

- UNIVERSAL, PULSE OR FLOW MEASUREMENT
- 6 DIGIT DISPLAY
- FRONT PANEL SEALED TO NEMA 4
- ANALOG OUTPUT OPTION
- 1,2,3 OR 4 ALARM OPTION
- RFI PROTECTED METAL CASE
- SERIAL COMMUNICATIONS
- RATE OR TOTAL DISPLAYS
- 5 YEAR WARRANTY



SMART INDICATOR DM4000 Series

DESCRIPTION

The DM4000 is a highly accurate digital process indicator, available in three versions :-

- DM4000U** accepts common industrial sensors.
- DM4000C** accepts various types of pulse input to provide RATE and TOTAL functions.
- DM4000A** is a dedicated Flow Computer accepting analog inputs and providing RATE and TOTAL functions.

A wide range of options are available enabling the DM4000 to be used in a variety of applications. Two output slots are provided, each of which can accept either a single or dual alarm relay output, an isolated 4-20mA output card or a bridge excitation card. A dedicated communications slot is also provided which can accept an RS485 serial digital communications card.

The sensor type and range are user configurable, either from the front panel or via the optional serial communications port. All ranges are fully calibrated which means the user can change quickly and easily from one sensor type to another. The analog outputs can be any part of the incoming range allowing the DM4000 to be used as a 'smart' sensor transmitter.

The NEMA 4 sealed front panel protects the DM4000 against environmental conditions such as water and dust.

Reduced stock holding due to the versatility of the DM4000 combined with its exceptional accuracy and stability and 5 year warranty, provides for a 'low cost of ownership'.

APPLICATIONS

- Process monitoring
- Strain gage measurement
- Flow measurement
- Alarm monitoring
- Data logging
- Batch controlling
- Speed measurement
- Data Acquisition

GENERAL FEATURES

Displays – When used as an analog or frequency indicator, 5 digit resolution is provided. The Totalizer has 12 digit resolution displayed in two 6 digit displays. Display update rate is 3.3 Hz.

Programming – All parameters can be entered from 3 keys on the front panel or via the optional communications port. Programming is done by pressing combinations of the three sealed front panel keypads through a series of menus which are displayed on the 6 digit display in helpful mnemonics. Lack of keypad use returns the instrument to the run mode. The keys are used individually to review setpoints and clear latched alarms.

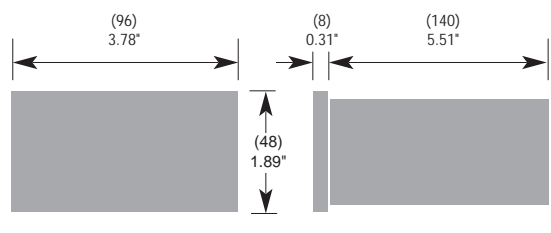
Communications – RS485 communications are optional. By using an RS485/232 converter unit, up to 99 DM4000s may be connected to a host computer to allow access to all configuration and process variable information. In addition, the Remote Configuration Package (RCP4000) is available which allows rapid configuration via a PC. Although 99 DM4000s can be interfaced on the network RS485 requires additional buffering for more than 32 units.

Front Panel – The front panel membrane is sealed to NEMA 4. User replaceable legends and identifying tags are protected by the membrane.

Filter – The input has a programmable 'Smart' digital filter which can be used to smooth out noisy signals.

Self testing – Background self testing is continuous and an internal watchdog monitors the correct operation of the internal microprocessor.

MECHANICAL DETAILS Weight approx. 1.2lb (.52Kg)



Dimensions: Panel cut out 3.62 x 1.73 inches (92 x 44 mm)



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BS EN ISO 9001:1994
 Certificate No. Q06257

DM4000 SMART INDICATOR

OUTPUTS

Two output slots are provided which can accept a variety of output option cards.

- 1,2,3 or 4 alarm relays/pulse outputs
- 4-20 mA isolated analog outputs
- Programmable excitation voltage

ALARM Status is indicated by individual discreet LED displays for each channel. All alarms can be: High, Low or Deviation and have programmable hysteresis. They can be set to fail safe high or low and can be latching or non-latching. The analog output can be any part of the input range.

