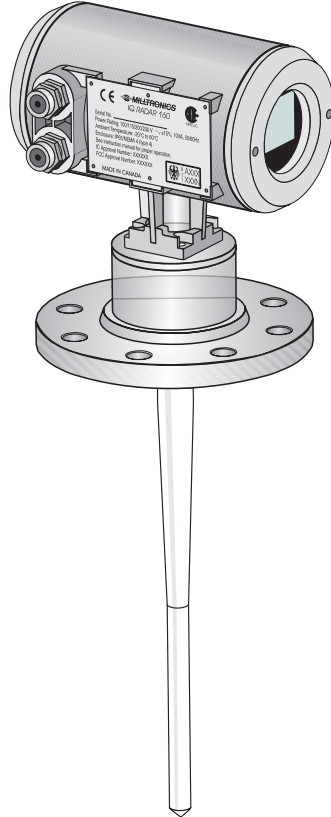


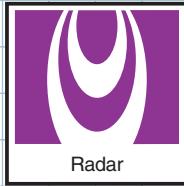
iQ LEVEL GAUGE 160



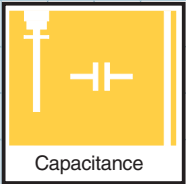
Instruction Manual

PL-591

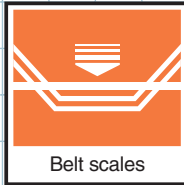
September 1999



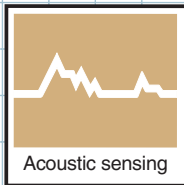
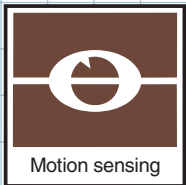
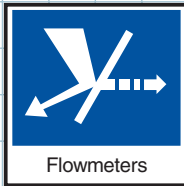
At Milltronics, we endeavour to design equipment that is simple to use and reliable in its operation, with the aim of satisfying our customers' needs.



Milltronics has been designing and manufacturing electronics based process measurement equipment since 1954. Our fields of expertise include continuous and point level measurement, weighing and feeding systems and motion sensing. Technologies include ultrasonic, capacitance and microwave radar.



Milltronics sells and markets world wide through subsidiaries, distributors and representatives. Through continuous improvement, we are striving to provide our customers with first rate sales information, engineering assistance and after sales support.



For more details on our products and services, please contact us and we will provide you with a listing of the offices or representatives nearest you.

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About this Manual

It is essential that this manual be referred to for proper installation and operation of your IQ Level Gauge 160/160 Ex.

- | | |
|------------------------|---|
| <i>Installation</i> | gives you step-by-step direction for the installation and interconnection of your IQ Level Gauge 160/160 Ex. |
| <i>Start-up</i> | instructs you in how to operate the keypad, program the unit and read the display. |
| <i>Operation</i> | describes the operation of the IQ Level Gauge 160/160 Ex. |
| <i>Applications</i> | looks at the IQ Level Gauge 160/160 Ex from a practical point of view, using a typical application example. |
| <i>Parameters</i> | lists the parameters available to you, with a description of their function and use. You are urged to read this section to familiarize yourself with the parameters available to you and get your IQ Level Gauge 160/160 Ex working to its fullest. |
| <i>Troubleshooting</i> | tabulates symptoms, causes and actions to common installation and application problems that you might encounter. Hopefully you will never have to read this section, but know it's there to help you. |
| <i>Appendices</i> | An alphabetical cross-reference of the parameters and their numbers, a record sheet for jotting down parameter values, a Temperature Derating Chart, as well as a list of approvals and certificates. |

About IQ Level Gauge 160/160 Ex

The IQ Level Gauge 160/160 Ex is to be used only in the manner outlined in this manual.

IQ Level Gauge 160/160 Ex is a versatile process material level monitoring instrument. Material level measurement is achieved using advanced pulse Level Gauge techniques. The unit consists of an electronic component coupled to the antenna and process connection.

IQ Level Gauge 160/160 Ex Features:

- ✓ ANSI, DIN flange or sanitary tri-clamp mounting
- ✓ corrosion-resistant construction, epoxy coated aluminum enclosure with stainless steel flange and Teflon^{®1} antenna and process seal.
- ✓ local display
- ✓ infrared keypad
- ✓ Dolphin-compatible

IQ Level Gauge 160/160 Ex Applications:

- ✓ liquids, slurries
- ✓ process temperatures up to 200°C
- ✓ vacuum and pressurized vessels

IQ Level Gauge 160/160 Ex Approvals and Certificates

- ✓ safety and radio
- ✓ Hazardous Area

Note:

See Appendix IV on page 49 for Approvals documentation.

¹ Teflon is a registered trademark of Du Pont.

Specifications

IQ Level Gauge 160/160 Ex

Power:

- AC version: ○ 100/115/200/230 $\pm 15\%$ V ac², 50/60 Hz, 15 VA
- DC version: ○ 18 – 36 V dc, 15W

Fuse:

- AC version: ○ FU1, 2AG type, slow blow, .25 Amp, 250V
- DC version: ○ F1, 2AG type, slow blow, 0.375A, 250V

Interface:

- analog output: ○ optically-isolated 0/4-20 mA into 750 Ω max, 0.02 mA resolution
- Dolphin/RS-485 link: ○ refer to Dolphin product specification.
- programmer link: ○ infrared receiver (refer to Programmer specification on page 8).
- display (local): ○ backlit, alphanumeric and multi-graphic liquid crystal for readout and entry

Performance:

- frequency: ○ 5.8 GHz (U.S.A. 6.3 GHz)
- accuracy at 20° C: ○ $\pm 0.3\%$ of measuring range or ± 30 mm, whichever is greater, from 1 to 15 m
- temperature drift: ○ $< \pm 0.5\%$ of measuring range or ± 50 mm, whichever is greater, over full operating temperature range
- measuring range: ○ 0.4 to 15 m
- repeatability: ○ ± 10 mm
- fail-safe: ○ mA programmable high, low or hold upon LOE condition

Mechanical:

- enclosure (electronic):
 - construction: ○ aluminum, epoxy coated
 - conduit: ○ 2 x 1/2" NPT or PG 16 entry
 - ingress protection: ○ Type 6 / NEMA 6, IP-67
- resonator: ○ nickel plated aluminum
- flange: ○ 316 stainless steel, Bolt hole pattern to ANSI & DN types, 3" sanitary tri-clamp

² factory set – see device nameplate

- antenna:
 - type:
 - construction:
- weight:
- dielectric rod
 - Teflon^{®3} (PTFE)
- 6.5 kg (14.3 lb) with 2"/150 psi flange, weight will vary with flange size and rating

Environmental:

- location:
 - indoor/outdoor
- altitude:
 - 2000 m max
- ambient temperature:
 - -40 to 60° C (-38 to 140° F)⁴
- relative humidity:
 - suitable for outdoor
(Type 6/NEMA 6/IP 67 enclosure)
- installation category:
 - II for ac version; I for dc version
- pollution degree:
 - 4

Process:

- material dielectric:
 - $\epsilon_r > 4$
(For $\epsilon_r < 4$, contact nearest Milltronics representative.)
- temperature:
 - -40 to 200°C (-40 to 392°F)⁴
- pressure (vessel):
 - -100 kPa to 1000 kPa
(-1 to 10 bar or -15 to 150 psi)

Approvals (refer to device nameplate) :

- safety:
 - CSA_{NRTL/C}, CE, FM
- radio:
 - BAPT, Industry Canada, FCC
- hazardous:
 - Level Gauge 160:
 - CSA Class I/II, Div.2, Group A,B,C,D, F&G.
 - Level Gauge 160Ex:
 - CENELEC, Eex de IIB+H₂T6. FM Class I, Div 1, Group A,B,C,D (Class I, Zone 1 IIC T6)

Contact Milltronics for complete and up to date list of approvals.

Programmer (remote keypad):

- enclosure:
 - general purpose
67 mm w x 100 mm h x 25 mm d
(2.6" w x 4" h x 1" d)
- ambient temperature:
 - -20 to 50° C (-5 to 122° F)
- interface:
 - proprietary infrared pulse signal
- power:
 - 9V battery (ANSI/NEDA 1604, PP3 or equivalent)
- weight:
 - 150 g (0.3 lb)

³ Teflon is a registered trademark of Du Pont.

⁴ See Temperature Derating on page 47.

