A Higher Level of Performance

User Manual

Centurion

Guided Radar

CGR Series

For more information, please visit >

www.hawkmeasure.com

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Principle of Operation

Guided-wave technology sends the radar pulse down a probe to measure either liquids, solids or a low dieletric to high dieletric Interface level.

The pulse hits the surface and / or Interface and is reflected back up the probe to the sensor, where the transit time is translated into a distance using time of fight and time expansion.

The amplitude of the reflection depends on the dielectric constant of the product.

Function

The HAWK range of Guided Radar products are ideal for the measurement of liquids, sludge, powders and granules to a range of 18.5m for level and interface. This technology is not affected by pressure, temperature, viscosity, vacuum, foam, dust, changes in dielectric constant or coating of the probe.

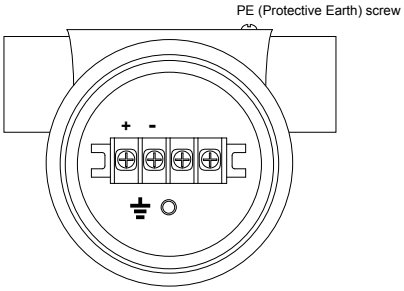
Primary Areas of Application

- Chemicals
- Petrochemicals
- Cement
- Building Aggregates
- Mining / Minerals
- Food & Beverages
- Oil & Gas
- Pharmaceutical
- Pulp & Paper
- Wastewater

Features

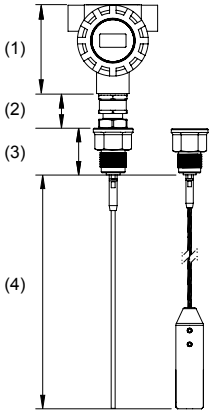
- Explosion proof housing option
- IECEx Ex d [ia] ia IIC T6 Gb Ga
- IECEx Ex ia tb [ia Da] IIIC T85C Da Db Tamb 60°C
- Interface Level measurement option
- Up to 18.5m (60ft 8in) range
- Very short minimum range (150mm, 6")
- Simple setup
- Auto-Calibration to any dielectric ≥ 1.5
- Adjustable Sensitivity
- Precise & continuous accuracy
- 2 wire loop
- 4-20mA, HART 7
- Protection class IP66, NEMA 4x
- Measures extremely low dielectric (1.5)
- Programmable fail safe mode

Wiring Terminal Compartment

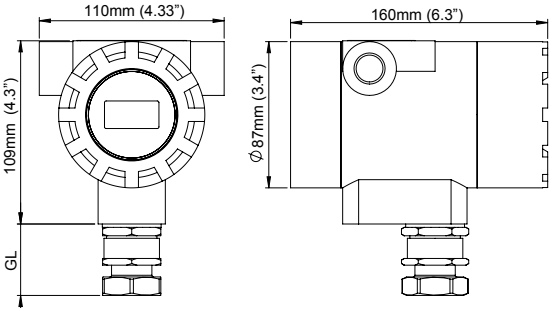


Dimensions - Reference

1	Housing
2	Barrier Gland / High Temp extension with Barrier Gland / End position with Barrier Gland
3	Threaded Connection / Flange
4	Probe Length

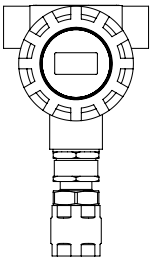


Dimensions Housing + Barrier Gland

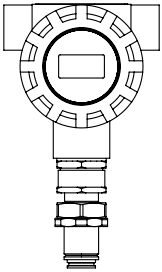


Housing with Process Temperature option '2'. Visual reference only.

Approval Option 1D



Approval Option XX



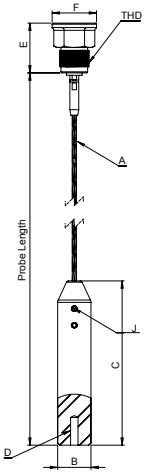
Barrier Gland Length (GL)			
Process Temperature Option*	Approval Option*	GL	
		mm	in
1	XX, 1D, 2D, 2A	55	2.2
2	XX, 1D, 2D, 2A	105	4.1

*Consult Part Numbering / Specifications for technical information

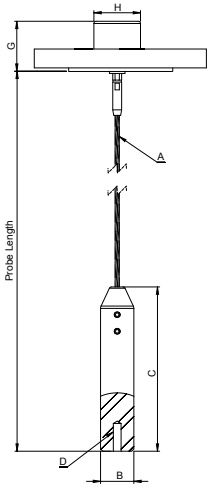
Dimensions - Probe Variants

A04 / A06 / A08 / J04 / J06 / J08

Threaded

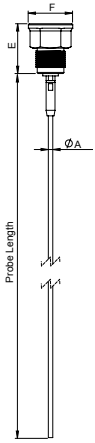


Welded Flange

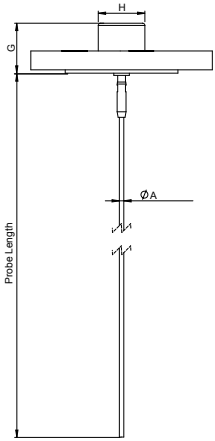


B04 / B06 / B08 / K04 / K06 / K08

Threaded



Welded Flange

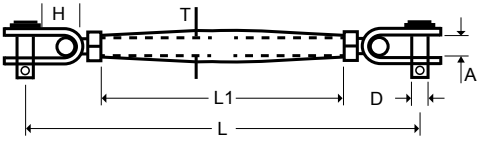


Probe / Cable Dimensions														
Probe Type	**THD BSP or NPT**	**A**		**B**		**C**		**E**		**F**		**D Internal Threads (A04, A06, A08 only)**	**J (Tightening Torque = 20Nm)**	
	in.	**mm**	**in.**	**mm**	**in.**	**mm**	**in.**	**mm**	**in.**	**mm**	**in.**		**Set Screw**	**Hex Key Size**
A04, B04, J04, K04	3/4	4	0.16	22	0.9	120	4.7	45	1.8	40	1.6	M10x1.25, 24mm deep	3x M8x1.25x12	4mm
A06, B06, J06, K06	1	6	0.24	28	1.1	150	5.9	45	1.8	40	1.6	M10x1.25, 24mm deep	3x M8x1.25x12	4mm
A08, B08, J08, K08	1-1/2	8	0.31	36	1.4	200	7.8	72	2.8	64	2.5	M10x1.25, 24mm deep	3x M10x1.5x18	5mm
	Welded Flange	**G**		**H**										
		mm	**in.**	**mm**	**in.**									
A04, B04, J04, K04		45	1.8	42	1.6									
A08, B08, J04, K04		72	2.8	70	2.7									

Cable Weight Tank Fastening Kit

The tank fastening kit (CGR-A0X-WL-SS) includes 2 eye bolts and 1 adjustable rigging lock.

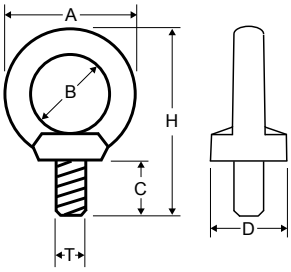
Rigging Lock



Dimensions	
T (thread)	M12
A	14mm (0.55")
D	12mm (0.47")
H	25mm (0.98")
L	252mm (9.9")
L1	150mm (5.9")

Recommended Working Load	983kg (1.05 ton)
Total Deformation Load	3750kg (4.13 ton)
Weight	576g (1.27lb)

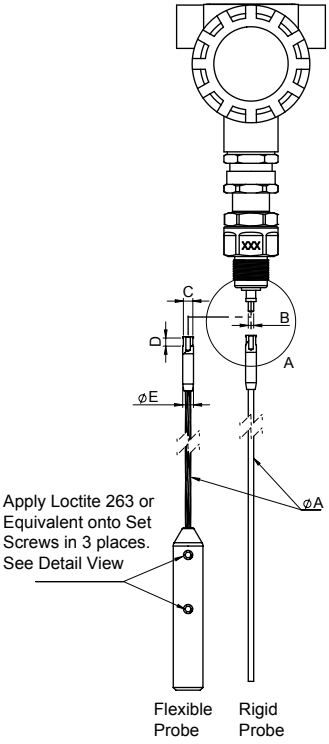
Eye Bolt

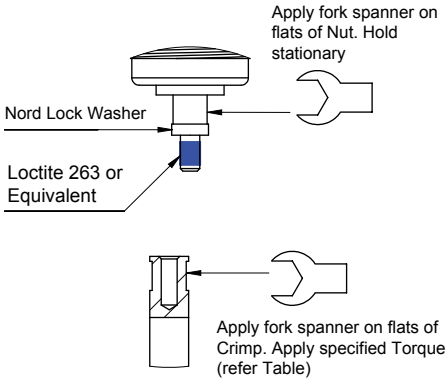


Dimensions	
T (thread)	M10
A	40mm (1.57")
B	25mm (0.98")
C	21mm (0.82")
D	20mm (0.79")
H	63mm (2.48")

