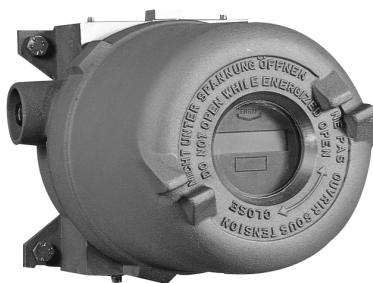

Installation guide 877 FDI

Field Display & Interface

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Preface

The Honeywell Enraf 877 FDI is an explosion-proof field indicator for Honeywell Enraf's series 854 servo level gauges and the series SmartRadar level gauges. The 877 FDI is suitable for hydrostatic level measurement (HTG) or for stand alone temperature measurement.

This installation guide is intended for technicians involved in the mechanical and electrical installation of the Honeywell Enraf series 877 FDI (Field Display & Interface).

EC declaration of conformity

Refer to EC declaration of conformity, shipped with the instrument.

Note:

All connections to the instrument must be made with shielded cables with exception of the mains, alarm outputs and Honeywell Enraf field bus cable. The shielding must be grounded in the cable gland on both ends of the cable.

Legal aspects

The mechanical and electrical installation shall only be carried out by trained personnel with knowledge of the requirements for installation of explosion-proof equipment in hazardous areas.

The information in this installation guide is the copyright property of Enraf BV, Netherlands. Enraf BV disclaims any responsibility for personal injury or damage to equipment caused by:

- Deviation from any of the prescribed procedures;
- Execution of activities that are not prescribed;
- Neglect of the general safety precautions for handling tools, use of electricity and microwave radiation.

The contents, descriptions and specifications in this installation guide are subject to change without notice. Enraf BV accepts no responsibility for any errors that may appear in this installation guide.

Additional information

Please do not hesitate to contact Honeywell Enraf or its representative if you require additional information.

Safety

Safety aspects of 877 FDI

Warning

Do not use the instrument for anything else than its intended purpose.

The housing of the 877 Field Display & Interface is explosion proof:

- II 1/2 G EEx d [ia/ib] IIB T5 acc. to KEMA 03ATEX1098, certified by KEMA, Netherlands
- Class I, Division 1, Groups B, C and D, (Factory Mutual no. 2Q1A6.AE)
- Class I, Division 1, Groups C and D; CSA Encl. 4 (CSA number: LR 46612-11)

Environmental conditions for the 877 FDI are:

ambient temperature : -40 to +65 °C (-40 to +149 °F)
relative humidity : 0 - 100 %
ingress protection : IP67 (NEMA Type 6P), suitable for outdoor installation

The cover can optionally be provided with sealing facility on the blocking device which prevents unauthorized opening.

One separate cable entry is provided for intrinsically safe options.

Warning

*Improper installation of cable glands, conduits or stopping plugs will
invalidate the Ex approval of the 877 FDI.*

Personal safety

The technician must have basic technical skills to be able to safely install the equipment.

When the 877 FDI is installed in a hazardous area, the technician must work in accordance with the (local) requirements for electrical equipment in hazardous areas.

Warning

In hazardous areas it is compulsory to use personal protection and safety gear such as: hard hat, fire-resistive overall, safety shoes, safety glasses and working gloves.

*Avoid possible generation of static electricity.
Use non-sparking tools and explosion-proof testers.*

*Make sure no dangerous quantities of combustible gas mixtures
are present in the working area.*

Never start working before the work permit has been signed by all parties.

Safety conventions

“**Warnings**”, “**Cautions**” and “**Notes**” are used throughout this installation guide to bring special matters to the immediate attention of the reader.

- A **Warning** concerns danger to the safety of the technician or user;
- A **Caution** draws the attention to an action which may damage the equipment;
- A **Note** points out a statement deserving more emphasis than the general text, but not requiring a “Warning” or a “Caution”.

Mechanical installation

Note:

The entire installation procedure shall be in accordance with national, local and company regulations.

The 877 FDI can be installed at the base of the tank near the tank shell or at any other suitable location. Sometimes the optional thermometer or pressure transmitter determines the location.

