
Installation guide 854 Advanced Technology Gauge

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Preface

The Honeywell Enraf 854 ATG is a servo gauge which measures the liquid level and can also be programmed to measure two additional interface levels.

This installation guide is intended for technicians involved in the mechanical and electrical installation of the Honeywell Enraf Series 854 ATG (Advanced Technology Gauge).

EC declaration of conformity

Refer to the 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.

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- 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 B.V. accepts no responsibility for any errors that may appear in this installation guide.

Additional information

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

Safety

Safety aspects of 854 ATG

Warning

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

For medium pressure versions (till 6 bar), the 854 ATG drum compartment housing is of aluminium, and for chemical version it is of stainless steel.

For high pressure version (max. 25 bar), the 854 ATG housing is of stainless steel.

The housing of the 854 ATG is explosion-proof:

- II 1/2 G EEx de [ib/ia] IIB T6 acc. to KEMA 01ATEX2092 X, certified by KEMA, Netherlands
- Class I, Division 1, Groups B, C & , D acc. to ANSI/NFPA no. 70, certified by Factory Mutual Research USA (FM no.: 3Q2A9.AX)

Environmental conditions for the 854 ATG are:

ambient temperature	:	-40 to + 65 °C (-40 to +149 °F)
operating pressure	:	max. 6 bar for medium pressure and chemical version max. 25 bar for high pressure version
relative humidity	:	0 - 100 %
ingress protection	:	IP65 (NEMA 4), suitable for outdoor installation

The drum compartment, which is in contact with the tank atmosphere, is separated from electronic compartment. A magnetic coupling transfers the drum movement (hence, displacer movement) to electronic compartment.

Wiring for intrinsically safe options, such as temperature or pressure measurement, is fed via two separate cable entries.

The 854 ATG covers can optionally be provided with sealing facilities on blocking devices, which prevents unauthorized opening.

Warning

Improper installation of cable glands, conduits or stopping plugs will invalidate the Ex approval of the 854 ATG.

Personal safety

The technician must have basic technical skills to be able to safely install the equipment. When the 854 ATG 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.

Pay attention to the kind of product in the tank. If any danger for health, wear a gas mask and take all necessary precautions.

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”.

General precautions

Caution

During transport of the gauge the motor block should be locked.

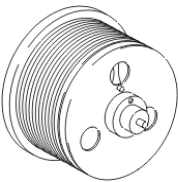
This is for protection of the weighing system.

Caution

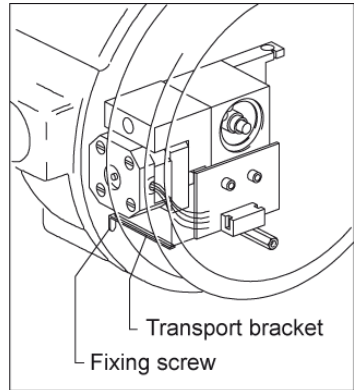
The box in which the 854 arrives also contains the measuring drum.

This is a precision measuring device and shall only be installed by a qualified commissioning engineer.

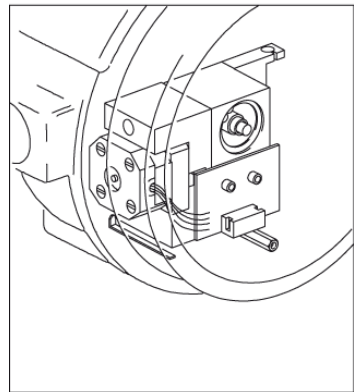
Accurate measurement requires an undamaged and clean drum.



Treat this drum with care !



Motor locked



Motor unlocked

Figure 1 Motor(un)locking

Special tools

Screw driver for Hex Allen-key screws M4 (length min. 22 mm) Part No.: 2998.506
Tommy bar Part No.: 2998.026

Mechanical installation

Note:

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

Preparation for transportation of the gauge

Caution

Do not transport the instrument with the motor unlocked. Refer to figure 1 for motor locking.

Drum should be transported in original protective box. Drum and displacer shall only be installed by a qualified commissioning engineer.

Process connection

The 854 ATG can be ordered with race face or flat face flange. Select gasket that is suitable for flange type, maximum pressure and product to be stored. Mount instrument flange horizontally.

Warning

Verify that tank or drum compartment is depressurized before opening the tank or drum compartment cover of 854 ATG.