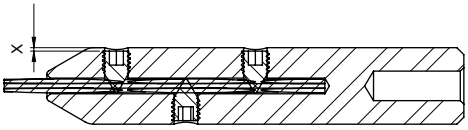
Recommended Working Load	675kg (0.74 ton)
Total Deformation Load	2600kg (2.87 ton)
Weight	60g (0.13lb)

Instructions for Assembling Detached Probe





Rope Weight



Note: Only Probes supplied by HAWK can be fitted in situ. Mounting of any other probe voids Hazardous Location Approval

Probe	Ø A(mm)	B(mm)	C(mm)	D(mm)	Ø E(mm)	T. Torque
J04, K04	4	M4	7	6	8	5 Nm
J06, K06	6	M6	10	6	11	10 Nm
J08, K08	8	M10	15	10	16	20 Nm

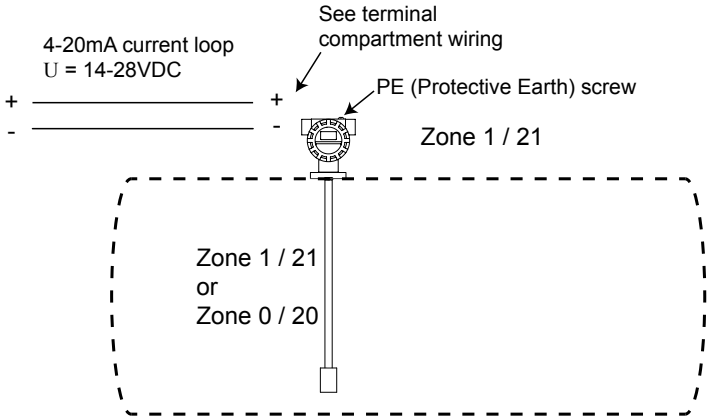
Set Screws on Rope Weight				
Probe	**Set Screw**	**Length**	**X**	**Torque**
J04, K04	3XM8X1.25	12mm	1mm	20 Nm
J06, K06	3XM8X1.25	12mm	3mm	20 Nm
J08, K08	3XM10X1.5	18mm	3mm	20 Nm

Safety Instructions

For installation requirements for Hazardous Locations please refer to appropriate Safety Instruction document located at:

http://www.hawkmeasure.com/productdetail.asp?id=57

CGR2 Series Wiring in Hazardous Locations



NOTE: (Ref Safety Instructions Sect 10a)

Application of supply voltages above 28VDC will cause damage to the equipment.

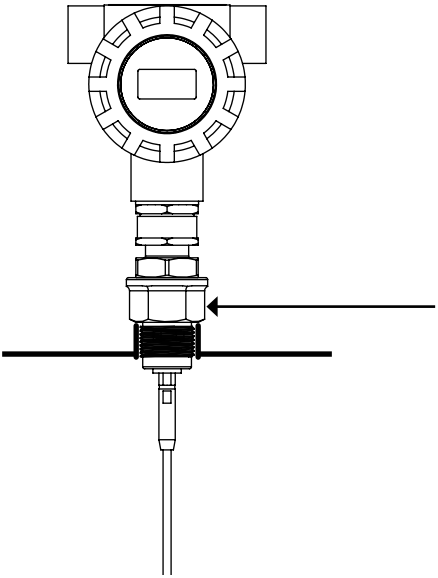
Voltages less than the U_m will not invalidate the type of protection.

Mounting - Instruction for Rotating the Housing

There are specific rotation points which should be used while mounting the unit into place.

The Housing Compartment should never be used to rotate the device during mounting.

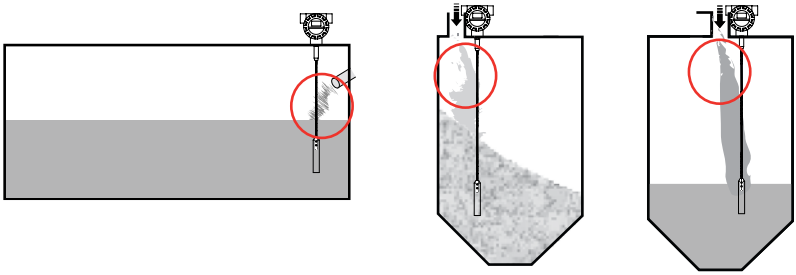
For rotating the housing after installation see 'Rotating the Enclosure' section.



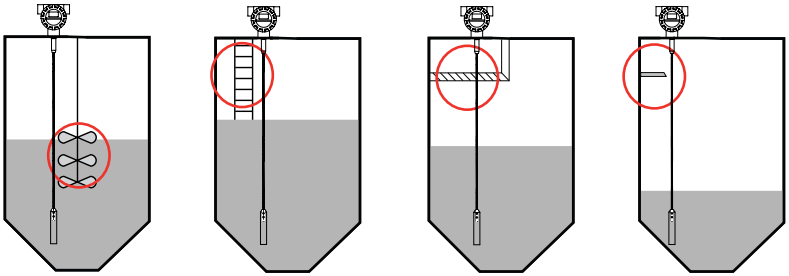
When Installing the CGR unit, use spanner or wrench ONLY at Process Fitting as indicated.

Placement Requirements

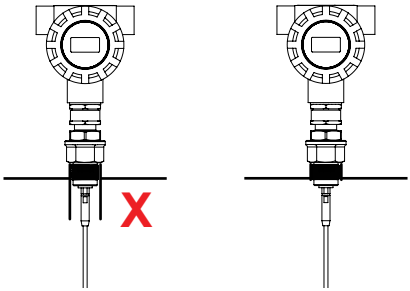
Do **NOT** mount near infeed



Do **NOT** mount over or adjacent to **any** obstacles



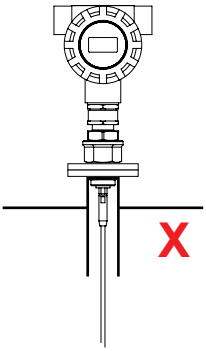
Nozzle / Socket Mounting



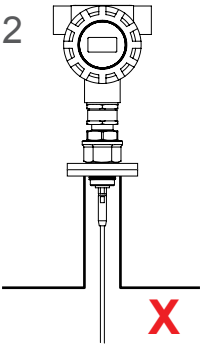
Nozzle / Socket should not protrude into vessel

Stand Pipe / Flanged Mounting

1



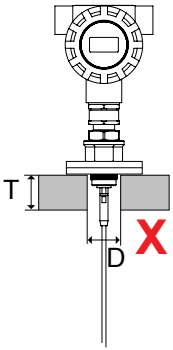
2



1. Stand pipes protruding into vessel may cause signal interference. Digitisation and / or Blanking Distance must be adjusted to avoid measurement issues

2. Long / narrow stand pipes may cause signal interference. Digitisation and / or Blanking Distance must be adjusted to avoid measurement issues

3



3. Roof Thickness (T) should not exceed Diameter (D) of cut away. Digitisation and / or Blanking Distance must be adjusted to avoid measurement issues

Mounting - Conductive Vessel

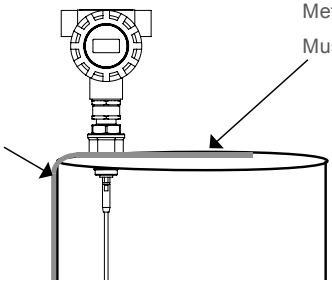
Unit performance is most optimized when there is a ground reference between the mounting (metal flange or thread) and the vessel. Metallic or metal reinforced vessels are ideal.

Mounting - Non Conductive Vessel

A non conductive vessel will require a conductive metal strip or equivalent connected to the metal flange or thread and running along side the vessel for at least the Probe insertion length. A conductive metal sheet (min 0.5m (8") should also be mounted on the roof and be in contact with metal thread or flange.

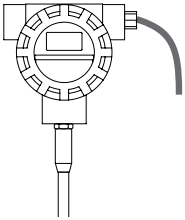
If a seal / gasket is used between the flange and the vessel ensure non coated / painted bolts are used to create ground reference with vessel.