Refer to Appendix A for the dimensions of the 877 FDI and the dimensions of the four mounting holes. The mounting holes are located at the rear side of the indicator.

Leave sufficient space for the Infra-red connector and for removal of the cover.

Secure the indicator with four bolts size M10 ($\frac{5}{8}$ ").

Note:

The weight of the 877 FDI is 12 kg (26 lbs).

Electrical installation

The entire electrical installation shall be in accordance with International Standard IEC 79-14 for electrical equipment to be installed in hazardous areas.

Warning

Make sure that all power to the instrument is switched off before opening the cover of the 877 FDI. Failure to do so may cause danger to persons or damage the equipment.

*The cover of the 877 FDI **must** be closed before switching on the power.*

Caution

Before opening the cover of the 877 FDI, make sure that the blocking device is removed (figure 1).

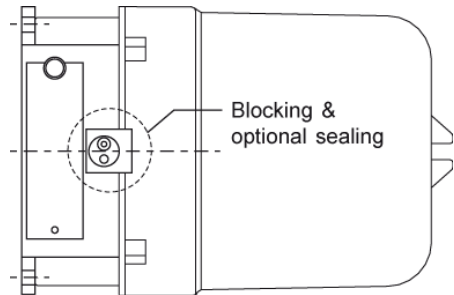


Figure 1 Blocking / sealing device

Caution

*Do not damage the thread of the cover and instrument and keep the threads free of dirt.
After opening, grease it lightly with anti seize grease.*

When closing, never tighten the cover before the thread is properly engaged.

*The cover should be turned counter-clockwise until the thread "clicks" in place,
then turn clockwise until the cover is fully closed.*

After closing the cover, do not forget to place the blocking device.

Preparing 877 FDI for electrical installation

Mains voltage selector

Check whether voltage selector is set correctly as indicated on identification label of the indicator as well as for the presented supply.

The voltage selector is located inside the indicator on top of the backplane (figure 2).

The 877 FDI operates on a mains voltage of 110, 130, 220 (+10% to -20%) and 230 Vac ($\pm 15\%$).

A special 65 Vac (+10% to -20%) is available.

Power rating: 25 VA (20 VA for FM);
frequency: 50 to 60 Hz ($\pm 10\%$); $I_{\max} = 2 \text{ A}$.

Install an explosion-proof mains switch in the mains supply cable to each 877 FDI. Specify which switch you need to operate the 877 FDI.

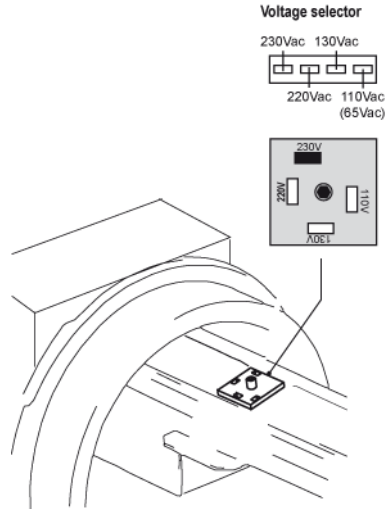


Figure 2 Voltage selector

Note:

For **240 V** supply voltage, set voltage selector to 230 V. Supply voltage may then vary from +10% to -20%.

To change voltage setting, proceed as follows:

- 1) Check the local mains voltage
- 2) Open the cover of the 877 FDI
- 3) If necessary, change the voltage selector to applicable voltage:
 - remove mains supply indication plate (Allen key size 3 mm)
 - slide the mains selector switch in appropriate position (refer to figure 2)
 - place mains supply indication plate and lock it
- 4) Close cover

Caution

Changes of the mains setting **shall** be marked on the identification label of the 877 FDI.

External fuses

The 877 FDI is internally fused on secondary side of transformer (fuses are located on the GPS board). Therefore, external fuses must be installed in the mains supply cable to each 877 FDI.

Mains voltage	Fuse value (in accordance to IEC 127-2-3)
220 / 230 Vac	315 ma slow
110 / 130 Vac	630 mA slow
65 Vac	1 A slow

Grounding

The 877 FDI housing should be properly grounded to the ground reference (generally the tank). This is a safety grounding requirement. For this purpose, the 877 FDI housing has external ground terminals.

