Data Sheet

ITT intelligent DPMs

DPM 24/40000 MF RS stock no. 312-325
DPM 48/40000 MF RS stock no. 313-227
DPM 48/40000 MFE1 RS stock no. 313-233
Configuration package RS stock no. 312-331

These units are intelligent multi-function digital panel instruments which incorporate a wide range of sophisticated functions and features.

A wide selection of input ranges covers ac/dc voltage/current sources, as well as linearisation for 10 types of thermocouples and Pt 100 temperature sensors. Inputs can be scaled (both linear and non-linear functions), mathematically combined with values from other similar DPMs and displayed in various formats.

Four alarm channels are included, together with a data-logging memory and comprehensive serial data communications facilities. This permits several DPMs to be cascaded, or connection of a printer, message display, personal computer or PLC. The extended scale range allows input signals with a 40,000 count resolution to be processed and displayed over a range from -19,999 to +99,999 counts.

All options are built-in as standard, and can be configured by the user to provide powerful and flexible solutions for many measurement and control applications. These DPMs can be configured and operated in several ways.

- By use of the front push-button keys
- By a terminal, or PC using the configuration software package, via the serial interface (RS stock no. 312-331)
- By remote control instructions over the serial interface.

Full configuration details and operating instructions are in the Operating Manual supplied with each unit.

A choice of three models covers all requirements:

Model	DPM 24/40000 MF	DPM 48/40000 MF	DPM 48/40000 MFE1
RS stock no.	312-325	313-227	313-233
Bezel size (mm)	24 × 96	48 × 96	48 × 96
Front keys	2	2	4
Display status	-	-	3 legends
Alarm status	-	-	4 legends
Data logging status	-	-	2 legends
Serial interface	RS-232C	RS-232C	RS-232C and RS-485
Analogue output	0.4...20mA	0/4...20mA	0...±20mA
Open collector outputs	2	2	2
Built-in relays	-	-	4
ac measurements	average	average	true RMS
User definable linearisation	-	-	25 point lookup table

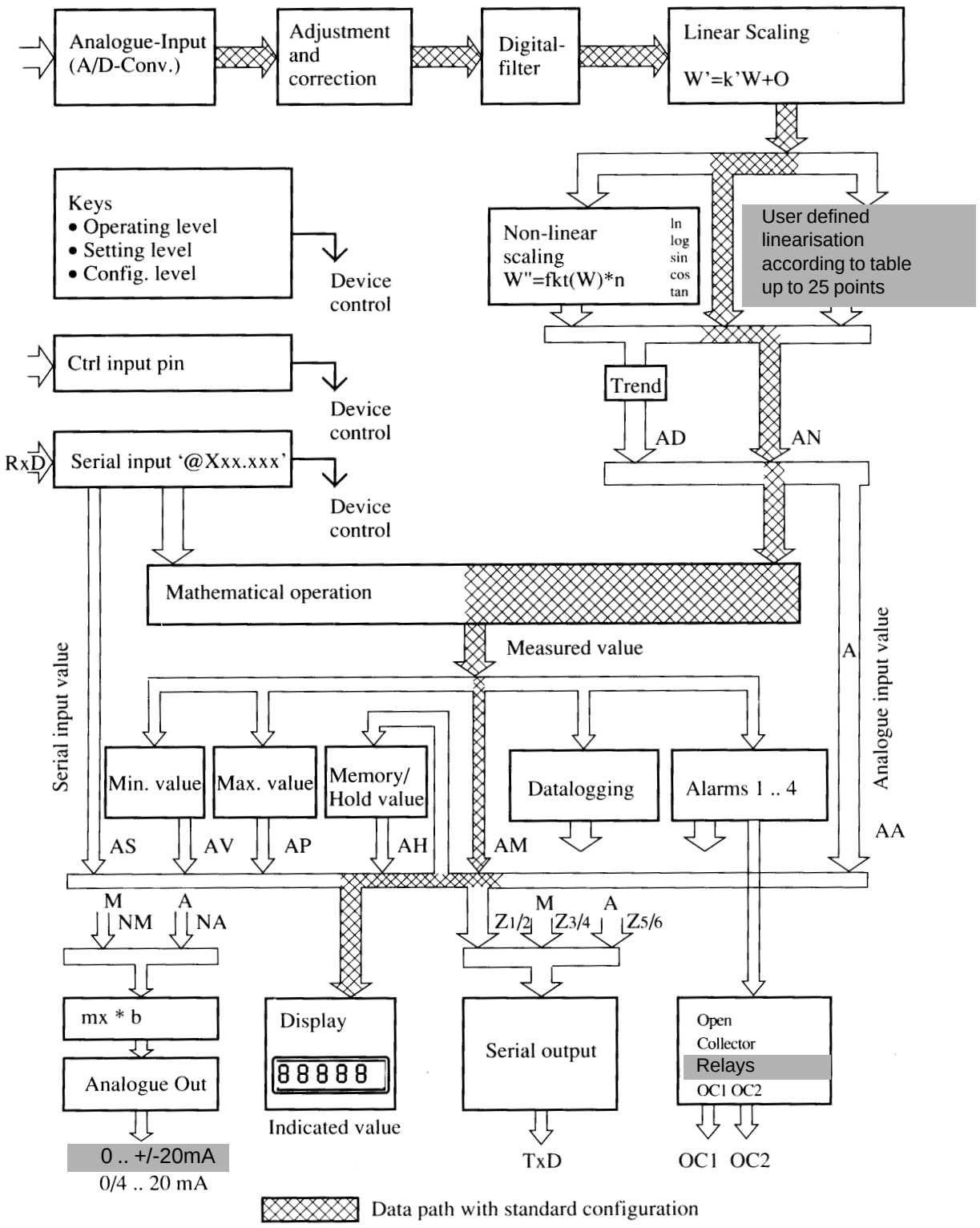
Features of DPM ... MF models

- Easy to configure
- Multi-range input for ac/dc voltages/currents, thermocouples and PT100 sensors
- Linear display scaling and zero offset
- Non-linear display scale functions
- Four alarm channels, two open collector outputs
- Can be combined with two, or more, similar units via serial interface
- Min/Max/Hold memories
- Datalogging timebase and memory
- Serial interface for remote control, output to similar DPMs, printers and computers
- Isolated analogue output for recorders, etc
- Wide range power supply 24 to 48Vdc and 24 to 240Vac
- Choice of case sizes with simple screw terminal connections.

Extra features of DPM ... MFE1

- Four built-in alarm relays
- User definable scaling via 25 point look up table
- RS-485 system interface
- True RMS ac measurements
- Four front keys
- Display and data logging status legends
- Alarm status legends
- Bipolar analogue output.

Block diagram/data flow



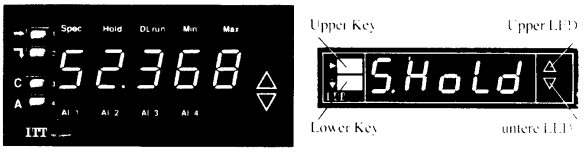
Note: Tinted features only apply to the DPM ... MFE1

Overview

Front keys

During normal service, pressing a key activates the function allocated to that specific key, (eg. output of a measured value via the serial interface to a printer: change-over to 'display hold', or one of the other functions available.

All device configuration parameters can be set via the keys.



Display

5-digit, seven-segment display/3 brightness levels/ blank (off). It is possible to select, by configuring, the continuous indication of the actual measured value, the serial or analogue input value, the hold, min. and max. value, as well as trends. Refer also to data flowchart.

Triangular LED indicators

When activated, they indicate the trend.

Panel status legends

AL1 AL2 AL3 AL4

are lit as long as the appropriate alarm is active. Can be switched off together with the display; otherwise they are lit at full brightness.

