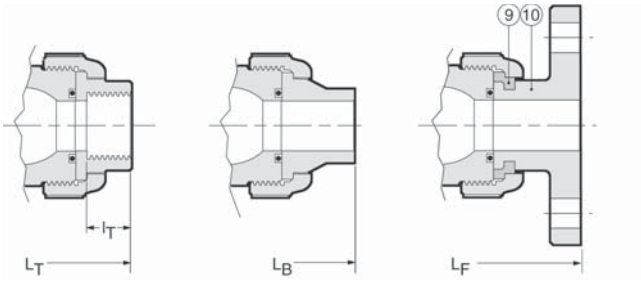
No.	Part	Pcs. T/U	Pcs. S/U	Materials
1	Body	1	1	PVC, CPVC, PP, PVDF
2	Ball	1	1	PVC, CPVC, PP, PVDF
3▲	Uniseat/Seal[1]	1	1	EPDM, FKM(Viton®), PTFE coated FKM (Viton®)
4	End Connector	2	1	PVC, CPVC, PP, PVDF
5	Union Nut	2	1	PVC, CPVC, PP, PVDF
6	Stop Ring	1	1	PVC, CPVC, PP, PVDF
7	Face O-Ring	1	1	EPDM, FKM(Viton®)
9	Flange Retainer[2]	2	1	PVDF
10	Factory Flange[3]	2	1	PVC, CPVC, PP, PVDF

[1] Standard seals are EPDM in PVC, CPVC and PP valves, PTFE coated FKM (Viton®) in PVDF valves. Coating is .002" thick.

[2] True Union: 2 pcs 1/2" to 2", 6 pcs 1-1/2" to 4" Single Union: 1 pcs 1/2" to 2", 3 pcs 2-1/2" to 4".

[3] True Union flanged valves have two factory flanges. Single Union valves have one factory flange and one fabricated flange. Consult Chemline for details on fabricated type.

UNION END CONNECTIONS



NPT Threaded

Butt Fusion PP and PVDF

Factory Flanged

DIMENSIONS INCHES

WEIGHTS LB.

Size	D_1	I_s	I_T	True Union PVC & CPVC L_T	L_S	L_F	True Union PP & PVDF L_T	L_B	L_F	Single Union PVC L_T	L_S	L_F	True Union Socket or Butt PVC	CPVC	PP	PVDF	Single Union PVC
1/2"	1.9	0.69	0.59	3.4	3.4	5.1	3.4	4.0	5.1	3.2	3.4	5.6	0.3	0.3	0.2	0.3	0.2
3/4"	2.4	0.72	0.67	4.1	3.9	6.1	4.1	4.4	6.1	3.8	3.7	6.6	0.5	0.5	0.3	0.6	0.4
1"	2.8	0.88	0.79	4.5	4.4	6.5	4.5	4.8	6.5	4.2	4.3	7.3	0.7	0.8	0.4	0.9	0.6
1-1/4"	3.1	0.94	0.87	5.0	4.9	6.6	5.0	5.9	6.6	6.2	6.3	12.3	1.1	1.2	0.7	1.5	1.5
1-1/2"	3.7	1.09	0.98	5.9	5.9	7.6	5.9	5.8	7.6	5.6	5.7	9.1	1.6	1.7	1.0	2.0	1.3
2"	4.2	1.16	1.10	7.0	6.8	8.4	7.0	6.5	8.4	6.5	6.5	10.5	2.2	2.4	1.4	2.7	1.8

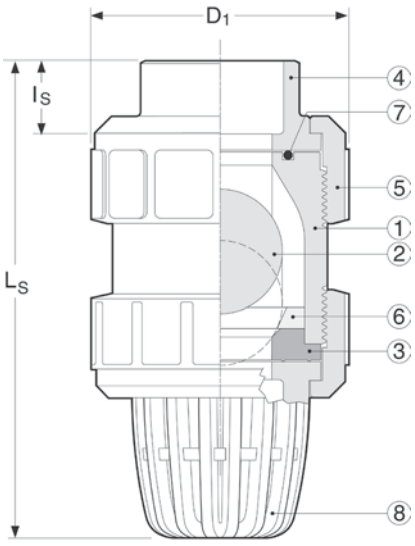
DIMENSIONS INCHES

WEIGHTS LB.

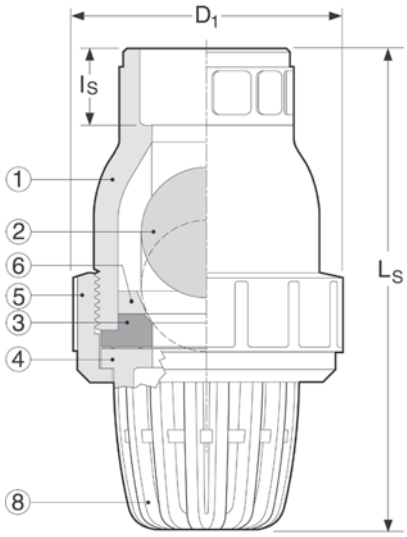
Size	D_1	I_s[4]	I_T	Single Union PVC & CPVC L_T	L_S	L_F	Single Union PP & PVDF L_T	L_B	L_F	Single Union PVC	CPVC	PP	PVDF
2-1/2"	6.0	2.10	2.17	10.0	10.4	14.3	8.7	*	*	5.7	6.2	*	*
3"	6.0	1.88	1.38	8.7	9.6	12.2	8.7	*	*	5.1	5.5	3.3	6.3
4"	8.3	2.00	1.77	12.1	12.2	15.0	12.1	*	*	12.7	13.9	8.1	15.7

[4] Consult Chemline.

Foot Valves



True Union Valve



Single Union Valve

PARTS

▲ Recommended Spare Parts

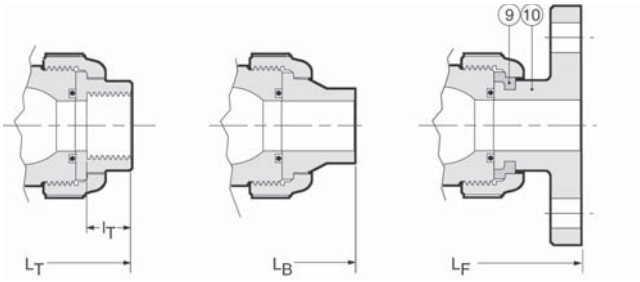
No.	Part	Pcs. T/U	Pcs. S/U	Materials
1	Body	1	1	PVC, CPVC, PP, PVDF
2	Ball	1	1	PVC, CPVC, PP, PVDF
3▲	Uniseat/Seal[1]	1	1	EPDM, FKM(Viton®), PTFE coated FKM (Viton®)
4	End Connector	2	1	PVC, CPVC, PP, PVDF
5	Union Nut	2	1	PVC, CPVC, PP, PVDF
6	Stop Ring	1	1	PVC, CPVC, PP, PVDF
7	Face O-Ring	1	1	EPDM, FKM(Viton®)
8	Foot Valve Basket	1	1	PVC, CPVC, PP, PVDF
9	Flange Retainer[2]	3	0	PVDF
10	Factory Flange[3]	1	0	PVC, CPVC, PP, PVDF

[1] Standard seals are EPDM in PVC, CPVC and PP valves, PTFE coated FKM (Viton®) in PVDF valves. Coating is .002" thick.

[2] True Union: 1 pc 1/2" to 2", 3 pcs 2-1/2" to 4".

[3] True Union valves have factory flanges. Single Union have fabricated flanges. Consult Chemline for details on fabricated type.

END CONNECTIONS FOR TRUE UNION VALVE



NPT Threaded

Butt Fusion PP and PVDF

Factory Flanged

DIMENSIONS INCHES

WEIGHTS LB.

Size	D_1	I_s Soc	I_T Thd	True Union PVC & CPVC L_T	True Union PVC & CPVC L_S	True Union PVC & CPVC L_F	Single Union PVC L_T	Single Union PVC L_S	Single Union PVC L_F	Single Union PVC Socket
1/2"	1.9	0.69	0.59	2.8	2.9	3.7	3.5	3.7	4.7	0.3
3/4"	2.4	0.72	0.67	3.3	3.3	4.4	4.1	4.2	5.4	0.4
1"	2.8	0.88	0.79	3.7	3.7	4.8	4.5	4.8	6.1	0.8
1-1/4"	3.7	0.94	0.87	*	*	*	*	*	*	1.8
1-1/2"	3.7	1.09	0.98	5.4	5.4	6.3	6.8	7.0	8.5	1.7
2"	4.2	1.16	1.10	6.4	6.4	7.2	7.4	7.6	9.3	2.1
2-1/2"	6.0	2.10	2.17	–	–	–	*	*	*	7.4
3"	6.0	1.88	1.38	–	–	–	11.6	12.1	14.2	7.1
4"	8.3	2.00	1.77	–	–	–	14.7	15.0	17.4	15.7

* Consult Chemline for dimensions.

For CPVC (2-1/2" to 4"), PP and PVDF Foot Valve lengths, consult Chemline.

Ball Check & Foot Valves

WORKING PRESSURES PSI

Size	PVC	CPVC				Polypropylene			PVDF			
	0-50°C 32-122°F	0-50°C 32-122°F	60°C 140°F	80°C 176°F	90°C 194°F	–20-30°C –4-90°F	60°C 140°F	80°C 176°F	–20-60°C –4-140°F	80°C 176°F	90°C 194°F	100°C 212°F
1/2″	150	150	115	85	60	150	90	60	150	120	110	85
3/4″	150	150	115	85	60	150	90	60	150	120	110	85
1″	150	150	115	85	60	150	90	60	150	120	110	85
1-1/4″	150	150	115	85	60	150	90	60	150	120	110	85
1-1/2″	150	150	115	85	60	150	90	60	150	120	110	85
2″	150	150	115	85	60	150	90	60	150	120	110	85
2-1/2″	100	100	90	60	45	100	60	45	100	90	60	45
3″	100	100	90	60	45	100	60	45	100	90	60	45
4″	100	100	90	60	45	100	60	45	100	90	60	45

Maximum Temperatures: PVC 0 to 60°C (32 to 140°F), **CPVC** 0 to 95°C (32 to 203°F), **PP** –20 to 90°C (–4 to194°F), **PVDF** –40 to 100°C (–40 to 212°F)

MINIMUM SEATING AND OPENING PRESSURE PSI

Size	Vertical Piping		Horizontal Piping	
	Open	Seating	Open	Seating
1/2″	0.7	2.8	0.1	2.8
3/4″	0.7	4.3	0.1	4.3
1″	0.7	4.3	0.1	4.3
1-1/4″	1.4	4.3	0.3	4.3
1-1/2″	1.4	4.3	0.3	4.3
2″	1.4	4.3	0.3	4.3
2-1/2″	1.4	2.8	0.3	2.8
3″	1.4	2.8	0.3	2.8
4″	1.4	2.8	0.3	2.8

Cv VALVES

Check Valves
6.5
17.
25.
86.
86.
130.
280.
280.
500.

VACUUM RATING

- 29.9 inches mercury
- Maximum recommended velocity 5 m/s

SAMPLE SPECIFICATION

All Ball Check valves in PVC, CPVC, PP or PVDF shall be Chemline BT or BC Series or equal with EPDM [FKM (Viton®) or PTFE coated FKM (Viton®)] seats and union ends. Sizes 1/2″ to 2″ shall be slip-out True Union style, sizes 2-1/2″ to 4″ shall be single union. The elastomer uniseat/seal shall function as both the ball seat and the union seal. Ball Check valves shall be rated 150 psi up to 2″ and 100 psi for sizes 2-1/2″ to 4″.

ORDERING EXAMPLE

Chemline Ball Check/Foot Valves	BT	A	020	E	S
Valve Type	**BT** – True Union Ball Check **BC** – Single Union Ball Check **FV** – Single Union Foot Valve **FT** – True Union Foot Valve				
Body Material	**A** – PVC **C** – CPVC **B** – PP **K** – PVDF				
Size	**005** – 1/2″ **007** – 3/4″ **010** – 1″ **012** – 1-1/4″ **015** – 1-1/2″ **020** – 2″ **025** – 2-1/2″ **030** – 3″ **040** – 4″				
Seals	**E** – EPDM **V** – FKM (Viton®) **T** – PTFE coated FKM (Viton®)				
Ends	**S** – Socket **T** – Threaded **F** – Flanged **B** – Butt[1] **CF** – ChemFlare™				

Example: Ball Check Valve, PVC, 2″, with EPDM seat, socket ends.

[1] PP and PVDF metric butt fusion ends (1/2″ to 2″) connect to Chemline PP and PVDF piping systems.

OPTIONS & ACCESSORIES

- **PTFE coated Uniseat/Seal**
- **Spring Loaded Ball** – Assists ball to seat faster

55 Guardsman Road, Thornhill, ON, L3T 6L2, Canada | ISO 9001:2008 Certified
tel.905.889.7890 | fax.905.889.8553 | request@chemline.com | chemline.com

CS-304-100 : Identification sheet

VWTC PROJECT NUMBER:	5000218009	REV:	1
PROJECT NAME:	AEM AMARUQ	SUBMITTED TO (COMPANY):	AGNICO EAGLE MINES
ENGINEER:	Gabriel Hébert	SUBMITTED TO (RESPONSIBLE)	
PROJECT MANAGER:	Clément B	PROJECT NUM REFERENCE.:	
PHONE NUMBER:		LOT NUMBER:	

SUPPLIER	EQPT CODE	EQPT TAG NO	DIA	DESCRIPTION	INFO 1	INFO 2	INFO 3	APPLIC.	NOTE	REV
TECKNO VALVE	ST-304-102	SV9-591	N/A	SOLENOID VALVE	TYPE: SOLENOID VALVE//MANUFACTURER : ASCO//MODEL : 8210G094//CONNECTION TYPE : THREADED | 13 mm (1/2") | 13 mm (1/2")//BODY : BRASS// SEAL | SEAT : | // STEM : N/A	ACTING : PILOT	NORMALLY : FERMÉ/CLOSED	KMnO4 PREP SYSTEM		
TECKNO VALVE	VASDBZ336126	SV15-042	DIA: 1"	SOLENOID VALVE - DRIVING WATER	TYPE: SOLENOID VALVE//MANUFACTURER : ASCO//MODEL : EF8210G004-120VAC//CONNECTION TYPE : THREADED | 25 mm (1") | 25 mm (1")//BODY : BRASS// SEAL | SEAT :NBR | PA// STEM : N/A	ACTING : PILOT	NORMALLY : FERMÉ/CLOSED	KMnO4 PREP SYSTEM		

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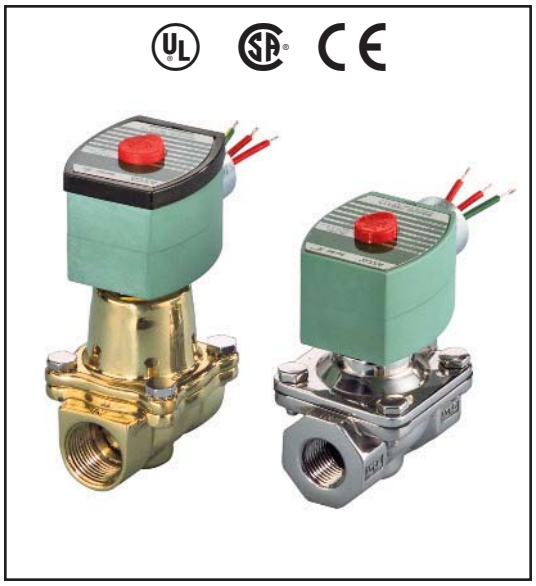
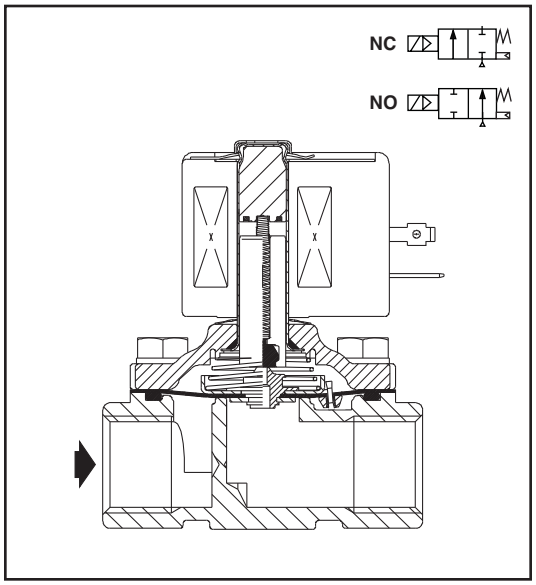
Features

- Wide range of pressure ratings, sizes, and resilient materials provide long service life and low internal leakage
- High flow valves for liquid, corrosive, and air/inert gas service
- Industrial applications include:
  - Car wash
  - Laundry equipment
  - Air compressors
  - Industrial water control
  - Pumps





Construction

Valve Parts in Contact with Fluids		
Body	Brass	304 Stainless Steel*
Seals and Discs	NBR or PTFE	
Disc-Holder	PA	
Core Tube	305 Stainless Steel	
Core and Plugnut	430F Stainless Steel	
Springs	302 Stainless Steel	
Shading Coil	Copper	Silver

*Catalog Numbers 8210G127, 8210G129, 8210G132, 8210G133 have 316L Stainless Steel bodies.

Electrical

Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part Number			
		AC			General Purpose		Explosionproof	
	DC Watts	Watts	VA Holding	VA Inrush	AC	DC	AC	DC
F	-	6.1	16	40	238210	-	238214	-
F	11.6	10.1	25	70	238610	238710	238614	238714
F	16.8	16.1	35	180	272610	97617	272614	97617
F	-	17.1	40	93	238610	-	238614	-
F	-	20	43	240	99257	-	99257	-
F	-	20.1	48	240	272610	-	272614	-
F	30.8	-	-	-	-	501695	-	501696
H	40.6	-	-	-	-	238910	-	238914

Standard Voltages: 24, 120, 240, 480 volts AC, 60 Hz (or 110, 220 volts AC, 50 Hz). 6, 12, 24, 120, 240 volts DC. Must be specified when ordering.
Other voltages available when required.

Solenoid Enclosures

Standard: RedHat II - Watertight, Types 1, 2, 3, 3S, 4, and 4X; RedHat - Type I.

Optional: RedHat II - Explosionproof and Watertight, Types 3, 3S, 4, 4X, 6, 6P, 7, and 9; Red-Hat - Explosionproof and Watertight, Types 3, 4, 4X, 7, and 9.

(To order, add prefix "EF" to catalog number, except Catalog Numbers 8210B057, 8210B058, and 8210B059, which are not available with Explosionproof enclosures.)
See Optional Features Section for other available options.

Nominal Ambient Temp. Ranges

RedHat II/RedHat AC: 32˚F to 125˚F (0˚C to 52˚C)
RedHat II DC: 32˚F to 104˚F (0˚C to 40˚C)
RedHat DC: 32˚F to 77˚F (0˚C to 25˚C)
(104˚F/40˚C occasionally)
8210G227 AC: 32˚F to 130˚F (0˚C to 54˚C)
DC: 32˚F to 90˚F (0˚C to 32˚C)
Refer to Engineering Section for details.

Approvals

UL listed as indicated. CSA certified.
RedHat II meets applicable CE directives.
Refer to Engineering Section for details.

ATEX/IECEx certified with prefix "EV" as listed. *Refer to Optional Features Electrical Section for details.*

Specifications (English units)

Pipe Size (in)	Orifice Size (in)	Cv Flow Factor	Operating Pressure Differential (psi)							Max. Fluid Temp. ˚F		Brass Body			Stainless Steel Body			Watt Rating/ Class of Coil Insulation ⑦	
				Max. AC			Max. DC												
			Min.	Air-Inert Gas	Water	Light Oil @ 300 SSU	Air-Inert Gas	Water	Light Oil @ 300 SSU	AC	DC	Catalog Number	Const. Ref. ④	UL ⑤ Listing	Catalog Number	Const. Ref. ④	UL ⑤ Listing	AC	DC
NORMALLY CLOSED (Closed when de-energized), NBR or PTFE ② Seating																			
3/8	3/8	1.5	①	150	125	-	40	40	-	180	150	8210G073 ③	1P	●	8210G036 ③	1P	●	6.1/F	11.6/F
3/8	5/8	3	0	150	150	-	40	40	-	180	150	8210G093	5D	❍	-	-	-	10.1/F	11.6/F
3/8	5/8	3	5	200	150	135	125	100	100	180	150	8210G001 ▼	6D	❍	-	-	-	6.1/F	11.6/F
3/8	5/8	3	5	300	300	300	-	-	-	175	-	8210G006 ✓	5D	❍	-	-	-	17.1/F	-
1/2	7/16	2.2	①	150	125	-	40	40	-	180	150	8210G015 ③	2P	●	8210G037 ③	2P	●	6.1/F	11.6/F
1/2	5/8	4	0	150	150	-	40	40	-	180	150	8210G094 ✓	5D	❍	-	-	-	10.1/F	11.6/F
1/2	5/8	4	0	150	150	125	40	40	-	175	150	-	-	-	8210G087 ✓	7D	●	17.1/F	11.6/F
1/2	5/8	4	5	200	150	135	125	100	100	180	150	8210G002 ▼	6D	❍	-	-	-	6.1/F	11.6/F
1/2	5/8	4	5	300	300	300	-	-	-	175	-	8210G007	5D	❍	-	-	-	17.1/F	-
1/2	3/4	4	5	-	300	-	-	300	-	130	90	8210G227	5D	❍ †	-	-	-	17.1/F	40.6/H
3/4	5/8	4.5	0	150	150	125	40	40	-	175	150	-	-	-	8210G088 ✓	7D	●	17.1/F	11.6/F
3/4	3/4	5	5	125	125	125	100	90	75	180	150	8210G009 ▼	9D	❍	-	-	-	6.1/F	11.6/F
3/4	3/4	5	0	150	150	-	40	40	-	180	150	8210G095 ✓	8D	❍	-	-	-	10.1/F	11.6/F
3/4	3/4	6.5	5	250	150	100	125	125	125	180	150	8210G003 ▼	11D	❍	-	-	-	6.1/F	11.6/F
3/4	3/4	6	0	350	300	200	200	200	200	200	180	8210G026 ② ‡ ◆	40P/10D	●	-	-	-	16.1F	30.8/F
1	1	13	0	150	125	125	135	120	120	180	180	8210G054 ‡ ◆	41D/31D	●	8210G089 ‡ ◆	45D/15D	●	16.1/F	30.8/F
1	1	13	5	150	150	100	125	125	125	180	150	8210G004 ▼	12D	❍	-	-	-	6.1/F	11.6/F
1	1	13.5	0	300	225	115	-	-	-	200	-	8210G027 ‡	42P	●	-	-	-	20.1/F	-
1	1	13.5	10	300	300	300	-	-	-	175	-	8210G078 ②	13P	-	-	-	-	17.1/F	-
1 1/4	1 1/8	15	0	150	125	125	135	120	120	180	180	8210G055 ‡ ◆	43D/32D	●	-	-	-	16.1/F	30.8/F
1 1/4	1 1/8	15	5	150	150	100	125	125	125	180	150	8210G008 ▼	16D	❍	-	-	-	6.1/F	11.6/F
1 1/2	1 1/4	22.5	0	150	125	125	135	120	120	180	180	8210G056 ‡ ◆	44D/33D	●	-	-	-	16.1/F	30.8/F
1 1/2	1 1/4	22.5	5	150	150	100	125	125	125	180	150	8210G022 ▼	18D	●	8210G127	-	-	6.1/F	11.6/F
2	1 3/4	43	5	150	125	90	50	50	50	180	150	8210G100	20P	●	8210G129	-	-	6.1/F	11.6/F
2 1/2	1 3/4	45	5	150	125	90	50	50	50	180	150	8210G101	21P	●	-	-	-	6.1/F	11.6/F
NORMALLY OPEN (Open when de-energized), NBR Seating (PA Disc-Holder, except as noted)																			
3/8	5/8	3	0	150	150	125	125	125	80	180	150	8210G033	23D	●	-	-	-	10.1/F	11.6/F
3/8	5/8	3	5	250	200	200	250	200	200	180	180	8210G011 ⑧ ⑨	39D	●	-	-	-	10.1/F	11.6/F
1/2	5/8	4	0	150	150	125	125	125	80	180	150	8210G034 ✓	23D	●	-	-	-	10.1/F	11.6/F
1/2	5/8	3	0	150	150	100	125	125	80	180	150	-	-	-	8210G030 ✓	37D	●	10.1/F	11.6/F
1/2	5/8	4	5	250	200	200	250	200	200	180	180	8210G012 ⑧ ⑨	39D	●	-	-	-	10.1/F	11.6/F
3/4	3/4	5.5	0	150	150	125	125	125	80	180	150	8210G035 ✓	25D	●	-	-	-	10.1/F	11.6/F
3/4	5/8	3	0	150	150	100	125	125	80	180	150	-	-	-	8210G038 ✓	38D	●	10.1/F	11.6/F
3/4	3/4	6.5	5	-	-	-	250	200	200	-	180	8210C013	24D	●	-	-	-	-	16.8/F
3/4	3/4	6.5	5	250	200	200	-	-	-	180	-	8210G013	46D	●	-	-	-	16.1/F	-
1	1	13	0	125	125	125	-	-	-	180	-	8210B057 ⑥ ⑩	34D	●	-	-	-	20/F	-
1	1	13	5	-	-	-	125	125	125	-	180	8210D014	26D	●	-	-	-	-	16.8/F
1	1	13	5	150	150	125	-	-	-	180	-	8210G014	47D	●	-	-	-	16.1/F	-
1 1/4	1 1/8	15	0	125	125	125	-	-	-	180	-	8210B058 ⑥ ⑩	35D	●	-	-	-	20/F	-
1 1/4	1 1/8	15	5	-	-	-	125	125	125	-	180	8210D018	28D	●	-	-	-	-	16.8/F
1 1/4	1 1/8	15	5	150	150	125	-	-	-	180	-	8210G018	48D	●	-	-	-	16.1/F	-
1 1/2	1 1/4	22.5	0	125	125	125	-	-	-	180	-	8210B059 ⑥ ⑩	36D	●	-	-	-	20/F	-
1 1/2	1 1/4	22.5	5	-	-	-	125	125	125	-	180	8210D032	29D	●	-	-	-	-	16.8/F
1 1/2	1 1/4	22.5	5	150	150	125	-	-	-	180	-	8210G032	49D	●	8210G132	-	-	16.1/F	-
2	1 3/4	43	5	-	-	-	125	125	125	-	150	8210 103	30P	●	-	-	-	-	16.8/F
2	1 3/4	43	5	125	125	125	-	-	-	180	-	8210G103	50P	●	8210G133	-	-	16.1/F	-
2 1/2	1 3/4	45	5	-	-	-	125	125	125	-	150	8210 104	27P	●	-	-	-	-	16.8/F
2 1/2	1 3/4	45	5	125	125	125	-	-	-	180	-	8210G104	51P	●	-			16.1/F	-

① 5 psi on Air; 1 psi on Water.
② Valve provided with PTFE main disc.
③ Valve includes Ultem (G.E. trademark) piston.
④ Letter "D" denotes diaphragm construction; "P" denotes piston construction.
⑤ ❍ Safety Shutoff Valve; ● General Purpose Valve.
Refer to Engineering Section (Approvals) for details.

⑥ Valves not available with Explosionproof enclosures.
⑦ On 50 hertz service, the watt rating for the 6.1/F solenoid is 8.1 watts.
⑧ AC construction also has PA seating.
⑨ No disc-holder.
⑩ Stainless steel disc-holder.
† UL listed for fire protection systems per UL429A.

‡ DC constructions must have solenoid mounted vertical and upright.
✓ ATEX/IECEx certified with prefix "EV".
▼ ATEX/IECEx certified for DC only with prefix "EV".
◆ Not available in 6 Volt DC. EF and HB prefix only.

Specifications (Metric units)

Pipe Size (in)	Orifice Size (mm)	Kv Flow Factor (m^3/hr)	Operating Pressure Differential (bar)							Max. Fluid Temp. ˚C		Brass Body			Stainless Steel Body			Watt Rating/ Class of Coil Insulation ⑦	
				Max. AC			Max. DC												
			Min.	Air-Inert Gas	Water	Light Oil @ 300 SSU	Air-Inert Gas	Water	Light Oil @ 300 SSU	AC	DC	Catalog Number	Const. Ref. ④	UL ⑤ Listing	Catalog Number	Const. Ref. ④	UL ⑤ Listing	AC	DC
NORMALLY CLOSED (Closed when de-energized), NBR or PTFE ② Seating																			
3/8	10	1.3	①	10	9	-	3	3	-	82	65	8210G073 ③	1P	●	8210G036 ③	1P	●	6.1/F	11.6/F
3/8	16	2.6	0	10	10	-	3	3	-	82	65	8210G093	5D	❍	-	-	-	10.1/F	11.6/F
3/8	16	2.6	0.3	14	10	9	9	7	7	82	65	8210G001 ▼	6D	❍	-	-	-	6.1/F	11.6/F
3/8	16	2.6	0.3	21	21	21	-	-	-	79	-	8210G006 ✓	5D	❍	-	-	-	17.1/F	-
1/2	11	1.9	①	10	9	-	3	3	-	82	65	8210G015 ③	2P	●	8210G037 ③	2P	●	6.1/F	11.6/F
1/2	16	3.4	0	10	10	-	3	3	-	82	65	8210G094 ✓	5D	❍	-	-	-	10.1/F	11.6/F
1/2	16	3.4	0	10	10	9	3	3	-	79	65	-	-	-	8210G087 ✓	7D	●	17.1/F	11.6/F
1/2	16	3.4	0.3	14	10	9	9	7	7	82	65	8210G002 ▼	6D	❍	-	-	-	6.1/F	11.6/F
1/2	16	3.4	0.3	21	21	21	-	-	-	79	-	8210G007	5D	❍	-	-	-	17.1/F	-
1/2	19	3.4	0.3	-	21	-	-	21	-	54	32	8210G227	5D	❍ †	-	-	-	17.1/F	40.6H
3/4	16	3.9	0	10	10	9	3	3	-	79	65	-	-	-	8210G088 ✓	7D	●	17.1/F	11.6/F
3/4	19	4.3	0.3	9	9	9	7	6	5	82	65	8210G009 ▼	9D	❍	-	-	-	6.1/F	11.6/F
3/4	19	4.3	0	10	10	-	3	3	-	82	65	8210G095 ✓	8D	❍	-	-	-	10.1/F	11.6/F
3/4	19	5.6	0.3	17	10	7	9	9	9	82	65	8210G003 ▼	11D	❍	-	-	-	6.1/F	11.6/F
3/4	19	5.1	0	24	21	14	14	14	14	93	82	8210G026 ② ‡ ◆	40P/10D	●	-	-	-	16.1F	30.8/F
1	25	11	0	10	9	9	9	8	8	82	82	8210G054 ‡ ◆	41D/31D	●	8210G089 ‡ ◆	45D/15D	●	16.1/F	30.8/F
1	25	11	0.3	10	10	7	9	9	9	82	65	8210G004 ▼	12D	❍	-	-	-	6.1/F	11.6/F
1	25	11.5	0	21	16	8	-	-	-	93	-	8210G027 ‡	42P	●	-	-	-	20.1/F	-
1	25	11.5	0.7	21	21	21	-	-	-	79	-	8210G078 ②	13P	-	-	-	-	17.1/F	-
1 1/4	29	13	0	10	9	9	9	8	8	82	82	8210G055 ‡ ◆	43D/32D	●	-	-	-	16.1/F	30.8/F
1 1/4	29	13	0.3	10	10	7	9	9	9	82	65	8210G008 ▼	16D	❍	-	-	-	6.1/F	11.6/F
1 1/2	32	19.5	0	10	9	9	9	8	8	82	82	8210G056 ‡ ◆	44D/33D	●	-	-	-	16.1/F	30.8/F
1 1/2	32	19.5	0.3	10	10	7	9	9	9	82	65	8210G022 ▼	18D	●	8210G127	-	-	6.1/F	11.6/F
2	44	37	0.3	10	9	6	3	3	3	82	65	8210G100	20P	●	8210G129	-	-	6.1/F	11.6/F
2 1/2	44	39	0.3	10	9	6	3	3	3	82	65	8210G101	21P	●	-	-	-	6.1/F	11.6/F
NORMALLY OPEN (Open when de-energized), NBR Seating (PA Disc-Holder, except as noted)																			
3/8	16	2.6	0.0	10	10	9	9	9	6	82	65	8210G033	23D	●	-	-	-	10.1/F	11.6/F
3/8	16	2.6	0.3	17	14	14	17	14	14	82	82	8210G011 ⑧ ⑨	39D	●	-	-	-	10.1/F	11.6/F
1/2	16	3.4	0	10	10	9	9	9	6	82	65	8210G087 ✓	7D	●	-	-	-	10.1/F	11.6/F
1/2	16	2.6	0	10	10	7	9	9	6	82	65	-	-	-	8210G087 ✓	7D	●	10.1/F	11.6/F
1/2	16	3.4	0.3	17	14	14	17	14	14	82	82	8210G012 ⑧ ⑨	39D	●	-	-	-	10.1/F	11.6/F
3/4	19	4.7	0	10	10	9	9	9	6	82	65	8210G087 ✓	7D	●	-	-	-	10.1/F	11.6/F
3/4	16	2.6	0	10	10	7	9	9	6	82	65	-	-	-	8210G087 ✓	7D	●	10.1/F	11.6/F
3/4	19	5.6	0.3	-	-	-	17	14	14	-	82	8210C013	24D	●	-	-	-	-	16.8/F
3/4	19	5.6	0.3	17	14	14	-	-	-	82	-	8210G013	46D	●	-	-	-	16.1/F	-
1	25	11	0	9	9	9	-	-	-	82	-	8210B057 ⑥ ⑩	34D	●	-	-	-	20/F	-
1	25	11	0.3	-	-	-	9	9	9	-	82	8210D014	26D	●	-	-	-	-	16.8/F
1	25	11	0.3	10	10	9	-	-	-	82	-	8210G014	47D	●	-	-	-	16.1/F	-
1 1/4	29	13	0	9	9	9	-	-	-	82	-	8210B058 ⑥ ⑩	35D	●	-	-	-	20/F	-
1 1/4	29	13	0.3	-	-	-	9	9	9	-	82	8210D018	28D	●	-	-	-	-	16.8/F
1 1/4	29	13	0.3	10	10	9	-	-	-	82	-	8210G018	48D	●	-	-	-	16.1/F	-
1 1/2	32	19.5	0	9	9	9	-	-	-	82	-	8210B059 ⑥ ⑩	36D	●	-	-	-	20/F	-
1 1/2	32	19.5	0.3	-	-	-	9	9	9	-	82	8210D032	29D	●	-	-	-	-	16.8/F
1 1/2	32	19.5	0.3	10	10	9	-	-	-	82	-	8210G032	49D	●	8210G132	-	-	16.1/F	-
2	44	37	0.3	-	-	-	9	9	9	-	65	8210 103	30P	●	-	-	-	-	16.8/F
2	44	37	0.3	9	9	9	-	-	-	82	-	8210G103	50P	●	8210G133	-	-	16.1/F	-
2 1/2	44	39	0.3	-	-	-	9	9	9	-	65	8210 104	27P	●	-	-	-	-	16.8/F
2 1/2	44	39	0.3	9	9	9	-	-	-	82	-	8210G104	51P	●	-	-	-	16.1/F	-

① 0.3 bar on Air; 0.0 bar on Water.
② Valve provided with PTFE main disc.
③ Valve includes UItem (G.E. trademark) piston.
④ Letter "D" denotes diaphragm construction; "P" denotes piston construction.
⑤ ❍ Safety Shutoff Valve; ● General Purpose Valve.
Refer to Engineering Section (Approvals) for details.

⑥ Valves not available with Explosionproof enclosures.
⑦ On 50 hertz service, the watt rating for the 6.1/F solenoid is 8.1 watts.
⑧ AC construction also has PA seating.
⑨ No disc-holder.
⑩ Stainless steel disc-holder.
† UL listed for fire protection systems per UL429A.

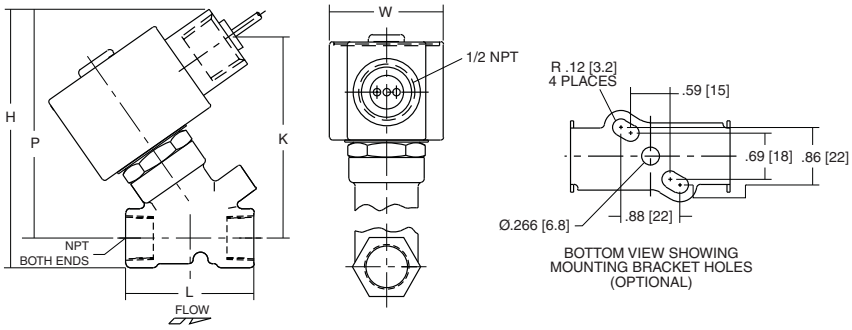
‡ DC constructions must have solenoid mounted vertical and upright.
✓ ATEX/IECEx certified with prefix "EV".
▼ ATEX/IECEx certified for DC only with prefix "EV".
◆ Not available in 6 Volt DC. EF and HB prefix only.

Dimensions: inches (mm)

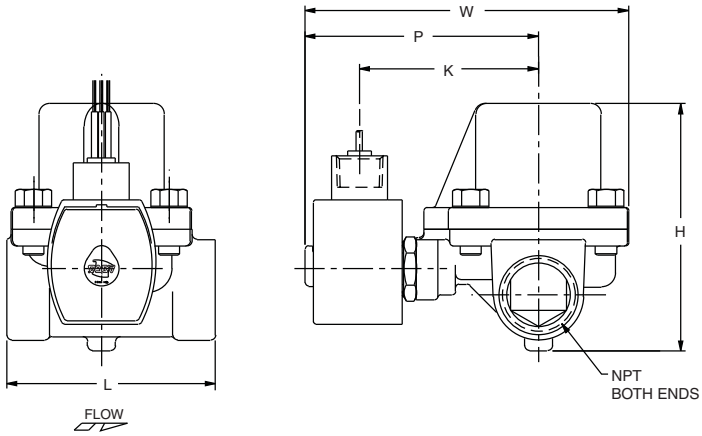
Const. Ref.		H	K	L	P	W
1*	in	3.85	3.00	1.91	3.41	1.69
	mm	98	76	49	87	43
2*	in	4.17	3.25	2.28	3.63	1.69
	mm	106	83	58	92	43
5	in	3.84	2.31	2.75	3.28	2.28
	mm	98	59	70	83	58
6*	in	3.38	1.94	2.75	2.80	2.28
	mm	86	49	70	71	58
7	in	4.19	2.50	2.81	3.47	2.39
	mm	106	64	71	88	61
8	in	4.13	2.47	2.81	3.44	2.29
	mm	105	63	71	87	58
9*	in	3.66	2.10	2.81	2.96	2.28
	mm	93	53	71	75	58
10*	in	5.20	3.40	2.80	4.50	2.50
	mm	131	86	71	114	62
11*	in	4.16	2.66	3.84	3.52	2.75
	mm	106	68	98	89	70
12	in	5.64	3.15	3.75	4.01	3.36
	mm	143	80	95	102	85
13	in	4.44	3.22	3.75	4.19	5.81
	mm	113	82	95	106	147
15*	in	5.20	3.30	3.80	4.40	3.80
	mm	133	83	98	111	98
16	in	5.64	3.15	3.66	4.01	3.56
	mm	143	80	93	102	90
18*	in	6.11	3.30	4.38	4.16	3.92
	mm	155	84	111	106	100
20*	in	7.33	3.71	5.06	4.57	4.87
	mm	186	94	129	116	124
21*	in	7.33	3.71	5.50	4.57	4.87
	mm	186	94	140	116	124
23	in	4.35	2.65	2.75	3.79	2.28
	mm	110	67	70	96	58
24	in	5.06	X	3.78	4.44	2.75
	mm	129	X	96	113	70
25	in	4.64	2.81	2.81	3.94	2.28
	mm	118	71	71	100	58
26	in	6.53	X	3.75	4.91	3.19
	mm	166	X	95	125	81
27	in	8.22	X	5.50	5.47	4.87
	mm	209	X	140	139	124
28	in	6.53	X	3.66	4.91	3.19
	mm	166	X	93	125	81
29	in	7.03	X	4.38	5.06	4.40
	mm	179	X	111	129	112

* DC dimensions slightly larger.
IMPORTANT: Valves may be mounted in any position, except as noted in specifications table.

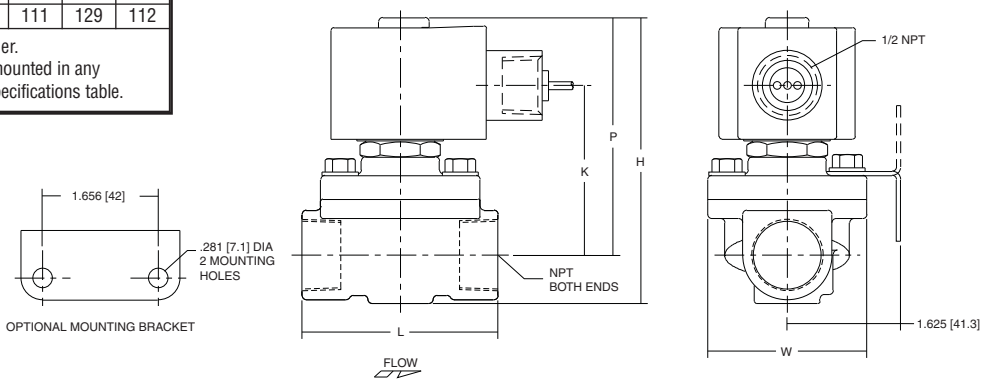
Const. Ref. 1, 2



Const. Ref. 13



Const. Ref. 5-9, 11, 23 , 25, 37,38, 40-46

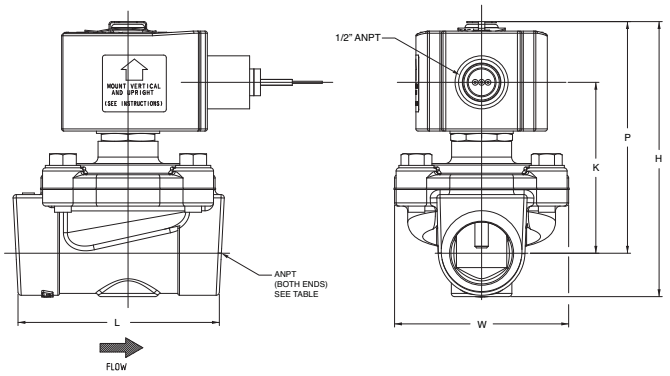


Dimensions: inches (mm)

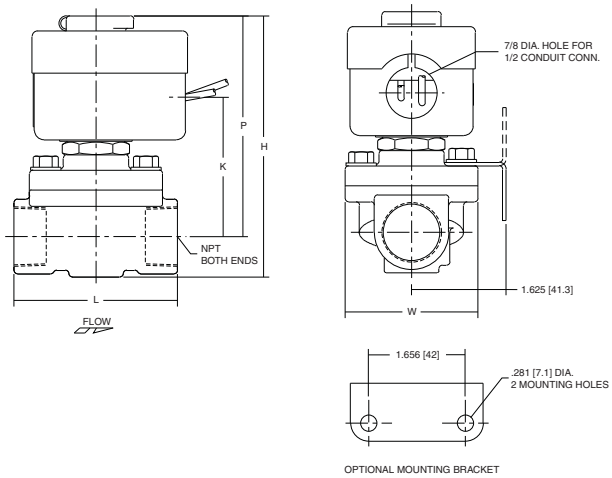
Const. Ref.		H	K	L	P	W
30	in	8.22	X	5.06	5.47	4.87
	mm	209	X	129	139	124
31	in	5.13	3.19	3.76	4.32	3.27
	mm	130	81	95	110	83
32	in	5.60	3.44	3.66	4.57	3.27
	mm	142	87	93	116	83
33	in	5.92	3.66	4.51	4.80	3.89
	mm	150	93	115	122	99
34	in	6.91	X	3.75	6.09	3.25
	mm	176	X	95	155	83
35	in	7.34	X	3.66	6.34	3.25
	mm	186	X	93	161	83
36	in	7.66	X	4.38	6.56	3.91
	mm	1.95	X	111	167	99
37	in	4.61	2.75	2.81	3.89	2.39
	mm	117	70	71	99	61
38	in	4.61	2.75	2.81	3.89	2.39
	mm	117	70	71	99	61
39	in	5.42	2.31	2.75	4.86	3.80
	mm	138	59	70	123	97
40	in	5.20	3.29	2.81	4.50	2.28
	mm	132	83	71	114	58
41	in	5.13	3.10	3.75	4.32	3.25
	mm	130	79	95	110	83
42	in	6.43	4.40	3.93	5.62	3.25
	mm	163	112	100	143	83
43	in	5.57	3.35	3.66	4.57	3.25
	mm	142	85	93	116	83
44	in	5.90	3.57	4.38	4.79	3.91
	mm	150	91	111	122	99
45	in	5.26	3.17	3.75	4.38	3.84
	mm	134	81	95	111	98
46	in	4.95	3.10	3.84	4.31	2.75
	mm	126	79	98	110	70
47	in	6.43	3.59	3.75	4.81	3.52
	mm	163	91	95	122	90
48	in	6.43	3.59	3.66	4.81	3.73
	mm	163	91	93	122	95
49	in	6.91	3.75	4.38	4.96	4.40
	mm	176	95	111	126	112
50	in	8.13	4.15	5.06	5.37	4.87
	mm	207	105	129	136	124
51	in	8.13	4.15	5.50	5.37	5.18
	mm	207	105	140	136	132

IMPORTANT: Valves may be mounted in any position, except as noted in specifications table.

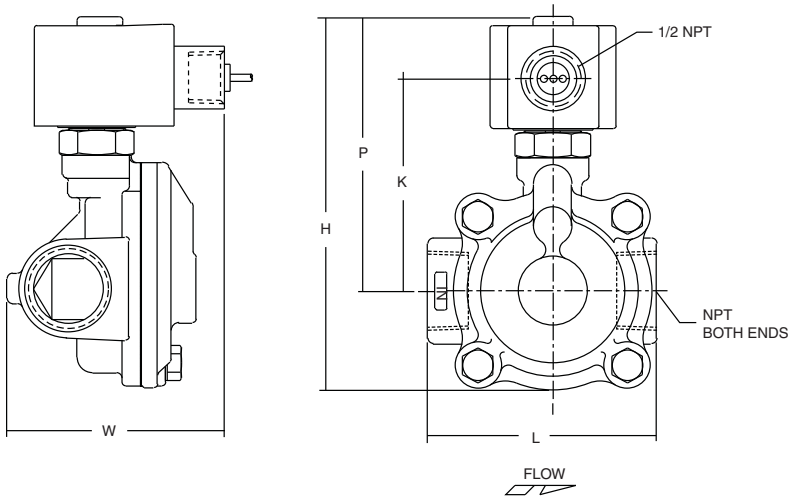
Const. Ref. 10, 15, 31, 32, 33



Const. Ref. 24, 34, 35, 36

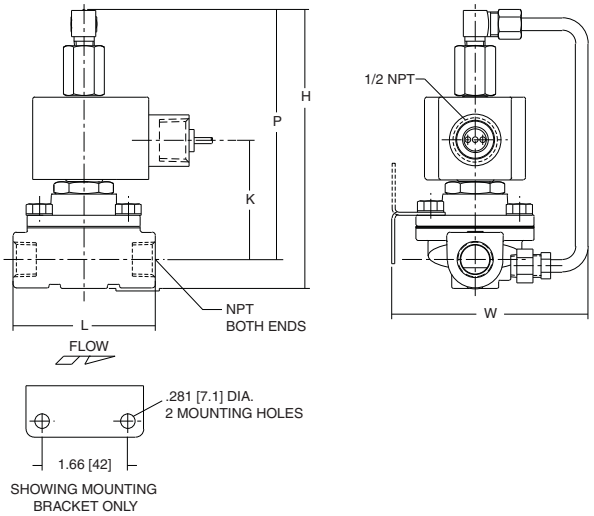


Const. Ref. 12, 16, 26, 28, 47, 48

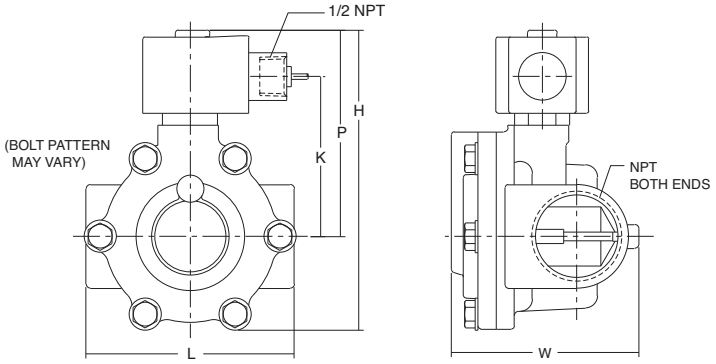


Dimensions: inches (mm)

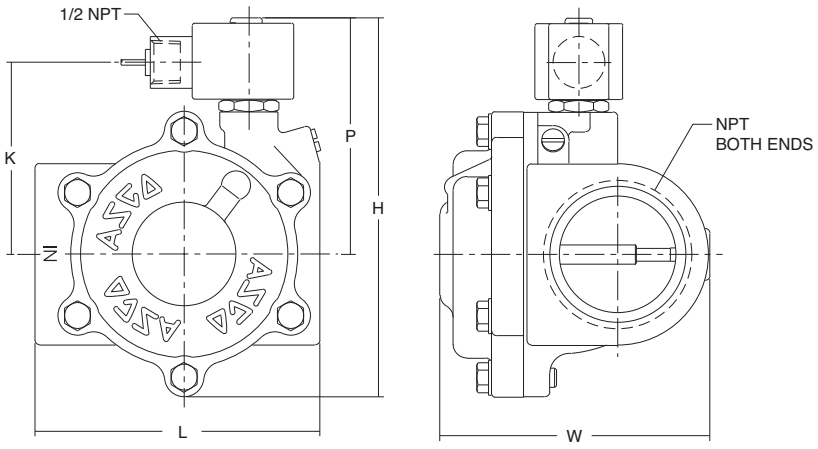
Const. Ref. 39



Const. Ref. 18, 29, 49



Const. Ref. 20, 21, 27, 30, 50, 51



CS-304-507 : Identification sheet

VWTC PROJECT NUMBER:	5000218009	REV:	1
PROJECT NAME:	AEM AMARUQ	SUBMITTED TO (COMPANY):	AGNICO EAGLE MINES
ENGINEER:	Gabriel Hébert	SUBMITTED TO (RESPONSIBLE)	
PROJECT MANAGER:	Clément B	PROJECT NUM REFERENCE.:	
PHONE NUMBER:		LOT NUMBER:	

SUPPLIER	EQPT CODE	EQPT TAG NO	DIA	DESCRIPTION	INFO 1	INFO 2	INFO 3	APPLIC.	NOTE	REV
TECKNO VALVE	VASDBR352337	SV15-041	N/A	SOLENOID VALVE - FEEDER	TYPE: SOLENOID VALVE//MANUFACTURER : ASCO//MODEL : EF8345G001-120VAC//CONNECTION TYPE : THREADED | 6 mm (1/4") | 6 mm (1/4")//BODY : BRASS// SEAL | SEAT :NBR | // STEM : N/A	ACTING :	NORMALLY :	KMnO4 PREP SYSTEM		

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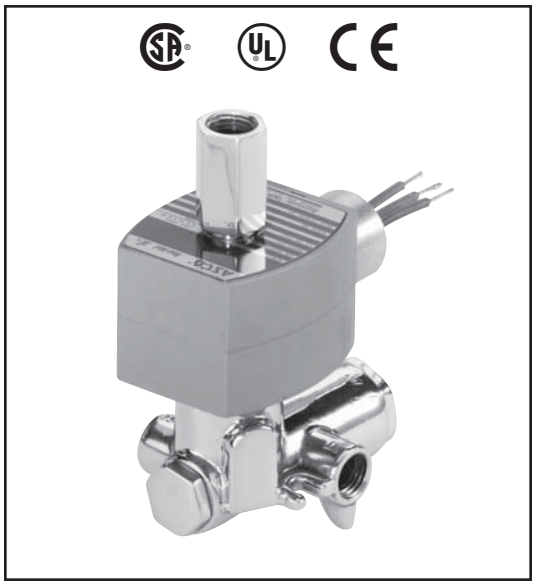
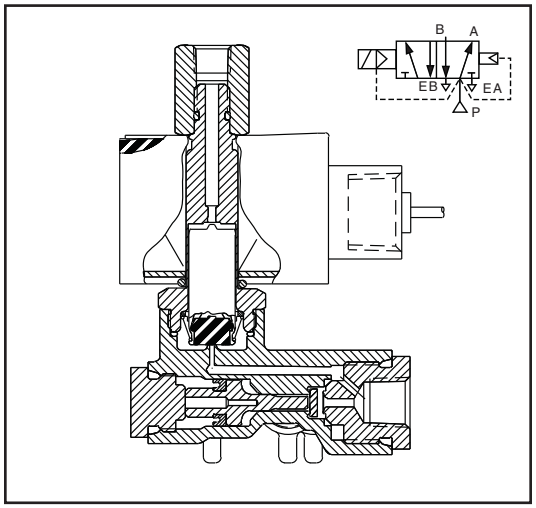
Features

- Compact valves for general service applications
- Low-cost, 4-way valve when low flow is sufficient
- Mountable in any position





Construction

Valve Parts in Contact with Fluids		
Body	Brass	316 Stainless Steel
Seals and Disc	NBR and PA	FKM, PA and UR
Core Tube	305 Stainless Steel	
Core and Plugnut	430F Stainless Steel	
Springs	302 Stainless Steel	
Shading Coil	Copper	Silver
Piston	PA	

Electrical

Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part Number					
		AC			General Purpose		Explosionproof (EF)		Explosionproof (EV)	
	DC Watts	Watts	VA Holding	VA Inrush	AC	DC	AC	DC	AC	DC
F	11.6	10.1	25	50	238610	238710	238614	238714	274614	274714

Standard Voltages: 24, 120, 240, 480 volts AC, 60 Hz (or 110, 220 volts AC, 50 Hz). 6, 12, 24, 120, 240 volts DC. Must be specified when ordering.
Other voltages are available when required.