In the DM4000A and C versions the relay output can be programmed to give a 100ms output at decade intervals from the TOTAL display.

eg. every 10 GAL or 100 GAL etc.

OPTIONS SPECIFICATIONS @ 68°F

OPTION 01	Single Relay Output Card
Relay	Single programmable alarm relay. Normally open and normally closed output available.
Rating	8 Amp @ 240V
Isolation	500V with respect to inputs*
OPTION 02	Dual Relay Output Card
Relay	Two independently programmable alarms sharing the same common
Rating	8 Amp @ 240V
Isolation	500V with respect to inputs*
OPTION 03	Current Output
	The output can be driven by either an internal or external power source
Accuracy	<0.1%FS
Resolution	<0.01%FS
Power	Internal supply will drive into 700 Ohm External loop voltage 10-30V DC
Isolation	500V with respect to inputs*
Response	<100ms for 63% change
Output	Minimum 0mA Maximum 22mA
OPTION 04	Bridge Excitation (Strain Gage)
	This provides either a programmable 2 to 20V output or a fixed 24V stable output
Range	2 to 24V DC
Accuracy	<0.1% FS
Isolation	500V with respect to inputs*
Stability	<56 ppm/°F
Output	50mA max (less current consumed by other output slot)
Ripple	<0.05%FS @ 50 mA
NOTES*	Isolation is supplied between inputs, outputs and communication slots but not between two analog output slots.

ENVIRONMENTAL SPECIFICATION

Ambient temp.range	32°F to 122°F
Relative Humidity	5-95% RH non-condensing
Isolation	Inputs fully isolated 500V
Power Supply	120V AC 50/60 Hz 240V AC 50/60 Hz 24V AC 50/60 Hz fully isolated to 1.5 KV

DM4000 OPTION U

UNIVERSAL

The DM4000U is a universal digital indicator which can be configured from the front panel to take all common industrial sensors without the need to change option boards or move jumpers. There are two output slots which can accept any of the optional output boards.

DM4000U SPECIFICATIONS @ 68°F

Sensor	± Accuracy ¹	Resolution ²	Nominal Range
Temperature			
K t/c	2°F	0.1°F	-454°F to 2192°F
J t/c	2°F	0.1°F	-346°F to 1400°F
T t/c	2°F	0.1°F	-454°F to 752°F
R t/c	4°F	0.5°F	+32°F to 3182°F
S t/c	4°F	0.5°F	+32°F to 3182°F
E t/c	2°F	0.5°F	+32°F to 1202°F
F t/c	2°F	0.5°F	+32°F to 1112°F
N t/c	2°F	0.5°F	+32°F to 2372°F
B t/c	4°F	0.5°F	+1832°F to 3272°F
Cold Junction	1°F	0.1°F	+32°F to 122°F
Pt100	0.2°F±0.1%rdg	0.02°F	-328°F to 1472°F
Voltage			
10 volts	0.02%FS	0.004%	±10V
1-5 volts	0.04%FS	0.008%	1V to +5V
1 volt	0.02%FS	0.004%	±1V
100mV	0.02%FS	0.004%	±0.1V
Current			
4-20mA	0.1%FS	0.004%	4 to 20mA
0-20mA	0.1%FS	0.004%	0 to 20mA
0-10mA	0.2%FS	0.008%	0 to 10 mA

A/D conversion rate is 10 per second.

*1 Accuracy includes linearization and cold junction tracking errors for a 50°F to 104°F ambient temperature for thermocouple inputs.

*2 Resolutions shown are theoretical maximums, however, resolution is programmable as is the position of the decimal point for engineering ranges. A/D resolution is 1 part in 25,000 (approximately 15 Bit plus sign).

USER LINEARIZATION

A user defined linearization table is provided for non-linear functions. In addition, the user can select a square root, power 3/2 or power 5/2 function. All displays are in engineering units. This feature is only available for voltage and current inputs.