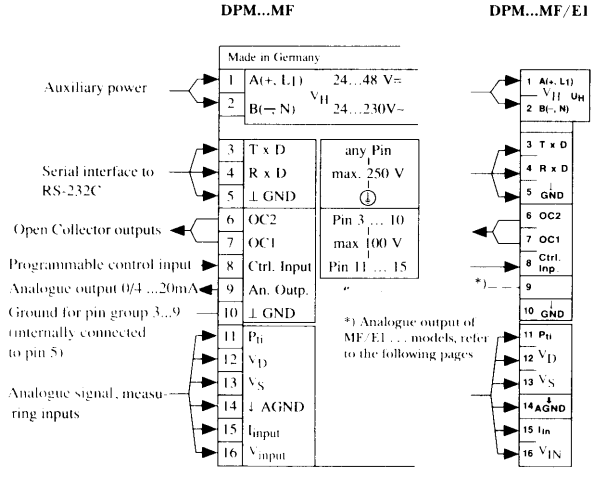
Spec — Spec is lit when anything other than the actual measured, hold, min. or max, value appears in the display (eg. when the 'serial' or the 'analogue' input values or trend values are indicated).

Hold — Hold is lit as long as the 'hold value' appears in the display, or when a constant is to be entered in the course of key programming.

DLrun — DLrun is lit as long as the 'run' status is active for datalogging.

Min Max — Min Max are lit as long as the minimum or the maximum value appears in the display.

General connections



Front keys

These can be configured to have the following functions:

- Passive (no function)
- Display reading hold
- Automatic taring (eg. weighing applications)
- Reset MIN/MAX memory
- Trigger datalogger
- Datalogger RUN/HOLD
- Send display value via serial output (eg. to a printer)
- Indicate 'analogue input value' on display
- Indicate 'serial input value' on display
- Output datalogging memory (eg. to a printer)
- Indicate min or max value
- Indicate alarm limit
- Extended key functions, etc.

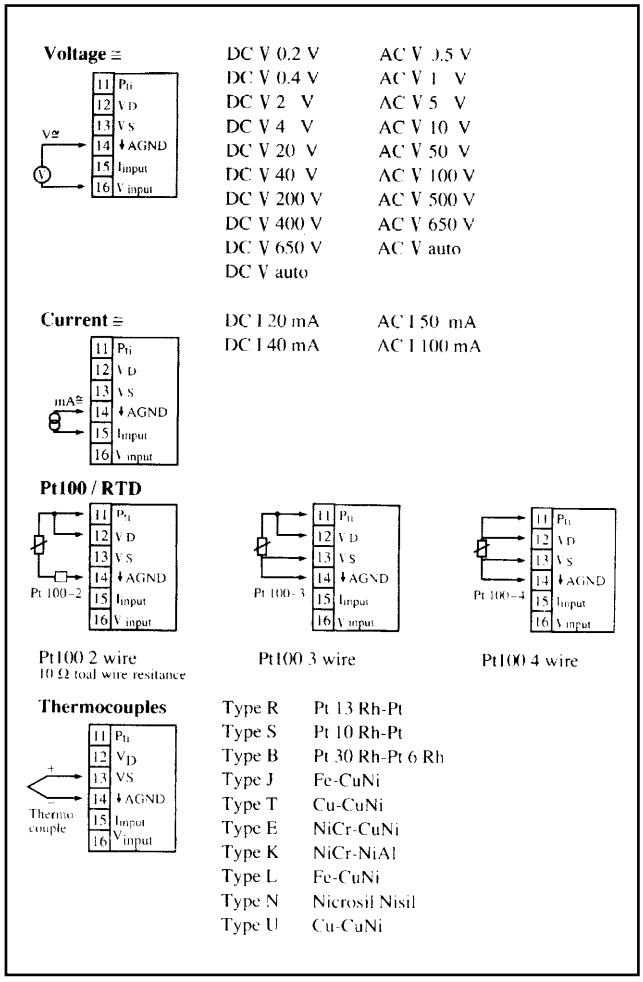
Control input pin

This can be configured to have the same functions as the front keys, plus:

- Continuous serial output of display value, whilst low.

Measuring connections

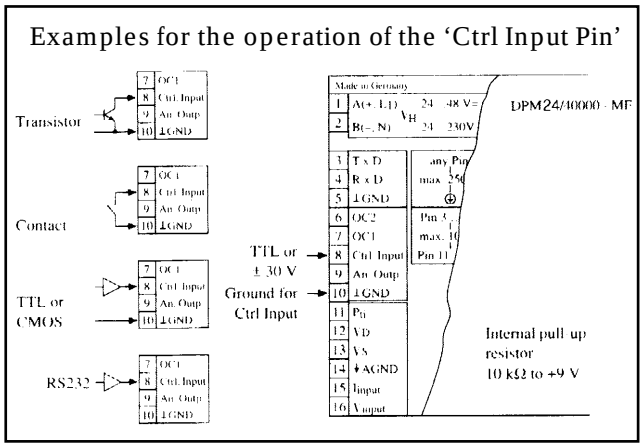
All the ranges shown on this page are standard options for all models. The desired range is selected via the menu.



Control terminal connections

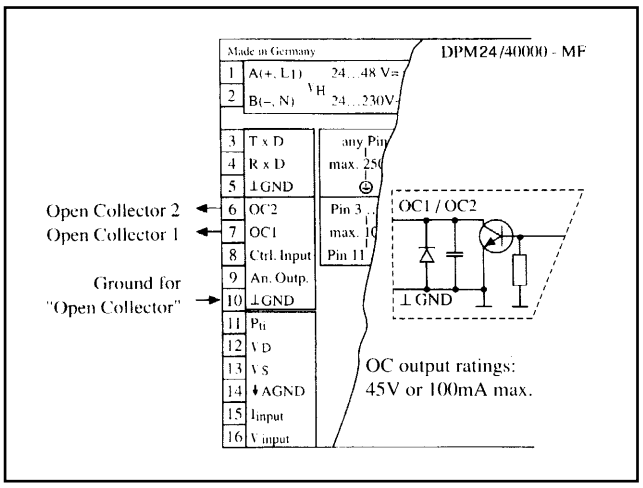
Ctrl Input Pin

The operator may set a separate input (Ctrl Input) to one of a number of preselected functions.



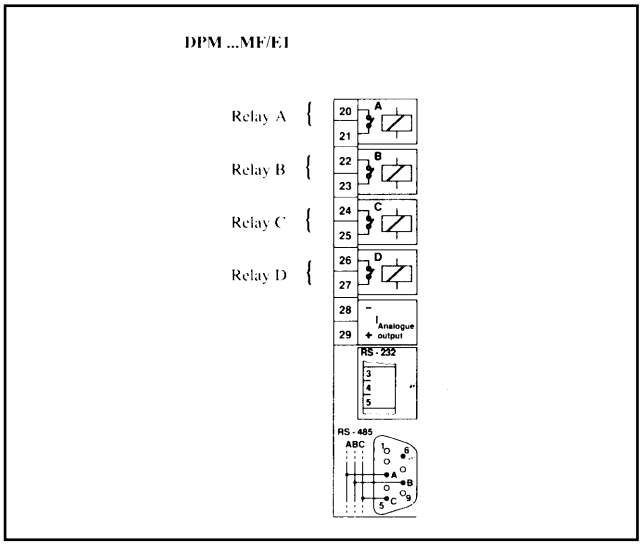
Open Collector' terminals

Two Open Collector (OC) outputs are available for control of other units and instruments. The activation and deactivation points can be programmed by the operator.



