RM4-IVH

High Speed/High Accuracy

4-20mA, ±2V or ±20V

Process Monitor/Controller

Operation & Instruction Manual

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3 Introduction

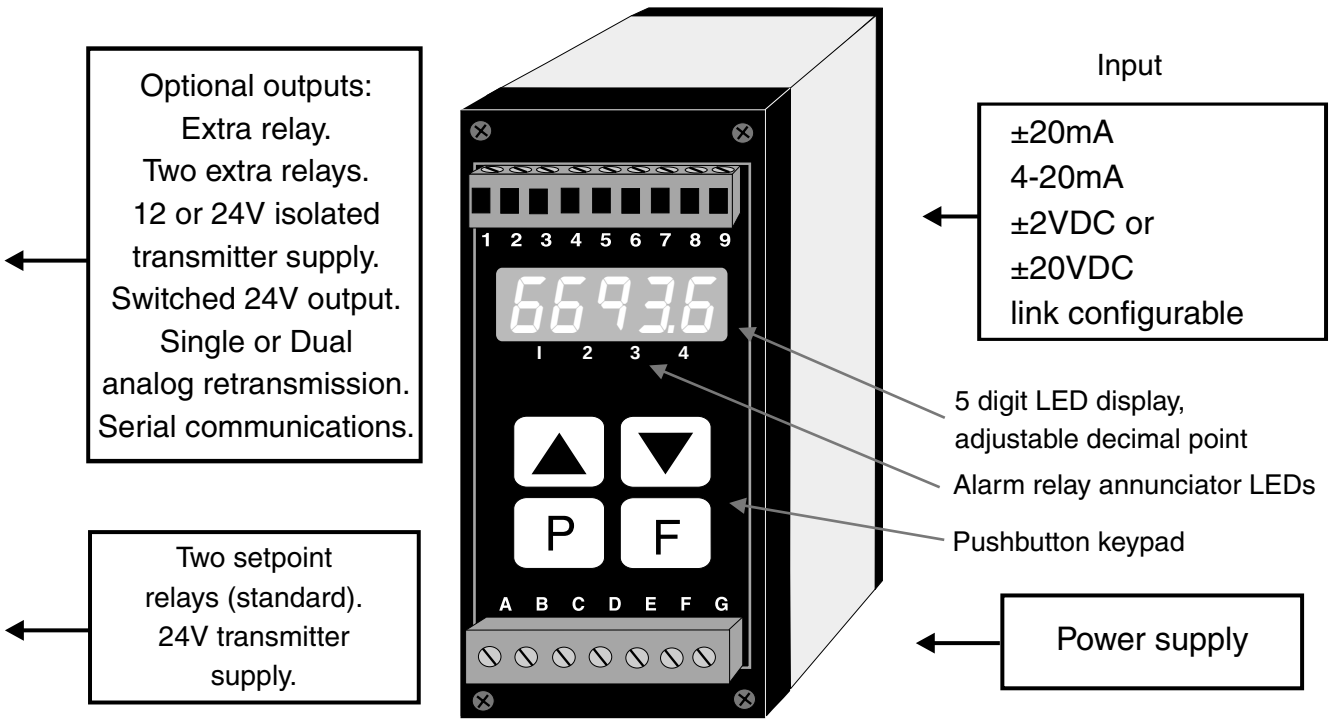
This manual contains information for the installation and operation of the RM4-IVH Monitor. Model RM4-IVH is a high precision monitor which may be configured via internal link settings to accept a 4-20mA, ±20mA, .±2VDC or ±20VDC input. Sample rate is programmable in steps from 5 to 100 samples per second.

Calibration, setpoint and other set up functions are easily achieved via the keypad. Two standard inbuilt relays provide alarm/control functions. Various combinations of one or two optional extra relays, analog (4-20mA, 0-1V or 0-10V) retransmission or serial (RS232, RS485 or RS422) communications may also be provided as an option. Alarms and retransmission may be set to operate from the live input value or to follow either the tare, batch, peak hold, display hold, peak memory or valley memory remote input operations. An Auto Zero function is included and may be set as required. The Auto Zero function allows the display to automatically zero itself when the reading is close to zero for a programmable number of samples.

Unless otherwise specified at the time of order, your RM4 has been factory set to a standard configuration. Like all other RM4 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.

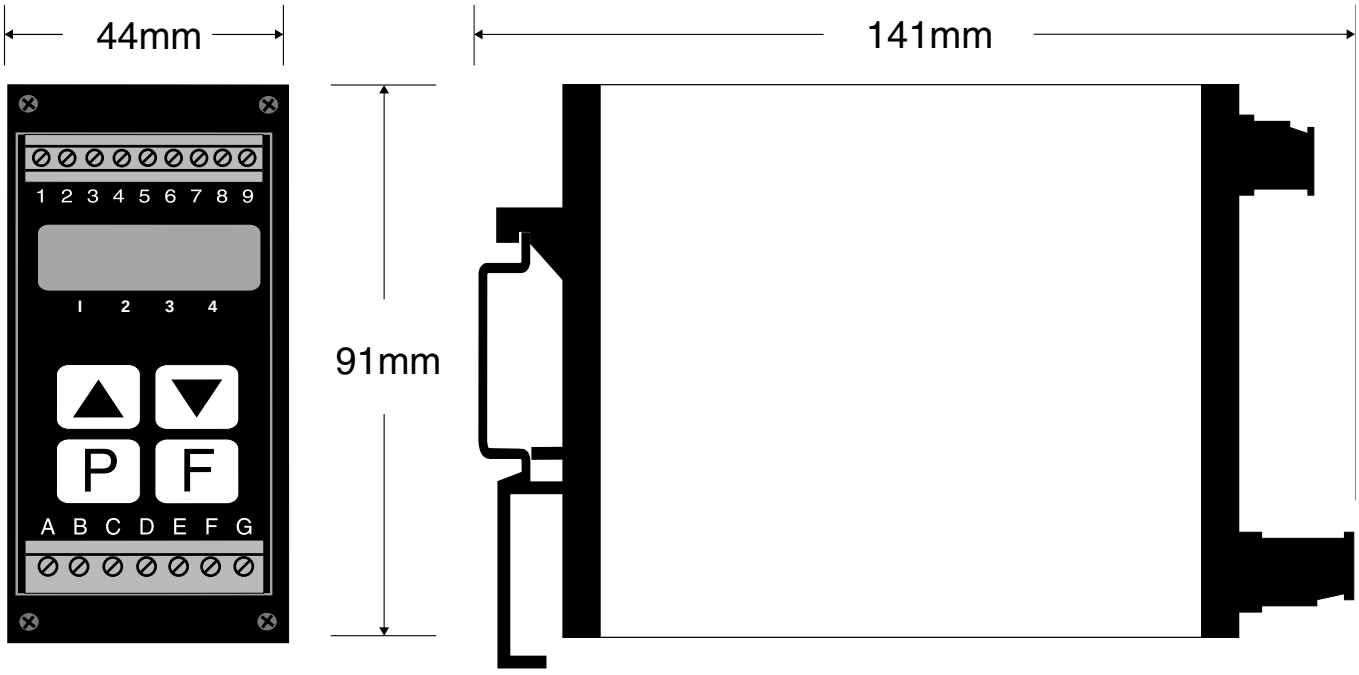
Full electrical isolation between power supply, input voltage or current and retransmission output is provided by the RM4, thereby eliminating grounding and common voltage problems. This isolation feature makes the RM4 ideal for interfacing to computers, PLCs and other data acquisition devices. The RM4 series of DIN Rail Process Modules are designed for high reliability in industrial applications. The 5 digit LED display provides good visibility, even in areas with high ambient light levels. A feature of the RM4-IVH is the programmable display brightness function, this allows the unit to be operated with low display brightness to reduce the instrument power consumption and to improve readability in darker areas. To reduce power consumption in normal use the display can be programmed to automatically dim or blank after a set time.

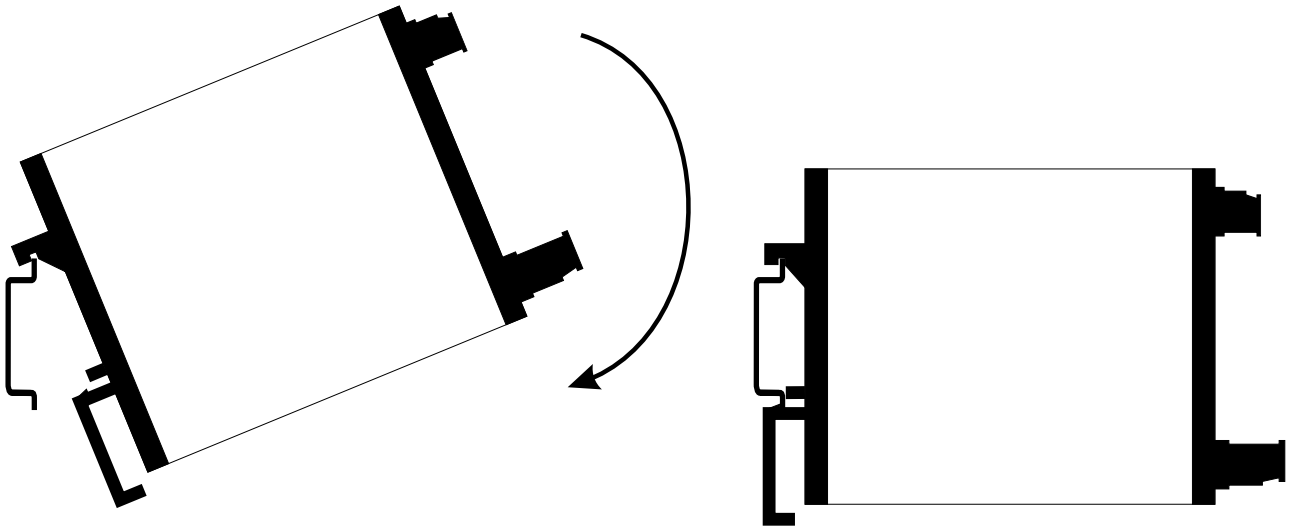
3 .1 Inputs & outputs



4 Mechanical installation

The RM4 is designed for DIN rail, horizontal mounting. The instrument snaps on 35mm DIN standard rails (EN50022). Cut the DIN rail to length and install where required. To install the RM4, simply clip onto the rail as shown below. To remove the RM4 lever the lower arm downwards using a broad bladed screwdriver to pull the clip away from the DIN rail.





