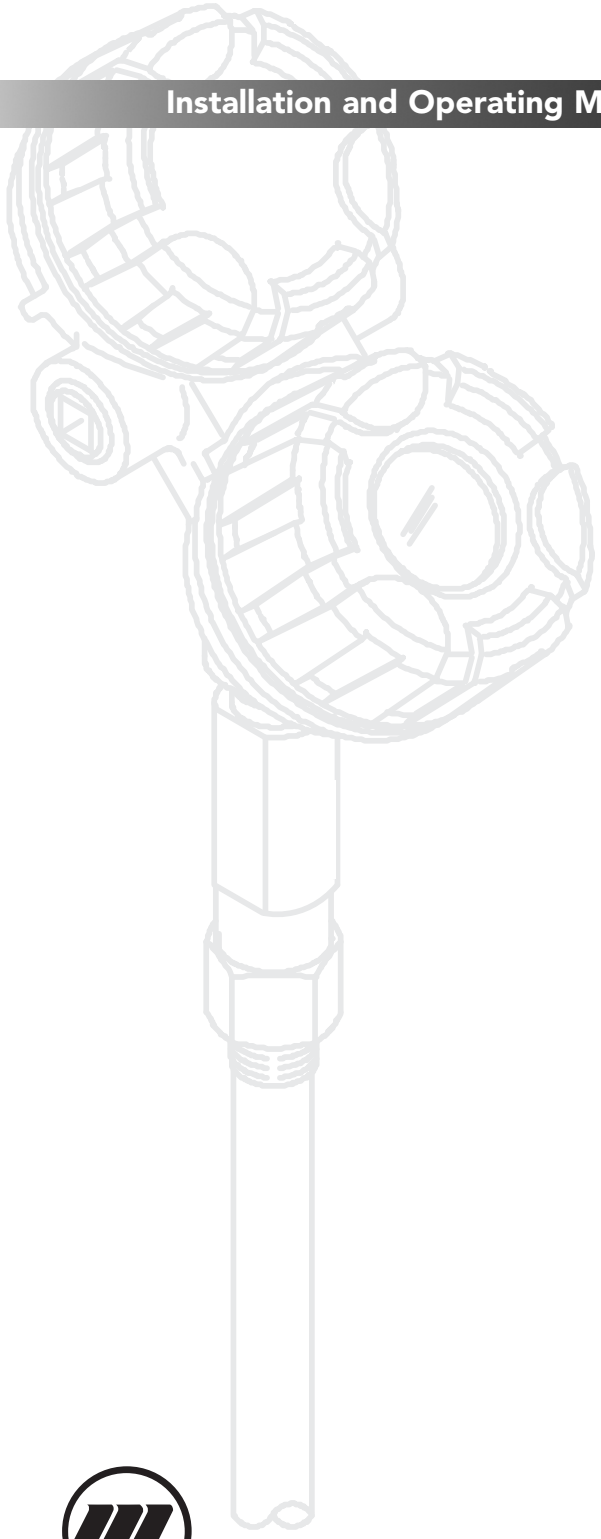
KOTRON® 805

Installation and Operating Manual



R.F. Capacitance

Level Transmitter

Magnetrol®

UNPACKING

Unpack the instrument carefully. Make sure all components have been removed from the foam protection. Inspect all components for damage. Report any concealed damage to the carrier within 24 hours. Check the contents of the carton/crates against the packing slip and report any discrepancies to Magnetrol. Check the nameplate model number to be sure it agrees with the packing slip and purchase order. Check and record the serial number for future reference when ordering parts.

These units are in conformity with the provisions of:

1. The EMC Directive: 2014/32/EU. The units have been tested to EN 61326: 1997 + A1 + A2.
2. Directive 2014/34/EU for Equipment or protective system for use in potentially explosive atmospheres. EC-type examination certificate number KEMA98ATEX4467X.
3. The PED directive 97/23/EC (pressure equipment directive). Safety accessories per category IV module H1.

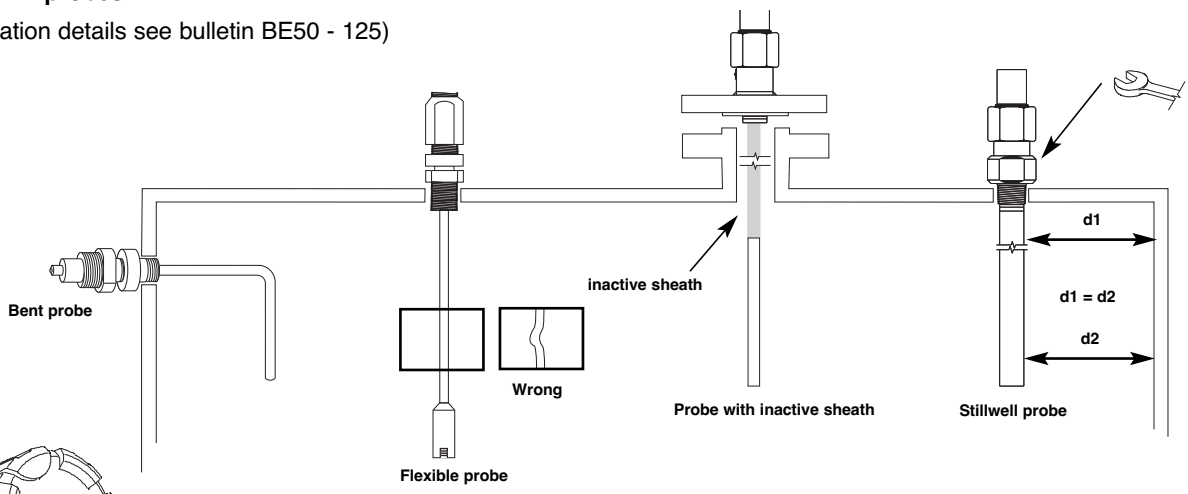
SPECIAL CONDITIONS FOR ATEX INTRINSICALLY SAFE USE

