CENTURY METERING SYSTEMS & CONTROLS
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TEMPERATURE CONTROLLER WITH 24 TIME ZONES (CMSC 7754-96) Instruction Manual (vr 1.0)

1. Introduction

CMSC 7754-96 is a comprehensive controller to work in conjunction with heating systems. It has the following features:

- Temperature measurement – RTD 4W Sensor
- Real Time Clock backed by online rechargeable Ni-Cd battery
- 24 TIME ZONES with Start Time (HH:MM) and duration as programmable parameters.
- Two Relay outputs (User Selectable) – designated as RELAY1 and RELAY2
- 128X128 Graphical LCD Display
- Four Capacitive Touch Sensitive keys for programming
- User selectable operating modes namely
    - AUTO Mode
        - Temperature based control mode
        - Temperature and Real Time Clock based control mode(Typical Application)
        - Real Time Clock only based control mode
        - Periodic Timer based control mode - programmable ON Time & OFF Time
        - Periodic Timer and Real Time Clock based control mode
    - MANUAL Mode
    - AUTO CYCLIC Mode – programmable Cycle Time
- RS-485 MODBUS Communication (optional)

1.1 Operating Modes

In a typical application, the unit works based on "temperature value" at the return line (Process Variable) along with RTC programmed in 24 Time zones. This mode of Recirculation Pump Control is **'Temperature and RTC based control'.**

However the user can program such a way that the control is based only on the Process Variable, ignoring RTC Time Zones. This is a simple **Temperature based control**.

In cases where the sensor is either not connected or faulty, RPC can be made to work in stand alone with programmable ON/OFF Timer. This is **'On Off Duration based control'**.

If RPC is made to work with ON/OFF Timer along with RTC programmed in 24 Time Zones, it is **'On Off Duration and RTC based control'**.

Refer the table below to ascertain how to program the above parameters

Temperature Based	**RTC based**	**ON-OFF Timer based**	**Control Mode**	**Control Output**
YES	YES	N.A.	Temperature and RTC based Control	Depends on Temperature and RTC, i.e. ▪ Relay ON if present RTC time falls within respective programmed TimeZone and temperature <= Set Value – Hysterisis ▪ Relay OFF if either present RTC time does not fall within respective programmed Time Zone or temperature >= Set Value
YES	NO	N.A.	Temperature based control	Depends only on Temperature, i.e., ▪ Relay ON if temperature <= Set Value – Hysterisis ▪ Rekay OFF if temperature >= Set Value
NO	YES	YES	On Off Duration based control	Depends only on RTC and ON & OFF times programmed by user.
NO	YES	NO	RTC based control	Relay ON when there is any active time zone Relay OFF when no Time Zone is activfe
NO	NO	YES	On Off Duration based control	Depends on ON and OFF times programmed by user

Table 1.1 : Mode of Recirculation Pump Control

2. Operating the equipment

On Power ON, the unit displays Century's Logo and two seconds later, it displays the unit details namely the model number, firmware version and unit ID

Once the unit is initialized, the following parameters will be indicated on the front panel (Ref Fig2.0):

- Temperature read from the sensor (Process Variable)
- Selected Operating Mode (AUTO/MANUAL/AUTO CYCLIC)
- Relay 1 and Relay 2 Statuses (ON/OFF)
- Time Zone which is active
- Real Time Clock

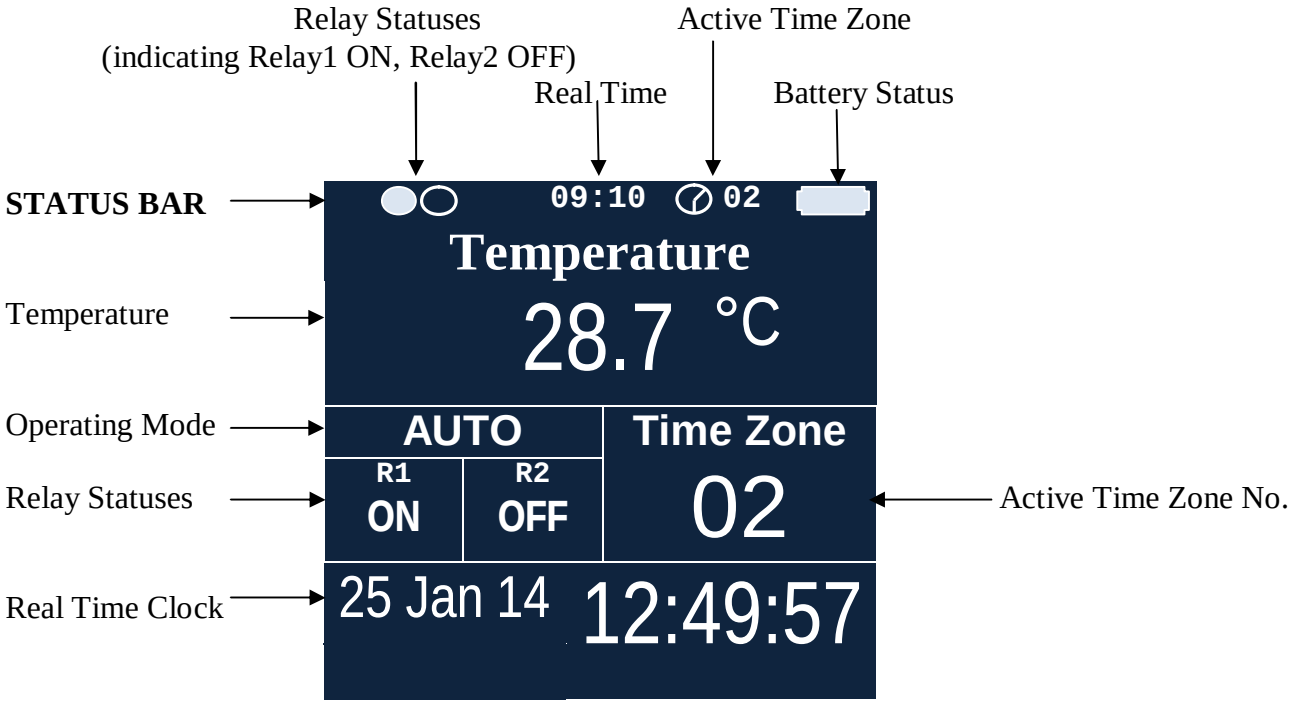
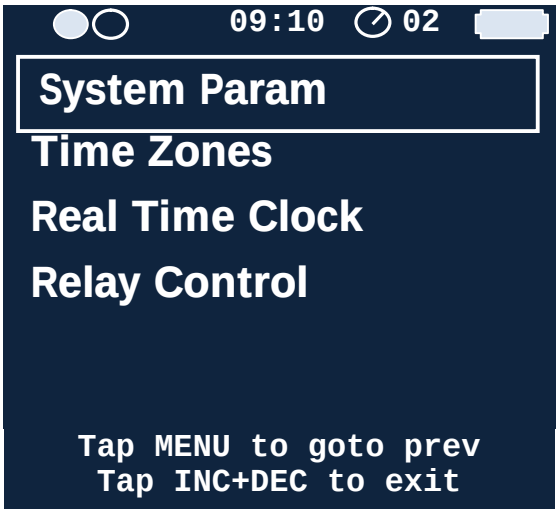


