Baffinland Iron Mines Corporation
Mary River Project

Construction Summary Report: Milne Port Water System

PERMIT TO PRACTICE
HATCH LTD.
Signature
Date 19 FEB 15
PERMIT NUMBER: P 512
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

REGISTERED PROFESSIONAL ENGINEER
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19 FEB 15
NT/NU

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			HATCH			CLIENT

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Facility Description Supporting Documents

1. Facility Description

The Milne Port Water Systems include the Milne Port facility's water treatment system, sewage treatment system, and the treated effluent discharge system.

1.1 Water Treatment System

The Mine Site water treatment system includes an adsorption clarifier water treatment plant designed to treat raw water for the removal of colour, turbidity and other impurities to provide a high quality effluent. The high quality effluent from the adsorption clarifier is then disinfected for potable and domestic use.

The process combines flocculation and clarification in the mono-media roughing filter. Flocs are formed and retained in the coarse mono-media. The dual media filter provides polishing of the pre-treated water to provide a high quality effluent. Disinfection involves UV and chlorination.

The treatment process is designed to run at the constant pre-set flowrate 3.4m3/h (15USgpm). The system flow is tracked by the inlet flow meter/ totalizer through the SCADA system.

Plant operation is controlled by the raw water tank level and the potable water tank level. On receipt of a low potable water tank level, the raw water pump downstream of the raw water tank (feeding the clarifier) is started, and the PLC controller opens the influent valve, starts selected chemical feed pumps, and initiates normal plant operation. On receipt of a high potable water tank signal, the plant is shut down. All control valves are de-energized to close, all chemical dosing is stopped.

The system is fed by water truck. The project is approved to source water from km32 Lake and from Phillips Creek (summer months only).

The Milne Port water treatment building is a foldaway building located west of the new accommodation facilities, east of the sewage treatment plant and south of the emergency response garage at N7 975 998 to N7 975 998 and E503 838.7 to E503 861.6. There is an overhead door on the west side of the building and a man door on the east and west.

The system includes the outdoor piping connecting the water treatment plant to the sewage treatment plant, and the piping between the water treatment plant and the accommodations facility. These pipes are HDPE DR11, pre-insulated with 50mm (2 inch) insulation and heat traced for year-round use.

The water treatment system operations and maintenance manual has been included in Appendix C.

1.2 Sewage Treatment System

The Milne Port sewage treatment plant (STP) is a membrane bioreactor (MBR) wastewater treatment plant designed for treatment of domestic wastewater. The STP is a packaged plant that comes with containerized inlet screen, equalization tank, post equalization tank screen, aeration tank, membrane tanks, UV disinfection systems and a sludge dewatering unit. The plant is housed inside six (6) 40 ft modified high-cube shipping containers that were interconnected when installed. The Milne Port sewage treatment plant was designed for an average design flow of 63m3/d (2.63m3/h). The system flow is tracked by the inflow meter and totalizer.

The Milne Port sewage treatment plant is located west of the water treatment building, east of the sewage truck building and south of the site services buildings at N7 975 996 to N7 975 971 and E503 801.3 to 503 801.3.

The system includes the outdoor piping connecting the accommodations facility to the sewage treatment plant, the effluent discharge piping and the potable water inlet. These pipes are HDPE DR11, pre-insulated with 50mm (2 inch) insulation and heat traced for year-round use.

The sewage treatment system operations and maintenance manual has been included in Appendix C.

1.3 Treated Effluent Discharge

During normal operation, the treated effluent from the sewage treatment plant (STP) is pumped to the permitted discharge point at Milne Inlet via the treated effluent discharge pipeline. In the event that the treated effluent does not meet discharge requirements, the off-spec effluent is pumped to the effluent pond located south of the fuel tank farm. Once the 'problem' in the STP is corrected, the off-spec effluent from the pond will be treated insitu or transported via vacuum truck and re-processed through the STP before directly discharging to Milne Inlet.

There are two tees in the treated effluent discharge pipeline located inside a valve box adjacent to the effluent pond. The first tee controls whether the treated effluent discharges to the effluent pond or directly to the discharge point at Milne Inlet and is controlled by manual valving located on the east berm of the effluent pond. The second tee connects with a blind flange on the side of the off-spec effluent pond. Should the effluent in the pond be determined suitable for discharge, a portable pump arrangement can be connected at the blind flange to empty the pond to the discharge point at Milne Inlet.

The pipeline routing exits the STP from the east wall, crosses over the STP roof, and turns south to meet with the utility berm running along the southern side of the facilities. The pipeline follows the berm west to the east side of the effluent pond and turns north along the pond berm. North of the pond and south of the fuel tank farm, the pipeline turns west along the berm and follows the berm north beside the fuel tank farm. North of the fuel tank farm the pipeline runs north-easterly to the discharge point above the high tide mark at Milne Inlet.

The treated effluent discharge pipeline is a 50mm (2 inch) diameter HDPE DR11 pipeline. The pipeline is approximately 750m long, above ground, pre-insulated with 50mm (2 inch) insulation and heat traced for year-round use. There are three locations where the pipe crosses underneath roads (see H349000-2000-00-014-0005 Milne Port Utility Services Site Layout). Under these roads the pipe runs inside larger carbon steel schedule 80 pipe to prevent the effluent line from being crushed by vehicle traffic.

The pumps and motors (duty/standby) start and stop as required to empty the containment tanks inside the STP.

2. Construction Activity Summary

Construction activities on the Milne Port water systems started in July 2013. The final system handover certificate for the water treatment system was completed in November 2014. The most recent item closeout on the open punch list is dated December 2014. The remaining punch list items are scheduled for completion in 2015.

The following summarizes the construction activities:

a. Crushed blast rock and fill material was quarried, crushed, screened, and hauled from the Milne Inlet Quarry (Q1) for use in the earthworks.

2.1 Water Treatment System

a. Prepared sub base and granular cap.

b. Installed berm between water building and camp.

c. Placed pre cast concrete foundation blocks.

d. Erected fold away building.

e. Installed raw water and treated water tanks.

f. Installed water treatment equipment.

g. Site run pre-insulated pipe and fittings on grade between the WTP outlet flange and the accommodation facilities.

h. Installed heat trace (two pass series self regulating system).

i. Installed heat trace RTD temperature sensors, controls and connect power supply.

j. Installed heat tracing control panels.

k. Installed water distribution system inside the accommodation facilities.

l. Connected electrical power to the building and install power distribution to the water treatment equipment.

m. Test treated water for regulatory compliance.

n. Site run pre-insulated pipe and fittings on grade between the WTP outlet flange and the sewage treatment plant.

o. Installed heat trace (two pass series self regulating system).

p. Installed heat trace RTD temperature sensors, controls and connect power supply.

q. Installed heat tracing control panels.

r. Commissioned the water treatment facility.

QA/QC

s. Pressure test of treated water pipe from water building to accommodation facilities.

t. In-service leak test of treated water pipe from water building to sewage treatment plant.

u. Off-site testing of water samples.

2.2 Sewage Treatment System

a. Prepared sub base and granular cap.

b. Placed sea containers, lining up pre-marked container connections.

c. Connected all pre-run piping connections.

d. Site run pre-insulated pipe and fittings on grade between the accommodation facilities and the sewage treatment plant.

e. Installed waste water collection system in the accommodation facilities.

f. Installed heat trace (two pass series self regulating system).

g. Installed heat trace RTD temperature sensors, controls and connect power supply.

h. Installed heat tracing control panels.

i. Connected all pre-wired electrical connections.

j. Connected electrical power to the building and install power distribution to the treatment equipment.

k. Commissioned the sewage treatment facility.

l. Test treated water for regulatory compliance.

QA/QC

m. Pressure test of waste water pipe from accommodation facilities to sewage treatment building.

n. Off-site testing of water samples.

2.3 Treated Effluent Discharge

a. Connected pipe to STP treated effluent nozzle.

b. Site run pipe between the STP and utility berm.

c. Installed pipe on grade following the utility berm to the Milne Inlet discharge point.

d. Installed manual valve station on berm at effluent pond.

e. Installed heat trace (two pass series constant watt system).

f. Installed heat trace RTD temperature sensors, controls and connect power supply.

g. Installed heat tracing control panels inside the Sewage Truck Building.

QA/QC

h. Pressure test of treated effluent pipe from sewage treatment building to the Milne Inlet discharge point.

3. Photographic Records

3.1 Water Treatment System

Figure 1: Pre-construction of the Milne Port water system [north view]

Figure 2: Water building pad and pre-cast concrete foundation blocks

Figure 3: Water building – fold away building erected

Figure 4: Water system – raw water tank, chlorine dosing system and clarifier

Figure 5: Water system – water treatment pumps and clarifier

Figure 6: Water system – blowers

Figure 7: Water system – chemical mixing / dosing tanks

Figure 8: Water system – water treatment pumps

Figure 9: Piping out of the water building (to accommodation facilities, to sewage treatment, and for firewater)

Figure 10: Piping between accommodation facilities, water treatment plant, and sewage treatment facility [northeast view]

Figure 11: Water building - water truck connection

3.2 Sewage Treatment System

Figure 12: Placing of the 6 sea containers, west of the accommodation facility [west view]

Figure 13: Weather sealing of connection joint between two of the six sea containers that combined are the sewage treatment building

Figure 14: Sewage treatment building – sea containers placed

Figure 15: Installation of interconnecting piping to and from the sewage treatment building

Figure 16: Treated effluent tanks inside the sewage treatment facility

3.3 Treated Effluent Discharge

Figure 17: Treated effluent discharge piping laid out for fusing [north view]

Figure 18: Installation of heat trace lines along an elbow of treated effluent discharge piping

Figure 19: Preparing to fuse two HDPE piping lengths (activity enclosed in protective tenting to retain heat required for fusing)

Figure 20: Road crossing with cables and piping routing through schedule 80 pipe sleeves for protection

Figure 21: Treated effluent discharge location onto rip rap at Milne Inlet [northwest view]

4. As-Built Drawings

The as-built drawings incorporate contractor red line markups, field instructions, requests for information, field sketches, and all other inputs provided by the field engineering team. The as-built drawings are attached in Appendix A.

Table 4-1: Water System 'As-Built' Drawing List

Drawing Number	Title	Revision
H349000-2000-00-014-0004	Milne Port Infrastructure Site Layout	3
H349000-2720-75-031-0001	Milne Port Raw/Fire Water System Piping & Instrumentation Diagram	1
H349000-2720-75-031-0002	Milne Port Potable Water System Piping & Instrumentation Diagram	1
H349000-2731-75-031-0001	Milne Port Sewage Water Treatment Piping & Instrumentation Diagram	1

5. Field Decisions

The following sections describe relevant field decisions made during construction:

a. The location of the Milne Port camp and support buildings was moved 20m north. The ground near the south of camp was too soft to supporting buildings. As a result, the water system buildings were constructed further north than shown on the original issued for construction (IFC) drawings.

b. Original design included installation of rock anchors on the outdoor HDPE piping to restrict piping movement caused by seasonal thermal expansion. The HDPE piping does still move due to thermal expansion, but this does not damage the system. As such these rock anchors have been removed from the project design.

c. Due to limited material availability onsite, road crossing schedule 80 pipe sleeve diameters vary to suit clearance between the ID of the sleeve and the OD of insulated process piping.

d. Modified heat trace installation for outdoor HDPE piping to include Heater Cable Sensing RTD's instead of Ambient Sensing RTD's to prevent overheating of the heat trace cable.

5.1 Water Treatment System

a. Installed electric heaters in the water building in place of the design diesel heating system. The diesel heaters were late in delivery. Project decision was to move to electric heating permanently.

b. Modifications were made to the electrical distribution to accommodate electric heat in the Water Building and Sewage Truck Building at Milne Port.

c. Layout of water treatment equipment inside the building was adjusted in the field to better suit layout of piping and electrical cable.

5.2 Sewage Treatment System

a. Roof flashing and roof sealant were added to the roof joints between the 6 sea containers that make up the sewage treatment plant. Spray foam insulation was added to joints and wall penetrations to weather-proof.

b. The power and IT cables installed on grade outside of the sewage treatment plant were unprotected and a trip hazard. A wooden step structure with handrail was constructed over the cables to form a safe access walkway.

c. The supplied STP discharge pumps and motors (duty/standby) were replaced in-field by units with reduced design head. The project's compressed delivery/shipping schedule did not allow for this equipment change before shipment of the STP equipment to site.

5.3 Treated Effluent Discharge

a. The valving arrangement was modified in-field on the treated effluent discharge pipeline adjacent to the treated effluent pond. Heat trace cable was looped up the pipe branch and back to main pipe run. Flanges were added to the design near the southeast corner of the treated effluent pond to allow for temporary hose coupling. This arrangement allows the pond to be pumped directly to the discharge point at Milne Inlet using a portable pump with hoses should the pond contents be tested and approved for discharge.

b. A timber valve box was constructed to encase the treated effluent branch and valve set adjacent to the effluent pond. Box was insulated and sealed to prevent snow ingress.

c. The discharge location was relocated from the original permitted discharge location to north of the tank farm to avoid interference with the ore dock and ship loader construction.

6. Performance Evaluation

6.1 Water Treatment System

The water quality out of the water treatment system is tested weekly using colorimetric analysis to ensure the potable water supplied to the Milne Port camp is free from detectable concentrations of total coliform and e-coli. Periodic sampling and potable water analyses in accordance with applicable Health Canada guidelines is also performed, the samples being sent to an external accredited laboratory. As of the data collection cut-off date of this report (December 9, 2014) there have been no adverse observations in operational performance of the water treatment system. The water treatment system has consistently tested within the allowable parameters for water quality with no abnormal observations in operational performance.

Observed settlement in the water building floor has been greater than expected since construction. The resulting movement of equipment caused a pipe to crack from bending stress in early 2014. Mitigation included cutting out the section of rigid pipe and replacing it with a flexible hose connection (Figure 22). Additional flexible hosing with barb connections have been installed between other equipment skids where differential settlement was observed. In addition to adding flexible hosing connections, the exposed floor locations in the water building were excavated between 12 and 18 inches, insulated with 6 inches of rigid

styrofoam, re-graded and backfilled in July 2014 to reduce risk of further settlement. The floor condition is being monitored; no further movement has been observed.

Figure 22: Location of cracked pipe in Milne Port Water Building, fixed infield with flexible hose connection as shown [27Apr2014].

The water building and accommodation vendor (Horizon) originally installed CPVC piping material for outdoor runs of treated water and sanitary sewer piping between the water building, STP and accommodation facilities. The glued CPVC joints failed a number of times in cold temperatures. The outdoor treated water piping has since been replaced with HDPE insulated and heat traced. The sanitary sewer line is still glued CPVC. Treated water from the water building to the STP was installed as HDPE. Firewater is carbon steel with Victaulic, so has not had the same issues.

6.2 Sewage Treatment System

The treated effluent quality out of the sewage treatment system is tested daily using colorimetric analysis to ensure the treated effluent water discharged is within specified Type A Water Licence criteria. Effluent is sampled in accordance with Type A Water Licence requirements and sent to an external accredited laboratory for analyses. As of the data collection cut-off date for this report (December 9, 2014) the plant has consistently maintained effluent compliance with the exception of several minor exceedances caused by upset influent conditions. In these instances, the plant was rapidly brought back into compliance and in some cases effluent was redirected on a short term basis to the PWSP. The results of effluent quality analyses are presented in monthly and annual Water Licence Reports submitted to the Nunavut Water Board as required by the Type A Water Licence.

There have been some occurrences of observed high vacuum levels in the operating sewage treatment system. The facility was built to the approved design, and continues to operate within the required parameters; however as a result of the observed high vacuum levels Operations have been coordinating with the vendor to determine whether system changes may improve performance moving forward.

6.3 Treated Effluent Discharge

The treated effluent discharge piping experienced a freeze blockage in October 2014. Subsequently the heat trace overheated and damaged the pipe. Investigation of the causes and planning for repairs in ongoing.

7. Vibration Monitoring

No vibration monitoring was conducted during the construction of the Milne Port water systems as it was not deemed necessary based on scope of activities required for construction.

Control for quarrying activity was conducted as per the project's specific management plans:

- BAF-PH1-830-P16-0040 (H349000-1000-07-126-0013): Quarry Management Plan Milne Inlet Quarry (Q1).
- BAF-PH1-830-P16-0004 (H349000-1000-07-126-0011): Borrow Pit and Quarry Management Plan.

8. Environmental Monitoring

Environmental monitoring during the construction of the Milne Port water systems was conducted as per the BAF-PH1-830-P16-0008 Environmental Protection Plan (EPP) recently updated in July 2014.

In addition to the EPP, BIM self-performed earthworks construction follows the requirements of the BAF-PH1-830-STD-0001 Environmental Health and Safety Management Framework issued December 2010. The Baffinland on-site Environmental Management Team was responsible for environmental monitoring at all sites during construction and following-up with the construction team(s) if there were any reported environmental incidents or non-conformances.

Water system construction was also required to follow the requirements of the Surface Water and Aquatic Ecosystems Management Plan (March 2014), BAF-PH1-830-P16-0026. This Management Plan outlines the best management practices implemented to limit the potential for adverse impacts to receiving waters, aquatic ecosystems, fish and fish habitat used during construction. In addition this plan details the systems in place to mitigate and manage drainage and runoff at the building sites, address point and non-point discharges to surface waters and assess those discharges on water quality and quantity relative to their receiving water systems.

Water system construction also followed the requirements of the Fresh Water Supply, Sewage, and Wastewater Management Plan (January 2014), BAF-PH1-830-P16-0010, as required by the Type A Water Licence.

The Spill Contingency Plan (March 2014), BAF-PH1-830-P16-0036, in conjunction with the Emergency Response Plan (March 2014), BAF-PH1-830-P16-0007, provides guidance and instructions for first responders and Baffinland Management in the event of a spill event or other emergency such as fire or accident.

The risks to the water quality in the respective rivers and streams as a result of construction of the water systems would originate from following sources based on construction methodology:

- Spills from equipment.
- Increase in sediment load in the water.

There were no recorded spills from equipment used at the construction site. During the period of construction, water quality monitoring conducted at downstream stations under Part D, Section 16 and Part I, of the Type “A” Water Licence 2AM-MRY1325 indicated total suspended solids (TSS) and other parameter at levels below the specified Water Licence criteria. The results for water quality monitoring were provided in monthly reports submitted to the Nunavut Water Board and other stakeholders. In consideration of the above, the environmental mitigation strategies were effective in maintaining runoff water quality.

9. Earthworks Data

The survey data collected was used in generating the as-built drawings included in Appendix A. Survey data was not recorded for pieces of equipment inside the respective facilities. The survey data collected has been included in Appendix B.

10. Unanticipated Observations

10.1 Water Treatment System

There were no unanticipated observations during construction.

10.2 Sewage Treatment System

There were no unanticipated observations during construction.

10.3 Treated Effluent Discharge

There were no unanticipated observations during construction.

11. Surface Monitoring

Not conducted.

12. Required Maintenance

None conducted to-date.

13. Adaptive Management

For discussion of adaptive management principles and practices applied during the Construction Phase of the Project and their overall effectiveness please refer to the 2013 Annual Report to the Nunavut Impact Review Board. Any additional adaptive management practices implemented as a result of works completed in 2014 will be reported in the updated 2014 Annual Report to the Nunavut Impact Review Board.

14. Concordance with Type "A" Water Licence

The Nunavut Water Board Type "A" Licence 2AM-MRY1325, Schedule D, outlines the requirements for Construction Monitoring Reports. The following table provides a concordance of the report, herein, with the requirements included in Part D.

Table 14-1: Table of Concordance for Schedule D

Schedule D Item No.	Schedule D Description	Corresponding Section in this Report
1a	description of all infrastructure and facilities designed and constructed to contain, withhold, divert or retain Water and/or Waste;	1
1b	a summary of construction activities including photographic records before, during and after construction of the facilities and infrastructure designed to contain, withhold, divert or retain Water and/or Waste;	2, 3
1c	as-built drawings and design for facilities and infrastructure, in Item 1(a) of this schedule, designed and constructed to contain, withhold, divert or retain Water and/or Waste;	4
1d	documentation of field decisions that deviate from the original plans and any data used to support or developed facilities and infrastructure to withhold, divert or retain Water and/or Waste;	5
1e	a comparison of measured versus predicted performance of infrastructure and facilities;	6
1f	any blast vibration monitoring and control for quarrying activity carried out in close proximity to fish bearing waters;	7
1g	monitoring conducted for sediment and explosives residue release from construction areas;	8
1h	monitoring undertaken in accordance with Part D of the during the Construction Phase of the Project;	8
1i	details confirming that the requirements of the CCME guidance document entitled "Aboveground Storage Tank	N/A

Schedule D Item No.	Schedule D Description	Corresponding Section in this Report
	Systems for Petroleum and Allied Petroleum Products (2003)" have been met by the Licensee;	
1j	data collected from instrumentation used to monitor earthworks and the interpretation of that data;	9
1k	a discussion of any unanticipated observations including changes in risk and mitigation measures implemented to reduce risk during construction;	10
1l	an overview of any method including frequency used to monitor deformations, seepage and geothermal responses;	11
1m	a summary of maintenance work undertaken as a result of settlement or deformation of dikes and dams;	12
1n	a summary of adaptive management principles and practices applied during the relevant phases of the Project and their overall effectiveness.	13

Appendix A

As-Built Drawings

A. H349000-2000-00-014-0004 Rev03: Milne Port Infrastructure Site Layout ***[1 page]***

B. H349000-2720-75-031-0001 Rev01: Milne Port Raw/Fire Water System Piping & Instrumentation Diagram ***[1 page]***

C. H349000-2720-75-031-0002 Rev01: Milne Port Potable Water System Piping & Instrumentation Diagram ***[1 page]***

D. H349000-2731-75-031-0001 Rev01: Milne Port Sewage Water Treatment Piping & Instrumentation Diagram ***[1 page]***

DWG. NO. H349000-2000-00-014-0004

FOR FUEL TANK FARM DETAILS SEE DRAWING* H349000-2613-10-014-0001

MILNE INLET

E 503 600

E 503 800

E 504 000

N 7 976 200

N 7 976 000

2615-BLD-001 MARINE MANIFOLD BUILDING

2521-BLD-002 WELDING SHOP BUILDING

2521-BLD-001 MAINTENANCE BUILDING

7232-BLD-011 SMOKE SHACK

2521-BLD-003 WORKSHOP OFFICE BUILDING

2521-BLD-004 WORKSHOP OFFICE WASHCAR

2750-BLD-003 SERVICES AREA E-HOUSE *1

7235-BLD-002 SITE SERVICES HEATED WAREHOUSE

7235-BLD-003 SITE SERVICES UNHEATED WAREHOUSE

7232-BLD-009 SITE SERVICES WASHCAR *1

7232-BLD-010 SITE SERVICES WASHCAR *2

7232-BLD-008 SITE SERVICES LUNCHROOM *2

7232-BLD-007 SITE SERVICES LUNCHROOM *1

2511-BLD-003 ACCOMMODATION LAUNDRY

2750-BLD-001 ACCOMMODATION AREA E-HOUSE *1

7231-BLD-001 CONSTRUCTION OFFICE *2

TEMP. POWER GEN. UNIT

2511-BLD-002 ACCOMMODATION OFFICE

2511-BLD-001 ACCOMMODATION SERVICE CORE

2512-BLD-003 ACCOMMODATION WING C

℄ RAMP TO SEALIFT BARGE LANDING AREA

SHIPPING CONTAINERS (TYP.)

SERVICE BERM

2750-BLD-005 FUEL TANK FARM E-HOUSE

EFFLUENT POND

SHIPPING CONTAINERS (TYP.)