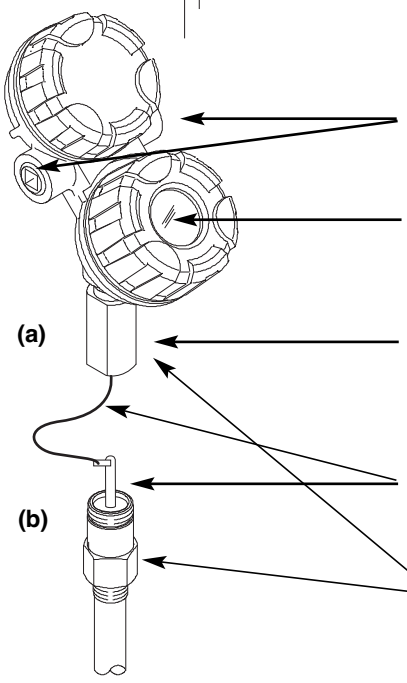
1. Because the enclosure of the transmitter is made of aluminium alloy, the transmitter must be installed so, that even in the event of rare incidents, an ignition source due to impact or friction between the enclosure and iron/steel is excluded.
2. Probes with an insulating layer, used in a potentially explosive atmosphere with gas, vapour or mist of gas group IIC, may only be used for the measurement of the level of a conductive fluid.

MOUNTING

KOTRON R.F probes

(For installation details see bulletin BE50 - 125)





2 cable entries (one plugged): M20 x 1.5 or 3/4" NPT

For replacing electronics only:
The electronic insert can easily be removed by loosening the 3 mounting screws and unplugging the module. The probe wire is fixed to the PCB by means of a spade plug.

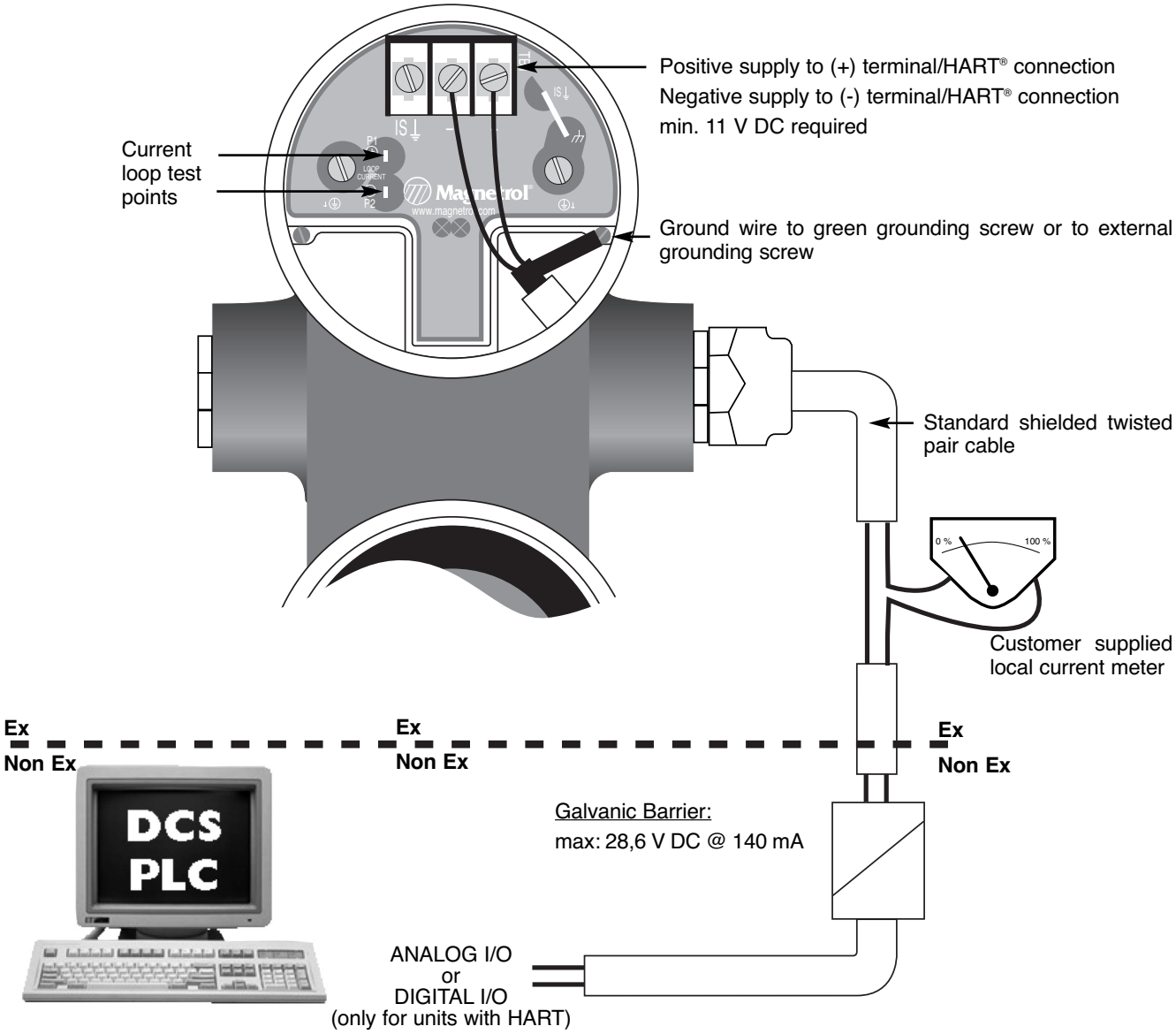
Handtighten or use  Size: 33 mm (1 1/8") or adjustable wrench

Disconnect white probe wire always at the probe - never at the electronics (see above).

WARNING: Never mount or dismantle a threaded probe by the upper mounting nut for the amplifier (a), ALWAYS use the lower probe mounting nut (b).