Fig 2.0: Default Display Mode

2.1 Getting into MENU

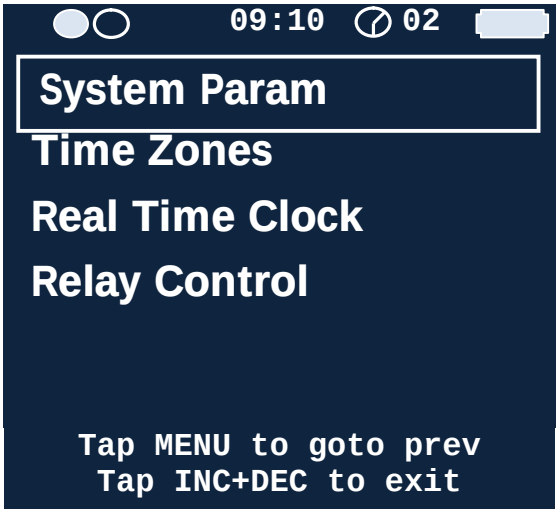
When the unit is running in DEFAULT mode (Default Display Mode shown in fig2.0), tap SCROL/MENU key to get into MENU. Menu items will be displayed as shown below



- System Param – System Parameters
  - Slave ID – Modbus Slave Address (optional and applicable only to the units with RS-485 communication feature)
  - Temperature Set Value, Hysteresis - if the operating mode selected is Temperature based or Temperature and Real Time Clock based
  - On Time, Off Time – if the operating mode selected is Periodic ON-OFF Timer based or Periodic ON-OFF Timer and Real Time Clock based
- Time Zones – Enable/Disable , Start Time (HH:MM) and Duration of 24 Time Zones
- Real Time Clock – Password protected option for setting Time and Date
- Relay Control
  - RTC (Real Time Clock) based? YES/NO
  - Temperature based? YES/NO
  - On-Off Timer based? YES/NO
  - Mode – Auto/Manual/Auto Cyclic
  - Relay – Relay1/Relay2
  - Cycle Time – If Auto Cyclic mode is selected

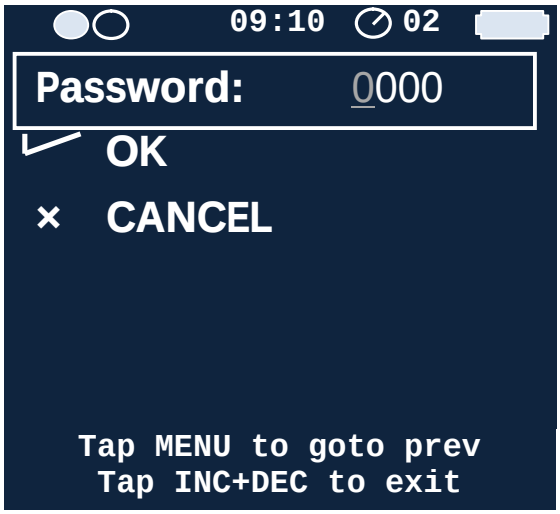
2.1.0 To set Real Time Clock *(Password Protected)*

1. Go to MENU as discussed in section 2.1. You will see the following screen.

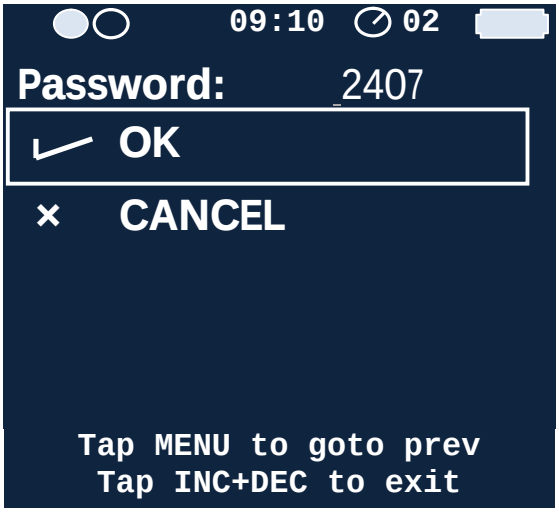


2. As you can see in the above image, the selection cursor by default is over “System Param”. Tap DEC key 2 times to bring the cursor down to “Real Time Clock” option.

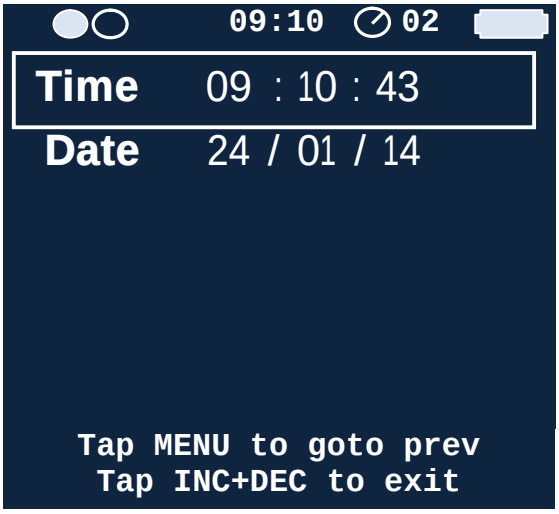
3. When the selection cursor is over “Real Time Clock”, tap ENTER key. You will see the following screen



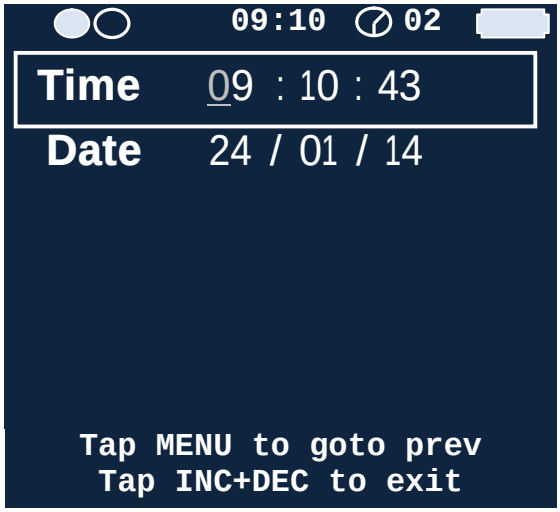
4. The Real Time Clock programming is password protected and the password is 2407. As seen in the image above, you will see “0 0 0 0” with its first digit blinking. You need to set this to 2407 to be able to set Time and Date.
5. Use INC key to increment the value of a blinking digit and DEC key to decrement. Once the blinking digit is set to desired value, tap ENTER to go to next digit.
6. This way, once you set the 4 digits to “2407” digit by digit, tap ENTER. Now the selection cursor goes to “OK” option as seen below.



