Model RM4-RS
Serial Input
Arithmetic and Wind Speed/Direction
Addendum

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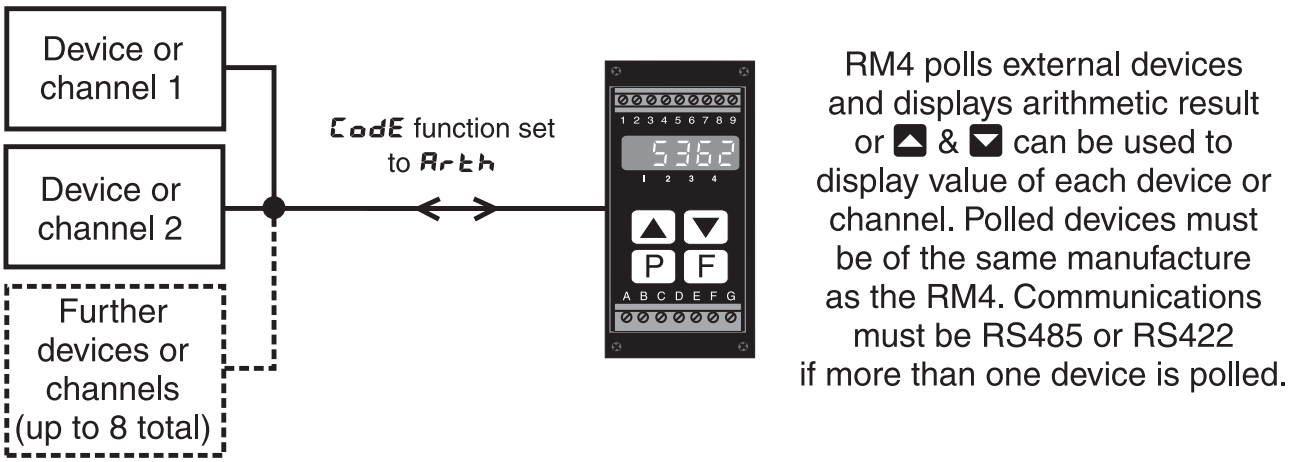
1 Introduction

This addendum to the RM4-RS manual contains information for the installation and operation using the arithmetic mode **ArtH** or the wind monitor mode **nmEA**. Refer to the main RM4-RS and RM4-RSA manual for any details not covered in this addendum.

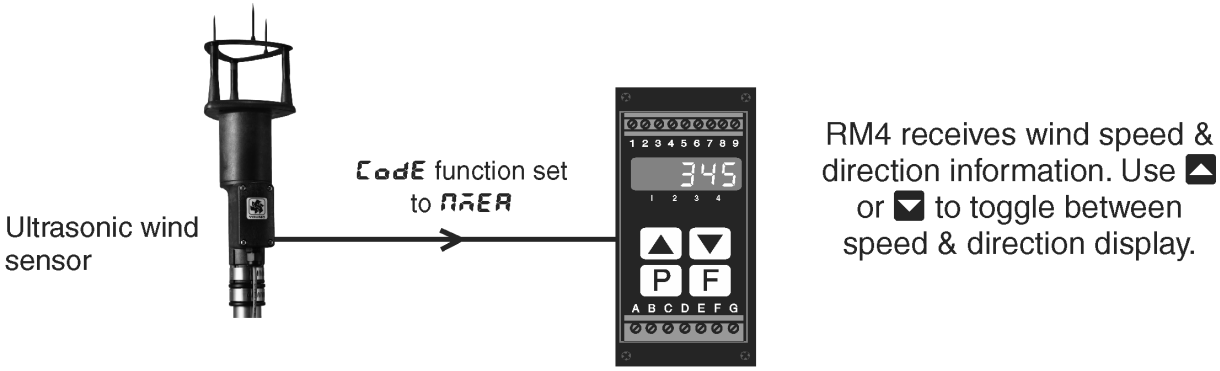
The RM4 will accept inputs from RS232, RS485, RS422 or serial current loop inputs (factory configured). The two modes covered by this addendum are detailed below. If the mode is changed it is necessary to remove power from the RM4 then reapply power in order to reset the mode.

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 RM4 instrument. To operate in this mode the **CodE** function must be set to **Arth**.



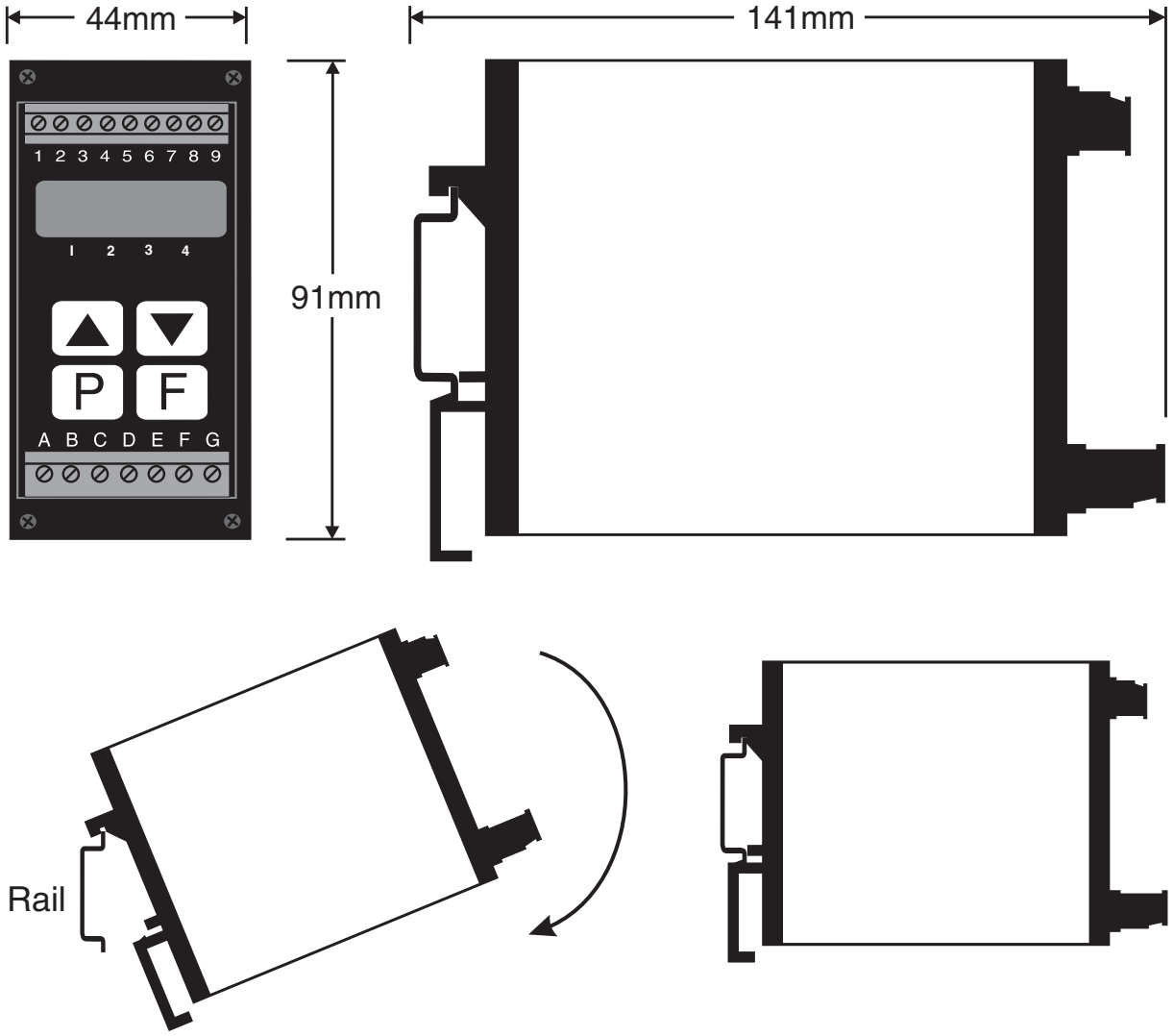
Wind speed and direction (NMEA). This mode is used only with instruments using NMEA (National Marine Electronics Association) serial code such as a wind speed and direction sensor. To operate in this mode the **CodE** function must be set to **nmEA**.

The display can be set to display wind speed, wind direction or to toggle (using ▲ or ▼ button) or automatically alternate the display between wind speed and direction. Analog retransmission output options can be selected to transmit wind direction (**Ch 1**) or wind speed (**Ch2**) at the **rEC** function (also at the **rEC2** function if dual analog output is used.) Similarly **Ch 1** or **Ch2** can be selected for the alarm relays at the **A 1**, **A2** etc. functions.