WIRING

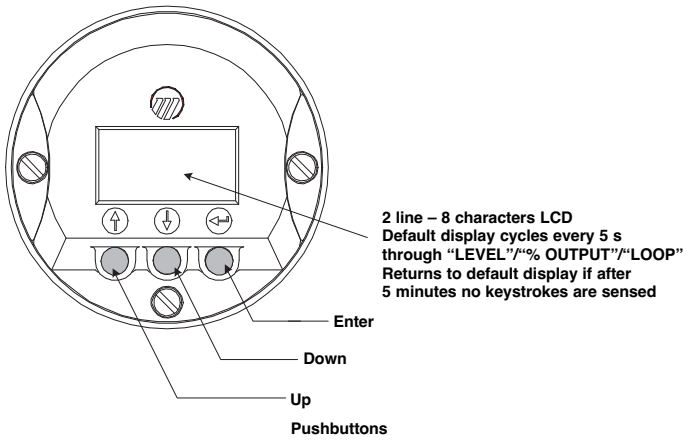
CAUTION: power must be switched OFF before wiring the unit.



CAUTION: ALWAYS check for proper grounding, Improper grounding will cause malfunction of the unit.

CALIBRATION

NOTE: When connected to an approved barrier, the intrinsically safe electronics of the Kotron 805 allow to remove both covers with power switched on – even if the area is known to be hazardous

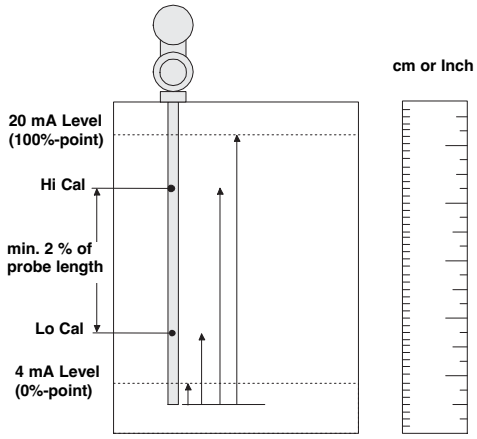


IMPORTANT: When the amplifier is not connected to a probe, the screen will show "NO LEVEL SIGNAL". Ignore this message for bench configuration.

CALIBRATION - TRANSMITTER WITH LCD SCREENMENU: STEP BY STEP PROCEDURE

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

TERMINOLOGY



Units	cm or inches Select the units of measurement in which the unit will be calibrated and will show values.
20 mA Level	= ☐ cm or inches or 100 % level point, is measured from the end of the probe. Keep this reference point also for the introduction of all future values.
Hi Cal	= ☐ cm or inches High Calibration point is the highest level from which the calibration is performed. Hi Cal is measured from the end of the probe.
Lo Cal	= ☐ cm or inches Low Calibration point is the lowest level from which the calibration is performed. Lo Cal is measured from the end of the probe.
4 mA Level	= ☐ cm or inches or 0 % level point, is measured from the bottom of the probe. The 4 mA level is by preferrence located on the probe. The unit will not measure below the end of the probe.

NOTE: The above example shows the end of the probe as reference point. Also the bottom or top of the tank can be used as reference point. Whichever point is used, it must always be used for all further values.

Display	Action	Comment
Ent Pass 0	"0" means that no password is introduced	Factory default setting
Ent Pass! 1	Press ↵ and last character changes into "!" Enter a value between 1 up to 255 as your personal password with ↓ and ↑	Changing password
New Pass 4096	Display shows an encrypted value, enter your password or call Magnetrol for assistance to recoop your password if necessary	Data is protected by a valid Password
New Pass 0000	Protect data by new password	Data is not protected

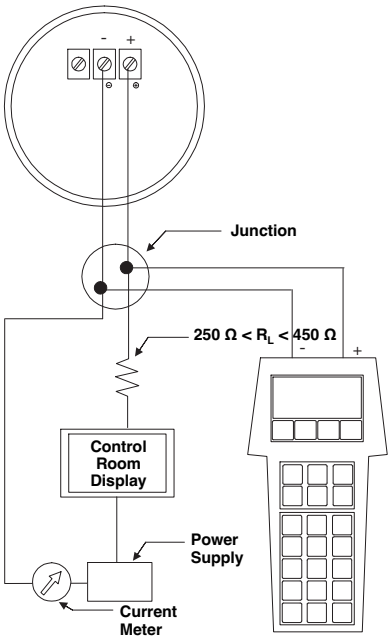
CALIBRATION - TRANSMITTER WITH LCD SCREENMENU: STEP BY STEP PROCEDURE

		Screen	Action	Comment
Run mode	①	*Level* *%Output* *Loop*	Transmitter Display	Transmitter default display. Level, % Output, and Loop values cycle every 5 seconds.
	②	Level xx.x cm	Transmitter Display	Transmitter displays Level measurement in cm or in.
	③	%Output xx.x%	Transmitter Display	Transmitter displays % Output measurement derived from the 4-20 mA span.
	④	Loop xx.xx mA	Transmitter Display	Transmitter displays Loop measurement (mA).
Configuration	⑤	Units xxx	**Select** units for level measurement readout.	**cm** or **inches**.
	⑥	Lo Cal xxx.x lu	**Enter** level value of the low calibration point	Set level at low calibration point and adapt with Up and Down the displayed value
	⑦	Lo Cap Xxxx pF	Transmitter Display	Transmitter displays capacitance at low calibration point in pF
	⑧	Hi Cal xxx.x lu	**Enter** level value of the high calibration point	Set level at high calibration point and adapt with Up and Down the displayed value
	⑨	Hi Cap Xxxx pF	Transmitter Display	Transmitter displays capacitance at high calibration point in pF
	⑩	Set 4mA xxx.x	**Enter** the level value for the 4 mA point.	4 mA level cannot be set at a lower level than the end of the probe
	⑪	Set 20mA xxx.x	**Enter** the level value for the 20 mA point.	20 mA level cannot be set at a higher level than the top of the probe
	⑫	Damping xx sec	**Enter** the damping factor.	A Damping factor (1-45 seconds) may be added to smooth a noisy display and/or output due to turbulence.
	⑬	Fault Choice	**Enter** the default value.	Select **3.6 mA, 22 mA** or **HOLD** (last value). 3.6 mA is not valid if unit includes HART.
	⑭	Poll Adr xx	**Enter** HART ID number.	**Select** a HART poll address (0-15). Enter 0 for a single transmitter installation.
	⑮	Trim 4 xxxx	Fine tune the 4 mA point.	**Attach** a mA meter to the output. If the output does not equal 4.0 mA, adjust the value on the display to equal 4.00 mA.
	⑯	Trim 20 xxxx	Fine tune the 20 mA point.	**Attach** a mA meter to the output. If the output does not equal 20.0 mA, adjust the value on the display to equal 20.00 mA.
Diagnostics	⑰	Loop Tst xx.x mA	**Enter** a mA Output value.	Set mA Output to any given value to perform loop test.
	⑱	Prb Rdg Xxxx pF	None, do not adjust.	Transmitter displays capacitance at present level
	⑲	Osc Tst Xxx tk	None, do not adjust.	Transmitter displays internal timing count with fixed capacitance (factory diagnostic)
	⑳	Opn Prb xxxx tk	None, do not adjust.	Transmitter displays internal timing count with probe disconnected (factory diagnostic)
	㉑	# Ticks xxxx	None, do not adjust.	Transmitter displays internal timing count at present level (factory diagnostic)
	㉒	Reint xxx	**Reinitialize** all values.	Reinitialize - choose YES to reset all configuration values back to factory defaults.
	㉓	Vern.nAa	None, do not adjust.	Transmitter displays version number of firmware
	㉔	New Pass xxx	**Enter** new password.	Use arrows to select desired value. Values between 1 and 255