Solenoid Enclosures

Standard: Watertight, Types 1, 2, 3, 3S, 4, and 4X.

Optional: Explosionproof and Watertight, Types 3, 3S, 4, 4X, 6, 6P, 7, and 9. (To order, add prefix "EF" or, for Explosionproof Stainless Steel trim and hub on Brass-Bodied valves, add "EV" to catalog number.)

See Optional Features Section for other available options.

Nominal Ambient Temp. Ranges

AC: 32˚F to 125˚F (0˚C to 52˚C)
DC: 32˚F to 104˚F (0˚C to 40˚C)

Refer to Engineering Section for details.

Approvals

CSA certified. UL listed as General Purpose Valve.
EV8345G081 solenoid only UL approved.
Meets applicable CE directives.

Refer to Engineering Section for details.

Important

A Minimum Operating Pressure Differential must be maintained between the pressure and exhaust ports. Supply and exhaust piping must be full area, unrestricted. ASCO flow controls and other similar components must be installed in the cylinder lines only.

Refer to Engineering Section for details.

ASCO®

Specifications (English units)

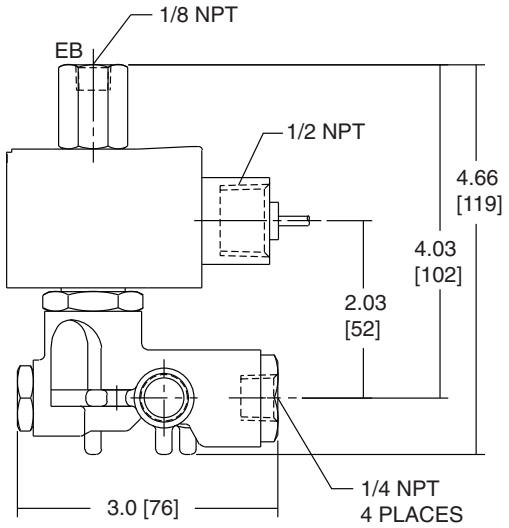
Pipe Size (ins.)	Orifice Size (ins.)		Cv Flow Factor		Operating Pressure Differential (psi)							Max. Fluid Temp. ˚F		Brass Body	Stainless Steel Body		Watt Rating/ Class of Coil Insulation	
					Max. AC				Max. DC									
	Press.	Exh.	Inlet	Exh.	Min.	Air-Inert Gas	Water	Lt. Oil @ 50 SSU	Air-Inert Gas	Water	Lt. Oil @ 50 SSU	AC	DC	Catalog Number	Catalog Number	Const. Ref.	AC	DC
SINGLE SOLENOID																		
1/4	1/16	3/32	.09	.09	10	150	150	150	100	100	100	180	104	8345G001	EV8345G081	1	10.1/F	11.6/F
SINGLE SOLENOID AIR-ONLY CONSTRUCTION - Exhaust to Atmosphere																		
1/4	1/16	3/32	.09	.09	10	150	-	-	100	-	-	180	104	8345H003	-	1	10.1/F	11.6/F

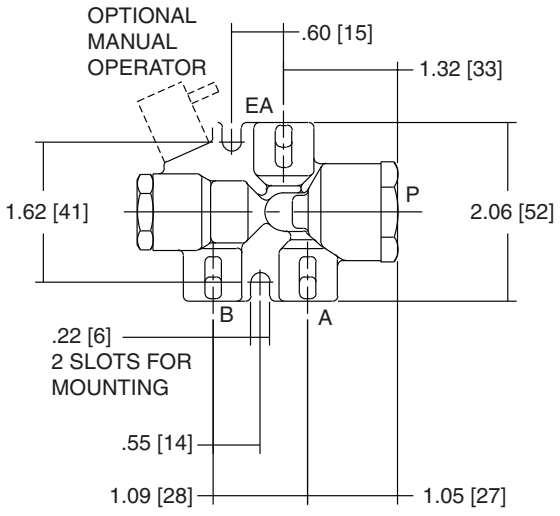
Specifications (Metric units)

Pipe Size (ins.)	Orifice Size (mm)		Kv Flow Factor (m3/h)		Operating Pressure Differential (bar)							Max. Fluid Temp. ˚C		Brass Body	Stainless Steel Body		Watt Rating/ Class of Coil Insulation	
					Max. AC				Max. DC									
	Press.	Exh.	Inlet	Exh.	Min.	Air-Inert Gas	Water	Lt. Oil @ 50 SSU	Air-Inert Gas	Water	Lt. Oil @ 50 SSU	AC	DC	Catalog Number	Catalog Number	Const. Ref.	AC	DC
SINGLE SOLENOID																		
1/4	2	2	.08	.08	0.7	10	10	10	7	7	7	82	40	8345G001	EV8345G081	1	10.1/F	11.6/F
SINGLE SOLENOID AIR-ONLY CONSTRUCTION - Exhaust to Atmosphere																		
1/4	2	2	.08	.08	0.7	10	-	-	7	-	-	82	40	8345H003	-	1	10.1/F	11.6/F

Dimensions inches (mm)

Const. Ref. 1





CS-402-400 : Identification sheet

VWTC PROJECT NUMBER:	5000218009	REV:	1
PROJECT NAME:	AEM AMARUQ	SUBMITTED TO (COMPANY):	AGNICO EAGLE MINES
ENGINEER:	Gabriel Hébert	SUBMITTED TO (RESPONSIBLE)	
PROJECT MANAGER:	Clément B	PROJECT NUM REFERENCE.:	
PHONE NUMBER:		LOT NUMBER:	

SUPPLIER	EQPT CODE	EQPT TAG NO	DIA	DESCRIPTION	INFO 1	INFO 2	INFO 3	APPLIC.	NOTE	REV
E&H	IEPOPS340482	LT9-591	N/A	TANK LEVEL TRANSMITTER	PRESSURE TRANSMITTER/MANUFACTURER : ENDRESS AND HAUSER/MODEL: PMC71-UCC1E3RABAA // U Approval: CSA C/US IS Cl.I,II,III Div.1 Gr.A-G, Cl.I Div.2 Gr.A-D, Ex ia, C: zone0,1,2/ US: zone 0,1,2,20,21,22// C Output Operating 4-20 mA Hart, inside	1E Sensor Range; Sensor Overload Limit 250mbar/25kPa3.75psi gauge; 5bar/500kPa/75psi // 3 Calibration; Unit: Sensor range; mmH2O/mH2O // Process Connection: Thread ANSI MNPT	N/A	KMnO4 PREP SYSTEM		rev1
E&H	IEPOPS340482	LT9-592	N/A	TANK LEVEL TRANSMITTER	PRESSURE TRANSMITTER/MANUFACTURER : ENDRESS AND HAUSER/MODEL: PMC71-UCC1E3RABAA // U Approval: CSA C/US IS Cl.I,II,III Div.1 Gr.A-G, Cl.I Div.2 Gr.A-D, Ex ia, C: zone0,1,2/ US: zone 0,1,2,20,21,22// C Output Operating 4-20 mA Hart, inside	1E Sensor Range; Sensor Overload Limit 250mbar/25kPa3.75psi gauge; 5bar/500kPa/75psi // 3 Calibration; Unit: Sensor range; mmH2O/mH2O // Process Connection: Thread ANSI MNPT	N/A	KMnO4 PREP SYSTEM		rev1

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Technical Information
Cerabar S PMC71, PMP71, PMP75

Process pressure measurement

Pressure transmitter with ceramic and metal sensors

Applications

The device is used for the following measuring tasks:
- Absolute pressure and gauge pressure measurement in gases, steams or liquids in all areas of process engineering and process measurement technology
- Level, volume or mass measurements in liquids
- High process temperatures
  - up to 150 °C (302 °F) without diaphragm seal
  - up to 400 °C (752 °F) with typical diaphragm seals
- High pressures up to 700 bar (10 500 psi)
- MID part certificate according to OIML R117-1 Edition 2007 (E) and EN 12405-1/A1 Edition 2006

Your benefits

- Very good reproducibility and long-term stability
- High reference accuracy up to ±0.025 %
- Turn down up to 100:1, higher on request
- Used for process pressure monitoring up to SIL 3, certified to IEC 61508 by TÜV SÜD
- High level of safety during operation thanks to function monitoring from the measuring cell to the electronics
- The patented TempC membrane for the diaphragm seal reduces measured errors caused by environmental and process temperature influences to a minimum
- Easy electronic replacement guaranteed with HistoROM®/M-DAT
- Uniform platform for differential pressure, hydrostatics and pressure (Deltabar S – Deltapilot S – Cerabar S)
- Practical user navigation for quick and easy commissioning
- Extensive diagnostic functions

Endress+Hauser
People for Process Automation

Table of contents

Document information

Document function

The document contains all the technical data on the device and provides an overview of the accessories and other products that can be ordered for the device.

Symbols used

Safety symbols

Symbol	Meaning
DANGER	**DANGER!** This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.
WARNING	**WARNING!** This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.
CAUTION	**CAUTION!** This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.
NOTICE	**NOTE!** This symbol contains information on procedures and other facts which do not result in personal injury.

Electrical symbols

Symbol	Meaning	Symbol	Meaning
⎓	Direct current	~	Alternating current
⎓ ~	Direct current and alternating current	⏚	**Ground connection** A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.
⏚	**Protective ground connection** A terminal which must be connected to ground prior to establishing any other connections.	⏚	**Equipotential connection** A connection that has to be connected to the plant grounding system: This may be a potential equalization line or a star grounding system depending on national or company codes of practice.

Symbols for certain types of information

Symbol	Meaning
✓	**Permitted** Procedures, processes or actions that are permitted.
✓✓	**Preferred** Procedures, processes or actions that are preferred.
✗	**Forbidden** Procedures, processes or actions that are forbidden.
ℹ	**Tip** Indicates additional information.
	Reference to documentation
	Reference to page
	Reference to graphic
	Visual inspection

Symbols in graphics

Symbol	Meaning
1, 2, 3 ...	Item numbers
1., 2., 3. ...	Series of steps
A, B, C, ...	Views
A-A, B-B, C-C, ...	Sections

Documentation

The document types listed are available:
In the Downloads area of the Endress+Hauser website: www.endress.com → Downloads

Brief Operating Instructions (KA): getting the 1st measured value quickly

The Brief Operating Instructions contain all the essential information from incoming acceptance to initial commissioning.

Operating Instructions (BA): your comprehensive reference

These Operating Instructions contain all the information that is required in various phases of the life cycle of the device: from product identification, incoming acceptance and storage, to mounting, connection, operation and commissioning through to troubleshooting, maintenance and disposal.

Description of Device Parameters (GP): reference for your parameters

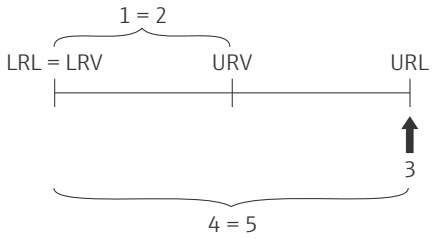
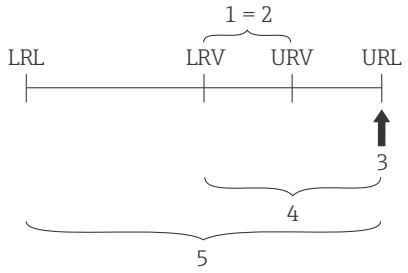
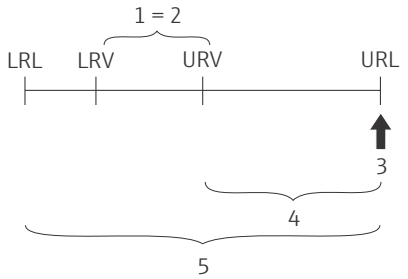
The document provides a detailed explanation of each individual parameter in the operating menu. The description is aimed at those who work with the device over the entire life cycle and perform specific configurations.

Safety Instructions (XA)

See "Safety instructions" section → 112

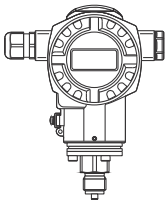
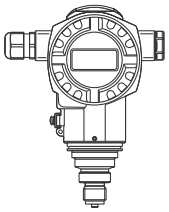
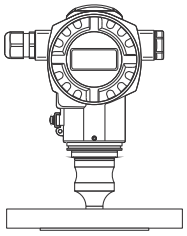
Terms and abbreviations

Term/abbreviation	Explanation
BA	Document type "Operating Instructions"
KA	Document type "Brief Operating Instructions"
SD	Document type "Special Documentation"
XA	Document type "Safety Instructions"
PN	Nominal pressure
MWP	The MWP (maximum working pressure) for the individual sensors depends on the lowest-rated element, with regard to pressure, of the selected components, i.e. the process connection has to be taken into consideration in addition to the measuring cell. Also observe pressure-temperature dependency. For the relevant standards and additional information, see the "Pressure specifications"→ 43 section. The MWP can also be found on the nameplate.
OPL	The OPL (over pressure limit = sensor overload limit) for the measuring device depends on the lowest-rated element, with regard to pressure, of the selected components, i.e. the process connection has to be taken into consideration in addition to the measuring cell. Also observe pressure-temperature dependency. For the relevant standards and additional information, see the "Pressure specifications"→ 43 section.
LRL	Lower range limit
URL	Upper range limit
LRV	Lower range value
URV	Upper range value
TD	**Turn down**

Term/abbreviation	Explanation
Case 1 (1 bar (15 psi) measuring cell): Lower range value (LRV) $\lvert \leq \rvert$ Upper range value (URV) $\rvert$ Example: ▪ Lower range value (LRV) = 0 bar ▪ Upper range value (URV) =0.5 bar (7.5 psi) ▪ Nominal value (URL) =1 bar (15 psi) Turn down: TD = URL / $\lvert$ URV $\rvert$ = 2:1 Set span: URV − LRV = 0.5 bar (7.5 psi) This span is based on the zero point.	 A0019780
Case 2 (1 bar (15 psi) measuring cell): Lower range value (LRV) $\lvert \leq \rvert$ Upper range value (URV) $\rvert$ Example: ▪ Lower range value (LRV) = 0 bar ▪ Upper range value (URV) = 0.5 bar (7.5 psi) ▪ Nominal value (URL) = 1 bar (15 psi) Turn down: TD = URL / $\lvert$ URV $\rvert$ = 2:1 Set span: URV − LRV = 0.5 bar (7.5 psi) This span is based on the zero point.	 A0019783
Case 3 (1 bar (15 psi) measuring cell): Lower range value (LRV) $\lvert \geq \rvert$ Upper range value (URV) $\rvert$ Example: ▪ Lower range value (LRV) = −0.6 bar (−9 psi) ▪ Upper range value (URV) = 0 bar ▪ Nominal value (URL) = 1 bar (15 psi) Turn down: TD = URL / $\lvert$ LRV $\rvert$ = 1.67:1 Set span: URV − LRV = 0.6 bar (9 psi) This span is based on the zero point.	 A0016451
	1 Set span *2 Zero-based span* *3 Nominal value ≙ Upper range limit (URL)* *4 Nominal measuring range* *5 Sensor measuring range*

Function and system design

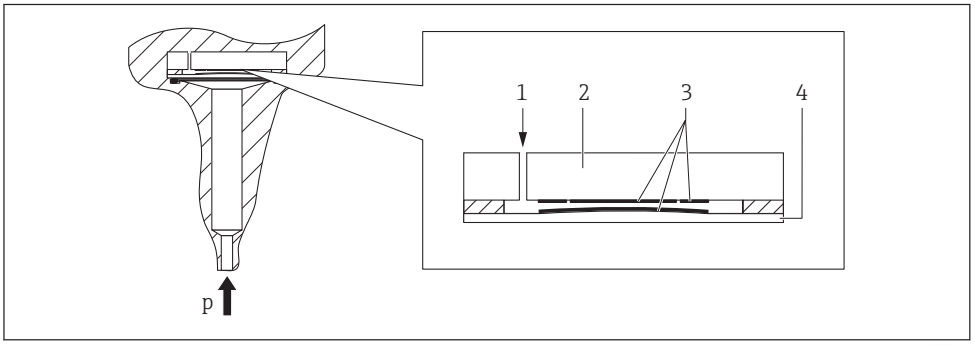
Device features

	PMC71	PMP71	PMP75
	 A0020461	 A0020463	 A0020464
	With capacitive measuring cell and ceramic process isolating diaphragm (Ceraphire®)	With piezoresistive measuring cell and metallic welded process isolating diaphragm	With diaphragm seal
Field of application	▪ Gauge pressure and absolute pressure ▪ Level		
Process connections	▪ Diverse thread ▪ DN 25 – DN 80 ▪ ASME 1 ½" – 4" ▪ JIS 50 A – 100 A	▪ Diverse thread ▪ DN 25 – DN 80 ▪ ASME 1 ½" – 4" ▪ JIS 25 A – 100 A ▪ Oval flange adapter ▪ Prepared for diaphragm seal mount	Wide range of diaphragm seals
Measuring ranges	from −100/0 to 100 mbar (−1.5/0 to 1.5 psi) to −1/0 to 40 bar (−15/0 to 600 psi)	from −400/0 to 400 mbar (−6/0 to 6 psi) to −1/0 to 700 bar (−15/0 to 10500 psi)	from −400/0 to 400 mbar (−6/0 to 6 psi) to −1/0 to 400 bar (−15/0 to 6000 psi)
OPL	max. 60 bar (900 psi)	max. 1050 bar (15750 psi)	max. 600 bar (9000 psi)
Process temperature range (temperature at process connection)	−25 to +125 °C (−13 to +257 °F)/ −20 to +150 °C (−4 to +302 °F) [1]	−40 to +125 °C (−40 to +257 °F)	−70 to +400 °C (−94 to +752 °F) (depends on filling oil)
Ambient temperature range	▪ Without LCD display: −40 to +85 °C (−40 to +185 °F) [2] ▪ With LCD display: −20 to +70 °C (−4 to +158 °F) ▪ Separate housing: −20 to +60 °C (−4 to +140 °F) ▪ Diaphragm seal systems depending on the version		
Reference accuracy	▪ Up to ±0.05 % of the set span ▪ PLATINUM version: up to ±0.025 % of the set span		Up to ±0.075 % of the set span
Supply voltage non-Ex	▪ 4 to 20 mA HART: 10.5 to 45 V DC ▪ PROFIBUS PA and FOUNDATION Fieldbus: 9 to 32 V DC		
Supply voltage Ex ia	10.5 to 30 V DC		
Output	4 to 20 mA with superimposed HART protocol, PROFIBUS PA or FOUNDATION Fieldbus		
Options		▪ Gold-rhodium coated process isolating diaphragm ▪ NACE-compliant materials	
	▪ Inspection certificate 3.1 ▪ HistoROM®/M-DAT memory chip ▪ Separate housing		
Specialties	▪ Metal-free measurement with PVDF connection ▪ Special cleaning of the transmitter to remove paint-wetting substances, for use in paint shops	▪ Process connections with minimum oil volume ▪ Gas-tight, elastomer-free	▪ Wide range of diaphragm seals ▪ For high media temperatures ▪ Process connections with minimum oil volume ▪ Completely welded versions

1) High-temperature version, see Product Configurator section "Additional options 1" or 110 "Additional options 2", option "T"
2) PMP71 and PMP75: lower temperatures on request

Measuring principle

Devices with ceramic process isolating diaphragm (Ceraphire®)

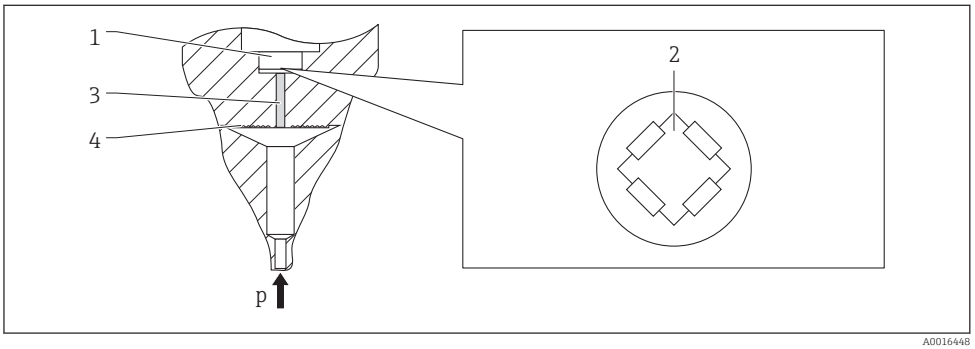


1 *Air pressure (relative pressure sensors)*
2 *Ceramic substrate*
3 *Electrodes*
4 *Ceramic process isolating diaphragm*

The ceramic sensor is an oil-free sensor, i.e. the process pressure acts directly on the robust ceramic process isolating diaphragm and causes it to deflect. A pressure-dependent change in capacitance is measured at the electrodes of the ceramic substrate and the process isolating diaphragm. The measuring range is determined by the thickness of the ceramic process isolating diaphragm.

Advantages:
- Guaranteed overload resistance up to 40 times the nominal pressure (see "OPL" column in table) → 🖹 11)
- The ultrapure 99.9% ceramic (Ceraphire®, see also "www.endress.com/ceraphire") ensures:
  - Extremely high chemical durability
  - Less relaxation
  - High mechanical durability
- Suitable for vacuums
- Secondary containment for enhanced integrity
- Process temperatures up to 150 °C (302 °F)

Devices with metallic process isolating diaphragm



1 *Silicon measuring element, substrate*
2 *Wheatstone bridge*
3 *Channel with fill fluid*
4 *Metal process isolating diaphragm*

PMP71

The process pressure deflects the metal process isolating diaphragm of the sensor and a fill fluid transfers the pressure to a Wheatstone bridge (semiconductor technology). The pressure-dependent change in the bridge output voltage is measured and evaluated.

Advantages:
- Can be used for process pressures up to 700 bar (10 500 psi)
- High long-term stability
- Guaranteed overload resistance up to 4 times the nominal pressure
- Secondary containment for enhanced integrity
- Significantly reduced thermal effect e.g. compared to diaphragm seal systems with capillaries

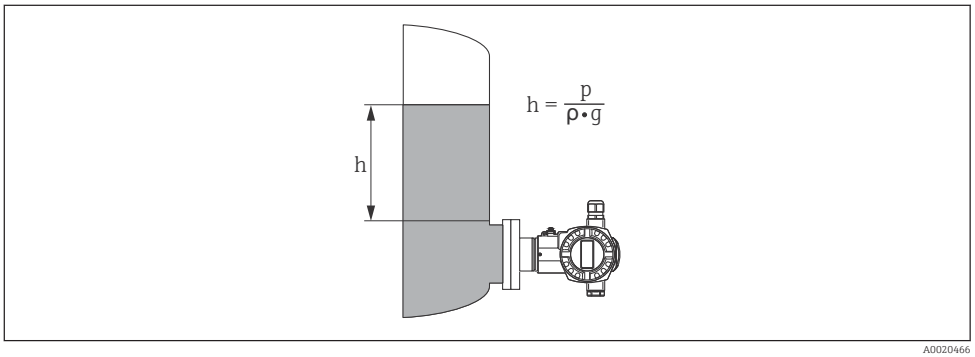
PMP75

The operating pressure acts on the process isolating diaphragm of the diaphragm seal and is transferred to the process isolating diaphragm of the sensor by a diaphragm seal fill fluid. The process isolating diaphragm is deflected and a fill fluid transfers the pressure to a resistance measuring bridge. The pressure-dependent change in the bridge output voltage is measured and evaluated.

Advantages:
- Depending on the version, can be used for process pressures up to 400 bar (6 000 psi) and for extreme process temperatures
- High long-term stability
- Guaranteed overload resistance up to 4 times the nominal pressure
- Secondary containment for enhanced integrity

Product design

Level measurement (level, volume and mass):



A0020466

h *Height (level)*
p *Pressure*
ρ *Density of the medium*
g *Gravitational constant*

Your benefits

- Selection of the level operating mode which is optimum for your application in the device software.
- Volume and mass measurements in any container shapes by means of a freely programmable characteristic curve.
- Choice of diverse level units with automatic unit conversion.
- A customized unit can be specified.
- Has a wide range of uses, e.g.
  - in the event of foam formation
  - in containers with agitators or screen fittings
  - in the event of liquid gases

Applications suitable for custody transfer measurement

The Parts Certificate is issued on the basis of the following standards:
- WELMEC guide 8.8 "General and Administrative Aspects of the Voluntary System of Modular Evaluation of Measuring instruments under the MID".
- OIML R117-1 Edition 2007 (E) "Dynamic measuring systems for liquids other than water".
- EN 12405-1/A1 Edition 2006 "Gas meters – Conversion devices – Part 1: Volume conversion".

Communication protocol

- 4 to 20 mA with HART communication protocol
- PROFIBUS PA
  - The Endress+Hauser devices meet the requirements of the FISCO model.
  - Due to a low current consumption of 13 mA ± 1 mA, the following number of devices can be operated on one bus segment if installing as per FISCO: up to 7 devices for Ex ia, CSA IS and FM IS applications or up to 27 devices for all other applications e.g. in non-hazardous areas, Ex nA etc.
    Further information on PROFIBUS PA can be found in Operating Instructions BA00034S "PROFIBUS DP/PA: Guidelines for planning and commissioning" and in the PNO Guideline.
- FOUNDATION Fieldbus
  - The Endress+Hauser devices meet the requirements of the FISCO model.
  - Due to a low current consumption of 15.5 mA ± 1 mA, the following number of devices can be operated on one bus segment if installing as per FISCO: up to 6 devices for Ex ia, CSA IS and FM IS applications or up to 24 devices for all other applications e.g. in non-hazardous areas, Ex nA etc.
    Further information on FOUNDATION Fieldbus, such as requirements for bus system components, can be found in Operating Instructions BA00013S "FOUNDATION Fieldbus Overview".

Input

Measured variable

Measured process variables

- Absolute pressure
- Gauge pressure

Calculated process variables

Level (level, volume or mass)

Measuring range

PMC71 – with ceramic process isolating diaphragm (Ceraphire®) for gauge pressure

Nominal value	Range limit		Lowest calibratable Span [1]	MWP	OPL	Vacuum resistance	Option [2]
	lower (LRL)	upper (URL)					
	[bar (psi)]	[bar (psi)]	[bar (psi)]	[bar (psi)]	[bar (psi)]	[bar_{abs} (psi_{abs})]	
100 mbar (1.5 psi)	−0.1 (−1.5)	+0.1 (+1.5)	0.005 (0.075)	2.7 (40.5)	4 (60)	0.7 (10.5)	1C
250 mbar (3.75 psi)	−0.25 (−4)	+0.25 (+4)	0.005 (0.075)	3.3 (49.5)	5 (75)	0.5 (7.5)	1E
400 mbar (6 psi)	−0.4 (−6)	+0.4 (+6)	0.005 (0.075)	5.3 (79.5)	8 (120)	0	1F
1 bar (15 psi)	−1 (−15)	+1 (+15)	0.01 (0.15)	6.7 (100.5)	10 (150)	0	1H
2 bar (30 psi)	−1 (−15)	+2 (+30)	0.02 (0.3)	12 (180)	18 (270)	0	1K
4 bar (60 psi)	−1 (−15)	+4 (+60)	0.04 (0.6)	16.7 (250.5)	25 (375)	0	1M
10 bar (150 psi)	−1 (−15)	+10 (+150)	0.1 (1.5)	26.7 (400.5)	40 (600)	0	1P
40 bar (600 psi)	−1 (−15)	+40 (+600)	0.4 (6)	40 (600)	60 (900)	0	1S

1) Turndown > 100:1 on request or can be set on device
2) Product Configurator, order code for "Sensor range; sensor over pressure limit"

PMC71 – with ceramic process isolating diaphragm (Ceraphire®) for absolute pressure

Nominal value	Range limit		Lowest calibratable Span [1]	MWP	OPL	Vacuum resistance	Option [2]
	lower (LRL)	upper (URL)					
	[bar (psi)]	[bar (psi)]	[bar (psi)]	[bar (psi)]	[bar (psi)]	[bar_{abs} (psi_{abs})]	
100 mbar (1.5 psi)	0	+0.1 (+1.5)	0.005 (0.075)	2.7 (40.5)	4 (60)	0	2C
250 mbar (3.75 psi)	0	+0.25 (+4)	0.005 (0.075)	3.3 (49.5)	5 (75)	0	2E
400 mbar (6 psi)	0	+0.4 (+6)	0.005 (0.075)	5.3 (79.5)	8 (120)	0	2F
1 bar (15 psi)	0	+1 (+15)	0.01 (0.15)	6.7 (100.5)	10 (150)	0	2H
2 bar (30 psi)	0	+2 (+30)	0.02 (0.3)	12 (180)	18 (270)	0	2K
4 bar (60 psi)	0	+4 (+60)	0.04 (0.6)	16.7 (250.5)	25 (375)	0	2M
10 bar (150 psi)	0	+10 (+150)	0.1 (1.5)	26.7 (400.5)	40 (600)	0	2P
40 bar (600 psi)	0	+40 (+600)	0.4 (6)	40 (600)	60 (900)	0	2S

1) Turndown > 100:1 on request or can be set on device
2) Product Configurator, order code for "Sensor range; sensor over pressure limit"

PMP71 and PMP75 – metallic process isolating diaphragm for gauge pressure

Nominal value	Range limit		Lowest calibratable Span [1]	MWP	OPL	Vacuum resistance [2]	Option [3]
	lower (LRL)	upper (URL)				Silicone oil/ Inert oil	
	[bar (psi)]	[bar (psi)]	[bar (psi)]	[bar (psi)]	[bar (psi)]	[bar_{abs} (psi_{abs})]	
400 mbar (6 psi)	−0.4 (−6)	+0.4 (+6)	0.005 (0.075)	4 (60)	6 (90)	0.01/0.04 (0.15/0.6)	1F
1 bar (15 psi)	−1 (−15)	+1 (+15)	0.01 (0.15)	6.7 (100)	10 (150)		1H
2 bar (30 psi)	−1 (−15)	+2 (+30)	0.02 (0.3)	13.3 (200)	20 (300)		1K
4 bar (60 psi)	−1 (−15)	+4 (+60)	0.04 (0.6)	18.7 (280.5)	28 (420)		1M
10 bar (150 psi)	−1 (−15)	+10 (+150)	0.1 (1.5)	26.7 (400.5)	40 (600)		1P
40 bar (600 psi)	−1 (−15)	+40 (+600)	0.4 (6)	100 (1500)	160 (2400)		1S
100 bar (1 500 psi)	−1 (−15)	+100 (+1500)	1.0 (15)	100 (1500)	400 (6000)		1U
400 bar (6 000 psi)	−1 (−15)	+400 (+6000)	4.0 (60)	400 (6000)	600 (9000)		1W
700 bar (10 500 psi) [4]	−1 (−15)	+700 (+10500)	7.0 (105)	700 (10500)	1050 (15750)		1X

1) Turndown > 100:1 on request or can be set on device
2) The vacuum resistance applies to the measuring cell under reference operating conditions. In the case of the PMP75, the pressure and temperature application limits of the selected filling oil must also be observed .
3) Product Configurator, order code for "Sensor range; sensor over pressure limit"
4) PMP71 only, PMP75 on request

PMP71 and PMP75 – metallic process isolating diaphragm for absolute pressure

Nominal value	Range limit		Lowest calibratable Span [1]	MWP	OPL	Vacuum resistance [2]	Option [3]
	lower (LRL)	upper (URL)				Silicone oil/ Inert oil	
	[bar (psi)]	[bar (psi)]	[bar (psi)]	[bar (psi)]	[bar (psi)]	[bar_{abs} (psi_{abs})]	
400 mbar (6 psi)	0	+0.4 (+6)	0.005 (0.075)	4 (60)	6 (90)	0.01/0.04 (0.15/0.6)	2F
1 bar (15 psi)	0	+1 (+15)	0.01 (0.15)	6.7 (100)	10 (150)		2H
2 bar (30 psi)	0	+2 (+30)	0.02 (0.3)	13.3 (200)	20 (300)		2K
4 bar (60 psi)	0	+4 (+60)	0.04 (0.6)	18.7 (280.5)	28 (420)		2M
10 bar (150 psi)	0	+10 (+150)	0.1 (1.5)	26.7 (400.5)	40 (600)		2P
40 bar (600 psi)	0	+40 (+600)	0.4 (6)	100 (1500)	160 (2400)		2S
100 bar (1 500 psi)	0	+100 (+1500)	1.0 (15)	100 (1500)	400 (6000)		2U
400 bar (6 000 psi)	0	+400 (+6000)	4.0 (60)	400 (6000)	600 (9000)		2W
700 bar (10 500 psi) [4]	0	+700 (+10500)	7.0 (105)	700 (10500)	1050 (15750)		2X

1) Turndown > 100:1 on request or can be set on device
2) The vacuum resistance applies to the measuring cell under reference operating conditions. In the case of the PMP75, the pressure and temperature application limits of the selected filling oil must also be observed .
3) Product Configurator, order code for "Sensor range; sensor over pressure limit"
4) PMP71 only, PMP75 on request

PMP71 - metallic process isolating diaphragms for absolute pressure with MID parts certificate

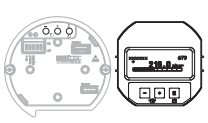
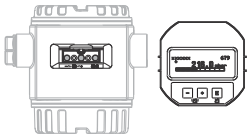
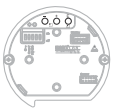
Nominal value	Range limit		Min. WP for gas applications suitable for custody transfer measurement	Min. WP for liquid applications suitable for custody transfer measurement	MWP	OPL	Vacuum resistance [1]	Option [2]
	lower (LRL) [3]	upper (URL) [4]					Silicone oil/ Inert oil	
[bar (psi)]	[bar (psi)]	[bar (psi)]	[bar (psi)]	[bar (psi)]	[bar (psi)]	[bar (psi)]	[bar (psi)]	
10 (150)	0	+10 (150)	0.5 (7.5)	0.5 (7.5)	26.7 (400.5)	40 (600)	0.01/0.04 (0.15/1)	MP
50 (750)	0	+50 (750)	10 (150)	2.5 (37.5)	100 (1500)	400 (6000)	0.01/0.04 (0.15/1)	MT
100 (1500)	0	+100 (1500)	5 (75)	5 (75)	100 (1500)	400 (6000)	0.01/0.04 (0.15/1)	MU

1) The vacuum resistance applies to the measuring cell under reference operating conditions
2) Product Configurator, order code for "Sensor range; sensor over pressure limit"
3) By default, the device is set to a lower range limit of 0 bar. Please specify in the order if the lower range limit is to be set to a different default value.
4) Max. WP for gas and liquid applications suitable for custody transfer measurement

Output

Output signal

- 4 to 20 mA with superimposed digital communication protocol HART, 2-wire
- Digital communication signal PROFIBUS PA (Profile 3.0), 2-wire
  - Signal coding: Manchester Bus Powered (MBP): Manchester II
  - Transmission rate: 31.25 KBit/s voltage mode
- Digital communication signal FOUNDATION Fieldbus, 2-wire
  - Signal coding: Manchester Bus Powered (MBP): Manchester II
  - Transmission rate: 31.25 KBit/s voltage mode

Output	Internal + LCD	External + LCD	Internal
			 A0021280
	Option [1]		
4 to 20mA HART	B	A	C
4 to 20mA HART, Li=0	E	D	F
PROFIBUS PA	N	M	O
FOUNDATION Fieldbus	Q	P	R

1) Product Configurator, order code for "Display, operation: "

Signal range 4 to 20 mA

3.8 mA to 20.5 mA

Signal on alarm

As per NAMUR NE43

4 to 20 mA HART

- Max. alarm: Can be set between 21 to 23 mA (factory setting: 22 mA)
- Hold measured value: last measured value is held
- Min. alarm: 3.6 mA

PROFIBUS PA

Can be set in the Analog Input Block.

Options:
- Last Valid Out Value (factory setting)
- Fail Safe Value
- Status bad

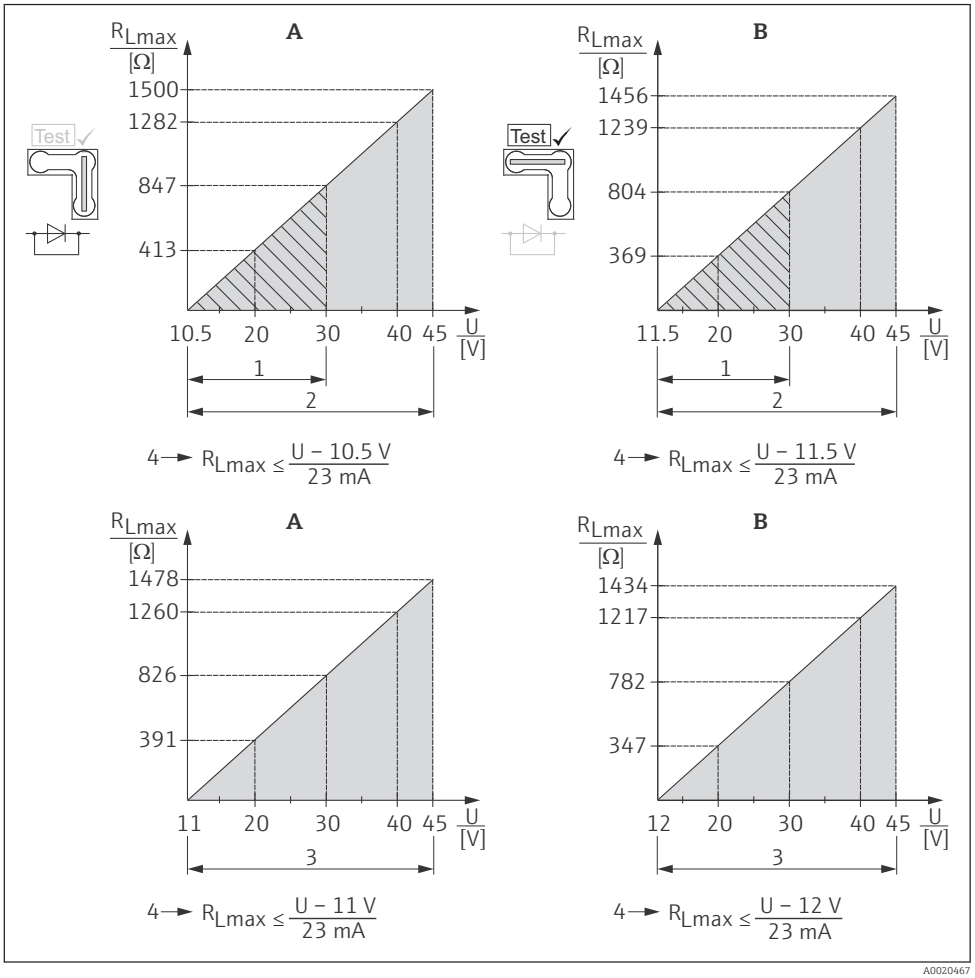
FOUNDATION Fieldbus

Can be set in the Analog Input Block.

Options:
- Last Good Value
- Fail Safe Value (factory setting)
- Wrong Value

Maximum load - 4 to 20 mA HART

In order to guarantee sufficient terminal voltage in two-wire devices, a maximum load resistance R (including line resistance) must not be exceeded depending on the supply voltage U_0 of the supply unit. In the following load diagrams, observe the position of the jumper and the explosion protection:



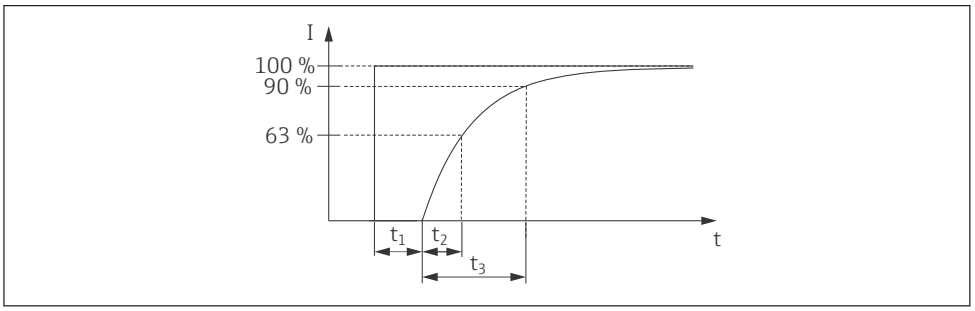
A0020467

A Jumper for 4 to 20 mA test signal set to "Non-test" position
B Jumper for 4 to 20 mA test signal set to "Test" position
1 Power supply 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
2 Power supply 10.5 (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, CSA dust ignition-proof, NEPSI Ex d
3 Power supply 11 (12) to 45 V DC for PMC71, Ex d[ia], NEPSI Ex d[ia]
4 R_{Lmax} maximum load resistance
U Supply voltage

When operating via a handheld terminal or via a PC with an operating program, a minimum communication resistance of 250 Ω must be taken into account.

Dead time, time constant

Presentation of the dead time and the time constant:



Dynamic behavior: current output

Type		Measuring cell	Dead time (t_1) [ms]	Time constant T63 (t_2) [ms]	Time constant T90 (t_3) [ms]
PMC71	max.	All	90	120	276
PMP71	max.	▪ 400 mbar (6 psi) ▪ ≥ 1 bar (15 psi)	45	▪ 70 ▪ 35	▪ 161 ▪ 81
PMP75	max.	PMP71 + influence of the diaphragm seal			

Dynamic behavior: Digital output (HART electronics)

A typical burst rate of 300 ms results in the following behavior:

Type		Measuring cell	Dead time (t_1) [ms]	Dead time (t_1) [ms] + Time constant T63 (t_2) [ms]	Dead time (t_1) [ms] + Time constant T90 (t_3) [ms]
PMC71	Min.	All	250	370	436
	max.		1050	1170	1236
PMP71	Min.	▪ 400 mbar (6 psi) ▪ ≥ 1 bar (15 psi)	205	▪ 275 ▪ 240	▪ 321 ▪ 241
	max.	▪ 400 mbar (6 psi) ▪ ≥ 1 bar (15 psi)	1005	▪ 1075 ▪ 1040	▪ 1121 ▪ 1041
PMP75	max.	PMP71 + influence of the diaphragm seal			

Reading cycle

- Acyclic: max. 3/s, typically 1/s (depending on command # and number of preambles)
- Cyclic (burst): max. 3/s, typically 2/s

The device commands the BURST MODE functionality for cyclical value transmission via the HART communication protocol.

Cycle time (update time)

Cyclic (burst): min. 300 ms

Response time

- Acyclic: min. 330 ms, typically 590 ms (depending on command # and number of preambles)
- Cyclic (burst): min. 160 ms, typically 350 ms (depending on command # and number of preambles)

Dynamic behavior: PROFIBUS PA

A typical PLC cycle time of 1 s results in the following behavior:

Type		Measuring cell	Dead time (t_1) [ms]	Dead time (t_1) [ms] + Time constant T63 (t_2) [ms]	Dead time (t_1) [ms] + Time constant T90 (t_3) [ms]
PMC71	Min.	All	125	245	311
	max.		1325	1445	1511

Type		Measuring cell	Dead time (t_1) [ms]	Dead time (t_1) [ms] + Time constant T63 (t_2) [ms]	Dead time (t_1) [ms] + Time constant T90 (t_3) [ms]
PMP71	Min.	▪ 400 mbar (6 psi) ▪ ≥ 1 bar (15 psi)	80	▪ 150 ▪ 115	▪ 196 ▪ 116
	max.	▪ 400 mbar (6 psi) ▪ ≥ 1 bar (15 psi)	1280	▪ 1350 ▪ 1315	▪ 1396 ▪ 1316
PMP75	max.	PMP71 + influence of the diaphragm seal			

Reading cycle (PLC)

- Acyclic: Typically 25/s
- Cyclic: Typically 30/s (depending on the number and type of the function blocks used in the closed-control loop)

Cycle time (update time)

Min. 200 ms

The cycle time in a bus segment in cyclic data communication depends on the number of devices, on the segment coupler used and on the internal PLC cycle time. A new measured value can be determined up to five times a second.

Response time

- Acyclic: Approx. 60 ms to 70 ms (depending on Min. Slave Interval)
- Cyclic: Approx. 10 ms to 13 ms (depending on Min. Slave Interval)

Dynamic behavior: FOUNDATION Fieldbus

A typical configuration for the macro cycle time (host system) of 1 s results in the following behavior:

Type		Measuring cell	Dead time (t_1) [ms]	Dead time (t_1) [ms] + Time constant T63 (t_2) [ms]	Dead time (t_1) [ms] + Time constant T90 (t_3) [ms]
PMC71	Min.	All	135	255	321
	max.		1135	1255	1321
PMP71	Min.	▪ 400 mbar (6 psi) ▪ ≥ 1 bar (15 psi)	90	▪ 160 ▪ 125	▪ 206 ▪ 126
	max.	▪ 400 mbar (6 psi) ▪ ≥ 1 bar (15 psi)	1090	▪ 1160 ▪ 1125	▪ 1206 ▪ 1126
PMP75	max.	PMP71 + influence of the diaphragm seal			

Reading cycle

- Acyclic: Typically 10/s
- Cyclic: max. 10/s (dependent on the number and type of function blocks used in a closed-control loop)

Cycle time (update time)

Cyclic: Min. 100 ms

Response time

- Acyclic: Typically 100 ms (for standard bus parameter settings)
- Cyclic: max. 20 ms (for standard bus parameter settings)

Damping

A damping affects all outputs (output signal, display):
- Via onsite display, handheld terminal or PC with operating program, continuous from 0 to 999 s
- Also for HART and PROFIBUS PA: Via DIP switch on the electronic insert, switch position "on" = set value and "off"
- Factory setting: 2 s

Alarm current

Description	Option [1]
Min alarm current	J
HART burst mode PV	
Min alarm current + HART burst mode PV	

1) Product Configurator, order code for "Additional options 1" and "Additional options 2"

Firmware version

Description	Option [1]
02.20.zz, HART, DevRev22	72
02.11.zz, HART, DevRev21	73
04.00.zz, FF, DevRev07	74
04.01.zz, PROFIBUS PA, DevRev03	75
02.10.zz, HART, DevRev21	76
03.00.zz, FF, DevRev06	77
04.00.zz, PROFIBUS PA	78

1) Product Configurator, order code for "Firmware version"

Protocol-specific data

HART

Manufacturer ID	17 (11 hex)
Device type code	24 (18 hex)
Device revision	▪ 21 (15 hex) - SW version 02.1y.zz - HART specification 5 ▪ 22 (16 hex) - SW version 02.2y.zz - HART specification 7
HART specification	▪ 5 ▪ 7
DD revision	▪ 4 (Russian in language selection) for device revision 21 ▪ 3 (Dutch in language selection) for device revision 21 ▪ 1 for device revision 22
Device description files (DTM, DD)	Information and files at: ▪ www.endress.com ▪ www.hartcomm.org
HART load	Min. 250 Ω
HART device variables	The measured values are assigned to the device variables as follows: **Measured values for PV (primary variable)** ▪ Pressure ▪ Level ▪ Tank content **Measured values for SV, TV (second and third variable)** Pressure **Measured values for QV (fourth variable)** Temperature
Supported functions	▪ Burst mode ▪ Additional transmitter status ▪ Device locking ▪ Alternative operating modes

PROFIBUS PA

Manufacturer ID	17 (11 hex)
Identification number	1541 hex

Profile version	3.0 ▪ SW version 03.00.zz ▪ SW version 04.00.zz 3.02 SW version 04.01.zz (device revision 3) Compatibility with SW version 03.00.zz and higher.
GSD revision	▪ 4 (SW version 3.00.zz and 4.00.zz) ▪ 5 (device revision 3)
DD revision	▪ 1 (SW version 3.00.zz and 4.00.zz) ▪ 1 (device revision 3)
GSD file	Information and files at: ▪ www.endress.com ▪ www.profibus.org
DD files	
Output values	**Measured value for PV (via Analog Input Function Block)** ▪ Pressure ▪ Level ▪ ▪ Tank content **Measured value for SV** ▪ Pressure ▪ Temperature
Input values	Input value sent from PLC, can be shown on display
Supported functions	▪ Identification & maintenance Simplest device identifier on the control system and nameplate ▪ Condensed status (only with Profile Version 3.02) ▪ Automatic ID number adjustment and switchable to the following ID numbers (only with Profile Version 3.02): – 9700: Profile-specific transmitter identification number with the "Classic" or "Condensed" status". – 1501: Compatibility mode for the old Cerabar S generation (PMC731, PMP731, PMC631, PMP635). – 1541: Identification number for the new Cerabar S generation (PMC71, PMP71, PMP75). ▪ Device locking: The device can be locked by hardware or software.