2 Mechanical installation

The instrument is designed for DIN rail mounting. The instrument clips on to 35mm DIN standard rails (EN50022). Cut the DIN rail to length and install where required. To install the instrument simply clip onto the rail as shown below. To remove the instrument lever the lower arm downwards using a broad bladed screwdriver to pull the clip away from the DIN rail.



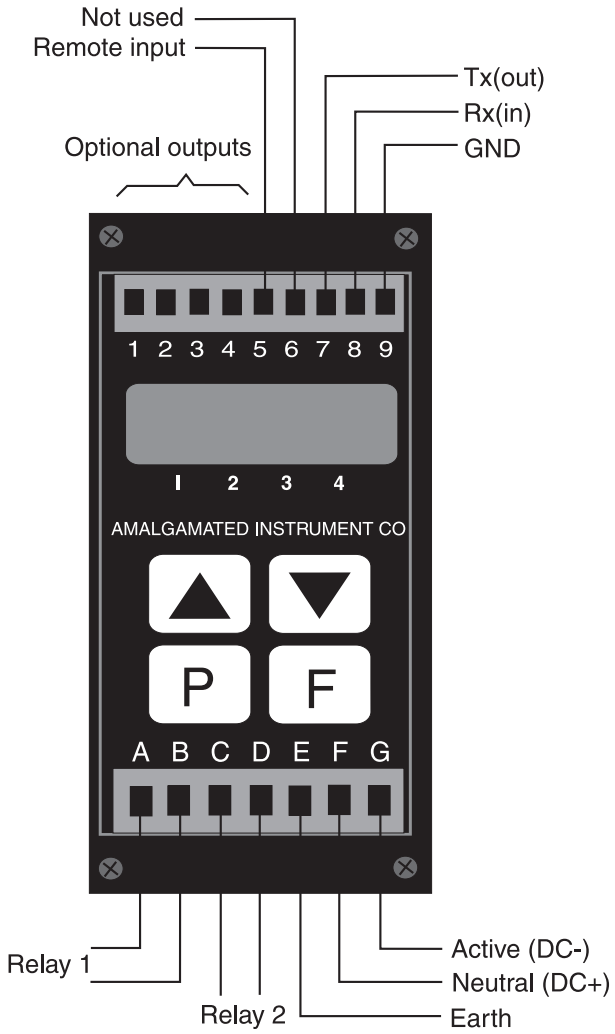
3 Electrical installation

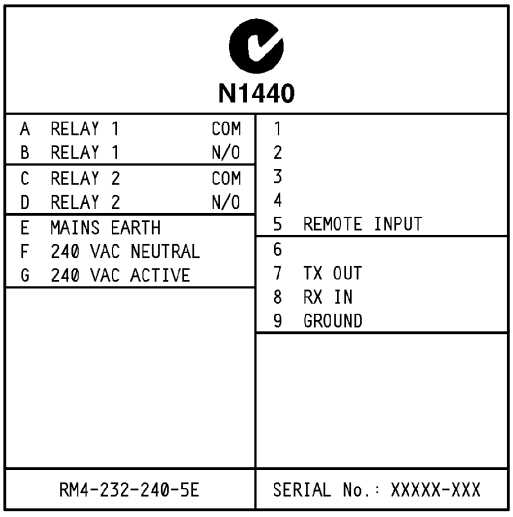
The RM4 Meter is designed for continuous operation and no power switch is fitted to the unit. It is recommended that an external switch and fuse be provided to allow the unit to be removed for servicing. The terminal blocks allow for wires of up to 2.5mm^2 to be fitted for power supply and relays 1 and 2 or 1.5mm^2 for input connections and optional outputs. Connect the wires to the appropriate terminals as indicated below.

Refer to connection diagrams provided in this manual 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 resultant reading.

Note that the power supply type is factory configured. Check power supply type before connecting. Relay outputs are voltage free contacts.

Electrical connections and data label (RS232 input 240VAC supply example)



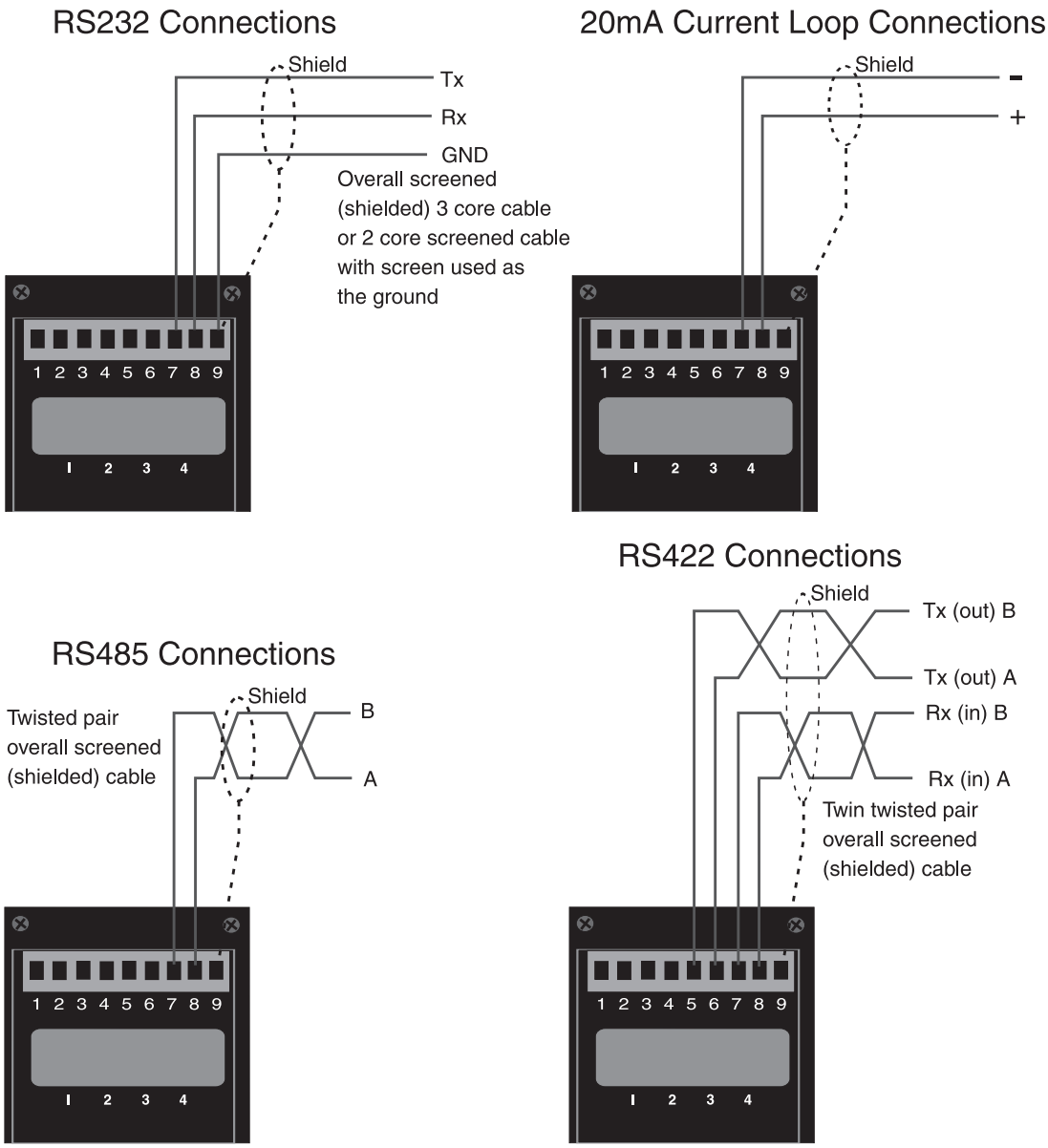


3.1 Power supply connections

AC supply connections use terminal G (Active), terminal F (Neutral) and terminal E (Case earth).

DC supply connections (12 to 48VDC) use terminal G (DC-), terminal F (DC+) and terminal E (Case earth).

3.2 Serial input connections

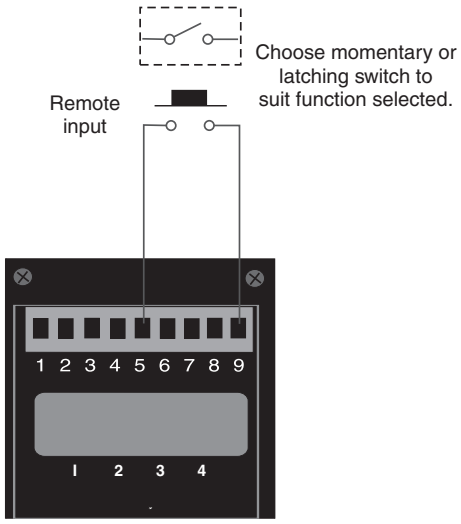


Note: the serial connections are isolated, therefore the screen should be connected to ground at both ends

Terminating resistors: If long cable runs are used in RS485 or RS422 installations reflections of data signals along the line can in some situations cause corruption of the signal. Fitting a 150Ω (nominal) resistor across the A and B terminals will help to absorb reflected signals and may fix the problem.

