

DM700/I LOOP POWERED DIGITAL INDICATOR

Designed, manufactured and supported by:



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1.0 DESCRIPTION

The DM700/I is a loop-powered process indicator with a 4-digit 7-segment red LED display. The DM700/I accepts a (4 to 20) mA input signal and displays the associated process variable.

The instrument configuration settings are selectable via a simple to use menu system, which is navigated by the use of three push-button keys located on the rear of the display. This is described over the page in detail.

The entire assembly is sealed into a cap that fits directly onto the SCH4 (plastic) or SCH15 (stainless steel) series of connecting heads. Please refer to the SCH4 and SCH15 datasheet for further information.

ATEX approved version DM700XI is also available for hazardous area use. This unit has the same configuration features, but configuration must only be performed in the safe area.

2.0 RECEIVING AND UNPACKING

Please inspect the packaging and instrument thoroughly for any signs of transit damage. If the instrument has been damaged, please notify your supplier immediately.

3.0 SPECIFICATION @ 20 °C

DM700/I DM700XI	
Input	(4 to 20) mA [Operated (3.8 to 21mA)]
Max input Current	90 mA for 1 minute
Accuracy	± 0.02 % of FSD
Max display range	-1999 to 9999
Stability	Zero 0.002% / °C Span 0.01 % / °C
Overrange	Less than 3.8 mA or greater than 21 mA
Default Range	0.0 to 100.0
Decimal Point	Programmable
Loop Voltage Drop	Less than 4 V @ 20 mA
Display	4 digit 7.6 mm Red LED
Connection	Two way screw terminal block
Ambient Temperature	(-20 to 75) °C, Storage (-50 to 85) °C
ATEX	DM700XI version ATEX II 1G EEx ia IIC T4-T5
EMC	Tested to BS EN 61326
Hart Transparent	Yes
Mechanical	Low profile SCH4 Head ABS, IP67 rating when used with SCH4 base unit Or SCH15 stainless steel base unit.

4.0 INSTALLATION AND WIRING

!!!! IMPORTANT

- The maximum current rating for this device 90 mA for 1 minute. Exceeding this value will destroy the device. Fuse protection of the current loop to which this device is connected is highly recommended.

- This unit must only be series connected into a (4 to 20) mA current loop.
- Ensure the instrument is installed with adequate protection against the environment. IP67 rating must be maintained.
- Try to avoid installing the equipment close to sources of extreme temperature and electrical or electromagnetic interference.

! DM700XI version please read and understand section 7 of this instruction sheet prior to any installation.

4.1 Configuration

Important DM700XI version configuration must only be performed in the safe area prior to installation.

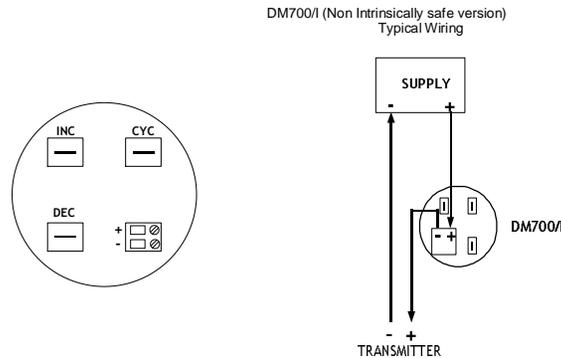
Connect the device to a (4 to 20) mA loop, set at any value between 4 and 20 mA. To configure the device follow the simple configuration menus printed on the reverse side of this sheet. Fit the correct units legend to the front panel face.

4.2 Enclosure

The equipment must be housed in either the SCH4 series of enclosures (DM700X/I only) or any metal enclosure offering protection to IP67. The enclosure must be suitable for the atmosphere and environment in which it is installed.

Please refer to the SCH4 data sheet for further details.
All external cabling/sensor entries must maintain IP67 rating.

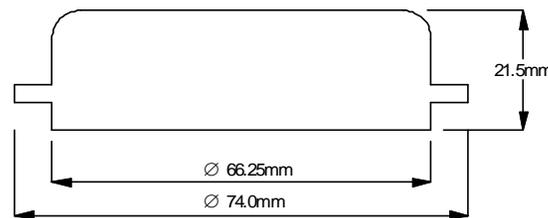
4.3 Wiring and switch location (viewed looking at connector)



5.0 MAINTENANCE

Apart from configuration this equipment requires no user maintenance. If re-calibration is required please contact your supplier for further information. Any cleaning of the instrument should be carried out using a mild detergent and a soft cloth. No solvents or abrasive cleaner should be used.

