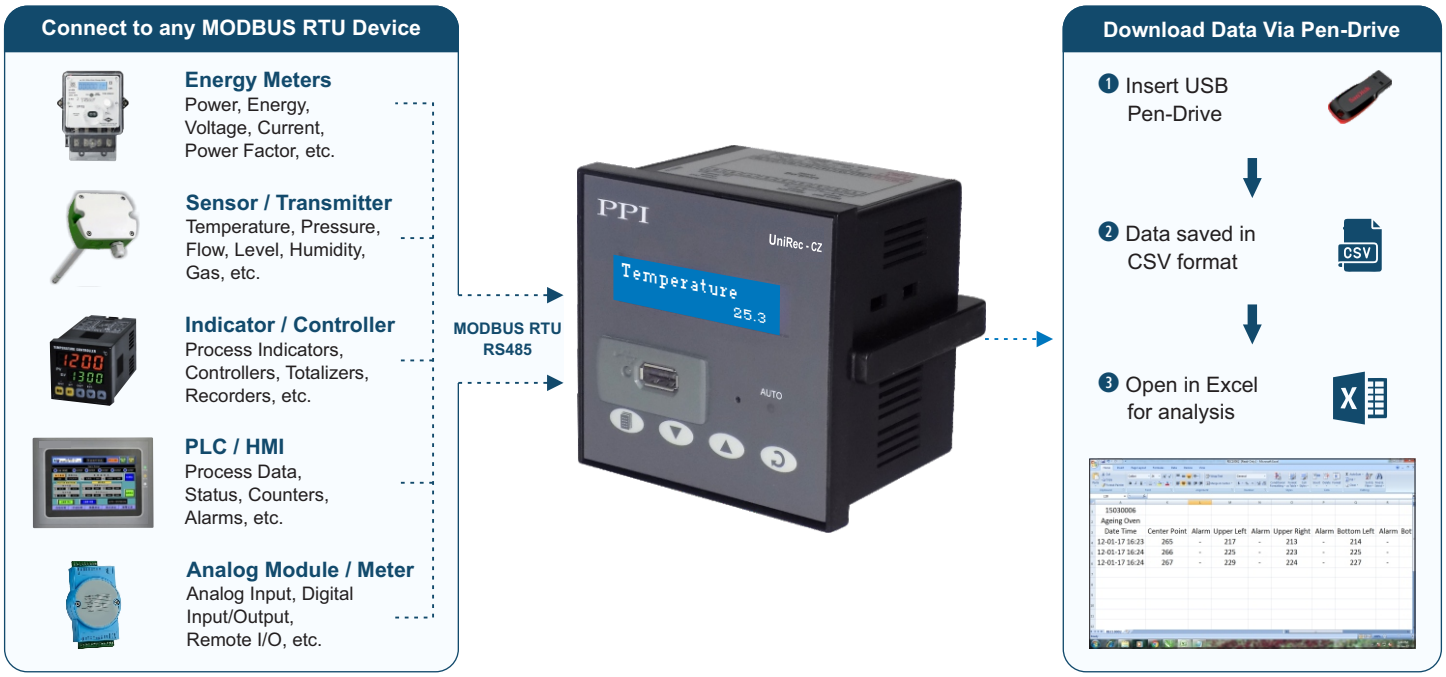
MODBUS Data Recorder with Pen-Drive Interface