Installation

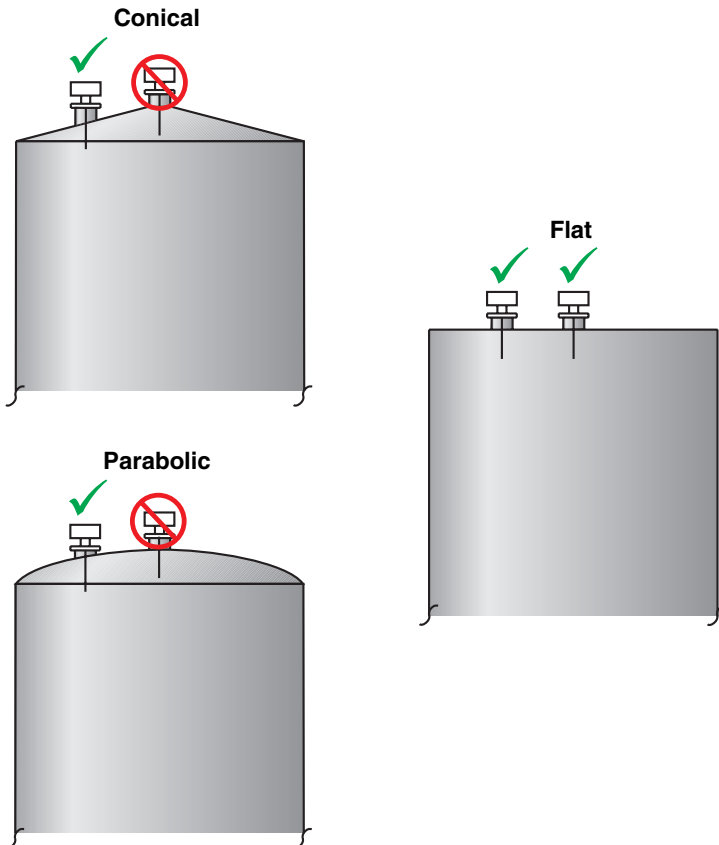
Location

Notes:

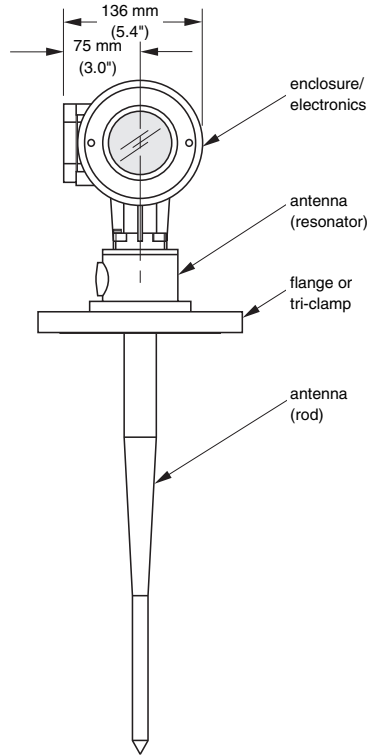
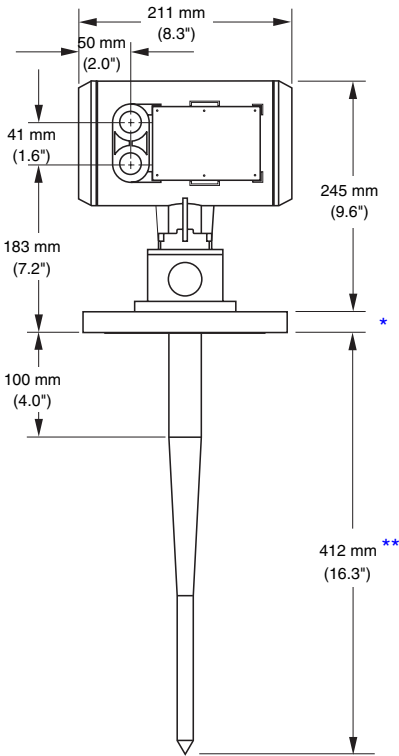
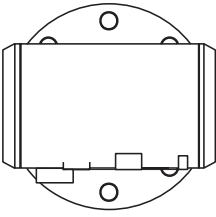
- Installation shall only be performed by qualified personnel and in accordance with local governing regulations.
- This product is susceptible to electrostatic shock. Follow proper grounding procedures.
- Do not mount in direct sunlight without the use of a sun shield.

Warning:

For vessels with conical or parabolic tops, do not mount the unit at the center. Otherwise, the concavity of the top can focus echoes into the centre, giving false readings.



IQ Level Gauge 160 Dimensions

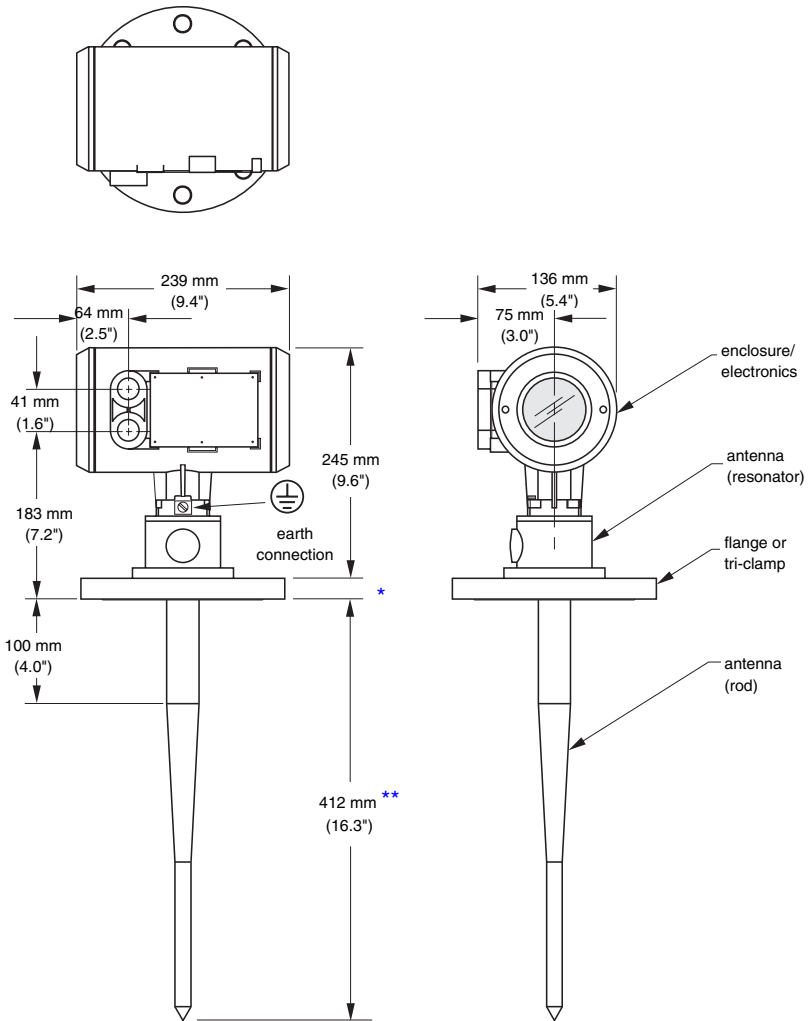


* Flange thickness 25 mm (1") nominal.

** Standard length, 50 and 100 mm (2" and 4") extensions available. See page 13.

Installation

IQ Level Gauge 160 Ex Dimensions

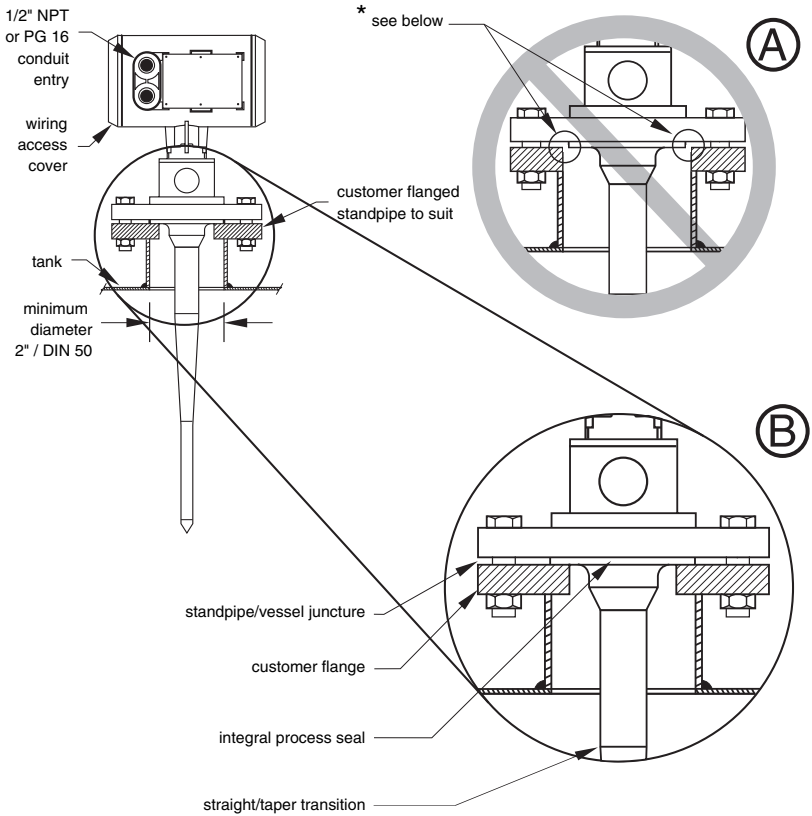


* Flange thickness 25 mm (1") nominal.

