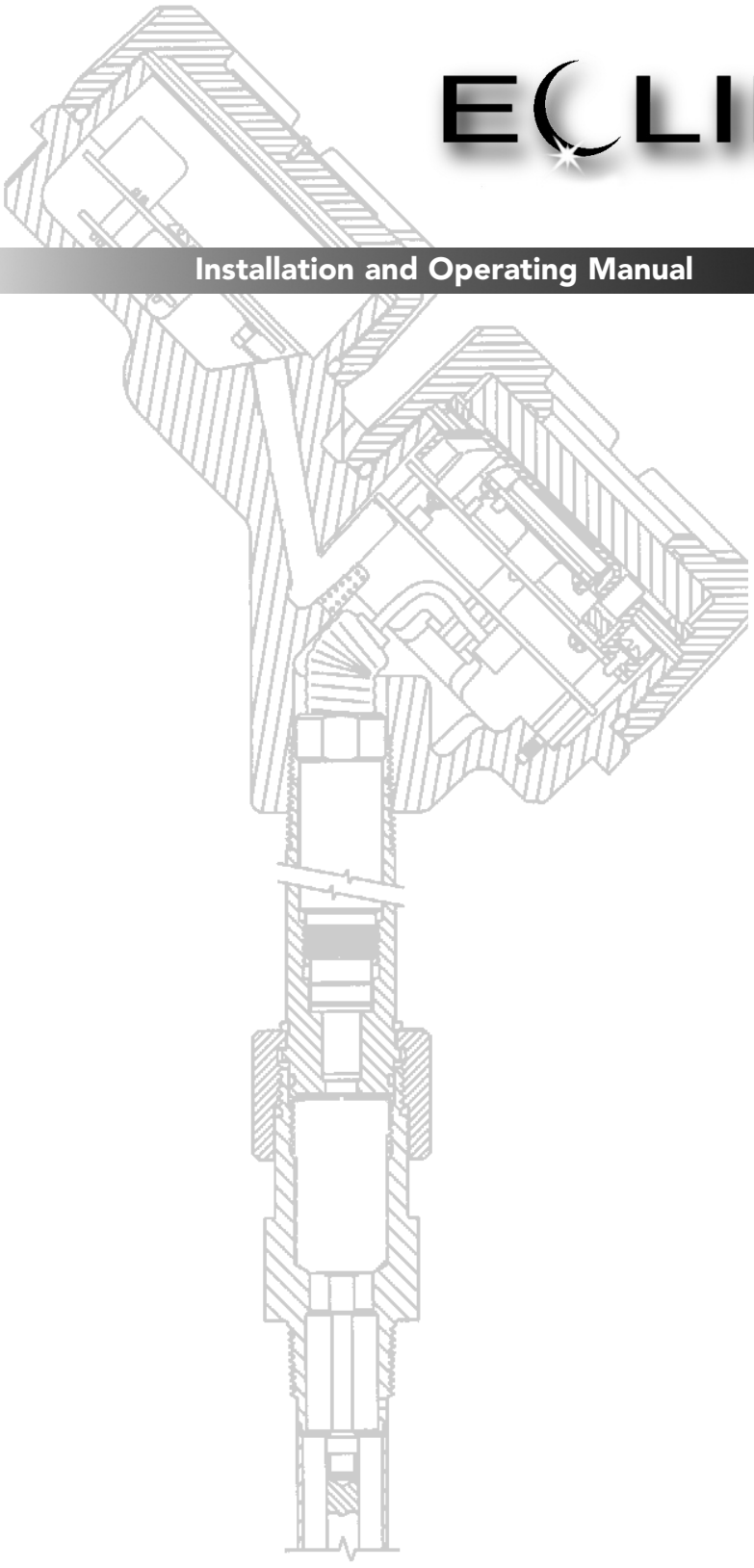
ECLIPSE™ 705

software V3.x

Installation and Operating Manual



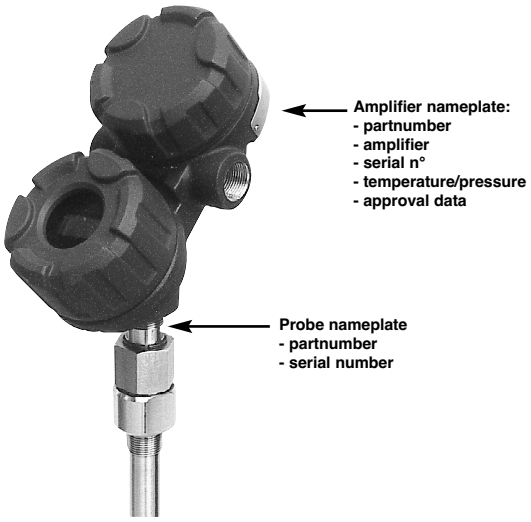
Guided Wave Radar

Level Transmitter

Magnetrol®

UNPACKING

Unpack the instrument carefully. Make sure all components have been removed from the foam protection. Inspect all components for damage. Report any concealed damage to the carrier within 24 hours. Check the contents of the carton/crates against the packing slip and report any discrepancies to Magnetrol. Check the nameplate model number to be sure it agrees with the packing slip and purchase order. Check and record the serial number for future reference when ordering parts. To avoid moisture ingress in the housing, covers should be fully tightened at all times. For the same reason, plugs should remain properly installed in the cable entries until replaced with a cable gland.



CE 0038 0344

These units are in conformity with the provisions of:

1. The EMC Directive: 2014/30/EU. The units have been tested to EN 61326: 1997 + A1 + A2.
2. Directive 2014/34/EU for Equipment or protective system for use in potentially explosive atmospheres. EC-type examination certificate number KEMA99ATEX0518X (intrinsic safe units) or BKI 12 ATEX 0017 (Ex d units) or KEMA99ATEX5014 (Non sparking units).
3. The PED directive 2014/68/EU (pressure equipment directive). Safety accessories per category IV module H1.

SPECIAL CONDITIONS FOR ATEX INTRINSICALLY SAFE USE

Because the enclosure of the Guided Wave Radar Level Transmitter Eclipse Model 705-5xxx-x1x and 705-5xxx-x7x and/or Probe Eclipse Model 7xx-xxx-xxx is made of aluminium, if it is mounted in an area where the use of category 1G apparatus is required, it must be installed such, that, even in the event of rare incidents, ignition sources due to impact and friction sparks are excluded.

For applications in explosive atmospheres caused by combustible dust, gases, vapours or mists and where category 1G or 1D apparatus is required, electrostatic charges on the non-metallic parts of the Probe Eclipse Model 7M5-xxx-xxx, Model 7M7-xxx-xxx and Model 7xF-xxx-xxx shall be avoided.

MOUNTING

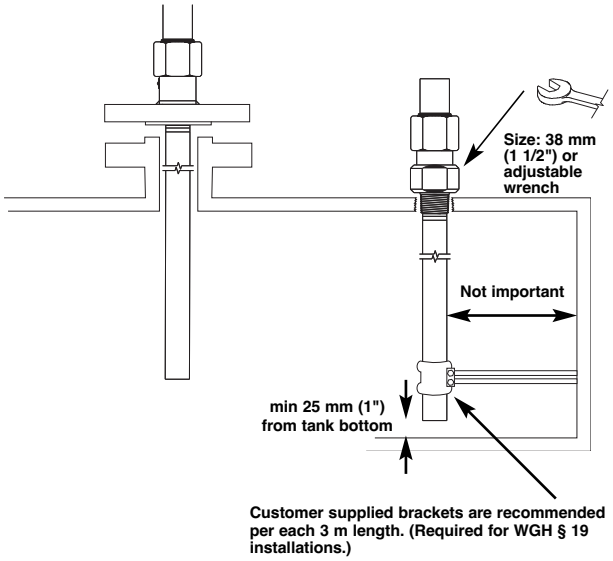
IMPORTANT:
To avoid damaging during transportation, Eclipse® 7MD/7ML large coax probes are shipped with 3 transport screws, securing the inner antenna. The 3 screws have to be removed prior to installation. They are located nearby the process connection. A separate label is attached to draw the attention to remove the screws.

To avoid moisture ingress in the housing, covers should be fully tightened at all times. For the same reason, cable gland and plugs should be properly installed in the cable entries.

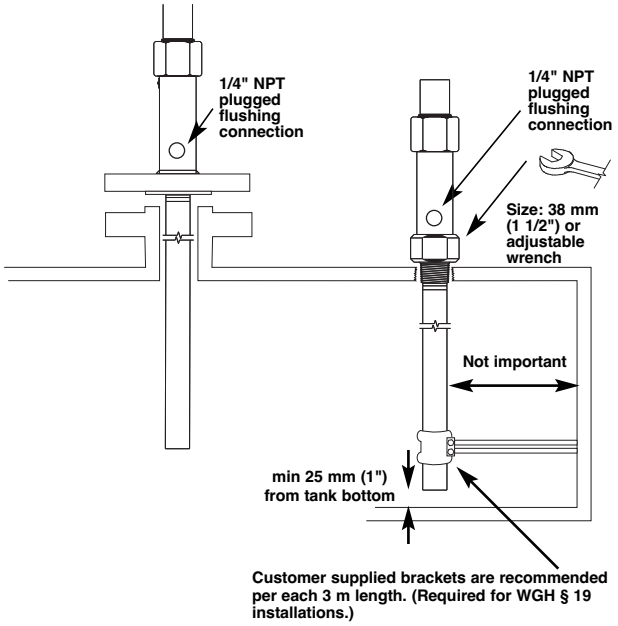
The unit is preconfigured from factory, based on given application details (when available). Therefore transmitter and GWR probe have the same serial n°.

Please make sure that corresponding serial numbers are mounted together.

Coaxial type GWR probes (7MD - 7MQ - 7MR - 7MS - 7MT)



Coaxial type GWR probes: Flushing connection (7ML - 7MM - 7MN)



Note: The flushing connection allows to purge the inside of the coaxial probe without dismantling. Re-assure the use of compatible purging liquid/gas to avoid unwanted chemical reaction.

Overfill safe and Overfill proof
Eclipse 7MD/7ML, 7MR/7MM and 7MT/7MN coaxial GWR probes are “Overfill safe” in use and “Overfill proof” certified.

Overfill safe means that the unit is capable to measure up to the process connection.

Overfill proof protection (such as WHG or VLAREM) certifies reliable operation when the transmitter is used as overfill alarm but assumes that the installation is designed in such way that the vessel/ cage cannot overfill.

Eclipse 7MQ/7MS has a transitioning zone (zone in which the unit does not measure accurately) at the top. Maximum level should not be higher than 25 mm (1") up to 200 mm (8") (depending dielectrics - see probe specifications) below the process connection. This may include utilizing a nozzle or spool piece.

Note: When using the 7MQ or 7MS probe, keep transmitter and probe matched as a set.

Metallic (or any conductive) obstructions in the tanks
Metallic obstructions have no influence on the measuring performance of coaxial GWR probes.

Turbulence
Customer supplied mounting brackets are recommended per each 3 m (10’) length and have no influence on the measuring performance of coaxial GWR probes.

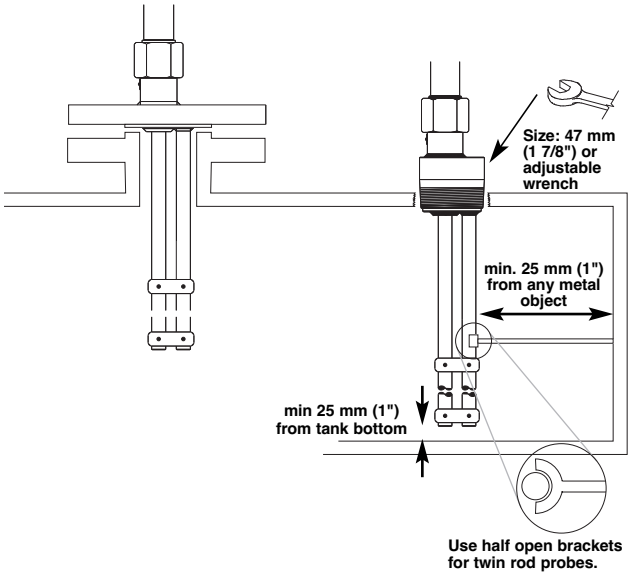
Stillwell /cages
Coaxial GWR probes are ideally suited for use in stillwells or cages. There is no min. clearance allowance to be taken into consideration.

Shortening of probe length
Coaxial GWR probes can be easily shortened on site when a procedure for this is strictly followed. This procedure can be separately obtained from factory.

Twin rod (7MB) / Twin cable (7M5 - 7M7) GWR probes

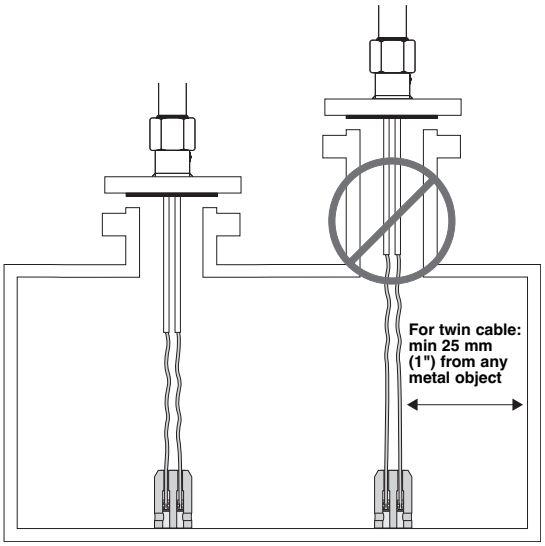
Mounting considerations for 7MB

Nozzle should be DN80 (3") diameter or larger.



Mounting considerations for 7M5/7M7

For nozzles < DN80 (3") diameter, the bottom of the inactive section of the probe should be flush with the bottom of the nozzle or extend into the vessel.



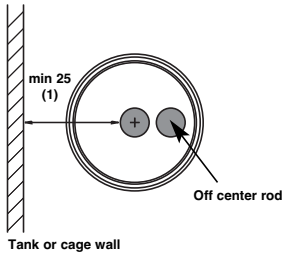
Overfill safe and Overfill proof

Eclipse twin rod GWR probes use software to ignore level readings in the transitioning zone at the top of the GWR probe. The maximum level is a minimum of 150 mm (6") below the process connection. This may include utilizing a nozzle or spool piece to raise the probe. Twin rod probes are overfill proof certified but not overfill safe in use.

Eclipse twin cable GWR probes, used in media with low dielectrics (hydrocarbons, powders) may require the setting of a blocking distance (zone in which the unit will not measure) of 300 mm up to 500 mm (12" to 20") depending probe length. The longer the probe, the longer the blocking distance will be. Eclipse twin cable GWR probes are not overfill proof certified and not overfill safe in use.

Metallic (or any conductive) obstructions in the tanks

Objects in the proximity within 25 mm (1") or closer such as pipes, support beams, metal ladders etc… may cause erroneous readings.



Turbulence

7MB: Customer supplied brackets are recommended per each 3 m (10') length and have no influence on the measuring performance of 7MB GWR probes. Use the “off center” rod to fasten the brackets (see above drawings).

7M5/7M7: It is recommended to secure the probe if significant turbulence exists. Optional weights are available to keep the probe taught. The probe should not make any contact with the metal tank wall. The 7M7 (liquids) probe can be attached to the bottom of the tank – it is not recommended to attach the 7M5 (solids) probe at the bottom of the tank.

Stillwell/cages

Min. 3" / DN 80 size nozzles, stillwells or by-pass cages are required for a good operation. Twin rod/cable probes should be min 25 mm (1") away from any metal tank wall. 7M5/7M7 have a 76 mm (3") inactive section. For nozzles < 3"/ DN 80, this section should be flush with the bottom of the nozzle or extend into the vessel.

IMPORTANT:
Twin rod/cable probes should be installed into a metal tank, stillwell or by-pass cage to meet CE requirements (EN 61326: 1997 + A1 + A2) electromagnetic compatibility.

MOUNTING

Twin rod (7MB) / Twin cable (7M5 - 7M7) GWR probes

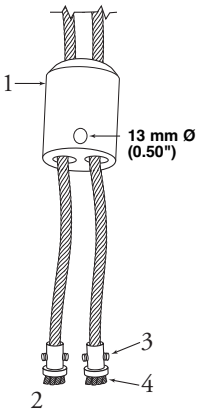
Shortening of probe length

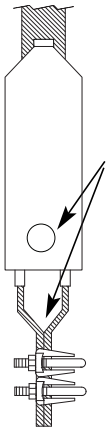
7MB probes can be shortened safely in the field. Make sure to re-install the bottom spacer for proper alignment and to adapt the probe length/ 4-20 mA settings in the menu.

Twin cable probes can be safely shortened in the field using below procedure. Make sure to adapt the probe length / 4-20 mA settings in the menu.

7M7/7M5 probe can be shortened in field.

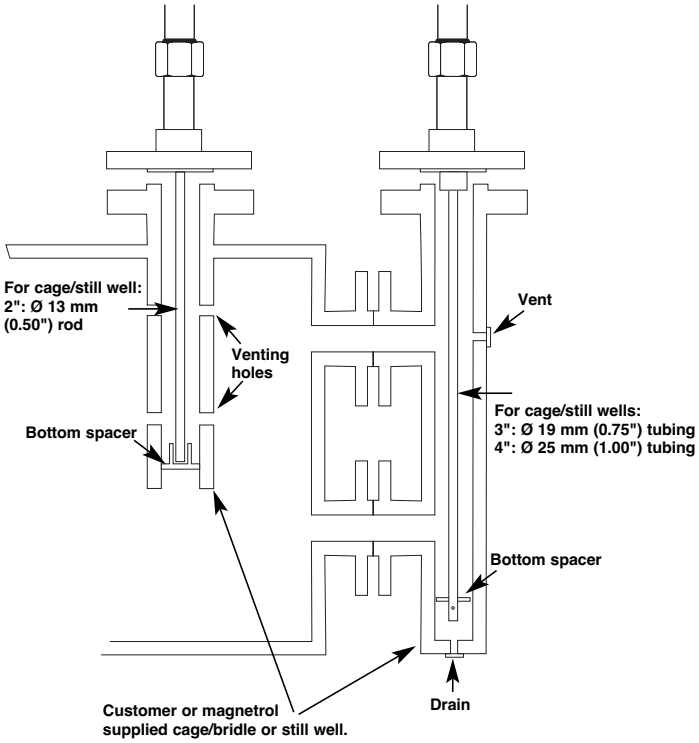
a. raise the weight (1) to expose the two securing devices (2)
b. loosen the two #10-32 set screws (3) on both securing devices using a 2.5 mm (3/32") hex wrench and slide the securing devices off of the probe
c. slide the TFE weight off of the probe.
d. cut and remove the required cable (4) length
e. remove 90 mm (3 1/2") of the rib between the two cables
f. strip 16 mm (5/8") of coating from the two cables.
g. slide the TFE weight back on to the probe.
h. enter new probe length (cm or inches) in software (See page 12, Item 9)





Note: Probe can be attached to the tank bottom using the noose or the 13 mm Ø (0.50") hole provided in the TFE weight.
7M7 GWR probes: cable tension should not exceed 89 N
7M5 GWR probes: pull down force should not exceed 1360 kg (3000 lbs)

Cage GWR probe (7MG)



Overfill safe

All 7MG GWR probes are overfill safe. Overfill safe means that the impedance match of the waveguide (probe) is aligned from electronics down to the bottom of the GWR probe. This allows the Eclipse 705 to measure up to the process flange without any dead zone at the top of the GWR probe.

Metallic (or any conductive) obstructions in the tanks

Metallic obstructions have no influence on the measuring performance of cage GWR probes.

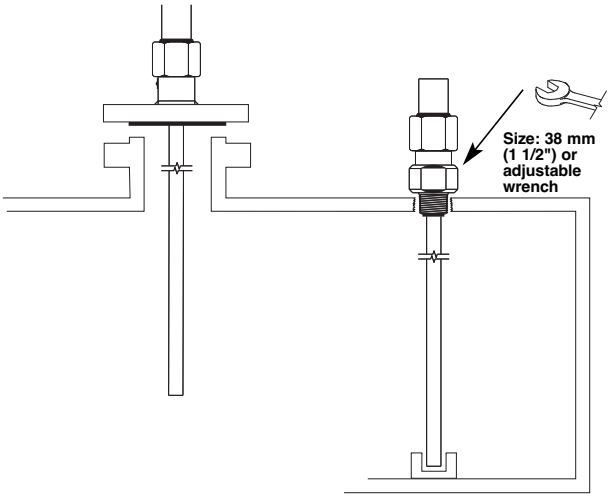
Stillwell/cages

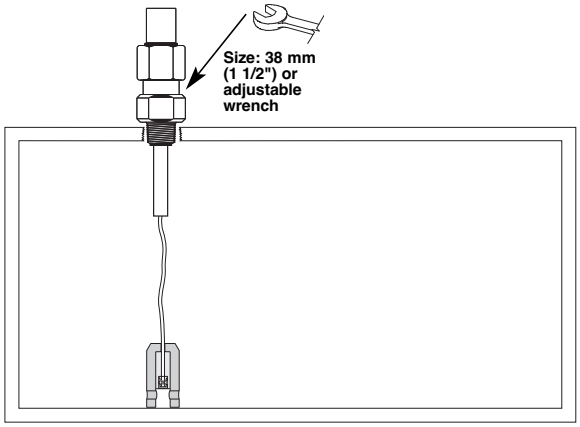
The cage GWR probe is a single rod GWR probe which uses an existing or new cage, bridle or schedule pipe stillwell to re-create the same propagation of signal of a coaxial GWR probe. Cage GWR probes are suited for 2", 3" or 4" size diam. and use an impedance matching part that aligns in the same way with the characteristic impedance of a standard coaxial style GWR probe.

Shortening of probe length

Cage GWR probes can be easily shortened on site. Always re-install the bottom spacer and adapt the new probe length in the menu of the amplifier.

Single rod (7MF - 7MH - 7MJ) / Single cable (7M1 - 7M2) GWR probes





High Level shutdown and Overfill protection

Special consideration is necessary in any high level shutdown / overfill protection application where single rod GWR probes are used. To ensure proper measurement, the guided wave radar probe should be installed so the maximum overfill level is at a minimum of 120 mm (4.8") up to 910 mm (36") – blocking distance depending application below the process connection. Consult factory for further information.

Metallic (or any conductive) obstructions in the tanks

Objects in the proximity of the probe may cause erroneous readings.

Distance to probe	Acceptable objects
< 150 mm (6")	Continuous, smooth, parallel, conductive surface (e.g. metal tank wall); probe should not touch tank wall
> 150 mm (6")	< 1"/DN25 diameter pipe and beams, ladder rungs
> 300 mm (12")	< 3"/DN80 diameter pipe and beams, concrete walls
> 450 mm (18")	All remaining objects

Turbulence

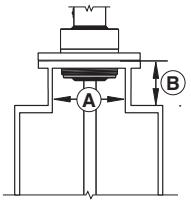
The bottom of the probe should be stabilized if turbulence will cause a deflection of more than 75 mm at 3 m (3" at 10') of length. Optional bottom spacers in TFE (for 7MF) or PEEK (for 7MJ) should be used to stabilize the probe, in case turbulence exists. It is recommended to secure the probe (7M1/7M2) if significant turbulence exists (see above drawing at right side). Optional weights are available to keep the probe taught. The 7M1 (liquids) probe can be attached to the bottom of the tank – it is not recommended to attach the 7M2 (solids) probe at the bottom of the tank. The probe should not make any contact with the metal tank wall.

Stillwell/cages

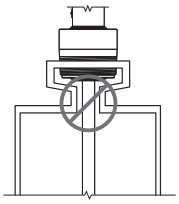
Max. 6" / DN 150 size stillwells or by-pass cages or a metal tank wall within 150 mm (6") of the probe, will allow the unit to measure accurately in media with dielectrics down to ε_r 1,9.

Nozzles do not restrict the performance by ensuring the following:

1. Nozzle must be 50 mm (2") or larger diameter.
2. Nozzle inside diameter **(A)** should be ≥ to nozzle height **(B)**. If this is not the case, it is recommended to adjust BLOCKING DISTANCE and/or SENSITIVITY settings.



Correct installation



Pipe reducers should not be used

IMPORTANT:
Single rod/cable probes should be installed into a metal tank, stillwell or by-pass cage to meet CE requirements (EN 61326: 1997 + A1 + A2) electromagnetic compatibility.

When used in a non-metallic vessel flange (metal) mounting is recommended for optimal performance.

MOUNTING

Single rod (7MF - 7MH - 7MJ) / Single cable GWR probes

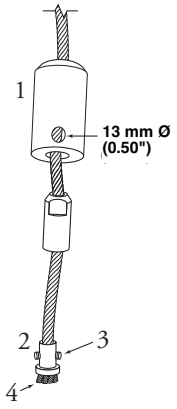
Shortening of probe length

Single rod/cable probes can be shortened safely in the field. Make sure to adapt the probe length/ 4-20 mA settings in the menu and the re-install of a bottom spacer when applicable.

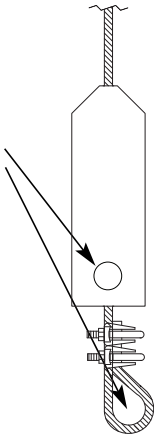
Single cable probes can be safely shortened in the field using below procedure. Make sure to adapt the probe length/ 4-20 mA settings in the menu.