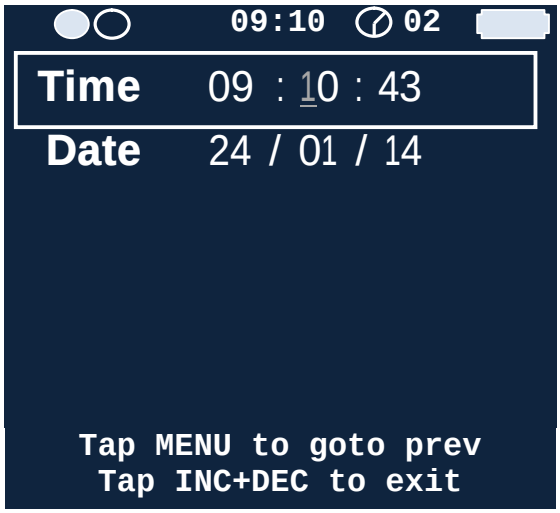
7. Now tap ENTER. The following screen will appear.



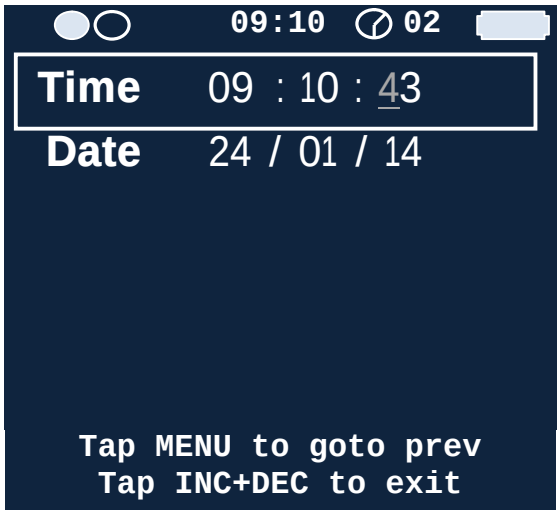
8. As you can see in the above image, the selection cursor is over "Time" option and the current time is displayed in HH:MM:SS. Tap ENTER. You will see first digit of Hours(HH) blinking as seen below.



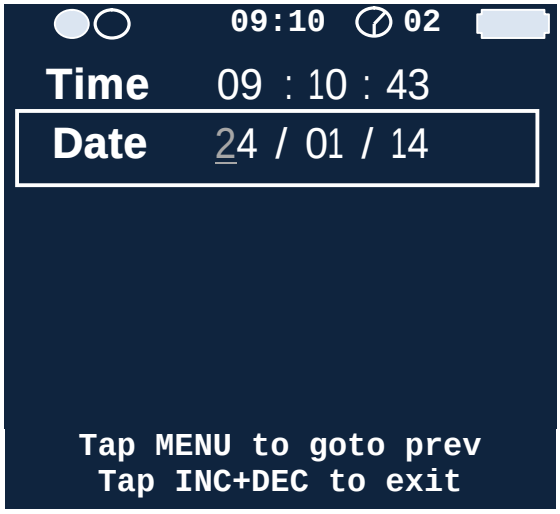
9. Use INC key to increment the value of the digit and DEC key to decrement. Once you have set the digit to desired value, tap ENTER key to go to next digit and program it in a similar way.
10. Once second digit of the 'HH' is also set to the desired value, tap ENTER. Now you will see the first digit of minutes (MM) blinking as seen below.



11. Set minutes digit by digit in similar way. Once both the digits are set and you tap ENTER key, first digit of Seconds(SS) starts blinking as seen below.



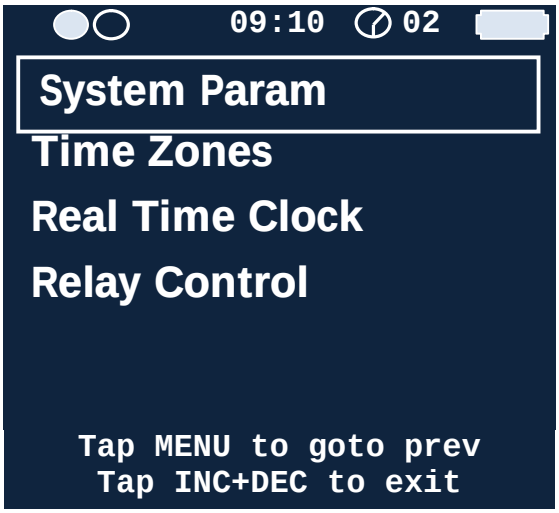
12. Once time is set and ENTER key is tapped after the last blink digit, bring the selection cursor down to "Date" option by tapping DEC key. The date is displayed in DD/MM/YY format. When the cursor is over "Date" option, tap ENTER key.



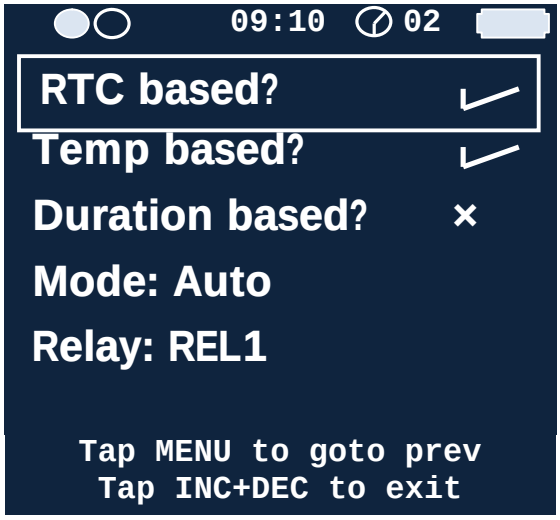
13. Set the day of the month, month and Year digit by digit the same way Time was set.
14. Tap SCROL/MENU to go to previous menu or INC+DEC together to exit.