= min. required calibration

CALIBRATION USING HART®

IMPORTANT: Check whether your HART® communicator is equiped with the 805 Device Descriptors (DD's). Older purchased devices may require an update – consult your local HART Service Centre or Magnetrol for further assistance.



CONNECTIONS

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

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

HART MENU

I/O Start up the device
1 Enter DEVICE SET UP
Press one of the following alphanumeric keys (if no key is sensed after 5 s, the unit will automatically jump to RUN mode and alternatively show Level/% Output and Loop signal

1 for entering CALIBRATION (see page 5 for additional information)
2 for entering BASIC SETUP – general HART
3 for ADVANCED SET UP CONFIGURATION (see page 5 for additional information)
4 for entering DIAGNOSTICS (see page 5 for additional information)
5 for entering REVIEW to review all settings.

1 Device Setup
2 Level
3 % Output
4 Loop

1 Calibration
- 1 Units
- 2 Empty Calibration
- 3 Full Calibration
- 4 4 mA Set Point
- **5** 20 mA Set Point
- 6 Damping
- 7 Fault State
- 8 Date/Time/Initials

2 Basic Setup
- 1 Tag
- 2 Descriptor
- 3 Date
- 4 Message
- 5 Final Asmbly Num
- 6 Poll Address
- 7 New Password

3 Advanced Setup/ Configuration
- 1 Adjust Trim 4 mA
- 2 Adjust Trim 20 mA
- 3 4 mA Trim Value
- 4 20 mA Trim Value
- 5 Enter Password
- 6 Set Magnetrol S/N
- 7 Set Dev ID Number

4 Diagnostics
- 1 Loop Test
  - 1 3.6 mA
  - 2 4 mA
  - 3 20 mA
  - 4 22 mA
  - 5 Other
- 2 Error Codes
- 3 Probe Reading
- 4 Cap at empty Cal
- 5 Cap at full Cal

5 Review
- 1 Model
- 2 Manufacturer
- 3 Dev Id, S/N
- 4 Tag
- 5 Descriptor
- 6 Date
- 7 Message
- 8 Units
- 9 Cap at empty Cal
- 10 Cap at full Cal
- 11 4 mA Set Point
- 12 20 mA Set Point
- 13 Damping
- 14 Fault State
- 15 Date/Time/Initials
- 16 Final Asmbly Num
- 17 Universal Rev
- 18 Fld Dev Rev
- 19 Software Rev
- 20 Poll Address
- 21 Num Req Preams
- 22 Firmware Version

MAINTENANCE

TROUBLESHOOTING SYSTEM PROBLEMS – LCD version

Symptom	Problem	Solution
LEVEL, % OUTPUT and LOOP values are all inaccurate.	Basic configuration data is questionable.	Check values and recalibrate if necessary (either or both points).
LEVEL readings are repeatable but consistently high or low from actual by a fixed amount.	Configuration data does not accurately match tank height.	Recalibrate if necessary.
LEVEL, % OUTPUT and LOOP values fluctuate.	Turbulence.	Increase the Damping factor until the readings stabilize.
LOOP value jittery, usually in tenths or hundredths digit.	Factory settings corrupted.	Check # of Ticks. If the number is also jittery, consult the Factory.
HART device only: handheld will only read Universal Commands.	Most current Device Descriptors (DDs) are not installed in handheld.	Contact local HART service center for the latest DDs.
HART device only; reads Product information (e.g., Mfgs. ID, Device #, Serial #, etc.) but will not read any process variables.	Early HART software does not account for Mfgs. ID #'s greater than 63. Magnetrol's ID is 86.	Contact manufacturer of your HART master software for upgrade. This is a shortcoming of early HART master software.

ERROR MESSAGES – LCD version

Symptom	Problem	Solution
OSC FAIL (HART error code = 0x40)	malfunctioning analog board and/or 32 pin connector (electronic module) between electronics and probe.	Check connection between electronics and probe or replace electronic module.
CORRUPT PARAMTRS (HART error code = 0x10)	Configuration parameters may have been lost.	Check all configuration parameters and recalibrate if required.
805 FAULT (Open)	Probe disconnected.	Check white probe wire (see page 2) and electronic module.
805 FAULT (Shorted)	Probe shorted.	Check white probe wire (see page 2) and probe insulation.
LEVEL (Uncal)	Unit is not calibrated.	Enter both Low and High calibration points.
ABV RNG (Above range)	Measured capacitance is higher than 12,000 pF.	Consult factory.
SFWR ERROR (Software error)	Software error.	Consult factory.