The 854 ATG can be adapted to various process connection flanges via adapters/calibration chambers as specified in Appendix B. Verify that maximum working pressure of adapter/calibration chamber complies with pressure in your tank.

Note:

When using 854 ATG on pressurized tank, it is recommended to install a suitable valve between tank and 854 ATG to isolate the instrument from the process when required. The valve shall have an opening large enough to feed through the displacer.

Orientation of 854 ATG gauge on tank

Mount the gauge in one of the following two ways.

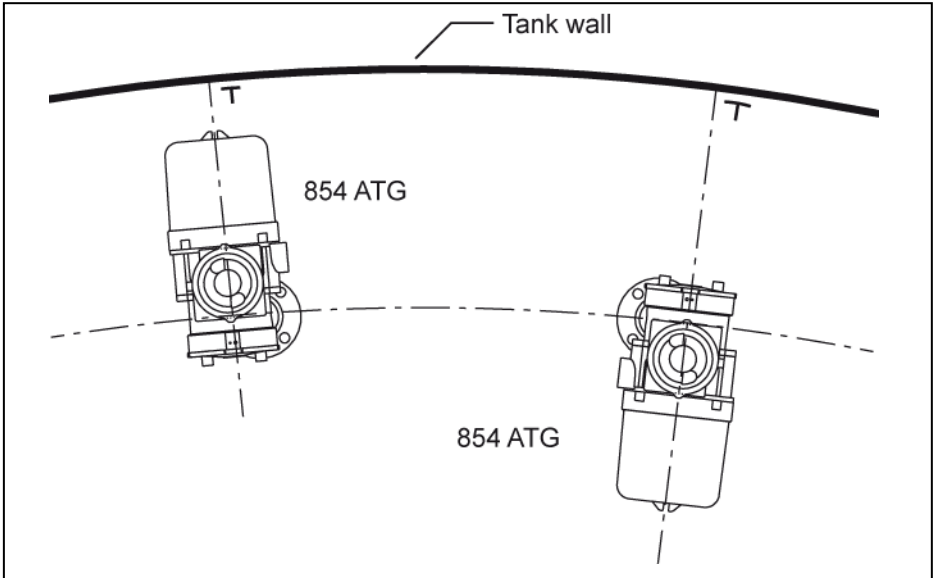


Figure 2 Orientation of the gauge on a tank (top view)

On a stilling well or guide pole, the orientation of the gauge may be chosen freely.

Note:

- The weight of the 854 ATG for: - medium pressure version is : 16 kg (35 lbs);
- chemical version is : 21 kg (46 lbs);
- high pressure version is : 26 kg (57 lbs).

Bolts

Secure the gauge adapter by using appropriate bolts. *)

Flange type	Number of bolts	Diameter x minimum length
NW50, ND6	4	M12 x 50
NW50, ND40	4	M16 x 60
2", 150 lbs	4	$\frac{5}{8}$ " x 3" (M16 x 80)
2", 300 lbs	8	$\frac{5}{8}$ " x 3" (M16 x 80)
6", 150 lbs	8	$\frac{3}{4}$ " x 3 $\frac{1}{4}$ " (M20 x 80)
6", 300 lbs	12	$\frac{3}{4}$ " x 4" (M20 x 100)

*) Bolt dimensions (acc. to DIN 2527, ANSI B16.5) are given in the table.

Mounting a pressure gauge set

- 1 Connect T-piece horizontally to drum house.
- 2 Check whether manometer is suitable for the maximum pressure in the tank.
- 3 Mount manometer and vent valve (figure 3).
- 4 Close vent valve.
- 5 Gently open valve between tank and drum compartment and check for leakage on all connections.

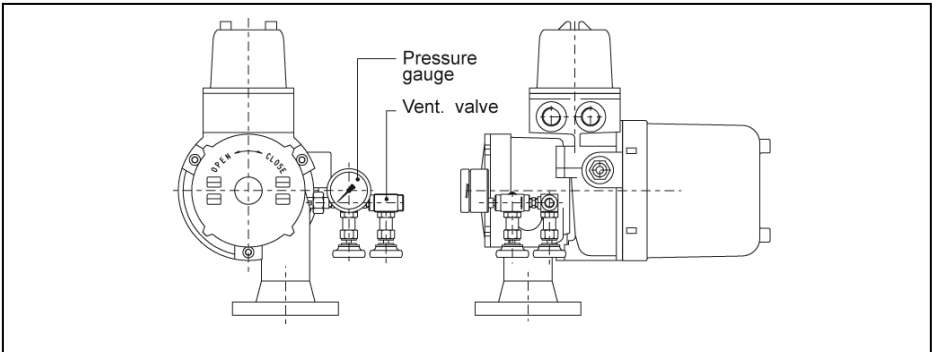


Figure 3 Mounting a pressure gauge set on a 854 Servo gauge

Grounding

Warning

For proper grounding of the 854 ATG, install a copper strip under one of the flange bolts for each flange.