Metallic strip connected to flange / mounting thread and running along side of non-metallic vessel



Metal Sheet (min 0.5m (8")
Must contact with metal thread / flange

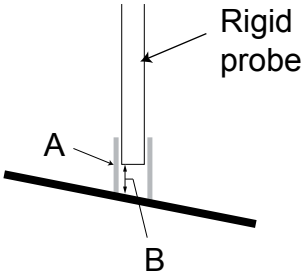
Gland Entry Wiring



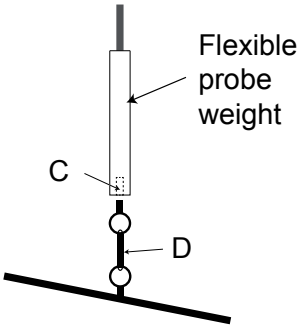
Wire at gland entry must angle down

Securing The End of The Probe

- Securing the end of rigid probes is not required unless there is risk of excessive lateral forces.
- Securing flexible cable weight via M10 thread on base of weight is recommended to prevent movement.



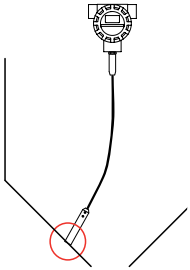
A	Metal socket
B	Floor clearance (min 50mm, 2")

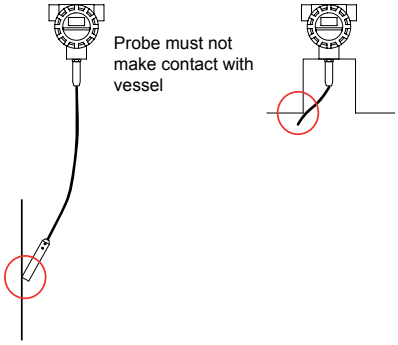


C	M10 thread
D	Cable Weight Fastening Kit or appropriate O ring & link secured to vessel floor.

Flexible Probe Movement

- Avoid mounting adjacent to internal structures (eg ladders, walkways). The cable must not make contact with any part of the vessel
- Take into consideration that material forces may push probe laterally. Secure Cable Weight if required.





Adjusting Probe Length

Rigid Probes

Cut rigid probes to appropriate length. After adjustment, you must change the 'ProbeLength' Parameter in 'Advanced' menu to represent the new length (password 222).

Flexible Probes

(a) Mark the point at which the flexible cable enters the cable weight.

(b) Release the cable weight grub screws with hex key.

(c) Measure and note the length of cable concealed within cable weight.

(d) Cut cable noting the length of cable must include the concealed length above.

(e) Re-insert the cable into the weight and tighten grub screws to tightening Torque of 20Nm.
Use loctite 243 or equivalent on grub screws to secure once completed.

(f) Adjust ProbeCalibr Parameter in 'Advanced' menu to represent new length (password 222).

Rotating Ex d Rated Enclosures (page 1 of 2)

The Ex d gland which couples the sensing probe to the flameproof enclosure provides a critical sealing function for the enclosure. Internal wires are passed through this gland and the high integrity seal. This gland incorporates a Union Joint which is designed to rotate.

However, this rotation is limited to one-time adjustment of Display orientation after installation on site, as shown below:

ONLY one 36mm spanner applied to the Hex of Union Joint to rotate enclosure to desired orientation as allowed. DO NOT hold the enclosure during this procedure.

As Installed, but LCD display not visible.

Rotation at Union Joint

Max 360° allowable one-time rotation in either direction.

Desired Orientation.

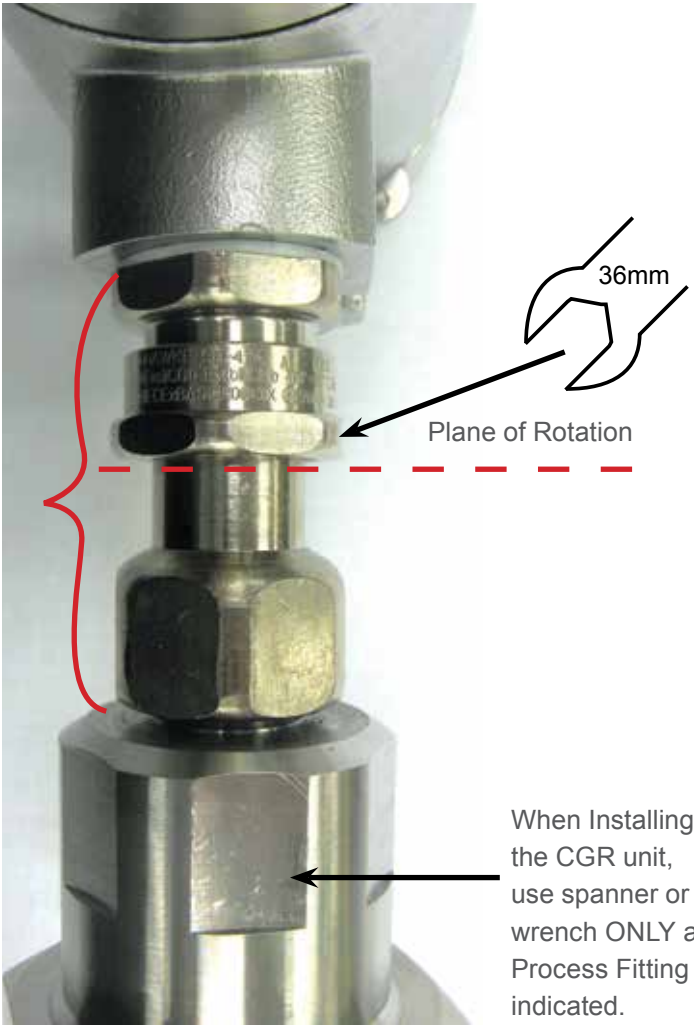
Rotation beyond these strict limits can damage the internal cables

Ensure Enclosure follows the spanner rotation and assembly integrity is not compromised

Rotating Ex d Rated Enclosures (page 2 of 2)

This is a Sealed Threaded Joint.

It must NOT be loosened or broken



Inspecting Ex d Rated Enclosures

Ensure all unused cable entries are sealed off by certified blanking plug as instructed in Putting In Service (Section 5, c).

a) All cable glands should be secured and tightened to seal on cables

b) After orientating the enclosure in the desired direction, if the enclosure wobbles or is felt loose, tighten the union joint by using 36mm spanner while holding the enclosure in the correct orientation as shown:

Rotating non Ex d Rated Enclosures (page 1 of 2)

The gland which couples the sensing probe to the enclosure provides a critical sealing function for the enclosure. Internal wires are passed through this gland and the high integrity seal. This gland incorporates a Union Joint which is designed to rotate.

However, this rotation is limited to one-time adjustment of Display orientation after installation on site, as shown below:

ONLY one 36mm spanner applied to the Hex of Union Joint to rotate enclosure to desired orientation as allowed. DO NOT hold the enclosure during this procedure.

As Installed, but LCD display not visible.

Rotation at Union Joint

Max 360° allowable one-time rotation in either direction.

Desired Orientation.

Rotation beyond these strict limits can damage the internal cables

Ensure Enclosure follows the spanner rotation and assembly integrity is not compromised

Rotating non Ex d Rated Enclosures (page 2 of 2)

Forces On The Probe

Tensile forces are heavily dependent on the viscosity and abrasive characteristics of the product in the vessel. Ensure tensile loading is appropriate for the selected cable as well as the silo cover and mounting structure. In critical cases it is better to select the larger flexible cable (8mm).

Probe Type	Tensile Load
A04 / J04 (4mm flexible cable @ 20°C, 68°F)	0.5 Ton
A06 / J06 (6mm flexible cable @ 20°C, 68°F)	1.0 Ton
A08 / J08 (8mm flexible cable @ 20°C, 68°F)	4.0 Ton

Lateral forces can exist due to movement and gradual flow of the product in the vessel, particularly with powder and granular materials.

These forces can cause stress and strain on the probe, as well as the process fitting and mounting hardware. Ensure that lateral forces are minimized by following the installation guidelines and Placement Requirements.

Probe Type	Lateral Load
B04 / K04 (4mm rigid probe @ 20°C)	1 Nm
B06 / K06 (6mm rigid probe @ 20°C)	3 Nm
B08 / K08 (8mm rigid probe @ 20°C)	8 Nm

Installation should only be performed by suitably qualified personnel.

A. Confirm mounting is within recommended specifications.

B. Check the selected unit matches the required application specifications.
For Hazardous Locations see appropriate safety instructions available at http://www.hawkmeasure.com

C. Check the wiring is correct and all connections are secure.

D. Apply power to the unit.

When power is applied the unit will start its normal load sequence.
The following messages will cycle on the display.

