

AWT420

Universal 4-wire, dual-input transmitter Hazardous area version



Measurement made easy

—
AWT420
Universal 4-wire,
dual-input transmitter

Introduction

The AWT420 is a universal 4-wire, dual-input transmitter suitable for the measurement and control of a wide range of parameters including pH, ORP, conductivity, turbidity/suspended solids and dissolved oxygen.

This document provides details for AWT420 (metal) enclosures for use in hazardous areas.

For information on AWT420 (plastic) enclosures for use in non-hazardous areas refer to [OI/AWT420](#).

The AWT420 supports both traditional analog and advanced digital EZLink sensors. For information on the sensors, including installation, commissioning, operation and maintenance procedures, refer to the specific sensor manual.

For more information

Further publications for the AWT420 transmitter are available for free download from:
www.abb.com/measurement
or by scanning this code:



Links and reference numbers for the transmitter publications are also shown below:

Search for/click on:

AWT420 transmitter – Data Sheet	DS/AWT420
AWT420 transmitter – Operating Instruction	OI/AWT420
AWT420 transmitter – Commissioning Instruction	CI/AWT420
AWT420 transmitter – HART Communications Supplement	COM/AWT420/HART
AWT420 transmitter – HART FDS Communications Supplement	COM/AWT420/HART/FDS
AWT420 transmitter – PROFIBUS Communications Supplement	COM/AWT420/PROFIBUS
AWT420 transmitter – MODBUS Communications Supplement	COM/AWT420/MODBUS
AWT420 transmitter – Ethernet Communications Supplement	COM/AWT420/ETHERNET

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1 Health & Safety

Document symbols

Symbols that appear in this document are explained below:

DANGER

The signal word '**DANGER**' indicates an imminent danger. Failure to observe this information will result in death or severe injury.

WARNING

The signal word '**WARNING**' indicates an imminent danger. Failure to observe this information may result in death or severe injury.

CAUTION

The signal word '**CAUTION**' indicates an imminent danger. Failure to observe this information may result in minor or moderate injury.

NOTICE

The signal word '**NOTICE**' indicates potential material damage.

Note

'**Note**' indicates useful or important information about the product.

Safety precautions

Be sure to read, understand and follow the instructions contained within this manual before and during use of the equipment. Failure to do so could result in bodily harm or damage to the equipment.

WARNING

Bodily injury

Installation, operation, maintenance and servicing must be performed:

- by suitably trained personnel only
- in accordance with the information provided in this manual
- in accordance with relevant local regulations

Potential safety hazards

AWT420 transmitter – electrical

WARNING

Bodily injury

To ensure safe use when operating this equipment, the following points must be observed:

- Up to 240 V AC may be present. Be sure to isolate the supply before removing the terminal cover.

Safety advice concerning the use of the equipment described in this manual or any relevant Material Safety Data Sheets (where applicable) can be obtained from the Company, together with servicing and spares information.

Safety standards

This product has been designed to satisfy the requirements of IEC61010-1:2010 3rd edition 'Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use' and complies with US NEC 500, NIST and OSHA.

Product symbols

Symbols that may appear on this product are shown below:



Protective earth (ground) terminal.



Functional earth (ground) terminal.



Alternating current supply only.



Direct current supply only.



This symbol, when noted on a product, indicates a potential hazard which could cause serious personal injury and/or death. The user should reference this instruction manual for operation and/or safety information.



This symbol, when noted on a product enclosure or barrier, indicates that a risk of electrical shock and/or electrocution exists and indicates that only individuals qualified to work with hazardous voltages should open the enclosure or remove the barrier.



The equipment is protected through double insulation.



Recycle separately from general waste under the WEEE directive.

...1 Health & Safety

Product recycling and disposal (Europe only)



ABB is committed to ensuring that the risk of any environmental damage or pollution caused by any of its products is minimized as far as possible. The European Waste Electrical and Electronic Equipment (WEEE) Directive that initially came into force on August 13 2005 aims to reduce the waste arising from electrical and electronic equipment; and improve the environmental performance of all those involved in the life cycle of electrical and electronic equipment. In conformity with European and UK local and national regulations, electrical equipment marked with the above symbol may not be disposed of in European and UK public disposal systems after 12 August 2005.

NOTICE

For return for recycling, please contact the equipment manufacturer or supplier for instructions on how to return end-of-life equipment for proper disposal.

End-of-life battery disposal

The transmitter contains a small lithium battery (located on the processor/display board) that must be removed and disposed of responsibly in accordance with local environmental regulations.

Information on ROHS Directive 2011/65/EU (RoHS II)



ABB, Industrial Automation, Measurement & Analytics, UK, fully supports the objectives of the ROHS II directive. All in-scope products placed on the market by IAMA UK on and following the 22nd of July 2017 and without any specific exemption, will be compliant to the ROHS II directive, 2011/65/EU.

Cleaning

The complete transmitter can be hosed down if it has been installed to IP66/NEMA 4X standards, i.e. cable glands are correctly fitted and all unused cable entry holes are blanked off – see page 6 and page 5.

Warm water and a mild detergent can be used.

