



*Proven Performance  
for Over 50 Years*

**MULTI-INPUT  
LINEAR FLOW COMPUTER**

**INSTALLATION AND MAINTENANCE MANUAL**

**MODEL NO. 4050**

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## 1.INTRODUCTION TO THE LINEAR MULTI-FLOW COMPUTER (COX) MODEL 4050

Designed to meet the ever-changing requirements of flow metering, the Multi-flow computer can be tailored to virtually any flow application. It is designed to accept up to 3 meters and correct for temperature changes and produce a usable output in whatever flow units you require. The 4050 is designed to work with manifold systems and switches relays that are adjustable at which point they trigger. This output (dry) can be used to change valve states and switch which meter measures the flow.

Each 4050 is programmed to your own individual requirements, software is written for each unit as and when required. Each 4050 comes standard with a frequency input card, an analogue input card, a relay card and a communication card. Other cards are optional, please call for additional options.

**Frequency Input Card** Up to three frequency inputs can be accepted from flow sensors; each input with a 32 point Linearization curve for the derivation of flow and a programmable factor for unit conversion. Programmable cut-off points enable displays of both frequency and flow to be inhibited below pre-set values. The update is programmable from 0.02 seconds up to virtual infinity. (Standard)

**Analogue Input Card 16 bit Resolution** Up to six analogue process inputs 0-10V or 4 to 20mA, are available for use with sensors of temperature; flow; density; viscosity; pressures - absolute, barometric, gauge or differential, and other factors requiring compensation. Each input has a five point Linearization curve. For conversion to alternative mass units a programmable mass factor can be used.

**Analogue Output Card 16 bit Resolution** Up to three analogue outputs 0-10V or 4 to 20mA, proportional to any desired parameter, are available for connection to remote facilities such as alarms, indicators, chart recorders, PLCs and the like. The analogue output reference parameter may be configured by the user.

**Pulse Outputs** Three TTL or open collector outputs are available for retransmission of rate, or for output of pulses per unit volume of total. These outputs, too, may be connected to remote indicators, totalizers or PLCs.

**Relay Card** The Multi-flow can accommodate up to three volt-free relays which can be deployed for alarm purposes. If the process includes a batching unit or controller, the relays can be used to control valves solenoids or pump starters

**Communications** To monitor parameters or program calibration data RS232, RS485 and interfaces can be incorporated. For connection to panel or desk mounted printers either a serial or parallel port can be incorporated, with the option of time and date indication.

**The Main Display** The standard display is alphanumeric with red dot matrix characters, 152mm wide and 18mm high, which give an exceptionally wide viewing angle. The display itself comprises three fields: on the left, a maximum of five characters may be used to give the parameter identity; in the centre is the read-out of the quantity being measured; and to the right are the characters defining the units of measurement. These can be changed by the end user. User test routines, and buzzer.

**Data Entry** All calibration data are entered by means of a hand-held infra-red keypad following a successful pass-code entry.

To prevent incorrect data entry, when two Multiflow units are positioned in close proximity, the reception of the unit that is not being addressed can be inhibited by a sequence of keystrokes on the front panel keyboard of that unit.

## 2.SPECIFICATIONS

**Frequency:** 32 point Linearization curve of frequency/viscosity versus counts per units measured (gallons, litres; etc) by interpolation between points and, by extrapolation, from the first and last two points of the curve. An engineering factor is included for the conversion of units.

**Frequency range:**

The default range is 0.5hertz to 65kHz with accuracy +/- 0.002Hz +/- least significant digit. A low cut off can be programmed by the end user, which will allow the computer to measure frequency down to 0.01 of a Hz.

**Signal conditioning:**

By Special request the COX 4050 can take signals from contact closure (reed switch): sine wave; low level input to base of PNP transistor and two wire modulated current frequency inputs. The default is a standard TTL type signal input or voltage pulse.

**Sensor Excitation Voltage**

An adjustable 1.5 to 24-volt dc output. Default is 12volts. Can be adjusted by the end user, it does involve adjusting a potentiometer.

Please call the factory for details. (215) 639-0900 ext. 316

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**Analogue Inputs:** 5 point Linearization, can be either 4 - 20mA or 0 - 10V dc.

**Resolution:** 16 bit

**Accuracy:** +/- 0.001% of full scale

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**Analogue Outputs:** Either 4 - 20mA or 0 - 10V dc.