INCINERATOR YARD (32mX30m)

2530-BLD-009 & 010 POWER GENERATION E-HOUSE *1 AND *2

2530-BLD-001 TO 007 POWER GENERATION MODULE *1 TO *7 FOR DETAILS SEE DRAWING* H349000-2530-50-042-0001

2540-BLD-001 WASTE MANAGEMENT BUILDING

INCINERATOR

2732-BLD-001 SEWAGE TRUCK BUILDING

2750-BLD-004 SERVICES AREA E-HOUSE *2

FOR SERVICE BERM DETAILS SEE DWG* H349000-2000-00-014-0005

4731-VP-005 SEWAGE TREATMENT PLANT

2720-BLD-001 WATER BUILDING

2513-BLD-002 EMERGENCY RESPONSE GARAGE

2513-BLD-001 EMERGENCY RESPONSE OFFICE

2512-BLD-004 ACCOMMODATION WING D

2512-BLD-002 ACCOMMODATION WING B

2510-PP-001 RAW SEWAGE LIFT STATION

2750-BLD-002 ACCOMMODATION AREA E-HOUSE *2

NEW PAD CORNER N: 7 975 972.690 E: 504 030.682

2512-BLD-001 ACCOMMODATION WING A

UNPREPARED AREA OF PAD

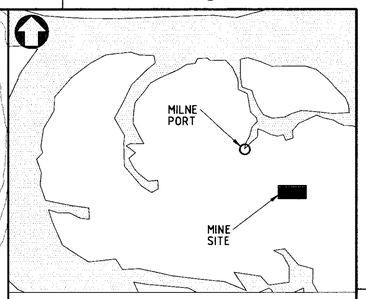
1

BUILDING COORDINATES

BUILDING TAG*	A	B
2511-BLD-003	N: 7 976 083.541 E: 503 925.750	N: 7 976 083.541 E: 503 944.035
2750-BLD-001	N: 7 976 091.970 E: 503 958.644	N: 7 976 091.970 E: 503 971.019
2750-BLD-002	N: 7 975 981.196 E: 503 958.514	N: 7 975 981.196 E: 503 952.235
2750-BLD-003	N: 7 976 168.368 E: 503 821.200	N: 7 976 162.089 E: 503 821.200
2750-BLD-004	N: 7 975 965.094 E: 503 790.819	N: 7 975 965.094 E: 503 784.541
2750-BLD-005	N: 7 976 081.438 E: 503 657.762	N: 7 976 075.159 E: 503 657.762
7231-BLD-001	N: 7 976 082.801 E: 503 893.111	N: 7 976 082.801 E: 503 911.399
7232-BLD-008	N: 7 976 072.050 E: 503 853.070	N: 7 976 072.050 E: 503 871.358
7232-BLD-010	N: 7 976 072.050 E: 503 877.359	N: 7 976 072.050 E: 503 887.111
4731-VP-005	N: 7 975 971.672 E: 503 808.540	N: 7 975 996.122 E: 503 808.540
2530-BLD-009	N: 7 976 057.146 E: 503 677.252	N: 7 976 043.397 E: 503 677.252
2513-BLD-001	POSITION TO SUIT AS-BUILT LOCATION OF THE BUILDING 2513-BLD-002 & THE ARTIC CORRIDOR	
2521-BLD-003	POSITION TO SUIT AS-BUILT LOCATION OF THE BUILDING 2521-BLD-001 & THE ARTIC CORRIDOR	

2

0 10 20 30 40 50
SCALE IN METRES



KEY-PLAN

NOTES:

1. TOPOGRAPHY PROVIDED BY TERRAPOINT CANADA INC.
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
3. CONTOURS ARE IN METRES. CONTOUR INTERVAL IS 1.5 METRES.
4. ALL 7000 SERIES MODULAR BUILDINGS ARE FOR CONSTRUCTION AND THEIR FINAL LOCATIONS WILL BE DETERMINED AT SITE BY THE CONSTRUCTION GROUP.
5. FOR FOLD-AWAY BUILDINGS SETOUT COORDINATES REFER TO APPLICABLE FOUNDATION DRAWINGS.

FOR CONSTRUCTION

PERMIT TO PRACTICE
HATCH LTD.
Signature
Date Aug 29 2013
PERMIT NUMBER: P 512
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

REGISTERED PROFESSIONAL ENGINEER J. J. LEMAY LICENSEE No. 3956 NT/NU

NO.	DESCRIPTION	BY	CHK'D	APP'D	DATE
2	CHANGED BUILDING LOCATIONS & COORDINATES	DK	CL	TT	2013-08-28
1	SCALE CHANGED & BLDG. COORDINATES ADDED	DK	CL	TT	2013-08-13

REVISIONS

REV.	ISSUE FOR	AUTH. BY	DATE
2	FOR CONSTRUCTION	TT	JC	2013-08-29
1	FOR CONSTRUCTION	TT	JC	2013-08-13
0	FOR CONSTRUCTION	TT	JC	2013-05-09

ISSUE AUTHORIZATION

H349000-2000-00-014-0001	EARLY REVENUE PHASE – SITE LAYOUT
DRAWING NO.	DRAWING TITLE

REFERENCE DRAWINGS

HATCH

DESIGNED BY T. THERTELL DATE 2013-08-27	DRAWN BY D. KARUNAKARAN DATE 2013-08-27
CHECKED BY T. THERTELL DATE 2013-08-29	DISCIP. ENGR. J. LEMAY DATE 2013-08-29
PROJ. DES. COORD. T. THERTELL DATE 2013-08-29	PROJ. ENGR. J. CLELAND DATE 2013-08-29
PROJ. MGR. S. PERRY DATE 2013-08-29	

Baffinland

MARY RIVER PROJECT

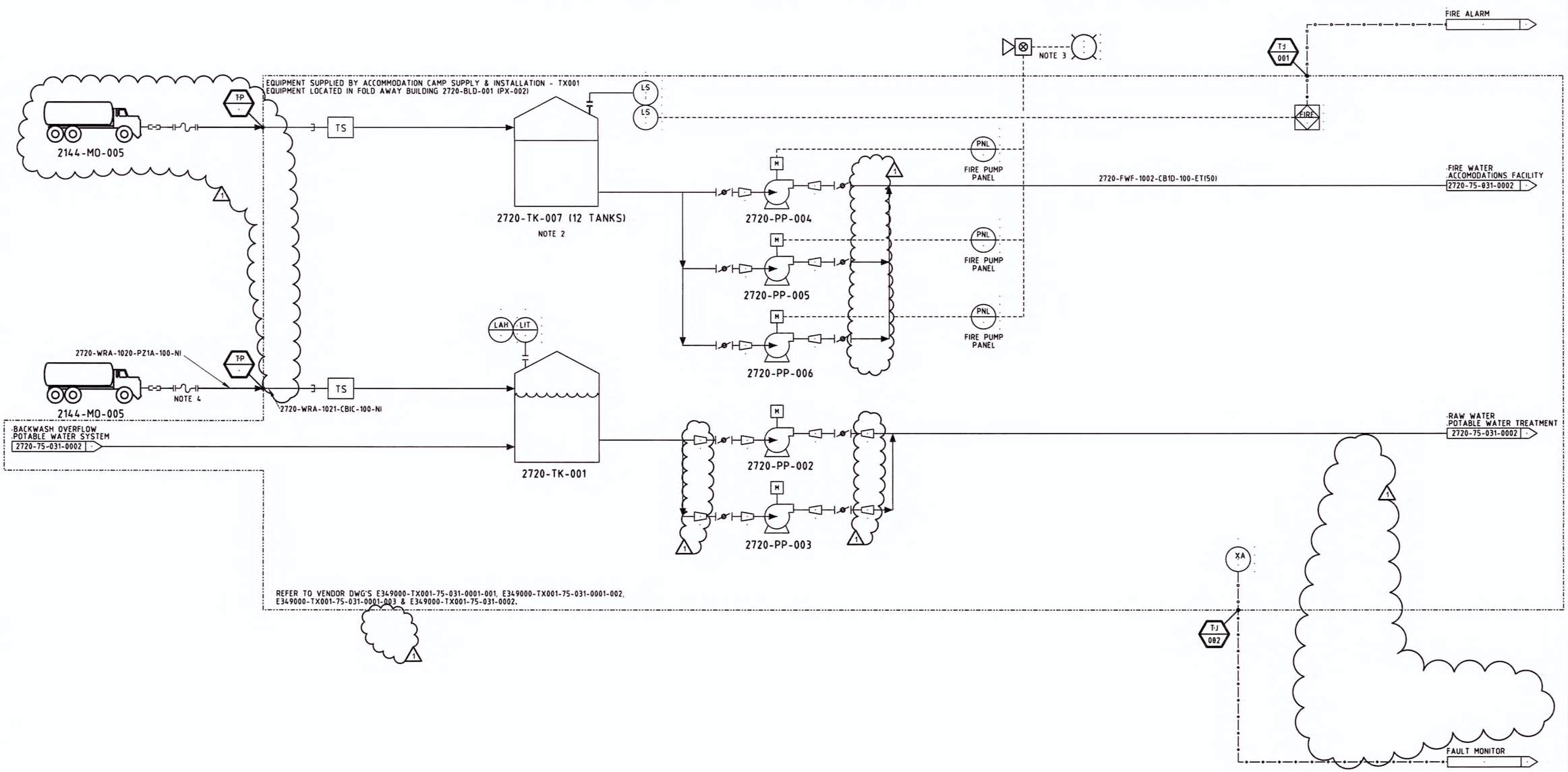
MILNE PORT INFRASTRUCTURE SITE LAYOUT

SCALE	DWG. NO.	REV.
1:1000 OR AS NOTED	H349000-2000-00-014-0004	2

ORIGINAL SHEET SIZE: ISO A1 (841 x 594)

DWG. NO. H349000-2720-75-031-0001

2144-MO-005 WATER TRAILER | 2720-TK-001 RAW WATER TANK | 2720-TK-007 FIRE WATER TANK | 2720-PP-004 DIESEL FIRE WATER PUMP | 2720-PP-005 ELECTRIC FIRE WATER PUMP | 2720-PP-006 JOCKEY PUMP | 2720-PP-002 RAW WATER DISTRIBUTION PUMP | 2720-PP-003 RAW WATER DISTRIBUTION PUMP



NOTES:

1. ALL INSTRUMENTS ARE VENDOR SUPPLIED.
2. TANKS ARE INTERCONNECTED.
3. LOCATED OUTSIDE BUILDING.
4. HOSE ARRANGEMENT IS PART OF THE TRUCK. SHOWN FOR REFERENCE ONLY.
5. VENDORS ARE RESPONSIBLE FOR STAMPING OF IFC PACKAGE DOCUMENTS.

DRAWING NO.	DRAWING TITLE
H349000-2720-05-030-0001	MILNE PORT, RAW/FIRE WATER SYSTEM, PFD
H349000-1000-75-041-0007	ALL AREAS, LEGEND SHEET 7 OF 7 – EQUIPMENT, P&ID
H349000-1000-75-041-0006	ALL AREAS, LEGEND SHEET 6 OF 7 – EQUIPMENT, P&ID
H349000-1000-75-041-0005	ALL AREAS, LEGEND SHEET 5 OF 7 – INSTRUMENTATION, P&ID
H349000-1000-75-041-0004	ALL AREAS, LEGEND SHEET 4 OF 7 – INSTRUMENTATION, P&ID
H349000-1000-75-041-0003	ALL AREAS, LEGEND SHEET 3 OF 7 – PIPING, P&ID
H349000-1000-75-041-0002	ALL AREAS, LEGEND SHEET 2 OF 7 – ASSET TAGGING, P&ID
H349000-1000-75-041-0001	ALL AREAS LEGEND SHEET 1 OF 7 – ASSET TAGGING, P&ID

REFERENCE DRAWINGS

NO.	DESCRIPTION	BY	CHK'D	APP'D	DATE
1	AS BUILT	MB	MB	JC	2015-01-07

REVISIONS

AS BUILT

REVISED AS MARKED. ALL OTHER DETAILS CONSTRUCTED WITHIN ACCEPTABLE TOLERANCES.

REV.	ISSUE FOR	AUTH. BY	DATE
1	AS-BUILT	S.H.	2015-01-07
0	APPROVED FOR CONSTRUCTION	O.A	2013-08-28

ISSUE AUTHORIZATION

HATCH

DESIGNED BY J.FESAR DATE 2013-03-25	DRAWN BY J. FESAR DATE 2013-03-25
CHECKED BY L. GONZALEZ-SARDI DATE 2013-08-28	DISCIP. ENGR. O. ATTFIELD DATE 2013-08-28
PROJ. DES. COORD. T. THERTELL DATE 2013-08-28	PROJ. ENGR. JAMES CLELAND DATE 2013-08-28
PROJ. MGR. STEVEN PERRY DATE 2013-08-28	

Baffinland

MARY RIVER PROJECT

MILNE PORT
RAW/FIRE WATER SYSTEM
PIPING & INSTRUMENTATION DIAGRAM

SCALE NTS OR AS NOTED | DWG. NO. H349000-2720-75-031-0001 | REV. 1

ORIGINAL SHEET SIZE: ISO A1 (841 x 594)

$USERNAME$ $DATE$ $FILE$ $TIME$

DWG. NO. H349000-2720-75-031-0002

2720-TK-011 BACKWASH SETTLING TANK | 2720-TK-008 POTABLE WATER STORAGE TANK | 2510-PP-001 RAW SEWAGE LIFT STATION | 2720-PP-009 POTABLE WATER DISCHARGE PUMP NO.1 | 2720-PP-010 POTABLE WATER DISCHARGE PUMP NO.2 | 2720-PP-011 POTABLE WATER DISCHARGE PUMP NO.3 | 2720-PP-012 BACKWASH SLURRY PUMP | 2720-PP-013 CLEAN BACKWASH PUMP | 2144-MO-012 SEWAGE HOLDING TANKS VACUUM TRUCK

LIFT STATION FAULT MONITOR

POTABLE WATER SYSTEM FAULT MONITOR

T-J 001

T-J 002

XA

XA

EQUIPMENT SUPPLIED BY ACCOMMODATION CAMP SUPPLY & INSTALLATION - TX001
EQUIPMENT LOCATED IN FOLD AWAY BUILDING 2720-BLD-001 (PX-002)

ACCOMMODATION AREA
2511-BLD-001, 2512-BLD-001 TO 003

FIREWATER
2720-75-031-0001

2720-FWF-1002-CB1D-100-ET(50)

TO SPRINKLERS

TO CAMP

SEWAGE COLLECTION

2730-WSW-1005-PH1A-100-ET(50)

RAW SEWAGE
SEWAGE TREATMENT SYSTEM
2731-75-31-0001

2510-PP-001

2720-WPO-1006-PH1A-075-ET(50)

RAW WATER
RAW WATER TANK
2720-75-031-0001

POTABLE WATER TREATMENT

2720-TK-008

REAGENT DOSING SYSTEM

SODIUM HYPOCHLORITE DOSING SYSTEM

CHLORINE DOSING SYSTEM

2720-PP-009

2720-PP-010

2720-PP-011

TP

2720-WPO-1003-PH1A-100-ET(50)

SEWAGE TREATMENT PLANT
2731-75-031-0001

REAGENT TOTES WAREHOUSE

REAGENT CRATES

2720-TK-011

2720-PP-012

TP

TS

SLURRY COLLECTION TANK

BACKWASH SLURRY
2731-75-031-0001

2144-MO-012

2720-PP-013

CLEAN BACKWASH WATER
RAW/FIRE WATER TANK
2720-75-031-0001

REFER TO VENDOR P&ID NO. E349000-TX001-75-031-0001-001/002/003

NOTES:

1. ALL INSTRUMENTS ARE VENDOR SUPPLIED.
2. VENDORS ARE RESPONSIBLE FOR STAMPING OF IFC PACKAGE DOCUMENTS.

DRAWING NO.	DRAWING TITLE
H349000-2720-05-030-0002	MILNE PORT, POTABLE WATER SYSTEM, PFD
H349000-1000-75-041-0007	ALL AREAS, LEGEND SHEET 7 OF 7 – EQUIPMENT, P&ID
H349000-1000-75-041-0006	ALL AREAS, LEGEND SHEET 6 OF 7 – EQUIPMENT, P&ID
H349000-1000-75-041-0005	ALL AREAS, LEGEND SHEET 5 OF 7 – INSTRUMENTATION, P&ID
H349000-1000-75-041-0004	ALL AREAS, LEGEND SHEET 4 OF 7 – INSTRUMENTATION, P&ID
H349000-1000-75-041-0003	ALL AREAS, LEGEND SHEET 3 OF 7 – PIPING, P&ID
H349000-1000-75-041-0002	ALL AREAS, LEGEND SHEET 2 OF 7 – ASSET TAGGING, P&ID
H349000-1000-75-041-0001	ALL AREAS LEGEND SHEET 1 OF 7 – ASSET TAGGING, P&ID

REFERENCE DRAWINGS

NO.	DESCRIPTION	BY	CHK'D	APP'D	DATE
1	AS BUILT	JB	MB	JC	2015-01-07

REVISIONS

AS BUILT

REVISED AS MARKED. ALL OTHER DETAILS CONSTRUCTED WITHIN ACCEPTABLE TOLERANCES.

REV.	ISSUE FOR	AUTH. BY	DATE
1	AS-BUILT	S.H.	J.C. 2015-01-07
0	APPROVED FOR CONSTRUCTION	O.A.	2013-08-28

ISSUE AUTHORIZATION

HATCH

DESIGNED BY J. FESAR	DRAWN BY J. FESAR
DATE 2013-03-25	DATE 2013-03-25
CHECKED BY L. GONZALEZ-SARDI	DISCIP. ENGR. O. ATTFIELD
DATE 2013-08-28	DATE 2013-08-28
PROJ. DES. COORD. T. THERTELL	PROJ. ENGR. JAMES CLELAND
DATE 2013-08-28	DATE 2013-08-28
PROJ. MGR. STEVEN PERRY	
DATE 2013-08-28	

Baffinland

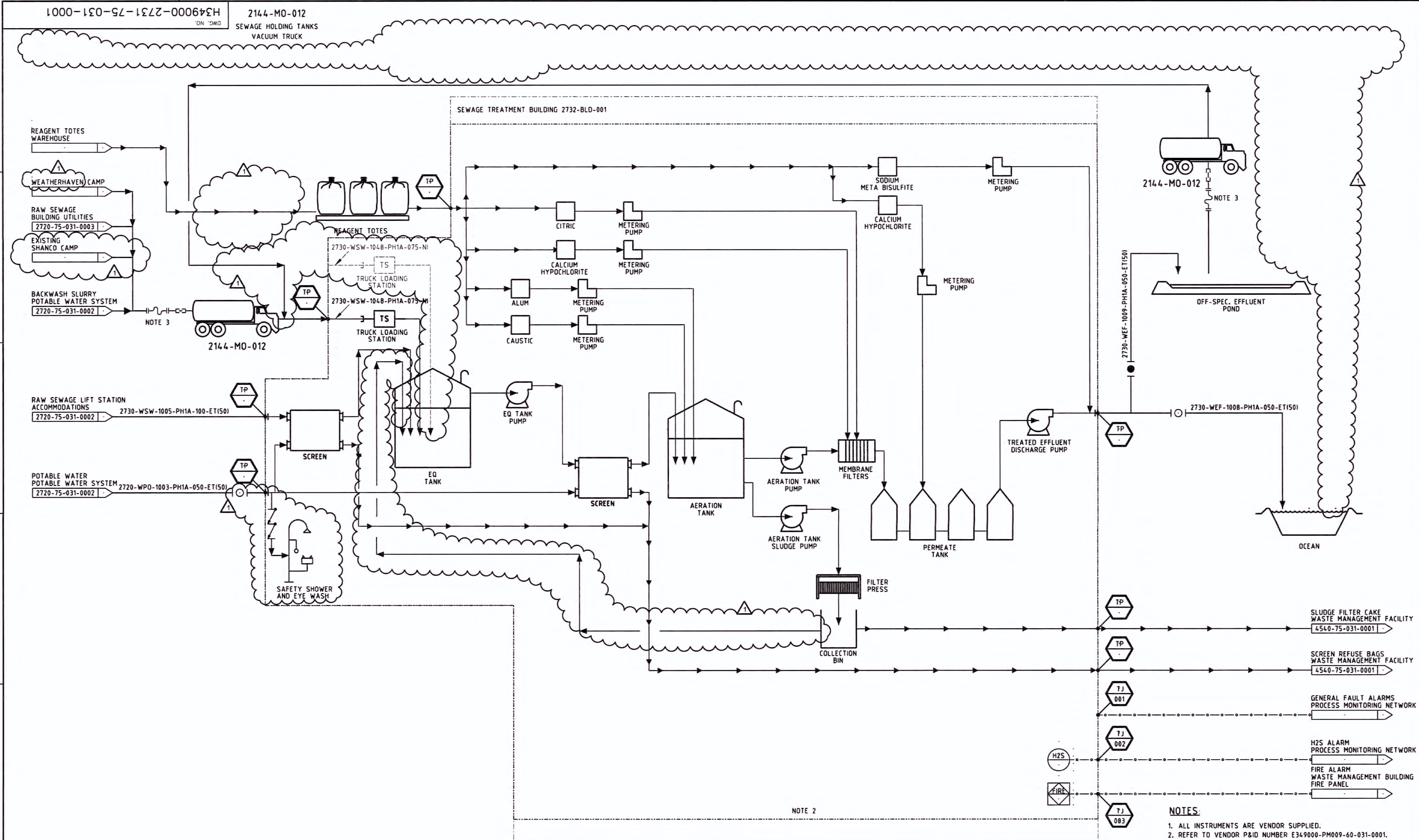
MARY RIVER PROJECT

MILNE PORT
POTABLE WATER SYSTEM
PIPING & INSTRUMENTATION DIAGRAM

SCALE NTS OR AS NOTED | DWG. NO. H349000-2720-75-031-0002 | REV. 1

ORIGINAL SHEET SIZE: ISO A1 (841 x 594)

$USERNAME$ $DATE$ $FILE$ $TIME$


H349000-2731-75-031-0001
DWG. NO.
2144-MO-012
SEWAGE HOLDING TANKS
VACUUM TRUCK
SEWAGE TREATMENT BUILDING 2732-BLD-001
REAGENT TOTES
WAREHOUSE
WEATHERHAVEN CAMP
RAW SEWAGE
BUILDING UTILITIES
2720-75-031-0003
EXISTING
SHANCO CAMP
BACKWASH SLURRY
POTABLE WATER SYSTEM
2720-75-031-0002
NOTE 3
2144-MO-012
REAGENT TOTES
2730-WSW-1048-PH1A-075-NI
TS
TRUCK LOADING STATION
2730-WSW-1048-PH1A-075-NI
TS
TRUCK LOADING STATION
TP
RAW SEWAGE LIFT STATION
ACCOMMODATIONS
2720-75-031-0002
2730-WSW-1005-PH1A-100-ET(50)
SCREEN
POTABLE WATER
POTABLE WATER SYSTEM
2720-75-031-0002
2720-WPO-1003-PH1A-050-ET(50)
SAFETY SHOWER AND EYE WASH
EQ TANK
EQ TANK PUMP
SCREEN
CITRIC
METERING PUMP
CALCIUM HYPOCHLORITE
METERING PUMP
ALUM
METERING PUMP
CAUSTIC
METERING PUMP
SODIUM META BISULFITE
METERING PUMP
CALCIUM HYPOCHLORITE
METERING PUMP
AERATION TANK
AERATION TANK PUMP
AERATION TANK SLUDGE PUMP
MEMBRANE FILTERS
PERMEATE TANK
FILTER PRESS
COLLECTION BIN
TREATED EFFLUENT DISCHARGE PUMP
2144-MO-012
NOTE 3
2730-WEF-1009-PH1A-050-ET(50)
OFF-SPEC. EFFLUENT POND
2730-WEF-1008-PH1A-050-ET(50)
OCEAN
SLUDGE FILTER CAKE
WASTE MANAGEMENT FACILITY
4540-75-031-0001
SCREEN REFUSE BAGS
WASTE MANAGEMENT FACILITY
4540-75-031-0001
TJ 001
GENERAL FAULT ALARMS
PROCESS MONITORING NETWORK
H2S
TJ 002
H2S ALARM
PROCESS MONITORING NETWORK
FIRE
FIRE ALARM
WASTE MANAGEMENT BUILDING
FIRE PANEL
TJ 003
NOTE 2

NOTES:

1. ALL INSTRUMENTS ARE VENDOR SUPPLIED.
2. REFER TO VENDOR P&ID NUMBER E349000-PM009-60-031-0001.
3. HOSE ARRANGEMENT IS PART OF THE TRUCK. SHOWN FOR REFERENCE ONLY.
4. VENDORS ARE RESPONSIBLE FOR STAMPING OF IFC PACKAGE DOCUMENTS.