2 Electrical installation

⚠ DANGER

Bodily injury

- **Before making any connections**, the external protective earth stud must be connected to the local earth bonding point using suitably sized ground cable.
- The transmitter is not fitted with a switch – an isolation device such as a switch or circuit breaker conforming to local safety standards must be fitted to the final installation. It must be fitted in close proximity to the transmitter, within easy reach of the operator and marked clearly as the isolation device for the transmitter.
- Remove all power from supply, relay, any powered control circuits and high common mode voltages before accessing or making any connections. For the mains power, use 3-core cable rated 3 A and for the relay connections use cable rated 5 A. Use cable rated 105 °C (221 °F) minimum that conforms to either IEC 60227 or IEC 60245, or to the National Electrical Code (NEC) for the US or the Electrical Code for Canada. The terminals accept cables AWG 24 to 16 (0.2 to 1.5 mm²).
- All connections to secondary circuits must have insulation to required local safety standards. After installation, there must be no access to live parts, for example, terminals. Use screened cable for signal inputs and relay connections. Route signal leads and power cables separately, preferably in an earthed (grounded) flexible metal conduit.

USA and Canada only

- Supplied cable glands are an optional extra and provided for the connection of MODBUS, Profibus and Ethernet communication wiring **ONLY**. A special cable gland is supplied with the Ethernet communications option and should be used only for the Ethernet cable.
- The use of cable glands, cable/flexible cord for connection of the mains power source to the mains input and relay contact output terminals is not permitted in the USA or Canada.
- For connection to mains (the mains input and relay contact outputs), use only suitably rated field wiring insulated copper conductors rated min. 300 V, 16 AWG, 105 °C (221 °F). Route wires through suitably rated flexible conduits and fittings.

⚠ WARNING

Bodily injury

- If the transmitter is used in a manner not specified by the Company, the protection provided by the equipment may be impaired.
- Ensure the correct fuses are fitted – see Figure 2, page 6 for fuse details.
- Replacement of the internal battery must be carried out by an approved technician only.
- The transmitter conforms to Installation Category II of IEC 61010.
- All equipment connected to the transmitter's terminals must comply with local safety standards (IEC 60950, EN61010-1).
- The DC power supply and the optional Ethernet and bus interface connectors must be connected to Safety Extra Low Voltage (SELV) circuits.

Earth bonding

⚠ WARNING

Before making any electrical connections:

- The external protective earth stud must be connected to the local earth bonding point using suitably sized ground cable. To connect to the protective earth stud, use a closed M4 cable lug.
- **Never** connect the protective earth with an end sleeve or an open cable lug.