**Resolution:** 16 bit

**Accuracy:** +/- 0.001% of full scale +/- least significant digit.

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**Pulse Outputs:** TTL or Open Collector outputs with a range of 1 hertz to 1 kHz

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**Relays:** Rating: 0.25A at 240Vac 9( Dry relay) .

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**Power supply:** A mains input or dc input can be used to supply the COX. The 110/240Vac is selectable on a switch inside the Flow computer..

220 to 240Vac 50-60Hz will draw approx    mA            (this depends on options fitted)

110 to 120Vac 50 -60Hz will draw approx    mA            (this depends on options fitted)

12V dc will draw approx            mA            (this depends on options fitted)

24V dc will draw approx            mA            (this depends on options fitted)

**CAUTION**

*Users are advised that although the equipment has protection and conforms to CE approvals, for trouble free operation the Multiflow system should be connected to a clean power supply; i.e. free of noise and not in the same phase as heavy machinery.*

*Any machinery using heavy contacts in the immediate proximity of Multiflow should be suitably suppressed. Inductive loads switched by the volt-free relay contacts should be fitted with suitable snubber networks.*



### 3. PROGRAMMING THE COX 4050

#### Entering The Programming Mode

Press the right arrow key until Secondary is displayed. Press the alter key and 'CODE \*\*\*\*' will be displayed. A four-digit code can now be entered (serial number). On each press of a key the '\*\*' will change to '+' in sequence from left to right. When all four '\*\*' have been set the code is automatically checked. If the display shows 'WRONG CODE' then try again making sure that you are entering the correct code, as each instrument has a different code setting. If a mistake is made during setting, then use the CLEAR key and try again.

If you are sure that the code is correct and the instrument still shows WRONG CODE then it is probable that the batteries need changing in the hand held remote control.

If you press the ALTER key by mistake the display will revert to normal after approx. 20 seconds. Pressing the ← → keys will have the same effect. Pressing any other key will reset the timer allowing sufficient time to enter each digit of code.

Exit program mode by pressing clear.

#### The Code Number

The code number for each instrument is taken from the last 4 digits of the serial number. The serial number can be found on the front page of this manual, on the rear of the instrument, and is also displayed when the instrument is first powered up, and finally by entering the Front panel Test routine.

For complete security it is recommended that the remote controller should be kept in a safe and secure place.

#### Unable To Enter A Code?

##### 1) Enabling and disabling the Infrared hand held keypad.

The infra-red keypad will work with any COX unit and therefore it may be necessary to disable this function on one unit where they are in close proximity. To LOCK OUT the infrared keyboard you must enter the Front Panel Test Routine and select N for the ENABLE IR control. Once locked out, the infrared keypad is totally inactive on that particular unit and the lock LED will be lit in the lower square panel. With the REMOTE OFF the displays may still be viewed by means of the front panel keys. To restore operation of the infra-red keyboard use the Front Panel Test Routine and select Y to the ENABLE IR menu.

##### 2) Automatic LOCK OUT

In some cases the instrument itself will inhibit the ALTER key as it may be performing a sequence of events that can not be interrupted, i.e. BATCHING. Please see the special instructions if applicable.

#### Unable To Use The Keys Or Key Bounce

If you are experiencing **key bounce** or you are **unable to use the keys** then there is probably interference with the infra-red remote control. Problems may occur when trying to operate the unit in **direct sunlight**; or using sodium lights etc. If there are problems then please contact your supplier.

## 4. PROGRAMMING THE IDENTIS AND UNIT LABELS (L/M, PPH, ETC)

- 1) When in any mode, select the display to be altered using the  $\uparrow\downarrow$  keys. Note if you are a curve menu you change the units only, this will change all points in that curve.
- 2) Press the **SHIFT** key followed by the **EXP/UNIT** key and the cursor will begin to flash at the far right hand side of the display.
- 3) Use the  $\uparrow\downarrow$  keys to select the required character for that position and the  $\leftarrow\rightarrow$  keys to alter the position of the cursor. Using these key, the units on the right hand side may be altered.
- 4) To move the cursor to the left hand side of the display press the **ALTER** key and the cursor will move across.
- 5) Use the  $\uparrow\downarrow$  keys to select the required character for that position and the  $\leftarrow\rightarrow$  keys to alter the position of the cursor. Using these keys the display designation may be altered.
- 6) Once the desired characters have been programmed then pressing the **ENTER** key will store them in that display.
- 7) Use the  $\uparrow\downarrow$  keys to select another display to be altered and repeat the above stages.