7M1/7M2 probe can be shortened in field.

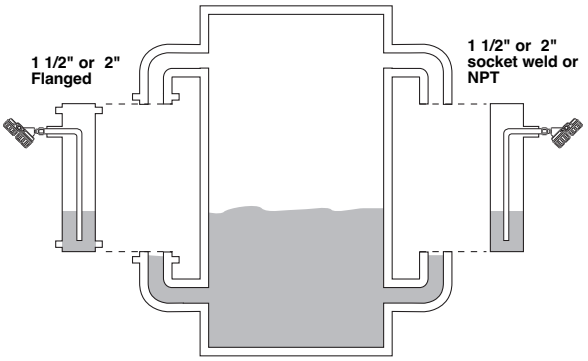
a. raise TFE weight (1) exposing securing device (2)
b. loosen both #10-32 set screws (3) using 2.5 mm (3/32") hex wrench and remove securing device
c. cut and remove needed cable length (4)
d. re-attach securing device (2) and tighten screws
e. enter new probe length (cm or inches) in software (See page 12, Item 9)



Note: Probe can be attached to the tank bottom using the noose or the 13 mm Ø (0.50") hole provided in the TFE weight.
7M1 GWR probes: cable tension should not exceed 89 N (20 lbs).
7M2 GWR probes: pull down force should not exceed 1360 kg (3000 lbs)



Top/Bottom GWR probes (7EK)



Overfill safe and Overfill proof

Eclipse 7EK GWR probes are “Overfill safe” in use and “Overfill proof” certified.

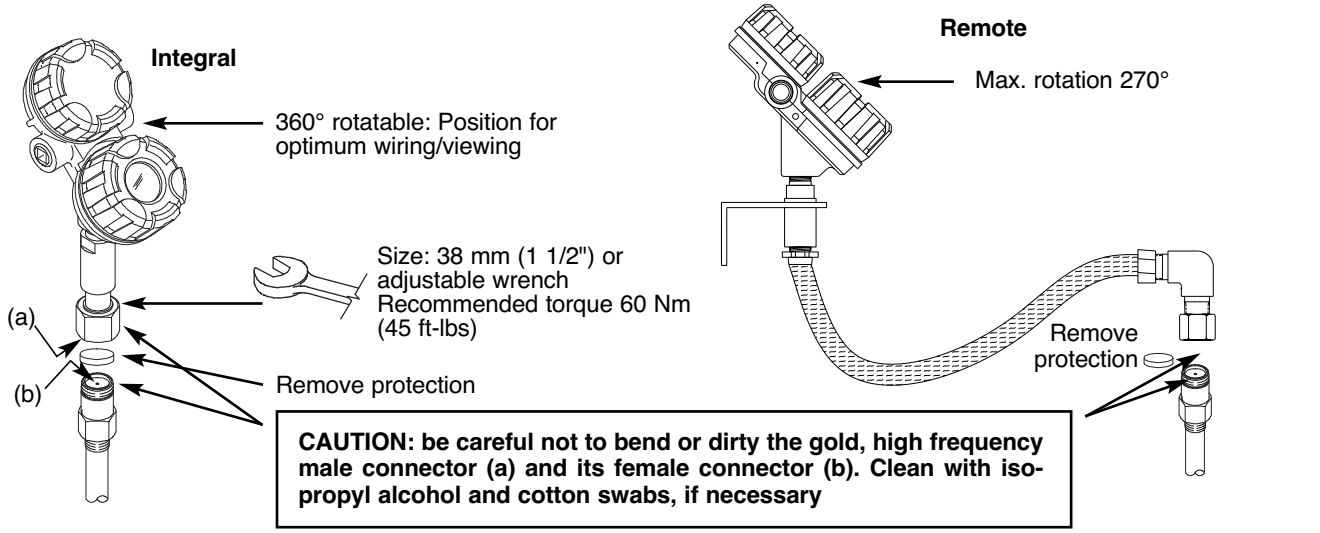
Overfill safe means that the unit is capable to measure up to the process connection. Units with “non overfill safe” probes use software to ignore level readings in the blocking distance or transitioning zone. When level rises too high in this zone, the unit may consider the end of probe reflection as the real level and may report an empty vessel instead of an overfilling vessel.

Overfill proof protection (such as WHG or VLAREM) certifies reliable operation when the transmitter is used as overfill alarm but assumes that the installation is designed in such way that the vessel/cage cannot overfill.

The 7EK probe is designed to replace without modification top/bottom mounted displacer transmitters. The unit will measure over the entire probe length and indicate for 20.5 mA above the highest measurable point and 3.8 below the lowest measurable point.

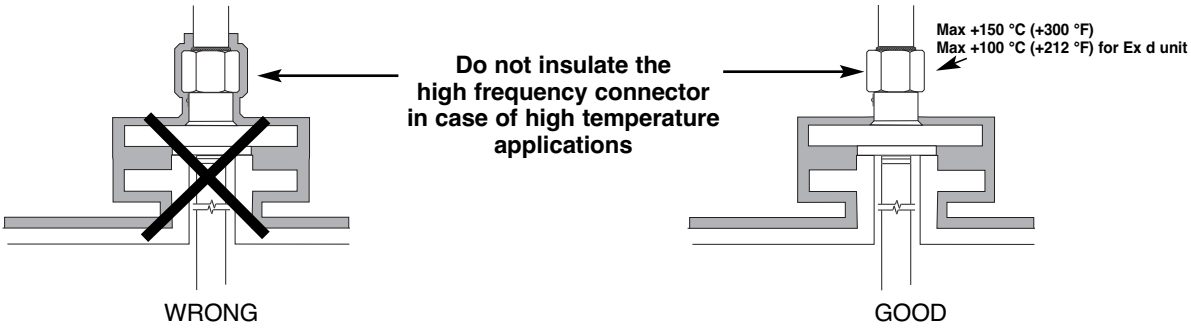
MOUNTING

Transmitter



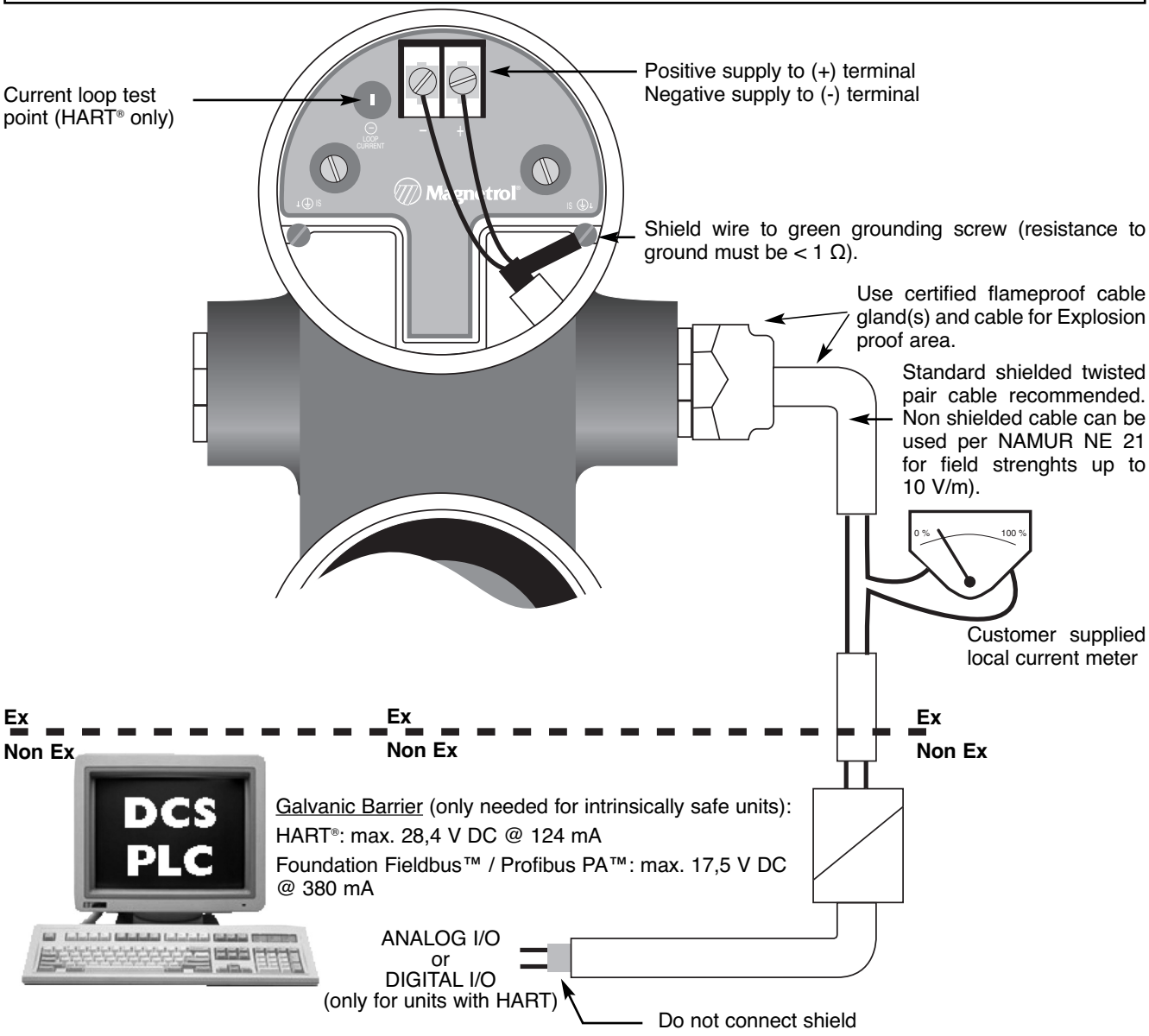
CAUTION: be careful not to bend or dirty the gold, high frequency male connector (a) and its female connector (b). Clean with iso-propyl alcohol and cotton swabs, if necessary

Insulation



WIRING

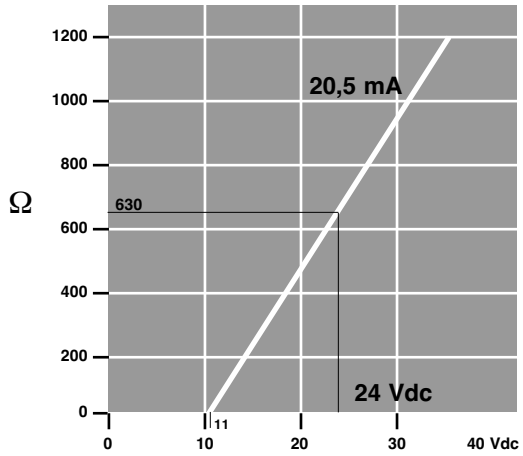
CAUTION: power must be switched OFF before wiring the unit.



IMPORTANT:

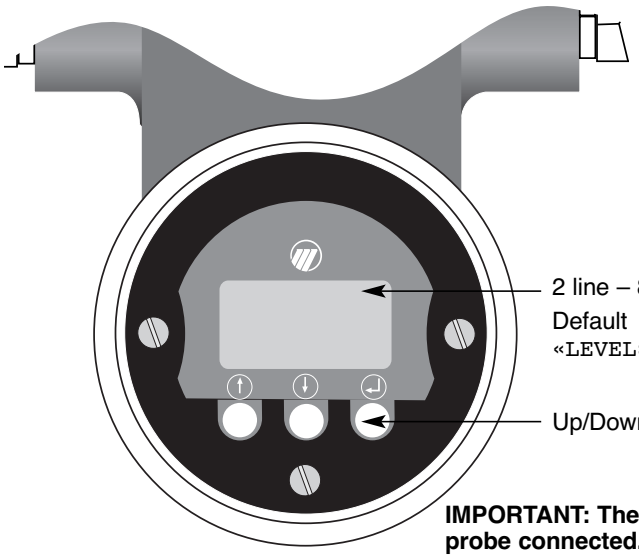
The shield wire should only be grounded at ONE side only. It is recommended to connect the shield to ground in the field (at the transmitter side - as shown above) but connecting in the control room is also allowed.

LOOP RESISTANCE



CONFIGURATION

NOTE: When connected to an approved barrier, the intrinsically safe electronics of the Eclipse allow to remove the covers with power switched on – even if the area is known to be hazardous



2 line – 8 characters LCD

Default display cycles every 5 s through Status «STATUS» / Level «LEVEL» / % output «% OUTPUT» / Loop «LOOP».

Up/Down and Enter pushbuttons

IMPORTANT: The Eclipse amplifier can be bench configured without GWR probe connected. Ignore the start up message «No Level Signal» / «STATUS» / «WeakSgnl» **in this case.**

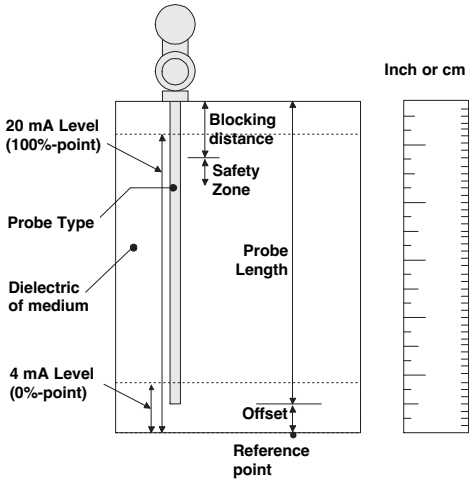
Display	Action	Comment
Units! cm	Press ↵:	The last character on the first line of the display changes to «!». This sign confirms that the values/choices of the second line can be modified via the ↓ and ↑ push buttons.
Units! **cm**	Press ↑ ↓	* Scroll through the choices or increase/decrease the values on the second line of the display by ↓ and ↑ pushbuttons. * Accept values/choices as selected by ↵ pushbutton.
Units cm	Press ↑ ↓	Scroll through the menu.

PASSWORD

DISPLAY	ACTION	COMMENT
Ent Pass 0	Display shows «0»	Factory default setting Data is not protected
Ent Pass! 1	Press ↵ and last character changes into «!» Enter your personal password with ↑ and ↓ (any value between 1 and 255) Press ↵ to confirm	Setting password
	Press ↵ and enter old password Press ↵ and last character changes into «!» Enter your new password with ↑ and ↓ (any value between 1 and 255) Press ↵ to confirm	Changing password
New Pass 4096	Display shows an encrypted value, enter your password or call Magnetrol for assistance to recoop your password if necessary	Data is protected by a valid Password

NOTE: Password protection is activated when after 5 minutes no keystrokes are sensed.

TERMINOLOGY



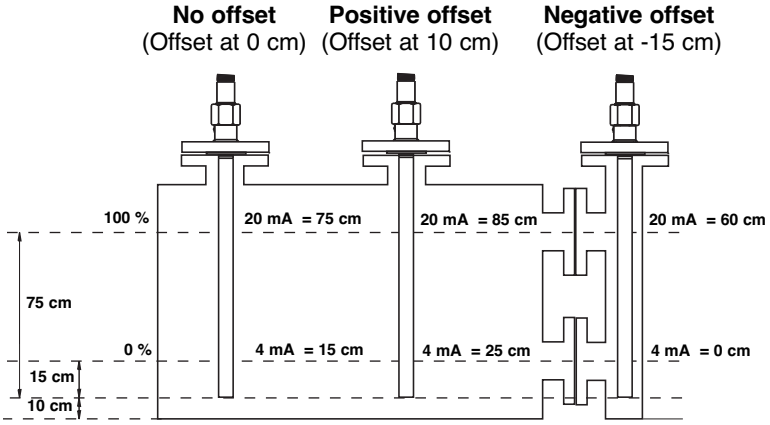
Offset = ☐ cm or inches
The offset is the distance between reference point (e.g. bottom of tank) and end of probe. From the reference point both 4 mA and 20 mA levels are calibrated. When offset is set at zero, the end of the probe is the reference point.

4 mA Level = ☐ cm or inches
or zero level point, is measured from the reference point. The unit has a transition zone at the bottom of the probe. Min. level to enter for media with:
εr = 2.0: 150 mm (6") + Offset
εr = 80: 25 mm (1") + Offset

20 mA Level = ☐ cm or inches
or 100 % level point, is measured from the reference point. The unit has a transition zone at the top of the probe. Transition zone varies depending on probe type and media: see probe specifications page 34 and continuing.

Probe length = ☐ cm or inches, record the exact probe length as printed on the nameplate: 705-xxxx-xxx / 7Mx-xxx-xxx

Dielectric Select the dielectric scale of the media to measure: **1.4–1.7** or **1.7–3** or **3–10** or **10–100**. When the dielectric is known, it will enhance the overall accuracy of the unit but select the dielectric scale ALWAYS to the lowest expected dielectricum.



Safety zone: In addition to the blocking distance, the user can introduce a safety zone to warn for liquid level entering this zone beneath the blocking distance. The loop signal will shift in this zone to a selectable fault signal. The unit will go to normal read out, when level drops lower than the safety zone, unless a latched fault signal is used. The safety zone is disabled from factory. Safety zone related settings include:
«`SZ Fault`»: to select the preferred error signal
«`SZ Height`»: to define the safety zone area
«`SZ Alarm Reset`»: to manually reset a latched «`SZ Fault`»

BEFORE STARTING

Start from run mode:

1. Select the desired language for configuration: English, French, German or Spanish in the language screen (32) «`language`». Scroll up for quickly reaching the language selection screen.
2. Define type of measurement:
   a. Level only (pages 12 & 13)
   b. Level and Volume (pages 14 & 15)
   c. Interface only (pages 16 & 17)
   d. Interface and Volume (pages 18 & 19)
   Scroll down until the screen reads «`MeasType`». The unit will now show only the applicable screens for the selected type of measurement.
3. Scroll one screen down and select the applicable engineering unit in «`LvlUnits`», all configuration values will be entered in that engineering unit.
4. Move to the loop control screen «`LoopCtrl`», select the loop control in function of the type of measurement «`MeasType`» selected.
5. Refer to the configuration procedure of the selected type of measurement.
6. Refer to page 20 for all hidden diagnostic screens and advanced configuration parameters. These screens allow the advanced user to configure the unit for special applications or to troubleshoot the unit in the field. It is NOT recommended to access this toolset without proper guidance or having followed proper training.

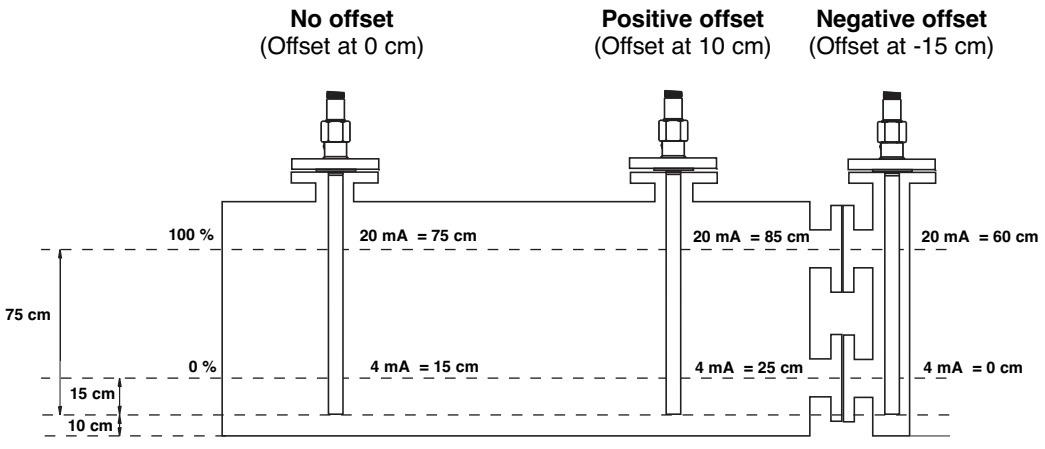
MENU: STEP BY STEP PROCEDURE – Eclipse 705: Level only

		Screen	Action	Comment
Run mode	①	*Status* *Level* *%Output* *Loop*	Transmitter Display	Transmitter default values cycle every 5 seconds. Status «Status», Level «Level», % Output «% Output», and Loop «Loop».
	②	Level xx.x	Transmitter Display	Transmitter displays level value in selected engineering units.
	③	%Output xx.x%	Transmitter Display	Transmitter displays % Output measurement derived from 20 mA span.
	④	Loop xx.xx mA	Transmitter Display	Transmitter displays Loop measurement (mA).
Configuration	⑤	PrbModel (select)	**Select** the type of probe	Select as per the 3 first digits of the probe partnumber. The partnumber is shown on the nameplate: e.g. 705-510A-A11/7MT-A230-218, select 7xT-x from the list.
	⑥	PrbMount (select)	**Select** the type of probe mounting.	Select NPT «NPT», BSP «BSP» or Flange «Flange». (consult factory when a «7xK» GWR probe is used)
	⑦	MeasType (select)	**Select** the type of measurement	Select level «Levl Only».
	⑧	LvlUnits (select)	**Select** units for level	cm «cm», m «m», inches «inches» or feet «feet».
	⑨	Probe Ln xxx.x	**Enter** the exact length of probe.	Enter as per the 3 last digits of the probe partnumber on the nameplate: - rigid probes, enter value cm or inches, - flexible probes, enter value in meters or feet e.g. 705-510A-A11/7MR-A230-218, enter «218» cm probe length.
	⑩	Lvl Ofst xxx.x	**Enter** the offset value.	When entering configuration values from the end of the probe is cumbersome, an offset can be introduced to determine a new reference point. This reference point can be either below the probe (positive offset) or at the probe (negative offset). See page 11 “Terminology”.
	⑪	Dielctrc (Select)	**Enter** the dielectric range value of the media	Select: «1.4–1.7»; «1.7–3»; «3–10» or «10–100» «1.7–3» is recommended for dielectrics ≥ 1,7
	⑫	Senstvty xxx	**Enter** sensitivity value	Allows fine adjustment of internal gain.
	⑬	Loop Ctrl (Select)	**Select** primary variable (PV)	Primary variable is the loop controlling parameter. Select level «Lvl only»
	⑭	Set 4mA xxx.x	**Enter** the level value for the 4 mA point.	A transition zone may exist at the bottom of the probe. See Functional Specifications Probe, see page 34 and continuing.
	⑮	Set 20mA xxx.x	**Enter** the level value for the 20 mA point.	A transition zone / blocking distance may exist at the top of the probe. See Functional Specifications Probe, see page 34 and continuing.
	⑯	Damping xx sec	**Enter** the damping factor.	A Damping factor (1-10 seconds) may be added to smooth a noisy display and/or output due to turbulence.
	⑰	Fault (Select)	**Enter** the value for error.	Select «3.6 mA», «22 mA» or hold last value «HOLD». In case of loop failure, error signal will follow the failing trend; meaning the unit will show 3.6 mA when the reviewed loop current by the device is found too low. The unit will show 22 mA in case the reviewed loop current is found too high.

= **Quick Start up**

	Screen	Action	Comment
Diagnostics	⑱ BlockDis xx.x	**Enter** distance in selected level units	Allows to ignore level measurements near the top of the probe, caused by e.g. condensation, crystalization. Make sure that the liquid level does NOT enter this zone. Consult factory or the 'Troubleshooting' section before entering any value. Normaly to be used with single rod probe.
	⑲ SZ Fault (select)	Select the safety zone fault.	Select «None» (None), «3.6mA», «22mA», «Latch 3.6mA» or «Latch 22mA». When either «Latch 3.6 / 22mA» signals is selected, the loop current remains in alarm until it is manually cleared with the «SZAlarm» screen (for safety zone explanation see Terminology - page 11).
	⑳ SZHeight xx.x	Select the safety zone value	Enter safety zone in cm or inches (see Terminology - page 11).
	㉑ SZ Alarm Reset	Reset safety zone latch fault	Clear a latched safety zone alarm «SZFault».
	㉒ Threshld (select)	Select the type of threshold	«Fixed» = the first reflection from the top will be considered as level (default setting) «CFD» = the strongest reflection from the top will be considered as level. Only change to «CFD», in case the unit is reading incorrect level. Adjustment of trim level «Trim Lvl» may be necessary when threshold is changed.
	㉓ Poll Adr xx	Enter HART ID number.	Select a HART poll address (0-15). Enter 0 for a single transmitter installation.
	㉔ Loop Mode	Enable/Disable	Determines whether the loop is fixed at 4.0 mA or controlled by the PV.
	㉕ Trim Lvl xx.x	Enter value to adjust level reading.	Allows to compensate for a fixed level deviation.
	㉖ Trim 4 xxxx	Fine tune the 4 mA point.	Attach a mA meter to the output. If the output does not equal 4.0 mA, adjust the value on the display to equal 4.00 mA.
	㉗ Trim 20 xxxx	Fine tune the 20 mA point.	Attach a mA meter to the output. If the output does not equal 20.0 mA, adjust the value on the display to equal 20.00 mA.
	㉘ Loop Tst xx.x mA	Enter a mA output value.	Set mA Output to any given value to perform loop test .
	㉙ LvlTicks xxxxx	Diagnostic display.	Shows time of flight from fiducial pulse to reflected signal from level.
	㉚ New Pass xxx	Enter new password.	Use arrows to select desired value. Values between 0 and 255.
	㉛ Language	Select language	Select «English», «Français», «Deutsch» or «Espagnol».
	㉜ Mdl705HT Ver xx.xx	None, do not adjust.	Factory setting. «Ver» refers to software version.
	㉝ DispFact (select)	Advanced diagnostics.	See page 20.