3.3 Remote input connections

The selected remote input function can be operated via an external contact closure via a switch, relay or open collector transistor switch.



3.4 Optional outputs

Refer to the separate "RM4 Din Rail Meter Optional Output Addendum" for connection details of optional outputs fitted.

3.5 Configuring the input board

There are no user configurable links on the input circuit boards. Refer to the separate RM4 DIN Rail Meter Optional Output Addendum booklet supplied if options are fitted.

4 Function tables - Arithmetic mode

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
A*x*Lo	Low setpoint value for designated alarm relay *x*	Any display value or **OFF**	**OFF**	See 5.1	6.1 / 19
A*x*Hi	High setpoint value for designated alarm relay *x*	Any display value or **OFF**	**OFF**	See 5.1	6.2 / 19
A*x*HY	Hysteresis value for the designated alarm relay *x*.	**0** to **9999**	**10**	See 5.1	6.3 / 20
A*x*tt	Trip time delay for the designated alarm relay *x*.	**0** to **9999**	**0**	See 5.1	6.4 / 20
A*x*rt	Reset time delay for the designated alarm relay *x*.	**0** to **9999**	**0**	See 5.1	6.5 / 21
A*x*n.o or **A*x*n.c**	Alarm relay *x* action to normally open (de-energised) or normally closed (energised)	**A*x*n.o** or **A*x*n.c**	**A*x*n.o**	See 5.1	6.6 / 21
A*x*SP or **A*x*t 1** etc.	Relay operation independent setpoint or trailing setpoint (*__Optional__)	**A*x*SP** or **A*x*t 1** etc.	**A*x*SP**	See 5.1	6.7 / 21
brgt	Display brightness level	**1** to **15**	**15**		6.8 / 22
dull	Display remote brightness switching	**0** to **15**	**1**		6.9 / 22

(*__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
d.oFF SECS	Auto display dimming timer	**0** to **9999**	**0**		6.10 / 23
rEC_	Analog output option low display value (*__Optional__)	Any display value	**0**		6.11 / 23
rEC¯	Analog output option high display value (*__Optional__)	Any display value	**1000**		6.12 / 23
rEC	Analog output 1 channel (*__Optional__)	**ch0** to **ch8**	**ch0**		6.13 / 24
rEC_ Ch2	Second analog output option low display value (*__Optional__)	Any display value	**0**		6.14 / 24

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

rEC⁻ Ch2	Second analog output option high display value (*Optional)	Any display value	1000		6.15 / 24
rEC2	Analog output 2 channel (*Optional)	ch0 to ch8	ch0		6.16 / 24
drnd	Display rounding	1 to 5000	1		6.17 / 24
dCPt	Decimal point	0, 0.1 etc.	0		6.18 / 25
FLtr	Digital filter	0 to 8	2		6.19 / 25
AtHH CH	Number of active channels for ArtH mode	1 to 8	4		6.38 / 33
Ch1 Addr	Channel 1 address	P1 to P8 or S1 to S8 or t1 to t8	P1		6.39 / 33
Ch2 Addr	Channel 2 address	P1 to P8 or S1 to S8 or t1 to t8	P1		6.40 / 33
Ch3 Addr	Channel 3 address	P1 to P8 or S1 to S8 or t1 to t8	P1		6.41 / 33
Ch4 Addr	Channel 4 address	P1 to P8 or S1 to S8 or t1 to t8	P1		6.42 / 34
Ch5 Addr	Channel 5 address	P1 to P8 or S1 to S8 or t1 to t8	P1		6.43 / 34
Ch6 Addr	Channel 6 address	P1 to P8 or S1 to S8 or t1 to t8	P1		6.44 / 34
Ch7 Addr	Channel 7 address	P1 to P8 or S1 to S8 or t1 to t8	P1		6.45 / 34
Ch8 Addr	Channel 8 address	P1 to P8 or S1 to S8 or t1 to t8	P1		6.46 / 34
Ch1 dCPt	Channel 1 decimal point	0, 0.1 etc.	0		6.47 / 35
Ch2 dCPt	Channel 2 decimal point	0, 0.1 etc.	0		6.48 / 35
Ch3 dCPt	Channel 3 decimal point	0, 0.1 etc.	0		6.49 / 35
Ch4 dCPt	Channel 4 decimal point	0, 0.1 etc.	0		6.50 / 35
Ch5 dCPt	Channel 5 decimal point	0, 0.1 etc.	0		6.51 / 35

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

CH6 dCPt	Channel 6 decimal point	0, 0.1 etc.	0		6.52 / 36
CH7 dCPt	Channel 7 decimal point	0, 0.1 etc.	0		6.53 / 36
CH8 dCPt	Channel 8 decimal point	0, 0.1 etc.	0		6.54 / 36
EA1	EA1 value for arithmetic formula	-19999 to 32767	1		6.55 / 36
Eb1	Eb1 value for arithmetic formula	-19999 to 32767	0		6.56 / 37
EC2	EC2 value for arithmetic formula	-19999 to 32767	1		6.60 / 38
EA2	EA2 value for arithmetic formula	-19999 to 32767	1		6.58 / 37
Eb2	Eb2 value for arithmetic formula	-19999 to 32767	0		6.59 / 37
EC2	EC2 value for arithmetic formula	-19999 to 32767	1		6.60 / 38
EA3	EA3 value for arithmetic formula	-19999 to 32767	1		6.61 / 38
Eb3	Eb3 value for arithmetic formula	-19999 to 32767	0		6.62 / 38
EC3	EC3 value for arithmetic formula	-19999 to 32767	1		6.63 / 38
EA4	EA4 value for arithmetic formula	-19999 to 32767	1		6.64 / 38
Eb4	Eb4 value for arithmetic formula	-19999 to 32767	0		6.65 / 39
EC4	EC4 value for arithmetic formula	-19999 to 32767	1		6.66 / 39
EA5	EA5 value for arithmetic formula	-19999 to 32767	1		6.67 / 39
Eb5	Eb5 value for arithmetic formula	-19999 to 32767	0		6.68 / 39
EC5	EC5 value for arithmetic formula	-19999 to 32767	1		6.69 / 39
EA6	EA6 value for arithmetic formula	-19999 to 32767	1		6.70 / 40
Eb6	Eb6 value for arithmetic formula	-19999 to 32767	0		6.71 / 40
EC6	EC6 value for arithmetic formula	-19999 to 32767	1		6.72 / 40

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

EA1	EA1 value for arithmetic formula	-19999 to 32767	1		6.73 / 40
Eb1	Eb1 value for arithmetic formula	-19999 to 32767	0		6.74 / 40
EC1	EC1 value for arithmetic formula	-19999 to 32767	1		6.75 / 41
EA8	EA8 value for arithmetic formula	-19999 to 32767	1		6.76 / 41
Eb8	Eb8 value for arithmetic formula	-19999 to 32767	0		6.77 / 41
EC8	EC8 value for arithmetic formula	-19999 to 32767	1		6.78 / 41
OP 1	Arithmetic operation between channels 1 and 2	Add, Sub, Prod, di U, Hi 9h, Lo, SI nE, COS or C.Sub	Add		6.79 / 41
OP2	Arithmetic operation between channel 3 and previous operation	Add, Sub, Prod, di U, Hi 9h, Lo, SI nE or COS	Add		6.80 / 42
OP3	Arithmetic operation between channel 4 and previous operation	Add, Sub, Prod, di U, Hi 9h, Lo, SI nE or COS	Add		6.81 / 42
OP4	Arithmetic operation between channel 5 and previous operation	Add, Sub, Prod, di U, Hi 9h, Lo, SI nE or COS	Add		6.82 / 43
OP5	Arithmetic operation between channel 6 and previous operation	Add, Sub, Prod, di U, Hi 9h, Lo, SI nE or COS	Add		6.83 / 43
OP6	Arithmetic operation between channel 7 and previous operation	Add, Sub, Prod, di U, Hi 9h, Lo, SI nE or COS	Add		6.84 / 44
OP7	Arithmetic operation between channel 8 and previous operation	Add, Sub, Prod, di U, Hi 9h, Lo, SI nE or COS	Add		6.85 / 45
Ch 1	Channel 1 polarity	both, POS or nEG	both		6.86 / 45
Ch2	Channel 2 polarity	both, POS or nEG	both		6.87 / 45