**IMPORTANT NOTE:** Where a maximum number of digits are to be displayed e.g. on total, it is advised that the display designation is limited to four or fewer characters, otherwise the displays will overlap causing apparent corruption. If this should occur then the number of characters for the display designation should be reduced, after which the display will return to normal.

In some cases the unit may prevent changes to the display. This is because the instrument needs to have these displays fixed to run correctly. See any special instructions supplied.

## 5. FREQUENCY INPUT CARD (EDIT CURVES) K FACTORS VS. F/V

This section describes how to program the Flow Curve, which the machine uses to compute the flow rate, by using The K factor (counts per unit measured) and frequency /viscosity.

- 1) Display shows **'EDIT CURVE 1' or 2 or 3.**
- 2) Press ALTER to display the first point of calibration. Then use the  $\uparrow\downarrow$  keys to select the required calibration point to be entered or altered. The left hand display will always show the curve and point number i.e.  $C^{101}$ , the right hand display will show the units, i.e. Hz, Hzv, L/M etc. This label can be changed by pressing the SHIFT then UNIT key.
- 3) To enter/alter data either press the CLEAR key or enter a numeric value. The machine reads from the lowest to highest K factor and frequency/viscosity, so they should be programmed lowest (first) to highest (last). The display will show SET on the left indicating that data is being entered. To obtain +/- values press the SHIFT key followed by the +/- key. To obtain EXP values enter the numeric value followed by the EXP key and the exponential value. Press the CLEAR key to delete incorrect data entry.
- 4) Having entered the correct value, press the ENTER key and the entered data with the channel and point number will be displayed
- 5) Use the  $\uparrow\downarrow$  key to select the next point of calibration or press the ENTER key to exit this mode and return to the list of program options.

### CHn Setup

To set up a frequency channel the following will apply, however some items are optional and may not appear in your specific application.

Display shows CHn SETUP, pressing alter and using the  $\uparrow\downarrow$  will show options. Use ALTER to change the values.

FRQ CUT OFF	When below this value of Frequency then FRQ = 0.0
VOL CUT OFF	When below this value of volume flow then Vol Flow = 0.0
MASS CUT OFF	When below this value of mass flow then Mass Flow = 0.0
TIME BASE	Used to calculate flow rate in Kfactors or Total in flow 1, 60 or 3600 based on time
UP DATE TIME	0.02 sec to 9999 secs for update control
FRQ CONSTANT	Default $2.0^{-7}$ used to adjust the internal crystal frequency.
VOL FACTOR	Multiplier Volume flow rate by this factor (for special applications)
MASS FACTOR	Multiplier Mass flow rate by this factor (for changing to pounds 8.32778)
ALPHA	Alpha factor used for Stro and Ros calculation.
CAL_TEMP	Calibration temperature of sensor used for Stro and Ros.

### Sort Curve

Through out the system each curve can be sorted or left as entered. **Each curve works from lowest entry to highest entry**, if entered this way then the sort routine does not need to be used. If you add a point that is not the highest then use the sort curve function.

### Reset Totals

This option allows the user to clear totals, please note that there maybe more than one total, i.e. Volume and Mass totals, each needs to be cleared! Use the ALTER key when on a RESET VOL 0=Y option to scan for the next total.

**BLANK TABLE INTO WHICH DATA MAY BE WRITTEN FOR REFERENCE.**

**K Factor and F/V Data Edit Curve**

Meter #1 (Typically Low Flow)				Meter #2 (Mid Flow)			
	K Factors	exp	F/V		K Factors	exp	F/V
01				01			
02				02			
03				03			
04				04			
05				05			
06				06			
07				07			
08				08			
09				09			
10				10			
11				11			
12				12			
13				13			
14				14			
15				15			
16				16			
17				17			
18				18			
19				19			
20				20			
21				21			
22				22			
23				23			
24				24			
25				25			
26				26			
27				27			
28				28			
29				29			
30				30			
31				31			
32				32			

**BLANK TABLE INTO WHICH DATA MAY BE WRITTEN FOR REF.****K factor and F/V Data Edit Curve****Meter (High Flow) #3**

	K Factors	exp	F/V		K Factors	exp	F/V
01				17			
02				18			
03				19			
04				20			
05				21			
06				22			
07				23			
08				24			
09				25			
10				26			
11				27			
12				28			
13				29			
14				30			
15				31			
16				32			

**6. ANALOGUE INPUT CARD EDIT CURVES****Set Viscosity/ Set S.G.**

This section describes how to program Specific Gravity and Viscosity for an individual chemical and its characteristics.