OFFSET



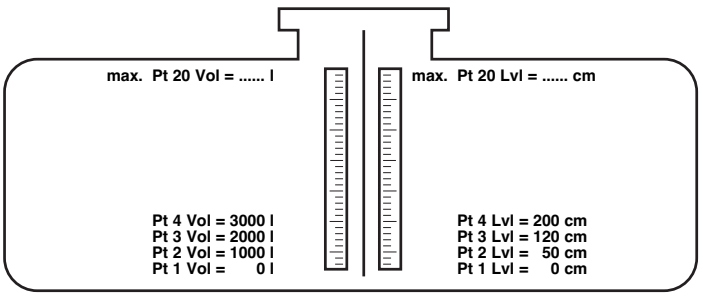
MENU: STEP BY STEP PROCEDURE – Eclipse 705: Level & Volume

	Screen	Action	Comment
Run mode	① *Status* *Volume* *%Output* *Loop*	Transmitter Display	Transmitter default values cycle every 5 seconds. Status «Status», Volume «Volume», % Output «% Output», and Loop «Loop».
	② Volume xxx	Transmitter Display	Transmitter displays Volume Value in selected engineering units.
	③ %Output xx.x%	Transmitter Display	Transmitter displays % Output measurement derived from 20 mA span.
	④ Loop xx.xx mA	Transmitter Display	Transmitter displays Loop measurement (mA).
Configuration	⑤ Level xxx	Transmitter Display	Transmitter displays level in selected volume units «LvlUnits».
	⑥ PrbModel (select)	**Select** the type of probe	Select as per the 3 first digits of the probe partnumber. The partnumber is shown on the nameplate: e.g. 705-510A-A11/7MT-A230-218, select 7xT-x from the list.
	⑦ PrbMount (select)	**Select** the type of probe mounting.	Select NPT «NPT», BSP «BSP» or Flange «Flange». (consult factory when a «7xK» GWR probe is used)
	⑧ MeasType (select)	**Select** the type of measurement	Select level and volume «Lvl&Vol».
	⑨ LvlUnits (select)	**Select** units for level	cm «cm», m «m», inches «inches» or feet «feet».
	⑩ Probe Ln xxx.x	**Enter** the exact length of probe.	Enter as per the 3 last digits of the probe partnumber on the nameplate: - rigid probes, enter value cm or inches, - flexible probes, enter value in meters or feet e.g. 705-510A-A11/7MR-A230-218, enter «218» cm probe length.
	⑪ Lvl Ofst xxx.x	**Enter** the offset value.	When entering configuration values from the end of the probe is cumbersome, an offset can be introduced to determine a new reference point. This reference point can be either below the probe (positive offset) or at the probe (negative offset). See page 11 “Terminology”.
	⑫ VolUnits (select)	**Select** units for volume	Liters «l» or gallons «g».
	⑬ StrapTbl xx pnts	**Enter** level/volume pairs in max 20 steps	Liters «l» or gallons «g».
	⑭ Dielctrc (Select)	**Enter** the dielectric range value of the media	Select: «1.4–1.7»; «1.7–3»; «3–10» or «10–100» «1.7–3» is recommended for dielectrics ≥ 1,7
	⑮ Senstvty xxx	**Enter** sensitivity value	Allows fine adjustment of internal gain.
	⑯ Loop Ctrl (Select)	**Select** primary variable (PV)	Primary variable is the loop controlling parameter. Select level «Lvl only» or volume «volume»
	⑰ Set 4mA xxx.x	**Enter** the level value for the 4 mA point.	A transition zone may exist at the bottom of the probe. See Functional Specifications Probe, see page 34 and continuing.
	⑱ Set 20mA xxx.x	**Enter** the level value for the 20 mA point.	A transition zone / blocking distance may exist at the top of the probe. See Functional Specifications Probe, see page 34 and continuing.
	⑲ Damping xx sec	**Enter** the damping factor.	A damping factor (1-10 seconds) may be added to smooth a noisy display and/or output due to turbulence.
	⑳ Fault (Select)	**Enter** the value for error.	Select «3.6 mA», «22 mA» or hold last value «HOLD». In case of loop failure, error signal will follow the failing trend; meaning the unit will show 3.6 mA when the reviewed loop current by the device is found too low. The unit will show 22 mA in case the reviewed loop current is found too high.

= **Quick Start up**

	Screen	Action	Comment
Advanced configuration	㉑ BlockDis x.x	**Enter** distance in selected level units	Allows to ignore level measurements near the top of the probe, caused by e.g. condensation, crystalization. Make sure that the liquid level does NOT enter this zone. Consult factory or the 'Troubleshooting' section before entering any value. Normaly to be used with single rod probe.
	㉒ SZ Fault (select)	Select the safety zone fault.	Select «None» (None), «3.6mA», «22mA», «Latch 3.6mA» or «Latch 22mA». When either «Latch 3.6 / 22mA» signals is selected, the loop current remains in alarm until it is manually reset with the «SZAlarm» reset screen (for safety zone explanation see Terminology - page 11).
	㉓ SZHeight xx.x	Select the safety zone value	Enter safety zone in cm or inches (see Terminology - page 11).
	㉔ SZ Alarm Reset	Reset safety zone latch fault	Select «Reset» «No» or «Yes» to reset alam when either «Latch 3.6mA» or «Latch 22mA» was selected in «SZFault».
	㉕ Threshld (select)	Select the type of threshold	«Fixed» = the first reflection from the top will be considered as level (default setting) «CFD» = the strongest reflection from the top will be considered as level. Only change to «CFD», in case the unit is reading incorrect level. Adjustment of trim level «Trim Lvl» may be necessary when threshold is changed.
	㉖ Poll Adr xx	Enter HART ID number.	Select a HART poll address (0-15). Enter 0 for a single transmitter installation.
	㉗ Loop Mode	Enable/Disable	Determines whether the loop is fixed at 4.0 mA or controlled by the PV.
	㉘ Trim Lvl xx.x	Enter value to adjust level reading.	Allows to compensate for a fixed level deviation.
	㉙ Trim 4 xxxx	Fine tune the 4 mA point.	Attach a mA meter to the output. If the output does not equal 4.0 mA, adjust the value on the display to equal 4.00 mA.
	㉚ Trim 20 xxxx	Fine tune the 20 mA point.	Attach a mA meter to the output. If the output does not equal 20.0 mA, adjust the value on the display to equal 20.00 mA.
Diagnostics	㉛ Loop Tst xx.x mA	Enter a mA output value.	Set mA Output to any given value to perform loop test.
	㉜ LvlTicks xxxxx	Diagnostic display.	Shows time of flight from fiducial pulse to reflected signal from level.
	㉝ New Pass xxx	Enter new password.	Use arrows to select desired value. Values between 0 and 255.
	㉞ Language	Select language	Select «English», «Français», «Deutsch» or «Espagnol».
	㉟ Mdl705HT Ver xx.xx	None, do not adjust.	Factory setting. «Ver» refers to software version.
	㊱ DispFact (select)	Advanced diagnostics.	See page 20.

Strapping table



NOTE: Consult page 13 for level offset «Lvl Ofst» details.

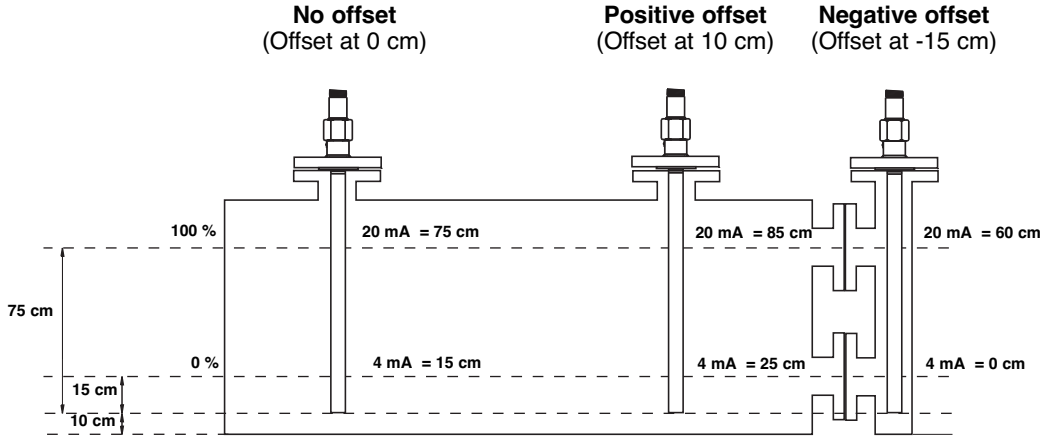
MENU: STEP BY STEP PROCEDURE – Eclipse 705: Interface

		Screen	Action	Comment
Run mode	①	*Status* *IfcLevel* *%Output* *Loop*	Transmitter Display	Transmitter default values cycle every 5 seconds. Status «Status», Interface level «Ifclevel», % Output «% Output», and Loop «Loop».
	②	IfcLevel xx.x	Transmitter Display	Transmitter displays interface level in selected engineering units.
	③	%Output xx.x%	Transmitter Display	Transmitter displays % Output measurement derived from 20 mA span.
	④	Loop xx.xx mA	Transmitter Display	Transmitter displays Loop measurement (mA).
Configuration	⑤	Level xxx	Transmitter Display	Transmitter displays interface level in selected level units «LvlUnits».
	⑥	PrbModel (select)	**Select** the type of probe	Select as per the 3 first digits of the probe partnumber. The partnumber is shown on the nameplate: e.g. 705-510A-A11/7MT-A230-218, select 7xT-x from the list.
	⑦	PrbMount (select)	**Select** the type of probe mounting.	Select NPT «NPT», BSP «BSP» or Flange «Flange». (consult factory when a «7xK» GWR probe is used)
	⑧	MeasType (select)	**Select** the type of measurement	Select interface «Interface».
	⑨	LvlUnits (select)	**Select** units for level	cm «cm», m «m», inches «inches» or feet «feet».
	⑩	Probe Ln xxx.x	**Enter** the exact length of probe.	Enter as per the 3 last digits of the probe partnumber on the nameplate: - rigid probes, enter value cm or inches, - flexible probes, enter value in meters or feet e.g. 705-510A-A11/7MR-A230-218, enter «218» cm probe length.
	⑪	Lvl Ofst xxx.x	**Enter** the offset value.	When entering configuration values from the end of the probe is cumbersome, an offset can be introduced to determine a new reference point. This reference point can be either below the probe (positive offset) or at the probe (negative offset). See page 11 “Terminology”.
	⑫	Upr Diel (Select)	**Enter** the dielectric range value of the upper media.	Enter the dielectrics of the upper layer liquid (between 1,4 and 5,0) – only upper layer dielectrics need to be entered.
	⑬	Dielctrc (Select)	**Select** the dielectric range value of the lower media	Select: «10–100»
	⑭	Senstvty xxx	**Enter** sensitivity value	Allows fine adjustment of internal gain.
	⑮	Loop Ctrl (Select)	**Select** primary variable (PV)	Primary variable is the loop controlling parameter. Select interface level «Ifc Level» or top level «Lvl Only»
	⑯	Set 4mA xxx.x	**Enter** the level value for the 4 mA point.	A transition zone may exist at the bottom of the probe. See Functional Specifications Probe, see page 34 and continuing.
	⑰	Set 20mA xxx.x	**Enter** the level value for the 20 mA point.	A transition zone / blocking distance may exist at the top of the probe. See Functional Specifications Probe, see page 34 and continuing.
	⑱	Damping xx sec	**Enter** the damping factor.	A damping factor (1-10 seconds) may be added to smooth a noisy display and/or output due to turbulence.
	⑲	Fault (Select)	**Enter** the value for error.	Select «3.6 mA», «22 mA» or hold last value «HOLD». In case of loop failure, error signal will follow the failing trend; meaning the unit will show 3.6 mA when the reviewed loop current by the device is found too low. The unit will show 22 mA in case the reviewed loop current is found too high.

= **Quick Start up**

	Screen	Action	Comment
Advanced configuration	⑳ BlockDis x.x	**Enter** distance in selected level units	Allows to ignore level measurements near the top of the probe, caused by e.g. condensation, crystalization. Make sure that the liquid level does NOT enter this zone. Consult factory or the 'Troubleshooting' section before entering any value. Normaly to be used with single rod probe.
	㉑ SZ Fault (select)	Select the safety zone fault.	Select «None» (None), «3.6mA», «22mA», «Latch 3.6mA» or «Latch 22mA». When either «Latch 3.6 / 22mA» signals is selected, the loop current remains in alarm until it is manually reset with the «SZAlarm» reset screen (for safety zone explanation see Terminology - page 11).
	㉒ SZHeight xx.x	Select the safety zone value	Enter safety zone in cm or inches (see Terminology - page 11).
	㉓ SZ Alarm Reset	Reset safety zone latch fault	Clear a latched safety zone alarm «SZFault».
	㉔ Threshld	Select top level threshold.	Default selection for most common applications is «Fixed».
	㉕ IfcThrs (select)	Select interface threshold.	Default selection for all applications is «CFD». In case the unit does not track the correct interface layer, select «Fixed».
	㉖ Poll Adr xx	Enter HART ID number.	Select a HART poll address (0-15). Enter 0 for a single transmitter installation.
	㉗ Loop Mode	Enable/Disable	Determines whether the loop is fixed at 4.0 mA or controlled by the PV.
	㉘ Trim Lvl xx.x	Enter value to adjust level reading.	Allows to compensate for a fixed level deviation.
	㉙ Trim 4 xxxx	Fine tune the 4 mA point.	Attach a mA meter to the output. If the output does not equal 4.0 mA, adjust the value on the display to equal 4.00 mA.
	㉚ Trim 20 xxxx	Fine tune the 20 mA point.	Attach a mA meter to the output. If the output does not equal 20.0 mA, adjust the value on the display to equal 20.00 mA.
Diagnostics	㉛ Loop Tst xx.x mA	Enter a mA output value.	Set mA Output to any given value to perform loop test .
	㉜ LvlTicks xxxxx	Diagnostic display.	Shows time of flight from fiducial pulse to reflected signal from level.
	㉝ IfcTicks xxxx	Diagnostic display.	Shows time of flight through the upper liquid layer.
	㉞ Medium	Diagnostic display.	Shows type of detected upper liquid; unknown «Unknown» oil only «Oil Only», thin oil layer «Thin Oil», thick oil layer «Thick Oil», or no level «Dry Probe».
	㉟ New Pass xxx	Enter new password.	Use arrows to select desired value. Values between 0 and 255.
	㊱ Language	Select language	Select «English», «Français», «Deutsch» or «Espagnol».
	㊲ Mdl705HT Ver xx.xx	None, do not adjust.	Factory setting. «Ver» refers to software version.
	㊳ DispFact (select)	Advanced diagnostics.	See page 20.

OFFSET



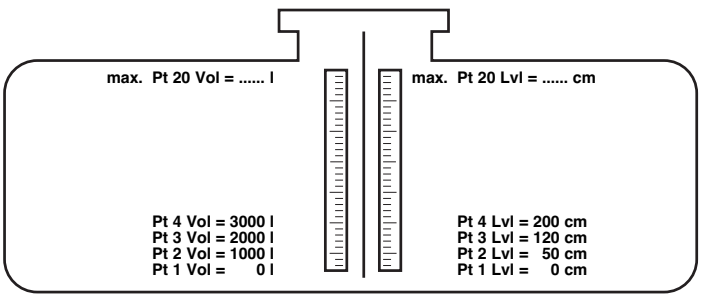
MENU: STEP BY STEP PROCEDURE – Eclipse 705: Interface & Volume

		Screen	Action	Comment
Run mode	1	*Status* *IfcVol* *%Output* *Loop*	Transmitter Display	Transmitter default values cycle every 5 seconds. Status «Status», Interface volume «IfcVolume», % Output «% Output», and Loop «Loop».
	2	IfcLevel or Ifc Vol	Transmitter Display	Transmitter displays Interface volume or Interface level in selected engineering units (depending selection in Loop control «Loop Ctrl»
	3	%Output xx.x%	Transmitter Display	Transmitter displays % Output measurement derived from 20 mA span.
	4	Loop xx.xx mA	Transmitter Display	Transmitter displays Loop measurement (mA).
Configuration	5	IfcLvl xxxx	Transmitter Display	Transmitter displays interface level in selected level units «LvlUnits».
	6	Volume xx.x	Transmitter Display	Transmitter displays volume in selected volume units «VollUnits».
	7	Level xxxx	Transmitter Display	Transmitter displays level in selected level units «LvlUnits».
	8	PrbModel (select)	**Select** the type of probe	Select as per the 3 first digits of the probe partnumber. The partnumber is shown on the nameplate: e.g. 705-510A-A11/7MT-A230-218, select 7xT-x from the list.
	9	PrbMount (select)	**Select** the type of probe mounting.	Select NPT «NPT», BSP «BSP» or Flange «Flange». (consult factory when a «7xK» GWR probe is used)
	10	MeasType (select)	**Select** the type of measurement	Select interface - volume «IfcVol».
	11	LvlUnits (select)	**Select** units for level	cm «cm», m «m», inches «inches» or feet «feet».
	12	Probe Ln xxx.x	**Enter** the exact length of probe.	Enter as per the 3 last digits of the probe partnumber on the nameplate: - rigid probes, enter value cm or inches, - flexible probes, enter value in meters or feet e.g. 705-510A-A11/7MR-A230-218, enter «218» cm probe length.
	13	Lvl Ofst xxx.x	**Enter** the offset value.	When entering configuration values from the end of the probe is cumbersome, an offset can be introduced to determine a new reference point. This reference point can be either below the probe (positive offset) or at the probe (negative offset). See page 11 “Terminology”.
	14	VolUnits	**Select** units for volume.	Liters «l» or gallons «g».
	15	StrapTbl xx pnts	**Enter** level/volume pairs in max 20 steps	Liters «l» or gallons «g».
	16	Upr Diel (Select)	**Enter** the dielectric range value of the upper media.	Enter the dielectrics of the upper layer liquid (between 1,4 and 5,0) – only upper layer dielectrics need to be entered.
	17	Dielctrc (Select)	**Select** the dielectric range value of the lower media	Select: «10–100»
	18	Senstvty xxx	**Enter** sensitivity value	Allows fine adjustment of internal gain.
	19	Loop Ctrl (Select)	**Select** primary variable (PV)	Primary variable is the loop controlling parameter. Select interface level «IfcLevel» or interface volume «Ifc Vol»
	20	Set 4mA xxx.x	**Enter** the level value for the 4 mA point.	A transition zone may exist at the bottom of the probe. See Functional Specifications Probe, see page 34 and continuing.
	21	Set 20mA xxx.x	**Enter** the level value for the 20 mA point.	A transition zone / blocking distance may exist at the top of the probe. See Functional Specifications Probe, page 34 and continuing.
	22	Damping xx s	**Enter** the damping factor.	A damping factor (1-10 seconds) may be added to smooth a noisy display and/or output due to turbulence.
	23	Fault (Select)	**Enter** the value for error.	Select «3.6 mA», «22 mA» or hold last value «HOLD». In case of loop failure, error signal will follow the failing trend; meaning the unit will show 3.6 mA when the reviewed loop current by the device is found too low. The unit will show 22 mA in case the reviewed loop current is found too high.

= **Quick Start up**

	Screen	Action	Comment
Advanced configuration	(24) BlockDis x.x	**Enter** distance in selected level units	Allows to ignore level measurements near the top of the probe, caused by e.g. condensation, crystalization. Make sure that the liquid level does NOT enter this zone. Consult factory or the 'Troubleshooting' section before entering any value. Normaly to be used with single rod probe.
	(25) SZ Fault (select)	Select the safety zone fault.	Select «None» (None), «3.6mA», «22mA», «Latch 3.6mA» or «Latch 22mA». When either «Latch 3.6 / 22mA» signals is selected, the loop current remains in alarm until it is manually reset with the «SZAlarm» reset screen (for safety zone explanation see Terminology - page 11).
	(26) SZHeight xx.x	Select the safety zone value	Enter safety zone in cm or inches (see Terminology - page 11).
	(27) SZ Alarm Reset	Reset safety zone latch fault	Clear a latched safety zone alarm «SZFault».
	(28) Threshld	Select top level threshold.	Default selection for most common applications is «Fixed».
	(29) IfcThrsh (select)	Select interface threshold.	Default selection for all applications is «CFD». In case the unit does not track the correct interface layer, select «Fixed».
	(30) Poll Adr xx	Enter HART ID number.	Select a HART poll address (0-15). Enter 0 for a single transmitter installation.
	(31) Loop Mode	Enable/Disable	Determines whether the loop is fixed at 4.0 mA or controlled by the PV.
	(32) Trim Lvl xx.x	Enter value to adjust level reading.	Allows to compensate for a fixed level deviation.
	(33) Trim 4 xxxx	Fine tune the 4 mA point.	Attach a mA meter to the output. If the output does not equal 4.0 mA, adjust the value on the display to equal 4.00 mA.
	(34) Trim 20 xxxx	Fine tune the 20 mA point.	Attach a mA meter to the output. If the output does not equal 20.0 mA, adjust the value on the display to equal 20.00 mA.
Diagnostics	(35) Loop Tst xx.x mA	Enter a mA output value.	Set mA Output to any given value to perform loop test .
	(36) LvlTicks xxxxx	Diagnostic display.	Shows time of flight from fiducial pulse to reflected signal from level.
	(37) IfcTicks xxxx	Diagnostic display.	Shows time of flight through the upper liquid layer.
	(38) Medium	Diagnostic display.	Shows type of detected upper liquid; unknown «Unknown» oil only «Oil Only», thin oil layer «Thin Oil», thick oil layer «Thick Oil» or no level «Dry Probe».
	(39) New Pass xxx	Enter new password.	Use arrows to select desired value. Values between 0 and 255.
	(40) Language	Select language	Select «English», «Français», «Deutsch» or «Espagnol».
	(41) Mdl705HT Ver xx.xx	None, do not adjust.	Factory setting. «Ver» refers to software version.
	(42) DispFact (select)	Advanced diagnostics.	See page 20.

Strapping table



NOTE: Consult page 17 for level offset «Lvl Ofst» details.

MENU: STEP BY STEP PROCEDURE: ADVANCED CONFIGURATION

Hidden diagnostic screens. Do not acces without assistance or having followed advanced training.

Diagnostics

	Screen	Action	Comment
1	DispFact Select	Review factory parameters	Select «YES» to reveal Factory parameters; «NO» to hide.
2	History (current status)	Review Diagnostic messages.	A cumulative review of all diagnostic messages. Press the enter button twice to clear.
3	Run time xx h	Display mode.	Shows time in hours that unit is in operation since last power on.
4	History Reset	Diagnostic display.	Select «YES» to clear «History».
5	HF cable (select)	Superuser parameter	Select from 1 m (3') or 3,6 m (12') remote.
6	FidTicks xxxx	Diagnostic display.	Shows time of flight from electronics to fiducial pulse. Value should remain stable within ± 10 ticks.
7	FidSprd X	Diagnostic display.	Value represents the variation of fiducial ticks – a value indicates that unit is OK, a problematic spread results into an error message.
8	Fid Type (select)	Select fiducial pulse type. Requires superuser password.	«positive» or «negative» (selection only allowed for some probes). Consult factory before changing status.
9	Fid Gain xxx	Change gain.	Value represents the # of gain applied to the fiducial signal.
10	Window xxx	None, do not adjust.	Factory setting.
11	Conv Fct xxxx	None, do not adjust.	Factory setting.
12	Scl Ofst xxx	None, do not adjust.	Factory setting.
13	Neg Ampl xxx	Enter new value. Requires superuser password.	Negative amplitude threshold.
14	Ifc Ampl xxx	Enter new value. Requires superuser password.	Interface amplitude threshold.
15	Pos Ampl xxx	Enter new value. Requires superuser password.	Positive amplitude threshold.
16	Signal xxx	Diagnostic display.	Indication of signal strength.
17	Compensate (select)	Access compensation screens. Requires superuser password.	«None» default. The selection of «Manual» or «Auto» activates the screens 16 through 20 for 7MS/7MQ probes.
18	DrateFct Xxxx	None, do not adjust.	Diagnostic display if «Compsate» is on «Auto». Shows velocity derating factor.
19	Targ Ampl Xxxx	None, do not adjust.	Diagnostic display if «Compsate» is on «Auto». Shows amplitude of steam reference target.
20	Targ Tks Xxxx		Diagnostic display if «Compsate» is on «Auto». Shows # of ticks from fiducial to steam reference target.
21	Targ Cal Xxxx	None, do not adjust.	Diagnostic display if «Compsate» is on «Auto». Shows the calibrated # of ticks at ambient temperature.
22	OperMode (select)	Select operating mode.	Selection screen if «Compsate» is on «Auto». Select run automatically «Run», calibrate «Cal», deactivate «Off».
23	7xKCorr xxx	Enter a value. Requires additional password.	Distance in mm (regardless .«LvlUnits») from fiducial to user reference point. Only for 7EK (top/bottom) probe.
24	ElecTemp xxx C	None, do not adjust.	Shows internal housing temperature.
25	Max Temp xxx C	None, do not adjust.	Diagnostic display, shows maximum internal housing temperature recorded.
26	Min Temp xxx C	None, do not adjust.	Diagnostic display, shows minimum internal housing temperature recorded.
27	SZ Hyst xx.x	None, do not adjust.	Safety zone Hysterisis, diagnostic factory setting

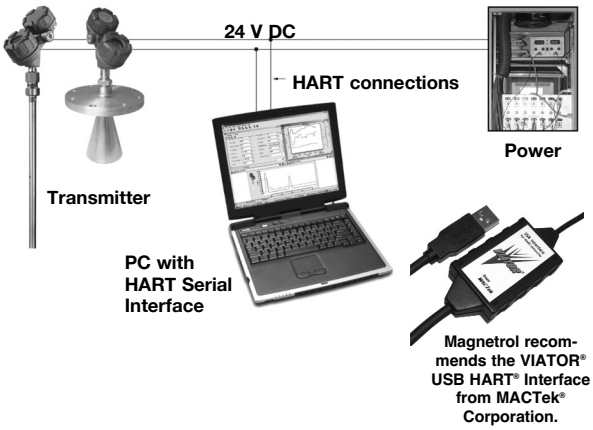
For more details about the use of PACT*ware*™ and FDT technology, refer to instruction manual 59-601

WHAT IS FDT, PACTware AND DTM

- FDT (Field Device Tool) is a new interface code that describes the standardization between frame programs (e.g, PACT*ware*) and DTMs (Device Type Manager).
- PACT*ware* (Process Automation Configuration Tool) is a frame program. It is a device-independent software program that communicates with all approved DTMs.
- DTM (Device Type Manager) is a device-specific software driver designed to operate within a FDT compatible frame program such as PACTware. It includes all special information needed to communicate with a specific device (e.g, Pulsar RX5). There are two basic categories of DTM's—Communication (HART, Fieldbus®, Profibus®, etc.) and Field Device (e.g. Pulsar RX5 Radar transmitter).