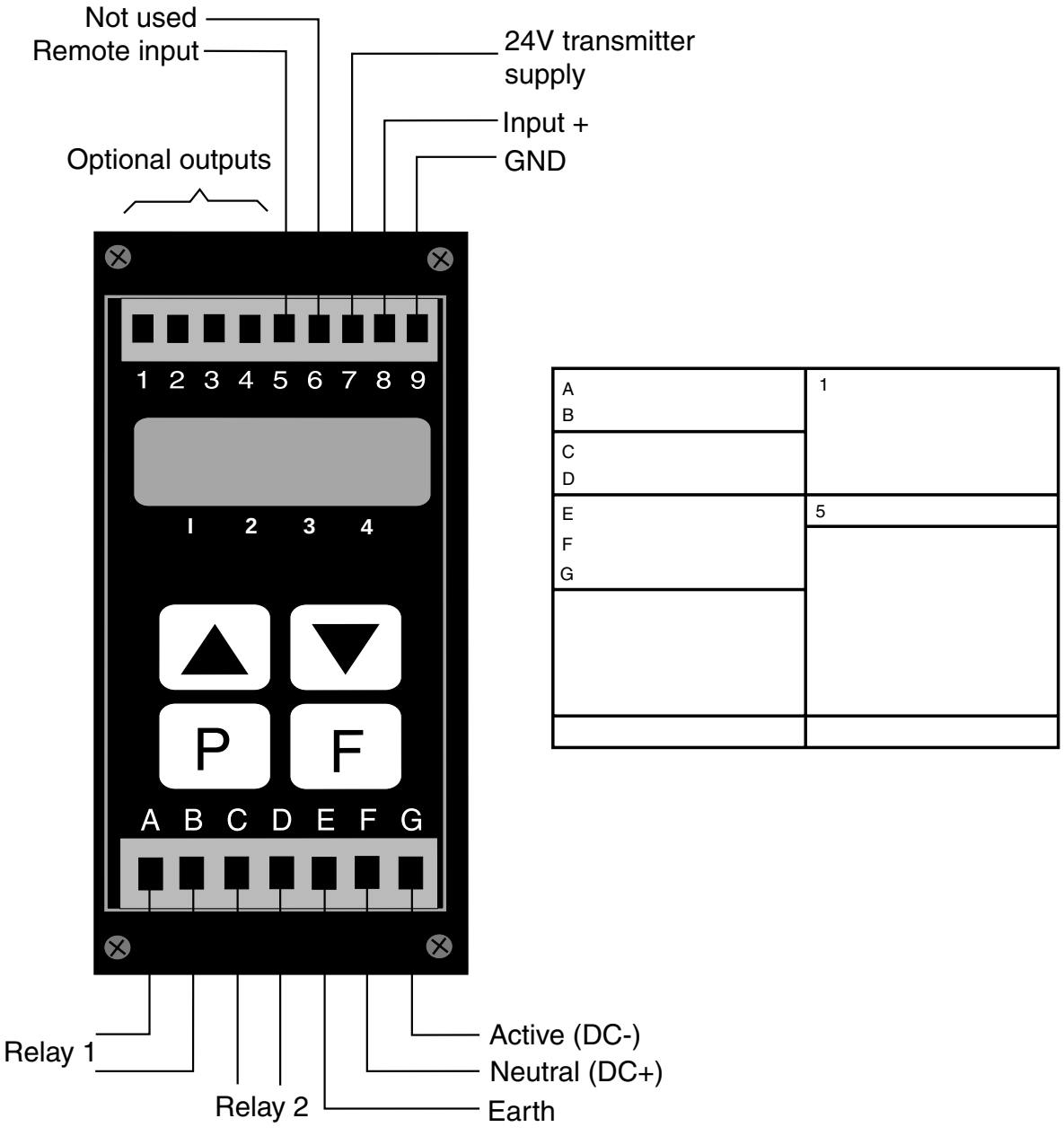
5 Electrical installation

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.

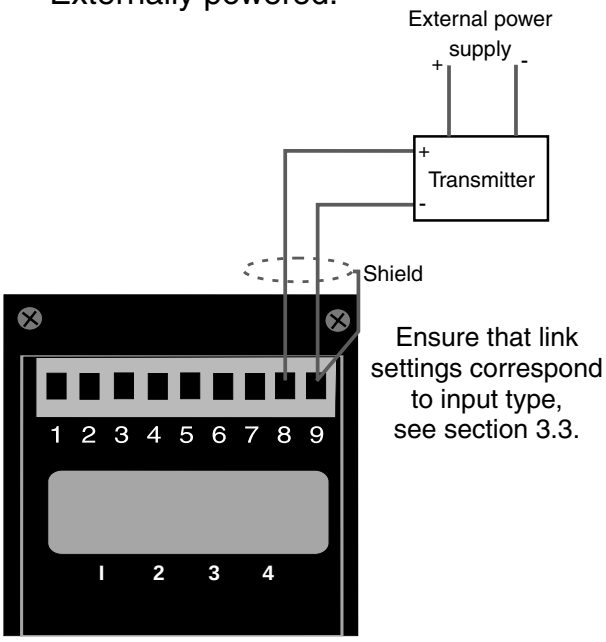
The terminal blocks allow for wires of up to 2.5mm^2 to be fitted for power supply and relays 1 and 2 or 1.5mm^2 for input signal connections and optional outputs. Connect the wires to the appropriate terminals as indicated below. Refer to other details provided in this manual to confirm proper selection 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.

Refer to the separate “RM4 DIN Rail Meter Optional Output Addendum” booklet for optional output wiring and link settings if optional outputs are fitted to the instrument.

5 .1 Signal input connections

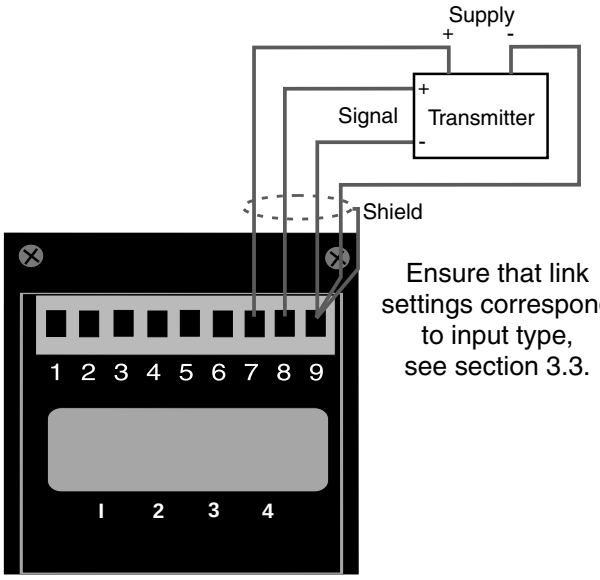


4 wire 4-20mA.
Externally powered.



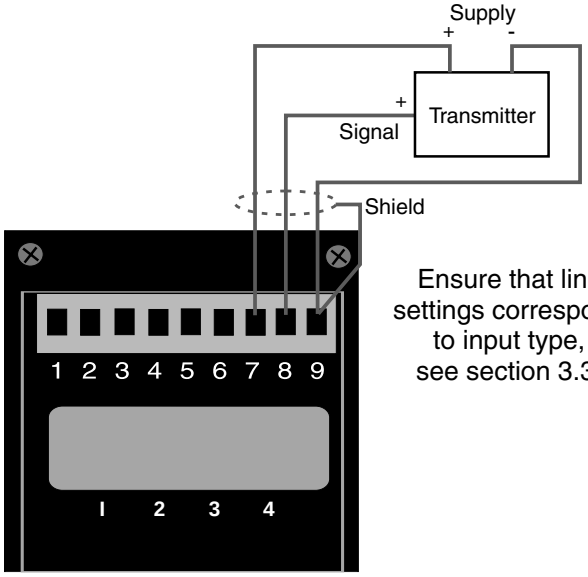
Ensure that link settings correspond to input type, see section 3.3.

4 wire 4-20mA.
Powered via standard
24V unregulated.



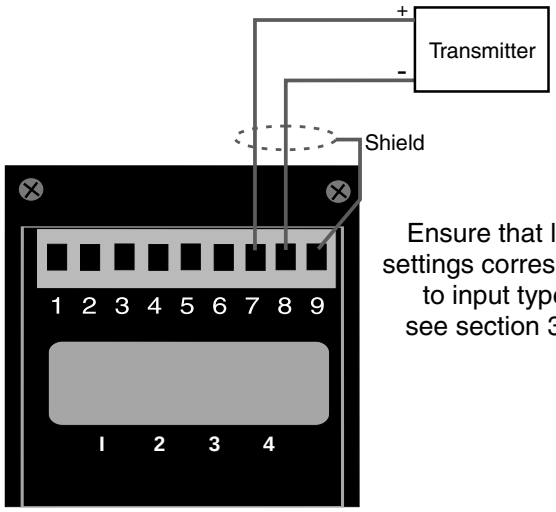
Ensure that link settings correspond to input type, see section 3.3.

3 wire 4-20mA.
Powered via standard
24V unregulated.



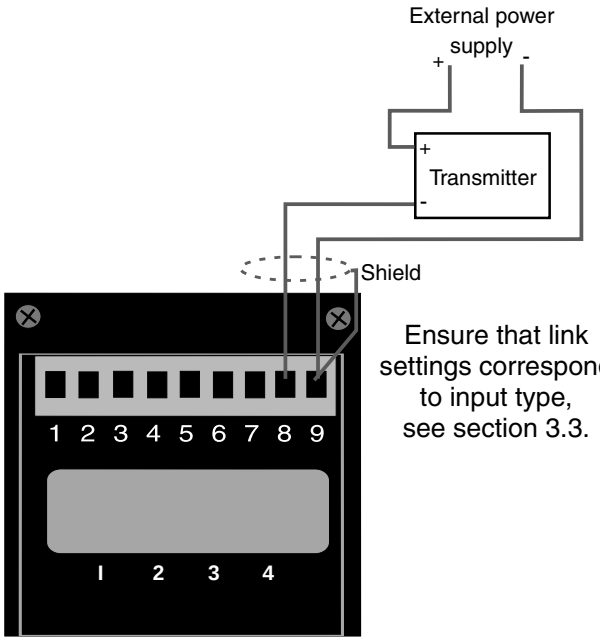
Ensure that link settings correspond to input type, see section 3.3.

2 wire 4-20mA.
Powered via standard
24V unregulated.



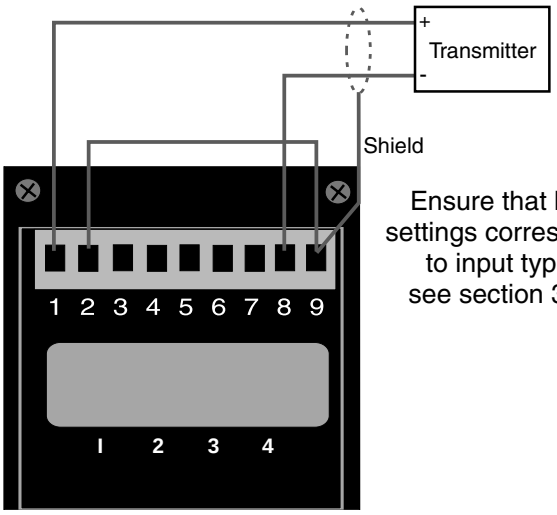
Ensure that link settings correspond to input type, see section 3.3.

2 wire 4-20mA.
Externally powered.



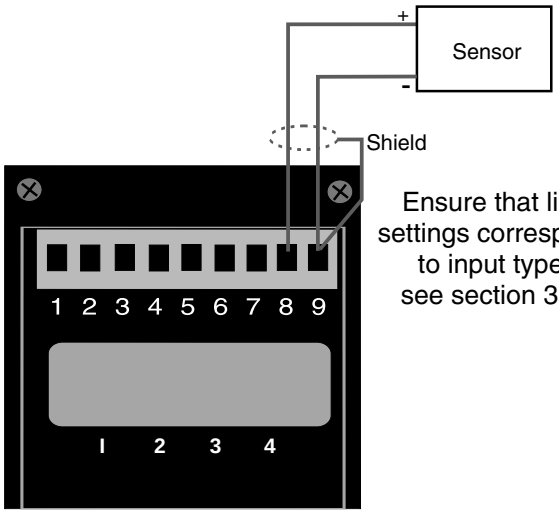
Ensure that link settings correspond to input type, see section 3.3.

2 wire 4-20mA.
Powered via optional
24V regulated.



Ensure that link settings correspond to input type, see section 3.3.

DC voltage input

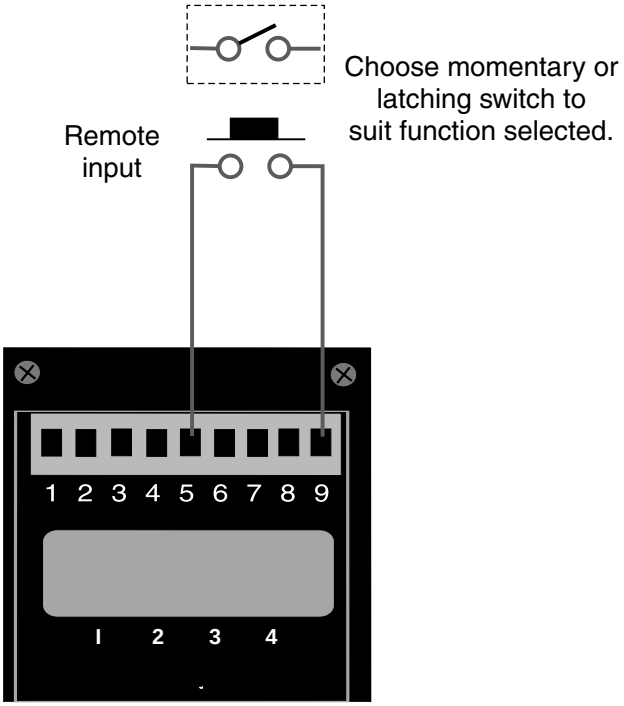


Ensure that link settings correspond to input type, see section 3.3.

