Model PM4-RS and PM4-RSA
Serial Input
Panel Mount Display/Controller
Operation and Instruction Manual

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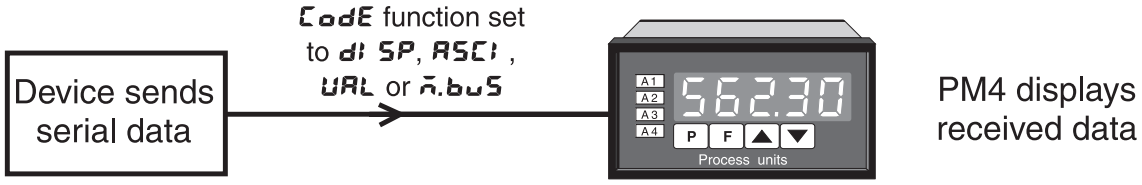
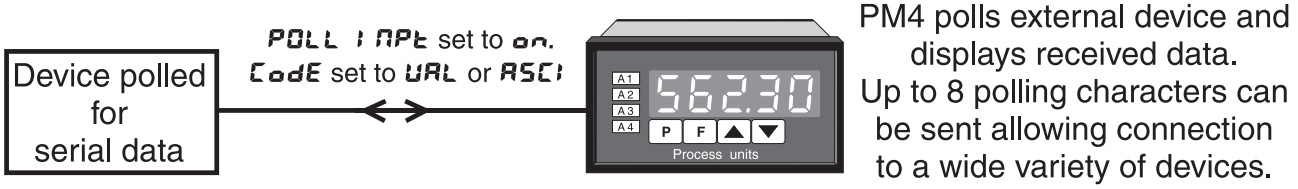
1 Introduction

This manual contains information for the installation and operation of the PM4 serial communications monitor. The PM4 will accept inputs from RS232, RS485, RS422 or serial current loop inputs (factory configured). The digital display will indicate numeric and some alpha characters (when alpha function is selected). There are six main modes in which the PM4-RS will operate, these are detailed below. If the mode is changed it is necessary to remove power from the PM4 then reapply power in order to reset the mode:

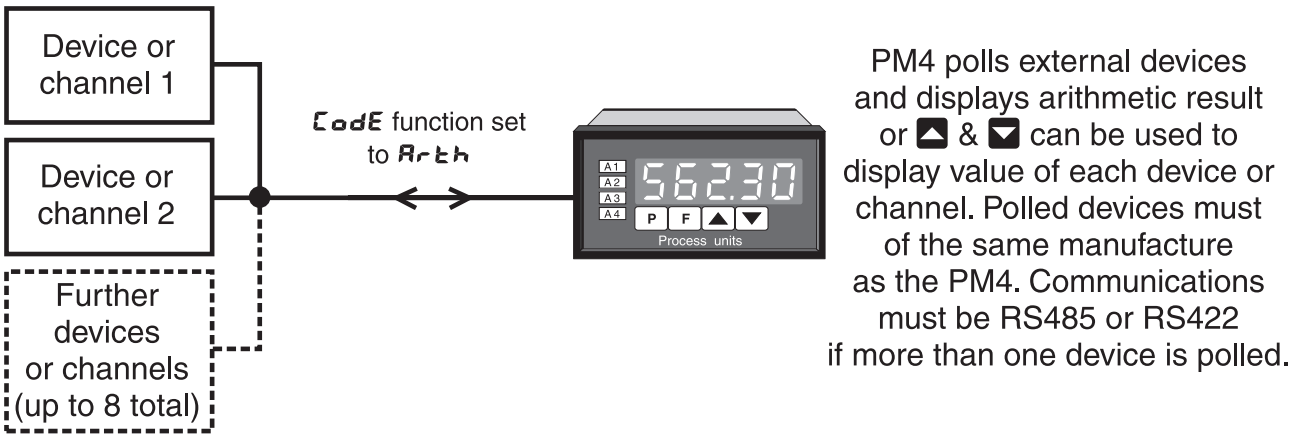
1. Direct display of input. The PM4 is sent an ASCII or Modbus RTU function 6 or 16 string and displays the characters. To operate in this mode the **POLL INPt** function must be set to **OFF**.



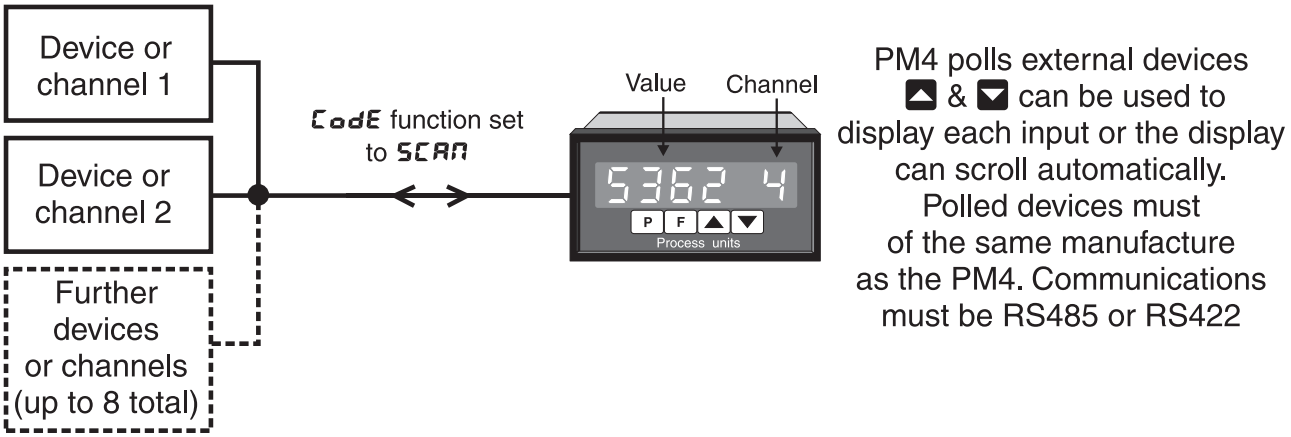
2. Poll mode. PM4 sends a poll command of up to 8 characters to request data. To operate in this mode the **POLL INPt** function must be set to **on**.



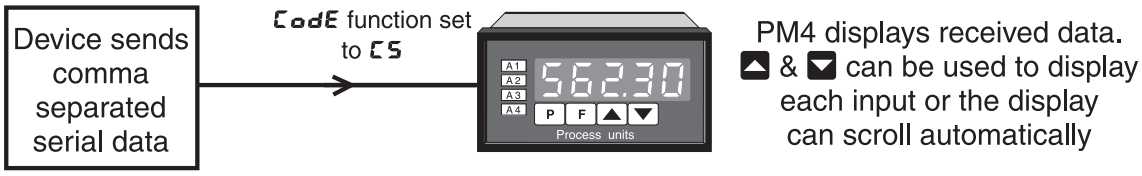
3. Arithmetic mode. The instrument can be programmed to accept input from up to eight RS485 or RS422 sources and combine these arithmetically. The time between polling requests is programmable from 0.0 to 20.0 seconds. The instruments polled for arithmetic operation must be of the same manufacture as the PM4 instrument. To operate in this mode the **CodE** function must be set to **ArtH**. Refer to the separate Addendum booklet for details of **ArtH** operation.



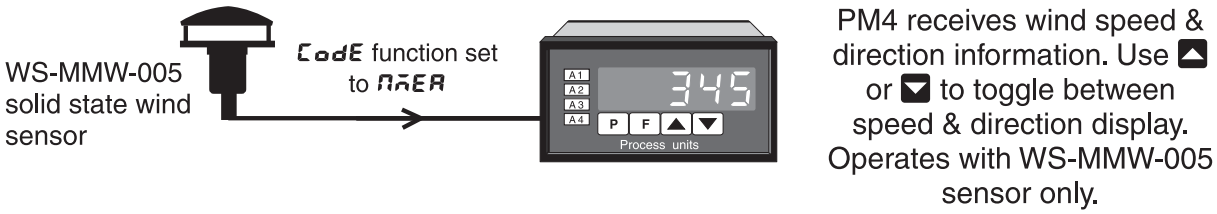
4. Scanning mode. Allows the PM4-RS to scan up to 8 inputs from other devices and display the value together with an indication of which input is being viewed. The input devices must be of the same manufacture as the PM4 and the serial communications must be via RS485. A special mode allows the PM4-RS to act as a slave display when connected to a model TP488 eight channel scanning monitor equipped with a serial output.



5. Comma separated mode. This mode allows the PM4-RS to accept up to eight display values sent sequentially, separated by a comma. The number of channels is selected at the **SCAn CH** function.



6. Wind speed and direction (NMEA). This mode is used only with instruments using NMEA (National Marine Electronics Association) serial code such as model WS-MMW-005 wind speed and direction sensor. Refer to the separate Addendum booklet for details of **nMEA** operation.



Unless otherwise specified at the time of order, your PM4 has been factory set to a standard configuration. Like all other PM4 series instruments the configuration and calibration is easily changed by the user. Initial changes may require dismantling the instrument to alter PCB links, other changes are made by push button functions. Full electrical isolation between power supply, input voltage or current and retransmission output is provided by the PM4, thereby eliminating grounding and common voltage problems. This isolation feature makes the PM4 ideal for interfacing to computers, PLCs and other data acquisition devices. The PM4 series of Panel Mount Monitors are designed for high reliability in industrial applications. The high brightness LED display provides good visibility, even in areas with high ambient light levels.

1.1 Standard outputs

- A standard inbuilt relay provides an alarm/control function

1.2 Output options

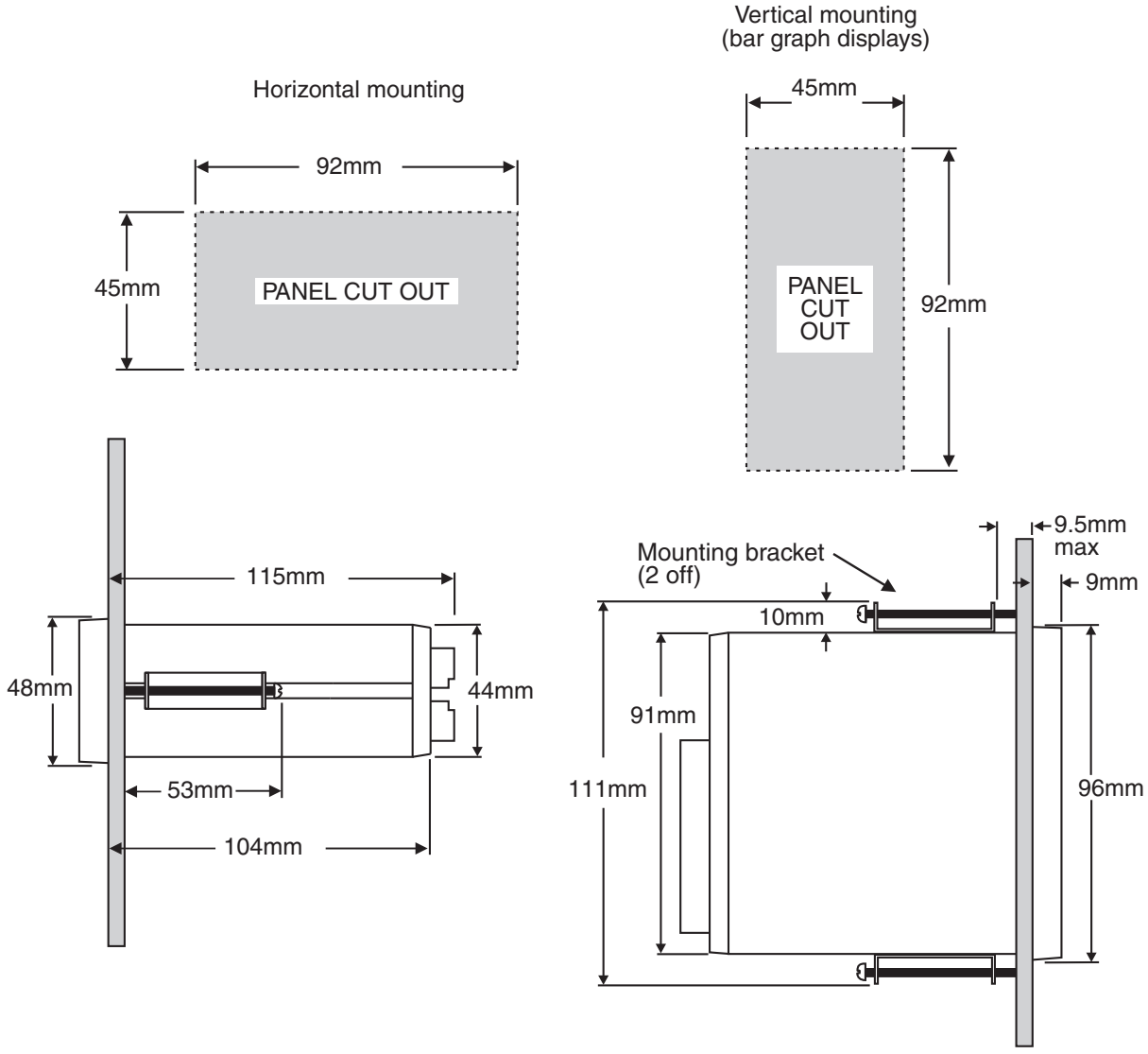
Some of the optional outputs below will not operate in all modes. Please check in chapter 4 and in the Arithmetic and Wind Speed/Direction mode addendum to see if the option is applicable to the mode required.

- 1, 3 or 6 extra relays.
- Isolated analog retransmission (single or dual analog outputs) configurable for 4–20mA, 0–1V or 0–10V
- ±12VDC (24V) isolated transmitter supply/excitation voltage (25mA max.)
- Isolated RS485 or RS232 serial communications (ASCII or Modbus RTU)
- Isolated Digital output - binary or BCD up to 16 bit, NPN or PNP output types available
- Isolated Optional outputs are available in certain combinations e.g. Extra relay plus RS232

2 Mechanical Installation

Choose a mounting position as far away as possible from sources of electrical noise such as motors, generators, fluorescent lights, high voltage cables/bus bars etc. An IP65 access cover which may be installed on the panel and surrounds is available as an option to be used when mounting the instrument in damp/dusty positions. A wall mount case is available, as an option, for situations in which panel mounting is either not available or not appropriate. A portable carry case is also available, as an option, for panel mount instruments.

Prepare a panel cut out of 45mm x 92mm +1 mm / – 0 mm (see diagram below). Insert the instrument into the cut out from the front of the panel. From the rear of the instrument fit the two mounting brackets into the recess provided (see diagram below). Whilst holding the bracket in place, tighten the securing screws being careful not to over-tighten, as this may damage the instrument. Hint: use the elastic band provided to hold the mounting bracket in place whilst tightening securing screws.



