RM6-IV
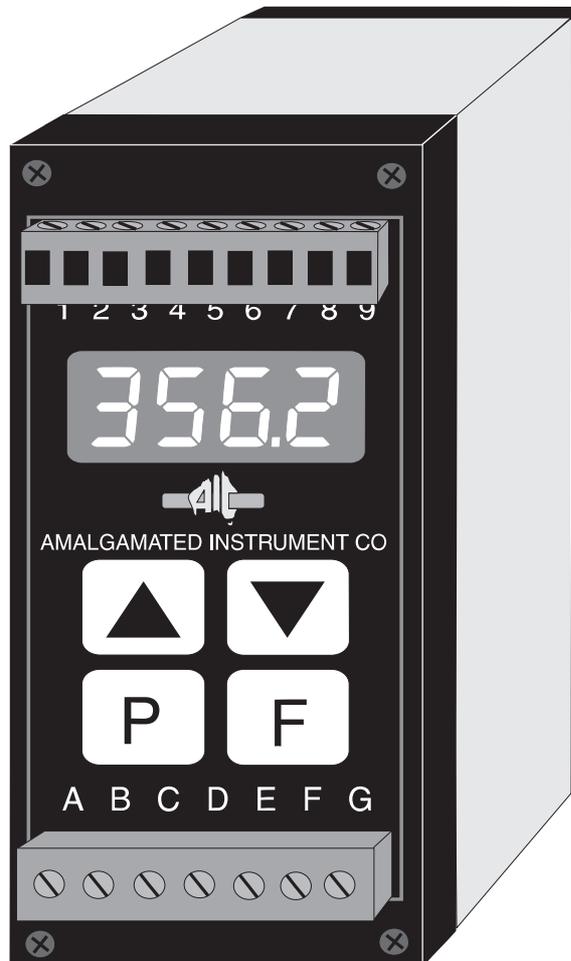# DIN Rail Mount
DC Current/DC Voltage
Process Monitor
Operation and Instruction Manual

Introduction

This manual contains information on the installation and operation of the RM6-IV monitor. The RM6-IV accepts inputs in the ranges 0 to 20mA, 4 to 20mA, 0 to ∫100mV, 0 to ∫1 Volt, 0 to ∫10 Volts, 0 to ∫100 Volts or user set input (called the **USEr** range) limits anywhere within the above ranges. Selection of input range is via the **InPt** function. The **SCLE** function is used to scale any of the standard input ranges whilst the **USEr** input is scaled using the **CAL 1** and **CAL2** "live" input functions.

The displayed output may be scaled to read in any engineering units. A square root extractor is included and can be configured as required. Two alarm/control relays are provided, one of which (relay 2) may be configured via a DIP switch to operate as a hardware failure alarm. The 4-20mA recorder output included is easily setup to retransmit between scaled input values.

Unless otherwise specified at the time of order your RM6-IV has been factory set to a standard configuration. This configuration can be easily changed by the user. All changes to configuration are made via the four push buttons (**P**, **F**, ▲ and ▼) located at the front of the unit.

The RM6 series instruments are designed for high reliability in industrial applications. The LED display can be set for desired brightness level to suit most locations and light levels.
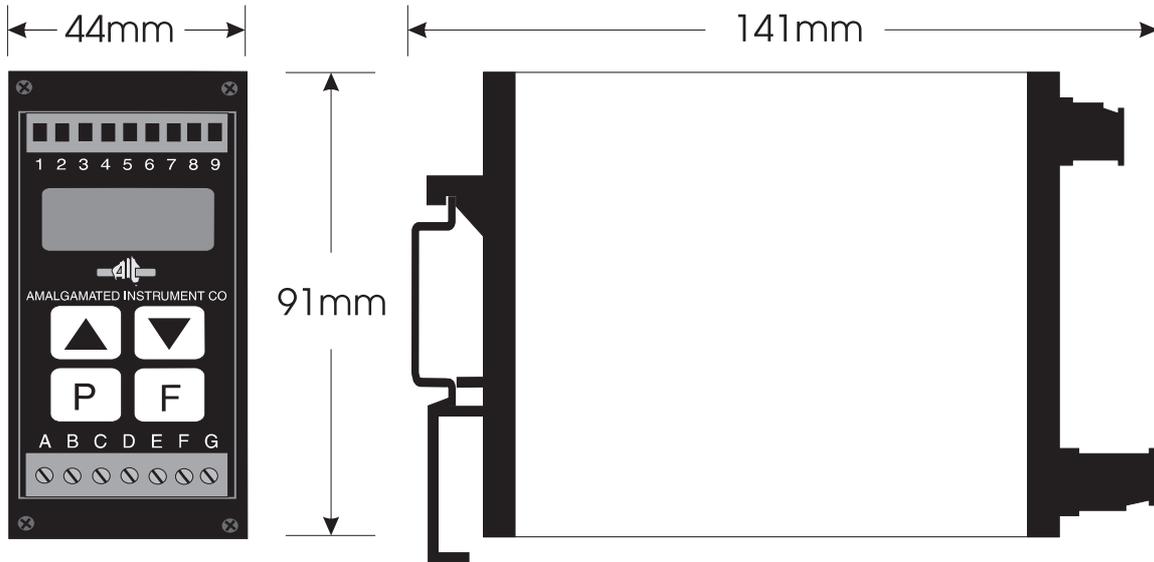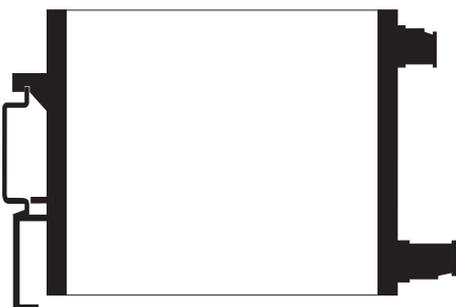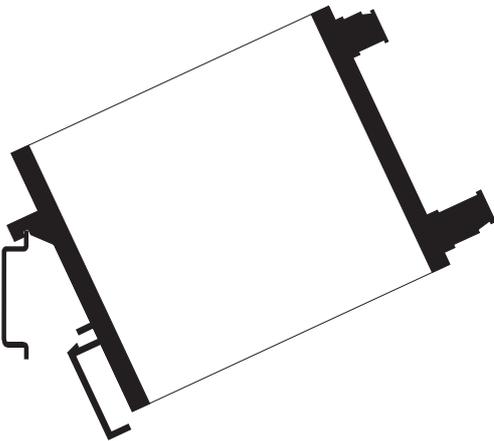
Mechanical Installation