REFERENCE DRAWINGS

DRAWING NO.	DRAWING TITLE
H349000-2731-05-030-0001	MILNE PORT, SEWAGE WATER TREATMENT, PFD
H349000-1000-75-041-0007	ALL AREAS, LEGEND SHEET 7 OF 7 – EQUIPMENT, P&ID
H349000-1000-75-041-0006	ALL AREAS, LEGEND SHEET 6 OF 7 – EQUIPMENT, P&ID
H349000-1000-75-041-0005	ALL AREAS, LEGEND SHEET 5 OF 7 – INSTRUMENTATION, P&ID
H349000-1000-75-041-0004	ALL AREAS, LEGEND SHEET 4 OF 7 – INSTRUMENTATION, P&ID
H349000-1000-75-041-0003	ALL AREAS, LEGEND SHEET 3 OF 7 – PIPING, P&ID
H349000-1000-75-041-0002	ALL AREAS, LEGEND SHEET 2 OF 7 – ASSET TAGGING, P&ID
H349000-1000-75-041-0001	ALL AREAS LEGEND SHEET 1 OF 7 – ASSET TAGGING, P&ID

THIS AS-BULT DOCUMENT HAS BEEN PREPARED BASED ON INFORMATION PROVIDED BY THIRD PARTIES. HATCH HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THIS INFORMATION AND SHALL NOT BE RESPOSIBLE FOR, AND DISCLAIMS ANY LIABILITY IN CONJUNCTION WITH, ANY ERRORS OR OMISSIONS THAT MAY BE INCORPORATED HEREIN AS A RESULT.

REVISIONS

NO.	DESCRIPTION	BY	CHK'D	APP'D	DATE
1	AS-BUILT	JB	SH	JC	2015-01-13

AS BUILT

REVISED AS MARKED. ALL OTHER DETAILS CONSTRUCTED WITHIN ACCEPTABLE TOLERANCES.

ISSUE AUTHORIZATION

REV.	ISSUE FOR	AUTH. BY		DATE
1	AS-BUILT	SH	JC	2015-01-13
0	APPROVED FOR CONSTRUCTION	O.A.		2013-08-28

HATCH

DESIGNED BY J.FESAR DATE 2013-03-25	DRAWN BY J FESAR DATE 2013-03-25
CHECKED BY L. GONZALEZ-SARDI DATE 2013-08-28	DISCIP. ENGR. O. ATTFIELD DATE 2013-08-28
PROJ. DES. COORD. T. THERTELL DATE 2013-08-28	PROJ. ENGR. JAMES CLELAND DATE 2013-08-28
PROJ. MGR. STEVEN PERRY DATE 2013-08-28	

Baffinland

MARY RIVER PROJECT

MILNE PORT
SEWAGE WATER TREATMENT
PIPING & INSTRUMENTATION DIAGRAM

SCALE NTS OR AS NOTED | DWG. NO. H349000-2731-75-031-0001 | REV. 1

ORIGINAL SHEET SIZE: ISO A1 (841 x 594)

$USERNAME$ $DATE$ $FILE$ $TIME$

Appendix B

Survey Data

Port Water Building As Built - 29Oct2014.asc

0001	7975989.625969	503854.067426	12.074	Nail
0002	7975995.904679	503808.634054	13.607	Nail
0003	7975986.439230	503808.588301	13.583	Nail
0004	7975975.484227	503808.509005	13.576	CC__
0005	7975964.765757	503825.869809	13.326	CC__
0006	7975991.410672	503839.661463	13.604	CC__
0007	7975985.289233	503839.650797	13.746	CC__
0008	7975997.308980	503854.497392	13.931	CC__
0009	7975990.601251	503860.836272	13.985	CC__
0069	7975979.343609	503839.545749	18.961	ZBdg
0070	7975997.322072	503839.551479	18.913	ZBdg
0071	7975997.366774	503860.852096	18.944	ZBdg
0072	7975979.363071	503860.824005	18.887	.Bdg
0100	7975990.153282	503838.382015	12.272	Nail
0101	7976031.767902	503810.469649	11.315	Nail
RTCM-Ref	0000	7976079.473010	503925.887938	16.092

0001	7976016.165390	503795.340913	11.395	ZTOS
0002	7976008.538211	503794.692713	12.007	ZTOS
0003	7976016.013886	503795.503674	11.409	ZBOS
0004	7976009.668037	503795.641569	11.483	ZBOS
0005	7976009.569499	503812.369685	11.570	ZBOS
0006	7976009.221921	503813.666566	11.508	ZBOS
0007	7976008.380855	503814.007110	11.549	ZBOS
0008	7976008.307712	503810.807298	11.850	ZTOS
0009	7976007.510498	503812.127918	11.875	ZTOS
0010	7976005.719228	503812.816458	11.966	ZTOS
0011	7975969.355134	503813.437643	11.819	XBOS
0012	7975968.857659	503812.247528	12.030	ZTOS
0013	7975967.332624	503810.344023	11.977	ZTOS
0014	7975965.886818	503799.120582	11.902	XTOS
0015	7975961.631039	503798.526773	12.323	ZTOS
0016	7975961.878211	503798.967885	12.075	ZBOS
0017	7975987.302796	503798.783810	11.957	ZBOS
0018	7975988.857763	503799.260468	11.969	ZBOS
0019	7975989.864457	503799.856036	11.979	ZBOS
0020	7975989.958021	503800.353232	12.039	XBOS
0021	7975987.311448	503798.413299	12.127	ZTOS
0022	7975988.815668	503798.806871	12.145	ZTOS
0023	7975990.366503	503799.770883	12.115	ZTOS
0024	7975990.440546	503800.446531	12.120	XTOS
0025	7975991.856758	503800.531719	12.177	ZTOS
0026	7975992.233201	503800.553178	12.054	ZBOS
0027	7975992.380717	503796.783304	12.005	ZBOS
0028	7975991.720162	503796.264217	11.980	ZBOS
0029	7975991.008454	503795.972920	11.987	ZBOS
0030	7975991.850035	503797.258976	12.145	ZTOS
0031	7975991.068519	503796.472709	12.162	ZTOS
0032	7975986.914728	503796.399411	12.094	ZTOS
0033	7975986.838068	503795.832461	11.903	ZBOS
0034	7975980.719725	503795.486878	11.672	ZBOS
0035	7975980.725656	503796.514787	12.080	ZTOS
0036	7975979.457415	503796.252870	12.092	ZTOS
0037	7975978.967052	503795.646763	12.188	ZTOS
0038	7975978.896343	503790.625685	11.920	ZTOS
0039	7975978.046001	503790.730936	11.982	ZTOS
0040	7975979.437272	503790.536390	11.711	ZBOS
0041	7975978.732933	503789.745041	11.663	ZBOS
0042	7975977.894328	503789.708319	11.756	ZBOS
0043	7975977.444971	503790.399865	11.719	ZBOS
0044	7975977.037793	503795.357804	11.727	ZBOS
0045	7975977.964871	503795.485878	12.242	ZTOS
0046	7975977.524517	503796.246277	12.206	ZTOS
0047	7975961.019462	503796.196733	12.303	ZTOS
0048	7975960.760446	503794.228623	12.283	XTOS
0049	7975961.639081	503795.549098	12.001	ZBOS
0050	7975961.727873	503792.687638	11.856	XBOS
0051	7975985.568740	503795.042000	11.691	ZBOS
0052	7975986.507160	503795.560339	11.864	ZTOS
0053	7975987.413874	503787.123522	11.895	ZTOS
0054	7975988.404749	503785.383149	11.836	ZTOS
0055	7975990.073233	503784.482768	11.830	ZTOS
0056	7975986.317843	503786.604027	11.669	ZBOS
0057	7975987.364520	503784.397138	11.715	ZBOS
0058	7975988.907092	503783.562339	11.652	ZBOS
0059	7976008.125983	503783.196366	11.430	ZBOS
0060	7976006.789521	503784.775987	11.914	ZTOS
0061	7976008.742273	503788.850392	11.369	ZBOS
0062	7976007.782295	503789.442874	11.904	ZTOS
0063	7976015.680850	503789.626343	11.484	XTOS

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0064 7976015.702106 503789.156518  11.384 XBOS
0065 7976006.430273 503788.827141  11.958 ZBdg
0066 7975996.532283 503788.827863  11.953 ZBdg
0067 7975996.471128 503789.783310  12.081 ZBdg
0068 7975996.113286 503789.833550  11.981 ZBdg
0069 7975996.152090 503794.509499  11.978 ZBdg
0070 7975996.476616 503794.533232  12.013 ZBdg
0071 7975996.521463 503795.519531  12.021 ZBdg
0072 7976006.398457 503795.518686  11.903 XBdg
0073 7975996.172702 503801.318728  11.850 ZBdg
0074 7975971.712891 503801.218829  12.819 ZBdg
0075 7975971.675583 503808.529120  12.873 ZBdg
0076 7975996.020302 503808.669142  12.861 .Bdg
RTCM-Ref 0000 7976010.761105 503797.157872  11.386 --------
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Port Treated Effluent Discharge As Built - 17Oct2014.asc

0001	7976338.146336	503635.797386	6.634	Zgln
0002	7976327.524781	503618.502004	7.161	Zgln
0003	7976324.830803	503609.587651	7.296	Zgln
0004	7976326.309577	503598.214643	7.868	Zgln
0005	7976325.664520	503585.742726	7.418	Zgln
0006	7976326.897458	503562.120364	7.451	Zgln
0007	7976327.432076	503550.200359	8.521	Zgln
0008	7976321.123402	503550.212310	9.069	Zgln
0009	7976320.984279	503550.239216	9.252	Node
0010	7976300.337677	503550.315263	10.771	Node
0011	7976300.286790	503550.357638	10.610	Zgln
0012	7976290.495188	503551.992787	11.779	Zgln
0013	7976255.951228	503558.260310	12.012	Zgln
0014	7976213.788901	503558.150916	12.817	Zgln
0015	7976153.214098	503557.895400	13.019	Zgln
0016	7976105.784412	503559.090910	13.115	Zgln
0017	7976069.045132	503559.277241	12.862	Zgln
0018	7976068.946007	503559.441702	12.908	Node
0019	7976068.380995	503577.138946	13.172	Node
0020	7976068.356168	503577.357735	13.058	Zgln
0021	7976067.350117	503619.074463	12.902	Zgln
0022	7976067.696884	503666.403094	12.974	Zgln
0023	7976047.104091	503667.051669	12.904	Zgln
0024	7976042.161153	503666.637829	13.086	Zgln
0025	7976019.623933	503666.065143	13.083	Xgln
0026	7976045.415999	503664.994910	12.693	Zgln
0027	7976048.547025	503665.141295	12.726	NodeT
0028	7976042.843308	503664.994647	12.677	Zgln
0029	7976041.315736	503667.430851	12.686	Zgln
0030	7976041.132790	503668.785861	12.638	Xgln
0031	7976017.959067	503664.619648	13.084	Zgln
0032	7976018.421002	503661.462376	14.194	Zgln
0033	7976018.613590	503658.083285	14.590	Zgln
0034	7976018.841518	503655.549096	14.133	Xgln
0035	7976017.315904	503666.045699	13.074	Zgln
0036	7975988.886636	503666.594349	12.887	Zgln
0037	7975988.301420	503666.586656	13.012	Node
0038	7975975.564054	503666.370785	12.947	Node
0039	7975974.820408	503666.369517	12.818	Zgln
0040	7975956.937730	503666.098000	12.734	Zgln
0041	7975957.308894	503701.335505	12.530	Zgln
0042	7975957.748939	503737.444336	12.523	Zgln
0043	7975956.313679	503773.093981	12.595	Zgln
0044	7975956.022407	503796.983985	12.675	Zgln
0045	7975991.540273	503797.017665	12.441	Zgln
0046	7975991.676408	503800.989076	12.452	Zgln
0047	7975991.583705	503801.063179	15.025	Xgln

Appendix C

Facility Description Supporting Documents

A. E349000-TX001-00-118-0003: Water Building Operations and Maintenance Manual ***[276 pages]***

B. E349000-TX001-40-042-0012: Milne Port Water Building Floor Plan As-Built ***[1 page]***

Note the page count for the document below. This report will be provided upon request.

C. E349000-PM009-00-118-0001: Sewage Treatment Plant Operations & Maintenance Manual ***[816 pages]***

HATCH VENDOR DATA REVIEW

Doc Number	E349000-TX001-00-118-0003	Sub	01
Date Received			

Review Grade

- ☐ C1 – Proceed to next submission & status
- ☐ C2 – Proceed with exceptions as noted to next submission & status
- ☑ C3 – Do not proceed, revise as noted & resubmit
- ☐ No further submission required - Complete
- ☐ C4 - No further submission required - Cancelled
- ☐ No further submission required - Superseded

Next Submittal Status

- ☐ Internal Review
- ☐ Certified Final
- ☑ Final
- ☐ As-Built

Next Submittal Date:

Package Coordinator: Name, Initials and Date:
M BILYK 17 NOV 11

REVIEWED ONLY FOR GENERAL CONFORMITY WITH THE SPECIFICATIONS. ACCEPTANCE BY THE ENGINEER DOES NOT WARRANT OR REPRESENT THAT THE INFORMATION CONTAINED ON THIS DRAWING/DOCUMENT IS EITHER ACCURATE OR COMPLETE. THE SOLE RESPONSIBILITY FOR CORRECT DESIGN, DETAILS & DIMENSIONS SHALL REMAIN WITH THE PARTY SUBMITTING THE DRAWING/DOCUMENT.

HORIZON NORTH
Manufacturing

OPERATIONS AND MAINTENANCE MANUAL

TABLE of CONTENTS

Water Building

- *Flow Meter; Endress and Hauser Promag 50W1H-PLGAR10BBAAA CW*
- *Eyewash Station*
  - *Station; Haws 7261/7271*
  - *Heater; Keltech C2N36KW*
  - *Thermostatic Valve; Bradley S19-2000*
- *Treated Water pumps*
  - *Pumps; Berkeley BVMI8-50*
  - *Pressure Switch; Allen Bradley 836-c7A*
  - *Control Panel; EEMAC1*
  - *Pressure Tanks; SSWM35*
- *Sprinkler; Milne Port Sprinkler Plans*
- *Water Treatment*
  - *Pressure Transducer; Cerabar T PMC 131*
  - *Transmitter; Liquiline M CM42*
  - *Turbidity & Suspended Solids Transmitter; Liquisys M CUM223-253*
  - *pH Electrodes; Orbisint CPS11*
  - *Ultrasonic Level Measurment; Prosonic M FMU40*
  - *Turbidity Sensor; Turbimax CUS31*
  - *Spill Pallet; 2-Drum Poly-Spillpallet 2000*

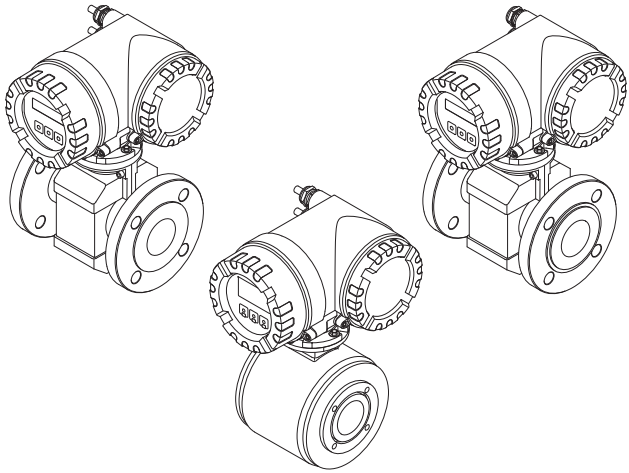
WHILE THE INFORMATION INCLUDED IN THIS MANUAL IS USEFUL THERE IS A LOT MORE REQUIRED. REFER TO SECTION 5 AND 6.2 OF S017823 I&O&M MANUALS.

Level | Pressure | Flow | Temperature | Liquid Analysis | Registration | Systems Components | Services | Solutions

Brief Operating Instructions

Proline Promag 50

Electromagnetic Flow Measuring System



These Brief Operating Instructions are not intended to replace the Operating Instructions provided in the scope of supply.
Detailed information is provided in the Operating Instructions and the additional documentation on the CD-ROM supplied.

The complete device documentation consists of:
- These Brief Operating Instructions
- Depending on the device version:
  - Operating Instructions and the Description of Device Functions
  - Approvals and safety certificates
  - Special safety instructions in accordance with the approvals for the device (e.g. explosion protection, pressure equipment directive etc.)
  - Additional device-specific information

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Endress+Hauser

People for Process Automation

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1 Safety instructions

1.1 Designated use

- The measuring device is to be used only for measuring the flow of conductive liquids in closed pipes. A minimum conductivity of 20 µS/cm is required for measuring demineralized water. Most liquids can be measured as of a minimum conductivity of 5 µS/cm.
- Any use other than that described here compromises the safety of persons and the entire measuring system and is, therefore, not permitted.
- The manufacturer is not liable for damage caused by improper or non-designated use.

1.2 Installation, commissioning and operation

- The measuring device must only be installed, connected, commissioned and maintained by qualified and authorized specialists (e.g. electrical technicians) in full compliance with the instructions in these Brief Operating Instructions, the applicable norms, legal regulations and certificates (depending on the application).
- The specialists must have read and understood these Brief Operating Instructions and must follow the instructions they contain. If you are unclear on anything in these Brief Operating Instructions, you must read the Operating Instructions (on the CD-ROM). The Operating Instructions provide detailed information on the measuring device.
- The measuring device should only installed in a de-energized state free from outside loads or strain.
- The measuring device may only be modified if such work is expressly permitted in the Operating Instructions (on the CD-ROM).
- Repairs may only be performed if a genuine spare parts kit is available and this repair work is expressly permitted.
- If performing welding work on the piping, the welding unit may not be grounded by means of the measuring device.

1.3 Operational safety

- The measuring device is designed to meet state-of-the-art safety requirements, has been tested, and left the factory in a condition in which it is safe to operate. Relevant regulations and European standards have been observed.
- The manufacturer reserves the right to modify technical data without prior notice. Your Endress+Hauser distributor will supply you with current information and updates to these Operating Instructions.
- The information on the warning notices, nameplates and connection diagrams affixed to the device must be observed. These contain important data on the permitted operating conditions, the range of application of the device and information on the materials used.
- If the device is not used at atmospheric temperatures, compliance with the relevant marginal conditions as specified in the device documentation supplied (on CD-ROM) is mandatory.
- The device must be wired as specified in the wiring and connection diagrams. Interconnection must be permitted.

- All parts of the device must be included in the potential equalization of the system.
- Cables, certified cable glands and certified dummy plugs must be suitable to withstand the prevailing operating conditions, such as the temperature range of the process. Housing apertures that are not used must be sealed with dummy plugs.
- The device should only be used for fluids to which all the wetted parts of the device are sufficiently resistant. With regard to special fluids, including fluids used for cleaning, Endress+Hauser will be happy to assist in clarifying the corrosion-resistant properties of wetted materials.
  However, minor changes in temperature, concentration or in the degree of contamination in the process may result in variations in corrosion resistance.
  For this reason, Endress+Hauser does not accept any responsibility with regard to the corrosion resistance of wetted materials in a specific application. The user is responsible for the choice of suitable wetted materials in the process.
- When hot fluid passes through the measuring tube, the surface temperature of the housing increases. In the case of the sensor, in particular, users should expect temperatures that can be close to the fluid temperature. If the temperature of the fluid is high, implement sufficient measures to prevent burning or scalding.
- Hazardous areas
  Measuring devices for use in hazardous areas are labeled accordingly on the nameplate. Relevant national regulations must be observed when operating the device in hazardous areas. The Ex documentation on the CD-ROM is an integral part of the entire device documentation. The installation regulations, connection data and safety instructions provided in the Ex documentation must be observed. The symbol and name on the front page provides information on the approval and certification (e.g. Ex Europe, FM USA, CSA Canada). The nameplate also bears the documentation number of this Ex documentation (XA***D/../..).
- For measuring systems used in SIL 2 applications, the separate manual on functional safety (on the CD-ROM) must be observed.
- Hygienic applications
  Measuring devices for hygienic applications have their own special labeling. Relevant national regulations must be observed when using these devices.
- Pressure instruments
  Measuring devices for use in systems that need to be monitored are labeled accordingly on the nameplate. Relevant national regulations must be observed when using these devices. The documentation on the CD-ROM for pressure instruments in systems that need to be monitored is an integral part of the entire device documentation. The installation regulations, connection data and safety instructions provided in the Ex documentation must be observed.
- Endress+Hauser will be happy to assist in clarifying any questions on approvals, their application and implementation.

1.4 Safety conventions

⚠ Warning!
"Warning" indicates an action or procedure which, if not performed correctly, can result in injury or a safety hazard. Comply strictly with the instructions and proceed with care.

☝ Caution!
"Caution" indicates an action or procedure which, if not performed correctly, can result in incorrect operation or destruction of the device. Comply strictly with the instructions.

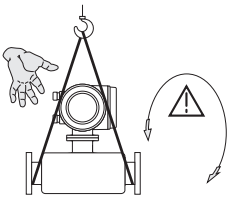
✎ Note!
"Note" indicates an action or procedure which, if not performed correctly, can have an indirect effect on operation or trigger an unexpected response on the part of the device.

2 Installation

2.1 Transporting to the measuring point

- Transport the measuring device to the measuring point in the original packaging.
- Do not remove the covers or caps until immediately before installation.

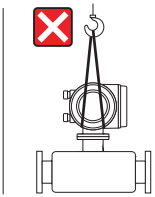
2.1.1 Transporting flanged devices DN ≤ 300 (≤ 12")



A0007408

To transport the unit, use slings slung around the process connections or use lugs (if available).

⚠ Warning!
Risk of injury! The device can slip.
The center of gravity of the measuring device may be higher than the holding points of the slings.
Always ensure that the device cannot slip or turn around its axis.



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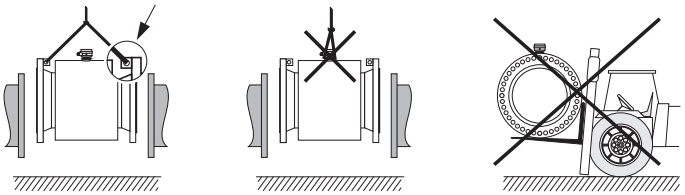
Do not lift measuring devices by the transmitter housing or the connection housing in the case of the remote version. Do not use chains as they could damage the housing.