Cable entries

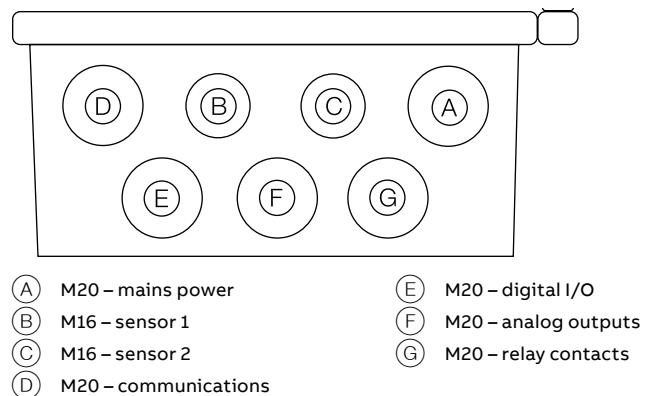


Figure 1 Cable entries

...2 Electrical installation

Terminal connections

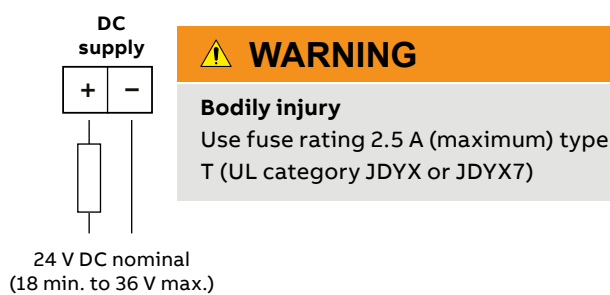
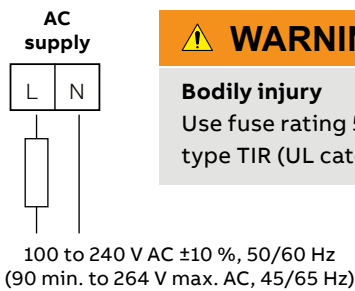
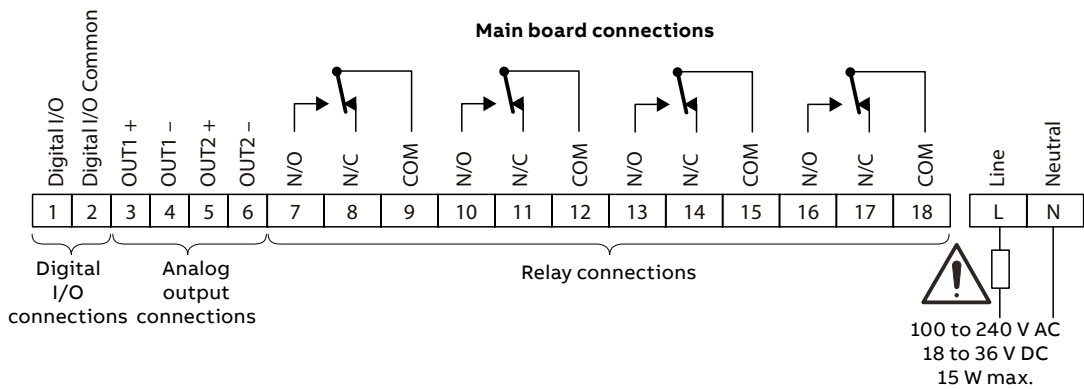
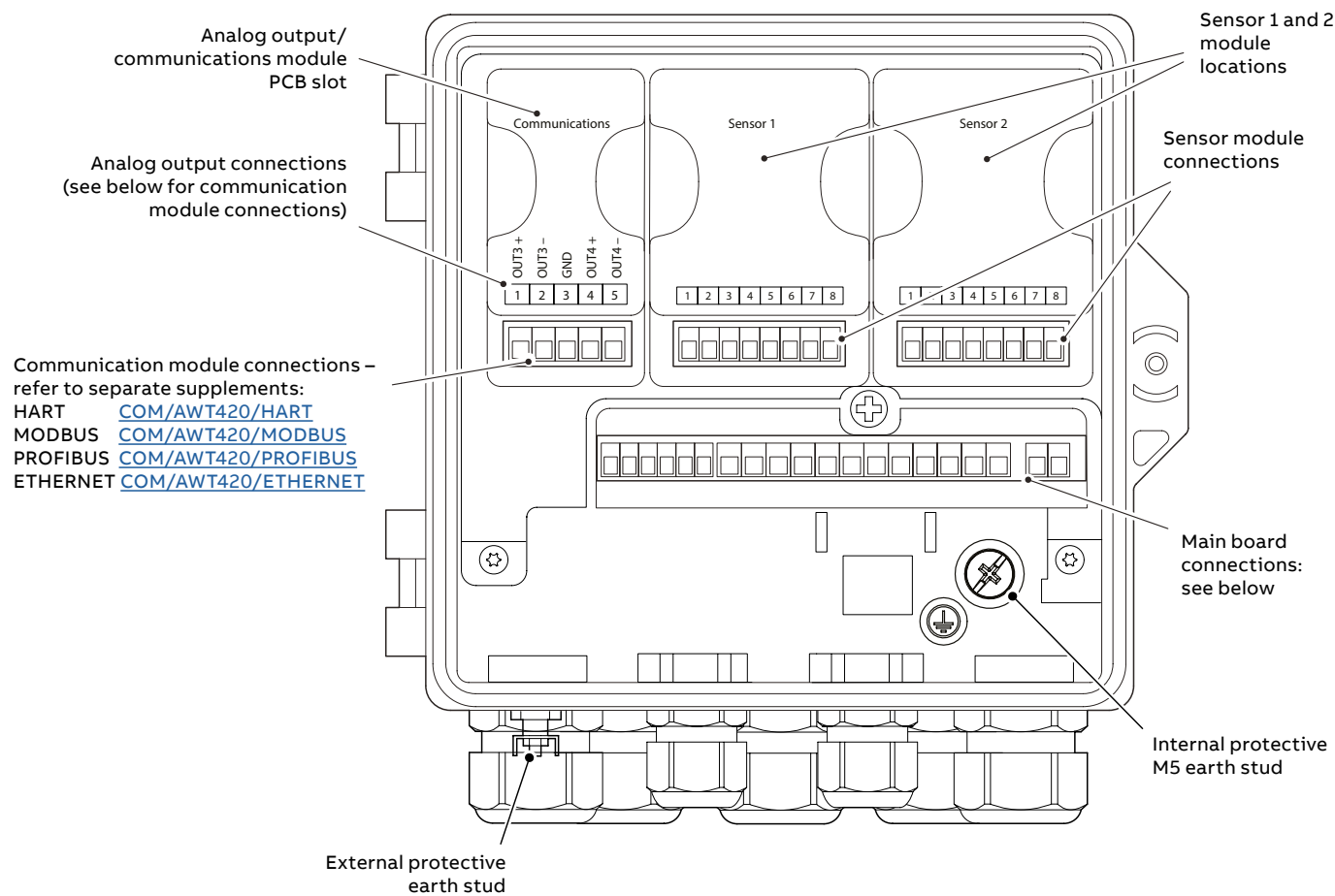


Figure 2 Electrical connections overview

3 Hazardous area considerations

Health & Safety

Safety precautions

Be sure to read, understand and follow the instructions contained within this manual before and during use of the equipment. Failure to do so could result in bodily harm or damage to the equipment

WARNING

Serious damage to health/risk to life

The AWT420 transmitter is a certified product suitable for use in hazardous area locations. Before using this product refer to the product labeling for details of hazardous area certification. Maintenance and installation must be carried out only by the manufacturer, authorized agents or persons conversant with the construction standards for hazardous area certified equipment.

Potential safety hazards

WARNING

Bodily injury

To ensure safe use when operating this equipment, the following points must be observed:

- Up to 240 V AC may be present. Be sure to isolate the supply before removing the terminal cover.

Safety advice concerning the use of the equipment described in this manual or any relevant Material Safety Data Sheets (where applicable) can be obtained from the Company, together with servicing and spares information.

Safety standards

This product has been designed to satisfy the requirements of IEC61010-1:2010 3rd edition 'Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use' and complies with US NEC 500, NIST and OSHA.

Name plate/Certification label

The following name plate is an example only. The name plate attached to the transmitter may be different.