- 1) Display shows 'Temperature'/ 'Viscosity' or 'S.G. 'set' or another option
- 2) Press ALTER to display the first point of calibration. Then use the  $\uparrow\downarrow$  keys to select the required calibration point to be entered or altered. The left hand display will always show the curve and point number i.e. C<sup>101</sup>, the right hand display will show the units, i.e. °C, CTS, S.G. etc. This label can be changed by pressing the SHIFT then UNIT key.
- 3) To enter/alter data either press the CLEAR key or enter a numeric value. The display will show SET on the left indicating that data is being entered. To obtain +/- values press the SHIFT key followed by the +/- key. To obtain EXP values enter the numeric value followed by the EXP key and the exponential value. Press the CLEAR key to delete incorrect data entry.
- 4) Having entered the correct value, press the ENTER key and the entered data with the channel and point number will be displayed
- 5) Use the  $\uparrow\downarrow$  key to select the next point of calibration or press the ENTER key to exit this mode and return to the list of program options.

**Sort Curve And Vis Temp Etc.**

Through out the system each curve can be sorted or left as entered. **Each curve works from lowest entry to highest entry**, if entered this way then the sort routine does not need to be used. If you add a point that is not the highest then use the sort curve function.

**BLANK TABLE INTO WHICH DATA MAY BE WRITTEN FOR REFERENCE.**

**Set Viscosity**

**Set Specific Gravity**

	Temperature	Viscosity	Temperature	S.G.
01				
02				
03				
04				
05				
06				
07				
08				
09				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				
32				

**7. FRONT PANEL TEST MODE**

By pressing the ←→ at the same time the front panel set up and test mode are entered.  
The display will show the following options by pressing the ↑↓.

- |               |   |  |
|---------------|---|--|
| ENABLE IR     | Y | User alter to enable Y and disable N the IR keyboard       |
| KEY CLICK     | N | User alter to select Y and disable N the audible key click |
| TEST REMOTE   | ↑ | Test the IR keyboard                                       |
| MAN 1234      |   | Serial number of unit                                      |
| ALTER TO EXIT |   | Press ALTER to exit this mode                              |

## 8. RS232 / RS485

### Command Structure.

Viewing data from the Multiflow;

All data is sent and received as ASCII HEX pairs, the maths used in PIC Hex format, 2 example routines are included to convert this data into PC or ASCII strings. The PIC Hex format is always 4 bytes and represents a 32-bit floating-point number system. To read data use the following format.

Description	ID	View	Hub/Slot	Reg/Mem	Slot	Address	No.Bytes	CR
String	a	V	H	R		00A0	04	CR
Hex	61	56	48	52		00A0	04	0D
ASCII Hex	36 31	35 36	34 38	35 32		30 30 41 30	30 34	0D

Notes: Reg/Memory allows the user to view live data within the Processors own working registers or the Flash memory address space that is used to store constant and curve data. The Hub is the main processor (the card connected to the serial link), whilst the SLOTS need to be addressed as follows.

Description	ID	View	Hub/Slot	Reg/Mem	Slot	Address	No.Bytes	CR
String	a	V	S	M	04	0600	04	CR
Hex	61	56	49	4D	04	0600	04	0D
ASCII Hex	36 31	35 36	34 39	34 44	30 34	30 36 30 30	30 34	0D

SLOT ID	Hex	Ascii Hex	Position
4	04	30 34	1A
5	05	30 35	1B
6	06	30 36	1C
7	08	30 38	2A
8	09	30 39	2B
9	0A	30 41	2C
10	0C	30 43	3A
11	0D	30 44	3B
12	0E	30 45	3C
13	10	31 30	4A
14	11	31 31	4B
15	12	31 32	4C
16	14	31 34	5A
17	15	31 35	5B
18	16	31 36	5C

### **General Address.**

To obtain the list address for your instrument please send email to [ed-s@s-k.com](mailto:ed-s@s-k.com) to request a complete list, also included are the conversion routines of the PicHex to standard PC/Ascii data.  
Char output FAST MEDIUM or SLOW