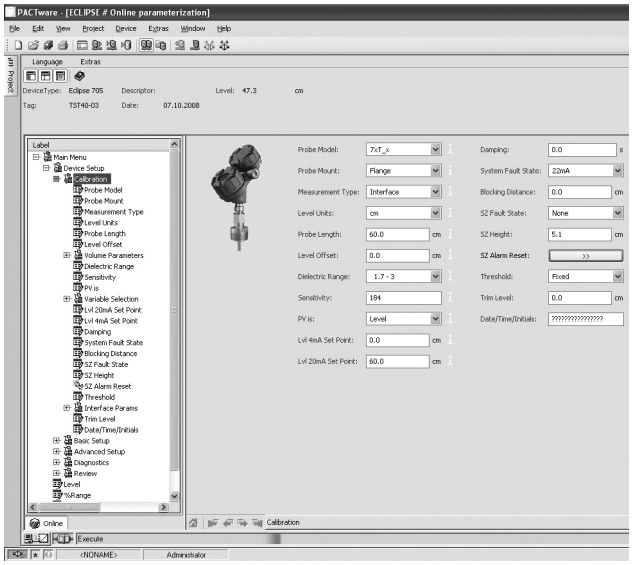
CONNECTIONS

The following diagram shows a typical hardware configuration. Observe all safety codes when attaching to instrument loops in hazardous areas or when measuring flammable media. Computers are not intrinsically safe devices.



QUICK START

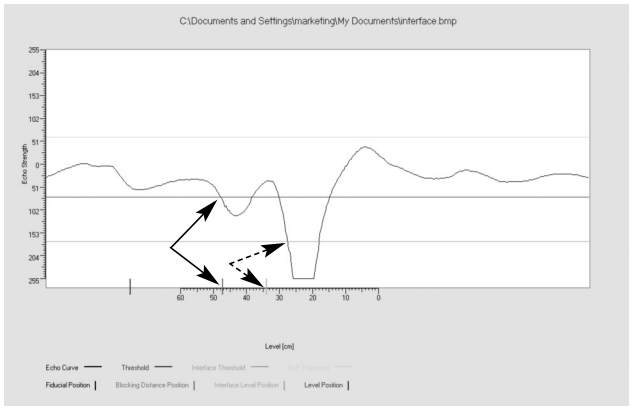
1. **Start a project**
   Open Pactware and add the Hart modem key and then the Magnetrol instrument to your project.
   Select: «Device» – «add device» – select device (repeat for each device in your project)
   Important: Make sure that the COM port settings for your Hart modem key are correct;
2. **Connect the devices**
   Select in the left window the Magnetrol instrument.
   Select: «Device» – «connect» (both modem and Magnetrol instrument are getting connected)
3. **Configure the instrument**
   Select: «Device» – «parameter» – «Online parameterization»
   Open «+ Main Menu» and select «+ Device set up» – «Calibration»
   Parameters can be changed in the window at right, via the drop down boxes. ENTER confirms the change online.
4. **Troubleshoot / Monitior the instrument**
   Process trend:
   Select: «Device» – «Additional functions» – «Process Trend»
   Process trend: all key data (level % Output, Loop, Signal strength) can be trended and saved, time scales can be adapted.
   Echo Curve:
   Select: «Device» – «Additional functions» – «Echo Curve»
   Echo Curve: shows the actual waveform. The echo curve is an efficient tool for advanced calibration and troubleshooting.
   Present Status:
   Open Main Menu and select «+ Device set up» – «Diagnostics» – «Present status»
   Present status: shows the entire overview of all detectable faults and warnings. Blank boxes indicate the healthy condition of the instrument. Ticked off boxes indicate for a possible fault or warning.



Echo Curve patterns

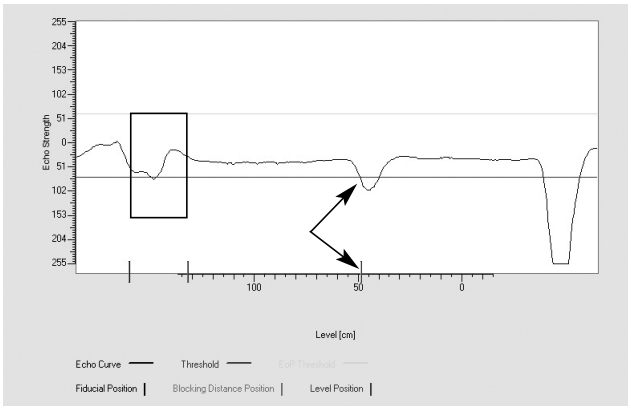
Below screens are examples of the most typical echo curves that occur in normal operation / error condition.

Normal oil/water interface



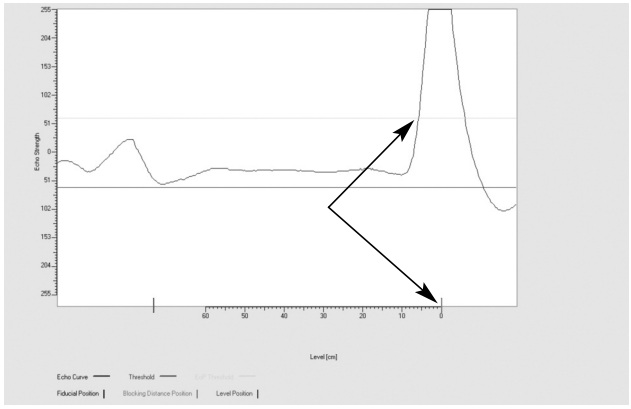
Normal signal pulses from oil over water

Level with Blocking Distance correction



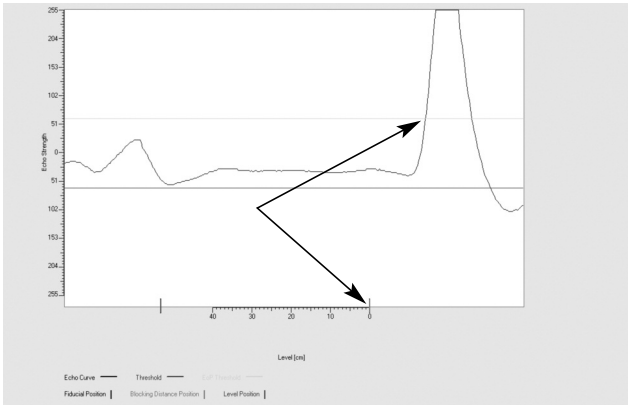
Signal pulse from level. Unit suffered from build up on top of the probe. The introduced blocking distance (see area in frame) solves the problem.

Dry Probe



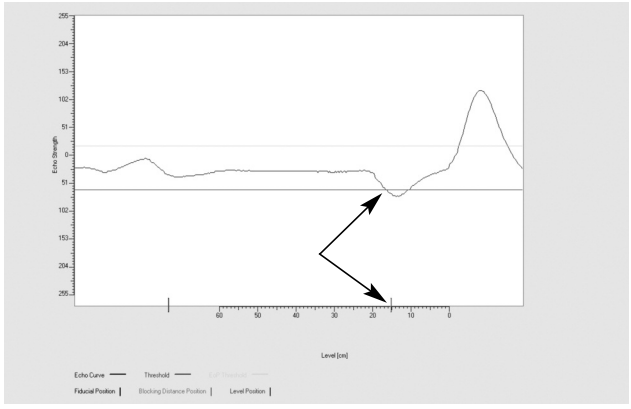
Signal pulse from an empty vessel/ cage – displayed message on the unit is «`DryProbe`» Dry Probe

EOP High or Low



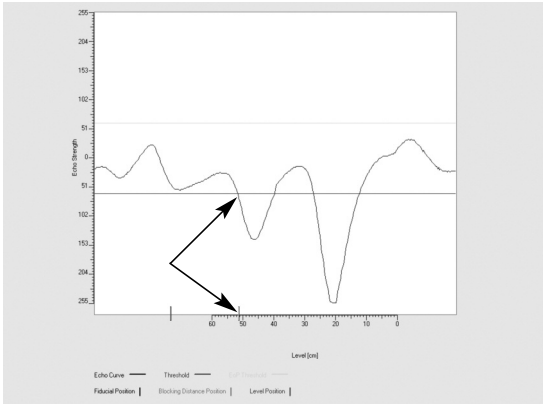
Signal pulse from an empty vessel or cage but with wrongly entered probe length – displayed message is «`EOP High`» or «`EOP Low`» (as shown in graph). Correct the probe length in either case.

Weak Signal

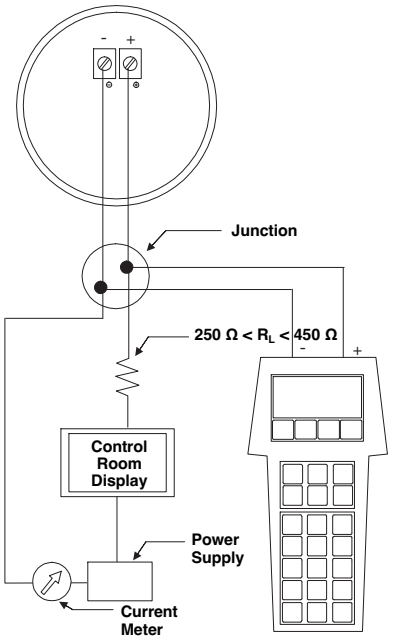


Signal pulse of a weak signal. Displayed message is «`WeakSgnl`». Solve this by either to:
- change dielectric setting to a lower range or
- increase the sensitivity

Threshold Fixed or CFD



Signal pulse of oil over water level. Always select «`Threshld Fixed`» (as shown in the graph). «`Threshld CFD`» will track the stronger reflection pulse. In case of level measurement, the unit will not compensate for the signal velocity in the upper oil layer and show an erroneous level reading.



CONNECTIONS

Connection of your Hart communicator:
- at power terminals (+) and (-) in wiring compartment
- at first junction box between unit and control room.

IMPORTANT: The digital HART® communication is superimposed on the 4-20 mA loop and requires a min. load resistance of 250 Ω and a max load resistance of 450 Ω.

CHECK HART®

Before starting the HART® configuration procedure – check if your HART® communicator is equipped with the proper Eclipse Device Descriptors (DD's).

I/O	start up the communicator
Select NO:	go offline
Select 4:	utility
Select 5:	simulation
Check manufacturer:	Magnetrol

HCF Release Date	HART Version	Model	Compatible with software
September 2008	Dev V1 DD V2	705 3.x	Version 3.0A and later
February 2013	Dev V2 DD V2		Version 3.2A and later

When the proper software version is not found, consult your local HART® Service Center to load the correct Eclipse DD's.

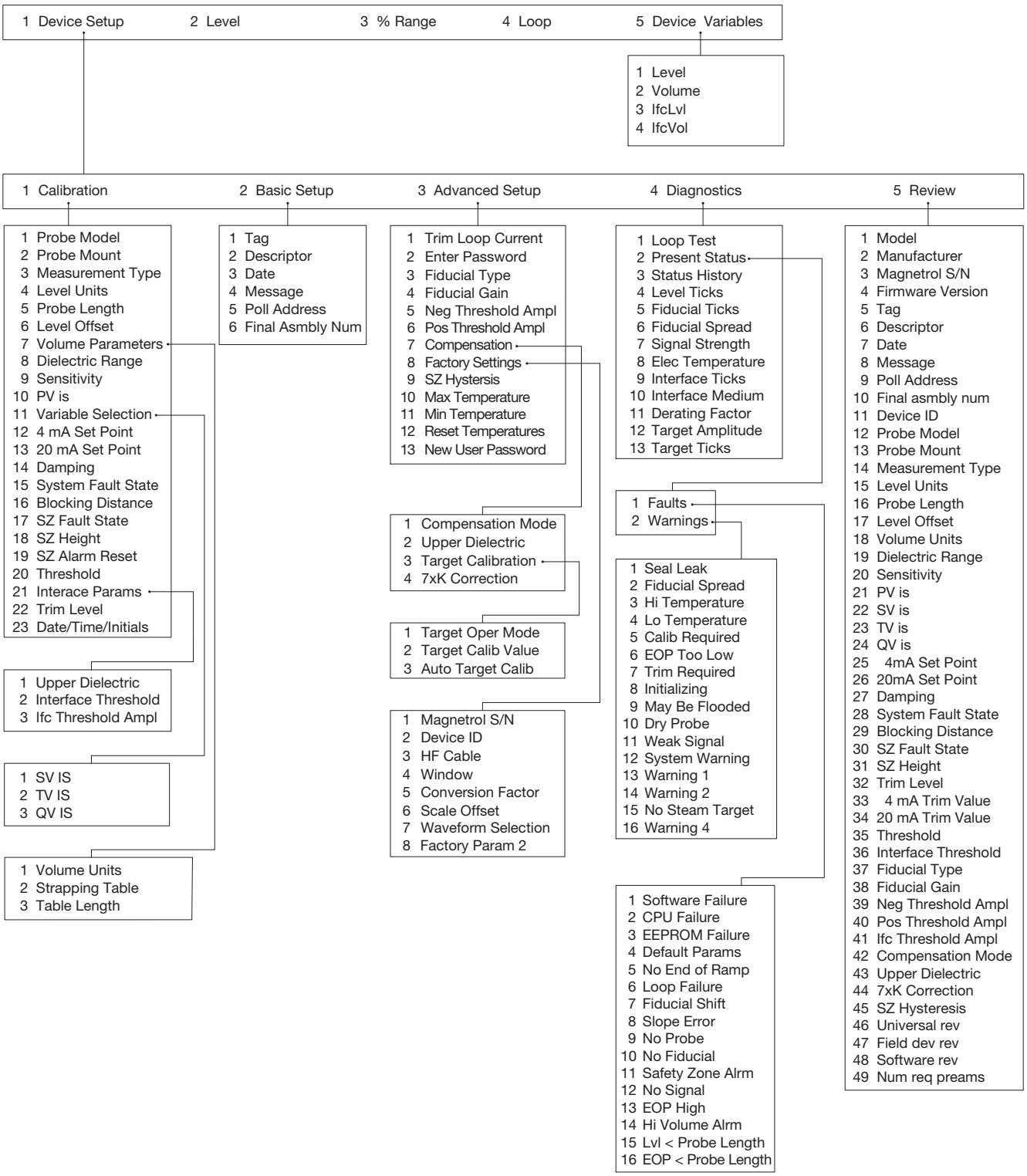
HART MENU

I/O Start up the device

1 Enter Device Set Up «DEVICE SET UP»
Press one of the following alphanumeric keys (if no key is sensed after 5 s, the unit will automatically jump to RUN mode and alternatively show Level/% Output and Loop signal

- 1 for entering Calibration «CALIBRATION» (see page 24 for additional information)
- 2 for entering Basic Set Up «BASIC SET UP» – general HART
- 3 for Advanced Set Up «ADVANCED SET UP» (see page 24 for additional information)
- 4 for entering Diagnostics «DIAGNOSTICS» (see page 24 for additional information)
- 5 for entering Review «REVIEW» to review all settings.

CONFIGURATION USING HART®



TROUBLESHOOTING

Symptom	Problem	Solution
LEVEL, % OUTPUT and LOOP values are all inaccurate.	Basic configuration data is questionable.	Reconfigure the Probe Length «Prb Ln» and Offset «Offset». Check also the Probe Model «Prb Model» / Probe Mount «Prb Mount» 1) Ensure the Level is accurate. 2) Reconfigure Loop values.
	Interface level has significant emulsion.	Examine process to reduce/eliminate emulsion layer.
LEVEL readings are repeatable but consistently high or low from actual by a fixed amount.	Configuration data does not accurately match probe length or tank height.	Ensure proper probe length «Prb Ln» & probe Model «Prb Model». Adjust trim level value by the amount of noted inaccuracy.
LEVEL, % OUTPUT and LOOP values fluctuate.	Turbulence.	Increase the Damping «Damping» factor until the readings stabilize.
	High frequency connection.	Check Fiducial Spread «FidSprd» (should be stable within ± 10 counts.)
LEVEL, % OUTPUT and LOOP values all reading low vs. actual (level or volume applications).	Lower dielectric material over higher dielectric material, e.g. oil over water.	Select Fixed Threshold option «Fixed» and/or select dielectric range from top layer.
	Coating, clumping or buildup on probe.	Expected inaccuracies due to affect on pulse propagation.
	Dense, water based foam.	Expected inaccuracies due to affect on pulse propagation.
LEVEL reading on Display is correct but LOOP is stuck on 4 mA	Basic configuration data is questionable.	Set Hart poll address «POLL ADR» to «0». If not using HART® multi drop
HART device only: handheld will only read Universal Commands.	Most current Device Descriptors (DDs) are not installed in handheld. (see page 20)	Contact local HART service center for the latest DD's.
LEVEL reading on display is stuck at full scale, LOOP is stuck at 20,5 mA.	Software believes probe is flooded (level near very top of probe).	Check actual level. If probe is not flooded, check for build up or obstructions near top of probe. Select higher dielectric range. Check for condensation in probe connection. Add Blocking Distance.
LEVEL, % OUTPUT and LOOP values all at maximum level.	Possible configuration issue with single rod probe	1) Increase Blocking Distance 2) Increase Dielectric Range
LEVEL, % OUTPUT and LOOP values all reading high vs. actual.	Possible obstruction in tank affecting single rod probe.	1) Increase Dielectric Range until obstruction is ignored. 2) Relocate probe away from obstruction.
LEVEL value reading high when should be zero.	Transmitter loose or disconnected from probe.	Ensure transmitter connected securely to probe.

HART ERROR MESSAGES

Error	Screen	Displayed status
Faults	Enlists possible error messages.	OFF: safe status ON: highlighted error is occurring – see page 27
Warnings	Enlists warning messages.	OFF: safe status ON: highlighted warning is occurring – see page 26
History	Built in log of the last 26 error messages.	See page 20.

PACTware™ PC Program

The Eclipse Model 705 offers the ability to do Trending and Echo Curve analysis using a PACTware DTM. This is a powerful troubleshooting tool that can aid in the resolution of some of the Error Messages shown above.

Refer to Bulletins 59-101 and 59-601 for more information.

WARNING MESSAGES

A warning message identifies the status of the instrument. A warning message does not necessarily require immediate action but may require close attention and/or follow up. The warning message will be displayed on the unit and/or selected on the Pactware screen while the output signal will remain normal.

Display Message	Action	Comment
OK	None	Normal operating mode
Initial	None	Program is Initializing, level reading held at 4 mA set point. This is a transient condition.
DryProbe	None	Normal message for a dry probe. End of probe signal is being detected.
WeakSgnl	1) Set transmitter to lower dielectric range 2) Increase sensitivity	Signal amplitude is lower than desired.
Flooded?	1) Decrease level in vessel 2) Set transmitter to lower dielectric range 3) Replace with Model 7MR Overfill probe	Loss of level signal possibly due to flooding, twin rod probes only
Fid Sprd*	1) Check connection between probe and transmitter 2) Check for moisture on top of probe 3) Consult factory	Fiducial Ticks variation is excessive.
Hi Temp	1) Transmitter may need to be moved to ensure ambient temperature is within specification 2) Change to remote mount transmitter 3) Use sunshade	Present temperature in electronics compartment is above +80° C
Lo Temp	1) Transmitter may need to be moved to ensure ambient temperature is within specification 2) Change to remote mount transmitter	Present temperature in electronics compartment is below -40° C.
Sys Warn	Consult factory	Unexpected but non-fatal software event
TrimReqd	Consult factory	Factory set Loop values are defaults, loop output may be inaccurate
Cal Reqd	Consult factory	Factory set default calibration parameters are in use, level reading may be inaccurate

ERROR MESSAGES

An error message identifies a possible instrument failure and requires an action. The error message will be displayed on the unit and/or selected on the Pactware screen while the output signal will shift to the selected error output (3.6mA, 22mA or HOLD).

Display Message	Action	Comment
HiVolAlm	Verify strapping table is entered correctly.	Level more than 5% above highest point in strapping table.
SlopeErr	Consult factory	Ramp circuit generating improper voltage
LoopFail	Consult factory **Note:** In case of loop failure, error signal will follow the failing trend; meaning the unit will show 3.6 mA when the reviewed loop current by the device is found too low. The unit will show 22 mA in case the reviewed loop current is found too high.	Loop current differs from expected value
No Ramp	Consult factory	No End-of-Ramp signal detected
DfltParm	Consult factory	Internal non-volatile parameters have been defaulted
EE Fail	Consult factory	EEPROM error allowing watchdog timer to expire
CPU Fail	Consult factory	A-D converter time out allowing watchdog timer to expire
SfwrFail	Consult factory	A fatal software error allowing watchdog timer to expire
EOP < Probe Length	1) Ensure probe length is entered correctly 2) Set transmitter to a lower dielectric range 3) Set threshold to «fixed» 4) Consult factory	End of Probe signal is out of range
Lvl < Probe Length	1) Verify entered probe length 2) Change threshold to «fixed»	Apparent position of the upper level pulse is lower than the end of probe
EOP High	1) Ensure probe length is entered correctly 2) Increase blocking distance (only for single or twin GWR probes) 3) Consult factory	End of Probe signal is out of range
NoSignal	1) Ensure dielectric setting is correct for measured medium 2) Increase sensitivity 3) Confirm that the probe type is proper for the dielectric of the medium 4) Consult factory	No level signal being detected.
No Fid	1) Check connection between probe and transmitter 2) Check for moisture on top of probe 3) Check for damaged gold pin on the high frequency connector 4) Consult factory	Fiducial signal is not being detected
FidShift	1) Check connection between probe and transmitter 2) Check for moisture on top of probe 3) Check for damaged gold pin on the high frequency connector 4) Consult factory	FidTicks shifted from expected value
No Probe	1) Ensure proper connection between probe and transmitter 2) Check for damaged gold pin on the high frequency connector	Electronics does not sense that a probe is attached
SZ Alarm	Decrease level in tank When in «SZ Fault», «Latch 3.6 mA» or «Latch 22 mA» was selected, reset with «SZ Alarm Reset»	Safety Zone alarm has been tripped, loop current fixed at SZ Fault

TROUBLESHOOTING APPLICATIONS: Level

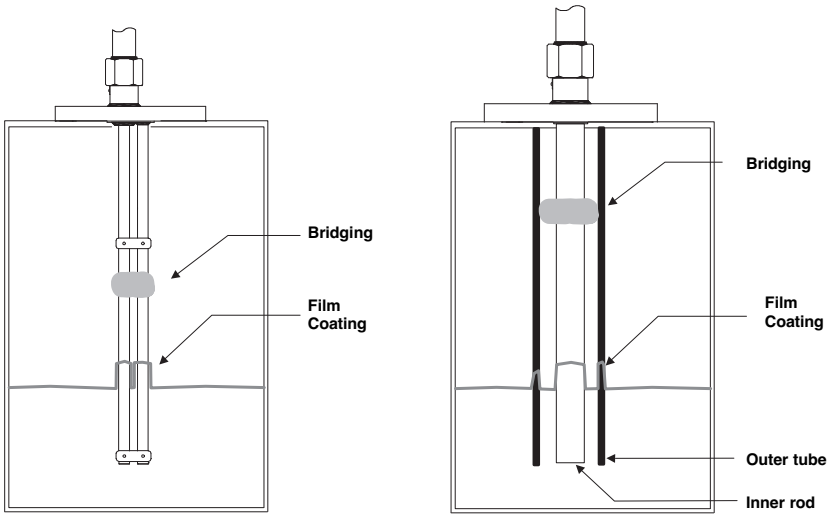
Most frequent application problems that may occur, media buildup on the probe and stratification, are covered here. Media buildup on the probe is not a problem in most cases–Eclipse circuitry typically works very effectively. Media buildup should be viewed as two types – Film Coating and Bridging.
Recommended guidelines to select the right GWR probe:

- Relatively clean liquids: use the standard coax GWR probes
- Possible build up: use the enlarged coax or twin rod GWR probe
- Extreme build up: use the single rod GWR probe

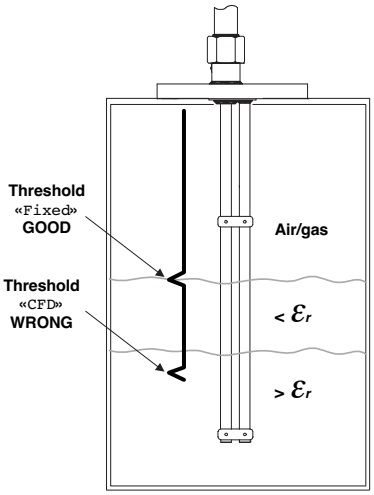
- **Continuous Film Coating**
  The most typical of coating problems where the media forms a continuous coating on the probe. Eclipse will continue to measure effectively with some small degradation in performance. A problem can develop if the product begins to buildup on the spacers that separate the probe elements. High dielectric media (e.g, water-based) will cause the greatest error.