Caution

Safety depends on proper grounding. Check the resistance of the ground connection directly after installation. The measured ground resistance shall be below the maximum prescribed by local grounding requirements.

Warning

when measuring the ground resistance, use a suitable explosion-proof tester.

Note:

Grounding shall be performed in accordance with local regulations.

Cable glands / conduit

Cable glands:

The 877 FDI requires explosion-proof (Ex-d) cable glands.

Note:

Mount the glands according to the supplier's instructions.

Conduit:

If the 877 FDI is installed in a hazardous area, threaded rigid metal conduit or threaded steel intermediate metal conduit shall be used.

Note:

*If the 877 FDI is installed in a hazardous area, stopper boxes **must** be applied within 18 inches (0.45 m) from the 877 FDI to seal the cabling in the conduit.*

Depending on the wiring configuration, one to three ¾" NPT threaded cable glands (or rigid conduits) may be required with the 877 FDI.

Refer to Appendix A for the cable entry dimensions of the 877 FDI.

Warning

Improper installation of cable glands, conduits or stopping plugs will invalidate the Ex approval of the 877 FDI.

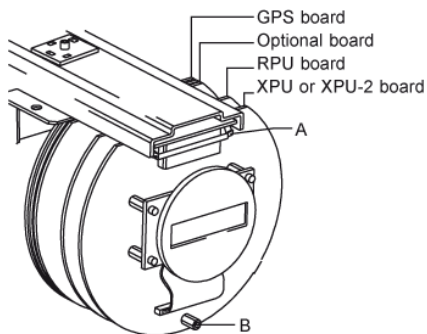
Note:

Seal unused cable inlets with an approved ¾" NPT stopping plug.

Terminal strip

The terminal strip is located against the rear side of the 877 FDI housing above the cable entries.

To reach the terminal strip, the cover has to be removed as well as all printed circuit boards (figure 3).



Warning

Only open the cover of the 877 FDI when the power is switched off.

To connect the wiring, proceed as follows:

- 1) Open cover of 877 FDI (make sure power is switched off)
- 2) Remove PCB retaining screw (B) and slide locking latch (A) to the right
- 3) Remove XPU(-2) board, optional boards (if present) and GPS board.

Note:

It is advised to (temporary) disconnect the non - i.s. wiring from the optional boards, if present, in order to remove the board and reach the terminal strip.

Terminal strip lay-out depends on model and installed options.

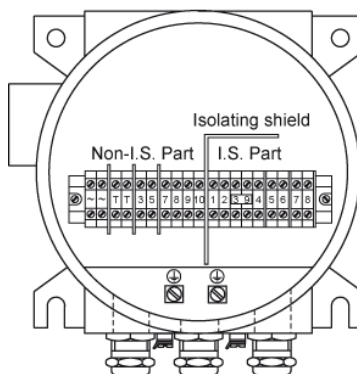


Figure 3 Reaching the terminal strip

Non-intrinsically safe cabling

The terminal strip of the 877 FDI is divided in a non-intrinsically safe part and an intrinsically safe part. Cable entries are $\frac{3}{4}$ " NPT.

The non-intrinsically safe wiring may only enter at the middle and left hand side cable entries (refer to figure 3).

Mains cabling : Must be suitable for the 877 FDI power ratings and, moreover, approved for use in hazardous areas.

Enraf field bus : One twisted pair cable is recommended.
 $R_{\max} = 200 \Omega / \text{line}$; $C_{\max} = 1 \mu\text{F}$. Maximum length: 10 km.

Enraf field bus lines may be interchanged (valid for T/T and 3/5). If local regulations allows, mains and Enraf field bus lines may share one cable. Mind the isolation voltage of the cores in the cable; refer to the International Standard IEC 61010-1.

Note:

If a quad cable is used and all four cores are twisted together, use two opposite cores for Enraf field bus lines and the two others for mains.

Relay outputs : Option. The relay contacts are potential free. Contact rating: $U_{\max} = 50 \text{ Vac}$ or 75 Vdc ; $I_{\max} = 3 \text{ A}$ non-inductive (CSA allows 0.6 A).