The dimensions of the RM6-IV are shown in the diagrams below. The RM6 is designed for DIN rail, horizontal mounting. The instrument snaps onto 35mm DIN standard rails (EN50022). To install the RM6 simply clip onto the rail shown below. To remove lever the lower arm downwards as illustrated below.
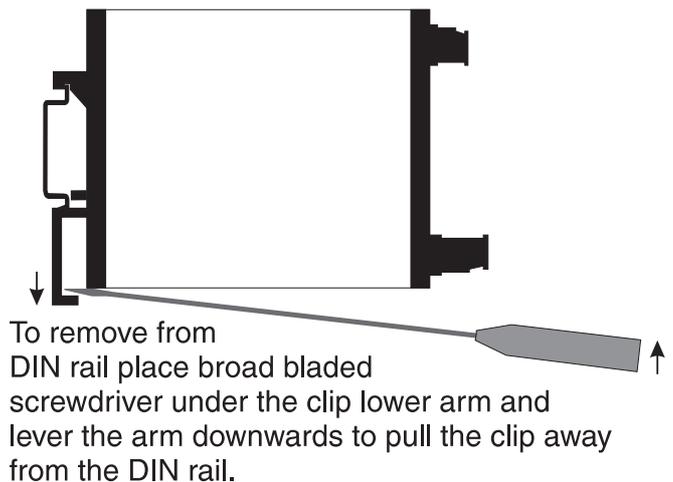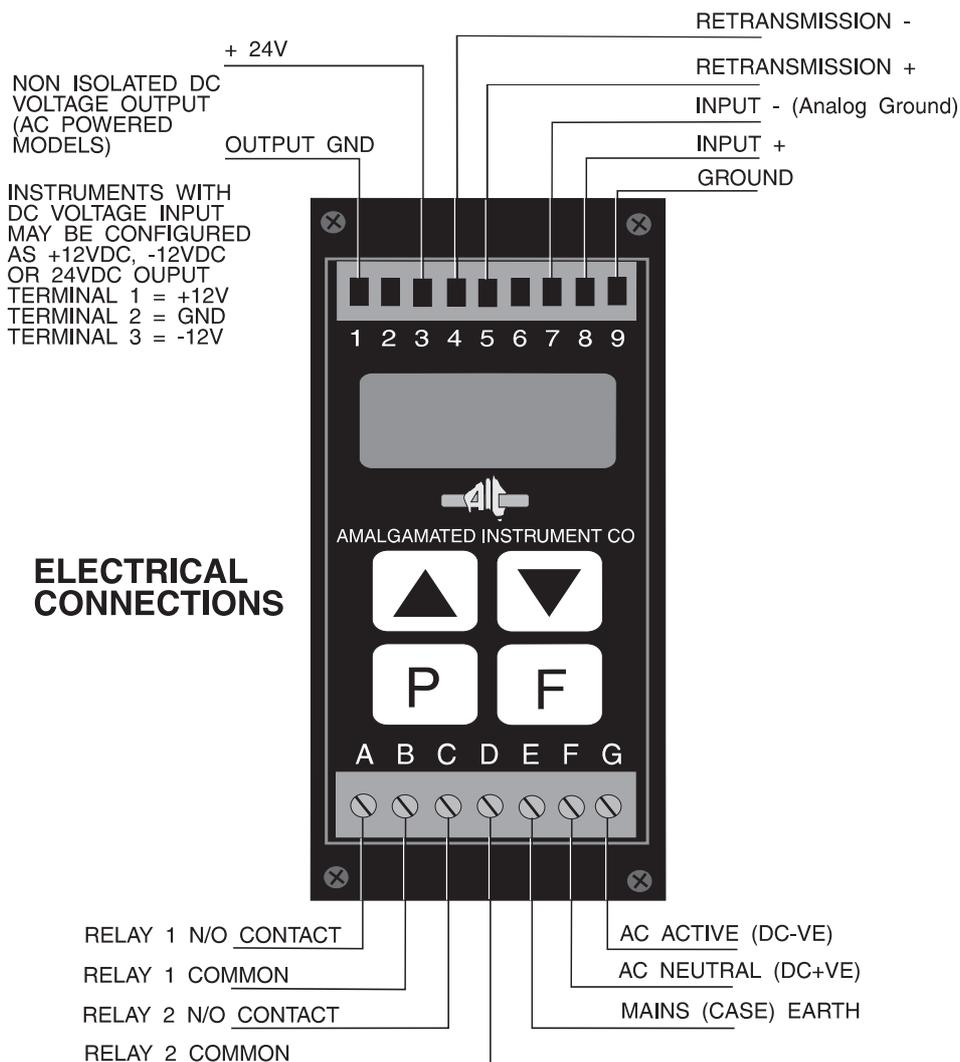
DIMENSIONS

CLIPPING THE INSTRUMENT ONTO THE DIN RAIL

REMOVING FROM THE DIN RAIL

To remove from DIN rail place broad bladed screwdriver under the clip lower arm and lever the arm downwards to pull the clip away from the DIN rail.
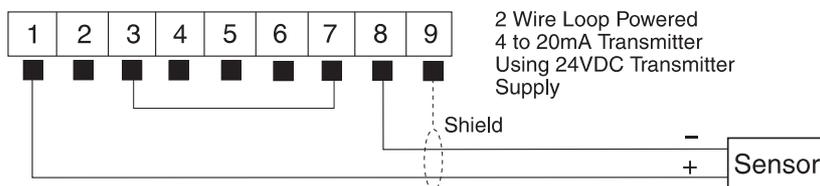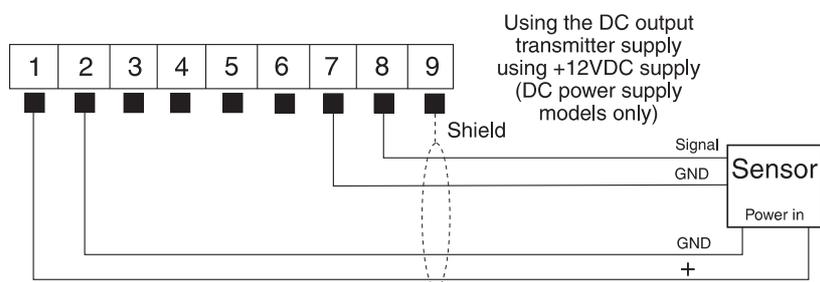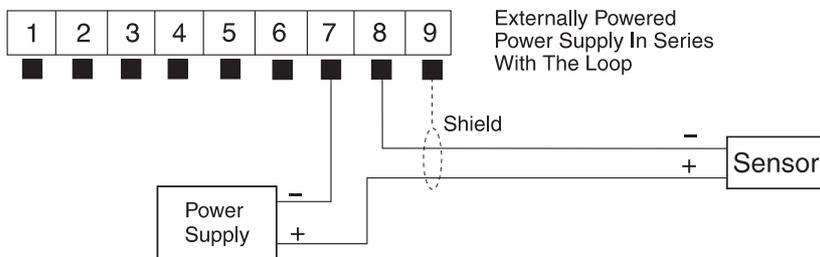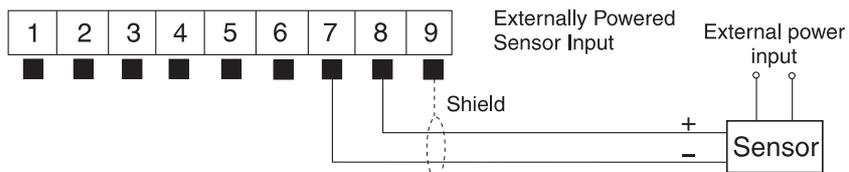
Electrical Installation

The diagrams below show the electrical connection points for the RM6-IV. As the instrument is designed for continuous use no power switch is fitted. It is recommended that an external switch and fuse be provided to allow the unit to be removed for servicing.

The terminal blocks are of the plug in type for ease of connection. Wires of up to 1.5mm diameter (2.5mm dia. for power supply and relay terminals) may be fitted. Connect the wires to the appropriate terminals as indicated in the diagrams below. Ensure that all connections are correct before switching on. When power is applied the instrument will cycle through a display sequence, see the "Switching On The Instrument" section for full details of display messages. At the end of the switch on display sequence a "live reading" will be shown on the display if an input is present. A test input or a known sensor input may be used at this stage to check the operation of the instrument.

NON ISOLATED DC VOLTAGE OUTPUT (AC POWERED MODELS)

+ 24V

OUTPUT GND

INSTRUMENTS WITH DC VOLTAGE INPUT MAY BE CONFIGURED AS +12VDC, -12VDC OR 24VDC OUPUT
TERMINAL 1 = +12V
TERMINAL 2 = GND
TERMINAL 3 = -12V

RETRANSMISSION -
RETRANSMISSION +
INPUT - (Analog Ground)
INPUT +
GROUND

1 2 3 4 5 6 7 8 9

AMALGAMATED INSTRUMENT CO

ELECTRICAL CONNECTIONS

A B C D E F G

RELAY 1 N/O CONTACT
RELAY 1 COMMON
RELAY 2 N/O CONTACT
RELAY 2 COMMON

AC ACTIVE (DC-VE)
AC NEUTRAL (DC+VE)
MAINS (CASE) EARTH

Examples of sensor connection.