Hawk
CGR Series
Serial Number
Software Revision

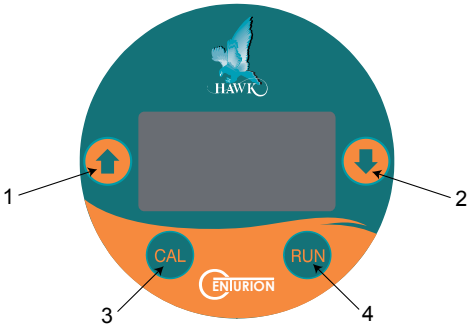
Menu Navigation

1 Navigate up, increase value

2 Navigate down, decrease value

3 CAL Proceed, select, save

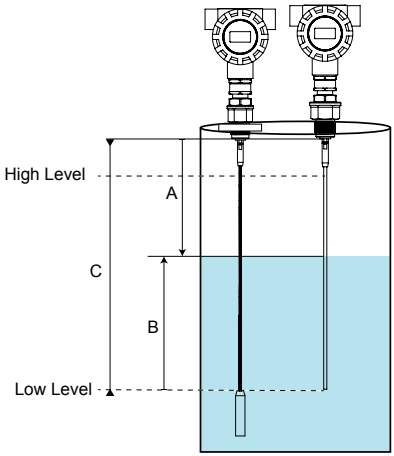
4 RUN Go back, return unit to operational mode



Displayed Measurements - Level

Measured Span Reference

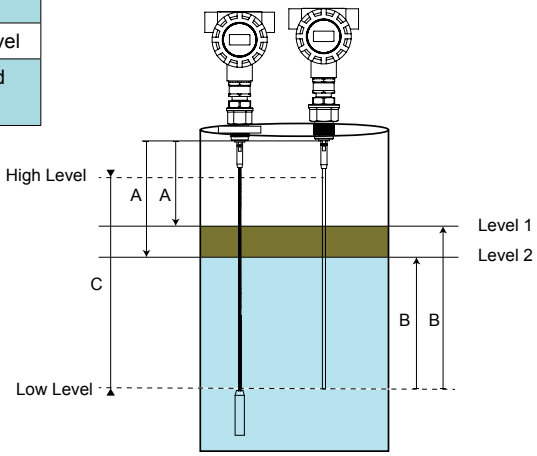
A	Distance - measured from base of thread or bottom of flange to material level
B	Level - measured from Low level to material level
C	% Level - proportional percentage of measured level based on Low and High level setting



Displayed Measurements - Interface[1]

Measured Span Reference

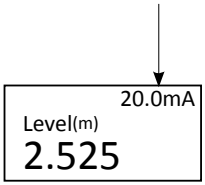
A	Distance - measured from base of thread or bottom of flange to material level
B	Level - measured from Low level to material level
C	% Level - proportional percentage of measured level based on Low and High level setting



(1) Interface mode is only available with the Interface communications option (see Part Numbers)

Displayed Diagnostics

While pressing the arrow buttons the top corner of the display cycles through various unit diagnostics



mA	Simulated current output in mA
Normal	Unit operating normally
Failed	Unit in failsafe conditions
Recover	Unit searching for level / attempting to amplify signal
[1]Level - 1	Upper Material Level measurement
[1]Level - 2	Lower Material Level measurement

[1]Interface mode is only available with the Interface communications option (see Part Numbers)

Setup Menu

```
Main Menu
▸Setup
 Advanced
 Autoset
```

Parameter	Description	Options
Display Mode	Select default Display mode	Volume(2) Level %Level Distance
Display Unit	Adjust displayed measurement unit	Centimeters Metres Feet Inches
Low Level	Set Low Level (4mA) distance	Adjustable
Hi Level	Set High Level (20mA) distance	Adjustable
Damping	Adjust output response time & smoothness	Adjustable
Tracking	Program application Fill and Empty speeds. InstaTrack is a special mode which we respond immediately to any detected reflection. 'Test' Mode adjusts unit function to be suitable for bench testing and demonstration. The unit will track nearest detected reflection regardless of size.	• Fast • Medium • Slow • InstaTrack • Test
Dielectric	Applies a pre-set value to Sensitivity based on selected Dielectric Constant range of material. For Interface units this should be the Upper Layer.	• <2 • <5 • <10 • <20 • <40 • <80 • >80
Fail Mode	Set Analogue failsafe output	3.80mA > 20.20mA LastKnown 4mA 20.00mA > 21.50mA
Fail Time	Set time delay for FailSafe condition (in seconds)	Adjustable
Digitize	The 'Digitize' function is an automatic setup routine used to eliminate false reflections. See 'Digize Function' for further information.	• Yes • No • Disable

(1) See 'Measured Range Reference' on next page

(2) Volume activation requires GosHawk. See dedicated CGR GosHawk manual.

Digitize Function

The 'Digitize' function is an automatic setup routine to create a digital map of false echoes generated by problems such as non-recommended mounting.

The function should be performed after physical installation to the application.

During the process the unit will prompt a measured distance (this must be either the material level if material is touching the probe, or end of probe of the vessel is empty. For **Interface** model type it must be the Upper Layer). The distance is adjustable if the displayed distance is not correct.

Ensure the value is not greater than the distance to the material level.

For best results follow this routine:

1) Ensure the unit is mounted according to mounting specifications and requirements.

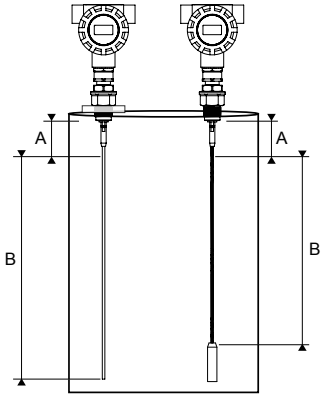
2) Ensure the material to be measured is in contact with the actively measured part of the probe.

3) Select Dielectric pre-set value of most similar to material to be measured. For **Interface** model type it must be the Upper Layer).

4) Run Digitize routine. Confirm displayed distance is either material level.

Measured Range Reference

A	Blanking (non-measurable zone)
B	Measurable Span (blanking to top of cable weight or end of rigid probe). High level must be = to or > than Blanking



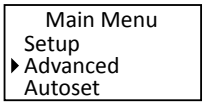
Minimum Recomended Range

Probe Variant	Distance
A04 / J04	150mm (6")
A06 / J06	150mm (6")
A08 / J08	150mm (6")
B04 / K04	150mm (6")
B06 / K06	150mm (6")
B08 / K08	150mm (6")

Maximum Range

Probe Variant	Distance
A04 / J04	18.5m (60ft 8in)
A06 / J06	18.5m (60ft 8in)
A08 / J08	18.5m (60ft 8in)
B04 / K04	4m (13ft 1in)
B06 / K06	4m (13ft 1in)
B08 / K08	4m (13ft 1in)

Advanced Menu



Parameter	Description	Options
Comms	Adjust communication protocol settings. The default ID is 0, and the default baud rate is 1200.	• Device ID • Baud Rate
Sensitivity	Manual adjustment of Sensitivity. Dieletric selection automatically sets this value to defaults based on the Dieletric selection. Sensitivity is the primary adjustment for the unit's ability to detect media. A higher value is used for lower Dk materials or more difficult applications.	• 0-100
Blanking	Blanking is a non-measurable zone. This can be increased to 'Blank' out high level false echoes caused by mounting	• Adjustable <150mm (6") is not recommended
Analog	Adjust Analog output. Switch from 4-20mA to 20-4mA Fine tune both 4mA current and 20mA current reading Park (Lock) Current to 4, 8 or 12mA.	• 4-20 • 20-4 • 4mA tuning • 20mA tuning • Park 4mA • Park 8mA • Park 12mA
Interface[(1)]	Enable / Disable Interface measurement mode. See 'Interface Mode' for more information	• Enable / Disable
Factry Reset	Restore all parameters to factory default.	• Yes • No
Device Info	Display device information	
Lock Code	Enable / Disable lock code. If enabled, select lock code number.	• Enable / Disable
ProbeCalibr	If physical length of probe is adjusted you must run this routine for the system to re-detect the probe end. Nothing should be touching the probe when commencing this function.	• Adjustable • Password protected (222)
ProbeFault	Probe Fault will activate Failsafe in the event of a missing Probe	• Enable / Disable
Dist Calibr	Calibrate distance correction factor. Some applications or environments can affect time of flight signal travel affecting the measured distance reading. This function allows the detected distance to be adjusted to suit the application.	• Adjustable

[(1)] Interface mode is only available with the Interface communications option (see Part Numbers)

Interface Mode Setup

Interface mode is only avaialble with the Interface communications option (see Part Numbers).

The Interface mode is designed to measure applications with low to high dielectric constant layers.

The transmited signal relfects off the Upper Layer and continues through the Interface and reflects from the Lower Layer.

The unit provides a level reading for both the Upper and Lower Layers available via HART. The Lower Layer will always be transmitted to the 4-20mA output.

When Interface mode is Enabled, the following parameters are adjustable.

