

# SMART INDICATOR

## DM4000 SERIES

- > UNIVERSAL INPUT
- > RATE AND TOTALISE FUNCTIONS
- > FLOW COMPUTER OPTION
- > 4 ALARM OPTION
- > SERIAL COMMUNICATIONS
- > IP65 SEALED FRONT PANEL
- > 2 YEAR WARRANTY



### INTRODUCTION

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 TOTALISE functions.
- **DM4000A** is a dedicated Flow Computer accepting analogue inputs and providing RATE and TOTALISE 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 to 20) mA output card or a bridge excitation card. A dedicated 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 analogue outputs can be any part of the incoming range allowing the DM4000 to be used as a 'Smart' sensor transmitter.

The IP65 sealed front panel protects the DM4000 against environmental conditions such as water and dust. When used with optional gasket.

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'.

### GENERAL FEATURES

#### TYPICAL APPLICATIONS

- Process Monitoring
- Strain Gauge Measurement
- Flow Measurement
- Alarm Monitoring
- Batch Controlling
- Speed measurement

**DISPLAYS** - When used as a Temperature Processor or frequency indicator, 5 digit resolution is provided. The Totaliser has 12 digit resolution displayed in two 6 digit displays. Display update rate is 3.3 Hz.

**PROGRAMMING** - All parameters can be entered 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 or via the optional communications port. Lack of keypad use returns the instrument to the run mode. The keys are used individually to review set points and clear latched alarms.

**COMMUNICATIONS** - RS485 communications are optional and 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. 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 IP65 and protects the user replaceable legends and identifying tags.

**FILTER** - The input has a programmable 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.

# SMART INDICATOR

## DM4000 SMART INDICATOR

### SPECIFICATIONS @ 20 °C

#### 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 to 20) mA isolated analog re-transmission
- Programmable excitation voltage

#### ALARMS

ALARM status is indicated by individual 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 analogue output can be any part of the input range.

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

#### OPTIONS SPECIFICATIONS @ 20 °C

<b>OPTION 01</b>	<b>SINGLE RELAY OUTPUT CARD</b>
Relay	Single programmable alarm relay. Normally open and normally closed output available.
Rating	7 A @ 240 VAC or 30 VDC
Breakdown Isolation	500 V with respect to inputs*
<b>OPTION 02</b>	<b>DUAL RELAY OUTPUT CARD</b>
Relay	Two independently programmable alarms sharing the same common
Rating	7 A @ 240 VAC or 30 VDC
Breakdown Isolation	500 V with respect to inputs*
<b>OPTION 03</b>	<b>CURRENT OUTPUT</b>
	The output can be driven by either an internal or external power source
Accuracy	< 0.1 % FS
Resolution	< 0.01 % FS (>10 % of the input range)
Power	Internal supply will drive into 700 Ω External loop voltage (10 to 30) VDC
Breakdown Isolation	500 V with respect to inputs*
Response	< 100 ms for 63 % change
Output	Minimum 0 mA Maximum 22 mA
<b>OPTION 04</b>	<b>BRIDGE EXCITATION (STRAIN GAUGE)</b>
	This provides either a programmable (2 to 20) V output or a fixed 24 V stable output
Range	(2 to 24) VDC
Accuracy	< 0.1 % FS
Breakdown Isolation	500 V with respect to inputs*
Stability	< 0.05 %/°C
Output	50 mA maximum (less current consumed by other output slot)
Ripple	< 0.05 % FS @ 50 mA

\*NOTE: Isolation is supplied between inputs, outputs and communication slots but not between two analogue output slots.