- **Bridging**
  Media that is viscous or solid enough to form a clog, or bridge, between the elements causes the greatest degradation in performance. High dielectric media (eg. water-based) will show as level at the location of the bridging.

- **Stratification/Interface**
  The Eclipse transmitter is designed to measure the first air/media interface it detects, when configured for level measurement only. It will not measure further liquid/ liquid interfaces. However, a low dielectric over a high dielectric application can cause a measurement problem if the level of the low dielectric medium becomes small enough (a few cm) to cause the electronics to trigger on the high dielectric medium that lies beneath it. Select the Fixed Threshold option to read the upper medium.
  Example: oil over water.



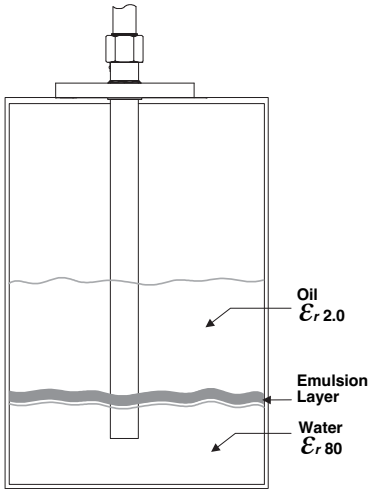
Continuous film coating / Bridging



Stratification/Interface

TROUBLESHOOTING APPLICATIONS: Interface

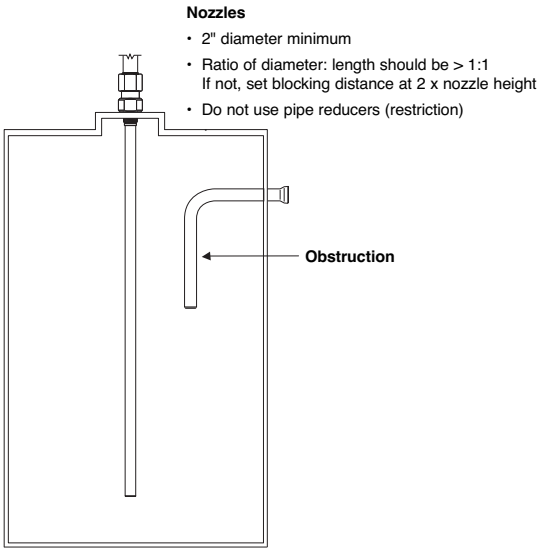
It is not uncommon for interface applications to have an emulsion layer form between the two media. This emulsion layer may pose problems for Guided Wave Radar as it may decrease the strength of the reflected signal. Since the properties of this emulsion layer are difficult to quantify, applications with emulsion layer should be avoided with Eclipse.



TROUBLESHOOTING APPLICATIONS: Single Rod type GWR probe

Most frequent application problems that may occur, media buildup on the probe and stratification, are covered here. Significant buildup on the probe is not a problem in most cases–Eclipse circuitry typically works very effectively.

- **Nozzles** (only for 7MF/7MH/7MJ/7M1/7M2)
  Nozzles can create false echoes that can cause diagnostic messages and/or errors in measurement. If end of probe high «Eop High» is displayed when first configuring the instrument:
  1. Ensure the probe length «Prb Ln» as entered in the software is equal to the actual probe length (see page 12, item 9). This value must be changed if the probe is cut shorter from the original length.
  2. Increase the blocking distance «BlockDis» value until the message is eliminated; 20 mA point may need to be lowered.
  3. Increase the dielectric range a small amount or decrease the sensitivity to aid in reducing echoes in nozzle. Increasing the dielectric settings may cause instrument to lose level of lower dielectric media; consult factory.

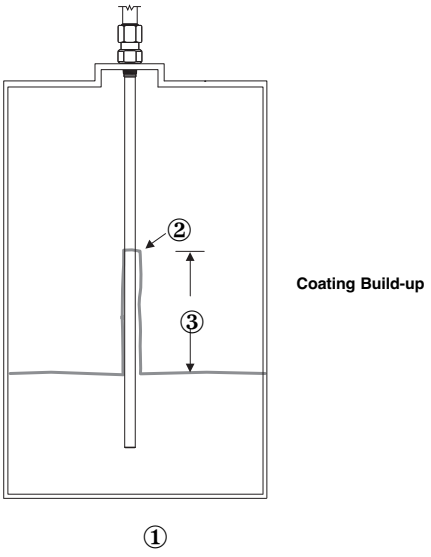


- **Obstructions** (only for 7MF/7MH/7MJ/7M1/7M2)
  If the level reading repeatedly locks on to a specific level higher than the current level, it may be caused by a metallic obstruction. Obstructions in the vessel (e.g. pipes, ladders) that are located close to the probe may cause the instrument to show them as level.
  1. Refer to the Probe Clearance Table
  2. Increase the dielectric range a small amount or decrease the sensitivity to aid in reducing disturbing echoes in nozzle. Increasing the dielectric settings may cause instrument to lose level of lower dielectric media; consult factory.

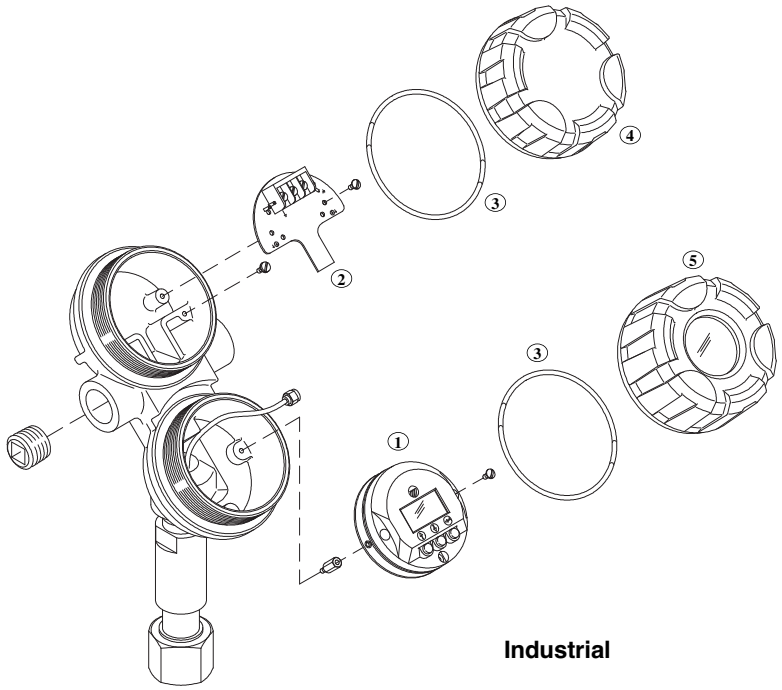
Probe clearance table

Distance to probe	Acceptable objects
< 150 mm (6")	Continuous, smooth, parallel, conductive surface (e.g. metal tank wall); probe should not touch tank wall
> 150 mm (6")	< 1"/DN25 diameter pipe and beams, ladder rungs
> 300 mm (12")	< 3"/DN80 diameter pipe and beams, concrete walls
> 450 mm (18")	All remaining objects

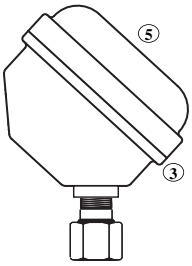
- **Coating/build-up** (only for 7MF/7MH/7MJ/7M1/7M2)
  The Eclipse® 705 wih Single Rod Probe was designed to operate effectively in the presence of media building up. Some expected error may be generated based upon the following factors:
  ① Dielectric of the media that created the coating
  ② Thickness of the coating
  ③ Length of the coating above the present level
  In case build up is picked up as level, increase the dielectric range a small amount or decrease the sensitivity.
- **Coating/build-up** (only for 7M5/7M7)
  Continuous film coating is where the media forms a thin continuous coating on the probe. Eclipse® will continue to measure effectively with some degradation in performance. The degradation is proportional to the dielectric of the media and the thickness of the coating up to a degree that the unit will see coating as a level. Higher dielectric media (eg. water based) will show sooner as a level at the location of the build up.



REPLACEMENT PARTS



Industrial



Hygienic

CAUTION: the electronic module connects to the antenna via the "High frequency connector". This part is extremely sensitive and brittle and requires to be handled very careful. It is recommended to exchange complete amplifier heads instead of electronic modules in the field.

Partn°: 7 0 5 – 5 | | | | – | | | |

Digit in partn°: X | 1 | 2 | 3 – 4 | 5 | 6 | 7 – 8 | 9 | 10

X = product with a specific customer requirement

Serial n°: | | | | | | – | | – | | | |

See nameplate, always provide complete partn° and serial n° when ordering spares.

Electronic Module (1)			
Digits			Replacement part
5	6 & 7	9	Hart
1	00	1, 2, 7 or 8	Z31-2835-002
	0A		Z31-2835-001
	A0		Z31-2835-004
	AA		Z31-2835-003
	00 or 0A	3 or 9	089-7254-001
	A0 or AA		089-7254-003
			FF
2	00	1, 2, 7 or 8	Z31-2841-002
	0A		Z31-2841-001
	00 or 0A	3 or 9	089-7254-002
			Profibus PA
3	00	1, 2, 7 or 8	Z31-2846-002
	0A		Z31-2846-001
	00 or 0A	3 or 9	089-7254-004

Wiring board (2)			
Digits			Replacement part
5	8	9	Hart
1	all	1, 2, 7 or 8	Z30-9151-001
			FF - Profibus PA
2 or 3	1, 2, A or B		Z30-9151-004
	3, 4, C, D, E, or F		Z30-9151-003

EXPEDITE SHIP PLAN (ESP)

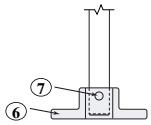
Several parts are available for quick shipment, within max. 1 week after factory receipt of purchase order, through the Expedite Ship Plan (ESP).
Parts covered by ESP service are conveniently grey coded in the selection tables.

Housing "O" ring (3)	
Digit 9	Replacement part
1, 2, 7 or 8	012-2201-237
3 or 9	012-2201-155

Housing cover (4)	
Digit 9	Replacement part
1 or 7	004-9225-002
2 or 8	004-9225-003

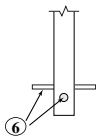
Housing cover (5)			
Digits			Replacement part
7	8	9	
0	all	1 or 7	004-9225-002
	all	2 or 8	004-9225-003
A	1, 2, A, B, E or F	1 or 7	036-4413-005
	3 or 4		036-4413-001
	C or D		036-4410-003
	all	2 or 8	036-4413-012
0	all	3 or 9	032-3934-001
A			036-5702-002

REPLACEMENT PARTS



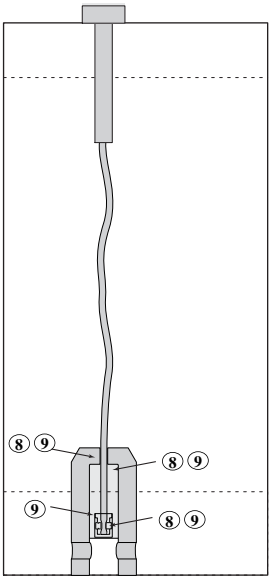
Bottom spacer

- **7MF/7MJ single rod GWR probe**
- **7MG cage GWR probe (2"/DN50)**

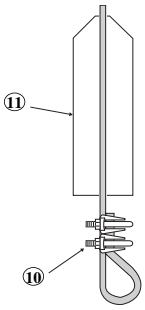


Bottom spacer

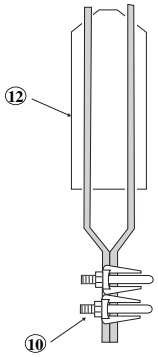
- **7MG cage GWR probe (other than 2"/DN50)**



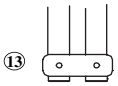
Cable weight
7M1 Single flexible cable
7M7 Dual flexible cable



Cable weight
7M2 Single flexible cable for solids



Cable weight
7M5 dual flexible cable for solids



Spacer 7MB
Twin rod

Spacer and set pin - rigid probes		
N°	**Description**	**Replacement part**
		TFE spacer & set pin
6 & 7	7MF-A	089-9114-001
	7MF-B	089-9114-002
	7MF-C	089-9114-003
		PEEK spacer & set pin
6 & 7	7MJ-A	089-9114-005
	7MJ-B	089-9114-006
	7MJ-C	089-9114-007

Spacer and set pin - cage probes		
N°	**Description**	**Replacement part**
6 & 7	7MG-A (2"/DN50)	089-9114-001
	7MG-B (2"/DN50)	089-9114-002
	7MG-C (2"/DN50)	089-9114-003
6	7MG (other than 2"/DN50)	consult factory

Cable weights - flexible probes		
N°	**Description**	**Replacement part**
8	7M1	089-9120-001
9	7M7	089-9121-001
10	7M2/7M5 cable rope clip	010-1731-001 (Qty 2 required)
11	7M2-316 (1.4401)	004-8778-001
12	7M5-316 (1.4401)	004-8778-002

Spacer - twin rod probe		
N°	**Description**	**Replacement part**
13	7MB probe spacer kit	consult factory

TRANSMITTER SPECIFICATIONS

FUNCTIONAL/PHYSICAL

Description		*Specification*
Power (at terminals)		HART®: - Weatherproof / ATEX flameproof enclosure / ATEX non sparking: 11 to 36 V DC - ATEX Intrinsically Safe: 11 to 28,4 V DC Foundation Fieldbus™ / Profibus PA™: - Weatherproof / ATEX flameproof enclosure / ATEX FNICO: 9 to 32 V DC - ATEX FISCO: 9 to 17,5 V DC
Output		4-20 mA with HART®, 3,8 mA to 20,5 mA useable (meets NAMUR NE 43) – HART 6, Foundation Fieldbus™ H1 or Profibus PA™ H1
Span		15 cm to 22 m (6" to 72.18') depending on selected probe
Resolution		Analog: 0,01 mA Display: 0,1 (cm or inch)
Loop Resistance		630 Ω @ 20,5 mA - 24 V DC
Damping		Adjustable 0-10 s
Diagnostic Alarm		Adjustable 3,6 mA, 22 mA, HOLD last output
User Interface		HART® communicator, AMS® or PACT*ware*™, Foundation Fieldbus™, Profibus PA™ and/or 3-button keypad
Display		2-line x 8-character LCD
Menu Language		English/Spanish/French/German (Foundation Fieldbus™, Profibus PA™: English)
Housing Material		IP 66/Aluminium A356T6 (< 0.20 % copper) or stainless steel
Approvals		ATEX II 3 (1) G EEx nA [ia] IIC T6, non sparking (probe can be used in flammable liquids) ATEX II 3 (1) G EEx nA [nL][ia] IIC T6, FNICO – non incendive① (probe can be used in flammable liquids) ATEX II 1 G Ex ia IIC T4 Ga, intrinsically safe ATEX II 1 G Ex ia IIC T4 Ga, FISCO – intrinsically safe① ATEX II 1/2 G Ex d[ia Ga] IIC T6 Gb② ATEX II 1/2 D Ex t[ia Da] IIIC T85°C Db IP66② IEC Ex d[ia Ga] IIC T6 Gb IEC Ex t[ia Da] IIIC T85°C Db IP66 IEC Ex ia IIC T4 Ga, intrinsically safe IEC Ex ia IIC T4 Ga, FISCO – intrinsically safe① IEC Ex ic[ia Ga] IIC T4 Gc EN 12952-11 and EN 12953-9 CE approved for steam drums as primary level safety device TÜV – WHG § 63, VLAREM II 5.17-7 LRS – Lloyds Register of Shipping (marine applications) Other approvals are available, consult factory for more details
SIL③ (Safety Integrity Level)	Standard electronics	Functional safety to SIL 1 as 1oo1 / SIL 2 as 1oo2 in accordance to IEC 61508 – SFF of 84,5 %
	Enhanced electronics	Functional safety to SIL 2 as 1oo1 in accordance to IEC 61508 – SFF of 91 % Certified for use in SIL 3 loops.
Electrical Data		Ui = 28,4 V, Ii = 124 mA, Pi = 0,84 W (HART®) Ui = 17,5 V, Ii = 380 mA, Pi = 5,32 W (Foundation Fieldbus™ / Profibus PA™)
Equivalent Data		Ci = 2,2 nF, Li = 3 μH (HART®) Ci = 3 nF, Li = 3 μH (Foundation Fieldbus™ / Profibus PA™)
Shock/Vibration Class		ANSI/ISA-S71.03 Class SA1 (Shock), ANSI/ISA-S71.03 Class VC2 (Vibration)
Surge protection		Meets CE EN 61326 (1000V)
Net weight	Cast aluminium	2,7 kg (6.0 lbs) – transmitter head / electronics only
	Stainless steel	5,7 kg (12.6 lbs) – transmitter head / electronics only
Overall Dimensions		H 214 mm (8.43") x W 111 mm (4.38") x D 188 mm (7.40")
Foundation Fieldbus™ specifications	ITK Version	5.0
	H1 Device Class	Link Master (LAS) – selectable ON/OFF
	Function Blocks	1 x RB, 4 x AI, 1 x TB and 1 x PID
	Execution time	AI = 15 ms, PID = 40 ms
	Quiescent current draw	15 mA
	DD/CFF files	Available at www.fieldbus.org
Profibus PA specifications	Device revision	0x01
	Digital communication protocols	Version 3.0 MBP (31.25 kbits/sec)
	Function Blocks	1 x PB, 4 x Al blocks, 1 x TB
	Execution time	15 ms
	Quiescent current draw	15 mA
	GSD files	Available at www.profibus.com

① Foundation Fieldbus™ and Profibus PA™ units.
② For ATEX flameproof enclosure units use Ex d bushing material STYCAST 2057 FR.
③ Not applicable for Foundation Fieldbus™ and Profibus PA™ units.

TRANSMITTER SPECIFICATIONS

PERFORMANCE

Description		*Specification*
Reference Conditions with a 1,8 m (72") coaxial type GWR probe		Reflection from liquid, with dielectric in center of selected range, at +20 °C (70 °F) with CFD threshold①
Linearity②	Coaxial/twin lead probes	< 0,1 % of probe length or 2,5 mm (0.1"), whichever is greater
	Single lead probes	< 0,3 % of probe length or 8 mm (0.3"), whichever is greater
Accuracy②	Coaxial/twin lead probes	< 0,1 % of probe length or 2,5 mm (0.1"), whichever is greater
	Single lead probes	± 0,5 % of probe length or 13 mm (0.5"), whichever is greater
	7MT/7ML interface	± 25 mm (1")
Resolution		± 2,5 mm (0.1")
Repeatability		< 2,5 mm (0.1")
Hysteresis		< 2,5 mm (0.1")
Response Time		< 1 second
Warm-up Time		< 5 seconds
Ambient Temp.		-40 °C to +80 °C (-40 °F to +175 °F) – blind transmitter -20 °C to +70 °C (-5 °F to +160 °F) – with digital display -40 °C to +70 °C (-40 °F to +160 °F) – for Ex ia and Ex d[ia] with blind transmitter -20 °C to +70 °C (-5 °F to +160 °F) – for Ex ia and Ex d[ia] with digital display
Process Dielectric Effect		< 7,5 mm (0.3") within selected range
Operating Temp. Effect		Approx. +0,02 % of probe length/°C for probes ≥ 2,5 m (8')③
Humidity		0-99 %, non-condensing
Electromagnetic Compatibility		Meets CE requirements (EN 61326: 1997 + A1 + A2) and NAMUR NE 21 (Single and Twin-Rod probe must be used in metallic vessel or stillwell)

① May degrade for 7MD/7ML probe or with fixed threshold.
② Top 600 mm (24") of twin rod probe: 30 mm (1.18").
Top 1220 mm (48") of single rod: application dependant.
Accuracy may degrade when using compensation.
③ Accuracy may degrade slightly < 2,5 m (8')

PROBE SPECIFICATIONS

Description		***7MR/7MM: overfill protection coaxial probe***
Materials	Probe	316/316L (1.4401/1.4404), Hastelloy® C (2.4819) or Monel® (2.4360)
	Process seal	Teflon® with Viton® GFLT, Aegis PF 128 or Kalrez® 4079 (consult factory for alternatives)
	Spacers	Teflon®
Probe diameter	Small coax	Inside rod 8 mm (0.315") – outer tube 22,5 mm (0.88")
	Enlarged	Stainless steel: inside rod 16 mm (0,63") – outer tube 45 mm (1.75") Hast. C / Monel®: inside rod 16 mm (0,63") – outer tube 49 mm (1.93")
Mounting		External cage and/or in-tank mounting
Process Connection	Small coax	Threaded: 3/4" NPT or 1" BSP (G 1")
	All	Flanged: various ANSI, EN (DIN) or torque tube mating flanges
Probe length		From 60 cm to 610 cm (24" to 240")
Transition Zone①	Top	0 mm (0")
	Bottom	εr: 1,4 = 150 mm (6")/εr: 80 = 25 mm (1")
Process Temp.②	Max	+200 °C @ 18,6 bar (+400 °F @ 270 psi)
	Min	-40 °C @ 51,7 bar (-40 °F @ 750 psi)
Max. Process Pressure②		70 bar @ +20 °C (1000 psi @ +70 °F)
Max. Viscosity		Small coax: 500 mPa.s (cP); Enlarged coax: 2000 mPa.s (cP)
Dielectric Range		1,4 to 100
Vacuum Service		Negative pressure but not hermetic seal
Media coating		In case of media coating, select 7MM probe

IntDescription		***7MD/7ML: high pressure / high temperature GWR probe***
Materials	Probe	316/316L (1.4401/1.4404), Hastelloy® C (2.4819) or Monel® (2.4360)
	Process seal	Borosilicate / Inconel® X-750
	Spacers	7Mx-A, B and C: Ceramic 7Mx-W: Teflon® 7Mx-V: High Temp PEEK 7Mx-N, P and R: PEEK
Probe diameter	Small coax	Inside rod 8 mm (0.315) – outer tube 22,5 mm (0,88")
	Enlarged	Stainless steel: inside rod 16 mm (0,63") – outer tube 45 mm (1.75") Hast. C / Monel®: inside rod 16 mm (0,63") – outer tube 49 mm (1.93")
Mounting		External cage and/or in-tank mounting
Process Connection	Small coax	Threaded: 3/4" NPT or 1" BSP (G 1")
	All	Flanged: various ANSI, EN (DIN) or torque tube mating flanges
Probe length		From 60 cm to 610 cm (24" to 240")
Transition Zone①	Top	0 mm (0")
	Bottom	εr: 1,4 = 150 mm (6") / εr: 80 = 25 mm (1")
Process Temp.②	Max	+425 °C @ 103 bar (+800 °F @ 1500 psi) for 7Mx-A, B and C +345 °C @ 324 bar (+650 °F @ 4700 psi) for 7Mx-V, N, P and R +200 °C @ 393 bar (+400 °F @ 5700 psi) for 7Mx-W
	Min	-196 °C @ 138 bar (-320 °F @ 2000 psi)
Max. Process Pressure②		431 bar @ +20 °C (6250 psi @ +70 °F)
Max. Viscosity		Small coax: 500 mPa.s (cP); Enlarged coax: 2000 mPa.s (cP)
Dielectric Range	Small coax	1,4 to 100 for 7Mx-W 1,7 to 100 for 7Mx-V 2,0 to 100 for 7Mx-A, B and C
	Enlarged	Level: Probes ≤ 2,5 m: εr ≥ 1,4 with single bottom spacer Probes > 2,5 m: εr ≥ 1,7 Interface: Upper liquid: εr ≥ 1,4 or 1,7 (see above) and ≤ 5 Lower liquid: εr ≥ 15
Vacuum service		Full vacuum (Helium leak < 10^{-8} cc/s @ 1 atmosphere vacuum)
Media coating		In case of media coating, select 7ML probe

① Transition Zone (zone with reduced accuracy) is dielectric dependent; εr = dielectric permitivity.
It is recommended to set 4-20 mA signal outside transition zone.
② See graphs at page 39 and 40.