FIELD TRANSMITTER SUPPLY

An internal 21V supply to power two wire 4-20mA field transmitters is standard. A programmable excitation supply for transducers is available as an option.

DM4000 OPTION C

PULSE INPUT

The DM4000C accepts all types of pulse input and provides a choice of RATE or TOTAL displays. RATE is in engineering units and TOTAL can have its own scaling. The TOTAL can be reset locally from the front panel or remotely from an external contact and is stored during power down.

The instrument has two individual input channels 'a' and 'b'. Either channel may be designated as the prime frequency input channel or alternatively as the control channel. User selection of channels is determined by the type of input.

Input signal accommodated by the channels are as follows:

Input type	channel
Volt free contact	a, b
TTL Input	b
10mV low level Input	b
NAMUR compatible signals	a
Open collector NPN	b
Open collector PNP	a

Frequency Range

0.03Hz to 50Hz for potential free contacts
0.03Hz to 20KHz for all other input types

Debounce

A 4ms Debounce is available to eliminate edge jitter for frequencies below 50Hz.

Frequency measurement

The incoming frequency is measured by a combination of period measurement and pulse counting. A 100ms window is used for all incoming frequencies above 10Hz. This is called the capture window.

For frequencies below 10Hz the capture window becomes the actual incoming period. The following table illustrates the point.

Frequency	<0.03	0.03 to 10	10 to 20K	20K to 25K
Capture Window	30 sec ⁶	Period ^{1&6}	100ms	
Display ⁵	Lo ²	Frequency Totalise ³	Over ⁴	

*Notes

- 1 Period is actual incoming period
- 2 Lo is engineering low range
- 3 Frequency and Total are scaled in engineering units
- 4 OVER is overrange
- 5 Display refresh rate is always 3.3 Hz
- 6 Capture window is halved when Debounce is selected (Below 50Hz)

Characterization

A 12 point user linearization table is provided as is a selectable 'Cut lo' feature which automatically sets the Rate to engineering low range for frequencies that fall below this programmable value. Relay options may be configured as alarms or pulse output if used in conjunction with total.

FIELD TRANSMITTER SUPPLY

An internal 8V power supply to power field transmitters is standard.

DM4000 OPTION A

FLOW COMPUTER

The DM4000A is a combination of the analog input handling of the DM4000U with the RATE and TOTAL functions of the DM4000C providing a special instrument designed for flow measurement applications.

The input can be either voltage or current and it is normally used in conjunction with a differential pressure sensor and some type of restriction e.g. orifice plate, flume, rectangular or 'V' weirs, to provide a digital representation of flow.

DM4000A SPECIFICATIONS @ 68°F

Sensor	± Accuracy	Resolution	Nominal Range
Voltage			
±10 volts	0.02%FS	0.004%	±10V
1-5 volts	0.04%FS	0.008%	1V to +5V
±1 volt	0.02%FS	0.004%	±1V
±100mV	0.02%FS	0.004%	±0.1V
Current			
4-20mA	0.1%FS	0.004%	4 to 20mA
0-20mA	0.1%FS	0.004%	0 to 20mA
0-10mA	0.2%FS	0.008%	0 to 10 mA

Characterization

Linear
Square Root (Orifice Plate)
Power 3/2 (Rectangular Weir/Flume)
Power 5/2 (45 deg. V Weir)
User: User defined 13 point

Display

Rate: 5 digits
Totalise: 6 digits + 6 overflow

Special feature

Programmable 100ms pulse output (when option 01 or 02 fitted)

The appropriate characterization can be selected from the front panel and the display scaled in linear flow units. In addition, a 13 point user definable characterization is available for the more unusual applications.

The display may be selected to show flow RATE or TOTAL; TOTAL having its own user programmable scaling. When displaying flow RATE, totalizing is performed in the background and pressing a front panel key provides a 'View' facility. If TOTAL is selected as the main display, it is possible to 'View' the instantaneous RATE.