#### ENVIRONMENTAL SPECIFICATION

Ambient temp.range	(0 to 50) °C
Relative Humidity	(5 to 95) % RH non-condensing
Breakdown Isolation	Inputs fully isolated 500 V
Power Supply	120 VAC (50 to 60) Hz 240 VAC (50 to 60) Hz 24 VAC (50 to 60) Hz fully isolated to 1.5 KV

## DM4000 OPTION U

### SPECIFICATIONS @ 20 °C

#### 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.

Sensor Voltage	±Accuracy	Resolution	Nominal Range °C
<b>K</b> T/C	1 °C	0.1 °C	-270 to 1200
<b>J</b> T/C	1 °C	0.1 °C	-210 to 760
<b>T</b> T/C	1 °C	0.1 °C	-270 to 400
<b>R</b> T/C	2 °C	0.5 °C	0 to 1750
<b>S</b> T/C	2 °C	0.5 °C	0 to 1750
<b>E</b> T/C	1 °C	0.5 °C	0 to 650
<b>F</b> T/C	1 °C	0.5 °C	0 to 600
<b>N</b> T/C	1 °C	0.5 °C	0 to 1300
<b>B</b> T/C	3 °C	0.1 °C	1000 to 1800
Cold Junction	0.5 °C	0.1 °C	0 to 50
<b>Pt100</b>	0.1 °C ± 0.1 % rdg	0.02 °C	-200 to 800
<b>VOLTAGE</b>			
10 V	0.02 % FS	0.004 %	± 10 V
(1 to 5) V	0.04 % FS	0.008 %	(1 to 5) V
1 V	0.02 % FS	0.004 %	± 1 V
100 mV	0.02 % FS	0.004 %	± 0.1 V
<b>CURRENT</b>			
(4 to 20) mA	0.1 % FS	0.004 %	(4 to 20) mA
(0 to 20) mA	0.1 % FS	0.004 %	(0 to 20) mA
(0 to 10) mA	0.2 % FS	0.008 %	(0 to 10) mA

\*NOTES: A/D conversion rate is 10 per second.

1. Accuracy includes linearisation and cold junction tracking errors for a (10 to 40) °C 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 LINEARISATION

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

#### FIELD TRANSMITTER SUPPLY

An internal 19 V supply to power two wire (4 to 20) mA field transmitters is standard. A programmable excitation supply for transducers is available as an option.

# SMART INDICATOR

## 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
10 mV low level Input	b
NAMUR compatible signals	a
Open collector NPN	b
Open collector PNP	a

### FREQUENCY RANGE

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

### DEBOUNCE

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

### FREQUENCY MEASUREMENT

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

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

Frequency	< 0.03	0.03 to 10	(10 to 20) K	(20 to 25) K
Capture Window	30 s*6	Period*1 *6	100 ms	
Display	Lo*2	Frequency Totalise*3	Over*4	

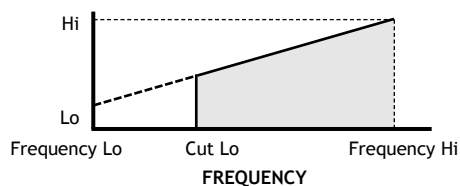
### \*NOTES:

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

### CHARACTERISATION

A 12 point user linearisation table is provided to enable customised input sensor characterisation. A 'cut lo' facility causes the instrument to disregard any input pulse rate that falls below a user programmed frequency. This is useful to prevent the instrument registering any flow at the low end of the sensor range where the flow meter output may be unreliable.

### ENGINEERING RANGE



### FIELD TRANSMITTER SUPPLY

An internal 8 V power supply to power field transmitters is standard. (NAMUR compatible).

## DM4000 OPTION A

### FLOW COMPUTER

The DM4000A is a combination of the analogue 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' weir, to provide a digital representation of flow.

## SPECIFICATIONS @ 20 °C

Sensor Voltage	±Accuracy	Resolution	Nominal Range
10 V	0.02 % FS	0.004 %	± 10 V
(1 to 5) V	0.04 % FS	0.008 %	(1 to 5) V
1 V	0.02 % FS	0.004 %	± 1 V
100 mV	0.02 % FS	0.004 %	± 0.1 V
<b>Current</b>			
(4 to 20) mA	0.1 % FS	0.004 %	(4 to 20) mA
(0 to 20) mA	0.1 % FS	0.004 %	(0 to 20) mA
(0 to 10) mA	0.2 % FS	0.008 %	(0 to 10) mA