** Standard length, 50 and 100 mm (2" and 4") extensions available. See page 13.

Installation

Mounting

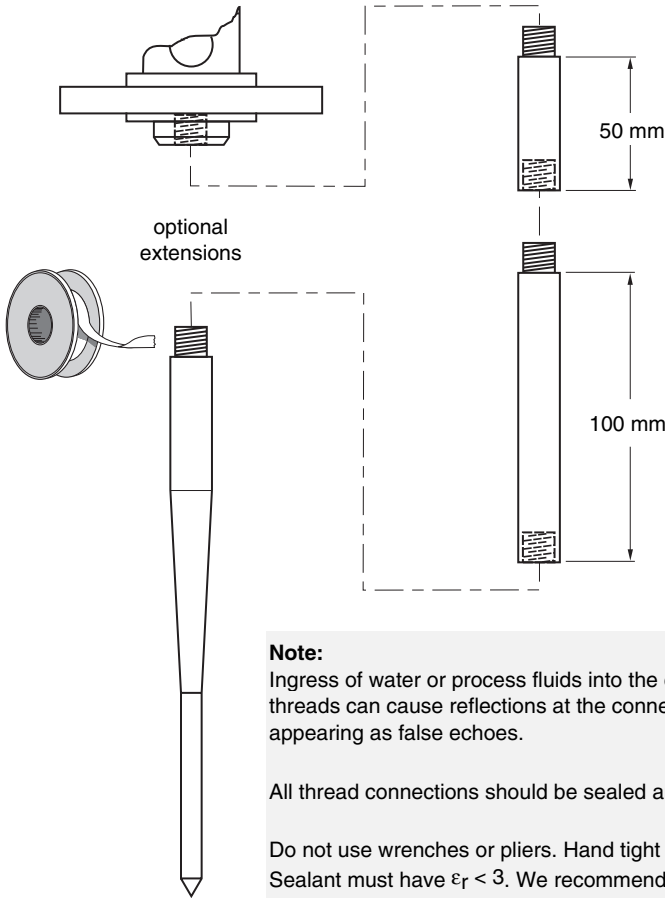


Notes:

- For 2" or 3" / DIN 50 or DIN 80, the straight/taper transition of the rod should extend past the standpipe/vessel opening. Add extensions as required. See Rod Assembly on page 13.
- For larger diameter standpipes, refer to the Rod Extension Requirements table on page 13.

* The unit in (A) is improperly mounted. The Integral process seal MUST rest on customer flange as in (B).

Rod Assembly



Note:

Ingress of water or process fluids into the connecting threads can cause reflections at the connection, appearing as false echoes.

All thread connections should be sealed and tight.

Do not use wrenches or pliers. Hand tight only.
Sealant must have $\epsilon_r < 3$. We recommend a non setting sealant such as Teflon tape or silicone compound.

Installation

Rod Extension Requirements

standpipe i.d.	standpipe height mm (inches)*		
	<100 (4)	100 to 150 (4 to 6)	150 to 200 (6 to 8)
50 mm (2")	n/r	**	**
80 mm (3")	n/r	50 mm	100 mm
100 mm (4")	n/r	50 mm	100 mm
150 mm (6")	n/r	50 mm	100 mm
>150 mm (6")	n/r	n/r	n/r

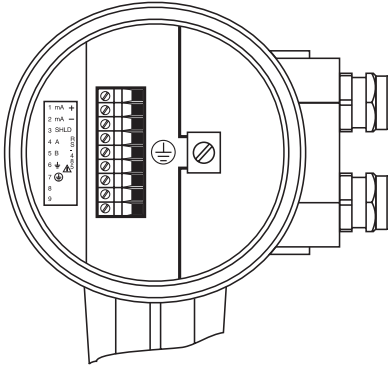
n/r extension not required

* Consult Milltronics for assistance with standpipe sizes not listed.

** application not recommended for 50 mm i.d. standpipes greater than 100 mm long

Interconnection

IQ Level Gauge 160 Terminal Block



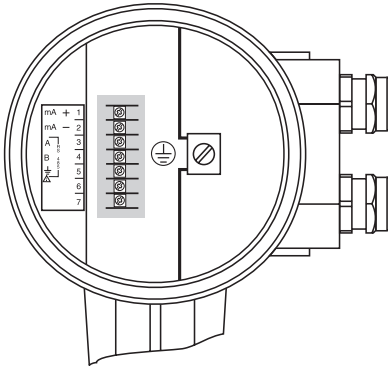
AC version

1 mA +	
2 mA -	
3 SHLD	
4 A	RS
5 B	
6 \perp	4 8 5
7 \perp	\triangle
8 L2/N	
9 L1	

DC version

1 mA +	
2 mA -	
3 shld	
4 A	RS
5 B	
6 \perp	4 8 5
7 \perp	\triangle
8 -	
9 +	18-36V ---

IQ Level Gauge 160 Ex Terminal Block



AC version

mA +	1
mA -	2
A	RS
B	
\perp	4 8 5
\triangle	
L2/N	
L1	7

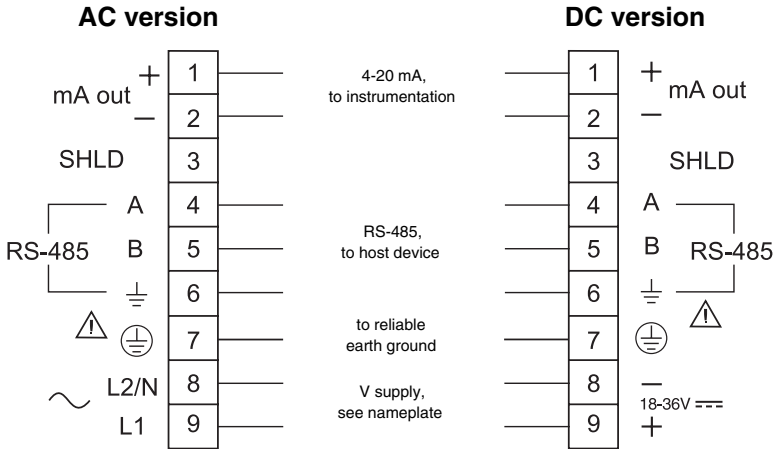
DC version

mA +	1
mA -	2
A	RS
B	
\perp	4 8 5
\triangle	
-	
18-36V ---	
+	7

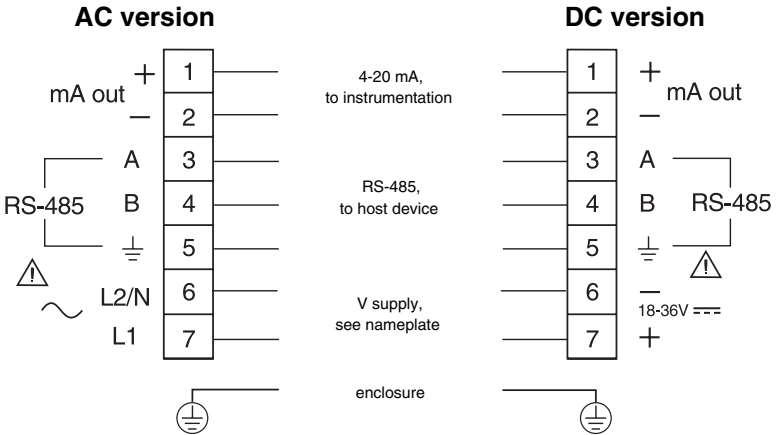
Notes for both AC and DC versions:

- mA, RS-485, wiring, 14 – 20 AWG, shielded copper wire.
- Recommended torque on terminal clamping screws, 0.5 – 0.6 Nm
- Ground shields at one end only.

IQ Level Gauge 160 Wiring



IQ Level Gauge 160 Ex Wiring



Notes for AC version only:

- Line, 12 – 14 AWG, copper wire
- The equipment must be protected by a 15 A fuse or circuit breaker in the building installation.
- A circuit breaker or switch in the building installation, marked as the disconnect switch, shall be in close proximity to the equipment and within easy reach of the operator.



All field wiring must have insulation suitable for at least 250 V.