Mind the isolation voltage of the cores in the cable; refer to the International Standard IEC 61010-1.

Analog output : Option. Use a shielded cable.
External supply voltage:

- minimum: 12 Vdc
- maximum: 64 Vdc

When the voltage exceeds 30 Vdc, an additional resistor is required. The permitted operational areas are shown in figure 4.

Operational area 1 represents the area of operation without the need for an external loop resistance.

Operational area 2 shows the area where a resistance is required.

Power rating resistor: 1 W / k Ω .

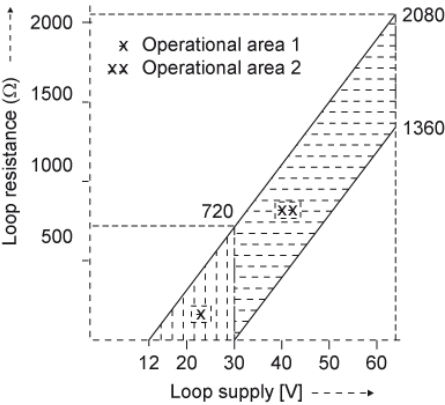


Figure 4 Selecting external loop resistor

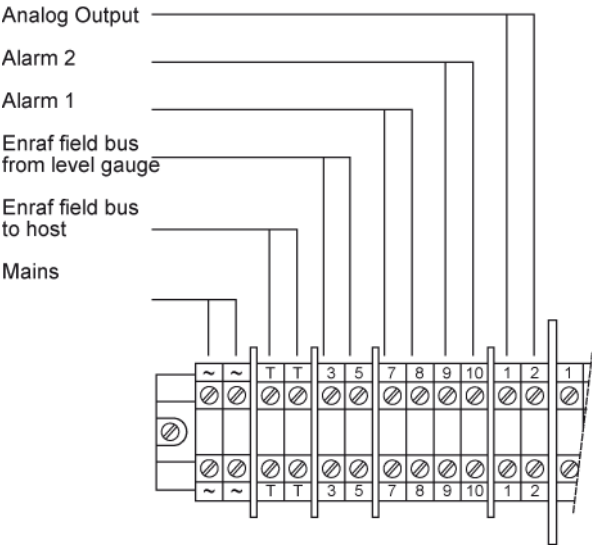


Figure 5 Non-intrinsically safe connections

Optional RS communication connections

For the cable connection requirements of the mains and alarm contacts, refer to previous section.

Caution
Keep the RS-232C / RS-485 lines as short as possible.

- RS-232C : Cable requirements: maximum length 15 m (50 ft); twisted and shielded.
- RS-485 : Cable requirements: maximum length 1200 m (3900 ft); twisted and shielded.

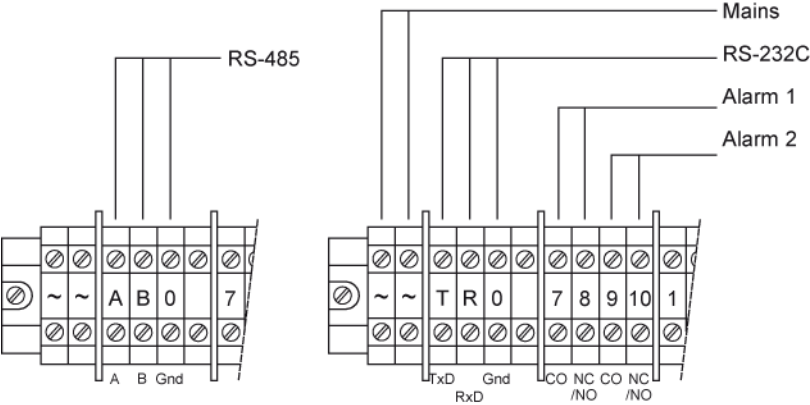


Figure 6 RS-232C and RS-485 connections

Intrinsically safe options

The cable for the intrinsically safe options shall only be fed through the right hand side cable entry. Blue marked cables are recommended for the intrinsically safe options.

Caution

The intrinsically safe options described in this section are explosion-proof certified. Make sure that the certificate of approval is available on site and act in accordance with the instructions as given in the approval certificate.