REPLACEMENT PARTS

Partn°: 8 0 5 – 5 _ _ _ – _ _ _

Serial n°: _ _ _ _ _ _ – _ _ – _ _ _

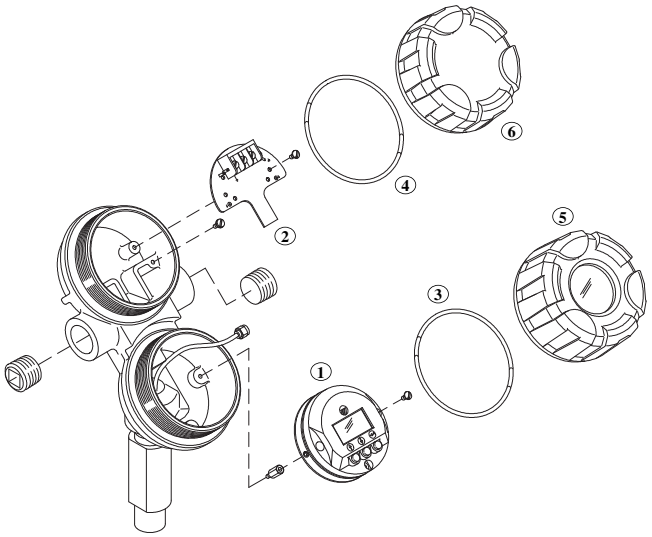
Digit in partn°: X 1 2 3 – 4 5 6 7 – 8 9 10

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

X = product with a specific customer requirement

EXPEDITE SHIP PLAN (ESP)

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



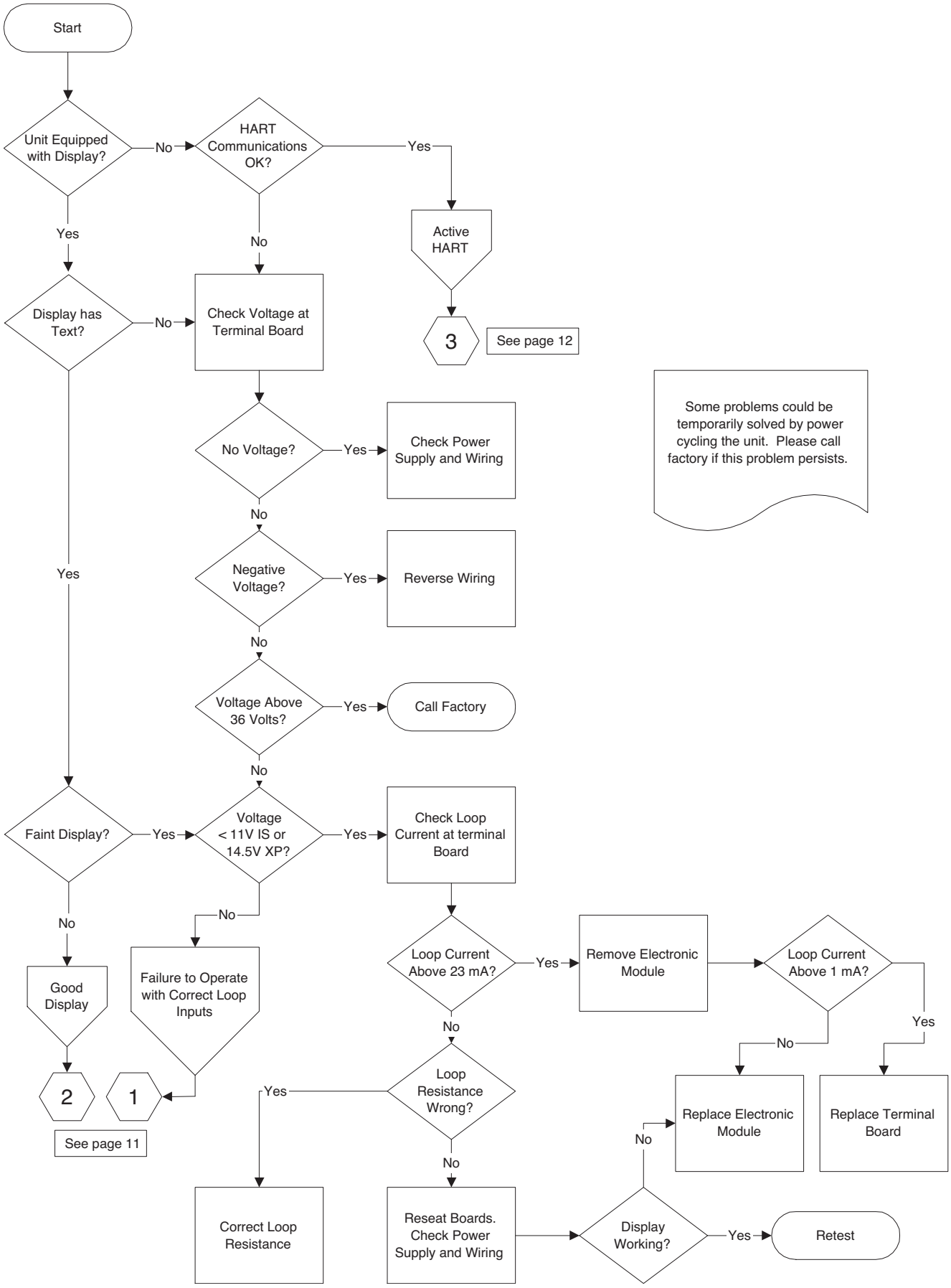
(1) Electronic module		
Digit 5	**Digit 6**	**Replacement part**
0	1	031-2809-003
	2	031-2809-023
	3	031-2809-033
	4	031-2809-043
1	0	031-2809-002
	1	031-2809-001
	2	031-2809-021
	3	031-2809-031
	4	031-2809-041

	Replacement part
(2) Wiring PC board	Z30-9106-003
(3) "O"-ring	012-2201-237
(4) "O"-ring	012-2201-237