PROBE SPECIFICATIONS

Description		*7MS: saturated steam GWR probe*	*7MQ: saturated steam GWR probe*
Materials	Probe	316/316L (1.4401/1.4404)	
	Process seal	High Temp PEEK with Aegis PF 128	High Temp PEEK with Aegis PF 128 Alumina
	Spacers	High Temp PEEK	Silicon nitride
Probe diameter		Inside rod 8 mm (0.315) – outer tube 22,5 mm (0,88")	Inside rod 8 mm (0.315) – outer tube 32 mm (1,25")
Mounting		External cage and/or in-tank mounting	
Process Connection		Threaded: 3/4" NPT or 1" BSP (G 1") Flanged: various ANSI, EN (DIN) or torque tube mating flanges	Threaded: not available Flanged: various ANSI, EN (DIN) or torque tube mating flanges
Probe length		From 60 cm to 450 cm (24" to 177")	
Transition Zone①	Top	200 mm (8"); consult factory for overfill applications	
	Bottom	$\varepsilon r \geq 10$ = 25 mm (1")	
Process Temp.②	Max	+300 °C @ 88 bar (+575 °F @ 1275 psi)	+345 °C @ 155 bar (+650 °F @ 2250 psi)
	Min	-15 °C @ 207 bar (0 °F @ 3000 psi)	
Max. Process Pressure②		88 bar @ +300 °C (1275 psi @ +575 °F)	155 bar @ +345 °C (2250 psi @ +650 °F)
Max. Viscosity		500 mPa.s (cP)	
Dielectric Range		10 to 100	
Vacuum service		Negative pressure but not hermetic seal	
Media coating		Not applicable	

Description		*7MF (industrial): standard single rod*	*7MJ: HTHP single rod*
Materials	Probe	316/316L (1.4401/1.4404), Hastelloy® C (2.4819), Monel® (2.4360), or PFA insulated 316/316L (1.4401/1.4404)	316/316L (1.4401/1.4404), Hastelloy® C (2.4819) or Monel® (2.4360)
	Process seal	TFE with Viton® GFLT, Aegis PF 128 or Kalrez® 4079 (consult factory for alternatives)	PEEK with Aegis PF 128
Probe diameter		Bare: 13 mm (0.50") - PFA coated: 16 mm (0.625")	Bare: 13 mm (0.50")
Process Connection		Threaded: 2" NPT or 2" BSP (G 2") Flanged: various ANSI or EN (DIN) flanges	
Probe length		From 60 cm to 610 cm (24" to 240")	
Blocking distance (top)		120 mm up to 910 mm (4.8" up to 36") - depending probe length (adjustable)	
Transition Zone① (bottom)		$\varepsilon r \geq 10$: 25 mm (1")	
Process Temp.②	Max	+150 °C @ 27,6 bar (+300 °F @ 400 psi)	+315 °C @ 155 bar (+600 °F @ 2250 psi)
	Min	7MF-F: -40 °C @ 13,8 bar (-40 °F @ 200 psi) Other 7MF-probes: -40 °C @ 51,7 bar (-40 °F @ 750 psi)	-15 °C @ 245 bar (0 °F @ 3550 psi)
Max Process Pressure②		70 bar @ +20 °C (1000 psi @ +70 °F)	245 bar @ +20 °C (3550 psi @ +70 °F)
Max Viscosity		10.000 mPa.s (cP) – consult factory in case of agitation/turbulence	
Dielectric Range		εr: 10-100 (depending installation conditions, down to $\varepsilon r \geq 1{,}9$)	
Vacuum service		Negative pressure but not hermetic seal	
Media coating		Max error of 10 % of coated length. % Error is related to dielectric of medium, thickness of coating and coated probe length above level.	

① Transition Zone (zone with reduced accuracy) is dielectric dependent; εr = dielectric permitivity.
It is recommended to set 4-20 mA signal outside transition zone / blocking distance.

② See graphs at page 39 and 40.

PROBE SPECIFICATIONS

Description		*7MF-E/G/H & 7MH: hygienic single rod probe*
Materials	Probe	316/316L (1.4401/1.4404), Hastelloy® C22 (2.4602) or AL-6XN stainless steel (UNS N08367); 7MH also available in 316L (1.4435) stainless steel
	Process seal	7MF: PTFE (GRAS 21CFR177-1550 and USP <88> Class VI at 121 °C) 7MH: PEEK & 'O'-ring in Viton or EPDM (GRAS 21CFR177-1550 and USP <88> Class VI at 121 °C)
Probe diameter		13 mm (0.50") or 6 mm (0.25")
Probe length		From 30 cm to 610 cm (12" to 240") (selectable per 1 cm)
Blocking distance (top)		0 mm up to 910 mm (0" up to 36") - depending probe length (adjustable)
Transition Zone① (bottom)		$\varepsilon r \geq 10$: 25 mm (1")
Process Temp.②	Max	+150 °C @ 13,8 bar (+300 °F @ 200 psi) for 7MH with Viton GF 'O'-rings and 7MF +120 °C @ 13,8 bar (+250 °F @ 200 psi) for 7MH with EPDM 'O'-rings
	Min	-40 °C @ 13,8 bar (-40 °F @ 200 psi)
Max Process Pressure②		13,8 bar @ +150 °C (200 psi @ +300 °F) for 7MH with Viton GF 'O'-rings and 7MF 13, 8 bar @ +120 °C (200 psi @ +250 °F) for 7MH with EPDM 'O'-rings
Max Viscosity		10.000 mPa.s (cP) – consult factory in case of agitation/turbulence
Dielectric Range		εr 10-100 (depending installation conditions, down to $\varepsilon r \geq 1,9$) – liquids
Media coating		Max error of 10 % of coated length. % Error is related to dielectric of medium, thickness of coating and coated probe length above level.

Description		*7M1 (liquids) / 7M2 (solids): single flexible*	*7M5 (solids) /7M7 (liquids): twin flexible*
Materials	Probe	316 SST (1.4401)	FEP coated 316 SST (1.4401)
	Process seal	7M1/7M7: Teflon® with Viton® GFLT, Aegis PF 128 or Kalrez® 4079 (consult factory for alternatives) 7M2/7M5: Teflon® with Viton® GFLT	
Probe diameter		7M1: 5 mm (0.19") 7M2: 6 mm (0.25")	6 mm (0.25")
Process Connection		Threaded: 2" NPT or 2" BSP (G 2") Flanged: various ANSI or EN (DIN) flanges	
Probe length		From 2 m (6.56') to max 22 m (72.18')	
Blocking distance (top)		120 mm up to 910 mm (4.8" up to 36") - depending probe length (adjustable)	300 mm to 500 mm (12" to 20")
Transition Zone① (bottom)		305 mm (12")	
Process Temp.②	Max	7M1/7M7: +150 °C @ 27,6 bar (+300 °F @ 400 psi) 7M2/7M5: +65 °C @ 3,45 bar (+150 °F @ 50 psi)	
	Min	7M1/7M7: -40 °C @ 51,7 bar (-40 °F @ 750 psi) 7M2/7M5: -40 °C @ 3,45 bar (-40 °F @ 50 psi)	
Max Process Pressure②		7M1/7M7: 70 bar @ +20 °C (1000 psi @ +70 °F) 7M2/7M5: 3,45 bar @ +20 °C (50 psi @ +70 °F)	
Max Viscosity		10.000 mPa.s (cP) – consult factory in case of agitation/ turbulence	1500 mPa.s (cP)
Dielectric Range		7M1: εr: 10-100 (depending installation conditions, down to $\varepsilon r \geq 1,9$) 7M2: εr: 4-100	εr: 1,9-100
Mechanical load		7M1: 9 kg (20 lbs)	
Pull-down force		7M2: 1360 kg (3000 lbs)	7M5: 1360 kg (3000 lbs)
Vacuum service		Negative pressure but not hermetic seal	
Media coating		Max error of 10 % of coated length. % Error is related to dielectric of medium, thickness of coating and coated probe length above level.	

① Transition Zone (zone with reduced accuracy) is dielectric dependent; εr = dielectric permitivity.
It is recommended to set 4-20 mA signal outside transition zone / blocking distance.
② See graphs at page 39 and 40.

PROBE SPECIFICATIONS

Description		***7MG: cage GWR probe***
Materials	Probe	316/316L (1.4401/1.4404), Hastelloy® C (2.4819) or Monel® (2.4360)
	Process seal	Teflon® with Viton® GFLT, Aegis PF 128 or Kalrez® 4079 (consult factory for alternatives)
	Bottom spacer	2" cage: Teflon®; 3" and 4" cage: PEEK
Probe diameter	2" cage	13 mm (0.50")
	3" cage	19 mm (0.75")
	4" cage	25 mm (1")
Mounting		In a 2", 3" or 4" cage / schedule pipe stillwell or bridle
Process Connection		Flanged: various ANSI or EN (DIN) flanges
Probe length		From 60 cm to 610 cm (24" to 240")
Transition Zone①	Top	0 mm (0")
	Bottom	εr: 1,4 = 150 mm (6")/εr: 80 = 50 mm (2")
Process Temp.②	Max	+200 °C @ 18,6 bar (+400 °F @ 270 psi)
	Min	-40 °C @ 51,7 bar (-40 °F @ 750 psi)
Max. Process Pressure②		70 bar @ +20 °C (1000 psi @ +70 °F)
Max. Viscosity		10.000 mPa.s (cP)
Dielectric Range	Level	εr ≥ 1,4
	Interface	Upper liquid: εr ≥ 1,4 and ≤ 5 Lower liquid: εr ≥ 15
Vacuum Service		Negative pressure but not hermetic seal
Media coating		Max error of 10 % of coated length. % Error is related to dielectric of medium, thickness of coating and coated probe length above level.

Description		***7MT/7MN: interface GWR probe***
Materials	Probe	316/316L (1.4401/1.4404), Hastelloy® C (2.4819) or Monel® (2.4360)
	Process seal	Teflon® with Viton® GFLT, Aegis PF 128 or Kalrez® 4079 (consult factory for alternatives)
	Spacers	Teflon®
Probe diameter	Small coax	inside rod 8 mm (0.315") – outer tube 22,5 mm (0.88")
	Enlarged	Stainless steel: inside rod 16 mm (0.63") – outer tube 45 mm (1.75") Hast. C / Monel®: inside rod 16 mm (0.63") – outer tube 49 mm (1.93")
Mounting		External cage and/or in-tank mounting
Process Connection	Small coax	Threaded: 3/4" NPT or 1" BSP (G 1")
	all	Flanged: various ANSI, EN (DIN) or torque tube mating flanges
Probe length		From 60 cm to 610 cm (24" to 240")
Transition Zone①	Top	0 mm (0")
	Bottom	εr: 1,4 = 150 mm (6")/εr: 80 = 50 mm (2")
Process Temp.②	Max	+200 °C @ 18,6 bar (+400 °F @ 270 psi)
	Min	-40 °C @ 51,7 bar (-40 °F @ 750 psi)
Max. Process Pressure②		70 bar @ +20 °C (1000 psi @ +70 °F)
Max. Viscosity		Small coax: 500 mPa.s (cP); Enlarged coax: 2000 mPa.s (cP)
Dielectric Range		Upper liquid: εr ≥ 1,4 and ≤ 5 Lower liquid: εr ≥ 15
Vacuum service		Negative pressure but not hermetic seal
Media coating		In case of media coating, select 7MN probe

① Transition Zone (zone with reduced accuracy) is dielectric dependent; εr = dielectric permitivity.
It is recommended to set 4-20 mA signal outside transition zones.
② See graphs at page 39 and 40.

PROBE SPECIFICATIONS

Description		***7MB: standard twin rod GWR probe***
Materials	Probe	316/316L (1.4401/1.4404), Hastelloy® C (2.4819) or Monel® (2.4360)
	Process seal	Teflon® with Viton® GFLT, Aegis PF 128 or Kalrez® 4079 (consult factory for alternatives)
	Spacers	Teflon®
Probe diameter		Two 13 mm (0.5") Ø rods – 22,2 mm (0.875") ℄ to ℄
Mounting		In-tank mounting only. Twin rod probe must be used in metallic vessel or stillwell > 25 mm (1") from any surface or obstruction.
Process Connection		Threaded: 2" NPT or 2" BSP (G 2") Flanged: various ANSI, EN (DIN) or torque tube mating flanges
Probe length		From 60 cm to 610 cm (24" to 240")
Transition Zone①	Top	εr ≥ 1,9 = 150 mm (6")
	Bottom	εr: 1,9 = 150 mm (6")/εr: 80 = 25 mm (1")
Process Temp.②	Max	+150 °C @ 27,6 bar (+300 °F @ 400 psi)
	Min	-40 °C @ 51,7 bar (-40 °F @ 750 psi)
Max. Process Pressure②		70 bar @ +20 °C (1000 psi @ +70 °F)
Max. Viscosity		1500 mPa.s (cP)
Dielectric Range		1,9 to 100
Vacuum service		Negative pressure but not hermetic seal
Media coating		Film: 3% error of coated length, bridging not recommended③

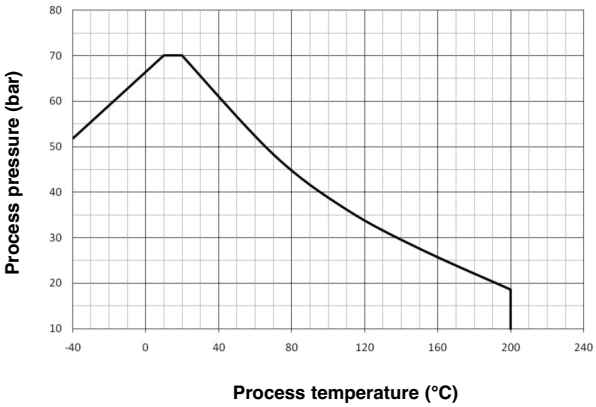
Description		***7EK: Top/Bottom GWR probe εr ≥ 1,4 - max +260 °C***	***7EK: Top/Bottom GWR probe εr ≥ 10 - max +315 °C***
Materials	Probe	316/316L (1.4401/1.4404)	
	Process seal	PEEK and TFE with Aegis PF 128	PEEK and Alumina with Aegis PF 128
	Bottom spacer	TFE	PEEK
Probe diameter		Inside tube: max 22,5 mm (0.88")	
Cage		2" - Sch 80 Top/Bottom cage	
Process Connection		Threaded: 1 1/2" NPT or 2" NPT Welded: 1 1/2" or 2" socket weld Flanged: Various ANSI, EN (DIN) or torque tube mating flanges	
Measuring range		min 356 mm (14") Std. – max 6,1 m (240")	
Process Temp.②	Max	+260 °C @ 115 bar (+500 °F @ 1670 psi)	+315 °C @ 109 bar (+600 °F @ 1585 psi)
	Min	-15 °C @ 117 bar (0 °F @ 1700 psi)	
Max. Process Pressure②		117 bar @ -15 °C (1700 psi @ +0 °F)	
Max. Viscosity		10.000 mPa.s (cP)	
Dielectric Range (level only)		1,4 to 100 - Non conductive and conductive media	10 to 100 - Conductive media
Vacuum service		Negative pressure but not hermetic seal	

① Transition Zone (zone with reduced accuracy) is dielectric dependent; εr = dielectric permitivity. It is recommended to set 4-20 mA signal outside transition zones.

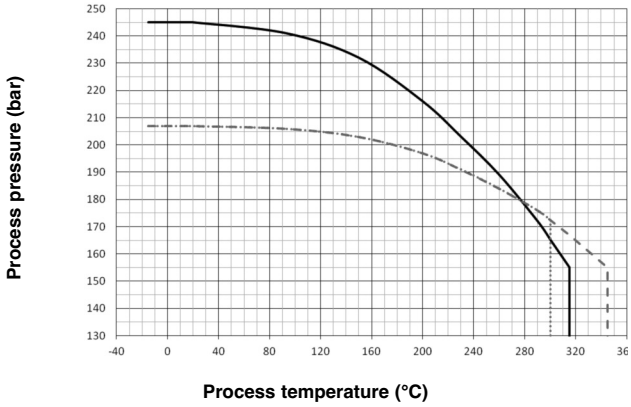
② See graphs at page 39 and 40.

③ Bridging is defined as continuous accumulation of material between the probe elements.

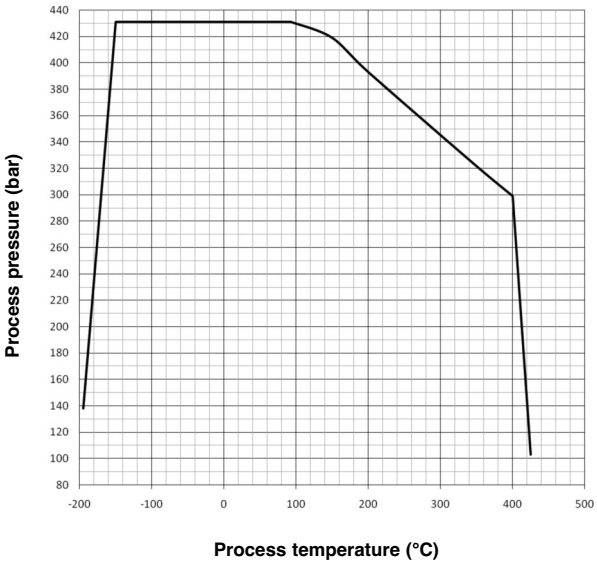
TEMPERATURE - PRESSURE RATING FOR ECLIPSE PROBE SEAL



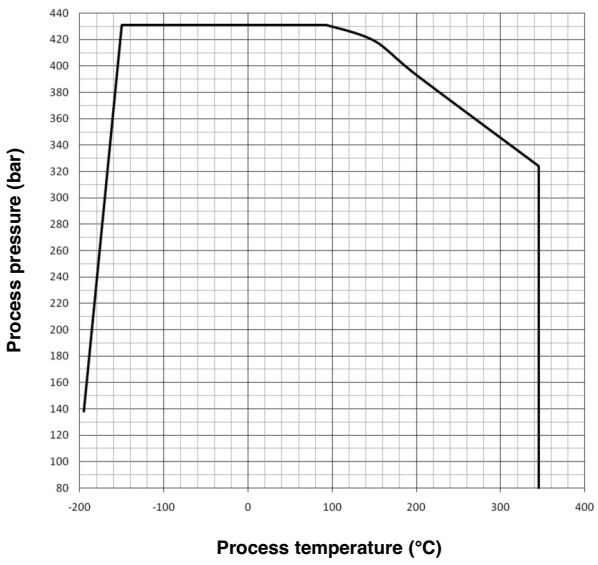
7MR/7MM, 7MT/7MN, 7MG probes



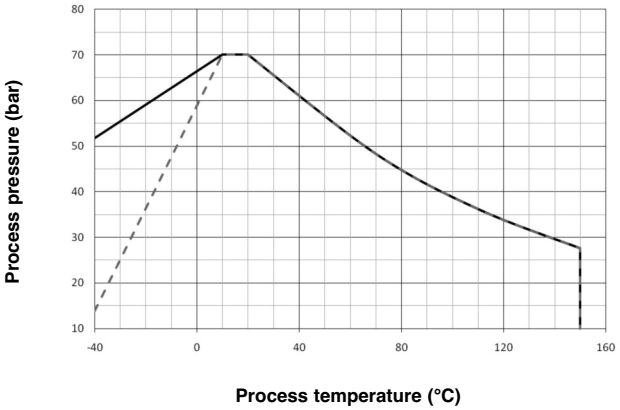
7MS probes
7MJ probes
7MQ probes



7MD/7ML probes
small coax

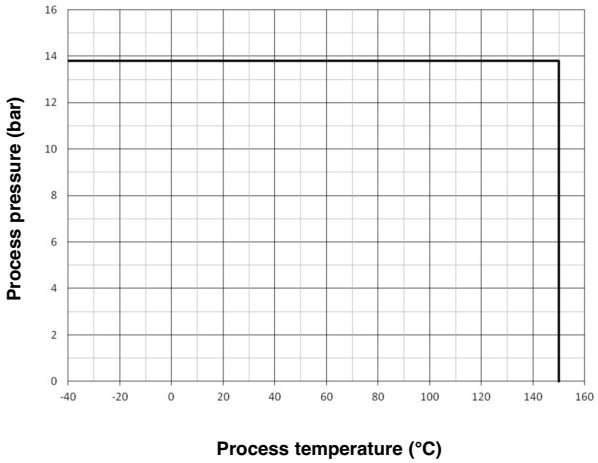


7MD/7ML probes
enlarged coax



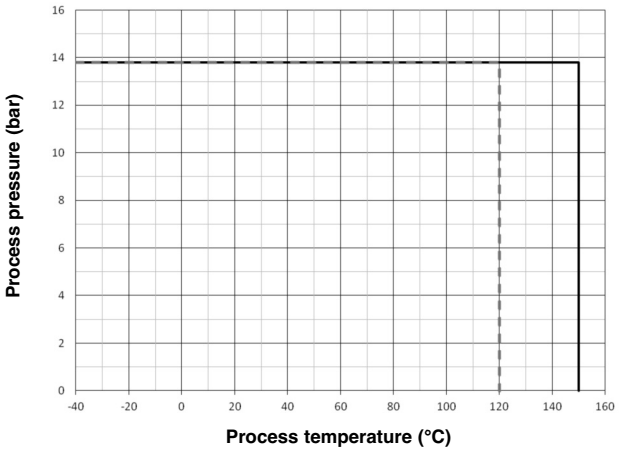
7M1/7M7, 7MB, 7MF probes
except 7MF-E, F, G, H

7MF-F probes

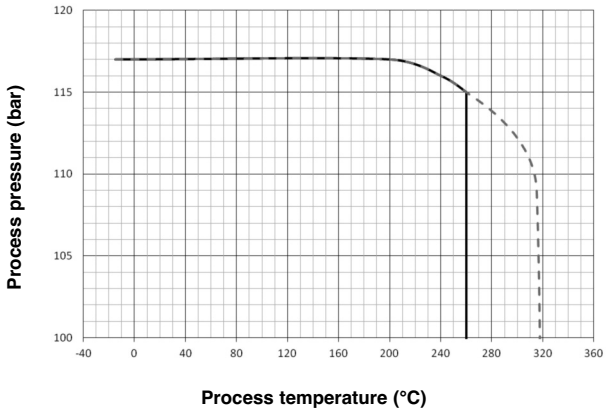


7MF-E, G, H probes

TEMPERATURE - PRESSURE RATING FOR ECLIPSE PROBE SEAL



——— 7MH with Viton GF 'O'-rings
– – – – 7MH with EPDM 'O'-rings



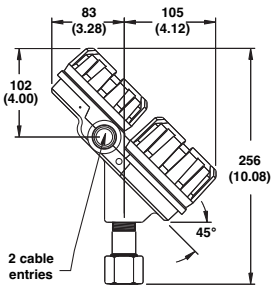
——— 7EK probes for max +260 °C
– – – – 7EK probes for max +315 °C and conductive liquids only

"O" RING SPECIFICATIONS① – Not suited for Ammonia/Chlorine applications

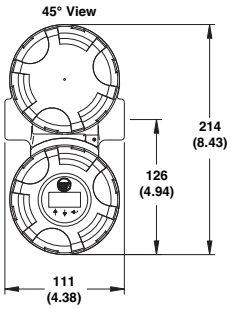
"O"-ring material	max process temperature	min process temperature	max process pressure	not recommended for applications	recommended for applications
Viton® GFLT	200°C @ 16 bar (400 °F @ 230 psi)	-40 °C (-40 °F)	70 bar @ 20 °C (1000 psi @ 70 °F)	ketones (MEK, acetone), skydrol fluids, amines, anhydrous ammonia, low molecular weight esters and ethers, hot hydrofluoric or chlorosulfonic acids, sour hydrocarbons	general purpose, ethylene
Neoprene®	150 °C @ 20 bar (300 °F @ 290 psi)	-55 °C (-65 °F)	70 bar @ 20 °C (1000 psi @ 70 °F)	phosphate ester fluids, ketones (MEK, acetone)	refrigerants, high anline point petroleum oils, silicate ester lubricants
EPDM	120 °C @14 bar (250 °F @ 200 psi)	-50 °C (-60 °F)	70 bar @ 20 °C (1000 psi @ 70 °F)	petroleum oils, di-ester base lubricant, steam	acetone, MEK, skydrol fluids
Kalrez® 4079	200 °C @ 16 bar (400 °F @ 232 psi)	-40 °C (-40 °F)	70 bar @ 20 °C (1000 psi @ 70 °F)	hot water/steam, hot aliphatic amines, ethylene oxide, propylene oxide	inorganic and organic acids (including hydro fluids and nitric), aldehydes, ethylene, organic oils, glycols, silicone oils, vinegar, sour hydrocarbons
Chemraz® 505	200 °C @ 14 bar (400 °F @ 200 psi)	-30 °C (-20 °F)	70 bar @ 20 °C (1000 psi @ 70 °F)	acetaldehyde, ammonia + lithium metal solution, butyraldehyde, di-water, freon, ethylene oxide, liquors, isobutyraldehyde	inorganic and organic acids, alkalines, ketones, esters, aldehydes, fuels
Buna-N	135 °C @ 22 bar (275 °F @ 320 psi)	-20 °C (-4 °F)	70 bar @ 20 °C (1000 psi @ 70 °F)	halogenated hydrocarbons, nitro hydrocarbons, phosphate ester hydraulic fluids, ketones (MEK, acetone), strong acids, ozone, automotive brake fluid	general purpose sealing, petroleum oils and fluids, cold water, silicone greases and oils, di-ester base lubricants, ethylene glycol base fluids
Polyurethane	95 °C @29 bar (200 °F @ 420 psi)	-55 °C (-65 °F)	70 bar @ 20 °C (1000 psi @ 70 °F)	acids, ketones, chlorinated hydrocarbons	hydraulic systems, petroleum oils, hydrocarbon fuel, oxygen, ozone
HSN *(Highly Saturated Nitrile)*	135 °C @ 22 bar (275 °F @ 320 psi)	-20 °C (-4 °F)	70 bar @ 20 °C (1000 psi @ 70 °F)	halogenated hydrocarbons, nitro hydrocarbons, phosphate ester hydraulic fluids, ketones (MEK, acetone), strong acids, ozone, automotive brake fluid, steam	NACE applications
Aegis PF128 ②	200 °C @ 16 bar (400 °F @ 232 psi)	-20 °C (-4 °F)	70 bar @ 20 °C (1000 psi @ 70 °F)	black liquor, freon 43, freon 75, galden, KEL-F liquid, molten potassium, molten sodium	inorganic and organic acids (including hydro fluids and nitric), aldehydes, ethylene, organic oils, glycols, silicone oils, vinegar, sour hydrocarbons, steam, amines, ethylene oxide, propylene oxide, NACE applications

① Valid for all GWR probe types, except 7MD, 7ML, 7MS, 7MJ, 7EK
② Max +150 °C (+300 °F) for use on steam.

