OPERATING MANUAL
OF
RM PLANT CONTROLLER
SMIT-1301L

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INDEX

CHAPTER 1

CHAPTER 2

CHAPTER 3

CHAPTER 4

CHAPTER 5

CHAPTER 1

1.1 INTRODUCTION

- This is an RM PLANT CONTROLLER. It is used for Concrete Manufacturing process.
- It is based on a popular 8-bit Microcontroller.
- The unit has:
  - 16 Char x 2 Line Alphanumeric LCD Display, large characters
  - The unit has 4 Discrete LEDs for Control Output status Indication.
- The system is designed to have Three Load cell Inputs, 5 Control Relay Outputs and 2 Digital Inputs.

1.2 SPECIFICATIONS

1	Power Supply	110-230V AC +/- 10% or Single Phase, 50 Hz Nominal 24VDC (factory configured)
2	Key board	12 keys Membrane keypad
3	LCD Display	16 x 2 Alphanumeric LCD Display Large character height : 9.66 mm
4	Digital Inputs	2
5	Relay Outputs	5
6	Analog Inputs	Up to 4 Channels Load cell
7	Serial Interface	(1) RS-232 For Printer (2) USB
8	Enclosure	General purpose, Panel Mount Made up of MS powder coated
9	Panel Mounting Dimensions	Cutout Size:138mm(W)*138mm(H) Outer:144mm(W)*144mmmm(H)*120 mm(D)

CHAPTER 2

2.1 SYSTEM DESCRIPTION

This is Microcontroller based unit with 3 load cell inputs, 5 relay outputs and large size alphanumeric LCD display. It is Panel mount unit supplied in an industry standard size.

2.2 HARDWARE DESCRIPTION

Construction of the instrument is Modular. It consists of:

- CPU CARD
- POWER SUPPLY CARD
- ANALOG INPUT CARD
- BACK PANEL
- FRONT PANEL (KB/DISPLAY)

2.2.1 CPU CARD

- It is based on microcontroller.
- The configuration data is stored in non-volatile RAM.
- Battery is not required for retention of data.
- Watch dog circuit is also incorporated on the CPU card to prevent malfunctioning of the system due to external noise thro' power supply or any other source. If the CPU starts malfunctioning, the watch dog circuit resets it and system will be brought to it's Power On status.
- The card is fitted on the backside of the front panel on four fixing screws with Nuts.

2.2.2 POWER SUPPLY CARD

- This is an SMPS.
- It accepts 110-230V AC as inputs
- It provides regulated DC voltages to the system.

2.2.3 ANALOG INPUT CARD

- This card accepts up to 4 Load cell Inputs.
- It provides excitation voltage to load cells
- It has on board amplifier circuits.
- 16-bits ADCs are used for each channel
- Card is connected with CPU card

2.2.4 BACK PANEL

This is a dummy plate. Terminal details are printed on the back panel. Refer appendix for terminal details. Most of the connectors are easily detachable. The unit is supplied with all the mating connectors.

2.2.5 ENCLOSURE

- The unit is supplied an MS powder coated enclosure.
- It is panel mounting type DIN standard enclosure.
- Outer dimensions are: 144 (H) x 144 (W) x 110 (D) mm.
- Panel cut-out required: 138mmx138 mm
- Side brackets are supplied with the instrument to mount in the panel.

2.2.6 FRONT PANEL

- Membrane keypad with 12 keys is fixed on the front panel.
- On the Front there is window for LCD display and status Indication LEDs.

2.3 INSTALLATION GUIDE

- Unpack the instrument from the packing box carefully.
- Mount the instrument in the panel cutout of 138mm * 138 mm.
- Fix the instrument with the panel using side brackets.
- All the electrical connections to be done at the back panel of the unit using spade lugs. Refer the Appendix for back panel layout.
- Make sure that no wire is connected loosely to avoid generation of spark and RFI. Connect mains cord on the back panel on the Phase, Neutral and Earth terminals.
- Instrument is factory configured for power supply of 110-230VAC or 24VDC
- Earth the instrument properly.
- Some of the contacts are powered. Hence don't touch any terminal directly when power is applied to the instrument. Whenever any connection is to be made or removed from the unit, always switch off the power.

CHAPTER 3

3.1 OPERATING DETAILS

The following paragraphs give detailed description of how to operate the unit. For efficient use of the instrument one must study and understand this section.

3.2 DISPLAY & KEYBOARD

The unit has 16 Char x 2 Line, large size LCD Display. It has keypad with 12 keys organized as 6 x 2 Matrix.