1	2	3	4	5	6	7	8	9

Externally Powered
Sensor Input

External power
input

Shield

+

−

Sensor

1	2	3	4	5	6	7	8	9

Externally Powered
Power Supply In Series
With The Loop

Shield

−

+

Sensor

Power
Supply

−

+

1	2	3	4	5	6	7	8	9

Using the DC output
transmitter supply
using +12VDC supply
(DC power supply
models only)

Shield

Signal

GND

Sensor

Power in

GND

+

1	2	3	4	5	6	7	8	9

2 Wire Loop Powered
4 to 20mA Transmitter
Using 24VDC Transmitter
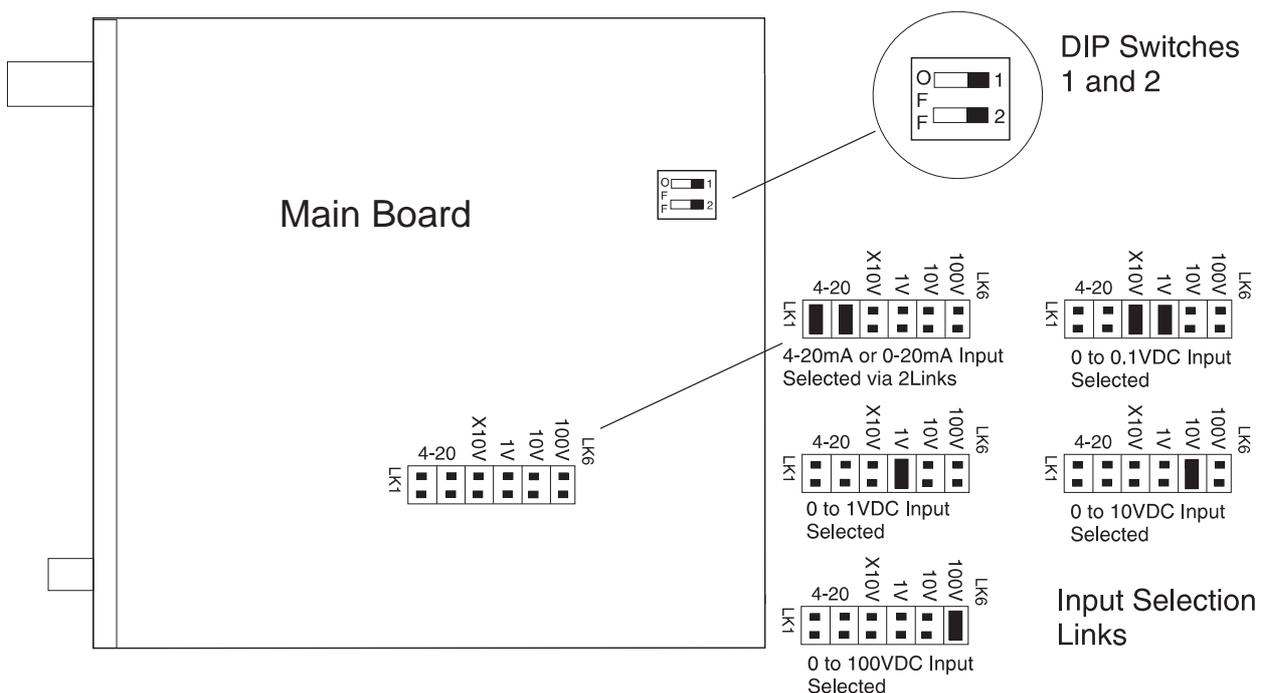Supply

Shield

−

+

Sensor

DIP Switch & Link Settings

The RM6 has two DIP switches and a set of input links located on the main board. To dismantle the instrument and gain access to the switches and links firstly remove the earth screw which passes through the side panel of the aluminium case then remove the four screws which secure the front display panel to the case and pull the display out of the case.

DIP Switch 1 - When set to the OFF position the instrument behaves normally. When set to the ON position the instrument will block access to any functions thus providing security for the existing setup. If an attempt is made to enter CAL or function setup modes with the switch in the ON position the message `no ACCS` will flash indicating that the access is blocked.

DIP Switch 2 - When set to the OFF position the instrument behaves normally and there is access to alarm 1 and 2 functions. When set to ON alarm 2 becomes a dedicated hardware failure alarm. Alarm 2 will operate in the normally closed (energised) mode and will open (de energise) if the entire instrument, its analog to digital converter or its micro controller fails. In the ON position there will be no access to alarm 2 functions since this alarm is now dedicated.

Input Links - Input links on the main board are used to select the required input range, ensure that the link setting corresponds to the software setting (see `inPt` function). To change a link setting simply pull the tab connected to the link to remove it from the unwanted setting and place the link or links in the required position. Note the 4-20mA / 0-20mA and 0-0.1V inputs each require two links.
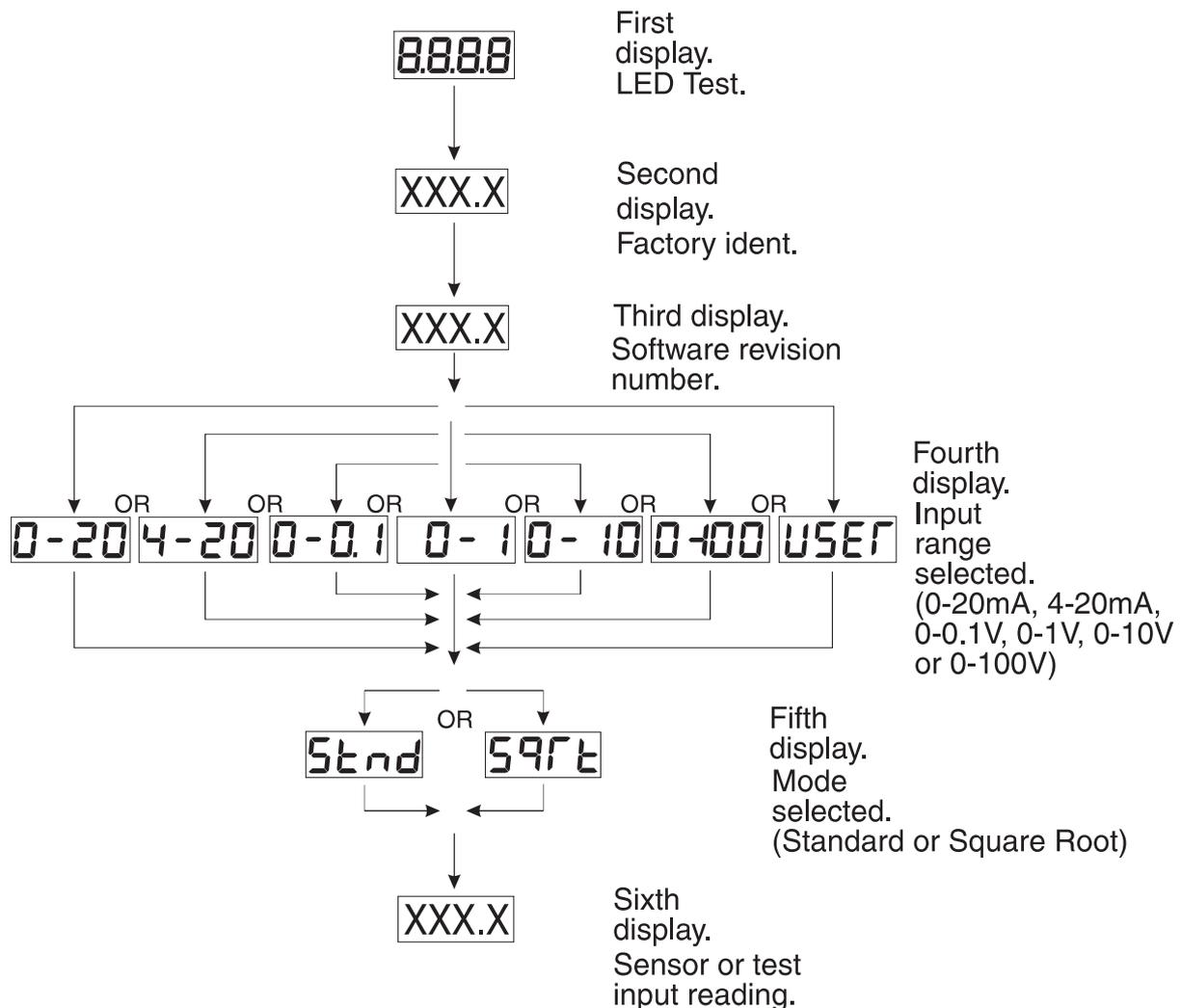

DIP Switches 1 and 2

Main Board

4-20mA or 0-20mA Input Selected via 2Links

0 to 1VDC Input Selected

0 to 100VDC Input Selected

0 to 0.1VDC Input Selected

0 to 10VDC Input Selected

Input Selection Links

Switching On The Instrument

When the instrument has been electrically connected you can view the status of the input range and measurement mode settings by applying power and watching the display sequence. If you connect a sensor or test voltage/current you will also see the reading obtained from the sensor or test input. Upon applying power the display automatically scrolls through five displays. The first lights up all LED digits i.e. displays eights. By watching this display you can confirm that all display segments are functioning. The second display is a factory identification message. The third display gives the software revision number of the instrument. The fourth display shows the input range selected, see the "Functions Available" and "Setting Up The RM6-IV" chapters if this is not the range you require. The fifth display shows the measuring mode being used, again see the "Functions Available" and "Setting Up The RM6-IV" sections for details. The sixth display shows the sensor/test input reading, if any input is connected. The switch on display sequence is illustrated in the diagram below.