Transmitters with cULus approval and ATEX IECEx UKEX (Aluminum Enclosure)

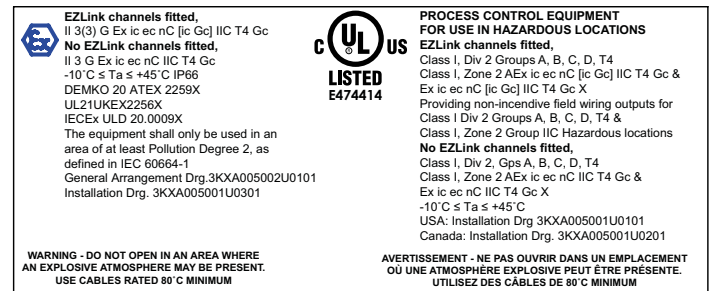


Figure 3 Example of hazardous area nameplate

Service and repair

DANGER

The product has no live maintenance facility. The instrument must be de-energized before any maintenance is performed.

If the instrument is located in a hazardous area none of the instrument's components can be serviced by the user. Only personnel from ABB, its approved representative(s) or persons conversant with the construction standards for hazardous area certified equipment, is (are) authorized to attempt repairs to the system and only components formally approved by the manufacturer should be used. Any attempt at repairing the instrument in contravention of these principles could cause damage to the instrument and corporal injury to the person carrying out the repair. It renders the warranty null and void and could compromise the hazardous area certification, correct working of the instrument, electrical integrity and the CE compliance of the instrument.

If you have any problems with installation, starting or using the instrument please contact the company that sold it to you. If this is not possible, or if the results of this approach are not satisfactory, please contact the manufacturer's Customer Service.

...3 Hazardous area considerations

Risk of electrostatic discharge

WARNING

Serious damage to health/risk to life

Potential electrostatic charging hazard – clean only with a damp cloth and install away from any charging risks.

Instruments mounted in a hazardous area

If the exterior of the instrument requires cleaning, care should be taken to minimize the risk of electrostatic discharge. Use a damp cloth or similar to clean all surfaces.

The keypad is intended to be operated in normal use, care should be taken to minimize the risk of electrostatic discharge. Use rubber gloves or ensure operators have been electrostatically discharged.

Hazardous area relevant information

NOTICE

The hazardous area designation is displayed on the name plate/certification label – see page 7.

IECEx/ATEX/UKEX

Non-Incendive

For models with EZLink channels:

II 3(3) G Ex ic ec nC [ic Gc] IIC T4 Gc

For models without EZLink channels:

II 3 G Ex ic ec nC IIC T4 Gc

Ingress protection classification

IP66

Ambient temperature range

–10 °C (14 °F) ≤ Ta ≤ 45 °C (113 °F)

Europe

NOTICE

Installation must be in accordance with IEC 60079-14 and the wiring practices for the country of installation.

Maximum operating voltage, Um

The maximum operating voltage Um for the AC version is 253 V AC

The maximum operating voltage Um for the DC version is 36 V DC

Dielectric strength

Conforms to IEC 60079-11 clause 6.3.13 between non-IS and IS circuits, and between IS circuits and earth.

cULus

Non-Incendive

EZLink channels fitted:

Class I Division 2 Groups A, B, C, D, T4

Class I Zone 2 AEx ic nc [ic Gc] IIC T4 Gc

Class I Zone 2 Ex ic nc [ic Gc] IIC T4 Gc X

Providing non-incendive field wiring outputs for Class I, Division 2 Groups A, B, C, D & Class I, Zone 2 Group IIC hazardous locations enables the EZLink connections to be connected and disconnected in the hazardous area.

For models without EZLink channels:

Class I Division 2 Groups A, B, C, D T4

Ingress protection classification

IP66

Ambient temperature range

–10 °C (14 °F) ≤ Ta ≤ 45 °C (113 °F)

US

NOTICE

Installation must be in accordance with the National Electrical Code (NFPA 70).

Canada

NOTICE

Installation must be in accordance with C22.1 Canadian Electrical Code, Part 1.

Maximum operating voltage, Um

The maximum operating voltage Um for the AC version is 253 V AC

The maximum operating voltage Um for the DC version is 36 V DC

Dielectric strength

Conforms to IEC 60079-11 clause 6.3.13 between non-IS and IS circuits, and between IS circuits and earth.

Hazardous location safety control drawings

Click below to download the hazardous location safety drawings for AWT420 transmitter (or scan the QR codes):

[AWT420 Metal transmitter UL US control drawing](#)



[AWT420 Metal transmitter UL CAN control drawing](#)



[AWT420 Metal transmitter UL ATEX IECEx UKEX control drawing](#)



Output parameters of EZLink sensor

Maximum open-circuit voltage	$U_o = 3.4 \text{ V}$
Maximum short-circuit current	$I_o = 84 \text{ mA}$
Maximum output power	$P_o = 283 \text{ mW}$
Maximum inductance	$L_o = 39 \text{ } \mu\text{H}$
Maximum capacitance	$C_o = 31.68 \text{ } \mu\text{F}$