List of keys and their functions:

KEYS	FUNCTION
SET	'SET' key: Use this key to view and Modify Parameters
▲	'INCREMENT' Key: Use this key to Increment Selected Digit Value. Can also use for Water/Additive Start/Stop
F1	'HOME' Key. Press this key to Home position/parameter
TARE / BIN-1	'TARE/BIN-1' is a dual function key. Press this key to Tare Bin-1 Weight. Can also use for Zero Calibration of Bin-1
TARE / BIN-2	'TARE/BIN-2' is a dual function key. Press this key to Tare Bin-2 Weight. Can also use for Zero Calibration of Bin-2
TARE / BIN-3	'TARE/BIN-3' is a dual function key. Press this key to Tare Bin-3 Weight. Can also use for Zero Calibration of Bin-3
ENTER	'ENTER' key. Use this to save Parameter Value. Also used for Header Print.
▼	'DIGIT SELECT' key: Use this key for Digit Select. Also use to Go to Next Parameter
F2	'F2' key: Use to Edit Value Of Parameters
CAL / BIN-1	'CAL/BIN-1' key: Use for Span Calibration Of Bin-1
CAL / BIN-2	'CAL/BIN-2' key: Use for Span Calibration Of Bin-2
CAL / BIN-3	'CAL/BIN-3' key: Use for Span Calibration Of Bin-3

3.3 EDIT MODE

In this mode user can view and/or modify various parameters.
One can perform this mode only when the instrument is in 'STOP' mode.

3.3.1 LIST OF PARAMETERS & PAGES:

User can set following parameter in the RM plant controller SMIT-1301L:

1. DATE
2. TIME
3. CAL WT LTR (0000-9999)
4. CAL WT TM (0000-9999) (Time in Second)
5. CAL ADD KG (0000-9999)
6. CAL ADD TM (0000-9999) (Time in Second)
7. SKIP/UNSKIP (For Channel 1 Skip/Unskip)
8. SKIP/UNSKIP (For Channel 2 Skip/Unskip)
9. SKIP/UNSKIP (For Channel 3 Skip/Unskip)
10. WATER SP (0000-9999) (For Water Set Point)
11. ADDI SP (0000-9999) (For Additive Set Point)
12. PRINT LAST(0000-9999) (For Print Off Line Batches)
13. CLEAR BATCH (Enter Pass word :3210 For Clear All Batches)
14. BAUD RATE(4800/9600/19200)
15. SP 1 (0000-9999)
16. SP 2 (0000-9999)
17. SP 3 (0000-9999)

To change any parameter value, Press 'SET' Key. The Password page will be displayed.

- Press 'F2' key, First digit will flash.
- Set Password: 1234 Using 'INCREMENT' Key and 'DIGIT SELECT' Key.
- Once correct value is set, Press 'ENTER' Key.

If password is correct, Date/Time Page will be displayed:

DATE	04/04/2020
TIME	10:00

In this page, Current date and time will be displayed

User can go to following pages one by one by pressing 'SET' key:

- Next Page will display water Calibration Parameter

CAL WT LTR	0010
CAL WT TM	0010

- Nest page will display Additive Calibration Parameter

CAL ADD KG	0010
CAL ADD TM	0010

- Next Page will display SKP/UNSKIP status of all channels:

1:UNSKIP	2:UNSKIP
3:UNSKIP	

  - If a channel is Skipped, '-----'will be displayed against that channel.

- Next Page will display water and Additive Set Point Values:

WATER SP	0010
ADDI SP	0010

- Pressing 'ENTER' will display next page:

PRINT LAST	0999
CLEAR BATCH	3210

  - This page is used to get OFF LINE Print
    - We Can Print Last 999 Batch Using this Parameter
  - You can also Clear Batch in this page using Password '3210'

- Pressing 'SET' key will display next page:

BAUD RATE	9600
SP 1	0100

  - User can set desired Baud Rate : 4800/9600/19200 from this page
  - User can also view/modify Set point SP 1 for BIN-1

- Pressing 'SET' from above page will display Page for SP 2 & SP 3.

SP 2	0100
SP3	0100

- User can also view/modify Set point SP 2 for BIN-2
- User can also view/modify Set point SP 3 for BIN-3

HOW TO CHANGE PARAMETER VALUES?

To change set value of any of the above parameter, user needs to go to desired page after entering correct password.

Once you go to desired page,

- Take cursor to desired parameter in the page by using 'DIGIT SELECT' (Down arrow) key.
- Once desired parameter is selected, press 'F2' key to allow Edit. Digit will start flashing
- Set desired value of parameter by using 'DIGIT SELECT' key and 'INCREMENT' Key
- Once desired value is set, Press "ENTER" Key. New value will be Saved against selected parameter.

3.4 LOAD CELL CALIBRATION

- The Zero and Full-scale values are stored in NVRAM/Flash RAM.
- Switch on the instrument and allow 15 minutes of warm up time before starting calibration.
- Connect the load cell to be used for the weight measurements at the load cell input terminal**.** (See the CONNECTION DETAILS for the same).

3.4.1 BIN 1 CALIBRATION

BIN-1 ZERO CALIBRATION:

- For Zero-Calibration, BIN-1 load cell should be empty.
- Press **'TARE/BIN-1'** key.
- This value will be stored as Zero-calibration reading

BIN-1 SPAN CALIBRATION:

- Place known weight on the BIN-1 Load cell Platform
- Press **'CAL/BIN-1'** key, PASSWORD page will be Displayed
- Set password '1234' as mentioned earlier and Press '**ENTER**' Key. Digit will flash on BIN-1 display window.