FOUNDATION Fieldbus

Manufacturer ID	452B48 hex
Device type	1007 hex
Device revision	▪ 6 - SW version 03.00.zz ▪ 7 - SW version 04.00.zz (FF-912)
DD revision	▪ 3 (device revision 6) ▪ 2 (device revision 7)
CFF revision	▪ 4 (device revision 6) ▪ 1 (device revision 7)
DD files	Information and files at: ▪ www.endress.com ▪ www.fieldbus.org
CFF files	
Device tester version (ITK version)	▪ 5.0 (device revision 6) ▪ 6.01 (device revision 7)
Number of ITK test campaign	▪ IT054600 (Device Revision 6) ▪ IT085500 (Device Revision 7)
Link Master (LAS) capable	Yes
Choice of "Link Master" and "Basic Device"	Yes, factory setting is Basic Device
Node address	Factory setting: 247 (F7 hex)

Supported functions	Field diagnostics profile (only with FF912) The following methods are supported: ▪ Restart ▪ Configure error as warning or alarm ▪ HistoROM ▪ Peakhold ▪ Alarm info ▪ Sensor trim
Number of VCRs	▪ 44 (device revision 6) ▪ 24 (device revision 7)
Number of link objects in VFD	50

Virtual communication references (VCRs)

	Device revision 6	Device revision 7
Permanent entries	44	1
Client VCRs	0	0
Server VCRs	5	10
Source VCRs	8	43
Sink VCRs	0	0
Subscriber VCRs	12	43
Publisher VCRs	19	43

Link settings

	Device revision 6	Device revision 7
Slot time	4	4
Min. Inter PDU delay	12	10
Max. response delay	10	10

Transducer Blocks

Block	Content	Output values
TRD1 Block	Contains all parameters related to the measurement	▪ Pressure or level (channel 1) ▪ Process temperature (channel 2)
Service Block	Contains service information	▪ Pressure after damping (channel 3) ▪ Pressure peakhold indicator (channel 4) ▪ Counter for max. pressure transgressions (channel 5)
Diagnostic Block	Contains diagnostic information	Error code via DI channels (channel 0 to 16)
Display Block	Contains parameters to configure the onsite display	No output values

Function blocks

Block	Content	Number blocks	Execution time		Functionality	
			Device Revision 6	Device Revision 7	Device Revision 6	Device Revision 7
Resource Block	This block contains all the data that uniquely identifies the device; it is an electronic version of a nameplate for the device.	1			enhanced	enhanced
Analog Input Block 1 Analog Input Block 2	The AI Block receives the measuring data from the Sensor Block, (selectable via a channel number) and makes the data available to other function blocks at its output. Enhancement: Digital outputs for process alarms, fail safe mode	2	45 ms	45 ms (without trend and alarm reports)	enhanced	enhanced
Digital Input Block	This block contains the discrete data of the Diagnose Block (selectable via a channel number 0 to 16) and provides them for other blocks at the output.	1	40 ms	30 ms	standard	enhanced
Digital Output Block	This block converts the discrete input and thus initiates an action (selectable via a channel number) in the DP Flow Block or in the Service Block. Channel 1 resets the counter for max. pressure transgressions.	1	60 ms	40 ms	standard	enhanced
PID Block	This block is used as a proportional-integral-derivative controller and can be used universally for closed-loop-control in the field. It enables cascade mode and feedforward control. Input IN can be indicated on the display. The selection is performed in the Display Block (DISPLAY_MAIN_LINE_CONTENT).	1	120 ms	70 ms	standard	enhanced
Arithmetic Block	This block is designed to permit simple use of popular measurement math functions. The user does not have to know how to write equations. The math algorithm is selected by name, chosen by the user for the function to be performed.	1	50 ms	40 ms	standard	enhanced
Input Selector Block	The Input Selector Block facilitates the selection of up to four inputs and generates an output based on the configured action. This block normally receives its inputs from AI Blocks. The block performs maximum, minimum, average and 'first good' signal selection. Inputs IN1 to IN4 can be indicated on the display. The selection is performed in the Display Block (DISPLAY_MAIN_LINE_CONTENT).	1	35 ms	35 ms	standard	enhanced
Signal Characterizer Block	The Signal Characterizer Block has two sections, each with an output that is a non-linear function of the respective input. The non-linear function is generated by a single look-up table with 21 arbitrary x-y pairs.	1	30 ms	40 ms	standard	enhanced
Integrator Block	The Integrator Block integrates a variable as a function of the time or accumulates the counts from a Pulse Input Block. The block can be used as a totalizer that counts up until a reset, or as a batch totalizer whereby the integrated value is compared against a target value generated before or during the control routine and generates a binary signal when the target value is reached.	1	35 ms	40 ms	standard	enhanced
Analog Alarm Block	This block contains all process alarm conditions (working like a comparator) and represents them at the output.	1	35 ms	35 ms	standard	enhanced

Additional function block information:

Instantiatable function blocks	YES	YES
Number of additional instantiatable function blocks	11	5

Power supply

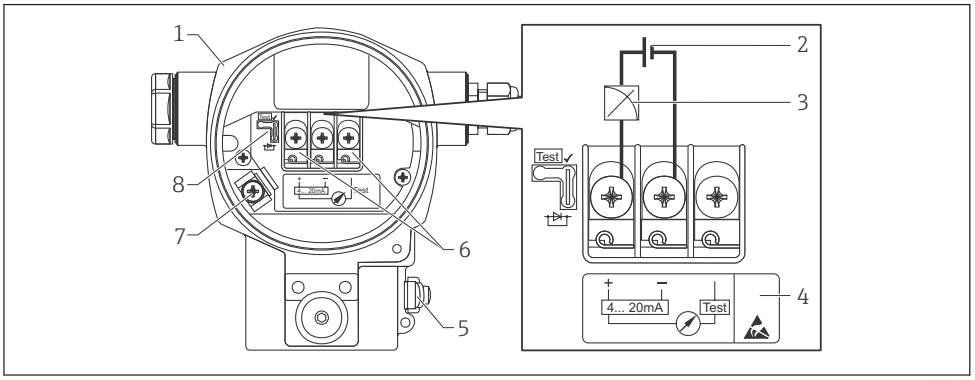
WARNING

Electrical safety is compromised by an incorrect connection.

- When using the measuring device in hazardous areas, the relevant national standards and regulations as well as the Safety Instructions or Installation or Control Drawings must be observed → 112.
- All explosion protection data are given in separate documentation which is available upon request. The Ex documentation is supplied as standard with all Ex-systems → 112.
- Devices with integrated overvoltage protection must be grounded → 26.
- Protective circuits against reverse polarity, HF influences and overvoltage peaks are integrated.

Terminal assignment

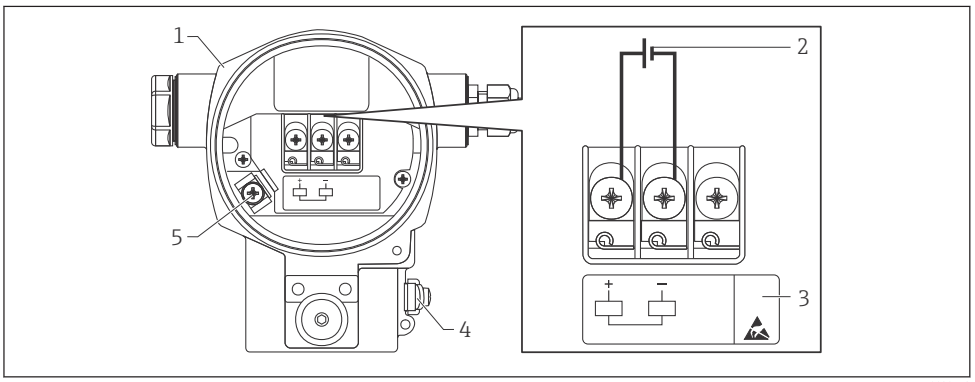
4 to 20 mA HART



A0019989

1 *Housing*
2 *Supply voltage*
3 *4 to 20 mA*
4 *Devices with integrated overvoltage protection are labeled "OVP" (overvoltage protection) here.*
5 *External ground terminal*
6 *4 to 20 mA test signal between positive and test terminal*
7 *Internal ground terminal*
8 *Jumper for 4 to 20 mA test signal*

PROFIBUS PA and FOUNDATION Fieldbus



A0020158

1 *Housing*
2 *Supply voltage*
3 *Devices with integrated overvoltage protection are labeled "OVP" (overvoltage protection) here.*
4 *External ground terminal*
5 *Internal ground terminal*

Supply voltage

4 to 20 mA HART

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
Version for non-hazardous area	11.5 to 45 V DC	10.5 to 45 V DC
Intrinsically safe	11.5 to 30 V DC	10.5 to 30 V DC
▪ Other types of protection ▪ Devices without certificate	11.5 to 45 V DC (versions with 35 V DC plug-in connection)	10.5 to 45 V DC (versions with 35 V DC plug-in connection)

Measuring a 4 to 20 mA test signal

A 4 to 20 mA test 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. Observe the position of the jumper in accordance with the following table.

Jumper position for test signal	Description
 A0019992	▪ Measurement of 4 to 20 mA test signal via the positive 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
 A0019993	▪ Measurement of 4 to 20 mA test signal via positive and test terminal: Not possible. ▪ Minimum supply voltage: 10.5 V DC

PROFIBUS PA

- Version for non-hazardous areas: 9 to 32 V DC
- Ex ia: 10.5 to 30 V DC

FOUNDATION Fieldbus

- Version for non-hazardous areas: 9 to 32 V DC
- Ex ia: 10.5 to 30 V DC

Current consumption

- PROFIBUS PA: 13 mA ±1 mA, switch-on current corresponds to IEC 61158-2, Clause 21
- FOUNDATION Fieldbus: 15.5 mA ±1 mA, switch-on current corresponds to IEC 61158-2, Clause 21

Electrical connection

PROFIBUS PA

The digital communication signal is transmitted to the bus via a 2-wire connection. The bus also provides the power supply. For further information on the network structure and grounding, and for further bus system components such as bus cables, see the relevant documentation, e.g. Operating Instructions BA00034S "PROFIBUS DP/PA: Guidelines for planning and commissioning" and the PNO Guideline.

FOUNDATION Fieldbus

The digital communication signal is transmitted to the bus via a 2-wire connection. The bus also provides the power supply. For further information on the network structure and grounding and for further bus system components such as bus cables, see the relevant documentation, e.g. Operating Instructions BA00013S "FOUNDATION Fieldbus Overview" and the FOUNDATION Fieldbus Guideline.

Terminals

- Supply voltage and internal ground terminal: 0.5 to 2.5 mm² (20 to 14 AWG)
- External ground terminal: 0.5 to 4 mm² (20 to 12 AWG)

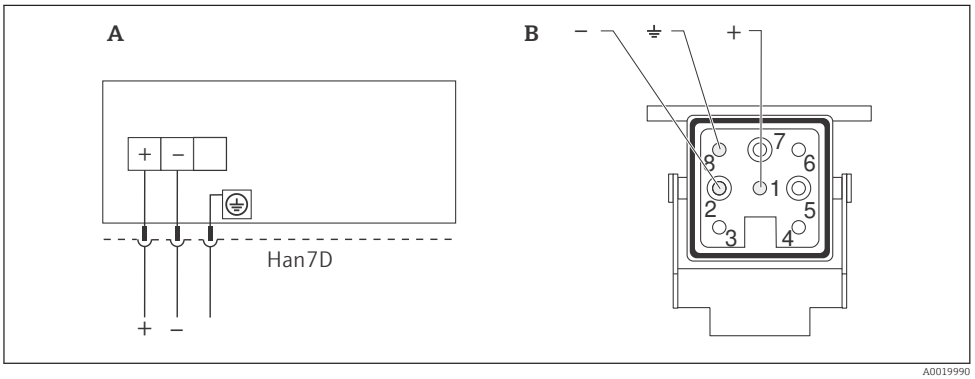
Cable entries

Approval	Cable gland	Clamping area
Standard, II 1/2 G Ex ia, IS	Plastic M20x1.5	5 to 10 mm (0.2 to 0.39 in)
ATEX II 1/2 D, II 1/3 D, II 1/2 GD Ex ia, II 1 GD Ex ia, II 3 G Ex nA	Metal M20x1.5 (Ex e)	7 to 10.5 mm (0.28 to 0.41 in)

For additional technical data, see section on housing → 🖹 45

Connector

Devices with Harting plug Han7D

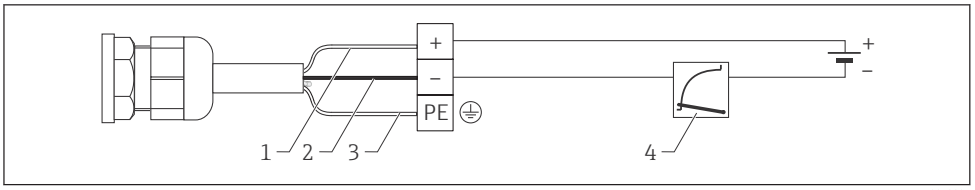


A0019990

A Electrical connection for devices with Harting plug Han7D
B View of the plug-in connection on the device

Material: CuZn, gold-plated plug-in jack and plug

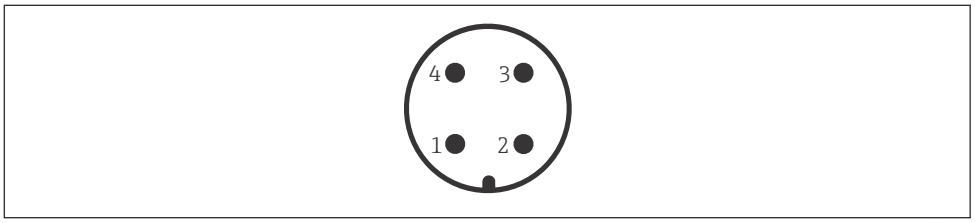
Cable version connection



A0019991

1 rd = red
2 bk = black
3 gnye = green
4 4 to 20 mA

Devices with M12 plug



A0011175

1 *Signal +*
2 *Not assigned*
3 *Signal –*
4 *Ground*

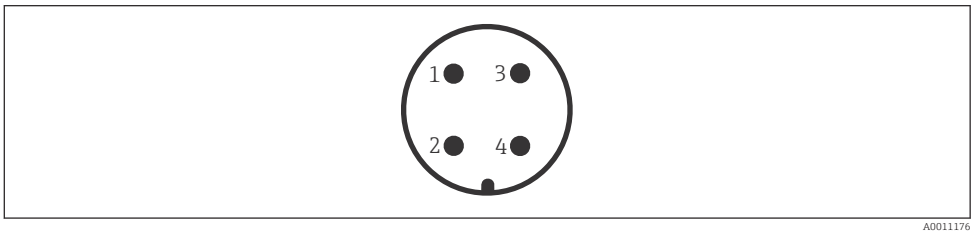
Endress+Hauser offers the following accessories for devices with an M12 plug:

Plug-in jack M 12x1, straight
- Material: Body PA; coupling nut CuZn, nickel-plated
- Degree of protection (fully locked): IP67
- Order number: 52006263

Plug-in jack M 12x1, elbowed
- Material: Body PBT/PA; coupling nut GD-Zn, nickel-plated
- Degree of protection (fully locked): IP67
- Order number: 71114212

Cable 4x0.34 mm^2 (20 AWG) with M12 socket, elbowed, screw plug, length 5 m (16 ft)
- Material: Body PUR; coupling nut CuSn/Ni; cable PVC
- Degree of protection (fully locked): IP67
- Order number: 52010285

Devices with 7/8" plug



A0011176

1 *Signal –*
2 *Signal +*
3 *Not assigned*
4 *Shielding*

External thread: 7/8 - 16 UNC
- Material: 316L (1.4401)
- Degree of protection: IP68

Cable specification

HART

- Endress+Hauser recommends using shielded, twisted-pair two-wire cables.
- Cable outer diameter: 5 to 9 mm (0.2 to 0.35 in) depending on the cable entry used → 📄 24

PROFIBUS PA

Use a twisted, shielded twin-core cable, preferably cable type A.

For further information regarding cable specifications, see the Operating Instructions BA00034S "PROFIBUS DP/PA: Guidelines for planning and commissioning", the PNO guideline 2.092 "PROFIBUS PA User and Installation Guideline" and IEC 61158-2 (MBP).

FOUNDATION Fieldbus

Use a twisted, shielded twin-core cable, preferably cable type A.

For further information on the cable specifications, see Operating Instructions BA00013S "FOUNDATION Fieldbus Overview", FOUNDATION Fieldbus Guideline and IEC 61158-2 (MBP).

Start-up current

12 mA

Residual ripple

Without influence on 4 to 20 mA signal up to ±5% residual ripple within the permitted voltage range [according to HART hardware specification HCF_SPEC-54 (DIN IEC 60381-1)].

Overvoltage protection (optional)

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

Ordering information: Product Configurator, order code for "Additional options 1" or Additional options 2", version "M"

NOTICE

Device could be destroyed!

► Devices with integrated overvoltage protection must be grounded.

Influence of power supply

≤0.0006 % of URL/1 V

Performance characteristics of ceramic process isolating diaphragm

Reference operating conditions

- As per IEC 60770
- Ambient temperature T_U = constant, in range: +21 to +33 °C (+70 to +91 °F)
- Humidityφ= constant, in range: 5 to 80 % rH
- Ambient pressure p_A = constant, in range: 860 to 1060 mbar (12.47 to 15.37 psi)
- Position of measuring cell = constant, in range: horizontal ±1° (see also "Influence of the installation position" section → 27)
- Input of LOW SENSOR TRIM and HIGH SENSOR TRIM for lower range value and upper range value
- Zero based span
- Material of process isolating diaphragm: Al_2O_3 (aluminum-oxide ceramic, Ceraphire®)
- Supply voltage: 24 V DC ±3 V DC
- Load with HART: 250 Ω

Measuring uncertainty for small absolute pressure measuring ranges

The smallest expanded uncertainty of measurement that can be returned by our calibration standards is:
- in range 1 to 30 mbar (0.0145 to 0.435 psi): 0.4 % of reading
- in range < 1 mbar (0.0145 psi): 1 % of reading.

Influence of the installation position

≤ 0.18 mbar (0.003 psi). Device has rotated 180° and process connection is pointing upwards.

A position-dependent zero point shift can be corrected → 34 and → 102.

Different tightening torques (e.g. for Clamp or Varivent connections) can merely cause a shift in the zero point. This effect is corrected by position adjustment during commissioning.

Resolution

- Current output: 1 µA
- Display: can be set (factory setting: presentation of the maximum accuracy of the transmitter)

Reference accuracy

The reference accuracy contains the non-linearity [DIN EN 61298-2 3.11] including the pressure hysteresis [DIN EN 61298-23.13] and non-repeatability [DIN EN 61298-2 3.11] in accordance with the limit point method as per [DIN EN 60770].

Measuring cell standard	Sensor	Reference accuracy in %
100 mbar (1.5 psi)	Gauge pressure	▪ TD 1:1 to TD 10:1 = ±0.075 ▪ TD > 10:1 = ±0.0075 x TD
100 mbar (1.5 psi)	Absolute pressure	▪ TD 1:1 to TD 5:1 = ±0.075 ▪ TD > 5:1 = ±0.015 x TD
250 mbar (3.75 psi)	Gauge pressure/ Absolute pressure	▪ TD 1:1 to TD 10:1 = ±0.075 ▪ TD > 10:1 = ±0.0075 x TD
400 mbar (6 psi), 1 bar (15 psi), 2 bar (30 psi), 4 bar (60 psi), 10 bar (150 psi), 40 bar (600 psi)	Gauge pressure/ Absolute pressure	▪ TD 1:1 to TD 10:1 = ±0.05 ▪ TD > 10:1 = ±0.005 x TD

Platinum measuring cell	Sensor	Reference accuracy in %
100 mbar (1.5 psi), 250 mbar (3.75 psi)	Gauge pressure/ Absolute pressure	TD 1:1 = ±0.05
400 mbar (6 psi), 1 bar (15 psi)	Gauge pressure/ Absolute pressure	TD 1:1 = ±0.035
2 bar (30 psi), 4 bar (60 psi)	Gauge pressure	TD 1:1 = ±0.025
2 bar (30 psi), 4 bar (60 psi)	Absolute pressure	TD 1:1 = ±0.035
10 bar (150 psi), 40 bar (600 psi)	Gauge pressure/ Absolute pressure	TD 1:1 = ±0.035

Thermal change of the zero output and the output span

Standard version

Measuring cell	−10 to +60 °C (+14 to +140 °F)	−20 to −10 °C (−4 to +14 °F) +60 to +125 °C (+140 to +257 °F)
	% of the set span	
100 mbar (1.5 psi), 250 mbar (3.75 psi), 400 mbar (6 psi)	±(0.088 x TD + 0.088)	±(0.138 x TD + 0.138)
1 bar (15 psi), 2 bar (30 psi), 4 bar (60 psi), 10 bar (150 psi), 40 bar (600 psi)	±(0.088 x TD + 0.04)	±(0.175 x TD + 0.075)

High-temperature version

Measuring cell	Sensor	−10 to +60 °C (+14 to +140 °F)	+60 to +150 °C (140 to +302 °F)
		% of the set span	
100 mbar (1.5 psi), 250 mbar (3.75 psi), 400 mbar (6 psi)	Gauge pressure	±(0.088 x TD + 0.088)	±(0.75 x TD)
1 bar (15 psi), 2 bar (30 psi), 4 bar (60 psi), 10 bar (150 psi), 40 bar (600 psi)	Gauge pressure	±(0.088 x TD + 0.040)	±(0.50 x TD)
100 mbar (1.5 psi)	Absolute pressure	±(0.088 x TD + 0.088)	±(1.25 x TD)
250 mbar (4 psi), 400 mbar (6 psi)	Absolute pressure	±(0.088 x TD + 0.088)	±(0.75 x TD)
1 bar (15 psi), 2 bar (30 psi), 4 bar (60 psi), 10 bar (150 psi)	Absolute pressure	±(0.088 x TD + 0.040)	±(0.75 x TD)
40 bar (600 psi)	Absolute pressure	±(0.088 x TD + 0.040)	±(0.50 x TD)

Total performance

The "Total performance" specification comprises the non-linearity including hysteresis and non-reproducibility as well as the thermal change of the zero point. For devices with NBR or HNBR seals, the values must be multiplied by a factor of 3. All specifications apply to the temperature range−10 to +60 °C (+14 to +140 °F)and a turndown of 1:1.

Measuring cell	Standard version	High-temperature version
	% of URL	
100 mbar (1.5 psi), 250 mbar (3.75 psi), 400 mbar (6 psi)	±0.2	±0.46
1 bar (15 psi), 2 bar (30 psi), 4 bar (60 psi), 10 bar (150 psi), 40 bar (600 psi)	±0.15	±0.46

Long-term stability

- For measuring ranges ≥ 1 bar (15 psi) ± 0.05 % of URL/year
- 100 mbar (1.5 psi)to40 bar (600 psi): ± 0.2 % of URL/10 years
- 100 mbar (1.5 psi)to40 bar (600 psi) (absolute pressure sensor): ± 0.3 % of URL/10 years

Total error

The total error comprises the total performance and long-term stability. For devices with NBR or HNBR seals, the values must be multiplied by a factor of 3. All specifications apply to the temperature range −10 to +60 °C (+14 to +140 °F) and a turndown of 1:1.

Measuring cell	Standard version	High-temperature version
	% of URL/year	
100 mbar (1.5 psi), 250 mbar (3.75 psi), 400 mbar (6 psi)	±0.25	±0.51
1 bar (15 psi), 2 bar (30 psi), 4 bar (60 psi), 10 bar (150 psi), 40 bar (600 psi)	±0.2	±0.51

Warm-up period

- 4 to 20 mA HART: < 10 s
- PROFIBUS PA: 6 s
- FOUNDATION Fieldbus: 50 s

Performance characteristics of the metallic process isolating diaphragm

Reference operating conditions

- As per IEC 60770
- Ambient temperature T_U = constant, in range: +21 to +33 °C (+70 to +91 °F)
- Humidityφ= constant, in range: 5 to 80 % rH
- Ambient pressure p_A = constant, in range: 860 to 1060 mbar (12.47 to 15.37 psi)
- Position of measuring cell = constant, in range: horizontal ±1° (see also "Influence of the installation position" section → 30)
- Input of LOW SENSOR TRIM and HIGH SENSOR TRIM for lower range value and upper range value
- Zero based span
- Material of the process isolating diaphragm: AISI 316L (1.4435)
- Filling oil: silicone oil
- Supply voltage: 24 V DC ±3 V DC
- Load with HART: 250 Ω

Measuring uncertainty for small absolute pressure measuring ranges

The smallest expanded uncertainty of measurement that can be returned by our calibration standards is:
- in range 1 to 30 mbar (0.0145 to 0.435 psi): 0.4 % of reading
- in range < 1 mbar (0.0145 psi): 1 % of reading.

Influence of the installation position

PMP71: Device rotated 180°, process connection pointing upwards.
- Process connections thread G 1 A, G 1 ½, G 2, 1 ½ MNPT, 2 MNPT, M 44x1,25, EN/DIN, ASME and JIS flanges: ≤ 10 mbar (0.15 psi).
- Process connections thread: G ½, ½ MNPT, JIS G ½, JIS R ½, M20x1.5: ≤ 4 mbar (0.06 psi).

The value is doubled for devices with inert oil.

A position-dependent zero point shift can be corrected → 34 and → 102.

Different tightening torques (e.g. for Clamp or Varivent connections) can merely cause a shift in the zero point. This effect is corrected by position adjustment during commissioning.

Resolution

- Current output: 1 µA
- Display: can be set (factory setting: presentation of the maximum accuracy of the transmitter)

Reference accuracy

The reference accuracy contains the non-linearity [DIN EN 61298-2 3.11] including the pressure hysteresis [DIN EN 61298-23.13] and non-repeatability [DIN EN 61298-2 3.11] in accordance with the limit point method as per [DIN EN 60770]. The specifications refer to the calibrated span.

PMP71

Measuring cell standard	Sensor	Reference accuracy in %
400 mbar (6 psi)	Gauge pressure/ Absolute pressure	▪ TD 1:1 = ±0.05 ▪ TD > 1:1 = ±0.05 x TD
1 bar (15 psi)	Gauge pressure/ Absolute pressure	▪ TD 1:1 to TD 2.5:1 = ±0.05 ▪ TD > 2.5:1 = ±0.02 x TD
2 bar (30 psi)	Gauge pressure	▪ TD 1:1 to TD 5:1 = ±0.05 ▪ TD > 5:1 = ±0.01 x TD
2 bar (30 psi)	Absolute pressure	▪ TD 1:1 to TD 5:1 = ±0.05 ▪ TD > 5:1 = ±0.01 x TD
4 bar (60 psi), 10 bar (150 psi)	Gauge pressure/ Absolute pressure	▪ TD 1:1 to TD 10:1 = ±0.05 ▪ TD > 10:1 = ±0.005 x TD
40 bar (600 psi)	Gauge pressure/ Absolute pressure	▪ TD 1:1 to TD 15:1 = ±0.075 ▪ TD > 15:1 = ±0.005 x TD
100 bar (1500 psi)	Gauge pressure/ Absolute pressure	▪ TD 1:1 to TD 10:1 = ±0.075 ▪ TD > 10:1 = ±0.0075 x TD

Measuring cell standard	Sensor	Reference accuracy in %
400 bar (6 000 psi)	Gauge pressure/ Absolute pressure	▪ TD 1:1 to TD 5:1 = ±0.15 ▪ TD > 5:1 = ±0.03 x TD
700 bar (10 500 psi)	Absolute pressure	▪ TD 1:1 to TD 5:1 = ±0.15 ▪ TD > 5:1 = ±0.03 x TD

Platinum measuring cell [1]	Sensor	Reference accuracy in %
400 mbar (6 psi), 1 bar (15 psi)	Gauge pressure/ Absolute pressure	TD 1:1 = ±0.035
2 bar (30 psi), 4 bar (60 psi), 10 bar (150 psi)	Gauge pressure	TD 1:1 = ±0.025
2 bar (30 psi), 4 bar (60 psi), 10 bar (150 psi)	Absolute pressure	TD 1:1 = ±0.035
40 bar (600 psi)	Gauge pressure/ Absolute pressure	TD 1:1 = ±0.05
100 bar (1 500 psi)	Absolute pressure	TD 1:1 = ±0.05
400 bar (6 000 psi), 700 bar (10 500 psi)	Gauge pressure/ Absolute pressure	TD 1:1 = ±0.075

1) Platinum version not for flush-mounted process connections G ½ and M20.

Ordering information

Description	Option [1]
Platinum	"K" or "L" or "M"

1) Product Configurator, order code for "Calibration; unit"

PMP75

Measuring cell standard	Sensor	PMP75 without capillary in %	PMP75 with capillary in %
400 mbar (6 psi)	Gauge pressure/ Absolute pressure	▪ TD 1:1 = ±0.15 ▪ TD > 1:1 = ±0.15 x TD	▪ TD 1:1 = ±0.15 ▪ TD > 1:1 = ±0.15 x TD
1 bar (15 psi)	Gauge pressure/ Absolute pressure	▪ TD 1:1 to TD 2.5:1 = ±0.075 ▪ TD > 2.5:1 = ±0.03 x TD	▪ TD 1:1 to TD 2.5:1 = ±0.1 ▪ TD > 2.5:1 = ±0.04 x TD
2 bar (30 psi)	Gauge pressure	▪ TD 1:1 to TD 5:1 = ±0.075 ▪ TD > 5:1 = ±0.015 x TD	▪ TD 1:1 to TD 2.5:1 = ±0.1 ▪ TD > 2.5:1 = ±0.04 x TD
2 bar (30 psi)	Absolute pressure	▪ TD 1:1 to TD 5:1 = ±0.075 ▪ TD > 5:1 = ±0.015 x TD	▪ TD 1:1 to TD 5:1 = ±0.075 ▪ TD > 5:1 = ±0.015 x TD
4 bar (60 psi)	Gauge pressure/ Absolute pressure	▪ TD 1:1 to TD 10:1 = ±0.075 ▪ TD > 10:1 = ±0.0075 x TD	▪ TD 1:1 to TD 10:1 = ±0.075 ▪ TD > 10:1 = ±0.0075 x TD
10 bar (150 psi), 40 bar (600 psi)	Gauge pressure/ Absolute pressure	▪ TD 1:1 to TD 15:1 = ±0.075 ▪ TD > 15:1 = ±0.005 x TD	▪ TD 1:1 to TD 15:1 = ±0.075 ▪ TD > 15:1 = ±0.005 x TD
100 bar (1 500 psi)	Gauge pressure/ Absolute pressure	▪ TD 1:1 to TD 10:1 = ±0.075 ▪ TD > 10:1 = ±0.0075 x TD	▪ TD 1:1 to TD 10:1 = ±0.075 ▪ TD > 10:1 = ±0.0075 x TD
400 bar (6 000 psi)	Gauge pressure/ Absolute pressure	▪ TD 1:1 to TD 5:1 = ±0.15 ▪ TD > 5:1 = ±0.03 x TD	▪ TD 1:1 to TD 5:1 = ±0.15 ▪ TD > 5:1 = ±0.03 x TD
700 bar (10 500 psi)	Absolute pressure	▪ TD 1:1 to TD 5:1 = ±0.15 ▪ TD > 5:1 = ±0.03 x TD	–

Platinum measuring cell [1]	Sensor	PMP75 without capillary in %		PMP75 without capillary in %
1 bar (15 psi), 2 bar (30 psi), 4 bar (60 psi), 10 bar (150 psi), 40 bar (600 psi), 400 bar (6 000 psi), 700 bar (10 500 psi)	Gauge pressure/ Absolute pressure	TD 1:1	= ±0.05	–

1) Platinum version not for flush-mounted process connections G ½ and M20.

Thermal change of the zero output and the output span

When using a PMP75, the influence of the respective diaphragm seal must also be taken into account → 99.

PMP71 and PMP75 (basic device), internal process isolating diaphragm

Measuring cell	Material of the Process isolating diaphragm		−10 to +60 °C (+14 to +140 °F)	−40 to −10 °C (−40 to +14 °F) +60 to +80 °C (+140 to +176 °F)
	316 L	Gold/ rhodium	% of the set span	
400 mbar (6 psi)	✔	✔	±(0.2 x TD + 0.015)	±(0.4 x TD + 0.03)
1 bar (15 psi), 2 bar (30 psi), 4 bar (60 psi), 10 bar (150 psi)	✔	✔	±(0.1 x TD + 0.01)	±(0.4 x TD + 0.02)
40 bar (600 psi)	✔	–	±(0.1 x TD + 0.01)	±(0.4 x TD + 0.02)
100 bar (1 500 psi)	✔	–	±(0.2 x TD + 0.015)	±(0.4 x TD + 0.03)
400 bar (6 000 psi)	✔	–	±(0.35 x TD + 0.02)	±(0.7 x TD + 0.04)
700 bar (10 500 psi)	✔	–	±(0.4 x TD + 0.03)	±(0.7 x TD + 0.04)

PMP71, flush-mounted process isolating diaphragm made of 316L with gold-rhodium coating

Measuring cell	−10 to +60 °C (+14 to +140 °F)	−40 to −10 °C (−40 to +14 °F) +60 to +80 °C (+140 to +176 °F)
	% of the set span	
400 mbar (6 psi)	±(0.2 x TD + 0.015) x 5	±(0.4 x TD + 0.03) x 5
1 bar (15 psi), 2 bar (30 psi), 4 bar (60 psi), 10 bar (150 psi), 40 bar (600 psi)	±(0.1 x TD + 0.01) x 5	±(0.4 x TD + 0.02) x 5
100 bar (1 500 psi)	±(0.2 x TD + 0.015) x 5	±(0.4 x TD + 0.03) x 5
400 bar (6 000 psi)	±(0.35 x TD + 0.02) x 5	±(0.7 x TD + 0.04) x 5
700 bar (10 500 psi)	±(0.4 x TD + 0.03) x 5	±(0.7 x TD + 0.04) x 5

Total performance

The "Total performance" specification comprises the non-linearity including hysteresis and non-reproducibility as well as the thermal change of the zero point.

All specifications apply to the temperature range −10 to +60 °C (+14 to +140 °F) and a turndown of 1:1.

PMP71

Measuring cell	PMP71	PMP71 with gold-rhodium coated Process isolating diaphragm
	% of URL	
400 mbar (6 psi)	±0.25	±1.25
1 bar (15 psi)	±0.15	±0.75
2 bar (30 psi)	±0.15	±0.45
4 bar (60 psi)	±0.15	±0.3
10 bar (150 psi), 40 bar (600 psi)	±0.15	±0.15
100 bar (1 500 psi)	±0.25	±0.25
400 bar (6 000 psi)	±0.3	±0.3
700 bar (10 500 psi)	±0.3	±0.3

Long-term stability

	Measuring cell	1 year	5 years	10 years
		% of URL		
PMP71	400 mbar (6 psi)	±0.05	±0.07	±0.10
	1 bar (15 psi)	±0.05	±0.07	±0.10
	2 bar (30 psi)	±0.07	±0.12	±0.15
	4 bar (60 psi), 10 bar (150 psi), 40 bar (600 psi), 100 bar (1 500 psi), 400 bar (6 000 psi), 700 bar (10 500 psi)	±0.05	±0.07	±0.10
PMP75	To determine long-term stability, the basic device is observed without the attached diaphragm seal.			

Total error

PMP71

The total error comprises the total performance and long-term stability. All specifications apply to the temperature range −10 to +60 °C (+14 to +140 °F) and a turndown of 1:1.

Measuring cell	% of URL/year
400 mbar (6 psi)	±0.3
1 bar (15 psi), 2 bar (30 psi), 4 bar (60 psi), 10 bar (150 psi), 40 bar (600 psi)	±0.2
100 bar (1 500 psi)	±0.3
400 bar (6 000 psi)	±0.35
700 bar (10 500 psi)	±0.35

Warm-up period

- 4 to 20 mA HART: < 10 s
- PROFIBUS PA: 6 s
- FOUNDATION Fieldbus: 50 s

Installation

General installation instructions

- For PMP75: → 📄 99 "Installation instructions" section.
- A position-dependent zero point shift can be corrected directly at the device via operating keys, and also in hazardous areas in the case of devices with external operation.
  Diaphragm seals also shift the zero point, depending on the installation position→ 📄 102.
- The device housing can be rotated up to 380° .
- Endress+Hauser offers a mounting bracket for installing the device on pipes or walls → 📄 34.
- Use flushing rings for flange and cell diaphragm seals if buildup or clogging can be expected at the diaphragm seal connection. The flushing ring can be fitted between the process connection and diaphragm seal. Material buildup in front of the process isolating diaphragm can be flushed away, and the pressure chamber vented, via the two lateral flushing holes.
- When measuring in media containing solids, such as dirty liquids, installing separators and drain valves is useful for capturing and removing sediment.
- Point the cable and connector downwards where possible to prevent moisture from entering (e.g. rain or condensation water).

Measuring arrangement for devices without diaphragm seals – PMC71, PMP71

Cerabar S transmitters without diaphragm seals are mounted as per the norms for a manometer (DIN EN 837-2). We recommend the use of shutoff devices and siphons. The orientation depends on the measuring application.

Pressure measurement in gases

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

Pressure measurement in vapors

Use siphons for pressure measurement in steam. The siphon reduces the temperature to almost ambient temperature. Fill the siphon with liquid before commissioning. 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. Note the max. permitted ambient temperature of the transmitter.

Pressure measurement in liquids

Mount Cerabar S with shutoff device below or at the same level as the tapping point.

Level measurement

- Mount Cerabar S below the lowest measuring point.
- Do not install the device in the following positions: In the filling curtain, in the tank outlet or at a point in the container which could be affected by pressure pulses from an agitator or a pump.
- The calibration and functional test can be carried out more easily if you mount the device downstream from a shutoff device.

Measuring arrangement for devices with diaphragm seals – PMP75

→ 📄 99

Orientation

The orientation may cause a zero point shift, see → 📄 27 and → 📄 30.

This position-dependent zero point shift can be corrected directly at the device via the operating key, and also in hazardous areas in the case of devices with external operation (position adjustment).

Wall and pipe mounting

Endress+Hauser offers a mounting bracket for installing the device on pipes or walls. The mounting bracket can be installed on pipes with a diameter of 1¼" to 2" or on walls.

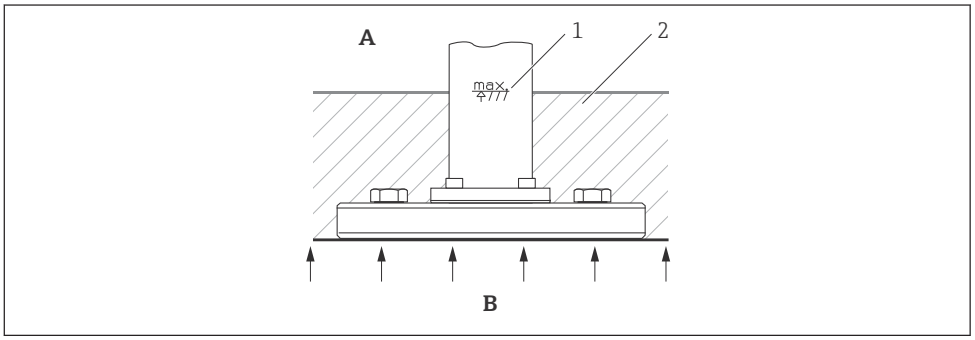
Ordering information:
- Product Configurator, order code for "Additional options 2", version "U" or
  Product Configurator, order code for "Accessory enclosed", version "PA" or
- as a separate accessory (part no.: 71102216).

Dimensions → 86.

Heat insulation – PMC71 high-temperature version

The PMC71 high-temperature version must only be insulated up to a certain height. The maximum permitted insulation height is indicated on the devices and applies to an insulation material with a heat conductivity ≤ 0.04 W/(m x K) and to the maximum permitted ambient and process temperature (see table below). The data were determined under the most critical application "quiescent air".

The data were determined under the most critical application "quiescent air".



A Ambient temperature
B Process temperature
1 Insulation height
2 Insulation material

	Temperature
Ambient temperature	≤ 70 °C (158 °F)
Process temperature	≤ 150 °C (302 °F)

Mounting of PVDF screw-in fittings

WARNING

Risk of damage to process connection!
Risk of injury!
► PVDF process connections with threaded connections must be installed with the mounting bracket supplied.

The mounting bracket can be installed on pipes with a diameter of 1¼" to 2" or on walls.

- The mounting bracket is included in the delivery.
- Ordering information:
  Product Configurator, order code for "Accessory enclosed", version "PA" or as a separate accessory (part no.: 71102216).
- Dimensions .

"Separate housing" version

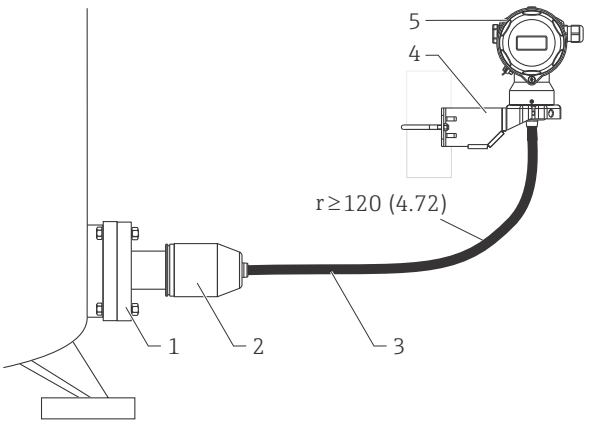
With the "separate housing" version, you are able to mount the housing with the electronics insert at a distance from the measuring point. This version facilitates trouble-free measurement:
- Under particularly difficult measuring conditions (at installation locations that are cramped or difficult to access)
- If rapid cleaning of the measuring point is required and
- If the measuring point is exposed to vibrations
- For compact installations

You can choose between different cable versions:
- PE: 2 m (6.6 ft), 5 m (16 ft) and 10 m (33 ft)
- FEP: 5 m (16 ft).

Ordering information: Product Configurator, order code for "Additional options 2", version "G".

Dimensions → 🖹 86

In the case of the "separate housing" version, the sensor is delivered with the process connection and cable ready mounted. The housing and a mounting bracket are enclosed as separate units. The cable is provided with a socket at both ends. These sockets are simply connected to the housing and the sensor.



1 Process connection with sensor - For degrees of protection, see the following section
2 Process connection adapter
3 Cable, both ends are fitted with a socket
4 Mounting bracket provided, suitable for pipe and wall mounting
5 Housing with electronic insert - degrees of protection → 🖹 45

Engineering unit mm (in)

Degree of protection for the process connection and sensor with the use of
- FEP cable:
  - IP 69
  - IP 66 NEMA 4/6P
  - IP 68 (1.83 mH_2O for 24 h) NEMA 4/6P
- PE cable:
  - IP 66 NEMA 4/6P
  - IP 68 (1.83 mH_2O for 24 h) NEMA 4/6P

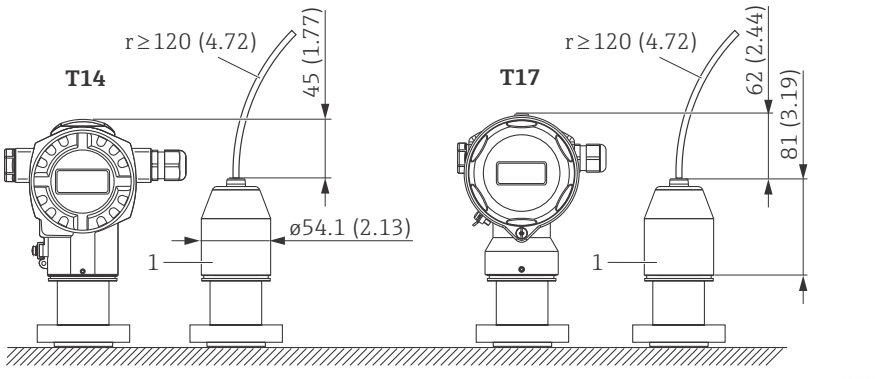
Technical data of the PE and FEP cable:
- Minimum bending radius: 120 mm (4.72 in)
- Cable extraction force: max. 450 N (101.16 lbf)
- Resistance to UV light

Use in hazardous area:
- Intrinsically safe installations (Ex ia/IS)
- FM/CSA IS: for Div. 1 installation only

Description	Weight
Process connection adapter	0.93 kg (2.05 lb)
Cable	0.05 kg/meter (0.11 lb)

Reduction of the installation height

If the separate housing is used, the installation height of the process connection is reduced compared to the dimensions of the standard version.



1 Process connection adapter

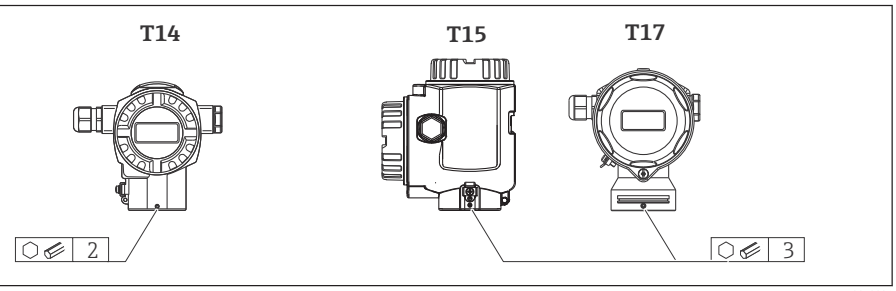
Engineering unit mm (in)

Turning the housing

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

Your benefits

- Easy mounting due to optimum alignment of housing
- Good, accessible device operation
- Optimum readability of the onsite display (optional).



Oxygen applications

Oxygen and other gases can react explosively to oils, grease and plastics, such that, among other things, the following precautions must be taken:
- All components of the system, such as measuring devices, must be cleaned in accordance with the BAM (DIN 19247) requirements.
- Dependent on the materials used, a certain maximum temperature and a maximum pressure for oxygen applications must not be exceeded.

The devices suitable for gaseous oxygen applications are listed in the following table with the specification p_{max}.

Order code for devices [1], cleaned for oxygen applications	p_{max} for oxygen applications	T_{max} for oxygen applications
PMC71 – * * * * * * ** 2 * *, Devices with sensors, nominal value < 10 bar (150 psi)	Over pressure limit (OPL) [2] [3] of sensor	60 °C (140 °F)
PMC71 – * * * * * * ** 2 * *, Devices with sensors, nominal value ≥ 10 bar (150 psi)	30 bar (450 psi)	60 °C (140 °F)
PMP71 – * * * ** * * ** N * *	depends on the lowest-rated element, with regard to pressure, of the selected components: over pressure limit (OPL) of the sensor, process connection (1.5 x PN) or fill fluid (160 bar (2 400 psi))	85 °C (185 °F)
PMP75 – * * * ** * * * ** N * *	depends on the lowest-rated element, with regard to pressure, of the selected components: over pressure limit (OPL) of the sensor, process connection (1.5 x PN) or fill fluid (160 bar (2 400 psi))	85 °C (185 °F)

1) Devices only, not accessories or enclosed accessories.
2) Product Configurator, order code for "Sensor range; sensor over pressure limit (= OPL)"
3) PMC71 with PVDF thread or flange: To be mounted only with mounting bracket. MWP 10 bar (150 psi), OPL max. 15 bar (225 psi). Process temperature range −10 to +60 °C (+14 to +140 °F)

Silicone-free applications

Special cleaning of the transmitter to remove paint-wetting substances, for use in paint shops for example.

Ordering information:

Product Configurator, order code for "Seal", option "L" or "M".

Ultrapure gas applications

Endress+Hauser also offers devices for special applications, such as ultrapure gas, cleaned from oil and grease. No special restrictions regarding the process conditions apply to these devices.

Ordering information:
- Product Configurator, order code for "Seal" or
- Product Configurator, order code for "Fill fluid".

Applications with hydrogen

Liquid applications with hydrogen separation from an electrolyte

The gold-rhodium coating, which can be ordered in the order code, offers protection only against hydrogen diffusion through the process isolating diaphragm in liquids (e.g. electrolytes or aqueous solutions).

Ordering information:

Product Configurator, order code for "Membrane material", option "6".

In gas applications and also in liquid applications with hydrogen separation from an electrolyte with a process temperature >100 °C (212 °F) , the gold-rhodium coating does **not** offer effective protection against hydrogen diffusion through the process isolating diaphragm. The diaphragm requires a pure gold coating. Endress+Hauser offers this product version with a gold coating of 25 µm (984.3 µin) as a **T**echnical **S**pecial **P**roduct.

Gas applications with hydrogen content

In the case of a gas application with hydrogen content, the diaphragm requires a pure gold coating. Endress+Hauser offers this product version with a gold coating of 25 µm (984.3 µin) as a **T**echnical **S**pecial **P**roduct.

Environment

Ambient temperature range

Version	PMC71 High-temperature version	PMC71	PMP71 [1]	PMP75 [1]
Without LCD display	−20 to +70 °C (−4 to +158 °F)	−40 to +85 °C (−40 to +185 °F)		
With LCD display [2]		−20 to +70 °C (−4 to +158 °F)		
With M12 connector, elbowed		−25 to +85 °C (−13 to +185 °F)		
With separate housing	–	−20 to +60 °C (−4 to +140 °F)		–
Diaphragm seal systems [3]	–	–	–	→ 99
MID parts certificate	–	–	−25 to +55 °C (−13 to +131 °F)	–

1) Lower temperatures on request
2) Extended temperature application range (−40 to +85 °C (−40 to +185 °F)) with restrictions in optical properties, such as display speed and contrast
3) Ambient temperature range and process temperature range are mutually dependent - see "Heat insulation" section → 103

For high-temperature applications, either a PMP75 with a temperature isolator or with a capillary can be used. If vibrations also occur in the application, Endress+Hauser recommends using a PMP75 with a capillary. If a PMP75 with a temperature isolator or capillary is used, we recommend a suitable bracket for mounting (see "Wall and pipe mounting" section)→ 34.

Hazardous areas

- For devices for use in hazardous areas, see Safety Instructions, Installation or Control Drawing → 112.
- Pressure measuring devices that have the usual explosion protection certificates (e.g. ATEX/ FM/ CSA/ IEC Ex,...) can be used in hazardous areas at ambient temperatures down to −50 °C (−58 °F). The functionality of the explosion protection is also guaranteed for ambient temperatures down to −50 °C (−58 °F).
- The nameplate specification is limited to an ambient temperature of −40 °C (−40 °F), as all measurement-specific testing of the device is performed only down to −40 °C (−40 °F). If the device is operated at an ambient temperature below −40 °C (−40 °F), the technical data in this document are no longer valid. Functional restrictions can be expected.

Storage temperature range

- −40 to +90 °C (−40 to +194 °F)
- Local display: −40 to +85 °C (−40 to +185 °F)
- Separate housing −40 to +60 °C (−40 to +140 °F)
- Devices with PVC-sheathed capillary: −25 to +90 °C (−13 to +194 °F)

Degree of protection

- Housing→ 45
- Separate housing → 36

Climate class

Class 4K4H (air temperature: −20 to +55 °C (−4 to +131 °F), relative humidity: 4 to 100 %) fulfilled as per DIN EN 60721-3-4 (condensation possible. With PMC71, avoid condensate in the device.)

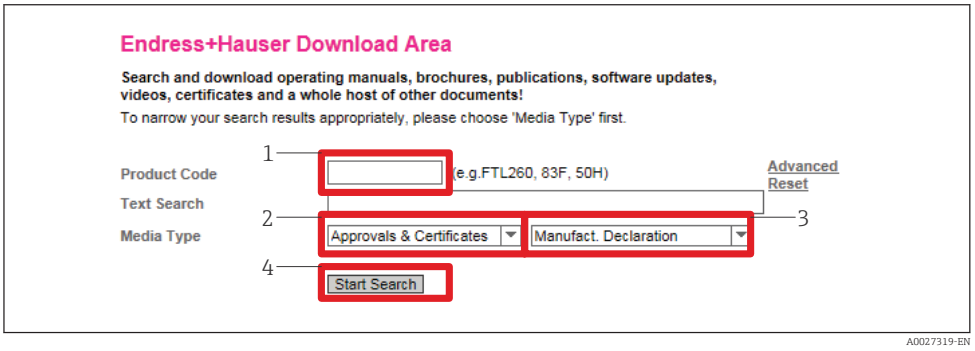
Electromagnetic compatibility

- Electromagnetic compatibility as per EN 61326 and NAMUR recommendation EMC (NE21).
- With enhanced immunity against electromagnetic fields as per EN 61000-4-3: 30 V/m with closed cover (for devices with T14 housing)
- Maximum deviation: < 0.5 % of span
- All EMC measurements were performed with a turn down (TD) = 2:1.
- Class E3 as per OIML R75-2

For further details refer to the Declaration of Conformity. A description of how to download this document is provided in the next section.

Downloading the Declaration of Conformity

http://www.endress.com/en/download



1. Enter the required product code
2. Select "Approvals & Certificates"
3. Select "Manufact. Declaration"
4. Click on "Start Search"

The available downloads are displayed.

Vibration resistance

Device/accessory	Test standard	Vibration resistance
PMC71 [1]	GL	Guaranteed for 3 to 25 Hz: ±1.6 mm (0.063 in); 25 to 100 Hz: 4 g in all 3 planes
PMP71		
PMP75 [2] [3]		
With mounting bracket	IEC 61298-3	Guaranteed for 10 to 60 Hz: ±0.15 mm (0.0059 in); 60 to 500 Hz: 2 g in all 3 planes
PMP71 with MID parts certificate	OIML R117-1	Class M3

1) Not for high-temperature version with Ex d[ia], CSA XP or FM XP
2) With aluminum T14 housing only
3) For applications with very high temperatures, a PMP75 with either a temperature isolator or a capillary can be used. If vibrations also occur in the application, Endress+Hauser recommends using a PMP75 with a capillary. If a PMP75 with a temperature isolator or capillary is used, it must be mounted with a mounting bracket

Process

Process temperature limits

For oxygen applications → 🖹 38

PMC71 (with ceramic process isolating diaphragm)

- −25 to +125 °C (−13 to +257 °F)
- High-temperature version: −20 to +150 °C (−4 to +302 °F); Product Configurator, order code for "Additional options 1", version "T".
- For saturated steam applications, use a device with a metal process isolating diaphragm, or provide a siphon for temperature isolation when installing.
- Observe the process temperature range of the seal in the following table.

Seal	Notes	Process temperature range	Option [1]
FKM Viton	–	−25 to +125 °C (−13 to +257 °F)/ 150 °C (302 °F) [2]	A, L
EPDM	FDA 21CFR177.2600; 3A Class II; USP Class VI DVGW (KTW, W270, W534), WRAS, ACS, NSF61	−20 to +125 °C (−4 to +257 °F)/ 150 °C (302 °F) [2]	B
EPDM		−20 to +150 °C (−4 to +302 °F)	B
Kalrez, Compound 4079	–	+5 to +125 °C (+41 to +257 °F)/ 150 °C (302 °F) [2]	D, M
Chemraz, Compound 505	–	−10 to +125 °C (+14 to +257 °F)/ 150 °C (302 °F) [2]	E
HNBR	FDA 21CFR177.2600; 3A Class II; KTW; AFNOR; BAM	−25 to +125 °C (−13 to +257 °F)	F [3]
NBR	–	−10 to +100 °C (+14 to +212 °F)	F
FKM Viton	FDA 21CFR177.2600	−5 to +125 °C (+23 to +257 °F)	G
FKM Viton	cleaned of oil and grease	−10 to +125 °C (+14 to +257 °F)/ 150 °C (302 °F) [2]	1
FKM Viton	cleaned for oxygen service	−10 to +60 °C (+14 to +140 °F)	2
The process temperature ranges specified here refer to permanent application of the PMC71. They may be exceeded for a short time (e.g. for cleaning).			

1) Product Configurator, order code for "Seal"
2) 150 °C (302 °F) for high-temperature version
3) These seals are used for devices with 3A-approved process connections.