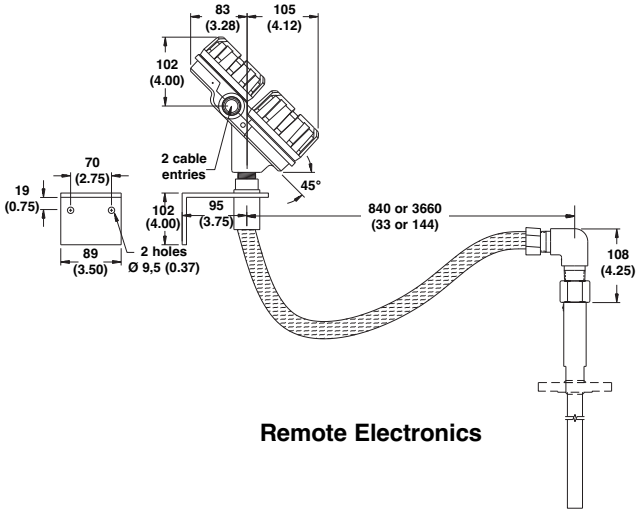
DIMENSIONS in mm (inches) - Dual compartment housing



Integral Electronics

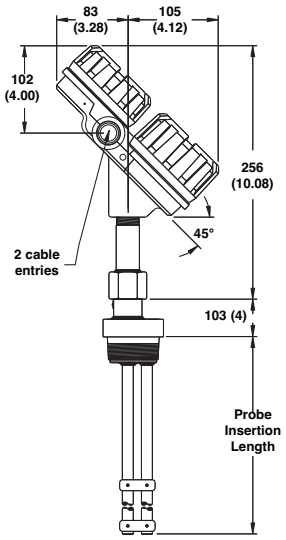


Eclipse Housing, (45° View)

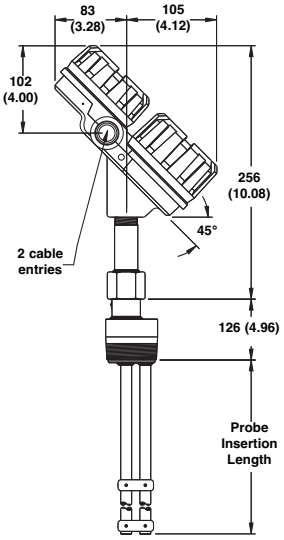


Remote Electronics

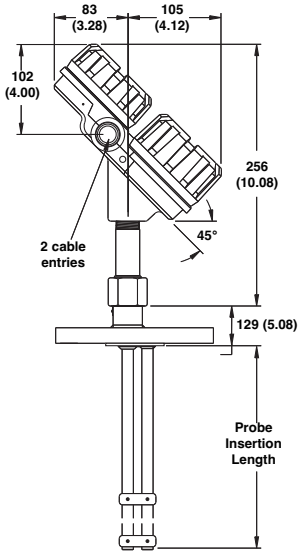
DIMENSIONS in mm (inches) - Twin Rod



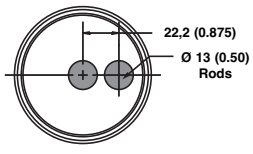
7MB with threaded 2" BSP (G 2") connection



7MB with threaded 2" NPT connection

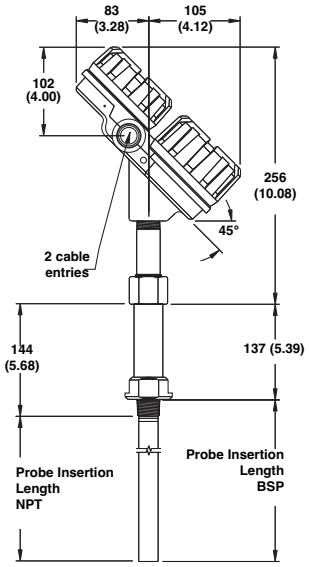


7MB with flanged connection

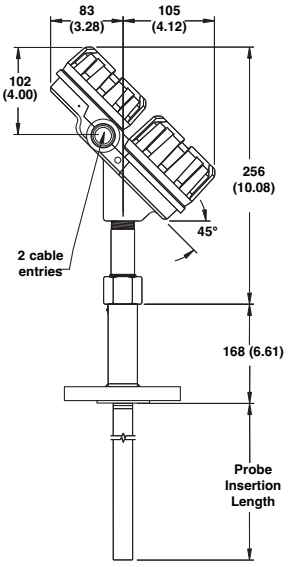


Twin Rod GWR Probe, End View

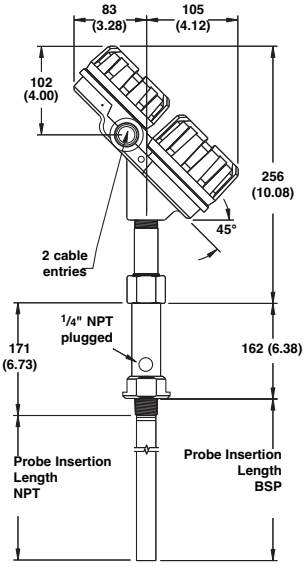
DIMENSIONS in mm (inches) - Coaxial GWR probes



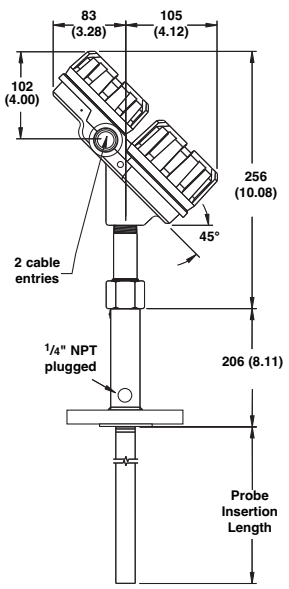
7MR / 7MT
with threaded connection



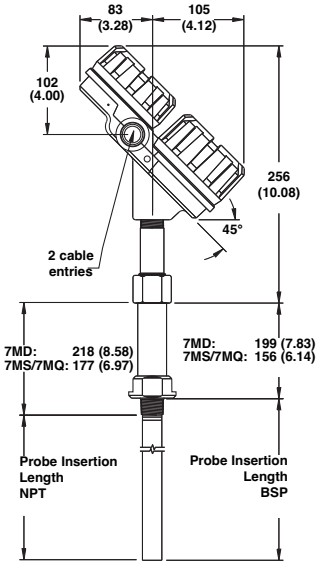
7MR / 7MT
with flanged connection



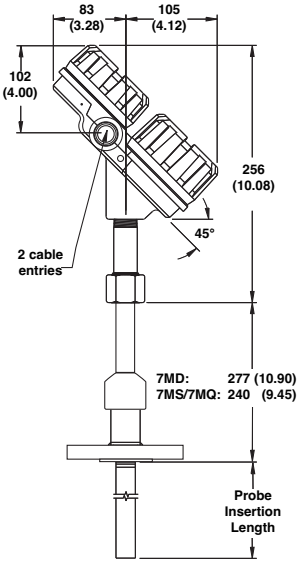
7MM / 7MN
with threaded connection



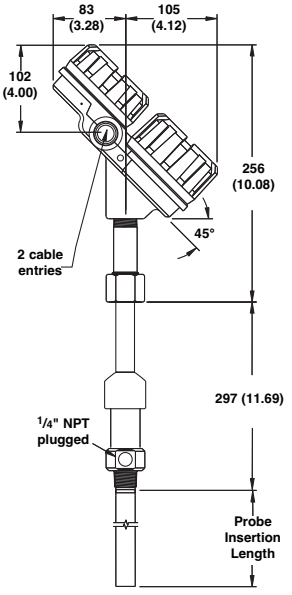
7MM / 7MN
with flanged connection



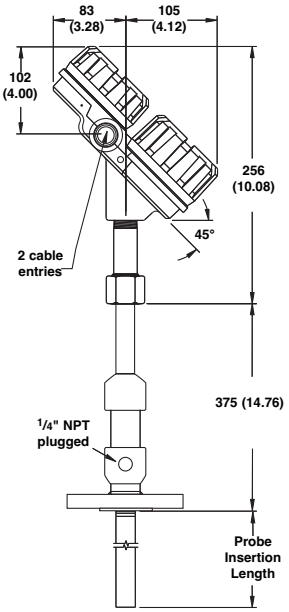
7MD/7MS/7MQ
with threaded connection



7MD/7MS/7MQ
with flanged connection

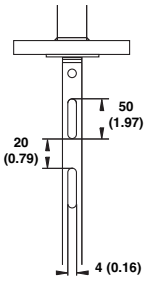


7ML
with threaded connection

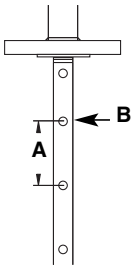


7ML
with flanged connection

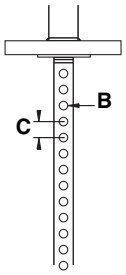
DIMENSIONS in mm (inches) - Coaxial GWR probes



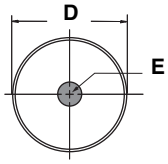
Slots for 7MR-A, 7MD-A/V/W (order per "x" description)



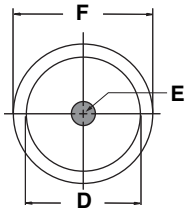
Venting holes for level



Venting holes for interface



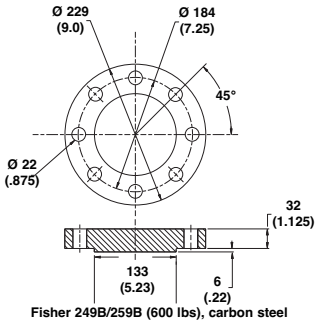
Coaxial GWR Probe, End View



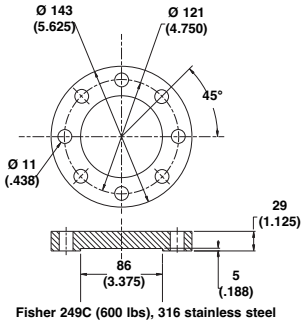
7MQ End View

Dim.	Small coax mm (inch)	Large coax mm (inch)
A	305 (12)	305 (12)
B	Ø 6,4 (0.25)	Ø 12,7 (0.5)
C	19 (0.75)	25,4 (1)
D	22,5 (0.88)	45 (1.75) - SST 49 (1.29) - HC and Monel
E	8 (0.31)	16 (0.63)
F	32 (1.25)	

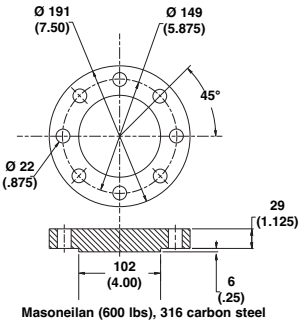
Proprietary flanges



Fisher 249B/259B (600 lbs), carbon steel

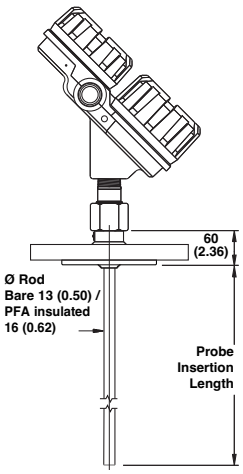


Fisher 249C (600 lbs), 316 stainless steel

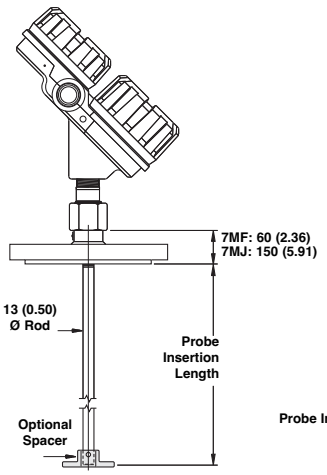


Masoneilan (600 lbs), 316 carbon steel

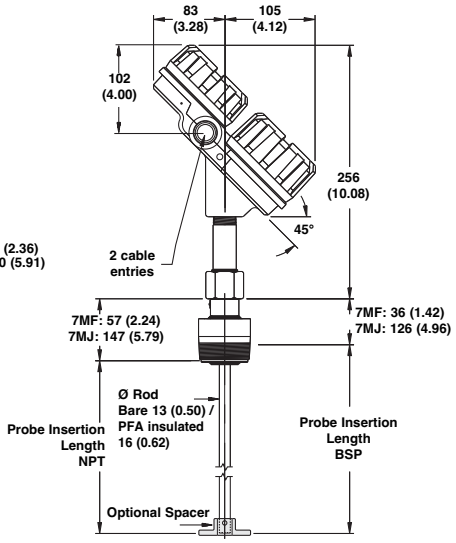
DIMENSIONS in mm (inches) - Single Rod



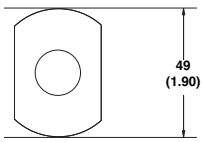
7MF-F with PFA faced-flanged connection



7MF/7MJ with flanged connection

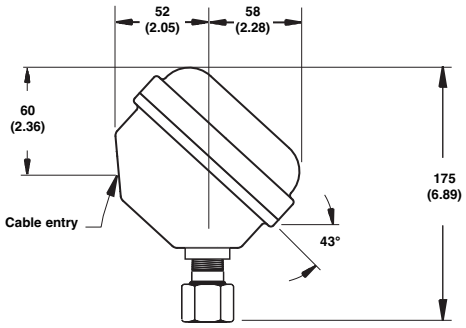


7MF/7MJ with threaded connection

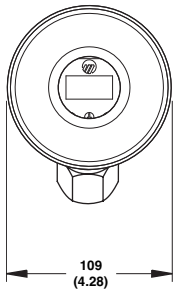


Spacer (end view)

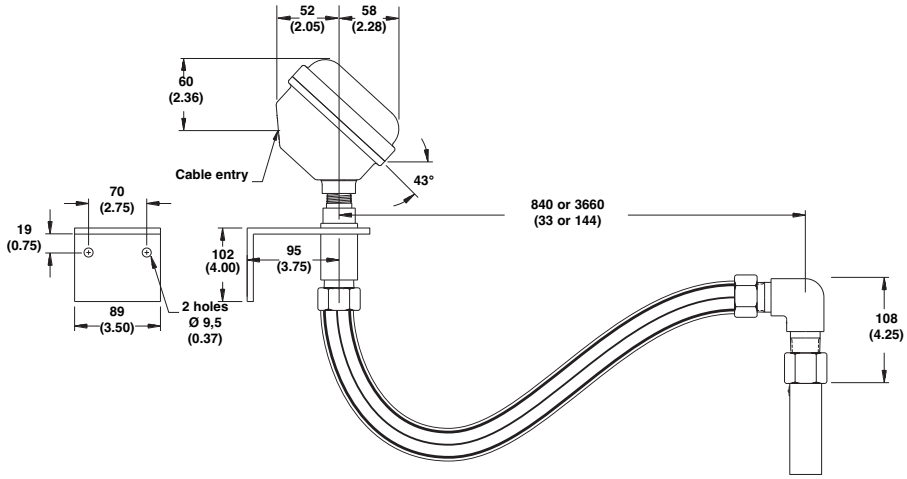
DIMENSIONS in mm (inches) - Hygienic



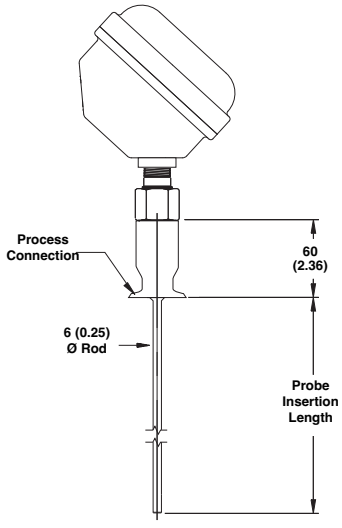
Integral Electronics



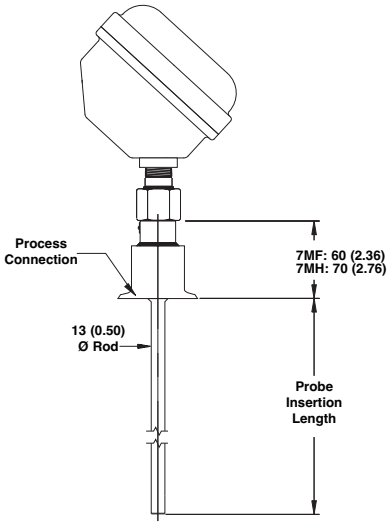
43° View



Remote Electronics

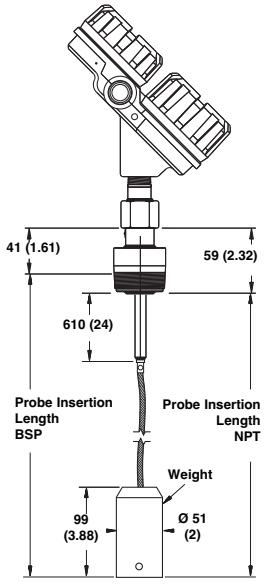


3/4" Tri-Clamp® connection

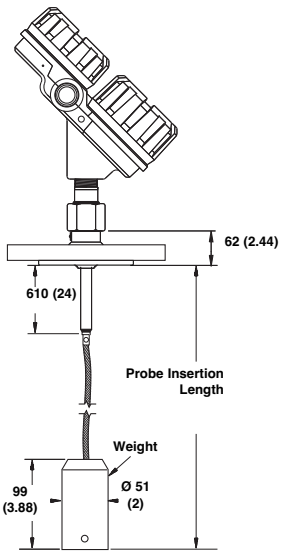


all except 3/4" Tri-Clamp® connection

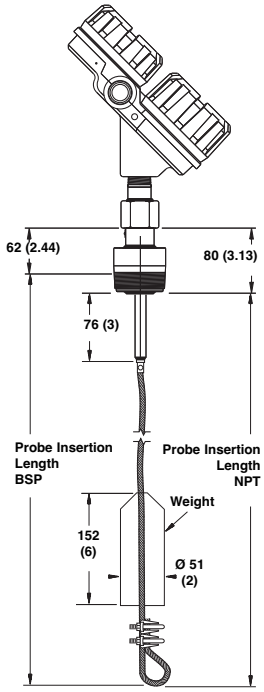
DIMENSIONS in mm (inches) - cable GWR probe



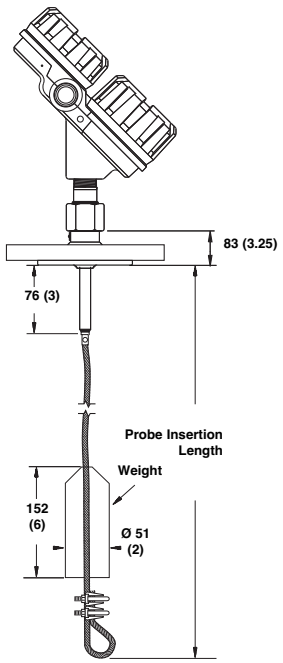
7M1
with threaded connection



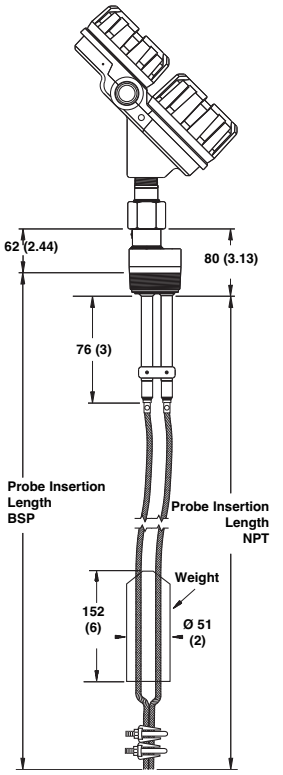
7M1
with flanged connection



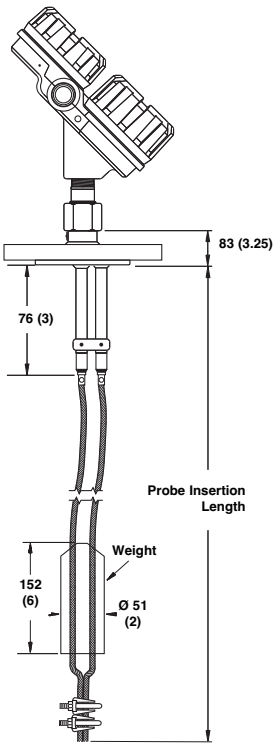
7M2
with threaded connection



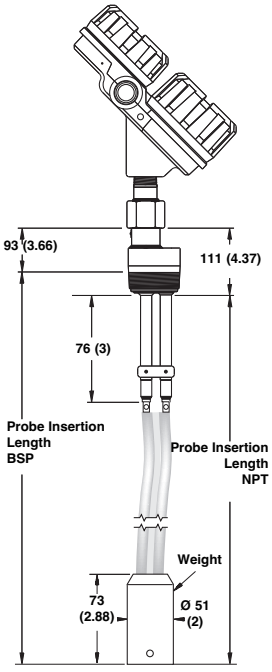
7M2
with flanged connection



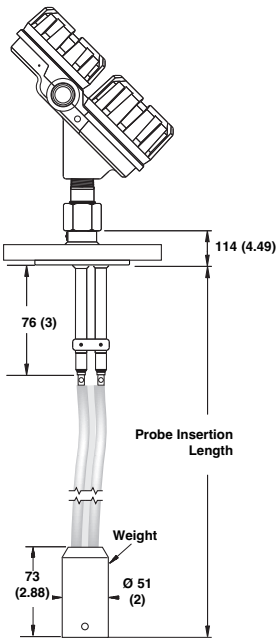
7M5
with threaded connection



7M5
with flanged connection

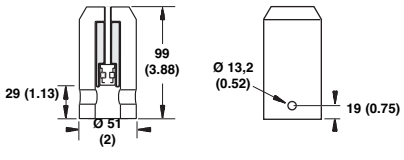


7M7
with threaded connection

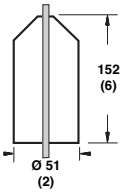


7M7
with flanged connection

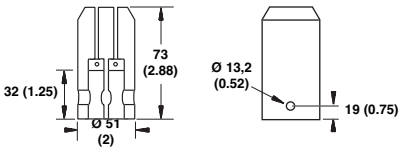
Additional weight



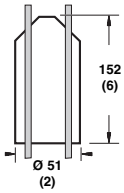
TFE Weight
450 g (1 lb.)
7M1



SST Weight
2,25 kg (5 lbs)
7M2

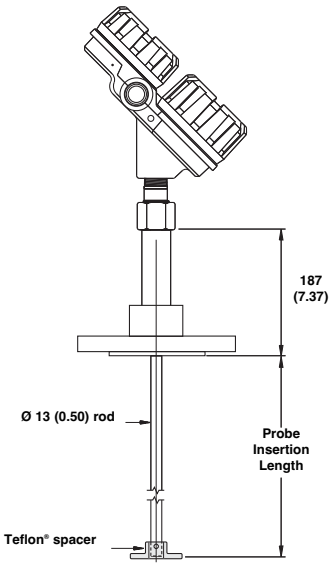


TFE Weight
284 g (10 oz.)
7M7

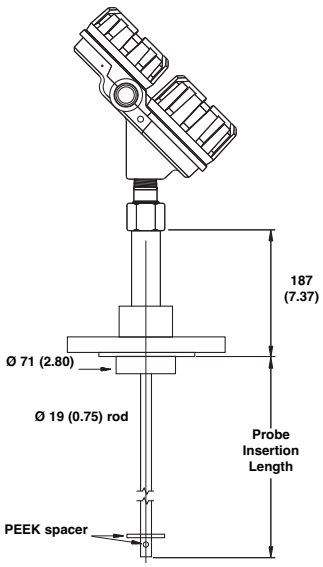


SST Weight
2,25 kg (5 lbs)
7M5

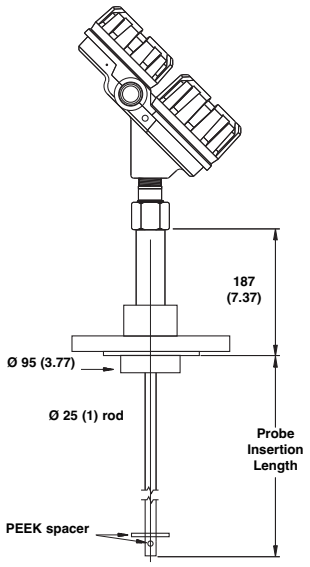
DIMENSIONS in mm (inches) - cage GWR probe