3 Electrical installation

3.1 Electrical installation

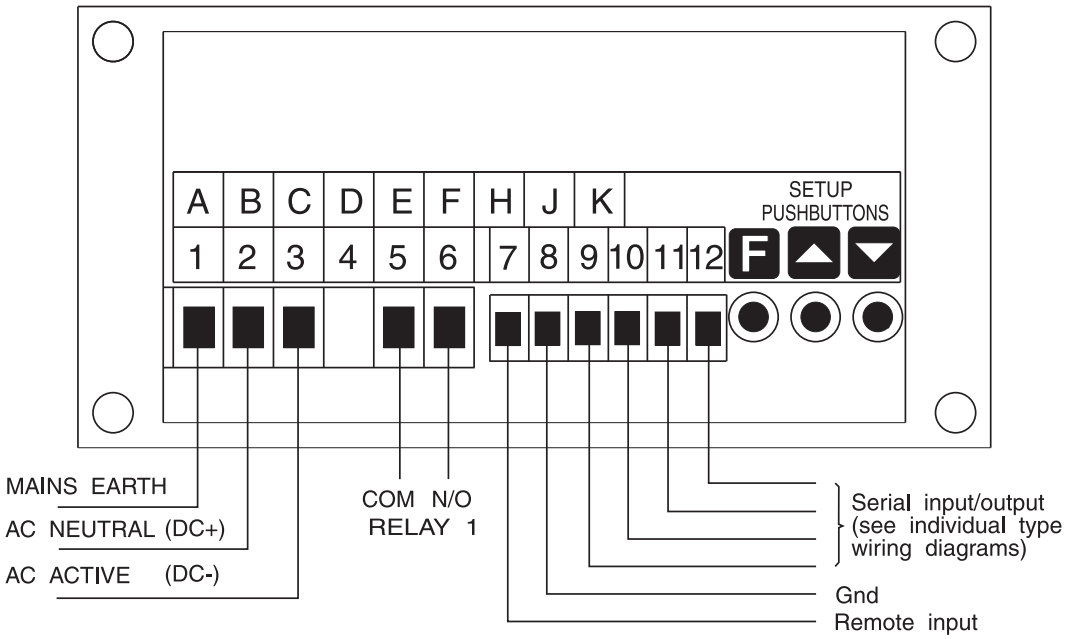
The PM4 Panel Meter is designed for continuous operation and no power switch is fitted to the unit. It is recommended that an external switch and fuse be provided to allow the unit to be removed for servicing.

The plug in, screw type, terminal blocks allow for wires of up to 2.5mm^2 to be fitted. Connect the wires to the appropriate terminals as indicated below. Refer to connection details provided in this chapter to confirm proper selection of voltage, polarity and input type before applying power to the instrument.

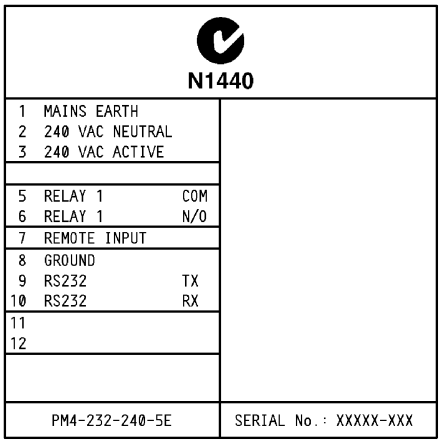
When power is applied the instrument will cycle through a display sequence indicating the software version and other status information, this indicates that the instrument is functioning. Acknowledgement of correct operation may be obtained by applying an appropriate input to the instrument and observing the reading.

For connection details of optional outputs refer to the separate "PM4 Panel Meter Optional Output Addendum" booklet supplied when options are fitted.

Use twin shielded wire for RS232 connection and twisted pair shielded wire for RS485 and RS422.



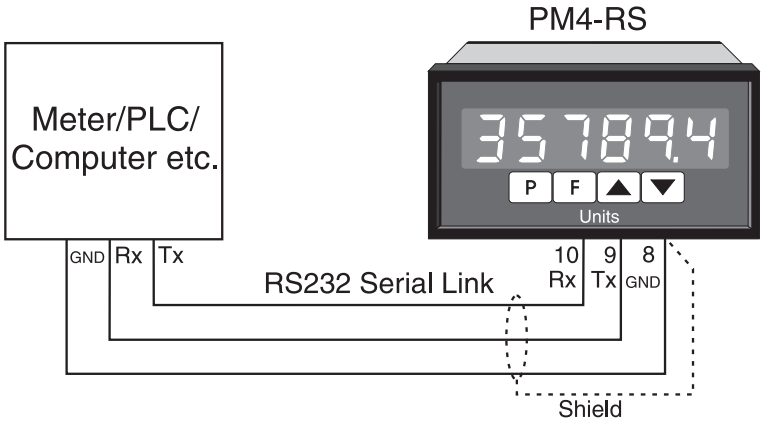
Instrument rear view



Instrument data label example

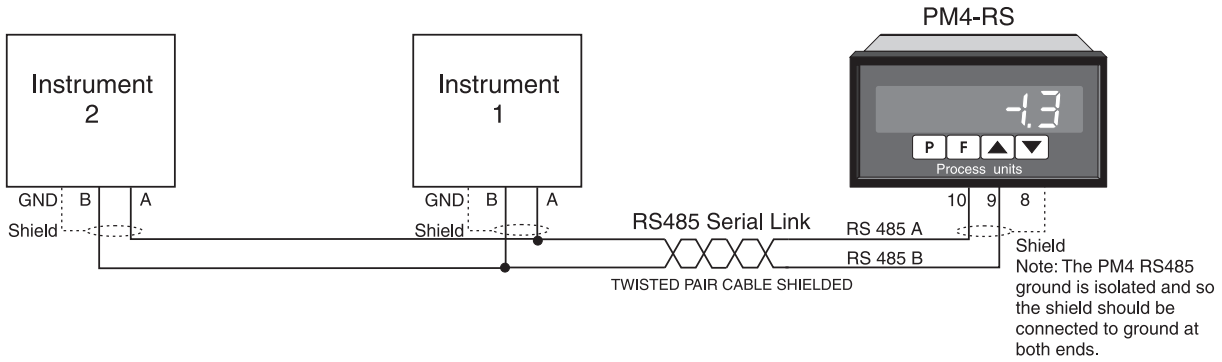
3.2 RS232 connections

Use 3 core shielded cable for RS232 connections. RS232 connections generally have Rx at the PM4-RS connected to Tx at the PLC/Computer etc. and Tx at the PM4-RS connected to Rx at the PLC/Computer etc. RS232 connections are usually rated to a maximum cable length of approximately 15 metres and are single ended in operation i.e. only one device can be connected to the PM4-RS.



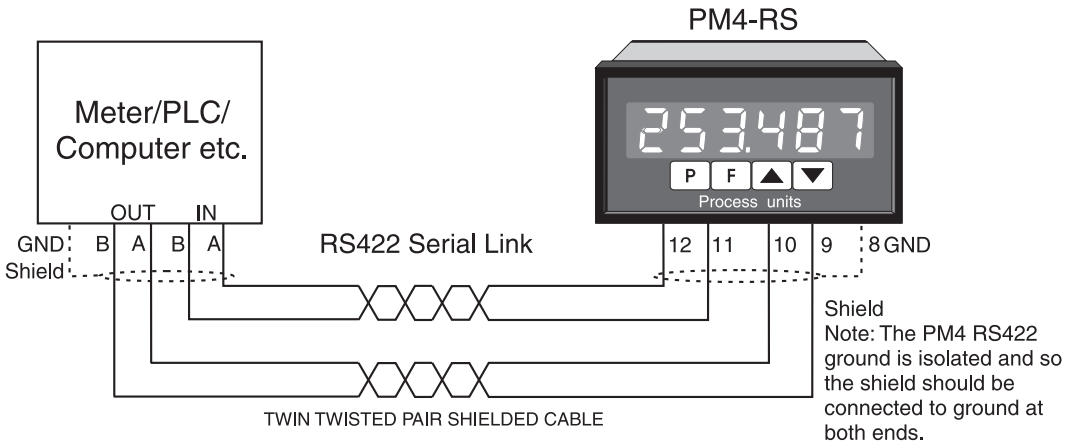
3.3 RS485 connections

RS485 connections use shielded, twisted pair wires. RS485 is rated to a maximum cable length of approximately 1200 metres and will allow connection of up to 32 drivers or receivers on the serial link. For cable runs of longer than a few metres terminating resistors may be required across the A and B terminals. The PM4-RS has an internal link (LK3) which can be used to switch in or out of circuit a 150Ω terminating resistor. For units without internal terminating resistors an external resistor of 150Ω (nominal) may be fitted. The terminating resistors are only required at the first and last units on the link.



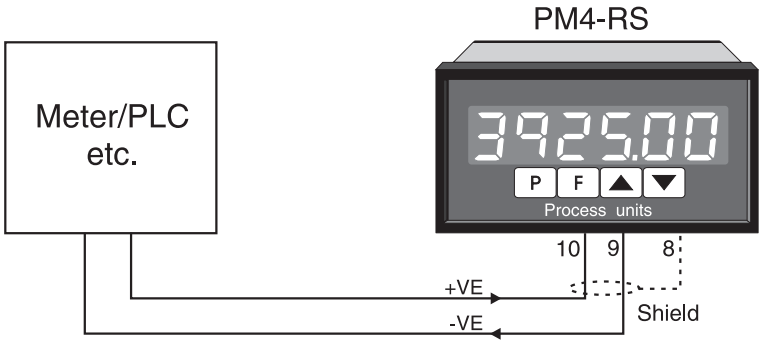
3.4 RS422 connections

RS422 connections use twin twisted pair, overall screened cable. RS422 is rated to a maximum cable length of approximately 1200 metres and will allow connection of 1 driver and up to 10 receivers on the serial link. Internal terminating resistors for RS422 can be fitted via links LK3 and LK4, see RS485 section above for notes on terminating links.



3.5 Serial current loop connections

Serial (i.e. pulsed) 20mA current loop connections are as shown below.



3.6 Relay connections

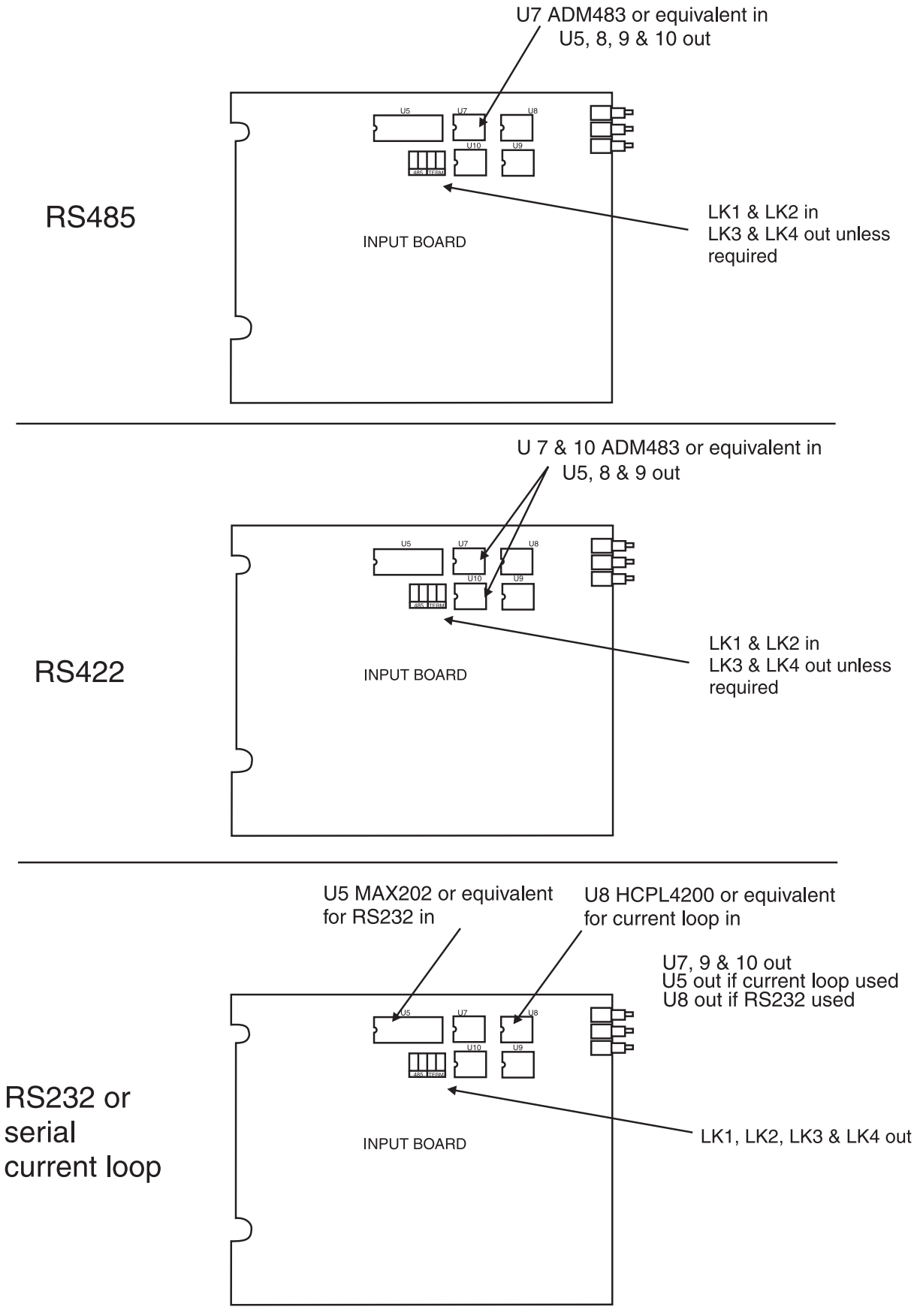
Relay connections The PM4 is supplied with one alarm relay as standard with connections on terminals 5 and 6, extra relays are optionally available. The relay is a single pole, single throw type and is rated at 5A, 240VAC into a resistive load. The relay contact is voltage free and may be programmed for normally open or normally closed operation.

3.7 Ext In (Remote input) connections

To operate the remote input connect a voltage free switch or relay across terminals 7 and 8. The function selected at the **r.I nP** function will operate when the switch is closed. Choose a momentary or latching switch to suit the application selected.

3.8 Link and driver chip connections

The driver chips are factory installed for the configuration ordered.



4 Functions available for each mode

The table below shows which functions are applicable to modes **di SP**, **ASCI** , **UAL**, **SCAN**, **CS** and **n.buS**. Refer to a separate Addendum booklet for details or **ArtH** and **nnEA** modes.