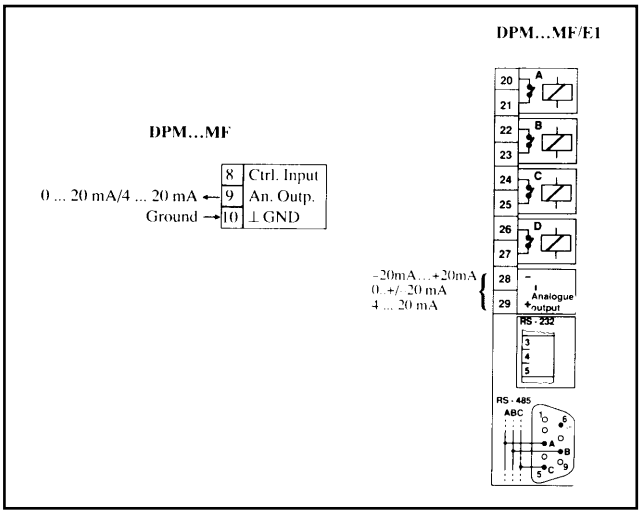
Relay outputs DPM … MFE1

Four built-in relays are available to control external devices according to the alarm channel configurations.



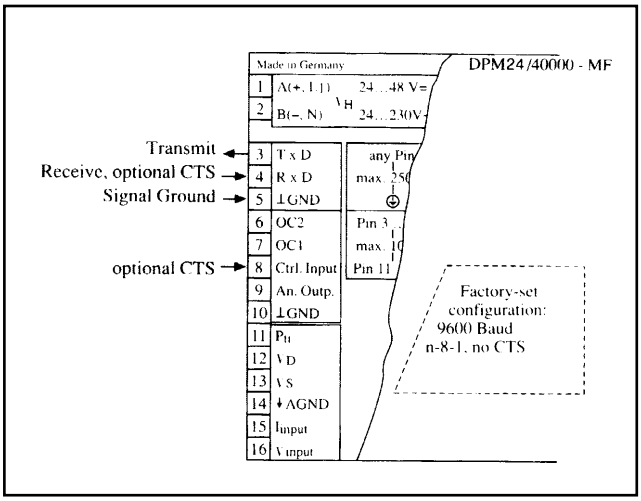
Analogue output

For connection of a graphic recorder or further processing of signals, an analogue output is available which offers an output choice of 0…20mA or 4…20mA, or in the case of the DPM…MFE1 -20 to +20mA. The output can be scaled to represent a desired part of the measured value.



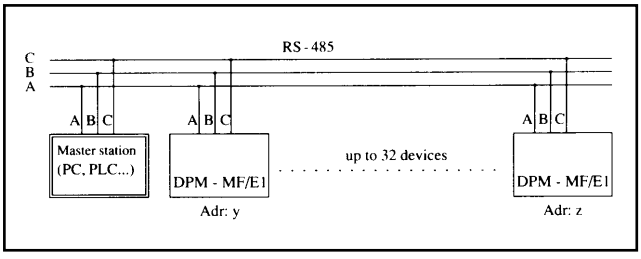
RS-232C serial interface

All models have an RS-232C serial interface for the connection of a PLC, process control computer, PC, terminal, printer or of other DPMs (cascading). The Baud rates 110/300/1200/2400/4800/9600 as well as parity, length of data word and number of stop bits can be adjusted.



RS-485 serial interface DPM … MFE1

The DPM…MFE1 also has an RS-485 system interface. This allows multidrop connection between a maximum of 32 devices controlled by a master station (eg. PC or PLC).



How to configure the DPM

Configuring the DPM means defining the following parameters:

…measuring type and range

…display scaling (internal mathematical calculation)

…the functions of control elements, such as keys and Ctrl Input Pin

…the functions of the serial interface (eg. automatic and cyclic transmission of data), display brightness, setting of the analogue output, Datalogging, etc.

There are three ways by which configuration can be accomplished:

1 …via the keys, directly on the instrument

All configuration parameters can be set via the keys. A complete outline of all menus for key operation is provided in the Operating Manual.

Configuration via the keys also allows simple re-configuration 'on site'.

2 …via the menu mask on the screen, by means of PC or terminal

This configuration method using a screen menu is the most convenient. A PC or a RS-232 terminal connected to the instrument serves as the input/output device. The 'mask' informs in a clear and concise way about all the settings and how to use the mask. It is easy to review all functions at a glance and to set them.

3 …via the serial interface (remote control function)

All configuration parameters can be changed and programmed by means of short serial commands in the DPM mode. See Operating Manual for full details.

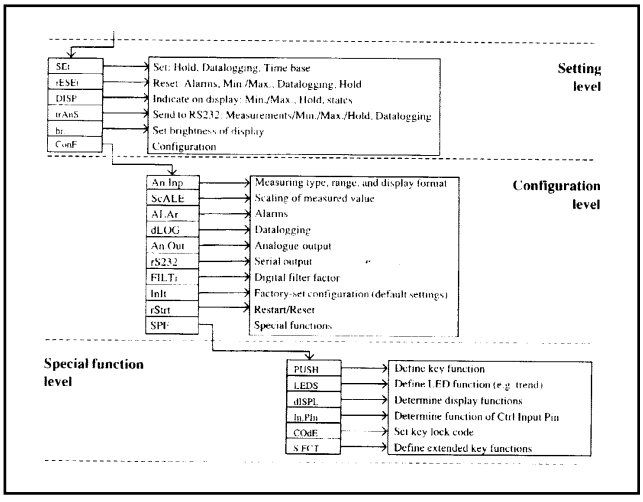
This method is particularly recommended for remote control where the option to dynamically reconfigure during operation is required.

1. Configuration via the keys

The top two front keys on the DPM-MF can be used to configure all the instrument parameters.

Assisted by the text appearing in the display, the operator is guided through menus in which he may select and enter the desired settings. If necessary, he will have to pass through submenus, to get to the desired parameters.

The parameters are subdivided into three function levels.

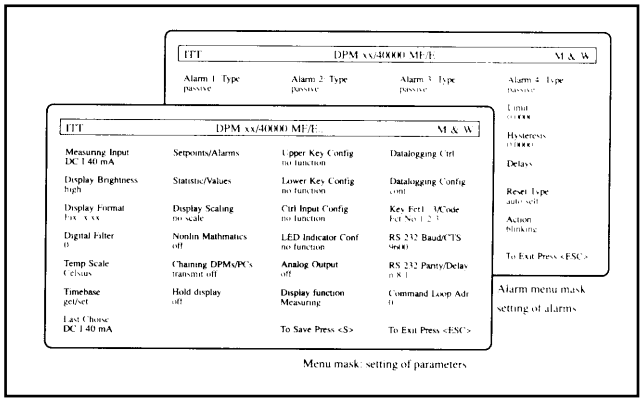


2. Configuration via the menu mask (terminal mode)

Manual configuration is possible by means of a screen menu mask, if the serial interface of the DPM is connected to a terminal or a PC.

Operation:

Using this instruction, the DPM creates a mask in which all the available parameter settings are indicated in plain text. To change DPM … MF parameters, simply pass through the available options for setting by keyboard actuation.



3. Configuration via the serial interface (remote control)

Instruction format - example:

Each DPM instruction consists of a compact sequence of ASCII characters.

Examples:

M0 <return>	: 'fetches' the indicated measuring value
DH2 <return>	: sets display brightness to 'dark'
FS10 <return>	: sets digital filter factor to '10'
BK1000 <return>	: sets a multiplication factor of 1000': eg. indication of millivolts instead of volts

Each DPM instruction comprises one or two letters or numeric characters which specify the type of instruction. Each instruction is followed by a number with or without decimal point (depending on the instruction).

A complete list of instructions is given in the Operating Manual.