- Now Set Current Value of known weight on platform using ‘INCREMENT’ key & ‘DECREMENT’ key
- Now Press **'ENTER'** key after few seconds.
- This reading will be stored as span value.

3.4.2 BIN 2 CALIBRATION

BIN-2 ZERO CALIBRATION:

- For Zero-Calibration, BIN-2 load cell should be empty.
- Press **‘TARE/BIN-2’** key.
- This value will be stored as Zero-calibration reading

BIN-2 SPAN CALIBRATION:

- Place known weight on the BIN-1 Load cell Platform
- Press **'CAL/BIN-1'** key, PASSWORD page will be Displayed
- Set password ‘1234’ as mentioned earlier and Press ‘**ENTER**’ Key. Digit will flash on BIN-1 display window.
- Now Set Current Value of known weight on platform using ‘INCREMENT’ key & ‘DECREMENT’ key
- Now Press **'ENTER'** key after few seconds.
- This reading will be stored as span value.

3.4.3 BIN 3 CALIBRATION

BIN-3 ZERO CALIBRATION:

- For Zero-Calibration, BIN-3 load cell should be empty.
- Press **‘TARE/BIN-3’** key.
- This value will be stored as Zero-calibration reading

BIN-3 SPAN CALIBRATION:

- Place known weight on the BIN-1 Load cell Platform
- Press **'CAL/BIN-1'** key, PASSWORD page will be Displayed
- Set password ‘1234’ as mentioned earlier and Press ‘**ENTER**’ Key. Digit will flash on BIN-1 display window.
- Now Set Current Value of known weight on platform using ‘INCREMENT’ key & ‘DECREMENT’ key
- Now Press **'ENTER'** key after few seconds.
- This reading will be stored as span value.

Now the instrument is calibrated.
Check linearity of the instrument by applying different weights on the weigh-platform.

3.5 WATER CALIBRATION

- Go to Water Calibration Page
- Set CAL WT TM=10 Sec and Press Enter Key so Water Pump Will be On for 10 Sec
- Now Manually Check How Much Water Will be Collect During 10 Sec
- Now Enter this Water Litre in CAL WAT LTR Parameter
- So Calibration of Water is Complete

3.6 ADDITIVE CALIBRATION

- Go to Additive Calibration Page
- Set CAL ADD TM=10 Sec and Press Enter Key, Relay for Additive Pump will remain On for set time.
- Check manually actual weight/volume of Additive collected
- Enter this Additive Litre in CAL ADD LTR Parameter
- So Calibration of Additive is Complete

CHAPTER 4

4.1 BACK PANEL CONNECTOR DETAILS

PIN NO	DESCRIPTION	
1	C	RELAY 1 (ADDITIVE)
2	NO	
3	C	RELAY 2 (WATER)
4	NO	
5	C	RELAY 3 (BIN-2)
6	NO	
7	C	RELAY 4 (BIN-3)
8	NO	
9	C	RELAY 5 (BIN-1)
10	NO	
11	NC	
12	+24VDC	DIGITAL INPUTS
13	DIG-1	
14	DIG-2	
15	COM	
16	PHASE	MAINS SUPPLY 230VAC
17	NEUTRAL	
18	EARTH	
19	SHIELD	BIN-1 LOADCELL
20	EX-(B)	
21	EX+(R)	
22	SENSE-(W)	
23	SENSE+(G)	
24	SHIELD	BIN-2 LOADCELL
25	EX-(B)	
26	EX+(R)	
27	SENSE-(W)	
28	SENSE+(G)	
29	SHIELD	BIN-3 LOADCELL
30	EX-(B)	
31	EX+(R)	
32	SENSE-(W)	
33	SENSE+(G)	

4.2 DIGITAL INPUTS:

4.2.1 WATER /ADDITIVE START/STOP

- For Water/Additive Start/Stop, apply digital input between Terminal No.13 (DIG-1) and Terminal No.15 (COM)
- You need to connect Potential Free Contact
- You can connect Push button between these two terminals.

4.2.2 BATCHING START/STOP

- For Batching Start/Stop, apply digital input between Terminal No.14 (DIG-2) and Terminal No.15 (COM)
- You need to connect Potential Free Contact
- You may connect Push Button between these two terminals.

4.3 RELAY OPERATION

- When Start additive input is received, Relay 1 will be ON. It will be switched Off when additive weight reaches Additive SP.
- When Start Water input is received, Relay 2 will be ON. It will be switched Off when water weight reaches Water SP.
- Relay 3 Will be ON, when Weight in Bin 2 is Greater than SP 2
- Relay 4 Will be ON When Weight in Bin 3 is Greater than SP 3
- Relay 5 Will be ON When Weight in Bin 1 is Greater than SP 1

CHAPTER 5

5.1 SALES & SERVICE

When you face any issue while installation, calibration or using the Indicator, you may contact:

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