Applications with jumps in temperature

Extreme jumps in temperature can result in temporary measuring errors. Temperature compensation takes effect after several minutes. Internal temperature compensation is faster the smaller the jump in temperature and the longer the time interval involved. For further information please contact your local Endress+Hauser Sales Center.

PMP71 (with metallic process isolating diaphragm)

Description	Limits
Process connections with internal process isolating diaphragm	−40 to +125 °C (−40 to +257 °F) (150 °C (302 °F) for max. one hour)
Process connections with flush-mounted process isolating diaphragm, G 1 A, G 1 ½ A, G 2 A, 1 NPT, 1 ½ NPT, 2 NPT, M 44x1.25, EN/DIN, ASME and JIS flanges	−40 to +100 °C (−40 to +212 °F)
Process connections with flush-mounted process isolating diaphragm, G ½ A, M20x1.5	−20 to +85 °C (−4 to +185 °F)

PMP71 (with metallic process isolating diaphragm) with MID parts certificate

−25 to +55 °C (−13 to +131 °F)

PMP75 (with diaphragm seal)

- Depending on the design and depending on the diaphragm seal and filling oil: −70 °C (−94 °F) up to +400 °C (+752 °F). Please note the temperature application limits of the diaphragm seal oil → 101.
- Please observe the maximum gauge pressure and maximum temperature.

Devices with PTFE-coated process isolating diaphragm

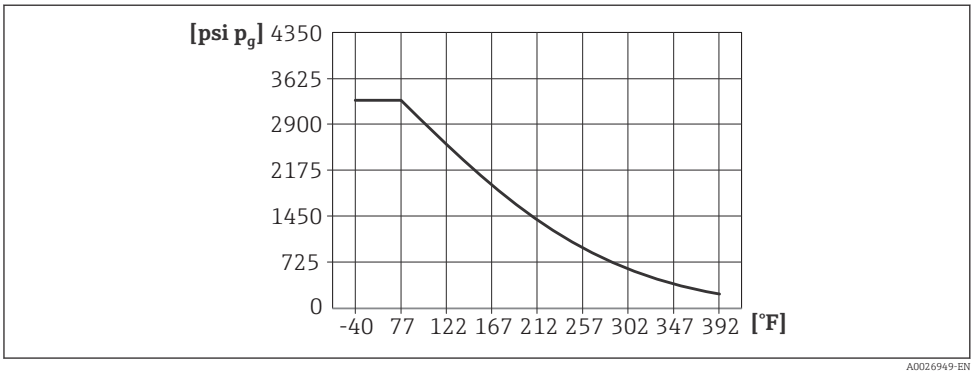
The non-stick coating has excellent gliding properties and is used to protect the process isolating diaphragm against abrasive media.

NOTICE

Incorrect use of the PTFE foil will destroy the device!

▶ The PTFE foil used is designed to protect the unit against abrasion. It does not provide protection against corrosive media.

For the range of application of the 0.25 mm (0.01 in) PTFE foil on an AISI 316L (1.4404/1.4435) process isolating diaphragm, see the following diagram:



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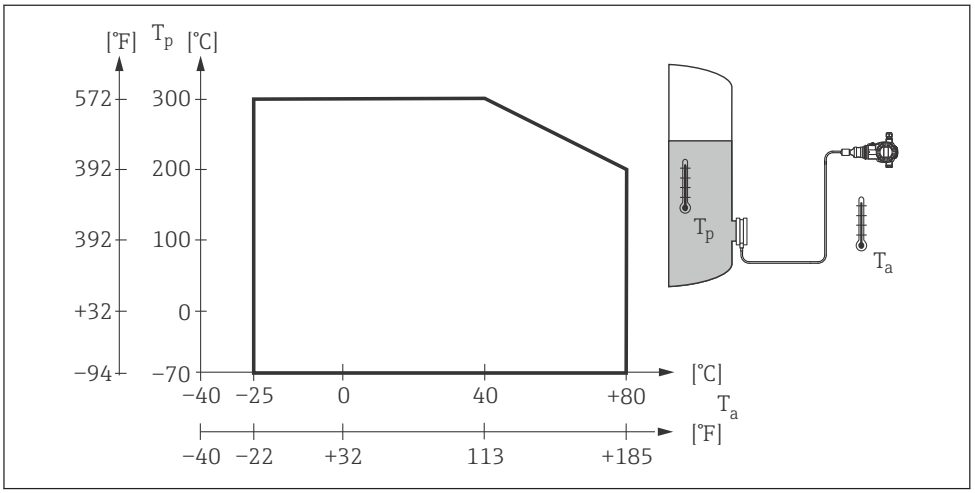
For vacuum applications: p_{abs} ≤ 1 bar (14.5 psi) to 0.05 bar (0.725 psi) up to max. +150 °C (302 °F).

Process temperature limits of flexible capillary armoring: PMP75

- 316L: No restrictions
- PTFE: No restrictions
- PVC: See the following diagram



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Pressure specifications

⚠ WARNING

The maximum pressure for the measuring device depends on the lowest-rated element with regard to pressure.

- For pressure specifications, see the "Measuring range" section and the "Mechanical construction" section.
- The measuring device must be operated only within the specified limits!
- The MWP (maximum working pressure) is specified on the nameplate of the individual sensor module. This value refers to a reference temperature of +20 °C (+68 °F), or +38 °C (+100 °F) for ASME flanges, and can be present at the device for an unlimited period. Observe the pressure-temperature dependency of the MWP.
- Please refer to the standards EN 1092-1: 2001 Tab. 18 for the pressure values permitted in the case of higher temperatures. (With regard to their stability-temperature property, the materials 1.4435 and 1.4404 are grouped together under 13E0 in EN 1092-1 Tab. 18. The chemical composition of the two materials can be identical). // 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 of the individual sensors (OPL = 1.5 x MWP (formula does not apply to the PMP71 or PMP75 with a 40 bar (600 psi) or 100 bar (1500 psi) measuring cell)) and may be applied only for a limited period of time to prevent any lasting damage.
- 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.
- In the case of sensor range and process connections where the over pressure limit (OPL) of the process connection is smaller than the nominal value of the sensor, the device is set at the factory, at the very maximum, to the OPL value of the process connection. If you want to use the entire sensor range, select a process connection with a higher OPL value (1.5 x PN; MWP = PN)
- In oxygen applications, the values for "p_{max} and T_{max} for oxygen applications must not be exceeded → 🖹 38.
- Steam hammering must be avoided. Steam hammering can cause zero point drifts. Recommendation: Residue (water droplets or condensation) may remain on the process isolating diaphragm following CIP cleaning and can result in local steam hammering the next time steam cleaning takes place. In practice, drying the process isolating diaphragm (e.g. by blowing) has proved to prevent steam hammering.

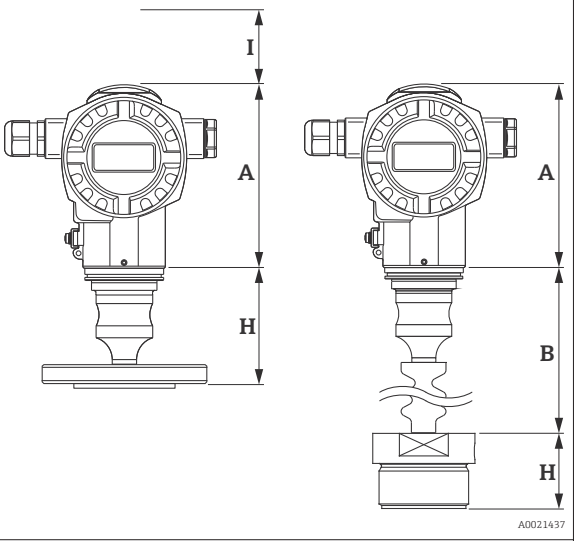
Mechanical construction

Device height

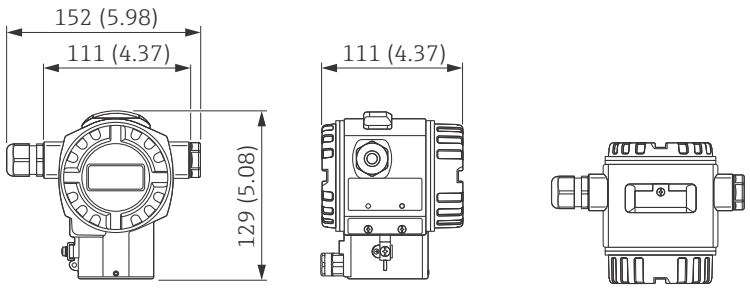
The device height is calculated from

- the height of the housing
- the height of optional mounted parts such as temperature isolators or capillaries
- the height of the relevant process connection.

The individual heights of the components can be found in the following sections. To calculate the device height, simply add up the individual heights of the components. If necessary, the installation space (the space used to install the device) must also be taken into account. You can use the following table for this:

Section	Page	Height	Example
Height of housing	→ 📄 45 ff.	(A)	
Optional mounted parts	→ 📄 49	(B)	
Process connections	→ 📄 49	(H)	
Installation space	-	(I)	
Device height			

T14 housing, optional display on the side

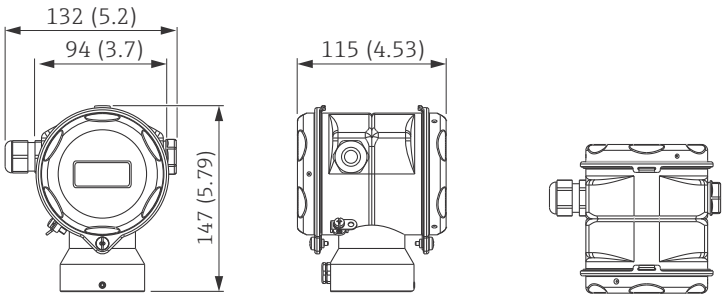


Engineering unit mm (in). Front view, left-hand side view, top view

Material		Degree of protection	Cable entry	Weight in kg (lb)		Option [1]
Housing	Cover seal			with display	without display	
Aluminum	EPDM	IP66/67 NEMA 6P	M20 gland	1.2 (2.65)	1.1 (2.43)	A
		IP66/67 NEMA 6P	G ½" thread			B
		IP66/67 NEMA 6P	NPT ½" thread			C
		IP66/67 NEMA 6P	M12 plug			D
		IP66/67 NEMA 6P	7/8" plug			E
		IP65 NEMA 4	HAN7D plug 90 degrees			F
316L	EPDM	IP66/67 NEMA 6P	M20 gland	2.1 (4.63)	2.0 (4.41)	1
		IP66/67 NEMA 6P	G ½" thread			2
		IP66/67 NEMA 6P	NPT ½" thread			3
		IP66/67 NEMA 6P	M12 plug			4
		IP66/67 NEMA 6P	7/8" plug			5
		IP65 NEMA 4	HAN7D plug 90 degrees			6
	FVMQ	IP66/67 NEMA 6P	M20 gland			7
	FVMQ	IP66/67 NEMA 6P	NPT ½" thread			8

1) Product Configurator, order code for "Housing, cover seal, cable entry, degree of protection"

T17 housing (hygienic), optional display on the side



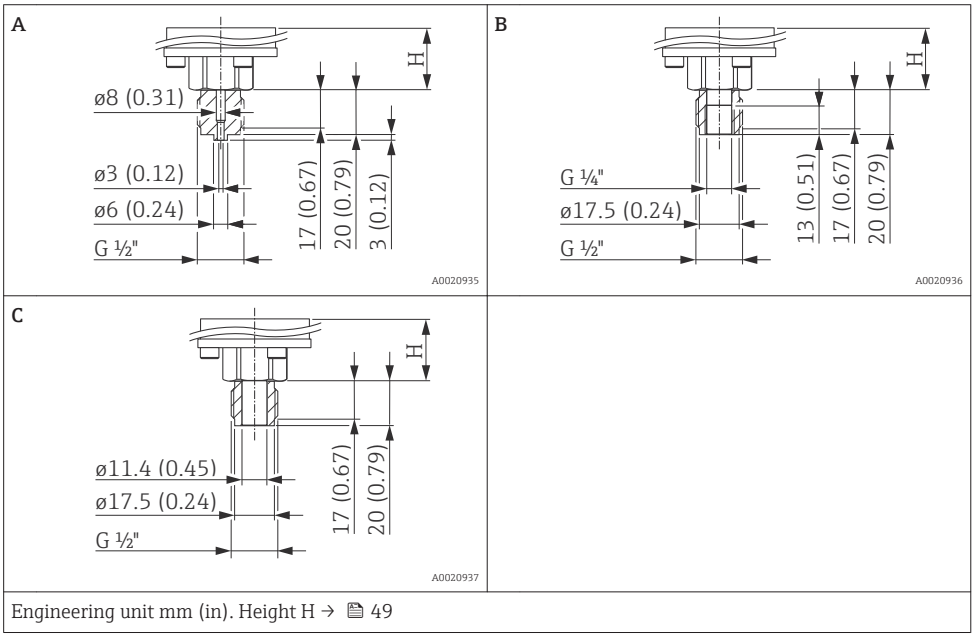
Engineering unit mm (in). Front view, left-hand side view, top view

Material		Degree of protection [1]	Cable entry	Weight in kg (lb)		Option [2]
Housing	Cover seal			with display	without display	
316L	EPDM	IP66/68 NEMA 6P	M20 gland	1.2 (2.65)	1.1 (2.43)	R
		IP66/68 NEMA 6P	G ½" thread			S
		IP66/68 NEMA 6P	NPT ½" thread			T
		IP66/68 NEMA 6P	M12 plug			U
		IP66/68 NEMA 6P	7/8" plug			V

1) Degree of protection IP 68: 1.83 mH_2O for 24 h
2) Product Configurator, order code for "Housing, cover seal, cable entry, degree of protection"

Process connections for PMC71 with internal process isolating diaphragm

Threaded connection ISO 228 G

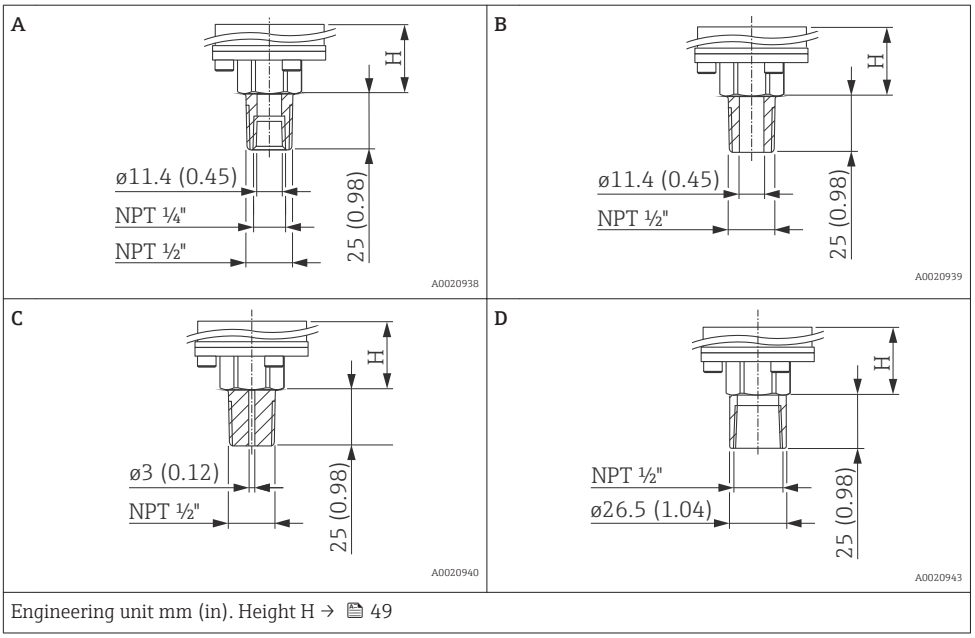


Engineering unit mm (in). Height H → 🖹 49

Item	Description	Material	Weight	Approval [1]	Option [2]
			kg (lb)		
A	Thread ISO 228 G ½" A EN 837	AISI 316L	0.63 (1.39)	CRN	GA
		Alloy C276 (2.4819)		CRN	GB
		Monel (2.4360)		-	GC
		PVDF ▪ Only mount with a mounting bracket (included) ▪ MWP 10 bar (150 psi), OPL max. 15 bar (225 psi) ▪ Process temperature range: +10 to +60 °C (+14 to +140 °F)		-	GD
B	Thread ISO 228 G ½" A, G ¼" (internal)	AISI 316L		CRN	GE
		Alloy C276 (2.4819)		CRN	GF
		Monel (2.4360)		-	GG
C	Thread ISO 228 G ½" A, Hole11.4 mm (0.45 in)	AISI 316L		CRN	GH
		Alloy C276 (2.4819)		CRN	GJ
		Monel (2.4360)		-	GK

1) CSA approval: Product Configurator, order code for "Approval"
2) Product Configurator, order code for "Process connection"

Threaded connection ANSI



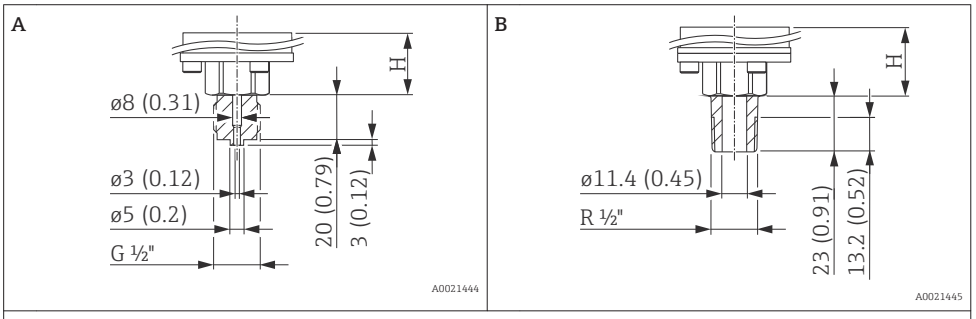
Engineering unit mm (in). Height H → 49

Item	Description	Material	Weight	Approval [1]	Option [2]
			kg (lb)		
A	ANSI ½" MNPT, ¼" FNPT	AISI 316L	0.63 (1.39)	CRN	RA
		Alloy C276 (2.4819)		CRN	RB
		Monel (2.4360)		-	RC
B	ANSI ½" MNPT, Hole11.4 mm (0.45 in)	AISI 316L		CRN	RD
		Alloy C276 (2.4819)		CRN	RE
		Monel (2.4360)		-	RF
C	ANSI ½" MNPT, Hole3 mm (0.12 in)	**PVDF** ▪ Only mount with a mounting bracket (included) ▪ MWP 10 bar (150 psi), OPL max. 15 bar (225 psi) ▪ Process temperature range: +10 to +60 °C (+14 to +140 °F)		-	RG
D	ANSI ½" FNPT Hole11.4 mm (0.45 in)	AISI 316L		CRN	RH
		Alloy C276 (2.4819)		CRN	RJ
		Monel (2.4360)		-	RK

1) CSA approval: Product Configurator, order code for "Approval"
2) Product Configurator, order code for "Process connection"

Process connections for PMC71 with internal process isolating diaphragm

Threaded connection JIS

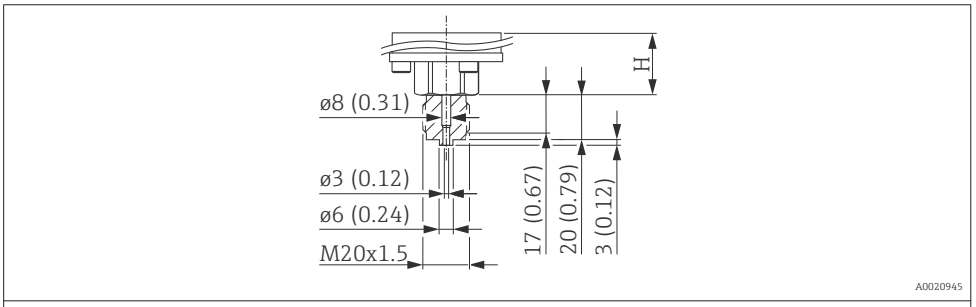


Engineering unit mm (in). Height H → 🖹 49

Item	Description	Material	Weight	Option [1]
			kg (lb)	
A	JIS B0202 G ½" (male)	AISI 316L	0.63 (1.39)	GL
B	JIS B0203 R ½" (male)			RL

1) Product Configurator, order code for "Process connection"

Threaded connection DIN 13



Engineering unit mm (in). Height H → 🖹 49

Description	Material	Weight	Option [1]
		kg (lb)	
DIN 13 M20 x 1.5, EN 837 3 mm (0.12 in)	AISI 316L	0.63 (1.39)	GP
	Alloy C276 (2.4819)		GQ

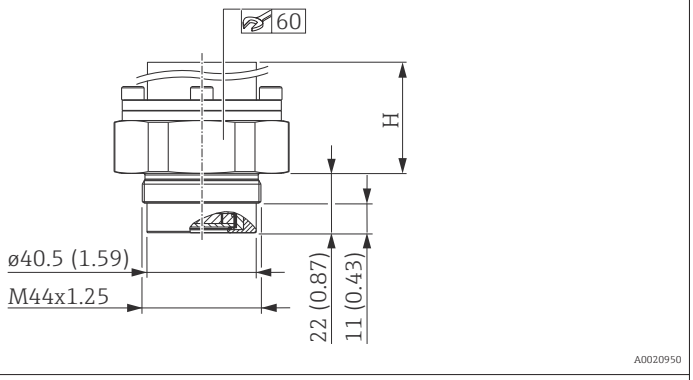
1) Product Configurator, order code for "Process connection"

Process connections for PMC71 with internal process isolating diaphragm - height H

Description	Height H
Standard height	26 mm (1.02 in)
Device with Ex d[ia], CSA XP or FM XP	96 mm (3.78 in)
High-temperature version	106 mm (4.17 in)
High-temperature version with Ex d[ia], CSA XP or FM XP	176 mm (6.93 in)

Process connections for PMC71 with flush-mounted process isolating diaphragm

Threaded connection DIN 13

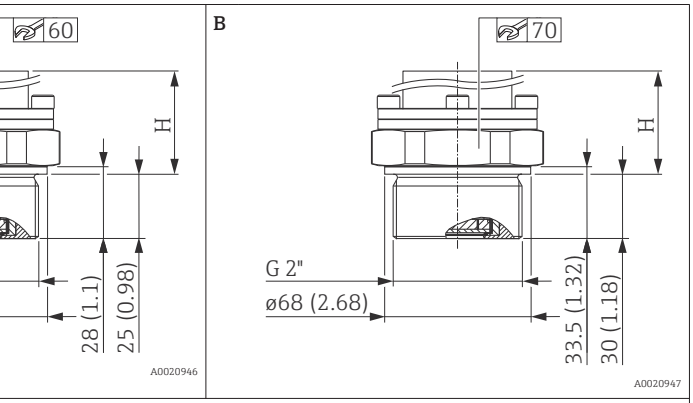


Engineering unit mm (in). Height H → 🖹 51

Description	Material	Weight	Option [1]
		kg (lb)	
DIN 13 M44 x 1.25	AISI 316L	0.63 (1.39)	1R
	Alloy C276 (2.4819)		1S

1) Product Configurator, order code for "Process connection"

Threaded connection ISO 228 G



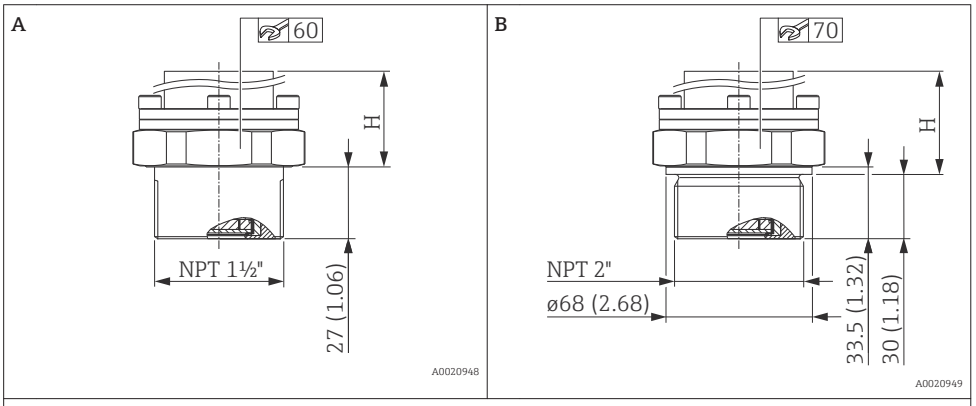
Engineering unit mm (in). Height H → 🖹 51

Item	Description	Material	Weight	Option [1]
			kg (lb)	
A	Thread ISO 228 G 1 ½" A	AISI 316L	0.63 (1.39)	1G
		Alloy C276 (2.4819)		1H
		Monel (2.4360)		1J
B	Thread ISO 228 G 2" A	AISI 316L		1K
		Alloy C276 (2.4819)		1L
		Monel (2.4360)		1M

1) Product Configurator, order code for "Process connection"

Process connections for PMC71 with flush-mounted process isolating diaphragm

Threaded connection ANSI



Engineering unit mm (in). Height H → 51

Item	Description	Material	Weight	Approval [1]	Option [2]
			kg (lb)		
A	ANSI 1 ½" MNPT	AISI 316L (CRN)	0.63 (1.39)	CRN	2D
		Alloy C276 (2.4819) (CRN)		CRN	2E
		Monel (2.4360)		-	2F
B	ANSI 2" MNPT	AISI 316L (CRN)		CRN	2G
		Alloy C276 (2.4819) (CRN)		CRN	2H
		Monel (2.4360)		-	2J

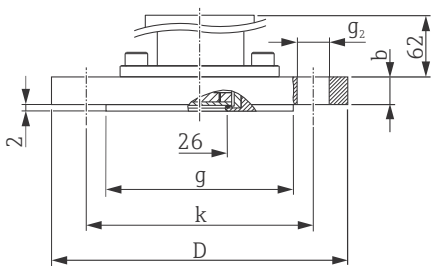
1) CSA approval: Product Configurator, order code for "Approval"
2) Product Configurator, order code for "Process connection"

Process connections for PMC71 with flush-mounted process isolating diaphragm - height H

Description	Height H
High-temperature version	86 mm (3.39 in)
High-temperature version with Ex d[ia], CSA XP or FM XP	151 mm (5.94 in)

Process connections for PMC71 with flush-mounted process isolating diaphragm

EN/DIN flanges, connection dimensions in accordance with EN 1092-1/DIN 2527

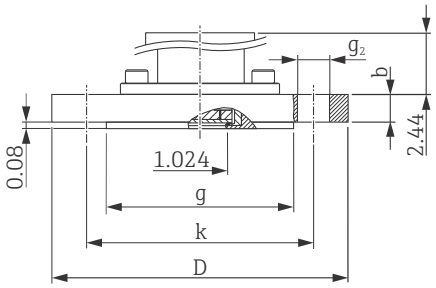


Engineering unit mm

Flange							Boltholes			Weight	Option [1]
Material	Nominal diameter	Nominal pressure	Shape [2]	D	Thickness b	Raised face g	Number	g_2	Hole circle k		
				mm	mm	mm		mm	mm	kg (lb)	
AISI 316L	DN 25	PN 10-40	B1 (D)	115	18	68	4	14	85	1.4 (3.09)	BA
AISI 316L	DN 32	PN 10-40	B1 (D)	140	18	78	4	18	100	2.0 (4.41)	CP
AISI 316L	DN 40	PN 10-40	B1 (D)	150	18	88	4	18	110	2.4 (5.29)	CQ
AISI 316L	DN 50	PN 10-40	B1 (D)	165	20	102	4	18	125	3.2 (7.06)	B3
PVDF	DN 50	PN 10-16	B1 (D)	165	21.4	102	4	18	125	0.6 (1.32)	BR
AISI 316L	DN 50	PN 63	B2 (E)	180	26	102	4	22	135	4.6 (10.14)	C3
PVDF	DN 80	PN 10-16	B1 (D)	200	21.4	138	8	18	160	1.0 (2.21)	BS
AISI 316L	DN 80	PN 10-40	B1 (D)	200	24	138	8	18	160	5.4 (11.91)	B4

1) Product Configurator, order code for "Process connection"
2) Description as per DIN 2527 provided in brackets

ASME flanges, connection dimensions in accordance with ASME B 16.5, raised face RF

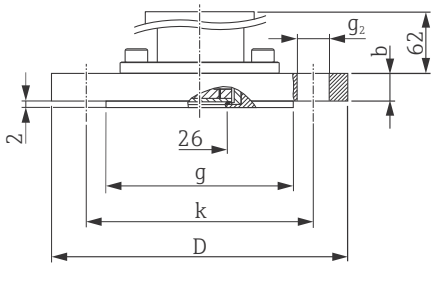


Engineering unit in.

Flange						Boltholes			Weight	Approval [1]	Option [2]
Material	Nominal diameter	Class	D	Thickness	Raised face	Number	g_2	Hole circle			
				b	g			k			
	[in]	[lb./sq.in]	[in]	[in]	[in]		[in]	[in]	[kg (lb)]		
AISI 316/316L [3]	1	150	4.25	1.18	2	4	0.62	3.12	0.9 (1.98)	-	AA [4]
AISI 316/316L [3]	1	300	4.88	1.18	2	4	0.75	3.5	1.4 (3.09)	-	AB [4]
AISI 316/316L [3]	1 ½	150	5	0.69	2.88	4	0.62	3.88	1.0 (2.21)	CRN	AE
AISI 316/316L [3]	1 ½	300	6.12	0.81	2.88	4	0.88	4.5	2.6 (5.73)	CRN	AQ
AISI 316/316L [3]	2	150	6	0.75	3.62	4	0.75	4.75	2.4 (5.29)	CRN	AF
ECTFE [5]	2	150	6	0.75	3.62	4	0.75	4.75	2.4 (5.29)	-	JR
PVDF	2	150	6	0.75	3.62	4	0.75	4.75	0.5 (1.1)	-	A3
AISI 316/316L [3]	2	300	6.5	0.88	3.62	8	0.75	5	3.2 (7.06)	CRN	AR
AISI 316/316L [3]	3	150	7.5	0.94	5	4	0.75	6	4.9 (10.8)	CRN	AG
ECTFE [5]	3	150	7.5	0.94	5	4	0.75	6	4.9 (10.8)	-	JS
PVDF	3	150	7.5	0.94	5	4	0.75	6	0.9 (1.98)	-	A4
AISI 316/316L [3]	3	300	8.25	1.12	5	8	0.88	6.62	6.8 (14.99)	CRN	AS
AISI 316/316L [3]	4	150	9	0.94	6.19	8	0.75	7.5	7.1 (15.66)	CRN	AH
ECTFE [5]	4	150	9	0.94	6.19	8	0.75	7.5	7.1 (15.66)	-	JT
AISI 316/316L [3]	4	300	10	1.25	6.19	8	0.88	7.88	11.6 (25.58)	CRN	AT

1) CSA approval: Product Configurator, order code for "Approval"
2) Product Configurator, order code for "Process connection"
3) Combination of AISI 316 for required pressure resistance and AISI 316L for required chemical resistance (dual rated)
4) Screws must be 15 mm (0.59 in) longer than the standard flange screws
5) ECTFE coating on AISI 316/316L. When operating in hazardous areas, avoid electrostatic charge on the plastic surfaces.

JIS flanges, connection dimensions in accordance with JIS B 2220 BL, raised face RF



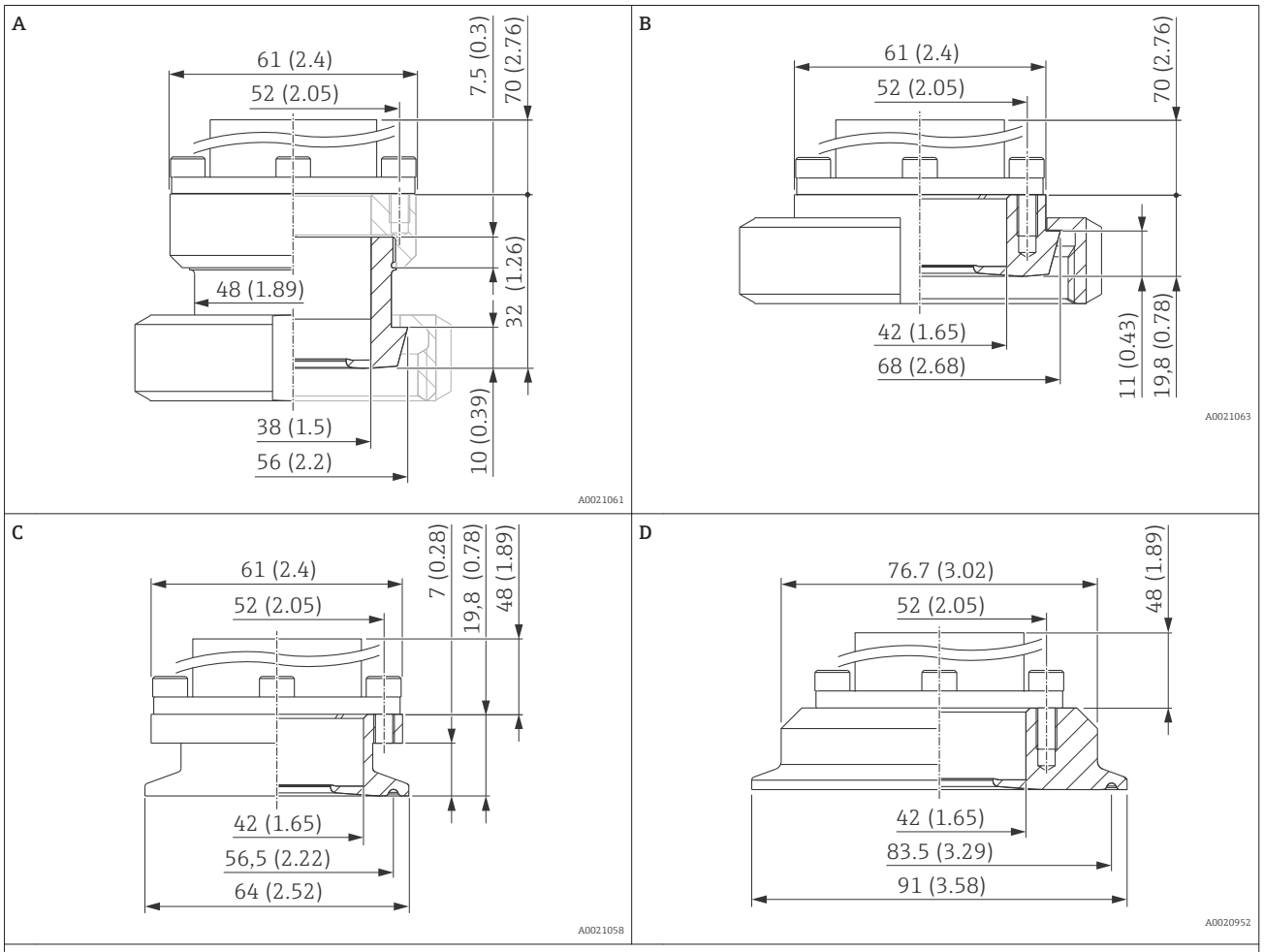
Engineering unit mm

Flange						Boltholes			Weight	Option [1]
Material	Nominal diameter	Nominal pressure	D	Thickness	Raised face	Number	g_2	Hole circle		
				b	g			k		
			mm	mm	mm		mm	mm	kg (lb)	
AISI 316L (1.4435)	50 A	10 K	155	16	96	4	19	120	2.0 (4.41)	KF
	80 A	10 K	185	18	127	8	19	150	3.3 (7.28)	KL
	100 A	10 K	210	18	151	8	19	175	4.4 (9.7)	KH

1) Product Configurator, order code for "Process connection"

Hygienic process connections for PMC71 with flush-mounted process isolating diaphragm

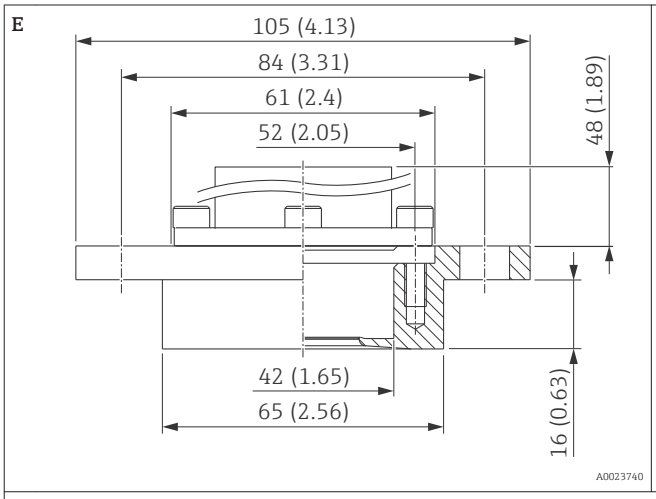
Many process connections with an EPDM or HNBR seal are approved for the PMC71 in accordance with the guidelines of the 3A Sanitary Standard. To ensure that the 3A approval is valid for the PMC71 version, a 3A-approved process connection together with an EPDM or HNBR seal must be selected when ordering (Product Configurator, order code for "Seal").

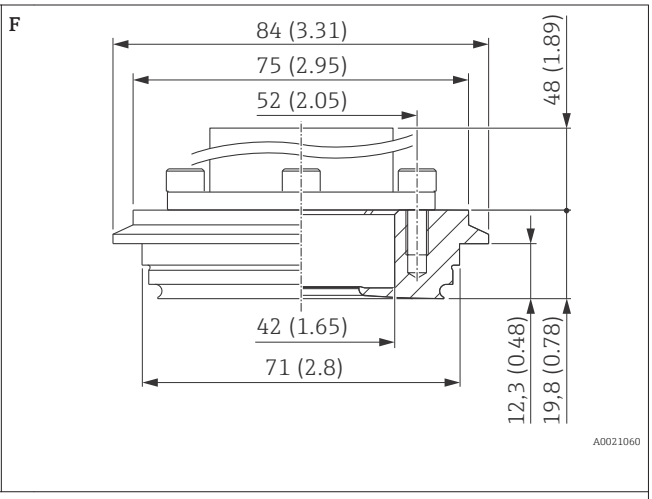


Engineering unit mm (in)

Item	Description	Nominal pressure	Material [1]	Weight	Approval [2]	Option [3]
				kg (lb)		
A	DIN 11851 DN 40 PN 25, with HNBR or EPDM seal	PN 25	AISI 316L (1.4435)	0.7 (1.54)	EHEDG, 3A, CRN	MP [4]
B	DIN 11851 DN 50 PN 25, with HNBR or EPDM seal	PN 25		0.9 (1.98)	EHEDG, 3A, CRN	MR [4]
C	Tri-Clamp ISO 2852 DN 51 (2"), with HNBR or EPDM seal	PN 40 [5]		0.7 (1.54)	EHEDG, 3A, CRN	TD [4]
D	Tri-Clamp ISO 2852 DN 76.1 (3"), with NBR or EPDM seal	PN 40 [5]		0.9 (1.98)	EHEDG, 3A, CRN	TF [4]

1) Delta-ferrite content < 1 %. Roughness of wetted surfaces R_a < 0.80 µm (31.5 µin) as standard. Lower surface roughness on request.
2) CSA approval: Product Configurator, order code for "Approval"
3) Product Configurator, order code for "Process connection"
4) Endress+Hauser supplies these slotted nuts in stainless steel AISI 304 (DIN/EN material number 1.4301) or in AISI 304L (DIN/EN material number 1.4307).
5) Restricted nominal pressure (13.8 bar (200 psi)) for the following approvals: Product Configurator, order code for "Approval", option "E", "U" and "V".





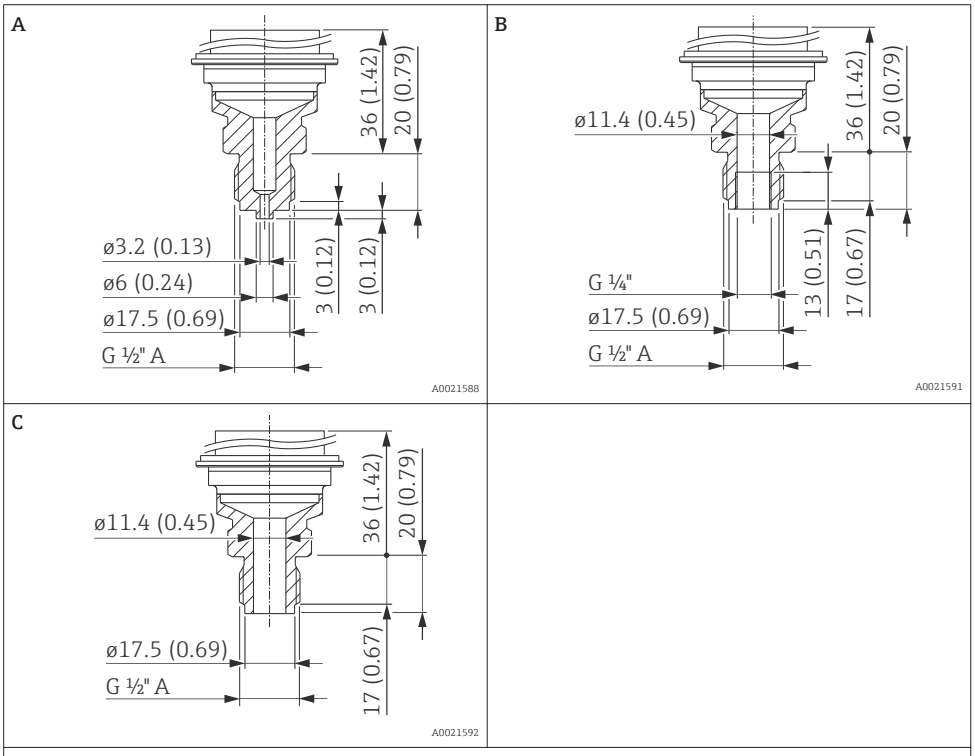
Engineering unit mm (in)

Item	Description	Nominal pressure	Material [1]	Weight	Approval [2]	Option [3]
				kg (lb)		
E	DRD DN50 (65 mm) with HNBR or EPDM seal	PN 25	AISI 316L (1.4435)	0.9 (1.98)	EHEDG	TK [4]
F	Varivent type N for pipes 40 – 162, with HNBR or EPDM seal	PN 40		1 (2.21)	EHEDG, 3A, CRN	TR

1) Delta-ferrite content < 1 %. Roughness of wetted surfaces R_a < 0.80 µm (31.5 µin) as standard. Lower surface roughness on request.
2) CSA approval: Product Configurator, order code for "Approval"
3) Product Configurator, order code for "Process connection"
4) Endress+Hauser supplies these slotted nuts in stainless steel AISI 304 (DIN/EN material number 1.4301) or in AISI 304L (DIN/EN material number 1.4307).

Process connections for PMP71 with internal process isolating diaphragm

Threaded connection ISO 228 G



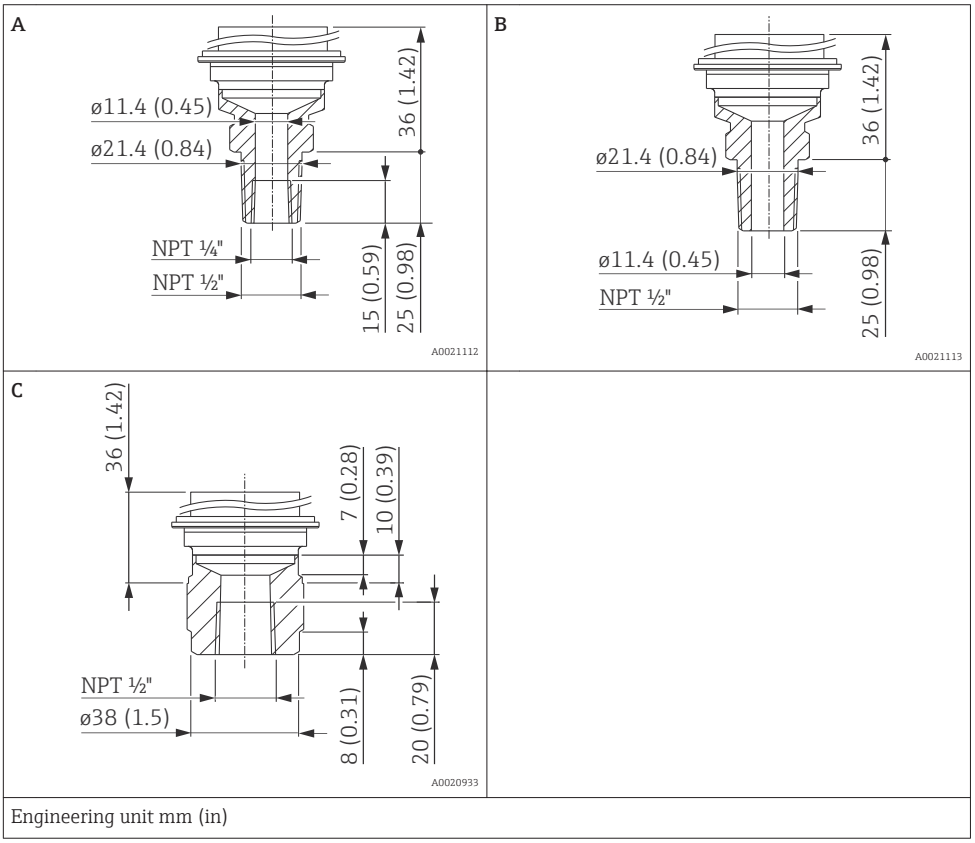
Engineering unit mm (in)

Item	Description	Material	Weight	Option [1]
			kg (lb)	
A	Thread ISO 228 G ½" A EN 837	AISI 316L	0.63 (1.39)	GA
		Alloy C276 (2.4819)		GB
B	Thread ISO 228 G ½" A, G ¼" (internal)	AISI 316L		GE
		Alloy C276 (2.4819)		GF
C	Thread ISO 228 G ½" A, Hole11.4 mm (0.45 in)	AISI 316L		GH
		Alloy C276 (2.4819)		GJ

1) Product Configurator, order code for "Process connection"

Process connections for PMP71 with internal process isolating diaphragm

Threaded connection ANSI



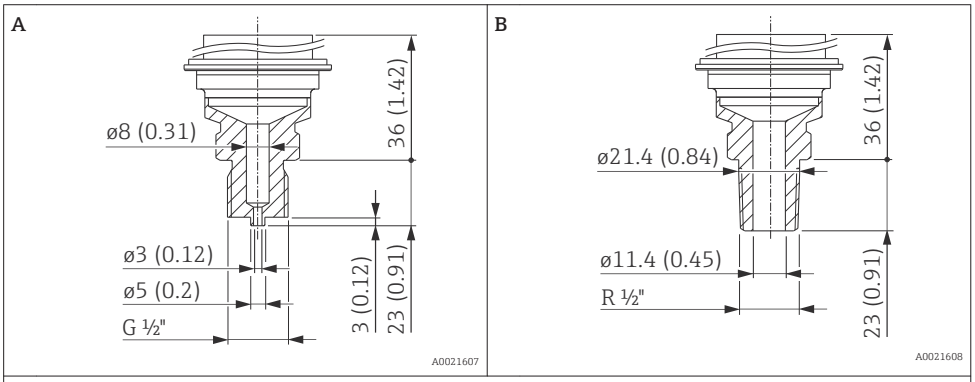
Engineering unit mm (in)

Item	Description	Material	Weight	Approval [1]	Option [2]
			kg (lb)		
A	ANSI ½" MNPT, ¼" FNPT	AISI 316L	0.63 (1.39)	CRN	RA
		Alloy C276 (2.4819)		CRN	RB
B	ANSI ½" MNPT, Hole 11.4 mm (0.45 in) = 400 bar (6 000 psi) Hole 3.2 mm (0.13 in) = 700 bar (10 500 psi)	AISI 316L		CRN	RD
		Alloy C276 (2.4819)		CRN	RE
C	ANSI ½" FNPT	AISI 316L	0.7 (1.54)	CRN	RH
		Alloy C276 (2.4819)		CRN	RJ

1) CSA approval: Product Configurator, order code for "Approval"
2) Product Configurator, order code for "Process connection"

Process connections for PMP71 with internal process isolating diaphragm

Threaded connection JIS

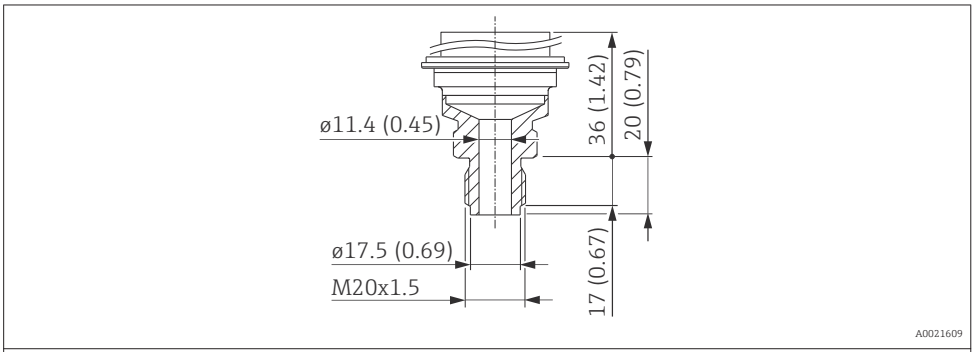


Engineering unit mm (in)

Item	Description	Material	Weight	Option [1]
			kg (lb)	
A	JIS B0202 G ½" (male)	AISI 316L	0.6 (1.32)	GL
B	JIS B0203 R ½" (male)			RL

1) Product Configurator, order code for "Process connection"

Threaded connection DIN 13



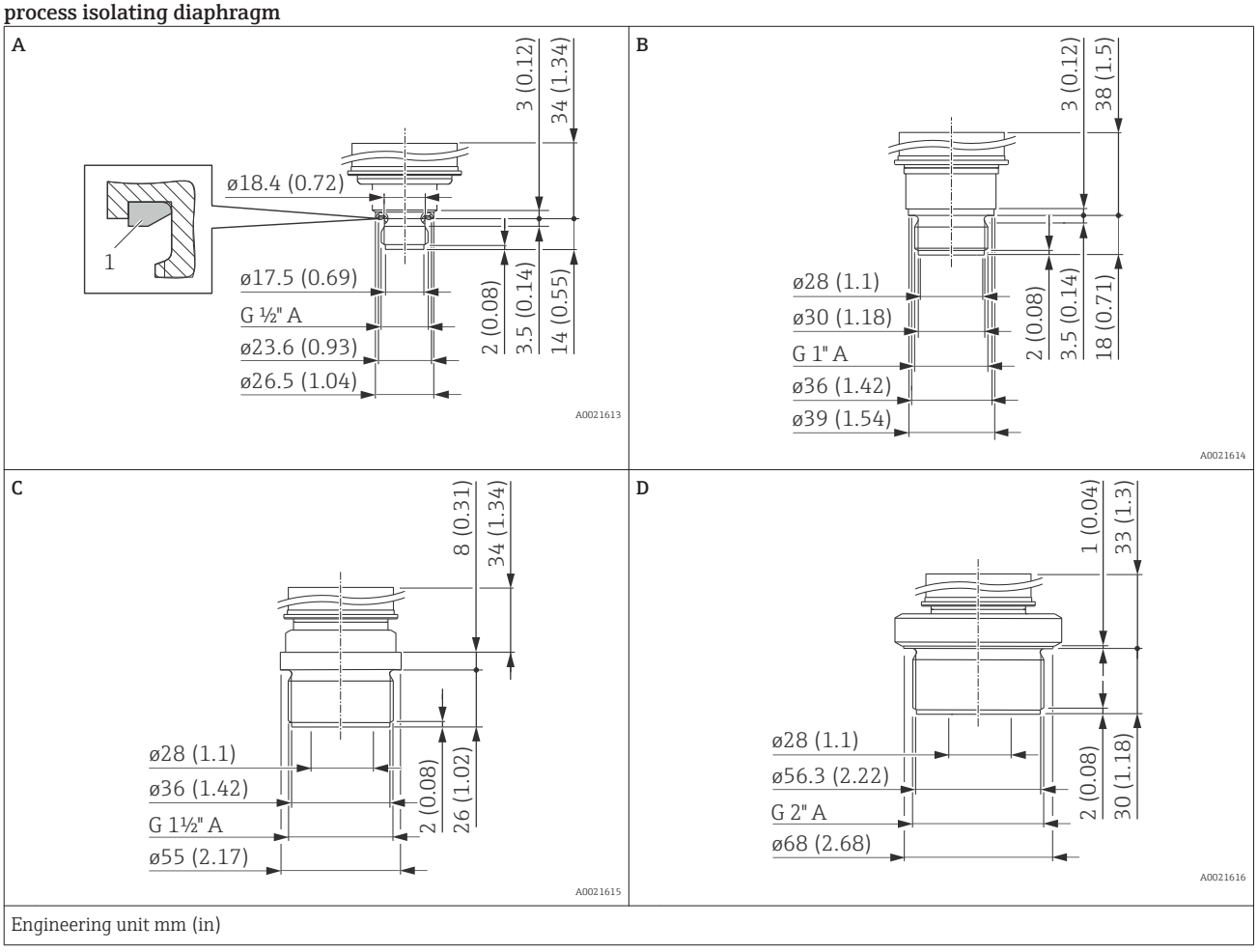
Engineering unit mm (in)