Configuration aid, example for DPM ... MF

Device configuration: Select and tick off parameters;

Measuring type/range

❑ DC-V0.2V
❑ 0,4 V
❑ 2 V
❑ 4 V
❑ 20 V
❑ 40 V
❑ 200 V
❑ 400 V
❑ 650 V
❑ DC-V auto
❑ AC-μ0.5 V
❑ 1 V
❑ 5 V
❑ 10 V
❑ 20 V
❑ 50 V
❑ 100 V
❑ 500 V
❑ 650 V
❑ AC-V auto
❑ DC-120 mA
❑ 40 mA
❑ AC-I 50 mA
❑ 100 mA
❑ PT 100 2-d
❑ 3-d
❑ 4-d
❑ Thermo R
❑ S
❑ B
❑ J
❑ T
❑ E
❑ K
❑ L
❑ N
❑ U
❑

Temp. scale

❑ °C
❑ °F
❑ Kelvin (absolute)

Scaling

[ ] Measured value a 1
[ ] Display value d 1
[ ] Measured value a 2
[ ] Display value d 2

Non-linear scaling see section 3.2, p. 34 [ ]

Display format

❑ DP0 Floating point
❑ DP1 x.xxxx
❑ DP2 –x.xxx
❑ DP3 —x.xx
❑ DP4 ––x.x
❑ DP5 ——x.

❑ D0 000xxx Leading zeros active

Display brightness

❑ DH0 off
❑ DH1 only single point lighted
❑ DH2 dark
❑ DH3 medium
❑ DH4 bright

Display function

❑ Actual measuring value
❑ Hold value
❑ Max. value
❑ Min. value
❑ Analogue input value
❑ Serial input value

Digital filter

[ ][ ][ ] Factor

Upper key function,

❑ passive
❑ Display Hold
❑ Reset Min/Max
❑ Datalog. trigger
❑ Datalog. run/hold
❑ serial output of value
❑ Indication "Analogue Inp"
❑ Indication "Serial Inp"
❑ Datalog. output

Lower key function

❑ passive
❑ Display Hold
❑ Reset Min/Max
❑ Datalog. trigger
❑ Datalog. run/hold
❑ serial output of value
❑ Indication 'Analogue Inp"
❑ Indication "Serial Inp"
❑ Datalog. output

Crt. Input Pin

❑ passive
❑ Display Hold
❑ Reset Min/Max
❑ Datalog. trigger
❑ Datalog. run/hold
❑ serial output of value
❑ Indication 'Analogue Inp"
❑ Indication 'Serial Inp"
❑ Datalog. output
❑ Continuous serial output

LED function

❑ DL0 off
❑ DL1 Trend indication

Serial interface

❑ 9600 Baudrate
❑ 4800
❑ 2400
❑ 1200
❑ 600
❑ 300
❑ 110

Dataformat

❑ n-8-1
❑ o-7-1
❑ e-7-1
❑ n-8-2
❑ o-7-2
❑ e-7-2

Control pin

❑ no CTS
❑ CTS to pin 4
❑ CTS to pin 8

Transmit delay rate

[ ][ ][ ]

Continuous output

❑ passive
❑ output to DPM
❑ pure ASCII output

Loop address

❑

Cascading

Analogue output

❑ passive
❑ active

[ ] Display at 0 mA
[ ] Display at 4 mA
[ ] Display at 20 mA

Datalogging

❑ passive
❑ continuous without reset
❑ 20/160
❑ 160/20
❑ continuous with reset
❑ 20/160 with reset
❑ 160/20 with reset

[ ][ ][ ][ ][ ][ ] sample interval (sec)

Extended key function

[ ][ ] Keyfunction 1
[ ][ ] Keyfunction 2
[ ][ ] Keyfunction 3

Refer to table on p. 39

Key access code

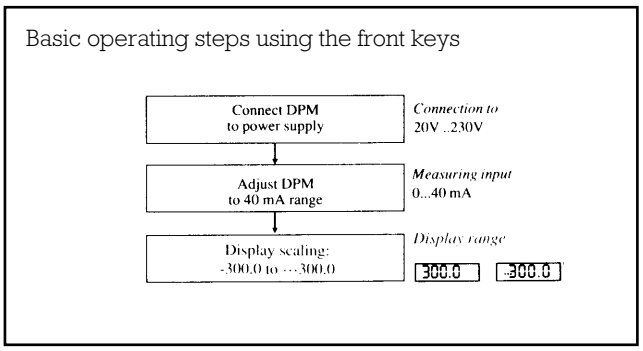
[ ][ ][ ] Code

Alarm configuration aid, example for DPM .... MF

Alarm 1	Alarm 2	Alarm 3	Alarm 4	Notes:
Type ❑ passive ❑ upper limit ❑ lower limit ❑ dynamic limit	Type ❑ passive ❑ upper limit ❑ lower limit ❑ dynamic limit	Type ❑ passive ❑ upper limit ❑ lower limit ❑ dynamic limit	Type ❑ passive ❑ upper limit ❑ lower limit ❑ dynamic limit	
Values, p. 44 [ ] Limit [ ] Hysteresis	Values [ ] Limit [ ] Hysteresis	Values, [ ] Limit [ ] Hysteresis	Values [ ] Limit [ ] Hysteresis	
Reset options ❑ Automatic ❑ Upper key, uncond. ❑ Lower key uncond. ❑ Ctrl-Inp-Pin., uncond. ❑ Upper key cond. ❑ Lower key cond. ❑ Ctrl-Inp-Pin, cond.	Reset options ❑ Automatic ❑ Upper key, uncond ❑ Lower key uncond. ❑ Ctrl-Inp-Pin., uncond ❑ Upper key cond. ❑ Lower key cond. ❑ Ctrl-Inp-Pin, cond.	Reset options ❑ Automatic ❑ Upper key, uncond ❑ Lower key uncond. ❑ Ctrl-Inp-Pin., uncond ❑ Upper key cond. ❑ Lower key cond. ❑ Ctrl-Inp-Pin, cond.	Reset options ❑ Automatic ❑ Upper key, uncond ❑ Lower key uncond. ❑ Ctrl-Inp-Pin., uncond ❑ Upper key cond. ❑ Lower key cond. ❑ Ctrl-Inp-Pin, cond.	
Output ❑ Display flashes ❑ upper LED ❑ lower LED ❑ OC 1 active low ❑ OC 2 active low ❑ serial output "A" or "P" ❑ Relay A, B, C ,D	Output ❑ Display flashes ❑ upper LED ❑ lower LED ❑ OC 1 active low ❑ OC 2 active low ❑ serial output "A" or "P" ❑ Relay A, B, C ,D	Output ❑ Display flashes ❑ upper LED ❑ lower LED ❑ OC 1 active low ❑ OC 2 active low ❑ serial output "A" or "P" ❑ Relay A, B, C ,D	Output ❑ Display flashes ❑ upper LED ❑ lower LED ❑ OC 1 active low ❑ OC 2 active low ❑ serial output "A" or "P" ❑ Relay A, B, C ,D	
Delay [ ] Pickup delay [ ] Dropout delay	Delay [ ] Pickup delay [ ] Dropout delay	Delay [ ] Pickup delay [ ] Dropout delay	Delay [ ] Pickup delay [ ] Dropout delay	

Example of first steps

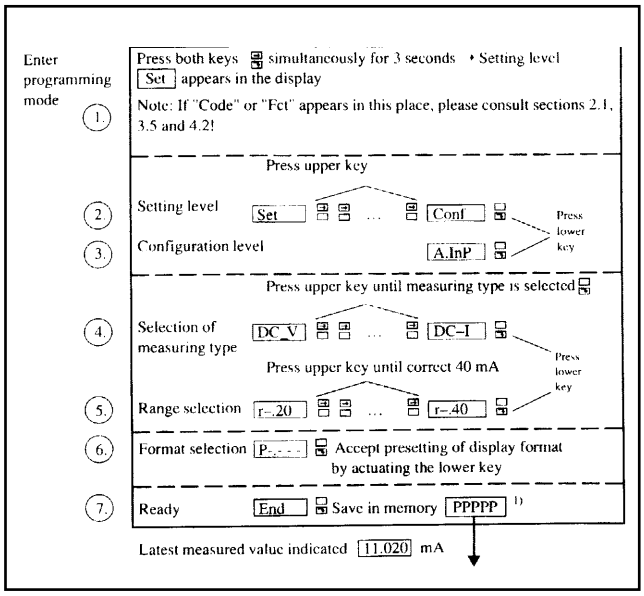
Adjusting the DPM for a measurement of 0 to 40mA, scaled -300 to +300 using the front keys for configuration:



Adjusting DPM to measurement of dc current (40mA) via the keys

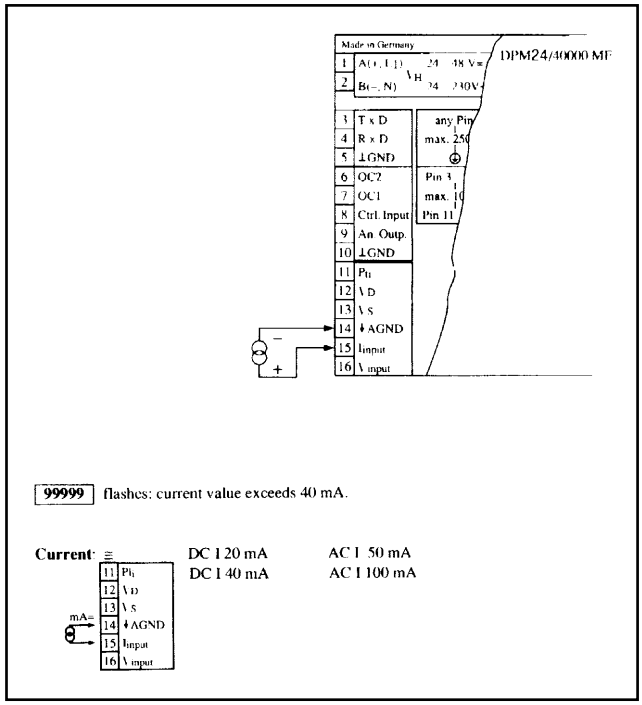
→ Key: Configuration of dc range of 40mA...

The two front keys can be used to configure all the settings in the DPM in a programming mode (except when a code prohibits access to programming to non-authorised persons).



1) The new setting DC-I 40mA is saved permanently in the DPM, so that DC-140mA is selected automatically when the DPM is switched on again.

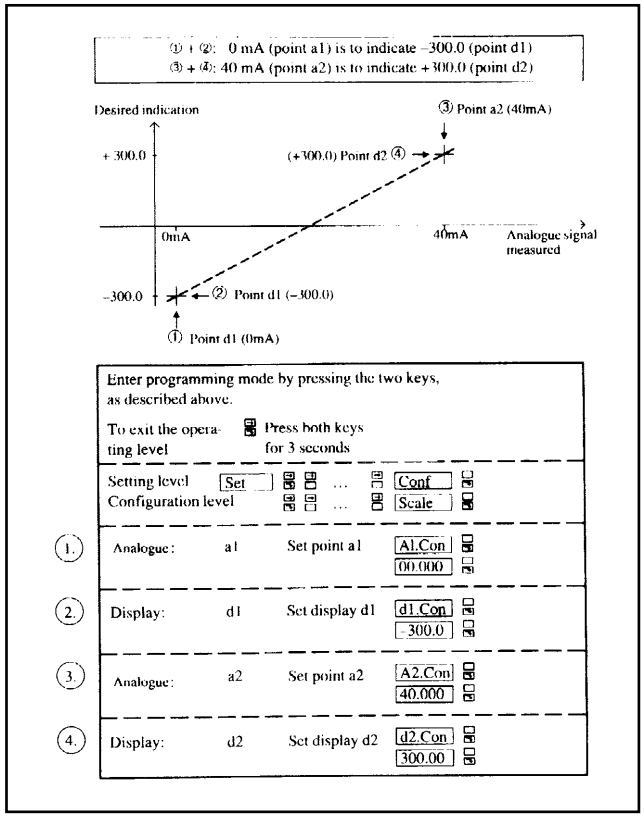
Connections for 40mA input



Display scaling

The analogue signal (the current of 0...40mA), is from a flow sensor. 0mA indicates a negative flow of -300ml, and 40mA a positive flow of +300.0ml.

Display scaling is set by means of the four values, ie:



Datalogging (DL)

Datalogging in the DPM means: logging of records of measuring data in an internal datalogging memory of the DPM over an extended period of time. The datalogging memory in the DPM provides capacity for up to 180 measured values with additional information. This data is lost if the DPM is switched off.

In the datalogging memory, each measuring data block consists of:

- the measured value (as shown in the display, but with 7 digits)
- the min/max values (optionally, reset after every trigger);
- the complete alarm status
- the relative time of day.

Continuous logging

In this mode, the measured data is logged continuously in the datalogging memory, at preselected intervals (sample interval: 1 second up to several hours).

The data is written continually into the cyclic memory, so that the last 180 records of measured values are available in memory.

The min and max values can be reset automatically by choice after each record, so that min/max values show the signal profile between 2 sampling points.

After the mode has been set, the instrument starts to operate immediately in the 'run' mode and saves measured values. DL operation is stopped temporarily by a 'DL hold" instruction (via keys, Ctrl Input Pin or serial interface), and the buffered measured values can be recalled from the datalogging memory. The 'latest' block of measured values, ie. the last to be buffered before the hold instruction, is marked by number '-1'; all the previous 'older' blocks have higher negative numbers.

Logging controlled by trigger

In this mode - as in the continuous logging mode - measured data is logged in the datalogging memory at preselected interval (sample interval, 1 second up to several hours).

In this mode, an external event (eg. an external alarm) may stop datalogging, thus changing - over to 'Hold'. After the 'trigger event' the DPM memory contains a list which describes the signal profile over a defined time interval before and after the trigger event. A trigger signal may, by key operation, Strobe pulse to the Ctrl input or via the serial interface, etc. Now this list can be evaluated by an external device.

At the moment the trigger is activated, the block of measured values in the datalogging memory is marked by number '0'; the data blocks logged after the trigger point have ascending positive numbers, and the blocks of measured data prior to the trigger point have descending negative numbers.

'Pretrigger (20/160)' means that 20 blocks of measured data were stored prior to the event (Trigger), and 160 blocks of measured data after the event.

'Posttrigger (160/20)' means that 160 blocks of measured data were stored prior to the event (Trigger), and 20 blocks of measured data after the event.

Operation can be stopped temporarily even without trigger by means of 'hold'; datalogging and can be restarted by 'run'.

Datalogging table of values

The datalogging memory can be listed via the serial interface (for ex. to be processed subsequently by a process control computer). The output can be started, depending on the configuration, by key actuation, via a strobe applied to the Ctrl Input Pin or via an instruction to the serial interface.

Moreover, individual records data can be selected from the DL memory (data flow control) by a PC or similar device, by addressing of pointers or by means of certain instructions in the DPM mode.

No.	Measured value	Time	Min	Max	Alarm	
-4:	xxxxx	06:14:21	xxxxx	xxxxx	yyyy	← Sample interval 3 seconds
-3:	xxxxx	06:14:24	xxxxx	xxxxx	yyyy	
-2:	xxxxx	06:14:27	xxxxx	xxxxx	yyyy	
-1:	xxxxx	06:14:30	xxxxx	xxxxx	yyyy	
0:	xxxxx	06:14:33	xxxxx	xxxxx	yyyy	← Trigger point
1:	xxxxx	06:14:36	xxxxx	xxxxx	yyyy	
2:	xxxxx	06:14:39	xxxxx	xxxxx	yyyy	
3:	xxxxx	06:14:42	xxxxx	xxxxx	yyyy	

Cascading of several DPMs

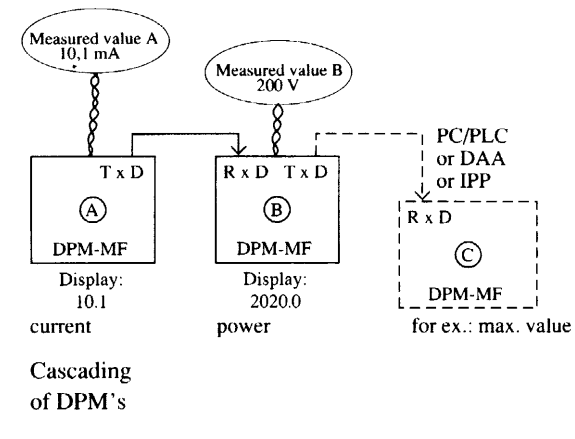
Direct processing and indication of several measured values on site is possible by cascading several DPM-MFs.