5 .2 Remote input connections

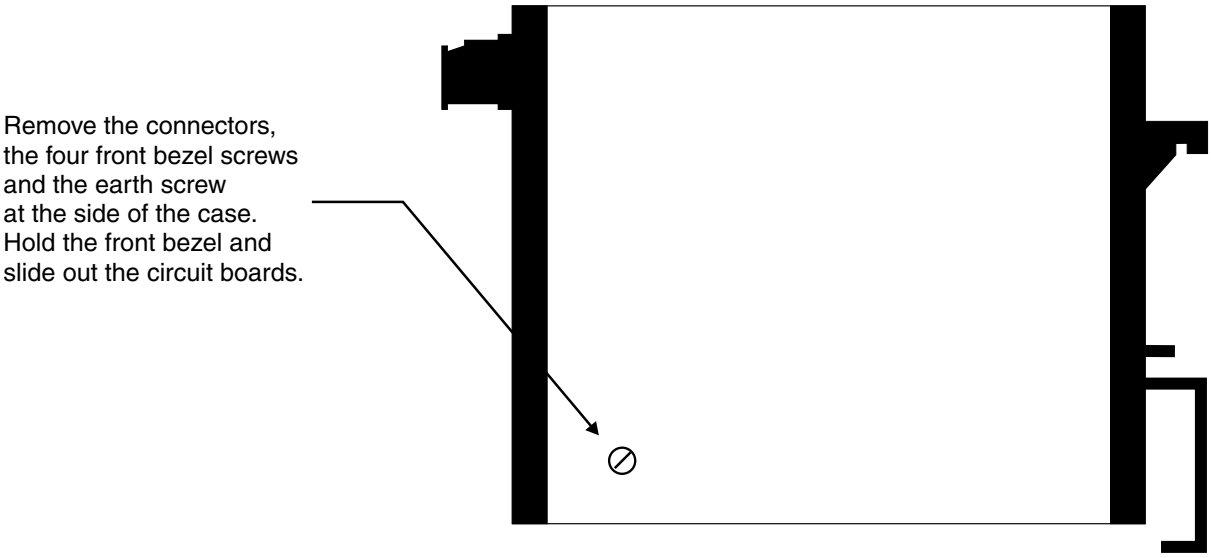
The selected remote input function can be operated via an external contact closure via a switch, relay or open collector transistor switch.

A momentary action is required for functions such as **tArE** and **2Er0**, a latching switch or normally closed momentary switch may be required for functions such as peak hold.

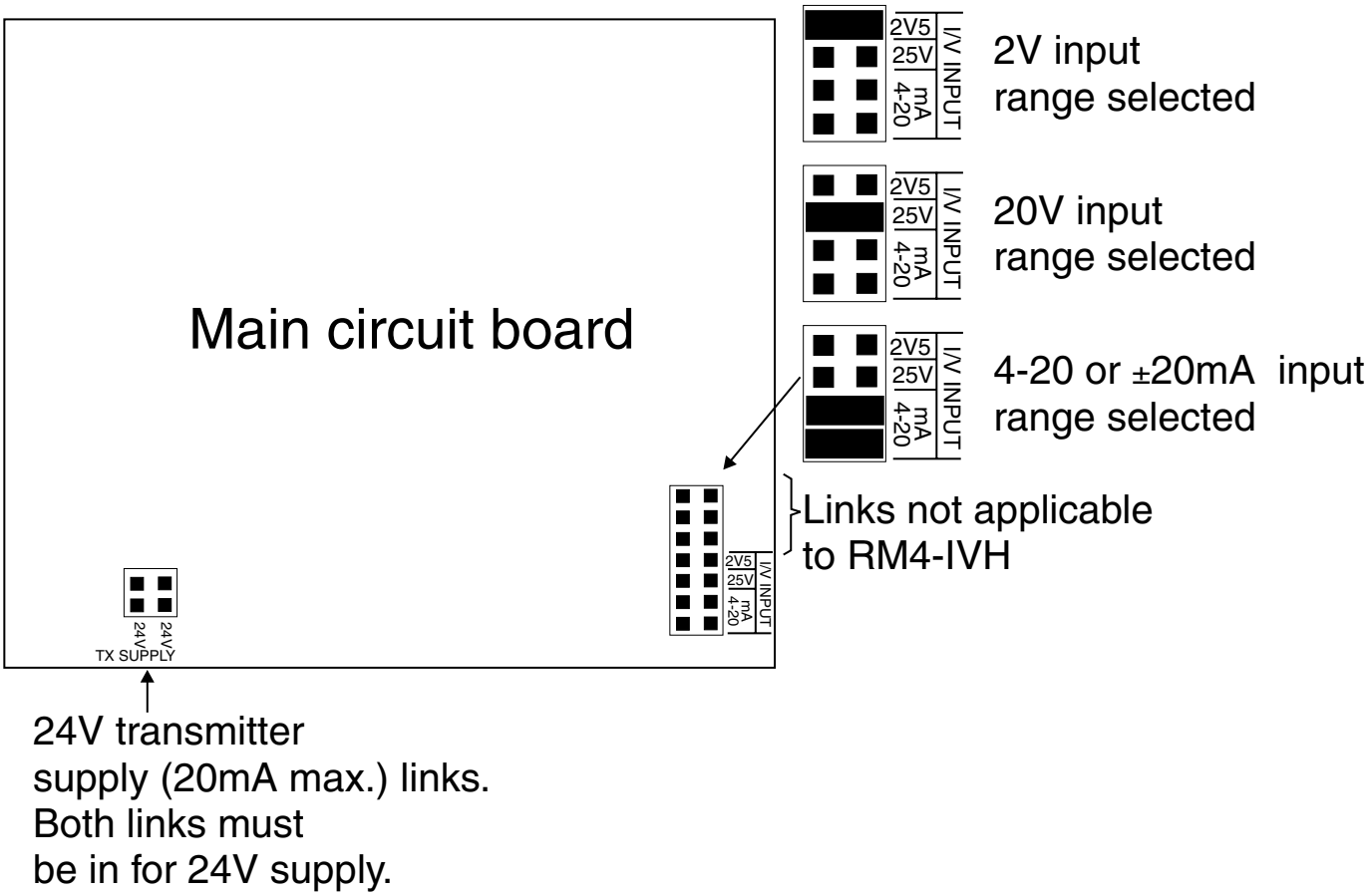


5 .3 Configuring the input board

Remove the circuit board from the case following the instructions below.



Link settings for the main input board are as shown below. Refer to the separate “RM4 DIN Rail Meter Optional Output Addendum” booklet for optional output wiring and link settings if optional outputs are fitted to the instrument.



6 Explanation of functions

The RM4 setup and calibration functions are configured through a push button sequence. Two levels of access are provided for setting up and calibrating:-

FUNC mode (simple push button sequence) allows access to alarm relay, preset value, display brightness & cell range selection functions.

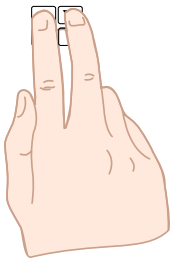
CAL mode (power up sequence plus push button sequence) allows access to all functions including calibration parameters.

Push buttons located at the front of the instrument are used to alter settings. 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.

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.



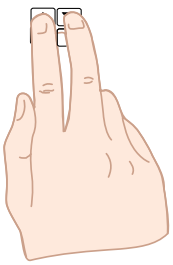
3. Within 2 seconds of releasing the F button press, then release the ▲ and ▼ buttons together. The display will now indicate FUNC followed by the first function.

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.

Function	Range	Description
AxLo	Display value or OFF	Alarm relay low setpoint - see “Alarm relays” chapter. Displays and sets each alarm low setpoint value.
AxHi	Display value or OFF	Alarm relay high setpoint - see “Alarm relays” chapter. Displays and sets each alarm high setpoint value.
AxHY	0 to 9999 display units	Alarm relay hysteresis [deadband]) - see “Alarm relays” chapter. Displays and sets the alarm hysteresis limit. This value is common for both high and low setpoint values.
AxtE	0.0 to 999.9 seconds	Alarm relay trip time - see “Alarm relays” chapter. Displays and sets the alarm trip time in seconds/tenths of seconds. This value is common for both alarm high and low setpoint values.
Axrt	0.0 to 999.9 seconds	Alarm relay reset time - see “Alarm relays” chapter. Displays and sets the alarm reset time in seconds/tenths of seconds. This value is common for both alarm high and low setpoint values.
Axn.o or Axn.c	n/a	Alarm relay normally open or normally closed - see “Alarm relays” chapter. Displays and sets the alarm relay action to normally open (de-energised) or normally closed (energised), when no alarm condition is present.
Ax.SP, Ax.t1, Ax.t2 etc.	n/a	Alarm relay operation independent setpoint or trailing - see “Alarm relays” chapter.
Ax FrEE	Display value	Free fall alarm value - see “Alarm relays” chapter. The alarm free fall value is used to provide a manual offset to the alarm operation.
P.SEt	Display value	Preset value - displays and sets the preset value to be used with the remote input (r.inP) or P button (P.but) function. When the P.SEt function is used the preset value will be set on the display when the remote input or P button is activated. This operation will cause an offset in the calibration scaling. Once activated the preset value will be retained even if power is removed from the instrument. The appropriate input function r.inP or P.but must be set to P.SEt to allow the preset operation to work Example: The RM4 is calibrated to read from 0 to 1000 for a 0 to 1000 litre tank. If the P.SEt value is set to 50 and a preset operation is carried out via the remote input when the display reads 0 then the RM4 will now be scaled to read from 50 to 1050 for the same 0 to 1000kg load.
brgt	1 to 15	Display brightness - 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 reducing glare in darkened areas.
dull	0 to 15	Remote display brightness - displays and sets the level for remote input brightness switching, see "Remote input functions" chapter. See also d.OFF SECS function below.
d.OFF SECS	0 to 9999 seconds	Auto display dimming timer - 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.

CL.no	n/a	Calibration number selection - this function allows the instrument to be calibrated to two different display values and hold the calibration values in memory. Alternatively two different calibration scaling values may be entered for a single cell. Choices at this function are CAL. 1 for the first cell calibration memory and CAL.2 for the second (note: these should not be confused with the calibration scaling functions CAL 1 and CAL2). The user has three ways of selecting the load cell calibration to be used, via the P button, via the remote input (see P.but and CAL.S function in the "Remote input functions" chapter) or by altering the selection at the CL.no function. To scale any of these independent calibration memories you may use any of the methods described in the "Calibration" chapter. Simply select the required cell number then scale using whichever calibration method best suits the application. In addition to different scaling the two channels can be programmed to operate from different decimal point, sample rate and lineariser point settings.
CAL mode functions. Entry via CAL mode (see first page of this chapter) must be made in order to view and adjust the functions which follow.		
drnd	1 to 5000 display units	Display rounding - 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. (example: if set to 10 the instrument will display in multiples of 10).
dCPt	0 to 0.0004	Decimal point selection - displays and sets the decimal point. By pressing the ▲ or ▼ keypads the decimal point position may be set. The display will indicate as follows: 0 (no decimal point), 0.1 (1 decimal point place), 0.02 (2 decimal point places), 0.003 (3 decimal point places) or 0.0004 (4 decimal point places)
FLtr	0 to 8	Digital filter - displays and sets the digital filter value. Digital filtering is used for reducing susceptibility to short term interference. The digital filter range is selectable from 0 to 8, where 0 = none and 8 = most filtering. A typical value for the digital filter would be 3. The digital filter uses a weighted averaging method of filtering which will increase the display update time at higher settings.
rEC_	Display value	Analog recorder/retransmission output low value - seen only when the analog retransmission option is fitted. Refer to the separate "RM4 DIN Rail Meter Optional Output Addendum" booklet supplied when this option is fitted. Displays and sets the analog retransmission output low value (4mA or 0V) in displayed engineering units. e.g. for a 4-20mA retransmission if it is required to retransmit 4mA when the display indicates 0 then select 0 at this function via the ▲ or ▼ button.
rEC¯	Display value	Analog recorder/retransmission output high value - seen only with analog output option. Displays and sets the analog retransmission output high value (20mA, 1V or 10V) in displayed engineering units. e.g. if it is required to retransmit 20mA when the display indicates 500 then select 500 at this function via the ▲ or ▼ button.
rAtE	5 to 100	Sample rate - displays and sets the input sample rate from 5 to 100 samples per second and is selected in steps as follows: 5 . 10, 15, 20, 30, 40, 50, 60, 80 and 100
rnGE	10 or 100	Input range. Set to 10 for mA input or 100 for Voltage input. Other values are available but should not be used.
r.i nP	n/a	Remote input - displays and sets the special function input selection, see "Remote input functions" chapter.