Place shark rings between flange and strip (figure 4).

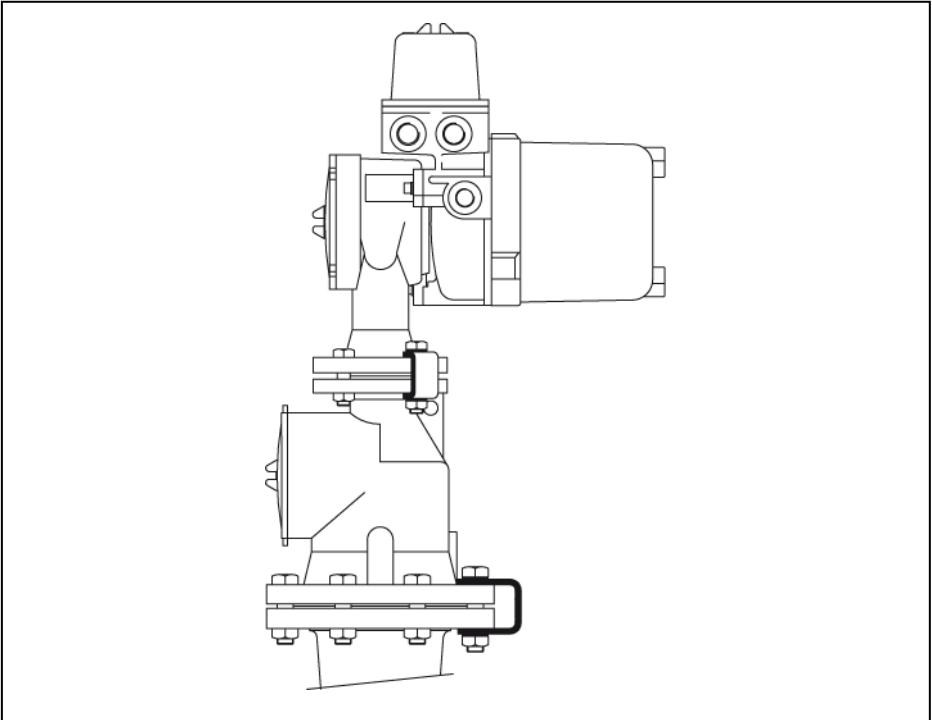


Figure 4 Example of flange ground

Note:

*Also in case of tanks with cathodic protection, the 854 ATG **must** be grounded to the tank.*

Cathodic protection can be maintained by isolating the cable screen/armouring or conduit.

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 electronic and terminal compartment.

*Failure to do so may cause danger to persons or damage the equipment.
All covers of the 854 ATG **must** be closed before switching on the power.*

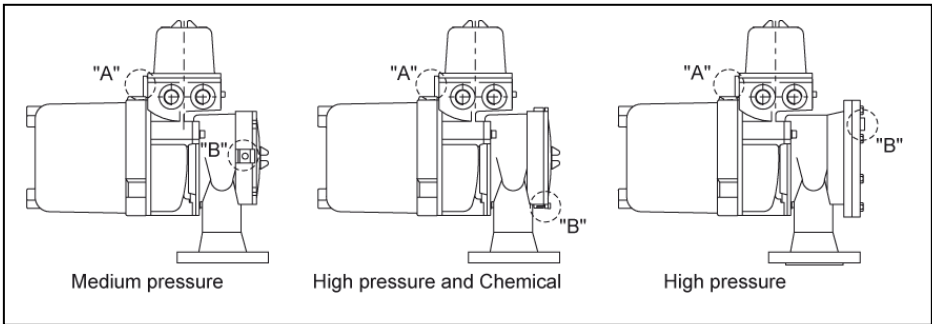


Figure 5 Blocking / sealing facilities

Caution

Before opening the electronic and terminal compartment cover, remove the optional blocking devices which locks the covers: 'A': for electronic compartment cover and terminal compartment cover; 'B': for drum compartment cover.