### **Computer interface information**

#### **Port Settings.**

The display shows menu 'SETUP COMMS', press ALTER to select the possible sub menus

BAUD	19200	Baud rate change using ALTER to 9600, 1200 or 19200
READ	ONLY	At present the system is set to read only
ID	a	Use ALTER to scan Ids a to z lower case only
RS485	FAST	Delay for bus transceiver FAST MEDIUM or SLOW
COMMS	FAST	Delay between Char output FAST MEDIUM or SLOW

## 4050 Multi-Input Linear Flow Computer

### PIN SETTINGS.

	RS232	RS485
9 way D,	Pin 2 RX	B
	Pin 3 TX	A
	Pin5 0v	0v

#### Code Examples:

```
Cal_dec(returned decimal value, asciihex string from input buffer 8 bytes, number of decimal places, returned ascii string)
cal_dec(a, Left$(rx_buff, 8), 3, b)
Label27.Caption = b

Sub cal_dec(dec, result, dp_pos, result_str)
    dec = 0
    eb = Left$(result, 2)
    If eb = "00" Then GoTo the_res_is_zero
    sethex = Right$(result, 6)
    e = Val("&h" + eb) - 127
    bin_data = ""

    For p = 1 To 6
        Select Case UCase(Mid$(sethex, p, 1))
            Case "0" nibble = "0000"
            Case "1" nibble = "0001"
            Case "2" nibble = "0010"
            Case "3" nibble = "0011"
            Case "4" nibble = "0100"
            Case "5" nibble = "0101"
            Case "6" nibble = "0110"
            Case "7" nibble = "0111"
            Case "8" nibble = "1000"
            Case "9" nibble = "1001"
            Case "A" nibble = "1010"
            Case "B" nibble = "1011"
            Case "C" nibble = "1100"
            Case "D" nibble = "1101"
            Case "E" nibble = "1110"
            Case "F" nibble = "1111"
        End Select
        bin_data = bin_data + nibble
    Next p
    If Left$(bin_data, 1) = "1" Then
        sign = "-"
    Else
        sign = ""
    End If
    dec = 1
    For p = 2 To Len(bin_data)
        Bit = Mid$(bin_data, p, 1)
        If Bit = "1" Then dec = dec + 2 ^ -(p - 1)
    Next
    dec = (2 ^ e) * dec
    wiv_sign = sign + Str(dec)
    dec = Val(wiv_sign)
the_res_is_zero:
    Select Case Val(dp_pos)
        Case 1
            result_str = Format(dec, "0.0")
        Case 2
            result_str = Format(dec, "0.00")
        Case 3
            result_str = Format(dec, "0.000")
        Case 4
            result_str = Format(dec, "0.0000")
        Case 5
            result_str = Format(dec, "0.00000")
        Case 6
            result_str = Format(dec, "0.000000")
        Case 7
            result_str = Format(dec, "0.0000000")
        Case 8
            result_str = Format(dec, "0.00000000")
        Case 9
            result_str = Format(dec, "0.000000000")
        Case Else
            result_str = Format(dec, "0")
    End Select
End Sub
```

## 9. SPECIAL OPTIONS

(Under Secondary)

### Setting RTC

Setting the real time clock. When either the time or the date is viewed pressing ALTER will enable the user to set the time/date.

### Manifold ON/OFF

When this display is showing, pressing ALTER on the IR keyboard will toggle this selection, ON or OFF. When off a manual option is enabled. This option allows the user to set the machine up for multiple meters and a relay state change at a particular set points.

### Manifold Autoranging Trip Points (Section 12)

Used for switching valves etc. These values are set for at what point relays open or close (usually used to control valves).

Under the menu system the display will show SETUP AUTO pressing alter will display the following. Access by using the  $\uparrow\downarrow$ .

$1\uparrow 2$	0.0 Hz	This shows the trip point in Hertz from meter 1 (Chan 1 low flow) to 2
$2\uparrow 3$	0.0 Hz	This shows the trip point in Hertz from meter 2 (Chan 2. medium flow) to 3
$3\downarrow 2$	0.0 Hz	This shows the trip point in Hertz from meter 3 (Chan 3. high flow) to 2
$2\downarrow 1$	0.0 Hz	This shows the trip point in Hertz from meter 2 (Chan 2. medium flow) to 1

These values should not be set above or below the next meters calibration figures, leave some space for the meter to switch over. An example is if meter 1 is set & calibrated for 20(1gpm) to 1100 hz(100gpm) and meter 2 at 100(85gpm) to 1000hz(500gpm) set trip point 1 to 2 at about 1000hz(saying 1000Hz= 92gpm) and set 2 to 1 trip point at about 110hz (saying 110Hz= 90gpm) .This allows room for some variance and avoids 4050 being in a switching loop.