Caution

Intrinsically safe wiring shall be separated from all other wiring. Cable lay-out shall be in accordance with local regulations.

Note:

*The shield of the intrinsically safe cable shall **not** be connected inside the 877 FDI housing. Connect the shield of the cable externally in the cable gland at both ends of the cable.*

Device

Cable requirements

Spot temperature element	:	Shielded; $R_{\max} = 12 \Omega$ / line.
Average temp. element (combined water probe)	:	Twisted pair and shielded; $R_{\max} = 25 \Omega$ / line. Wiring between the 877 FDI and 762 VITO must be protected with EMC shielded conduit. Same conditions for connection to 862 MIR.
Pressure transmitters	:	Twisted pair and shielded; $R_{\max} = 25 \Omega$ / line (only pressure transmitters with HART [®] protocol). Pressure transmitter P1 is the bottom transmitter, P2 is the middle transmitter and P3 is the top transmitter.

Note:

If pressure transmitters are connected to HART input 2, it must be verified that the maximum values for current and power of the HCU option board HART input 2 circuit are not exceeding the maximum values of the connected pressure transmitters. Refer to Appendix B.

If the values of the HART input 2 circuit are too high, then connect the pressure transmitters to HART input 1 and the 762 VITO Interface to HART input 2 (only possible when HART input 1 is available).

Device

Cable requirements

977 Tank Side Indicator : Twisted pair and shielded; $R_{\max} = 5 \Omega$ / line, maximum cable length 50 m (160 ft).

Water bottom probe : Twisted and shielded pair; $R_{\max} = 25 \Omega$ / line.
(no VITO water sensor) (only with HART® protocol)

Note:

If also pressure transmitters are connected, use a junction box for the parallel connection of the pressure transmitters and water bottom probe.

Caution

When junction boxes are used in the intrinsically safe wiring loop, make sure they are approved for the application and are equipped with approved terminals and have correct entries for the cable glands.