8.8.8.8	First display. LED Test.
XXX.X	Second display. Factory ident.
XXX.X	Third display. Software revision number.
0-20 4-20 0-0.1 0-1 0-10 0-100 USEr	Fourth display. Input range selected. (0-20mA, 4-20mA, 0-0.1V, 0-1V, 0-10V or 0-100V)
Stnd OR SQrt	Fifth display. Mode selected. (Standard or Square Root)
XXX.X	Sixth display. Sensor or test input reading.

Functions Available

Note: Some of the functions described in this chapter are available only when the instrument is powered up in `CAL` mode. See "Setting Up the RM6-IV", page 10, for details of this mode. Some of these functions are only seen when `USEr` input mode and some when in the standard voltage or current selection input mode. See the function tables and details in "Setting Up the RM6-IV".

Two measuring modes are available. These are:

Standard mode - This mode is indicated by `Stnd` on the display. Use this mode for linear measurement applications.

Square root mode - This mode is indicated by `Sqrt` on the display. Use this mode when the square root facility is required in the measurement being made.

These modes are chosen under the "Select" (`SLCt`) function. The mode chosen determines how the sensor inputs (input (`InPt`) function) will be interpreted by the instrument. See "Setting Up The RM6-IV" chapter for full details and set up procedure for each mode and function.

Brief Description of Functions:

Alarm/Control relay functions - Two Alarm/Control relays are provided, each one can be adjusted to change the low setpoint (`A1Lo` and `A2Lo`), the high setpoint (`A1Hi` and `A2Hi`), the hysteresis or deadband (`A1HY` and `A2HY`), the trip time (`A1tt` and `A2tt`) additionally each can be set to operate as normally open (`A1n.o` and `A2n.o`) or normally closed (`A1n.c` and `A2n.c`). (Note: DIP Switch 2 is used to select alarm 2 operation, refer to page 5).

Retransmission output - The recorder output or analog retransmission output is set at 4-20mA. The functions `rEC_` and `rEC¯` set the display values at which 4 and 20mA are transmitted respectively.

Digital filter (`FLtr`) - allows the user to alter the input filter level from 0 to 8, this is a weighted averaging type of filter and is used when the instrument is functioning with inputs carrying electrical "noise". The highest setting will give the highest filter level (i.e. it will filter out higher levels of noise) but it will also give the slowest display response time. Thus a setting of 8 will give a higher filter level than a setting of 5, but the setting of 5 will give a faster display response. Choose a level which is just high enough to filter out the noise present to ensure optimum response time. A setting of 3 is standard.

Display brightness (`brgt`) - allows the setting of the display brightness level from 0 to 15, where 15 is the highest brightness level.

Decimal point (`dCPt`) - allows the user to alter the placement of the decimal point. Displays such as `294.3`, `29.43` etc. may be set.

Setpoint access enable (**5PAC**) - Can be set to **on** or **OFF**, when set to **OFF** the alarm setpoint functions will only be accessible when powering up the instrument in **CAL** mode. When set to **on** the alarm setpoint functions selected in **A !5A** and **A2.5A** will be accessible by normal function setup mode entry. See "Setting Up the RM6-IV" chapter for details of calibration and function setup modes.

Alarm 1 setpoint access select (**A !5A**) - When **5PAC** is set to **on** these two functions allow for one or both setpoints for the alarm to be accessed via function setup mode entry only (i.e. there is no need to enter CAL mode). Selections are **A !Lo** (low setpoint accessible), **A !H,** (high setpoint accessible) and **A !bt** (both setpoints accessible).

Alarm 2 setpoint access select (**A2.5A**) - As above but choices are for alarm 2 e.g. **A2bt**.

Input selection (**! nPt**) - Allows the selection of the input ranges to be used. The input ranges available are: 0 - 20mA (**0-20**), 4 - 20mA (**4-20**), 0 - 1 Volt (**0- !**), 0 - 10 Volts (**0- !0**), 0 - 100 Volts (**0 !00**) and user (**USEr**). The **USEr** function allows the input limits to be set anywhere within the limits of the other ranges e.g. 3 - 16mA. The use of the **USEr** mode is described in the "Setting Up The User Function", page 21. Ensure that the link settings on the main circuit board correspond to the input selection made in this function , see "DIP Switch & Link Settings", page 5.

Calibration points (**CAL !**&**CAL 2**) - (seen only in **USEr** mode) The calibration function is seen only in **USEr** mode where input low and high (0% and 100%) levels are variable. Entering the calibration points allows the instrument to store the actual input signal levels at the input limits.

Scale (**5CLE**) - (not seen in **USEr** mode) The scale function is used as a separate function in non **USEr** mode and used with **CAL !** & **CAL 2** if in USER mode. Within the scale function the display values for the input limits are entered.

Offset (**OFSt**) - (seen only in **USEr** mode) The offset function allows the entry of a single value by which the calibration curve is to be adjusted before being displayed.

Uncalibrate (**UCAL**) - The uncalibrate function allows the user to reset the functions back to the factory settings. See the "Factory Configuration" section for a table of factory settings and a record of user changes made to these settings.

Select (**5LCt**) - from within this function one of the two measuring modes (Standard or Square Root) is selected.

7   Function Tables

Initial display	Next display	Default setting	Record your settings
A1Lo	Value in memory	OFF	
A1Hi	Value in memory	OFF	
A2Lo	Value in memory	OFF	
A2Hi	Value in memory	OFF	
A1HY	Value in memory	1	
A2HY	Value in memory	1	
A1tt	Value in memory	0	
A2tt	Value in memory	0	
A1n.o/A1n.c	A1n.o or A1n.c	A1n.o	
A2n.o/A2n.c	A2n.o or A2n.c	A2n.c	
rEC_	Value in memory	0	
rEC⁻	Value in memory	1000	
FLtr	0 to 8	3	
brgt	0 to 15	15	
dCPt	0, 0.0, 1, 0.02 or 0.003	0	
SPAC	on or OFF	on	
A1SA	A1Lo, A1Hi, or A1bt	A1bt	
A2SA	A2Lo, A2Hi, or A2bt	A2bt	
iNPt	0-20, 4-20, 0-0.1, 0-1 0-10, 0-100 or USEr	4-20	
*CAL1	SCL1 value	0.0	
*CAL2	SCL2 value	100.0	
SCLE	En0 or 4 followed by En20, 0.1, 1, 10 or 100	0.0 and 100.0	
*OFSt	Scale Value		
UCAL	CAL CLr		
SLCt	Stnd SArt	Stnd	

Notes: * Means function is only available in USEr mode.
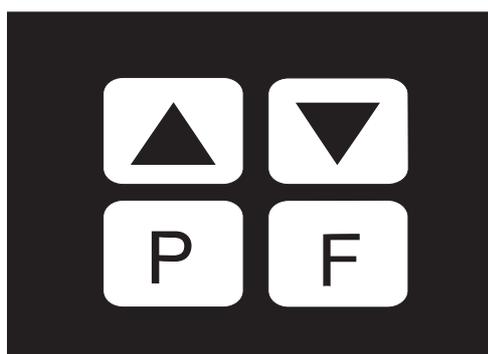Shaded functions are available only through power up CAL mode entry.

Setting Up The RM6-IV

This section contains descriptions of the setting of each of the available measuring modes and functions.

There are two entry methods to functions in the RM6-IV, these are the CAL or calibration mode and the function setup mode. In CAL mode all functions are available (note: some functions are only seen when $USEr$ is selected in the $InPt$ function), this function requires a special power up procedure. In function setup mode only selected functions are seen, entry does not require any special power up procedure.

RM6 Front Panel Pushbuttons

Entering the CAL mode - to enter this mode the instrument must have power removed.

1. Press in and hold the **F** button then reapply the power whilst still holding in the **F** button. As part of the initial display messages (see "Switching On the Instrument" chapter) you should see the message CAL. When you see this message the **F** button may now be released.
2. The instrument will indicate its normal readings and will continue to do so until function setup mode is entered. Once function setup mode is entered all available functions for the input type selected will be available.

Upon completion of any adjustments the instrument should be taken out of CAL mode by removing power to the instrument, waiting for a few seconds and then re applying power. Exiting from CAL mode in this manner reduces the risk of the settings being tampered with.