Note for DC version only:

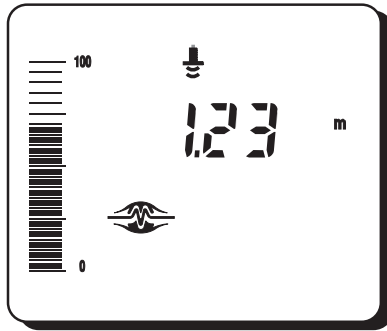


dc terminals shall be supplied from an SELV source in accordance with IEC 1010.1 Annex H

Start Up

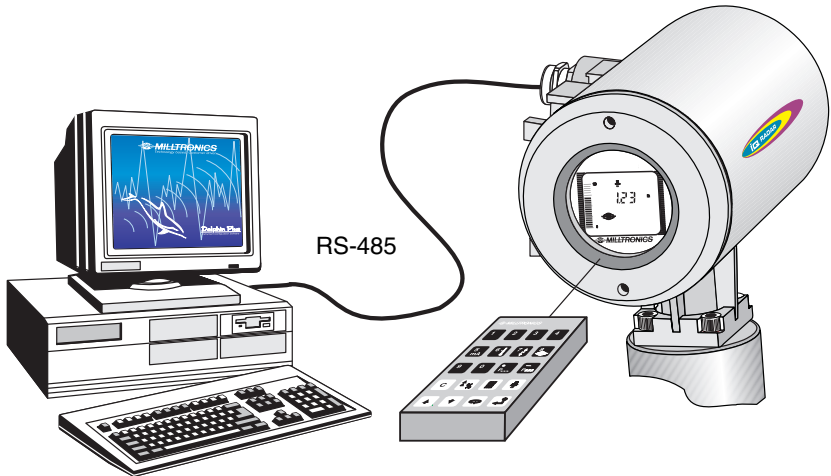
Overview

The IQ Level Gauge 160/160 Ex has two modes of operation: *run* and *program*. When the unit is powered, after installation procedures have been completed, it is programmed to start up in the *run* mode, to detect the distance from the antenna flange to the target in meters.



typical display

The unit can be placed into the *program* mode at any time; to alter a number of program parameters in order to better suit the application or user's preferences. Programming can be carried out locally via the hand programmer or remotely via the optional Dolphin/RS-485 interface.



hand programmer


The first step in programming is to ensure that all parameters are at their factory setting. The quickest way is to perform a master reset, P999 (see page 39).

For a Quick Start, P001 to P007 are the key parameters requiring entry.

They set:

- mode of measurement
- process material
- antenna configuration
- measurement response
- units
- empty distance
- span

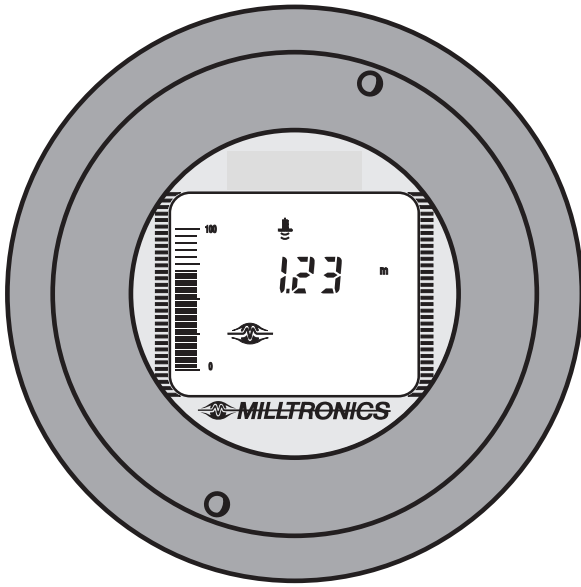
There are a number of other program parameters that can be changed subsequently or during another programming session. Refer to the Parameter Description that starts on page 31, for a list of the parameters available.

When programming has been completed, the IQ Level Gauge 160/160 Ex can be put into *run* by pressing,  or exiting Dolphin.

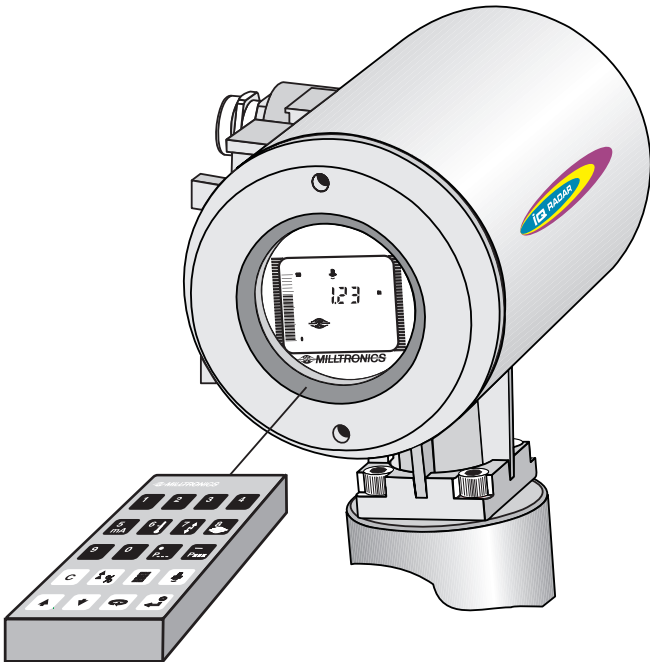
Hand Programmer



Display



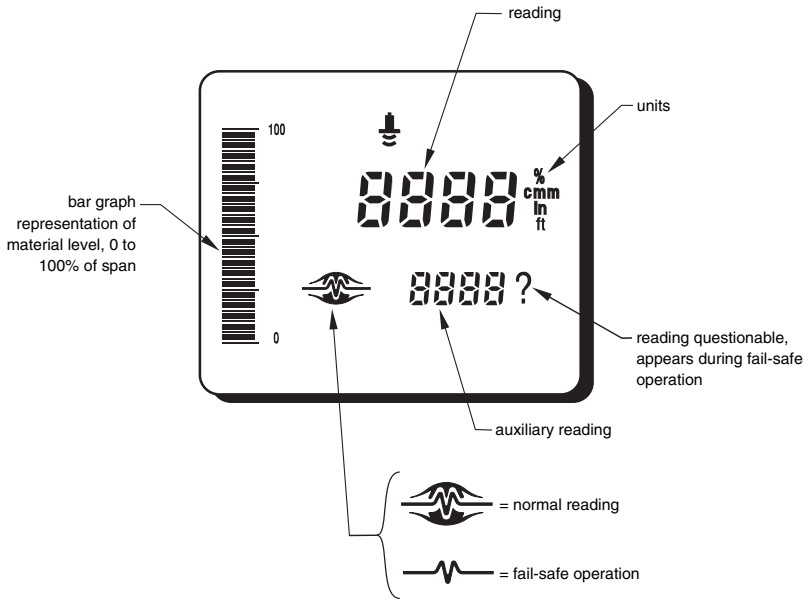
Aiming the Hand Programmer



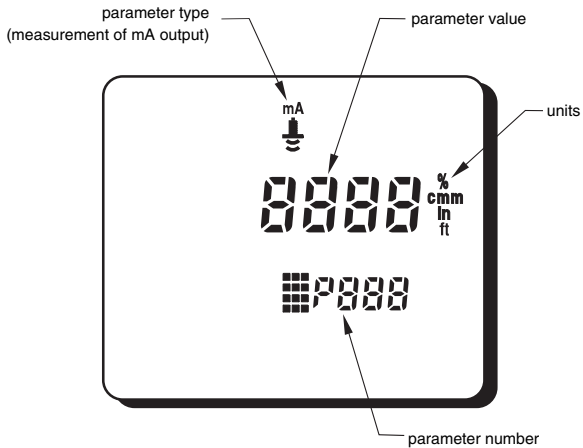
Start Up

Local Operation

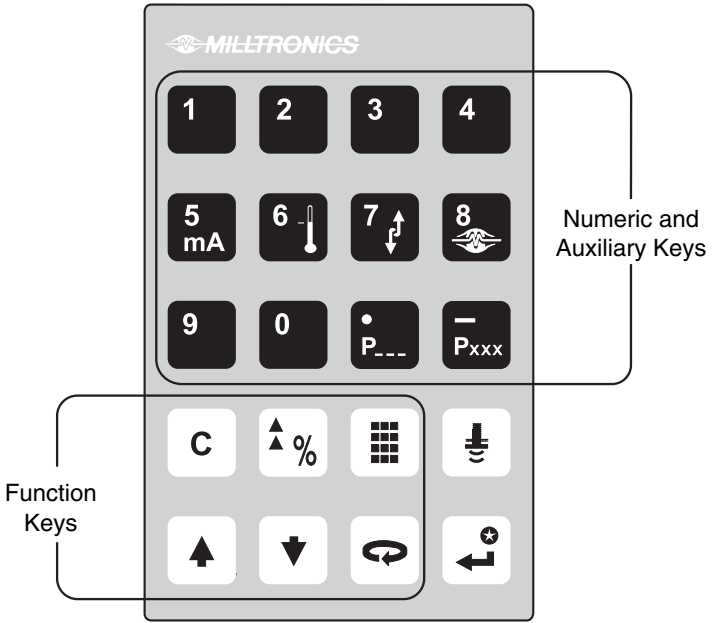
Run Display



Program Display



Hand Programmer




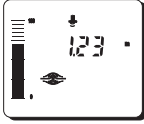
Key	Programming Mode	Run Mode
0 to 9	Values	
5 mA		“mA output value”
P...	Decimal point	
-Pxxx	Negative value	
C	Clear value	
▲ %		Toggle between units and % on reading display
3x3 grid	End program session and enable <i>run</i> mode	Initiate and complete program mode access
⚡		“Distance”
▲	Parameter scroll-up	
▼	Parameter scroll-down	
↩ (+)	Enter the displayed value	