2.1.1 Choosing Relay Control Mode (Ref Table 1.2)

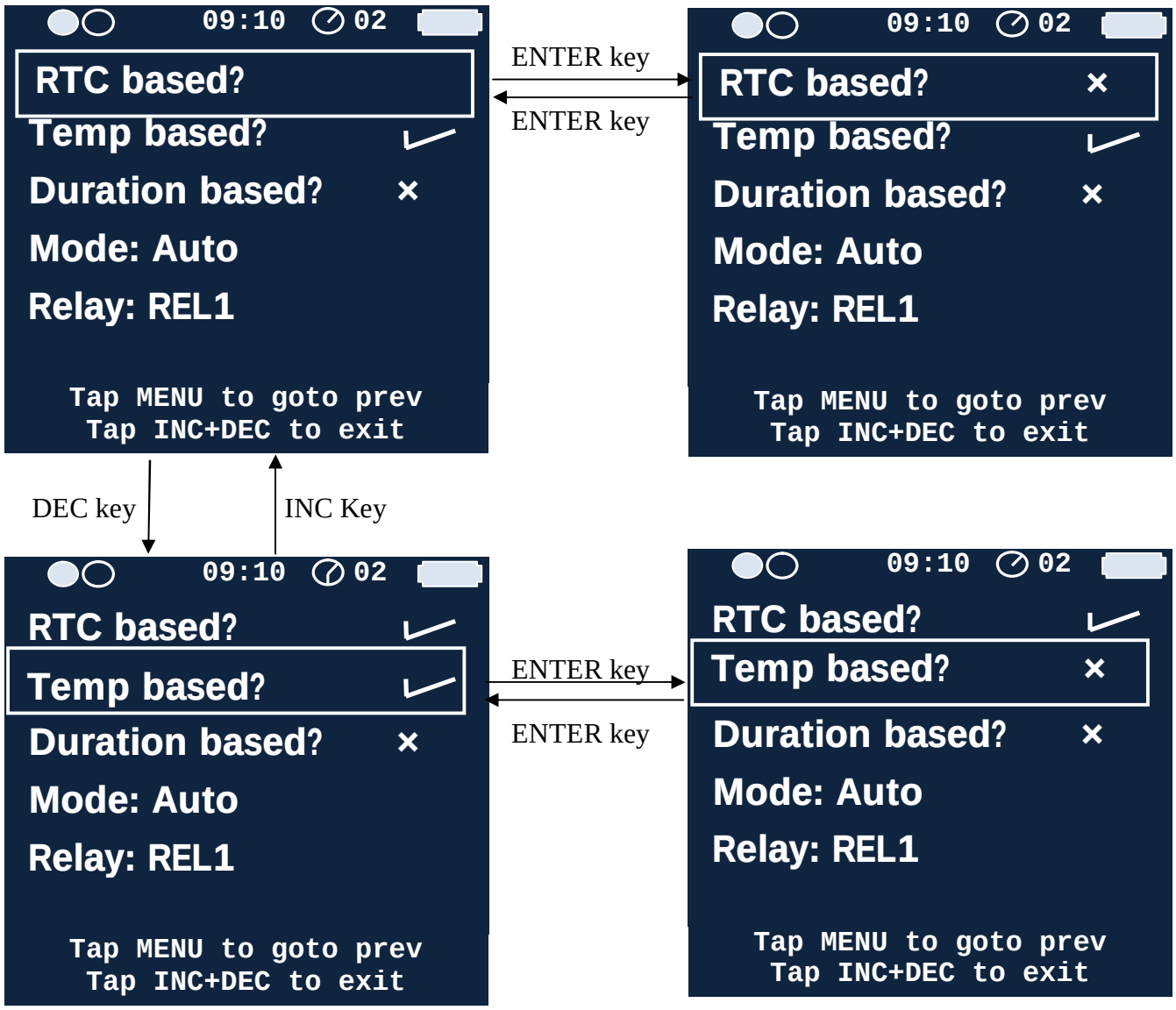
1. Go to MENU as discussed in section 2.1. You will see the following screen



2. Tap DEC key 3 times to go to Relay Control and tap ENTER. The following screen will appear.



3. A tick mark next to the option indicates that the option is enabled / YES and '×' mark next to the option indicates that the option is disabled / NO. In the above configuration, the mode of operation chosen is Temperature and Real Time Clock based.
4. Tap ENTER to change from YES to NO or vice versa. Tap INC or DEC to move the selection cursor upwards or downwards.



5. After the options “RTC Based”, “Temp based” and “Duration based” are programmed this way, bring down the selection cursor to “Mode” option and press ENTER to enter into mode selection and choose between AUTO, MANUAL and AUTO CYCLIC modes.