2.1.2 Transporting flanged devices DN > 300 (> 12")

Use only the metal eyes provided on the flanges to transport, lift or position the sensor in the piping.

☝ Caution!
Do not attempt to lift the sensor with the tines of a fork-lift truck beneath the metal casing! This would buckle the casing and damage the internal magnetic coils.



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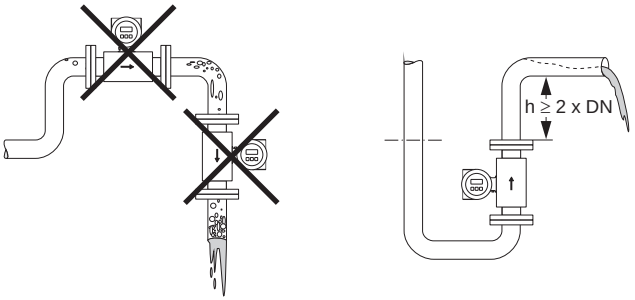
2.2 Installation conditions

2.2.1 Dimensions

For the dimensions of the measuring device, see the associated Technical Information on the CD-ROM.

2.2.2 Mounting location

The accumulation of air or formation of gas bubbles in the measuring tube can result in an increase in measuring errors.
For this reason avoid the following mounting locations in the pipe:
- At the highest point of a pipeline. Risk of air accumulating!
- Directly upstream from a free pipe outlet in a down pipe.

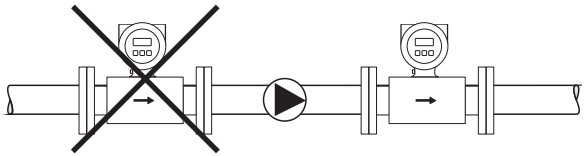


A0008154

Installation of pumps

Do not install the sensor on the intake side of a pump. This precaution is to avoid low pressure and the consequent risk of damage to the lining of the measuring tube. It might be necessary to use pulse dampers in systems incorporating piston pumps, piston diaphragm pumps or peristaltic pumps.

Information on the measuring system's pressure tightness and resistance to vibration and shock can be found in the Operating Instructions of the CD-ROM.



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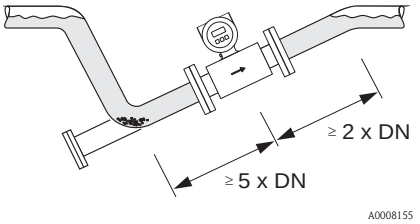
Partially filled pipes

Partially filled pipes with gradients necessitate a drain-type configuration.
The empty pipe detection (EPD) function offers additional protection by detecting empty or partially filled pipes.

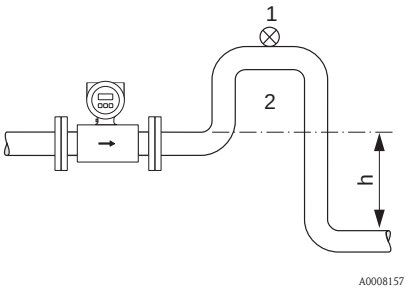
Caution!
Risk of solids accumulating! Do not install the sensor at the lowest point in the drain. It is advisable to install a cleaning valve.



Installation in a partially filled pipe

Down pipes

Install a siphon or a vent valve downstream of the sensor in down pipes longer than 5 meters (16 ft). This precaution is to avoid low pressure and the consequent risk of damage to the lining of the measuring tube. This measure also prevents the system losing prime, which could cause air pockets.
For information on the pressure tightness of the measuring tube lining, see the Operating Instructions on the CD-ROM.



Measures for installation in a down pipe (h > 5 m/16 ft)

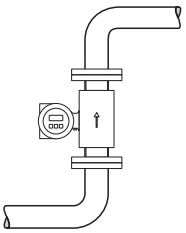
1. Vent valve
2. Siphon

2.2.3 Orientation

An optimum orientation helps avoid gas and air accumulations and buildup in the measuring tube. The measuring device, nevertheless, supplies a range of functions and tools to measure problematic fluids correctly:

- Electrode cleaning circuitry (ECC) to prevent electrically conductive deposits in the measuring tube, e.g. for fluids causing buildup
- Empty pipe detection (EPD) for detecting partially filled measuring tubes, e.g. in the case of degassing fluids or varying process pressures
- Exchangeable measuring electrodes for abrasive fluids (only Promag W)

Vertical orientation



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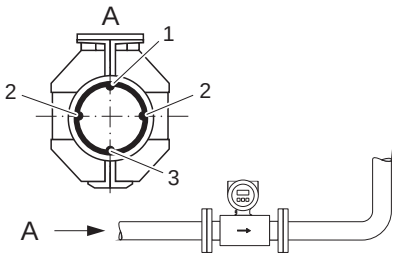
This orientation is optimum for self-emptying piping systems and when using empty pipe detection (EPD) or open electrode detection (OED).

Horizontal orientation

The measuring electrode plane should be horizontal. This prevents brief insulation of the two electrodes by entrained air bubbles.

Caution!
In the case of horizontal orientation, empty pipe detection only works correctly if the transmitter housing is facing upwards. Otherwise there is no guarantee that empty pipe detection will respond if the measuring tube is only partially filled or empty.



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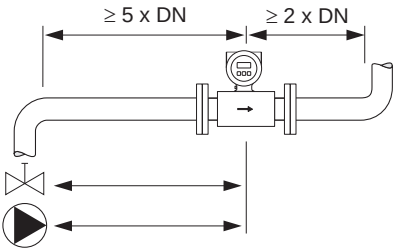
1. EPD electrode for empty pipe detection (not for Promag H, DN 2 to 15, 1/12" to ½").
2. Measuring electrodes for signal detection
3. Reference electrode for potential equalization (not for Promag H)

Inlet and outlet runs

If possible, install the sensor upstream from fittings such as valves, T-pieces, elbows, etc.



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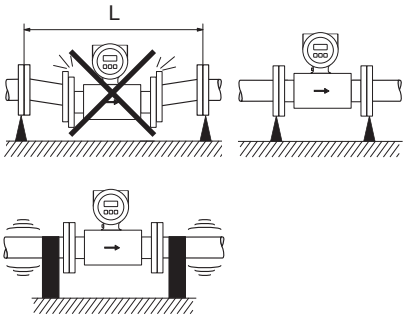
The following inlet and outlet runs must be observed in order to meet accuracy specifications:
- Inlet run: ≥ 5 × DN
- Outlet run: ≥ 2 × DN

2.2.4 Vibrations

Secure and fix both the piping and the sensor if vibrations are severe.



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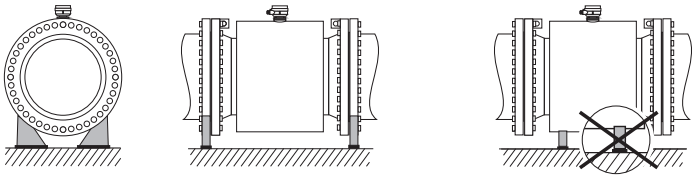
Measures to prevent device vibration
(L > 10 m/33 ft)

Caution!
It is advisable to install the sensor and transmitter separately if vibration is excessively severe. For information on the permitted shock and vibration resistance, see the Operating Instructions on the CD-ROM.

2.2.5 Foundations, supports

If the nominal diameter is DN ≥ 350 (≥ 14"), mount the sensor on a foundation of adequate load-bearing strength.

Caution!
Risk of damage! Do not support the weight of the sensor on the metal casing.
This would buckle the casing and damage the internal magnetic coils.



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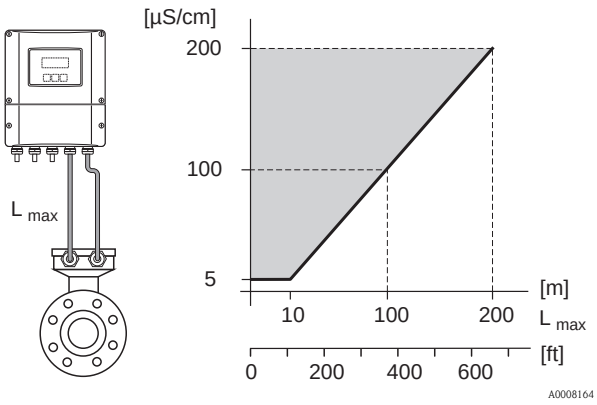
2.2.6 Length of connecting cable

Comply with the following instructions in order to ensure correct measuring results:
- Secure the cable run or route the cable in an armored conduit. Movement of the cable can falsify the measuring signal, particularly if the fluid conductivity is low.
- Route the cable well clear of electrical machines and switching elements.
- Ensure potential equalization between the sensor and transmitter, if necessary.
- The permissible cable length L_{max} depends on the fluid conductivity.



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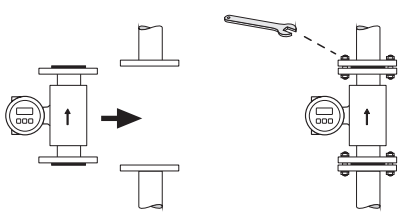
Gray shaded area = permissible range

L_{max} = length of connecting cable in [m]/[ft]

Fluid conductivity in (µS/cm)

2.3 Installing the Promag L sensor

Caution!
- The protective covers mounted on the two sensor flanges (DN 50…300) are used to hold the lap joint flanges in place and to protect the PTFE liner during transportation. Consequently, do not remove these covers until immediately before the sensor is installed in the pipe.
- The protective plates must always remain mounted while the device is in storage.
- Make sure that the lining at the flange is not damaged or removed.



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Note!
Screws, nuts, seals, etc. are not included in the scope of supply and must be supplied by the customer.

The sensor is installed between the two pipe flanges:
- The requisite torques must be observed → 13
- If grounding disks are used, follow the mounting instructions which will be enclosed with the shipment.
- To comply with the device specification, a concentrical installation in the measuring section is required

2.3.1 Seals

Comply with the following instructions when installing seals:
- Hard rubber lining → additional seals are **always** required!
- Polyurethane lining → **no** seals are required.
- **No** seals are required for PFTE measuring tube lining.
- For DIN flanges, only use seals to DIN EN 1514-1.
- Make sure that the mounted seals do not protrude into the piping cross-section.

Caution!
Risk of short circuit!
Do not use electrically conductive sealing compounds such as graphite! An electrically conductive layer could form on the inside of the measuring tube and short-circuit the measuring signal.

2.3.2 Ground cable

If necessary, special ground cables can be ordered as accessories for potential equalization.

2.3.3 Screw tightening torques (Promag L)

Please note the following:
- The tightening torques listed below are for lubricated threads only.
- Always tighten the screws uniformly and in diagonally opposite sequence.
- Overtightening the screws will deform the sealing faces or damage the seals.
- The tightening torques listed below apply only to pipes not subjected to tensile stress.

Promag L tightening torques for EN (DIN)

Nominal diameter [mm]	EN (DIN) Pressure rating [bar]	Threaded fasteners	Max. tightening torque Hard rubber [Nm]	Polyurethane [Nm]	PTFE [Nm]
50	PN 10/16	4 × M 16	–	15	40
65*	PN 10/16	8 × M 16	–	10	22
80	PN 10/16	8 × M 16	–	15	30
100	PN 10/16	8 × M 16	–	20	42
125	PN 10/16	8 × M 16	–	30	55
150	PN 10/16	8 × M 20	–	50	90
200	PN 10	8 × M 20	–	65	130
250	PN 10	12 × M 20	–	50	90
300	PN 10	12 × M 20	–	55	100
350	PN 6	12 × M 20	111	120	–
350	PN 10	16 × M 20	112	118	–
400	PN 6	16 × M 20	90	98	–
400	PN 10	16 × M 24	151	167	–
450	PN 6	16 × M 20	112	126	–
450	PN 10	20 × M 24	153	133	–
500	PN 6	20 × M 20	119	123	–
500	PN 10	20 × M 24	155	171	–
600	PN 6	20 × M 24	139	147	–
600	PN 10	20 × M 27	206	219	–
700	PN 6	24 × M 24	148	139	–
700	PN 10	24 × M 27	246	246	–
800	PN 6	24 × M 27	206	182	–
800	PN 10	24 × M 30	331	316	–
900	PN 6	24 × M 27	230	637	–
900	PN 10	28 × M 30	316	307	–
1000	PN 6	28 × M 27	218	208	–
1000	PN 10	28 × M 33	402	405	–
1200	PN 6	32 × M 30	319	299	–
1200	PN 10	32 × M 36	564	568	–
1400	PN 6	36 × M 33	430	–	–

Nominal diameter [mm]	EN (DIN) Pressure rating [bar]	Threaded fasteners	Max. tightening torque Hard rubber [Nm]	Polyurethane [Nm]	PTFE [Nm]
1400	PN 10	36 × M 39	654	618	–
1400	PN 16	36 × M 45	729	762	–
1600	PN 6	40 × M 33	440	417	–
1600	PN 10	40 × M 45	946	893	–
1600	PN 16	40 × M 52	1007	1100	–
1800	PN 6	44 × M 36	547	521	–
1800	PN 10	44 × M 45	961	895	–
1800	PN 16	44 × M 52	1108	1003	–
2000	PN 6	48 × M 39	629	605	–
2000	PN 10	48 × M 45	1047	1092	–
2000	PN 16	48 × M 56	1324	1261	–
2200	PN 6	52 × M 39	698	–	–
2200	PN 10	52 × M 52	1217	–	–
2400	PN 6	56 × M 39	768	–	–
2400	PN 10	56 × M 52	1229	–	–
* Designed acc. to EN 1092-1 (not to DIN 2501)					

Promag L tightening torques for ANSI

Nominal diameter [mm]	[inch]	ANSI Pressure rating [lbs]	Threaded fasteners	Max. tightening torque Hard rubber [Nm]	[lbf · ft]	Polyurethane [Nm]	[lbf · ft]	PTFE [Nm]	[lbf · ft]
50	2"	Class 150	4 × 5/8"	–	–	15	11	40	29
80	3"	Class 150	4 × 5/8"	–	–	25	18	65	48
100	4"	Cla ss 150	8 × 5/8"	–	–	20	15	44	32
150	6"	Class 150	8 × ¾"	–	–	45	33	90	66
200	8"	Class 150	8 × ¾"	–	–	65	48	125	92
250	10"	Class 150	12 × 7/8"	–	–	55	41	100	74
300	12"	Class 150	12 × 7/8"	–	–	68	56	115	85
350	14"	Class 150	12 × 1"	135	100	158	117	–	–
400	16"	Class 150	16 × 1"	128	94	150	111	–	–
450	18"	Class 150	16 × 1 1/8"	204	150	234	173	–	–
500	20"	Class 150	20 × 1 1/8"	183	135	217	160	–	–
600	24"	Class 150	20 × 1 ¼"	268	198	307	226	–	–

Promag L tightening torques for AWWA

Nominal diameter		AWWA	Threaded fasteners	Max. tightening torque					
		Pressure rating		Hartgummi		Polyurethane		PTFE	
[mm]	[inch]			[Nm]	[lbf · ft]	[Nm]	[lbf · ft]	[Nm]	[lbf · ft]
700	28"	Class D	28 × 1 ¼"	247	182	292	215	–	–
750	30"	Class D	28 × 1 ¼"	287	212	302	223	–	–
800	32"	Class D	28 × 1 ½"	394	291	422	311	–	–
900	36"	Class D	32 × 1 ½"	419	309	430	317	–	–
1000	40"	Class D	36 × 1 ½"	420	310	477	352	–	–
1050	42"	Class D	36 × 1 ½"	528	389	518	382	–	–
1200	48"	Class D	44 × 1 ½"	552	407	531	392	–	–
1350	54"	Class D	44 × 1 ¾"	730	538	–	–	–	–
1500	60"	Class D	52 × 1 ¾"	758	559	–	–	–	–
1650	66"	Class D	52 × 1 ¾"	946	698	–	–	–	–
1800	72"	Class D	60 × 1 ¾"	975	719	–	–	–	–
2000	78"	Class D	64 × 2"	853	629	–	–	–	–
2150	84"	Class D	64 × 2"	931	687	–	–	–	–
2300	90"	Class D	68 × 2 ¼"	1048	773	–	–	–	–

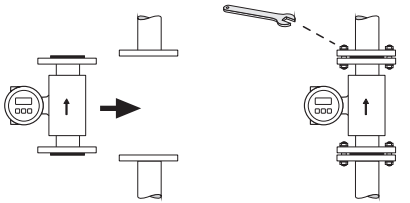
Promag L tightening torques for AS 2129

Nominal diameter	AS 2129	Threaded fasteners	Max. tightening torque		
	Pressure rating		Hard rubber	Polyurethane	PTFE
[mm]			[Nm]	[Nm]	[Nm]
350	Table E	12 × M 24	203	–	–
400	Table E	12 × M 24	226	–	–
450	Table E	16 × M 24	226	–	–
500	Table E	16 × M 24	271	–	–
600	Table E	16 × M 30	439	–	–
700	Table E	20 × M 30	355	–	–
750	Table E	20 × M 30	559	–	–
800	Table E	20 × M 30	631	–	–
900	Table E	24 × M 30	627	–	–
1000	Table E	24 × M 30	634	–	–
1200	Table E	32 × M 30	727	–	–

Promag L tightening torques for AS 4087

Nominal diameter [mm]	AS 4087 Pressure rating	Threaded fasteners	Max. tightening torque		
			Hard rubber [Nm]	Polyurethane [Nm]	PTFE [Nm]
350	PN 16	12 × M 24	203	–	–
375	PN 16	12 × M 24	137	–	–
400	PN 16	12 × M 24	226	–	–
450	PN 16	12 × M 24	301	–	–
500	PN 16	16 × M 24	271	–	–
600	PN 16	16 × M 27	393	–	–
700	PN 16	20 × M 27	330	–	–
750	PN 16	20 × M 30	529	–	–
800	PN 16	20 × M 33	631	–	–
900	PN 16	24 × M 33	627	–	–
1000	PN 16	24 × M 33	595	–	–
1200	PN 16	32 × M 33	703	–	–

2.4 Installing the W sensor



Note!
Screws, nuts, seals, etc. are not included in the scope of supply and must be supplied by the customer.

The sensor is installed between the two pipe flanges:
- The requisite torques must be observed → 18
- If grounding disks are used, follow the mounting instructions which will be enclosed with the shipment.
- To comply with the device specification, a concentrical installation in the measuring section is required

2.4.1 Seals

Comply with the following instructions when installing seals:
- Hard rubber lining → additional seals are **always** necessary.
- Polyurethane lining → **no** seals are required.
- For DIN flanges, use only seals according to EN 1514-1.
- Make sure that the seals do not protrude into the piping cross-section.

Caution!
Risk of short circuit!
Do not use electrically conductive sealing compounds such as graphite! An electrically conductive layer could form on the inside of the measuring tube and short-circuit the measuring signal.

2.4.2 Ground cable

If necessary, special ground cables can be ordered as accessories for potential equalization.

2.4.3 Screw tightening torques (Promag W)

Please note the following:
- The tightening torques listed below are for lubricated threads only.
- Always tighten the screws uniformly and in diagonally opposite sequence.
- Overtightening the screws will deform the sealing faces or damage the seals.
- The tightening torques listed below apply only to pipes not subjected to tensile stress.

Promag W tightening torques for EN (DIN)

Nominal diameter [mm]	EN (DIN) Pressure rating [bar]	Threaded fasteners	Max. tightening torque [Nm]	
			Hard rubber	Polyurethane
25	PN 40	4 × M 12	-	15
32	PN 40	4 × M 16	-	24
40	PN 40	4 × M 16	-	31
50	PN 40	4 × M 16	48	40
65*	PN 16	8 × M 16	32	27
65	PN 40	8 × M 16	32	27
80	PN 16	8 × M 16	40	34
80	PN 40	8 × M 16	40	34
100	PN 16	8 × M 16	43	36
100	PN 40	8 × M 20	59	50
125	PN 16	8 × M 16	56	48
125	PN 40	8 × M 24	83	71
150	PN 16	8 × M 20	74	63
150	PN 40	8 × M 24	104	88
200	PN 10	8 × M 20	106	91
200	PN 16	12 × M 20	70	61
200	PN 25	12 × M 24	104	92
250	PN 10	12 × M 20	82	71
250	PN 16	12 × M 24	98	85
250	PN 25	12 × M 27	150	134
300	PN 10	12 × M 20	94	81
300	PN 16	12 × M 24	134	118
300	PN 25	16 × M 27	153	138
350	PN 6	12 × M 20	111	120
350	PN 10	16 × M 20	112	118
350	PN 16	16 × M 24	152	165
350	PN 25	16 × M 30	227	252
400	PN 6	16 × M 20	90	98
400	PN 10	16 × M 24	151	167
400	PN 16	16 × M 27	193	215
400	PN 25	16 × M 33	289	326
450	PN 6	16 × M 20	112	126
450	PN 10	20 × M 24	153	133

Nominal diameter [mm]	EN (DIN) Pressure rating [bar]	Threaded fasteners	Max. tightening torque [Nm]	
			Hard rubber	Polyurethane
450	PN 16	20 × M 27	198	196
450	PN 25	20 × M 33	256	253
500	PN 6	20 × M 20	119	123
500	PN 10	20 × M 24	155	171
500	PN 16	20 × M 30	275	300
500	PN 25	20 × M 33	317	360
600	PN 6	20 × M 24	139	147
600	PN 10	20 × M 27	206	219
600 *	PN 16	20 × M 33	415	443
600	PN 25	20 × M 36	431	516
700	PN 6	24 × M 24	148	139
700	PN 10	24 × M 27	246	246
700	PN 16	24 × M 33	278	318
700	PN 25	24 × M 39	449	507
800	PN 6	24 × M 27	206	182
800	PN 10	24 × M 30	331	316
800	PN 16	24 × M 36	369	385
800	PN 25	24 × M 45	664	721
900	PN 6	24 × M 27	230	637
900	PN 10	28 × M 30	316	307
900	PN 16	28 × M 36	353	398
900	PN 25	28 × M 45	690	716
1000	PN 6	28 × M 27	218	208
1000	PN 10	28 × M 33	402	405
1000	PN 16	28 × M 39	502	518
1000	PN 25	28 × M 52	970	971
1200	PN 6	32 × M 30	319	299
1200	PN 10	32 × M 36	564	568
1200	PN 16	32 × M 45	701	753
1400	PN 6	36 × M 33	430	398
1400	PN 10	36 × M 39	654	618
1400	PN 16	36 × M 45	729	762
1600	PN 6	40 × M 33	440	417
1600	PN 10	40 × M 45	946	893
1600	PN 16	40 × M 52	1007	1100
1800	PN 6	44 × M 36	547	521
1800	PN 10	44 × M 45	961	895
1800	PN 16	44 × M 52	1108	1003
2000	PN 6	48 × M 39	629	605
2000	PN 10	48 × M 45	1047	1092
2000	PN 16	48 × M 56	1324	1261

* Designed acc. to EN 1092-1 (not to DIN 2501)