Function	Section	di SP	ASCI	UAL	SCAN	CS	n.buS
Ax Lo	6.1	No	No	Yes	Yes	Yes	Yes
Ax Hi	6.2	No	No	Yes	Yes	Yes	Yes
Ax HY	6.3	No	No	Yes	Yes	Yes	Yes
Axtt	6.4	No	No	Yes	Yes	Yes	Yes
Axrt	6.5	No	No	Yes	Yes	Yes	Yes
Axn.o or **Axn.c**	6.6	No	No	Yes	Yes	Yes	Yes
AxSP or **Axt 1** etc.	6.7	No	No	Yes	Yes	Yes	Yes
br9t	6.8	Yes	Yes	Yes	Yes	Yes	Yes
dull	6.9	Yes	Yes	Yes	Yes	Yes	Yes
bAr_	6.10	No	Yes	Yes	Yes	Yes	No
bAr¯	6.11	No	Yes	Yes	Yes	Yes	No
bAr tYPE	6.12	No	Yes	Yes	Yes	Yes	No
bAr CHAn	6.13	No	Yes	Yes	Yes	Yes	No
d90P	6.14	No	No	Yes	Yes	Yes	Yes
d9.0P	6.15	No	No	Yes	Yes	Yes	Yes
bcd Strt	6.16	No	No	Yes	Yes	Yes	Yes
di 9_	6.17	No	No	Yes	Yes	Yes	Yes
di 9¯	6.18	No	No	Yes	Yes	Yes	Yes
dout CHAn	6.19	No	No	No	Yes	Yes	Yes
rEC_	6.20	No	No	Yes	Yes	Yes	No
rEC¯	6.21	No	No	Yes	Yes	Yes	No
rEC	6.22	No	No	Yes	Yes	Yes	No
rEC_ Ch2	6.23	No	No	Yes	Yes	Yes	No
rEC¯ Ch2	6.24	No	No	Yes	Yes	Yes	No
rEC2	6.25	No	No	Yes	Yes	Yes	No
drnd	6.26	No	No	Yes	No	No	No
dCPt	6.27	No	No	Yes	No	No	No
FLtr	6.28	No	No	Yes	No	No	No
bAUd rAtE	6.29	Yes	Yes	Yes	Yes	Yes	Yes
PrtY	6.30	Yes	Yes	Yes	Yes	Yes	Yes
dAtA	6.31	Yes	Yes	Yes	Yes	Yes	Yes

Function	Section	dISP	ASCI	UAL	SCAN	CS	MODBUS
INPt	6.32	Yes	Yes	Yes	Yes	Yes	Yes
CodE	6.33	Yes	Yes	Yes	Yes	Yes	Yes
P.but	6.34	Yes	Yes	Yes	Yes	Yes	Yes
r.INP	??	Yes	Yes	Yes	Yes	Yes	Yes
ACCS	6.36	Yes	Yes	Yes	Yes	Yes	Yes
SPAC	6.37	No	No	Yes	No	No	No
A1 OPEr	6.38	No	No	Yes	Yes	Yes	Yes
A2 OPEr	6.39	No	No	Yes	Yes	Yes	Yes
MODBUS Addr	6.40	No	No	No	No	No	Yes
SCH1	6.41	No	Yes	Yes	No	No	No
SCH2	6.42	No	Yes	Yes	No	No	No
SCH3	6.43	No	Yes	Yes	No	No	No
tchr	6.44	No	Yes	Yes	No	No	No
dLAY	6.45	No	Yes	Yes	No	No	No
bAct	6.46	No	Yes	Yes	No	No	No
n.Chr	6.47	No	Yes	Yes	No	No	No
I.dPt	6.48	No	Yes	Yes	No	No	No
ALPH	6.49	No	Yes	Yes	No	No	No
POLL INPt	6.50	No	Yes	Yes	No	No	No
POLL dLAY	6.51	No	Yes	Yes	No	No	No
P.ch.1	6.52	No	Yes	Yes	No	No	No
P.ch.2	6.53	No	Yes	Yes	No	No	No
P.ch.3	6.54	No	Yes	Yes	No	No	No
P.ch.4	6.55	No	Yes	Yes	No	No	No
P.ch.5	6.56	No	Yes	Yes	No	No	No
P.ch.6	6.57	No	Yes	Yes	No	No	No
P.ch.7	6.58	No	Yes	Yes	No	No	No
P.ch.8	6.59	No	Yes	Yes	No	No	No
dS.to	6.60	Yes	Yes	Yes	Yes	Yes	Yes
t.out	6.61	Yes	Yes	Yes	Yes	Yes	Yes
FASt r485	6.62	Yes	Yes	Yes	Yes	Yes	No
A1	6.63	No	No	Yes	Yes	Yes	No
A2 to A7	6.64	No	No	Yes	Yes	Yes	No

Function	Section	dISP	RSCI	URL	SCAN	CS	M.bUS
CLr ZERO	6.65	No	No	Yes	No	No	No
SCAN CH	6.66	No	No	No	Yes	Yes	No
SCAN SECS	6.67	No	No	No	Yes	Yes	No
Ch 1 Addr	6.68	No	No	No	Yes	No	No
Ch2 Addr	6.69	No	No	No	Yes	No	No
Ch3 Addr	6.70	No	No	No	Yes	No	No
Ch4 Addr	6.71	No	No	No	Yes	No	No
Ch5 Addr	6.72	No	No	No	Yes	No	No
Ch6 Addr	6.73	No	No	No	Yes	No	No
Ch7 Addr	6.74	No	No	No	Yes	No	No
Ch8 Addr	6.75	No	No	No	Yes	No	No
dFLt dISP	6.76	No	No	No	Yes	Yes	No
Ch 1 dCPt	6.77	No	No	No	Yes	Yes	No
Ch2 dCPt	6.78	No	No	No	Yes	Yes	No
Ch3 dCPt	6.79	No	No	No	Yes	Yes	No
Ch4 dCPt	6.80	No	No	No	Yes	Yes	No
Ch5 dCPt	6.81	No	No	No	Yes	Yes	No
Ch6 dCPt	6.82	No	No	No	Yes	Yes	No
Ch7 dCPt	6.83	No	No	No	Yes	Yes o	No
Ch8 dCPt	6.84	No	No	No	Yes	Yes	No
Ch 1	6.86	No	No	No	No	Yes	No
Ch2	6.87	No	No	No	No	Yes	No
Ch3	6.88	No	No	No	No	Yes	No
Ch4	6.89	No	No	No	No	Yes	No
Ch5	6.90	No	No	No	No	Yes	No
Ch6	6.91	No	No	No	No	Yes	No
Ch7	6.92	No	No	No	No	Yes	No
Ch8	6.93	No	No	No	No	Yes	No
r.trn bAUd	6.94	Yes	Yes	Yes	Yes	Yes	Yes
r.trn PrtY	6.95	Yes	Yes	Yes	Yes	Yes	Yes
r.trn O.Put	6.96	Yes	Yes	Yes	Yes	Yes	Yes
r.trn Addr	6.97	Yes	Yes	Yes	Yes	Yes	Yes

5 Function tables - summary of setup functions

Note: the order in which the functions appear on the display may not be exactly as shown below. The availability and order of functions is determined by choice of function settings and options fitted.

Functions in this first table are available in FUNC or CAL mode

Display	Function	Range	Default	Your record	Ref/Page
AxLo	Low setpoint value for designated alarm relay x	Any display value or OFF	OFF	See 5.1	6.1 / 24
AxHi	High setpoint value for designated alarm relay x	Any display value or OFF	OFF	See 5.1	6.2 / 24
AxHY	Hysteresis value for the designated alarm relay x.	0 to 9999	10	See 5.1	6.3 / 25
Axtt	Trip time delay for the designated alarm relay x.	0 to 9999	0	See 5.1	6.4 / 26
Axrt	Reset time delay for the designated alarm relay x.	0 to 9999	0	See 5.1	6.5 / 26
Axn.o or Axn.c	Alarm relay x action to normally open (de-energised) or normally closed (energised)	Axn.o or Axn.c	Axn.o	See 5.1	6.6 / 26
AxSP or Axt 1 etc.	Relay operation independent setpoint or trailing setpoint (*Optional)	AxSP or Axt 1 etc.	AxSP	See 5.1	6.7 / 27
brgt	Display brightness level	1 to 15	15		6.8 / 27
dULL	Display remote brightness switching	0 to 15	1		6.9 / 27

(*Optional)—this function will only be accessible if the relevant option is fitted

Functions in this second table are available only in CAL mode or if ACCS is set to ALL

Display	Function	Range	Default	Your record	Ref/Page
bAr_	Bargraph low value	Any display value	0		6.10 / 28
bAr¯	Bargraph high value	Any display value	1000		6.11 / 28
bAr tYPE	Bargraph type for instruments with bargraph display	bAr, S.dot, d.dot, C.bAr or r.dot	bAr		6.12 / 28

(*Optional)—this function will only be accessible if the relevant option is fitted

bAr CHAn	Bargraph channel	0 to 8	0		6.13 / 29
d9OP	Digital output option mode (*Optional)	bcd, b.SCL, bin or bin2	bin2		6.14 / 30
d9.OP	Digital output option polarity (*Optional)	AIo or AHi	AIo		6.15 / 30
bcd Strt	Digital output option BCD start position (*Optional)	0, 1 or 2	0		6.16 / 30
di9_	Digital output option low value (*Optional)	Any display value	0		6.17 / 30
di9¯	Digital output option high value (*Optional)	Any display value	1000		6.18 / 31
dout CHAn	Digital output option channel (*Optional)	ch0 to ch8	ch0		6.19 / 31
rEC_	Analog output option low display value (*Optional)	Any display value	0		6.20 / 31
rEC¯	Analog output option high display value (*Optional)	Any display value	1000		6.21 / 32
rEC	Analog output 1 channel (*Optional)	ch0 to ch8	ch0		6.22 / 32
rEC_ Ch2	Second analog output option low display value (*Optional)	Any display value	0		6.23 / 32
rEC¯ Ch2	Second analog output option high display value (*Optional)	Any display value	1000		6.24 / 32
rEC2	Analog output 2 channel (*Optional)	ch0 to ch8	ch0		6.25 / 33
drnd	Display rounding	1 to 5000	1		6.26 / 33
dCPt	Decimal point	0, 0.1 etc.	0		6.27 / 33
FLtr	Digital filter	0 to 8	2		6.28 / 34
bAUd rAtE	Baud rate for serial communications	300.600. 1200.2400. 4800.9600. 19.2 or 38.4	9600		6.29 / 34
PrtY	Parity for serial input	nonE.EUEn or Odd	nonE		6.30 / 34
dAtA	Data type	8.bit or 7.bit	8.bit		6.31 / 34
inPt	Input type	r232, r422, r485 or i 20	r232		6.32 / 35

(*Optional)—this function will only be accessible if the relevant option is fitted

CodE	Data type for display	dI SP, ASCI , UAL, ArtH, ñ.buS, PtA, SCAn, nñEA or CS	dI SP		6.33 / 35
P.but	P button function	nonE .Hi . Lo .HI Lo. tArE or 2Er0	nonE		6.34 / 37
r.I nP	Remote input (external input)function	nonE. P.HLd. d.HLd .Hi . Lo .Hi Lo. tArE .2Er0. SP.Ac .no.Ac or duLL	nonE		6.35 / 37
ACCS	Access mode	OFF .EASY. nonE or ALL	OFF		6.36 / 38
SPAC	Setpoint access mode (*Optional)	A 1.A 1-2 etc.	A 1		6.37 / 39
A 1 OPEr	Alarm relay 1 operation mode	I nPt, t.out or both	I nPt		6.38 / 39
A2 OPEr	Alarm relay 2 operation mode	I nPt, t.out or both	I nPt		6.39 / 39
ñ.buS Addr	Modbus address	0 to 255	1		6.40 / 40
SCH 1	Address character 1	-2 to 255	- 1		6.41 / 40
SCH2	Address character 2	-2 to 255	- 1		6.42 / 40
SCH3	Address character 3	-2 to 255	- 1		6.43 / 41
tchr	Terminating character	- 1 to 255	13		6.44 / 41
dLAY	Number of characters to skip	0 to 255	0		6.45 / 41
bAct	Number of characters back	0 to 24	0		6.46 / 41
n.Chr	Number of characters to skip from SCH	0 to 10	0		6.47 / 42
I .dPt	Input string decimal point	- 1 to 8	- 1		6.48 / 42
ALPH	Alphabetic characters on or off	on or OFF	OFF		6.49 / 43
POLL I nPt	Polling function	on or OFF	OFF		6.50 / 43
POLL dLAY	Polling delay time	0.0 or 20.0	0.0		6.51 / 43
P.ch. 1	First polling character	- 1 to 255	- 1		6.52 / 43

(*Optional)—this function will only be accessible if the relevant option is fitted

P.ch.2	Second polling character	-1 to 255	-1		6.53 / 44
P.ch.3	Third polling character	-1 to 255	-1		6.54 / 44
P.ch.4	Fourth polling character	-1 to 255	-1		6.55 / 44
P.ch.5	Fifth polling character	-1 to 255	-1		6.56 / 44
P.ch.6	Sixth polling character	-1 to 255	-1		6.57 / 45
P.ch.7	Seventh polling character	-1 to 255	-1		6.58 / 45
P.ch.8	Eighth polling character	-1 to 255	-1		6.59 / 45
dS.to	Display timeout	0 to 9999	10		6.60 / 45
t.out	Data string timeout	0.0 to 10.0	1.0		6.61 / 45
FASt r485	Fast RS485	on or OFF	OFF		6.62 / 46
A1	Alarm relay 1 operation channel	ch0 to ch8	ch0		6.63 / 46
A2 to A7	Alarm relays 2 to 7 operation channel (*__Optional__)	ch0 to ch8	ch0		6.64 / 46
CLr ZEr0	Clear zero	n/a	n/a		6.65 / 46
SCAN CH	Number of channels to scan	0 to 8	0		6.66 / 47
SCAN SECS	Number of seconds between scans	0 to 255	0		6.67 / 47
Ch1 Addr	Channel 1 address	P1 to P8 or S1 to S8 or t1 to t8	P1		6.68 / 47
Ch2 Addr	Channel 2 address	P1 to P8 or S1 to S8 or t1 to t8	P1		6.69 / 48
Ch3 Addr	Channel 3 address	P1 to P8 or S1 to S8 or t1 to t8	P1		6.70 / 48
Ch4 Addr	Channel 4 address	P1 to P8 or S1 to S8 or t1 to t8	P1		6.71 / 48
Ch5 Addr	Channel 5 address	P1 to P8 or S1 to S8 or t1 to t8	P1		6.72 / 48
Ch6 Addr	Channel 6 address	P1 to P8 or S1 to S8 or t1 to t8	P1		6.73 / 48
Ch7 Addr	Channel 7 address	P1 to P8 or S1 to S8 or t1 to t8	P1		6.74 / 49

(*__Optional__)—this function will only be accessible if the relevant option is fitted