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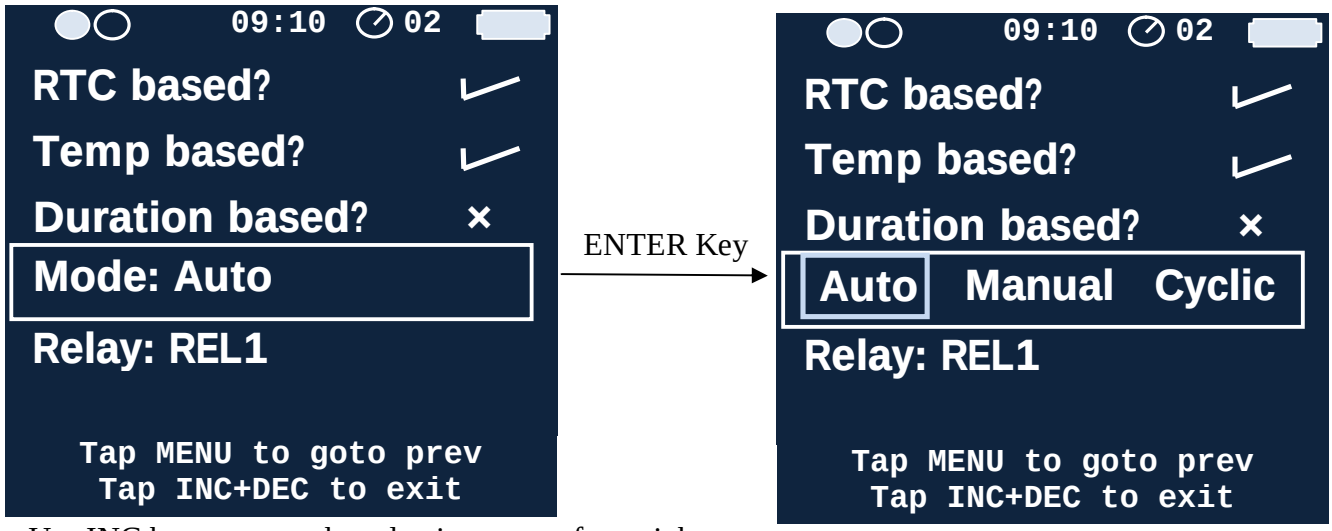
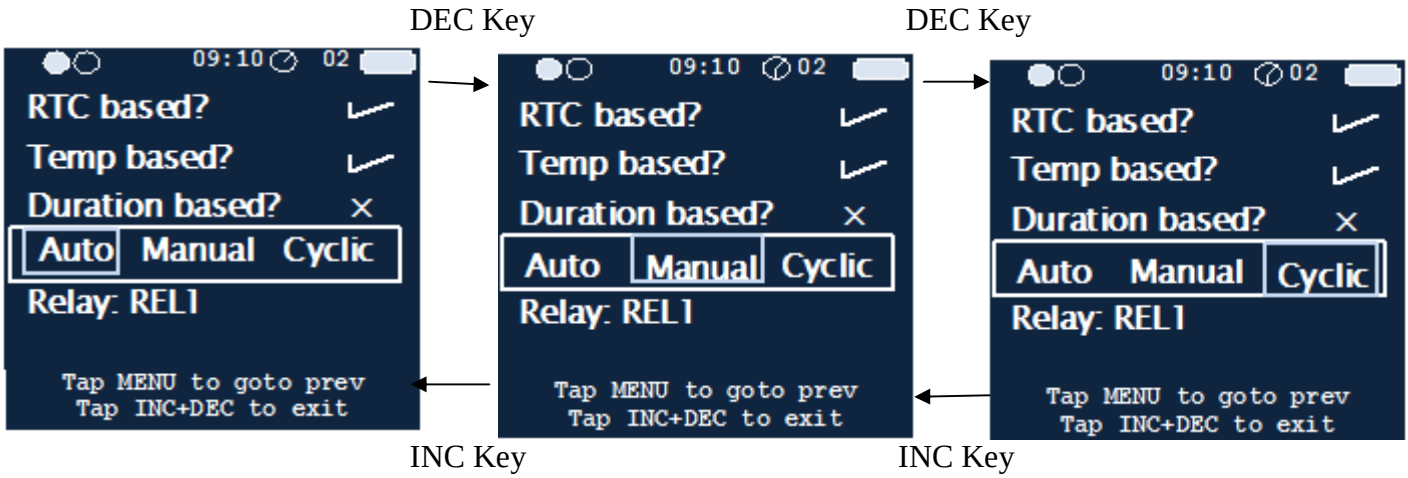
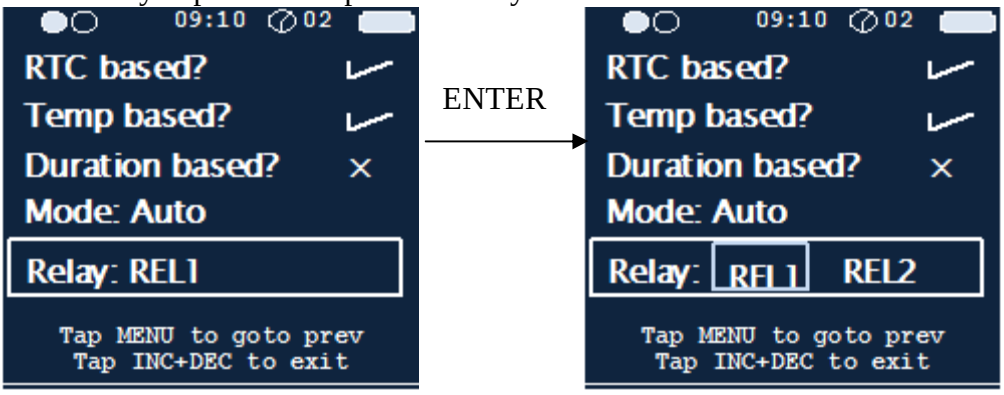


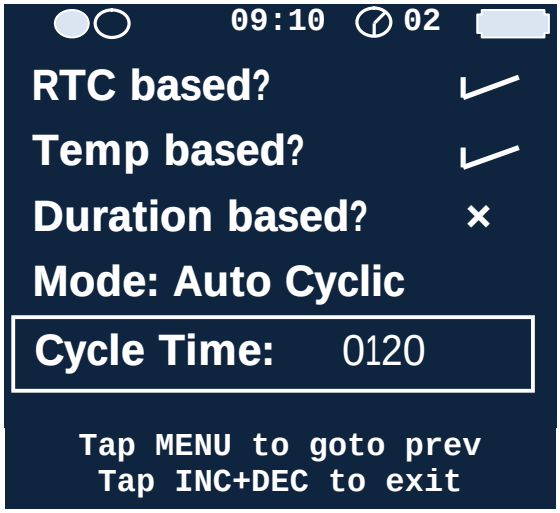
6. Use INC key to move the selection cursor from right to left and DEC key to move it from left to right. Once the cursor is over the desired option, tap ENTER key.



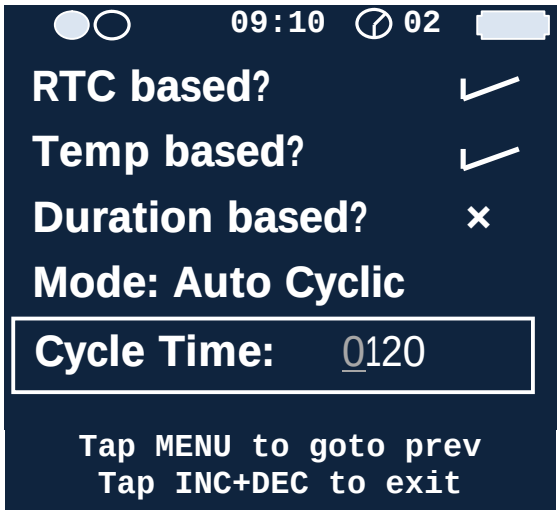
7. If the option chosen is AUTO or MANUAL, the next option is Relay Selection. Bring the cursor over "Relay" option and tap ENTER key.



8. Use INC key to move the selection cursor from right to left and DEC key to move it from left to right. Once the cursor is over the desired option, tap ENTER key. Skip to #12.
9. If the mode chosen is AUTO CYCLIC, the next parameter is Cycle Time.