Description	Material	Weight	Option [1]
		kg (lb)	
DIN 13 M20 x 1.5, EN 837 11.4 mm (0.45 in)	AISI 316L	0.6 (1.32)	GP
	Alloy C276 (2.4819)		GQ

1) Product Configurator, order code for "Process connection"

Process connections for PMP71 with flush-mounted process isolating diaphragm

Threaded connection ISO 228 G

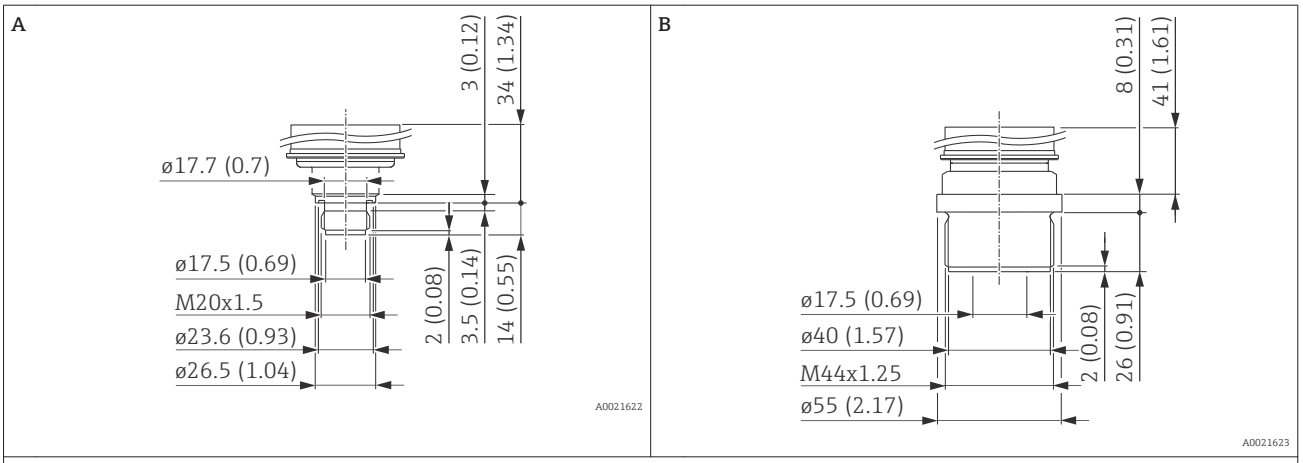


Engineering unit mm (in)

Item	Description	Material	Weight	Option [1]
			kg (lb)	
A	Thread ISO 228 G ½" A, DIN 3852 FKM seal (item 1) pre-installed	AISI 316L	0.4 (0.88)	1A
		Alloy C276 (2.4819)		1B
B	Thread ISO 228 G 1" A	AISI 316L	0.7 (1.54)	1D
		Alloy C276 (2.4819)		1E
C	Thread ISO 228 G 1 ½" A	AISI 316L	1.1 (2.43)	1G
		Alloy C276 (2.4819)		1H
D	Thread ISO 228 G 2" A	AISI 316L	1.5 (3.31)	1K
		Alloy C276 (2.4819)		1L

1) Product Configurator, order code for "Process connection"

Threaded connection DIN



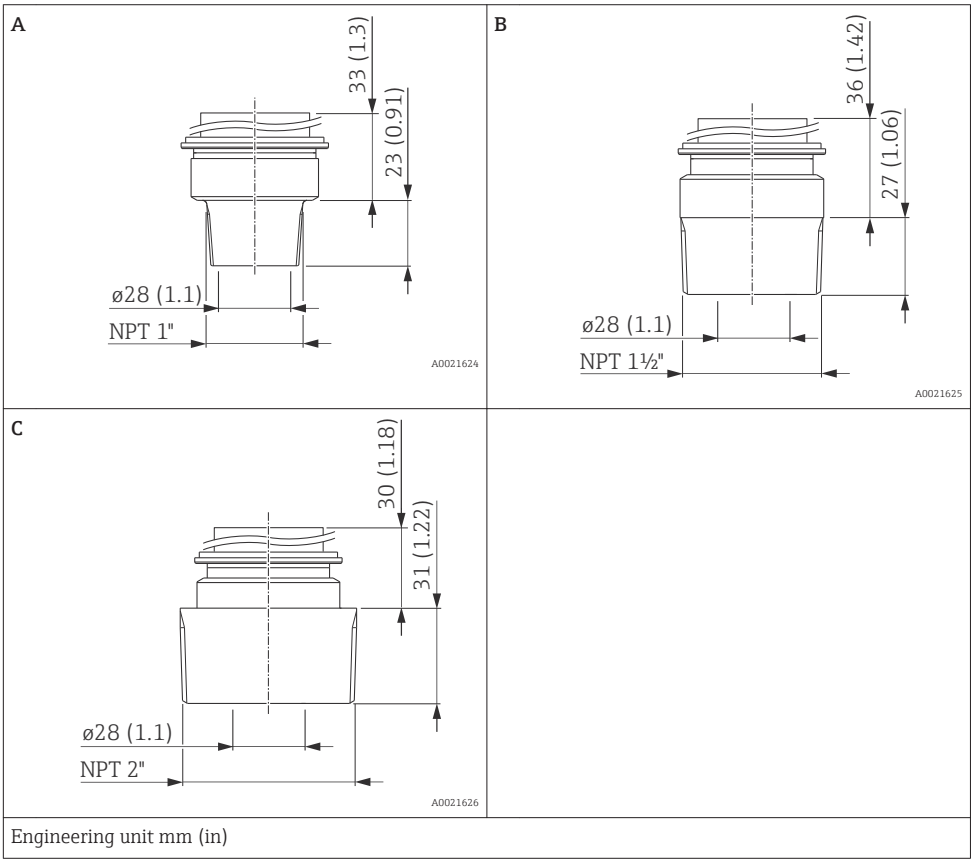
Engineering unit mm (in)

Item	Description	Material	Weight	Option [1]
			kg (lb)	
A	Thread DIN 16288 M20	AISI 316L	0.4 (0.88)	1N
		Alloy C276 (2.4819)		1P
B	Thread DIN 13 M44 x 1.25	AISI 316L	1.1 (2.43)	1R
		Alloy C276 (2.4819)		1S

1) Product Configurator, order code for "Process connection"

Process connections for PMP71 with flush-mounted process isolating diaphragm

Threaded connection ANSI



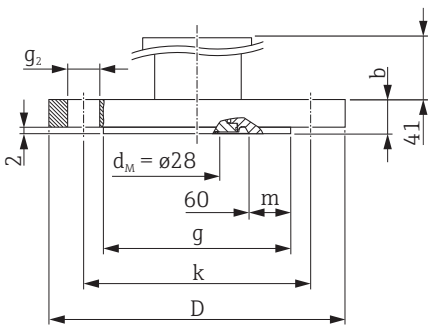
Engineering unit mm (in)

Item	Description	Material	Weight	Approval [1]	Option [2]
			kg (lb)		
A	ANSI 1" MNPT	AISI 316L	0.7 (1.54)	CRN	2A
		Alloy C276 (2.4819)		CRN	2B
B	ANSI 1 ½" MNPT	AISI 316L	1 (2.21)	CRN	2D
		Alloy C276 (2.4819)		CRN	2E
C	ANSI 2" MNPT	AISI 316L	1.3 (2.87)	CRN	2G
		Alloy C276 (2.4819)		CRN	2H

1) CSA approval: Product Configurator, order code for "Approval"
2) Product Configurator, order code for "Process connection"

Process connections for PMP71 with flush-mounted process isolating diaphragm

EN/DIN flanges, connection dimensions in accordance with EN 1092-1/DIN 2527



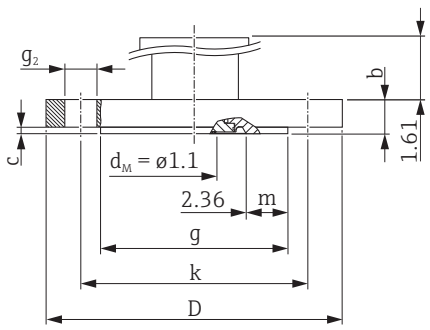
Engineering unit mm

Flange [1]							Boltholes			Weight Flange	Option [2]
Nominal diameter	Nominal pressure	Shape [3]	D	Thickness	Raised face	Width of Raised face	Number	g_2	Hole circle		
				b	g	m			k		
			[mm]	[mm]	[mm]	[mm]		[mm]	[mm]	[kg]	
DN 25	PN 10-40	B1 (D)	115	18	68 [4]	4	4	14	85	1.2 (2.65)	CN
DN 32	PN 10-40	B1 (D)	140	18	78 [4]	9	4	18	100	1.9 (4.19)	CP
DN 40	PN 10-40	B1 (D)	150	18	88 [4]	14	4	18	110	2.2 (4.85)	CQ
DN 50	PN 10-40	B1 (D)	165	20	102	-	4	18	125	3.0 (6.62)	B3
DN 80	PN 10-40	B1 (D)	200	24	138	-	8	18	160	5.3 (11.69)	B4

1) Material: AISI 316L
2) Product Configurator, order code for "Process connection"
3) Name as per DIN 2527 provided in brackets
4) With these process connections the raised face is smaller than described in the standard. Due to a smaller raised face a special seal must be used. For further information, please contact a seal manufacturer or your local Endress+Hauser Sales Center.

Process connections for PMP71 with flush-mounted process isolating diaphragm

ASME flanges, connection dimensions in accordance with ASME B 16.5, raised face RF*



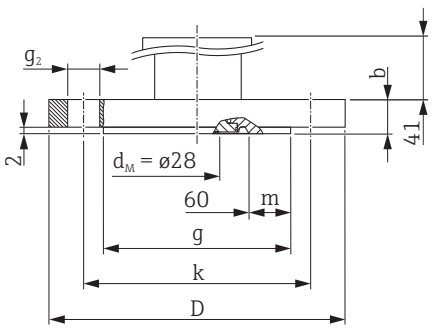
Engineering unit in.
(*all apart from AN, see table below)

Flange [1]							Boltholes			Weight	Approval [2]	Option [3]
Nominal diameter	Class/ nominal pressure	D	Thickness	Raised face	Thickness of raised face	Width of Raised face	Number	g_2	Hole circle			
			b	g	c	m			k			
[in]	lb./sq.in	[in]	[in]	[in]	[in]	[in]		[in]	[in]	[kg]		
1	300	4.88	0.69	2 [4]	0.06	0.2	4	0.75	3.5	1.3 (2.87)	CRN	AN
1 ½	150	5	0.69	2.88 [4]	0.08	0.52	4	0.62	3.88	1.5 (3.31)	CRN	AE
1 ½	300	6.12	0.81	2.88 [4]	0.08	0.52	4	0.88	4.5	2.6 (5.73)	CRN	AQ
2	150	6	0.75	3.62	0.08	-	4	0.75	4.75	2.4 (5.29)	CRN	AF
2	300	6.5	0.88	3.62	0.08	-	8	0.75	5	3.2 (7.06)	CRN	AR
3	150	7.5	0.94	5	0.08	-	4	0.75	6	4.9 (10.8)	CRN	AG
3	300	8.25	1.12	5	0.08	-	8	0.88	6.62	6.7 (14.77)	CRN	AS
4	150	9	0.94	6.19	0.08	-	8	0.75	7.5	7.1 (15.66)	CRN	AH
4	300	10	1.25	6.19	0.08	-	8	0.88	7.88	11.6 (25.88)	CRN	AT

1) Material: AISI 316/316L; Combination of AISI 316 for required pressure resistance and AISI 316L for required chemical resistance (dual rated)
2) CSA approval: Product Configurator, order code for "Approval"
3) Product Configurator, order code for "Process connection"
4) With these process connections the raised face is smaller than described in the standard. Due to a smaller raised face a special seal must be used. For further information, please contact a seal manufacturer or your local Endress+Hauser Sales Center.

Process connections for PMP71 with flush-mounted process isolating diaphragm

JIS flanges, connection dimensions in accordance with JIS B 2220 BL, raised face RF



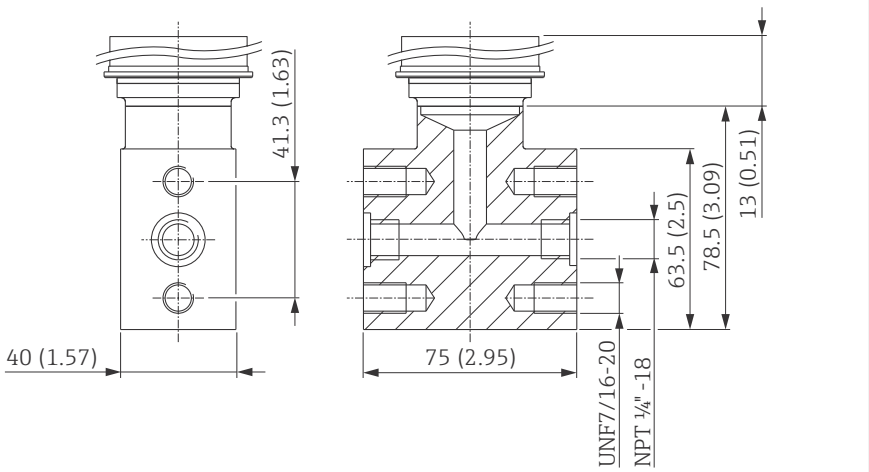
Engineering unit mm

Flange							Boltholes			Weight Flange	Option [1]
Material	Nominal diameter	Class/ Nominal pressure	D	Thickness	Raised face	Width of Raised face	Number	g_2	Hole circle		
				b	g	m			k		
			[mm]	[mm]	[mm]	[mm]		[mm]	[mm]	[kg]	
AISI 316L	25 A	20 K	125	16	67 [2]	3.5	4	19	90	1.5 (3.31)	KA
AISI 316L	50 A	10 K	155	16	96	-	4	19	120	2.0 (4.41)	KF
AISI 316L	80 A	10 K	185	18	127	-	8	19	150	3.3 (7.28)	KL
AISI 316L	100 A	10 K	210	18	151	-	8	19	175	4.4 (9.7)	KH

1) Product Configurator, order code for "Process connection"
2) With these process connections the raised face is smaller than described in the standard. Due to a smaller raised face a special seal must be used. For further information, please contact a seal manufacturer or your local Endress+Hauser Sales Center.

Process connections for PMP71

Oval flange



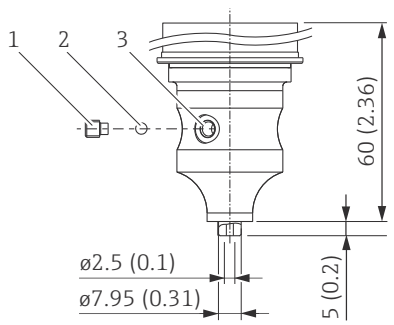
Engineering unit mm (in)

Material	Description	Weight	Approval [1]	Option [2]
		kg (lb)		
AISI 316L (1.4404)	Oval flange adapter 1/4-18 NPT as per IEC 61518 Mounting: 7/16-20 UNF	1.9 (4.19)	CRN	UR

1) CSA approval: Product Configurator, order code for "Approval"
2) Product Configurator, order code for "Process connection"

Process connections for PMP71

Prepared for diaphragm seal mount



1 Setscrew with hexagonal recess4 mm (0.16 in), material A2-70
2 Bearing DIN 5401 (1.3505)
3 Hole for filling fluid

Engineering unit mm (in)

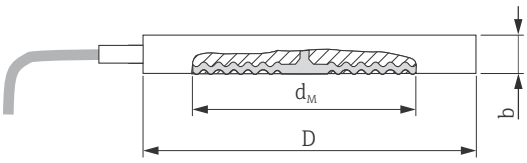
Material	Description	Weight in kg (lb)	Approval [1]	Option [2]
AISI 316L (1.4404)	Prepared for diaphragm seal mount	1.9 (4.19)	CRN	U1

1) CSA approval: Product Configurator, order code for "Approval"
2) Product Configurator, order code for "Process connection"

Process connections for PMP75 with flush-mounted process isolating diaphragm

- The weights of the diaphragm seals are given in the tables. For the weight of the housing, see
- The following drawings are drawings that illustrate how the system works in principle. In other words, the dimensions of a diaphragm seal supplied can deviate from the dimensions given in this document.
- With the use of high-temperature oils the design can deviate strongly.
- Note "Planning instructions, diaphragm seal systems" section→ 99
- For further information please contact your local Endress+Hauser Sales Center.

Diaphragm seal cell structure

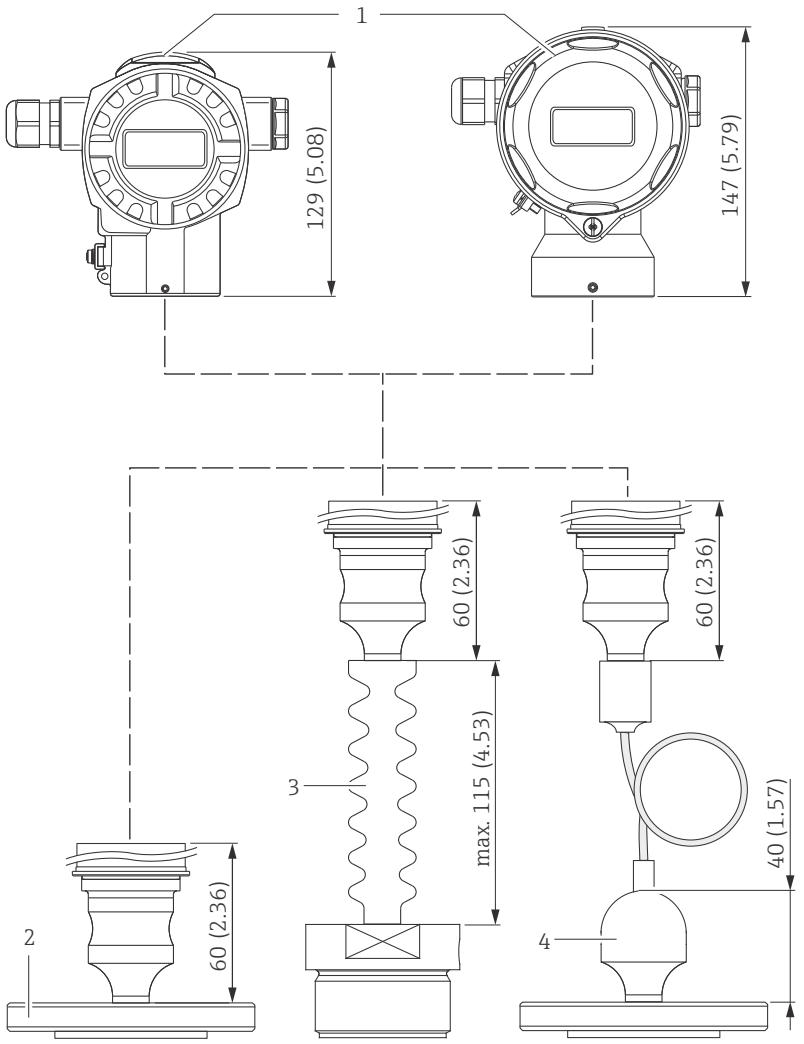


Engineering unit mm (in)

Flange					Diaphragm seal		Approval [1]	Option [2]
Material	Nominal diameter	Nominal pressure [3]	D	Thickness b	Max. diameter of the process isolating diaphragm d_M	Weight [kg (lb)]		
			[mm]	[mm]	[mm]			
AISI 316L	DN 50	PN 16-400	102	20	59	1.3 (2.87)	-	UI
	DN 80	PN 16-400	138	20	89	2.3 (5.07)	-	UJ
	DN 100	PN 16-400	162	20	89	3.1 (6.84)	-	UK
	[in]	[lb/sq.in]	[in (mm)]	[in (mm)]	[in (mm)]			
	2	150-2500	4.01 (102)	0.79 (20)	2.32 (59)	1.3 (2.87)	CRN	UL
	3	150-2500	5.35 (136)	0.79 (20)	3.50 (89)	2.3 (5.07)	CRN	UM
	4	150-2500	6.22 (158)	0.79 (20)	3.50 (89)	3.1 (6.84)	CRN	UR

1) CSA approval: Product Configurator, order code for "Approval"
2) Product Configurator, order code for "Process connection"
3) The specified nominal pressure applies to the diaphragm seal. The maximum pressure for the measuring device is dependent on the lowest-rated element, with regard to pressure, of the selected components → 43.

PMP75 basic device

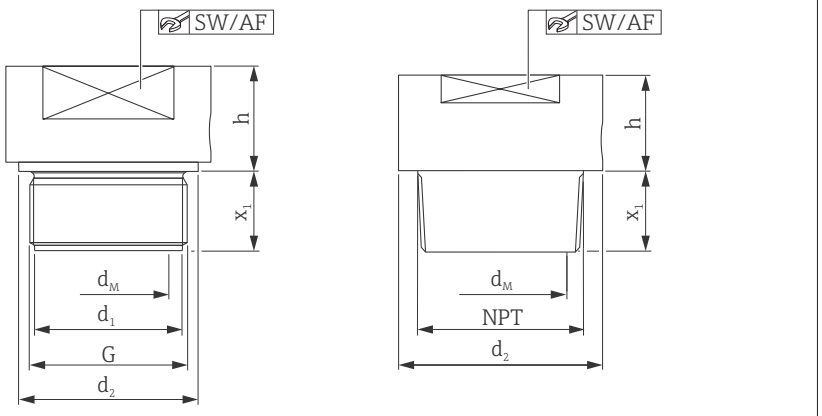


1 PMP75 basic device
2 Diaphragm seal, here, e.g. flange diaphragm seal
3 Diaphragm seal with temperature isolator
4 Process connections with capillary lines are 40 mm (1.57 in) higher than process connections without capillary lines

Engineering unit mm (in). PMP75 basic device with diaphragm seal.

Process connections for PMP75 with flush-mounted process isolating diaphragm

Thread ISO 228 and ANSI



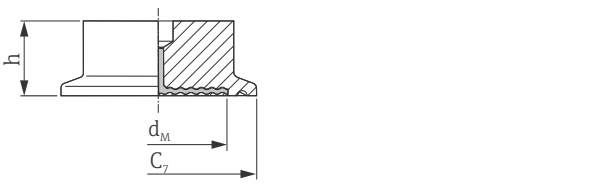
Engineering unit mm (in). Left: thread ISO 228, right: thread ANSI

Threaded connection							Diaphragm seal			Approval [1]	Option [2]
Material	Thread	Nominal pressure	d_1	d_2	Screw-in length	Across flats	Max. diameter of the process isolating diaphragm	Height	Weight		
		PN				SW/AF		h			
			[mm]	[mm]	[mm]		[mm]	[mm]	[kg (lb)]		
AISI 316L	G 1" A	400	30	39	21 [3]	32	30	19	0.4 (0.88)	-	1D
Alloy C276									0.5 (1.1)	-	1E
AISI 316L	G 1 ½" A	400	44	55	30	50	42	20	0.9 (1.98)	-	1G
Alloy C276									1.0 (2.21)	-	1H
AISI 316L	G 2"	400	56	68	30	65	50	20	1.9 (4.19)	-	1K
Alloy C276									2.1 (4.63)	-	1L
AISI 316L	1" MNPT	400	–	48	28	41	24	37	0.6 (1.32)	CRN	2A
Alloy C276									0.7 (1.54)	CRN	2B
AISI 316L	1 ½" MNPT	400	–	60	30	41	36	20	0.9 (1.98)	CRN	2D
Alloy C276									1.0 (2.21)	CRN	2E
AISI 316L	2" MNPT	400	–	78	30	65	38	35	1.8 (3.97)	CRN	2G
Alloy C276									2.0 (4.41)	CRN	2H

1) CSA approval: Product Configurator, order code for "Approval"
2) Product Configurator, order code for "Process connection"
3) 28 mm (1.1 in) in conjunction with high-temperature oil

Process connections for PMP75 with flush-mounted process isolating diaphragm

Tri-Clamp ISO 2852



Engineering unit mm (in)

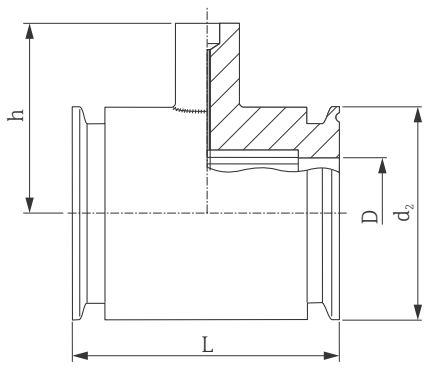
Material [1]	Nominal diameter ISO 2852	Nominal diameter DIN 32676	Nominal diameter	Diameter	Max. diameter of the process isolating diaphragm		Height	Weight	Approval [2]	Option [3]
					Standard	with TempC membrane				
				C_7	d_M	d_M	h			
			[in]	[mm]	[mm]	[mm]	[mm]	[kg (lb)]		
AISI 316L	ND 25 / 33.7	DN 25	1	50.5	24	-	37	0.32 (0.71)	EHEDG, 3A, CRN	TB
	ND 38	DN 40	1 ½	50.5	36	36	30	1 (2.21)	EHEDG, 3A, CRN	TC [4) 5)]
	ND 51 / 40	DN 50	2	64	48	41	30	1.1 (2.43)	EHEDG, 3A, CRN	TD [4) 5)]
	ND 63.5	DN 50	2 ½	77.5	61	61	30	0.7 (1.54)	EHEDG, 3A	TE [6)]
	ND 76.1	–	3	91	73	61	30	1.2 (2.65)	EHEDG, 3A, CRN	TF [5)]

1) Surface roughness of the wetted surfaces R_a < 0.76 µm (29.9 µin) as standard. Lower surface roughness on request.
2) CSA approval: Product Configurator, order code for "Approval"
3) Product Configurator, order code for "Process connection"
4) Optionally available as an ASME-BPE-compliant diaphragm seal version for use in biochemical processes, surfaces in contact with medium R_a < 0.38 µm (15 µin)) , electropolished; order using order code for "Additional options", option "P".
5) Alternatively available with TempC membrane.
6) With TempC membrane

PN max. = 40 bar (580 psi). The maximum PN depends on the clamp used.

Process connections for PMP75 with flush-mounted process isolating diaphragm

Tri-Clamp pipe diaphragm seal ISO 2852



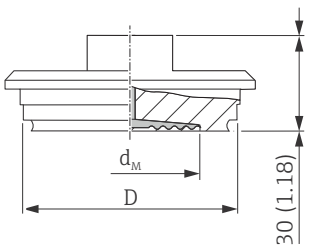
Engineering unit mm (in)

Material [1]	Nominal diameter ISO 2852	Nominal diameter	Nominal pressure	D	d_2	Height	Installation length	Weight	Approval [2]	Option [3]
						h	L			
		[in]		[in]	[mm]	[mm]	[mm]	[kg (lb)]		
AISI 316L	DN 25	1	PN 40	22.5	50.5	67	126	1.7 (3.75)	3A, CRN	SB
	DN 38	1 ½	PN 40	35.5	50.5	67	126	1.0 (2.21)	3A, CRN	SC [4]
	DN 51	2	PN 40	48.6	64	79	100	1.7 (3.75)	3A, CRN	SD [4]

1) Surface roughness of the wetted surfaces R_a < 0.8 µm (31.5 µin) as standard.
2) CSA approval: Product Configurator, order code for "Approval"
3) Product Configurator, order code for "Process connection"
4) incl. 3.1 and pressure test in accordance with the Pressure Equipment Directive, category II

Hygienic process connections for PMP75 with flush-mounted process isolating diaphragm

Varivent for pipes



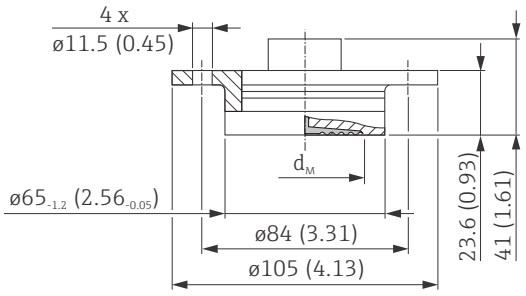
Engineering unit mm (in)

Material [1]	Description	Nominal pressure	D	Max. diameter of the process isolating diaphragm		Weight	Approval	Option [2]
				Standard	with TempC membrane			
				d_M	d_M			
			[mm]	[mm]	[mm]	[kg (lb)]		
AISI 316L	Type F for pipes DN 25 - DN 32	PN 40	50	34	36	0.4 (0.88)	EHEDG, 3A	TU [3]
AISI 316L	Type N for pipes DN 40 - DN 162	PN 40	68	58	61	0.8 (1.76)	EHEDG, 3A	TR [4] [5]

1) Surface roughness of the wetted surfaces R_a < 0.76 µm (29.9 µin) as standard.
2) Product Configurator, order code for "Process connection"
3) With TempC membrane
4) Optionally available as an ASME-BPE-compliant diaphragm seal version for use in biochemical processes, surfaces in contact with medium R_a < 0.38 µm (15 µin)) , electropolished; order using order code for "Additional options", option "P". Reduced surface roughness on request.
5) Alternatively available with TempC membrane.

Hygienic process connections for PMP75 with flush-mounted process isolating diaphragm

DRD DN50 (65 mm)

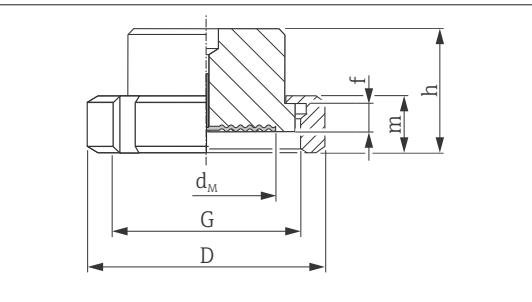


Engineering unit mm (in)

Material [1]	Nominal pressure	Max. diameter of the process isolating diaphragm		Weight	Option [2]
		Standard	with TempC membrane		
		d_M	d_M		
		[mm]	[mm]	[kg (lb)]	
AISI 316L	PN 25	50	48	0.75 (1.65)	TK [3]

1) Surface roughness of the wetted surfaces R_a < 0.76 µm (29.9 µin) as standard.
2) Product Configurator, order code for "Process connection"
3) Alternatively available with TempC membrane.

SMS nozzles with coupling nut

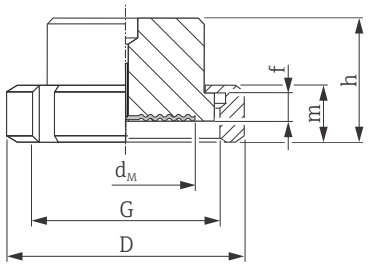


Engineering unit mm (in)

Material [1]	Nominal diameter	Nominal pressure	D	Nozzle height	Thread	Height	Height	max. diameter of the diaphragm	Weight	Approval	Option [2]
				f	G	m	h	d_M			
			[mm]	[mm]		[mm]	[mm]	[mm]	[kg (lb)]		
AISI 316L	1	PN 25	54	3.5	Rd 40 – 1/6	20	42.5	24	0.25 (0.55)	3A, EHEDG	TG
	1 ½	PN 25	74	4	Rd 60 – 1/6	25	57	36	0.65 (1.43)	3A, EHEDG	TH [3]
	2	PN 25	84	4	Rd 70 – 1/6	26	62	48	1.05 (2.32)	3A, EHEDG	TI [3]

1) Surface roughness of the wetted surfaces R_a < 0.76 µm (29.9 µin) as standard.
2) Product Configurator, order code for "Process connection"
3) Alternatively available with TempC diaphragm.

APV-RJT nozzles with coupling nut

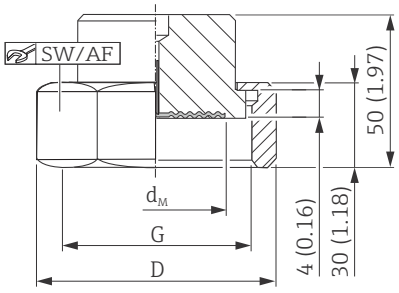


Engineering unit mm (in)

Material [1]	Nominal diameter	Nominal pressure	D	Nozzle height	Thread	Height	Height	Max. diameter of the process isolating diaphragm	Weight	Option [2]
		PN		f	G	m	h	d_M		
	[in]	[bar]	[mm]	[mm]		[mm]	[mm]	[mm]	[kg (lb)]	
AISI 316L	1	PN 40	77	6.5	1 13/16 – 1/8"	22	42.6	21	0.45 (0.99)	TL
	1 ½	PN 40	72	6.4	2 5/16 – 1/8"	22	42.6	28	0.75 (1.65)	TM
	2	PN 40	86	6.4	2 7/8 – 1/8"	22	42.6	38	1.2 (2.65)	TN

1) Surface roughness of the wetted surfaces R_a < 0.8 µm (31.5 µin) as standard.
2) Product Configurator, order code for "Process connection"

APV-ISS nozzles with coupling nut



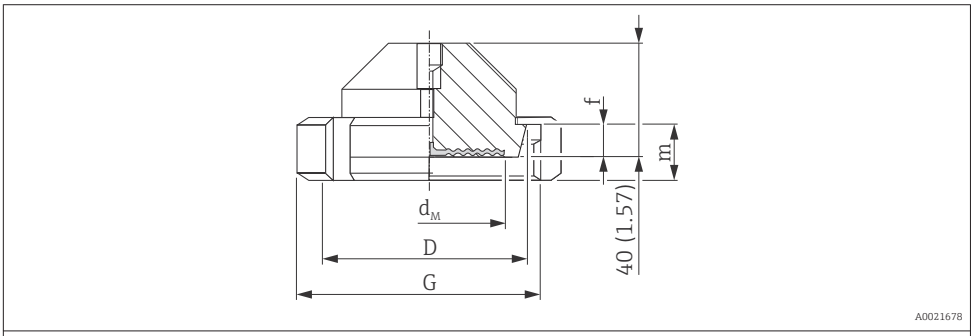
Engineering unit mm (in)

Material [1]	Nominal diameter	Nominal pressure	D	Thread	Across flats	Max. diameter of the process isolating diaphragm	Weight	Option [2]
		PN		G	AF	d_M		
	[in]	[bar]	[mm]			[mm]	[kg (lb)]	
AISI 316L	1	PN 40	54.1	1 ½" – 1/8"	46.8	24	0.4 (0.88)	TP
	1 ½	PN 40	72	2" – 1/8"	62	34	0.6 (1.32)	TQ
	2	PN 40	89	2 ½" – 1/8"	77	45	1.1 (2.43)	TS

1) Surface roughness of the wetted surfaces R_a < 0.8 µm (31.5 µin) as standard.
2) Product Configurator, order code for "Process connection"

Hygienic process connections for PMP75 with flush-mounted process isolating diaphragm

Taper adapter with coupling nut, DIN 11851



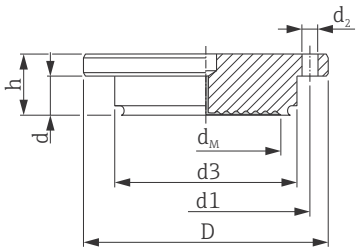
Engineering unit mm (in)

Material [1]	Taper adapter				Slotted nut		Diaphragm seal			Approval	Option [2]
							Max. diameter of the process isolating diaphragm		Weight		
	Description	Nominal pressure	D	Nozzle height	Thread	Height	Standard	with TempC membrane			
		PN		f	G	m	d_M	d_M			
		[bar]	[mm]	[mm]		[mm]	[mm]	[mm]	[kg (lb)]		
AISI 316L	DN 32	PN 40	50	10	Rd 58 x 1/6"	21	32	28	0.45 (0.99)	3A, EHEDG	MI [3]
	DN 40	PN 40	56	10	Rd 65 x 1/6"	21	38	36	0.45 (0.99)	3A, EHEDG	MZ [3]
	DN 50	PN 25	68.5	11	Rd 78 x 1/6"	19	52	48	1.1 (2.43)	3A, EHEDG	MR [4]
	DN 65	PN 25	86	12	Rd 95 x 1/6"	21	66	61	2.0 (4.41)	3A, EHEDG	MS [4]
	DN 80	PN 25	100	12	Rd 110 x 1/4"	26	81	61	2.55 (5.62)	3A, EHEDG	MT [4]

1) Surface roughness of the wetted surfaces R_a < 0.76 µm (29.9 µin) as standard.
2) Product Configurator, order code for "Process connection"
3) With TempC diaphragm
4) Alternatively available with TempC membrane.

NEUMO BioControl

Process temperature range: −10 to +200 °C (+14 to +392 °F)

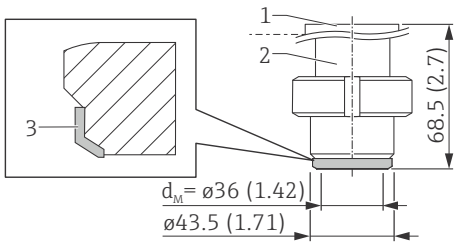


Engineering unit mm (in)

Material [1]	NEUMO BioControl								Diaphragm seal			Approval	Option [2]
									Max. diameter of the process isolating diaphragm		Weight		
	Nominal of the diaphragm	Nominal pressure	Diameter					Height	Standard	with TempC membrane			
		PN	D	d	d_2	d_3	d_1	m	d_M	d_M			
		[bar]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kg (lb)]		
AISI 316L	DN 50	PN 16	90	17	4 x Ø 9	50	70	27	40	36	1.1 (2.43)	3A	S4 [3]
	DN 80	PN 16	140	25	4 x Ø 11	87.4	115	37	61	61	2.6 (5.73)	3A	S6 [3]

1) Surface roughness of the wetted surfaces R_a < 0.76 µm (29.9 µin) as standard.
2) Product Configurator, order code for "Process connection"
3) With TempC membrane

Universal process adapter



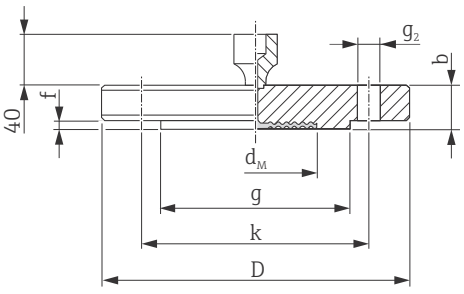
Engineering unit mm (in)

Description	Material [1]	Weight [kg (lb)]	Approval	Option [2]
Universal process adapter with pre-installed silicone molded seal (item 3) (spare part no.: 52023572) FDA 21CFR177.2600/USP Class VI-70C	▪ Item 1: Top section AISI 316L (1.4404) ▪ Item 2: Bottom section AISI 316L (1.4435)	0.8 (1.76)	3A, EHEDG	00 [3] [4]

1) Surface roughness of the wetted surfaces R_a < 0.76 µm (29.9 µin) as standard. Surface quality R_a< 0.38 µm (15 µin) electropolished (wetted)
Ordering information: Product Configurator, order code for "Additional options 2", option "P".
2) Product Configurator, order code for "Process connection"
3) Endress+Hauser supplies these slotted nuts in stainless steel AISI 304 (DIN/EN material number 1.4301) or in AISI 304L (DIN/EN material number 1.4307).
4) Alternatively available with TempC membrane.

Process connections for PMP75 with flush-mounted process isolating diaphragm

EN/DIN flanges, connection dimensions in accordance with EN 1092-1/DIN 2527 and DIN 2501-1

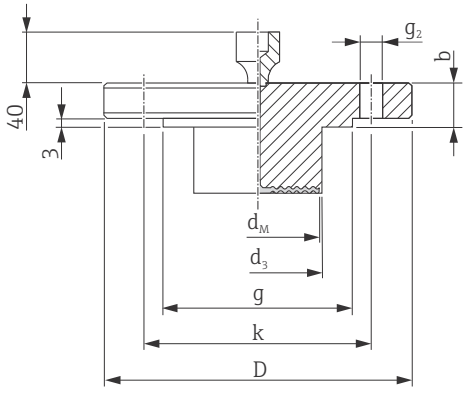


Engineering unit mm

Flange [1) 2) 3)]							Boltholes			Diaphragm seal		Option [4)]
Nominal diameter	Nominal pressure	Shape [5)]	D	Thickness	Raised face		Number	g_2	Hole circle	max. diameter process isolating diaphragm	Weight	
				b	g	f			k			
			[mm]	[mm]	[mm]	[mm]		[mm]	[mm]	d_M	[kg (lb)]	
DN 25	PN 10-40	B1 (D)	115	18	68	3	4	14	85	32	2.1 (4.63)	CN
DN 25	PN 63-160	B2 (E)	140	24	68	2	4	18	100	28	2.5 (5.51)	DN
DN 25	PN 250	B2 (E)	150	28	68	2	4	22	105	28	3.7 (8.16)	EN
DN 25	PN 400	B2 (E)	180	38	68	2	4	26	130	28	7.0 (15.44)	E1
DN 32	PN 10-40	B1 (D)	140	18	77	2.6	4	18	100	34	1.9 (4.19)	CP
DN 40	PN 10-40	B1 (D)	150	18	87	2.6	4	18	110	48	2.2 (4.85)	CQ
DN 50	PN 10-40	B1 (D)	165	20	102	3	4	18	125	59	3.0 (6.62)	B3
DN 50	PN 63	B2 (E)	180	26	102	3	4	22	135	59	4.6 (10.14)	C3
DN 50	PN 100-160	B2 (E)	195	30	102	3	4	26	145	59	6.2 (13.67)	EF
DN 50	PN 250	B2 (E)	200	38	102	3	8	26	150	59	7.7 (16.98)	ER
DN 50	PN 400	B2 (E)	235	52	102	3	8	30	180	59	14.7 (32.41)	E3
DN 80	PN 10-40	B1 (D)	200	24	138	3.5	8	18	160	89	5.3 (11.69)	B4
DN 80	PN 100	B2 (E)	230	32	138	4	8	24	180	89	8.9 (19.62)	C4
DN 100	PN 100	B2 (E)	265	36	175	5	8	30	210	89	13.7 (30.21)	C5

1) material: AISI 316L
2) The roughness of the surface in contact with the medium including the raised face of the flanges (all standards) made of Alloy C276, Monel, tantalum, rhodium-gold or PTFE is R_a< 0.8 µm (31.5 µin). Reduced surface roughness on request.
3) The raised face of the flange is made of the same material as the process isolating diaphragm.
4) Product Configurator, order code for "Process connection"
5) Description as per DIN 2527 provided in brackets

EN/DIN flanges with barrel (extended diaphragm seal), connection dimensions in accordance with EN 1092-1/DIN 2527 and DIN 2501-1



Engineering unit mm

Flange [1) 2)]						Boltholes			Diaphragm seal		Option [3)]
Nominal diameter	Nominal pressure	Shape [4)]	D	Thickness	Raised face	Number	g_2	Hole circle	max. diameter of the process isolating diaphragm	Weight	
				b	g			k			
			[mm]	[mm]	[mm]		[mm]	[mm]	d_M	[kg (lb)]	
DN 50	PN 10-40	B1 (D)	165	20	102	4	18	125	47	[5)]	D3 [5)]
DN 80	PN 10-40	B1 (D)	200	24	138	8	18	160	72	[5)]	D4 [5)]

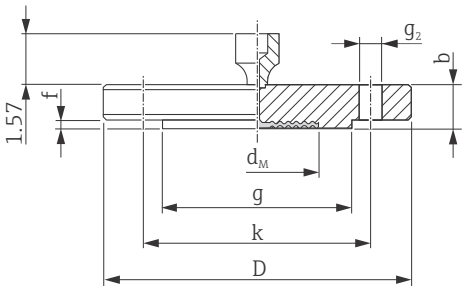
1) Material: AISI 316L
2) In the case of process isolating diaphragms made of Alloy C276, Monel or tantalum, the raised face of the flange and the barrel pipe are made of 316L
3) Product Configurator, order code for "Process connection"
4) Description as per DIN 2527 provided in brackets
5) Available with 50 mm (1.97 in), 100 mm (3.94 in) and 200 mm (7.87 in) barrel, (extended diaphragm seal), for barrel (extended diaphragm seal) diameter and weight see the following table

Option [1)]	Nominal diameter	Nominal pressure	Barrel (extended diaphragm seal) length	Barrel (extended diaphragm seal) diameter	Weight
			(L)	d_3	
			[mm]	[mm]	[kg (lb)]
D3	DN 50	PN 10-40	50 / 100 / 200	48.3	3.2 (7.1)/ 3.8 (8.4)/ 4.4 (9.7)
D4	DN 80	PN 10-40	50 /100 / 200	76	6.2 (13.7)/ 6.7 (14.8)/ 7.8 (17.2)

1) Product Configurator, order code for "Process connection"

Process connections for PMP75 with flush-mounted process isolating diaphragm

ASME flanges, in accordance with connection dimensions ASME B 16.5, raised face RF

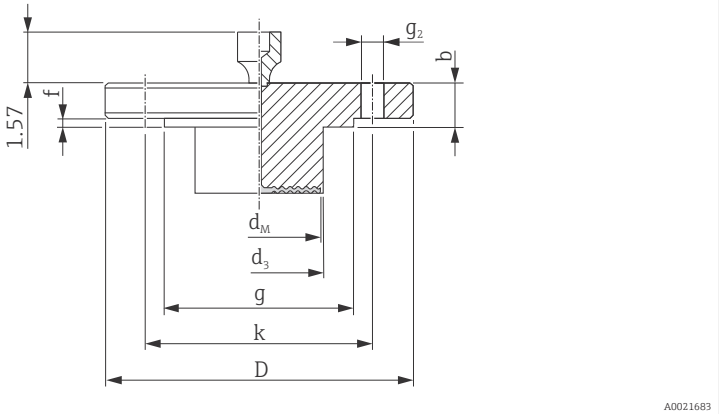


Engineering unit in

Flange [1) 2) 3)]						Boltholes			Diaphragm seal		Approval [4)]	Option [5)]
Nominal diameter	Class	D	Thickness	Raised face		Number	g_2	Hole circle	max. diameter of the process isolating diaphragm	Weight		
			b	g	f			k	d_M			
[in]	[lb./sq.in]	[in]	[in]	[in]	[in]		[in]	[in]	[in]	[kg (lb)]		
1	150	4.25	0.56	2	0.08	4	0.62	3.12	1.26	1.2 (2.65)	CRN	AC
1	300	4.88	0.69	2	0.08	4	0.75	3.5	1.26	1.3 (2.87)	CRN	AN
1	400/600	4.88	0.69	2	0.25	4	0.75	3.5	1.26	1.4 (3.09)	CRN	HC
1	900/1500	5.88	1.12	2	0.25	4	1	4	1.26	3.2 (7.06)	CRN	HN
1	2500	6.25	1.38	2	0.25	4	1	4.25	1.26	4.6 (10.14)	CRN	HO
1 ½	150	5	0.69	2.88	0.06	4	0.62	3.88	1.89	1.5 (3.31)	CRN	AE
1 ½	300	6.12	0.81	2.88	0.06	4	0.88	4.5	1.89	2.6 (5.73)	CRN	AQ
2	150	6	0.75	3.62	0.06	4	0.75	4.75	2.32	2.2 (4.85)	CRN	AF
2	300	6.5	0.88	3.62	0.06	8	0.75	5	2.32	3.4 (7.5)	CRN	AR
2	400/600	6.5	1	3.62	0.25	8	0.75	5	2.32	4.3 (9.48)	CRN	HF
2	900/1500	8.5	1.5	3.62	0.25	8	1	6.5	2.32	10.3 (22.71)	CRN	HR
2	2500	9.25	2	3.62	0.25	8	1.12	6.75	2.32	15.8 (34.84)	-	H3
3	150	7.5	0.94	5	0.06	4	0.75	6	3.5	5.1 (11.25)	CRN	AG
3	300	8.25	1.12	5	0.06	8	0.75	6	3.5	7.0 (15.44)	CRN	AS
4	150	9	0.94	6.19	0.06	8	0.75	7.5	3.5	7.2 (15.88)	CRN	AH
4	300	10	1.25	6.19	0.06	8	0.88	7.88	3.5	11.7 (25.8)	CRN	AT

1) Material AISI 316/316L: Combination of AISI 316 for required pressure resistance and AISI 316L for required chemical resistance (dual rated)
2) The roughness of the surface in contact with the medium including the raised face of the flanges (all standards) made of Alloy C276, Monel, tantalum, rhodium-gold or PTFE is R_a< 0.8 µm (31.5 µin). Lower surface roughness on request.
3) The flange raised face is made of the same material as the process isolating diaphragm.
4) CSA approval: Product Configurator, order code for "Approval"
5) Product Configurator, order code for "Process connection"

ASME flanges with barrel (extended diaphragm seal), connection dimensions in accordance with ASME B 16.5, raised face RF



Engineering unit in

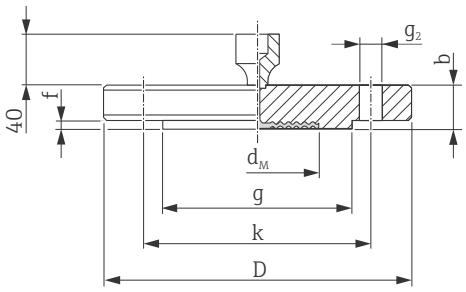
Flange [1) 2)]						Boltholes			Diaphragm seal		Approval [3)]	Option [4)]
Nominal diameter	Class	D	Thickness	Raised face		Number	g_2	Hole circle	max. Ø membrane	Weight		
			b	g	f			k	d_M			
[in]	[lb./sq.in]	[in]	[in]	[in]	[in]		[in]	[in]	[in]	[kg (lb)]		
2	150	6	0.75	3.62	0.06	4	0.75	4.75	1.85	[5)]	CRN	J3 [5)]
3	150	7.5	0.94	5	0.06	4	0.75	6	2.83	[5)]	CRN	J4 [5)]
3	300	8.25	1.12	5	0.06	8	0.88	6.62	2.83	[5)]	CRN	J7 [5)]
4	150	9	0.94	6.19	0.06	8	0.75	7.5	3.5	[5)]	CRN	J5 [5)]
4	300	10	1.25	6.19	0.06	8	0.88	7.88	3.5	[5)]	CRN	J8 [5)]

1) Material: AISI 316/316L. Combination of AISI 316 for required pressure resistance and AISI 316L for required chemical resistance (dual rated)
2) In the case of process isolating diaphragms made of Alloy C276, Monel or tantalum, the raised face of the flange and the barrel pipe are made of 316L.
3) CSA approval: Product Configurator, order code for "Approval"
4) Product Configurator, order code for "Process connection"
5) Choice of 2", 4", 6" or 8" barrel (extended diaphragm seal), for diameter and weight of barrel (extended diaphragm seal) see the following table

Option [1)]	Nominal diaphragm	Class	Barrel (extended diaphragm seal) length	Barrel (extended diaphragm seal) process isolating diaphragm	Weight
			(L)	d_3	
	[in]	[lb./sq.in]	in (mm)	in (mm)	[kg (lb)]
J3	2	150	2 (50.8) / 4 (101.6) / 6 (152.4) / 8 (203.2)	1.9 (48.3)	3.0 (6.6)/ 3.4 (7.5)/ 3.9 (8.6)/ 4.4 (9.7)
J4	3	150	2 (50.8) / 4 (101.6) / 6 (152.4) / 8 (203.2)	2.99 (76)	6.0 (13.2) / 6.6 (14.5) / 7.1 (15.7) / 7.8 (17.2)
J7	3	300	2 (50.8) / 4 (101.6) / 6 (152.4) / 8 (203.2)	2.99 (76)	7.9 (17.4) / 8.5 (18.7) / 9.0 (19.9) / 9.6 (21.2)
J5	4	150	2 (50.8) / 4 (101.6) / 6 (152.4) / 8 (203.2)	3.7 (94)	8.6 (19) / 9.9 (21.8) / 11.2 (24.7) / 12.4 (27.3)
J8	4	300	2 (50.8) / 4 (101.6) / 6 (152.4) / 8 (203.2)	3.7 (94)	13.1 (28.9)/ 14.4 (31.6)/ 15.7 (34.6)/ 16.9 (37.3)

1) Product Configurator, order code for "Process connection"

JIS flanges, connection dimensions in accordance with JIS B 2220 BL, raised face RF