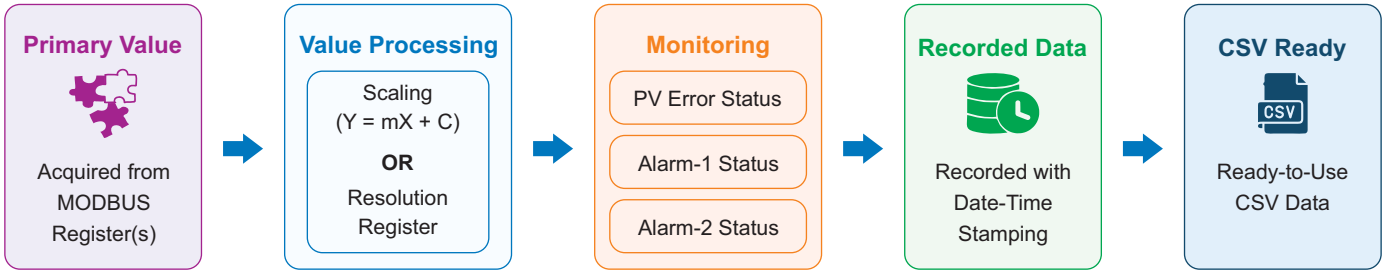
PPI
The Perfection Experts

UniRec-CZ

User Manual



Process Channel Architecture



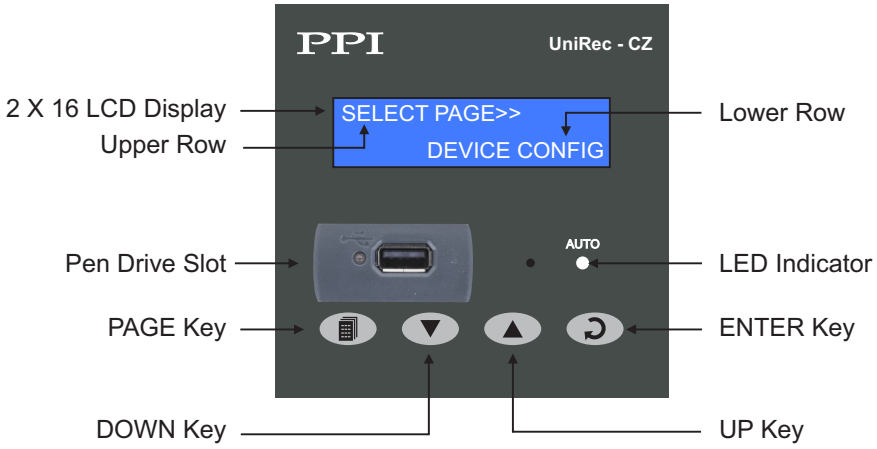
CONTENTS

Section 1

FRONT PANEL : LAYOUT AND OPERATION

The front panel comprises of 2 X 16 (2 rows of 16 characters each) LCD Display, LED indicator & membrane keys. Refer Figure 1.1 below.

Figure 1.1



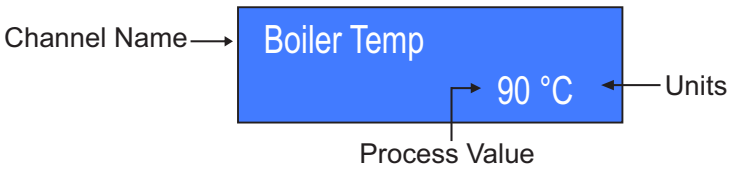
LCD DISPLAY

The LCD Display has 2 rows, the Upper Row & the Lower Row; each having 16 Characters.

In normal operation mode (Run Mode) :

- The Upper Row displays the user assigned Channel Names.
- The Lower Row displays the corresponding Process Values followed by Units. Refer Figure 1.2 (a) below.

Figure 1.2(a)



In Set-up Mode, the Upper Row displays the settable Parameter *Name*s and the Lower Row displays the corresponding *Value*s. Refer Figure 1.2(b) below.

Figure 1.2(b) : Set-up Mode

LED INDICATOR

The front panel round LED lamp indicates the channel scan mode. The LED glows ON if the channel scanning is in Auto mode.

KEYS

There are four tactile keys provided on the front panel for setting-up the parameter values and for other functions & commands. The Table 1.2 below lists each key and the associated function.

Table 1.2

Symbol	Key	Function
	SET-UP	Press to enter / exit Set-up Mode.
	DOWN	Press to decrease the parameter value. Pressing once decreases the value by one count; holding the key pressed speeds up the change.
	UP	Press to increase the parameter value. Pressing once increases the value by one count; holding the key pressed speeds up the change.
	ENTER / Alarm ACK	Press to store the set parameter value and to scroll to the next parameter in Set-up Mode. Press to acknowledge / mute alarm output (if active).

PEN-DRIVE SLOT

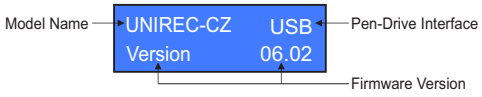
A rectangular slot with USB connector type A is provided for Pen-Drive operation.

Section 2

BASIC OPERATION

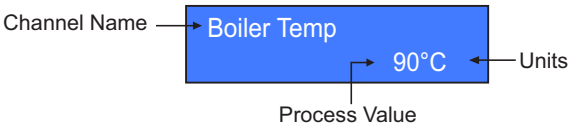
POWER-UP

Upon switching on the power to the unit, the display shows the following information for approximately 4 seconds.



MAIN DISPLAY MODE

This is the default display mode. In this mode, the UniRec-CZ shows the polled / processed channel values on the Lower Readout and the Channel Name on the Upper Readout. If configured, the units are displayed next to the channel values.