Entering the function setup mode - to make any changes to the function settings you will need to enter the function setup mode. To enter this mode the power should be applied and a reading present on the display.

1. Press and release the **F** button followed (within 2 seconds) by pressing the ▲ and ▼ buttons together, release the buttons. $FUNC$ will be displayed telling you that you are in the function mode.
2. Scroll through the functions by pressing and releasing the **F** button each time you want to change functions.

3. When you arrive at the function you want (as confirmed by the display) the ▲ and ▼ push buttons are used to change settings. Be careful not to press the ▲ or ▼ push button unless you want to change the setting. Any changes to settings will not be saved until the function is exited by pressing and releasing the **F** button to move to the next function.

As you scroll past the last function (**SLCt**), the messages **FUNC** and **End** will be displayed. Refer to the relevant part of this section for a detailed description of setting up each function and to the "Setup Examples" chapter for an example of setting up each function. Pressing and releasing the **P** button will cause an immediate exit from function mode (without saving any changes to the current function) and the display will revert to normal measure mode.

8 - .1   Setting the alarm low setpoints (**A 1Lo** and **A2Lo**)

The alarm low setpoint value is the display reading at which and below which the relays will activated. **A 1Lo** sets the first relay low point and **A2Lo** sets the second relay low setpoint.

To set alarm 1 low setpoint the function **A 1Lo** must be flashing with the previous setting, use the ▲ or ▼ button to adjust the setting to the required value. To disable the low alarm set the low setpoint to **OFF** by pressing ▲ and ▼ simultaneously.

A2Lo can be set in the same manner.

8 - .2   Setting the alarm high setpoints (**A 1Hi** and **A2Hi**)

The alarm high setpoint values are the display readings at which and above which the relays will activated. **A 1Hi** sets the first relay low point and **A2Hi** sets the second relay low setpoint.

To set alarm 1 high setpoint the function **A 1Hi** must be flashing with the previous setting, use the ▲ or ▼ button to adjust the setting to the required value. To disable the high alarm set the high setpoint to **OFF** by pressing ▲ and ▼ simultaneously.

A2Hi can be set in the same manner.

8 - .3   Setting the alarm hyseteresis values (**A 1HY** and **A2HY**)

The hysteresis values (sometimes referred to as "deadband") is used to prevent repeated activation and de-activation of the alarms when the measured value is close to one of the setpoint values. For the high alarm setpoints the alarm will trip at the high setpoint but will not reset until the display value equals the alarm setpoint value minus the hysteresis value. For the low alarm setpoints the alarm will trip at the low setpoint but will not reset until the display value equals the alarm setpoint value plus the hysteresis value. When a hysteresis value is selected it is applied to both high and low setpoints for the selected relay. Use the ▲ or ▼ button to adjust the setting at the **A 1HY** or **A2HY** function.
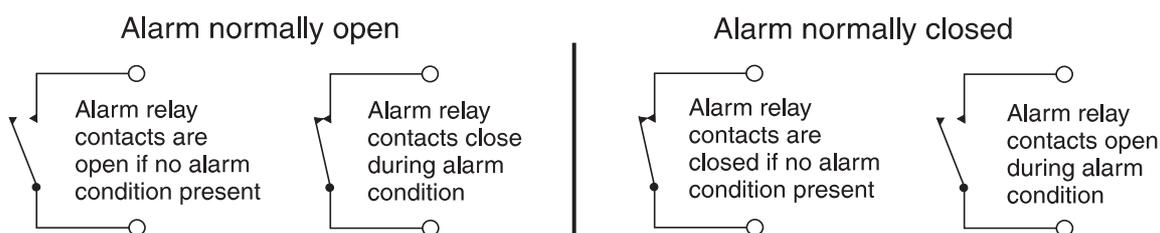
8 - .4 Setting the alarm trip times (*A 1tt* and *A2tt*)

To set alarm 1 low setpoint the function *A 1tt* must be flashing with the previous setting, use the ▲ or ▼ button to adjust the setting to the required value.

Alarm 2 trip times may be set in the same manner.

8 - .5 Setting the alarm normally open/ normally closed operation (*A 1n.o.A 1n.c* and *A2n.o.A2n.c*)

At the function use the ▲ or ▼ button to select normally open (relay deactivated when no alarm condition is present) or normally closed (relay activated when no alarm condition is present)

Alarm normally open   Alarm normally closed

Alarm relay contacts are open if no alarm condition present

Alarm relay contacts close during alarm condition

Alarm relay contacts are closed if no alarm condition present

Alarm relay contacts open during alarm condition

8 - .6 Setting the recorder output functions (*rEC⌐* and *rEC⌐*)

To set he recorder output low limit (*rEC⌐*) set the display value to the required display for 4mA retransmission using the ▲ or ▼ button. To set the recorder output high limit (*rEC⌐*) set the display value to the required display for 20mA retransmission using the ▲ or ▼ button.

8 - .7 Setting the digital filter (*FLtr*)

The digital filter setting ranges from 0 (no filtering, fast display response time) to 8 (maximum filtering, slower display response time). To optimise the display response time choose the lowest filter value needed.

To change the filter value follow the procedure below.

1. Scroll through the functions by pressing and releasing the 🄵 button until *FLtr* is displayed followed by the current filter setting e.g. *2*

2. Use the ▲ or ▼ button to change this value. When the required value is reached press and release the 🄵 button to accept this new setting and enter the next function.

8 - .8 Setting the display brightness (*br9t*)

The display brightness function allows the user to set the display brightness to suit the lighting environment and viewing distance required.

To change the brightness value follow the procedure below.

1. Scroll through the functions by pressing and releasing the 🄵 button until *br9t* is displayed followed by the current filter setting e.g. *15*

2. Use the ⬆ or ⬇ button to change this value. When the required value is reached press and release the **F** push button to accept this new setting and enter the next function.

8 - .9   Setting the decimal point (dCPt)

The decimal point may be set to none, one, two or three decimal places. These are displayed as:

0 = no decimal points e.g. **2596**

0. 1 = one decimal point place e.g. **259.6**

0.02 = two decimal point places e.g. **25.96**

0.003 = three decimal point places e.g. **2.596**

To change the setting follow the procedure below.

1. Enter via **CAL** mode then enter the function mode as described earlier.

2. Scroll through the functions by pressing and releasing **F** until **dCPt** is reached this will be followed by a display with the current decimal point setting will be shown e.g. **0.02**

3. Press and release the ⬆ or ⬇ push button as needed until the required display is obtained.

4. Having obtained the required display press the **F** button to accept this new setting and enter the next function.

8 - .10   Setpoint access enable (SPAC)

The setpoint access enable may be set to either **ON** or **OFF**.

To change the setting follow the procedure below.

1. Enter via **CAL** mode then enter the function mode as described earlier.

2. Scroll through the functions by pressing and releasing **F** until **SPAC** is reached this will be followed by a display with the current setting.

3. Press and release the ⬆ or ⬇ push button as needed until the required display is obtained.

4. Having obtained the required display press the **F** button to accept this new setting and enter the next function.

8 - .11   Alarm 1 setpoint access (A1SA)

The alarm 1 setpoint access enable may be set to either **A1Lo**, **A1Hi** or **A1.bt**.

To change the setting follow the procedure below.

1. Enter via **CAL** mode then enter the function mode as described earlier.

2. Scroll through the functions by pressing and releasing **F** until **A 1SA** is reached this will be followed by a display with the current setting.

3. Press and release the **▲** or **▼** push button as needed until the required display is obtained.

4. Having obtained the required display press the **F** button to accept this new setting and enter the next function.

8 - .12 Alarm 2 setpoint access (**A2SA**)

The alarm 2 setpoint access enable may be set to either **A2Lo**, **A2Hi** or **A2.bt**.

To change the setting follow the procedure below.

1. Enter via **CAL** mode then enter the function mode as described earlier.

2. Scroll through the functions by pressing and releasing **F** until **A2SA** is reached this will be followed by a display with the current setting.

3. Press and release the **▲** or **▼** push button as needed until the required display is obtained.

4. Having obtained the required display press the **F** button to accept this new setting and enter the next function.

8 - .13 Setting up the input function (**I NPt**)

The input function is used to select the input signal range. The RM6-IV has 6 preset input ranges and one user (**USEr**) configurable range. The preset ranges are 0 - 20mA, 4 - 20mA, 0 - 0.1 Volts, 0 - 1 Volt, 0 - 10 Volts and 0 - 100 Volts. The user range input values may be set anywhere between the limits of any of the 6 preset ranges. Note: If changes are made to the input function ensure that the appropriate input links are selected, see "DIP Switch and Link Settings", page 5.