Caution

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

*When closing, never tighten the covers before the threads are properly engaged.
The covers should be turned counter-clockwise until the thread "clicks" in place,
then turn clockwise until the covers are fully closed.*

After closing the covers, do not forget to place the blocking devices.

Preparing gauge for electrical installation

Mains voltage selector

Check whether voltage selector is set correctly as indicated on identification label of 854 ATG as well as for the presented supply.

The voltage selector is located inside electronic compartment (on the top of backplane).

It is marked with 'A' in figure 6.

The 854 ATG operates on a mains voltage of 110, 130, 220 Vac (+10% to -20%) and 230 Vac ($\pm 15\%$).

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

Power rating: 25 VA.

Frequency: 50 to 60 Hz ($\pm 10\%$). $I_{\max} = 2$ A.

Install an explosion-proof mains switch in the mains supply cable to each 854 ATG.
Specify which switch you need to operate the 854 ATG.

Note:

*For 240 V supply voltage, set the 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 electronic compartment cover.
- 3) If necessary, change voltage selector to applicable voltage;
 - Remove mains supply indication plate
 - Slide switch in appropriate position (refer to figure 6.)
 - Place mains supply indication plate and lock it
- 4) Close cover.

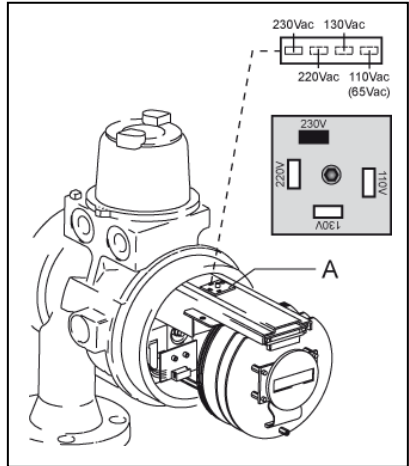


Figure 6 Voltage selector

Caution

Changes of the mains setting **shall** be marked on the identification label of the 854 ATG.

External fusing

The 854 ATG is internally fused on secondary side of transformer (fuses are located on GPS board). Therefore, external fuses must be installed in the mains supply cable to each 854 ATG.

mains voltage	fuse value (in accordance with IEC 127-2-3)
220 Vac or 230 Vac	315 mA slow
110 Vac or 130 Vac	630 mA slow
65 Vac	1 A slow

Cable glands / conduit

Cable glands:

Explosion-proof (Ex-d) or increased safe (Ex-e) cable glands must be used, depending on local requirements. Refer to the Ex-marking on the identification label of the 854 ATG to determine which type of cable glands is required.

Note:

Mount the glands according to the supplier's instructions.

Conduit:

If the 854 ATG is installed in a hazardous area, threaded rigid metal conduit or threaded steel intermediate metal conduit shall be used.

Note:

*If the 854 ATG is installed in a hazardous area, stopper boxes **must** be applied within 18 inches (0.45 m) from the 854 ATG to seal the cabling in the conduit.*

Depending on the wiring configuration, one to four ¾" NPT threaded cable glands (or rigid conduits) may be required with the 854 ATG.

Note:

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

Warning

Improper installation of cable glands, conduit or stopping plugs will invalidate the Ex approval of your 854 ATG.

Grounding

The 854 ATG housing should be properly grounded to the ground reference (generally the tank). This is a safety grounding requirement. Grounding can be performed by copper strips across the flanges (refer to section Grounding at mechanical installation), or by a ground wire. With last mentioned method, use one of the external ground terminals of the 854 ATG.

Note:

Grounding shall be performed in accordance with local regulations.

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.

Lay-out terminal compartment

The terminal compartment on top of the 854 ATG is divided into a non-intrinsically safe and an intrinsically safe part. Cable entries are 3/4" NPT.