Specific conditions of safe use

- 1 The enclosure contains aluminum and is considered to present a potential risk of ignition by impact or friction. Care shall be taken into account during installation and use to prevent impact or friction.
- 2 For areas subject to explosive gas and/or dust atmospheres the painted surface of the equipment may store electrostatic charge and become a source of ignition in applications with a low relative humidity < ~30 % relative humidity where the painted surface is relatively free of surface contamination such as dirt, dust, or oil. Guidance on protection against the risk of ignition due to electrostatic discharge can be found in IEC TS 60079-32-1. Cleaning of the painted surface shall only be done in accordance with the manufacturer's instructions (see: Risk of electrostatic discharge).
- 3 The equipment shall not be used where UV light or radiation may impinge on the enclosure or the window of the enclosure.
- 4 The equipment shall only be used in an area of at least Pollution Degree 2, as defined in IEC 60664-1.
- 5 Transient protection shall be provided that is set at a level not exceeding 140 % of the peak rated voltage at the supply and relay terminals of the equipment.
- 6 The equipment shall only be used in an area of at least overvoltage category II, as defined in IEC 60664-1.
- 7 The EZLink wiring is intrinsically safe and must be installed and separated from non-IS wiring in accordance with IEC/EN 60079-14.
- 8 Relay contacts must be limited to 3 A (the non-hazardous version is 5 A).

...3 Hazardous area considerations

Electrical installation in hazardous areas

IECEX/ATEX/UKEX gland entries

For hazardous area installations, suitable ATEX, IECEX, or UKEX cable glands and blanking elements with a minimum IP66 rating must be used to seal the entry holes.

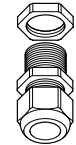
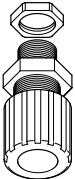

cULus installation

The use of Conduit for the non-I.S. external circuits, or installation should be in accordance with Section 501.10(b) of the NEC (NFPA 70).

Cable gland specification for hazardous area (Exe) applications

- M20 entries
 - 5 to 9 mm (0.2 to 0.35 in)
- M16 entries
 - 5 to 10 mm (0.20 to 0.39 in)
- ½ in NPT: 6 to 12 mm (0.24 to 0.47 in)
- Ethernet: 4.7 to 6.35 mm (0.187 to 0.25 in)

Part numbers for hazardous area (Exe) glands

Part number			
3KXA877420L0116	M20 (qty. 5), M16 (qty. 2)		
3KXA877420L0117	½ in NPT (qty. 5), M16 (qty. 2)		
3KXA877420L0118	M20 (qty. 4), M16 (qty. 2) Ethernet (qty. 1)		Ethernet
3KXA877420L0119	½ in NPT (qty. 4), M16 (qty. 2) Ethernet (qty. 1)		
3KXA877420L0120	Ethernet gland (qty. 1)	M16	

Power supply connection

WARNING

Bodily injury.

USA and Canada only:

- The use of cable glands, cable/flexible cord for connection of the mains power source to the mains input and relay contact output terminals is not permitted.

NOTICE

Electrical installation – ABB recommendations

- Ferrules are fitted to all cables.
- Use M5 ring terminals prior to fitting to the earth boss.
- Only 1 cable per gland.

Connection capacity

Connection method	Push-in spring method
Conductor cross-section solid	0.2 mm ² to 1.5 mm ²
Conductor cross-section flexible	0.2 mm ² to 1.5 mm ²
Conductor cross-section AWG/kcmil	24 to 16
Conductor cross-section flexible, with ferrule without plastic sleeve	0.2 mm ² to 1.5 mm ²
Conductor cross-section flexible, with ferrule with plastic sleeve	0.2 mm ² to 0.75 mm ²
Stripping length	8 mm

Connecting the transmitter power supply

Referring to Figure 4:

- 1 Using a suitable screwdriver, release door retaining screw (A) and open the transmitter door.
- 2 Release terminal cover retaining screw (B) and remove terminal cover plate (C).
- 3 Fit cable gland (D) and secure using nut (E).
- 4 Remove gland cover (F) and route mains power supply cable (G) through it.
- 5 Route the cable through cable gland (D) and into the enclosure case.
- 6 Make connections to the power supply connection terminals (H). Connect earth wire (I) to M5 earth stud (J).
- 7 Tighten gland cover (F).
- 8 Refit terminal cover (C) and secure it with retaining screw (B).
- 9 Close the transmitter door and secure with door retaining screw (A).

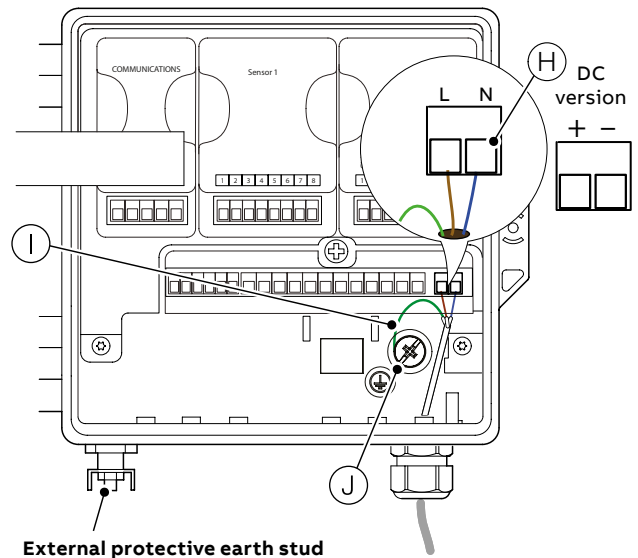
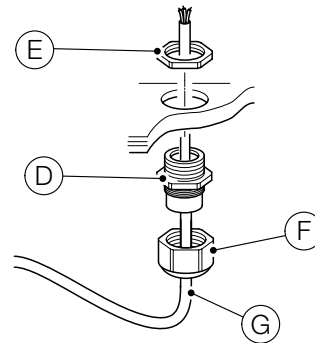
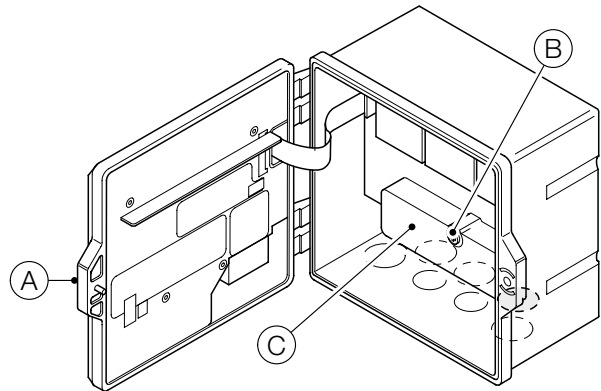