Start Up


Local Programming

To Access Program Mode

Press 




run mode

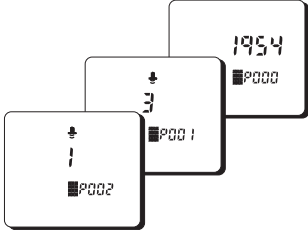


Initial program starts at P000

To Access a Parameter


Scroll Access


Press 






Scroll up or down


Direct Access

Press 




e.g. P000 accessed

Press   



index parameter field



e.g. P005 accessed


Start Up


To Modify a Parameter Value:

Note:


Security must be disabled!

Changing Parameter Values

Press **1** 




Select parameter
e.g. P001 = 3




e.g. P001 = 1


Clearing a Parameter Value

Press **2**




e.g. field entry = 2


Press **c** **1** 




e.g. P001 = 1

Resetting a Parameter Value

Press **c** 





e.g. P001 = 1




Reset to factory value
P001 = 3

To Access Run Mode:

Press 



from *program*



exit and return to *run*

Overview

The IQ Level Gauge 160/160 Ex is a level measuring device for use with liquids and slurries. Using advanced pulse Level Gauge technology, the device calculates material level by emitting a series of Level Gauge pulses, and then analyzing their reflection.

The device consists of an enclosed electronic component, mounted to a flanged antenna component. The electronic component generates a 5.8 GHz (U.S.A. 6.3 GHz) Level Gauge signal which is directed to the antenna, a Teflon[®] dielectric rod coupled to the core of the device's mounting flange.

The Level Gauge signal is emitted axially from the antenna and propagates along this axis in a defined conical beam decreasing in strength at a rate inversely proportional to the distance.

The Level Gauge pulse detects the interface between the dielectric constant of the atmosphere, and that of the material being measured. Electro-magnetic wave propagation is not sensitive to the temperature and atmospheric conditions or variations in the vessel. In an ideal application, echoes from stratified vapours are either non-existent, or minimal compared to major echoes from the process material.

The series of echoes from the pulses transmitted are sensed by the antenna during the receive period of the electronics. The echoes are stored as a profile of the activity in the vessel. The profile is analysed and the distance of the material surface to the Level Gauge antenna is determined. This distance is used as a basis for display of material level and mA output.

Transceiver

The IQ Level Gauge 160/160 Ex transceiver operates under 1 of 5 sets of preset conditions (P003), summarized as follows:

parameter value	measurement response	echo verification	filter	fail-safe timer
1	0.1 m/min	slow	on	100
2	1 m/min	•	on	10
3	10 m/min	•	on	1
4	100 m/min	•	off	0.1
5	1000 m/min	fast	off	0

When the echoes are received, the relevant echo extraction technique (P820 and P830) is applied to determine the true material echo.

The measurement response limits the maximum rate at which the display and analog output respond to changes in measurement. It is of concern especially where liquid surfaces are in agitation or falls into the Level Gauge path during filling.

Loss of Echo

A loss of echo occurs when the IQ Level Gauge 160/160 Ex deems that the calculated measurement is unreliable, i.e. the confidence (P805) is less than the threshold (P804). Refer to Troubleshooting on page 41.

If the condition persists for a time beyond the limit as set by the fail-safe timer (P070), the confidence icon changes from full to partial (see page 20) and the reading and mA output are immediately forced to the fail-safe default (P071).

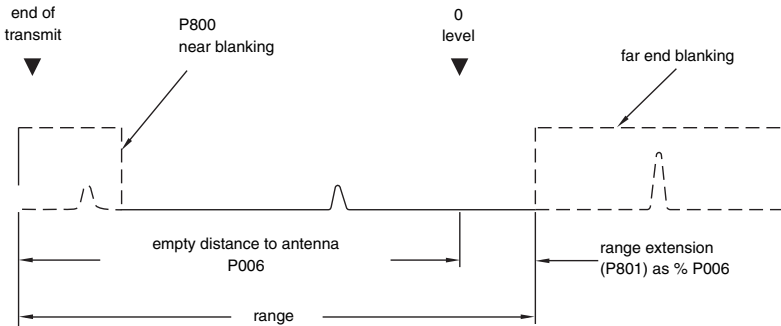
Upon receiving a reliable echo, the loss of echo condition is aborted (icon returns to full) and the reading and mA output return to the present level immediately.

Blanking

Near blanking (P800) is used to ignore the zone in front of the antenna where false echoes (e.g. ladder rung) appear as an echo during the receive cycle. This is usually indicated by an incorrect high level reading and can be overcome by increasing the near blanking from its factory set value.

Far end blanking is a feature that ignores the zone below the zero or empty level where false echoes can appear at levels that interfere with the processing of the true echo.

Typical Receiver Signal



In applications where the zero level is above the bottom of the vessel and it is desired to monitor the zone below the normal zero, range extension (P801) can be used to extend the range into the far end blanking. Range extension is entered as a percentage of P006. As range extension reduces the protection afforded by the far end blanking, it should be used judiciously. Avoid excessive range extension as this can reduce the measurement's reliability and accuracy. Range extension is factory set for 5% of P006. If it is found that false echoes are appearing, after the blanking zone, P801 should be increased accordingly.

Analog Output

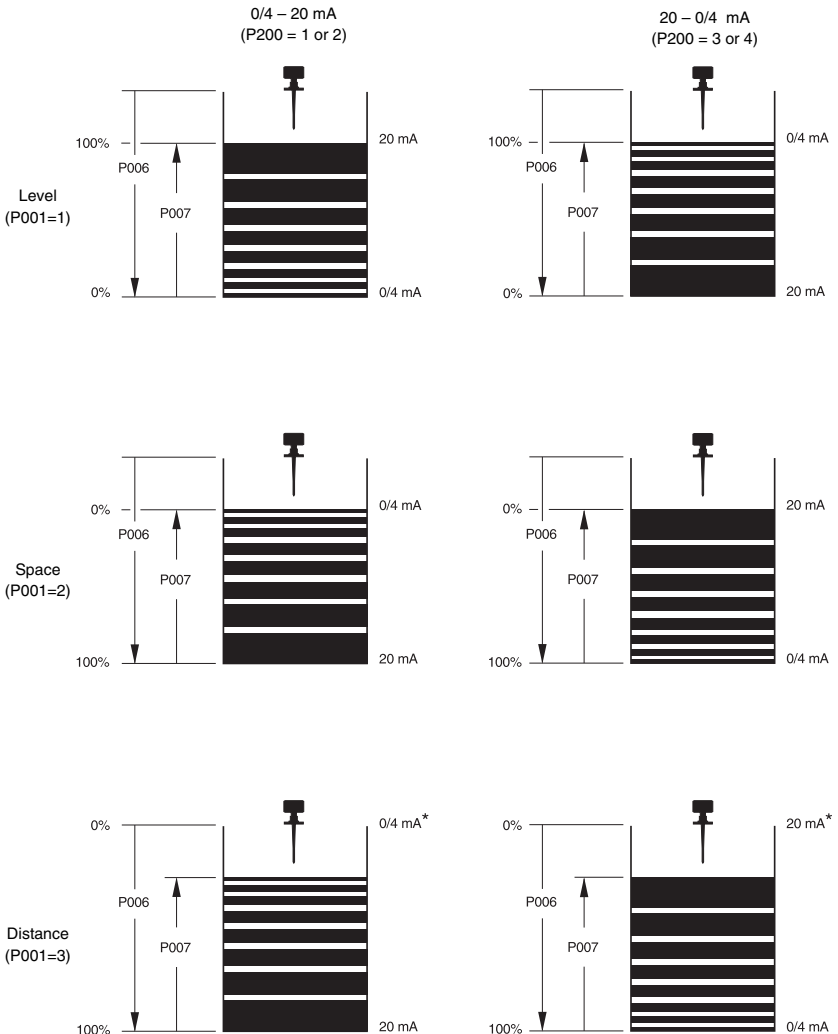
The IQ Level Gauge 160/160 Ex can be programmed to provide an analog output (P200) of 0 to 20 or 4 to 20 mA, and for proportional or inverse span.