Promag W tightening torques for ANSI

Nominal diameter		ANSI	Threaded fasteners	Max. tightening torque			
		Pressure rating		Hard rubber		Polyurethane	
[mm]	[inch]	[lbs]		[Nm]	[lbf · ft]	[Nm]	[lbf · ft]
25	1"	Class 150	4 × ½"	-	-	7	5
25	1"	Class 300	4 × 5/8"	-	-	8	6
40	1 ½"	Class 150	4 × ½"	-	-	10	7
40	1 ½"	Class 300	4 × ¾"	-	-	15	11
50	2"	Class 150	4 × 5/8"	35	26	22	16
50	2"	Class 300	8 × 5/8"	18	13	11	8
80	3"	Class 150	4 × 5/8"	60	44	43	32
80	3"	Class 300	8 × ¾"	38	28	26	19
100	4"	Class 150	8 × 5/8"	42	31	31	23
100	4"	Class 300	8 × ¾"	58	43	40	30
150	6"	Class 150	8 × ¾"	79	58	59	44
150	6"	Class 300	12 × ¾"	70	52	51	38
200	8"	Class 150	8 × ¾"	107	79	80	59
250	10"	Class 150	12 × 7/8"	101	74	75	55
300	12"	Class 150	12 × 7/8"	133	98	103	76
350	14"	Class 150	12 × 1"	135	100	158	117
400	16"	Class 150	16 × 1"	128	94	150	111
450	18"	Class 150	16 × 1 1/8"	204	150	234	173
500	20"	Class 150	20 × 1 1/8"	183	135	217	160
600	24"	Class 150	20 × 1 ¼"	268	198	307	226

Promag W tightening torques for JIS

Nominal diameter	JIS	Threaded fasteners	Max. tightening torque [Nm]	
[mm]	Pressure rating		Hard rubber	Polyurethane
25	10K	4 × M 16	-	19
25	20K	4 × M 16	-	19
32	10K	4 × M 16	-	22
32	20K	4 × M 16	-	22
40	10K	4 × M 16	-	24
40	20K	4 × M 16	-	24
50	10K	4 × M 16	40	33
50	20K	8 × M 16	20	17
65	10K	4 × M 16	55	45
65	20K	8 × M 16	28	23
80	10K	8 × M 16	29	23
80	20K	8 × M 20	42	35
100	10K	8 × M 16	35	29

Nominal diameter [mm]	JIS Pressure rating	Threaded fasteners	Max. tightening torque [Nm] Hard rubber	Polyurethane
100	20K	8 × M 20	56	48
125	10K	8 × M 20	60	51
125	20K	8 × M 22	91	79
150	10K	8 × M 20	75	63
150	20K	12 × M 22	81	72
200	10K	12 × M 20	61	52
200	20K	12 × M 22	91	80
250	10K	12 × M 22	100	87
250	20K	12 × M 24	159	144
300	10K	16 × M 22	74	63
300	20K	16 × M 24	138	124

Promag W tightening torques for AWWA

Nominal diameter		AWWA		Max. tightening torque			
				Hard rubber		Polyurethane	
[mm]	[inch]	Pressure rating	Threaded fasteners	[Nm]	[lbf · ft]	[Nm]	[lbf · ft]
700	28"	Class D	28 × 1 ¼"	247	182	292	215
750	30"	Class D	28 × 1 ¼"	287	212	302	223
800	32"	Class D	28 × 1 ½"	394	291	422	311
900	36"	Class D	32 × 1 ½"	419	309	430	317
1000	40"	Class D	36 × 1 ½"	420	310	477	352
1050	42"	Class D	36 × 1 ½"	528	389	518	382
1200	48"	Class D	44 × 1 ½"	552	407	531	392
1350	54"	Class D	44 × 1 ¾"	730	538	633	467
1500	60"	Class D	52 × 1 ¾"	758	559	832	614
1650	66"	Class D	52 × 1 ¾"	946	698	955	704
1800	72"	Class D	60 × 1 ¾"	975	719	1087	802
2000	78"	Class D	64 × 2"	853	629	786	580

Promag W tightening torques for AS 2129

Nominal diameter [mm]	AS 2129 Pressure rating	Threaded fasteners	Max. tightening torque [Nm] Hard rubber
50	Table E	4 × M 16	32
80	Table E	4 × M 16	49
100	Table E	8 × M 16	38
150	Table E	8 × M 20	64
200	Table E	8 × M 20	96
250	Table E	12 × M 20	98
300	Table E	12 × M 24	123

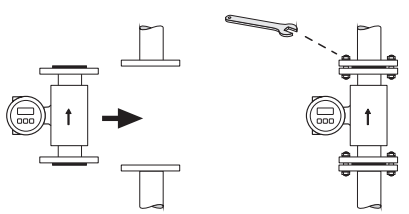
Nominal diameter [mm]	AS 2129 Pressure rating	Threaded fasteners	Max. tightening torque [Nm] Hard rubber
350	Table E	12 × M 24	203
400	Table E	12 × M 24	226
450	Table E	16 × M 24	226
500	Table E	16 × M 24	271
600	Table E	16 × M 30	439
700	Table E	20 × M 30	355
750	Table E	20 × M 30	559
800	Table E	20 × M 30	631
900	Table E	24 × M 30	627
1000	Table E	24 × M 30	634
1200	Table E	32 × M 30	727

Promag W tightening torques for AS 4087

Nominal diameter [mm]	AS 4087 Pressure rating	Threaded fasteners	Max. tightening torque [Nm] Hard rubber
50	Table E	4 × M 16	32
80	PN 16	4 × M 16	49
100	PN 16	4 × M 16	76
150	PN 16	8 × M 20	52
200	PN 16	8 × M 20	77
250	PN 16	8 × M 20	147
300	PN 16	12 × M 24	103
350	PN 16	12 × M 24	203
375	PN 16	12 × M 24	137
400	PN 16	12 × M 24	226
450	PN 16	12 × M 24	301
500	PN 16	16 × M 24	271
600	PN 16	16 × M 27	393
700	PN 16	20 × M 27	330
750	PN 16	20 × M 30	529
800	PN 16	20 × M 33	631
900	PN 16	24 × M 33	627
1000	PN 16	24 × M 33	595
1200	PN 16	32 × M 33	703

2.5 Installing the Promag P sensor

Caution!
- The plates mounted on the two sensor flanges protect the PTFE which is turned over the flanges and, consequently, should not be removed until **immediately prior** to mounting the sensor.
- The protective plates must always remain mounted while the device is in storage.
- Make sure that the lining at the flange is not damaged or removed.



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Note!
Screws, nuts, seals, etc. are not included in the scope of supply and must be supplied by the customer.

The sensor is installed between the two pipe flanges:
- The requisite torques must be observed → 25
- If grounding disks are used, follow the mounting instructions which will be enclosed with the shipment.

2.5.1 Seals

Comply with the following instructions when installing seals:
- **No** seals are required for PFA or PFTE measuring tube lining.
- For DIN flanges, only use seals to DIN EN 1514-1.
- Make sure that the mounted seals do not protrude into the piping cross-section.

Caution!
Risk of short circuit! Do not use electrically conductive sealing compounds such as graphite! An electrically conductive layer could form on the inside of the measuring tube and short-circuit the measuring signal.

2.5.2 Ground cable

If necessary, special ground cables can be ordered as accessories for potential equalization.

2.5.3 Installing the high-temperature version (with PFA lining)

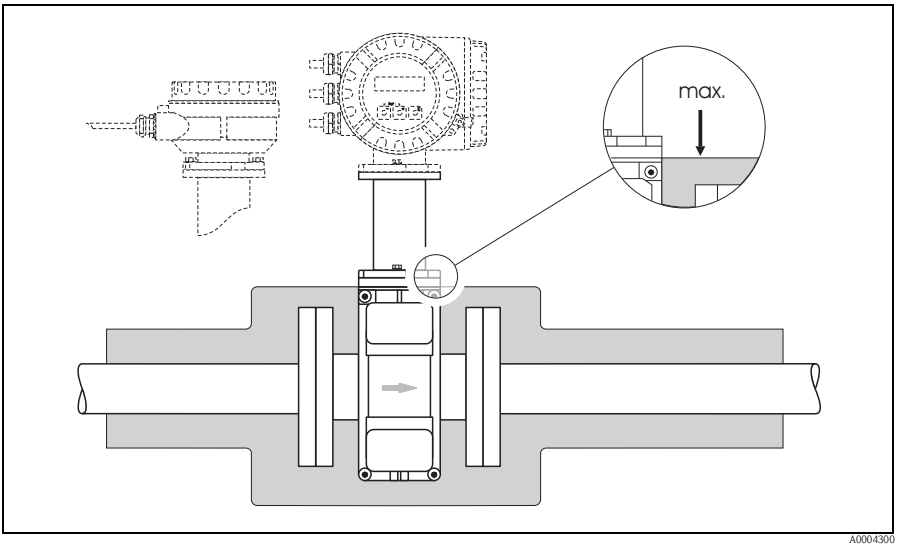
The high-temperature version has a housing support for the thermal separation of sensor and transmitter. The high-temperature version is always used for applications in which high ambient temperatures are encountered **in conjunction with** high fluid temperatures. The high-temperature version is obligatory if the fluid temperature exceeds +150 °C.

Note!
You will find information on permissible temperature ranges in the Operating Instructions of the CD-ROM

Insulation

Pipes generally have to be insulated if they carry very hot fluids, in order to avoid energy losses and to prevent accidental contact with pipes at temperatures that could cause injury. Guidelines regulating the insulation of pipes have to be taken into account.

Caution!
Risk of measuring electronics overheating. The housing support dissipates heat and its entire surface area must remain uncovered. Make sure that the sensor insulation does not extend past the top of the two sensor shells.



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2.5.4 Tightening torques for threaded fasteners (Promag P)

Please note the following:
- The tightening torques listed below are for lubricated threads only.
- Always tighten the screws uniformly and in diagonally opposite sequence.
- Overtightening the screws will deform the sealing faces or damage the seals.
- The tightening torques listed below apply only to pipes not subjected to tensile stress.

Promag P tightening torques for EN (DIN)

Nominal diameter [mm]	EN (DIN) Pressure rating [bar]	Threaded fasteners	Max. tightening torque [Nm]	
			PTFE	PFA
15	PN 40	4 × M 12	11	–
25	PN 40	4 × M 12	26	20
32	PN 40	4 × M 16	41	35
40	PN 40	4 × M 16	52	47
50	PN 40	4 × M 16	65	59
65 *	PN 16	8 × M 16	43	40
65	PN 40	8 × M 16	43	40
80	PN 16	8 × M 16	53	48
80	PN 40	8 × M 16	53	48
100	PN 16	8 × M 16	57	51
100	PN 40	8 × M 20	78	70
125	PN 16	8 × M 16	75	67
125	PN 40	8 × M 24	111	99
150	PN 16	8 × M 20	99	85
150	PN 40	8 × M 24	136	120
200	PN 10	8 × M 20	141	101
200	PN 16	12 × M 20	94	67
200	PN 25	12 × M 24	138	105
250	PN 10	12 × M 20	110	–
250	PN 16	12 × M 24	131	–
250	PN 25	12 × M 27	200	–
300	PN 10	12 × M 20	125	–
300	PN 16	12 × M 24	179	–
300	PN 25	16 × M 27	204	–
350	PN 10	16 × M 20	188	–
350	PN 16	16 × M 24	254	–
350	PN 25	16 × M 30	380	–
400	PN 10	16 × M 24	260	–
400	PN 16	16 × M 27	330	–
400	PN 25	16 × M 33	488	–
450	PN 10	20 × M 24	235	–
450	PN 16	20 × M 27	300	–

Nominal diameter [mm]	EN (DIN) Pressure rating [bar]	Threaded fasteners	Max. tightening torque [Nm] PTFE	PFA
450	PN 25	20 × M 33	385	–
500	PN 10	20 × M 24	265	–
500	PN 16	20 × M 30	448	–
500	PN 25	20 × M 33	533	–
600	PN 10	20 × M 27	345	–
600 *	PN 16	20 × M 33	658	–
600	PN 25	20 × M 36	731	–
* Designed acc. to EN 1092-1 (not to DIN 2501)				

Promag P tightening torques for ANSI

Nominal diameter		ANSI Pressure rating [lbs]	Threaded fasteners	Max. tightening torque PTFE		PFA	
[mm]	[inch]			[Nm]	[lbf · ft]	[Nm]	[lbf · ft]
15	½"	Class 150	4 × ½"	6	4	–	–
15	½"	Class 300	4 × ½"	6	4	–	–
25	1"	Class 150	4 × ½"	11	8	10	7
25	1"	Class 300	4 × 5/8"	14	10	12	9
40	1 ½"	Class 150	4 × ½"	24	18	21	15
40	1 ½"	Class 300	4 × ¾"	34	25	31	23
50	2"	Class 150	4 × 5/8"	47	35	44	32
50	2"	Class 300	8 × 5/8"	23	17	22	16
80	3"	Class 150	4 × 5/8"	79	58	67	49
80	3"	Class 300	8 × ¾"	47	35	42	31
100	4"	Class 150	8 × 5/8"	56	41	50	37
100	4"	Class 300	8 × ¾"	67	49	59	44
150	6"	Class 150	8 × ¾"	106	78	86	63
150	6"	Class 300	12 × ¾"	73	54	67	49
200	8"	Class 150	8 × ¾"	143	105	109	80
250	10"	Class 150	12 × 7/8"	135	100	–	–
300	12"	Class 150	12 × 7/8"	178	131	–	–
350	14"	Class 150	12 × 1"	260	192	–	–
400	16"	Class 150	16 × 1"	246	181	–	–
450	18"	Class 150	16 × 1 1/8"	371	274	–	–
500	20"	Class 150	20 × 1 1/8"	341	252	–	–
600	24"	Class 150	20 × 1 ¼"	477	352	–	–

Promag P tightening torques for JIS

Nominal diameter [mm]	JIS Pressure rating	Threaded fasteners	Max. tightening torque [Nm] PTFE	PFA
25	10K	4 × M 16	32	27
25	20K	4 × M 16	32	27
32	10K	4 × M 16	38	–
32	20K	4 × M 16	38	–
40	10K	4 × M 16	41	37
40	20K	4 × M 16	41	37
50	10K	4 × M 16	54	46
50	20K	8 × M 16	27	23
65	10K	4 × M 16	74	63
65	20K	8 × M 16	37	31
80	10K	8 × M 16	38	32
80	20K	8 × M 20	57	46
100	10K	8 × M 16	47	38
100	20K	8 × M 20	75	58
125	10K	8 × M 20	80	66
125	20K	8 × M 22	121	103
150	10K	8 × M 20	99	81
150	20K	12 × M 22	108	72
200	10K	12 × M 20	82	54
200	20K	12 × M 22	121	88
250	10K	12 × M 22	133	–
250	20K	12 × M 24	212	–
300	10K	16 × M 22	99	–
300	20K	16 × M 24	183	–

Promag P tightening torques for AS 2129

Nominal diameter [mm]	AS 2129 Pressure rating	Threaded fasteners	Max. tightening torque [Nm] PTFE
25	Table E	4 × M 12	21
50	Table E	4 × M 16	42

Promag P tightening torques for AS 4087

Nominal diameter [mm]	AS 4087 Pressure rating	Threaded fasteners	Max. tightening torque [Nm] PTFE
50	PN 16	4 × M 16	42

2.6 Installing the Promag H sensor

Depending on the order specifications, the sensor is supplied with or without ready-mounted process connections. Mounted process connections are fixed to the sensor with 4 or 6 hexagonal-headed bolts.

☝ Caution!
Depending on the application and length of the pipe, the sensor may have to be supported or additionally secured. The sensor must be secured if using plastic process connections. An appropriate wall mounting kit can be ordered separately from Endress+Hauser as an accessory.

2.6.1 Seals

When mounting the process connections, make sure that the seals in question are free from dirt and centered correctly.

☝ Caution!
- The screws must be securely tightened in the case of metal process connections. Together with the sensor, the process connection forms a metal connection that ensures defined seal compression.
- With regard to process connections made of plastic material, comply with the max. torques for lubricated threads (7 Nm / 5.2 lbf ft). A seal must always be used between the connection and counterflange for plastic flanges.
- The seals should be replaced periodically depending on the application, particularly if molded seals are used (aseptic version)! The intervals between seal replacement depend on the frequency of the cleaning cycles and the fluid and cleaning temperatures. Replacement seals can be ordered as an accessory.

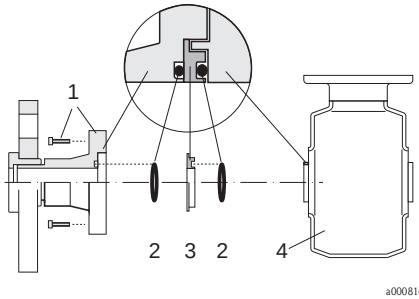
2.6.2 Using and mounting grounding rings (DN 2 to 25, 1/12" to 1")

In the case of process connections made of plastic (e.g. flange connections or adhesive couplings), potential equalization between the sensor and fluid must be ensured via additional grounding rings.
If grounding rings are missing, this can affect accuracy or result in the destruction of the sensor due to electrochemical electrode reduction.

☝ Caution!
- Depending on the order option, appropriate plastic disks are used instead of grounding rings for the process connections. These plastic disks only act as a kind of "place holder" and do not have any potential equalization function whatsoever. In addition, they also assume an important sealing function at the sensor/connection interface. Thus, these plastic disks/seals should never be removed and should always be mounted for process connections without metal grounding rings!
- Grounding rings can be ordered separately from Endress+Hauser as an accessory.
  When ordering, make sure that the grounding rings are compatible with the electrode material. Otherwise there is the risk that electrodes can be damaged by electrochemical corrosion! For information on materials, see the Operating Instructions on the CD-ROM.

- Grounding rings, incl. seals, are mounted inside the process connections.
  The face-to-face length is not affected.

Installing the grounding rings



1 = Process connection hexagonal-headed bolts
2 = O-ring seals
4 = Sensor
3 = Grounding ring or plastic disk (place holder)

a. Release the 4 or 6 hexagonal-headed bolts (1) and remove the process connection from the sensor (4).
b. Remove the plastic disk (3) including the two O-ring seals (2) from the process connection.
c. Insert one of the O-ring seals (2) back into the groove of the process connection.
d. Place the metal grounding ring (3) into the process connection as illustrated.
e. Now insert the second O-ring seal (2) into the groove of the grounding ring.
f. Mount the process connection back onto the sensor. In doing so, make sure to observe the max. torques for lubricated threads (7 Nm) (5.2 lbf ft).

2.6.3 Welding the sensor into the pipe (weld nipples)

Caution!
Risk of destroying the electronics! Make sure that the welding system is not grounded via the sensor or transmitter.

a. Secure the sensor with a few welding points in the pipe.
   A welding jig suitable for this purpose can be ordered separately as an accessory.
b. Release the screws on the process connection flange and remove the sensor, including the seal, from the pipe.
c. Weld the process connection into the pipe.
d. Mount the sensor back into the pipe.
   In doing so, make sure the seals are clean and correctly positioned.

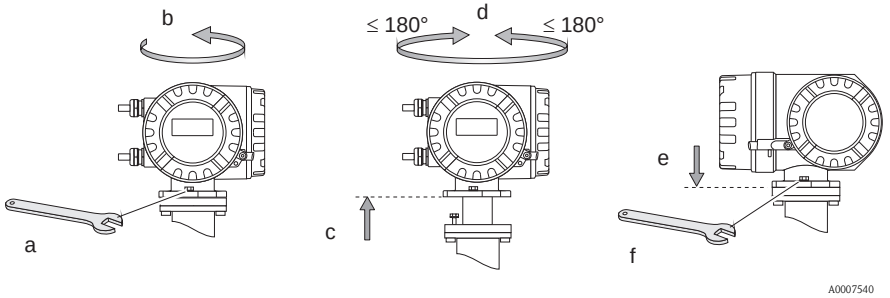
Note!
- When welding is performed correctly with thin-walled pipes carrying food, the seal is not damaged by the heat even when it is mounted. It is recommended, however, to disassemble the sensor and seal.
- For the disassembly work, it must be possible to open the pipe approx. 8 mm (0.31 in) in total.

2.7 Installing the transmitter housing

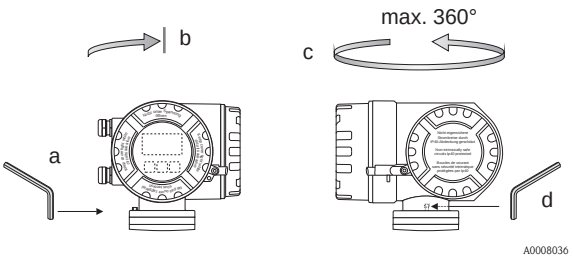
2.7.1 Turning the transmitter housing

Turning the aluminum field housing

Aluminum field housing for non-Ex area



Aluminum field housing for Zone 1 or Class I Div. 1



For Zone 1 or Class I Div. 1:

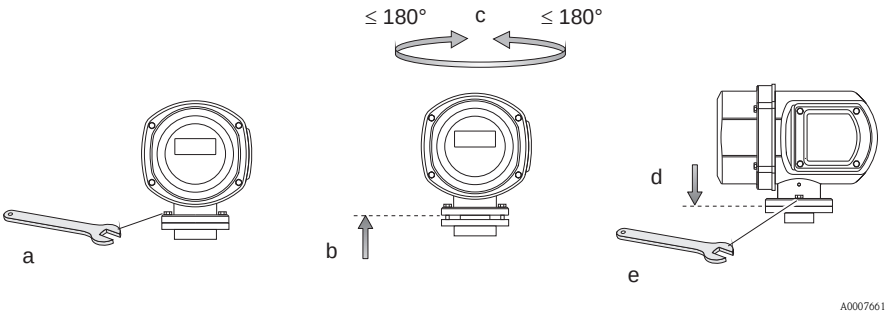
a. Release the setscrew.

b. Turn the transmitter housing gently clockwise until the stop (end of the thread).

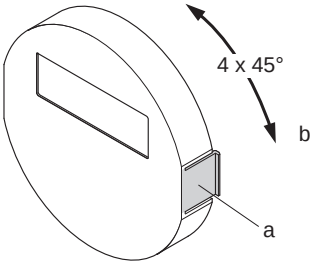
c. Turn the transmitter counterclockwise (max. 360°) to the desired position.

d. Retighten the setscrew.

Turning the stainless steel field housing



2.7.2 Turning the onsite display



a. Press in the side latches on the display module and remove the module from the cover plate of the electronics compartment.

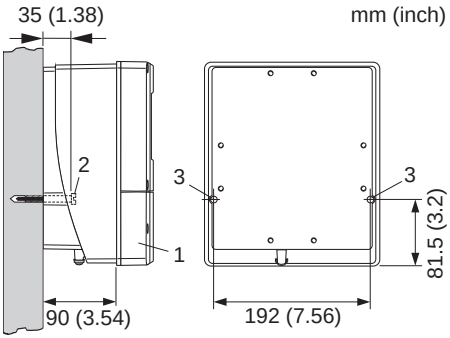
b. Turn the display to the desired position (max. 4 × 45° in both directions) and reset it onto the cover plate of the electronics compartment.

2.7.3 Installing the wall-mount housing

Caution!

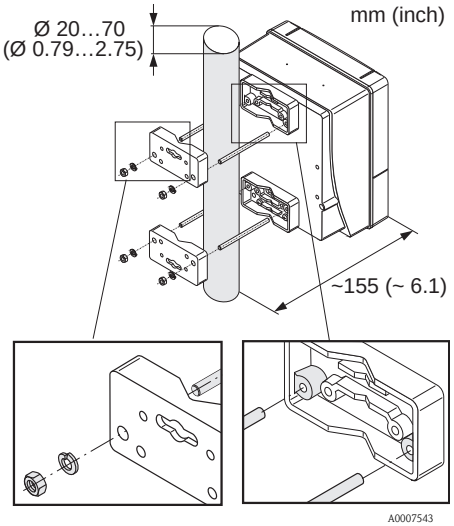
- Make sure that the ambient temperature does not exceed the permitted range.
- Always install the wall-mount housing in such a way that the cable entries point downwards.