When two, or more, similar DPMs are connected via their serial interfaces, it is possible to mathematically compute the combination of analogue and serial input values in the following ways:

No computation
Analogue + serial
Analogue - serial
Analogue × serial
Analogue/serial
Serial - analogue
(Analogue + serial)/2 (average)
(Analogue × 100)/serial (%)
(Serial × 100)/analogue (%)
(Analogue-serial) × 100/analogue (%)

Example:

In DPM 'B' the values of the measuring station (10.1mA), which were received via R × D, are multiplied by the internal measured value (200V) so that the result 2020.0 (mW) appears.



Cascading of DPM's

Measurement specification

Overview - measuring types

dc voltage ac voltage (average)	dc-V ac-V	±200mV-650V 500mV-650V
dc current ac current (average)*	dc-I ac-I	±20mA and 40mA 50mA and 100mA
Temperature measurement	PT100 Thermocouples	2, 3, 4 wire connection Types K, J, T, E, U, L. N, R, S, B
Measuring rate	approx. 10/sec, depending on measuring type	

*dc coupled true RMS with DPM … MFE1 model

General data

CMR	>140dB max. 250V	(dc or ac, 50Hz)
NMR	>50dB 40dB	(ac 50Hz) (ac 60Hz)
Service temp range	0·C…50°C	
Storage temp range	-40°C…80°C	
Supply voltage	in the range of auxiliary voltage of 50-250Vac	
Influence	<±0.02% FS	

Reference conditions

Temperature	23°C ±2°C
Power supply (auxil. voltage)	24Vdc ±10%
Frequency (measuring range ac)	50Hz ±2Hz

Terms

LSD	Least significant digit (resolution as per table
FS	Full scale

Absolute maximum ratings

V input (16)	1kV
I input (15)	250mA/2.5V
V_S, V_P (13,12)	25V
P_t(11)	63V

True RMS measurements DPM … MFE1

Response time	<2 sec (digital filter 3)
Crest factor	4
Effect of frequency eg. for 5V range	30 …1500Hz 0.1% 15 … 2500 Hz 1% 5 … 5000 Hz 5%

dc voltage ranges

dc-V dc voltage ranges ±	200mV	400mV	2V	4V	20V	40V	200V	400V	650V
Resolution interface (LSD)	5µV	10µV	50µV	0.1mV	0.5mV	1mV	5mV	10mV	50mV
Resolution display (basic config.)	10µV		0.1mV		1mV		10mV		100mV
Overload	1kV								
Input resistance Leakage current	>100MΩ 20pA		>2MΩ 20pA						
Accuracy (Ref. Cond.) min.	0.04% FS ±4 LSD		0.03% FS ±3 LSD						
TK 0 … 50°C	≤50ppm/°C								
Note	Range 650V referred to 1000 V								

ac voltage ranges (measurement of average value of RMS calibrated) DPM ... MF models

Average ac-V value ac voltage ranges	0.5V	1.0V	5V	10V	50V	100V	500V	650V
Resolution, interface	50µV	100µV	0.5mV	1mV	5mV	10mV	50mV	0.1V
Overload	max. $1000V_{rms}$/max. $60V_{DC}$							
Input resistance Leakage current	>100MΩ 20pA		>2MΩ 20pA					
Accuracy (Ref. Cond.)	0.2% FS at 50Hz ±4 LSD							
TK 0 … 50°C	≤100ppm/°C							
Effect of frequency variations 40 … 400Hz	2%		0.1%					

dc current ranges

Continuous current dc-I ranges ±	20mA	40mA
Voltage drop	200mV (10Ω)	400mV (10Ω)
Resolution interf.	0.5µA	1µA
Resolution display	1µA	
Overload	250mA (2.5 Volts)	
Accuracy (Ref. Cond.)	0.04% FS ±3 LSD	
TK 0 … 50°C	≤75ppm/°C	

ac current range (measurements of average value RMS calibrated)

Continuous current dc-I	50mA	100mA
Ranges	Higher ranges with external shunt	
Voltage drop	500mV (10Ω)	1000mV (10Ω)
Resolution (LSD)	5µA	10µA
Overload	$250mA_{rms}$	
Accuracy (Ref. Cond.)	0.2% FS ±4LSD	
TK 0 … 50°C	≤125ppm/°C	

PT100 temperature sensors

PT100 as per DIN 43760	2 wire	4 wire	3 wire
Range	-200°C to +850°C		
Resolution	0.1°C		
Current at sensor	<1mA		
External resistance	10.00Ω[1])	max. 500Ω	max. 50Ω symmetrical
Accuracy Ref. Cond.)	0.2°C (-200 + 200) ±1 0.4°C (-200 +850) ±1		0.4°C ±1 0.8°C ±1
Break indication	Display flashes '99999'[2]) Interface *****		
TK 0…50°C	0.04°C/K		
Indicating unit	selectable: Centigrade, Fahrenheit, Kelvin		
Note	1) External compensation required 2) Not in case of 4 wires		

Thermocouple temperature sensors

Effect of cable resistance	1.5µV/10Ω
Break indication	Display flashes '99999' Serial interface *****
Temp. coeff. 0 … 50°C	100ppm/°C FS -depends on range and type of thermocouple - related to thermoelectric e.m.f.
Indication adjustable	in °C Centigrade °F Fahrenheit Abs Kelvin

Cold junction compensation

Service temperature range	0 to 50°C
Accuracy incl. thermal contact	1°C

Thermocouple	Range °C Ref. temp: 0°C	Accuracy (Ref. Cond.)	Display resolution
Type J IEC 584 Fe-CuNi	-210 / 1200	1.5°C	0.2°C
Type L DIN 43710 Fe-CuNi	-200 / 900	1°C	
Type T IEC 584 Cu-CuNi	-260 / 400	1°C	
Type U DIN 43710 Cu-CuNi	-200 / 900	1°C	
Type K IEC584 NiCr-NiAl	-260 / -150 -150 / 1370	2°C 1°C	
Typ E IEC 584 NiCr-CuNi	-260 / 1000	1°C	
Type N BS 4937 Nicrosil-Nisil	-260 / -50 -50 / 0 0 / 1000	2°C 1.5°C 1°C	
Type R IEC 584 Pt 13Rh-Pt	-50 / 1230 1230 / 1770	1.5°C 2°C	0.5°C
Typ S IEC 584 Pt 10Rh-Pt	-50 / 1340 1340 / 1770	1.5°C 2°C	
Typ B IEC 584 Pt 30Rh-Pt 6Rh	400 / 1820	2°C	1.0°C
Remarks	Accuracy, excluding reference junction Constantan : CuNi Chromel : NiCr		

Analogue output DPM ..... MF models

Resolution	>2000 steps (0 to 20mA) >1600 steps (4 to 20mA)
Accuracy	±0.5% of fs value (20mA)
Response time	0.1 sec typ.
Voltage range	5V/250Ω max.

Analogue output DPM ... MFEI

Resolution	>4050 steps (-20 to +20mA)
Accuracy	0.15% of fs value (20mA)
Response time	0.2 sec typ.
Voltage range	7.5V/375Ω max.