The channel-wise process value indication update depends upon the selected Auto / Manual scan mode. The scan mode can be toggled between Auto and Manual by holding the ENTER key pressed for approximately 5 Seconds. The front panel LED indicator glows ON in Auto mode and remains OFF in manual mode. The channel update rate in Auto mode depends upon the set value (1 to 99 Sec.) for the parameter 'Scan Rate'. In Manual mode, the channels can **only** be scrolled using UP and DOWN keys. However, in Auto Mode though the channels are automatically scrolled with set interval, the UP/DOWN Keys can still be used for quick manual scrolling through channels.

In case of channel value error, the Lower Readout shows the error message configured by the user.

Use Enter key to sequentially view the number of records stored and the Date/Time information. Refer figures below.

Section 3

PEN-DRIVE OPERATIONS

The UniRec-CZ allows downloading the records stored inside its internal memory onto the Pen Drive for subsequent reading in Excel Sheet.

Each of the installed UniRec-CZ creates and maintains its own Record-Data file on Pen Drive using a file naming scheme that involves an user assigned identification tag, called *Recorder ID*. The user can assign any numeric value, from 1 to 127, as *Recorder ID* to the UniRec-CZ for its unique identification. The file created by UniRec-CZ for downloading the stored records is named *recN.csv*; where *N* is the Recorder ID assigned to the UniRec-CZ. For example; the UniRec-CZ with Recorder ID 5, creates and maintains the file with the name *Rec5.csv*. The records are downloaded to the file on Pen Drive in *Comma Separated Values (CSV)* format and thus the file is assigned the extension '*.csv*'.

Upon selecting the 'Copy (New)' or 'Re-copy (Old)' operation (explained later) after insertion of the Pen Drive; the UniRec-CZ first searches for any existing file with the name recN.csv (where, N is the Recorder ID assigned to the UniRec_CZ). If the file exists, the UniRec-CZ appends the available stored records to the file. If the file does not exist, the UniRec_CZ automatically creates a new file with the name recN.csv (where, N is the Recorder ID assigned to the UniRec-CZ) and then downloads the records.

Back-up File System

It is possible that a file-write operation may be interrupted due to reasons like sudden power-failure or removal (or, loose-contact) of the Pen Drive, resulting in partial transfer of records. An interrupted file-write operation makes the file unusable for appending any further records. Also, the partially transferred records in the interrupted file are lost (but are still retained inside the UniRec-CZ's internal memory). That is, the file on Pen Drive exists with the previous records intact (if any) and becomes a read-only file.

An interrupted file-write operation event is registered by the UniRec-CZ in its internal memory as well as on the Pen Drive that was being written. Upon resumption of operation, the UniRec-CZ prompts for Recovery of the interrupted operation. Upon selecting the "Recover" operation, the following sequence of steps is executed.

1. A back-up file of the existing interrupted file is created to retain the previous records.

   The back-up file is named bN_S.csv; where, 'N' is the Recorder ID and 'S' is the sequential number (1 to 250) assigned to the back-up file. For example; if the Recorder ID is 5 and there does not exist any previous back-up file, then the new back-up file is named b5_1.csv. If, however, there exists previous back-up file(s), then 'S' is assigned the lowest numeric value (in sequential order). For example; if a Pen Drive already contains back-up files – [b5_**1**.csv, b5_**4**,csv and b5_14.csv] – then the new back-up file is named b5_2.csv.

2. The existing interrupted file is deleted.
3. A new file with the same name (e.g. rec5.csv) is created.
4. All the records (including those that were already transferred during the interrupted operation) are downloaded to the new file.

PEN DRIVE (MEMORY-STICK) OPERATION

Upon inserting the Pen Drive into the USB port, the UniRec-CZ responds by displaying the following message on the LCD screen:

In case of any error in reading the Pen Drive or if the Pen Drive does not respond for more than 60 seconds, the following message is displayed:

Ensure proper insertion of the Pen Drive into the USB port and acknowledge the message by pressing front panel ENTER key. The UniRec-CZ repeats the device checking operation. If the error persists; remove the Pen Drive from the port and acknowledge the message (using ENTER key). The UniRec-CZ responds with the following message:

Acknowledge the message to revert to normal RUN mode operation or insert a new Pen Drive and then acknowledge the message to continue with file read/write operations.