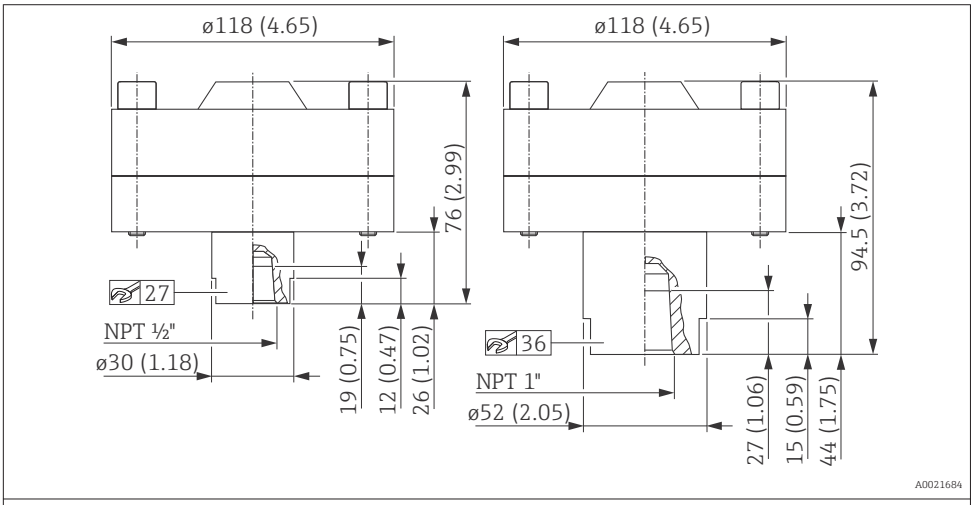
Engineering unit mm

Flange [1) 2) 3)]						Boltholes			Diaphragm seal		Option [4)]
Nominal diameter	Nominal pressure	D	Thickness	Raised face		Number	g_2	Hole circle	max. Ø membrane	Weight	
			b	g	f			k	d_M		
		[mm]	[mm]	[mm]	[mm]		[mm]	[mm]	[mm]	[kg (lb)]	
25 A	10 K	125	14	67	1	4	19	90	32	1.5 (3.31)	KC
50 A	10 K	155	16	96	2	4	19	120	59	2.3 (5.07)	KF
80 A	10 K	185	18	127	2	8	19	150	89	3.3 (7.28)	KL
100 A	10 K	210	18	151	2	8	19	175	89	4.4 (9.7)	KH

1) Material: AISI 316L
2) The roughness of the surface in contact with the medium including the raised face of the flanges (all standards) made of Alloy C276, Monel, tantalum, rhodium-gold or PTFE is R_a< 0.8 µm (31.5 µin). Lower surface roughness on request.
3) The flange raised face is made of the same material as the process isolating diaphragm.
4) Product Configurator, order code for "Process connection"

Process connections for PMP75

Thread ½ NPT and 1 NPT, separator

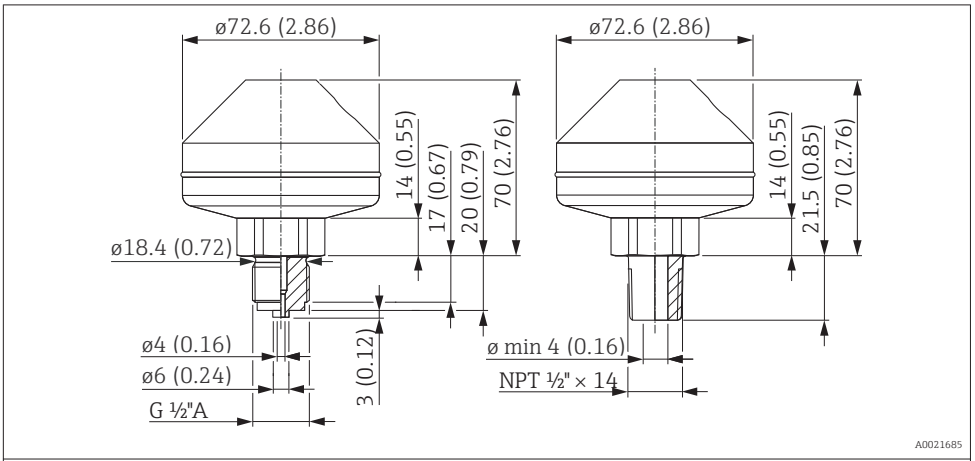


Engineering unit mm (in)

Material	Description	Measuring range [bar (psi)]	Nominal pressure	Weight [kg (lb)]	Option [1]
AISI 316L	Threaded, ½" NPT with Viton seal (200 °C (392 °F)	≤ 250 (3625)	PN 250	4.75 (10.47)	UG
	Threaded, 1" NPT with Viton seal			5.0 (11.03)	UH

1) Product Configurator, order code for "Process connection"

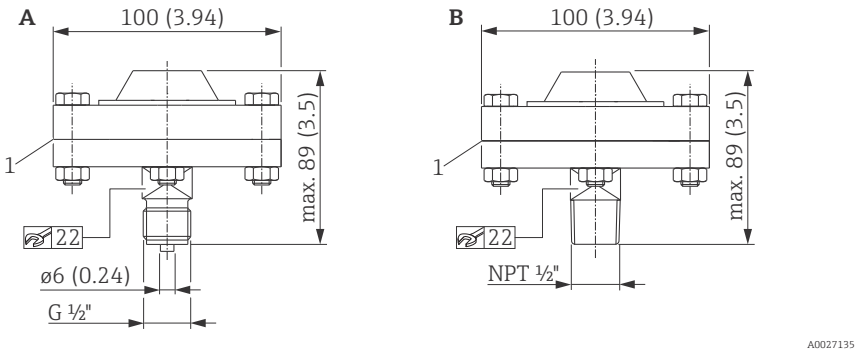
Thread ISO 228 G ½ A and ANSI ½ MNPT, separator



Engineering unit mm (in)

Material	Description	Measuring range [bar (psi)]	Nominal pressure	Approval	Weight [kg (lb)]	Option [1]
AISI 316L	Welded, ISO 228 G ½ A EN837	≤ 160 (2320)	PN 160	-	1.43 (3.15)	UA
	Welded, ANSI ½ MNPT			CRN [2]		UB

1) Product Configurator, order code for "Process connection"
2) CSA approval: Product Configurator, order code for "Approval"

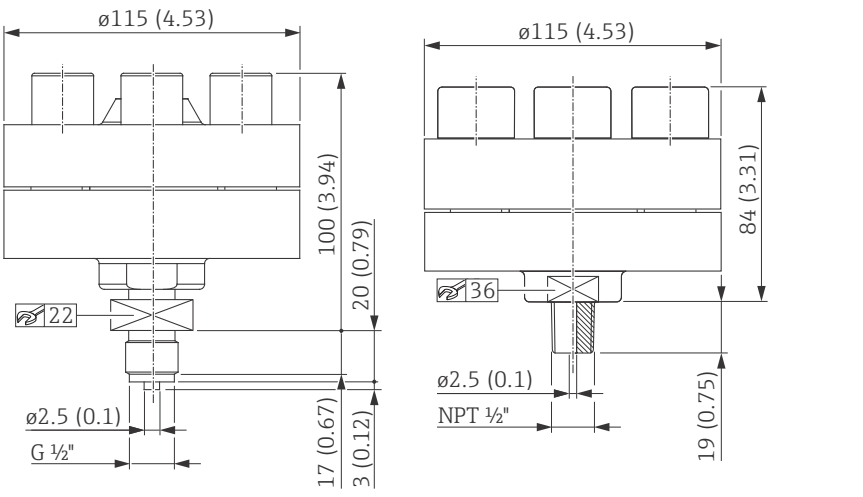


A Option "UC" with threaded connection ISO 228 G ½ B
B Option "UD" with threaded connection ANSI ½ MNPT
1 PTFE seal as standard max. 260 °C (500 °F) (higher temperatures on request)

Engineering unit mm (in)

Material	Description	Measuring range [bar (psi)]	Nominal pressure	Weight [kg (lb)]	Option [1]
AISI 316L (1.4404), screws made of A2	ISO 228 G ½ B EN837	≤ 40 (580)	PN 40	1.43 (3.15)	UC
	ANSI ½ MNPT				UD

1) Product Configurator, order code for "Process connection"

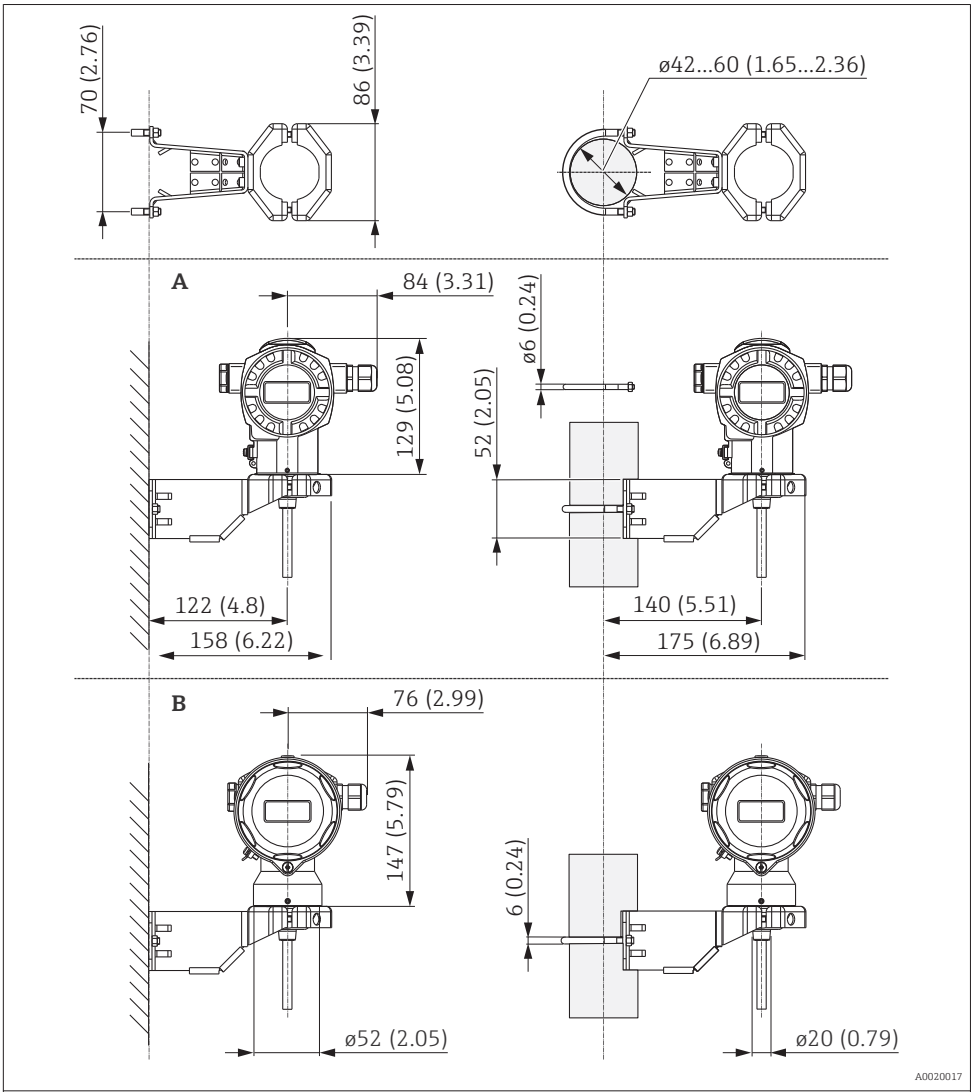


Engineering unit mm (in)

Material	Description	Measuring range [bar (psi)]	Nominal pressure	Weight [kg (lb)]	Option [1]
AISI 316L (1.4404), screws made of A2	Threaded, ISO 228 G ½ B EN837, with integrated seal lip	> 40 bar (580)	PN 400	4.75 (10.47)	UC
	Threaded, ANSI ½ MNPT, with integrated seal lip				UD

1) Product Configurator, order code for "Process connection"

Separate housing: Wall and pipe mounting with mounting bracket



Engineering unit mm (in)

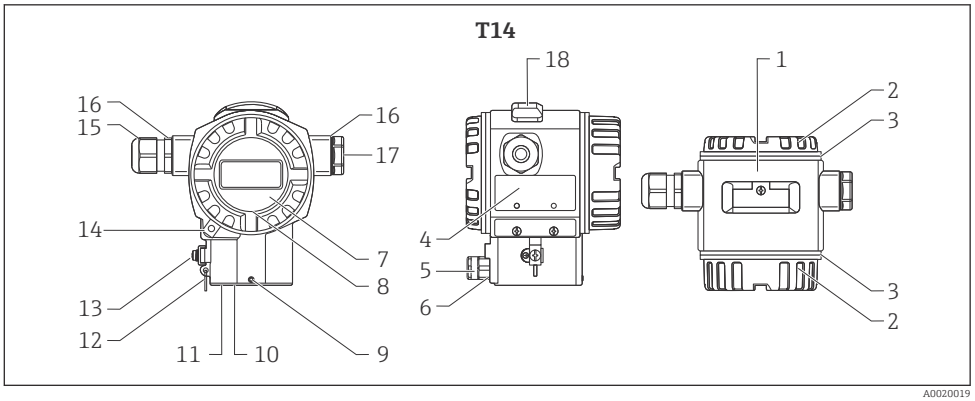
Item	Description	Weight in kg (lb)		Option [1]
		Housing (T14 or T17)	Mounting bracket	
A	Dimensions with T14 housing, optional side display	→ 🖹 45	0.5 (1.10)	U
B	Dimensions with T17 housing, optional side display			

1) Product Configurator, order code for "Additional options 2", version "G"

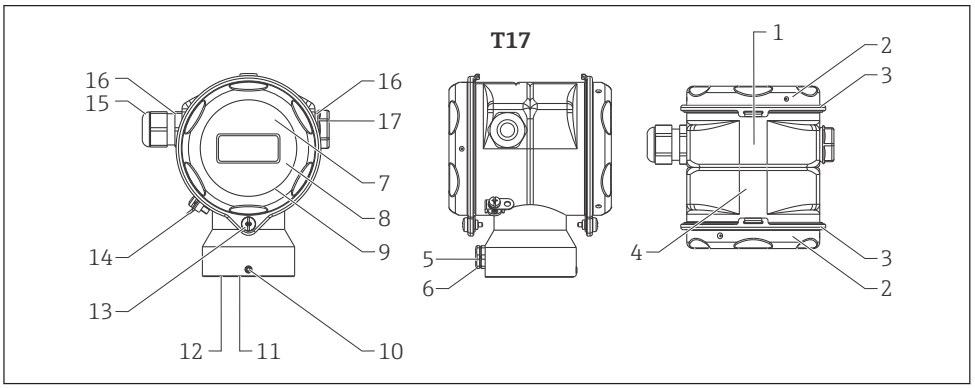
Also available for order as a separate accessory: Part number 71102216

Materials not in contact with process

Transmitter housing



Item number	Component part	Material
1	T14 housing, RAL 5012 (blue)	▪ Die-cast aluminum with protective powder-coating on polyester base ▪ Thread coating: Heat-curing lubricant varnish
1	T14 housing	▪ Precision casting AISI 316L (1.4435) ▪ Thread coating: Heat-curing lubricant varnish
2	Cover, RAL 7035 (gray)	Die-cast aluminum with protective powder-coating on polyester base
3	Cover seal	EPDM
4	Nameplates	▪ AISI 316L (1.4404), if T14 housing is precision-cast ▪ Anodized aluminum, if housing T14/T15 of die-cast aluminum
5	Pressure compensation filter	AISI 316L (1.4404) and PBT-FR
6	Pressure compensation filter, O-ring	VMQ or EPDM
7	Sight glass	Mineral glass
8	Sight glass seal	Silicone (VMQ)
9	Screw	A4
10	Sealing ring	EPDM
11	Snap ring	PA66-GF25
12	Snap ring for nameplates	AISI 304 (1.4301)/AISI 316 (1.4401)
13	External ground terminal	AISI 304 (1.4301)
14	Cover clamp	Clamp AISI 316L (1.4435), screw A4
15	Cable entry	Polyamide (PA) or CuZn nickel-plated
16	Seal of cable entry and plug	Silicone (VMQ)
17	Blind plug	PBT-GF30 FR, for dust ignition-proof: AISI 316L (1.4435)
18	External operation (keys and key cover), RAL 7035 (gray)	Polycarbonate PC-FR, screw A4
Devices with MID parts certificate	Seal wire	DIN 1367-0 St/Zn (soft galvanized steel)
Devices with MID parts certificate	Seals	Pb (lead)



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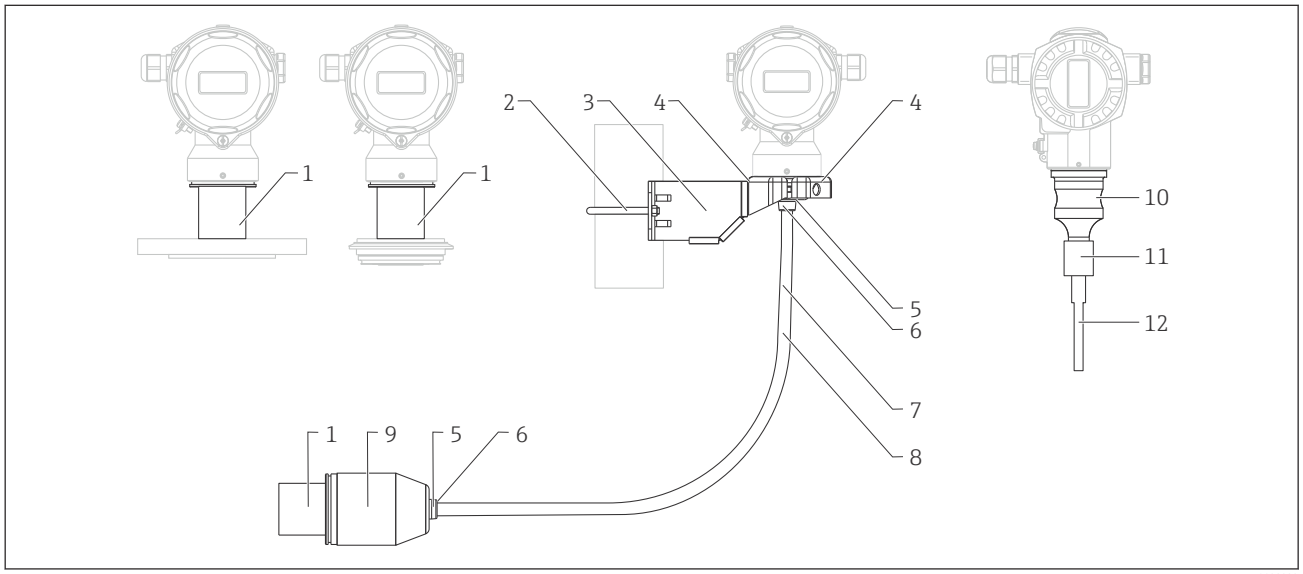
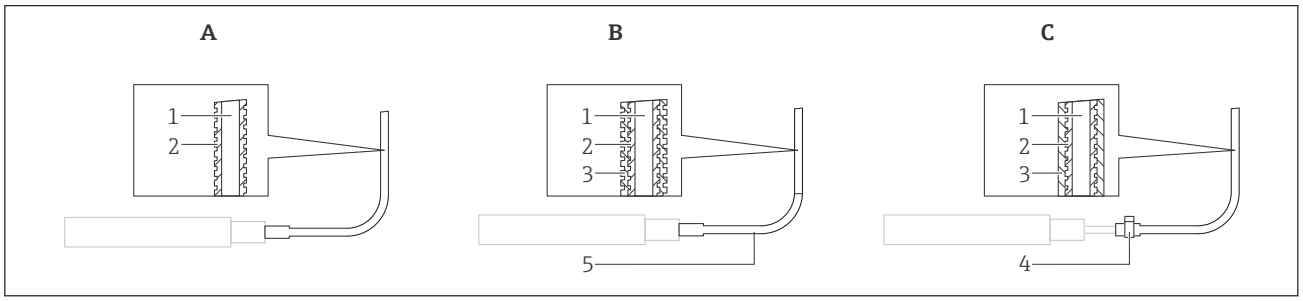
Item number	Component part	Material
1	T17 housing	AISI 316L (1.4404)
2	Cover	
3	Cover seal	EPDM
4	Nameplates	Lasered on
5	Pressure compensation filter	AISI 316L (1.4404) and PBT-FR
6	Pressure compensation filter, O-ring	VMQ or EPDM
7	Sight glass for non-hazardous area, ATEX Ex ia, NEPSI Zone 0/1 Ex ia, IECEx Zone 0/1 Ex ia, FM NI, FM IS, CSA IS	Polycarbonate (PC)
8	Sight glass for ATEX 1/2 D, ATEX 1/3 D, ATEX 1 GD, ATEX 1/2 GD, ATEX 3 G, FM DIP, CSA dust ignition-proof	Mineral glass
9	Sight glass seal	EPDM
10	Screw	A2-70
11	Sealing ring	EPDM
12	Snap ring	PA6
13	Screw	A4-50 Thread coating: Heat-curing lubricant varnish
14	External ground terminal	AISI 304 (1.4301)
15	Cable entry	Polyamide PA, for dust ignition-proof: CuZn nickel-plated
16	Seal of cable entry and plug	Silicone (VMQ)
17	Blind plug	PBT-GF30 FR, for dust ignition-proof: AISI 316L (1.4435)
Devices with MID parts certificate	Seal wire	DIN 1367-0 St/Zn (soft galvanized steel)
Devices with MID parts certificate	Seals	Pb (lead)

Connecting parts



Item number	Component part	Material
1	Connection between the housing and process connection	AISI 316L (1.4404)
2	Mounting bracket	Bracket AISI 316L (1.4404)
3		Screw and nuts A4-70
4		Half-shells: AISI 316L (1.4404)
5	Seal for cable from separate housing	EPDM
6	Gland for cable from separate housing	AISI 316L (1.4404)
7	PE cable for separate housing	abrasion-proof cable with strain-relief Dynema members; shielded using aluminum-coated foil; insulated with polyethylene (PE-LD), black; copper wires, twisted, UV-resistant
8	FEP cable for separate housing	Abrasion-proof cable; shielded using galvanized steel wire netting; insulated with fluorinated ethylene propylene (FEP), black; copper cores, twisted, UV-resistant
9	Process connection adapter for separate housing	AISI 316L (1.4404)
10	Cell body	AISI 316L (1.4404)
11	Connection between body of measuring cell and capillary	AISI 316L (1.4404)
12	Heat-shrink tube (available only if capillary has PTFE or PVC sheath)	Polyolefin



Item	Component part	A Standard flexible capillary armoring	B PVC-coated flexible capillary armoring	C PTFE-hose flexible capillary armoring
1	Capillary	AISI 316 Ti (1.4571) [1]	AISI 316 Ti (1.4571)	AISI 316 Ti (1.4571)
2	Flexible armor for capillary	AISI 316L (1.4404)	AISI 316L (1.4404)	AISI 316L (1.4404)
3	Coating/Hose	-	PVC [2]	PTFE [3]
4	Single-ear clamp	-	-	1.4301
5	Shrink tubing at capillary junction	-	Polyolefin	-

1) Product Configurator, order code for "Capillary armoring:" option "SA"
2) Product Configurator, order code for "Capillary armoring:" option "SB"
3) Product Configurator, order code for "Capillary armoring:" option "SC"

Weight

Component part	Weight
Housing	See "Housing" section
Process connection	See "Process connections" section
Capillary with armoring made of AISI 316L (1.4404)	0.16 kg/m (0.35 lb/m) + 0.35 kg (0.77 lb)
Capillary with armoring made of AISI 316L (PVC)	0.21 kg/m (0.46 lb/m) + 0.35 kg (0.77 lb)
Capillary with armoring made of AISI 316L (PTFE)	0.29 kg/m (0.64 lb/m) + 0.35 kg (0.77 lb)

Materials in contact with process

NOTICE

► The device components in contact with the process are specified in the "Mechanical construction" → 📄 44 and "Ordering information" → 📄 109 sections.

Delta-ferrite content

A delta-ferrite content of ≤ 3% can be guaranteed and certified for the wetted parts if option "8" is selected in the "Additional options 1" or "Additional options 2" order code in the Product Configurator.

If the PMC71 with hygienic process connections is selected, a delta-ferrite content of ≤ 1% can be guaranteed and certified if option "8" is selected in the "Additional options 1" or "Additional options 2" order code in the Product Configurator.

TSE Certificate of Suitability (Transmissible Spongiform Encephalopathy)

The following applies to all device components in contact with the process:

- They do not contain any materials derived from animals.
- No additives or operating materials derived from animals are used in production or processing.

Process connections

- "Clamp connections" and "Hygienic process connections": AISI 316L (DIN/EN material number 1.4435)
- Endress+Hauser supplies process connections with a threaded connection as well as DIN/ EN flanges made of stainless steel as per AISI 316L (DIN/EN material number 1.4404 or 1.4435). With regard to their stability-temperature property, the materials 1.4404 and 1.4435 are grouped together under 13E0 in EN 1092-1: 2001 Tab. 18. The chemical composition of the two materials can be identical.
- Some process connections are also available in alloy C276 (DIN/EN material number 2.4819). For this purpose see the information in the "Mechanical construction" section.

Process isolating diaphragm

Sensor	Description	Option [1]
PMC71	Al_2O_3 aluminum-oxide ceramic FDA, ultra-pure 99.9 % [2] Ceraphire® (see also www.endress.com/ceraphire)	Standard
PMP71	AISI 316L	1
	AISI 316L with gold-rhodium coating	6
	Alloy C276 (2.4819)	2
PMP75	AISI 316L	1
	AISI 316L, TempC	E
	AISI 316L with gold-rhodium coating	6
	AISI 316L with 0.25 mm (0.01 in)PTFE coating	8
	Alloy C276 (2.4819)	2 [3]
	Monel (2.4360)	3 [3]
	Tantalum (UNS R05200)	5 [3]

1) Product Configurator, order code for "Membrane material"
2) The US Food & Drug Administration (FDA) has no objections to the use of ceramics made of aluminum oxide as a surface material in contact with foodstuffs. This declaration is based on the FDA certificates of our ceramic suppliers
3) The material of the flange raised face is the same material as is used for the process isolating diaphragm. For devices with a barrel (extended diaphragm seal), the flange raised face and the barrel pipe are made of 316L.

Seals

Device	Description	Option [1]
PMC71	FKM Viton	A
	FKM Viton, FDA	G
	EPDM	B
	Kalrez	D
	Chemraz	E
	NBR (FDA)/3A: HNBR (FDA)	F
	FKM Viton, cleaned for silicone-free applications	L
	Kalrez, cleaned for silicone-free applications	M
	FKM Viton, cleaned from oil and grease	1
	FKM Viton, cleaned for oxygen service, note pressure and temperature application limits	2

1) Product Configurator, order code for "Seal"

Fill fluid

PMP71

Description	Option [1]
Silicone oil	A
Inert oil	F
Inert oil, cleaned from oil and grease	K
Inert oil, cleaned for oxygen service (observe application limits pressure/temperature)	N

1) Product Configurator, order code for "Fill fluid"

PMP75

Description	Option [1]
Silicone oil	A
...m capillary, inert oil	B
...ft capillary, inert oil	C
Vegetable oil	D
Inert oil	F
High-temperature oil, temperature isolator	G
Silicon oil, temperature isolator	H
Inert oil, cleaned from oil and grease	K
Inert oil, cleaned for oxygen service	N
...m capillary, silicone oil	1
...ft capillary, silicone oil	2
...m capillary, high-temperature oil	3
...ft capillary, high-temperature oil	4
...m capillary, vegetable oil	5
...ft capillary, vegetable oil	6
...m capillary, low-temperature oil	7
...ft capillary, low-temperature oil	8

1) Product Configurator, order code for "Fill fluid"

Operability

Operating concept

Operator-oriented menu structure for user-specific tasks

- Commissioning
- Operation
- Diagnosis

Fast and safe commissioning

Guided menus for applications

Reliable operation

- Local operation possible in several languages
- Standardized operation at the device and in the operating tools
- Parameters relating to measured values can be locked/unlocked using the device's write protection switch, using the device software or via remote operation

Efficient diagnostics increase measurement availability

- Remedial measures are integrated in plain text
- Diverse simulation options

Local operation

Functions

Function	External operation (operating keys, optional, not T17 housing)	Internal operation (electronic insert)	Onsite display (optional)
Position adjustment (zero point correction)	✔	✔	✔
Setting lower-range value and upper-range value - reference pressure present at the device	✔ (HART only)	✔ (HART only)	✔
Device reset	✔	✔	✔
Locking and unlocking parameters relevant to the measured value	—	✔	✔
Value acceptance indicated by green LED	✔	✔	✔
Switching damping on and off	✔ (only if display is connected)	✔ (HART and PA only)	✔
Configuring the bus address of the device (PA)	—	✔	✔
Switching simulation mode on and off (FOUNDATION Fieldbus)	—	✔	✔

Operating the device using onsite display (optional)

A 4-line liquid crystal display (LCD) is used for display and operation. The onsite display shows measured values, dialog text as well as fault and notice messages in plain text, thereby supporting the user in every stage of operation.

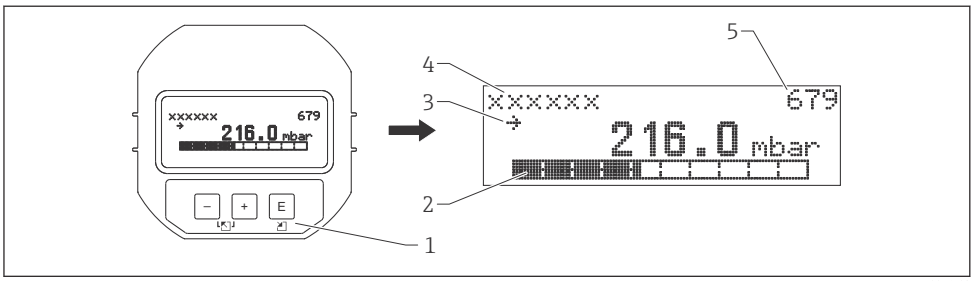
The display can be removed for easy operation.

The device display 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 value.

Functions:
- 8-digit measured value display incl. leading sign and decimal point, bar graph for
  - 4 to 20 mA HART as current display
  - PROFIBUS PA as graphic display of the standardized value of the AI block
  - FOUNDATION Fieldbus as graphic display of the transducer output.
- Simple and complete menu guidance due to breakdown of parameters into several levels and groups
- Menu guidance in up to 8 languages
- Each parameter is given a 3-digit ID number for easy navigation.
- Option for configuring the display according to individual requirements and preferences, such as language, alternating display, display of other measured values such as sensor temperature, contrast setting.
- Comprehensive diagnostic functions (fault and warning message, peak-hold indicators, etc.).
- Rapid and safe commissioning with the Quick Setup menus.

Overview



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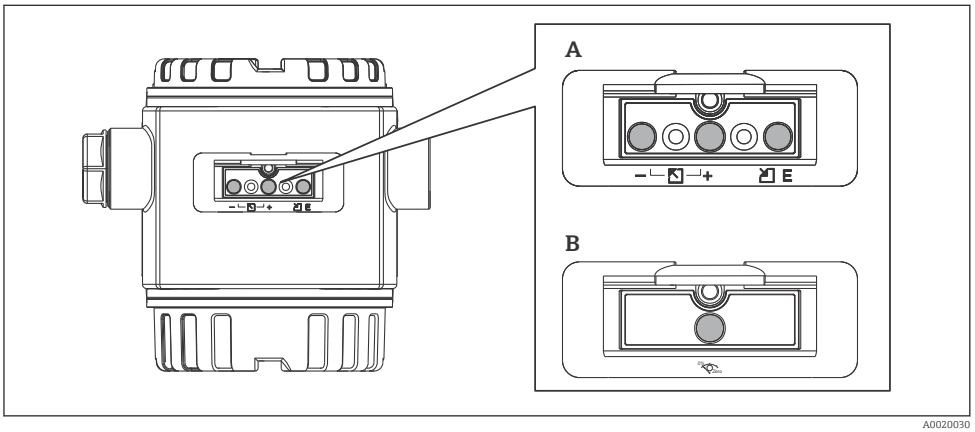
1 Operating keys
2 Bargraph
3 Symbol
4 Header
5 Parameter ID number

Operating keys on the exterior of the device

With the aluminum housing (T14), the operating keys are located either outside on the housing, under the protection cap or inside on the electronic insert. With the stainless steel housing (T17), the operating keys are always located inside the housing on the electronic insert.



A0020030

A 4 to 20 mA HART
B PROFIBUS PA and FOUNDATION Fieldbus

The operating keys located externally on the device work on the Hall sensor principle. As a result, no additional openings are required in the device. This guarantees:

- Complete protection against environmental influences such as moisture and contamination.
- Simple operation without any tools.
- No wear.

Ordering information:

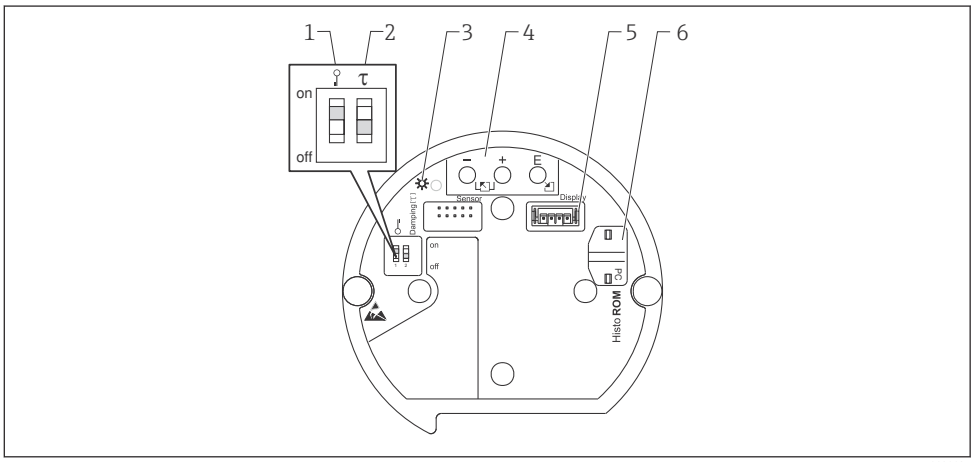
Product Configurator, order code for "Output, operation"

Operating keys and elements located internally on the electronic insert

Ordering information:

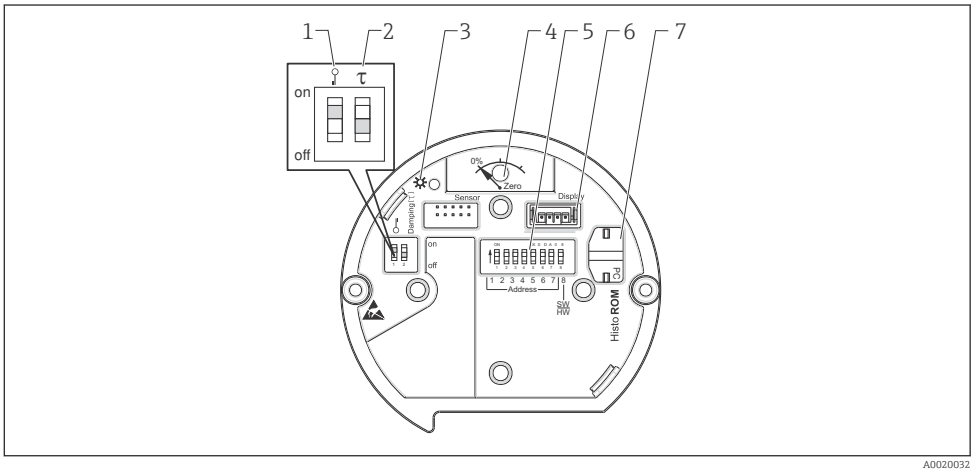
Product Configurator, order code for "Output, operation"

HART



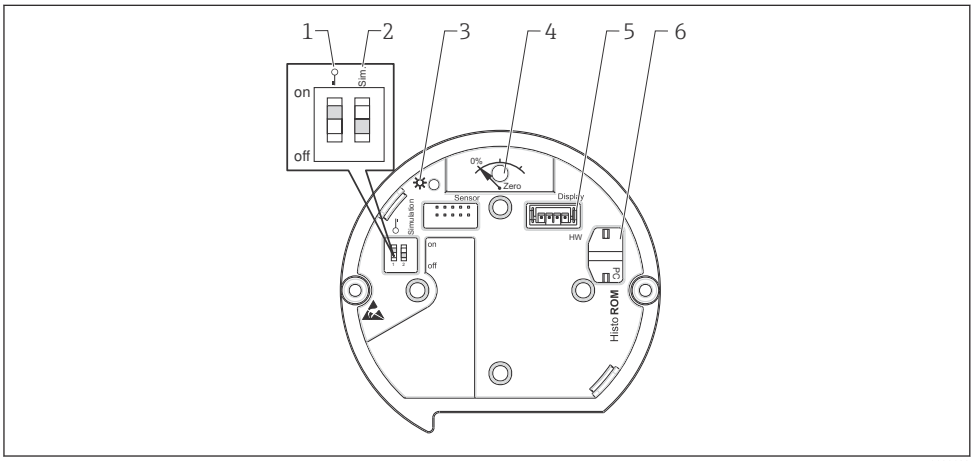
1 DIP switch for locking/unlocking parameters relevant to the measured value
2 DIP switch for switching damping on/off
3 Green LED to indicate value being accepted
4 Operating keys
5 Slot for optional display
6 Slot for optional HistoROM®/M-DAT

PROFIBUS PA



1 DIP switch for locking/unlocking parameters relevant to the measured value
2 DIP switch for switching damping on/off
3 Green LED to indicate value being accepted
4 Key for position adjustment and device reset
5 DIP switch for bus address
6 Slot for optional display
7 Slot for optional HistoROM®/M-DAT

FOUNDATION Fieldbus



1 DIP switch for locking/unlocking parameters relevant to the measured value
2 DIP switch for simulation mode on/off
3 Green LED to indicate value being accepted
4 Key for position adjustment and device reset
5 Slot for optional display
6 Slot for optional HistoROM®/M-DAT

Remote operation

All software parameters are accessible depending on the position of the write protection switch on the device.

Hardware and software for remote operation	HART	PROFIBUS PA	FOUNDATION Fieldbus
FieldCare	✔	✔	✔
FieldXpert SFX100	✔	—	✔
NI-FBUS Configurator	—	—	✔
HistoROM®/M-DAT	✔	✔	✔

FieldCare

FieldCare is an Endress+Hauser asset management tool based on FDT technology. With FieldCare, you can configure all Endress+Hauser devices as well as devices from other manufacturers that support the FDT standard.

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

Connection options:
- HART via Commubox FXA195 and the USB port on a computer
- PROFIBUS PA via segment coupler and PROFIBUS interface card
- Service interface with Commubox FXA291 and ToF adapter FXA291 (USB).

For further information please contact your local Endress+Hauser Sales Center.

Field Xpert SFX100

Field Xpert is an industrial PDA with integrated 3.5" touchscreen from Endress+Hauser based on Windows Mobile. It offers wireless communication via the optional VIATOR Bluetooth modem from Endress+Hauser. Field Xpert also works as a stand-alone device for asset management applications. For details, refer to BA00060S/04/EN.

Commubox FXA195

For intrinsically safe HART communication with FieldCare via the USB interface. For details refer to TI00404F/00/EN.

Commubox FXA291

The Commubox FXA291 connects Endress+Hauser field devices with a 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.

For the following Endress+Hauser devices you need the "ToF adapter FXA291" as an additional accessory:
- Cerabar S PMC71, PMP7x
- Deltabar S PMD7x, FMD7x
- Deltapilot S FMB70

ToF adapter FXA291

The ToF adapter FXA291 connects the Commubox FXA291 with devices of the ToF platform, pressure equipment and Gammapilot via the USB interface of a personal computer or a notebook. For details refer to KA00271F.

Profiboard

For connecting a PC to PROFIBUS.

Proficard

For connecting a laptop to PROFIBUS

FF configuration program

FF configuration program, such as NI-FBUS Configurator, to
- connect devices with "FOUNDATION Fieldbus signal" into an FF network
- set FF-specific parameters

Remote operation via the NI-FBUS Configurator:

The NI-FBUS Configurator is an easy-to-use graphical environment for creating linkages, field-based control loops and schedules based on the FOUNDATION Fieldbus concept.

You can use the NI-FBUS Configurator to configure a fieldbus network as follows:
- Set block and device tags
- Set device addresses
- Create and edit function block control strategies (function block applications)
- Configure vendor-defined function and transducer blocks
- Create and edit schedules
- Read and write to function block control strategies (function block applications)
- Invoke Device Description (DD) methods
- Display DD menus
- Download a configuration
- Verify a configuration and compare it to a saved configuration
- Monitor a downloaded configuration
- Replace a virtual device by a real device
- Save and print a configuration

HistoROM®/M-DAT (optional)

HistoROM®/M-DAT is a memory module which can be attached to every electronic insert. HistoROM®/M-DAT can be retrofitted at any stage (order number: 52027785).

Your benefits
- Quick and safe commissioning of the same measuring points by copying the configuration data of one transmitter to another transmitter.
- Reliable process monitoring thanks to cyclical recording of pressure and sensor temperature measured values.
- Simple diagnosis by recording diverse events such as alarms, configuration changes, counters for measuring range undershoot and overshoot for pressure and temperature as well as user limit overshoot and undershoot for pressure and temperature etc.
- Analysis and graphic evaluation of the events and process parameters via software (contained in scope of supply).

A CD with an Endress+Hauser operating program is also included in the scope of delivery. You can copy data from one transmitter to another transmitter when operating a FOUNDATION Fieldbus device via an FF configuration program. You need the Endress+Hauser FieldCare operating program and the Commubox FXA291 service interface and the ToF adapter FXA291 to be able to access the data and events saved in the HistoROM®/M-DAT.

Ordering information:
Product Configurator, order code for "Additional options:", version "N" or
Product Configurator, order code for "Application package:", option "EN" or
as a separate accessory (part no.: 52027785).

For further information please contact your local Endress+Hauser Sales Center.

System integration

The device can be given a tag name (max. 8 alphanumeric characters)

Description	Option [1]
Measuring point (TAG), see additional spec.	Z1
Bus address, see additional spec.	Z2

1) Product Configurator, order code for "Identification"

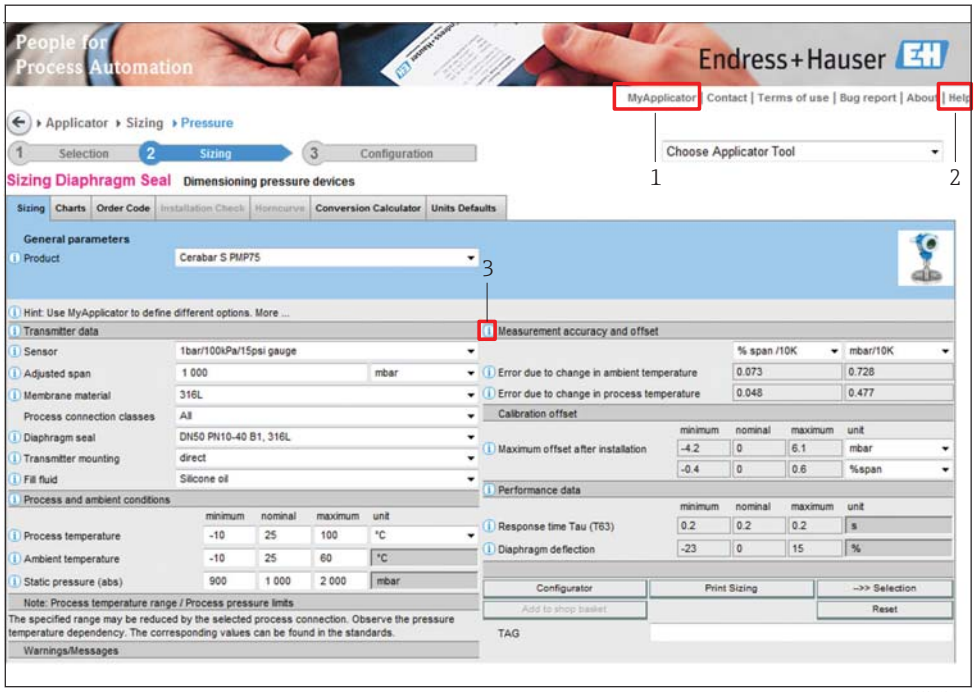
Planning instructions, diaphragm seal systems

NOTICE

Incorrect sizing/ordering of diaphragm seal systems

The performance and the permitted range of application of a diaphragm seal system depend on the process isolating diaphragm used, the filling oil, the coupling, the unit design and on the process and ambient conditions present in the individual application.

- ▶ To help you select the right diaphragm seal system for your applications, Endress+Hauser provides its customers with the free "Applicator Sizing Diaphragm Seal" tool, which is available on DVD or at "www.endress.com/applicator".



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1 *My Applicator - configuration of the Applicator settings*
2 *Applicator help*
3 *Mouse-over help - hover the cursor over these fields for brief information*

For more detailed information or the layout of the optimum diaphragm seal solution for your application, please contact your local Endress+Hauser Sales Center.

Applications

Diaphragm seal systems should be used if the process and the device should be separated. Diaphragm seal systems offer clear advantages in the following instances:

- In the case of extreme process temperatures
- For aggressive media
- In the case of process media that crystallize
- In the case of corrosive or highly various process media or process media with solids content
- In the case of heterogeneous and fibrous process media
- If extreme measuring point cleaning is necessary, or for very humid mounting locations
- If the measuring point is exposed to severe vibrations
- For mounting locations that are difficult to access

Design and operation mode

Diaphragm seals are separating equipment between the measuring system and the process.

A diaphragm seal system consists of:
- A diaphragm seal
- If necessary, a capillary tube or temperature isolator
- Fill fluid
- A pressure transmitter

The process pressure acts via the process isolating diaphragm of a diaphragm seal on the liquid-filled system, which transfers the process pressure onto the sensor of the pressure transmitter.

Endress+Hauser delivers all diaphragm seal systems as welded versions. The system is hermetically sealed, which ensures the highest reliability.

The diaphragm seal determines the application range of the system by:
- The process isolating diaphragm diameter
- The process isolating diaphragm stiffness and material
- The design (oil volume)

diameter of the process isolating diaphragm

The greater the diameter of the process isolating diaphragm (less stiff), the smaller the temperature effect on the measurement result.

Stiffness of the process isolating diaphragm

The stiffness depends on the diameter of the process isolating diaphragm, the material, any existing coating and the thickness and shape of the process isolating diaphragm. The process isolating diaphragm thickness and the shape are determined by the design. The stiffness of a process isolating diaphragm of a diaphragm seal influences the temperature operating range and the measuring error caused by temperature effects.

The new TempC membrane: Highest accuracy and process safety in pressure and differential pressure measurement with diaphragm seals

To measure even more precisely in such applications and to increase process safety, Endress+Hauser has developed the TempC membrane based on a completely revolutionary technology. This diaphragm guarantees the highest level of accuracy and process safety in diaphragm seal applications.
- The very low temperature effect minimizes the influence of fluctuations of both process and ambient temperatures, thus guaranteeing accurate and stable measurements. Measurement inaccuracies caused by temperature are reduced to a minimum.
- The TempC membrane can be used at temperatures between −40 °C (−40 °F) and +250 °C (+482 °F). This guarantees maximum process safety even for very long sterilization and cleaning cycles (SIP/CIP) in tanks and pipes at high temperatures.
- Thanks to the TempC membrane, smaller dimension process connections are possible. With a smaller process connection, the new diaphragm measures at least as accurately as a conventional diaphragm with a larger diameter.
- Short recovery times after temperature shocks mean less downtime during batch processes and therefore a far higher level of availability of the production facilities.
- In addition, the TempC membrane excels in terms of its improved hygienic cleanability and its insensitivity to substantial changes in the pressure load.

Ordering information:

See the Product Configurator for the individual process connection and the choice of process isolating diaphragm.

Selection in the Applicator:

Under "Transmitter data" in the "Diaphragm material" field.

Capillary

As standard, capillaries with an internal diameter of 1 mm (0.04 in) are used.

The capillary tube influences the thermal change, the ambient temperature operating range and the response time of a diaphragm seal system as a result of its length and internal diameter.

Filling oil

When selecting the filling oil, the media and ambient temperature as well as the operating pressure are of crucial importance. Observe the temperatures and pressures during commissioning and cleaning. A further selection criterion is the compatibility of the filling oil with the requirements of the process media. For this reason, only filling oils that are harmless to health may be used in the food industry, such as vegetable oil or silicone oil (see also the following section on "diaphragm seal filling oils").

The filling oil used influences the thermal change, the temperature operating range of a diaphragm seal system and the response time. A temperature change results in a volume change of the filling oil. The volume change is dependent on the expansion coefficient and on the volume of the filling oil at calibration temperature (constant in range: +21 to +33 °C (+70 to +91 °F)). The application range can be extended by a filling oil with a lower expansion coefficient and a shorter capillary.

For example, the filling oil expands in the event of a temperature increase. The additional volume presses against the process isolating diaphragm of a diaphragm seal. The stiffer a diaphragm is, the greater its return force, which counteracts a volume change and acts on the measuring cell together with the operating pressure, thus shifting the zero point.

Pressure transmitter

The pressure transmitter influences the temperature operating range, the TK zero point and the response time as a result of its volume change. The volume change is the volume that has to be shifted to pass through the complete measuring range.

Pressure transmitters from Endress+Hauser are optimized with regard to minimum volume change.

Diaphragm seal filling oils

Filling oil	Permitted temperature range [1] at 0.05 bar (0.725 psi) ≤ p_{abs} ≤ 1 bar (14.5 psi)	Permitted temperature range [1] at p_{abs} ≥1 bar (14.5 psi)	Density [g/cm3] / [SGU]	Viscosity [mm²/s] / [cSt] at 25 °C (77 °F)	Expansion coefficient [2] [1/K]	Notes	Option [3]
Silicone oil	−40 to +180 °C (−40 to +356 °F)	−40 to +250 °C (−40 to +482 °F)	0.96	100	0.00096	(Suitable for use in food FDA 21 CFR 175.105)	A, H, 1 or 2
High-temperature oil	−10 to +200 °C (+14 to +392 °F)	−10 to +400 °C (+14 to +752 °F) [4] [5] [6]	1.00	150	0.00096	(High temperatures)	G, 3 or 4
Inert oil	−40 to +80 °C (−40 to +176 °F)	−40 to +175 °C (−40 to +347 °F)	1.87	27	0.000876	(For ultrapure gas and oxygen applications)	F or N
Vegetable oil	−10 to +120 °C (+14 to +248 °F)	−10 to +200 °C (+14 to +392 °F)	0.94	9.5	0.00101	(Suitable for use in food FDA 21 CFR 172.856)	D, 5 or 6
Low-temperature oil	−70 to +80 °C (−94 to +176 °F)	−70 to +180 °C (−94 to +356 °F)	0.92	4.4	0.00108	(Low temperatures)	7 or 8

1) Observe temperature limits of the device and the system.
2) Please refer to the "Applicator Sizing Diaphragm Seal" selection tool for the thermal change of the diaphragm seal and other important technical features.
3) Product Configurator, order code for "Fill fluid"
4) 325 °C (617 °F) at an absolute pressure of ≥1 bar (14.5 psi) .
5) 350 °C (662 °F) at an absolute pressure of ≥1 bar (14.5 psi) (max. 200 hours).
6) 400 °C (752 °F) at an absolute pressure of ≥1 bar (14.5 psi) (max. 10 hours).

Information on cleaning

- Endress+Hauser provides flushing rings as an accessory to enable cleaning of the process isolating diaphragm without removing the transmitter from the process. For further information please contact your local Endress+Hauser Sales Center.
- 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.

Installation instructions

Diaphragm seal systems

- The diaphragm seal together with the transmitter form a closed, calibrated system, which is filled through ports in the diaphragm seal and in the measuring system of the transmitter. These ports are sealed and must not be opened.
- For devices with a temperature isolator or capillary, a suitable fastening device (mounting bracket) is recommended.
- When mounting, sufficient strain relief must be provided for the capillary line to prevent the capillary from bending (capillary bending radius ≥ 100 mm (3.94 in)
- For more detailed installation instructions, Endress+Hauser provides its customers with the free "Applicator Sizing Diaphragm Seal" tool, which is available on CD or can be downloaded online at "www.endress.com/applicator".

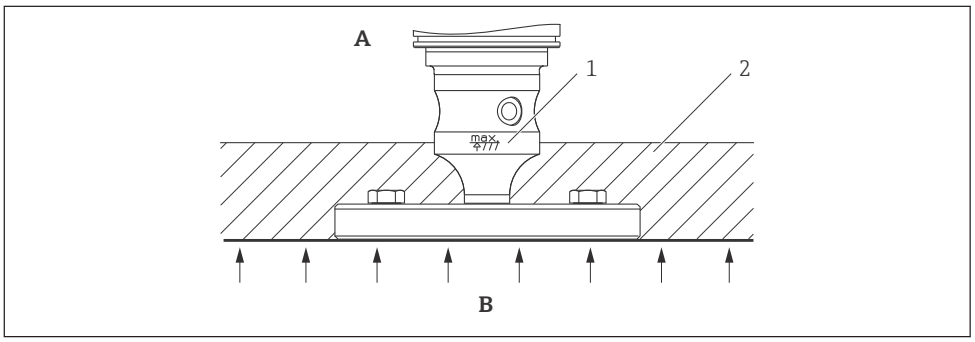
Capillary

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 or above the reference temperature
- with a bending radius ≥ 100 mm (3.94 in)
- When using diaphragm seal systems with a capillary, sufficient strain relief must be provided to prevent the capillary from bending (capillary bending radius ≥ 100 mm (3.94 in)).
- In the case of devices with diaphragm seals and capillaries, the zero point shift caused by the hydrostatic pressure of the filling liquid column in the capillaries must be taken into account when selecting the measuring cell. If a measuring cell with a small measuring range is selected, a position adjustment can cause range violation.