Relay data DPM ... MFE1

	Resistive load	Inductive load
Ratings	250Vac 1A 30Vdc 1A	250Vac 1A 30Vdc 1A

Power supply unit

All models have an autoranging wide range power supply for dc and ac inputs without pre-selection.

dc voltage	$24V_{DC}$...$48V_{DC}$±20%*	
Power consumption	@ 24V:	typ. 1.6W
	@ 48V:	typ. 2.5W
ac voltage:	$24V_{AC}$...230Vac	
	+15%/-20%	
Apparent power	@ 24Vac:	typ. 2.5VA
	@115Vac:	typ. 20VA
	@230Vac:	typ. 40VA

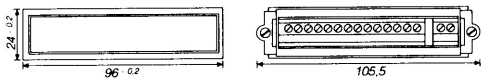
* Ripples within the specified voltage range are admissible.

Mechanical specifications

Case: black
Type of enclosure: Case: IP 65 -Terminals: IP 20
- Frontbezel: IP 65
Standard: DIN 43700 and DIN 43718

DPM 24/40000 MF

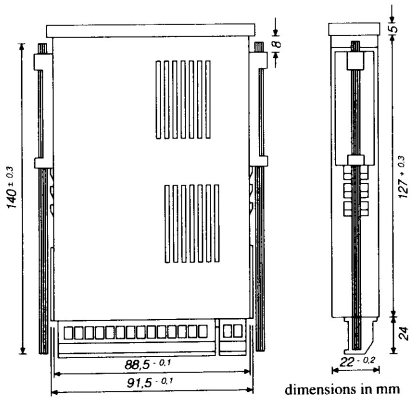
Weight: approx. 210 g



Screw-type fixing

Panel cutout:
$92^{+0.8}$ x $22{,}2^{+0.3}$ mm

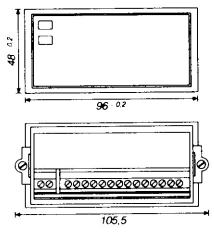
Max. panel thickness:
1 - 22 mm



dimensions in mm

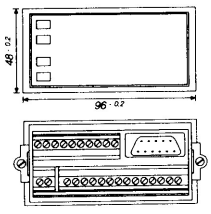
DPM 48/40000 MF

Weight: approx. 260 g



DPM 48/40000 MF/E . .

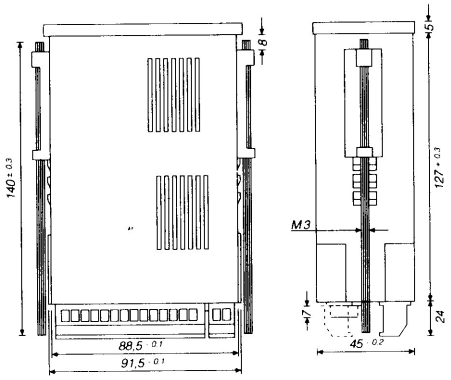
Weight: approx. 370 g



Screw-type fixing

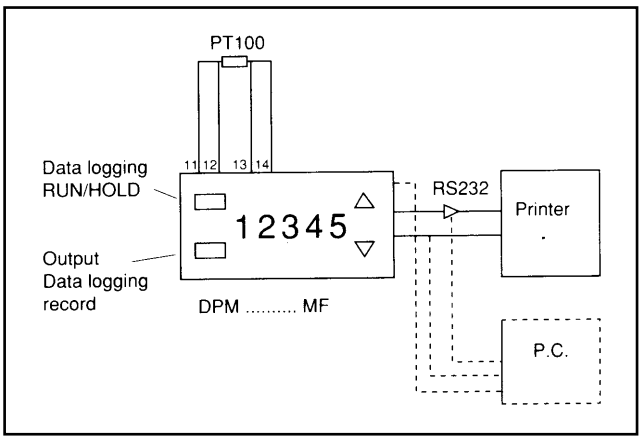
Panel cutout:
$92^{+0.8}$ x $45{,}5^{+0.6}$ mm

Max. panel thickness:
1 - 22 mm



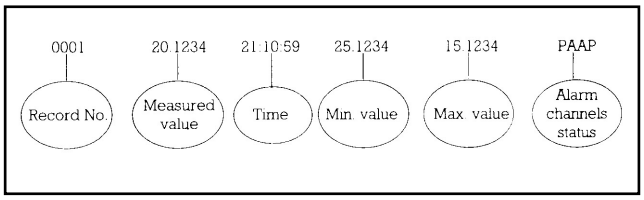
Application ideas

24-hour temperature profile using datalogging feature



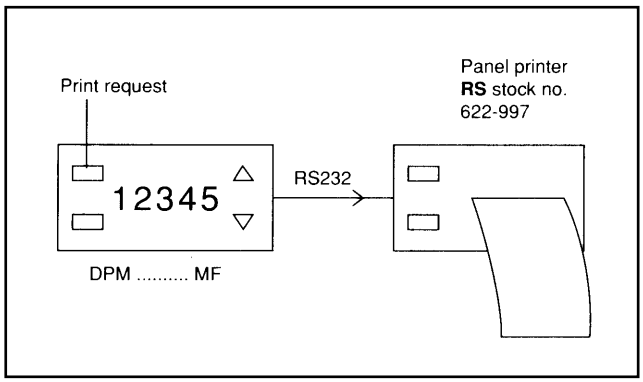
Steps

1. Configure input and scale range for temperature sensor (eg. 4-wire PT100).
2. Configure upper front key or control input to be datalogger run/hold control.
3. Configure lower front key to be datalogger output.
4. Set datalogging time base interval in seconds. eg. 540 seconds gives recording every 9 minutes with 160 records over 24 hours.
5. Set datalogging to continuous mode.
6. Set internal time base time to actual time.
7. In operation, datalogging occurs at the preset time interval once the run/hold key (or control input) is operated and is continuous until the key (input) is operated again to hold the datalogger.
8. The last 160 records (24 hours readings) can then be listed on a printer. The record format is as follows:
9. Records could be sent to a PC for further processing.



Note: Timebase and datalogging memory values are lost if the DPM power is switched off.

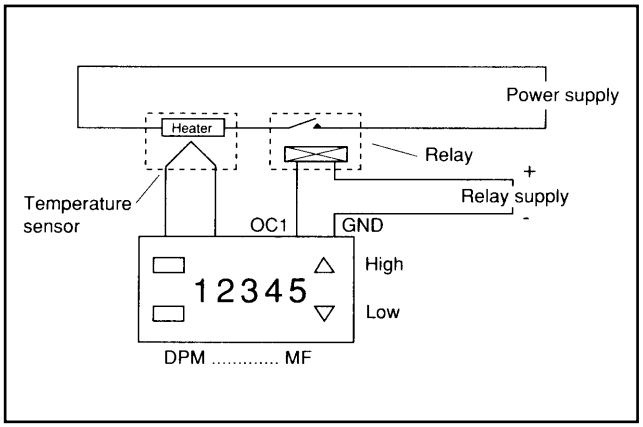
Using panel printer to obtain record of values



Steps

1. Configure DPM for input type, scale range, etc.
2. Configure upper (or lower) key, (or control input) to send display value via RS-232 serial data output.
3. Connect panel print and adjust both DPM and printer to same serial communications format (baud rate, etc).
4. In operation, the display value is sent to the printer when the front key is pressed.