Ch8 Addr	Channel 8 address	P1 to P8 or S1 to S8 or t1 to t8	P1		6.75 / 49
dFLt di SP	Default display for SCAN or CS mode	ch1 to ch8	ch1		6.76 / 49
Ch1 dCPt	Channel 1 decimal point	0, 0.1 etc.	0		6.77 / 49
Ch2 dCPt	Channel 2 decimal point	0, 0.1 etc.	0		6.78 / 50
Ch3 dCPt	Channel 3 decimal point	0, 0.1 etc.	0		6.79 / 50
Ch4 dCPt	Channel 4 decimal point	0, 0.1 etc.	0		6.80 / 50
Ch5 dCPt	Channel 5 decimal point	0, 0.1 etc.	0		6.81 / 50
Ch6 dCPt	Channel 6 decimal point	0, 0.1 etc.	0		6.82 / 50
Ch7 dCPt	Channel 7 decimal point	0, 0.1 etc.	0		6.83 / 51
Ch8 dCPt	Channel 8 decimal point	0, 0.1 etc.	0		6.84 / 51
Ch0	Channel 0 polarity	both, POS or NEG	both		6.85 / 51
Ch1	Channel 1 polarity	both, POS or NEG	both		6.86 / 51
Ch2	Channel 2 polarity	both, POS or NEG	both		6.87 / 52
Ch3	Channel 3 polarity	both, POS or NEG	both		6.88 / 52
Ch4	Channel 4 polarity	both, POS or NEG	both		6.89 / 52
Ch5	Channel 5 polarity	both, POS or NEG	both		6.90 / 52
Ch6	Channel 6 polarity	both, POS or NEG	both		6.91 / 52
Ch7	Channel 7 polarity	both, POS or NEG	both		6.92 / 53
Ch8	Channel 8 polarity	both, POS or NEG	both		6.93 / 53

(*__Optional__)—this function will only be accessible if the relevant option is fitted

r.trn bAUd	Baud rate for serial retransmission (*Optional)	300, 600, 1200, 2400, 4800, 9600, 19.2 or 38.4	9600		6.94 / 53
r.trn PrtY	Parity for serial retransmission (*Optional)	nonE, EUEn or Odd	nonE		6.95 / 53
r.trn O.PuT	Output mode for serial retransmission (*Optional)	nonE, di SP, Cont, POLL, Cont, ñ.buS or A.buS	nonE		6.96 / 54
r.trn Addr	Address for serial retransmission (*Optional)	0 to 31	0		6.97 / 54

(*Optional)—this function will only be accessible if the relevant option is fitted

5.1 Relay table

Record your relay settings in the table below

Display	Relay 1	Relay 2	Relay 3	Relay 4	Relay 5	Relay 6	Relay 7
*x*Lo							
*x*Hi							
*x*HY							
*x*tt							
*x*rt							
*x*n.o or *x*n.c							
*x*SP or *x*t 1 etc.	n/a						
A1							
A2							
A3							
A4							
A5							
A6							
A7							

6 Explanation of functions

The PM4 setup and calibration functions are configured through a push button sequence. The three push buttons located at the rear of the instrument (also at the front on some display options) are used to alter settings. Two basic access modes are available:

FUNC mode (simple push button sequence) allows access to commonly set up functions such as alarm setpoints.

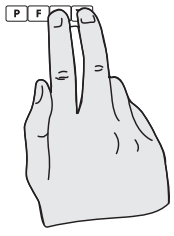
CAL mode (power up sequence plus push button sequence) allows access to all functions including calibration parameters.

Once **CAL** or **FUNC** mode has been entered you can step through the functions, by pressing and releasing the **F** push button, until the required function is reached. Changes to functions are made by pressing the or push button (in some cases both simultaneously) when the required function is reached. See the flow chart example on the following page.

Entering CAL Mode

1. Remove power from the instrument. Hold in the **F** button and reapply power. The display will briefly indicate **CAL** as part of the "wake up messages" when the **CAL** message is seen you can release the button. Move to step 2 below.

2. When the "wake up" messages have finished and the display has settled down to its normal reading press, then release the **F** button.
Move to step 3 below.



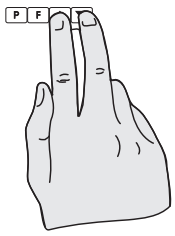
3. Within 2 seconds of releasing the **F** button press, then release the ▲ and ▼ buttons together. The display will now indicate **FUNC** followed by the first function.

Note: If step 1 above has been completed then the instrument will remain in this **CAL** mode state until power is removed. i.e. there is no need to repeat step 1 when accessing function unless power has been removed.

Entering FUNC Mode

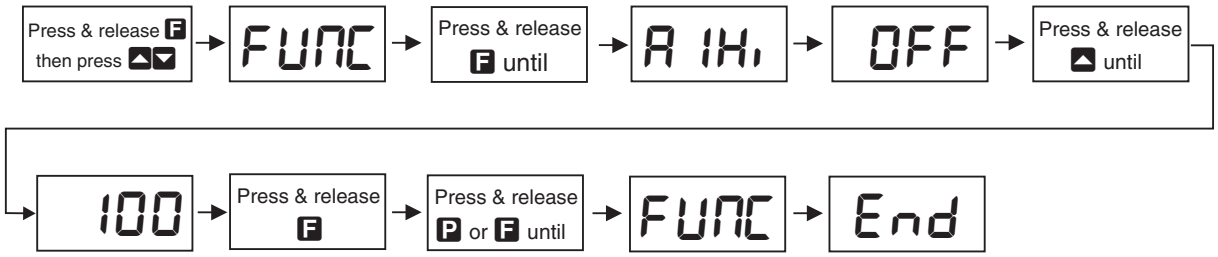
No special power up procedure is required to enter **FUNC** mode.

1. When the "wake up" messages have finished and the display has settled down to its normal reading press, then release the **F** button.

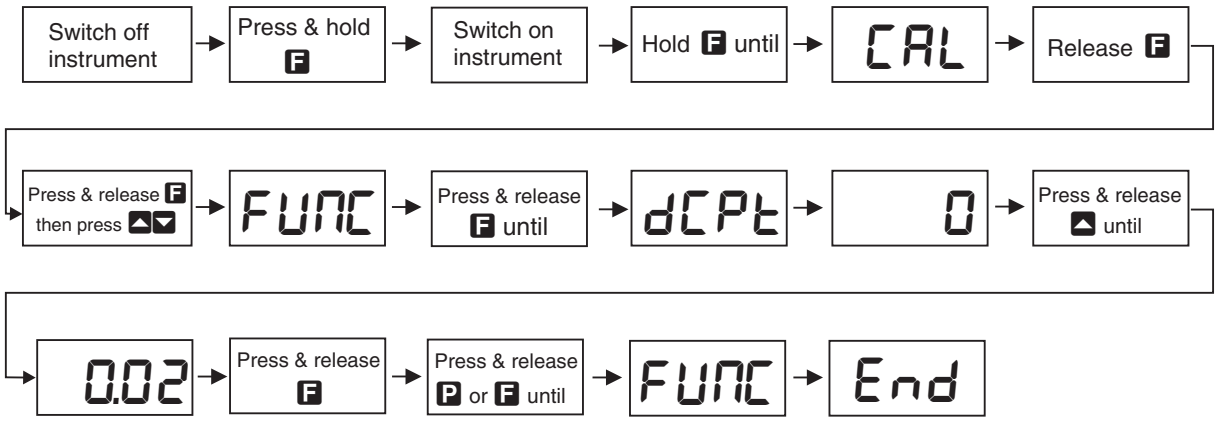


2. Within 2 seconds of releasing the **F** button press, then release the ▲ and ▼ buttons together. The display will now indicate **FUNC** followed by the first function.

Example: Entering FUNC mode to change alarm 1 high function A 1H, from OFF to 100



Example: Entering CAL mode to change decimal point function dCPt from 0 to 0.02



Easy alarm relay adjustment access facility

The display has an easy alarm access facility which allows access to the alarm setpoints simply by pressing the F button at the front or rear of the instrument. The first setpoint will then appear and changes to this setpoint may be made to this setpoint via the ▲ or ▼ buttons. Press the F button to accept any changes or to move on to the next setpoint. Note: this easy access also functions in the same manner for the PI control setpoint (relay and/or analog PI output) if PI control is available. The instrument must be set in the manner described below to allow the easy access facility to work:

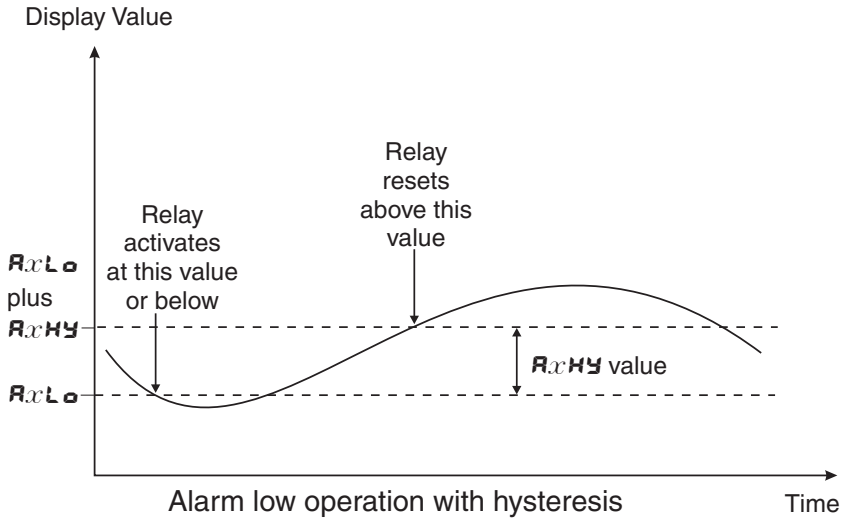
1. The F.I nP function must be set to SPAC or the ACCS function must be set to EASY.
2. At least one alarm must have a setpoint, nothing will happen if all the alarm setpoints are set to OFF.
3. The SPAC function must be set to allow access to the relays required e.g. if set to A 1-2 then the easy access will work only with alarm relays 1 and 2 even if more relays are fitted.
4. The instrument must be in normal measure mode i.e. if the instrument is powered up so that it is in CAL mode then the easy access will not function. If in doubt remove power from the instrument, wait for a few seconds then apply power again.
5. If the easy access facility is used then the only way to view or alter any other function settings is to power up via CAL mode i.e. there is no entry to FUNC mode functions unless the instrument is powered up in CAL mode.

6.1 Alarm relay low setpoint

Display: RxLo
Range: Any display value or OFF
Default Value: OFF

Displays and sets the low setpoint value for the designated alarm relay x. Note x will be replaced by the relay number when displayed e.g. R 1Lo for relay 1. Use this low setpoint function if a relay operation is required when the display value becomes equal to or less than the low setpoint value. To set a low alarm value go to the RxLo function and use the ▲ or ▼ push buttons to set the value required then press F to accept this value. The low alarm setpoint may be disabled by pressing the ▲ and ▼ push buttons simultaneously. When the alarm is disabled the display will indicate OFF. If the relay is allocated both a low and high setpoint then the relay will activate when the value displayed moves outside the band set by the low and high setpoints. The value at which the relay will reset is controlled by the RxHY function.

Example:
If R 1Lo is set to 10 then relay 1 will activate when the display value is 10 or less.

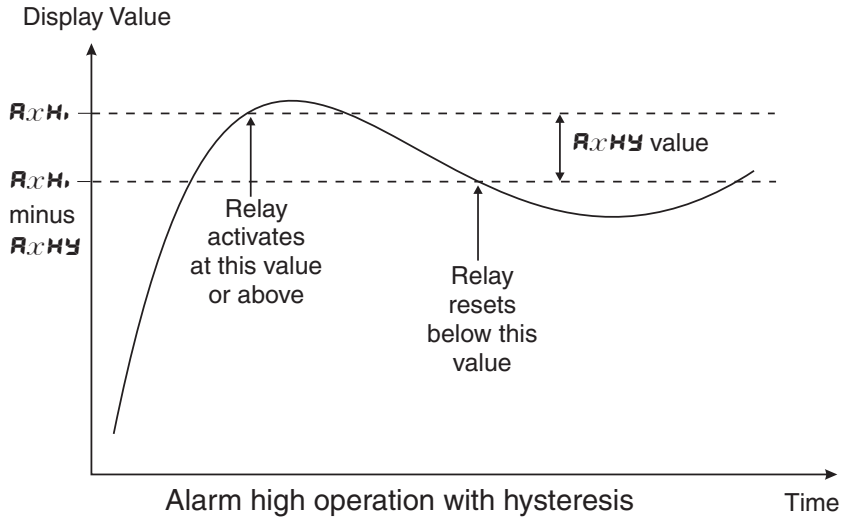


6.2 Alarm relay high setpoint

Display: RxHi
Range: Any display value or OFF
Default Value: OFF

Displays and sets the high setpoint value for the designated alarm relay x. Note x will be replaced by the relay number when displayed e.g. R 1Hi for relay 1. Use this high setpoint function if a relay operation is required when the display value becomes equal to or more than the low setpoint value. To set a high alarm value go to the RxHi function and use the ▲ or ▼ push buttons to set the value required then press F to accept this value. The high alarm setpoint may be disabled by pressing the ▲ and ▼ push buttons simultaneously. When the alarm is disabled the display will indicate OFF. If the relay is allocated both a low and high setpoint then the relay will activate when the value displayed moves outside the band set by the low and high setpoints. The value at which the relay will reset is controlled by the RxHY function.

Example:
If **A 1H,** is set to **100** then relay 1 will activate when the display value is **100** or higher.



6.3 Alarm relay hysteresis (deadband)

Display: **AxHY**

Range: **0** to **9999**

Default Value: **10**

Displays and sets the alarm relay hysteresis limit for the designated relay x. Note x will be replaced by the relay number when displayed e.g. **A 1HY** for relay 1. To set a relay hysteresis value go to the **AxHY** function and use the ⏶ or ⏷ push buttons to set the value required then press **F** to accept this value. The hysteresis value is common to both high and low setpoint values. The hysteresis value may be used to prevent too frequent operation of the relay when the measured value is rising and falling around setpoint value. e.g. if **A 1HY** is set to zero the alarm will activate when the display value reaches the alarm setpoint (for high alarm) and will reset when the display value falls below the setpoint, this can result in repeated on/off switching of the relay at around the setpoint value.

The hysteresis setting operates as follows: In the high alarm mode, once the alarm is activated the input must fall below the setpoint value minus the hysteresis value to reset the alarm. e.g. if **A 1H,** is to **50.0** and **A 1HY** is set to **3.0** then the setpoint output relay will activate once the display value goes to **50.0** or above and will reset when the display value goes below **47.0** i.e. at **46.9** or below. In the low alarm mode, once the alarm is activated the input must rise above the setpoint value plus the hysteresis value to reset the alarm. e.g. if **A 1Lo** is to **20.0** and **A 1HY** is set to **10.0** then the alarm output relay will activate when the display value falls to **20.0** or below and will reset when the display value goes above **30.0** i.e at **30.1** or above. The hysteresis units are expressed in displayed engineering units.

Example: If **A 1H,** is set to **100** and **A 1HY** is set to **10** then relay 1 will activate when the display value is **100** or higher and will reset at a display value of **89** or lower.

