LMM Designs

MULTI-FLOW

Serial No.DM3002

India Recipe Systems

Index

Introduction to the Linear Multi-Flow Meter (LMM) Mark 2.0

Designed to meet the ever changing requirements of flow metering, the Multiflow can be tailored to virtually any flow application; from the most basic of rate and total indicators to a batcher or full control system, with computer and printer interface. The system will operate with most peripherals i.e. Flow sensors, Pressure, Temperature Etc.

Each LMM is hand built to your own individual requirements, by selection from the options listed below. Special software is written for each unit as and when required. Each function now has a stand alone card, up to 5 cards can be added to your system.

Frequency Input Card Up to three frequency inputs can be accepted from flow sensors; each input with a 32 point linearisation 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.

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 linearisation 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 Ouputs Three TTL or open collecter 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, totalisers or PLCs.

Relay Card The Multi-flow can accommodate up to seven 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 programme 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.

SPECIFICATION

Frequency: 32 point linearization curve of frequency versus flow rate; 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 LMM to measure frequency down to 0.01 of a Hz. The crystal oscilator can be programmed to offset and errors by calibration.

Signal conditioning:
On request the LMM 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 5 to 24V dc output; 100mA each; available only when used on the mains ac supply. This can be set by the end user See section Titled HardWare.

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

Resolution: 16 bit
Accuracy: +/- 0.001% of full scale

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

Resolution: 16 bit
Accuracy: +/- 0.001% of full scale +/- least significant digit.

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.

Power supply: A mains input or dc input can be used to supply the LMM. The PSU input id 90vac to 265vac.

220 to 240Vac 50-60Hz will draw approx 18 mA (this depends on options fitted)
110 to 120Vac 50 -60Hz will draw approx 36 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; ie 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.

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 keyclick
TEST REMOTE	↑	Test the IR keyboard
MAN 1234		Serial number of unit
ALTER TO EXIT		Press ALTER to exit this mode

It should be noted that the exact order of each display will vary in the way that the cards are plugged in.

Working Displays (when LMM is powered on)

When the unit is powered up the serial number is displayed for approximately 5 seconds then the first display line is shown.

Use the up (↑)key⬆ or the down (↓)⬇ key to scroll through the resultant displays see table below. The same keys on the hand held remote control will perform the same function.

STANDARD Ident	Display result	units	Description of resultant displays
SOL[0]	0.00	LTRS	Solvent batcher [0] will indicate the current solvent number as [1] to [6]
WAT[0]	0.00	LTRS	Water batcher [0] will indicate [1] when running

The left direction key (←) ⬅ or the right (→) ➡ can be used to toggle between the STANDARD DISPLAYS (see table above) and the RAW DISPLAYS (see table below). A message is momentarily displayed indicating which section is selected. Use the ↑↓ direction keys to select a display.

RAW ident	Display result	units	Description of resultant displays
date	dd/mm/yyyy		Date
time	Hh:mm:ss		Time
TANK[1]	0		Setting of recipe for the tank 0 = inactive 1-25 to activate the tank
TANK[2]	0		Setting of recipe for the tank 0 = inactive 1-25 to activate the tank
TANK[3]	0		Setting of recipe for the tank 0 = inactive 1-25 to activate the tank
TANK[4]	0		Setting of recipe for the tank 0 = inactive 1-25 to activate the tank
TANK[5]	0		Setting of recipe for the tank 0 = inactive 1-25 to activate the tank
TANK[6]	0		Setting of recipe for the tank 0 = inactive 1-25 to activate the tank
TANK[7]	0		Setting of recipe for the tank 0 = inactive 1-25 to activate the tank
TANK[8]	0		Setting of recipe for the tank 0 = inactive 1-25 to activate the tank
TANK[9]	0		Setting of recipe for the tank 0 = inactive 1-25 to activate the tank
TANK[10]	0		Setting of recipe for the tank 0 = inactive 1-25 to activate the tank
TANK[11]	0		Setting of recipe for the tank 0 = inactive 1-25 to activate the tank
TANK[12]	0		Setting of recipe for the tank 0 = inactive 1-25 to activate the tank
MAN	0		Recipe for manual fill setting this to > 0 will enable START on Front
L	-- --- ----- - -	Hz	Indicates the tank levels as filled or low level there are 12 bars from left to right as 1 to 12: example shows tank 3 and tank 7 are empty
RPB	0.00	LTR	Check display that hub has correct batch to send to batch card
F[1]	n.nnn	Hz	Frequency from solvent meter (Hz)
RT[1]	n.nn	L/M	solvent flow rate
PB	n.nnn	Hz	Current value of the preset batch for the solvent
F[2]	n.nnn	Hz	Frequency from water meter (Hz)
RT[2]	n.nn	L/M	Water flow rate
PB	n.nnn	Hz	Current value of the preset batch for the water
relay	1234567		diagnostic function

Flow fail indication as follows:

SOLF 0.00 LTRS indicates the solvent has stopped due to a flow fail the char F.