Mounted directly on the wall



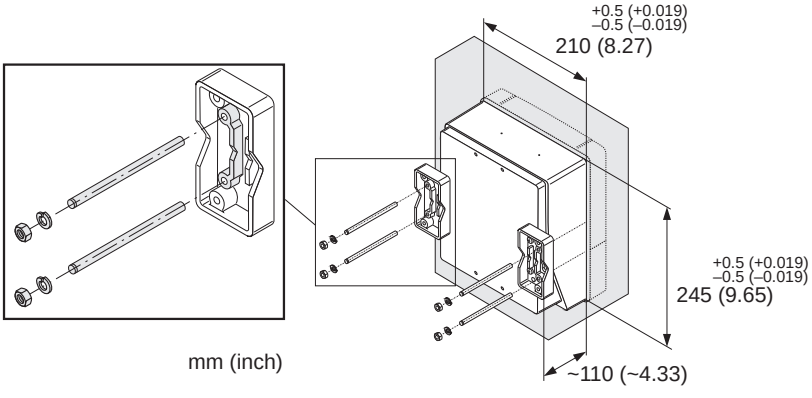
1. Connection compartment
2. Securing screws M6 (max. ø 6.5 mm (0.25"); screw head max. ø 10.5 mm (0.4")
3. Housing bores for securing screws

Pipe mounting



Caution!
Danger of overheating! If the device is mounted on a warm pipe, make sure that the housing temperature does not exceed +60 °C (+140 °F) which is the maximum temperature permitted.

Panel mounting



2.8 Post-installation check

- Is the measuring device damaged (visual inspection)?
- Does the device correspond to specifications at the measuring point, including process temperature and pressure, ambient temperature, minimum fluid conductivity, measuring range, etc.?
- Does the arrow on the sensor nameplate match the actual direction of flow through the pipe?
- Is the position of the measuring electrode plane correct?
- Were all screws tightened to the specified torques when the sensor was installed?
- Were the correct seals used (type, material, installation)?
- Are the measuring point number and labeling correct (visual inspection)?
- Were the inlet and outlet runs respected?
  - Inlet run $\geq 5 \times$ DN
  - Outlet run $\geq 2 \times$ DN
- Is the measuring device protected against moisture and direct sunlight?
- Is the sensor adequately protected against vibration (attachment, support)?
  Acceleration up to 2 g by analogy with IEC 600 68-2-8

3 Wiring

⚠ Warning!
Risk of electric shock! Components carry dangerous voltages.
- Never mount or wire the measuring device while it is connected to the power supply.
- Before connecting the power supply, check the safety equipment.
- Route the power supply and signal cables so they are securely seated.
- Seal the cable entries and covers tight.

☝ Caution!
Risk of damaging the electronic components!
- Connect the power supply in accordance with the connection data on the nameplate.
- Connect the signal cable in accordance with the connection data in the Operating Instructions or the Ex documentation on the CD-ROM.

In addition, for the remote version

☝ Caution!
Risk of damaging the electronic components!
- Only connect sensors and transmitters with the same serial number.
- Observe the cable specifications of the connecting cable → Operating Instructions on the CD-ROM.

✎ Note!
Install the connecting cable securely to prevent movement.

In addition, for measuring devices with fieldbus communication

☝ Caution!
Risk of damaging the electronic components!
- Observe the cable specification of the fieldbus cable → Operating Instructions on the CD-ROM.
- Keep the stripped and twisted lengths of cable shield as short as possible.
- Screen and ground the signal lines → Operating Instructions on the CD-ROM.
- When using in systems without potential equalization → Operating Instructions on the CD-ROM.

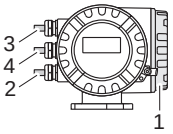
In addition, for Ex-certified measuring devices

⚠ Warning!
When wiring Ex-certified measuring devices, all the safety instructions, wiring diagrams, technical information etc. of the related Ex documentation must be observed
→ Ex documentation on the CD-ROM.

3.1 Connecting the various housing types

Wire the unit using the terminal assignment diagram inside the cover.

3.1.1 Compact version

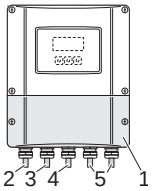


A0007545

Transmitter connection:

1 Connection diagram inside the connection compartment cover
2 Power supply cable
3 Signal cable or fieldbus cable
4 Optional

3.1.2 Remote version (transmitter): non-Ex Zone, Ex Zone 2, Class I Div. 2



A0012690

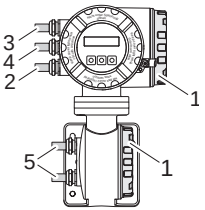
Transmitter connection:

1 Connection diagram inside the connection compartment cover
2 Power supply cable
3 Signal cable
4 Fieldbus cable

Connecting the connecting cable (→ 36):

5 Sensor/transmitter connecting cable

3.1.3 Remote version (transmitter): Ex Zone 1, Class I Div. 1



A0008218

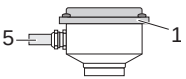
Transmitter connection:

1 Connection diagram inside the connection compartment cover
2 Power supply cable
3 Signal cable or fieldbus cable
4 Optional

Connecting the connecting cable (→ 36):

5 Sensor/transmitter connecting cable

3.1.4 Remote version (sensor)



A0008037

Transmitter connection:

1 Connection diagram inside the connection compartment cover

Connecting cable connection:

5 Sensor/transmitter connecting cable

3.2 Connecting the remote version connecting cable

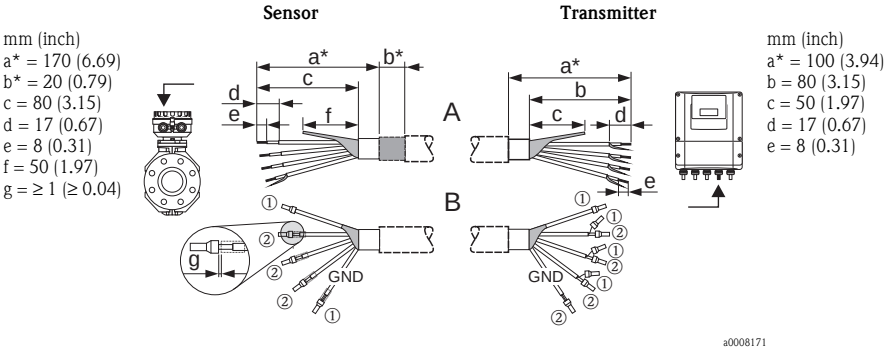
3.2.1 Connecting cable for Promag W, P and L

Connecting cable termination

Terminate the signal and coil current cables as shown in the figure below (Detail A).
Fit the fine-wire cores with cable end ferrules (Detail B).

Signal cable termination

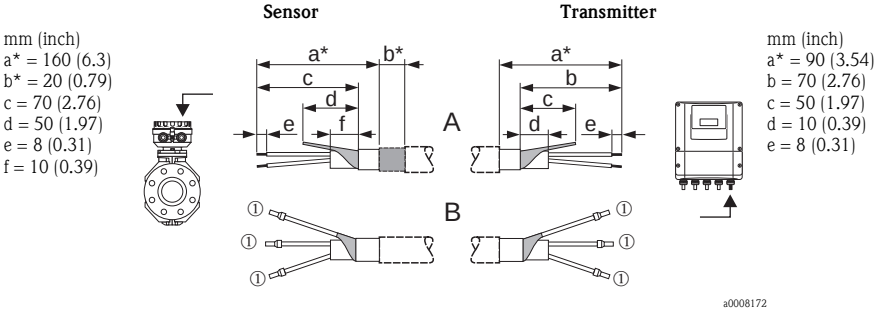
Make sure that the cable end ferrules do not touch the wire shields on the sensor side! Minimum distance = 1 mm (0.04 in), exception "GND" = green cable.



① = Cable end ferrules, red, ∅ 1.0 mm (0.04"); ② = Cable end ferrules, white, ∅ 0.5 mm (0.02")
* = Stripping for armored cables only

Coil current cable termination

Insulate one core of the three-core cable at the level of the core reinforcement; you only require two cores for the connection.



① = Cable end ferrules, red, ∅ 1.0 mm (0.04"); ② = Cable end ferrules, white, ∅ 0.5 mm (0.02")
* = Stripping for armored cables only

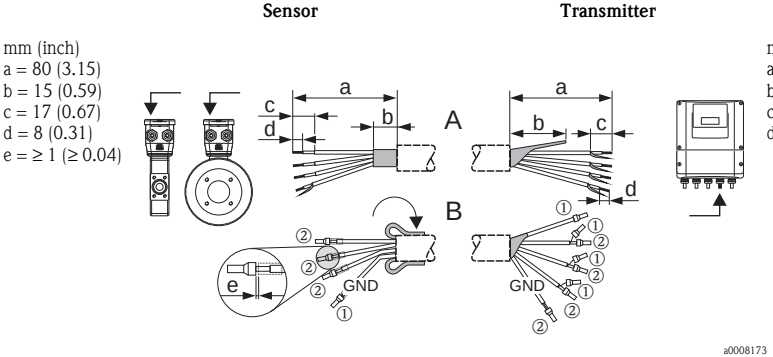
3.2.2 Promag H connecting cable

Connecting cable termination

Terminate the signal and coil current cables as shown in the figure below (Detail A).
Fit the fine-wire cores with cable end ferrules (Detail B).

Signal cable termination

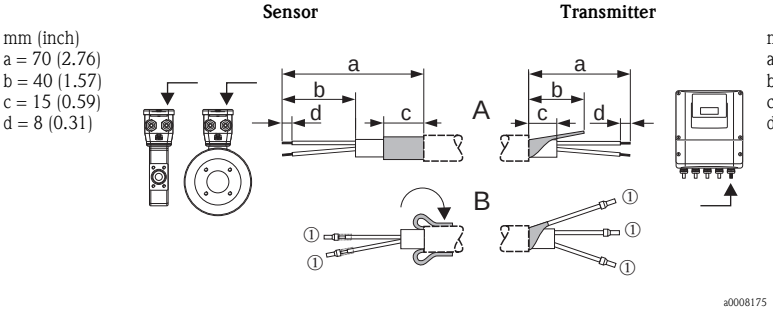
Make sure that the cable end ferrules do not touch the wire shields on the sensor side! Minimum distance = 1 mm (0.04 in), exception "GND" = green cable.



① = Cable end ferrules, red, ∅ 1.0 mm (0.04"); ② = Cable end ferrules, white, ∅ 0.5 mm (0.02")

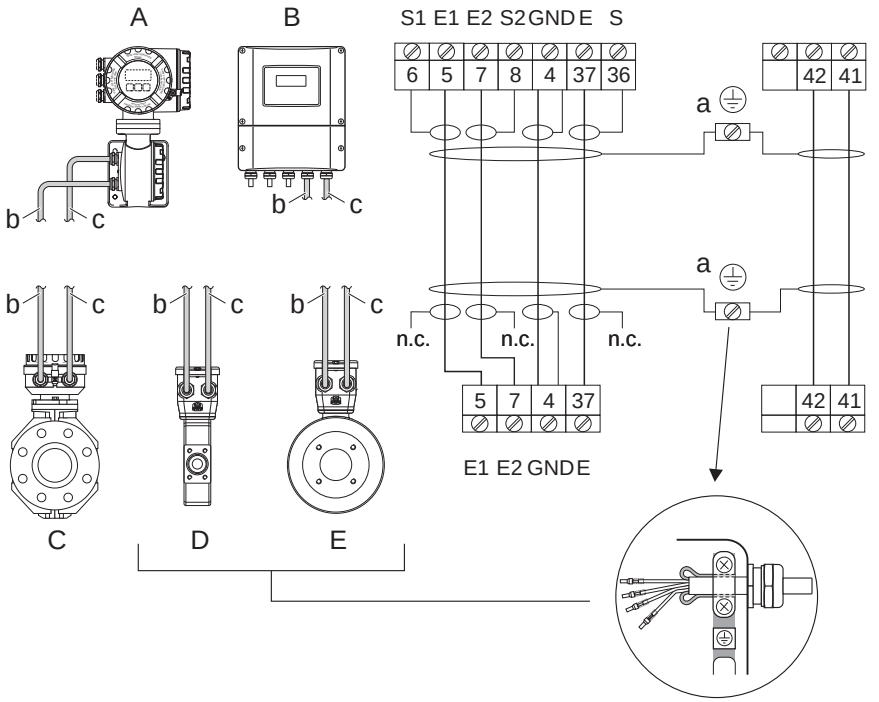
Coil current cable termination

Insulate one core of the three-core cable at the level of the core reinforcement; you only require two cores for the connection.



① = Cable end ferrules, red, ∅ 1.0 mm (0.04"); ② = Cable end ferrules, white, ∅ 0.5 mm (0.02")

3.2.3 Connecting cable connection



A Transmitter housing on connection housing, remote version
B Wall-mount housing on connection housing, remote version

C Sensor connection housing, remote version for Promag W, P, L
D Sensor connection housing, remote version for Promag H, DN ≤ 25
E Sensor connection housing, remote version for Promag H, DN ≥ 40

a Ground terminals (are provided for potential equalization connection)
b Coil circuit connecting cable
c Signal circuit connecting cable (electrodes)

n.c. = not connected, isolated cable shields

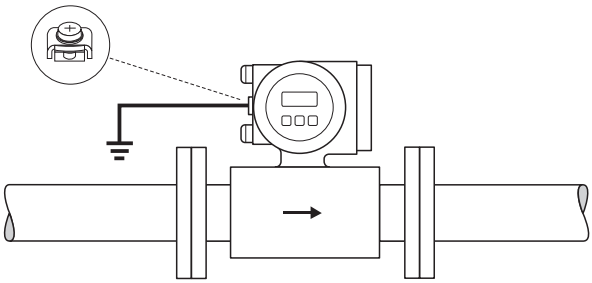
Cable colors for terminal numbers:
5/6 = brown
7/8 = white
4 = green
36/37 = yellow

3.3 Potential equalization

Perfect measurement is only ensured when the medium and the sensor have the same electrical potential. Most sensors have a reference electrode installed as standard, which guarantees the required potential connection. This usually means that the use of ground disks or other measures are unnecessary.

- Promag L, Promag W and Promag P
  Reference electrode available as standard.
- Promag H
  – No reference electrode available. There is always an electrical connection to the fluid via the metal process connection.
  – In the case of plastic process connections, potential equalization must be ensured through the use of grounding rings.

Standard situation
Potential equalization takes place via the ground terminal of the transmitter when using the device in metal, grounded pipes.



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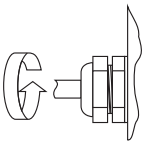
✎ Note!
Potential equalization for other areas of application → Operating Instructions on the CD-ROM.

3.4 Degree of protection

The devices meet all the requirements for IP 67.

After mounting in the field or service work, the following points have to be observed to ensure that IP 67 protection is retained:
- Install the measuring device in such a way that the cable entries do not point upwards.
- Do not remove the seal from the cable entry.
- Remove all unused cable entries and plug them with suitable/certified drain plugs.
- Use cable entries and drain plugs with a long-term operating temperature range in accordance with the temperature specified on the nameplate.



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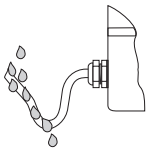
Tighten the cable entries correctly.



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The cables must loop down before they enter the cable entries ("water trap").

3.5 Post-connection check

- Are cables or the device damaged (visual inspection)?
- Does the supply voltage match the information on the nameplate?
- Do the cables used comply with the necessary specifications?
- Do the mounted cables have adequate strain relief and are they routed securely?
- Is the cable type route completely isolated? Without loops and crossovers?
- Only remote version:
  - Is the flow sensor connected to the matching transmitter electronics?
  - Is the connecting cable between sensor and transmitter connected correctly?
- Are all screw terminals firmly tightened?
- Have all the measures for grounding and potential equalization been correctly implemented?
- Are all cable entries installed, firmly tightened and correctly sealed?
- Cable routed as a "water trap" in loops?
- Are all the housing covers installed and securely tightened?

In addition, for measuring devices with fieldbus communication:
- Are all the connecting components (T-boxes, junction boxes, connectors, etc.) connected with each other correctly?
- Has each fieldbus segment been terminated at both ends with a bus terminator?
- Has the max. length of the fieldbus cable been observed in accordance with the specifications?
- Has the max. length of the spurs been observed in accordance with the specifications?
- Is the fieldbus cable fully shielded and correctly grounded?

4 Hardware settings

This section only deals with the hardware settings needed for commissioning. All other settings (e.g. output configuration, write protection, etc.) are described in the associated Operating Instructions on the CD-ROM.

✎ Note!
No hardware settings are needed for measuring devices with HART or FOUNDATION Fieldbus-type communication.

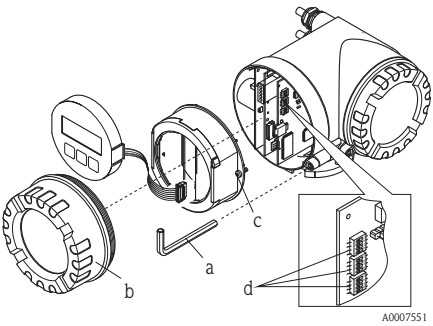
4.1 Device address

Has to be set for measuring devices with the following communication methods:
- PROFIBUS DP/PA

The device address can be configured via:
- Miniature switches → see description below
- Local operation → see **Software settings section** → 📄 48

Addressing via miniature switches

⚠ Warning!
Risk of electric shock! Risk of damaging the electronic components!
- All the safety instructions for the measuring device must be observed and all the warnings heeded → 📄 34.
- Use a workspace, working environment and tools purposely designed for electrostatically sensitive devices.



⚠ Warning!
Switch off the power supply before opening the device.

a. Loosen the cheese head screw of the securing clamp with an Allen key (3 mm)

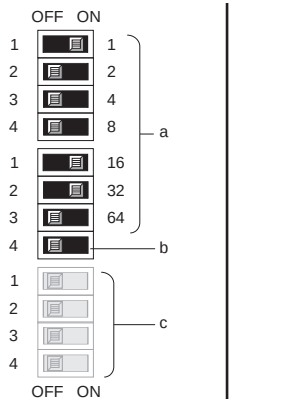
b. Unscrew cover of the electronics compartment from the transmitter housing.

c. Loosen the securing screws of the display module and remove the onsite display (if present).

d. Set the position of the miniature switches on the I/O board using a sharp pointed object.

Installation is the reverse of the removal procedure.

PROFIBUS



Device address range: 0 to 126
Factory setting: 126

a. Miniature switches for device address
Example shown:
1+16+32 = device address 49

b. Miniature switches for the address mode (method of addressing):
- OFF (factory setting) = software addressing via local operation/operating program
- ON = hardware addressing via miniature switches

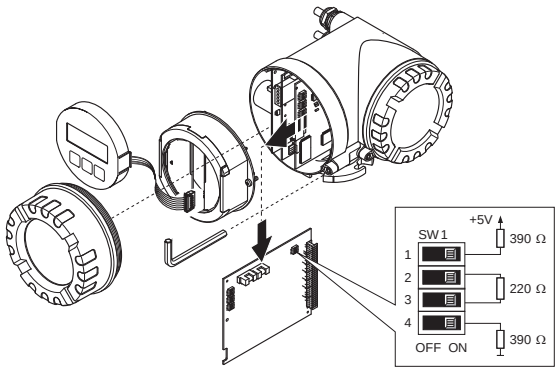
c. Miniature switches not assigned.

4.2 Terminating resistors

Note!
If the measuring device is used at the end of a bus segment, termination is required.
This can be performed in the measuring device by setting the terminating resistors on the I/O board. Generally, however, it is recommended to use an external bus terminator and not perform termination at the measuring device itself.

Has to be set for measuring devices with the following communication methods:
- PROFIBUS DP
  - Baudrate ≤ 1.5 MBaud → Termination can be performed at the measuring device, see graphic
  - Baudrate > 1.5 MBaud → An external bus terminator must be used

Warning!
Risk of electric shock! Risk of damaging the electronic components!
- All the safety instructions for the measuring device must be observed and all the warnings heeded → 34.
- Use a workspace, working environment and tools purposely designed for electrostatically sensitive devices.



Setting the terminating switch SW1 on the I/O board:
ON - ON - ON - ON

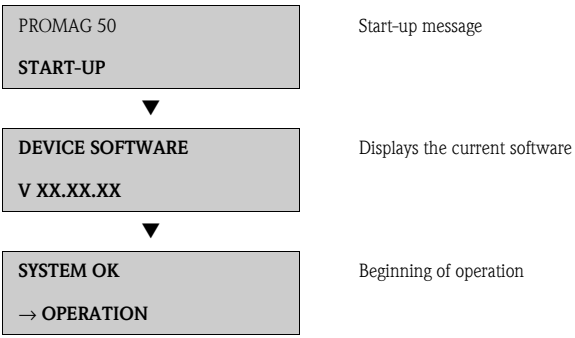
5 Commissioning

5.1 Switching on the measuring device

On completion of the installation (successful post-installation check), wiring (successful post-connection check) and after making the necessary hardware settings, where applicable, the permitted power supply (see nameplate) can be switched on for the measuring device.

When the power supply is switched on, the measuring device performs a number of power-up checks and device self-checks. As this procedure progresses the following messages can appear on the onsite display:

Display examples:

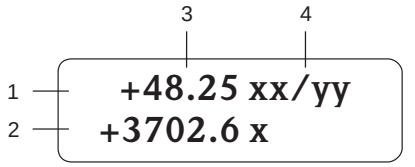


The measuring device starts operating as soon as the startup procedure is complete.
Various measured values and/or status variables appear on the display.

✎ Note!
If an error occurs during startup, this is indicated by an error message.
The error messages that occur most frequently when a measuring device is commissioned are described in the Troubleshooting section → 48.

5.2 Operation

5.2.1 Display elements



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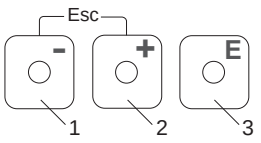
Display lines/fields

1. Main line for primary measured values
2. Additional line for additional measured variables/status variables
3. Current measured values
4. Engineering units/time units

5.2.2 Operating elements



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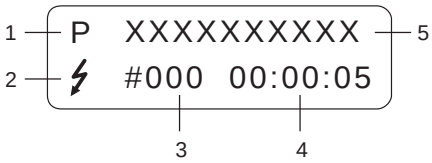
Operating keys

1. (–) Minus key for entering, selecting
2. (+) Plus key for entering, selecting
3. Enter key for calling the function matrix, saving

When the +/– keys are pressed simultaneously (Esc):
- Exit the function matrix step-by-step:
- > 3 sec. = cancel data input and return to the measured value display

5.2.3 Displaying error messages



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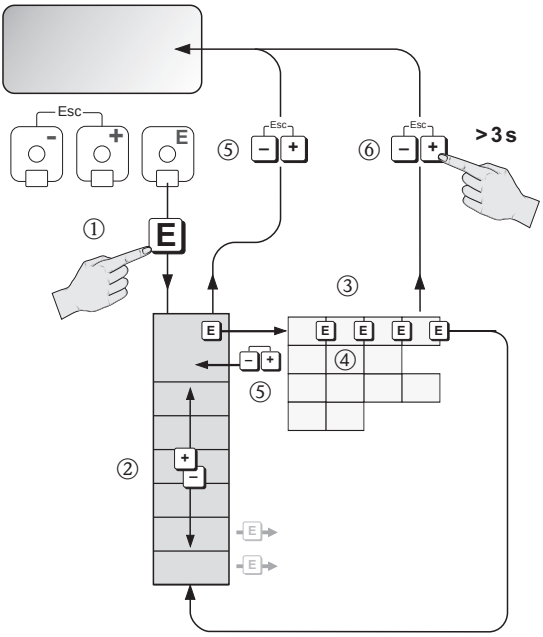
1. Type of error:
   P = Process error, S = System error
2. Error message type:
   ϟ = Fault message, ! = Notice message
3. Error number
4. Duration of the last error that occurred:
   Hours: Minutes: Seconds
5. Error designation
   List of all error messages, see associated Operating Instructions on the CD-ROM

5.3 Navigating within the function matrix



A0007562

1. E → Enter the function matrix (starting with measured value display)
2. ± → Select the group (e.g. OPERATION)
   E → Confirm selection
3. E → Select function (e.g. LANGUAGE)
4. ± → Enter code **50** (only for the first time you access the function matrix)
   E → Confirm entry

   ± → Change function/selection (e.g. ENGLISH)
   E → Confirm selection
5. ± → Return to measured value display step by step
6. ± > 3 s → Return immediately to measured value display

5.4 Calling the Commissioning Quick Setup

All the functions needed for commissioning are called up automatically with the Quick Setup. The functions can be changed and adapted to the process in question.