6.4 Alarm relay trip time

Display: Rxtt
Range: 0 to 9999
Default Value: 0

Displays and sets the alarm trip time in seconds. The trip time is common for both alarm high and low setpoint values. The trip time provides a time delay before the alarm relay will activate when an alarm condition is present. The alarm condition must be present continuously for the whole trip time period before the alarm will activate. If the input moves out of alarm condition during this period the timer will reset and the full time delay will be restored. This trip time delay is useful for preventing an alarm trip due to short non critical deviations from setpoint. The trip time is selectable over 0 to 9999 seconds. To set a trip time value go to the Rxtt function and use the ▲ or ▼ push buttons to set the value required then press F to accept this value.

Example: If R 1tt is set to 5 seconds then the display must indicate an alarm value for a full 5 seconds before relay 1 will activate.

6.5 Alarm relay reset time

Display: Rxrt
Range: 0 to 9999
Default Value: 0

Displays and sets the alarm reset delay time in seconds. The reset time is common for both alarm high and low setpoint values. With the alarm condition is removed the alarm relay will stay in its alarm condition for the time selected as the reset time. If the input moves back into alarm condition during this period the timer will reset and the full time delay will be restored. The reset time is selectable over 0 to 9999 seconds. To set a reset time value go to the Rxrt function and use the ▲ or ▼ push buttons to set the value required then press F to accept this value.

Example: If R 1rt is set to 10 seconds then the resetting of alarm relay 1 will be delayed by 10 seconds.

6.6 Alarm relay normally open/closed

Display: Rxn.o or Rxn.c
Range: Rxn.o or Rxn.c
Default Value: Rxn.o

Displays and sets the setpoint alarm relay x action to normally open (de-energised) or normally closed (energised), when no alarm condition is present. Since the relay will always open when power is removed a normally closed alarm is often used to provide a power failure alarm indication. To set the alarm relay for normally open or closed go to the Rxn.o or Rxn.c function and use the ▲ or ▼ push buttons to set the required operation then press F to accept this selection. **Example:** If set to R 1n.o alarm relay 1 will be open circuit when the display is outside alarm condition and will be closed (short circuit across terminals) when the display is in alarm condition.

6.7 Alarm relay setpoint or trailing operation

Display: AxSP or Axt 1 etc.
Range: AxSP or Axt 1 etc.
Default Value: AxSP

Relay operation independent setpoint or trailing setpoint, this function will not be seen unless extra optional relays are fitted. Each alarm, except relay 1, may be programmed to operate with an independent setpoint value or may be linked to operate at a fixed difference to another relay setpoint, known as trailing operation. The operation is as follows:

Alarm 1 (A1) is always independent. Alarm 2 (A2) may be independent or may be linked to Alarm 1. Alarm 3 (A3) may be independent or may be linked to Alarm 1 or Alarm 2. Alarm 4 (A4) may be independent or may be linked to Alarm 1, Alarm 2 or Alarm 3. The operation of each alarm is selectable by selecting, for example, (Alarm 4) A4.SP = Alarm 4 normal setpoint or A4.t 1 = Alarm 4 trailing Alarm 1 or A4.t2 = Alarm 4 trailing Alarm 2 or A4.t3 = Alarm 4 trailing Alarm 3. For trailing set points the setpoint value is entered as the difference from the setpoint being trailed. If the trailing setpoint is to operate ahead of the prime setpoint then the value is entered as a positive number and if operating behind the prime setpoint then the value is entered as a negative number.

Example: With Alarm 2 set to trail alarm 1, if A 1H, is set to 1000 and A2H, is set to 50 then Alarm 1 will activate at 1000 and alarm 2 will activate at 1050 (i.e. 1000 + 50). If Alarm 2 had been set at -50 then alarm 2 would activate at 950 (i.e. 1000 – 50).

6.8 Display brightness

Display: brgt
Range: 1 to 15
Default Value: 15

Displays and sets the digital display brightness. The display brightness is selectable from 1 to 15, where 1 = lowest intensity and 15 = highest intensity. This function is useful for improving the display readability in dark areas or to reduce the power consumption of the instrument. See also the dull function. To set brightness level go to the brgt function and use the ▲ or ▼ push buttons to set the value required then press F to accept this value.

6.9 Display remote brightness switching

Display: dull
Range: 0 to 15
Default Value: 1

Displays and sets the level for remote input brightness switching, see r.1 nP function. When a remote input is set to dull the remote input can be used to switch between the display brightness level set by the brgt function 6.8 and the display brightness set by the dull function. The display dull level is selectable from 0 to 15, where 0 = lowest intensity and 15 = highest intensity. This function is useful in reducing glare when the display needs to be viewed in both light and dark

ambient light levels. To set dull level go to the dull function and use the ▲ or ▼ push buttons to set the value required then press F to accept this value.

Example:
With dull set to 4 and brgt set to 15 and the r.inP function set to dull the display brightness will change from the 15 level to 4 when a switch connected to the remote input terminals is activated.

6.10 Bargraph low value

Display: bAr_
Range: Any display value
Default Value: 0

Seen only in bargraph display instruments. Displays and sets the bar graph low value i.e. the value on the 7 segment display at which the bargraph will start to rise. This may be independently set anywhere within the display range of the instrument. Note: The bAr_ and bAr‾ settings are referenced from the 7 segment display readings, not the bargraph scale values. The bargraph scale may scaled differently to the 7 segment display. For example the bargraph scale may be indicating percentage fill of a tank whilst the 7 segment display is indicating actual process units. To set bargraph low level go to the bAr_ function and use the ▲ or ▼ push buttons to set the value required then press F to accept this value.

6.11 Bargraph high value

Display: bAr‾
Range: Any display value
Default Value: 1000

Seen only in bargraph display instruments. Displays and sets the bar graph high value i.e. the value on the 7 segment display at which the bargraph will reach its maximum indication (e.g. all LEDs illuminated). May be independently set anywhere within the display range of the instrument. To set bargraph high level go to the bAr‾ function and use the ▲ or ▼ push buttons to set the value required then press F to accept this value.

6.12 Bargraph type for instruments with bargraph display

Display: bAr tYPE
Range: bAr, S.dot, d.dot, C.bAr or r.dot
Default Value: bAr

Bar graph display operation mode - seen only in vertical or circular bargraph display instruments. Allows selection of bargraph operation mode. Choices available are:

- bAr - conventional solid bargraph display i.e. all LEDs illuminated when at full scale. When scaling the display use the bAr_ and bAr‾ functions e.g. bAr_ = 0 and bAr‾ =

100 will give a bargraph with no segments lit at a 7 segment display reading of 0 and all segments lit with a 7 segment display reading of 100.

- S.dot - single dot display. A single segment will be lit to indicate the input readings position on the scale. When scaling the display use the bAr_L and bAr_H functions e.g. bAr_L = 0 and bAr_H = 100 will give a bargraph with the bottom segment lit at a 7 segment display reading of 0 and the top segment lit with a 7 segment display reading of 100. Note: this could also be set up as a centre zero single dot display by entering a negative value and positive value. e.g. bAr_L = -100, bAr_H = 100.

- d.dot - double dot display. Two segments will be lit to indicate the input reading position on the scale. The reading should be taken from the middle of the two segments. When scaling the display use the bAr_L and bAr_H functions e.g. bAr_L = 0 and bAr_H = 100 will give a bargraph with the bottom two segments lit at a 7 segment display reading of 0 and the top two segments lit with a 7 segment display reading of 100. Note: this could also be set up as a centre zero double dot display by entering a negative value and positive value. e.g. bAr_L = -100, bAr_H = 100.

- C.bAr - centre bar display. The display will be a solid bargraph but will have its zero point in the middle of the display. If the seven segment display value is positive the bargraph will rise. If the seven segment display value is negative then the bargraph will fall. When scaling the display use the bAr_L and bAr_H functions e.g. bAr_L = 0 and bAr_H = 100 will give a bargraph with all the bottom half segments lit at a 7 segment display reading of -100 and all the top segments lit with a 7 segment display reading of 100.

- r.dot - modulus or wrap around single dot bargraph. This mode of operation allows the bargraph to wrap around the limits set by the bAr_L and bAr_H functions by dividing the 7 segment display by the modulus (the modulus is the difference between 0 and bAr_H) and displaying the remainder. For example if bAr_L is set to 0 and bAr_H is set to 10 then in other bargaph modes when the 7 segment display reads a value such as 25 the bargraph would be stuck at the high limit of its travel since it cannot go beyond 10. In r.dot mode the display will wrap around at 10 then continue up the bar again and will be at the midpoint of the bargraph when the 7 segment display shows 25 (as it would for a 7 segment display of 15, 35, etc.). In this example for a 7 segment display of 25 the value of 25 is divided by the modulus value of 10 in this example and the remainder displayed i.e. 10 goes into 25 twice with the remainder of 5 and so a bargaph position of 5 is displayed. This mode will operate on both vertical and circular bargraph type displays.

6.13 Bargraph channel

Display:	bAr CHAn
Range:	0 to 8
Default Value:	0

Bargraph channel - for multiple input value modes e.g. ArtH mode, this function allows selection of which of the inputs will be sent to the bargraph for display. The first input will be displayed by the 7 segment display. For nnEA mode channel is the wind direction and channel 2 is the wind speed.

6.14 Digital output option mode

Display: d9OP
Range: bcd, b.SCL, b, n or b, n2
Default Value: b, n2

Seen only with the 16 bit digital output option. Refer to the separate "PM4 Panel Meter Optional Output Addendum" booklet supplied when this option is fitted. Selections available are: b, n2 (signed binary) i.e. -32767 to 32767, b, n (unsigned binary) i.e. 0 to 65535, b.SCL (scaled binary, see d, 9_ and d, 9¯ below), bcd (binary coded decimal) i.e. up to four BCD numbers.

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6.15 Digital output option polarity

Display: d9.OP
Range: AI o or AH,
Default Value: AI o

Seen only with the 16 bit digital output option. Refer to the separate "PM4 Panel Meter Optional Output Addendum" booklet supplied when this option is fitted. Selections available are: AI o (active low i.e. logic 1 = 0V output, logic 0 = +V output) or AH, (active high i.e. logic 1 = +V output, logic 0 = 0V output).

6.16 Digital output option BCD start position

Display: bcd Strt
Range: 0, 1 or 2
Default Value: 0

Seen only with the 16 bit digital output option. Refer to the separate "PM4 Panel Meter Optional Output Addendum" booklet supplied when this option is fitted. This function affects BCD mode only and determines the number of digits to skip when outputting from the display. As the output is 16 bit it can output up to 4 BCD numbers. Select from 0 to number of display digits minus 4. e.g. for a 6 digit display you may select 0 to 2, if 2 is selected then the four left most digits will be output, if set to 0 then the four right most digits will be output.

6.17 Digital output option low value

Display: d, 9_
Range: Any display value
Default Value: 0

Seen only with the 16 bit digital output option. Refer to the separate "PM4 Panel Meter Optional Output Addendum" booklet supplied when this option is fitted. Accepts any valid display value.

Determines the low scaling point for the **b.SCL** mode and has no effect on other modes. See example which follows in 6.18.

6.18 Digital output option high value

Display: **d. 9^**
Range: Any display value
Default Value: **1000**

Seen only with the 16 bit digital output option. Refer to the separate "PM4 Panel Meter Optional Output Addendum" booklet supplied when this option is fitted. Determines the high scaling point for the **b.SCL** mode and has no effect on other modes.

Example:
If **d. 9_** is set to **0** and **d. 9^** is set to **65535** ($2^{16}-1$) then the retransmission will not be scaled i.e. a display of **2** will cause a retransmission of 2. If **d. 9^** is now changed to **32767** ($2^{15}-1$) then a display of **2** will cause a retransmission of 4 (note: rounding may occur on retransmission).

6.19 Digital output option channel

Display: **dout CHAN**
Range: **ch0** to **ch8**
Default Value: **ch0**

Channel for digital output - applicable only in **ARtH**, **SCAN**, **CS** or **nnEA** mode. This function allows selection of the input channel to be retransmitted on the digital output. If multiple input channels are not being used then leave this function set to **ch0**. For **nnEA** mode channel is the wind direction and channel 2 is the wind speed.

6.20 Analog output option low value

Display: **rEC_**
Range: Any display value
Default Value: **0**

Seen only when analog retransmission option fitted. Refer to the separate "PM4 Panel Meter Optional Output Addendum" booklet supplied when this option is fitted for wiring details and link settings. Displays and sets the analog retransmission (4–20mA, 0–1V or 0–10V, link selectable) output low value (4mA or 0V) in displayed engineering units. To set the analog output low value go to the **rEC_** function and use the ▲ or ▼ push buttons to set the required value then press **F** to accept this selection.

Example:
If it is required to retransmit 4mA when the display indicates **0** then select **0** in this function using the ▲ or ▼ button.

6.21 Analog output option high value

Display: rEC^
Range: Any display value
Default Value: 1000

Seen only when analog retransmission option fitted. Refer to the separate "PM4 Panel Meter Optional Output Addendum" booklet supplied when this option is fitted for wiring details and link settings. Displays and sets the analog retransmission (4–20mA, 0–1V or 0–10V, link selectable) output high display value (20mA, 1V or 10V) in displayed engineering units. To set the analog output high value go to the rEC^ function and use the ▲ or ▼ push buttons to set the required value then press F to accept this selection.

Example:
If it is required to retransmit 20mA when the display indicates 50 then select 50 in this function using the ▲ or ▼ button.

6.22 Analog output 1 channel

Display: rEC
Range: ch0 to ch8
Default Value: ch0

Seen only when analog retransmission option fitted. Refer to the separate "PM4 Panel Meter Optional Output Addendum" booklet supplied when this option is fitted for wiring details and link settings. Analog output 1 channel. Select from ch0 to ch8. In MnEA mode select ch 1 for wind direction retransmission and ch2 for wind speed. In Arth mode ch0 is the arithmetic sum. ch0 should not be selected for any mode other than Arth.

6.23 Second analog output option low value

Display: rEC_ Ch2
Range: Any display value
Default Value: 0

See rEC_ function 6.20 for description of operation.

6.24 Second analog output option high value

Display: rEC^ Ch2
Range: Any display value
Default Value: 1000

See rEC^ function 6.21 for description of operation.

6.25 Analog output 2 channel

Display: rEC2
Range: ch0 to ch8
Default Value: ch0

Seen only when analog retransmission option fitted. Refer to the separate "PM4 Panel Meter Optional Output Addendum" booklet supplied when this option is fitted for wiring details and link settings. Analog output 2 channel. Select from ch0 to ch8. In MnEA mode select ch 1 for wind direction retransmission and ch2 for wind speed. In Arth mode ch0 is the arithmetic sum. ch0 should not be selected for any mode other than Arth.

6.26 Display rounding

Display: drnd
Range: 1 to 5000
Default Value: 1

Displays and sets the display rounding value. This value may be set to 1 - 5000 displayed units. Display rounding is useful for reducing the instrument resolution without loss of accuracy in applications where it is undesirable to display to a fine tolerance. To set the display rounding value go to the drnd function and use the ▲ or ▼ push buttons to set the required value then press F to accept this selection.

Example:
If set to 10 the display values will change in multiples of 10 only i.e. display moves from 10 to 20 to 30 etc.