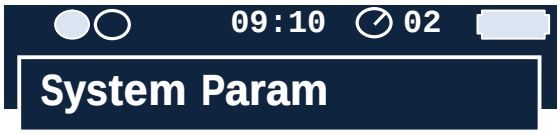
10. Bring the cursor over Cycle Time option to program the value. Tap ENTER. Now you will see first digit of the parameter blinking

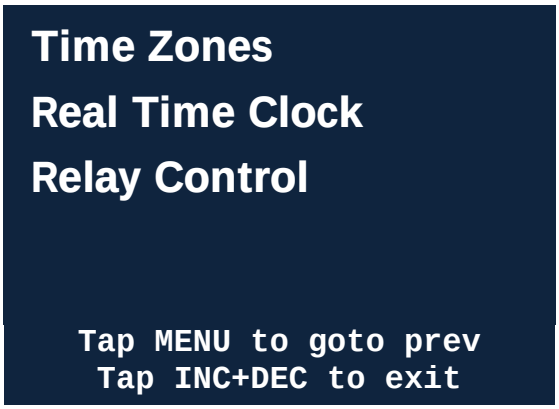


11. Use INC and DEC keys to increment or decrement the value of the digit. Tap ENTER to go to next digit. The maximum limit allowed for Cycle Time is 1440. Once all the 4 digits are set to the desired values, tap ENTER to store.
12. Tap INC+DEC together to exit or SCROL/MENU key to go to previous menu

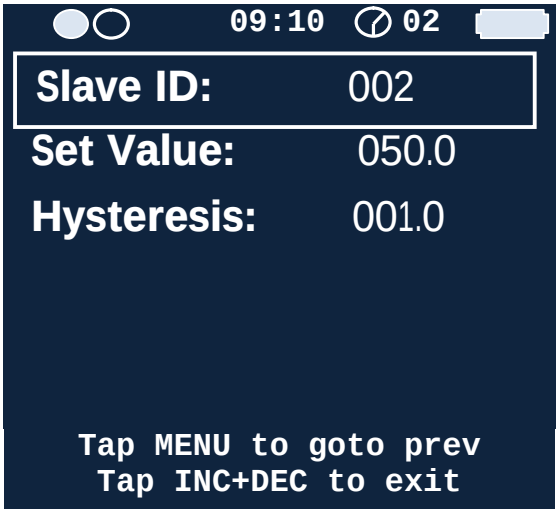
2.1.2 To program Temperature Set Value and Hysteresis *(programmable only if Temperature based control is enabled)*

1. Go to MENU as discussed in section 2.1. You will see the following screen

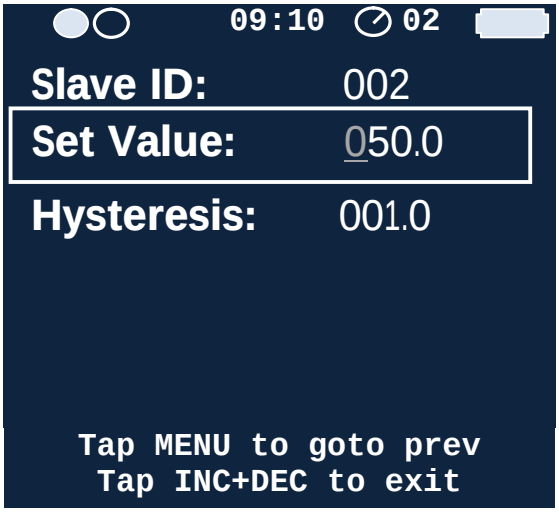




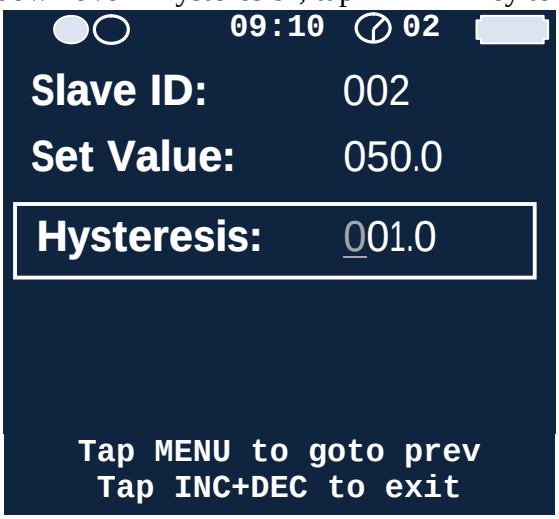
2. Once the cursor is over “SYSTEM PARAM”, tap ENTER key. You will see the following screen.



3. Use DEC key to bring the selection cursor downwards and INC key to move it upwards. Once the selection cursor is over the “Set Value” option, tap ENTER key. You will see the first digit of the set value blinking.



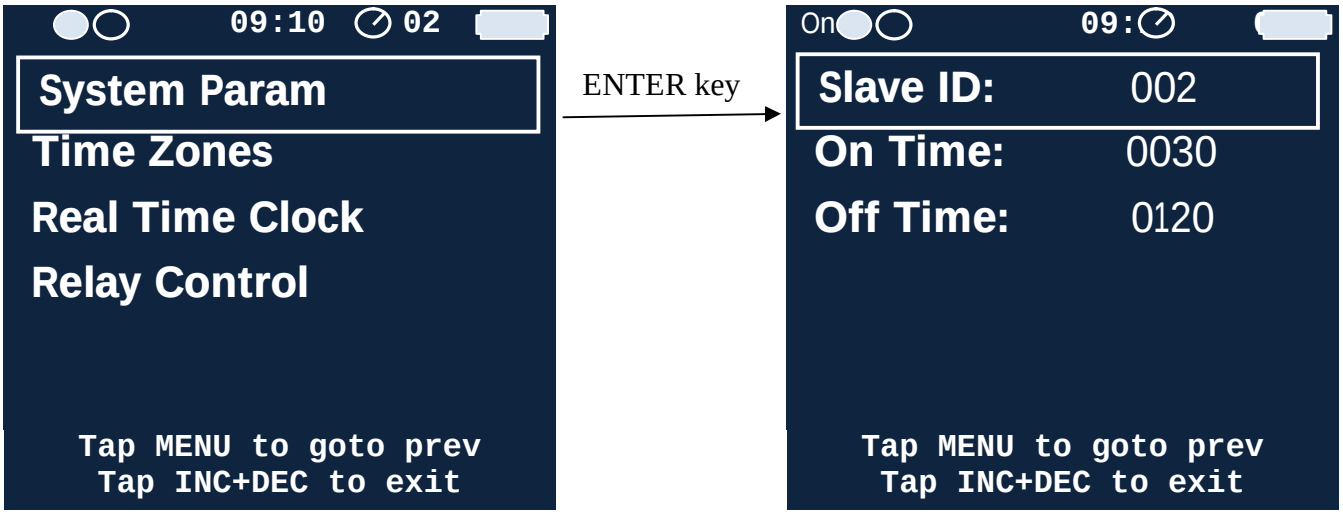
4. Use INC key to increment the value of the blinking digit and DEC key to decrement the value. To go to next digit, tap ENTER. Once you have set all the digits to the desired values, tap ENTER key to store the value.
5. Now bring the cursor down over "Hysteresis", tap ENTER key to program Hysteresis digit by digit as explained above.