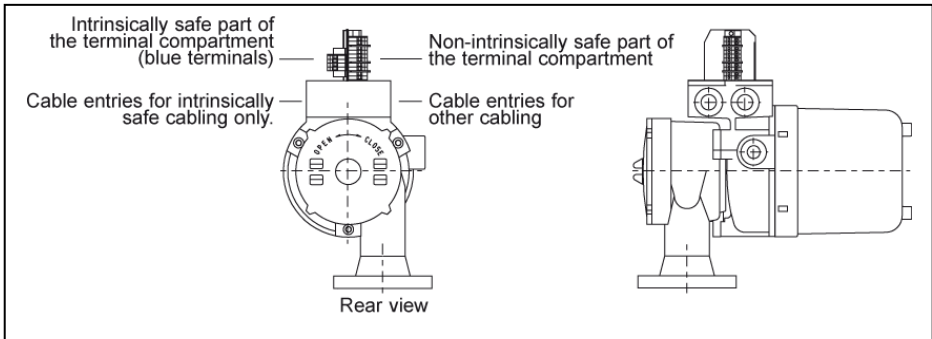


Figure 7 Location of 854 terminal compartment

The non-intrinsically safe cabling may only enter at the two right hand side cable entries (figure 7).

Warning

Only open the terminal compartment cover (top cover) when the power is switched off.

Non-intrinsically safe cabling

- Mains cabling : Must be suitable for the 854 ATG power rating and, moreover, approved for the use in hazardous areas.

- Honeywell 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.
 Honeywell Enraf field bus lines may be interchanged. If local regulations allow, mains and Honeywell 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 Honeywell Enraf field bus lines and the two others for mains.

- Relay output : Option. The relay output contacts are potential free.
 Contact rating: $U_{max} = 50 \text{ Vac}$ or 75 Vdc ; $I_{max} = 3 \text{ A}$ non-inductive (CSA only: 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 shielded cable. External supply voltage: 12 to 64 Vdc. See figure 9.

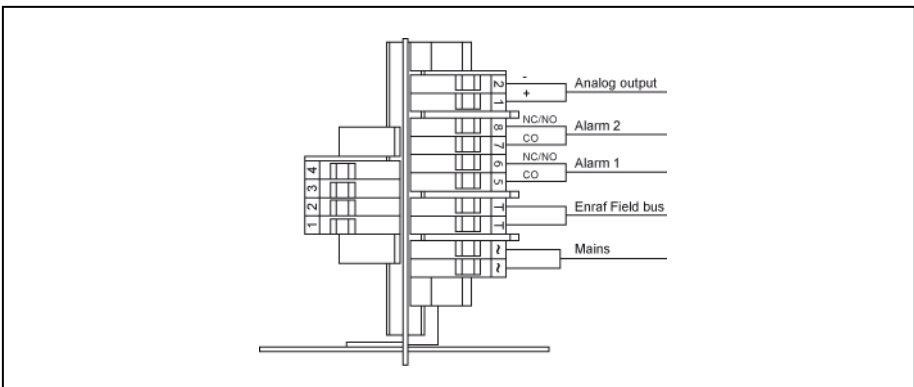


Figure 8 Non-Intrinsically safe connections

When the voltage exceeds 30 Vdc, an additional resistor is required.

The permitted operational areas are shown in figure 9.

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

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

The power rating of the external resistor depends on the value of the resistor.
We recommend 1 W / k Ω

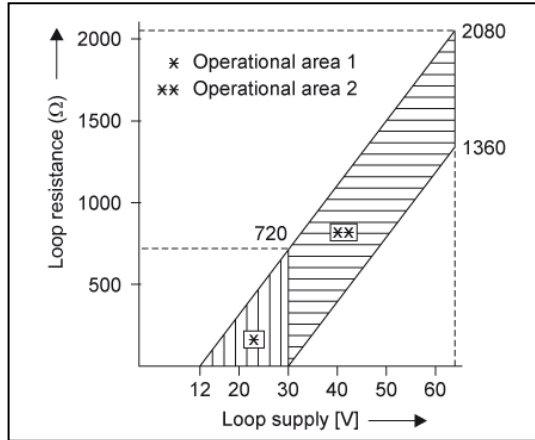


Figure 9 Selecting the external loop resistor

Optional RS communication connections

For the cable connections of the mains and the 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 metres (50 ft); twisted and shielded.

RS-485 : Cable requirements: maximum length 1200 metres (3900 ft); twisted and shielded.