Figure 4 Connecting the transmitter power supply

...3 Hazardous area considerations

Fitting the hazardous location EZLink bulkhead connector

WARNING

Bodily injury

Up to 240 V AC may be present. Isolate the power supply before removing the opening the transmitter door.

Referring to Figure 5:

- 1 Remove connector block cradle (A) from EZLink module(s) and retain for connection.
- 2 Unlock and open transmitter door (B).
- 3 Fit EZLink modules as follows:
 - if one EZLink module is used, push-fit it into location (C) (sensor 1).
Note. When fitting the cable assembly, the EZLink bulkhead connector for sensor 1 passes through cable entry (D).
 - if two EZLink modules are used, push-fit sensor 1 module into location (C) and sensor 2 module into location (E).
Note. When fitting the cable assemblies, the EZLink bulkhead connector for sensor 1 passes through cable entry (D) and the EZLink bulkhead connector for sensor 2 passes through cable entry (F).

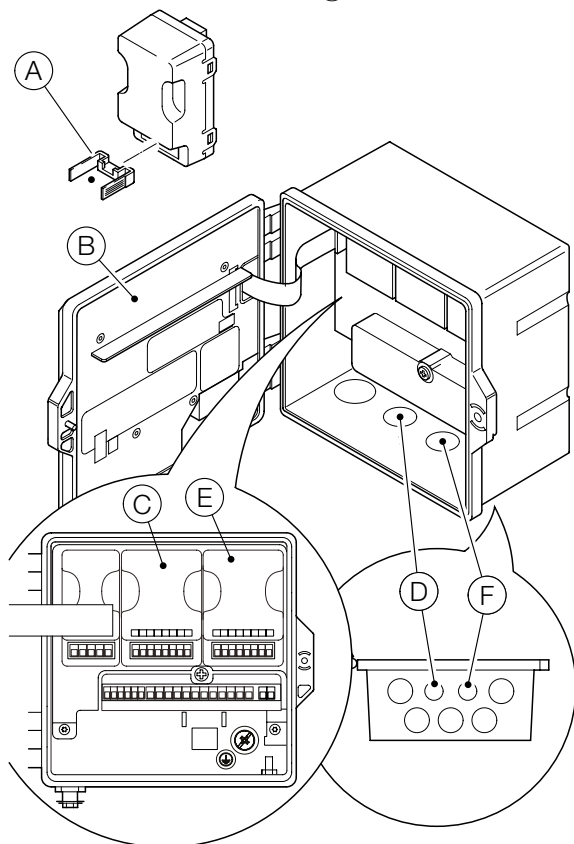


Figure 5 EZLink module positions and EZLink cable entries

Referring to Figure 6:

- 4 Pass EZLink bulkhead connector cable (G) through the correct cable entry – see step 3.
- 5 Pass thread alignment washer (H) over EZLink bulkhead connector cable (G), ensuring alignment tab (I) locates into case slot.
- 6 Pass thread back nut (J) over EZLink bulkhead connector cable (G).

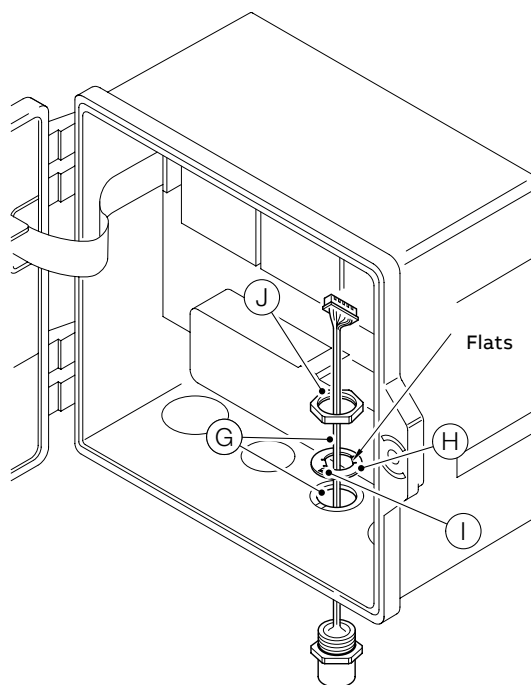


Figure 6 Preparing EZLink bulkhead connector cable fixings

EZLink HazLoc connector specification/spares

Power consumption (maximum)

150 mA @ 24 V DC (3.75 W max)

Digital sensor connector IP rating

IP67 (when connected)

Fixed length cable

1 or 10 m (3.28 or 32.8 ft)

Extension cable (options)

1, 5, 10, 15, 25, 50 m (3.2, 16.4, 32, 49.2, 82, 164 ft)

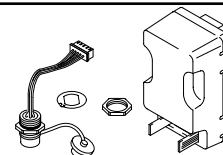
Maximum length (including optional extension cable)

Up to 210 m (689 ft)

EZLink HazLoc module assembly

Part number

3KXA877420L0018



Referring to Figure 7:

- 7** Fit alignment tab (I) into gland plate slot (K) into the casting slot.
- 8** Insert EZLink bulkhead connector body (L) fully into cable entry and align the bulkhead connector body using the flats on the alignment washer (see Figure 6, item (H)).
- 9** Screw back nut (J) onto bulkhead connector body and tighten to a torque of 3 to 4 N·m (2.21 to 2.95 lbf·ft) using a torque wrench.