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

Ch3	Channel 3 polarity	both, POS or NEG	both		6.88 / 46
Ch4	Channel 4 polarity	both, POS or NEG	both		6.89 / 46
Ch5	Channel 5 polarity	both, POS or NEG	both		6.90 / 46
Ch6	Channel 6 polarity	both, POS or NEG	both		6.91 / 46
Ch7	Channel 7 polarity	both, POS or NEG	both		6.92 / 46
Ch8	Channel 8 polarity	both, POS or NEG	both		6.93 / 47
bAUd rAtE	Baud rate for serial communications	300. 600. 1200. 2400. 4800. 9600. 19.2 or 38.4	9600		6.23 / 26
PrtY	Parity for serial input	NONE. EVEN or Odd	NONE		6.24 / 26
dAtA	Data type	8.bit or 7.bit	8.bit		6.25 / 27
inPt	Input type	r232, r422, r485 or i 20	r232		6.26 / 27
CodE	Data type for display	diSP, ASCI, UAL, ArtH, n.bUS, SCAN, nnEA or CS	diSP		6.27 / 27
A1 OPEr	Alarm relay 1 operation mode	inPt, t.out or both	inPt		6.28 / 29
A2 OPEr	Alarm relay 2 operation mode	inPt, t.out or both	inPt		6.29 / 29
diS.to	Display timeout	0 to 9999	10		6.30 / 29
t.out	Data string timeout	0.0 to 10.0	1.0		6.31 / 30
P.but	P button function	NONE. Hi. Lo. HI Lo. tArE or 2Er0	NONE		6.32 / 30
r.in P	Remote input (external input) one function	NONE. P.HLd. d.HLd. Hi. Lo. Hi Lo. tArE. 2Er0. SP.Ac. no.Ac or dULL	NONE		6.33 / 30

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

ACCS	Access mode	OFF, EASY, NONE or ALL	OFF		6.34 / 32
SPAC	Setpoint access mode (*Optional)	A1, A1-2 etc.	A1		6.35 / 32
A1	Alarm relay 1 operation channel	ch0 to ch8	ch0		6.36 / 32
A2 to A4	Alarm relay 2 to 4 operation channel	ch0 to ch8	ch0		6.37 / 32
CLr ZERO	Clear zero	n/a	n/a		6.94 / 47
r.trn bAUd	Baud rate for serial retransmission (*Optional)	300, 600, 1200, 2400, 4800, 9600, 19.2 or 38.4	9600		6.95 / 47
r.trn PrtY	Parity for serial retransmission (*Optional)	NONE, EVEN or Odd	NONE		6.96 / 47
r.trn O.Put	Output mode for serial retransmission (*Optional)	NONE, dI SP, Cont, POLL, Cont, ñ.buS or A.buS	NONE		6.97 / 47
r.trn Addr	Address for serial retransmission (*Optional)	0 to 31	0		6.98 / 48

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

4.1 Relay table

Record your relay settings in the table below. Note: relays 3 and 4 are optionally fitted.

Display	Relay 1	Relay 2	Relay 3	Relay 4
A*x*Lo				
A*x*Hi				
A*x*HY				
A*x*tt				
A*x*rt				
A*x*n.o or A*x*n.c				
A*x*SP or A*x*t 1 etc.	n/a			
A1 OPEr		n/a	n/a	n/a
A2 OPEr	n/a		n/a	n/a
A1		n/a	n/a	n/a
A2	n/a		n/a	n/a
A3	n/a	n/a		n/a
A4	n/a	n/a	n/a	

5 Function table - Wind Speed and Direction mode

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
Rx Lo	Low setpoint value for designated alarm relay x	Any display value or **OFF**	**OFF**	See 5.1	6.1 / 19
Rx Hi	High setpoint value for designated alarm relay x	Any display value or **OFF**	**OFF**	See 5.1	6.2 / 19
RxHY	Hysteresis value for the designated alarm relay x.	**0** to **9999**	**10**	See 5.1	6.3 / 20
Rxtt	Trip time delay for the designated alarm relay x.	**0** to **9999**	**0**	See 5.1	6.4 / 20
Rxrt	Reset time delay for the designated alarm relay x.	**0** to **9999**	**0**	See 5.1	6.5 / 21
Rxn.o or **Rxn.c**	Alarm relay x action to normally open (de-energised) or normally closed (energised)	**Rxn.o** or **Rxn.c**	**Rxn.o**	See 5.1	6.6 / 21
RxSP or **Rxt 1** etc.	Relay operation independent setpoint or trailing setpoint (*__Optional__)	**RxSP** or **Rxt 1** etc.	**RxSP**	See 5.1	6.7 / 21
brgt	Display brightness level	**1** to **15**	**15**		6.8 / 22
dull	Display remote brightness switching	**0** to **15**	**1**		6.9 / 22

(*__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
d.oFF SECS	Auto display dimming timer	**0** to **9999**	**0**		6.10 / 23
rEC_	Analog output option low display value (*__Optional__)	Any display value	**0**		6.11 / 23
rEC¯	Analog output option high display value (*__Optional__)	Any display value	**1000**		6.12 / 23
rEC	Analog output 1 channel (*__Optional__)	**ch0** to **ch8**	**ch0**		6.13 / 24
rEC_ Ch2	Second analog output option low display value (*__Optional__)	Any display value	**0**		6.14 / 24

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

rEC² Ch2	Second analog output option high display value (*Optional)	Any display value	1000		6.15 / 24
rEC2	Analog output 2 channel (*Optional)	ch0 to ch8	ch0		6.20 / 25
SPEd Un, t	Units to be used for MAEA mode	mS, mPH, hPH or hnot	mS		6.20 / 25
dFLt di SP	Default display for MAEA mode	di r, SPEd or SCAn	SCAn		6.21 / 26
SCAn SECS	Number of seconds between scans	0 to 255	0		6.22 / 26
bAUd rAtE	Baud rate for serial communications	300.600. 1200.2400. 4800.9600. 19.2 or 38.4	9600		6.23 / 26
PrtY	Parity for serial input	nonE.EUEn or Odd	nonE		6.24 / 26
dAtA	Data type	8.bit or 7.bit	8.bit		6.25 / 27
inPt	Input type	r232, r422, r485 or i 20	r232		6.26 / 27
CodE	Data type for display	di SP, ASCI , UAL, ArtH, m.buS, SCAn, MAEA or CS	di SP		6.27 / 27
A1 OPEr	Alarm relay 1 operation mode	inPt, t.out or both	inPt		6.28 / 29
A2 OPEr	Alarm relay 2 operation mode	inPt, t.out or both	inPt		6.29 / 29
dS.to	Display timeout	0 to 9999	10		6.30 / 29
t.out	Data string timeout	0.0 to 10.0	1.0		6.31 / 30
P.but	P button function	nonE.Hi . Lo.HI Lo. tArE or 2Er0	nonE		6.32 / 30
r.in P	Remote input (external input) one function	nonE. P.HLd. d.HLd.Hi . Lo .Hi Lo. tArE.2Er0. SP.Ac .no.Ac or dull	nonE		6.33 / 30
ACCS	Access mode	OFF.EASY. nonE or ALL	OFF		6.34 / 32

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

SPAC	Setpoint access mode (*Optional)	A 1, A 1-2 etc.	A 1		6.35 / 32
A 1	Alarm relay 1 operation channel	ch0 to ch8	ch0		6.36 / 32
A2 to A4	Alarm relay 2 to 4 operation channel	ch0 to ch8	ch0		6.37 / 32
r.trn bAUd	Baud rate for serial retransmission (*Optional)	300, 600, 1200, 2400, 4800, 9600, 19.2 or 38.4	9600		6.95 / 47
r.trn PrtY	Parity for serial retransmission (*Optional)	nonE, EUEn or Odd	nonE		6.96 / 47
r.trn O.Put	Output mode for serial retransmission (*Optional)	nonE, di SP, Cont, POLL, Cont, ñ.buS or A.buS	nonE		6.97 / 47
r.trn Addr	Address for serial retransmission (*Optional)	0 to 31	0		6.98 / 48 Z

(***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. Note: relays 3 and 4 are optionally fitted.