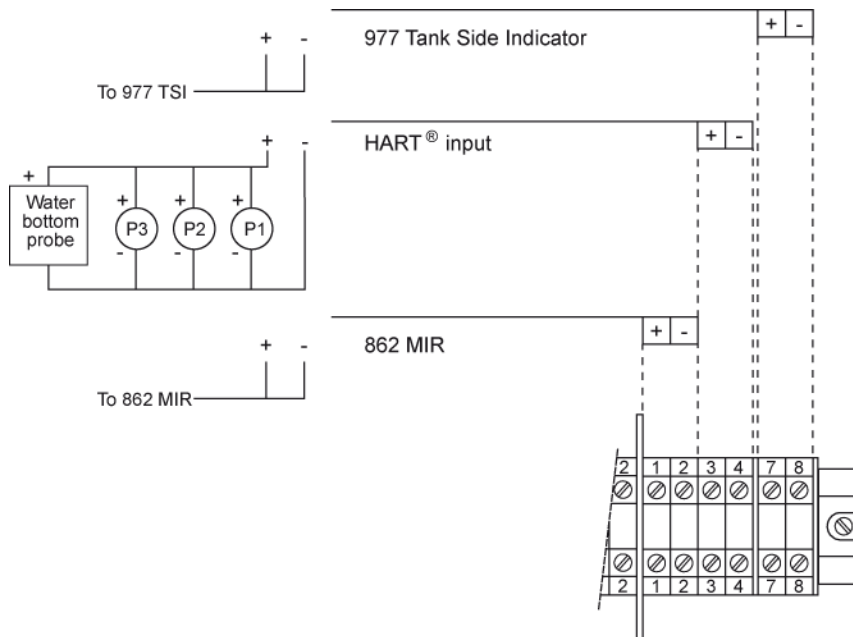


Figure 7 Intrinsically safe connections with MPU-3 / HPU option board

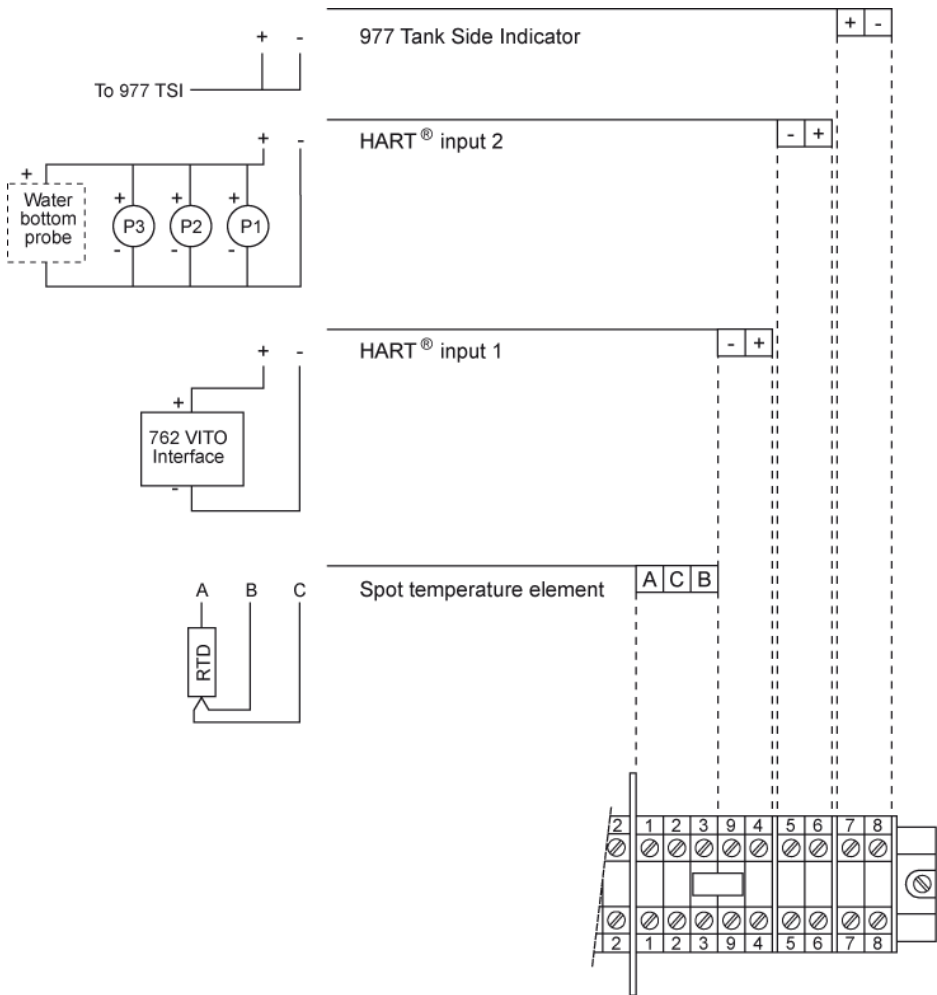
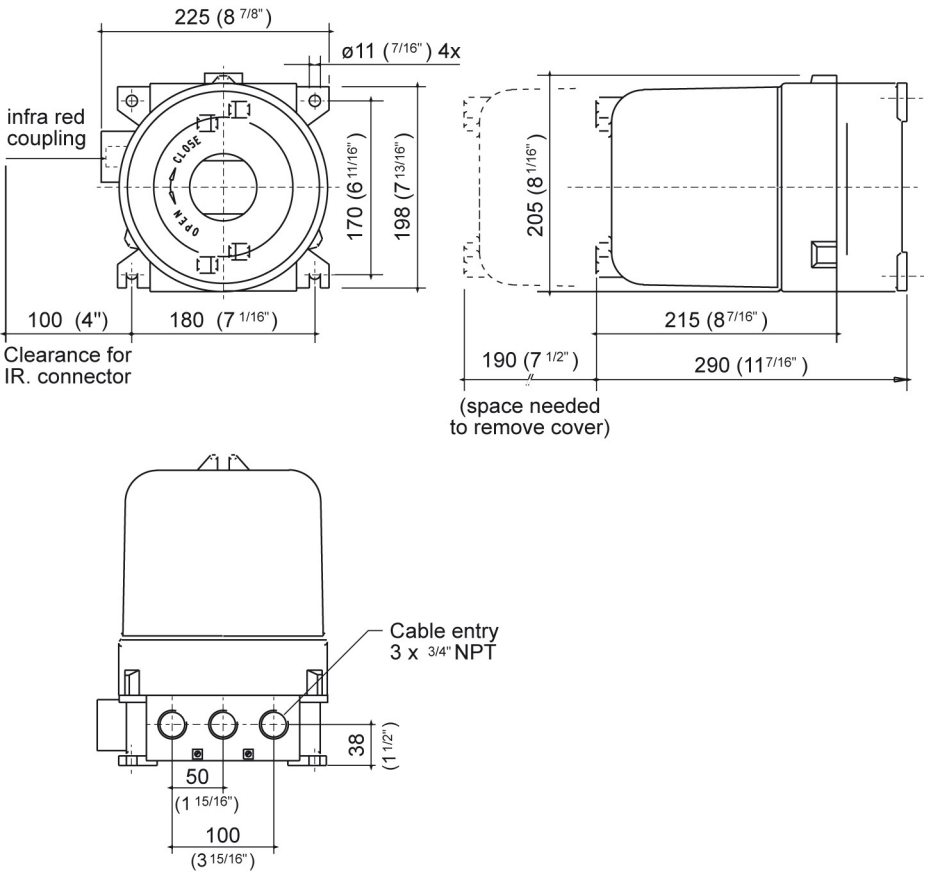