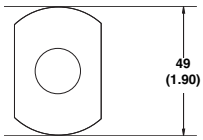
7MG - 2" cage



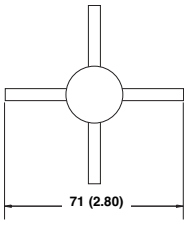
7MG - 3" cage



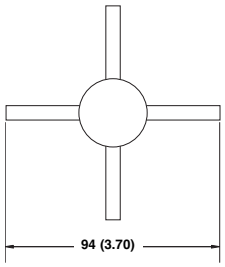
7MG - 4" cage



Spacer (end view)



Spacer (end view)



Spacer (end view)

MODEL IDENTIFICATION

A complete measuring system consists of:

1. Eclipse transmitter head/electronics
2. Eclipse 705 GWR probe
3. Free of charge: Eclipse 705 DTM (PACT*ware*™) can be downloaded from www.magnetrol.com.
4. Option: MACTek Viator USB HART® interface: order code: **070-3004-002**
5. Option:
   - TFE spacer for single rod metal GWR probes; order code: **089-9114-001** (7MF-A), **089-9114-002** (7MF-B), **089-9114-003** (7MF-C)
   - PEEK spacer for single rod 7MJ GWR probe; order code: **089-9114-005** (7MJ-A), **089-9114-006** (7MJ-B), **089-9114-007** (7MJ-C)
   - Additional weight for 7M1 GWR probe; order code: **089-9120-001**
   - Additional weight for 7M7 GWR probe; order code: **089-9121-001**
   - Additional weight for 7M2 GWR probe; order code: **004-8778-001**
   - Additional weight for 7M5 GWR probe; order code: **004-8778-002**

1. Code for ECLIPSE 705 transmitter head/electronics

BASIC MODEL NUMBER

7 0 5	Eclipse 705 guided wave radar transmitter

POWER

5	24 V DC, two wire loop powered

OUTPUT AND ELECTRONICS

1 0	4-20 mA with HART® – standard electronics (SFF of 84.5%)
1 A	4-20 mA with HART® – SIL enhanced electronics (SFF of 91%)
2 0	Foundation Fieldbus™ communication
3 0	Profibus PA™ communication

ACCESSORIES

A	Digital display and keypad
0	- Blind transmitter (no display/keypad) for dual compartment housing - Blind housing cover for hygienic housing

SEE NEXT PAGE

[ ]	7	0	5	–	5					

complete code for ECLIPSE 705 transmitter head/electronics

→ X = product with a specific customer requirement

1. Code for ECLIPSE 705 transmitter head/electronics

SEE PREVIOUS PAGE

MOUNTING / HOUSING MATERIAL / APPROVAL①

Integral mount electronics

Cast aluminium - dual compartment

1 1	Weatherproof
A 1	ATEX intrinsically safe (digit 5 = 1) / ATEX FISCO (digit 5 = 2 or 3)
C 1	ATEX flameproof enclosure
E 1	ATEX non sparking (digit 5 =1) / ATEX FNICO (digit 5 = 2 or 3)

Cast SST - dual compartment

1 2	Weatherproof
A 2	ATEX intrinsically safe (digit 5 = 1) / ATEX FISCO (digit 5 = 2 or 3)
C 2	ATEX flameproof enclosure
E 2	ATEX non sparking (digit 5 =1) / ATEX FNICO (digit 5 = 2 or 3)

304 SST - IP 67 - hygienic

1 3	Weatherproof
A 3	ATEX intrinsically safe (digit 5 =1) / ATEX FISCO (digit 5 = 2 or 3)

84 cm (33") remote mount electronics

Cast aluminium - dual compartment

2 1	Weatherproof
B 1	ATEX intrinsically safe (digit 5 = 1) / ATEX FISCO (digit 5 = 2 or 3)
D 1	ATEX flameproof enclosure
F 1	ATEX non sparking (digit 5 =1) / ATEX FNICO (digit 5 = 2 or 3)

Cast SST - dual compartment

2 2	Weatherproof
B 2	ATEX intrinsically safe (digit 5 = 1) / ATEX FISCO (digit 5 = 2 or 3)
D 2	ATEX flameproof enclosure
F 2	ATEX non sparking (digit 5 =1) / ATEX FNICO (digit 5 = 2 or 3)

304 SST - IP 67 - hygienic

2 3	Weatherproof
B 3	ATEX intrinsically safe (digit 5 =1) / ATEX FISCO (digit 5 = 2 or 3)

3,66 m (144") remote mount electronics (consult factory for applications with $\varepsilon_r < 10$)

Cast aluminium - dual compartment

2 7	Weatherproof
B 7	ATEX intrinsically safe (digit 5 = 1) / ATEX FISCO (digit 5 = 2 or 3)
D 7	ATEX flameproof enclosure
F 7	ATEX non sparking (digit 5 =1) / ATEX FNICO (digit 5 = 2 or 3)

Cast SST - dual compartment

2 8	Weatherproof
B 8	ATEX intrinsically safe (digit 5 = 1) / ATEX FISCO (digit 5 = 2 or 3)
D 8	ATEX flameproof enclosure
F 8	ATEX non sparking (digit 5 =1) / ATEX FNICO (digit 5 = 2 or 3)

304 SST - IP 67 - hygienic

2 9	Weatherproof
B 9	ATEX intrinsically safe (digit 5 =1) / ATEX FISCO (digit 5 = 2 or 3)

① For IEC approval, use ATEX approval and clearly request IEC nameplate.

CABLE ENTRY

1	M20 x 1,5 (2 entries - 1 plugged)
0	3/4" NPT (2 entries - 1 plugged)
4	1/2" NPT (1 entry)

	7	0	5	5							

complete code for ECLIPSE 705 transmitter head/electronics

X = product with a specific customer requirement

2. Code for ECLIPSE 705 GWR probe

BASIC MODEL NUMBER

7 M B	Twin Rod GWR probe for liquid level – WHG approved	ε_r: ≥ 1,9
7 M D	HTHP GWR probe for level/interface – WHG approved	ε_r: ≥ 2,0 if digit 4 = A, B or C
7 M F	Single rod GWR probe	ε_r: ≥ 1,9/10
7 M G	Cage GWR probe for level/interface	
7 M H	Hygienic single rod GWR probe	
7 M J	HTHP single rod GWR probe	ε_r: ≥ 1,9/10
7 M L	HTHP GWR probe for level/interface with flushing connection	ε_r: ≥ 2,0 if digit 4 = A, B or C
7 M M	GWR probe for level with flushing connection	ε_r: ≥ 1,4
7 M N	GWR probe for interface with flushing connection	upper liq: ε_r: ≥ 1,4 and ≤ 5 / lower liq: ≥ 15
7 M Q	Coaxial GWR probe for saturated steam applications, incl. steam compensation / reference target; 345 °C (650 °F) max.	
7 M R	GWR probe for level – WHG approved	ε_r: ≥ 1,4
7 M S	Coaxial GWR probe for saturated steam applications, incl. steam compensation / reference target; 300 °C (575 °F) max.	
7 M T	GWR probe for interface	upper liq: ε_r: ≥ 1,4 and ≤ 5 / lower liq: ≥ 15
7 M 1	Single cable GWR probe in 316 stainless steel (1.4401)	ε_r: ≥ 1,9/10 – liquids
7 M 2	Single cable GWR probe in 316 stainless steel (1.4401)	ε_r: ≥ 4,0 – solids
7 M 5	Twin cable GWR probe in FEP coated 316 SST (1.4401)	ε_r: ≥ 1,9 – solids
7 M 7	Twin cable GWR probe in FEP coated 316 SST (1.4401)	ε_r: ≥ 1,9 – liquids

MATERIAL OF CONSTRUCTION - wetted parts (including process connection flange when applicable)

A	316/316L (1.4401/1.4404) stainless steel	
B	Hastelloy C (2.4819)	
C	Monel (2.4360)	
E	316/316L (1.4401/1.4404) stainless steel 0,4 μm Ra (15 Ra) electropolished surface finish	
F	PFA insulated 316/316L (1.4401/1.4404) stainless steel	
G	AL-6XN stainless steel (UNS N08367) 0,4 μm Ra (15 Ra) electropolished surface finish	
H	Hastelloy® C22 (2.4602) 0,4 μm Ra (15 Ra) electropolished surface finish	
L	316L (1.4435) stainless steel 0,4 μm Ra (15 Ra) electropolished surface finish	
4	PFA insulated 316/316L (1.4401/1.4404) stainless steel	
V	316/316L (1.4401/1.4404) stainless steel with High Temp PEEK® spacers	ε_r: ≥ 1,7
W	316/316L (1.4401/1.4404) stainless steel with Teflon® spacers	ε_r: ≥ 1,4
N	Enlarged coax 316/316L (1.4401/1.4404) stainless steel	
P	Enlarged coax Hastelloy C (2.4819)	
R	Enlarged coax Monel (2.4360)	

PROCESS CONNECTION - SIZE/TYPE (consult factory for other process connections)

Threaded

1 1	3/4" NPT
2 2	1" BSP (G 1")
4 1	2" NPT
4 2	2" BSP (G 2")

ANSI flanges

2 3	1"	150 lbs ANSI RF
2 4	1"	300 lbs ANSI RF
2 5	1"	600 lbs ANSI RF
2 K	1"	600 lbs ANSI RJ
2 L	1"	900 lbs ANSI RJ
3 3	1 1/2"	150 lbs ANSI RF
3 4	1 1/2"	300 lbs ANSI RF
3 5	1 1/2"	600 lbs ANSI RF
3 K	1 1/2"	600 lbs ANSI RJ
3 M	1 1/2"	900/1500 lbs ANSI RJ
3 N	1 1/2"	2500 lbs ANSI RJ
4 3	2"	150 lbs ANSI RF
4 4	2"	300 lbs ANSI RF
4 5	2"	600 lbs ANSI RF
4 K	2"	600 lbs ANSI RJ
4 M	2"	900/1500 lbs ANSI RJ
4 N	2"	2500 lbs ANSI RJ
5 3	3"	150 lbs ANSI RF
5 4	3"	300 lbs ANSI RF
5 5	3"	600 lbs ANSI RF
5 K	3"	600 lbs ANSI RJ
5 L	3"	900 lbs ANSI RJ
5 M	3"	1500 lbs ANSI RJ
5 N	3"	2500 lbs ANSI RJ
6 3	4"	150 lbs ANSI RF
6 4	4"	300 lbs ANSI RF
6 5	4"	600 lbs ANSI RF
6 K	4"	600 lbs ANSI RJ
6 L	4"	900 lbs ANSI RJ
6 M	4"	1500 lbs ANSI RJ
6 N	4"	2500 lbs ANSI RJ

SEE NEXT PAGE

[ ] 7 M [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] **complete code for ECLIPSE 705 GWR probe**

→ X = product with a specific customer requirement

2. Code for ECLIPSE 705 GWR probe

SEE PREVIOUS PAGE

PROCESS CONNECTION - SIZE/TYPE

EN (DIN) flanges

B B	DN 25 PN 16/25/40	EN 1092-1 Type A
B C	DN 25 PN 63/100	EN 1092-1 Type B2
B F	DN 25 PN 160	EN 1092-1 Type B2
C B	DN 40 PN 16/25/40	EN 1092-1 Type A
C C	DN 40 PN 63/100	EN 1092-1 Type B2
C F	DN 40 PN 160	EN 1092-1 Type B2
C G	DN 40 PN 250	EN 1092-1 Type B2
C H	DN 40 PN 320	EN 1092-1 Type B2
C J	DN 40 PN 400	EN 1092-1 Type B2
D A	DN 50 PN 16	EN 1092-1 Type A
D B	DN 50 PN 25/40	EN 1092-1 Type A
D D	DN 50 PN 63	EN 1092-1 Type B2
D E	DN 50 PN 100	EN 1092-1 Type B2
D F	DN 50 PN 160	EN 1092-1 Type B2
D G	DN 50 PN 250	EN 1092-1 Type B2
D H	DN 50 PN 320	EN 1092-1 Type B2

D J	DN 50 PN 400	EN 1092-1 Type B2
E A	DN 80 PN 16	EN 1092-1 Type A
E B	DN 80 PN 25/40	EN 1092-1 Type A
E D	DN 80 PN 63	EN 1092-1 Type B2
E E	DN 80 PN 100	EN 1092-1 Type B2
E F	DN 80 PN 160	EN 1092-1 Type B2
E G	DN 80 PN 250	EN 1092-1 Type B2
E H	DN 80 PN 320	EN 1092-1 Type B2
E J	DN 80 PN 400	EN 1092-1 Type B2
F A	DN 100 PN 16	EN 1092-1 Type A
F B	DN 100 PN 25/40	EN 1092-1 Type A
F D	DN 100 PN 63	EN 1092-1 Type B2
F E	DN 100 PN 100	EN 1092-1 Type B2
F F	DN 100 PN 160	EN 1092-1 Type B2
F G	DN 100 PN 250	EN 1092-1 Type B2
F H	DN 100 PN 320	EN 1092-1 Type B2
F J	DN 100 PN 400	EN 1092-1 Type B2

Hygienic

2 P	3/4" Tri-Clamp®
3 P	1" - 1 1/2" Tri-Clamp®
4 P	2" Tri-Clamp®
9 P	2 1/2" Tri-Clamp®
5 P	3" Tri-Clamp®
6 P	4" Tri-Clamp®
C S	DN 40 DIN 11851
D S	DN 50 DIN 11851
V V	Varivent Type N (mounting diameter 68 mm)
D N	D 50 NEUMO BioControl
V N	D 65 NEUMO BioControl
E N	D 80 NEUMO BioControl
D R	DN 50 DIN 11864-1 Type A
S Y	DN 1 1/2" SMS
T Y	DN 2" SMS

Torque tube mating flanges

T T	300/600 lbs Fisher (249B/259B) in carbon steel
T U	300/600 lbs Fisher (249C) in stainless steel
U T	300/600 lbs Masoneilan flange in carbon steel
U U	300/600 lbs Masoneilan flange in stainless steel

PROCESS SEAL - MATERIAL

0	Viton® GFLT
1	EPDM (Ethylene Propylene) PEEK® & EPDM 'O'-rings for 7MH
2	Kalrez® 4079
3	HSN (highly saturated nitrile)
4	Buna-N
5	Neoprene®

6	Chemraz® 505
7	Polyurethane
8	Aegis PF 128
A	Kalrez® 6375
C	PEEK® & Viton GF 'O'-rings for 7MH
N	Borosilicate/Inconel® X-750 for 7MD/7ML PTFE for 7MF-E/G/H

SEE NEXT PAGE

[ ] 7 M [ ] [ ] [ ] [ ] [ ] [ ] [ ] **complete code for ECLIPSE 705 GWR probe**

→ X = product with a specific customer requirement

2. Code for ECLIPSE 705 GWR probe

SEE PREVIOUS PAGE

INSERTION LENGTH

Rigid GWR probes: specify per cm (0.39") increment

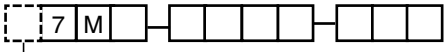
0 6 0	min 60 cm (24")
6 1 0	max 610 cm (240") – max 450 cm (177") for 7MQ / 7MS

Flexible GWR probes: specify per m (3.28') increment

0 0 2	min 2 m (6.56')
0 2 2	max 22 m (72.18')

Hygienic GWR probes: specify per cm (0.39") increment

0 3 0	min 30 cm (12")
1 8 0	max 180 cm (72") for 3/4" Tri-Clamp® process connection
6 1 0	max 610 cm (240") for all other process connections



complete code for ECLIPSE 705 GWR probe

X = product with a specific customer requirement

2. Code for ECLIPSE® 705 Top/Bottom GWR probe and cage

Additional dimensions are provided (see drawings at bottom of this page):
- Dimension A: top of process connection up to 20 mA range
- Dimension B: bottom of process connection up to 4 mA range
- Level Range, if different from 356 mm (14")

BASIC MODEL NUMBER

GWR probe suited for in-line external cage mounting

7 E K	Top/Bottom GWR probe and cage - overfill safe

MATERIAL OF CONSTRUCTION - wetted parts (including process connection flange when applicable)

	Cage and Flanges	GWR probe
K	316/316L (1.4401/1.4404) stainless steel	316/316L (1.4401/1.4404) stainless steel
M	Carbon steel	

PROCESS CONNECTION - SIZE/TYPE

Threaded

3 1	1 1/2" NPT
4 1	2" NPT

Welded

3 9	1 1/2" socket weld
4 9	2" socket weld

ANSI flanges

3 3	1 1/2" 150 lbs ANSI RF
3 4	1 1/2" 300 lbs ANSI RF
3 5	1 1/2" 600 lbs ANSI RF
4 3	2" 150 lbs ANSI RF
4 4	2" 300 lbs ANSI RF
4 5	2" 600 lbs ANSI RF

LEVEL RANGE

A	356 mm (14")

OPTIONS

0	None
2	Sight glass connections (sight glass not included)

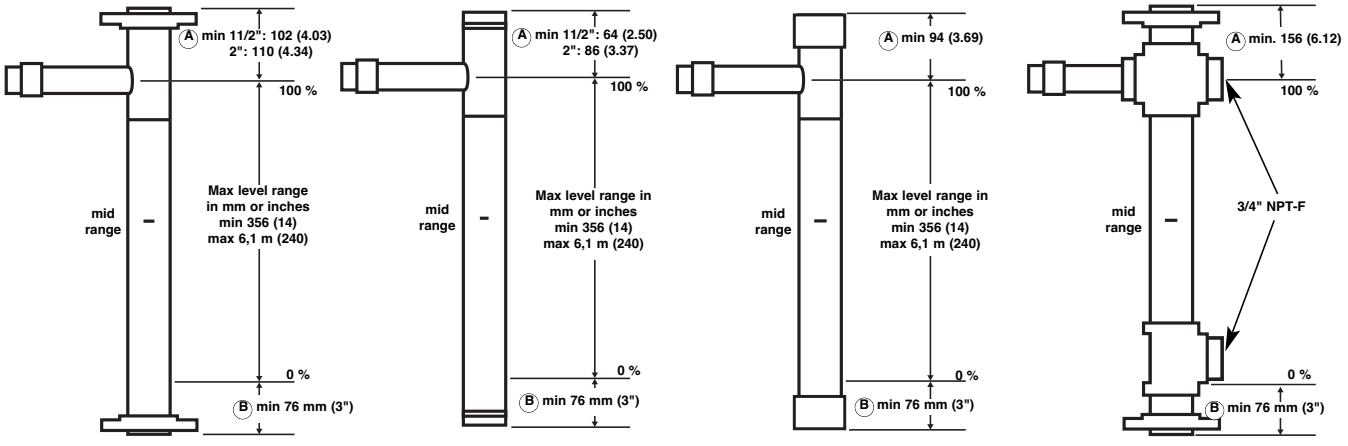
LIQUID TYPE / OPERATING TEMPERATURE

1 0	Conductive liquids ($\varepsilon_r \geq 10$)	max +315 °C (+600 °F)
2 0	All liquids ($\varepsilon_r \geq 1,4$)	max +260 °C (+500 °F)

[ ] 7 E K [ ] [ ] [ ] A [ ] [ ] 0 **complete code for ECLIPSE 705 Top/Bottom GWR probe and cage**

→ X = product with a specific customer requirement

DIMENSIONS in mm (inches)



Flanged 7EK | **Threaded 7EK** | **Welded 7EK** | **Optional sight glass connections**

705 Eclipse Guided Wave Radar Transmitter

Configuration Data Sheet

Copy blank page and store calibration data for future reference and troubleshooting.

Item	Screen	Value	Value	TROUBLESHOOTING	
Vessel Name					
Vessel #					
Process Medium					
Tag #					
Electronics Serial #					
Probe Serial #				Working Value	Non-Working Value
Level	«Level»				
Volume (optional)	«Volume»				
Interface (optional)	«IfcLvl»				
Interface Volume (opt.)	«IfcVol»				
Probe Model	«PrbModel»				
Probe Mount	«PrbMount»				
Measurement Type	«MeasType»				
Level Units	«LvlUnits»				
Probe Length	«Probe Ln»				
Level Offset	«Lvl Ofst»				
Volume Units (opt.)	«VolUnits»				
Strapping Table (opt.) (Make a separate list for each level and its corresponding volume	«StrapTbl»				
	«Pt1..20»				
Dielectric	«Dielectrc»				
Sensitivity	«Senstvty»				
Loop Control	«LoopCtrl»				
4mA point	«Set 4mA»				
20mA point	«Set 20mA»				
Damping	«Damping»				
Blocking Distance	«BlockDis»				
Safety Zone Fault	«Sz Fault»				
Safety Zone Height	«SzHeight»				
Safety Zone Alarm	«Sz Alarm Reset»				
Fault Choice	«Fault»				
Threshold	«Treshld»				
Interface Threshold	«IfcThrs»				
HART Poll Address	«Poll Adr»				
Level Trim	«Trim Lvl»				
Trim 4 mA	«Trim 4»				
Trim 20 mA	«Trim 20»				
Level Ticks	«LvlTicks»				
Interface Ticks (opt.)	«IfcTicks»				
HF cable	«HF Cable»				

705 Eclipse Guided Wave Radar Transmitter

Configuration Data Sheet – additional Advanced Diagnostic

Copy blank page and store calibration data for future reference and troubleshooting.

Item	Screen	Value	Value	TROUBLESHOOTING	
				Correct Value	Incorrect Value
# of Fiducial Ticks	«FidTicks»				
Fiducial Spread	«Fid Sprd»				
Sys Code	«Sys Code»				
Fiducial Type	«Fid Type»				
Fiducial Gain	«Fid Gain»				
Window	«Window»				
Conversion Factor	«Conv Fct»				
Scale Offset	«Scl Ofst»				
Negative Amplitude	«Neg Ampl»				
Positive Amplitude	«Pos Ampl»				
Signal	«Signal»				
Compensate	«Compensate»				
Derating Factor	«DrateFct»				
Target Amplitude (7MS)	«TargAmpl»				
Target Ticks (7MS)	«Targ Tks»				
Target Calibration (7MS)	«Targ Cal»				
Operating Mode	«OperMode»				
7EK Correction	«7xK Corr»				
Electronics temperature	«ElecTemp»				
Max temperature	«Max Temp»				
Min temperature	«Min Temp»				
Safety Zone Hysterisis	«SZ Hyst»				

Notes

IMPORTANT

SERVICE POLICY

Owners of Magnetrol products may request the return of a control; or, any part of a control for complete rebuilding or replacement. They will be rebuilt or replaced promptly. Magnetrol International will repair or replace the control, at no cost to the purchaser, (or owner) ***other than transportation cost*** if:

a. Returned within the warranty period; and,
b. The factory inspection finds the cause of the malfunction to be defective material or workmanship.

If the trouble is the result of conditions beyond our control; or, is **NOT** covered by the warranty, there will be charges for labour and the parts required to rebuild or replace the equipment.
In some cases, it may be expedient to ship replacement parts; or, in extreme cases a complete new control, to replace the original equipment before it is returned. If this is desired, notify the factory of both the model and serial numbers of the control to be replaced. In such cases, credit for the materials returned, will be determined on the basis of the applicability of our warranty.
No claims for misapplication, labour, direct or consequential damage will be allowed.

RETURNED MATERIAL PROCEDURE

So that we may efficiently process any materials that are returned, it is essential that a “Return Material Authorisation” (RMA) form will be obtained from the factory. It is mandatory that this form will be attached to each material returned. This form is available through Magnetrol’s local representative or by contacting the factory. Please supply the following information:

1. Purchaser Name
2. Description of Material
3. Serial Number and Ref Number
4. Desired Action
5. Reason for Return
6. Process details

Any unit that was used in a process must be properly cleaned in accordance with the proper health and safety standards applicable by the owner, before it is returned to the factory.
A material Safety Data Sheet (MSDS) must be attached at the outside of the transport crate or box.
All shipments returned to the factory must be by prepaid transportation. Magnetrol ***will not accept*** collect shipments.
All replacements will be shipped Ex Works.

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Magnetrol®

www.magnetrol.com

BENELUX FRANCE	Heikensstraat 6, 9240 Zele, België -Belgique Tel. +32 (0)52.45.11.11 • Fax. +32 (0)52.45.09.93 • E-Mail: info@magnetrol.be
DEUTSCHLAND	Alte Ziegelei 2-4, D-51491 Overath Tel. +49 (0)2204 / 9536-0 • Fax. +49 (0)2204 / 9536-53 • E-Mail: vertrieb@magnetrol.de
INDIA	B-506, Sagar Tech Plaza, Saki Naka Junction, Andheri (E), Mumbai - 400072 Tel. +91 22 2850 7903 • Fax. +91 22 2850 7904 • E-Mail: info@magnetrolindia.com
ITALIA	Via Arese 12, I-20159 Milano Tel. +39 02 607.22.98 • Fax. +39 02 668.66.52 • E-Mail: mit.gen@magnetrol.it
RUSSIA	Business center “Farvater”, Ruzovskaya Street 8B, office 400A, 190013 St. Petersburg Tel. +7 812 320 70 87 • E-Mail: info@magnetrol.ru
U.A.E.	DAFZA Office 5EA 722 • PO Box 293671 • Dubai Tel. +971-4-6091735 • Fax +971-4-6091736 • E-Mail: info@magnetrol.ae
UNITED KINGDOM	Unit 1 Regent Business Centre, Jubilee Road Burgess Hill West Sussex RH 15 9TL Tel. +44 (0)1444 871313 • Fax +44 (0)1444 871317 • E-Mail: sales@magnetrol.co.uk