Parameter	Description	Options
DK Comp	Set dielectric of interface layer. This adjusts the velocity compensation for the transmitted signal as it passes through the interface. Default 2.22	• 0-100
IFace Width	Set water reading (level 2) offset in the event of a merged echo. A merged echo will occur if the interface is too thin to produce a separate echo. The offset is measured from the end of the merged echo backwards. Default 150mm (0.5ft) *Note: This is an advanced setting and should not be adjusted without expert knowledge*	• Adjustable
IFace Size	Sets the echo size (in signal voltage) to dictate whether an echo is from the Interface or Level. If the echo is larger than the value the unit will assume no Interface is present and will set Level 1 reading to be the same as Level 2 reading. If the echo is smaller it will assume there is only an Interface layer measurable and will set Level 2 to end of probe measurement. Default 2.34 *Note: This is an advanced setting and should not be adjusted without expert knowledge*	• 0-2.49

Commissioning

For commissioning via PC and GosHawk see dedicated CGR GosHawk Manual.

Parameter	Instruction
1. Set High and Low level	High and Low level distances can be programmed manually or you can run Autoset. Autoset can be used to program the High or Low level based on the material level which is touching the probe when the function is run.
2. Set Tracking Speeds	Tracking speeds can be set to Fast, Medium, Slow and Custom (measured in Displayed Units per hour)
3. Select application Dielectric	Choose closest Dielectric range from the pre-set list. Select lower value if unsure.
3. Run Digitize	Confirm displayed distance is either material level (for **Interface** applications it must be the Upper Layer) or end of probe if vessel is empty. Ensure the value is not greater than the distance to the material level. See 'Digitize Function' for additional critical information.
4. Add Damping	Increasing Damping value if a smoother response trend is required. This value is automatically set by the Tracking speed.
5. Run unit	Press RUN several times to commence unit operation

HART Information / DD

HART Revision 7

DTM/DD files available at http://www.hawkmeasure.com/downloads.asp in 'Drivers' section.

Supported hosts include PRM, Fieldmate and AMS. DD files for the 475 Communicator are available.

HART Variables

Variable	Function	Function (for Inteface model type)
Primary	Level	Level 2
Secondary	Unfiltered echo distance	Level 1
Third	Echo signal size	Level 2 echo signal size
Fourth	Termperature	Termperature

HART Universal Command List

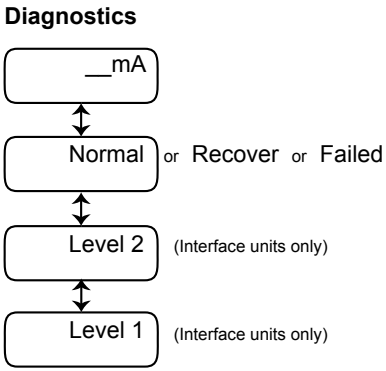
Command No.	Function
0	Read unique identifier
1	Read Primary Variable
2	Read current and percent of range
3	Read current and four predefined dynamic variables.
6	Write polling addr
7	Read loop configuration
8	Read Dynamic Variable Classifications
11	Read unique ident. Associated with tag
12	Read message
13	Read Tag, Description, Date
14	Read PV sensor information
15	Read output information
16	Read final assembly number
17	Write message
18	Write Tag, Description, Date
19	Write final assembly number
20	Read Long Tag

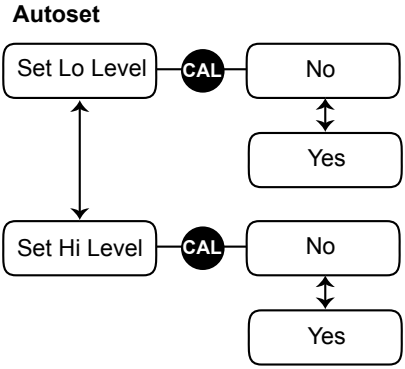
HART Common Practice List

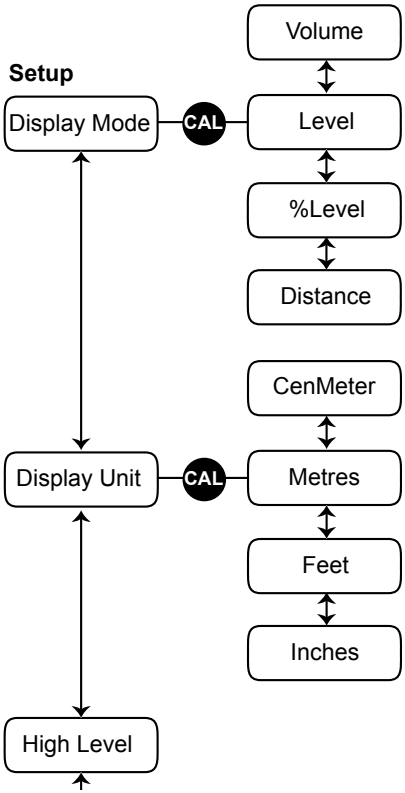
Command No.	Function
34	Write Primary Variable Damping Value
35	Write Primary Variable Range Value
36	Set Primary Variable Upper Range Value
37	Set Primary Variable Lower Range Value
38	Reset Configuration Changed Flag
40	Enter/Exit Fixed Primary Variable Current Mode
44	Write Primary Variable Units
45	Trim Primary Variable Current Dac Zero
46	Trim Primary Variable Current Dac Gain
57	Read Unit Tag, Descriptor, Date
58	Write Unit Tag, Descriptor, Date
59	Write Number Of Response Preambles
109	Burst Mode Control
110	Read All Dynamic Variables

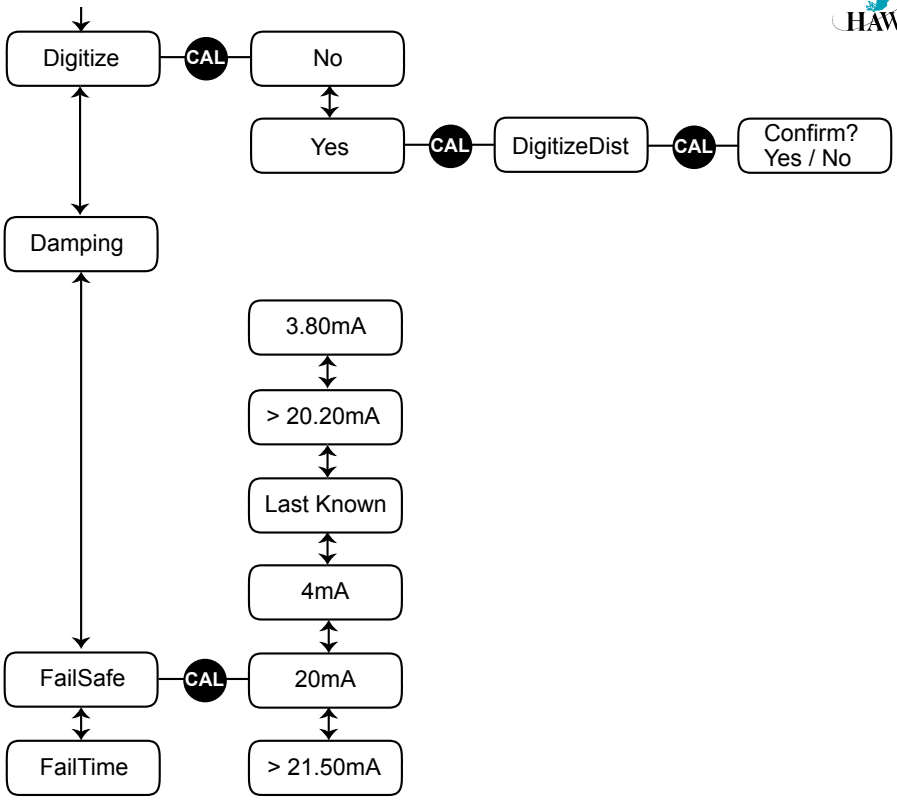
Status / Diagnostic Flags

Status / Diagnostic Flags
Device Malfunction (Fails safe status)
Configuration Changed
Cold Start
Output Current Fixed
Primary Variable Out of limits