Heat insulation

The PMP75 must only be insulated up to a certain height. The maximum permitted insulation height is indicated on the devices and applies to an insulation material with a heat conductivity ≤ 0.04 W/(m x K) and to the maximum permitted ambient and process temperature. The data were determined under the most critical application "quiescent air". Maximum permitted insulation height, here indicated on a PMP75 with a flange:



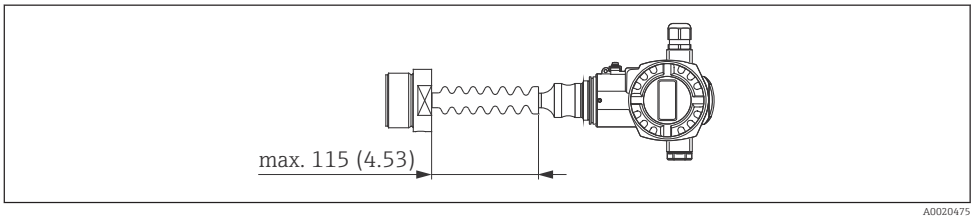
A Ambient temperature ≤ 70 °C (158 °F)
B Process temperature max. 400 °C (752 °F), depending on the diaphragm seal filling oil used
1 Maximum insulation height
2 Insulation material

Mounting with temperature isolator

Endress+Hauser recommends the use of temperature isolators in the event of constant extreme fluid temperatures which cause the maximum permitted electronics temperature of +85 °C (+185 °F) to be exceeded.

Depending on the filling oil used, diaphragm seal systems with temperature isolators can be used up to a maximum of +260 °C (+500 °F).

To minimize 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 maximum 21 mbar (0.315 psi) due to the hydrostatic column in the temperature isolator. You can correct this zero point shift at the device.



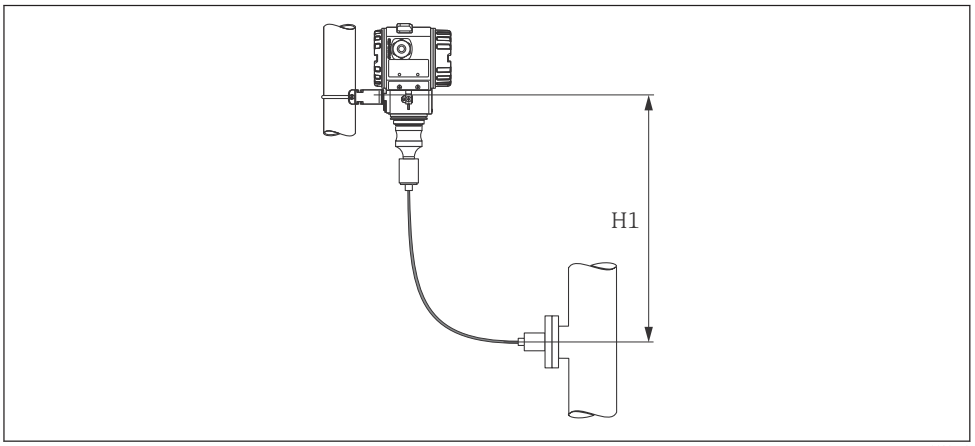
1 PMP75 with temperature isolator, material 316L (1.4404)

Vacuum applications

Installation instructions

For applications under vacuum, Endress+Hauser recommends mounting the pressure transmitter below the diaphragm seal. This prevents vacuum loading of the diaphragm seal caused by the presence of fill fluid in the capillary.

When the pressure transmitter is mounted above the diaphragm seal, the maximum height difference H1 in accordance with the illustration below must not be exceeded. The following graphic depicts mounting above the lower diaphragm seal:



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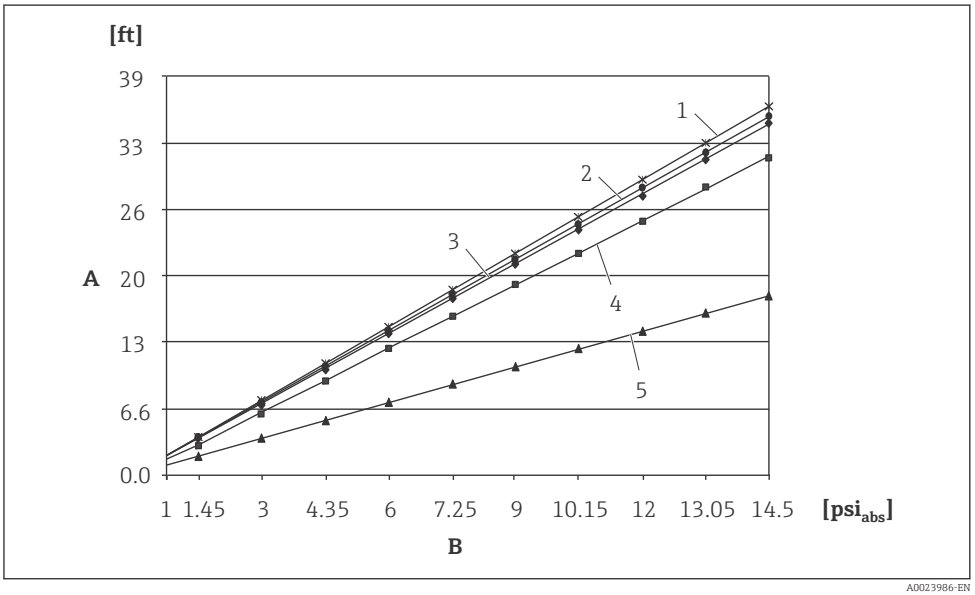
The maximum height difference depends on the density of the filling oil and the smallest ever pressure that is permitted to occur at the diaphragm seal (empty container), see the following diagram. The following diagram depicts the maximum installation height above the diaphragm seal for vacuum applications.



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A Height difference H1
B Pressure at diaphragm seal
1 Low-temperature oil
2 Vegetable oil
3 Silicone oil
4 High-temperature oil
5 Inert oil

Certificates and approvals

CE mark

The device meets the legal requirements of the relevant EC directives. Endress+Hauser confirms that the device has been successfully tested by applying the CE mark.

C-tick mark

The measuring system complies with EMC requirements of the "Australian Communications and Media Authority (ACMA)".

Ex approvals

- ATEX
- FM
- CSA
- NEPSI
- IECEx
- TIIS
- GOST
- Also combinations of different approvals

All explosion protection data are given in separate documentation which is available upon request. The Ex documentation is supplied as standard with all Ex-systems → 112.

Suitable for hygiene applications

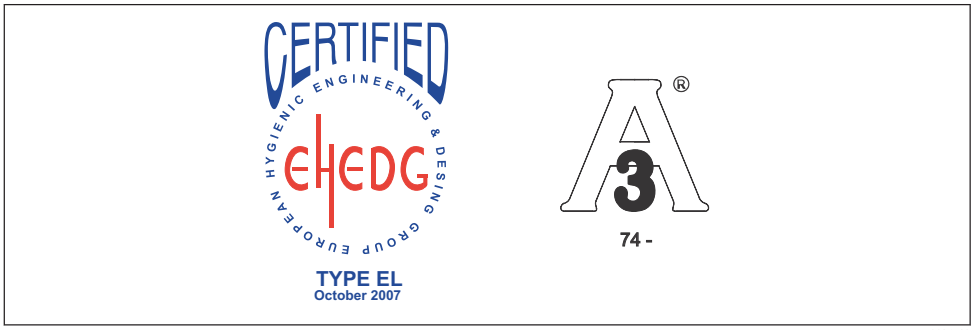
All materials in contact with foodstuffs comply with framework regulation (EC) 1935/2004. The device is available with hygienic process connections (overview: see order code).

CAUTION

Contamination in the process!

Risk of contamination if incorrect seals and parts are used!

- ▶ To avoid the risk of contamination, when installing the device comply with the design principles of EHEDG, Guideline 37 "Hygienic Design and Application of Sensors" and Guideline 16 "Hygienic Pipe Couplings".
- ▶ Suitable assemblies and seals must be used to ensure hygienic design in accordance with 3-A SSI and EHEDG specifications.
- ▶ The leak-proof connections can be cleaned with the cleaning methods typical of this industry (CIP and SIP). Attention must be paid to the pressure and temperature specifications of the sensor and process connections for CIP and SIP processes (clean in place/sterilize in place).



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The gap-free connections can be cleaned of all residue using the usual cleaning methods within this industry.

Functional safety SIL/ IEC 61508 Declaration of Conformity (optional)

The Cerabar S devices with a 4 to 20 mA output signal have been developed in accordance with the IEC 61508 standard. These devices can be used to monitor the process level and pressure up to SIL 3. For a detailed description of the safety functions with Cerabar S, settings and functional safety data, see the "Functional safety manual - Cerabar S" SD00190P/00.

For devices up to SIL 3 / IEC 61508 Declarations of Conformity see:

Ordering information:

Product Configurator, order code for "Additional options 1" and "Additional options 2", version "E".

Overfill protection

WHG (see document ZE00260P/00/DE)

Ordering information:

Product Configurator, order code for "Approval", option "6".

CRN approval

Some device versions have CRN approval. A CRN-approved process connection with a CSA approval must be ordered for a CRN-approved device. These devices are fitted with a separate nameplate with the registration number CRN 0F10525.5C .

PMP75 devices with a capillary are not CRN-approved.

Ordering information:

Product Configurator, order code for "Process connection; material" and

Product Configurator, order code for "Approval"

Other standards and guidelines

The applicable European guidelines and standards can be found in the relevant EU Declarations of Conformity. The following were also applied:

DIN EN 60770 (IEC 60770):

Transmitters for use in industrial-process control systems. Part 1: Methods for operating performance evaluation

DIN 16086:

Electrical pressure measuring instruments, pressure sensors, pressure transmitters, pressure measuring instruments, concepts, specifications on data sheets

EN 61326-X:

EMC product family standard for electrical equipment for measurement, control and laboratory use.

EN 60529:

Degrees of protection provided by enclosures (IP code)

WELMEC guide 8.8:

General and Administrative Aspects of the Voluntary System of Modular Evaluation of Measuring instruments under the MID.

OIML R117-1 Edition 2007 (E):

Dynamic measuring systems for liquids other than water.

EN 12405-1/A1 Edition 2006:

Gas meters – Conversion devices – Part 1: Volume conversion

Pressure Equipment Directive (PED)

The device corresponds to Article 3 (3) of the EC directive 97/23/EC (Pressure Equipment Directive) and has been designed and manufactured in accordance with good engineering practice.

The following also applies:
- PMP71 with threaded connection and internal process isolating diaphragm PN > 200 as well as oval flange adapter PN > 200:
  Suitable for stable gases in group 1, category I
- PMP75 with pipe diaphragm seal ≥ 1.5"/PN40:
  Suitable for stable gases in group 1, category II
- PMP75 with barriers PN > 200 ≥ 1.5"/PN40:
  Suitable for stable gases in group 1, category I
- PMP75 with threaded connection PN > 200

Marine approval

- GL (German Lloyd)
- ABS

Ordering information:

Product Configurator, order code for "Additional options 1" or "Additional options 2", version "S".

Drinking water approval

PMC71/PMP71: NSF 61 approval

Ordering information:

Product Configurator, order code for "Additional options 1" or Additional options 2", version "F".

Approvals for custody transfer

All aspects of OIML R117-1 Edition 2007 (E) and EN 12405-1/A1 Edition 2006 are fulfilled.

MID Parts Certificate

TC7975

Classification of process sealing between electrical systems and (flammable or combustible) process fluids in accordance with ANSI/ISA 12.27.01

Endress+Hauser devices are designed in accordance with ANSI/ISA 12.27.01. allowing the user to waive the use and save the cost of installing external secondary process seals in the conduit as required by the process sealing sections of ANSI/NFPA 70 (NEC) and CSA 22.1 (CEC). These instruments comply with the North American installation practice and provide a very safe and cost-saving installation for pressurized applications with hazardous fluids. Please refer to the following table for the seal class assigned (single seal or dual seal):

Device	Approval	Remark	Single seal MWP	Dual seal MWP
PMC71	CSA C/US IS, XP	except separate housing	-	60 bar (900 psi)
	CSA C/US IS	With separate housing	40 bar (600 psi)	-
PMP71	CSA C/US XP, XP+IS	except separate housing	400 bar (6 000 psi)	-
	CSA C/US IS	except separate housing	>200 to 400 bar (3 000 to 6 000 psi)	≤200 bar (3 000 psi)
	CSA C/US IS	With separate housing	400 bar (6 000 psi)	-
PMP75	XP, XP+IS	except separate housing	400 bar (6 000 psi)	-
	CSA C/US IS	except separate housing	>200 to 400 bar (3 000 to 6 000 psi)	≤200 bar (3 000 psi)
	CSA C/US IS	With separate housing	400 bar (6 000 psi)	-

Further information can be found in the control drawings of the relevant devices.

Inspection certificate

Description	PMC71	PMP71	PMP75	Option
Material test certificate for wetted components, inspection certificate as per EN10204-3.1 acc. to specification 52005759	✔	✔	✔	B [1]
Declaration of Conformity NACE MR0175, wetted metal parts	—	✔	✔	C [1]
Material test certificate for wetted components as per EN 10204 3.1 and NACE MR0175 material, inspection certificate as per EN10204-3.1 acc. to specification 52010806	—	✔	✔	D [1]
Individual testing with test certificate, inspection certificate as per EN10204-3.1	✔	✔	✔	3 [1]
Overpressure testing with test certificate, inspection certificate as per EN10204-3.1	✔	✔	✔	4 [1]
Helium leak test EN 1518 with test certificate, inspection certificate as per EN10204-3.1	✔	✔	—	5 [1]
EN10204-3.1 material wetted parts +Ra, Ra= surface roughness, dimensional check, inspection certificate	✔	—	—	6 [1]
EN10204-3.1 measurement of delta ferrite content, inspection certificate	✔	—	—	8 [1]
3.1 Material documentation, wetted metal parts, EN10204-3.1 inspection certificate	✔	✔	✔	JA [2]
Declaration of Conformity NACE MR0175, wetted metal parts	—	✔	✔	JB [2]
Declaration of Conformity NACE MR0103, wetted metal parts	✔	✔	✔	JE
PMI test (XRF), internal procedure, metal parts in contact with the medium	✔	✔	✔	KG
Welding documentation, wetted/pressurized seams	—	✔	—	KS

1) Product Configurator, order code for "Additional options 1" and "Additional options 2"
2) Product Configurator, order code for "Test, certificate"

Calibration

Description	PMC71	PMP71	PMP75	Option [1]
Sensor range; mbar/bar	✔	✔	✔	1
Sensor range; kPa/MPa	✔	✔	✔	2
Sensor range; mmH2O/mH2O	✔	✔	✔	3
Sensor range; inH2O/ftH2O	✔	✔	✔	4
Sensor range; psi	✔	✔	✔	6
Customer-specific; see additional specification	✔	✔	✔	B
Factory calibration certificate, 5-point; see additional specification	✔	✔	✔	C
DKD/DAkkS certificate; see additional specification	✔	✔	✔	D
Customized pressure; see additional specification	✔	✔	✔	E
Customized level; see additional specification	✔	✔	✔	F
Customized pressure + 5-point factory calibration certificate; see additional specification	✔	✔	✔	H
Customized level + 5-point factory calibration certificate; see additional specification	✔	✔	✔	I
Platinum; see additional specification	✔	✔	—	K
Platinum + factory calibration certificate 5-point; see additional specification	✔	✔	—	L
Platinum + DKD/DAkkS certificate; see additional specification	✔	✔	—	M

1) Product Configurator, order code for "Calibration; unit"

Ordering information

Detailed ordering information is available from the following sources:
- In the Product Configurator on the Endress+Hauser website: www.endress.com → Select country → Products → Select product → Product page function: Configure this product
- From your Endress+Hauser Sales Center: www.endress.com/worldwide

Product Configurator - the tool for individual product configuration
- Up-to-the-minute configuration data
- Depending on the device: Direct input of information specific to measuring point, e.g. measuring range
- Automatic verification of exclusion criteria
- Automatic creation of the order code and its breakdown in PDF or Excel output format
- Ability to order directly from the Endress+Hauser Online Shop

Scope of delivery

- Measuring device
- Optional accessories
- Brief Operating Instructions
- Certificates

Configuration data sheet

Pressure

The following configuration data sheet must be completed and included with the order if the option "E" or "H" has been selected in the Product Configurator, order code for "Calibration; Unit".

Pressure unit

❑ mbar	❑ mmH_2O [1]	❑ mmHg [2]	❑ Pascal	❑ torr
❑ bar	❑ mH_2O [1]	❑ inHg [2]	❑ hPa	❑ g/cm^2
❑ psi	❑ ftH_2O [1]	❑ gf/cm^2	❑ kPa	❑ kg/cm^2
	❑ inH_2O [1]	❑ kgf/cm^2	❑ MPa	❑ lb/ft^2
				❑ atm

1) The conversion factor for the pressure unit is based on a reference temperature of 4 °C (39.2 °F).
2) The conversion factor of the pressure unit refers to a reference temperature of 0 °C (32 °F).

Calibration range / Output

Lower range value (LRV): _____ [pressure unit]
Upper range value (URV): _____ [pressure unit]

Display

Display of the content of the main line (option depends on sensor and communication variant)

- ❑ Primary value [PV] (default)
- ❑ Primary value [%]
- ❑ Pressure
- ❑ Current [mA] (HART only)
- ❑ Temperature
- ❑ Error number
- ❑ Alternating display

Damping

Damping: _____ sec (Default 2 sec)

Smallest span (factory calibration)

Level

The following configuration data sheet must be completed and included with the order if the option "F" or "T" has been selected in the Product Configurator, order code for "Calibration; Unit".

Pressure unit

❑ mbar ❑ bar ❑ psi
❑ mmH_2O [1] ❑ mH_2O [1] ❑ ftH_2O [1] ❑ inH_2O [1]
❑ mmHg [2] ❑ inHg [2] ❑ gf/cm^2 ❑ kgf/cm^2
❑ Pascal ❑ hPa ❑ kPa ❑ MPa
❑ torr ❑ g/cm^2 ❑ kg/cm^2 ❑ lb/ft^2 ❑ atm

Output unit (scaled unit)

Mass	Lengths	Volume	Volume	Percent
❑ kg	❑ m	❑ l	❑ USgal	❑ %
❑ t	❑ dm	❑ hl	❑ impgal	
❑ lb	❑ cm	❑ m^3	❑ USbblPE TR	
	❑ mm	❑ ft^3		
	❑ ft			
	❑ inch			

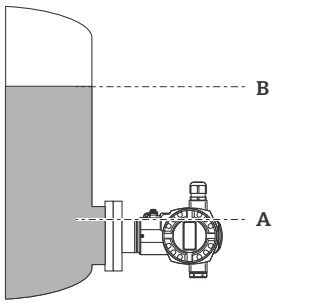
Empty calibration [a]: Low pressure value (empty) _____ [pressure unit]

Empty calibration [a]: Low measured value (empty) _____ [Scaled unit]

Full calibration [b]: High pressure value (full) _____ [pressure unit]

Full calibration [b]: High level value (full) _____ [Scaled unit]

Example



A 0 mbar/0 m
B 300 mbar (4.5 psi) / 3 m (9.8 ft)

1) The conversion factor for the pressure unit is based on a reference temperature of 4 °C (39.2 °F).
2) The conversion factor of the pressure unit refers to a reference temperature of 0 °C (32 °F).

Display

Display of the content of the main line (option depends on sensor and communication variant)

❑ Primary value [PV] (default)
❑ Primary value [%]
❑ Pressure
❑ Current [mA] (HART only)
❑ Temperature
❑ Level before lin.
❑ Tank content
❑ Error number
❑ Alternating display

Damping

Damping: _____ sec (Default 2 sec)

Accessories

HistoROM®/M-DAT	HistoROM®/M-DAT is a memory module which can be attached to every electronic insert. Ordering information: Product Configurator, order code for "Additional options 1" or Additional options 2", version "N" or as a separate accessory (part no.: 52027785).
Wall and pipe mounting	Endress+Hauser offers a mounting bracket for installing the device on pipes or walls. Ordering information: Product Configurator, order code for "Additional options 2", version "U" or as a separate accessory (part no.: 71102216). Dimensions → 🖹 34
Welding flanges and welding neck	For details refer to TI00426F/00/EN "Weld-in adapter and flanges".

Supplementary documentation

Field of Activities

Pressure measurement, powerful instruments for process pressure, differential pressure, level and flow:

FA00004P/00/EN

Technical Information

- EMC test procedures: TI00241F/00/EN
- Deltabar S: TI00382P/00/EN
- Deltapilot S: TI00416P/00/EN
- EMC test procedures: TI00241F/00/EN

Operating Instructions

4 to 20 mA HART:
- Cerabar S: BA00271P/00/EN
- Description of device functions Cerabar S/Deltabar S/Deltapilot S: BA00274P/00/EN

4 to 20 mA HART with MID parts certificate:
- BA00412P/00/EN
- Description of Device Functions: BA00413P/00/EN

PROFIBUS PA:
- Cerabar S: BA00295P/00/EN
- Description of device functions Cerabar S/Deltabar S/Deltapilot S: BA00296P/00/EN

FOUNDATION Fieldbus:
- Cerabar S: BA00302P/00/EN
- Description of device functions Cerabar S/Deltabar S/Deltapilot S: BA00303P/00/EN

Brief Operating Instructions

- 4 to 20 mA HART, Cerabar S: KA01019P/00/EN
- PROFIBUS PA, Cerabar S: KA01022P/00/EN
- FOUNDATION Fieldbus, Cerabar S: KA01025P/00/EN

Functional safety manual (SIL)

Cerabar S (4 to 20 mA): SD00190P/00/EN

Overfill protection

WHG: ZE00260P/00/DE

Safety Instructions (XA)

Depending on the approval, the following Safety Instructions (XA) are supplied with the device. They are an integral part of the Operating Instructions.

Directive	Device	Electronics	Documentation	Option [1)]
ATEX II 1/2 G Ex ia IIC T6	PMC71, PMP71, PMP75	4 to 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	XA00244P	1
ATEX II 1/2 D Ex ia	PMP71, PMP75	4 to 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	▪ XA00246P ▪ XA00289P	2
ATEX II 1/2D Ex tD	PMC71	4 to 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	▪ XA00247P ▪ XA00290P	2
ATEX II 1/3D Ex tD	PMP71, PMP75	4 to 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	▪ XA00248P ▪ XA00291P	4
ATEX II 2G Ex d IIC T6 Gb	PMP71, PMP75	4 to 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	XA00249P	5
ATEX II 2G Ex d [ia] IIC T6 Gb	PMC71	4 to 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	XA00250P	5
ATEX II 1/2G Ex ia IIC T6, WHG (German Water Resources Act)	PMC71, PMP71, PMP75	4 to 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	XA00244P	6
ATEX II 3 G Ex nA II T6	PMC71, PMP71, PMP75	4 to 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	XA00251P	7
ATEX II 1/2G Ex ia + II 1/2D Ex iaD	PMC71, PMP71, PMP75	4 to 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	XA00253P	3

Directive	Device	Electronics	Documentation	Option [1]
ATEX II 1G Ex ia + II 1D Ex iaD	PMC71, PMP71, PMP75	4 to 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	XA00276P	8
ATEX II 1/2G Ex ia IIC T6+II 2G Ex d IIC T6	PMP71, PMP75	4 to 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	XA00252P	B
ATEX II Ex ia + FM IS + CSA IS ATEX II 1/2G Ex ia IIC T6 + FM/CSA IS Cl.I,II,III Div. 1 Gr.A-G, FM/CSA: Zone 0,1,2	PMC71	▪ 4 to 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus ▪ HART ▪ PROFIBUS PA, FOUNDATION Fieldbus	▪ XA00244P ▪ XA00593P + XA01059P ▪ XA00596P + XA01060P	E
ATEX II Ex ia / Ex d + FM/CSA IS + XP ATEX II 1/2G Ex ia IIC T6+ ATEX II 2G Ex d IIC T6+ FM/CSA IS + XP Cl.I.II Div.1 Gr.A-G/B-G FM: Zone 1.2/CSA: Zone 1,2	PMP71, PMP75	▪ 4 to 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus ▪ HART ▪ PROFIBUS PA, FOUNDATION Fieldbus	▪ XA00252P ▪ XA00592P + XA01197P ▪ XA00590P + XA01198P	F

1) Product Configurator, order code for "Approval"

Directive	Device	Electronics	Documentation	Option [1]
IECEx Zone 0/1 Ex ia IIC T6	PMC71, PMP71, PMP75	4 to 20 mA HART	XB00005P	I
IEC Ex d[ia] IIC T6 Gb	PMC71	4 to 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	XA00511P	B
IEC Ex d IIC T6 Gb	PMP71, PMP75	4 to 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	XA00510P	M

1) Product Configurator, order code for "Approval"

Directive	Device	Electronics	Documentation	Option [1]
NEPSI Ex ia IIC T6	PMC71, PMP71, PMP75	4 to 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	XA00549P	H
NEPSI Ex d IIC T6	PMP71, PMP75	4 to 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	XA00551P	G
NEPSI Ex d[ia] IIC T6	PMC71	4 to 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	XA00551P	G

1) Product Configurator, order code for "Approval"

Directive	Device	Electronics	Documentation	Option [1]
TIIS Ex d [ia] IIC T6	PMC71	4 to 20 mA HART	TC17436	L
TIIS Ex d [ia] IIC T4	PMC71	4 to 20 mA HART	TC17398, TC17399	M
TIIS Ex d IIC T6	PMP71 (700 bar version)	4 to 20 mA HART	TC17445	L
TIIS Ex d IIC T6	PMP71, PMP75	4 to 20 mA HART	TC17446	L

1) Product Configurator, order code for "Approval"

Directive	Device	Electronics	Documentation	Option [1]
INMETRO Ex ia IIC T6 Ga/Gb	PMC71, PMP71, PMP75	4 to 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	XA01315P	J
INMETRO Ex d IIC T6 Gb	PMP71, PMP75	4 to 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	XA01279P	O
INMETRO Ex ta IIIC Da/Db	PMP71, PMP75	4 to 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	XA01313P	Z
INMETRO Ex d ia IIC T6 Gb	PMC71	4 to 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	XA01280P	P
INMETRO Ex ia IIIC Da/Db	PMC71	4 to 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	XA01314P	Z

1) Product Configurator, order code for "Approval"

Installation/Control Drawings

Directive	Device	Electronics	Documentation	Option [1]
FM IS Class I, II, III, Division 1, Groups A – G; NI, Class I Division 2, Groups A – D; AEx ia	PMC71, PMP71, PMP75	▪ 4 to 20 mA HART ▪ PROFIBUS PA, FOUNDATION Fieldbus	▪ XA01059P ▪ XA01060P	S
CSA IS Class I, II, III, Division 1, Groups A – G; Class I Division 2, Groups A – G	PMC71, PMP71, PMP75	▪ 4 to 20 mA HART ▪ PROFIBUS PA, FOUNDATION Fieldbus	▪ XA00593P ▪ XA00596P	U
FM IS + XP Class I, Division 1, Groups A – D	PMP71, PMP75	▪ 4 to 20 mA HART ▪ PROFIBUS PA, FOUNDATION Fieldbus	▪ XA01197P ▪ XA01198P	C
CSA IS + XP Class I Division 1, Groups A – D	PMP71, PMP75	▪ 4 to 20 mA HART ▪ PROFIBUS PA, FOUNDATION Fieldbus	▪ XA00592P ▪ XA00590P	D
FM/CSA IS + XP Class I Division 1, Groups A – D	PMP71, PMP75	▪ 4 to 20 mA HART ▪ PROFIBUS PA, FOUNDATION Fieldbus	▪ XA00592P + XA01197P ▪ XA01198P + XA00590P	E
FM NI Cl.I Div.2 Groups A - D, Zone 2	PMC71, PMP71, PMP75	4 to 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	XA01063P	R
FM XP Cl.I Div.1 Groups A - D, AEx d, Zone 1,2	PMC71, PMP71, PMP75	4 to 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	XA01070P	T
FM DIP Cl.II,III Div.1 Gr.E-G, Zone 21,22	PMP71, PMP75	4 to 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	FM3017778	Q
CSA C/US XP Cl.I Div.1 Gr.B-D, Ex d, Zone 1,2	PMC71, PMP71, PMP75	4 to 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	ZD00230P + XA00599P	V
CSA C/US General Purpose	PMD75, FMD77, FMD78	4 to 20 mA HART, PROFIBUS PA, FOUNDATION Fieldbus	-	X

1) Product Configurator, order code for "Approval"

Registered trademarks

HART®	Registered trademark of the HART Communication Foundation, Austin, USA
PROFIBUS®	Registered trademark of the PROFIBUS User Organization, Karlsruhe, Germany
FOUNDATION™ Fieldbus	Registered trademark of the Fieldbus Foundation, Austin, Texas, USA

Patents

This product is protected by at least one of the following patents. Further patents are pending.

DE patents	US patents	EP patents
-	US 5,836,063 A1	EP 0 797 084 B1
-	US 5,877,424 A1	EP 0 780 674 B1
DE 203 05 869 U1	-	-
-	US 6,363,790 A1	EP 0 995 979 B1
-	US 5,670,063 A1	EP 0 516 579 B1
-	US 5,539,611 A1	-
-	US 5,050,034 A1	EP 0 445 382 B1
-	US 5,005,421 A1	EP 0 351 701 B1
-	-	EP 0 414 871 B1
-	-	EP 1 061 351 B1
-	US 5,334,344 A1	EP 0 490 807 B1
-	US 6,703,943 A1	-

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Endress+Hauser

People for Process Automation

CS-413-300 : Identification sheet

VWTC PROJECT NUMBER:	5000218009	REV:	1
PROJECT NAME:	AEM AMARUQ	SUBMITTED TO (COMPANY):	AGNICO EAGLE MINES
ENGINEER:	Gabriel Hébert	SUBMITTED TO (RESPONSIBLE)	
PROJECT MANAGER:	Clément B	PROJECT NUM REFERENCE.:	
PHONE NUMBER:		LOT NUMBER:	

SUPPLIER	EQPT CODE	EQPT TAG NO	DIA	DESCRIPTION	INFO 1	INFO 2	INFO 3	APPLIC.	NOTE	REV
TECKNO VALVE	IMPSGG300380	PI15-041	DIA. CADRAN: 2.5"	SERVICE WATER PRESSURE GAUGE	PRESSURE GAUGE/MANUFACTURER: ASHCROFT// MODEL: 25-1009SWL-02L-160PSIG// 1/4''	N/A	N/A	KMnO4 PREP SYSTEM		rev1

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ASHCROFT®

Duralife® Pressure Gauge
Type 1009, ASME B 40.1
Grade 1A (±1% of span)

DESIGNED FOR SAFETY AND LONGER LIFE

- ***5-year limited warranty***
- ***Patented PowerFlex™ movement isolates movement from shock and vibration for longer life***
- ***All stainless, all-welded construction for long life***
- ***ASME Grade 1A, 1% accuracy full scale***
- ***True Zero™ pointer indication – no stop pin to mask false zero reading – ensures safety and process control***

The following Table is *not* for conversion purposes.

STANDARD RANGES [3][4][5]

Pressure psi	kg/cm² - bar	kPa
0/15	0/1	0/100
0/30	0/1.6	0/160
0/60	0/2.5	0/250
0/100	0/4	0/400
0/160	0/6	0/600
0/200	0/10	0/1000
0/300	0/16	0/1600
0/400	0/25	0/2500
0/600	0/40	0/4000
0/800	0/60	0/6000
0/1000	0/100	0/10,000
0/1500	0/160	0/16,000
0/2000	0/250	0/25,000
0/3000	0/400	0/40,000
0/4000	0/600	0/60,000
0/5000	0/1000	0/100,000
0/6000		
0/7500		
0/10,000		
0/15,000		
Vacuum		
30 in./0 in.Hg	–1/0	–100/0
Compound		
30 in.Hg/15 psi	–1/0/1.5	–100/0/150
30 in.Hg /30 psi	–1/0/3	–100/0/300
30 in.Hg /60 psi	–1/0/5	–100/0/500
30 in.Hg /100 psi	–1/0/9	–100/0/900
30 in.Hg /150 psi	–1/0/15	–100/0/1500
30 in.Hg /300 psi	–1/0/24	–100/0/2400

- ***New PLUS!™ Performance Option:***
  - ***Liquid-filled performance in a dry gauge***
  - ***Fights vibration and pulsations without liquid-fill headaches***
  - ***See pages 6-7 for details***
  - ***Order as option XLL***

OTHER FEATURES:

Available in 2½˝ and 3½˝ dial sizes, Duralife® pressure gauges are liquid fillable and field convertible for panel mounting. Both zero and span adjustments are standard.

The gauge is available dry, liquid-filled weatherproof or hermetically sealed and *now* with *PLUS!™* performance option. A five year limited warranty is standard with the Duralife® 1009.

BOURDON SYSTEM SELECTION[1]

Ordering Code	Bourdon Tube & Tip Material[1]	Socket Material	Tube Type	Range Selection Limits (psi)	NPT Conn.[6]
AW	316 stainless steel	Bronze	C-Tube	Vac/600	¼
AW	316 stainless steel	Bronze	Helical	1000	¼
SW	316 stainless steel	316 stainless steel	C-Tube	Vac/600	¼ & ½[2]
SW	316 stainless steel	316 stainless steel	Helical	800/15,000	¼ & ½[2]

(1) For selection of the correct Bourdon system material, see the media application table on page 243.
(2) ½ NPT available 3½˝ lower SW system only.
(3) Type 1009 gauges may be ordered with metric single-scale dial: kPa,bar or kg/cm².
(4) Dual-scale dials will be supplied with standard metric inner scale and equivalent psi outer scale or with standard psi inner scale and equivalent metric outer scale–please specify.
(5) Special logos and scales available upon request.
(6) ¼˝ JIS, BSP or DIN threads available on SW systems.

TO ORDER THIS 1009 DURALIFE PRESSURE GAUGE:

Select: 35 1009 SW (L) 02L XXX 1000#

1. Dial size–2½˝, 3½˝
2. Case type–1009
3. Tube and socket material
4. Liquid filled (glycerin), leave blank if dry
5. Connection size–⅛ (01), ¼ (02) ½ (04)
6. Connection location–Lower (L), Back (B)
7. Optional Features–see page 176
8. Standard pressure range–1000 psi

Accessories: see pages 233-238

Consult factory for guidance in product selection
Phone (203) 385-0217, Fax (203) 385-0602 or
visit our web site at www.ashcroft.com

DRESSER Instruments

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ASHCROFT®
Trust the shield.™

Type 310, 315 All-Welded "Mini" Diaphragm Seal

PRODUCT FEATURES

- Compact size to fit space-restricted areas
- Designed to protect transducers, mini-switches and 3½″ or smaller pressure gauges from corrosion, plugging or freeze-up
- All-welded metal construction prevents leakage of process media
- Rated for 2500 psi at 100°F
- Fill/bleed connection is standard
- Available with male process connection (Type 310)

The compact size of the Ashcroft® 310 mini-seal allows it to fit into space-restricted areas and is designed to protect transducers, mini-switches, and 3½" or smaller dial size pressure gauges from corrosion, plugging or freeze- up. All welded metal construction prevents leakage of process media. It is rated for 2500 psi at 100°F and has a 316L stainless steel top housing standard. Lower housing materials include 316L stainless steel or Hastelloy C. Diaphragm materials include 316L stainless, Hastelloy C or Tantalum. ¼ NPT or ½ NPT process connection sizes are available.

PRODUCT SPECIFICATIONS

Model Number:	Type 310, 315
Process Connection Size:	¼″, ½″ (⅛″, ¾″, 1″- 310 only) (see table A)
Instrument Connection Size:	⅛, ¼ NPT
Diaphragm Material:	316L SS, Hastelloy C276, Tantalum, Monel
Bottom Housing Materials:	316L SS, Hastelloy C276, Monel, Hastelloy B
Filling Fluid:	Glycerin, Silicone, Halocarbon, Syltherm

Ashcroft Inc., 250 East Main Street, Stratford, CT 06614 USA
Tel: 203-378-8281 • Fax: 203-385-0408
email: info@ashcroft.com • www.ashcroft.com

Type 310, 315 All-Welded "Mini" Diaphragm Seal

Table A – Process Connection

Process Connection	Size	Code
Threaded – male NPT*	⅛	01
Threaded – male NPT*	¼	02
Threaded – male NPT*	½	04
Threaded – male NPT*	¾	06
Threaded – male NPT*	1	08
Threaded – female NPT†	¼	25
Threaded – female NPT†	½	50

*Available in Type 310 only.
†Available in Types 310 & 315.

Pressure Ratings – All 2500 psi except flanged seals are per ASME B 16.5, temperature limit determined by diaphragm, bottom housing and/or filling fluid.

Table B – Type

Description	Code
All-welded mini-seal	310
All-welded midi-seal w/flushing connection	315

Table C – Diaphragm Materials

Materials	Code
316L stainless steel	S
Hastelloy C-276	H
Tantalum	U
Monel	P

Table D – Housing Materials

Bottom(1)	Code	Top(2)
316L SS	S	316L SS
Hastelloy C-276	H	316L SS
Monel	M	Monel

(1) Other bottom housing materials on application.
(2) Top housing material is 316L SS (standard). Monel mini-seal standard with monel top housing.

Table E – Instrument Connection

Instrument Connection	Size	Code
Threaded – female NPT	¼	02T
Threaded – female NPT	⅛	01T

NOTES:
(1) For use with most 3½″ and smaller gauges. Movementless gauge 4½″ (exception).
(2) Other bottom housing materials on application.
(3) Top housing material is 316L SS (standard). Monel mini-seal standard with monel top housing.
(4) Not available with monel bottom housing.

Table F – Filling Fluid

Fill	Service	Connection to Instrument	Temperature Range °F	Code
Glycerin	Pressure	Direct Only	0/400	CG
Silicone	Pressure/Vacuum	Direct or Flexible Line	–40/600	CK
Halocarbon	Pressure/Vacuum in presence of strong oxidizing agent	Direct or Flexible Line	–70/300	CF
Syltherm	Pressure	Direct or Flexible Line	–40/750	HA

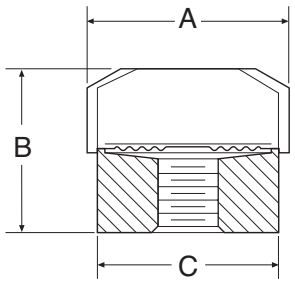
Monel is a registered trademark of Huntington Alloys, Inc.
Hastelloy is a registered trademark of Cabot Corp.
Halocarbon is a registered trademark of Halocarbon Products
GYLON 3510 is a registered trademark of Garlock Inc.

HOW TO ORDER:

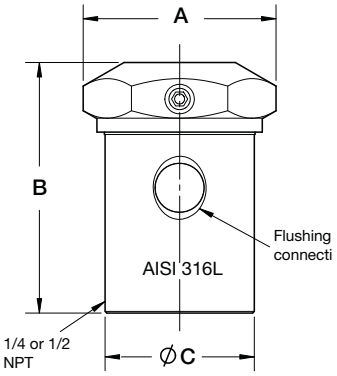
1. **From Table A...** select PROCESS CONNECTION (e.g., 1/4″ process code 25)
2. **From Table B...** select TYPE (310)
3. **From Table B...** select DIAPHRAGM MATERIAL. (e.g., 316L stainless steel–code S)
4. **From Table C...** select BOTTOM HOUSING MATERIAL. (e.g., 316 stainless steel–code S)
5. **From Table D...** select INSTRUMENT CONNECTION size. (e.g., 1/4 NPT–code 02T)
6. **From Table E...** select FILLING FLUID, if diaphragm seal will be attached to instrument. (e.g., Glycerin–code CG)

Coded order: **25-310SS-02T-CG**

Dimension



Types 310 mini-seal – Threaded ¼, ½, ¾, NPT



Types 315 mini-seal – Threaded ¼, ½, ¾, NPT

	A		B		C	
	in	mm	in	mm	in	mm
Type 310	1.75	(38)	.81	(30)	1.34	(34)
Type 315	1.73	(44)	2.25	(57.2)	1.34	(34)

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email: info@ashcroft.com • www.ashcroft.com

CS-434-100 : Identification sheet

VWTC PROJECT NUMBER:	5000218009	REV:	1
PROJECT NAME:	AEM AMARUQ	SUBMITTED TO (COMPANY):	AGNICO EAGLE MINES
ENGINEER:	Gabriel Hébert	SUBMITTED TO (RESPONSIBLE)	
PROJECT MANAGER:	Clément B	PROJECT NUM REFERENCE.:	
PHONE NUMBER:		LOT NUMBER:	

SUPPLIER	EQPT CODE	EQPT TAG NO	DIA	DESCRIPTION	INFO 1	INFO 2	INFO 3	APPLIC.	NOTE	REV
LUMEN	IEPOPS201955	PSL15-041	N/A	SERVICE WATER PRESSURE SWITCH	PRESSURE SWITCH/MANUFACTURER: ALLEN BRADLEY// MODEL: 836T-T253J	1/4" FNPT female pipe connection	Adjustable Range : 12-150 psi	KMnO4 PREP SYSTEM		rev1

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Bulletin 836T Pressure Controls

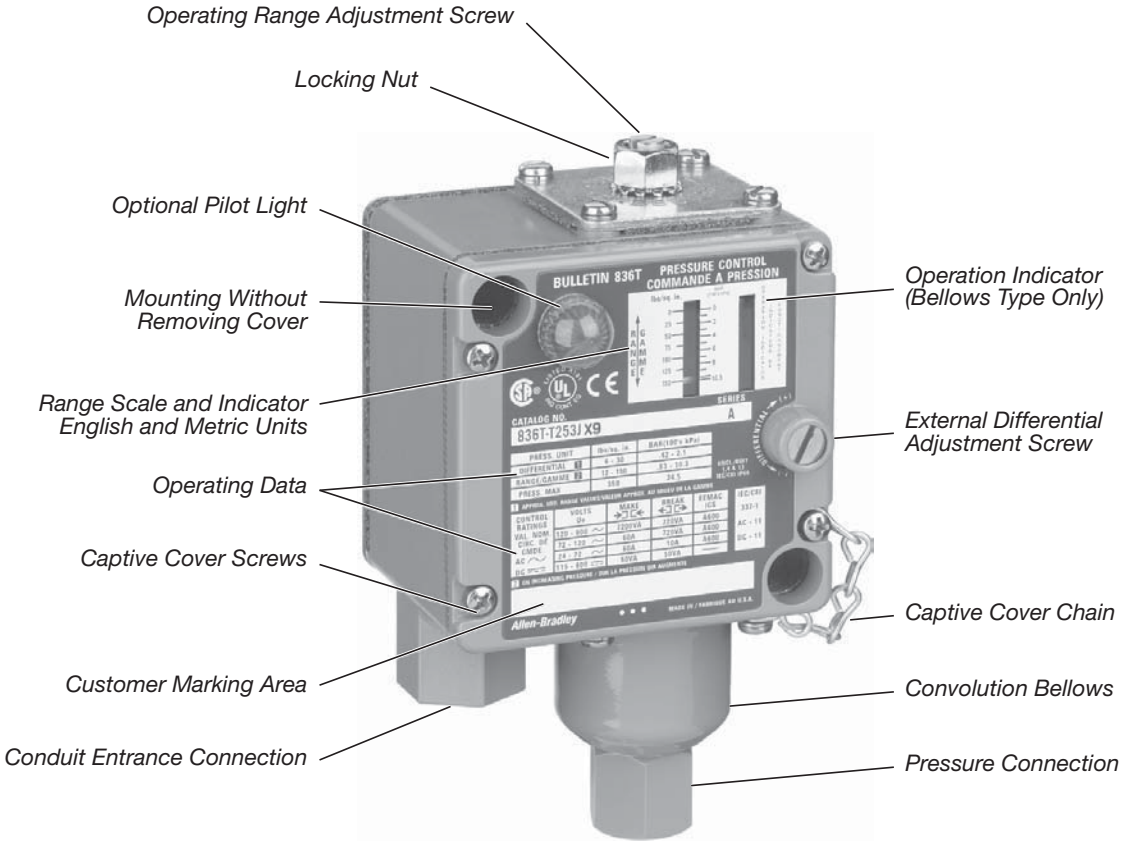
- Operating ranges from 30 in. Hg vacuum…5000 psi
- Independently adjustable range and differential
- Copper alloy and stainless steel bellows
- 2- and 4-Circuit contact block
- Pressure difference controls available
- 1/4 in. and 3/8 in. N.P.T. and O-ring straight thread connections
- Type 4 & 13 and Type 7 & 9 and 4 & 13 combination enclosures

Table of Contents

Standards Compliance and Certification

(For file and guide numbers, see page 13-44)

Product Overview



Bulletin 836T Style T Bellows Type Enclosure Type 1, 4 & 13, IEC IP66

Description

Bulletin 836T Pressure Controls are control circuit devices designed to meet the traditional requirements of the transportation, machine tool, and other heavy-duty industries. Allen-Bradley Bulletin 836T Pressure Controls can be used in pneumatic and hydraulic applications. The copper alloy bellows actuators can be used with air, water, oil, vapor, and other non-corrosive gases and liquids. Type 316 stainless steel bellows are available for more corrosive gases, vapors, and fluids.

A rugged stainless steel cylinder and stainless steel piston assembly is used for the higher-pressure coolant and hydraulic oil applications. May also be used with water and water-based fluids. The controls feature snap-action precision switches equipped with silver contacts. A relatively friction-free mechanism provides consistent operation regardless of mounting position. Devices are designed to allow easy adjustment of pressure settings.

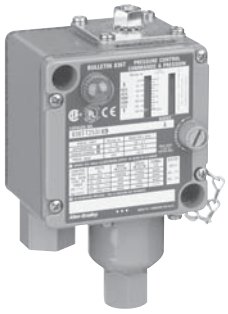
Allen-Bradley Bulletin 836T Pressure Controls are used in many types of applications with adjustable ranges from 30 in. Hg vacuum…5000 psi. They can be used to control pneumatic systems and maintain a pressure tank within a preset and constant pressure range. They can be used to detect over-pressures of gases and liquids to prevent damage to valuable equipment. Pressure controls can also detect low pressure to protect equipment from loss of coolants and lubrication.

Bulletin 836T Pressure Controls are offered in a variety of styles to fit a wide range of applications. The devices are available with either a Type 1, 4 & 13, or 7 & 9 and 4 & 13 combined enclosure. They are available with two-circuit or four-circuit contact blocks. Accessories and modifications are available to tailor the devices to meet most application requirements.

Applications

- Machine tools
- Machine hydraulic pressures
- Material clamping fixtures
- Lubricant and coolant pressures
- Compactor ram pressures
- Air compressors

Style T — Pressure Control



Style T

- Independently adjustable operating range and differential
- Single bellows or piston operation

Copper Alloy Bellows

- 1/4 in. N.P.T. female pipe connection
- Adjustable operating range — 30 in. Hg vacuum…650 psi
- Maximum line pressure — up to 1300 psi
- Occasional surge pressure — up to 1600 psi

Type 316 Stainless Steel Bellows

- 1/4 in. N.P.T. female pipe connection
- Adjustable operating range — 30 in. Hg vacuum…375 psi
- Maximum line pressure — up to 600 psi
- Occasional surge pressure — up to 600 psi

Piston

- 3/8 in. N.P.T. female pipe connection
- SAE 7/16-20 UNF-2B thread O-ring boss seal
- SAE 9/16-18 UNF-2B thread O-ring boss seal
- Adjustable operating range — 40…5000 psi
- Occasional surge pressure — up to 15,000 psi

Style D — Pressure Difference Control

Style D

- Independently adjustable system difference range and differential
- Two-bellows operation, one bellows connected to each system

Copper Alloy Bellows

- 1/4 in. N.P.T. female pipe connection
- Adjustable system difference range — 1…70 psi
- Maximum line pressure — up to 600 psi
- Occasional surge pressure — up to 650 psi

Type 316 Stainless Steel Bellows

- 1/4 in. N.P.T. female pipe connection
- Adjustable system difference range — 1…70 psi
- Maximum line pressure — up to 500 psi
- Occasional surge pressure — up to 500 psi

Technical Terms

Adjustable operating range — Total span within which the contacts can be adjusted to trip and reset.

Trip setting — Higher pressure setting at which value the contacts transfer from their normal state to a change state.

Reset setting — Lower pressure setting at which value the contacts return to their normal state.

Adjustable differential — Difference between the trip and reset values

Minimum differential — When the differential is set to the lowest possible difference between trip and reset.

Maximum differential — When the differential is set to the highest possible difference between trip and reset.

Max. occasional surge pressure — Maximum surge pressure that can be applied to the actuator. Surges or ransients can occur during start-up and shut-down of a machine or system. Expressed in milliseconds, complex electronic instrumentation is required to measure the varying amplitude, frequency, and duration of this wave form. Extreme surges that occur approximately 8 times in a 24-hour period are negligible.

Maximum line pressure — Maximum sustained pressure that can be applied to the actuator without permanent damage. The control should not be cycled at this pressure. **Note:** Does not apply to piston type controls.

psi — Pounds per square inch gauge (positive pressure). Devices listed are in gauge pressure units which use atmospheric pressure as a reference. Atmospheric pressure at sea level is approximately 14.7 psi or 30 in. Hg.

Vacuum — Inches of mercury (in. Hg) vacuum (negative pressure).

Operating range adjustment screw — This screw is used to adjust the trip setting by varying the force of the main spring.

Differential adjustment screw — This screw is used to adjust reset setting by varying the force of the differential blade spring.

Pressure media — There are many types of pressure media that can be controlled. Examples include air, water, hydraulic fluids, and other types of gases and liquids. The type of media and the maximum system pressure will determine the type of actuator used for the pressure control application. See page 13-33.

Pressure connection — Common standard types of pressure connections used in control systems are 1/4 in. and 3/8 in. N.P.T. female pipe threads. SAE 7/16 and SAE 9/16 O-ring boss seals are also available (piston versions only).

Contact configuration — Bulletin 836T controls are available with either a 2-circuit or 4-circuit contact block. See page 13-31.

Style D

Style D — pressure difference controls adjustable system difference range — The adjustable operating range for a pressure difference control.

System difference pressure bushing — This bushing is used to adjust the trip setting by varying the force on the main spring.

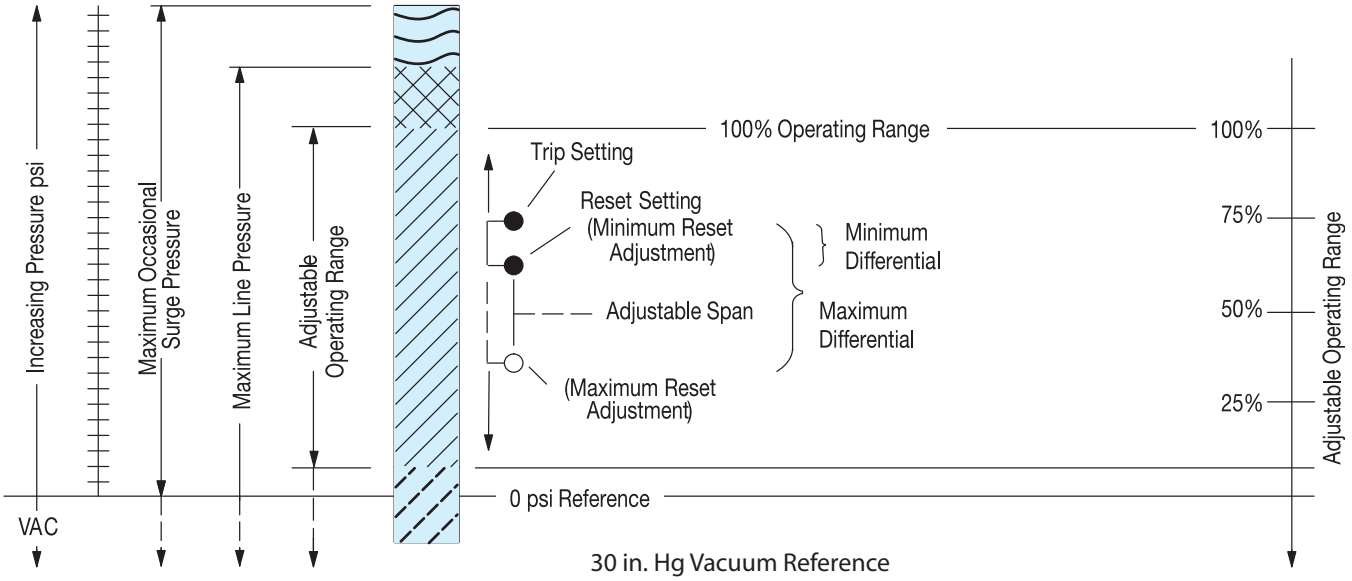
Trip setting — Desired difference in pressure between the two bellows at which value the contacts transfer from their normal state to a changed state. This occurs in one of the following conditions:

- The pressure in the bottom bellows is higher than the pressure in the top bellows by a value equal to the trip setting.
- The pressure in the bottom bellows remains constant and the pressure in the top bellows decreases by a value equal to the trip setting.