To change the input setting of the preset ranges you must select one of the preset input ranges at the **I NPt** function (i.e. the **USEr** function must not have been selected). The procedure for setting up the **USEr** function is described in the chapter "Setting Up The User Function". Follow the procedure below.

1. Enter via **CAL** mode then enter the function mode as previously described.

2. Scroll through the functions by pressing and releasing the **F** push button until **I NPt** is displayed followed by the current input setting e.g. **4-20**

3. Use the **▲** or **▼** push button to select the input range required.

4. When the required value is displayed press the **F** push button to enter this value and move to the next function. The preset range selected has now been set.

8 - .14 Scale (`SCLE`) function

The scale function allows the display values to be set for the input limits. Note: this function will not be accessible if the input function is set to `USEr`. To alter the scale values follow the procedure below.

1. Enter via `CAL` mode then enter the function mode as previously described.

2. Scroll through the functions by pressing and releasing the **F** push button until `SCLE` is displayed.

3. Press the ▲ and ▼ push buttons together. The message `En4` will be displayed if the 4 - 20mA range is selected or `En0` will be displayed for any other preset range. The old setting will then be displayed.

4. Use the ▲ or ▼ push button to change the old setting to a new reading (the reading you wish displayed when a minimum input level is present).

5. Press and release the **F** push button. The display will now indicate the maximum input level, shown as: `En20` or `En0.1` or `En1` or `En10` or `E100` depending on the input range set. The old setting will then be displayed.

6. Use the ▲ or ▼ push button to change the old setting to a new reading (the reading you wish displayed when a maximum input level is present).

7. Pressing and releasing the **F** push button will give the `SCLE End` and `FUNC End` messages and cause a return to normal measuring mode.

8 - .15 Uncalibrating (`UCAL`)

The uncalibrating function allows all of the user alterable functions to be reset to factory configuration (for settings see the "Function Table" chapter for default settings). To uncalibrate the instrument follow the procedure below.

1. Enter via `CAL` mode then enter the function mode as previously described.

2. Scroll through the functions by pressing and releasing the **F** push button until `UCAL` is displayed.

3. Press the ▲ and ▼ push buttons together. The message `CAL CLr` will be displayed followed by the `FUNC End` message. The instrument then returns to its normal measuring mode.

8 - .16 Select (`SLCt`) function

The select function allows the user to change measuring modes. These modes are:

Standard (5ᴗⁿᴅ) - In this mode the inputs are simply scaled, if required, and displayed.

Square root (5ᴗᴦᴛ) - see below for description.

To change the setting follow the procedure below.

1. Enter via **ᴄᴿʟ** mode then enter the function mode as described earlier. Scroll through the functions by pressing and releasing **F** until **5ʟᴄᴛ** is reached this will be followed by a display with the current setting.

2. Press and release the ▲ or ▼ push button as needed until the required display is obtained.

3. Having obtained the required display press the **F** button to accept this new setting and enter the next function.

8 - .17 Square root mode (5ᴗᴦᴛ)

When the square root function is used the scaled displayed value follows the square root of the percentage of the full scale input value. Note that negative numbers will not be displayed when in square root mode, numbers less than zero will be displayed as zero. The upper and lower input limits are set as normal as are the values to be displayed at these limits. For example if, for a 4 - 20mA input you wish to display **0** at 4mA and **1000** at 20mA the square root function will calculate as follows:

At 20mA (100%) the display will be **1000** i.e. $\sqrt{100}x100$.

At 16mA (75%) the display will be **866** i.e. $\sqrt{75}x100$.

At 12mA (50%) the display will be **707** i.e. $\sqrt{50}x100$ and so on.

The procedure for setting the square root function and changing the limits is as follows.

1. Enter via **ᴄᴿʟ** mode then enter the function mode as previously described.

2. Scroll through the functions by pressing and releasing the **F** push button until **5ʟᴄᴛ** is displayed.

3. Use the ▲ or ▼ push button to change the display to **5ᴗᴦᴛ**

4. Press and release the **F** push button until the **Fᴜⁿᴄ Eⁿᴅ** message is displayed.

5. Re enter the function mode.

6. Scroll through the functions by pressing and releasing the **F** push button until **Iⁿᴘᴛ** is displayed.

7. Set the limits and display values as described in the "Setting Up The Input Function (Iⁿᴘᴛ)" section of this chapter.

Setup Examples

This section contains examples of setting up some of the RM6-IV functions with the exception of the **USEr** function, this is dealt with in its own section. It is assumed in all but one case that only one change of function is required, the final example shows the procedure for multiple changes. Following each example is a flow diagram for easy reference. Some of the common button press symbols are described below.

Press **F** at switch on	Enter CAL mode by holding the **F** button in whilst powering up the instrument
Press **F** and ▲▼	Enter function mode by pressing **F** and, within 2 seconds pressing both ▲ and ▼ together.
Press & release **F**	Press **F** once then release.
Press & release **F** until	Repeatedly press and release **F** until the required display is reached.

Press both ▲ and ▼	Press both buttons together.
Press & release ▼ until	Press and release button for small changes in value. Also applies to ▲
Press & hold ▲ until	Press and hold the button for large changes in value. This will cause the display to change rapidly. Also applies to ▼

9 - .1   Setting the digital filter

New setting 6.

Old setting 3.

Enter the function mode.

Display shows **FUNC** followed by first function.

Press and release the **F** push button until the display shows **FLtr** followed by **3** (old setting).

Press and release the ▲ push button until **6** is observed on the display. Press and release the **F** push button until the **FUNC End** message is seen and the display returns to normal measuring mode.

Press **F** and ▲▼ → **FUNC** → Press & release **F** until → **FLtr** → **3** → Press & release ▲ until →

→ **6** → Press & release **F** until → **FUNC** → **End**

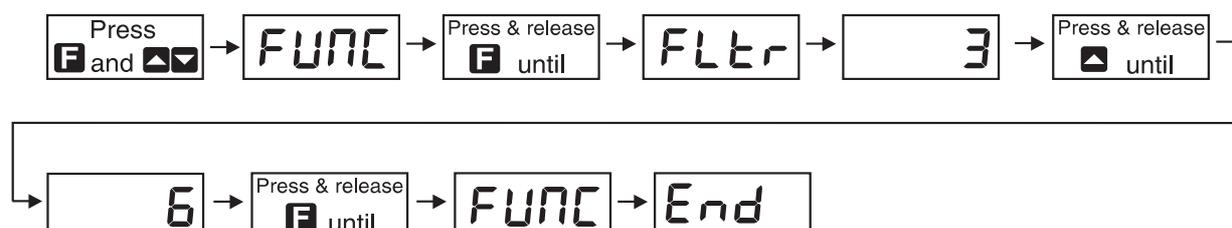## 9 - .2   Setting the display brightness

New setting 10.

Old setting 15.

Enter the function mode.

Display shows *FUNC* followed by first function.

Press and release the **F** push button until the display shows *brgt* followed by *15* (old setting).

Press and release the **▼** push button until *10* is observed on the display. Press and release the **F** push button until the *FUNC End* message is seen and the display returns to normal measuring mode.

| Press **F** and **▲▼** | → | *FUNC* | → | Press & release **F** until | → | *brgt* | → | *15* | → | Press & release **▼** until |

| → | *10* | → | Press & release **F** until | → | *FUNC* | → | *End* |

9 - .3   Setting the decimal point

New setting one decimal point place.

Old setting is no decimal points.

Enter via *CAL* mode
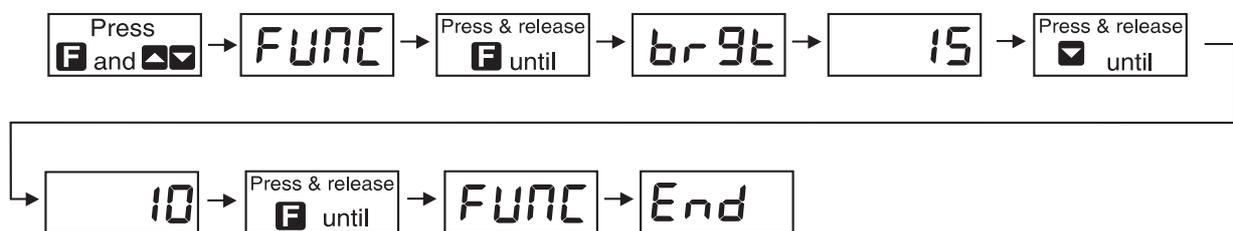
Enter the function mode.