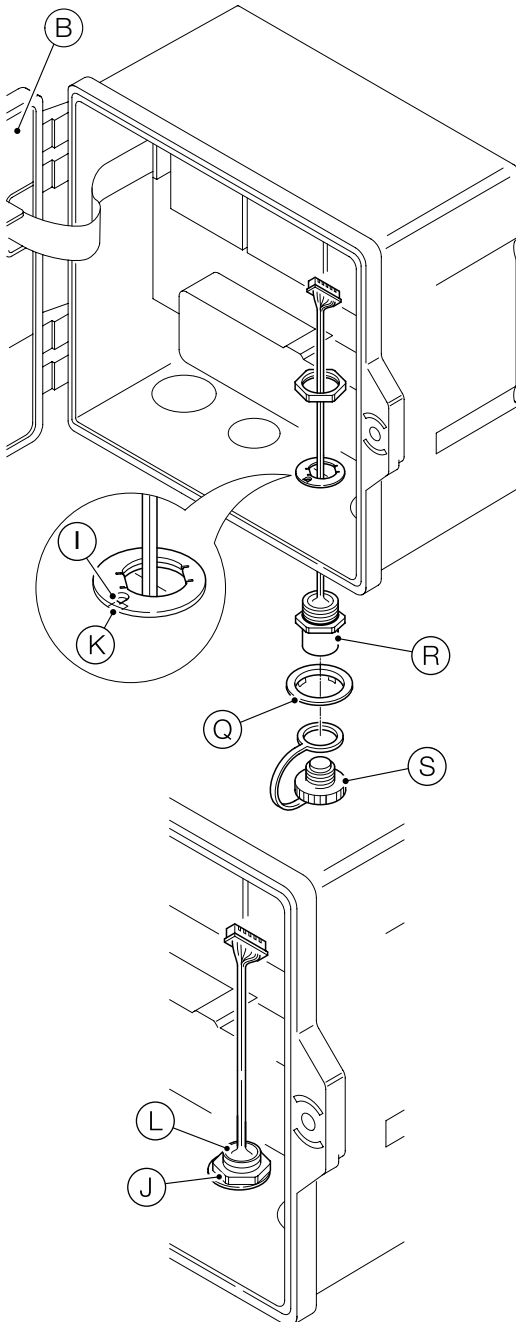


Figure 7 Securing the EZLink bulkhead connector cable

Referring to Figure 8:

- 10** Place EZLink cable plug (M) into EZLink bulkhead connector block cradle (A).
- 11** Attach EZLink bulkhead cable bung (O) to cable loom and push bung forward to cover connection plug (M).
- 12** Plug assembled connector block cradle/cable plug/bung into EZLink module (P).

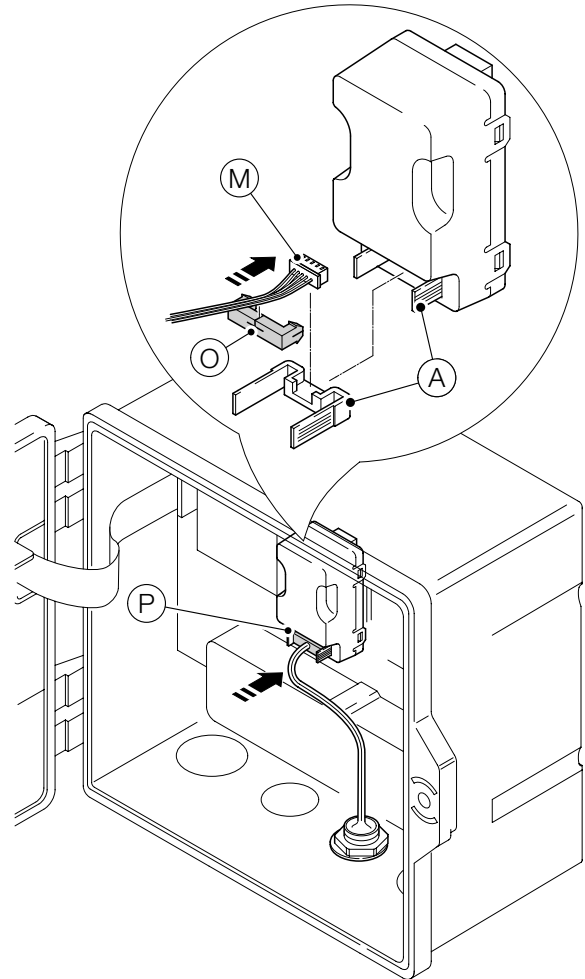


Figure 8 Connecting the EZLink cable assembly

Referring to Figure 7:

- 13** Push EZLink bulkhead label (Q) onto bulkhead connector body (R).
- 14** Fit bulkhead dust cap (S) onto bulkhead connector body (R).
- 15** If a second EZLink module is required, repeat all steps.
- 16** Close and lock transmitter door (B).