The user should take care to enter a reasonable hysteresis. Refer to **section 12** for the relay truth table.

### Channel “ # ”

This display shows the current channel number running, however if the MANIFOLD OFF option is running then pressing the ALTER key will change the channel number, (relay and analogue output)

### VOL ON / MASS ON

Pressing ALTER (IR Keyboard) will select the VOLume or The MASS to be running. The effect is:

1. Each time the AUTO MANIFOLD changes the display will change to the new channel and display either the VOLume or the MASS flow rate.
2. If fitted the analogue output will represent Volume or Mass flow rate.

## 10. PROGRAMMING HELPER

**Primary**  
(Basic settings)

**Secondary**

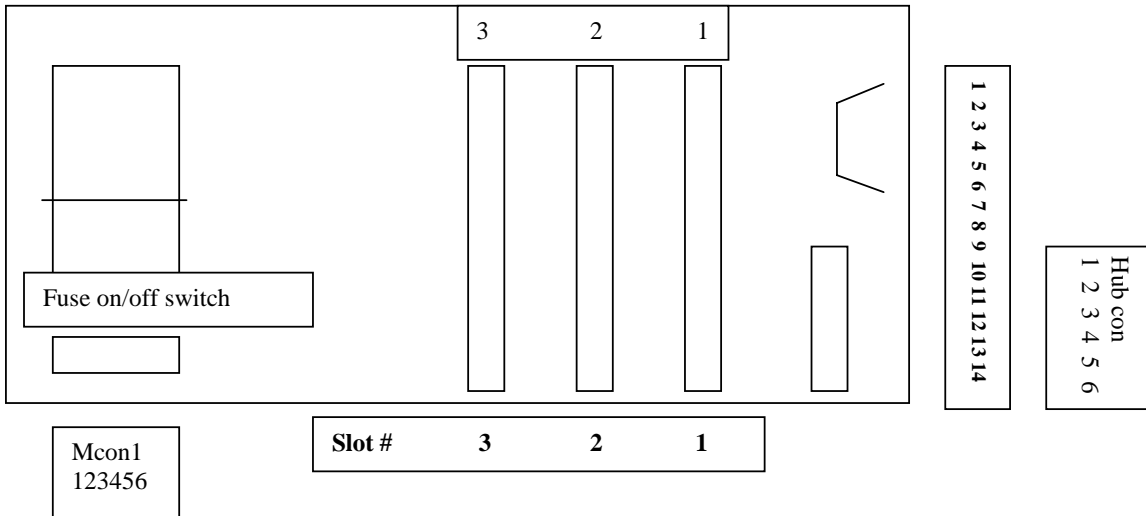
**Program Mode**  
Enter by pressing ALT &  
Serial #

<u>Computed Data</u>	<u>Raw Data</u>	<u>Settings</u>
Viscosity	Frequency 1, 2 & 3	Set-up Auto (Hz Trip points)
Specific Gravity	Roshkoe	Cards Fitted (what cards are installed)
Volume Rate 1, 2 & 3	Strouhal	Set-up Comms (Port settings)
Mass 1, 2 & 3	K factor 1, 2 & 3	Edit Curve (K Factor Programming)
Total Volume	A1 Temperature = ma	Channel set-up 1, 2, 3
Temperature	Date	Clear Totals
	Manifold(on/off)	Sort Curve
	Volume(on/ off)	Set Viscosity (programming fluid data)
		Set specific Gravity (programming fluid data)
		Set Temperature (setting C or F by ranging ma output)
		Set-up Inputs (system changes not recommended)
		Sort Vis/Sg/Temp