Display	Relay 1	Relay 2	Relay 3	Relay 4
A*x*Lo				
A*x*H,				
A*x*HY				
A*x*tt				
A*x*rt				
A*x*n.o or A*x*n.c				
A*x*SP or A*x*t 1 etc.	n/a			
A 1 OPEr		n/a	n/a	n/a
A2 OPEr	n/a		n/a	n/a
A 1		n/a	n/a	n/a
A2	n/a		n/a	n/a
A3	n/a	n/a		n/a
A4	n/a	n/a	n/a	

6 Arithmetic and Wind Speed/Direction mode functions

Some of the functions described in this chapter are common to both ARTH and WSEA modes, others will only appear in one mode, check the function tables for each mode to confirm which functions apply. The RM4 setup and calibration functions are configured through a push button sequence. The push buttons located at the front of the instrument 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 indicate CAL as part of the "wake up messages" when the CAL message is seen you can release the button.

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

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.

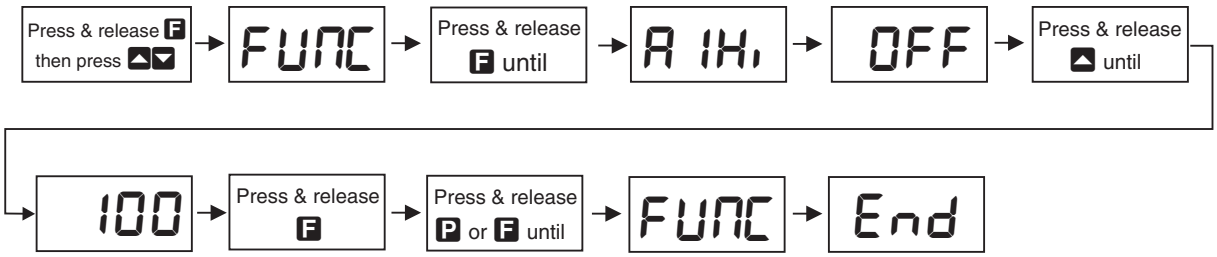
Entering FUNC Mode

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

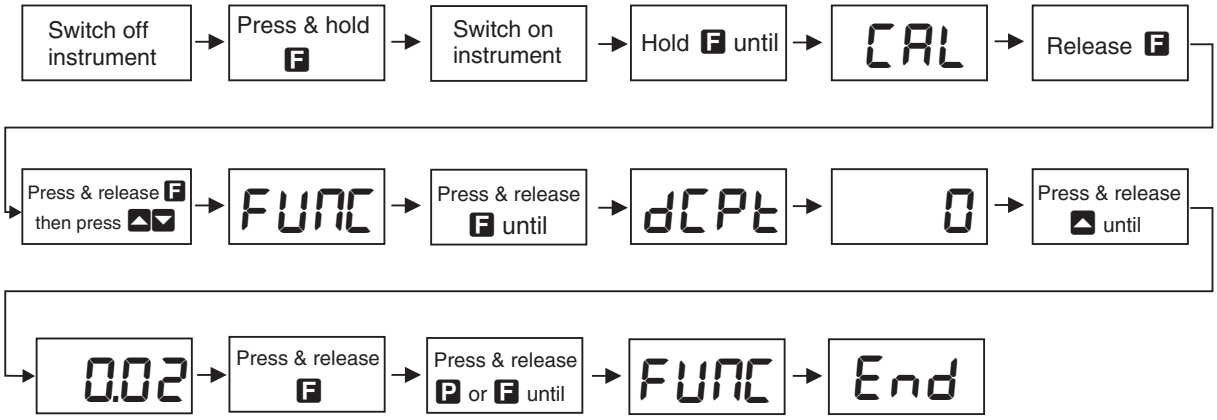
1. When the "wake up" messages have finished and the display has settled down to its normal reading press, then release the F button.

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 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 r.1 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

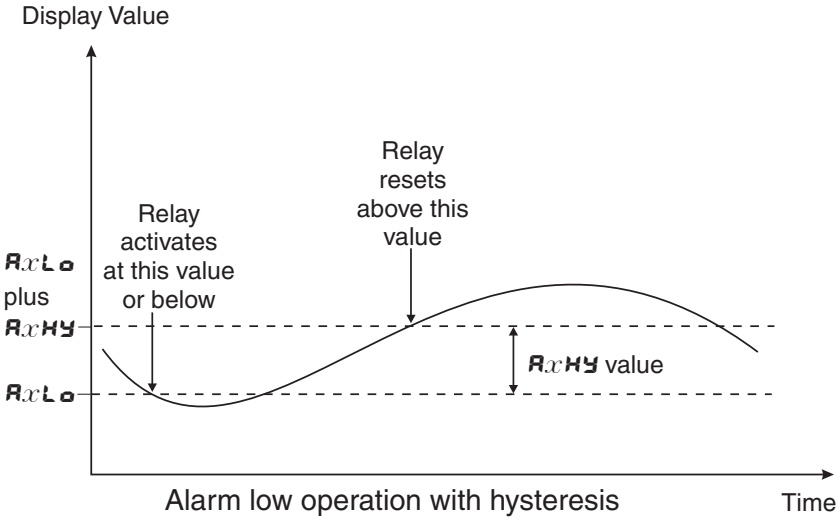
Display: RxLo

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

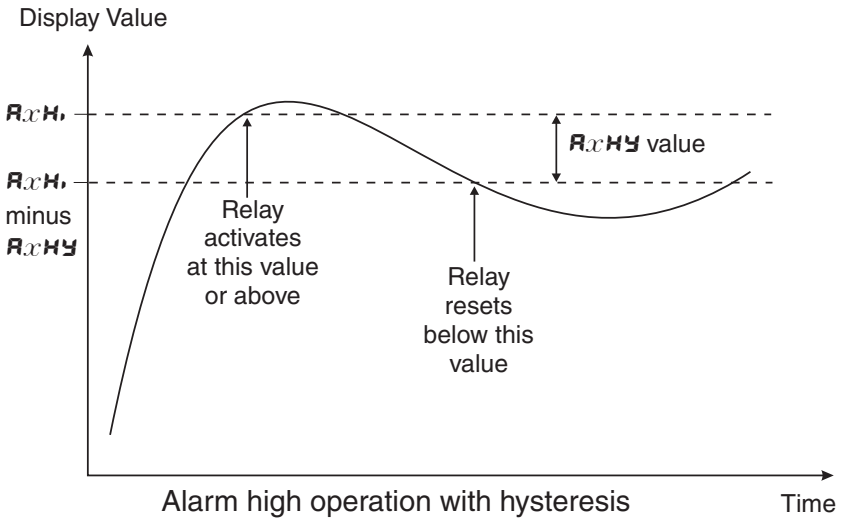
Display: RxH,

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 1H, 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 RxH, 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 R 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: RxHY

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. R 1HY for relay 1. To set a relay hysteresis value go to the RxHY 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 R 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 R 1H, is set to 50.0 and R 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 R 1Lo is to 20.0 and R 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 R 1H, is set to 100 and R 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 Axtt function and use the ▲ or ▼ push buttons to set the value required then press F to accept this value.

Example: If A 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: Axrt
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 Axrt function and use the ▲ or ▼ push buttons to set the value required then press F to accept this value.

Example: If A 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: Axn.o or Axn.c
Range: Axn.o or Axn.c
Default Value: Axn.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 Axn.o or Axn.c function and use the ▲ or ▼ push buttons to set the required operation then press F to accept this selection. **Example:** If set to A 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 only be seen where more than one relay is fitted. Each alarm relay, 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 A1H, 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. The d.oFF SECS function (automatic display blanking or dulling) will also cause the dull function to appear if the d.oFF SECS function is enabled i.e. set to any value other than 0.

Example: With dull set to 4 and brgt set to 15 and the r.1 nP 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 Auto display dimming timer

Display: d.oFF SECS
Range: 0 to 9999
Default Value: 0

This function allows a time to be set after which the display brightness (set by the brgt function) will automatically be set to the level set at the dULL function. The auto dimming feature can be used to reduce power consumption. The function can be set to any value between 0 and 9999 seconds. A setting of 0 disables the auto dimming. The display brightness can be restored by pressing any of the instruments front push buttons. The display brightness will also be restored whilst one or more alarm relays is activated. In normal display mode (i.e. not in CAL mode) there is a 2 minute delay period after the instrument is switched on during which the automatic display dimming will not operate. If any of the front pusbuttons are pressed during this period this 2 minute delay will be canceled.

6.11 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 "RM4 Din Rail 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.

6.12 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 "RM4 Din Rail 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.

6.13 Analog output 1 channel

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

Seen only when analog retransmission option fitted. Refer to the separate "RM4 Din Rail 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 dnEA 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.

6.14 Second analog output option low value

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

See rEC_ function 6.11 for description of operation.