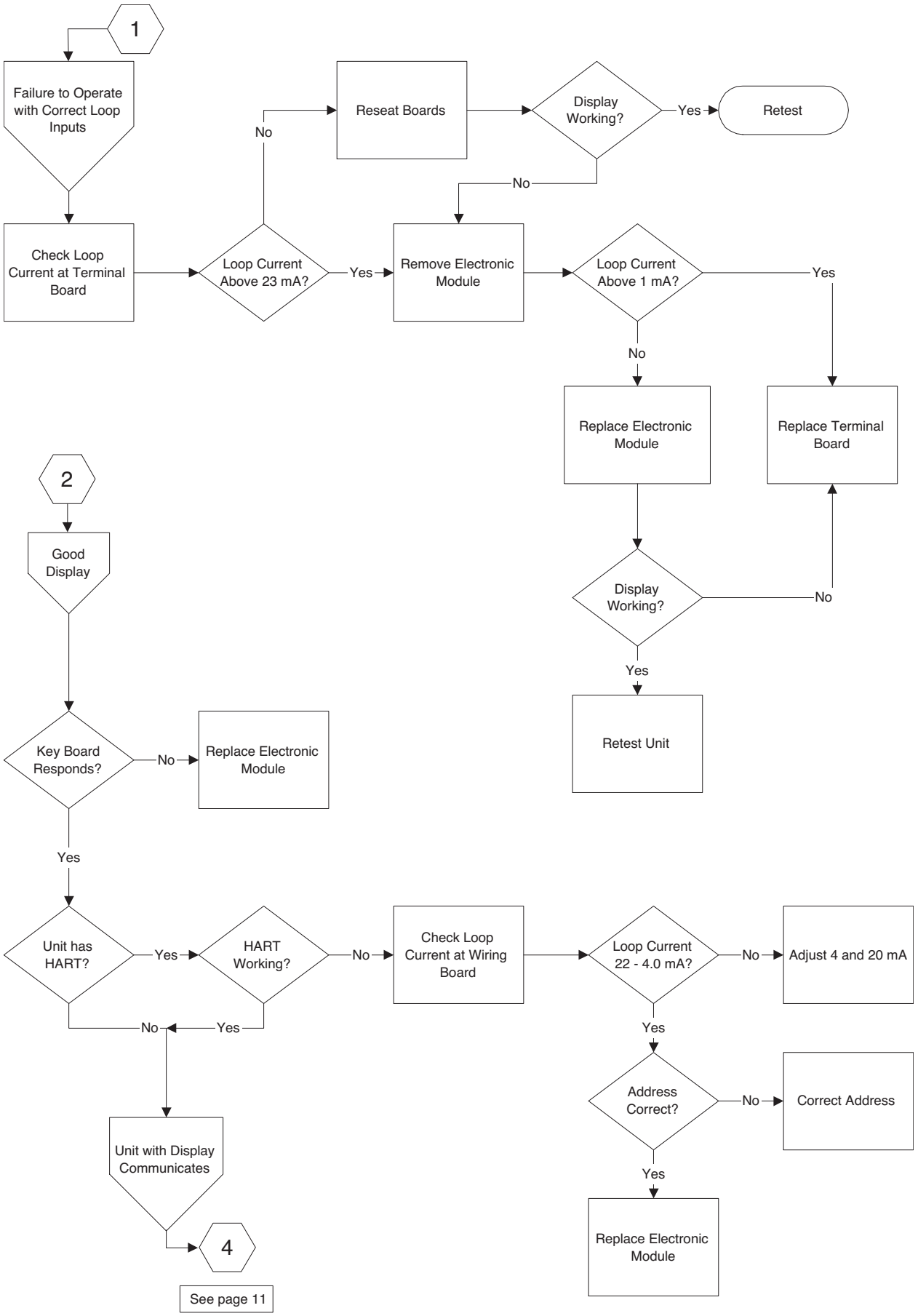
(5) Housing cover		
Digit 7	**Digit 9**	**Replacement part**
0	1	004-9225-002
	2	004-9225-003
A	1	036-4413-005
	2	036-4413-002

(6) Housing cover	
Digit 9	**Replacement part**
1	004-9225-002
2	004-9225-003

TROUBLESHOOTING FLOWCHART (LCD version)