### 11. WIRING DIAGRAM TERMINALS

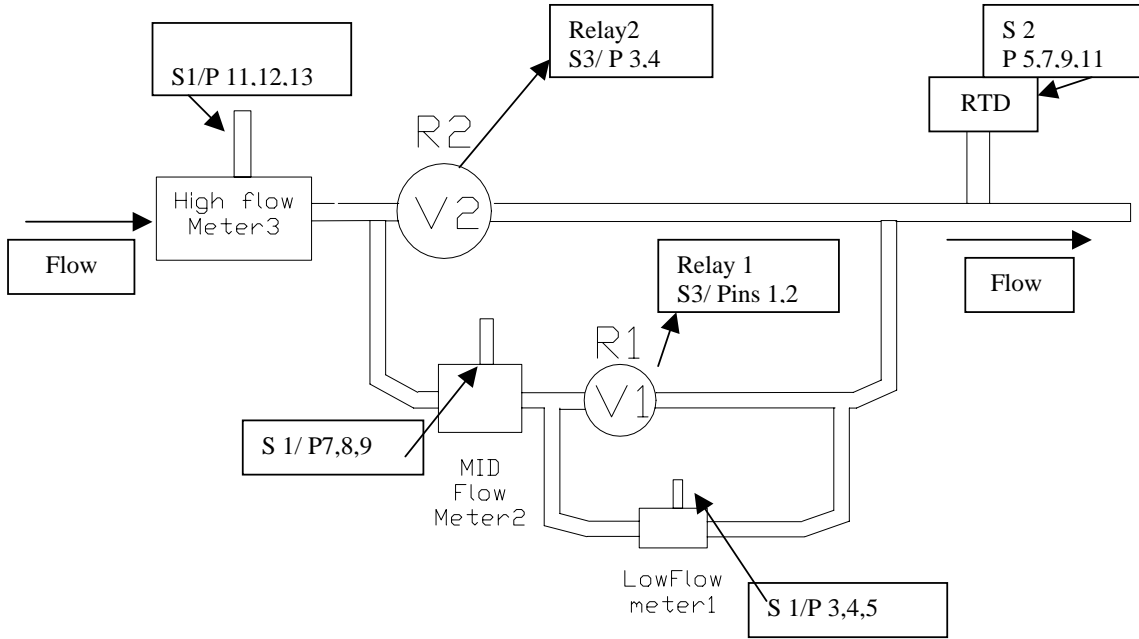
**JUMPER FOR TEMP. COMPENSATION**

	<b>3</b>	<b>2</b>	<b>1</b>		
<b>TB</b>	<b>RELAYS SLOT</b>	<b>ANALOGUE IN SLOT</b>	<b>FREQUENCY SLOT</b>		
1	NO RELAY 1	+SIG 1 V OR I	SPECIAL IP		1
2	COMMON	0v	SPECIAL IP		2
3	NO RELAY 2	+SIG 2 V OR I	EX. VOLTAGE Meter input Vdc		3
4	COMMON	0v	+ SIGNAL 1		4
5	NO RELAY 3	+RTD PROBE	- SIGNAL 1 or 0v		5
6	COMMON	0v	0v		6
7		+RTD PROBE	EX. VOLTAGE Meter input Vdc		7
8		0v	+ SIGNAL 2		8
9		-RTD	- SIGNAL 2 or 0v		9
10		0v	0v		10
11		-RTD	EX. VOLTAGE Meter input Vdc		11
12		0v	+ SIGNAL 3		12
13		+12v Output	- SIGNAL 3 or 0v		13
14		0v	0v		14



Mcon1	1	+24vDC input from 100mA to 200mA (depends on cards fitted)
	2	0v
	3	0v
	4	+24vDC output repeated from input 1 or when on Main supply
	5	Optional relay C
	6	Optional relay NO
Mains input 80 to 265 ac auto. Fuse 1.0 amp.		
HubCon		
	1	Fused 5vDC
	2	Open Collector Output
	3	SW1 input
	4	SW2 input
	5	SW3 input
	6	0v

## 12. MANIFOLD SYSTEM INSTALLATION EXAMPLE



(S) Slot –(V) Valve (R ) Relay (P) Pins

### Truth Table for Relays

Relays are dry outputs with open (o) or closed (c) states, which can be used to switch valves etc.

<u>CONDITION</u>	<u>RELAY 1</u>	<u>RELAY 2</u>	<u>RELAY 3</u>
No power to unit	O	O	O
Power On No Flow	C	C	O
Low Flow	C	C	O
1 to 2 trip point (Flow at 2)	O	C	O
2 to 3 trip point (Flow at 3)	O	O	O
3 to 2 trip point	O	C	O
2 to 1 trip point	C	C	O