Characterisation	Linear Square Root (Orifice Plate) Power <sup>3</sup> / <sub>2</sub> (Rectangular Weir/Flume) Power <sup>5</sup> / <sub>2</sub> (45 deg. V Weir) User: User defined 13 point
Display	Rate: 5 digits Totalise: 6 digits + 6 overflow
Special Feature	Programmable 100 ms pulse output (when Option 01 or 02 fitted)

The appropriate characterisation can be selected from the front panel and the display scaled in linear flow units. In addition, a 13 point user definable characterisation 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, totalising 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 100 ms every time there is a change in a particular selectable digit on the TOTAL display, i.e. the contact will close for 100 ms 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

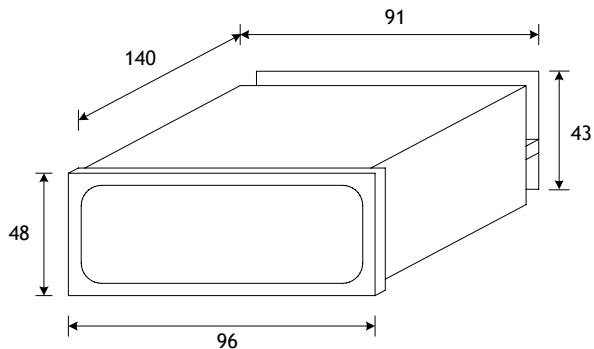
An internal 19 V supply to power two wire (4 to 20) mA field transmitters is standard. A programmable excitation supply for transducers is available as an option.

# SMART INDICATOR

## MECHANICAL DETAILS

(All dimensions in mm)

Weight 0.52 Kg  
Panel cut out (92 x 44) mm



### ORDER CODE

TYPE		OPTION SLOT 1	OPTION SLOT 2	COMMS	SUPPLY
Universal input	DM4000U				
Pulse input	DM4000C				
Flow computer	DM4000A				
Options*					
Single programmable alarm relay 8 A single pole			01		
Dual independently programmable alarm relays 8 A single pole, N/C (shared common)			02		
(0 to 20) mA isolated analogue output or a voltage output by the addition of an external resistor			03		
(2 to 20) V programmable plus 24 V transducer excitation voltage			04		
Communications					
	No communication			000	
	RS485 comms-multi drop			485	
Supply					
	240 VAC (50 to 60) Hz				240
	120 VAC (50 to 60) Hz				120
	24 VAC (50 to 60) Hz				24

#### \*NOTE:

Any combination of option can be installed into the two output slots with the exception that only one transducer excitation card Opt4000/04 can be used. Options can be ordered separately, see below.

#### DM4000 OPTIONS (if ordered separately)

OPT 4000/01	One trip relay 8 A S/P
OPT 4000/02	Two trip relays 8 A S/P N/C common connection
OPT 4000/03	(0 to 20) mA isolated analogue re-transmission
OPT 4000/04	(2 to 20) V programmable with 24 V auxiliary
OPT 4000/024	24 VAC Power supply
OPT 4000/485	Serial Communications RS485

#### DM4000 COMMUNICATIONS

RCP 4000	PC configuration package
----------	--------------------------

#### DM4000 CONFIGURATION

Part Config.	Sensor type and range only
Full Config.	To user specification

#### DM4000 ACCESSORIES

ACC 4000/01	Wall mounted IP65 enclosure
ACC 4000/02	Adaptor for ¼ to ⅛ DIN
ACC 4000/03	Spare 3 way connector
ACC 4000/04A	Spare User Guide Flow
ACC 4000/04C	Spare User Guide Pulse
ACC 4000/04U	Spare User Guide Universal
ACC 4000/05	Spare 5 way connector
ACC 4000/06	Pack of 10 sealing gaskets
ACC 4000/07	Shunt Resistor 250 Ω 0.1 % pack of 10
ACC 4000/08	Shunt Resistor 50 Ω 0.1 % pack of 10
RS 232/485	RS 232/485 Converter kit