6.15 Second analog output option high value

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

See rEC¯ function 6.12 for description of operation.

6.16 Analog output 2 channel

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

Seen only when analog retransmission option fitted. Refer to the separate "RM4 Din Rail 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 dnEA 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.

6.17 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.

6.18 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) or **0.0004**(4 decimal places). Note if the decimal point is altered the display may need to be recalibrated and alarm etc. settings checked. In arithmetic mode this function sets the decimal point position for the result channel i.e. channel 0

6.19 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.

6.20 Units to be used for **MAEA** mode

Display: **SPEd Unit**
Range: **mS**, **mPH**, **kPH** or **knot**
Default Value: **mS**

Applicable to **MAEA** mode only. Select from the following choices: **mS** (metres/sec), **mPH** (miles/hour), **kPH** (kilometers/hour) or **knot** (knots).

6.21 Default display for NMEA mode

Display: dFLt dI SP
Range: dIr, SPEd or SCAN
Default Value: SCAN

Applicable to NMEA mode only. Select from the following choices: dIr (wind direction), SPEd (wind speed) or SCAN (automatically toggles display between direction and speed at the rate set by the SCAN SECS function). For example if this function is set to dIr then the operator will need to push the ▲ or ▼ button to display speed, the display will then automatically revert back to direction after approximately 4 minutes.

6.22 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 NMEA. Selects the number of seconds between channel scans or between wind speed and direction if CodE function is set to NMEA. 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.

6.23 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.

6.24 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.

6.25 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.

6.26 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.

6.27 Data type for display

Display: CodE
Range: di SP, ASCI , UAL, ArtH, n.buS, 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, SCAn, nnEA or CS. Note: see the separate Addendum booklet for details of arithmetic mode Art h and Wind speed/direction nnEA operation. 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.

- **d, 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.

- **VAL mode**
  With VAL 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 1 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 VAL mode any leading zeroes transmitted will be ignored e.g. data received such as -00345 will be displayed as -345.

- **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 wind speed and direction sensor or similar NMEA output sensor. See "Wind Speed and Direction NMEA mode" chapter in the RM4-RS addendum booklet 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.

6.28 Alarm relay 1 operation mode

Display: A1 OPEr
Range: inPt, t.out or both
Default Value: inPt

Relay 1 operation mode - relay 1 can be made to operate from the input value (e.g. at the A1Lo or A1Hi value, applicable when CodE is set to VAL or rn.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.

6.29 Alarm relay 2 operation mode

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

Relay 2 operation mode - relay 2 can be made to operate from the input value (e.g. at the A1Lo or A1Hi value, applicable when CodE is set to VAL or rn.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.

6.30 Display timeout

Display: dS.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.

6.31 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.

6.32 P button function

Display: P.but
Range: NONE, Hi, Lo, HI Lo, tARE or 2ERO
Default Value: NONE

P button function - The following applies only when the CodE function is set to UAL. The P button 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.inP function below. Functions available are: NONE, Hi, Lo, Hi Lo, tARE or 2ERO

6.33 Remote input function

Display: r.inP
Range: NONE, P.HLd, d.HLd, Hi, Lo, Hi Lo, tARE, 2ERO, 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.

d.SCL - applicable only if the dummy load option board is fitted. When the dummy load option board is fitted this option allows the input to be switched from the load to the dummy load. When the dummy load is activated the display will show the scaling value for the dummy load. The scaling value should be noted once installation is complete. Note that if the display is re calibrated or zeroed then the scaling value for the dummy load will change and a note of the new value should be taken. The tare operation will not alter the dummy load scaling value. An adjustment screw allows some adjustment of the value displayed. Whilst the dummy load is connected the display will flash the message **d.SCL** approximately once every 8 seconds. If the dummy load is activated via a momentary action switch (or via the front **P** button) the display will revert back to a normal live input display value after 20 seconds. If a latching switch is used to activate the dummy load then the display will show the dummy load value and flash the **d.SCL** message until 20 seconds after the remote input is released. For 5 digit displays the activation of the dummy load will also cause the "A2" annunciator LED to light during the duration of the dummy load display. The value shown for the dummy load does not affect normal relay or retransmission operations.

6.34 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" section. 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.

6.35 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.

6.36 Alarm relay 1 operation channel

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

Alarm relay 1 allocation - applicable only to ArEh, 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 ArEh mode ch0 represents the arithmetic result. ch0 should not be selected for any other mode.

6.37 Alarm relay 2 to 4 operation channel

Display: A2 to A4
Range: ch0 to ch8
Default Value: ch0

Alarm relay allocation for relays 2, 3, and 4 - applicable only to ArEh, nnEA, SCAn and CS

modes. Note: relays 3 and 4 are optional. See section 6.36

6.38 Number of active channels for ArtH mode

Display: AtHH CH
Range: 1 to 8
Default Value: 4

Displays and selects the number of active input channels used in the arithmetic operation. The instrument will automatically poll the number of channels selected.

6.39 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.

6.40 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 6.39 for further information.

6.41 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 6.39 for further information.

6.42 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 6.39 for further information.

6.43 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 6.39 for further information.

6.44 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 6.39 for further information.

6.45 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 6.39 for further information.

6.46 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 6.39 for further information.

6.47 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.

6.48 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 6.47 for further details.

6.49 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 6.47 for further details.

6.50 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 6.47 for further details.

6.51 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 6.47 for further details.

6.52 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 6.47 for further details.

6.53 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 6.47 for further details.

6.54 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 6.47 for further details.

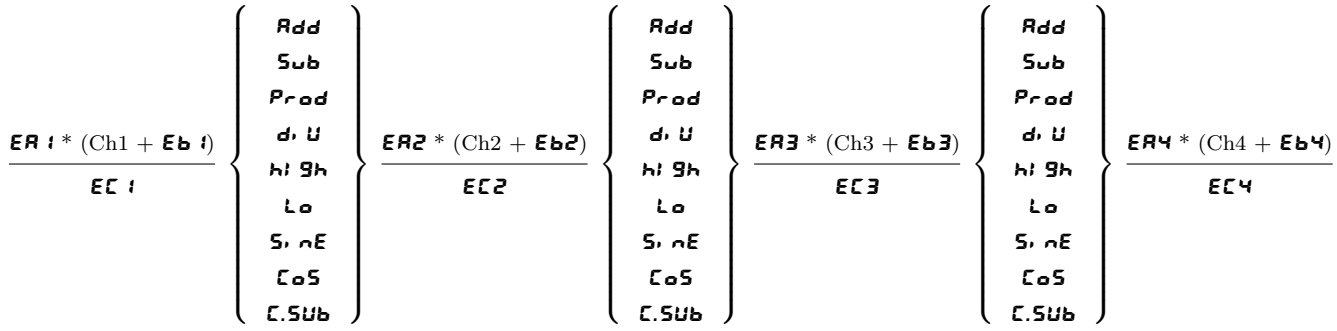
6.55 Channel 1 EA1 value for arithmetic formula

Display: EA1
Range: -19999 to 32767
Default Value: 1

Seen only in SEt OPEr = ArtH mode. Displays and sets the EA1 value to be used in the arithmetic formula. A range from -19999 to 32767 is available for this function. This value is used together with the input value for channel 1, the Eb1 and EC1 to produce the a value to be used together with the OP1, OP2, OP3 and OP4 options in the formula below (4 channel example shown):

$$\frac{EA1 * (Ch1 + Eb1)}{EC1} \{OP1\} \frac{EA2 * (Ch2 + Eb2)}{EC2} \{OP2\} \frac{EA3 * (Ch3 + Eb3)}{EC3} \{OP3\} \frac{EA4 * (Ch4 + Eb4)}{EC4}$$

As the formula shows the EA1, Eb1 and EC1 values entered are used to manipulate the display value for channel 1 (Ch1). This value then acts on the similarly manipulated channel 2 value using the operation selected at the OP1 function etc. for the remaining active channels. A full expansion of the formula showing the OP1, OP2 and OP3 options is given below.



Note: **A** and **C** are whole numbers, **b** has the same decimal place setting as its associated channel.

6.56 Channel 1 Eb 1 value for arithmetic formula

Display: Eb 1
Range: -19999 to 32767
Default Value: 0

Seen only in SEt OPEr = ArtH mode. Displays and sets the Eb 1 value to be used in the arithmetic formula. See function 6.55 for further details.

6.57 Channel 2 EC2 value for arithmetic formula

Display: EC2
Range: -19999 to 32767
Default Value: 1

Seen only in SEt OPEr = ArtH mode. Displays and sets the EC2 value to be used in the arithmetic formula. See function 6.55 for further details.