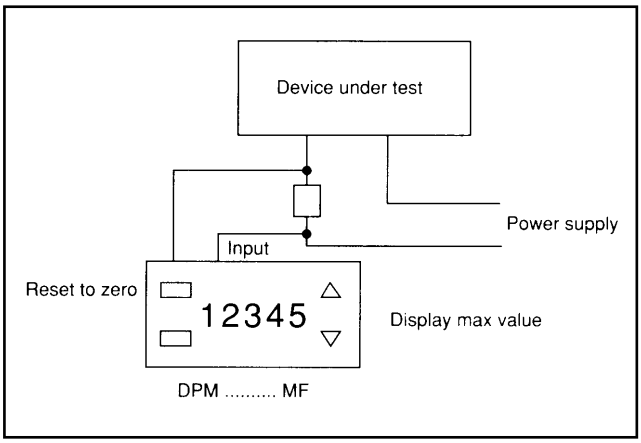
Simple temperature controller



Steps

1. Configure DPM for temperature sensor type and range.
2. Configure DPM to control relay (via OCI) and LED trend indicators to show HIGH/LOW.
3. In operation, the heater power is switched off when preset temperature limit is reached, and switched on when temperature falls to regulate heater temperature.
4. Display shows current temperature with additional LEDs showing HIGH or LOW temperature status.

Using 'max. value' display to measure worst case power consumption



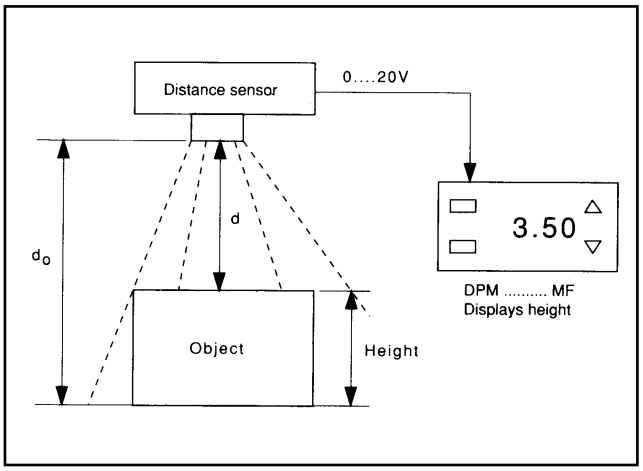
A device (eg. a pump) consumes different amounts of power under different operating conditions. In order to determine the worst case power consumption over a range of operating cycles the DPM...MF is used to measure and hold the maximum current in the display. If the supply voltage is constant the display can be scaled to display power directly.

Steps

1. Configure DPM for input and scale range desired.
2. Configure DPM to display 'max value'.
3. Configure one key (or Ctrl input) to reset the display to zero.
4. In operation the display shows max value. This can be reset to zero when required.

Note: A second key can be configured as a print request to record the max value on a printer connected to the serial port.

An easy way to obtain a sophisticated display scaling



The DPM can be scaled using just two points. For each point the analogue measured value can be assigned a defined display value. Using a sensor, which gives a linear output (eg. 0 to 20V) proportioned to the distance (d) between sensor and the object, the internal calculation and scaling facilities of the DPM can be used to simplify the calibration of the measurement.

Steps

1. Configure input range for 20V.
2. Configure first scaling point but setting the analogue sensor output value to give a 00.00 display without an object, ie. a 00.00 display for d_o.
3. Repeat with a known object (eg. 3.5cm high) to set the second scaling point so that the display reads '3.50'.
4. In operation the DPM will now show the height of unknown objects directly in cm.

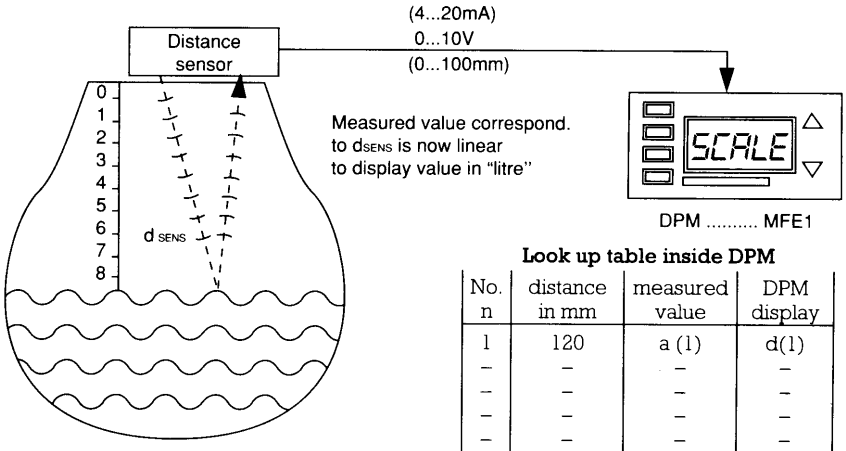
User definable linearisation

To display volume of irregular tank by measuring surface level

Example, Calibration of an oil tank, display in 'LITRE'

DPM menu mask

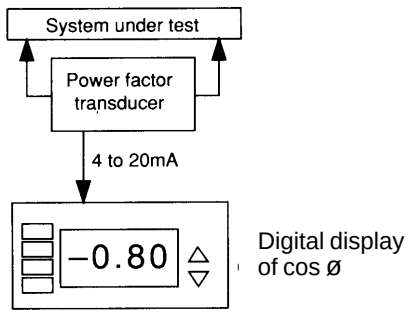
1. select 'Nolin Maths 'set ulin'
2. n:? input No. in Look up table
3. d(n):? set display value
4. a(n):? set 'm' for act measuring value
5. repeat steps 2 through 4
6. save loop up table (parameters) by 'S'



Look up table inside DPM

No. n	distance in mm	measured value	DPM display
1	120	a (1)	d(1)
–	–	–	–
–	–	–	–
–	–	–	–
–	–	–	–
n	–	a (n)	d(n)
–	–	–	–
–	–	–	–
–	–	–	–
–	–	–	–
25	20	a (25)	d(25)

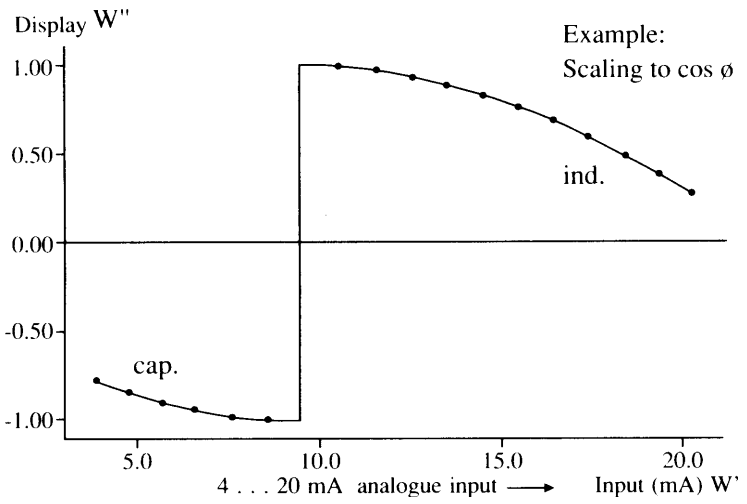
User definable linearisation DPM ... MFE1 to give a power factor (cos ø) display



The user definable linearisation (25 point look up table) of the DPM...MFE1 can be used to give a digital display from the 4 to 20mA output of power factor transducer connected to the system under test. The display value (cos ø) is related to the analogue output according to the tabulated values below.

Steps

1. Configure the DPM for 20mA input.
2. Install the analogue and digital display values in the look up table.
3. In use the DPM will give a direct readout in cos ø units.



n	Analogue W'	Display W"
1	4.00	-0.80
2	4.71	-0.85
3	5.59	-0.90
4	7.05	-0.96
5	7.78	-0.98
6	8.22	-0.99
7	9.38999	-1.00
8	9.39	1.00
9	10.56	0.99
10	11.00	0.98
11	11.73	0.96
12	13.19	0.9
13	14.80	0.8
14	16.05	0.7
15	17.14	0.6
16	18.17	0.5
17	19.19	0.4
18	20.00	0.3
..	.....	....
25	.....	....