Programming

Upon entering the Program mode, the analog output level holds its prior value.

Run

The analog output responds in the following manner:



*reference value only. mA level limited by near blanking.

0 and 100% are percentage of full scale reading (m, cm, mm, ft, in)

Volume

To program the unit for volume, set:

- operation (P001) to level (0) (see page 31),
- tank shape (P050) to a value other than 0 (see page 33),
- other volume parameters (P051 to P053) as required.

Fail-Safe

When the fail-safe timer (P070) expires, the mA output responds as follows:

Fail-safe Mode (071)	Status (0/4 – 20)	Status (20 - 0/4)
high	22	0/2
low	0/2	22
hold	hold	hold

Run / Program

When the IQ Level Gauge 160/160 Ex changes from *run* to *program*, the unit no longer responds to the process. The last measurement is stored and the associated reading and mA output are held.

As a courtesy, the unit reverts to the parameter last addressed during the previous program session.

Upon return to *run*, the transceiver resumes operation. The reading and mA output default to the last measurement taken. The reading and associated outputs migrate to the current process level at a rate controlled by the measurement response (P003).

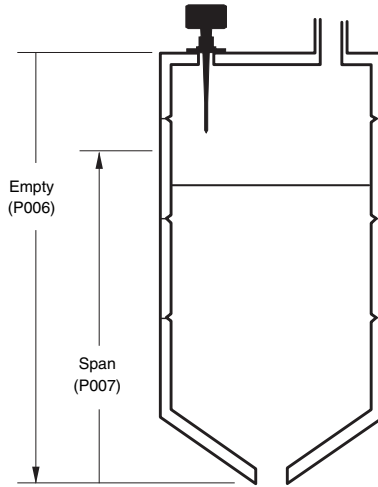
If the IQ 160/160 Ex is left in *Program* mode for 10 minutes, it automatically reverts to *Run* mode.

Application Example

Note:

The minimum distance from the antenna face to the target is limited by the near blanking, P800.

The application is to obtain a level measurement and corresponding 4-20 mA output proportional to material levels in a chemical tank. The bottom of the antenna flange is 5 m from the tank bottom. The empty level is 0 m (bottom) and the full level (span) is 4.5 m from the bottom. The maximum rate of filling or emptying is about 0.1 m/min. In the event of a loss of echo, the IQ Level Gauge 160/160 Ex is to go into fail-safe Hi after 2 minutes.


**Reset:**

P999 master reset

Program:

P001	enter '1'	mode of measurement	= level
P002	enter '1'	material	= liquid
P003	enter '2'	measurement response	= 1m/min.
P004	enter '240'	antenna	= dielectric rod, standard length
P005	enter '1'	units	= metres
P006	enter '5'	empty distance	= 5 m
P007	enter '4.5'	span	= 4.5 m
P070	enter '2'	fail-safe timer	= 2 min.
P071	enter '1'	fail-safe	= Hi

Run:

Press run to start normal operation. Press .

Parameter Descriptions

P000 Lock

Locks out the ability to change parameter values P001 through P999. The program mode is still active, but restricted to viewing only. The lock is enabled if P000 value is other than 1954.

Entry:

1954 = unlocked

1954 = locked

P001 Operation

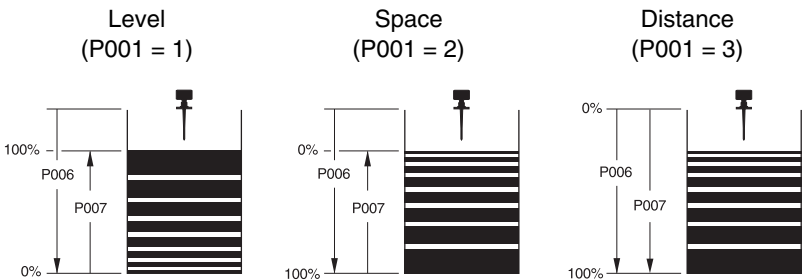
Determines the mode of measurement.

Entry:

1 = level; material level referenced to empty distance (P006)

2 = space; space to material level referenced from (P007) span

3 = distance; distance to target referenced from the flange face



P002 Material

Optimizes measurement reliability for target type.

Entry:

1 = liquids, slurries

P003 Measurement Response

Collectively sets a number of operating parameters that determine the maximum rate of change in target range that the reading and mA output can keep up to.

If IQ Level Gauge 160/160 Ex cannot keep up with the rate of level change, select a faster rate. If the reading bounces around an average value, select a slower rate. In general, reliability is traded for speed. Noisy applications or

those with agitators tend to be more manageable at slower response rates, as these make use of filtering, echo verification and longer fail-safe delay.

Note:

Select P003 for a measurement response just faster than the greater of the maximum filling or emptying rate.

echo verification: discriminates between agitator blades in motion or spurious noise, and the target surface (true echo).

filter: averages successive measurements to filter out false echoes.

fail-safe timer: establishes the period from the time a loss of echo starts until the fail-safe default (P071) is effected. The P003 preset timer value can be overridden by P070.

Entry:

measurement response		echo verification	filter	f-s timer (P070)
1 = 0.1 m/min	slow	on	on	100
2 = 1 m/min	•	on	on	10
3 = 10 m/min	•	on	on	1
4 = 102 m/min	•	off	on	0.1
5 = 1020 m/min	fast	off	off	0

P004 Antenna

Identifies antenna configuration.

Entry:

240 = dielectric rod

241 = rod + 50 mm extension

242 = rod + 100 mm extension

243 = rod + 150 mm extension (50 + 100 mm)

Notes:

- Setting this parameter automatically configures the offset correction, P652.
- See page 13 for assembly instructions for rod extensions.

P005 Units

Determines the units for programming and measurement.

Entry:

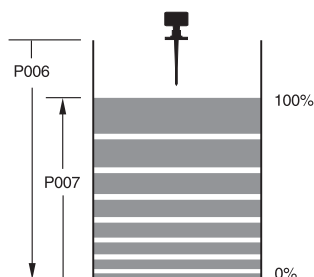
- 1 = metres
- 2 = centimetres
- 3 = millimetres
- 4 = feet
- 5 = inches

P006 Empty

Distance from flange face to empty level or maximum target range.

P007 Span

Distance from empty (P006) to full/100% level or minimum target range.



P050 Tank Shape

This parameter, in conjunction with parameters P051, P052 and P053, enable the IQ 160/160 Ex to show readings based on reservoir volume (rather than level).

Enter the Tank Shape value that matches the monitored vessel or reservoir.

When Operation is "level" (P001 = 1), liquid (material) volume is calculated.

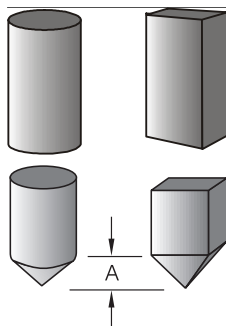
In the *run* mode, Readings are displayed in volumetric units, see Max Volume (P051) on page 34. When percent is selected the displayed Reading is the calculated volume as a percentage of Max Volume.

Entry:

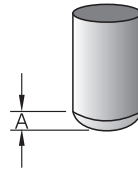
0 = disabled (Factory)

1 = flat bottom

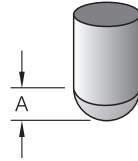
2 = conical or pyramidal bottom



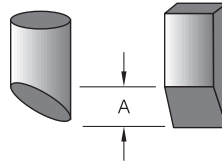
3 = parabolic bottom



4 = spherical bottom



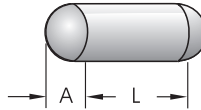
5 = angled bottom



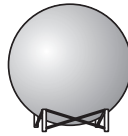
6 = flat ends



7 = parabolic ends



8 = sphere

**Note:**

Tank dimensions 'A' and 'L' are entered via parameters P502 and P503 respectively.

P051 Max Volume

For Readings in volumetric units (rather than percent), enter the vessel volume between Empty (P006) and Span (P007).

The units of measurement for this reading are non-dimensional. The volume is calculated from the empty position to the maximum position and is scaled according to the Tank Shape (P050) value. This enables the use of any volume units required.

Example

1. If max. volume = 3650 m³, enter 3650.
2. If max. volume = 267500 gallons, enter 267.5 (1000's of gallons).

Enter the volume of the tank at full (Factory = 1)

P052 Tank Dimension 'A'

This is dimension 'A' as used in the tank shape parameter (P050) on page 33.

Enter the height of the tank bottom if P050 = 2,3,4, or 5, or the length of one end section of the tank if P050 = 7.