6.58 Channel 2 EA2 value for arithmetic formula

Display: EA2
Range: -19999 to 32767
Default Value: 1

Seen only in SEt OPEr = ArtH mode. Displays and sets the EA2 value to be used in the arithmetic formula. See function 6.55 for further details.

6.59 Channel 2 Eb2 value for arithmetic formula

Display: Eb2
Range: -19999 to 32767
Default Value: 0

Seen only in SEt OPEr = ArtH mode. Displays and sets the Eb2 value to be used in the arithmetic formula. See function 6.55 for further details.

6.60 Channel 2 EC2 value for arithmetic formula

Display: EC2
Range: -19999 to 32767
Default Value: 1

Seen only in SEt OPEr = ArtH mode. Displays and sets the EC2 value to be used in the arithmetic formula. See function 6.55 for further details.

6.61 Channel 3 EA3 value for arithmetic formula

Display: EA3
Range: -19999 to 32767
Default Value: 1

Seen only in SEt OPEr = ArtH mode. Displays and sets the EA3 value to be used in the arithmetic formula. See function 6.55 for further details.

6.62 Channel 3 Eb3 value for arithmetic formula

Display: Eb3
Range: -19999 to 32767
Default Value: 0

Seen only in SEt OPEr = ArtH mode. Displays and sets the Eb3 value to be used in the arithmetic formula. See function 6.55 for further details.

6.63 Channel 3 EC3 value for arithmetic formula

Display: EC3
Range: -19999 to 32767
Default Value: 1

Seen only in SEt OPEr = ArtH mode. Displays and sets the EC3 value to be used in the arithmetic formula. See function 6.55 for further details.

6.64 Channel 4 EA4 value for arithmetic formula

Display: EA4
Range: -19999 to 32767
Default Value: 1

Seen only in CodE = ArtH mode. Displays and sets the EA4 value to be used in the arithmetic formula. See function 6.55 for further details.

6.65 Channel 4 Eb4 value for arithmetic formula

Display: Eb4
Range: -19999 to 32767
Default Value: 0

Seen only in CodE = Arth mode. Displays and sets the Eb4 value to be used in the arithmetic formula. See function 6.55 for further details.

6.66 Channel 4 EC4 value for arithmetic formula

Display: EC4
Range: -19999 to 32767
Default Value: 1

Seen only in CodE = Arth mode. Displays and sets the EC4 value to be used in the arithmetic formula. See function 6.55 for further details.

6.67 Channel 5 EA5 value for arithmetic formula

Display: EA5
Range: -19999 to 32767
Default Value: 1

Seen only in CodE = Arth mode. Displays and sets the EA5 value to be used in the arithmetic formula. See function 6.55 for further details.

6.68 Channel 5 Eb5 value for arithmetic formula

Display: Eb5
Range: -19999 to 32767
Default Value: 0

Seen only in CodE = Arth mode. Displays and sets the Eb5 value to be used in the arithmetic formula. See function 6.55 for further details.

6.69 Channel 5 EC5 value for arithmetic formula

Display: EC5
Range: -19999 to 32767
Default Value: 1

Seen only in CodE = Arth mode. Displays and sets the EC5 value to be used in the arithmetic formula. See function 6.55 for further details.

6.70 Channel 6 EA6 value for arithmetic formula

Display: EA6
Range: -19999 to 32767
Default Value: 1

Seen only in CodE = ArtH mode. Displays and sets the EA6 value to be used in the arithmetic formula. See function 6.55 for further details.

6.71 Channel 6 Eb6 value for arithmetic formula

Display: Eb6
Range: -19999 to 32767
Default Value: 0

Seen only in CodE = ArtH mode. Displays and sets the Eb6 value to be used in the arithmetic formula. See function 6.55 for further details.

6.72 Channel 6 EC6 value for arithmetic formula

Display: EC6
Range: -19999 to 32767
Default Value: 1

Seen only in CodE = ArtH mode. Displays and sets the EC6 value to be used in the arithmetic formula. See function 6.55 for further details.

6.73 Channel 7 EA7 value for arithmetic formula

Display: EA7
Range: -19999 to 32767
Default Value: 1

Seen only in CodE = ArtH mode. Displays and sets the EA7 value to be used in the arithmetic formula. See function 6.55 for further details.

6.74 Channel 7 Eb7 value for arithmetic formula

Display: Eb7
Range: -19999 to 32767
Default Value: 0

Seen only in CodE = ArtH mode. Displays and sets the Eb7 value to be used in the arithmetic formula. See function 6.55 for further details.

6.75 Channel 7 EC7 value for arithmetic formula

Display: EC7
Range: -19999 to 32767
Default Value: 1

Seen only in CodE = Arth mode. Displays and sets the EC7 value to be used in the arithmetic formula. See function 6.55 for further details.

6.76 Channel 8 EA8 value for arithmetic formula

Display: EA8
Range: -19999 to 32767
Default Value: 1

Seen only in CodE = Arth mode. Displays and sets the EA8 value to be used in the arithmetic formula. See function 6.55 for further details.

6.77 Channel 8 Eb8 value for arithmetic formula

Display: Eb8
Range: -19999 to 32767
Default Value: 0

Seen only in CodE = Arth mode. Displays and sets the Eb8 value to be used in the arithmetic formula. See function 6.55 for further details.

6.78 Channel 8 EC8 value for arithmetic formula

Display: EC8
Range: -19999 to 32767
Default Value: 1

Seen only in CodE = Arth mode. Displays and sets the EC8 value to be used in the arithmetic formula. See function 6.55 for further details.

6.79 Arithmetic operation between channels 1 and 2

Display: OP 1
Range: Add, Sub, Prod, di U, Hi 9h, Lo, SI nE, COS or C.Sub
Default Value: Add

Displays the arithmetic operation to be undertaken between the formula for channels 1 and 2. See also function 6.55 which illustrates the formula.
Choices are:

- Add - channel 1 formula plus channel 2 formula

- **Sub** - channel 1 formula minus channel 2 formula
- **Prod** - channel 1 formula times channel 2 formula
- **di U** - channel 1 formula divided by channel 2 formula
- **Hi 9h** - highest of channel 1 formula or channel 2 formula
- **Lo** - lowest of channel 1 formula or channel 2 formula
- **Si nE** - channel 1 formula times the sine of the angle represented by channel 2 formula
- **COS** - channel 1 formula times the cosine of the angle represented by channel 2 formula
- **C.Sub** - channel 1 formula clock time input minus channel 2 formula clock time.
  Note: **C.Sub** is meant to be used when connecting to two clocks with compatible serial outputs.

6.80 Arithmetic operation between channel 3 and previous operation

Display:	**OP2**
Range:	**Add**, **Sub**, **Prod**, **di U**, **Hi 9h**, **Lo**, **Si nE** or **COS**
Default Value:	**Add**

Displays the arithmetic operation to be undertaken between the channel 3 formula and the previous result. See also function 6.55 which illustrates the formula.
Choices are:

- **Add** - mathematical result of **OP 1** plus channel 3 formula
- **Sub** - mathematical result of **OP 1** minus channel 3 formula
- **Prod** - mathematical result of **OP 1** times channel 3 formula
- **di U** - mathematical result of **OP 1** divided by channel 3 formula
- **Hi 9h** - highest of mathematical result of **OP 1** or channel 3 formula
- **Lo** - lowest of mathematical result of **OP 1** or channel 3 formula
- **Si nE** - mathematical result of **OP 1** times the sine of the angle represented by channel 3 formula
- **COS** - mathematical result of **OP 1** times the cosine of the angle represented by channel 3 formula

6.81 Arithmetic operation between channel 4 and previous operation

Display:	**OP3**
Range:	**Add**, **Sub**, **Prod**, **di U**, **Hi 9h**, **Lo**, **Si nE** or **COS**
Default Value:	**Add**

Displays the arithmetic operation to be undertaken between the channel 4 formula and the previous result. See also function 6.55 which illustrates the formula.
Choices are:

- **Add** - mathematical result of **OP 1** and **OP2** plus channel 4 formula
- **Sub** - mathematical result of **OP 1** and **OP2** minus channel 4 formula
- **Prod** - mathematical result of **OP 1** and **OP2** times channel 4 formula
- **di U** - mathematical result of **OP 1** and **OP2** divided by channel 4 formula
- **Hi 9h** - highest of mathematical result of **OP 1** and **OP2** or channel 4 formula
- **Lo** - lowest of mathematical result of **OP 1** and **OP2** or channel 4 formula
- **Si nE** - mathematical result of **OP 1** and **OP2** times the sine of the angle represented by channel 4 formula
- **COS** - mathematical result of **OP 1** and **OP2** times the cosine of the angle represented by channel 4 formula