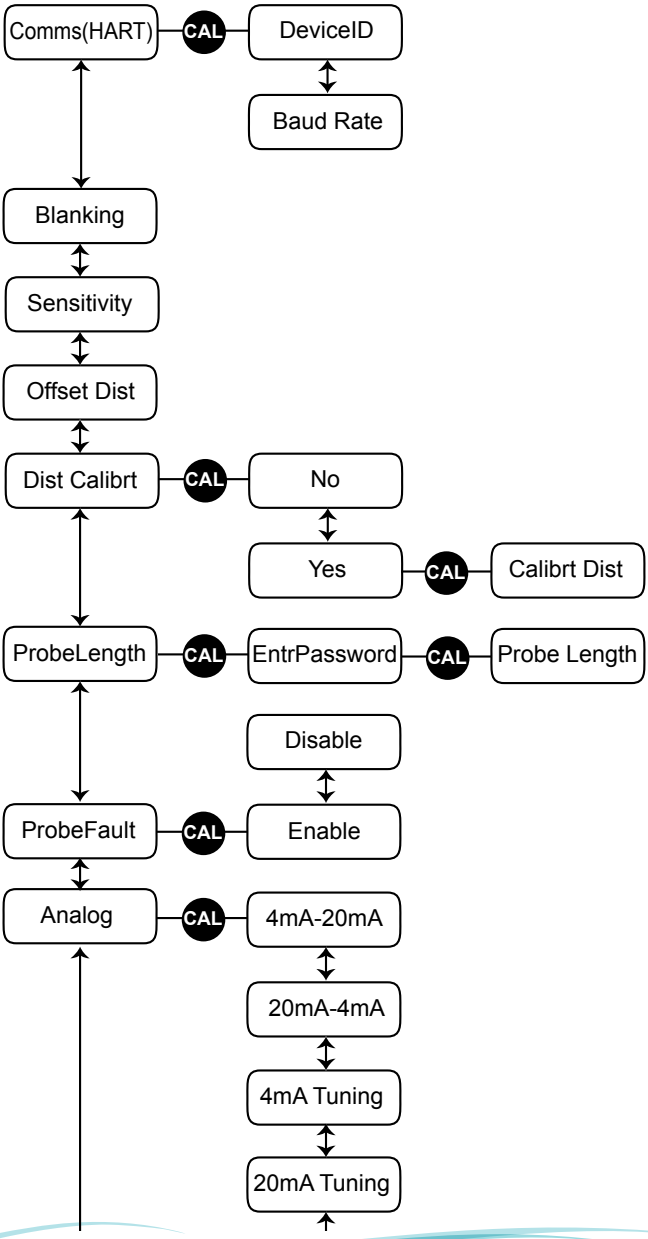

Diagnostics
__mA
Normal
or
Recover
or
Failed
Level 2
(Interface units only)
Level 1
(Interface units only)

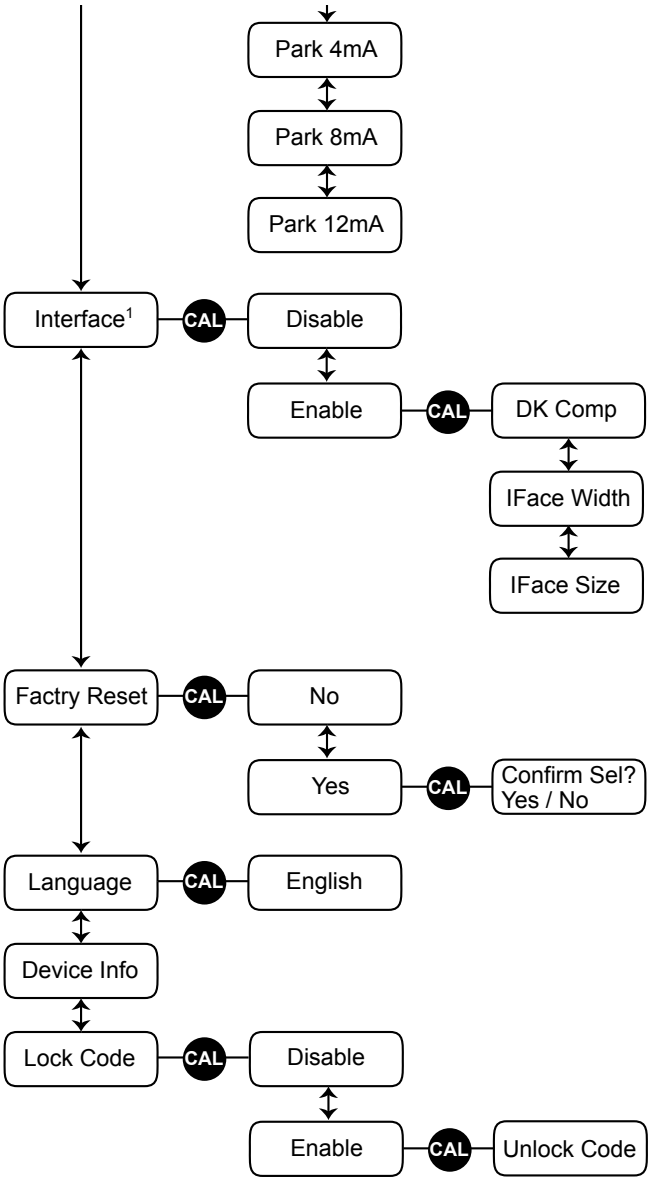

Autoset
Set Lo Level
CAL
No
Yes
Set Hi Level
CAL
No
Yes


Setup
Volume
Display Mode
CAL
Level
%Level
Distance
CenMeter
Display Unit
CAL
Metres
Feet
Inches
High Level


Digitize
CAL
No
Yes
CAL
DigitizeDist
CAL
Confirm?
Yes / No
Damping
3.80mA
> 20.20mA
Last Known
4mA
FailSafe
CAL
20mA
FailTime
> 21.50mA

Advanced


Comms(HART)
CAL
DeviceID
Baud Rate
Blanking
Sensitivity
Offset Dist
Dist Calibrt
CAL
No
Yes
CAL
Calibrt Dist
ProbeLength
CAL
EntrPassword
CAL
Probe Length
Disable
ProbeFault
CAL
Enable
Analog
CAL
4mA-20mA
20mA-4mA
4mA Tuning
20mA Tuning



[1]Interface mode is only available with the Interface communications option (see Part Numbers)

Troubleshooting

Problem	Check
Display is blank Unit continually re-starts	Check incoming power on loop is to specification. Check incoming power on loop is continuous. Bench test with new 24V supply.
Measurement is non-responsive (material touching probe)	Run Digitize routine. If routine has already been run, Lower Dielectric selection or increase Sensitivity parameter. Check unit status for 'Failsafe'. The unit will go to Failsafe if it cannot detect any reflections. Check the probe element for damage or excessive build up. Ensure mounting is correct to specification with good ground reference. Ensure probe is not touching the vessel. Place current meter in line with loop. Ensure the 4-20mA is proportional to level reading based on High and Low level.
Unit is indicating a material level while no material is present	**A) If the unit is indicating full / high** Ensure no structure is making contact with the probe. Check for build up bridging between the probe and vessel / nozzle Run Digitize routine while no material is contacting the probe. Set Display Mode to Distance, note the measurement. If distance is near high level use Blanking to eliminate reflection interference. Adjust High level to ensure it is not within the Blanking range. **B) If the unit is indicating other level** The unit should measure the end of probe while nothing is touching the probe. Run Digitize routine while no material is contacting the probe. Confirm 'Low Level' is set correctly. Ensure no structure is making contact with the probe. Check for excessive build up and clean the probe. Ensure mounting is correct to specification with good ground reference. Place current meter in line with loop. Ensure the 4-20mA is proportional to level reading based on High and Low level. Use 4mA and 20mA tuning to force the output reading to each value to ensure the current control is operating correctly.
PLC reading does not match reading on display	Connect a Multimeter in series with the powered loop. Compare the 'mA' diagnostic on the display with the mA reading on the loop. If these values do not match, disconnect the loop wires and measure the resistance across the loop. This should not exceed specification. Confirm High Level and Low Level are set to the same values in CGR and control system.

Troubleshooting (con't)

Unit measurement is locked at or near end of probe	The material touching the probe may not be generating a large enough reflection in the application conditions. Ensure unit is mounted as per specifications. Take note of the ground reference requirement. Ensure the probe is not making contact with the vessel. Use a minimum 2" / 50mm flange to improve signal transmission. Change unit Tracking to 'Demo' mode to measure closest echo instead of largest. Increase Sensitivity.
The probe is too long	Non-hazardous rated units can have the probe length cut to requirement. For flexible probes release the cable weight by undoing grub screws. After adjusting the probe ensure the new probe length is recorded on site. Update ProbeCalibrt parameter to new length. Do not adjust the probe of hazardous location rated units.
Adjusting / commissioning the unit without removing the lid	You will require a HART to PC connector and HAWK GosHawkII software. See CGR GosHawk user manual' for further information.
Digitize fails	The digitization process will fail if the unit cannot detect a measurable difference between the largest false reflection and the reflection generated by either the end of probe or the material touching the probe. Choose a lower Dielectric pre-set and re-run Digitize. Increase Sensitivity value and re-run Digitize. Ensure the Digitize distance is not greater than the material level. Ensure no structure is making contact with the probe. Check for excessive build up and clean the probe. Ensure mounting is correct to specification with good ground reference.
Digitize displays incorrect distance	If Digitize displays a closer distance than the material level / end of probe enter the distance to the correct material level. The unit will automatically eliminate the detected echo and find the correct level. If Digitize displays a longer distance than the material level the measured material may not be returning a large enough signal. Increase Sensitivity and change Tracking to 'Test' mode. Ensure unit has conforming ground reference. If Digitize displays a longer distance than the end of the probe length adjust see 'Measurement Accuracy' below or the 'ProbeLength' parameter in 'Advanced' menu if the Probe length has been modified.
Measurement accuracy	Material / Dielectric or environment can create small measurement inaccuracy. Run Dist Calibrt parameter in software to manually adjust measured distance to new value.