1. E → Enter the function matrix (starting with measured value display)
2. ± → Select the group QUICK SETUP
   E → Confirm selection
3. QUICK SETUP COMMISSIONING function appears.
4. Intermediate step if configuration is blocked:
   ± → Enter the code **50** (confirm with E) and thus enable configuration
5. ± → Go to Commissioning Quick Setup
6. ± → Select YES
   E → Confirm selection
7. E → Start Commissioning Quick Setup
8. Configure the individual functions/settings:
   – Via ±-key, select option or enter number
   – Via E-key, confirm entry and go to next function
   – Via ±-key, return to Setup Commissioning function
   (settings already made are retained)

✎ Note!
Observe the following when performing the Quick Setup:
- Configuration selection: Select the ACTUAL SETTING option
- Unit selection: This is not offered again for selection after configuring a unit
- Output selection: This is not offered again for selection after configuring an output
- Automatic configuration of the display: select YES
  – Main line = Mass flow
  – Additional line = Totalizer 1
  – Information line = Operating/system conditions
- If asked whether additional Quick Setups should be executed: select NO

All the available functions of the measuring device and their configuration options as well as additional Quick Setups, if available, are described in detail in the "Description of Device Functions" Operating Instructions. The related Operating Instructions can be found on the CD-ROM.

The measuring device is ready for operation on completion of the Quick Setup.

5.5 Software settings

5.5.1 Device address

Has to be set for measuring devices with the following communication methods:
- PROFIBUS DP/PA → device address range 0 to 126, factory setting 126

The device address can be configured via:
- Miniature switches → see Hardware settings → 41
- Local operation → see description below

Note!
The COMMISSIONING SETUP must be executed before setting the device address.

Calling the Communication Quick Setup

1. E → Enter the function matrix (starting with measured value display)
2. ± → Select the group QUICK SETUP
   E → Confirm selection
3. → Select the QUICK SETUP COMMUNICATION function
4. Intermediate step if configuration is blocked: ± → Enter the code **50**
   (confirm with E) and thus enable the configuration
5. ± → Go to Communication Quick Setup
6. ± → Select YES; E → confirm selection
7. E → Start Communication Quick Setup
8. Configure the individual functions/settings:
   – Via ±-key, select option or enter number
   – Via E-key, confirm entry and go to next function
   – Via ±-key, return to Setup Commissioning function
   (settings already made are retained)

All the available functions of the measuring device and their configuration options as well as additional Quick Setups, if available, are described in detail in the "Description of Device Functions" Operating Instructions. The related Operating Instructions can be found on the CD-ROM.

The measuring device is ready for operation on completion of the Quick Setup.

5.6 Troubleshooting

A complete description of all the error messages is provided in the Operating Instructions on the CD-ROM.

Note!
The output signals (e.g. pulse, frequency) of the measuring device must correspond to the higher-order controller.

www.endress.com/worldwide

Endress+Hauser

People for Process Automation

KA00026D/06/EN/14.11
71154524
FM+SGML 9.0

model 7261-7271

AXION MSR™ Eye/Face Wash

FEATURES & BENEFITS

CONSTRUCTION

1-1/4" IPS Schedule 40 hot-dipped galvanized steel pipe and fittings along with powder-coated cast-iron 9" (22.9 cm) diameter floor flange provide corrosion resistance in a long lasting product.

STRAINERS/FILTERS

Chrome-plated brass in-line 50 x 50 mesh water strainer prevents debris from reaching the eyewash so the unit stays functioning at its best. Strainer is easily serviceable.

QUALITY CONTROL

Eye/face wash and valve assembly are pre-built and fully water/pressure tested to ensure no leaks and proper function which ultimately reduces installation time.

VALVE

Valve is designed to make the flushing of fluid occur with the push of a stainless steel flag, and is equipped with a stainless steel ball and stem to provide added protection against corrosion and breakage.

EYE/FACE WASH

AXION MSR™; eye/face wash head (patent pending) uses an inverted directional laminar flow to sweep contaminants away from the vulnerable nasal cavity.

BOWL

The 11" (27.9 cm) round green ABS plastic receptor is resistant to damage from alkalies, salt solutions, oils and most acids.

OPTIONS

- ☐ Foot Treadle: Model SP220 foot control assembly, including powder-coated aluminum treadle for hands free activation of eyewash.
- ☐ Tempered Water Blending Systems: Model TWBS.EW.H, prepackaged instantaneous electrical water heater, 480 VAC/3 phase/20 KW, fully engineered and tested system with fail-safe features to produce up to 6 gpm (22.7 L) tempered water for eye washes.
- ☐ Repair Kit: Model VRKEWSTR is a repair kit for SP507 and SP509. Includes screen and gasket.
- ☐ Dust Cover: Model 9102 is a stainless steel cover that protects the eyewash heads as well as the bowl. Pushing the stainless steel flag will activate the unit while raising the dust cover. (Picture shows cover mounted to an eyewash.)

To see all options for this model, visit www.hawsco.com

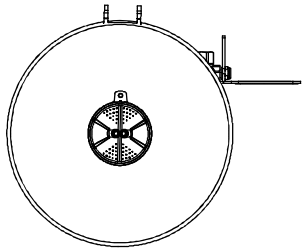
SPECIFICATIONS

Model 7261-7271 pedestal eye/face wash shall include a green ABS plastic 11" (27.9 cm) bowl, an AXION MSR™ eye/face wash head shall feature inverted directional laminar flow which achieves zero vertical velocity supplied by an integral flow control, chrome-plated brass stay-open ball valve equipped with stainless steel ball and stem, and chrome-plated brass in-line 50 x 50 mesh water strainer. Unit shall also include 1-1/4" Schedule 40 hot-dipped galvanized steel pipe and fittings along with powder-coated cast-iron 9" (22.9 cm) diameter floor flange, yellow plastic pop-off dust cover for eyewash head, universal sign, 1/2" IPS inlet, and 1-1/4" IPS waste.

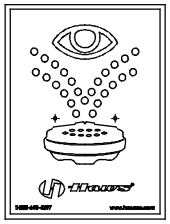
APPLICATIONS

Where the eyes of any person may be exposed to injurious or corrosive materials, suitable facilities for quick flushing and cleansing of the eyes must be provided within the work area for immediate emergency use. Emergency eyewash facilities shall be in unobstructed and accessible locations that require no more than 10 seconds for the injured person to reach.

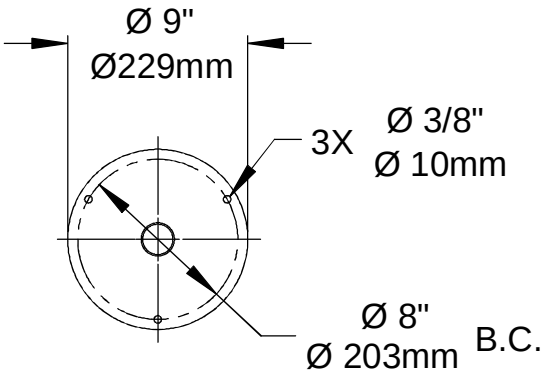
Model 7261-7271 is certified by CSA to meet the ANSI Z358.1 Standard for Emergency Eyewash and Shower Equipment.



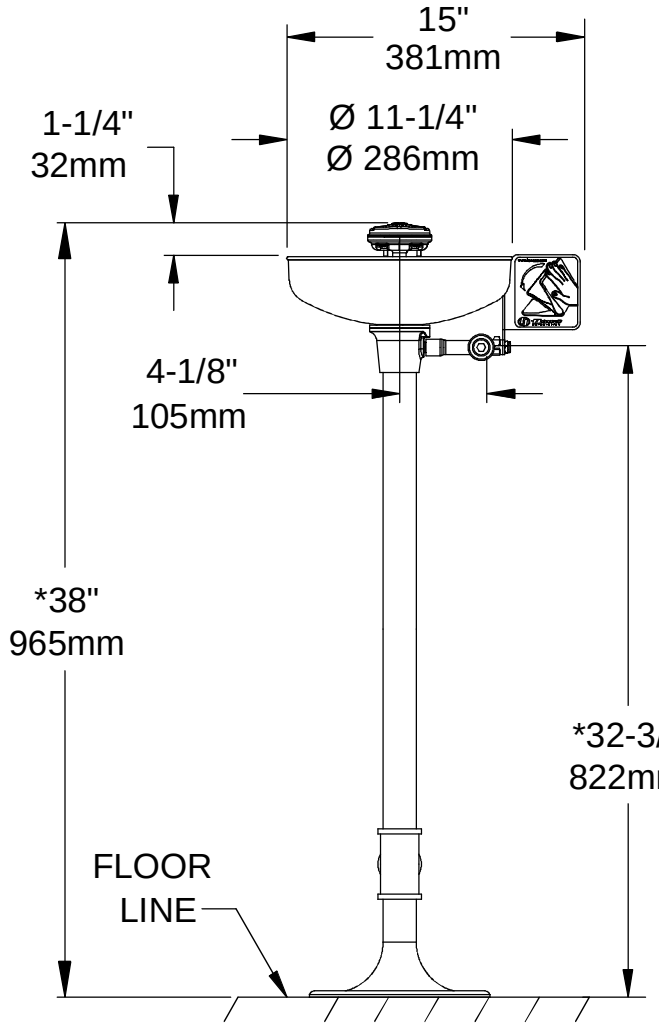
TOP VIEW

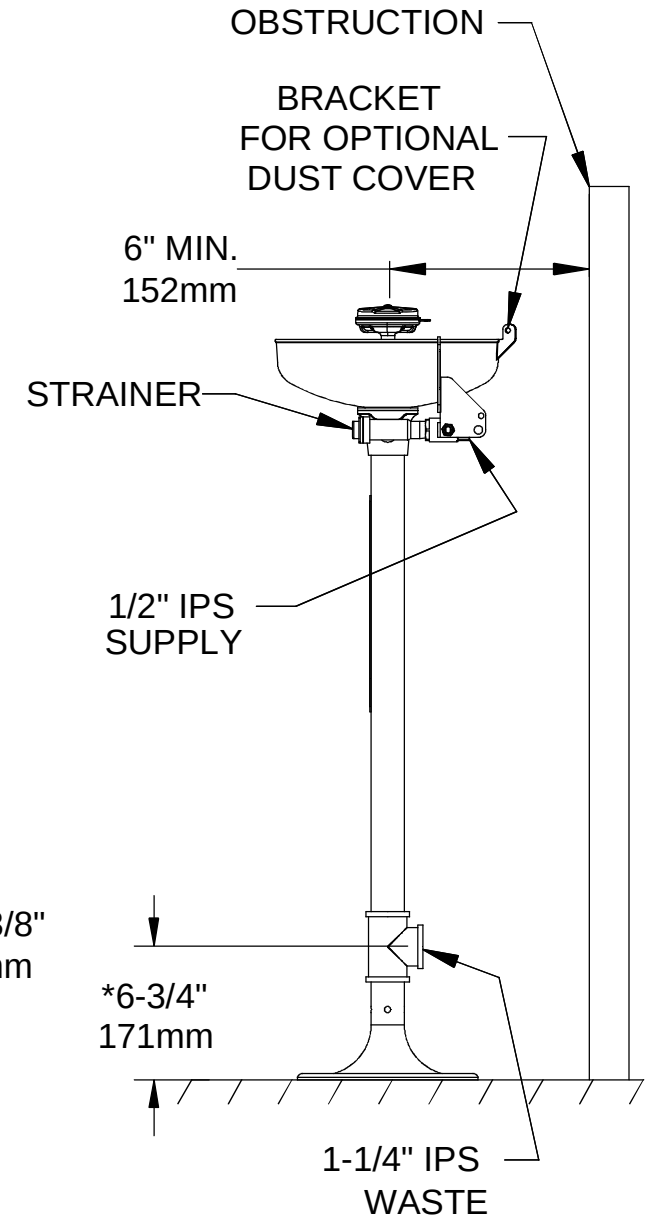


SIGN IS TO BE POSITIONED SUCH THAT IT IS VISIBLE WITHIN THE AREA SERVED BY THE EYEWASH



MOUNTING DETAIL





NOTES:

1. TO COMPLY WITH ANSI Z358.1-2009 FOR EMERGENCY EYEWASH AND EYE/FACE WASH:
   - UNIT SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AND ACCEPTABLE PLUMBING PRACTICES.
   - EYEWASH OR EYE/FACE WASH SHALL BE POSITIONED WITH NOZZLES NOT LESS THAN 83.8 CM (33IN.) AND NO GREATER THAN 114.3 CM (45 IN.) FROM SURFACE ON WHICH USER STANDS AND 15.3 CM (6 IN.) MINIMUM FROM WALL OR NEAREST OBSTRUCTION.
2. *THESE DIMENSIONS MAY VARY ± 1/2" [12.7mm]

Haws®
1455 KLEPPE LANE
SPARKS, NEVADA 89431
(775) 359-4712 FAX (755) 359-7424
E-MAIL: HAWS@HAWSCO.COM
WEBSITE: WWW.HAWSCO.COM

ECN NO.	REVISED PER ECN: 4754	BY: HM	MODEL(S)	PART NUMBER
DRAWN: CJL	DATE: 04/92	CHK'D.:	7261/7271	0002080043.D
APPROVED:	DATE:			DRAWING NO. 09398A00 / REV 17
SCALE: 1:1	DRAWING TYPE: INSTALLATION	SIZE: A		SHEET 1 OF 1

INSTALLATION, OPERATION
&
MAINTENANCE INSTRUCTIONS

1455 Kleppe Lane ◆Sparks, NV 89431-6467 ◆(775) 359-4712 ◆Fax (775) 359-7424
E-mail: haws@hawsco.com ◆ website: www.hawsco.com

No. 2080043(17)

Model 7261/7271
Pedestal Eye/Face Wash

NOTE TO INSTALLER: Please leave this information with the Maintenance Department.

LIMITED WARRANTY

HAWS warrants that this specific product is guaranteed against defective material or poor workmanship for a period of **one year from date of shipment**. HAWS liability under this warranty shall be discharged by furnishing without charge F.O.B. HAWS Factory any goods, or part thereof, which shall appear to the Company upon inspection to be of defective material or not of first class workmanship, provided that claim is made in writing to Haws within a reasonable period after receipt of the product. Where claims for defects are made, the defective part or parts shall be delivered to the Company, prepaid, for inspection. HAWS will not be liable for the cost of repairs, alterations or replacements, or for any expense connected therewith made by the owner or his agents, except upon written authority from HAWS, Sparks, Nevada. HAWS will not be liable for any damages caused by defective materials or poor workmanship, except for replacements, as provided above. Buyer agrees that Haws has made no other warranties either expressed or implied in addition to those above stated, except that of title with respect to any of the products or equipment sold hereunder and that HAWS shall not be liable for general, special, or consequential damages claimed to arise under the contract of sale.

The emergency equipment manufactured by HAWS is warranted to function if installation and maintenance instructions provided are adhered to. The units also must be used for the purpose for which they were intended. This product is intended to supplement first-aid treatment. Due to widely varying conditions, Haws cannot guarantee that the use of this emergency equipment will prevent serious injury or the aggravation of existing or prior injuries.

NO OTHER WARRANTIES EXPRESSED OR IMPLIED ARE AUTHORIZED, PROVIDED OR GIVEN BY HAWS.

SHOULD YOU EXPERIENCE DIFFICULTY WITH THE INSTALLATION OF THIS MODEL PLEASE CALL:

TECHNICAL SUPPORT: 1-800-766-5612

FOR CUSTOMER SERVICE: 1-888-640-4297

LOCATION OF UNIT: The Model 7261/7271Eyewash unit should be installed in close proximity to potential accident areas. It should be clearly identified, free from obstructions and easy to access.

SUPPLY LINE: The minimum recommended line size is 1/2" IPS with 30-90 psi (2-6 ATM) flowing pressure. Where sediment or mineral content is a problem, an inlet filter is recommended.

PLUMBING CONNECTIONS: Inlet supply is female 1/2" IPS. Waste outlet is 1-1/4" IPS.

TROUBLESHOOTING

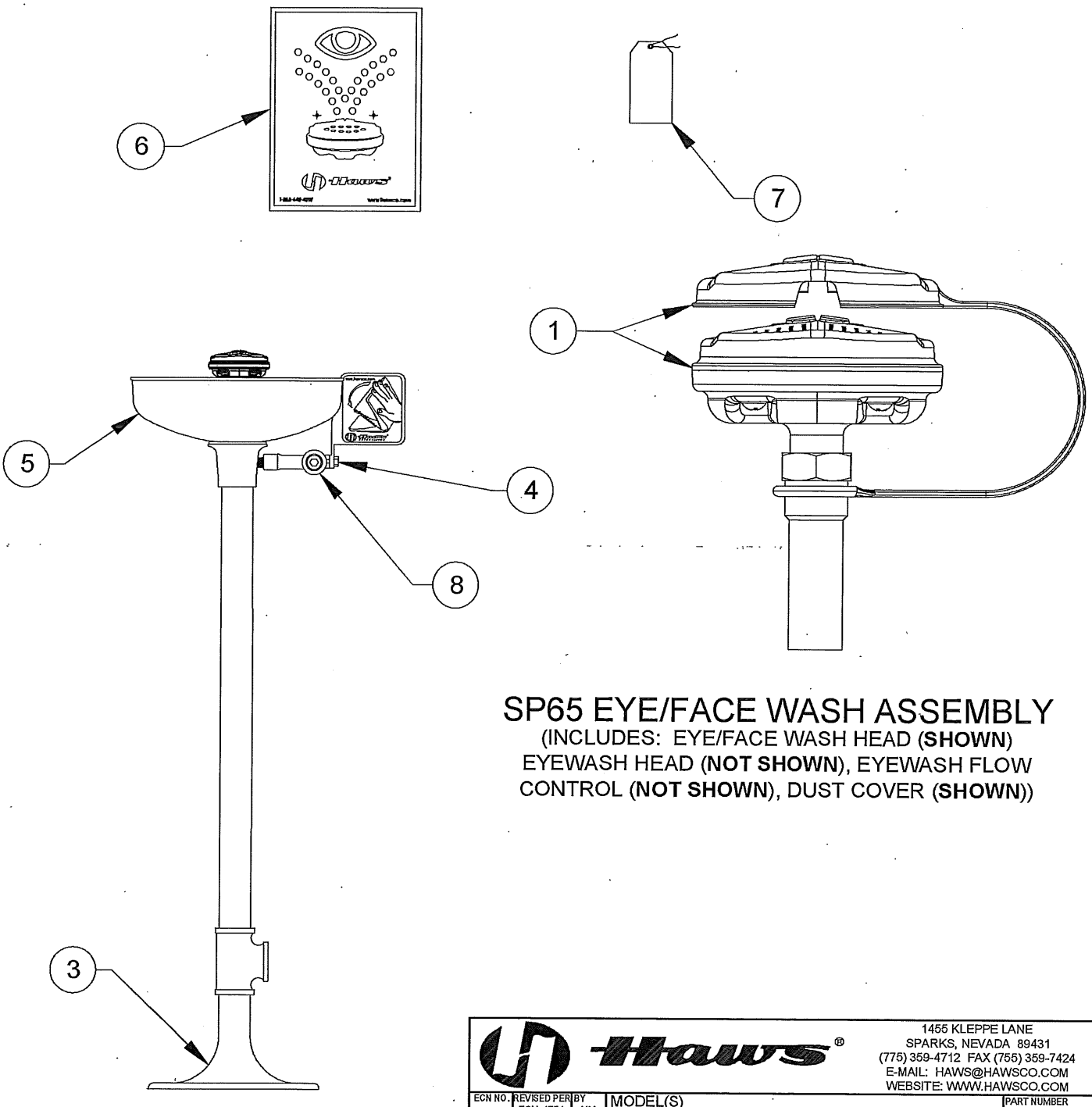
PROBLEM	REPAIR CHECKLIST
1. No flow.	1. Check the main shut-off valve.
2. Insufficient water flow.	2. a. Verify minimum 30psi flowing supply line pressure. b. Probable clogging of flow control due to inadequate line flushing. Unscrew eye/face wash head and remove the four screws to disassemble the head. Clean the flow control and reassemble head. See SP65 Installation Drawing for details. c. Remove cap located on L – Strainer using a 3/8" allen wrench to access and clean filter screen.
3. Eyewash or face/wash streams do not meet desired level or are not balanced.	3. Possible blocked flow control, see above solution. Possible non-leveled eyewash assembly.
4. Water does not drain properly.	4. Check the main waste line of your building to see if it does handle the capacity required for the entire drainage system.

For more information on Haws products, see our website: www.hawsco.com

OPTIONAL

PARTS BREAKDOWN

ITEM	DESCRIPTION	PART NO.
1	EYE/FACE WASH ASSY	SP65
2	FOOT TREADLE (NOT SHOWN)	SP220
3	FLOOR FLANGE	SP75
4	VALVE ASSEMBLY	SP229
5	BOWL	SP93
6	EYEWASH SIGN	SP175
7	TEST TAG	SP170
8	L-STRAINER	SP509
--	VRKEWSTR STR. REPAIR KIT	--



SP65 EYE/FACE WASH ASSEMBLY

(INCLUDES: EYE/FACE WASH HEAD (**SHOWN**) EYEWASH HEAD (**NOT SHOWN**), EYEWASH FLOW CONTROL (**NOT SHOWN**), DUST COVER (**SHOWN**))

WHEN ORDERING PARTS PLEASE SPECIFY MODEL NUMBER.