Display shows *FUNC* followed by first function.

Press and release the **F** push button until the display shows *dCPt* followed by *0* (old setting).

Press the **▲** push button to get display to *0. 1*

Press and release the **F** push button until the *FUNC End* message is observed and display returns to normal measuring mode.

| Press **F** at switch on | → | Press **F** and **▲▼** | → | *FUNC* | → | Press & release **F** until | → | *dCPt* | → | *0* |

| → | Press & release **▲** until | → | *0.1* | → | Press & release **F** until | → | *FUNC* | → | *End* |

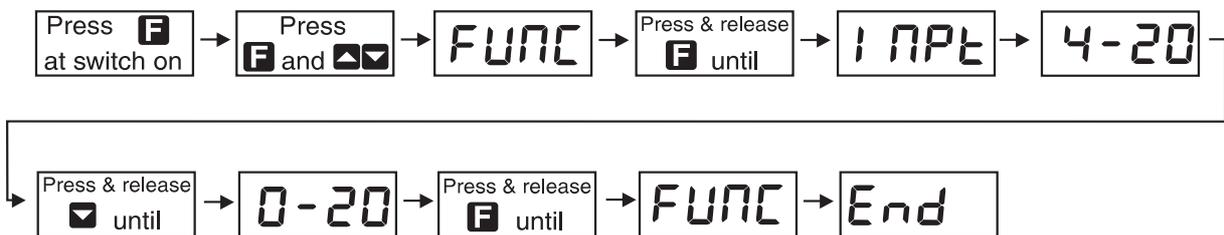## 9 - .4 Setting the input range

New range 0 - 20mA

Old range 4 - 20mA

Enter via *CAL* mode

Enter the function mode. Press and release the **F** push button until *INPt* appears on the display followed *4-20* (old setting).

Press and release the **▼** push button until *0-20* appears on the display.

Press and release the **F** button until the *FUNC End* message is seen and the display returns to normal measuring mode.

9 - .5 Changing multiple settings

In the flow diagram overleaf the digital filter is changed from 6 to 4, the decimal point value is changed from 1 to 2 decimal point places, the input from 0-20mA to 0-100V and the display values from -30 and 500 to 0 and 800.

Press **F** at switch on → Press **F** and ▲▼ → `FUNC` → `A 1Lo` → Press & release **F** until → `FLtr`

→ `6` → Press & release ▼ until → `4` → Press & release **F** until → `dCPt` → `0.1`

→ Press & release ▼ → `0.02` → Press & release **F** until → `1NPt` → `0-20` → Press & release ▲ until

→ `0-100` → Press & release **F** → `SCLE` → Press both ▼ and ▼ → `En0` → `-30`

→ Press & hold ▲ until → `0` → Press & release **F** → `E 100` → `500` → Press & hold ▲ until

→ `800` → Press & release **F** until → `FUNC` → `End`

→

10   Setting Up The User Function

10.1   Setting up the user function (𝖴𝖲𝖤𝗋)

The extra functions which appear as you scroll through the functions are:

𝖢𝖠𝖫 𝟣 - First calibration input

𝖢𝖠𝖫 𝟤 - Second calibration input

𝖮𝖥𝖲𝗍 - Offset value

In setting up the user function you will be setting the limits of the input by applying a signal at both these limits and assigning a value to be displayed for each input. The first limit input is set as 𝖢𝖠𝖫 𝟣, the value the user wishes displayed for this limit is called 𝖲𝖢𝖫 𝟣 (scale 1). The second limit input is set as 𝖢𝖠𝖫 𝟤, the value the user wishes displayed for this limit is called 𝖲𝖢𝖫 𝟤 (scale 2). For example if our user limits are 2.5 to 25 Volts and we wish the 2.5 Volt level to be displayed as 𝟢 and the 25 Volt level to be displayed as 𝟣𝟢𝟢𝟢 then 𝖢𝖠𝖫 𝟣 will be entered as a 2.5 Volt input signal and 𝖲𝖢𝖫 𝟣 entered as 𝟢, 𝖢𝖠𝖫 𝟤 will be entered as a 25 Volt input signal and 𝖲𝖢𝖫 𝟤 entered as 𝟣𝟢𝟢𝟢. See Figure 8 for diagram.

Setting 𝖢𝖠𝖫 𝟣

1. Apply an input signal of a known value to the instrument.

2. Enter via 𝖢𝖠𝖫 mode then enter the function mode as previously described.

3. Scroll through the functions by pressing and releasing the 🄵 push button until 𝗂𝗇𝖯𝗍 is displayed followed by the old input setting e.g. 𝟦-𝟤𝟢

4. Use the 🔼 or 🔽 push button to change this value to 𝖴𝖲𝖤𝗋.

5. When 𝖴𝖲𝖤𝗋 is displayed press and release the 🄵 push button . 𝖢𝖠𝖫 𝟣 will now be displayed. Press 🔼 and 🔽 together, the reading from the input will be displayed. Check that this is the required input level.

6. Press the 🄵 push button, 𝖲𝖢𝖫 𝟣 will be displayed followed by the old reading. Use the 🔼 or 🔽 push button to change this value to the required value i.e. the display value you wish at this input level.

7. When the required value is reached press the 🄵 push button to accept this new setting. The display will now show 𝖢𝖠𝖫 𝟣 followed by 𝖤𝗇𝖽. 𝖢𝖠𝖫 𝟤 will now be displayed. You may now edit 𝖢𝖠𝖫 𝟤 or continue pressing and releasing the 🄵 push button until the message 𝖥𝖴𝗇𝖢 followed by 𝖤𝗇𝖽 is displayed and the instrument returns to its normal measuring mode.

Setting $CAL2$

Since $CAL1$ and $CAL2$ are independent functions they do not need to be set together, thus $CAL2$ may be set following the $CAL1$ setting or set individually. The setting procedure is identical to the $CAL1$ procedure. Note that if setting $CAL2$ directly after $CAL1$ then you will be starting from step 6 in the instructions below.

1. Apply an input signal of a known value to the instrument.

2. Enter the function mode as previously described.

3. Scroll through the functions by pressing and releasing the **F** push button until **I NPE** is displayed followed by the old input setting e.g. **4-20**

4. Use the ▲ or ▼ push button to change this value to user (**USEr**).

5. When **USEr** is displayed press and release the **F** push button. **CAL1** will now be displayed followed by the reading from the input. Press the **F** push button again, **CAL2** will be displayed.

6. Press the ▲ and ▼ push buttons together, a reading from the input will be displayed. Check that this is the required **CAL2** input.

7. Press the **F** push button, **SCL2** will be displayed followed by the old reading. Use the ▲ or ▼ push button to change this value to the required value i.e. the display value you wish at this input level.

8. When the required value is reached press and release the **F** push button to accept this new setting, the display will now show **CAL2 End** followed by the **FUNC End** message.

The instrument then returns to its normal measuring mode.

Setting **CAL1** and **CAL2** sets the display upper and lower limits corresponding with the input upper and lower limits. Note that **CAL1** does not have to correspond with the low input signal or display. Thus the display could be scaled to show a high reading at a low input level (inverting the slope of the diagram) if required.

10.2   Example of Setting the **USEr** function

The following example is in standard measuring mode but is equally applicable in square root mode.

New range 20 Volts to 80 Volts (display 20 Volts = **7.5**, 80 Volts =

220).

Old range 0 - 20mA (Display 0mA = **-30.0**, 20mA = **500.0**).

Apply an input voltage somewhere within the new range (assume the lowest value, 20 Volts). Ensure that the wiring connections have also been changed if needed, see "Electrical Installation" section.

Enter via **CAL** mode

Enter the function mode. **FUNC** will be displayed.

Press and release the **F** push button until **INPt** appears on the display followed by the old display (**0-20**).

Use the **▲** push button to obtain the **USEr** display message.

Press the **F** push button to obtain a **CAL 1** then press ^ and v push buttons together, a reading from the input will follow.

Confirm that this reading is correct and stable then press the **F** push button.