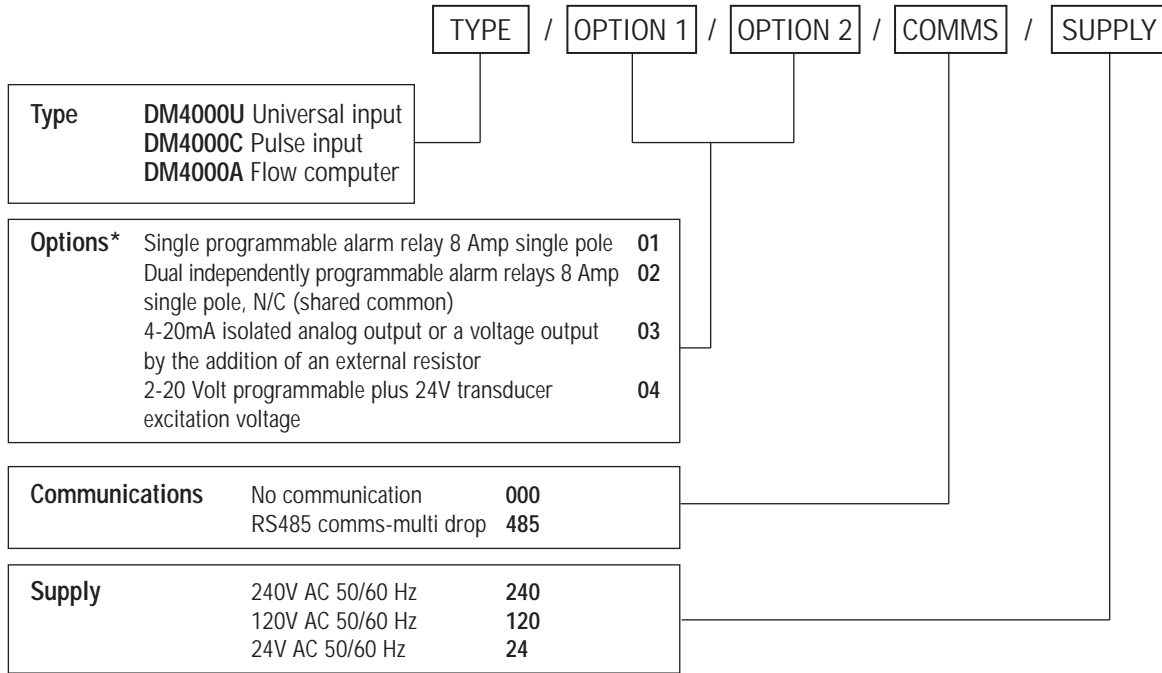
Output options can be dedicated to either RATE or TOTAL and the TOTAL is maintained during power down stored in EEPROM.

In addition, a relay output option can be configured as a pulse output giving a contact closure for 100ms every time there is a change in a particular selectable digit on the TOTAL display, i.e. the contact will close for 100ms say every 100 litres. This provides a low cost means of interfacing with data logging systems or to drive additional secondary counters.

FIELD TRANSMITTER SUPPLY

An internal 21V supply to power two wire 4-20mA field transmitters is standard. A programmable excitation supply for transducers is available as an option.

ORDER CODE



Note* Any combination of option can be installed into the two output slots with the exception that only one transducer excitation card can be used.
Options can be ordered separately by using the code Opt 4000 [] option number.


ACCESSORIES

- ACC 4000-01 Wall mounted enclosure to NEMA 4
- ACC 4000-02 Adaptor for 1/4 to 1/8 DIN
- ACC 4000-03 Spare 3 way connector
- ACC 4000-04 Spare Handbook
- ACC 4000-05 Spare 5 way connector
- ACC 4000-06 Pack of 10 sealing gaskets
- ACC 4000-07 Pack of 10 shunt resistor 250 ohm 0.1%
- ACC 4000-08 Pack of 10 shunt resistor 50 ohm 0.1%
- RS 232/485 Convertor Kit

CONFIGURATION

A configuration service is offered for DM4000 series.
The DM4000U is normally supplied configured for 4-20 mA input scaled 0-100.0. The configuration may be easily changed by the user but can be configured at the factory for a small extra charge.

LOCAL REPRESENTATION



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