Select Operation

If the “Pen Drive checking” operation is successful; the UniRec-CZ presents one or more of the following options for the next operation:

None
Recover
Copy (New)
Re-copy (Old)

The option 'Recover' is presented only if the inserted Pen Drive contains an interrupted write-operation file. In this case, the 'Copy (New)' and 'Re-copy (Old) ' options are not presented.

The 'Copy (New)' option is presented only if there are new records available in the internal memory and the 'Recover' option is not presented.

The 'Re-copy (Old)' option is presented only if there are old records available in the internal memory and the 'Recover' option is not presented.

Use UP/DOWN keys to select the desired option and then press ENTER key for the execution of the operation.

Recover, Copy (New) & Re-copy (Old) Operations

The ‘Recover', 'Copy (New)' & 'Re-copy (Old)’ options are similar in operations as they all download (copy) records available in the internal memory onto the inserted Pen Drive. The difference lies in the set of records that is downloaded.

The 'Copy (New)' operation downloads the records that are not yet downloaded even once, that is, “new” records. After successfully downloading the “new” records, the UniRec-CZ retains this set of records as “old” records until next successful 'Copy (New)' operation is executed.

The 'Re-Copy (Old)' operation downloads the set of records that were successfully copied during last 'Copy (New)' operation and thus retained as “old” records. This feature allows re-gaining the copied records in case of the Pen Drive failure / malfunctioning after copying records or inadvertent deletion of the record file from the Pen Drive.

The 'Recover' operation copies the records that were being downloaded in the previous 'Copy (New)' or 'Re-copy (Old)' operation that was interrupted.

Upon selecting one of the above 3 operations, the UniRec-CZ opens an existing file or creates a new file for downloading the records (refer section “File System for Write Operation”).

If there is an error in opening/creating a file or deleting/re-naming a file (while creating back-up file for 'Recover' operation) or any other errors encountered while downloading the records; the UniRec-CZ displays an appropriate error message. The Upper Row shows the message while the Lower Row shows the numbers of records pending for downloading.

For various error messages, the operation types for their occurrence and explanation, refer Table 3.1 below.

Table : 3.1

Error Message	Operation	What it Means
Cant Open File	Copy (New) Re-copy (Old) Recover	Unable to open an existing file or create a new file.
Cant Write File Bal 1234	Copy (New) Re-copy (Old) Recover	Unable to write records in an Open file.
Disc Full Bal 1234	Copy (New) Re-copy (Old) Recover	No space on Pen Drive to continue writing records in an Open file.
Cant Close File	Copy (New) Re-copy (Old) Recover	Unable to close the file after successful downloading
Cant Rename File	Recover	Unable to rename an interrupted file for back-up
Cant Delete File	Recover	Unable to delete an interrupted file.

In case of any of the above Error Messages, make sure that the Pen Drive is firmly inserted in the USB port and retry the operation by acknowledging the error message through front panel ENTER key. If the error persists, replace the Pen Drive.

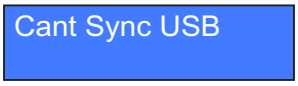
However, if no error is encountered while opening/creating a file for copying the records, the UniRec-CZ begins downloading the records with the following message screen.

The upper row shows the operation type; Copying for 'Copy' operation or Re-copying for 'Re-copy' or 'Recover' operation. The Lower Row displays countdown of the numbers of balance records. Upon successful completion of the operation, the UniRec-CZ displays the total numbers of records copied (or, re-copied) through the following message:

Remove the Pen Drive and acknowledge the message using ENTER key. The UniRec-CZ reverts to normal RUN mode.

USB Port Failure

In case of any failure of the USB port itself; depending upon the type of the error one of the following two messages may be displayed on the front panel LCD.



Remove the Pen Drive and acknowledge the message using ENTER key. The UniRec-CZ reverts to normal RUN mode.

The UniRec-CZ needs servicing for any further Pen Drive operations.

Section 4

SET-UP MODE : ACCESS AND OPERATION

The UniRec-CZ requires various user settings that determine how the Recorder will function or operate. These settings are called Parameters.

The parameters are always presented in a fixed format: The Upper Row displays the *Parameter Name* and the Lower Row displays the options / set value. The parameters appear in the same sequence as listed in their respective sections.

For convenience and ease of memorizing, the various parameters have been arranged in different groups depending upon the functions the parameters represent. Each group is assigned a unique Page Header for its access.

SET-UP MODE

The Set-up Mode allows the user to view and / or modify the parameter values. Follow the steps below to open a desired Page Header for setting the parameter values.

1. Press and release PAGE key. The Upper Row shows SELECT PAGE and the Lower Row shows the name for the first available Page Header. See Figure below.