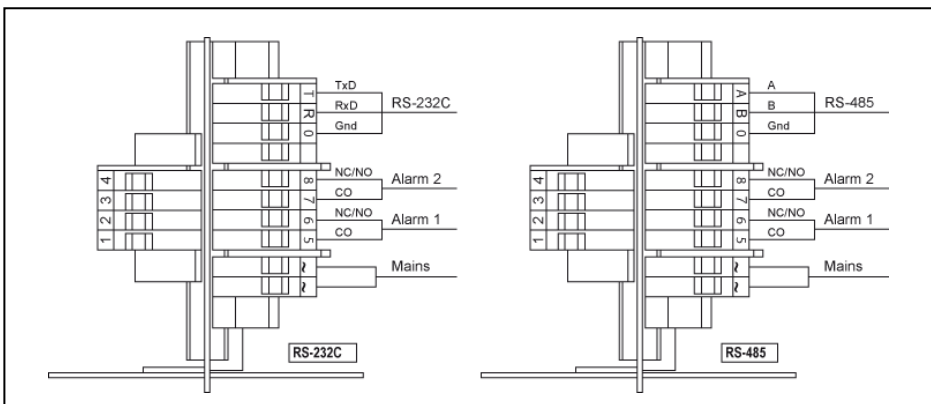


Figure 10 RS-232C / Rs-485 connections

Intrinsically safe options

The cables for the intrinsically safe options shall only be fed through the cable entries at the side of the intrinsically safe (blue) terminals. 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-outs shall be in accordance with local regulations.

Note:

*The shield of the intrinsically safe cable shall **not** be connected inside the 854 ATG 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; $R_{max} = 12 \Omega / \text{line}$.
Average temp. element (combined water probe) :	Twisted pair and shielded; $R_{max} = 25 \Omega / \text{line}$. Wiring between the 854 ATG and 762 VITO must be protected with EMC shielded conduit. Same conditions for connection to 862 MIR.
Pressure transmitters :	Twisted pair and shielded; $R_{max} = 25 \Omega / \text{line}$ (only pressure transmitters with HART [®] protocol). Pressure transmitter P1 is the bottom transmitter (measures liquid head) and P3 is the top transmitter (measures vapour pressure).

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 C.

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; $R_{\max} = 5 \Omega / \text{line}$, maximum cable length 50 m (160 ft).
Water bottom probe (no VITO water sensor)	: Twisted pair and shielded; $R_{\max} = 25 \Omega / \text{line}$. (only with HART [®] protocol).

Note:

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

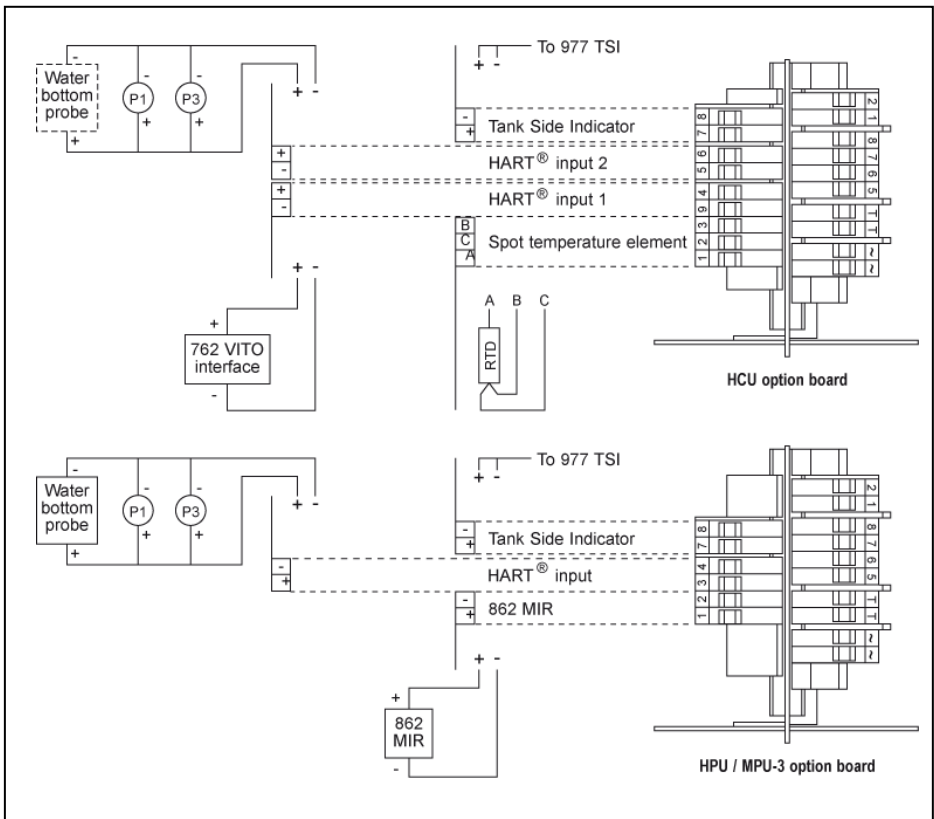
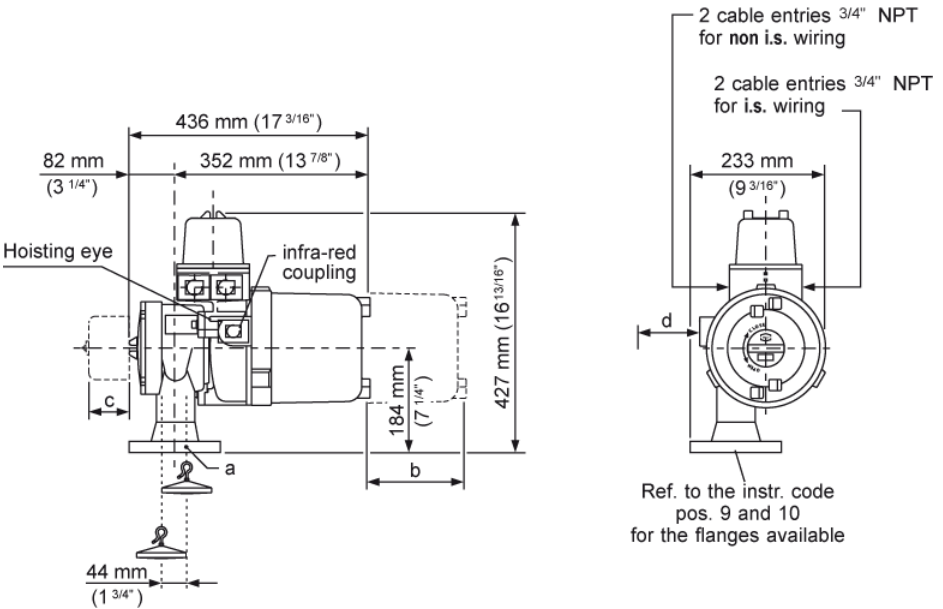