P.but	n/a	P button function - the function of the P button is programmable in the same manner as the remote input. The P button selection will override the selection made under the r.I nP function if both have the same functions selected. Upon reaching the P.but function the choices shown below are available, see "Remote input functions" chapter for a full description of each choice. Note: To prevent accidental operation of the P button in the tArE, 2Er0 or P.SEt functions it is necessary to hold the button in for approx. 2 seconds to perform the selected operation. When in Lo.Hi or Hi Lo the high/low values held in memory can be reset (i.e. the memory is cleared) by holding the P button pressed for 2 seconds. When the preset (P.SEt) is selected and the 2Er0rnGE function is used the preset will not operate if it would take the display outside the zero range limits. In this case the error message 2Er0 rnGE Err will be seen. Choices available for the P button function are: nonE No function, Hi Peak memory, Lo Valley memory, Hi Lo Toggles between peak and valley memory, tArE Push button tare or nett or gross display function (toggles), 2Er0 Push button zero, CAL.S Select calibration scaling (operates only whilst button pressed), P.SEt Preset value, btch Batch
ACCS	OFF. EASY. nonE or ALL	Alarm relay access mode - The access mode function ACCS has one of four possible settings namely OFF, EASY, nonE and ALL. If set to OFF the mode function has no effect or alarm relay operation. If set to EASY the "easy alarm access" mode will be activated, see “Alarm relays” chapter for a description. 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 functions. If set to ALL then access to all functions can be made via FUnC mode i.e. there is no need for the CAL mode power up sequence. This function provides an alternative to using the r.I nP function for easy access or no access mode thereby allowing the remote input to be programmed for an alternative use.
Li n PtS	2 to 5	Lineariser points - see also “Calibration” chapter. Displays and sets the number of calibration scaling points to be used. Choices are 2, 3, 4 or 5 points.
SPAC	A 1, A 1-2 etc.	Setpoint access - sets the FUnC mode access to the alarm relays set points. The following choices are available; A 1 - Allows setpoint access to alarm 1 only. A 1-2 - Allows access to alarms 1 and 2 only. A 1-3 - Allows access to alarms 1, 2 and 3 only etc. up to the maximum number of relays fitted. To allow this function to operate the remote input r.I nP function must be set to SPAC.
CAL 1, CAL2. CAL3. CAL4& CAL5	n/a	Calibration scaling points - see “Calibration” chapter. Displays and sets the independent calibration/scaling points of the input to the display. See “Calibration” chapter for full details of setting up.
ECAL	n/a	Not applicable to this instrument
CAL OFSt	Display value	Offset calibration - see also “Calibration” chapter. Allows the instrument calibration to be offset by a single point value. This value is added or subtracted across equally the range of the instrument. Press, then release ▲ and ▼ simultaneously to enter the CAL OFSt function.
SEt 2Er0	n/a	Set zero - Used to set the RM4 display reading of zero. The set zero point is entered when the load cell is installed and in a no weight condition. To operate the set zero function press, then release, ▲ and ▼ simultaneously. The zero point will be retained even if power is removed.

ZERO RNGE	Display value or OFF	Zero range - The zero range function allows a limit value to be set above which the display will not zero i.e. if a zero operation is attempted via the P button, remote input or set zero function when the display value is greater than the zero range setting the display will refuse to zero and give a ZERO RNGE Err message. For example if the zero range setting is 10 the instrument will only respond to a zero operation if the display reading at the time is between -10 and 10. If the zero range function is not required it can be set to OFF by pressing the ▲ and ▼ buttons simultaneously at this function. When switched off the instrument can be zeroed no matter what the display value. Note that the instrument keeps track of the value being zeroed at each operation, when the total amount zeroed from repeated operations becomes greater than the zero range value the instrument will reject the zero operation and a ZERO RNGE Err message will be seen. If repeated zero operations are required the ZERO RNGE function should be set to OFF or alternatively the tARE operation could be considered. If the ZERO RNGE Err message occurs for this reason it can be cleared via the CAL ZERO function operation which follows.
CAL ZERO	n/a	Calibration zero - The calibration zero can be used to select a zero point other than the display zero as the reference for the ZERO RNGE function. The calibration zero function is used only with the ZERO RNGE function. To operate the CAL ZERO function press the ▲ and ▼ buttons simultaneously when the required load for a zero reading is on the load cell the press the F button. The display should indicate CAL ZERO End to indicate that the operation is complete. For example if the CAL ZERO operation is carried out with a display reading of 500 and a ZERO RNGE reading of 10 the zero range function will allow the display to zero only if the current display reading is between 490 and 510.
AUTO ZERO	0 to 100 display units	Auto zero - The RM4-IVH can be set to automatically zero its reading if the display is within the range set by the AUTO ZERO function (for the set number of samples, see A.2.Cnt). For example if the auto zero is set to 10 then the instrument will re-zero itself whenever the display is within 10 units of zero for the set number of samples i.e. between -10 and 10. The auto zero can be set within the range 0 to 100 display units. Setting auto zero to 0 will disable the function and the instrument will not re-zero automatically. The time taken to auto zero depends upon the sample rate and the sample count (A.2.Cnt) setting.
A.2. Cnt	10 to 1000 samples	Auto zero sample count - Displays and sets the number of samples to be taken for the auto zero function. For example if set to 50 then if the display is within the auto zero setting (e.g. 10) for 50 samples then the instrument will re-zero. The sample count may be set within the range of 10 to 1000.
A1 to A4	Live, tARE, btch, P.HLd, dHLd, Hi, Lo or diSP	Alarm mode - The alarms can be set to operate from the live input value (Live), the tare value (tARE), the batch value (btch), the peak hold value (P.HLd), the display hold (dHLd), the peak memory (Hi), the valley memory (Lo) or the display value (diSP). Ensure that the r.1 nP. r.1 n2 or r.1 n3 or P.but function is also set to the desired operation. See “Alarm relays” chapter for further information.

rEC	Li uE, tArE, btch, P.HLd, dHLd, Hi , Lo or di SP	Retransmission mode - seen only with analog retransmission option. See also “Remote Input Functions” chapter. The retransmission of 4-20mA, 0-1V or 0-10V can be set to follow the live input value (Li uE), the tare value (tArE), the batch value (btch), the peak hold value (P.HLd), the display hold (dHLd), the peak memory (Hi) or the valley memory (Lo). Ensure that the r.in P or P.but function is also set to the desired operation. Operation is as follows:- Li uE - with the rEC function set to Li uE the retransmission will follow the “live” input signal present i.e. any tare, zero, batch or other operation will have no effect on the retransmission. tArE - with the rEC function set to tArE the retransmission will follow the remote input or P button tare function. e.g. if rEC_ is set to 0 and rEC¯ is set to 100 and the instrument is given a remote tare (via an external input or P button) when the display shows 40 then after the tare the display will change to 0. For a 4-20mA retransmission, 4mA will be transmitted at the new (tared) display value of 0 and 20mA will be transmitted for a gross value of 100. btch - (see also “Batch Operation” chapter) with the rEC function set to btch the retransmission will follow the remote input or P button batch function. e.g. if rEC_ is set to 0 and rEC¯ is set to 100 and the instrument is given a remote batch (via an external input or the P button) when the display shows 30 then after the batch input the display is unaltered but for a 4-20mA retransmission, 4mA will be transmitted at the batched display value of 30 and 20mA will be transmitted for a display value of 130. P.HLd - with the rEC function set to P.HLd the retransmission will follow the remote input or P button peak hold function. i.e. whilst the remote input is closed or the P button held in the retransmission will represent the peak value only. d.HLd - with the rEC function set to d.HLd the retransmission will follow the remote input or P button display hold function. i.e. whilst the remote input is closed or the P button held in the retransmission will represent the held value only. Hi - with the rEC function set to Hi the retransmission will follow the remote input or P button peak memory function. i.e. the retransmission value will always be the peak memory value. A remote input closure or P button operation can be used to reset the memory. Lo - with the rEC function set to Lo the retransmission will follow the remote input or P button valley memory function. i.e. the retransmission value will always be the lowest memory value. A remote input closure or P button operation can be used to reset the memory. di SP - with the rEC function set to di SP the retransmission will follow whatever display value happens to be on the display at the time.
Lo di SP	Display value or OFF	Low overrange limit value - The display can be set to show an overrange message if the display value falls below the Lo di SP setting. For example if Lo di SP is set to 50 then once the display reading falls below 50 the message -or- will flash instead of the normal display units. This message can be used to alert operators to the presence of an input which is below the low limit. If this function is not required it should be set to OFF by pressing the ▲ and ▼ buttons simultaneously at this function.
Hi 9H di SP	Display value or OFF	High overrange limit value - The display can be set to show an overrange message if the display value rises above the Hi 9H di SP setting. For example if Hi 9H di SP is set to 1000 then once the display reading rises above 1000 the message -or- will flash instead of the normal display units. This message can be used to alert operators to the presence of an input which is above the high limit. If this function is not required it should be set to OFF

di SP	FLSH or -or-	Overrange display warning message - The di SP function can be set to FLSH or -or-. If the Lo di SP or HI 9H di SP functions are used then the di SP function determines the nature of the overrange warning display. If set to FLSH the display value will flash on and off approximately once per second. If the di SP function is set to -or- then the -or- message will flash on and off approximately once per second whenever an overrange condition exists. In each case the display will return to normal if the input returns to a non overrange value.
bAud	300 to 38.4 in steps	Set baud rate - seen only with serial output option - Refer to the separate "RM4 DIN Rail Meter Optional Output Addendum" booklet supplied when this option is fitted. Select from 300 . 600 . 1200 . 2400 . 4800 . 9600 . 19.2 or 38.4.
PrtY	NONE, EUEN or odd	Set parity - seen only with serial output option - Refer to the separate "RM4 DIN Rail Meter Optional Output Addendum" booklet supplied when this option is fitted. Select parity check to either NONE, EUEN or odd.
O.Put	di SP, Cont, POLL or Modbus	Set RS232/485 interface modes. Refer to the separate "RM4 DIN Rail Meter Optional Output Addendum" booklet supplied when this option is fitted. Select di SP, Cont . POLL or Modbus Allows user to select the RS232/485 interface operation as follows:- di SP Sends image data from the display without conversion to ASCII. Cont Sends ASCII form of display data every time display is updated. POLL Controlled by computer or PLC as host. Host sends command via RS232/485 and instrument responds as requested. Modbus Modbus RTU protocol.
Addr	0 to 31	Set unit address for polled (POLL) or Modbus (Modbus) mode (0 to 31)) - seen only with serial output option - Refer to the separate "RM4 DIN Rail Meter Optional Output Addendum" booklet supplied when this option is fitted. Allows several units to operate on the same RS485 interface reporting on different areas etc. The host computer or PLC may poll each unit in turn supplying the appropriate address. **Note:** Address 0 cannot be used with Modbus protocol. The unit address ranges from 0 to 31 (DEC) but is offset by 32 (DEC) to avoid clashing with ASCII special function characters (such as <STX> and <CR>). Therefore 32 (DEC) or 20 (HEX) is address 0, 42 (DEC) or 2A (HEX) addresses unit 10.