Reset setting — Predetermined normal difference in pressure between the two bellows, at which value the contacts return to their normal state. This occurs in one of the following conditions:

- The pressure in the bottom bellows is lower than the top bellows.
- The pressure in the bottom bellows remains constant and the pressure in the top bellows increases.

Figure 1
Graphics to illustrate technical terms



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Preferred availability cat. nos. are printed in **bold**

Allen-Bradley

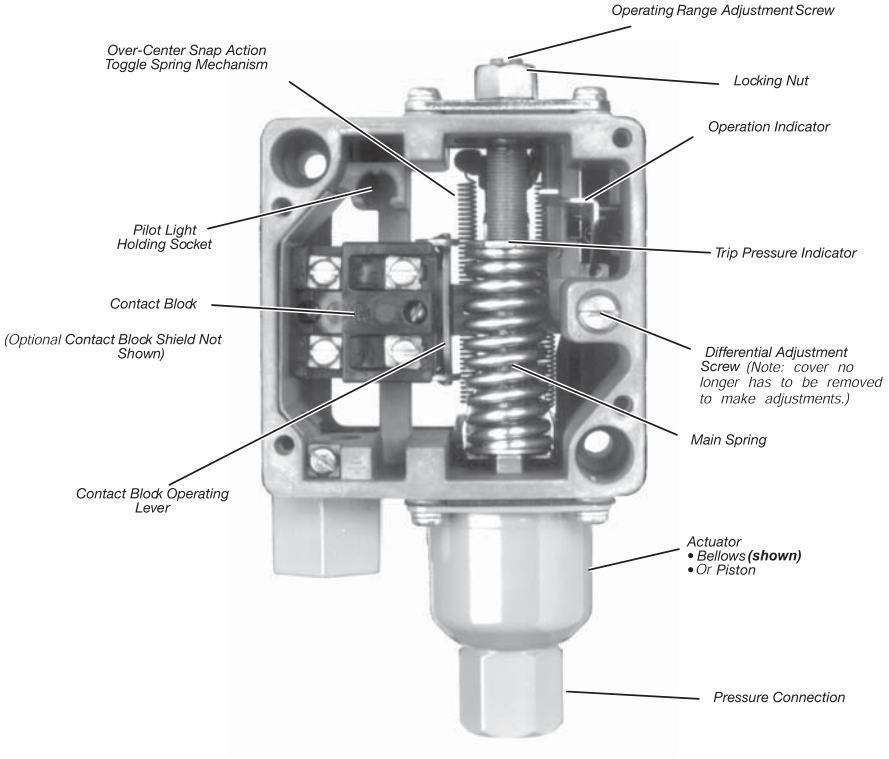
Theory of Operation

Bulletin 836T Pressure Controls are designed to open or close electrical circuits in response to changes in pneumatic (air or gas) or hydraulic (oil or non-corrosive liquids) pressure. Piston controls are not intended for use with air or water. Figure 2 shows the basic operating mechanism.

Pressure is applied to the actuator which can be either a bellows or piston type. As pressure rises, the actuator exerts force on the main spring. When the threshold force of the main spring is overcome, levers transfer the motion to the contact block, displacing the contacts — this is referred to as the trip setting. The unique lever design amplifies the actuator motion, providing shorter stroke, which results in maximizing bellows life.

The lever assembly also includes a virtually friction-free over-center toggle arrangement, providing positive snap action to the contact block for long contact life. As pressure falls, force on the differential spring increases and contacts return to their normal state — this is referred to as reset setting. Varying the force of the main spring (by turning the operating range adjustment screw) determines when the contacts will trip. Varying the force of the differential spring (by turning the differential adjustment screw) determines when the contacts will reset. Setting trip and reset values determines the operating parameters of the application.

Figure 2
Basic mechanical structure



Applications for Control

Pressure controls can be used to either control or monitor a machine or process. Figure 3 shows a typical control application. Here, pressure is controlled within predetermined high and low values. Figure 4 shows a typical monitoring application. Here, pressure is monitored between a high and low value, signaling when a preset limit has been exceeded.

Figure 3
Typical control application

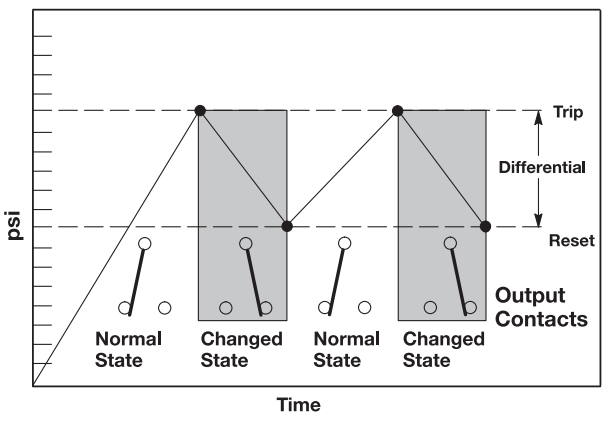
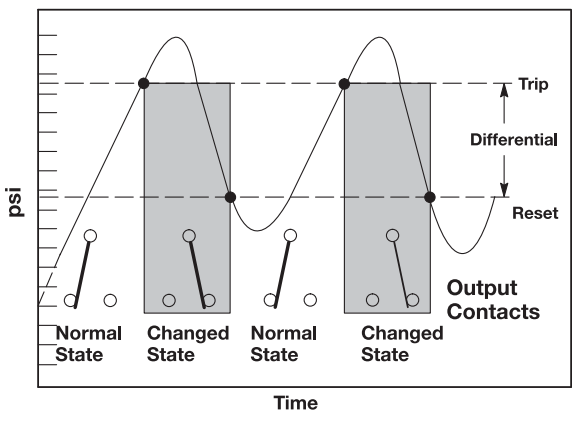


Figure 4
Typical monitoring application



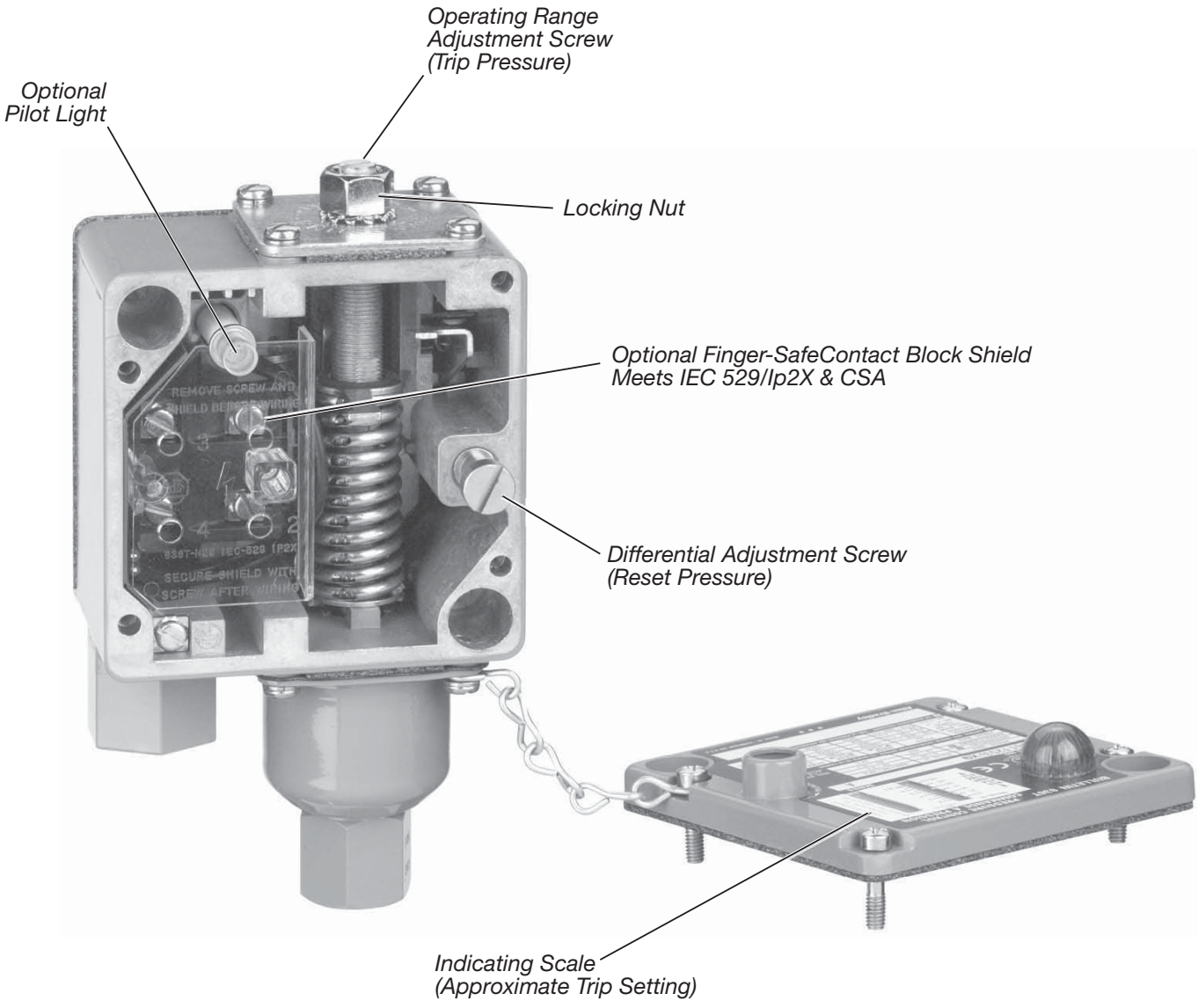
Control Setting — Style T Pressure Controls

Allen-Bradley controls are designed for ease of setting to help minimize installation time. Standard pressure controls shipped from the factory are set at the maximum operating range and minimum differential. By using a pressure gauge and following these simple directions, the control can be set to the specific requirements for each application. See Figure 5.

Step 1 — Adjust trip setting
The trip setting is controlled by the operating range adjustment screw and is adjusted externally. After loosening the lock nut, the trip setting is set by turning the operating range adjustment screw counterclockwise to lower the trip setting or clockwise to raise the trip setting. The approximate trip setting is shown on the indicating scale. When the proper setting is reached, simply tighten the lock nut.
Note: Turning the operating range adjustment screw will cause both the trip and reset settings to change in virtually equal increments.

Step 2 — Adjust reset setting
The reset setting is controlled by an external differential adjustment screw. The reset setting is set by turning the differential adjustment screw clockwise to increase the differential or counterclockwise to decrease the differential.
Note: Adjusting the differential has little or no affect on the trip setting.

Figure 5
Trip and reset adjustment for pressure controls



Control Setting — Style D Pressure Difference Controls

Standard pressure difference controls shipped from the factory are set at the maximum adjustable difference range and minimum differential. Remove the front cover and use a pressure gauge to make the following adjustments. See Figure 6.

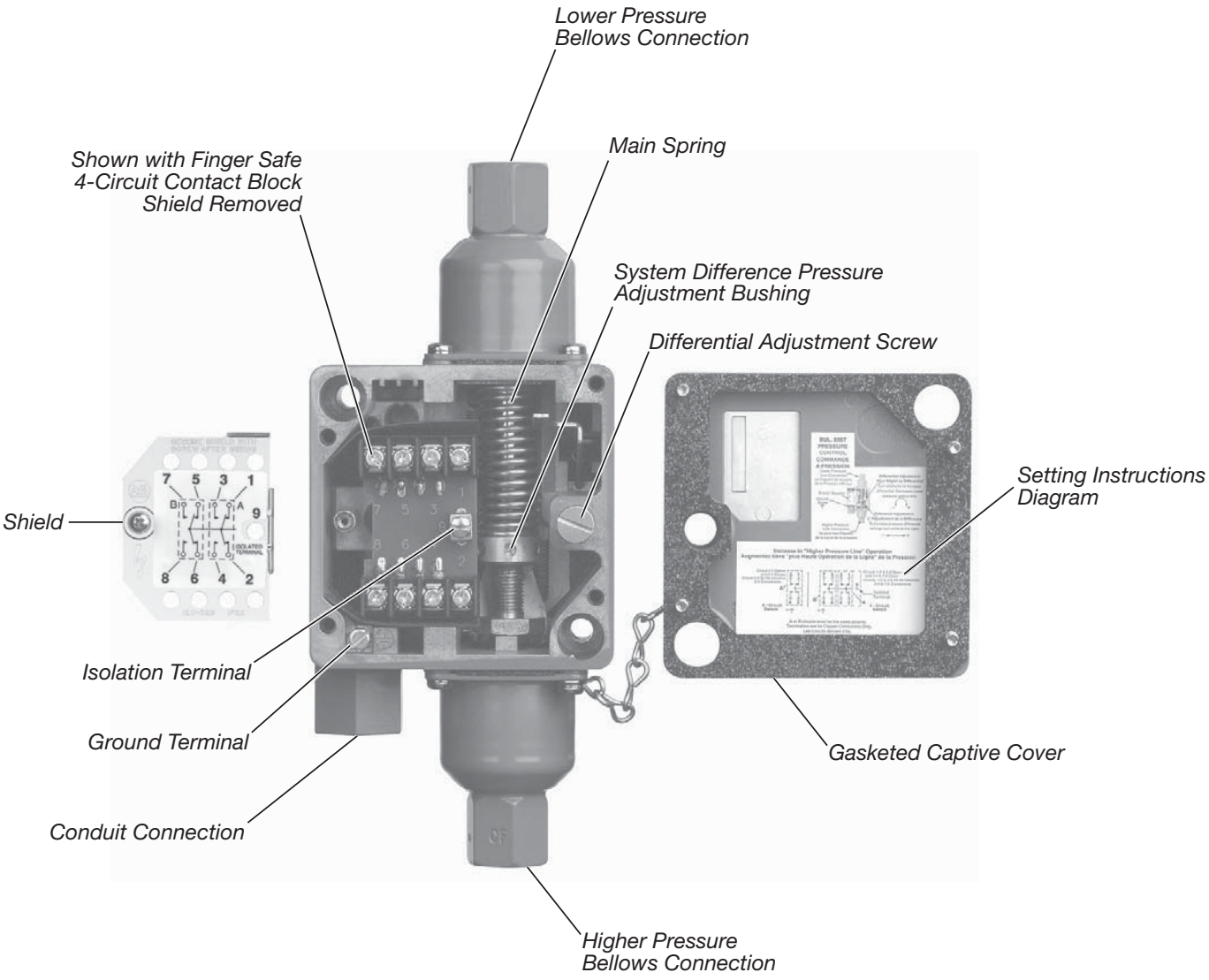
Step 1 — Adjust trip setting (difference pressure)

The trip setting is controlled by the system difference pressure bushing and is adjusted internally. With no pressure (open to atmosphere) applied to top bellows, apply a constant pressure to bottom bellows equal to the desired difference in pressure at which the contacts are to trip. Insert a 1/8 in. diameter rod into a hole in the bushing and turn bushing to the left. Continue to turn bushing until the mechanism trips; circuit 1-2 will open. At this value, the trip setting is set at the pressure which is being applied to the bottom bellows.
Note: Turning the system difference pressure bushing will cause both the trip and reset settings to change in virtually equal increments.

Step 2 — Adjust reset setting (differential pressure)

The reset setting is controlled by differential adjustment screw (this adjustment can be made with the cover on). The reset setting is adjusted by turning the differential adjustment screw clockwise to increase the differential or counterclockwise to decrease the differential.
Note: Adjusting the differential has little or no affect upon the trip setting (difference pressure).

Figure 6
Trip and reset adjustment for pressure difference controls — 4-circuit contact block

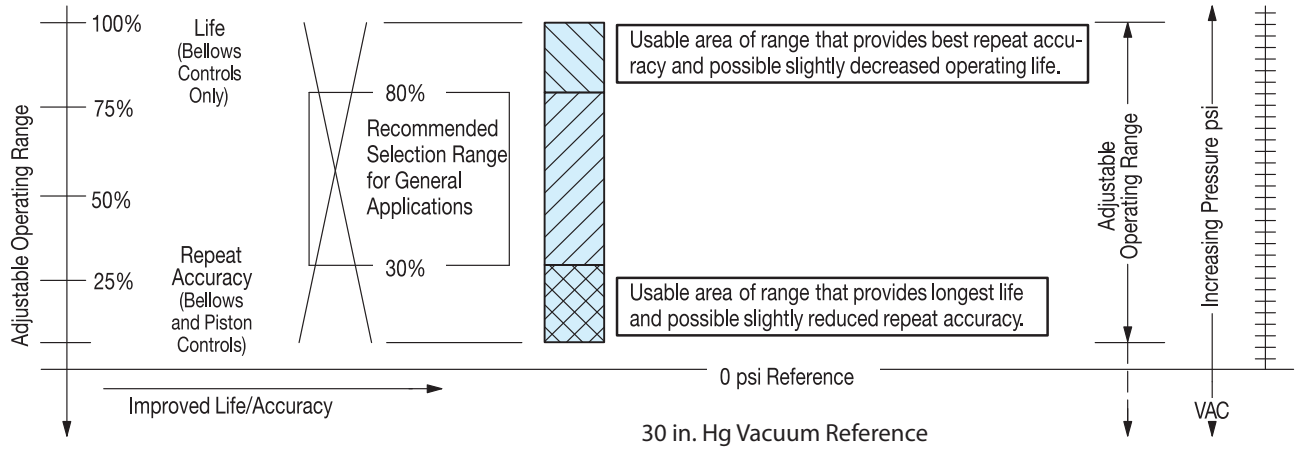


Repeat Accuracy and Mechanical Life

The design and construction of Bulletin 836T Pressure Controls provide a typical repeat accuracy equal to or better than the values shown in the repeat accuracy table below. Repeat accuracy is based on percent of maximum range, evaluated from test data and calculated using the formula per ICS 2-225 standards. Repeat accuracy and mechanical life of bellows type controls is graphically illustrated in Figure 7. The life curve does not apply to piston type controls.

For general applications, controls selected where the contacts operate between 30% and 80% of the operating range and where the maximum line and surge pressures do not exceed the specified values will provide excellent life and repeat accuracy. For more specific applications, it is important to note that the controls are designed to operate below or above these values. However, there may be a small trade-off between the factors of repeat accuracy and mechanical life.

Figure 7
Repeat accuracy versus mechanical life graph



Repeat Accuracy

Type	Typical Characteristics (% of Maximum Range) ✶
Bellows	± 1%
Piston with seal	± 5% ❄
Piston without seal	± 3%

✶ Evaluation made from test data and calculated using formula per ICS 2-225 standards.

❄ Seal adds additional friction and value shown takes into consideration initial breakaway frictional force incurred during start-up or infrequent cycle operation. On continual cycle operation the repeat accuracy approaches ±3%.

Conversion Factors (Rounded)

psi x 703.1 = mmH_2O
psi x 27.68 = in. H_2O
psi x 51.71 = mm/Hg
psi x 2.036 = in. Hg
psi x 0.0703 = kg/cm^2
psi x 0.0689 = bar
psi x 68.95 = mbar
psi x 6895 = Pa
psi x 6.895 = kPa

Note: psi - pounds per square inch (gauge).
H_2O at 39.2 °F
Hg at 32 °F

Mounting without Removing Cover

Bulletin 836T controls can be mounted without removing the front cover. This helps prevent foreign materials from entering the opened enclosure during the interval between mounting and wiring of the control.

Factory Set Pressure Controls

Rockwell Automation will factory set pressure controls to customer specified values. Unspecified pressure controls shipped from the factory are set at the maximum operating range and minimum differential. See Factory-Set Pressure Controls, page 13-44.

Temperature Range

The temperature range at +32 °F (0 °C) or below is based on the absence of freezing moisture, water, or other fluids that may solidify and impede the operation of the control. Temperature ratings:

Operating: –22… +150 °F (–30…+66 °C)
Storage: –22…+200 °F (–30…+93 °C)

Contacts

Bulletin 836T controls feature 2- and 4-circuit contact blocks for added control circuit flexibility. Two-circuit contact blocks have one normally open contact and one normally closed contact and may be arranged for single-pole double-throw operation or separate circuit operation having the same polarity. Four-circuit contact blocks may be arranged for double-pole double-throw operation or separate circuit operation having the same polarity.

2-Circuit Contact Ratings — NEMA A600 (ICS 2-125)

AC						DC	
Maximum AC Voltage	A		Continuous Carrying Current	VA		Maximum Voltage	[A]
	Make	Break		Make	Break		
120	60	6.00	10	7200	720	115…125	0.4
240	30	3.00	10	7200	720	230…250	0.2
480	15	1.50	10	7200	720	550…600	0.1
600	12	1.20	10	7200	720	—	—

IEC 337-1					
Maximum Operational Voltage U_e	Utilization Category	Maximum Continuous Current I_{th}	Volts U_e	Rated Operational Current Make	Rated Operational Current Break
AC600	AC-11	10	120…600 AC	7200 VA	720 VA
		10	72…120 AC	60 A	720 VA
DC600	DC-11	10	24…72 AC	60 A	10 A
		—	115…600 DC	50 VA	50 VA

4-Circuit Contact Ratings — NEMA B150 (ICS 2-125)

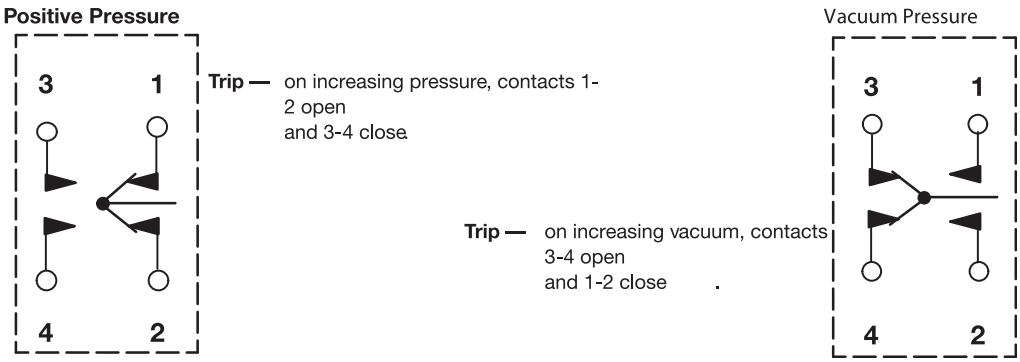
AC						DC	
Maximum AC Voltage	A		Continuous Carrying Current	VA		Maximum Voltage	[A]
	Make	Break		Make	Break		
120	30	3.00	5	3600	360	115…120	0.33
240	27.5	2.80	5	6600	660	230…240	0.17

IEC 337-1					
Maximum Operational Voltage U_e	Utilization Category	Maximum Continuous Current I_{th}	Volts U_e	Rated Operational Current Make	Rated Operational Current Break
AC150	AC-11	5	72…120 AC	30 A	360 VA
		5	24…72 AC	30 A	3 A
DC150	DC-11	—	115…240 DC	40 VA	40 VA

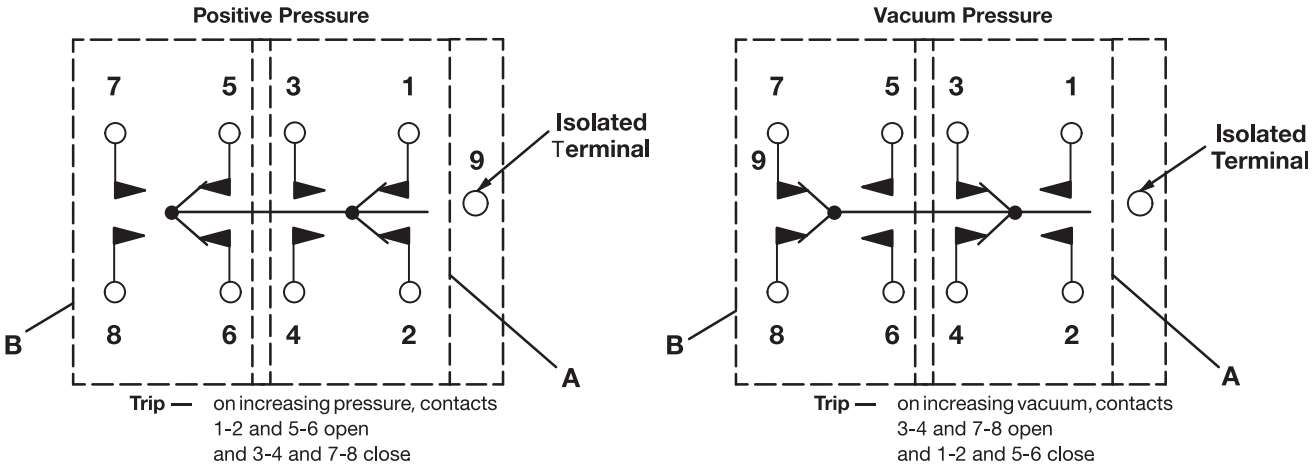
Note: NEMA does not rate contacts to switch low voltage and current. Bulletin 836T Styles T and D Pressure Controls are supplied with silver contacts. The devices are designed to deliver high force snap action to the contacts. This provides exceptional contact fidelity at 24V DC I/O card current level entry when the integrity of the enclosure is maintained.

Contact Wiring Configurations

2-Circuit Contact Blocks



4-Circuit Contact Blocks



Note: Circuits A and B are electrically isolated from one another.
A or B circuits must be the same polarity.

Nameplate with Removable Paint Mask

The masks are convenient for the many users who repaint controls to match the machine or color code equipment. Saves costly time-consuming hand masking necessary so as not to conceal product functional specifications and approval listings. This feature is standard on most controls at no additional cost. The paint mask feature cannot be supplied on controls with pilot lights. They are also not available on those devices where it is necessary to remove the mask and add suffix modifications to the catalog number or specific customer identification in the space provided.

Figure 8
Removable paint mask

Cover with Transparent Mask and Instruction Label in Place

Cover with Mask Partially Removed

Pressure Control Selection

The selection table below is an overview of the five types of Bulletin 836T Pressure Controls Rockwell Automation offers. Each type of control is suitable for use on many types of applications. Pressure ranges, pressure connections, enclosure types, and the compatibility of the actulator with different types of pressure media are given to assist in the selection of which type of control to use.

836T				
Actuator Type	Copper Alloy Bellows	Type 316 Stainless Steel Bellows	Piston Type Without Seal	Piston Type With Seal
Adjustable operating ranges	30 in. Hg vacuum…650 psi	30 in. Hg vacuum…375 psi	40…5000 psi	80…5000 psi
Adjustable differentials	2…125 psi	2…90 psi	20…650 psi	40…650 psi
Maximum line pressures	up to 1300 psi	up to 600 psi	—	—
Occasional surge pressures	up to 1600 psi	up to 600 psi	up to 15,000 psi	up to 15,000 psi
Pressure Media				
Air	•	•		
Water	•	•	•	•
Hydraulic fluids	•	•	•	•
Corrosive liquids ∗		•		
Non-corrosive liquids	•	•	•	•
Corrosive gases ∗		•		
Non-corrosive gases	•	•		
Enclosures				
Type 1, 4 & 13	•	•	•	•
Type 7 & 9 and 4 & 13, IP66	•	•	•	•
Pipe Connections				
Standard pressure connection	1/4 in. N.P.T. female pipe thread	1/4 in. N.P.T. female pipe thread	3/8 in. N.P.T. female pipe thread SAE 7/16-20 UNF-2B thread O-ring boss seal SAE 9/16-18 UNF-2B thread O-ring boss seal	3/8 in. N.P.T. female pipe thread SAE 7/16-20 UNF-2B thread O-ring boss seal SAE 9/16-18 UNF-2B thread O-ring boss seal

∗ Corrosive liquids and gases must be compatible with Type 316 Stainless Steel Bellows.

Note: Pressure difference controls are supplied with either copper alloy or stainless steel bellows. See Product Selection on page 13-39 and page 13-40 for details.

Ordering Bulletin 836T Pressure Controls

When ordering Bulletin 836T Pressure Controls, consider the following:

- Device style
- Adjustable operating range
- Adjustable differential
- Maximum line pressure
- Occasional surge pressure
- Pressure media
- Enclosure type
- Pressure connection

How to Order

Step 1: Basic Device
Select a catalog number for the basic device.....**See pages 13-35…13-40.**

Step 2: Modifications
If required, add the appropriate modification suffix code(s) to the catalog number of the basic device.....**See page 13-41.**

Step 3: Accessories
If required, order accessories.....**See page 13-42.**

Step 4: Factory Options
Factory-set pressure controls.....**See page 13-44 .**

Catalog Number Explanation

Note: Catalog number must not include blank spaces.

836T –	T	25	1	J	X40	X15
	a	*b*	*c*	*d*	*e*	*f*

a

Style of Device	
Code	Description
T	Pressure control
D	Pressure difference control

b

Operator Type		
Code	Style	Description
25	T	Copper alloy bellows
26	T	Type 316 stainless steel bellows
30	T	Piston without seal
35	T	Piston with seal
40	T	Piston with seal (independent trip and reset adjustment)
45	D	Copper alloy bellows
46	D	Type 316 stainless steel bellows

c

Pressure Specifications
See “Pressure Specifications” on pages 13-35…13-40

d

Enclosure Type	
Code	Description
J	1, 4 & 13 Industrial use
E	7 & 9 and 4 & 13 Combined hazardous locations

e

Contact Block Type	
Code	Description
None	2-circuit contact block - standard
X40	4-circuit contact block

f

Modification 1
Add suffix codes in descending order whenever possible. (Optional. See page 13-41.)

Product Selection

Style T — Type 1, 4 & 13 with Pilot Light Option

Style T — Type 1, 4 & 13 with Pilot Light, Range Locking Cap, and 5-Pin Mini-Receptacle

Style T Pressure Controls with Copper Alloy Bellows∗ — S.P.D.T. 2-Circuit Contact Block

Standard Pressure Controls shipped from the factory are set at the maximum operating range and minimum differential.

Pressure Specifications				Enclosure Type	
	Adjustable Differential [psi] (Approximate Mid-Range Values)	Maximum psi		Type 1, 4 & 13	Type 7 & 9 and 4 & 13 ‡
Adjustable Operating Range [psi]		Line Pressure	Occasional Surge Pressure❄	Cat. No.	Cat. No.
30 in. Hg vacuum…35	2…7	80	90	**836T-T251J**	836T-T251E
6…75	3…15	200	220	**836T-T252J**	836T-T252E
12…150	6…30	350	450	**836T-T253J**	836T-T253E
20…300	10…55	600	750	**836T-T254J**	836T-T254E
40…450	20…90	900	1200	**836T-T255J**	836T-T255E
60…650	30…125	1300	1600	**836T-T256J**	836T-T256E

Style T Pressure Controls with Copper Alloy Bellows∗ — D.P.D.T. 4-Circuit Contact Block

Standard Pressure Controls shipped from the factory are set at the maximum operating range and minimum differential.

Pressure Specifications				Enclosure Type	
	Adjustable Differential [psi] (Approximate Mid-Range Values)	Maximum psi		Type 1, 4 & 13	Type 7 & 9 and 4 & 13 ‡
Adjustable Operating Range [psi]		Line Pressure	Occasional Surge Pressure❄	Cat. No.	Cat. No.
30 in. Hg vacuum…35	2.2…7	80	90	836T-T251JX40	836T-T251EX40
6…75	4.5…15	200	220	**836T-T252JX40**	836T-T252EX40
12…150	9…30	350	450	**836T-T253JX40**	836T-T253EX40
20…300	15…55	600	750	836T-T254JX40	836T-T254EX40
40…450	30…90	900	1200	836T-T255JX40	836T-T255EX40
60…650	45…125	1300	1600	836T-T256JX40	836T-T256EX40

∗ Copper alloy bellows may be used on water or air, and other liquids or gases not corrosive to this alloy.

❄ Transients (pulses) can occur in a system prior to reaching a steady-state condition. Surge pressures within published values generated during startup or shutdown of a machine or system, not exceeding eight times in a 24-hour period, are negligible.

‡ The combined Type 7 & 9 and 4 & 13 hazardous gas and dust service enclosure is supplied with special gasket and O-ring seal to diminish/exclude moisture, fluids, and dust from entering the enclosure. Enclosure is rated for the following environments:
CLASS I Groups C,D
CLASS II Groups E,F,G
CLASS III

Ordering Modifications

Modifications are ordered by adding the appropriate modification suffix code to the catalog number of the basic device. Add suffix codes to the catalog number in descending order.

Item	Description	Suffix Code
Oxygen/nitrous oxide service	Bellows and fittings specially prepared for oxygen and nitrous oxide service. Devices tested with pure oxygen, bellows plugged for protection from contamination and a tag warning against contamination is applied.	X2
External adjustment sealed	The 836T external adjustment is sealed, requiring cover removal to adjust differential (includes contact block shield)	X3
Tamper resistant setting	Range and differential adjustments are factory sealed. Price includes factory setting charge.∗	X4
SAE 7/16-20 UNF thread O-ring boss seal (piston type pressure control)	Female SAE straight thread O-ring seal designed to prevent leaks and minimize loss of hydraulic fluids.	X6
SAE 9/16-18 UNF thread O-ring boss seal (piston type pressure control)		X7
Neon pilot light 120V AC	A high-intensity neon pilot light for 120V AC, 60 Hz applications is available and can be wired for ON or OFF operation. The current rating is 1.0 mA.❄	X9
Red LED pilot light 24V DC	A high-intensity LED 24V DC pilot light is available to meet the requirements of the automotive, machine tool builders, and other industries. The current rating is 22 mA and can be wired for ON or OFF operation.❄	X15
Green LED pilot light 24V DC		X18
Special diaphragm assembly (piston type pressure control)	Diaphragm is made of Viton® and Nomex® fabric. Required when phosphate ester base and other adverse hydraulic fluids are present. Use on Catalog Numbers **836T-T300J** through **836T-T303J** series controls.	X25
Special diaphragm and O-ring assembly (piston type pressure control)	Diaphragm is made of Viton® and Nomex® fabric, O-ring is made of Viton® . Required when phosphate esterbase and other adverse hydraulic fluids are present. Use on Catalog Numbers **836T-T350J, -T351J, -T352J, -T353J** and **-T400J** series controls.	X26
Viton® enclosure gaskets	Special enclosure gaskets made of Viton® are available for applications where the standard gasket materials are not fluid compatible. Viton® is generally specified by the user for use with existing and newly developed coolants and hydraulic fluids to maintain enclosure integrity. These include cover, backplate, cover, and bellows or piston gaskets. **Note**: Viton® enclosure gaskets are often used with special diaphragm assemblies **(X25 or X26)**. See description above.	X29
5-Pin mini-type receptacle without pilot light❄	Select the desired pin wiring configuration from the diagrams on pages 13-45…13-47. Rated at 8 A, 600V.	See pages 13-45…13-47.
5-Pin mini-type receptacle with prewired pilot light❄	Select the desired pin wiring, pilot light wiring, and voltage from the diagrams on pages 13-45…13-47. Includes receptacle and pilot light. Rated at 8 A, 600V.	See pages 13-45…13-47.
5-Pin micro-connect receptacle without pilot light❄	Select the desired pin wiring configuration from the diagrams on pages 13-45…13-47. Add number "1" to the suffix number immediately following the letter "X." **Example: "X19" becomes "X119."** Rated at 3 A, 300V. Pin/Wiring Code: 1 – Red with white tracer, 2 – Red, 3 – Green (Gnd), 4 – Red with yellow tracer, 5 – Red with Black Tracer	See pages 13-45…13-47.
5-Pin micro-connect receptacle with prewired pilot light❄	Select the desired pin wiring configuration and pilot light (X9 or X15, see above for specifications) from the diagrams on pages 13-45…13-47. Add number "1" to the Suffix Number immediately following the letter "X." **Example: "X12X9" becomes "X121X9."** Rated at 3 A, 300V. Pin/Wiring Code: 1 – Red with white tracer, 2 – Red, 3 – Green (Gnd), 4 – Red with yellow tracer, 5 – Red with black tracer	See pages 13-45…13-47.
Additional optional receptacles and wiring❄	For assistance, please consult your local Rockwell Automation sales office or Allen-Bradley distributor.	

∗ See paragraph entitled “Factory-Set Pressure Controls” on page 13-44.
❄ Not available on the Type 7 & 9 and 4 & 13 combined enclosed devices.

Ordering Accessories

Accessories are ordered as separate catalog numbers. Select the required accessories from the accessories table below.

Item	Description	Type	Cat. No.
External fixed pulsation snubbers	Controls are supplied as standard with an internal pulsation snubber. However, a control properly selected and used within the adjustable range values, yet having a short bellows life, is a good indication of the presence of extreme surge pressures. External fixed pulsation snubbers are available to provide **additional** dampening when extreme pulsations or surges are present. Recommended if more than eight line surges occur in a 24-hour time period.	Snubber for bellows control 1/4-18 N.P.T. thread	**836-N7**
		Snubber for piston control 3/8-18 N.P.T. thread	**836T-N8**
Selectable element pulsation snubbers	Controls are supplied as standard with an internal pulsation snubber. However, a control properly selected and used within the adjustable range values, yet having a short bellows life, is a good indication of the presence of extreme surge pressures. Selectable element pulsation snubbers are supplied with five different elements to provide a selectable balance between maximizing pressure control life and minimizing control response time. Pulsation snubbers are supplied with the mid-range element already mounted and four other color-coded porosity elements included in the package. See "Selectable Pulsation Snubber Porosity Elements" table on this page for porosity specifications.	Snubber for bellows control 1/4-18 N.P.T. thread	**836-N40**
		Snubber for piston control 3/8-18 N.P.T. thread	**836T-N41**
	Female SAE straight thread O-ring seal designed to prevent leaks and minimize loss of hydraulic fluids. Use on applications with a pressure range of 550…5000 psi.	SAE 7/16-20 UNF-2B thread O-ring boss seal for piston controls	836T-N49
		SAE 9/16-18 UNF-2B thread O-ring boss seal for piston controls	**836T-N50**
Selectable pulsation snubber porosity elements	Package consists of five porosity elements and complete instructions. Elements are color-coded for easy identification. Elements are available in five different porosities for a wide range of applications. See selectable pulsation snubber porosity elements table.		See Table on this page
Locking cap	Deters unauthorized tampering of range setting. Once installed, the locking cap can be removed with a screwdriver to re-adjust the control.	—	**836T-N13**
Isolation trap with two 1/4 in. male pipe fittings	An isolation trap is available for high-temperature media applications from 150…600 °F or corrosive applications compatible with Type 316 stainless steel tubing and fittings. The isolation coil is inserted between the bellows of the pressure control and the elevated temperature line of the system. The isolation trap will fill with condensed water or can be filled with water or suitable fluid when installed. A silicone buffer fluid is available in a convenient dispenser. Copper alloy lower and higher pressure range bellows can be applied to many applications using the isolation trap. The silicone buffer fluid is used to isolate many corrosive substances from coming in contact with the bellows. The isolation trap is rated at 3000 psi working pressure. Not available for piston-type controls. See photo on this page.		836-N25
Isolation trap with one 1/4 in. male and one 1/4 in. female pipe fittings			836-N26
2 oz. of buffer fluid to fill bellows and tubing			836-N27
Metric electrical entry conduit adapters	BS 20 mm thread adapter		**836T-N36**
	Pg 13.5 thread adapter		836T-N37

Selectable Pulsation Snubber Porosity Elements

Recommended Type of Service	Color Code	Porosity	Cat. No.
Viscous fluids (over 500 SSU)∗	None	Coarser	836-N43
Medium type oils (225…500 SSU)∗	Black		**836-N44**
Water and light oils (30… 225 SSU)∗	Brown		**836-N45**
Low viscosity fluids (under 30 SSU)∗	Green		**836-N46**
Air and other gases	Red	Finer	**836-N47**
One of each of the above	—	Assorted	836-N48

∗ Saybolt Seconds Universal (SSU) — units of viscosity measurement.

Note: Color code is located on end of element.

Isolation Trap and Silicone Buffer Fluid

Fixed Pulsation Snubbers

Male/Female Pipe Threads

Selectable Element Pulsation Snubbers

Male/Female Pipe Threads

Pulsation Snubbers

Conversion Kits

Ordering Conversion Kits

Conversion Kits are ordered by adding the appropriate suffix code to the catalog number of the basic device. Select the required conversion kits from the table below.

Conversion Kits

Item	Description	Suffix Code
Neon pilot light conversion kit	Converts standard control to control with 120V AC neon pilot light. Not available on Type 7 & 9 devices. Kit includes pilot light and cover assembly.	N9
Red LED pilot light conversion kit	Converts standard control to control with 24V DC LED pilot light; has a 22 mA current rating. Not available on Type 7 & 9 devices. Kit includes pilot light and cover assembly.	N15
Green LED pilot light conversion kit	Converts standard control to control with 24V DC LED pilot light; has a 22 mA current rating. Not available on Type 7 & 9 devices. Kit includes pilot light and cover assembly.	N18

Example:
To convert a **Cat. No. 836T-T301J** to a **Cat. No. 836T-T301JX15**, order **Cat. No. 836T-T301JN15**.

Renewal Parts

Ordering Renewal Parts

Renewal Parts are ordered as separate catalog numbers. Select the required renewal parts from the table below.

Renewal Parts

Item	Description	Cat. No.
2-Circuit contact block renewal kit	Allows renewal of worn contacts for Bulletin 836T controls.	**836T-N1**
4-Circuit contact block renewal kit	Allows renewal of worn contacts for Bulletin 836T controls.	836T-N2
Renewal seals for piston-type controls	For use on Cat. No. 836T-T350J.	836T-N20
	For use on Cat. No. 836T-T351J.	836T-N21
	For use on Cat. No. 836T-T352J and 836T-T400J.	836T-N22
	For use on Cat. No. 836T-T353J.	836T-N23

Factory-Set Pressure Controls

Ordering factory-set pressure controls

- When a specific factory setting is requested, the specific terminal connections must be specified — e.g., N.O. or N.C. It must also be specified whether the contact operation is occurring on either increasing or decreasing pressure. For example:

Normally Closed (N.C.) contacts to open at∗ psi increasing pressure and close at∗ psi decreasing pressure.

—OR—

Normally Open (N.O.) contacts to close at∗ psi increasing pressure and open at∗ psi decreasing pressure.

- If minimum differential is not critical and the inherent minimum differential satisfies the application, specify the factory setting as follows:

Normally Closed (N.C.) contacts to open at∗ psi increasing pressure minimum differential.

—OR—

Normally Open (N.O.) contacts to close at∗ psi increasing pressure minimum differential.

Quality analog test gauges§ are used when applying requested factory settings to these rugged industrial grade pressure controls. (Gauges are calibrated and accuracy is traceable to the The National Institute of Standards and Technology.)

The actual requested setting is applied to the control by reading the set point directly from the test gauge being used. However, traceable gauge tolerance variance between source and user, and possible severe shock during shipping and installation, may contribute to the factory settings deviating slightly from the specified values. Slight recalibration can easily be accomplished upon final installation to meet specific requirements for the more demanding applications.

When installed, the controls will perform with a repeat accuracy as established in the paragraph entitled “Repeat Accuracy" (see page 13-54). Special service is available to factory-set controls on digital laboratory instruments, up to 600 psi, when required for more critical applications. An additional charge may be added for this service contingent upon setting tolerance and quantity. Please contact your local Rockwell Automation sales office or Allen-Bradley distributor.

∗ Specify psi (pounds per square inch) or, in. Hg vac (inches of mercury vacuum).

❄ Per ANSI B40.1 Grade 2A (0.5% accuracy full scale), Grade 3A (0.25% accuracy full scale).

If not specified, setting tolerances will be as shown in the table below.

Pressure Range	Tolerance
30 in. Hg Vac....0	+/- 1 in. Hg vac.
> 0...100 psi	+/- 1 psi
> 100...300 psi	+/- 2 psi
> 300...500 psi	+/- 5 psi
> 500...1000 psi	+/- 10 psi
> 1000...5000 psi	+/- 50 psi

Standards Compliance

- UL508
- UL698, 1604 (Haz. Loc.)
- CSA 22,2 No. 14
- NEMA ICS-2

Certifications

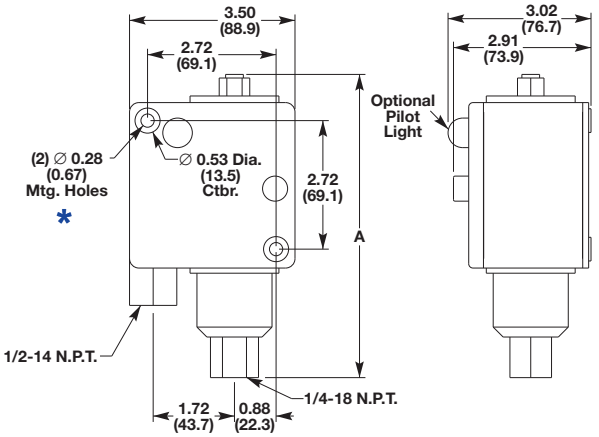
File and Guide Numbers

	UL		CSA	
	File Number	Guide Number	File Number	Class
Bulletin 836T	E14842	NKPZ	LR1234	3211-03
	E53048 (Haz. Loc.)	NOWT	LR11924 (Haz. Loc.)	3218-05
	Hazardous Location enclosure devices are not CE compliant. All other enclosed devices are CE compliant.			

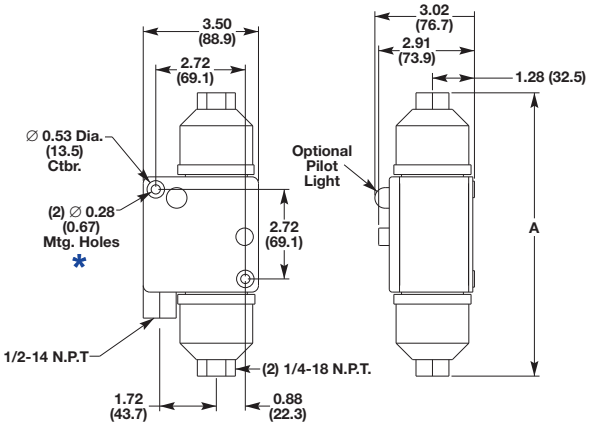
Approximate Dimensions and Shipping Weights

Dimensions in inches (millimeters). Dimensions are not intended to be used for manufacturing purposes.

Type 4 & 13 (Bellows)



Approximate Shipping Weight 3-1/2 lbs. (1.6 kg)

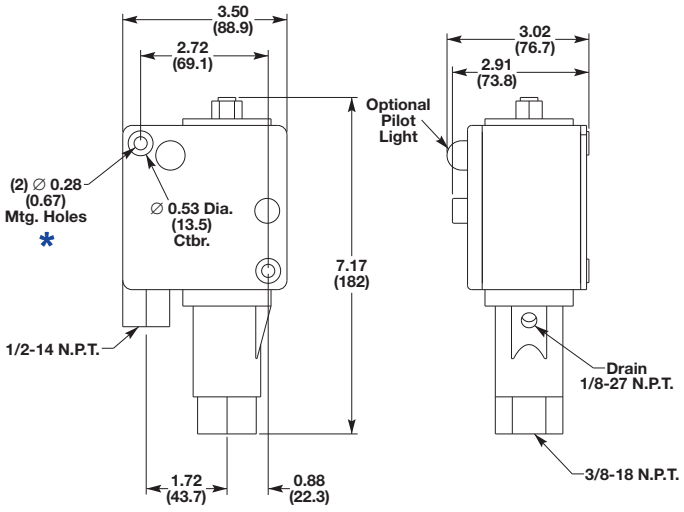


Approximate Shipping Weight 4 lbs. (1.8 kg)

Cat. No.	A Dimensions	Cat. No.	A Dimensions	Cat. No.	A Dimensions	Cat. No.	A Dimensions
836T-T251J	6.65 (169)	**836T-T254J**	6.95 (176)	**836T-D450J**	8.60 (218)	836T-D460J	8.60 (218)
836T-T260J		**836T-T255J**					
—	—	**836T-T256J**	7.09 (180)	**836T-D451J**	8.14 (207)		
836T-T252J	6.41(163)	**836T-T262J**	7.33 (186)	**836T-D452J**		**836T-T252J**	8.5 (216)
836T-T253J		**836T-T263J**	7.25 (184)			836T-D463J	10.06 (256)
836T-T261J				**836T-D453J**	9.5 (241)		

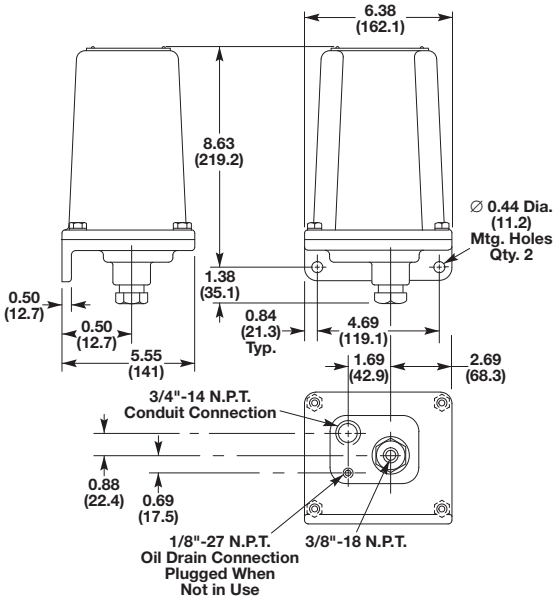
Type 4 & 13 (Piston)

(Does not include Dual Bellows Devices)



Approximate Shipping Weight 4.5 lbs. (2.0 kg)

Type 4 & 13 and 7 & 9 Bellows and Piston Type



Approximate Shipping Weight 10 lbs. (4.5 kg)

∗ (2) mounting screws are required: 3/16 x 20 x 2 in. Counterbore depth is 1-1/8 in. Overall depth of mtg hole (front to back) is 2-1/4 in.

Cat. No.	
836T-T300J	836T-T350J
	836T-T351J
836T-T301J	836T-T352J
836T-T302J	836T-T353J
836T-T303J	836T-T400J

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CS-451-200 : Identification sheet

VWTC PROJECT NUMBER:	5000218009	REV:	1
PROJECT NAME:	AEM AMARUQ	SUBMITTED TO (COMPANY):	AGNICO EAGLE MINES
ENGINEER:	Gabriel Hébert	SUBMITTED TO (RESPONSIBLE)	
PROJECT MANAGER:	Clément B	PROJECT NUM REFERENCE.:	
PHONE NUMBER:		LOT NUMBER:	

SUPPLIER	EQPT CODE	EQPT TAG NO	DIA	DESCRIPTION	INFO 1	INFO 2	INFO 3	APPLIC.	NOTE	REV
E&H	IESWLE5204819	LSL9-591	ENCLOSURE: 110 x 218 mm, SHAFT:	HOPPER LOW LEVEL SWITCH	LEVEL SWITCH // MANUF: E&H// MODEL :FTE31-C6DB11 Soliswitch FTE31, thread NPT Level limit switch, Paddel. Solid >= 100 g/dm3. 1x relay double pole change over switch.	Housing: Plastics PBT, IP65 NEMA4 Rod: steel 1.4305 (303). 1x Cable entry NPT 1/2. Appval:C CSA DIP Cl. II,III, Div.1, Gr.EFG Power : 24VDC relay	Paddel; Additional Option:1 316Ti; basic version Version:1 Basic version B Marking: 71072711: TAG on device	KMnO4 PREP SYSTEM		rev1

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Level | Pressure | Flow | Temperature | Liquid Analysis | Registration | Systems Components | Services | Solutions

Technical Information

Soliswitch FTE31

Level Limit Switch
Economical paddle limit switch
For application in dust hazardous explosive areas

Application areas

The universal paddle level limit switch FTE 31 is used as a full, empty and demand alarm on silos containing solids. Its construction and materials make the unit suitable for use in the food industry.
The unit is suitable as a level limit switch in dust explosion hazardous areas.
Typical applications are level detection in:

- Cereals
- Sugar
- Cacao
- Animal feeds
- Washing powders
- Chalk
- Dry plaster
- Cement
- Granulates
- Wood chips

Features and benefits

- Simple operation
- Proven principle
- Slip clutch
- Ingress protection to IP 65 / NEMA 4x / Type 4x

TI068R/09/en
51002384

Endress+Hauser
People for Process Automation