6.27 Decimal point

Display: dCPt
Range: 0, 0.1 etc.
Default Value: 0

Displays and sets the decimal point. By pressing the ▲ or ▼ pushbutton at the dCPt function the decimal point position may be set. The display will indicate as follows: 0 (no decimal point), 0.1 (1 decimal place), 0.02 (2 decimal places), 0.003 (3 decimal places) and 0.0004 for display with more than 4 digits. Note if the decimal point is altered the display will need to be recalibrated and alarm etc. settings checked. In arithmetic mode this function sets the decimal point position for channel 0 i.e. the arithmetic result.

6.28 Digital filter

Display: FLtr
Range: 0 to 8
Default Value: 2

Displays and sets the digital filter value. Digital filtering uses a weighted average method of determining the display value and is used for reducing display value variation due to short term interference. The digital filter range is selectable from 0 to 8, where 0 = none and 8 = most filtering. Use ▲ or ▼ at the FLtr function to alter the filter level if required. Note that the higher the filter setting the longer the display may take to reach its final value when the input is changed, similarly the relay operation and any output options will be slowed down when the filter setting is increased. To set the digital filter value go to the FLtr function and use the ▲ or ▼ push buttons to set the required value then press F to accept this selection.

6.29 Baud rate for optional serial communications

Display: bAUd rAtE
Range: 300.600. 1200.2400.4800.9600. 19.2 or 38.4
Default Value: 9600

Select from 300.600. 1200.2400.4800.9600. 19.2 or 38.4 baud. This must be set to match the baud rate selected at the sending device.

6.30 Parity for serial input

Display: PrtY
Range: nONE.EUEn or Odd
Default Value: nONE

Select parity check to either nONE, EUEn or Odd. This must be set to match the parity selected at the sending device.

6.31 Data type

Display: dAtA
Range: 8.b, t or 7.b, t
Default Value: 8.b, t

Displays and selects the input data type. Select either 8.b, t for 8 data bits plus 1 stop bit or 7.b, t for 7 data bits plus 1 stop bit. This must be set to match the number of data bits of the sending device.

6.32 Input type

Display: I nPt
Range: r232, r422, r485 or I 20
Default Value: r232

Select input type used RS232, RS422, RS485 or serial 20mA current loop. Choices appear as: r232, r422, r485 or I 20. The hardware for the input type is factory configured and changing this function does not change the input type but it is important that this function matches the hardware setup.

6.33 Data type for display

Display: CodE
Range: di SP, ASCI , UAL, ArtH, n.buS, PtA, SCAn, nnEA or CS
Default Value: di SP

One of eight different display modes can be selected in this function, namely di SP, ASCI , UAL, ArtH, n.buS, PtA, SCAn, nnEA or CS. Note: see the separate Addendum booklet for details of arithmetic mode Arth and Wind speed/direction nnEA operation. The PtA option is a special purpose function and is not described to this manual. See also the "Examples" section at the end of this chapter. Note that if the mode is altered it is necessary to switch the instrument off then on again to reset to the new mode.

- **di SP mode**
  With di SP selected (image mode) the display expects to see an input in raw data format from another instrument. This mode is generally only used when the display is connected to an instrument from the same manufacturer. This mode is not used with any other source. The data format expected is: <ESC>Incccc

Where:	<ESC>	is 27 Dec or 1B Hex
	I	is the ASCII character "I"
	n	is the number of image characters to follow
	cccc	are the image characters in Hex. format

- **ASCI mode**
  ASCI selects ASCII type input data, the input data will then be displayed without modification (see also ALPH function as this can also affect what is displayed). Displays of characters in ALPH mode are left justified. Any leading zeroes received will be visible in this mode e.g. data received such as 00873 will be displayed as 00873.

- **UAL mode**
  With UAL selected (numeric or value mode) the incoming characters will not be displayed unless they are numeric characters or a negative sign "-", the characters will be read until a terminating character (see tchr) is found. In circumstances, e.g. when terminating characters are not sent by the transmitting device, the instrument can be programmed to look for a constant transmitted character which occurs before to the required display values rather than at the end of the string. In this instance the SCH I character can be used and the

display told to display a number of characters after this character (see n.Chr function). Once the tchr or SCH 1 character is found the numeric value will be updated and displayed. If a non numeric character is found then the conversion will cease at that point. Note that ASCII control characters 00 Decimal (Null) to 31 Decimal (Unit Separator) will be ignored if they are seen as part of the string and will not cause the conversion to cease when encountered, they will however not be ignored if used as a start character (SCH 1, 2 or 3) or the terminating character set at the tchr function. The numeric value is filtered after conversion the FLtr setting determines the level of filtering. Note: In UAL mode any leading zeroes transmitted will be ignored e.g. data received such as -00345 will be displayed as -345.

- **PtA mode**
  Not applicable to this instruction manual. Do not use this mode.

- **SCAn mode**
  With SCAn selected the instrument can be made to scan and display in turn values from up to 8 other devices or channels from the same manufacturer. To operate in scan mode select the number of channels to scan at the SCAn CH function then select the automatic scanning period at the SCAn SECS function (the scanning period sets the time for the display automatic scrolling, note that the ▲ or ▼ button can also be used to manually scroll between channels) then set the address for each channel at the Ch 1Addr, Ch2Addr etc. functions. The address choices are P 1.P2.P3.P4.P5.P6.P7.P8.S 1.S2.S3.S4.S5. S6.S7 or S8. A 1 to A8 and t 1 to t8 are also choices but are only for use in polling channels 1 to 8 of a model TP488 scanning monitor. The letters P and S refer to the primary (P) or secondary (S) display values from the transmitting instrument e.g. the primary display value of a conductivity instrument will be the conductivity value on the display whilst the secondary display value would be the solution temperature. The number refers to the address of the instrument. For example if Ch 1 Addr function has P3 selected then the primary display value from the instrument with address 3 will be requested as the channel 1 input.

- **n.buS mode**
  With n.buS selected the display will accept a modbus RTU input. An address (1 to 255) must be selected at the n.buS Add function to correspond to the address selected at the host device. The instrument accepts modbus command 6 "preset single register" and command 16 "preset multiple registers". The command 6 or 16 information sent can be used to preset four registers, these are:

Register 0	Decimal point position
Register 1	Input taken as an unsigned 16 bit number (0 to 65535)
Register 2	Input taken as a signed 16 bit number (-32767 to 32767)
Register 3	Signed 32 bit number high order 16 bits
Register 4	Signed 32 bit number low order 16 bits

  Registers 3 and 4 are used together to form a 32 bit number. The display will be updated when the low order register is set.

- **nnEA mode**
  With nnEA selected the instrument must be connected to model WS-MMW-005 solid state wind speed and direction sensor or similar NMEA output sensor. See "Wind Speed and Direction NMEA mode" chapter for wiring details and communications setup requirements.

- **CS mode**
  In CS mode up to 8 values can be sent in comma separated form. The number of values to

be displayed is set at the **SCAN CH** function. The ▲ or ▼ buttons can be used to view these values or the display can be set to scan between values automatically via the **SCAN SECS** function. An indicator will be displayed just prior to the values e.g. **CH2** to indicate which value will appear next. The format required for this mode is:

<value1>,<value2>,.....<value8><CR>

Where: <CR> is the carriage return character.

The **CS** mode can be used with the TP488 scanning monitor and other multi output monitors when the other units **OPut** function is set to **Cont**.

6.34 P button function

Display: **P.but**

Range: **NONE**, **HI**, **LO**, **HI LO**, **tARE** or **ZERO**

Default Value: **NONE**

P button function - The following applies only when the **CodE** function is set to **UAL**. The P button (5, 6 or 8 digit LED models only) may be set to operate some of the remote input functions. With the tare and zero functions, to prevent accidental operation, the P button must be held pressed for 2-3 seconds before the display will tare or zero, momentary operation of the tare function will cause the gross value to be displayed, preceded by the message **GROS**. If both the remote input and P button function are operated simultaneously the P button will override the remote input. The functions below are as described in the **r.i NP** function below. Functions available are: **NONE**, **HI**, **LO**, **HI**, **LO**, **tARE** or **ZERO**

6.35 Remote input function

Display: **r.i NP**

Range: **NONE**, **P.HLd**, **d.HLd**, **HI**, **LO**, **HI**, **LO**, **tARE**, **ZERO**, **SP.Ac**, **No.Ac** or **duLL**

Default Value: **NONE**

Remote input function - When these remote input terminals are short circuited, via a switch, relay, keyswitch etc. the instrument will perform the selected remote input function. A message will flash to indicate which function has been selected when the remote input pins are short circuited. The remote input functions are as follows:

NONE - no remote function required i.e. activating the remote input has no effect.

P.HLd - peak hold. The display will show the peak value (highest positive value) only whilst the remote input terminals are short circuited i.e. the display value can rise but not fall whilst the input terminals are short circuited. The message **P.HLd** will appear briefly every 8 seconds whilst the input terminals are short circuited to indicate that the peak hold function is active.

d.HLd - display hold. The display value will be held whilst the remote input terminals are short circuited. The message **d.HLd** will appear briefly every 8 seconds whilst the input terminals are short circuited to indicate that the display hold function is active.

HI - peak memory. The peak value stored in memory will be displayed if the remote input terminals are short circuited, if the short circuit is momentary then the display will return to normal measurement after 20 seconds. If the short circuit is held for 2 to 3 seconds or the power is removed from the instrument then the memory will be reset.

Lo - valley memory. The minimum value stored in memory will be displayed. Otherwise operates in the same manner as the **HI** function described above.

HI Lo - toggle between **HI** and **Lo** displays. This function allows the remote input to be used to toggle between peak and valley memory displays. The first operation of the remote input will cause the peak memory value to be displayed, the next operation will give a valley memory display. **PHI** or **PLo** will flash before each display to give an indication of display type.

tARE - display tare. Short circuiting the remote input pins momentarily will allow toggling between nett and gross values (shown as **NEtt** and **grOS**). If the remote input is short circuited for approx. 2 seconds the display will be tared and will show zero. The tare will be lost if power is removed.

2ErO - display zero. Zeroes the display in same manner as the tare function except that the zero is not lost when power is removed and the display will zero as soon as the remote input is shorted. When the **2ErO** operation is used the gross value cannot be recalled and the input at the time of the **2ErO** operation will become the new zero point.

SP.Ac - setpoint access only. This blocks access to any functions except the alarm setpoint functions unless the remote input pins are short circuited or entry is made via **CAL** mode or if the **ACCS** function is set to **ALL**.

No.Ac - no access. This blocks access to all functions unless the remote input pins are short circuited or entry is made via **CAL** mode or if the **ACCS** function is set to **ALL**.

dULL - display brightness control. The remote input can be used to change the display brightness. When this mode is selected the display brightness can be switched, via the remote input terminals, between the brightness level set at the **brgt** function and the brightness level set at the **dULL** function.

6.36 Access mode

Display: **ACCS**

Range: **OFF**.**EASY**.**NONE** or **ALL**

Default Value: **OFF**

Access mode - the access mode function **ACCS** has four possible settings namely **OFF**.**EASY**.**NONE** and **ALL**. If set to **OFF** the mode function has no effect on alarm relay operation. If set to **EASY** the "easy alarm access" mode will be activated. Refer to "Easy alarm relay adjustment access facility" page 23. If set to **NONE** there will be no access to any functions via **FUNC** mode, entry via **CAL** mode must be made to gain access to alarm and calibration functions. If set to **ALL** then access to all functions, including calibration functions, can be gained via **FUNC** mode.

6.37 Setpoint access mode

Display: SPAC
Range: A 1, A 1-2 etc.
Default Value: A 1

Setpoint access - seen only if more than 1 relay fitted. Sets the access via FUNC mode and "easy alarm access" mode to the alarm relay setpoints. The following choices are available:
A 1 - Allows setpoint access to alarm 1 only.
A 1-2 - Allows setpoint access to alarms 1 and 2 only.
A 1-3 - Allows setpoint access to alarms 1, 2 and 3 etc. up to the maximum number of relays fitted.
The remote input function (r.1 nP) must be set to SP.AC for this function to operate. Note: Only the setpoints which have been given a value will be accessible e.g. if A 1H, is set to OFF then there will be no access to the A 1H, function when SPAC is used.

6.38 Alarm relay 1 operation mode

Display: A 1 OPEr
Range: 1 nPt, t.out or both
Default Value: 1 nPt

Relay 1 operation mode - relay 1 can be made to operate from the input value (e.g. at the A 1Lo or A 1H, value, applicable when CodE is set to UAL or ñ.buS only) or when the display blanks due to the timeout value being exceeded (timeout value set at the dS.to function). If set to both the relay will operate from the display value or if communications fails.

6.39 Alarm relay 2 operation mode

Display: A2 OPEr
Range: 1 nPt, t.out or both
Default Value: 1 nPt

Relay 2 operation mode - relay 2 can be made to operate from the input value (e.g. at the A 1Lo or A 1H, value, applicable when CodE is set to UAL or ñ.buS only) or when the display blanks due to the timeout value being exceeded (timeout value set at the dS.to function). If set to both the relay will operate from the display value or if communications fails. Note that this function is only available for the first 2 relays fitted.

6.40 Modbus address

Display: n.bus Addr
Range: 0 to 255
Default Value: 1

Seen only when CodE function is set to n.bus. An address (0 to 255) must be selected to correspond to the address selected at the host device when Modbus communications is being used. Note: address 0 is available but should not be used with Modbus communications.

6.41 Address character 1

Display: SCH 1
Range: -2 to 255
Default Value: - 1

Seen only when CodE function = URL or ASCI . When a string is sent the instrument will look for three address characters, SCH 1, SCH2 and SCH3. If these character do not appear, one after the other, then the string of data will not be accepted and will not be displayed. Selecting - 1 disables the SCH and no matching will be required for that character. Selecting -2 means "dont care" and any character will be taken as a match (note that a missing character will not constitute a match). Valid characters are -2 to 255 Decimal. SCH 1 is the first start of text character. The use of one or more start of text characters allows addressing of the display in multidrop applications using RS485. If data is required to be displayed by only selected displays on a multidrop line then the data can be preceded by an address which matches the SCH settings in the instruments required. The SCH 1 character can also be used in conjunction with the n.Chr function to force the display to show only a certain number of characters following the SCH1 character. This method cannot be used with either SCH2 or SCH3. For example if the data string is always preceded by the letter M e.g. M345678 then setting SCH 1 to 77 (decimal form of the ASCII character M) and n.Chr to 3 will mean that the display will show 345 i.e. the three characters following the M character.

6.42 Address character 2

Display: SCH2
Range: -2 to 255
Default Value: - 1

Seen only when CodE function = URL or ASCI . See function 6.41 for details.

6.43 Address character 3

Display: SCH3
Range: -2 to 255
Default Value: -1

Seen only when CodE function = URL or ASCI . See function 6.41 for details.

6.44 Terminating character

Display: tchr
Range: -1 to 255
Default Value: 13

Seen only when CodE function = URL or ASCI . Terminating character, default is 13 (the decimal equivalent of the ASCII carriage return <CR>). This character is recognised as the end of transmission for a certain input stream. The next character received will be interpreted as the start of the next input stream. A setting of -1 means that no terminating character is used.