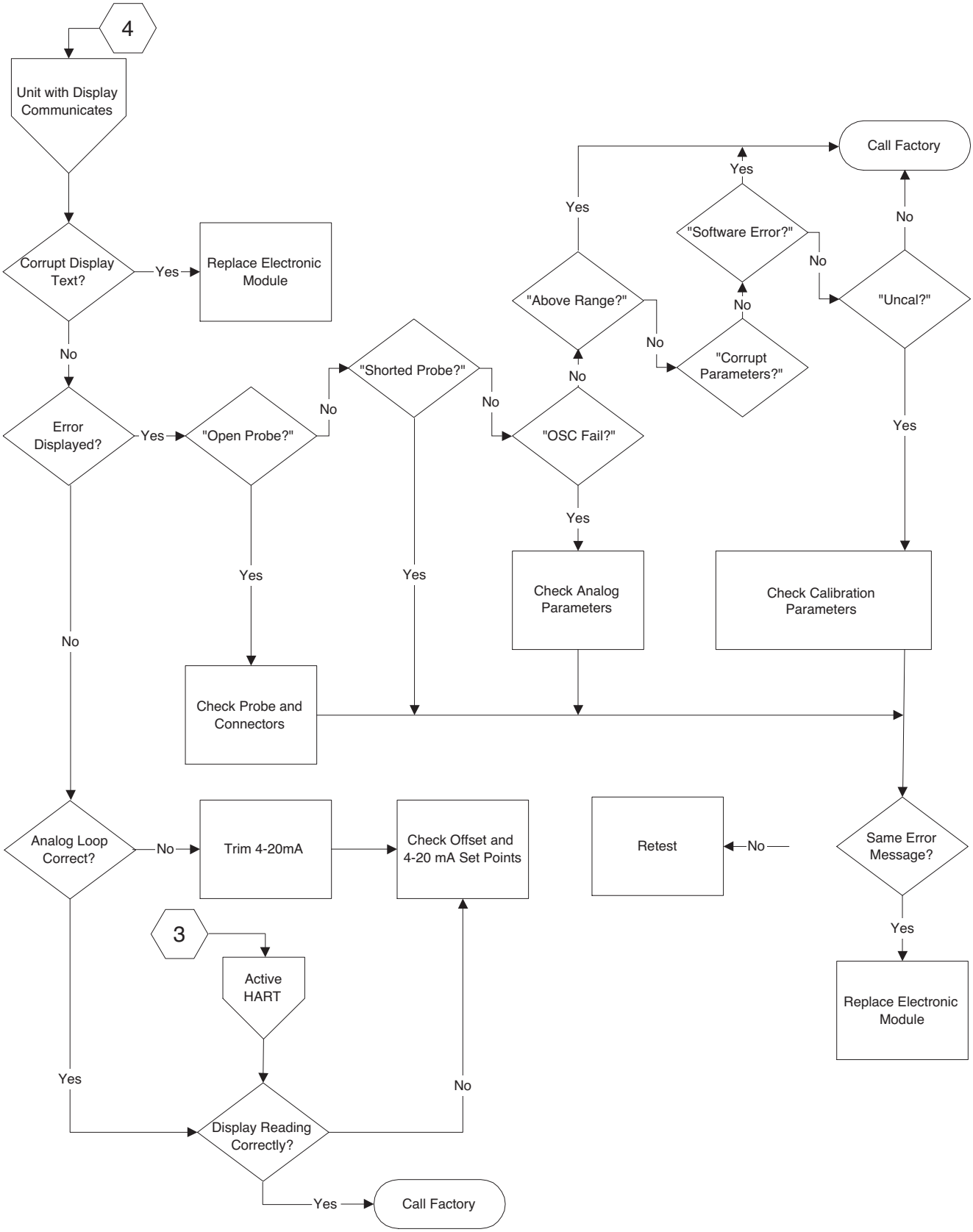


TROUBLESHOOTING FLOWCHART (LCD version)



See page 11

TROUBLESHOOTING FLOWCHART (LCD version)



TRANSMITTER SPECIFICATIONS

FUNCTIONAL/PHYSICAL

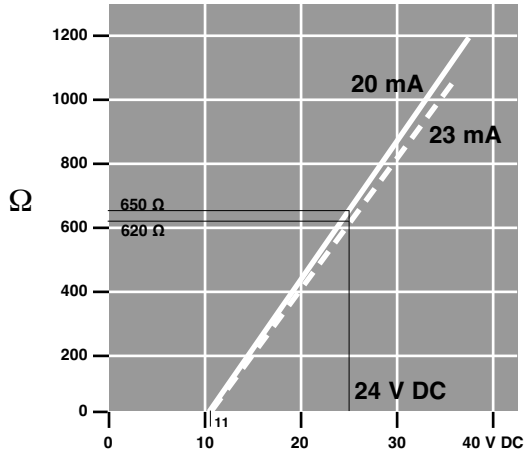
Description	*Specification*
Power (at terminals)	General Purpose: 11 to 36 V DC ATEX Intrinsically Safe: 11 to 28.6 V DC
Output	4-20 mA or 4-20 mA with HART® 3.8 to 20.5 mA useable (meets NAMUR NE 43)
Span	minimum 5 pF - maximum 10.000 pF
Zero and Range	0 mm to 45 m (0' to 150')
Resolution	Analog: 0.01 mA Digital display: 0,1 cm (0.1")
Loop Resistance	ATEX Intrinsically Safe/General Purpose: 650 Ω @ 24 V DC
Damping	Adjustable 1-45 s
Diagnostic Alarm	Adjustable 3.6 mA, 22 mA, HOLD (3.6 mA is not valid if unit includes HART®)
Digital Communication (HART®)	Version 5.x
User Interface	3-button keypad and/or HART communicator
Display	2-line x 8-character LCD
Approvals	ATEX II 1 G EEx ia IIC T4 (ambient temperature: -40 °C up to +80 °C) ATEX II 1 G EEx ia IIC T6 (ambient temperature: -40 °C up to +40 °C)
Electrical Data	Ui = 28,6 V, Ii = 140 mA, Pi = 1 W
Equivalent Data	Ci = 2,2 nF; Li = 0,037 mH
Menu Language	English/Spanish/French or German
Housing Material	Aluminium A356T6 (< 0.25% copper) or 316 SST (1.4401) / IP 66
Net and Gross Weight	2.70 kg net; 3.20 kg gross
Overall Dimensions	H 214 mm (8.43") x W 111 mm (4.38") x D 188 mm (7.40")

PROCESS CONDITIONS

Description	*Specification*
Maximum Process Temperature	540 °C @ 35 bar (1000 °F @ 500 PSIG) - depending probe selection
Maximum Process Pressure	345 bar @ 40 °C (5000 PSIG @ 100 °F) - depending probe selection
Ambient temperature electronics	-40 °C to +80 °C (-40 °F to +175 °F) Display not readable below -20 °C (-5 °F)
Storage temperature	-40 °C to +80 °C (-40 °F to +175 °F)
Humidity	0-99 %, non-condensing
Electromagnetic Compatibility	Meets CE requirements (EN 61326: 1997 + A1 + A2) and NAMUR NE 21