SELECT PAGE>>
Operator Paras

2. Select the desired Page Header / Sub-header name on the Lower Readout using the UP/DOWN keys.
3. Press and release ENTER key. The Upper Row shows the name of the first parameter listed in the selected Page Header / Sub-header and the Lower Row shows its current value.

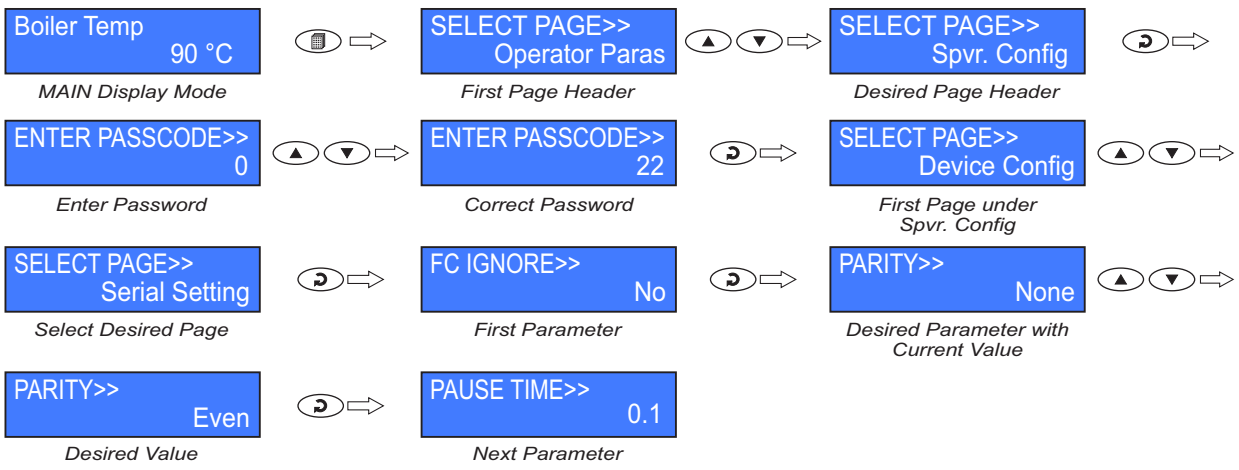
Adjusting Parameter Values

Once a Page Header is accessed; step through the following sequence to adjust the values of the desired parameters.

1. Press and release the ENTER key until the name for the required parameter appears on the Upper Row. The last parameter in the list rolls back to the first parameter.
2. Use UP / DOWN keys to adjust the parameter value.
3. Press and release the ENTER key. The new value gets stored in the non-volatile memory and the next parameter in the list is displayed.

The figure 4.1 below illustrates how to access the desired Page Header and edit the parameter value. The illustration shows the example of altering the value for the parameter 'Parity' (available in sub-header "Serial Setting") from 'None' to 'Even'.

Figure 4.1



To exit the Set-up Mode and return to the MAIN Display Mode, press and release PAGE key.

Notes:

1. It is a must to press the ENTER key after altering the value of a parameter else the new value will not be registered / stored. That is, a return to the MAIN Display Mode (by depressing PAGE key) without pressing the ENTER key will not store the altered value in the UniRec-CZ memory and the previous set value will be retained.
2. If the UniRec-CZ is left in Set-up Mode for more than 30 seconds without any key operation, it automatically exits the Set-up Mode and returns to the MAIN Display Mode.

Section 5

OPERATOR PARAMETERS

The Operator Page allows select one of several Pen-Drive options.

Table : 5.1

Parameter Description	Settings (Default Value)
SELECT OPTION *(Available only when a Pen Drive is attached to the USB socket)* **None** No operation **Copy (New)** Download available New Records to Pen Drive. This option is not presented if there are no new records stored in the internal memory. **Re-copy (Old)** Download available Old Records to Pen Drive. This option is not presented if there are no old records stored in the internal memory. **Recover** This option is presented only if a prior 'Copy (New)' or 'Recopy (Old)' operation was interrupted. The interrupted operation is resumed from the beginning.	None Copy (New) Re-copy (Old) Recover (Default : None)

Section 6

SUPERVISORY CONFIGURATION

The Page Header 'Spvr. Config' encompasses a subset of Page Headers containing parameters that are set less frequently. These parameters should only be accessible to Supervisory level and thus are protected by password. Upon entering the appropriate password for the parameter 'ENTER PASSCODE', the following list of Page Header is available.