Enter the dimension in units (P005)

P053 Tank Dimension 'L'

This is dimension 'L' as used in the tank shape parameter (P050) on page 33.

Enter the tank length (excluding both end sections) if P050 = 7.

Enter the dimension in units (P005)

P070 Fail-Safe Timer

The amount of time delay, in minutes, before going into fail-safe mode.

P071 Fail-Safe Material Level

Selects the default measurement in the event that the fail-safe timer expires.

Entry:

1 = high; maximum span value

2 = low; minimum span value

3 = hold; hold current value

P200 mA Range

Enables the mA output function by selecting the range and relationship to span.

Entry:

1 = 0 to 20 mA

2 = 4 to 20 mA

3 = 20 to 0 mA

4 = 20 to 4 mA

P341 Run Time

View the accumulated number of days the IQ Level Gauge 160/160 Ex has been operating.

P652 Offset Correction

An offset value can be applied to the reading as a correction to the measurement.

Values:

-999 to 9999

Factory = 0

P655 Propagation Factor

The propagation factor (p.f.) is used to compensate for the change in the microwave velocity, as compared with propagation in free space, when propagation is within a still pipe (metal).

The propagation factor is constant for a given pipe diameter,

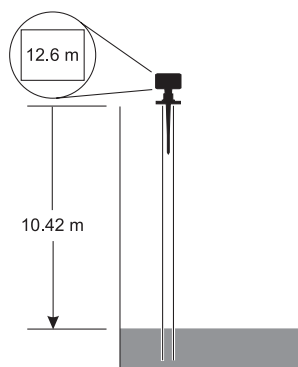
pipe size (i.d.)	Propagation Factor
50 mm	0.828
100 mm	0.954

or can be determined by comparing the Level Gauge distance reading to the actual process material distance (measured from the face of the IQ 160 flange).

$$\text{p.f.} = \frac{\text{actual distance}}{\text{IQ 160 distance}}$$

$$\text{e.g. p.f.} = \frac{10.42 \text{ m}}{12.6 \text{ m}} = 0.827$$

Enter the propagation factor
Factory = 1



P800 Near Blanking

Sets the amount of blanking as measured from the flange face and extending into the measurement range. See Blanking on page 27.

Enter value in units of P005.
Factory = 0.4m

P801 Range Extension

Sets the amount of range extension as measured from the empty distance (P006) and extending into the far end blanking. See Blanking on page 27.

Enter as a % of P006, the distance below empty not blanked.
Factory = 5%

P804 Confidence Threshold

The minimum echo confidence in dB that the echo must meet in order to prevent a loss of echo condition and the expiration of the fail-safe timer (P070).

Enter value in the range of 0 to 99.
Factory = 5

P805 Echo Confidence

A measure of echo reliability.

P806 Echo Strength

The absolute strength of the selected echo, in dB above 1 μ V rms.

P820 Algorithm

Selects the algorithm to be applied to the echo profile in order to extract the true echo.

Entry:

- 1 = best of first and largest (factory)
- 2 = first echo
- 3 = largest echo
- 4 = reserved
- 5 = reserved
- 6 = reserved

P825 Echo Marker Trigger

Authorized factory personnel only.

P830 TVT Type

Selects the TVT profile applied to the echo profile.

Entry:

1 = Smooth 1

2 = flat

3 = No TVT

4 = Smooth 2 (factory – contact Milltronics for assistance with other selections)


5 = Smooth 3

6 = Smooth 4

P900 Software Revision

Displays the EPROM software revision level.

P901 Memory

Tests the memory. Test is initiated by scrolling to the parameter or repeated by pressing .

Display:

PASS = normal

FAIL = consult Milltronics

P911 mA Output Value

Displays the value from the previous measurement. A test value can be entered and the displayed value is transmitted to the output. Upon returning to the run mode, the parameter assumes the actual mA output level.

P920 Reading Measurement

Displays the reading measurement that the unit is programmed for in run mode (P001, operation).

P921 Material Measurement

Displays the reading measurement as though the unit were programmed to read level (P001 = 1).

P922 Space Measurement


Displays the reading measurement as though the unit were programmed to read space (P001 = 2).

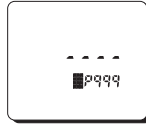
P923 Distance Measurement

Displays the reading measurement as though the unit were programmed to read distance (P001 = 3)

P999 Master Reset

Resets parameters to their factory setting.

Press  




initiate reset



reset complete

Troubleshooting

The following is a list of operating symptoms, their probable causes and the actions needed to resolve them.

Symptom	Cause	Action
display reads 	level or target is out of range	<ul style="list-style-type: none"> check specifications check parameters
	material build-up on antenna	<ul style="list-style-type: none"> clean re-locate IQ Level Gauge 160/160 Ex
	location or aiming: <ul style="list-style-type: none"> poor installation flange not level standpipe not vertical 	<ul style="list-style-type: none"> relocate or re-aim IQ Level Gauge 160/160 Ex for maximum echo confidence, P805
	antenna malfunction: <ul style="list-style-type: none"> temperature too high physical damage excessive foam 	<ul style="list-style-type: none"> inspect use foam deflector or stilling well relocate use a defoamer
Reading does not change, but the level does	IQ Level Gauge 160/160 Ex processing wrong echo, i.e. vessel wall, or structural member	<ul style="list-style-type: none"> re-locate IQ Level Gauge 160/160 Ex check standpipe for internal burrs or welds increase blanking, P800 refer to page 13 for Rod Extensions Requirements raise short measurement confidence threshold, P804
Measurement is consistently off by a constant amount	Was P004 set correctly? P006 not correct	<ul style="list-style-type: none"> Check distance from Flange face to zero level (P006)

Symptom	Cause	Action
Screen blank	power error	<ul style="list-style-type: none"> • check nameplate rating against voltage supply • check power wiring or source
Reading erratic	echo confidence weak	<ul style="list-style-type: none"> • refer to P805
	liquid surface agitated	<ul style="list-style-type: none"> • decrease measurement response P003
	material filling	<ul style="list-style-type: none"> • re-locate IQ Level Gauge 160/160 Ex
Reading response slow	P003 setting	<ul style="list-style-type: none"> • increase response if possible
Reads correctly but occasionally reads high when vessel is not full	detecting close range echo	<ul style="list-style-type: none"> • increase blanking • build up near top of tank or nozzle • Rod extensions may be required (see page 13).
Level reading lower than material level	material is within near blanking zone	<ul style="list-style-type: none"> • decrease blanking P800 (min. 0.4 m) • Raise IQ160/160 Ex

Maintenance

The IQ Level Gauge 160/160 Ex requires no maintenance or cleaning; however, a program of periodic checks is advised.

Appendix I

Alphabetical Parameter List

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Units	005	33

* accessible in Dolphin only.

Appendix II

Programming Chart

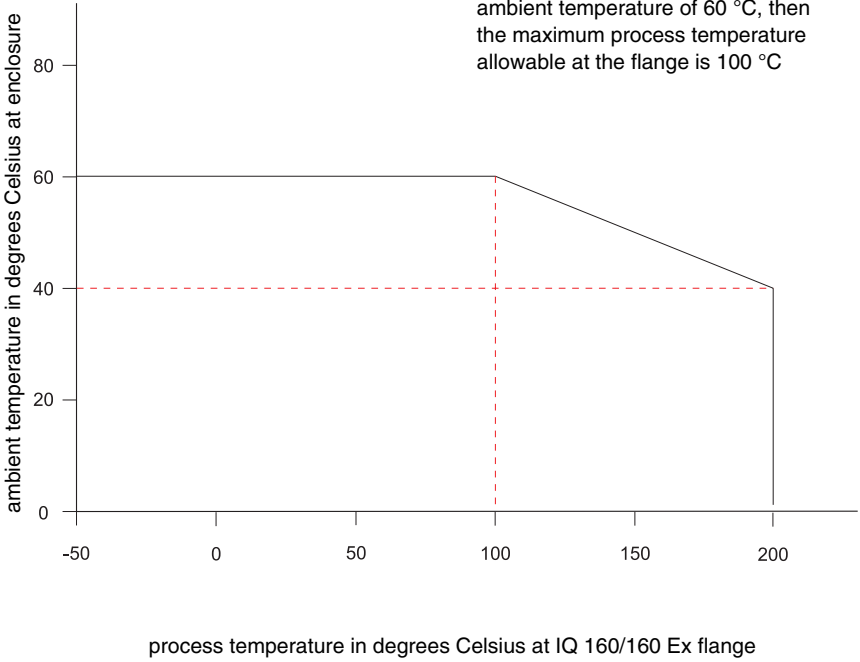
Number	Parameter Name	Value
001	Operation	
002	Material	
003	Measurement Response	
004	Antenna	
005	Units	
006	Empty	
007	Span	
050	Tank Shape	
051	Max Volume	
052	Tank Dimension 'A'	
053	Tank Dimension 'L'	
070	Fail-Safe Timer	
200	mA Range	
341	Run Time	
652	Offset Correction	
655	Propagation Factor	
800	Near Blanking	
801	Range Extension	
804	Confidence Threshold	
805	Echo Confidence	
806	Echo Strength	
820	Algorithm	
825	Echo Marker Trigger	

Number	Parameter Name	Value
830	TVT Type	
841	Long Shot Number*	
900	Software Revision	
901	Memory	
911	mA Output Value	
920	Reading Measurement	
921	Material Measurement	
922	Space Measurement	
923	Distance Measurement	

Appendix III

Temperature Derating

e.g. if the IQ 160/160 Ex is operating in an ambient temperature of 60 °C, then the maximum process temperature allowable at the flange is 100 °C



BZT Approval – English



Regulierungsbehörde für Telekommunikation und Post

Telecommunications

Decree 39/1998

General Licence No. 826 Intended for common use when employing transmission and reception plants of MILLTRONICS LIMITED company, Worcester, England.