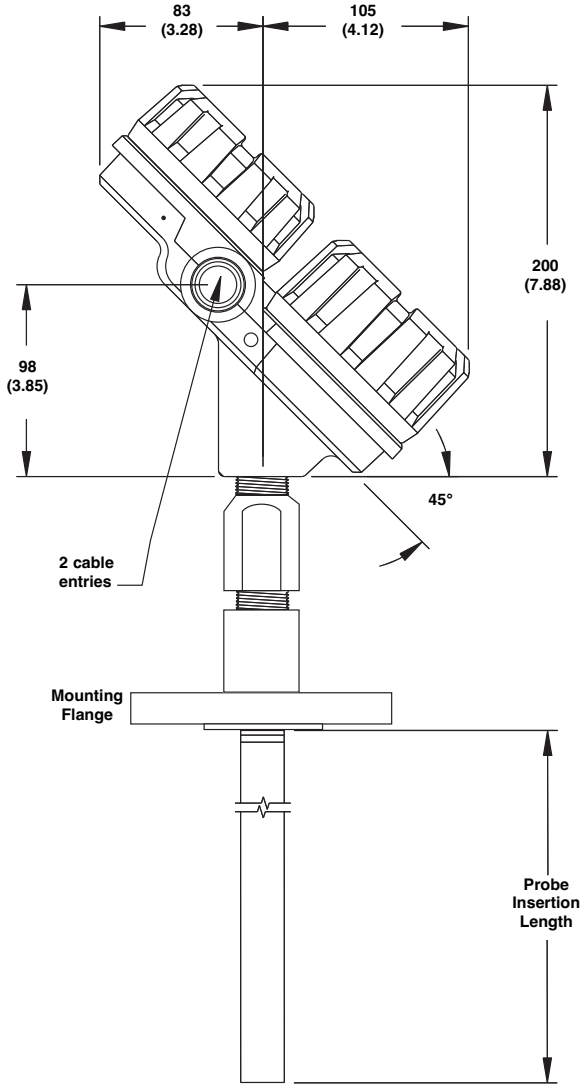
PERFORMANCE

Description	*Specification*
Reference conditions	20 °C (70 °F)
Accuracy	+/- 0.5% of span or 2.5 mm whichever is greater
Resolution	0.1 pF
Repeatability	+/- 0.1% of span
Linearity	+/- 0.25% of span
Response time	less than 1 s (adjustable via damping)
Ambient temperature effect	approximately +0.03% per °C
Warm up time	less than 5 s

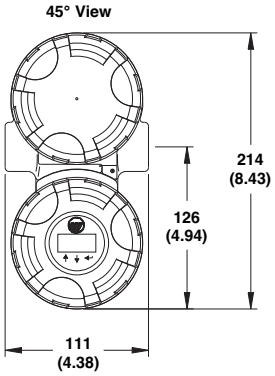


OUTPUT TABLE

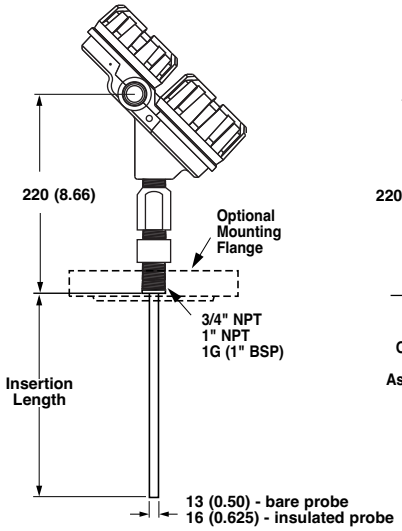
DIMENSIONS in mm (inches)



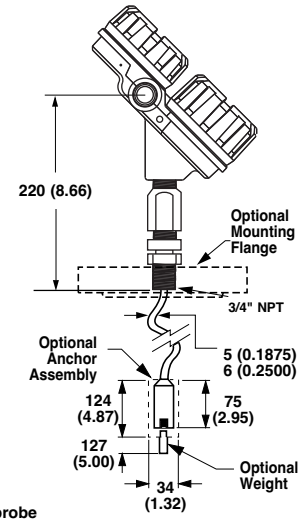
Kotron 805 Housing
side view



Kotron 805 Housing
front View

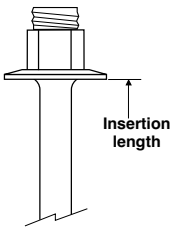


Rigid probe

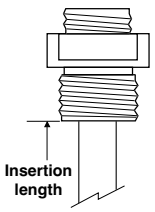


Flexible probe

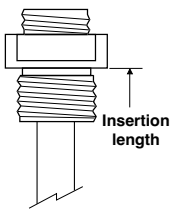
CONNECTIONS



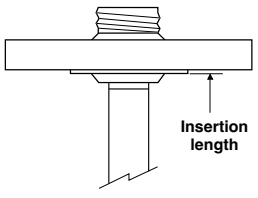
Tri-Clamp®



Threaded
NPT



Threaded
BSP



Welded flange ANSI / EN (DIN)

IDENTIFICATION

A complete measuring system consists of:

1. Kotron 805 transmitter head/electronics.
2. KOTRON® Probe; a full range of rigid and flexible probes for conductive and non-conductive media is available (see bulletin BE 50-125).
   Rigid probes: from 150 mm (6") to 6000 mm (20') insertion length.
   Flexible probes: from 1 m (3,28') to 45 m (150') insertion length.

1. Code for KOTRON® 805 transmitter head/electronics

BASIC MODEL NUMBER

8 0 5	KOTRON® 805 transmitter

POWER

5	24 V DC, two wire loop powered

SIGNAL OUTPUT

0	4 - 20 mA analog output
1	4 - 20 mA analog output with HART® communication

MENU LANGUAGE

0	None, for use with blind transmitter (requires HART® communication)
1	English for use with transmitter with LCD display and keypad
2	Spanish for use with transmitter with LCD display and keypad
3	French for use with transmitter with LCD display and keypad
4	German for use with transmitter with LCD display and keypad

ACCESSORIES

0	Blind transmitter (no display/keypad) - requires HART® communication
A	Digital display and keypad

APPROVAL

1	Weatherproof
A	Intrinsically safe, ATEX II 1G EEx ia II C T6

HOUSING

1	Cast aluminium, dual compartiment housing – IP 66
2	Stainless steel, dual compartiment housing – IP 66

CABLE ENTRY

0	3/4" NPT (2 entries - one plugged)
1	M20 x 1.5 (2 entries - one plugged)

[ ]	8	0	5	–	5				–			

complete code for KOTRON® 805 transmitter head/electronics

→ X = product with a specific customer requirement

Notes

IMPORTANT

SERVICE POLICY

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

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

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

RETURNED MATERIAL PROCEDURE

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

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

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

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Magnetrol®

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