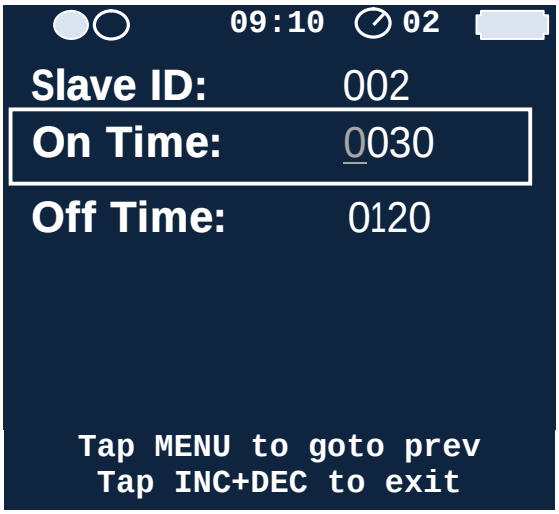
6. Tap INC+DEC keys together to exit or tap SCROL/MENU to go to previous menu.

2.1.2 To program Relay On Time and Off Time ***(programmable only if On-Off Duration based control is enabled and Temperature based Control is disabled)***

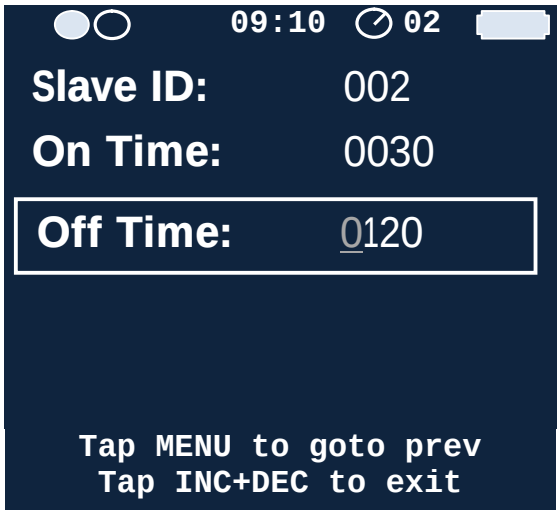
15. Go to MENU as discussed in section 2.1. When the selection cursor is over "SYSTEM PARAM", tap ENTER key. You will see the following screen



16. You will see the selection cursor over "Slave ID" option. Bring the cursor down to "On Time" option using DEC key and tap ENTER. You will see the first digit of the parameter blinking as seen below.



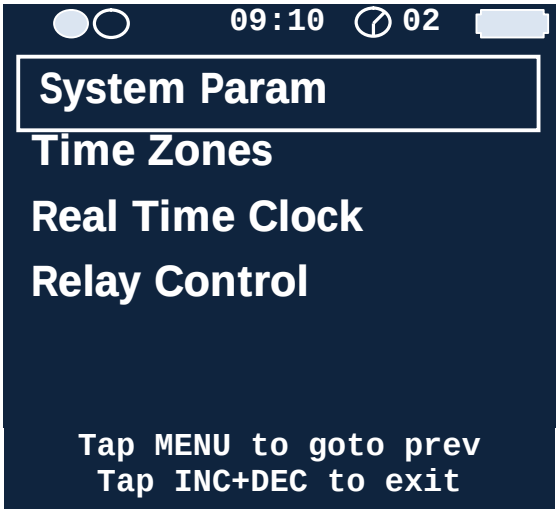
17. Use INC key to increment the value of the blinking digit or DEC key to decrement the value. To go to next digit, tap ENTER.
18. Once all the 4 digits are set the desired values, tap ENTER key to store the value.
19. Now move the selection cursor down to “Off Time” option and tap ENTER key. You will see the first digit of the parameter blinking as seen below.



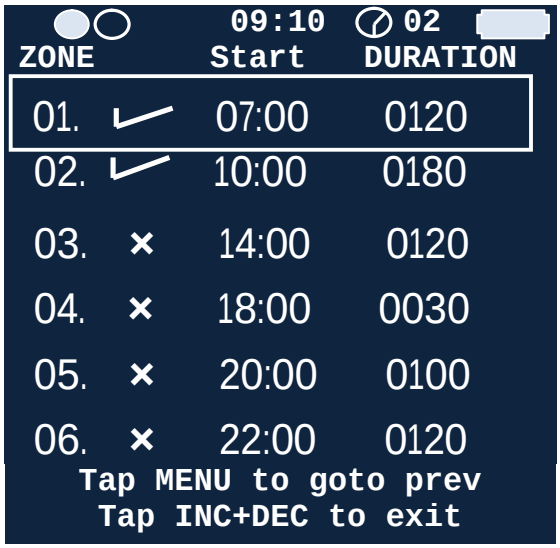
20. Use INC key to increment the value of the blinking digit or DEC key to decrement the value. To go to next digit, tap ENTER.
21. Once all the 4 digits are set the desired values, tap ENTER key to store the value.
22. Tap INC+DEC keys together to exit or tap SCROL/MENU to go to previous menu.

2.1.3 To program Time Zones

1. Go to MENU as discussed in section 2.1. You will see the following screen.



2. As you can see in the above image, the selection cursor by default is over "System Param". Tap DEC key to bring the cursor down to "Time Zones" option.
3. Now tap ENTER key. The following screen will appear.