Use RESET to clear this situation.

To Change idents and units see section titled **DISPLAY IDENTS AND UNITS**

PROGRAMMING THE IDENTS AND UNIT LABELS

1) When in all mode, select the display to be altered using the ↑↓ 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 ↑↓ keys to select the required character for that position and the ←→ 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 ↑↓ keys to select the required character for that position and the ←→ 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 ↑↓ 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.

PROGRAMMING THE LMM

ENTERING THE PROGRAMMING MODE.

Press the SHIFT key on the infra-red controller, followed by the CODE Key. '**CODE ******' will be displayed. A four digit code can now be entered. 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.

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 Infra-red hand held keypad.

The infra-red keypad will work with any LMM 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 infra-red 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.

CARDS FITTED

This option is for information only, pressing ALTER will display the first card slot (1 to 5) of the fitted cards. As you use the ↑↓ each slot is displayed as N(1 to 5)A,B or C the status (empty or type of card fitted) is displayed.

Example of cards fitted.

1A	Manifold Hz	Indicating the first slot has a Frequency Card set up for Manifold Operation in Hz
1B	Empty	Indicating no further options in this slot
1C	Empty	
2A	Ana-Output	Slot 2 has an Analogue output card fitted
2B	Empty	
2C	Empty	
3A	Empty	
3B	Empty	
3C	Empty	
4A	Empty	
4B	Empty	
4C	Empty	
5A	Empty	
5B	Empty	
5C	Empty	

Each card and alpha identifier will depend on the card and its function. The user can use this information to check the integrity of the cards fitted, its operation and the fact that it is communication with the main hub.

BATCHER SETUP

This section describes how to program any of the potential batch setup values in the system.

CH[1] SETUP for solvent batching and CH[2] SETUP for water batch

To set up a batch channel the following will apply.

Display shows CHn SETUP, pressing alter and using the ↑↓ will show options. Use ALTER to change the values.

UP DATE TIME		0.02 sec to 9999 secs for update control
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
VOL FACTOR		Multiplier frequency x Kfactor = flow rate in units desired
TIME BASE		Used to calculate flow rate in Kfactors or Total in flow 1, 60 or 3600
DP 3		Decimal point position for flow rate and batch display
PRE-BATCH		POST BATCH, BATCH RUN (action of second relay)
KEYS ON		REAR ON, BOTH ON (start / stop / reset from front and rear)
FRQ CONSTANT		Default 2.0^{-7} used to adjust the internal crystal frequency.
BATCH OVERRUN		Batch over run value
PRE BATCH		Pre / Post batch valve
FLOW FAIL		Timer in seconds for flow fail if no pulses after start

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.

RECIPE SETTING

After having gained access to the MENU the user will see the headings R 1 to R 25 by pressing the up and down/keys; these are the recipes; press ALTER to change the settings as follows:

P[01] 1.00 LTR solvent Product 1 quantity
P[02] 2.00 LTR solvent Product 2 quantity
P[03] 3.00 LTR solvent Product 3 quantity
P[04] 4.00 LTR solvent Product 4 quantity
P[05] 5.00 LTR solvent Product 5 quantity
P[06] 6.00 LTR solvent Product 6 quantity
P[07] 6.00 LTR water Product 7 quantity

RECIPE	SOLVENT 1	SOLVENT 2	SOLVENT 3	SOLVENT 4	SOLVENT 5	SOLVENT 6	WATER
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							

SPECIAL OPTIONS

SETTING Real Time Clock.

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. When ALTER is pressed the cursor will flash at the Day you can enter the dd/mm/yyyy by pressing the numeric keypad. Pressing the ENTER key will load the RTC with this information. The same applies to the time.

RECIPE and BATCHING NOTES FOR DM3003.

OPERATOR NOTES:

Setting the tank recipe number to greater than 0 will enable the auto fill via the demand on the level switch inputs; this will be immediate if the tank is in demand.

To disable a tank simply set the tank recipe to 0.

To perform a manual dispense set the 'man' tank to the desired recipe and press START; you can do this until the require container is full. For safety the 'man' tank should be reset to 0 to prevent accidental dispenses.

STOP will halt the current batch operation (START will continue from this point)

RESET resets all operation to beginning; current batch is cleared, sequence to beginning.

FLOW FAIL

This function monitors updates and if no flow is detected when the system has open valves for an operator period of updates then the system will shut down.

The Fail message will appear in either the Solvent or the Water batch display to indicate a problem. The system will then be disabled until the RESET key pressed. This key should only be pressed when the problem has been rectified to prevent a further flow rate taking place.

Simple diagnostic's:

1. Tank is in demand but no flow is taking place.

   Check TANK is enabled with recipe and not 0.
   Check recipe has some data values.
   Check tank level display and physical level in tank.

2. Tank keeps filling even when above the float level

   Check tank level display.
   Check barrier status leds.
   Check PLC lights.
   Ensure level float is working.
   Keep tank disabled until problem is solved.