Centurion Guided Radar System

Model
CGR2 — 2 wire Centurion Guided Radar

Communication
- H — 4-20mA with HART
- I — 4-20mA with HART & Interface measurement

Housing
- 1 — Aluminum, Epoxy Painted
- 2 — 316L Stainless Steel

Gland Entry
- 1 — 1/2" NPT Cable gland entry
- 2 — 3/4" NPT Cable gland entry
- 3 — M20 x 1.5 Cable gland entry
- 4 — M25 x 1.5 Cable gland entry

Probe Type[3]
- A04 — 4mm flexible cable
- A06 — 6mm flexible cable
- A08 — 8mm flexible cable
- B04 — 4mm rigid probe
- B06 — 6mm rigid probe
- B08 — 8mm rigid probe
- J04 — Detached 4mm flexible cable
- J06 — Detached 6mm flexible cable
- J08 — Detached 8mm flexible cable
- K04 — Detached 4mm rigid probe
- K06 — Detached 6mm rigid probe
- K08 — Detached 8mm rigid probe

Probe variant / materials[3]
- S — 316L

Mounting[3]
- TN07 — 3/4" NPT Thread (316L) or threaded flange mount[2]
- TB07 — 3/4" BSP Thread (316L)
- TN10 — 1" NPT Thread (316L)
- TB10 — 1" BSP Thread (316L)
- TN15 — 1.5" NPT Thread (316L) or threaded flange mount[2]
- TB15 — 1.5" BSP Thread (316L)
- FXXX[1] — Pre-Welded Flange (replace XXX with 3 character Welded Flange Code)

Process O-ring seal[4]
- V — FKM (Viton) (-20°C to +204°C)
- B — NBR (-35°C to +110°C)[5]
- S — Silicone (-60°C to +230°C)

Process Temperature
- 1 — -40°C to +80°C (-40 to +176°F)
- 2 — -40°C to +150°C (-40 to +302°F)

Process Pressure
- 1 — 5 bar
- 3 — 20 bar
- 4 — 40 bar
- 5 — 100 bar[6]

Approval Standard
- XX — Not Required
- 1D — IECEx Ex ia/d [ia Ga] IIC T6 Ga/Gb Tamb 60°C
- 2D — IECEx Ex ia tb [ia Da] IIIC T85C Da Db Tamb 60°C
- A2 — ATEX Grp II Cat 3 GD IP66 Tamb -40°C to 60°C

Probe Length[3]
Specify in cm to the nearest 10cm

[1] See Weld Code selection in Flange Table.

[2] Order flange as separate line item. See Probe / Mounting combination table matching size and variants options. See Flange Table Accessory Code for ordering.

[3] See Probe Table for valid Probe, Variant / Materials, Mounting and Length combinations prior to selection

[4] Select O-Ring based on application requirements.

[5] Not available with Process Temperature option 2

[6] Not available with Mounting options TN15 or TB15

CGR2	H	1	3	B04	S	TN15	B	1	1	1D	200

Probe Combination Table

Probe / Mounting Combination Table

Each line represents valid part combinations

Probe Code	Variant / Materials	Mounting	Flange Sizes		Max. Length
			Min. Size	Max size	
A04 / J04	S	TN07, TB07, FXXX	1", DN25, 25mm	1-1/2", DN40, 40mm	1850cm
A06 / J06	S	TN10, TB10	N/A	N/A	1850cm
A08 / J08	S	TN15, TB15, FXXX	2", DN50, 50mm	4", DN100, 100mm	1850cm
B04 / K04	S	TN07, TB07, FXXX	1", DN25, 25mm	1-1/2", DN40, 40mm	400cm
B06 / K06	S	TN10, TB10	N/A	N/A	400cm
B08 / K08	S	TN15, TB15, FXXX	2", DN50, 50mm	4", DN100, 100mm	400cm

Accessories

Tank Fastening Kit

CGR-A0X-WL-SS

Kit includes:

Qty1 RIGGING-SCR-JAW-JAW-SS-M12

Qty2 EYEBOLT-SS-M10

Mounting Flanges

Threaded Flanges

Model

FLA -

Flange Size

1	1” or DN25 or 25mm
H	1 1/2” or DN40 or 40mm
2	2” or DN50 or 50mm
K	2 1/2” or DN65 or 65mm
3	3” or DN80 or 80mm
L	3 1/2” (ANSI ONLY)
4	4” or DN100 or 100mm

Flange Type

A1	ANSI B16.5 150LB FLANGE
A3	ANSI B16.5 300LB FLANGE
A6	ANSI B16.5 600LB FLANGE
A9	ANSI B16.5 900LB FLANGE
AA	ANSI B16.5 1500LB FLANGE
AB	ANSI B16.5 2500LB FLANGE
D6	DIN2527 PN6 FLANGE
D0	DIN2527 PN10 FLANGE
D1	DIN2527 PN16 FLANGE
D2	DIN2527 PN25 FLANGE
D4	DIN2527 PN40 FLANGE
J5	JIS 5K FLANGE
J0	JIS 10K FLANGE
J1	JIS 16K FLANGE
J2	JIS 20K FLANGE
J4	JIS 40K FLANGE
S1	AS 2129 Table D
S2	AS 2129 Table E
S3	AS 2129 Table F
S4	AS 2129 Table H

-

Material

SS SS316L

-

Thread Type

TB07	3/4” BSP THDs
TB10	1” BSP THDs
TB15	1 1/2” BSP THDs
TN07	3/4” NPT THDs
TN10	1” NPT THDs
TN15	1 1/2” NPT THDs

FLA - 2 A1 - SS - TB15

Welded Flanges

Model

F

Flange Size

1	1” or DN25 or 25mm
H	1 1/2” or DN40 or 40mm
2	2” or DN50 or 50mm
K	2 1/2” or DN65 or 65mm
3	3” or DN80 or 80mm
L	3 1/2” (ANSI ONLY)
4	4” or DN100 or 100mm

Flange Type

A1	ANSI B16.5 150LB FLANGE
A3	ANSI B16.5 300LB FLANGE
A6	ANSI B16.5 600LB FLANGE
A9	ANSI B16.5 900LB FLANGE
AA	ANSI B16.5 1500LB FLANGE
AB	ANSI B16.5 2500LB FLANGE
D6	DIN2527 PN6 FLANGE
D0	DIN2527 PN10 FLANGE
D1	DIN2527 PN16 FLANGE
D2	DIN2527 PN25 FLANGE
D4	DIN2527 PN40 FLANGE
J5	JIS 5K FLANGE
J0	JIS 10K FLANGE
J1	JIS 16K FLANGE
J2	JIS 20K FLANGE
J4	JIS 40K FLANGE
S1	AS 2129 Table D
S2	AS 2129 Table E
S3	AS 2129 Table F
S4	AS 2129 Table H

F 2 D4

Electronics

Power

- 2 wire loop powered
- 24VDC (14 to 28VDC)

Power Consumption

- <500mW @ 24VDC

Analog Output

- 14V @ 0 Ohm
- 19V @ 250 Ohms
- 24V @ 500 Ohms
- Current park at 4mA, 8mA, 12mA

Communications*

- HART (Revision 7)
- GosHawkII via HART. Full parameter list

Maximum Range

- Flexible cable probe:18.5m (60ft 8in)
- Rigid probe: 4m (13ft 1in)

Minimum Range (Blanking)

- 150mm (6")

Dielectric Range

- ≥ 1.5

Frequency

- 2.2 GHz

Resolution

- Analog: 1uA
- Display: 1.0mm

Accuracy[1]

- +/- 3mm

Measurements per second

- 3

Response Time

- <1 second (based on application selection)

Sum of non linearity, non repeatability, hysteresis

- Analog +/- 0.02%

Repeatability

- +/- 3mm

Memory

- Non-Volatile (No backup battery required)
  >10 years data retention

Operating Temperature (Electronics)

- -40°C to +80°C (-40 to +176°F)

Display

- 4 line graphic display (128 x 64 pixels)

Language

- English

Configuration

- 4 button (Up, Down, Cal, Run), GosHawkII via HART

Approvals*

- IECEx Zone 0/1, Zone 1
  IECEx TSA 14.0037X
  Ex ia/d [ia Ga] IIC T6 Ga/Gb
  Tamb = -40°C to +60°C
  IP 66, NEMA 4X
  (T6 … T1)
- IECEx Zone 20/21
  IECEx TSA 14.0037X
  Ex ia tb [ia Da] IIIC T85°C Da Db
  Tamb = -40°C to +60°C
  IP 66, NEMA 4X
- ATEX Grp II Cat 3 GD IP66 Tamb -40°C to 60°C

Cable Entries

- 1/2" NPT
- 3/4" NPT
- M20 x 1.5
- M25 x 1.5

Enclosure

Type

- Dual Compartment with Glass window

Material

- Die-cast Copper-Free Aluminum, Epoxy Painted
- 316L Stainless

Cable Entries

- 1/2" NPT
- 3/4" NPT
- M20 x 1.5
- M25 x 1.5

IP Rating

- NEMA 4X
- IP66

Specifications model dependent. Consult part number listing.