6.0 MECHANICAL DETAIL



7.0 DM700XI VERSION - FOR USE IN POTENTIALLY EXPLOSIVE ATMOSPHERES.

7.1 ATEX Certificate

The DM700XI has been issued with an EC-type examination certificate, confirming compliance with the European ATEX directive 94/9/EC for Intrinsic Safety. The unit bears the Community Mark and subject to local codes of practice, may be installed in any of the European Economic Area (EEA) members countries. The equipment must be installed and maintained in accordance with local requirements for electrical equipment for use in potentially explosive atmospheres, eg EN60079-14 & EN60079-17. This instruction sheet describes installation which conforms with BSEN60079-14 & BS EN60079-17. When designing systems outside the UK, the local code of practice should be consulted.

7.2 ATEX Mark

The DM700XI product labels carry the following information.

Front Panel Label Manufacturer Type	Status instruments Ltd DM700XI
CE mark	Explosive protection mark
Approval	II 1G EEx 1a IIC T4 (Tamb = -20°C to +75) °C T5 (Tamb = -20°C to +40) °C
Certification reference	TRL05ATEX21087X Ui = 30V , Ii = 100 mA , Pi = 0.75W , Ci = 0 , Li = 0
Internal Label Serial Number (includes date code) Range Country of manufacture	Made in UK

7.3 Special conditions for safe use

As indicated by the Certificate reference "X" suffix, special conditions apply for safe use. They are as follows:-

When connected to an approved system the DM700XI may be installed in:-
 Zone 0 explosive gas air mixture continuously present
 Zone 1 explosive gas air mixture likely to occur in normal use
 Zone 2 explosive gas air mixture not likely to occur and if it does, it will only occur for a short time.

Be used in gas groups :-

Group A	propane
Group B	ethylene
Group C	hydrogen

Allowable temperature class

T4	(Tamb = -20 °C to +75 °C)
T5	(Tamb = -20 °C to +40 °C)

Environmental protection

The equipment must be housed in either the SCH4 series of enclosure or any metal enclosure offering protection to IP67. The enclosure must be suitable for the atmosphere and environment in which it is installed.

Maintenance

The DM700XI must not be configured in the hazardous area, only in the safe area. The DM700XI contains no user serviceable, adjustable or replacement parts. No attempt should be made to repair the unit. All units must be returned to the manufacturer for repair or replacement. Attempted repair or service may invalidate the explosive protection features of the equipment.

A warning label must be attached next to this equipment, stating:-

Warning Electrostatic Hazard. Do not charge by rubbing or cleaning with solvents.

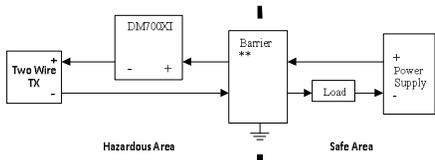
7.4 Connection

The intrinsically safe output parameters of the (4 to 20) mA loop (which is defined by the Zener barrier or galvanic isolator used) supplying the DM700XI must be less than:

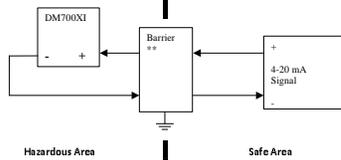
Uo	=	30V dc
Io	=	100mA
Po	=	750 mW

The DM700XI requires an additional 4 volts from the loop to operate correctly.

DM700XI connected in a two wire transmitter loop.



DM700XI used to indicate a signal from the safe area in the hazardous area.



**** Two channel barrier shown. If the (4 to 20) mA loop can be earthed at the barrier minus terminal then a single channel barrier may be used.**

8.0 Configuration Menu

The prime function of the DM700/I device is to sink a (4 to 20) mA current input and display the associated process variable (PV) in units such as mbar, °C or gallons/minute.

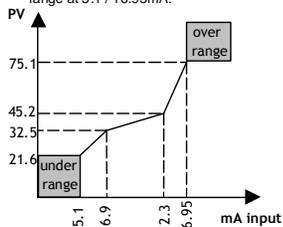
The section overleaf describes the menus accessible on the DM700/I. By accessing these menus, the user can modify the instrument configuration in many ways. The following section refers to the configuration menu to describe how to configure the input scaling.