Haws®
1455 KLEPPE LANE
SPARKS, NEVADA 89431
(775) 359-4712 FAX (755) 359-7424
E-MAIL: HAWS@HAWSCO.COM
WEBSITE: WWW.HAWSCO.COM

ECN NO.	REVISED PER	BY
	ECN: 4754	HM

DRAWN	DATE	CHKD
CLF	02/23/93	
APPROVED	DATE	

MODEL(S): 7261/7271

PART NUMBER: 0002080043
DRAWING NO.: 11447C00 REV: 17

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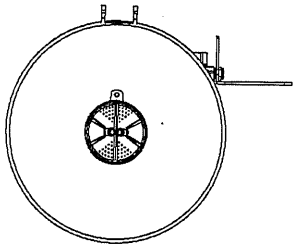
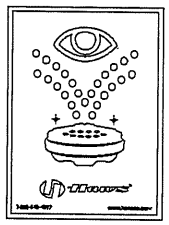


TOP VIEW



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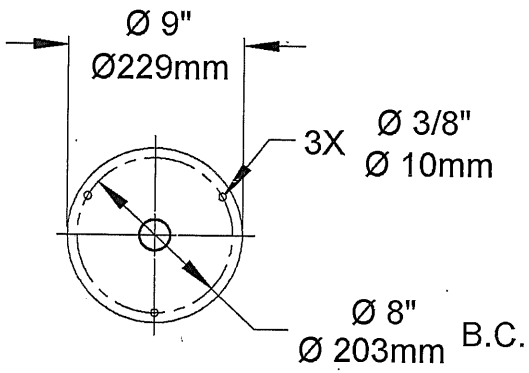
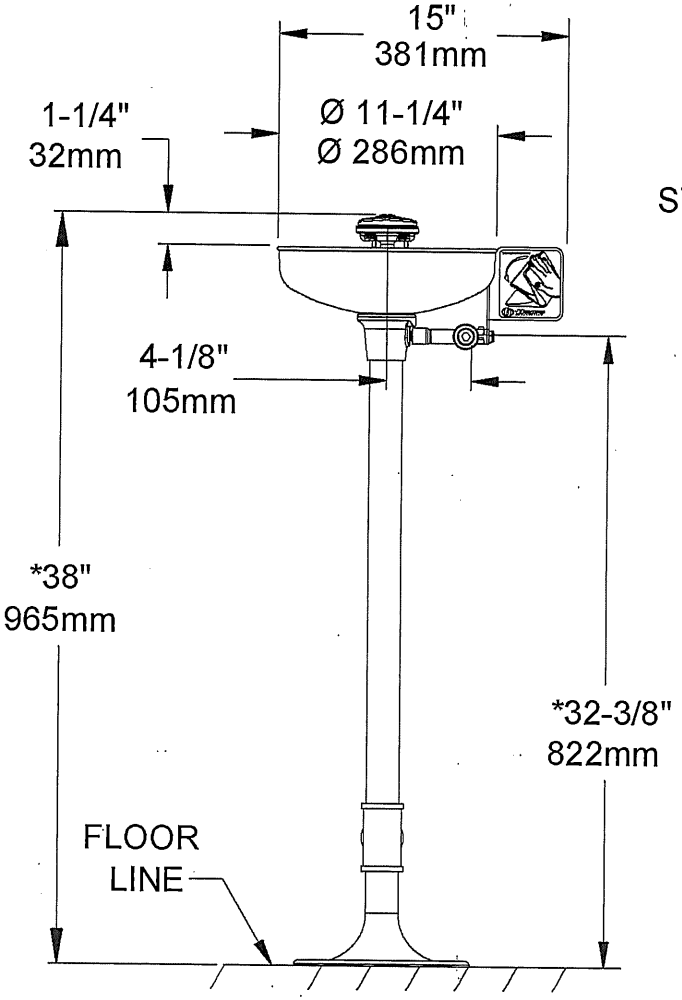
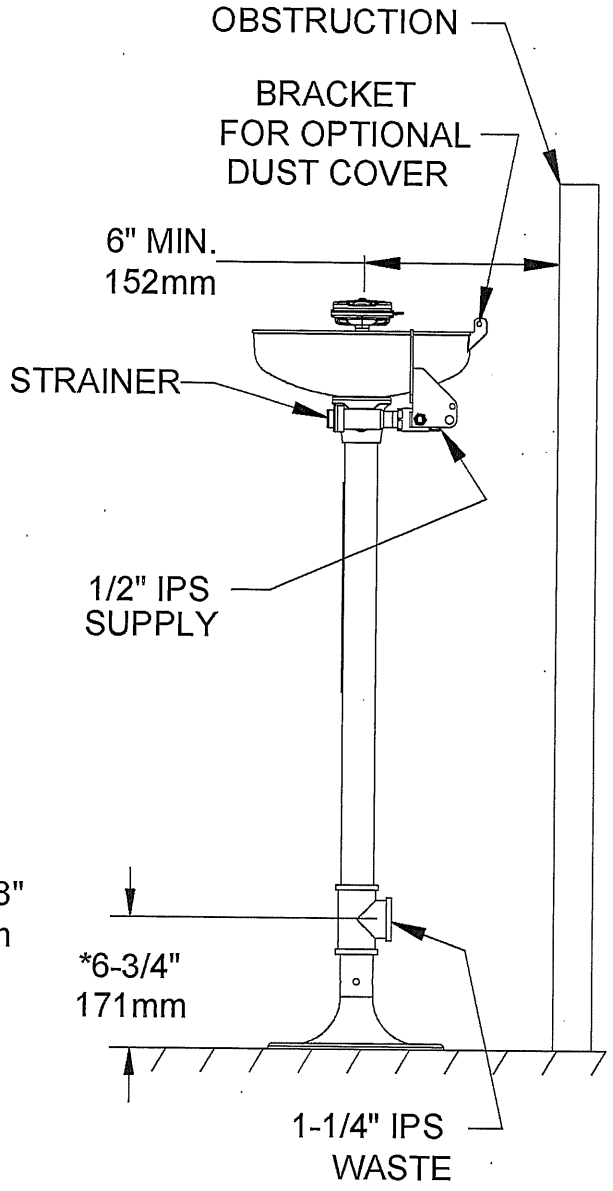


MOUNTING DETAIL





NOTES:

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2. *THESE DIMENSIONS MAY VARY ± 1/2" [12.7mm]

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WEBSITE: WWW.HAWSCO.COM

ECN NO.	REVISED PER ECN: 4754	BY: HM
DRAWN: CJL	DATE: 04/92	CHK'D: TJH
APPROVED:	DATE: 5/93	

MODEL(S) 7261/7271

PART NUMBER 0002080043.D

DRAWING NO. 09398A00 REV 17

SCALE: 1:1 | DRAWING TYPE: INSTALLATION | SIZE: A | SHEET 1 OF 1

C2N Series - Light Industrial Heaters

Tankless Water Heating Solutions

- Copper and brass heat exchanger
- PID Temperature controller with full modulating temperature control capabilities
- Air-cooled solid-state relay switching
- Two-tier anti-scald protection
- NEMA 4 Enclosure - standard
- 480 and 600V, 3-Phase - standard

Standard Equipment

Tankless Water Heating Specifications

Keltech, Inc. C2N-Series Tankless Water Heaters are designed to accommodate most light industrial fluid heating applications including those with incoming process temperatures up to 130°F, demand is 36kW - 50kW and total flow is <10 GPM up to 15 GPM. Standard units require =/> .75 GPM; lower flows available. NEMA 4X and explosion proof purge system options available.

Electrical Specifications for the Heater

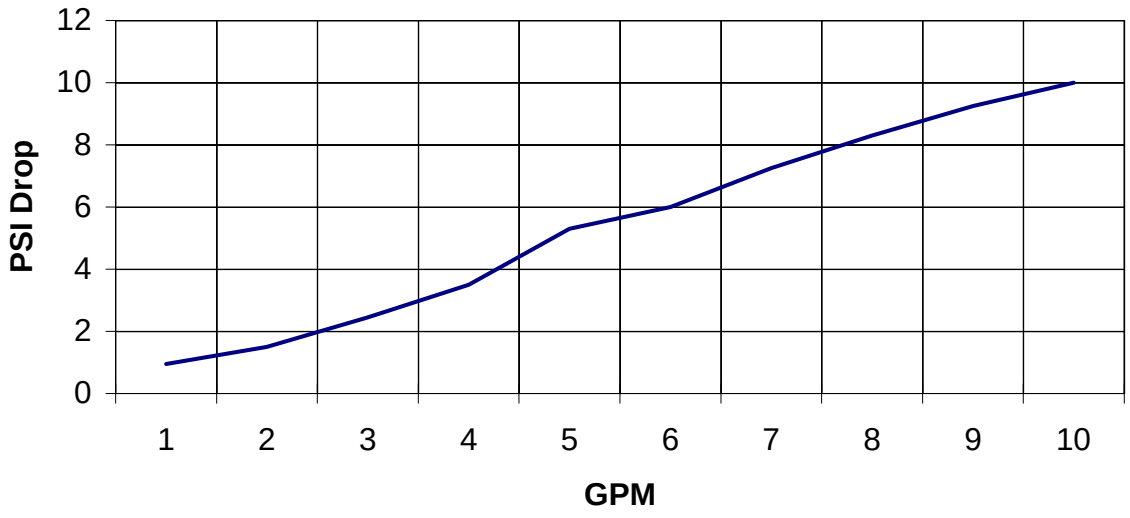
Capacity (kW)	Voltage	Amperage
36	480	44
36	600	35
50	480	60
50	600	48

Water Flow and Maximum Temperature Rise by kW

kW	GPM	2	3	4	5	6	7	8	9	10	12	15
36	ΔT °F	122	82	62	50	40	36	30	27	24	20	18
50	ΔT °F	170	113	85	68	57	48	43	38	34	28	23

Sizing for the proper flow rate is important. If the temperature rise capabilities of the heater is not sufficient, please contact Keltech for additional product information.

C2N Pressure Drop Advantage



729 South Grove Street, Delton, Michigan 49046
Phone: 800-999-4320 Fax: 269-623-6398
www.keltech-inc.com

C2N Series - Light Industrial Series

Tankless Water Heating Solutions

Standard Product - C2N Series

36kW Light Industrial Heaters

- ☐ **C2N363/480D** Three Phase 36kW, 480V Light Industrial Heater
- ☐ **C2N363/600D** Three Phase 36kW, 600V Light Industrial Heater

50kW Light Industrial Heaters

- ☐ **C2N503/480D** Three Phase 50kW, 480V Light Industrial Heater
- ☐ **C2N503/600D** Three Phase 50kW, 600V Light Industrial Heater

Product Options

☐	**D1**	4-20mA Input for Integration with Facility Controls
☐	**EXP2**	Explosion Proof Class1/Division2
☐	**FDS**	Internal Fuse Disconnect
☐	**GF**	Ground Fault Package
☐	**N4X**	NEMA-4X Enclosure - Stainless Steel

✔ **Keltech Tankless Water Heaters are non-cancelable, non-refundable and non-returnable.**

Application Attributes (MANDATORY)

Coldest area ground water temperature:_____

Minimum Flow:_____

Maximum Flow:_____

Set point temperature:_____

Delta T Calculation

Set Point Temperature - Coldest Incoming Water Temperature = Minimum Delta T for Application

Model Number Configuration

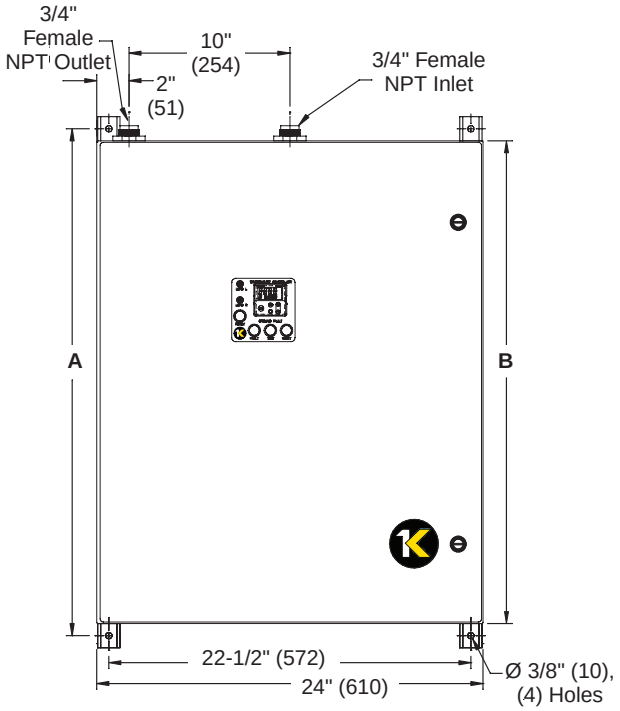
C2N_____/_____D-_____-_____-_____-_____

List applicable option codes alphabetically.

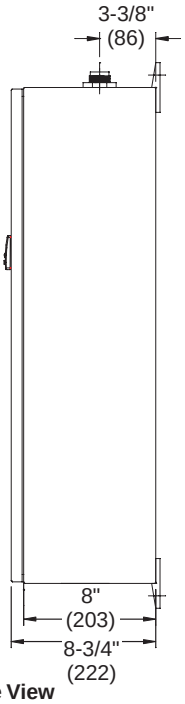
Customer Signoff_____

729 South Grove Street, Delton, Michigan 49046
Phone: 800-999-4320 Fax: 269-623-6398
www.keltech-inc.com

C2N Series - Dimensions (mm)

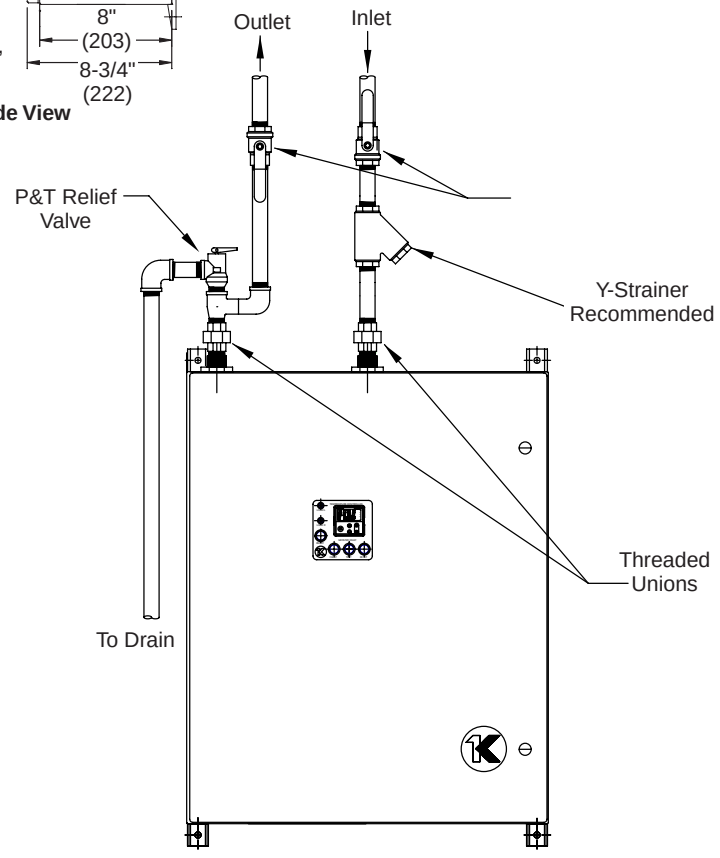


Front View



Side View

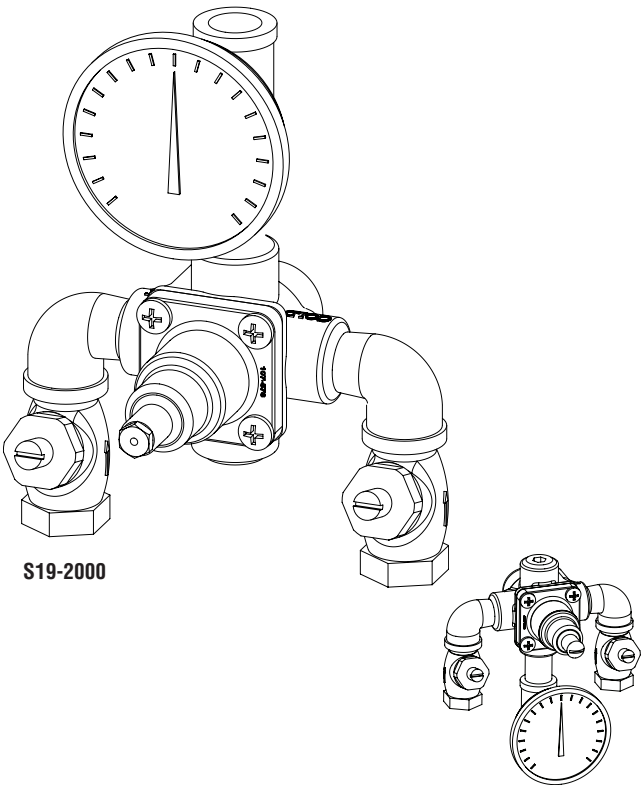
	Dim "A"	Dim "B"
36kW	31-1/2" (800)	30" (762)
50kW	37-1/2" (953)	36" (914)



729 South Grove Street, Delton, Michigan 49046
Phone: 800-999-4320 Fax: 269-623-6398
www.keltech-inc.com

S19-2000, S192000EFX
Emergency Fixture Thermostatic Mixing Valves

- Exceeds ANSI Z358.1
- ASSE 1071 Certified
- Reliable Liquid-Filled Thermostat with 10-Year Warranty
- Checkstops on Inlets
- Adjustable Set Point within Temperature Range
- Accurate Temperature Control to within ±3° F
- Built-in Cold Water Bypass, Assuring Cold Flow
- Positive Shutoff of Hot Supply When Cold Supply is Lost
- Easy Installation and Serviceability
- Dirt and Lime Resistant
- Dial Thermometer
- Factory Assembled and Tested
- Universal Mounting Capability
- Cabinet Features:
  - — 18 Gauge Body & Door
  - — Left-Hand Hinge
  - — Cylinder Lock
  - — Inlet/Outlet Knock-Out Holes for Mounting Flexibility
  - — Stainless Steel or Baked White Enamel Finishes
  - — Surface-Mounted or Recessed Style with Flange



S19-2000

S19-2000EFX

Valve Specifications

Maximum Operating Pressure

125 PSI (860 kPA)

Maximum Inlet Temperature

180° F (82° C)

Recommended Inlet Temperature

120° F (49° C) – 140° F (60° C)

Temperature Range		Set Point
Std.	65° F (18° C) to 90° F (32° C)	85° F (29° C)

Flow Capacities – GPM (L/Min)

Model	Min. Flow	Pressure Drop – PSI (Bar)						
		5 (.5)	10 (1.0)	15 (1.5)	20 (2.0)	30 (2.5)	45 (3.0)	60 (4.0)
S19-2000	1.5 (5.5)	3.0 (13.5)	4.0 (19.0)	5.0 (23.5)	6.0 (27.0)	7.3 (30.5)	9.0 (33.5)	10.5 (38.5)
Cold Bypass Only		2.3 (10.5)	3.2 (14.5)	4.0 (18.0)	4.6 (21.0)	5.6 (23.5)	6.8 (25.5)	7.7 (29.5)

Optional Selections

Finish	
☐ **C**	Chrome Plated
Cabinets	
☐ **SS**	Surface Mount Stainless Steel
☐ **RS**	Recessed Stainless Steel
☐ **SE**	Surface Mount White Enamel
☐ **RE**	Recessed White Enamel
☐ **W**	Plexi-glass Window in Door

Code Compliance and Certifications

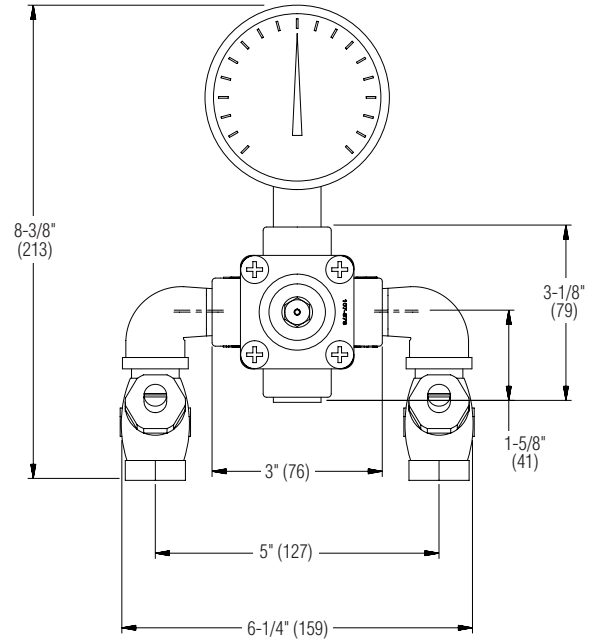
ASSE 1071 & UPC certified.

Engineer's Approval _____

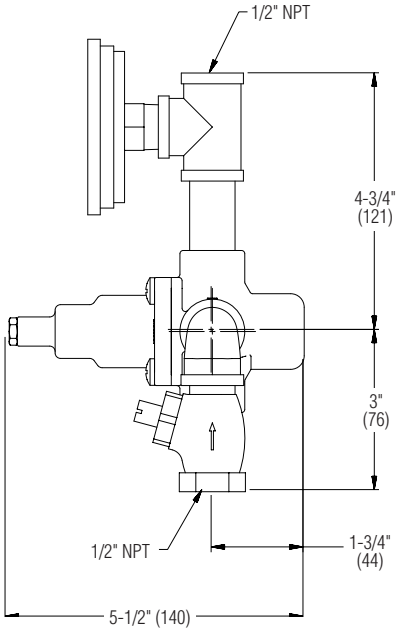
P.O. Box 309, Menomonee Falls, WI 53052-0309
Phone: 800.BRADLEY(800.272.3539) Fax: 262.253.4161
bradleycorp.com

Dimensions **(mm)**

Front View

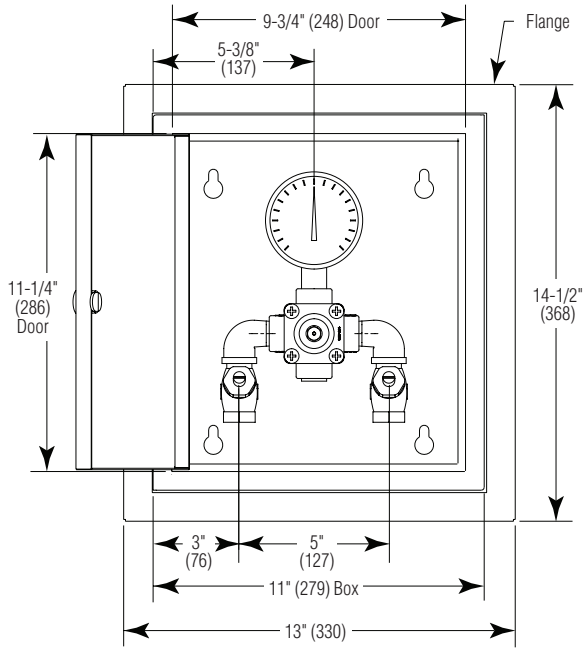


Side View

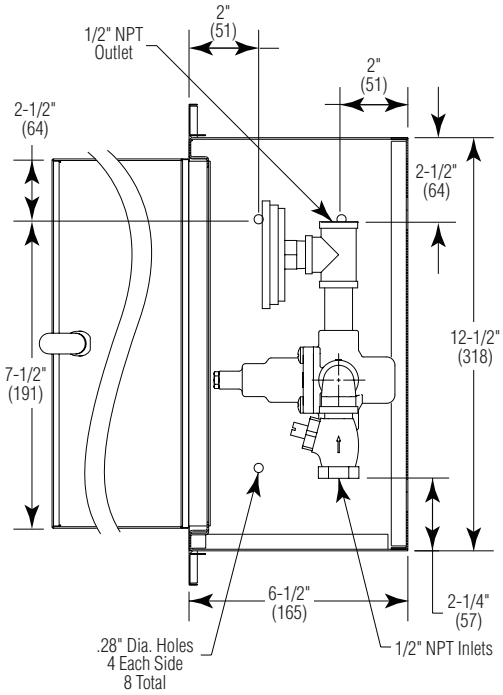


Dimensions — S19-2000 Recessed Cabinet

Front View



Side View



P.O. Box 309, Menomonee Falls, WI 53052-0309
Phone: 800.BRADLEY(800.272.3539) Fax: 262.253.4161
bradleycorp.com