4. You can view 6 time zones' parameters in one screen. You can use DEC key and drag the selection cursor to the bottom to be able to view further (time zones next to the ones seen on the screen).
    a. As seen in the image above, the left most column indicates the zone number.
    b. The ✓ mark next to the zone number indicates that the time zone is enabled and '×' indicates that the time zone is disabled.
    c. The next column indicates 'Start Duration' in HH:MM format
    d. The last column (right most) indicates 'Duration' of the zone in minutes.
5. Move the cursor over the time zone whichever you desire to program using INC key (to move up) and DEC key (to move down). Tap ENTER. You will see the ✓/ × mark blinking. Use INC/DEC keys to change the status from 'disable' to enable or vice versa.
6. Now tap ENTER key. You will see the first digit of Start Time HH blinking as seen below

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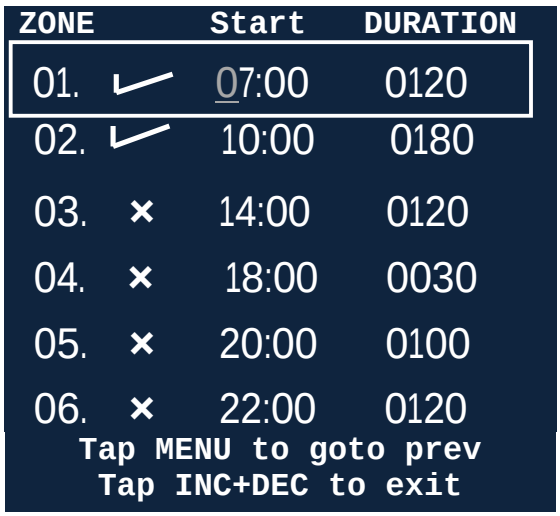
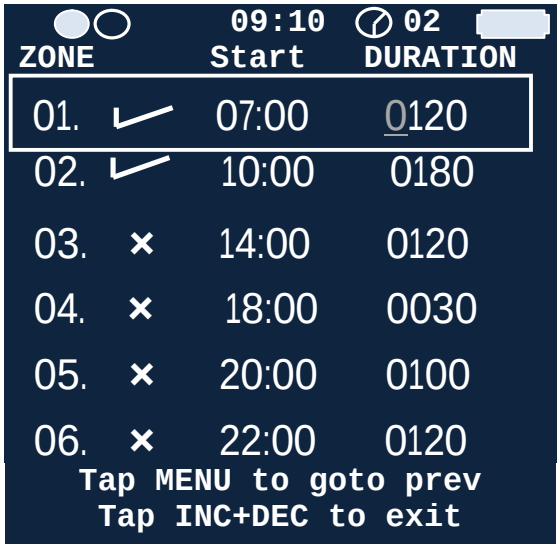


7. Use INC key to increment the value of the blinking digit and DEC key to decrement the value. Once it is set to the desired value, tap ENTER key and set the next digit in similar way.

8. Similarly set MM of Start Time. The next parameter is Duration in terms of minutes.

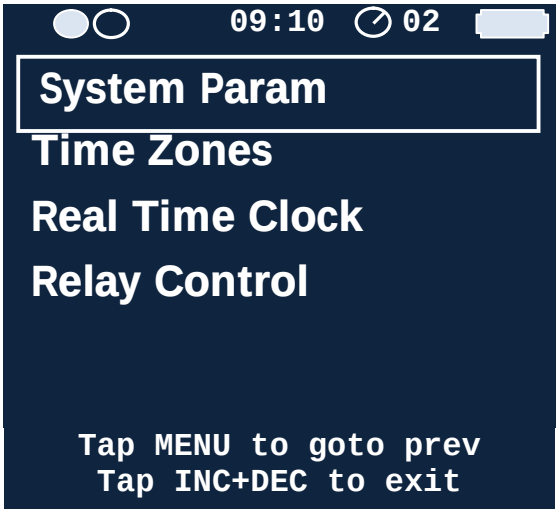


9. Set duration of time zone digit by digit using INC/DEC key to increment/decrement the value of the blinking digit and ENTER key to go to next digit.
10. Once all the four digits are set. Tap ENTER key to store the value.
11. Tap SCROL/MENU key to go to previous menu or INC+DEC keys together to exit.

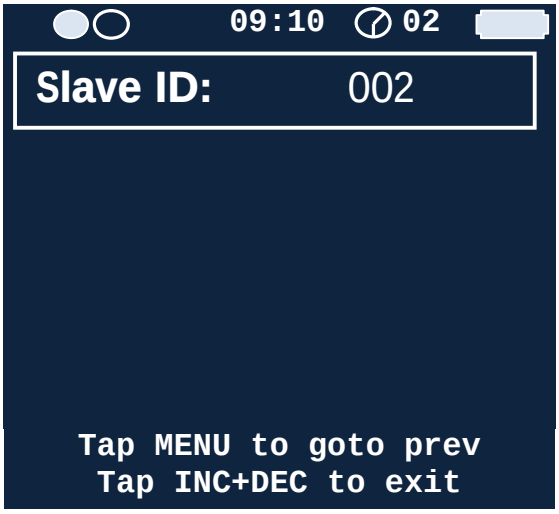
2.1.4 To program MODBUS Slave Address

(applicable only if the ordered unit features MODBUS communication)

1. Go to MENU as discussed in section 2.1. You will see the following screen



2. Once the cursor is over "SYSTEM PARAM", tap ENTER key. You will see the following screen.



3. Tap ENTER key. You will see the first digit blinking as seen below.

4. Set the address digit by digit using INC/DEC key to increment/decrement the value of the blinking digit and ENTER key to go to next digit.
5. Once all the 3 digits are set to the desired value, tap ENTER to store the value.
6. Tap MENU to go to previous menu or INC+DEC keys together to exit.

3. Limits of programmable parameters

Sl No.	Menu	Parameter	Limit
1.	System Param	Slave ID	1 – 240
2.		Set Value	20.0 to 99.9 deg C
3.		Hysteresis	1.0 to 10.0 deg C
4.		On Time	0 to 1440 minutes
5.		Off Time	0 to 1440 minutes
6.	Time Zones	Status	✓ (Enable) or × (Disable)
7.		Start Time HH	0 to 23
8.		Start Time MM	0 to 59
9.		Duration	1 to 1440 minutes
10.	Real Time Clock	Time HH	0 to 23
11.		Time MM	0 to 59
12.		Time Seconds	0 to 59
13.		Date DD	1 to 31 (dependent on month of year)
14.		Date MM	1 to 12
15.		Date YY	0 to 99
16.	Relay Control	RTC based	✓ (Enable) or × (Disable)
17.		Temp based	✓ (Enable) or × (Disable)
18.		Duration based	✓ (Enable) or × (Disable)
19.		Mode	AUTO/MANUAL/AUTO CYCLIC
20.		Relay	Relay1 or Relay2
		Cycle Time	1 to 1440 minutes

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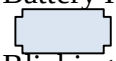
4. Error Messages

Sl No.	Display Message	Fault	Cause
1.	Open	Sensor Open	Sensor is either not connected or faulty
2.	Short	Sensor Short	Sensor inputs are shorted or faulty
3.	Battery Icon  Blinking	Battery Fault	Battery is discharged / not plugged in / faulty