6.45 Number of characters to skip

Display: dLAY
Range: 0 to 255
Default Value: 0

Seen only when CodE function = URL or ASCI . Select the numbers of characters in front of the input string to skip before displaying (may be set from 0 to 200, default is 0 [off]). This allows the display to skip a certain number of characters in the input string before starting the display. This is useful for skipping unwanted data such as control characters etc., which may be sent by the instruments along with the display information. For example if dLAY is set to 5 then 678 will be displayed from the following example string: <STX>12345678<CR> i.e. the first 5 characters of the string will be ignored. Note that in URL mode the values displayed will be right justified and in ASCI mode the display is left justified e.g. for this example using a 4 digit display <BLANK>678 will be seen in URL mode whereas in ASCI mode the value will displayed as 678<BLANK> for a 4 digit display.

6.46 Number of characters to skip backwards

Display: bAcK
Range: 0 to 24
Default Value: 0

Seen only when CodE function = URL or ASCI . Number of characters back from the terminating character to skip, default is 0 [off]. The display will wait for the terminating character and will then skip back over the last X characters in front to the terminating character with the X value

being the value set in this function. For example if the terminating character tchr is set to 13 (i.e. carriage return <CR>) and bAct is set to 4 then 1234 will be displayed from the example string <STX>12345678<CR>. For the same input string the display would show 12345678 if the bAct function was set to 0 and the display had enough digits to show this value. If the number of display digits is too few the overrange message -or- will be seen in URL mode or the most significant values which will fit on the display will be displayed in ASCI mode. Both ASCI an URL mode values will be right justified when the bAct function is used and the display value is less than the number of digits on the display.

6.47 Number of characters to skip from SCH character

Display: n.Chr
Range: 0 to 10
Default Value: 0

Seen only when CodE function = URL or ASCI . Normally used only when no consistent end of text character is being transmitted and operates in a similar manner to the dLAY function. In most circumstances the dLAY or bACt function would be used in preference to this function. If the length of the input data string is likely vary, or the position of the required display data can vary in the string, but the required data to be displayed is always a set number of bytes away from a constant character which can be used as the SCH character then the n.Chr function can be used instead of the dLAY function. This function sets the number of characters to be extracted from the data string immediately following the SCH 1 (or SCH2 if used or SCH3 if used) character. If this function is not required it should be left at the default setting of 0 which will disable the function. For example if SCH 1 is used and SCH2 and 3 are disabled and the n.Chr function is set to 3 then the 3 characters after the SCH 1 character will be displayed. See also the SCH 1, SCH2 and SCH3 functions.

6.48 Input string decimal point place

Display: 1 .dPt
Range: -1 to 8
Default Value: -1

In some systems the transmitting unit may display a decimal point position but not transmit the decimal point as part of the serial data. The 1 .dPt can be used to inform the instrument of the required position of the decimal point on the display. The decimal point position of the result shown on the display is set via the dCPt function. If the 1 .dPt function is not needed then it should be left at the default setting of -1 which will disable the function.

6.49 Alphabetic character display on or off

Display: ALPH
Range: on or OFF
Default Value: OFF

Seen only when CodE function = UAL or ASCI . Set this function to OFF to filter alpha characters from the input stream i.e. only numeric characters will be displayed and alpha characters ignored. When set to on the instrument will display both alpha and numeric characters. Note: only a limited number of alpha characters may be displayed due to the nature of 7 segment displays, non displayable characters (e.g. W and X) will be ignored.

6.50 Polling function

Display: POLL InPt
Range: on or OFF
Default Value: OFF

Seen only when CodE function = UAL or ASCI . The instrument has the ability to transmit up to eight characters for polling purposes. This ability to poll is used when the instrument is to display data from a source which requires a polling command before it will communicate. The characters are set by functions P.ch. 1 to P.ch.8 and the repeat rate for this polling is set by the POLL dLAY function. If POLL InPt is set to OFF then no characters will be transmitted and the other polling functions will not be seen. If set to on then the characters selected will be transmitted at the rate selected by the POLL dLAY function. This ability to poll is used when the instrument is to display data from a source which requires a polling command before it will communicate.

6.51 Polling delay time

Display: POLL dLAY
Range: 0.0 or 20.0
Default Value: 0.0

Seen only when CodE function = UAL or ASCI and POLL InPt function is set to on. When the polling facility is being used the POLL dLAY function sets the repeat rate, in seconds, of the poll command. The time may be set from 0.0 seconds (as fast as the baud rate will allow) to 20.0 seconds.

6.52 First polling character

Display: P.ch. 1
Range: -1 to 255
Default Value: -1

Seen only when CodE function = UAL or ASCI and POLL InPt function is set to on. Each

of the eight poll command characters can be set from -1 to 255 decimal. If set to -1 then the character is ignored, if set to any other number then the equivalent ASCII character for that number will be sent. Characters 0 to 31 are special control characters such as "carriage return" and "start of text". Use as many "P.ch" characters as required by your system and set the remaining characters to -1 so that they are ignored.

6.53 Second polling character

Display: P.ch.2
Range: -1 to 255
Default Value: -1

Refer to function 6.52.

6.54 Third polling character

Display: P.ch.3
Range: -1 to 255
Default Value: -1

Refer to function 6.52.

6.55 Fourth polling character

Display: P.ch.4
Range: -1 to 255
Default Value: -1

Refer to function 6.52.

6.56 Fifth polling character

Display: P.ch.5
Range: -1 to 255
Default Value: -1

Refer to function 6.52.

6.57 Sixth polling character

Display: P.ch.6
Range: -1 to 255
Default Value: -1

Refer to function 6.52.

6.58 Seventh polling character

Display: P.ch.7
Range: -1 to 255
Default Value: -1

Refer to function 6.52.

6.59 Eighth polling character

Display: P.ch.8
Range: -1 to 255
Default Value: -1

Refer to function 6.52.

6.60 Display timeout

Display: d5.to
Range: 0 to 9999
Default Value: 10

This function allows the user to set a timeout value for a valid display. Valid times are 0 to 9999 seconds, a setting of 0 disables the timeout. If a new data stream is not received before the timeout value is reached then the display will be blanked.

6.61 Data string timeout

Display: t.out
Range: 0.0 to 10.0
Default Value: 1.0

This function allows the user to set a timeout value for the data stream. Valid times are 0.0 to 10.0 seconds, a setting of 0.0 disables the timeout. The timeout will cause the current data stream to be ignored if the time gap between characters in the stream exceeds the t.out value. This function helps to prevent false displays when the data stream is interrupted.

6.62 Fast RS485

Display: FASt r485
Range: on or OFF
Default Value: OFF

This function should be set to on only when communicating via RS485 with old style RM4 units i.e. RM4 units with 4 digit displays and 6805 processors. This function is used to address timing problems when communicating with these version instruments.

6.63 Alarm relay 1 operation channel

Display: A 1
Range: ch0 to ch8
Default Value: ch0

Alarm relay 1 allocation - applicable only to ArtH, nnEA, SCAn and CS modes. Allows relay 1 to be allocated to one channel. Settings available are ch0, ch 1, ch2, ch3, ch4, ch5, ch6, ch7 or ch8. In nnEA mode ch 1 represents wind direction and ch2 represents wind speed. In ArtH mode ch0 represents the arithmetic result. ch0 should not be selected for any other mode.

6.64 Alarm relays 2 to 7 operation channel

Display: A2 to A7
Range: ch0 to ch8
Default Value: ch0

Alarm relay allocation for relays 2, 3, 5, 5, 6 and 7 - applicable only to ArtH, nnEA, SCAn and CS modes. See section 6.63

6.65 Clr zero

Display: CLr 2Er0
Range: n/a
Default Value: n/a

Seen only when CodE function = UAL or ArtH. Allows any zero operations performed via the remote input or P button to be cleared. Pressing the ▲ and ▼ buttons simultaneously will clear the zero offset, the message CLrd will be seen, confirming the zero clearing operation is completed. The instrument will then return to displaying the value of the string sent.

6.66 Number of channels to scan

Display: SCAN CH
Range: 0 to 8
Default Value: 0

Seen only when CodE function = SCAN or CS. Select the number of channels from 0 to 8. The SCAN mode allows up to 8 instruments or channels from the same manufacturer as this instrument to be connected and polled individually. A different polled address must be set for each input channel and a scan period set. The display in scan mode will show the value to 3 digits followed by a space followed by the channel number being shown.

The CS mode allows up to eight values to be displayed the ▲ or ▼ button can be used to toggle between values or the display set to scan automatically (see function 6.67). An indicator e.g. CH2 will be seen prior to the value to indicate which value is being viewed.

6.67 Number of seconds between scans

Display: SCAN SECS
Range: 0 to 255
Default Value: 0

Seen only when CodE function is set to SCAN, CS or ñNEA. Selects the number of seconds between channel scans or between wind speed and direction if CodE function is set to ñNEA. The scan period can be set from 0 to 255 seconds. If set to 0 the display will not automatically scroll between channels and the ▲ or ▼ button must be used to change the channel displayed. Note the display will not automatically scan if it is in CAL mode.

6.68 Channel 1 address

Display: Ch 1 Addr
Range: P 1 to P8 or S 1 to S8 or t 1 to t8
Default Value: P 1

Seen only when CodE function is set to SCAN or ArtH. The instruments connected to the display for scanning purposes must be of the same manufacture this instrument. These units allow a primary and in some cases secondary values to be sent. Refer to the separate manuals supplied when this option is fitted to see if secondary values are available for that instrument. The primary value is the main display value for that instrument e.g. For a conductivity instrument the conductivity would be the primary value and the temperature the secondary. Addresses available are P 1 to P8 (to poll for primary values), S 1 to S8 (to poll for secondary values) and t 1 to t8 (to poll a channel of model TP488 scanning monitor). The numerical value refers to the channel number of a TP488 scanning monitor, for other instruments the numerical value is the address which is set at the Addr function of the instrument being polled. For example if Ch2 Addr is set to P2 then the value will be returned will be the primary display value from the instrument whose Addr function is set to 2.

6.69 Channel 2 address

Display: Ch2 Addr
Range: P 1 to P8 or S 1 to S8 or t 1 to t8
Default Value: P 1

Seen only when CodE function is set to SCAN or ArtH. Scan address for channel 2, see function 6.68 for further information.

6.70 Channel 3 address

Display: Ch3 Addr
Range: P 1 to P8 or S 1 to S8 or t 1 to t8
Default Value: P 1

Seen only when CodE function is set to SCAN or ArtH. Scan address for channel 3, see function 6.68 for further information.

6.71 Channel 4 address

Display: Ch4 Addr
Range: P 1 to P8 or S 1 to S8 or t 1 to t8
Default Value: P 1

Seen only when CodE function is set to SCAN or ArtH. Scan address for channel 4, see function 6.68 for further information.

6.72 Channel 5 address

Display: Ch5 Addr
Range: P 1 to P8 or S 1 to S8 or t 1 to t8
Default Value: P 1

Seen only when CodE function is set to SCAN or ArtH. Scan address for channel 5, see function 6.68 for further information.

6.73 Channel 6 address

Display: Ch6 Addr
Range: P 1 to P8 or S 1 to S8 or t 1 to t8
Default Value: P 1

Seen only when CodE function is set to SCAN or ArtH. Scan address for channel 6, see function 6.68 for further information.

6.74 Channel 7 address

Display: Ch7 Addr
Range: P 1 to P8 or S 1 to S8 or t 1 to t8
Default Value: P 1

Seen only when CodE function is set to SCAN or ArtH. Scan address for channel 7, see function 6.68 for further information.

6.75 Channel 8 address

Display: Ch8 Addr
Range: P 1 to P8 or S 1 to S8 or t 1 to t8
Default Value: P 1

Seen only when CodE function is set to SCAN or ArtH. Scan address for channel 8, see function 6.68 for further information.

6.76 Default display for SCAN or CS mode

Display: dFLt dI SP
Range: ch 1 to ch8
Default Value: ch 1

Applicable to SCAN and CS modes only. Allows selection of the default channel for the 7 segment display. For example if this function is set to ch 1 then channel 1 will appear at switch on and the operator will need to push the ▲ or ▼ button to view the other active channels. If left on a channel which is not the default channel the display will automatically revert back to the default channel after approximately 4 minutes. A function with the same name but different choices also exists in nAnEA mode.

6.77 Channel 1 decimal point

Display: Ch 1 dCPt
Range: 0, 0. 1 etc.
Default Value: 0

Seen only in CodE = ArtH mode. Displays and sets the decimal point for input channel 1. By pressing the ▲ or ▼ pushbuttons the decimal point position may be set. The display will indicate as follows: 0 (no decimal point), 0. 1 (1 decimal place), 0.02 (2 decimal places) etc.

6.78 Channel 2 decimal point

Display: CH2 dCPt
Range: 0, 0.1 etc.
Default Value: 0

Seen only in CodE = ArtH mode. Displays and sets the decimal point for input channel 2. See function 6.77 for further details.

6.79 Channel 3 decimal point

Display: CH3 dCPt
Range: 0, 0.1 etc.
Default Value: 0

Seen only in CodE = ArtH mode. Displays and sets the decimal point for input channel 3. See function 6.77 for further details.

6.80 Channel 4 decimal point

Display: CH4 dCPt
Range: 0, 0.1 etc.
Default Value: 0

Seen only in CodE = ArtH mode. Displays and sets the decimal point for input channel 2. See function 6.77 for further details.

6.81 Channel 5 decimal point

Display: CH5 dCPt
Range: 0, 0.1 etc.
Default Value: 0

Seen only in CodE = ArtH mode. Displays and sets the decimal point for input channel 5. See function 6.77 for further details.

6.82 Channel 6 decimal point

Display: CH6 dCPt
Range: 0, 0.1 etc.
Default Value: 0

Seen only in CodE = ArtH mode. Displays and sets the decimal point for input channel 6. See function 6.77 for further details.

6.83 Channel 7 decimal point

Display: CH7 dCPt
Range: 0, 0.1 etc.
Default Value: 0

Seen only in CodE = ArtH mode. Displays and sets the decimal point for input channel 7. See function 6.77 for further details.

6.84 Channel 8 decimal point

Display: CH8 dCPt
Range: 0, 0.1 etc.
Default Value: 0

Seen only in CodE = ArtH mode. Displays and sets the decimal point for input channel 8. See function 6.77 for further details.

6.85 Channel 0 polarity

Display: CH0
Range: both, POS or NEG
Default Value: both

Displays and sets the polarity selection for the display of the engineering value for channel 0. Channel 0 is the channel which displays the result of the arithmetic operations. If set to bOtH then the display will be able to indicate both positive and negative values. If set to POS the display will allow only positive values with any values below zero being rounded to zero. If set to NEG then the display will allow only negative values with any value above zero being rounded to zero. Channel 0 polarity applies to Arithmetic mode ArtH only.