3. Nothing is being dispensed

   Check that air is on
   Check that unit is not in flow fail

SETTING THE RECIPES

To set the recipes follows the simple steps below;

1. Enter program mode (shift – code then enter serial number {3002}) using the remote control unit
2. Use the up/down keys on the remote control unit to select the recipe number R 1 to R 25

As an example we will preset recipe 3 with 2 litres for product 6 and 3 litres of water (product 7) and assumes that all the products are at zero to begin with. Please note the user should ensure that all products are correct before leaving the recipe!

3. The display should read R 3 then press ALTER
4. The display shows P^{31} 0.00 LTR this being $Recipe^{3}$ $Product^{1}$ the product line is physical line 1.
5. If this line contains a data value use CLEAR to zero it.
6. Use the UP to select the next product P^{32} 0.00 LTR and clear as required.
7. When you reach P^{36} 0.00 LTR then press CLEAR
8. Use 0 to 9 (.) CLEAR to create P^{36} 2.00 LTR
9. Press ENTER when the above display is correct.
10. Use UP the select the next product P^{37} 0.00 LTR and enter P^{37} 3.00 LTR
11. Press ENTER to confirm this entry and then ENTER again to return to R 3 display.

Use the above procedure to enter or alter up to 25 recipes.

ENABLING OR DISABLING TANKS FOR AUTO CONTROL

To enable or disable a TANK follow the procedure below;

1. Use the LEFT or RIGHT arrow key to display the secondary menu list. The display will flash for 1 second with “Seconday” to indicate you are on the correct list.
2. Use the UP or DOWN keys to navigate through this list to the desired tanks as displayed in the format.

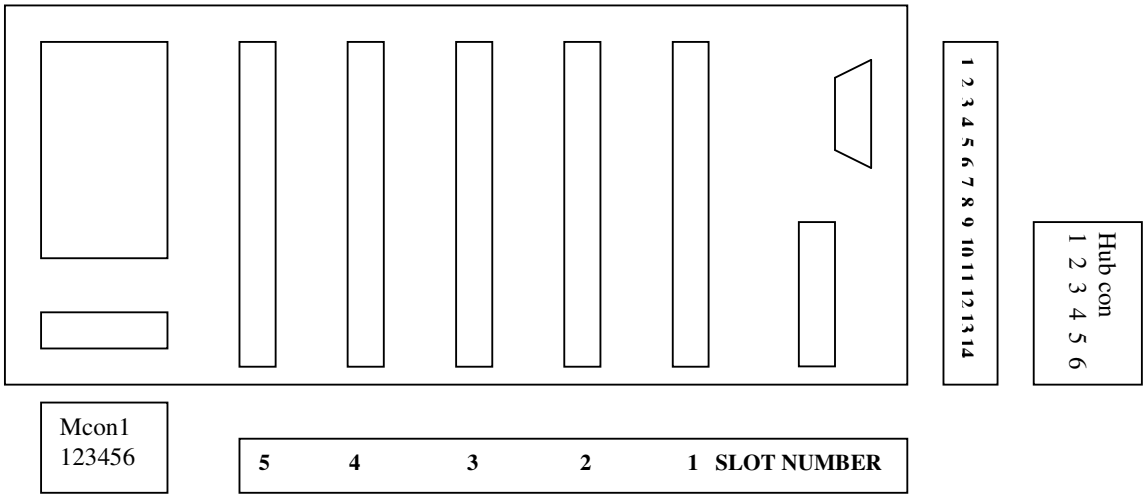
$TANK^{3}$ 21.	indicates Tank 3 is active with recipe number 21
$TANK^{4}$ 0.	indicates Tank 4 is in-active.

3. To turn on Tank 4 press and hold ALTER until the 0. starts to flash.
4. Use the UP/DOWN keys to change the digit from 0. to 1 through 9.
5. To increase the number for example tank 10 press the LEFT key to show 00. with the left hand 0 flashing.
6. Repeat the procedure using the UP/DOWN to adjust the digit(s) to read 10.
7. To enable this tank 4 with recipe 10 press STOP. The tank is now active.

3. To disable tank 3 repeat the above procedure but ensure the data reads 00.
4. Press STOP will disable Tank 3.

TERMINALS for SN DM3002

TB	SOLVENT	SPB	SW	RELAYS
	SLOT 1	SLOT 2	SLOT 3	
1	EX. VOLTAGE	EX. VOLTAGE	PLC INPUTS	PLC OUTS
2	+ SIGNAL 1	+ SIGNAL 1		
3	- SIGNAL 1 or 0v	- SIGNAL 1 or 0v		
4	0v	0v		
5	START	START		
6	STOP	STOP		
7	RESET	RESET		
8	EARTH GUARD	EARTH GUARD		
9	NC BATCH REL	NC BATCH REL		
10	C BATCH REL	C BATCH REL		
11	NO BATCH REL	NO BATCH REL		
12				
13				
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 end of solvent batch
4 SW2 end of water batch
5 SW3
6 0v