...3 Hazardous area considerations

Removing/refitting a panel-mounted AWT420 transmitter – panel seal requirements

NOTICE

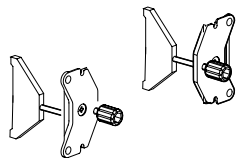
RENEW THE PANEL SEAL AND PANEL FIXINGS if removing the unit from the panel mounting – **DO NOT RE-USE EXISTING PARTS** – see Panel-mount kit below for replacement part number.

Panel-mount kit

Part number

3KXA877210L0101

Panel-mount kit,
including fixings,
flanges, clamps
and seal



Dimensions in mm (in)

Referring to Figure 9:

- 1 Cut the correct sized hole in panel (A).
- 2 Insert the transmitter into the panel cut-out (B).
- 3 Screw one panel clamp anchor screw (C) into the left-hand bracket (D) until 10 to 15 mm (0.39 to 0.59 in) of the thread protrudes from the other side of the bracket and position one clamp (E) over the end of the thread.

NOTICE

The correct torque is critical to ensure proper compression of the panel seal and achieve the IP66/NEMA 4X hosedown rating.

- 4 Holding assembly (F) together, position bracket (D) into the left-hand recess on the rear of the transmitter and secure with bracket securing screw (G). Ensure that the plastic washer remains in the position fitted.
- 5 Repeat steps 3 and 4 for the right-hand panel clamp assembly.
- 6 Torque each panel clamp anchor screw to 0.5 to 0.6 N·m (4.42 to 5.31 lbf·in).

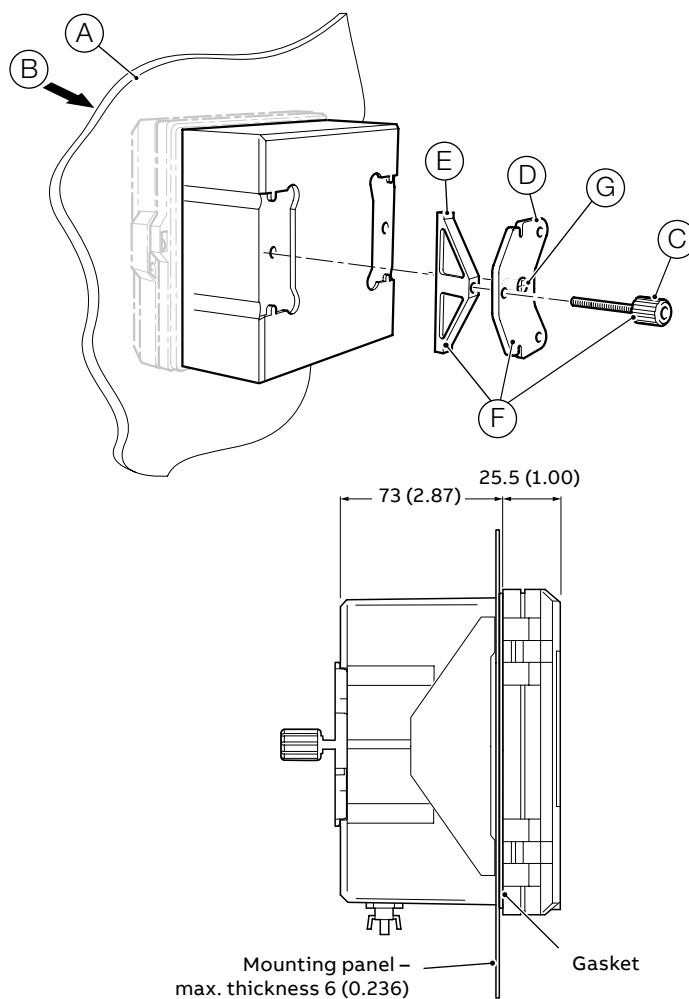
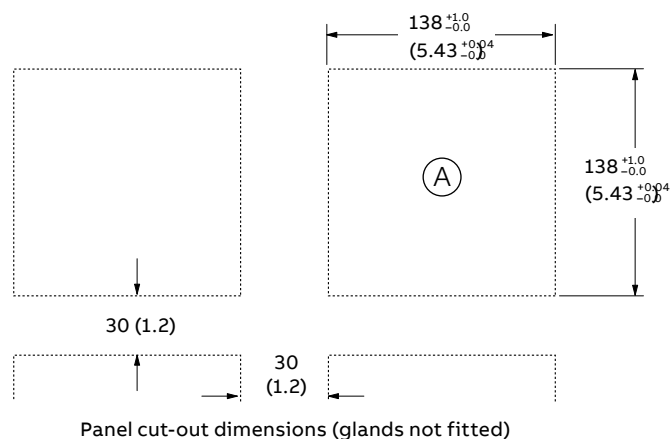


Figure 9 Panel-mounting the transmitter

Acknowledgements

- HART is a registered trademark of the FieldComm Group.
- Modbus is a registered trademark of Schneider Electric USA Inc.
- PROFIBUS is a registered trademark of PROFIBUS organization.

ABB Measurement & Analytics

For your local ABB contact, visit:
www.abb.com/contacts

For more product information, visit:
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