Figure 11 Intrinsically safe option connections

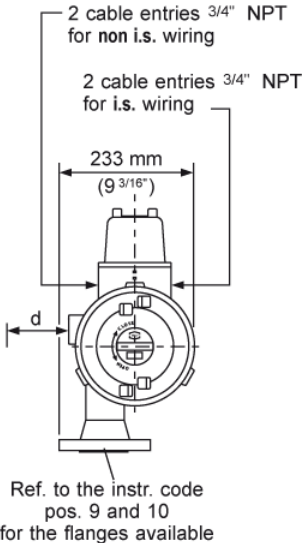
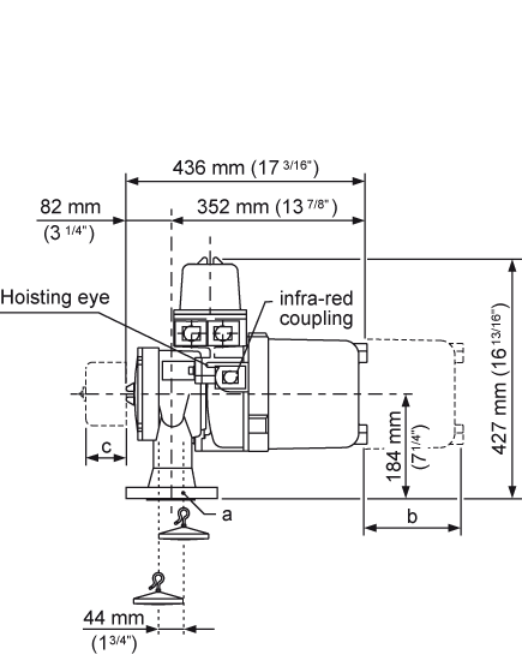
Appendix A

Dimensions 854 ATG (medium pressure and chemical version)



- a: Position of measuring wire with displacer in top position
- b: 200 mm (7 7/8") (space needed to remove cover)
- c: 65 mm (2 9/16") (space needed to remove measuring drum)
- d: 100 mm (4") (free space for IR connection)

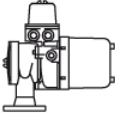





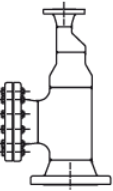
Dimensions 854 ATG (high pressure version)