Returning to the normal measure mode

When the calibration procedure has been completed it is advisable to return the instrument to the normal mode (where calibration functions cannot be tampered with). To return to the normal mode, turn off power to the instrument, wait a few seconds and then restore power.

6 .1 Error Messages

CAL ERR - This indicates that one of the calibration points has caused an overrange error in the analog to digital converter. Check that the input mA or Volts are within the range selected at the input links, also check that the **RNGE** function is set to the value required.

SPAN ERR - This indicates that the calibration points entered were too close together i.e. not enough change in mA or Volts between calibration inputs. Calibrate again with the points further apart.

ZERO RNGE Err - This indicates that an attempt to zero or preset a value on the display has failed due to the **ZERO RNGE** function value being exceeded. Check the **ZERO RNGE** function setting, if this is set at the required figure and the display value seems to be within the zero range limits then it could be that previous preset or zero operations have accumulated and caused the limit to be exceeded. See the "Explanation of functions" chapter **ZERO RNGE** details of using the **CLR ZERO** function in these circumstances.

"**----**" - This display indicates that the actual input is higher than the value set at the **RNGE** function. Check the **RNGE** function setting and if this is OK then check the actual input.

"**-or-**" - This display indicates an overrange reading. This could be due to the instrument not being able to display the number because it is too large e.g. above **9999** on a 4 digit display. Alternatively it could mean that the **Lo dI SP** or **HI GH dI SP** limit value has been exceeded and the instrument is showing a warning message.

7 Function table

Initial display	Meaning of display	Next display	Default Setting	Record Your Settings
AxLo	Alarm x low setpoint value	Setpoint value or OFF	OFF	See following table
AxHi	Alarm x high setpoint value	Setpoint value or OFF	OFF	See following table
AxHY	Alarm x hysteresis	Hysteresis value in measured units	10	See following table
Axtt	Alarm x trip time	0.0 to 999.9 seconds	0.0	See following table
Axrt	Alarm x reset time	0.0 to 999.9 seconds	0.0	See following table
Axn.o or Axn.c	Alarm x action N/O or N/C	Axn.o or Axn.c	Axn.o	See following table
Ax.SP or Ax.t 1	Alarm x independent or trailing setpoint 1,2 etc.	Ax.SP or Ax.t 1	Ax.SP	See following table
Ax FrEE	Alarm free fall value	Value in memory	0	See following table
P.SEt	Preset value	Value in memory	0	
br9t	Digital display brightness	1 to 15 (15 = highest brightness)	15	
duLL	Remote brightness control	0 to 15 (15 = highest brightness)	1	
d.OFF SECS	Display auto dimming timer (seconds)	0 to 9999	0	
rEC_	Recorder output low limit	Value in memory	0	
rEC¯	Recorder output high limit	Value in memory	100	
CL.no	Calibration number selection	CAL. 1 or CAL.2	CAL 1	
Functions below are accessible via CAL mode only				
drnd	Display rounding selects resolution	Value in memory	1	
dCPt	Display decimal point	Decimal Pt position (e.g. 0. 1 or 0.02)	0	
FLtr	Digital filter range 0 to 8	0 to 8 (8 = most filtering)	2	
rAtE	Sample rate (samples per second)	5, 10, 15, 20, 30, 40, 50, 60, 80 or 100	10	
rnGE	Input range, set to 10 for mA input or 100 for Volts input	10 or 100 (ignore other values)	100	
r.1 nP	Remote input 1	nonE, P.HLd, d.HLd, Hi, Lo, Hi Lo, tArE, 2Er0, SP.Ac, no.Ac, CAL.S, P.SEt, 1, CAL, btch, CAL or duLL	nonE	
P.but	P Button function	nonE, Hi, Lo, Hi Lo, tArE, 2Er0, CAL.S, P.SEt or btCh	nonE	
ACCS	Setpoint access mode	OFF, EASY, nonE or ALL	OFF	
SPAC	Setpoint access (only seen if 2 or more relays fitted)	A 1, A 1-2, A 1-3 etc.	A 1	
Li n PtS	Lineariser points	2, 3, 4 or 5	2	
CAL 1	Calibration - first point	See calibration chapter	n/a	
CAL2, CAL3, CAL4 & CAL5	Calibration - second, third, fourth & fifth points	See calibration chapter	n/a	
ECAL	Not applicable to this instrument			
CAL OFSt	Offset calibration	See calibration chapter	n/a	
SEt 2Er0	Set zero	See calibration chapter	n/a	
2Er0 rnGE	Zero range	Value in memory	1000	
CAL 2Er0	Calibration zero	n/a	n/a	
AUt0 2Er0	Auto zero range	0 to 100	0	
A.2. Cnt	Auto zero samples	10 to 1000	10	
A 1	Alarm mode for relay 1	Li uE, tArE, btch, P.HLd, d.HLd, Hi, Lo or di SP	Li uE	
Ax	Alarm mode for subsequent relays	Li uE, tArE, btch, P.HLd, d.HLd, Hi, Lo or di SP	Li uE	
rEC	Retransmission mode	Li uE, tArE, btch, P.HLd, d.HLd, Hi, Lo or di SP	Li uE	
Lo di SP	Low overrange	Value in memory or OFF	OFF	

HI GH dI SP	High overrange	Value in memory or OFF	OFF	
dI SP	Display overrange indication	FLSH or -or-	FLSH	
bAUdrAtE	Baud rate	300, 600, 1200, 2400, 4800, 9600 . 19.2 or 38.4	9600	
PrtY	Parity select	nONE .EUEn or Odd	nONE	
O.Put	Output continuous or controlled	POLL .Cont . dI SP or n.buS	Cont	
Addr	Set unit address for poll or modbus modes	0 to 31	0	

Note: Functions in the shaded areas on this table will be displayed only when those particular options are fitted.

Settings for relays - record settings here				
	A1	**A2**	**A3**	**A4**
AxLo				
AxHi				
AxHY				
Axtt				
Axrt				
Axn.o or Axn.c				
Ax.SP or Ax.t 1	n/a			
Ax FrEE				
Ax				

8 Alarm relays

The RM4 is provided with 2 alarm relays as standard. One or two extra optional independent alarm relays may also be provided, these relays are designated **A1** , **A2** etc. Each alarm has the following parameters which may be set by the user:

1. Low trip point, adjustable in measurement units.
2. High trip point, adjustable in measurement units.
3. Alarm hysteresis, adjustable in measurement units.
4. Alarm trip time, adjustable in one second steps.
5. Alarm reset time, adjustable in one second steps.
6. N/O or N/C relay operation.
7. Independent or trailing alarms (available on relays 2 and upwards)
8. Alarm "free fall" value
9. Alarm to follow the live input, display, the tare, batch. peak hold, display hold, max or min value.

Note that the alarm settings are not changed when calibration scaling channels are changed. The alarms operate in the following way:

If the measured value is above the High Trip Point, or below the Low Trip Point, the alarm trip timer starts. This timer is reset if the measured value drops below the High Trip Point or above the Low Trip point. When the alarm trip timer's time exceeds the Trip delay time, the alarm is operated.

When the alarm has tripped, the measured value is compared to the High Set Point less the Hysteresis value and the Low Set Point plus the Hysteresis value. If it is less than the High Set Point less the Hysteresis value and greater than the Low Set Point plus the Hysteresis value, the alarm is reset.

Alarm low setpoint (**AxLo**)

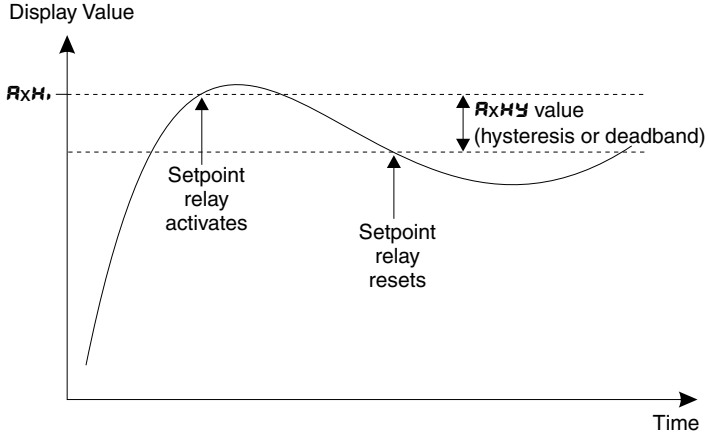
Displays and sets the low setpoint value for the designated alarm relay. The low alarm setpoint may be disabled by pressing the ▲ and ▼ keypads simultaneously. When the alarm is disabled the display will indicate **OFF** . Use ▲ or ▼ to adjust the setpoint value if required. The alarm will activate when the displayed value is lower than the setpoint value. Each relay may be configured with both a low and high setpoint if required, if so the relay will be activated when the display reading moves outside the band set between low and high setpoints.

Alarm high setpoint (**AxHi**)

Displays and sets the high setpoint value for the designated alarm relay. The high alarm setpoint may be disabled by pressing the ▲ and ▼ keypads simultaneously. When the alarm is disabled the display will indicate **OFF**. Use ▲ or ▼ to adjust the setpoint value if required. The alarm will activate when the displayed value is higher than the setpoint value. Each relay may be configured with both a low and high setpoint if required, if so the relay will be activated when the display reading moves outside the band set between low and high setpoints.

Alarm Hysteresis (**AxHY**)

Displays and sets the alarm hysteresis limit and is common for both high and low setpoint values. The hysteresis value may be used to prevent too frequent operation of the setpoint relay when the measured value stays close to the setpoint. Without a hysteresis setting (**AxHY** set to zero) the alarm will activate when the display value goes above 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.

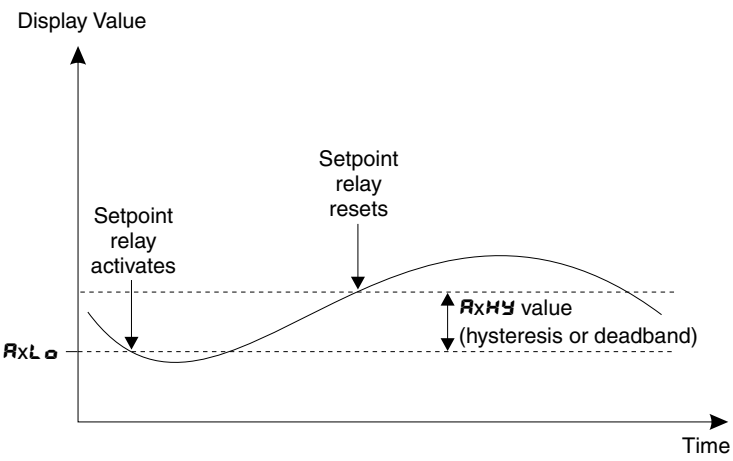
e.g. if **A 1Hi** is set to **50.0** and **A 1HY** is set to **3.0** then the setpoint output relay will

activate once the display value goes above **50.0** and will reset when the display value goes below **47.0** (50.0 minus 3.0).

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 set to **20.0** and **A 1HY** is set to **10.0** then the alarm output relay will activate when the display value falls below **20.0** and will reset when the display value goes above **30.0** (20.0 plus 10.0).

The hysteresis units are expressed in displayed engineering units.



The alarm trip time determines how long the measured value has to be above the high trip point or below the low trip point before an alarm is given. This can be used to prevent false alarms on noisy inputs. The value is set in seconds, with a range of **0.0** to **9999** seconds. For normal operation a delay of three to five seconds is suitable.

Alarm trip time (**Rxtt**)

The alarm trip time determines how long the measured value has to be above the high trip point or below the low trip point before an alarm is given. This can be used to prevent false alarms on noisy inputs. The value is set in seconds, with a range of **0.0** to **999.9** seconds. For normal operation a delay of three to five seconds is suitable.