Figure 8 Intrinsically safe connections with HCU option board

Appendix A Dimensional drawing



Appendix B ATEX approval

The 877 FDI has been ATEX approved as explosion proof. Hence, explosion-proof EEx d approved glands or conduit are to be used.

Connection requirements of optional boards

The identification label on the 877 FDI indicates whether your instrument is equipped with an optional board with intrinsically safe measuring circuits.

XPU-2 board (i.s. option), [EEx ib] IIB

Output circuit for 977 TSI:

Max. values	:	U = 21 V; I = 395 mA; P = 1.41 W
Max. permissible ext. inductance	:	0.8 mH
Max. permissible ext. capacitance	:	1.27 μ F

HCU option board, [EEx ia] IIB

Spot temperature input circuit:

Max. values	:	U = 23.1 V; I = 221 mA; P = 0.19 W
Max. permissible ext. inductance	:	3.5 mH
Max. permissible ext. capacitance	:	980 nF

HART input 1 circuit (for 762 VITO Interface):

Max. values	:	U = 23.1 V; I = 90 mA; P = 0.52 W
Max. permissible ext. inductance	:	15 mH
Max. permissible ext. capacitance	:	1.02 μ F

HART input 2 circuit (for HART[®] pressure transmitters and/or external water probe):

Max. values	:	U = 23.1 V; I = 148 mA; P = 0.86 W
Max. permissible ext. inductance	:	7 mH
Max. permissible ext. capacitance	:	1.02 μ F

MPU-3 option board, [EEx ib] IIB

862 MIR input circuit:

Max. values	:	U = 21 V; I = 231 mA; P = 0.88 W
Max. permissible ext. inductance	:	3 mH
Max. permissible ext. capacitance	:	1.27 μ F

HPU option board, [EEx ib] IIB

862 MIR input circuit:

Max. values	:	U = 21 V; I = 221 mA; P = 0.86 W
Max. permissible ext. inductance	:	3 mH
Max. permissible ext. capacitance	:	1.27 μ F

HPU option board, [EEx ia] IIBHART input circuit (for HART[®] pressure transmitters and/or external water probe):

Max. values	:	U = 21 V; I = 148 mA; P = 0.72 W
Max. permissible ext. inductance	:	6 mH
Max. permissible ext. capacitance	:	1.27 μ F

Appendix C Related documents

Instruction manual 877 FDI Field Display & Interface

Instruction manual RPU Hard alarm output contacts

Installation guide 762 VITO Interface & 764, 765 or 766 VITO temperature and/or water sensors

Installation guide 977 Tank Side Indicator

Instruction manual XPU-2 option RS-232C/RS-485

Instruction manual Temperature, Water bottom and Analog output options

Instruction manual HIMS / HTG and vapour pressure (P3) measurement

Instruction manual 847 PET

Installation Info 003 (Installation HTG / HIMS systems)

Identification code 877 FDI Field Display & Interface

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