- a: Position of measuring wire with displacer in top position
- b: 200 mm (7 7/8") (space needed to remove cover)
- c: 65 mm (2 9/16") (space needed to remove measuring drum)
- d: 100 mm (4") (free space for IR connection)

Appendix B

Available adapters & calibration chambers

Orientation	Specifications
	<p>Orientation of adapters, reducers and calibration chambers with respect to the 854 ATG as drawn.</p> <p>Asymmetrical adapters must be mounted in the right way with respect to the 854 gauge in order to prevent malfunctioning of the gauge.</p> <p>For symmetrical adapters the orientation is insignificant.</p>
	<p>Flange adapter for medium pressure</p> <p>2" to 6", 150 lbs, ff (aluminium, 3.2371) Height: 48 mm (1⁷/₈") Part no.: 0815.092 NW50-ND6 to NW150-ND16, ff (aluminium, 3.2371) Height: 48 mm (1⁷/₈") Part no.: 0815.093 2" to 6", 150 lbs, ff (AISI 316, 1.4401) Height: 48 mm (1⁷/₈") Part no.: 0815.095</p>
	<p>Calibration adapter for medium pressure 0.6 MPa (88 psi)</p> <p>2" to 6", 150 lbs (aluminium, 3.2371) Height: 307 mm (12¹/₁₆") Part no.: 0815.091 2" to 8", 150 lbs (aluminium, 3.2371) Height: 307 mm (12¹/₁₆") Part no.: 0815.096 NW50-ND6 to NW150-ND16 (aluminium, 3.2371) Height: 307 mm (12¹/₁₆") Part no.: 0815.094 2" to 4", 150 lbs (stainless st. ASTM A 351 CF8M, 1.4408) Height: 270 mm (10⁹/₁₆") Part no.: 0815.085 2" to 6", 150 lbs (stainless st. ASTM A 351 CF8M, 1.4408) Height: 288 mm (11³/₈") Part no.: 0815.086</p>
	<p>Calibration adapter for high pressure 4 MPa (590 psi)</p> <p>2" to 6", 300 lbs (carbon st. GS C25.N, 1.0619) Height: 344 mm (13⁹/₁₆") Part no.: 0815.087 NW50-ND40 to NW150-ND40 (carbon st. GS C25.N, 1.0619) Height: 344 mm (13⁹/₁₆") Part no.: 0815.071</p>
	<p>Adapter for medium pressure</p> <p>2" to 4", 150 lbs Height: 241 mm (9¹/₂") for high pressure 2" to 4", 300 lbs Height: 257 mm (10¹/₈")</p>
	<p>Adapter for medium pressure</p> <p>2" to 6", 150 lbs Height: 392 mm (15⁷/₁₆") 2" to 8", 150 lbs Height: 417 mm (16⁷/₁₆") for high pressure 2" to 6", 300 lbs Height: 410 mm (16¹/₈") 2" to 8", 300 lbs Height: 435 mm (17¹/₈")</p>
	<p>Adapter for medium pressure</p> <p>2" to 4" with 4" blind flange, 150 lbs Height: 451 mm (17³/₄") 2" to 6" with 4" blind flange, 150 lbs Height: 679 mm (26³/₄") 2" to 8" with 6" blind flange, 150 lbs Height: 775 mm (30¹/₂") for high pressure 2" to 4" with 4" blind flange, 300 lbs Height: 467 mm (18³/₈") 2" to 6" with 4" blind flange, 300 lbs Height: 695 mm (27³/₈") 2" to 8" with 6" blind flange, 300 lbs Height: 791 mm (31¹/₈")</p> <p>* Mat.: Flanges ASTM A 105, Grade N Body : ASTM A 105, Grade N</p>

Appendix C

ATEX approval

The terminal compartment of the 854 ATG level gauge has been ATEX approved as explosion-proof and as being increased safe. The type of cable glands that must be used:

For protection type increased safe EEx e approved glands are to be used.

For protection type explosion proof EEx d approved glands or conduit are to be used.

Connection requirements of optional boards

The identification label on the 854 ATG 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

Appendix D

Related documents

Instruction manual 854 ATG level gauge

Instruction manual 854 density option

Instruction manual SPU II Hard alarm output contacts

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

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 of Pressure Transmitters for HTG and HIMS"

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