The instrument needs to know at least 2 co-ordinate pairs to define the relationship between mA input and displayed PV. The default method is to have scal (scaling) set to STND (standard). This allows the user to edit the ENLO (engineering low) and ENHI (engineering high) PV values that correspond to 4 mA and 20 mA input values, respectively. The default values for ENLO and ENHI are 0 & 100, respectively, giving a linear display range of 0 to 100 for (4 to 20) mA input.

Alternatively, the user may not know the exact PV values at 4 & 20 mA. You can choose AUTO scaling to solve this problem. This allows the user to edit ENLO and ENHI PV values that correspond to LO mA and HI mA input values, respectively. When the user accesses the ScLO (scale low) menu entry, the display flashes iPLO (input low) to prompt the user to apply the LO mA value. Once the correct input signal is present and stable, the user should press ENT to store. The user is then prompted to apply the HI mA value (in SChI / iPHI).

The user can choose LIn (linearisation type) to be NONE, S9RT, RT32, RT52 or USER.

- NONE is the default, and sets a straight linear relationship between mA input and PV. The input will go under / over-range at 3.8 / 21.5mA.
- S9RT (square root), RT32 (root 3/2) and RT52 (root 5/2) set a $X^{1/2}$, $X^{3/2}$, or $X^{5/2}$ relationship, intended for flow applications where, for example, the flow is proportional to the square root of level. The input will go under / over-range at 3.8 / 21.5mA.
- USER allows user-defined linearisation using up to 20 co-ordinate pairs. For example, if the user wanted to apply a 3-segment set of interpolated co-ordinate points as shown below, you would select LIn = USER, then set SEGS = 3. The user would then set the mA interpolation points as in1, in2, in3, in4 = 5.1, 6.9, 12.3, 16.95. The corresponding PV interpolation points would be set as out1, out2, out3, out4 = 21.6, 32.5, 45.2, 75.1. The input would then go under / over-range at 5.1 / 16.95mA.



Once the input has been scaled using any of these methods, the user can choose to apply a constant offset to the PV, using the OFST setting. The user can also select the display resolution using the DecP setting. A menu access passcode can be set using the PASS setting. The menu timeout period can be changed using the TOUT setting.

There are three buttons, which the operator must press in various combinations in order to configure and/or calibrate the device. These buttons are located on the underside of the indicator's circuit board. Viewed from the front, the three buttons (CYCLE, INCRement and DECrem) are shown in black and located as shown in the diagram to the left. Pressing 2 buttons simultaneously causes ENTER or ESCape actions.

Run-time

If no buttons are pressed for a minute or more, the device assumes run-time mode. The LCD shows the temperature (if the input is in range) or shows `-----` or `-----` to indicate over/under range. In order to access menu configuration mode, the user must press ENTER followed immediately by CYCLE. In order to exit the menu and return to run-time, a user must press ESCAPE.

When cycling around the menu, the title (e.g. t.type, UNIT, etc.) is displayed for some time. To edit the chosen parameter, the user should press INCRement or DECrem.

Legend:

- INCRement menu entry
- DECrem menu entry
- ENTER to confirm entry, or:
- CYCLE to reject and move on

Menu Structure:

L in	scal	enl o	enhi	sl o	shi	segs	in1	out 1	in2	out 2	of st	decp	pass	t out
none	st nd	88.88	88.88	ipl o	iphi	2	88.88	88.88	88.88	88.88	88.88	8888.	88.88	60s
s9rt	auto					3						8888	88.88	hour
rt32						etc						8888		
rt52						8						8888		
user						9						8888		

Notes for menu items:

- scal:** Choose St nd (standard), where electrical hi/lo values are (4 to 20) mA or AUTO (where electrical hi/lo scaling is given by ScLO & SChI)
- enl o / enhi:** Low/high values for PV scaling. Only shown if USER linearisation type is NOT selected.
- sl o / shi:** Apply low/high scale electrical input, i.e. the electrical low/high values which correspond to the ENLO / ENH values entered. Only shown if AUTO scaling selected.
- segs:** Choose number of interpolated segments (SEGS) for user-linearisation. Then enter co-ordinate pair values which are to be interpolated. INK values correspond to the electrical input. CLX values correspond to the displayed PV. Only shown if USER linearisation type selected.
- of st:** The PV is offset by the number entered here.
- decp:** Choose the position of the decimal point in run-time.
- pass:** If non-zero, the user will be prompted for this number in order to enter the menu from run-time.
- t out:** The device will return to run-time after this time.