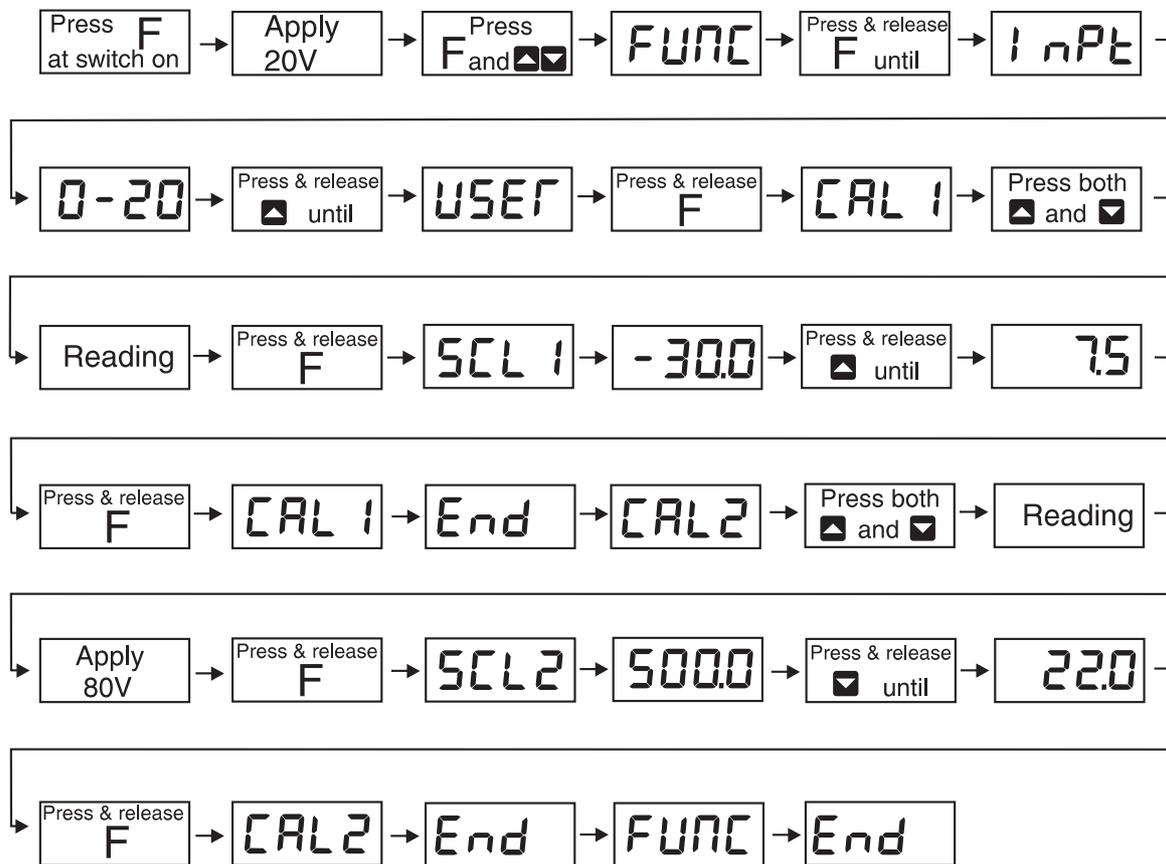**SCL 1** will be displayed followed by the old display setting.

Use the ^ push button to alter this reading to **7.5**

Press the F push button again, the **CAL 1End** message will be seen followed by **CAL2** . Press **▲** and **▼** together, an input reading will be displayed.

Apply another input within the range (assume the highest value, 80 Volts). When the input reading is confirmed as correct and is stable press the **F** push button.

SCL2 will be displayed followed by the old display value. Use the **▼** push button to change this reading to **220**

Press and release the **F** push button. The **CAL2 End** followed by **FUNC End** messages are seen and the display returns to normal measuring mode.

| Press F at switch on | → | Apply 20V | → | Press F and ▲▼ | → | FUNC | → | Press & release F until | → | InPt |

| → | 0-20 | → | Press & release ▲ until | → | USEr | → | Press & release F | → | CAL 1 | → | Press both ▲ and ▼ |

| → | Reading | → | Press & release F | → | SCL 1 | → | -30.0 | → | Press & release ▲ until | → | 7.5 |

| → | Press & release F | → | CAL 1 | → | End | → | CAL 2 | → | Press both ▲ and ▼ | → | Reading |

| → | Apply 80V | → | Press & release F | → | SCL 2 | → | 500.0 | → | Press & release ▼ until | → | 22.0 |

| → | Press & release F | → | CAL 2 | → | End | → | FUNC | → | End |

Setting the offset （OFSt）

The offset function appears only in user mode (standard and square root function). It allows the calibration curve to be offset by a set value. The set value will be added to, or subtracted from the display value along the whole input range. To change the offset simply.

Enter via CAL mode then enter the function mode and scroll through the functions until OFSt appears. Apply a known input to the instrument and press the ▲ and ▼ push buttons together. A reading will be shown, when this is stable press the F push button.

The display will now indicate SCLE followed by the old value. Use the ▲ or v button to obtain the required offset.

Press the F push button. The display will show OFSt End followed by FUNC End indicating that the offset calibration is complete. The display now returns to normal measuring mode.

Trouble Shooting

The following section details some common setup problems encountered by instrumentation meters of the RM6 type. See "Setting Up the RM6-IV" section for details on entering the function mode if you need to check settings.

1. Display not illuminated - check power supply connections.

2. Display shows "‑ or ‑" indicates that the number is to big to display i.e. input is too high to display given the configuration figures. Check input from sensor and configuration setup (software and link settings) also check calibration.

3. Row of flashing "----" on display indicates input over range. Check input from sensor. If necessary a current or voltage transformer can be used with the instrument for over range inputs.

4. Display shows COP followed by FAIL this message indicates that an internal reset has been generated by the microprocessor. The message should be followed by the "switch on" display sequence and a return to normal measurement. Short term power failure or a spike on the power supply line are possible causes of the reset. Check the power supply to the instrument for drop out or spikes if the reset is occurring regularly enough to be a problem. Also check grounding and shielding of input leads.

5. Display runs through switch on sequence but gives no reading from input - check sensor connections. Check that sensor itself is giving appropriate output for range selected. Check that sensor is connected to appropriate input terminals.

6. Unexpected or erratic display values - check that the sensor is functioning correctly. Check that appropriate measuring mode, input range and display values have been set. Possibility of interference due to noise, check earthing, sensor shielding (if any) and digital filter setting.

Specifications

TECHNICAL SPECIFICATIONS

Input:	DC 4-20mA (-20 to 20mA), DC 0-0.1V (-0.1 to 0.1) 0-1V (-1 to 1V), 0-10V (-10 to 10V), or 0-100V (-100 to 100V)
Input impedance:	80Ω DC current range 1MΩ DC voltage ranges
Accuracy:	0.05% FS when calibrated
ADC resolution:	1 in 20,000
AD conversion:	Dual slope ADC
Sample rate:	4 per second
Memory retention:	Non volatile EEPROM memory
Microprocessor:	MC68HC05C8 CMOS
Ambient temp:	-10 to 60ºC
Humidity:	5 to 95% non condensing
Display types:	4 digit red 7.6mm digit height
Power supply:	AC 240V, 110V or 24V 50/60Hz DC (wide range) Isolated 9 to 55V DC (non isolated from input) 9 to 24V
Power usage:	AC supply less than 4VA DC supply 4W approx.
Transmitter supply:	DC output non isolated 20mA max. 24VDC on AC powered models +/-12V (24V) on DC powered models (may be less for DC models powered by less than 24V)

PHYSICAL CHARACTERIS

Case size:	44mm x 94mm x 141mm(including connectors)
Connections:	Plug in screw terminals (max 1.5mm diameter wire)
Weight:	400 gms unpacked

ORDERING CODE

240VAC powered:	RM6-IV-240-4E
110VAC powered:	RM6-IV-110-4E
24VAC powered:	RM6-IV-24-4E
DC powered:	RM6-IV-DC-4E
DC powered (non isolated):	RM6-IV-DCN-4E

13   Guarantee and Service

Products manufactured by Amalgamated Instrument Co Pty Ltd are 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, damaged due to excessive 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 Amalgamated Instrument Co Pty Ltd.

Products for attention under guarantee (unless otherwise agreed) **must be returned to the factory 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 must be given, and the mode of operation used when the product failed.

In any event Amalgamated Instrument Co Pty Ltd has no other obligation or liability beyond replacement or repair of this product.

A.I.C. may make such modifications 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.

If service other than under guarantee is required please contact Amalgamated Instrument Co Pty Ltd directly.