[1]*Accuracy dielectric & material dependent*

Probe

Probe Size / Wetted Materials

- 4mm SS316L rod
- 4mm DIN3055 (7x7 strand) SS316L flexible cable
- 6mm SS316L rod
- 6mm DIN3055 (7x7 strand) SS316L flexible cable
- 8mm SS316L rod
- 8mm DIN3055 (7x7 strand) SS316L flexible cable

Probe Entry Wetted Materials[2]

- TN07 / TB07 / TN10 / TB10 / Welded Flange[1] SS 316L, PEEK
- TN15 / TB15 / Welded Flange[1] - SS 316L, PTFE, GF25

[1] *See Probe / Mounting Combination Table for flange types*

Probe O-Ring Seals[3]

- Silicone / VMQ (-60°C to +230°C)
- NBR (-35°C to +110°C)
- Viton (-20°C to +204°C)

Process Connections

- 3/4" NPT or BSP
- 3/4" NPT with Flange
- 1" NPT or BSP
- 1.5" NPT or BSP
- 1.5" NPT with Flange
- Welded Flange

Electromagnetic Compatibility

CAN ICES-3(A)/NMB-3(A)

This device complies with Part 15, Subpart B Class A of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Process Pressure*

- -1 to 100 BAR

Process Temperature[3]

- -40°C to +80°C (-40 to +176°F)
- -40°C to +150°C (-40 to +302°F)

Tensile Load (flexible cable probes)

- Probe Type: A04 / J04 0.5 ton
- Probe Type: A06 / J06 1.0 ton
- Probe Type: A08 / J08 4.0 ton

Lateral Load (rigid probes)

- Probe Type: B04 / K04 1 Nm
- Probe Type: B06 / K06 3 Nm
- Probe Type: B08 / K08 8 Nm

Maximum Probe Length

- Probe Type: A04 / J04 1850cm
- Probe Type: A06 / J06 1850cm
- Probe Type: A08 / J08 1850cm
- Probe Type: B04 / K04 400cm
- Probe Type: B06 / K06 400cm
- Probe Type: B08 / K08 400cm

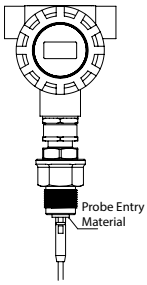
Minimum Probe Length

- Probe Type: A04 / J04 100cm
- Probe Type: A06 / J06 100cm
- Probe Type: A08 / J08 100cm
- Probe Type: B04 / K04 20cm
- Probe Type: B06 / K06 20cm
- Probe Type: B08 / K08 20cm

**Specifications model dependent. Consult part number listing.*

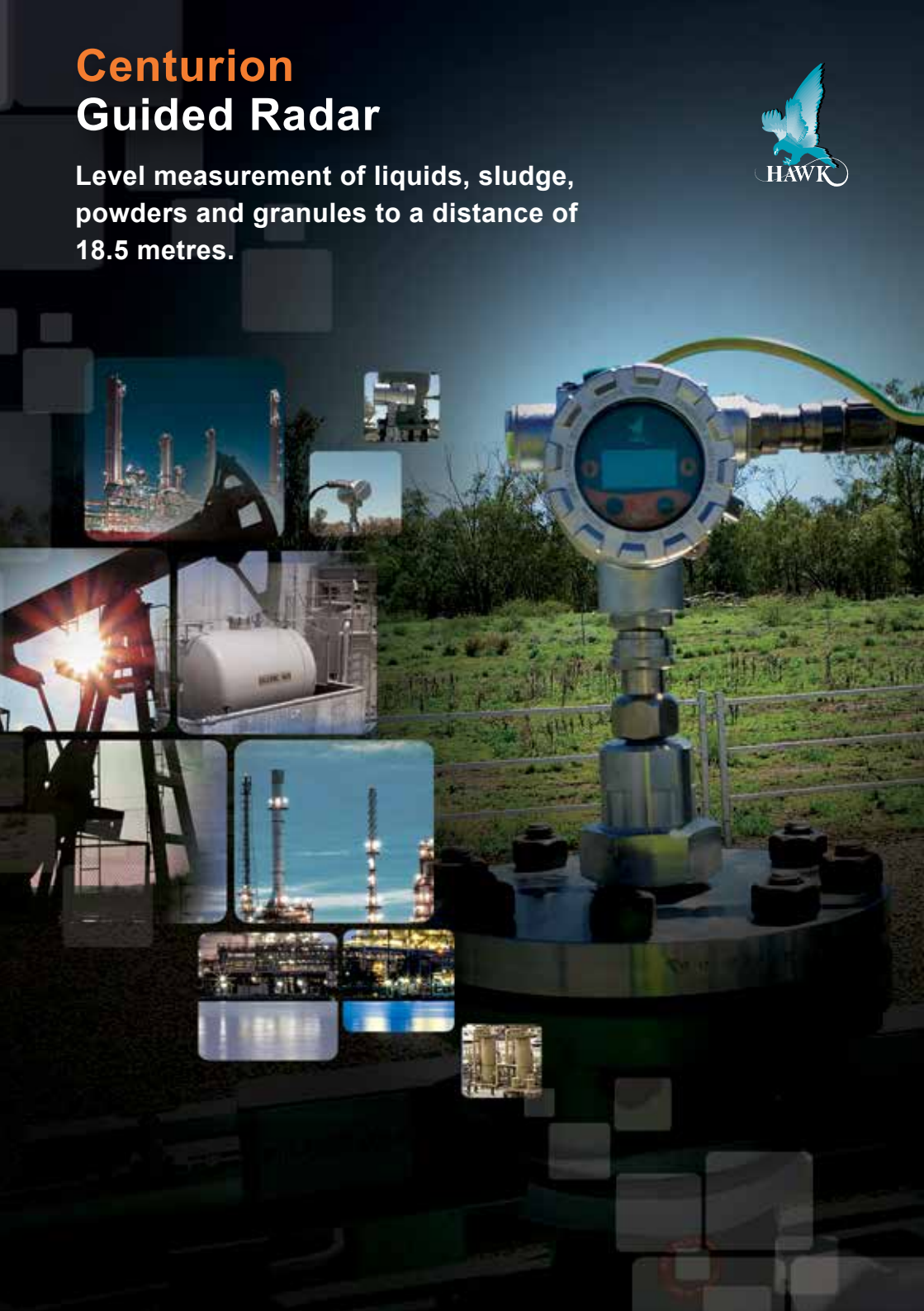
[3] Observe min / max temperatures for O-ring seal.

[2] Probe Entry



Centurion
Guided Radar

Level measurement of liquids, sludge, powders and granules to a distance of 18.5 metres.



Ordering Instructions

Threaded unit type

Assemble part number taking note of the valid combinations and exclusions for the full system.
The unit is ordered as a single line item. For example:

CGR2H13B08STB15B11XX200

Flanged type - Threaded flange

Assemble part number taking note of the valid combinations and exclusions for the full system. The unit and the threaded flange are ordered as separate line items. For example:

CGR2H13B08S**TN15**B11XX200
FLA-FA4-SS-**TN15**
or
CGR2H13B08S**TN07**B11XX200
FLA-FA1-SS-**TN07**

Flanged type - Welded flange

Assemble part number taking note of the valid combinations and exclusions for the full system.
In the Mounting part code enter 4 character Welded flange code from the table. All Welded flanges have F as the first character. For example:

CGR2H13B08S**F4A1**B11XX200

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