1. Based on § 47 par. 1 and 5 of the Telecommunications Law (TKG) from July 25th, 1996 (BGBl. I.S. 1120, the frequency 5.8 GHz is assigned as General Assignment for common use when employing transmission and reception radio plants distributed by MILLTRONICS LIMITED company, Worcester, England, and characterized by the designation "IQ Level Gauge". These radio plants are used for level measurement in chemical Industry plants with maximum radiating capacity of 30uW and a bandwidth of up to 1.3GHz. This General Assignment does not exclude further assignments of the same frequency for similar or equal purposes when using other devices.
2. The radio plants must be identified as follows: "Bundesadler"(Federal Eagle Symbol), assignment number "BZT G750826K", company name "MILLTRONICS LIMITED, Worcester, England" and identification "IQ Level Gauge".
3. The use of this frequency must not Interfere with other telecommunication or radio plants.
4. This General Assignment does not provide any protection for users of such radio plants against frequency interferences by users operating in the same frequency range.

Additional Information for the distributor and users of radio plants sold under this General Assignment

1. There is no need for particular frequency assignment or for conformity rating as ruled by §61 of the Telecommunications Law. If the radio plants sold for this frequency use and for this purpose comply electrically and mechanically with a design technically proofed by an accredited testing lab and if they are identified as described under #2 of the above mentioned regulations.
2. The identification label must be applied to the radio devices' enclosure, either on a nameplate or in an appropriate location on the enclosure. When stamped or engraved, it must be visible. The identification must be time and wear resistant and must be fixed in such a way to the enclosure, in order that any attempted removal of the latter will cause it to tear. It must always be visible from the outside.
3. The distributing company has to add a complete reprint of this General Assignment to each device for sale under the above mentioned approval.
4. The General Assignment allows for interconnection of the radio plants with other telecommunication plants, provided there is a need to do so. In this case, the corresponding technical requirements and legal requirements for telecommunication must be respected. If the telecommunication plants to be interconnected with the radio plants are linked to public telecommunication networks, the interconnection is subject to a preceding written authorization by the Telecommunications and Mail Regulation Service. For further information, please contact the responsible offices of this Service.
5. The above mentioned transmission and reception radio plants must comply with the EMVG directives, and consequently include CE identification.
6. The General Assignment does not deal with the security of persons in electromagnetic fields, nor with the electrical or mechanical security of radio plants, including antenna plants. Those are subject to special regulations and directives.
7. The General Assignment only applies to frequency use in its legal aspect for telecommunication. It does not involve any other directives, even if they concern legal aspects for telecommunication, and third-party rights, particularly additional permissions and approvals, if required, with regards to construction and private jurisdiction, for example.

BZT Approval – German Original Text



Regulierungsbehörde für Telekommunikation und Post

Fermeldewesen

Vfg 39/1998

Allgemeinzuteilung Nr. 826 für die Benutzung durch die Allgemeinheit unter Verwendung von Sende- und Empfangsfunkanlage der Firma MILLTRONICS LIMITED, Worcester, England.

- Hiermit wird auf Grund § 47 Abs. 1 und 5 des Telekommunikationsgesetzes (TKG) vom 25. Juli 1996 (BGBl. I S. 1120) die **Frequenz 5,8 GHz** als Allgemeinzuteilung für die Benutzung durch die Allgemeinheit unter Verwendung von Sende- und Empfangsfunkanlagen der **Vertriebsfirma MILLTRONICS LIMITED, Worcester, England**, mit der Typenbezeichnung **"IQ Level Gauge"** zugeteilt. Diese Funkanlagen dienen der **Füllstandsmessung in Anlagen der chemischen Industrie** mit einer Strahlungsleistung von maximal 30 uW und einer belegten Bandbreite von bis zu 1,3 GHz. Diese Allgemeinzuteilung schließt weitere Zuteilungen der gleichen Frequenz zu ähnlichen oder gleichen Zwecken unter Verwendung anderer Geräte nicht aus.
- Die Funkanlagen sind wie folgt zu kennzeichnen: **Bundesadler**, Zulassungsnummer **"BZT G750826K"**, sowie der Name der Vertriebsfirma MILLTRONICS LIMITED, Worcester, England und der Typenbezeichnung **"IQ Level Gauge"**.
- Im Rahmen dieser Frequenznutzung dürfen andere Telekommunikationsanlagen sowie andere Funkanlagen nicht gestört werden.
- Im Rahmen dieser Allgemeinzuteilung besteht für die Benutzer solcher Funkanlagen keinerlei Schutz vor frequenzmäßigen Beeinträchtigungen durch andere Frequenznutzer im gleichen Frequenzbereich.

Zusatzhinweise für die Vertriebsfirma und die Benutzer einer unter dieser Allgemeinzuteilung in den Verkehr gebrachten Funkanlage

- Es bedarf keiner weiteren Frequenzuteilung und keiner Konformitätsbewertung im Sinne des § 61 TKG im einzelnen, wenn die für diese Frequenznutzung und diesen Verwendungszweck in Verkehr gebrachten Funkanlagen mit dem bei einem akkreditierten Prüflabor technisch geprüften Baumuster elektrisch und mechanisch übereinstimmen und wie unter Ziffer 2 der o. a. Bestimmungen beschrieben, gekennzeichnet sind.
- Die Kennzeichnung ist am Gehäuse der Funkanlagen, entweder auf einem Typenschild oder an örtlich zusammenhängender Stelle, wenn die Form einer Prägung oder Gravur gewählt wird, an gut sichtbarer Stelle anzubringen. **Die Kennzeichnung muß dauerhaft und abnutzungssicher ausgeführt und so mit dem Gehäuse verbunden sein, daß sie beim Entfernen zerstört wird. Sie muß von außen jederzeit sichtbar sein.**
- Die Vertriebsfirma dieser Funkanlagen ist verpflichtet, jedem unter dem o. g. Zulassungszeichen in den Verkehr zu bringenden Funkgerät einen vollständigen Nachdruck dieser Allgemeinzuteilung beizufügen.
- Auf Grund dieser allgemeinen Frequenzuteilung dürfen diese Funkanlagen mit anderen Telekommunikationsanlagen zusammenschaltet werden, soweit dafür ein Bedarf besteht und die jeweiligen technischen und telekommunikationsrechtlichen Anforderungen erfüllt werden.

Sofern die Telekommunikationsanlagen, mit denen diese Funkanlagen zusammenschaltet werden sollen, mit öffentlichen Telekommunikationsnetzen verbunden sind, bedarf diese Zusammenschaltung der vorherigen schriftlichen Genehmigung der Regulierungsbehörde für Telekommunikation und Post (Reg TP). Entsprechende Auskünfte erteilen die zuständigen Außenstellen der Reg TP.

- Die obengenannten Sende- und Empfangsfunkanlagen müssen die Vorschriften des EMVG erfüllen, also auch eine CE-Kennzeichnung tragen.
- Diese allgemeine Frequenzuteilung hat weder die Sicherheit von Personen in elektromagnetischen Feldern noch die elektrische und mechanische Sicherheit der Funkanlagen einschließlich der Antennenanlagen zum Gegenstand. Hierfür gelten die einschlägigen Bestimmungen und Vorschriften.
- Diese allgemeine Frequenzuteilung betrifft nur telekommunikationsrechtliche Aspekte der Frequenznutzung. Sonstige Vorschriften, auch telekommunikationsrechtlicher Art, und Rechte Dritter, insbesondere ggf. zusätzliche erforderliche Zulassungen und Genehmigungen, z. B. baurechtlicher oder privatrechtlicher Art bleiben unberührt.

Amtsblatt 7/98

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