6.82 Arithmetic operation between channel 5 and previous operation

Display: **OP4**
Range: **Add**, **Sub**, **Prod**, **di U**, **Hi 9h**, **Lo**, **Si nE** or **COS**
Default Value: **Add**

Displays the arithmetic operation to be undertaken between the channel 5 formula and the previous result. See also function 6.55 which illustrates the formula.
Choices are:

- **Add** - mathematical result of **OP 1** and **OP2** and **OP3** plus channel 5 formula
- **Sub** - mathematical result of **OP 1** and **OP2** and **OP3** minus channel 5 formula
- **Prod** - mathematical result of **OP 1** and **OP2** and **OP3** times channel 5 formula
- **di U** - mathematical result of **OP 1** and **OP2** and **OP3** divided by channel 5 formula
- **Hi 9h** - highest of mathematical result of **OP 1** and **OP2** and **OP3** or channel 5 formula
- **Lo** - lowest of mathematical result of **OP 1** and **OP2** and **OP3** or channel 5 formula
- **Si nE** - mathematical result of **OP 1** and **OP2** and **OP3** times the sine of the angle represented by channel 5 formula
- **COS** - mathematical result of **OP 1** and **OP2** and **OP3** times the cosine of the angle represented by channel 5 formula

6.83 Arithmetic operation between channel 6 and previous operation

Display: **OP5**
Range: **Add**, **Sub**, **Prod**, **di U**, **Hi 9h**, **Lo**, **Si nE** or **COS**
Default Value: **Add**

Displays the arithmetic operation to be undertaken between the channel 6 formula and the previous result. See also function 6.55 which illustrates the formula.
Choices are:

- **Add** - mathematical result of **OP 1** and **OP2** and **OP3** and **OP4** plus channel 6 formula
- **Sub** - mathematical result of **OP 1** and **OP2** and **OP3** and **OP4** minus channel 6 formula
- **Prod** - mathematical result of **OP 1** and **OP2** and **OP3** and **OP4** times channel 6 formula
- **di U** - mathematical result of **OP 1** and **OP2** and **OP3** and **OP4** divided by channel 6 formula
- **Hi 9h** - highest of mathematical result of **OP 1** and **OP2** and **OP3** and **OP4** or channel 6 formula
- **Lo** - lowest of mathematical result of **OP 1** and **OP2** and **OP3** and **OP4** or channel 6 formula
- **Si nE** - mathematical result of **OP 1** and **OP2** and **OP3** and **OP4** times the sine of the angle represented by channel 6 formula
- **COS** - mathematical result of **OP 1** and **OP2** and **OP3** and **OP4** times the cosine of the angle represented by channel 6 formula

6.84 Arithmetic operation between channel 7 and previous operation

Display: **OP6**
Range: **Add**, **Sub**, **Prod**, **di U**, **Hi 9h**, **Lo**, **Si nE** or **COS**
Default Value: **Add**

Displays the arithmetic operation to be undertaken between the channel 7 formula and the previous result. See also function 6.55 which illustrates the formula.
Choices are:

- **Add** - mathematical result of **OP 1** and **OP2** and **OP3** and **OP4** and **OP5** plus channel 7 formula
- **Sub** - mathematical result of **OP 1** and **OP2** and **OP3** and **OP4** and **OP5** minus channel 7 formula
- **Prod** - mathematical result of **OP 1** and **OP2** and **OP3** and **OP4** and **OP5** times channel 7 formula
- **di U** - mathematical result of **OP 1** and **OP2** and **OP3** and **OP4** and **OP5** divided by channel 7 formula
- **Hi 9h** - highest of mathematical result of **OP 1** and **OP2** and **OP3** and **OP4** and **OP5** or channel 7 formula
- **Lo** - lowest of mathematical result of **OP 1** and **OP2** and **OP3** and **OP4** and **OP5** or channel 7 formula
- **Si nE** - mathematical result of **OP 1** and **OP2** and **OP3** and **OP4** and **OP5** times the sine of the angle represented by channel 7 formula
- **COS** - mathematical result of **OP 1** and **OP2** and **OP3** and **OP4** and **OP5** times the cosine of the angle represented by channel 7 formula

6.85 Arithmetic operation between channel 8 and previous operation

Display: OP7
Range: Add, Sub, Prod, di U, Hi 9h, Lo, SI nE or COS
Default Value: Add

Displays the arithmetic operation to be undertaken between the channel 8 formula and the previous result. See also function 6.55 which illustrates the formula.
Choices are:

- **Add** - mathematical result of **OP 1** and **OP2** and **OP3** and **OP4** and **OP5** and **OP6** plus channel 8 formula
- **Sub** - mathematical result of **OP 1** and **OP2** and **OP3** and **OP4** and **OP5** and **OP6** minus channel 8 formula
- **Prod** - mathematical result of **OP 1** and **OP2** and **OP3** and **OP4** and **OP5** and **OP6** times channel 8 formula
- **di U** - mathematical result of **OP 1** and **OP2** and **OP3** and **OP4** and **OP5** and **OP6** divided by channel 8 formula
- **Hi 9h** - highest of mathematical result of **OP 1** and **OP2** and **OP3** and **OP4** and **OP5** and **OP6** or channel 8 formula
- **Lo** - lowest of mathematical result of **OP 1** and **OP2** and **OP3** and **OP4** and **OP5** and **OP6** or channel 8 formula
- **SI nE** - mathematical result of **OP 1** and **OP2** and **OP3** and **OP4** and **OP5** and **OP6** times the sine of the angle represented by channel 8 formula
- **COS** - mathematical result of **OP 1** and **OP2** and **OP3** and **OP4** and **OP5** and **OP6** times the cosine of the angle represented by channel 8 formula

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 Clear zero

Display: CLr ZERO
Range: n/a
Default Value: n/a

Seen only when CodE function = VAL 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.

6.95 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.

6.96 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.

6.97 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.

6.98 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.

7 Arithmetic function examples

Example 1: To get an average of channels 1, 2, 3 and 4 each input is added together and divided by 4:

Program:
EA1 = 1, Eb1 = 0, EC1 = 4,
EA2 = 1, Eb2 = 0, EC2 = 4,
EA3 = 1, Eb3 = 0, EC3 = 4,
EA4 = 1, Eb4 = 0, EC4 = 4,
OP1 = Add,
OP2 = Add,
OP3 = Add

$$\frac{1*(Ch1+0)}{4}\ Add\ \frac{1*(Ch2+0)}{4}\ Add\ \frac{1*(Ch3+0)}{4}\ Add\ \frac{1*(Ch4+0)}{4}$$

Example 2: Three inputs are present. The display is to indicate the highest of the 3 inputs. Channel 1 input is to be multiplied 2/3.

Program:
EA1 = 2, Eb1 = 0, EC1 = 3,
EA2 = 1, Eb2 = 0, EC2 = 1,
EA3 = 1, Eb3 = 0, EC3 = 1,
OP1 = Hi9H,
OP2 = Hi9H

$$\frac{2*(Ch1+0)}{3}\ HIGH\ \frac{1*(Ch2+0)}{1}\ HIGH\ \frac{1*(Ch3+0)}{1}$$

Example 3: To multiply the figure displayed on channel 1 by the sine of the angle of the figure displayed on channel 2. The second channel would normally be scaled from 0 to 360 when either the sine or cosine is being used, however numbers outside this range are acceptable.

Program:
EA1 = 1, Eb1 = 0, EC1 = 1,
EA2 = 1, Eb2 = 0, EC2 = 1,
OP1 = SINE

$$\frac{1*(Ch1+0)}{1}\ SINE\ \frac{1*(Ch2+0)}{1}$$

8 Wind speed and direction NMEA mode

This chapter deals specifically with the NMEA (National Marine Elecronics Association) mode of operation. When used in this mode the RM4-RS must be connected to a sensor with NMEA output and the RM4 **CodE** function must be set to **NMEA**.

Communication settings require the baud rate (**bAUd rAtE** function) parity (**PrtY** function) and data bits (**dAtA** function) be set to match the sensor output.

The display can be set to show wind speed, wind direction or to toggle (using ▲ or ▼ button) or automatically alternate the display between wind speed and direction. Analog retransmission output options can be selected to transmit wind direction (**Ch 1**) or wind speed (**Ch2**) at the **rEC** function (also at the **rEC2** function if dual analog output is used.) Similarly **Ch 1** or **Ch2** can be selected for the alarm relays at the **A 1**, **A2** etc. functions.

Other settings allow the wind speed units and default display to be selected. See Chapter 5, page 14 for details of setup functions for the NMEA wind speed and direction mode.