Alarm Reset Time (**Rxrt**)

The alarm reset time determines how long the measured value has to be below the high trip point or above the low trip point before the alarm is reset. The value is set in seconds, with a range of **0.0** to **9999** seconds. For normal operation a delay of zero seconds is suitable.

Alarm Relay N/O or N/C Operation (**Rxn.o** or **Rxn.c**)

Each alarm may be programmed to operate as a normally open (N/O e.g. **R1 n.o**) or normally closed (N/C e.g. **R2n.c**) device. A N/O relay is de-energised when no alarm condition is present and is energised when an alarm condition is present. A N/C relay is normally energised and is de-energised when an alarm condition is present. The N/C mode is useful for power failure detection.

Trailing or independent set points (**Rx.SP** or **Rx.t 1** etc)

A function exists to allow relays, other than relay 1, to be used as independent relays with their own set points or they may be made to "trail" another relays setpoint. For example if **R2.SP** is selected then alarm 2 will act as an independent relay. If **R2.t 1** is selected then the alarm 2 relay will trail alarm 1 relay. With **R2.t 1** selected if alarm 1 high setpoint is set to 50 and alarm 2 high set point set to 20 then alarm 2 relay will operate at a display of 70 (50 + 20). Alternatively alarm 2 could be set to operate at 30 (50 - 20) by setting alarm 2 high setpoint to -20.

Trailing Alarm Table Showing Possible Alarm Assignments			
	R2	**R3**	**R4**
R 1	**R2.t 1**	**R3.t 1**	**R4.t 1**
R2		**R3.t2**	**R4.t2**
R3			**R4.t3**

Free fall alarm (**Rx FrEE**)

In most applications the **R 1FrEE** or **R2 FrEE** function etc. will be used in conjunction with a "high" alarm setting such as **R 1H,** to force the alarm relay to operate at a given measured quantity prior to the actual alarm setting. This function can be used to prevent any overfilling due to product which was in "free fall" when the alarm relay operated.

Applications include filling containers via a chute, auger or conveyor belt in which shutting off the

filling process once the desired quantity is reached will result in some overfilling due to the free fall product. The free fall value can be found by comparing the required product weight to the final weight.

For example a series of containers is to be filled with 40.0 litres of product, **A 1H,** is set to **40.0** and this relay activation is used to stop the filling process. It is found that due to free fall product the average weight of the filled containers is actually 41.7 litres. i.e. 1.7 litres of product continues to fill the container after the alarm relay used to stop the filling process is activated. As an alternative to subtracting 1.7 litres from the **A 1H,** setting we can use the free fall setting **A 1FF** of 1.7 to ensure that alarm 1 relay operates 1.7 litres prior to the desired weight.

The table below illustrates the action of the free fall alarm with both high and low alarm relay settings.

Free fall value	Relay setpoint	Alarm relay activates display reading of:	With a hysteresis of 5 (**AxHY**) alarm resets at:
AxFF = 10	**AxH,** = 100	90 or above	85 or below
AxFF = 10	**AxLo** = 50	40 or below	45 or above
AxFF = -10	**AxH,** = 100	110 or above	105 or below
AxFF = -10	**AxLo** = 50	60 or below	65 or above

Access mode (**ACCS**)

The access mode function **ACCS** has three possible settings namely **OFF**, **EASY**, **NONE** or **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, see details below. 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 functions. If set to **ALL** then all functions are accessible via **FUNC** mode i.e. there is no need to enter **CAL** mode.

8.1 Easy Alarm Access

The RM4-IVH has an easy alarm access facility which allows operator access to the selected alarm setpoints (only to the setpoints selected at the **SPAC** function) simply by pressing the **F** button. 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.

The instrument must be set in the manner described below to allow the easy access facility to work:

1. Either the **ACCS** function must be set to **EASY** or the **F.I NP** function must be set to **SP.AC**. If the **ACCS** function is used the remote input function **F.I NP** can be assigned to a different use.
2. The selected relays must have a setpoint, nothing will happen if all the alarm relay setpoints are set to **OFF**.
3. The **SP.AC** 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 then 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 unless the instrument is powered up in **CAL** mode.

8.2 Alarm mode

The alarm mode functions (**A1** to **A4**) allow the alarm relays to follow either the live input value (**L, uE**), the tare function (**tARE**), the batch function (**btch**), the peak hold function (**P.HLd**), the display hold (**d.HLd**), the peak memory (**H,**),valley memory (**Lo**) or display (**d1 SP**). Other than **L, uE** & **d1 SP** operation a remote input or **P** button must also be set to the function required.

Example 1- **A1** is set to **L, uE**

With the alarm function set to follow the live input value the alarm will follow the live input regardless of what is on the display at the time. For example if **A 1H,** is set to **50** and some time later the instrument is tared when the display reading was **5** relay 1 will now activate at a reading of **45** since the **45** reading will occur at the same live input value as the **50** reading prior to the tare operation.

Example 2 - A 1 is set to tArE and r.1 nP (remote input special function) is set to tArE

Assume that A 1H, is set to 100 and that the instrument is given a remote tare when the display reads 40. Once the instrument is tared the display will read 0. Alarm 1 is set to follow the tare value and will therefore operate when the (nett) display becomes greater than 100.

Note: If the instrument had been tared when A1 was set to di SP then the alarm will follow the gross value not the tared value and will operate if the nett display is above 60 (i.e. the gross value is above 100). The low alarm setting operates in the same manner e.g. if A 1Lo was set to 100 and the display was tared at a reading of 40 then the low alarm would operate when the display reads 60 or below.

Example 3 - A 1 is set to batch and r.1 nP is set to batch see “Batch Operation” chapter

Example 4 - A 1 is set to P.HLd and r.1 nP is set to P.HLd

If A 1H, is set to 100 then it will operate whenever the display shows a value over 100. If the peak value exceeds 100 when the remote input is closed then alarm 1 will activate and will not reset until the remote input opens and the display value falls below 100.

Example 5 - A 1 is set to d.HLd and r.1 nP is set to d.HLd

If A 1Lo is set to 5 then it will operate whenever the display shows a value below 5. If the display hold remote input is operated at a value above 5 then the alarm will not activate whilst the remote input remains closed, no matter what the electrical input. Likewise if the remote input is operated at a value below 5 then alarm will not de activate until the remote input is opened and the display value goes above 5.

Example 6 - A 1 is set to H, and r.1 nP is set to H,

If A 1H, is set to 50 and the peak memory value becomes greater than 50 then alarm 1 will be constantly activated at this point and will only become de activated when the memory is reset at a value below 50. The memory can be reset by holding the remote input closed for 2-3 seconds. Note that in this case the alarm can be activated even if the display value is less than the alarm setting, this is because the alarm is activated by the value in peak memory rather than the display value.

Example 7 - A 1 is set to Lo and r.1 nP is set to Lo

If A 1LO is set to 280 and the valley memory value becomes less than 280 then alarm 1 will be constantly activated at this point and will only become de activated when the memory is reset at a value above 280. The memory can be reset by holding the remote input closed for 2-3 seconds. Note that in this case the alarm can be activated even if the display value is greater than the alarm setting, this is because the alarm is activated by the value in valley memory rather than the display value.

Example 8 - A 1 is set to di SP

With the rEC function set to di SP the retransmission will follow whatever display value happens to be on the display at the time. For example if A 1H, is set to 100 and the peak memory (H,) when activated causes the display to show a value of 100 or more the relay will activate.

Optional relays

Two alarm relays are fitted as standard. One or two extra relays are optionally available. See appropriate appendix in this manual for details of optional relays.

Switching Inductive Loads

If the alarm relay is to be used to switch an inductive load, such as a solenoid, it is advisable to use a suppressor circuit either across the load or across the relay contacts. Switching inductive loads without a suppressor circuit can cause arcing at the relay contacts resulting in electrical interference and wear on the contacts. A typical suppressor circuit consists of a 100Ω resistor in series with a 0.1uF capacitor, this circuit is then placed across the load or relay contacts. Ensure that the resistor and capacitor are of sufficiently high rating to cope with the voltage and current encountered.

9 Remote input functions

Remote input operation is via voltage free contacts on the instrument terminal block (terminals 5 and 9) shorting together these terminals will cause the selected function to operate.

The remote input may be either a bi-state contact closure (toggle switch, PLC or other external switch) or a momentary or latching switch contact, depending on the function requirements. Each remote input may be configured to perform any **one** of the following functions:

Function	Description
NONE	None - this function is selected when none of the special functions are required.
PHLd	Peak hold - this function displays and holds the peak reading, when the contact input is closed i.e. the maximum value from the time of contact closure. When the contact is open the display indicates the live reading. A two position toggle switch or normally closed momentary action switch would be commonly used for peak hold.
dHLd	Display hold - the display hold function is similar to peak hold, except that the held reading is the value displayed at the time the switch contact is closed.
H,	Peak Memory - the peak memory (max) is displayed when the pushbutton contact is closed momentarily i.e. the maximum display value since the last reset. The display is returned to the normal display after 20 seconds. To reset the peak memory the button must be held closed for 1 to 2 seconds. Note: the H, function will be reset 5 seconds after instrument switch on i.e. the H, readings will only start to be stored once 5 seconds have elapsed.
Lo	Valley memory - the valley memory (min) operates in a similar way to the peak memory but shows the lowest display value since last reset. Note: the Lo function will be reset 5 seconds after instrument switch on i.e. the Lo readings will only start to be stored once 5 seconds have elapsed.
H, Lo	Peak memory/valley memory - The display may be toggled between peak and valley memory indications.
tArE	Pushbutton tare - when the remote pushbutton is closed for 2 to 3 seconds the current input value is tared off. The switch input for this function is usually a momentary action pushbutton switch. Once the display has been tared the “live” display will be interrupted every few seconds by the message nEtt to indicate that the reading has been tared and the nett reading is being displayed. Further operation of the pushbutton will cause the display to toggle between gross reading (the display will indicate this by flashing grOS periodically) and nett reading (indicated by nEtt). Removing power from the instrument will cause the value tared to be lost so another tare operation may be needed.
2Er0	Pushbutton zero - allows the load cell system display to be set to zero via momentary operation of the pushbutton. This zero value will be retained even if the power is removed. If the zero operation were to cause the zero to shift beyond the 2Er0rnGE function limits the preset will be aborted and a 2Er0rnGE Err message will be seen.
SP.Ac	Setpoint access only - allows access to the selected (via the SPAC function) alarm set points only, no other functions, when key switch is open. Allows full access with the key switch/remote input closed. The switch input for this function is usually a key switch between terminals 5 and 9. See also the ACCS function. If the instrument is powered up in CAL mode access to all functions will be available with or without a short circuit across the remote input terminals.
no.Ac	No program access - inhibits access to functions via keypads. The remote input requires a contact closure (short circuit) to allow access to functions. The switch input for this function is usually a key switch between terminals 5 and 9. See also the ACCS function. If the instrument is powered up in CAL mode access to all functions will be available with or without a short circuit across the remote input terminals.

CAL.S	Select calibration - when the external input is open the calibration selected in function mode will be used. When the external input is closed the next calibration set will be used. e.g. if CAL. 1 is selected under the CL.no function then closing the switch will cause the next calibration (CAL.2) to be used. This function may be used to select different load cells, different rigging arrangements etc. This may also be used to change measuring units. e.g. the unit may be calibrated in litres on CAL. 1 and millimetres on CAL.2. The CAL.S function also allows different decimal points, display rounding, and sample rate settings between CAL. 1 and CAL.2.
P.SEt	Preset value - the display value will start at the value selected in the preset value function P.SEt (this function appears after the alarm functions, see Function Table). This works in a similar manner to the Zero function except that a preset weight/pressure value can be input. If the preset operation were to cause the zero to shift beyond the ZEr0rnGE function limits the preset will be aborted and a ZEr0 rnGE Err message will be seen.
I.CAL	Initiate auto calibration - this function allows the user to select when an auto calibration takes place rather than relying on the instruments normal internal calibration which may cause the output to pause. Closing the external input will cause an internal calibration to take place. If the input is held closed then an internal calibration will take place periodically.
btch	Batch - the batch function does not affect the display value when operated. It does, however affect the retransmission and alarm functions, see the “Batch Operation” chapter for a full description.
CAL	Calibration - When set to CAL the remote input can be used to perform a calibration. See “Calibration” chapter for details.
dULL	Dull - when the remote input is set to dULL the remote input can be used to switch between the display brightness level set by the brGt function and the display brightness set by the dULL function. The display brightness is selectable from 0 to 15, where 0 = lowest intensity (display off) 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 and for reducing power consumption in battery powered applications.