6.86 Channel 1 polarity

Display: CH 1
Range: both, POS or NEG
Default Value: both

Displays and sets the polarity selection for the display of the engineering value for channel 1. If set to bOtH then the display will be able to indicate both positive and negative values. If set to POS the display will allow only positive values with any values below zero being rounded to zero. If set to NEG then the display will allow only negative values with any value above zero being rounded to zero.

6.87 Channel 2 polarity

Display: Ch2
Range: both, POS or NEG
Default Value: both

Displays and sets the polarity selection for the display of the engineering value for channel 2. See function 6.86 for further information.

6.88 Channel 3 polarity

Display: Ch3
Range: both, POS or NEG
Default Value: both

Displays and sets the polarity selection for the display of the engineering value for channel 3. See function 6.86 for further information.

6.89 Channel 4 polarity

Display: Ch4
Range: both, POS or NEG
Default Value: both

Displays and sets the polarity selection for the display of the engineering value for channel 4. See function 6.86 for further information.

6.90 Channel 5 polarity

Display: Ch5
Range: both, POS or NEG
Default Value: both

Displays and sets the polarity selection for the display of the engineering value for channel 5. See function 6.86 for further information.

6.91 Channel 6 polarity

Display: Ch6
Range: both, POS or NEG
Default Value: both

Displays and sets the polarity selection for the display of the engineering value for channel 6. See function 6.86 for further information.

6.92 Channel 7 polarity

Display: Ch7
Range: both, POS or NEG
Default Value: both

Displays and sets the polarity selection for the display of the engineering value for channel 7. See function 6.86 for further information.

6.93 Channel 8 polarity

Display: Ch8
Range: both, POS or NEG
Default Value: both

Displays and sets the polarity selection for the display of the engineering value for channel 8. See function 6.86 for further information.

6.94 Baud rate for serial retransmission

Display: r.trn bAUd
Range: 300, 600, 1200, 2400, 4800, 9600, 19.2 or 38.4
Default Value: 9600

Seen only when serial retransmission is fitted. Refer to the separate "Optional Output Addendum" booklet supplied when this option is fitted. The baud rate should be chosen to match that of the device to which this instrument is connected.

6.95 Parity for serial retransmission

Display: r.trn PrtY
Range: NONE, EVEN or Odd
Default Value: NONE

Seen only when serial retransmission is fitted. Refer to the separate "Optional Output Addendum" booklet supplied when this option is fitted. The parity should be chosen to match that of the device to which this instrument is connected.

6.96 Output mode for serial retransmission

Display: r.trn O.Put
Range: NONE, di SP, Cont, POLL, Cont, n.buS or A.buS
Default Value: NONE

Seen only when serial retransmission is fitted. Refer to the separate "Optional Output Addendum" booklet supplied when this option is fitted. Selects the required output mode for retransmission. Note: if the CodE function is set to ASCI then only the di SP output selection can be used.

6.97 Address for serial retransmission

Display: r.trn Addr
Range: 0 to 31
Default Value: 0

Seen only when serial retransmission is fitted. Refer to the separate "Optional Output Addendum" booklet supplied when this option is fitted. Selects the required address for retransmission when in POLL output mode using RS485 retransmission. Addressing allows several units to operate on the same RS485 interface. The host computer or PLC may poll each unit in turn, supplying the appropriate address. The unit addresses range from 0 to 31 (DEC) but is offset by 32 (DEC) to avoid clashing with special function characters such as <STX> and <CR>. For example 32 (DEC) (space in ASCII) is address 0 and 42 (DEC) (* in ASCII) is address 10.

6.98 Returning to normal measure mode

When the calibration has been completed it is advisable to return the instrument to the normal mode (where calibration functions are less likely to be tampered with). To return to normal mode, turn off power to the instrument, wait a few seconds and then restore power.

6.99 Error Messages

- Blank display - if the display shows its normal "wake up" messages when powered up but then the display goes blank this means that the PM4 does not recognise that data is being sent to it. If no data is being sent the display will blank. If data is being sent and the display is still blank then check that the correct baud rate and parity are set, if these are correct check that the remaining settings are set correctly for the input string being sent. See "Examples" section which follows for examples of function settings.

- -or- - this message means that the number being received is too big to display e.g. 12345 cannot be displayed on a 4 digit display. If applicable the dLAY or bACt functions can be used to force the display to ignore the unwanted display values.

- O.run Err - this message means that data is being received at a faster rate than it can be processed. Reduce the baud rate or the rate at which data is transmitted to the display.

- **FrAE Err** - this message means that data is being received but cannot be interpreted correctly, this is normally due to electrical noise or distorted input signals due to reflections on the line (most commonly seen with RS485). See RS485 connections section for notes on RS485 terminating resistors.

6.100 Examples

Example 1 Input string: <STX>Weight: +2000kg gross +1234kg tare<CR>
Required display: **1234** (on a 4 digit display)
One possible group of settings to achieve the required display is:-

SCH 1 set to **2** Decimal (this corresponds to <STX>)
SCH2 set to **87** Decimal (this corresponds to W)
SCH3 set to **- 1** (disabled)
codE set to **UAL**
dLAY set to **5**
tchr set to **13** (this corresponds to <CR>)

The matching of all three start of text characters is valid since <STX> appears first followed by W (from Weight) and **SCH3** is disabled. The 5 numeric characters following the W (i.e. <SPACE> and **2000**) are ignored since **dLAY** is set to **5**. The kg characters are ignored since **codE** is set to **UAL**. The + is taken as a numeric value but is not displayable. The terminating character is set to <CR>.

Example 2 Input string: <STX>XYZNNM10.05kg<ETX>
Required display: **10.05** on a 4 digit display
One possible group of settings to achieve the required display is:-

SCH 1 set to **- 1** (disabled)
SCH2 set to **- 1** (disabled)
SCH3 set to **- 1** (disabled)
dLAY set to **0**
ALPH set to **OFF**
codE set to **UAL**
dCPt set to **0.02**
tchr set to **3** (this corresponds to <ETX>)

The **SCH 1**, **SCH2** and **SCH3** characters are all disabled. The decimal point is set at two places and therefore appears between the two zeroes on the display.

Example 3 Input string: <STX>X1 ABC 12.34<CR><LF> <STX>Y2 ABC 56.78<CR><LF>
Required display: **56.8** with 5 sec. display blanking.
One possible group of settings to achieve the required display is:-

SCH 1 set to **2** Decimal (this corresponds to <STX>)
SCH2 set to **-2** (dont care)
SCH3 set to **50** (this corresponds to 2 in ASCII)
dLAY set to **1**
ALPH set to **OFF**

codE set to **URL**
dCPt set to **0.1**
bAct set to **0**
tchr set to **13** (this corresponds to <CR>)
dS.to set to **5**

The <STX> character corresponds to **SCH1**, **SCH2** is set to dont care and **SCH3** is set to 2 so the first string is ignored (<STX>Y1 does not match <STX> / dont care / 2). The second string does match, all of the alpha characters which follow Y2 (ABC) are ignored since **ALPH** is set to **OFF** but the spaces are numeric values so setting **dLAY** to **1** will cause one space to be ignored. The decimal point is set at one place and therefore the displayed number is rounded and shown as one decimal place. The display will blank if there is a 5 second gap between strings due to the **dS.to** setting.

Example 4 Input string: ABCDXYZGGNNMM10A0033<CR>
Required display: **10A00** on a 5 digit display.
If the status characters and desired values are sent as one string then the easiest way to recover the desired values is by using the **bAct** function.

SCH1 set to **-1** (disabled)
SCH2 set to **-1** (disabled)
SCH3 set to **-1** (disabled)
dLAY set to **0**
codE set to **ASC**
dCPt set to **0**
bAct set to **2**
tchr set to **13** (this corresponds to <CR>)
ALPH set to **on**

In this mode the last 2 characters will be discarded (because **bAct** is set to 2) and the instrument will display up to 5 characters preceding these two.

Example 5 - Polling facility setup example. The PM4-RS is connected to a different PM4 instrument which has serial communications and is set to a polling address of 5. The PM4-RS is required to request a primary display value. The request is to be updated every 10 seconds. The polling command required for transmission of the primary display value from this PM4 is:

<STX>P5<CR>
Where: <STX> is the start of text control character, P is the primary display request character, 5 is the unit address and <CR> is the carriage return control character. The main PM4-RS function settings required for this example are:

CodE set to **URL**
POLL1nPt set to **on**
POLL dLAY set to **10.0**
P.ch.1 set to **2** (this correspond to <STX>)
P.ch.2 set to **80** (this corresponds to P)
P.ch.3 set to **37** (this corresponds to address 5 (32 is address 0))
P.ch.4 set to **13** this corresponds to <CR>
P.ch.5, **P.ch.6**, **P.ch.7** and **P.ch.8** are all set to **-1**.

Example 6 - Polling facility setup example. The PM4-RS is connected to a PLC via a serial link. The PLC requires a polling command of "T?" before it will transmit data to the PM4. The

application requires that the PLC be polled every 2.5 seconds. The main PM4-RS function settings required for this example are:

CodE set to **URL** (or ASCI depending on requirements)
POLL InPt set to **on**
POLL dLAY set to **2.5**
P.ch.1 set to **84** (this correspond to T)
P.ch.2 set to **63** (this corresponds to ?)
P.ch.3, **P.ch.4**, **P.ch.5**, **P.ch.6**, **P.ch.7** and **P.ch.8** are all set to **- 1**

6.101 ASCII Code Conversion Listing

ASCII for control characters is shown in brackets. e.g. STX may in some cases be entered as ∧B.

ASCII char.	Decimal	Hex	ASCII char.	Decimal	Hex	ASCII char.	Decimal	Hex
NUL (∧@)	00	00	+	43	2B	V	86	56
SOH (∧A)	01	01	,	44	2C	W	87	57
STX (∧B)	02	02	-	45	2D	X	88	58
ETX (∧C)	03	03	.	46	2E	Y	89	59
EOT (∧D)	04	04	/	47	2F	Z	90	5A
ENQ (∧E)	05	05	0	48	30	[	91	5B
ACK (∧F)	06	06	1	49	31	\	92	5C
BEL (∧G)	07	07	2	50	32	]	93	5D
BS (∧H)	08	08	3	51	33	∧	94	5E
HT (∧I)	09	09	4	52	34	_	95	5F
LF (∧J)	10	0A	5	53	35	‘	96	60
VT (∧K)	11	0B	6	54	36	a	97	61
FF (∧L)	12	0C	7	55	37	b	98	62
CR (∧M)	13	0D	8	56	38	c	99	63
SO (∧N)	14	0E	9	57	39	d	100	64
SI (∧O)	15	0F	:	58	3A	e	101	65
DLE (∧P)	16	10	;	59	3B	f	102	66
DC1 (∧Q)	17	11	<	60	3C	g	103	67
DC2 (∧R)	18	12	=	61	3D	h	104	68
DC3 (∧S)	19	13	>	62	3E	i	105	69
DC4 (∧T)	20	14	?	63	3F	j	106	6A
NAK (∧U)	21	15	@	64	40	k	107	6B
SYN (∧V)	22	16	A	65	41	l	108	6C
ETB (∧W)	23	17	B	66	42	m	109	6D
CAN (∧X)	24	18	C	67	43	n	110	6E
EM (∧Y)	25	19	D	68	44	o	111	6F
SUB (∧Z)	26	1A	E	69	45	p	112	70
ESC (∧[)	27	1B	F	70	46	q	113	71
FS (∧\)	28	1C	G	71	47	r	114	72
GS (∧∧)	29	1D	H	72	48	s	115	73
RS (∧)	30	1E	I	73	49	t	116	74
US (∧_)	31	1F	J	74	4A	u	117	75
SP ( )	32	20	K	75	4B	v	118	76
!	33	21	L	76	4C	w	119	77
”	34	22	M	77	4D	x	120	78
#	35	23	N	78	4E	y	121	79
$	36	24	O	79	4F	z	122	7A
%	37	25	P	80	50	{	123	7B
&	38	26	Q	81	51	|	124	7C
’	39	27	R	82	52	}	125	7D
(	40	28	S	83	53	~	126	7E
)	41	29	T	84	54	DEL	127	7F
*	42	2A	U	85	55			

7 Specifications

7.1 Technical specifications

Input types:	Either RS232, RS485, RS422 or Serial current loop (input type is factory configured)
Baud rate:	300, 600, 1200, 2400, 4800, 9600, 19.2k or 38.4k programmable
Microprocessor:	HC68HC11 CMOS
Ambient temperature:	LED -10 to 60^o C, LCD -10 to 50^o C
Humidity:	5 to 95% non condensing
Display:	LED Models: 4 digit 20mm, 5 digit 14.2mm + status LEDs + 4 way keypad. 6 digit 14.2mm + 4 way keypad LCD Models: 4 digit 12.7mm, 6 digit 12.7mm
Power Supply:	AC 240V, 110V or 24V 50/60Hz or DC isolated wide range 12 to 48V. Note: supply type is factory configured.
Power Consumption:	AC supply 4 VA max, DC supply typically 80mA at 12VDC and 40mA at 24VDC for PM4 with no optional outputs, actual current drawn depends on display type and options fitted
Output (standard):	1 x relay, Form A, rated 5A resistive
Relay Action:	Programmable N.O. or N.C

7.2 Optional outputs

Extra Relays:	Same specs. as Relay 1 (up to 6 extra relays). Available as one, three or six extra relays.
Analog Retransmission:	12 bit isolated 4 to 20mA, 0 to 1V or 0 to 10V link selectable (single or dual analog output versions available). (4-20mA will drive into resistive loads of up to 800Ω)
Serial Communications:	Isolated RS232 or RS485 (ASCII or Modbus RTU)
DC Voltage output:	Isolated, regulated ±12V (24VDC) standard or ±5V (10VDC). Rated output current 25mA max.

7.3 Physical Characteristics

Bezel Size:	DIN 48mm x 96mm x 10mm
Case Size:	44mm x 91mm x 120mm behind face of panel
Panel Cut Out:	45mm x 92mm +1mm/-0mm
Connections:	Plug in screw terminals (max. 2.5mm^2 wire)
Weight:	400 gms basic model, 450 gms with option card

8 Guarantee and service

The product supplied with this manual is guaranteed against faulty workmanship for a period of two years from the date of dispatch.

Our obligation assumed under this guarantee is limited to the replacement of parts which, by our examination, are proved to be defective and have not been misused, carelessly handled, defaced or damaged due to incorrect installation. This guarantee is VOID where the unit has been opened, tampered with or if repairs have been made or attempted by anyone except an authorised representative of the manufacturing company.

Products for attention under guarantee (unless otherwise agreed) must be returned to the manufacturer freight paid and, if accepted for free repair, will be returned to the customers address in Australia free of charge.

When returning the product for service or repair a full description of the fault and the mode of operation used when the product failed must be given. In any event the manufacturer has no other obligation or liability beyond replacement or repair of this product.

Modifications may be made to any existing or future models of the unit as it may deem necessary without incurring any obligation to incorporate such modifications in units previously sold or to which this guarantee may relate.

This product is designed and manufactured in Australia.