Selecting the remote input function

To select the required function, enter CAL mode in the usual way (see “Explanation of functions” chapter) and step through the functions until you reach the remote input indicated by the display message r.I nP followed by the selected function. Use the ▲ and ▼ buttons to select the required function.

With functions requiring a latching switch (peak hold and display hold) the r.I nP value will be used when the switch is ON and the display value when the switch is OFF.

10 Batch operation

The remote input **r.i nP** . and the **P** button function **P.but** may be programmed to operate in batch (**btch**) mode. Operation of any of these inputs in batch mode will have no effect on the displayed value (i.e. the total load or weight is always visible) but can be made to affect the method in which the setpoint alarm relays and retransmission options operate.

Alarm operation in batch mode.

In addition to setting the required remote input or **P** button function to **btch** the alarm mode function for the required alarm operation mode must also be set to **btch**. The alarm operation mode functions are **A 1** for alarm 1, **A2** for alarm 2, **A3** for alarm 3 (if fitted) and **A4** for alarm 3 (if fitted).

When in batch mode the selected alarm may be set to operate at a given batch figure i.e. **A 1Lo** or **A 1H,** can be allocated batch values.

Example

Assume that the meter is scaled to read in kilograms up to a maximum of 1000kg. **r.i nP** is set to **btch** and **A 1** is also set to **btch**. **A 1H,** is set to **100**, **A 1Lo** is set to **OFF** and **A 1HY** is set to **0**. If the display reading is **300** when the remote input is operated then the display will not alter but alarm 1 relay will now activate when the display reading increases by the batch value of **100** i.e. at a value of **400** or above.

The effect on alarm settings for the same example is shown in the table below.

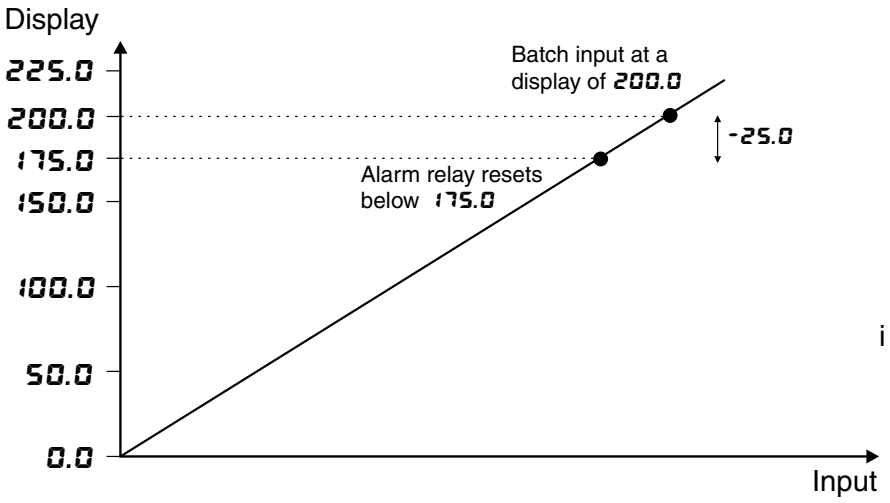
Alarm Settings with **A 1HY** = **0**	Alarm deactivates	Alarm activates
A 1Lo = **OFF**, **A 1H,** = **100**	At values below **400**	At values above **400** i.e. **300** + the batch value
A 1Lo = **OFF**, **A 1H,** = **-100**	At values below **200**	At values above **200**
A 1Lo = **100**, **A 1H,** = **OFF**	At values above **400**	At values below **400**
A 1Lo = **-100**, **A 1H,** = **OFF**	At values above **200**	At values below **200**
A 1Lo = **50**, **A 1H,** = **100**	At values between 350 &**400**	At values below **300** or above **400**

The effect of a hysteresis setting (setting **A 1HY** to **10** in this example) is shown in the table below.

Alarm Settings with **A 1HY** = **10**	Alarm deactivates	Alarm activates
A 1Lo = **OFF**, **A 1H,** = **100**	At values below **390**	At values above **400**
A 1Lo = **OFF**, **A 1H,** = **-100**	At values below **190**	At values above **200**
A 1Lo = **100**, **A 1H,** = **OFF**	At values above **410**	At values below **400**
A 1Lo = **-100**, **A 1H,** = **OFF**	At values above **210**	At values below **200**

Example

Assume that **A 1H,** is set to **-25.0** and that the instrument is given a remote batch input when the display reads **200.0** i.e. the alarm relay is activated at this stage. The display does not alter when a batch input is applied but alarm 1 will not reset until the display goes below **175.0** (200 minus 25.0). i.e. once the batch nput is applied the display value must decrease by the alarm value before the alarm will reset.



Retransmission operation in batch mode

As with the alarm operation the display value on the RM4-IVH does not alter once the batch function has been operated. The retransmission value however will be affected. The function used to set the retransmission to follow the batch (batch) operation is rEC for analog retransmission. For serial retransmission the RM4-IVH must receive a request to operate its remote input function (using the "reset special function value" command, refer to the "RS232/RS485 commands" addendum).

Example

The analog retransmission has been set via the rEC_ and rEC¯ functions to transmit a 4mA signal at a display value of 0 and to transmit a 20mA signal at a display value of 1000. The rEC and r.i nP functions have been set to batch. If the remote input is operated when the display value is 80 then the RM4-IVH will now transmit 4mA at a display value of 80 and will transmit 20mA at a display value of 1080.

The analog retransmission could be input to a PLC or other device for control purposes.

11 Calibration

To enter the CAL (calibration) mode a follow the method described on the first page of the "Explanation of Functions" chapter.

Unique calibration procedures allow two different methods of calibration to suit various applications plus an calibration offset. Use only one of the tree methods to obtain calibration scaling.

Method 1- two, three, four or five calibration points are independently set from "live" inputs. The ability to set each point individually is useful where the calibration is being carried out on site and delays are experienced during the calibration procedure (e.g. filling tanks etc.).

If two points are used the display will be linear. If more than two points are used the display can be made to follow a linearisation curve. The number of points to be used is set at the LIN PTS function. For most applications two points will be used.

Method 2 - allows a simple pushbutton calibration from a live input. This method is particularly suited to item counting applications. Note that this method is only applicable if two linearisation points are set.

Calibration offset - allows a single point offset to be introduced.

Calibration - method 1, calibration by entering in known values

Method 1 uses two, three, four or five different live input values to calibrate the instrument.

1. Step through the functions until the display indicates LIN PTS and use the ▲ or ▼ keypad to select the number of calibration scaling points required.

2. Step through the functions until the display indicates CAL 1. Now press, then release, the ▲ and ▼ buttons simultaneously to enter the calibration functions. The display will now indicate CAL 1 (1st calibration point) followed by a "live" reading. Apply a known input to the instrument of nominally 0% (this value is not critical and may be anywhere within the measuring range of the instrument). For example you could arrange that the load or pressure is zero at this time. When the live reading has stabilised press the F button.

3. The display will indicate SCL 1 (scale 1) followed by the scale value in memory. Now use the ▲ or ▼ button to obtain the required scale value.

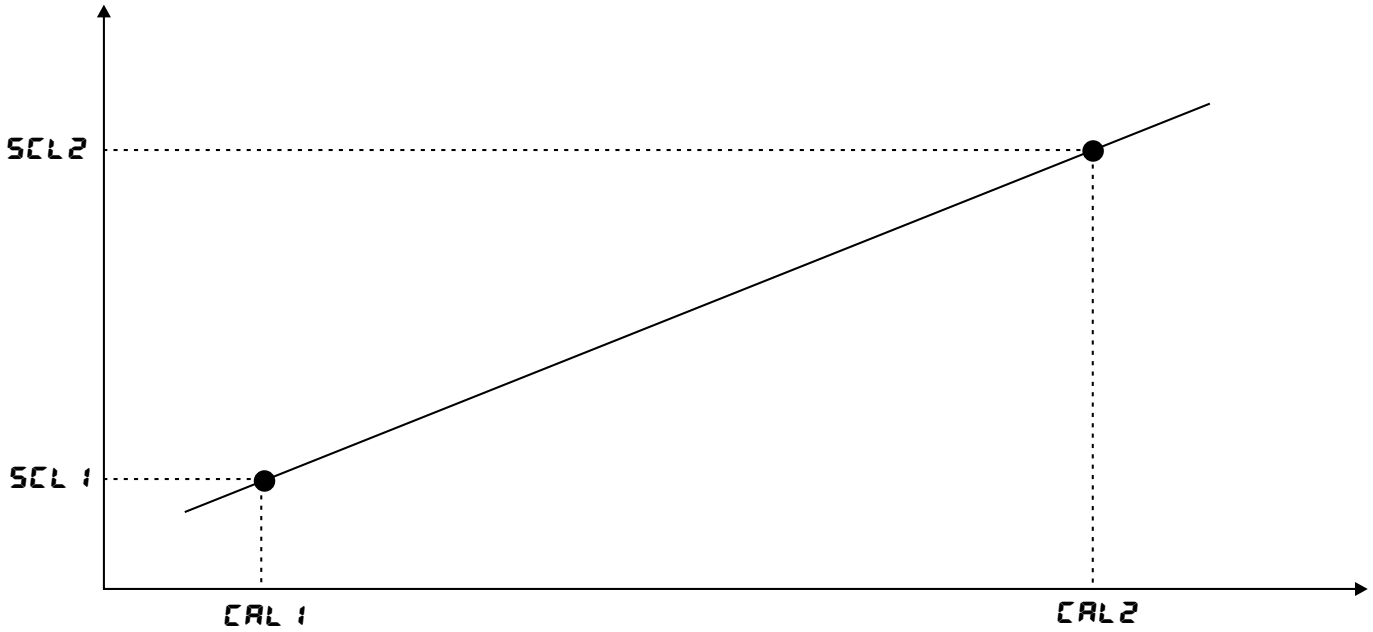
4. Press the F button, the display will now indicate CAL End (indicating that calibration of the first point is complete).

5. The display will now indicate CAL 2 (2nd calibration point). If you do not wish to enter the second point at this stage then press and release the F button until the FUNC End message is seen. If you wish to enter the second point at this stage press the ▲ and ▼ buttons simultaneously.

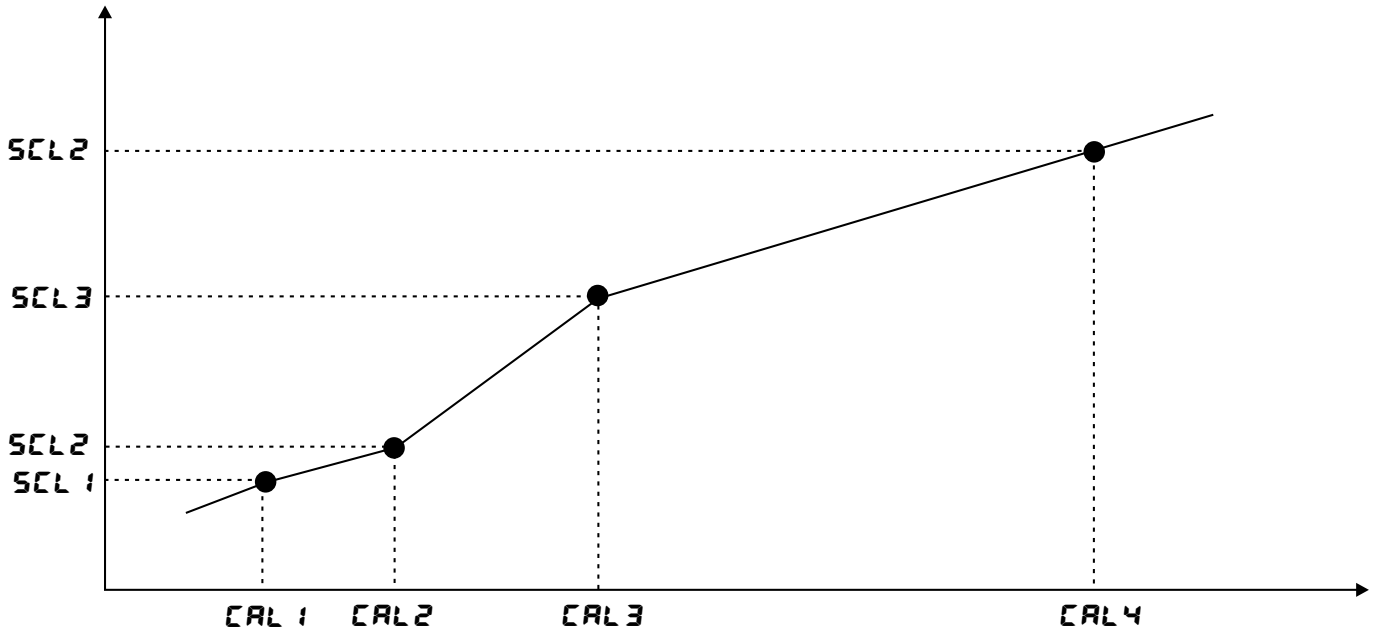
6. The display will now indicate CAL 2 (2nd calibration point) followed by a "live" reading. Apply an input greater than that used for CAL 1 (again this value is not critical but it should be at least 10% of full load cell capacity different to the CAL 1 input. For best accuracy the input should be as close to full capacity as possible).

7. When the reading has stabilised, press the F button, the display will now read SCL 2 (scale 2) followed by the second scale value in memory. Use the ▲ or ▼ button to obtain the required scale value. Press the F button, the display will now read CAL End (indicating that calibration of the second point is complete).

8. Repeat the process for the remaining calibration points.

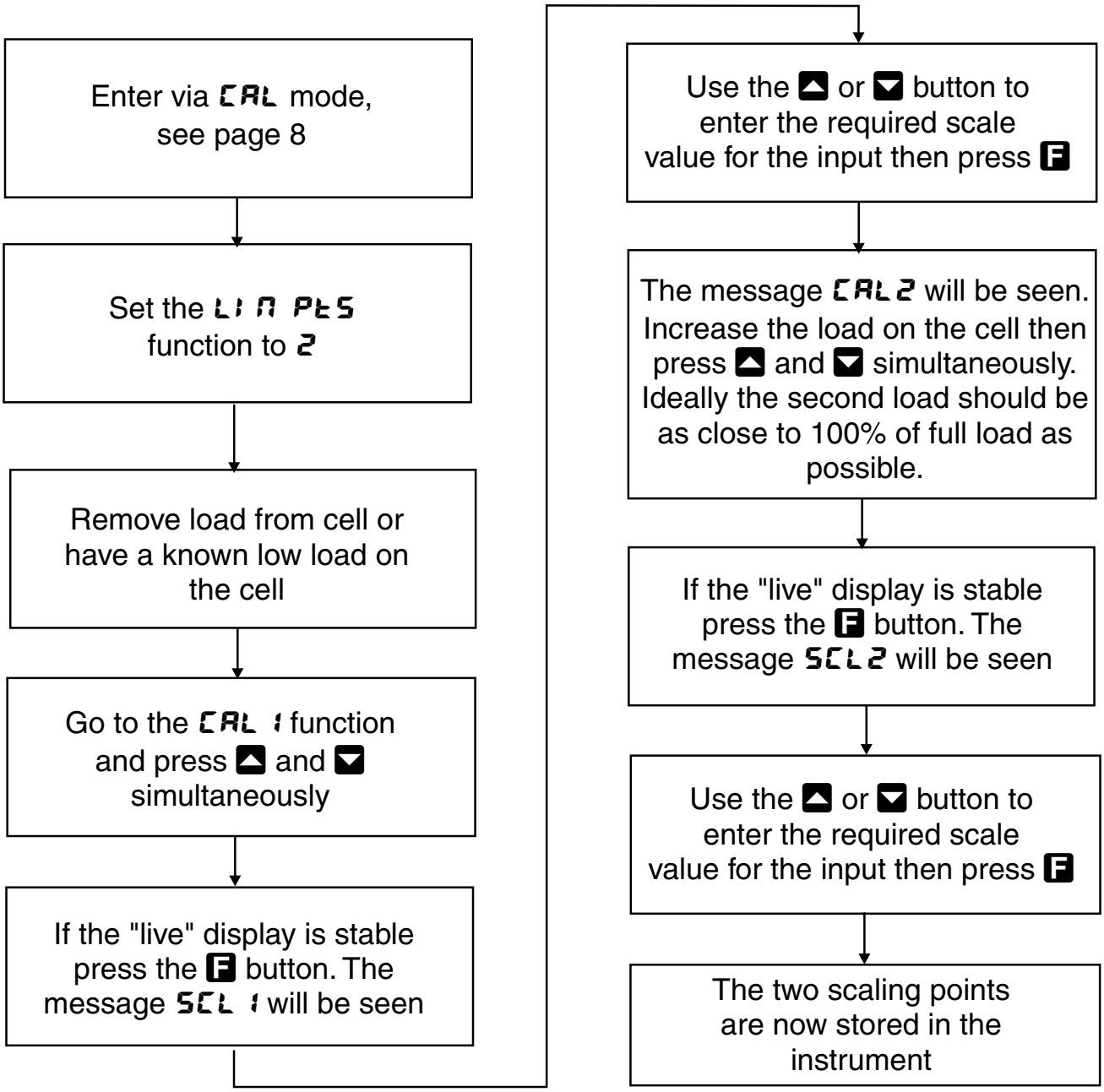


Two scaling points - display is linear



More than two scaing points - linearised display

Example - Scaling using two live inputs



Note: If the "live" display at any scaling point is not stable then check the input signal for stability.

Example - Scaling using three linearisation points

Enter via CAL mode, see page 8

Set the LIN PTS function to 3

Remove load from cell or have a known low load on the cell

Go to the CAL 1 function and press ▲ and ▼ simultaneously

If the "live" display is stable press the F button. The message SCL 1 will be seen

Use the ▲ or ▼ button to enter the required scale value for the input then press F

The message CAL 2 will be seen. Change the load on the cell then press ▲ and ▼ simultaneously

If the "live" display is stable press the F button. The message SCL 2 will be seen

Use the ▲ or ▼ button to enter the required scale value for the input then press F

The message CAL 3 will be seen. Change the load on the cell then press ▲ and ▼ simultaneously

If the "live" display is stable press the F button. The message SCL 3 will be seen

Use the ▲ or ▼ button to enter the required scale value for the input then press F

The three scaling points are now stored in the instrument

Note: If the "live" display at any scaling point is not stable then check the input signal for stability.

SEt ZERO (set zero)

Used to set the load cell system to display reading zero. The set zero point is entered when the load cell is installed and in a no weight condition.

In calibration mode step through the functions until the SEt ZERO display is seen. Press the ▲ and ▼ buttons simultaneously to get a “live” display. Pressing and releasing the F button gives a ZERO End display.

Calibration - method 2, Remote Input Calibration

Note: this method can only be used if the Li nPtS function is set to 2.

The remote input calibration method allows simple, live input, calibration suitable for situations requiring frequent calibration such as in item counting by weight applications. In this method of calibration a remote input function (e.g. r.I nP) is assigned to CAL, closure of the remote input then initiates the calibration process. The procedure is as follows:

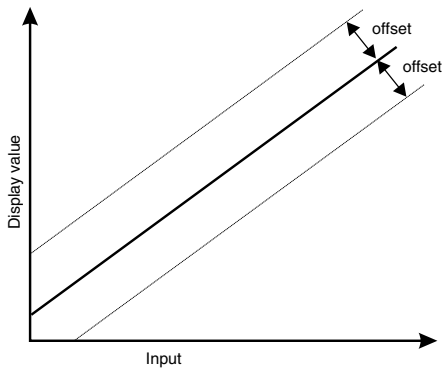
1. Assign the remote input (via r.I nP function) to CAL.
2. Assign a the P button to ZERO and zero the display when it is in a no load condition.
3. Place a weight (or known number of items) on the weighing platform then operate the CAL remote input i.e. close the switch.
4. The message SCLE will appear on the display followed by the previous scale value in memory. Use the ▲ or ▼ button to alter this reading to the value required for this load.
5. Press, then release, the F button, the message CAL End will be seen and the instrument will return to normal measure mode.

Note that the P button may be used to abort the calibration process once beyond step 3.

Calibration offset

The calibration offset allows a single point adjustment to be made to the calibration. Note the value set in this function will add or subtract the value equally across the measurement range of the instrument.

Enter the calibration mode as described above, but do not enter CAL 1 or CAL2 etc. functions. Step through the functions until the display indicates CAL OFSt, Now press the ▲ and ▼ buttons simultaneously to enter the offset mode. The display will now indicate CAL OFSt (offset) followed by the “live” reading. *Apply a known input to the instrument. When the reading has stabilised press the F button. The display will indicate SCLE (scale) followed by the previous scale value set in memory. Now press the ▲ or ▼ button to obtain the required display value for this input. Press the F button the display will now indicate OFSt End (indicating that the offset calibration is complete).



Returning to the normal measure mode

When the calibration procedure has been completed it is advisable to return the instrument to the normal mode (where calibration functions cannot be tampered with). To return to the normal mode, turn off power to the instrument, wait a few seconds and then restore power.

Note:

* “Apply a known input” refers to either a simulated or real input.

12 Specifications

12 .1 Technical Specifications

Input:	4-20mA, ±20mA, ±2VDC or ±20VDC link selectable
Accuracy:	0.01% to 0.05% of full scale (alarms and display) dependant upon sample rate and range selection. Serial comms. ±1 display digit accuracy.
Sample Rate:	5 to 100 per sec selectable
ADC Resolution:	Up to 22 bits depending on sample rate
ADC Conversion:	Sigma Delta
Microprocessor:	MC68HC11FI CMOS
Ambient Temperature:	-10 to 60°C
Humidity:	5 to 95% non condensing
Display:	LED 5 digit 7.6mm + alarm annunciator LEDs
Power Supply:	AC 240V, 110V, 24V or 32V 50/60Hz. DC 12 to 48V wide range.
Power Consumption:	AC supply 4 VA max, DC supply, (depends on display type & options)
Output (standard):	2 x relays, form A rated 5A resistive 240VAC 24VDC unregulated transmitter supply (20mA max.)
Relay Action:	Programmable N.O. or N.C.

12 .2 Output Options

Third Relay:	Rated 0.5A resistive 30VAC or DC. May be configured for either form A or form C if the third relay is the only option fitted.
Fourth Relay:	Rated 0.5A resistive 30VAC or DC, form A.
Switched Voltage:	Non isolated 24VDC output to be used for open collector or solid state relay driver output.
Analog Retransmission:	Isolated 4 to 20mA or 0 - 1V or 0 - 10V link selectable, 12 bit or 16 bit versions available.
Serial Communications:	RS232, RS485 or RS422 factory configured
Transmitter supply:	Isolated & regulated. Link selectable12VDC (50mA max) or 24VDC (25mA max)

12 .3 Physical Characteristics

Case Size:	44mm (w) x 91mm (h)x 141mm (d)
Connections:	Plug in screw terminals (max 1.5mm^2 wire for load cell and options 2.5mm^2 for power and relays 1 & 2)
Weight:	470 gms basic model, 500 gms with option card

13 Guarantee and Service

The product supplied with this manual is guaranteed against faulty workmanship for a period of 2 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.