1. Device Configuration (*Device Config*)
2. Relay Configuration (*Relay Config*)
3. Recorder Configuration (*Recorder Config*)
4. RTC Settings (*RTC Settings*)
5. Serial Setting (*Serial Setting*)
6. Configuration Mode (*Config Mode*)
7. Utilites (*Utilites*)
8. Return to Main Mode (*Exit*)

The parameters covered under each Page Header are described in detail in the following sections.

Section 7

DEVICE CONFIGURATION

Table : 7.1

Parameter Description	Settings (Default Value)
STATUS OFF STR>> This parameter is applicable for Status type channels. The PC Configuration tool allows setting the message (string) for 'active' status only. For non-active status the string selected for this parameter is displayed and recorded.	– – No Off (Default : – –)
DELETE RECORDS Setting this command to 'Yes', erases all the records stored in the internal memory.	No Yes (Default : No)
SCAN RATE Applicable for Auto Scan Mode only. This parameter value sets the time interval for which each channel is displayed. In other words, the rate at which the channels are sequentially updated on the recorder's front display.	1 Sec. to 99 Sec. (Default : 3 Sec.)
RECORDER ID This parameter assigns a unique identification number to the UniRec-CZ which is then used in file naming system for downloading the records to the Pen Drive.	1 to 127 (Default : 1)
TOTAL DEVICES ⊗ This is a Read-only parameter and shows the number of slave devices connected (configured) on the RS485 network for channel monitoring.	upto 25 (Default : 1)
SELECT DEVICE ⊗ Select the device number that needs configuration for the parameters 'Device Type' and 'Device ID' (described next).	1 to Total Device
PV RESOLUTION ⊗ Set the process value indication resolution (decimal point). All the resolution based parameters (Hysteresis, Alarm Setpoints etc.) then follow this resolution setting.	Not Applicable 1, 0.1, 0.01 0.001, 0.0001 (Default : Not Applicable)
DEVICE ID ⊗ Set the unique communication ID that the UniRec-CZ will use to fetch the process information from the selected device.	1 to 127 (Default : 1, 2, 3,.....so on)

⊗
- **Ignore these parameters.**
- **Do not alter the values.**
- **Will be removed in the next firmware version.**

Section 8

RELAY CONFIGURATION

Table : 8.1

Parameter Description	Settings (Default Value)
RELAY-1 LOGIC **RELAY-2 LOGIC** **Normal :** The Relay remains ON under Alarm condition; OFF otherwise. Useful for activating Audio / Visual Alarm. **Reverse :** The Relay remains OFF under Alarm condition; ON otherwise. Useful for Tripping the system under monitoring.	Normal Reverse (Default : Normal)

Section 9

RECORDER CONFIGURATION

Table : 9.1

Parameter Description	Settings (Default Value)
NORMAL INTERVAL Time interval in MM:SS for generating periodic records.	0.02 to 150.00 mm:ss (Default : 5.00)

Section 10

RTC SETTING

Table : 10.1

Parameter Description	Settings
TIME (HH:MM) Set current clock time in Hrs:Min (24 Hours format).	0.0 to 23:59
DATE Set current calendar date.	1 to 31
MONTH Set current calendar month.	1 to 12
YEAR Set current calendar year.	2000 to 2099

Section 11

SERIAL SETTING

Table : 11.1

Parameter Description	Settings
FC IGNORE ⊗ If set to 'Yes', the UniRec-CZ ignores comparing the Function Code (FC) sent in the query and the one received in the response packet.	No Yes (Default : No)
BAUD RATE Communication speed in 'Bits per Second' for the back-end devices RS485 Network. Make sure that all the slave devices are set to this Baud Rate.	2400, 4800, 9600, 14400, 19200, 38400, 57600 (Default : 9600)
PARITY One of the communication error trapping features for the back-end devices RS485 Network. Make sure that all the slave devices are set to this Parity.	None Even Odd (Default : Even)
PAUSE TIME The time delay between two consecutive Query-Responce MODBUS transactions. It determines the rate at which the UniRec-CZ polls the parameters.	0.1 to 5.0 Sec. (Default : 0.1 Sec)
RESPONSE TIME The maximum time the UniRec-CZ waits for the back-end slave device to respond to a MODBUS query.	0.3 to 3.0 Sec. (Default : 0.3 Sec.)

⊗
- **Ignore this parameter.**
- **Do not alter the value.**
- **Will be removed in the next firmware version.**

Section 12

CONFIGURATION MODE

Table : 12.1

Parameter Description	Settings
CONFIG MODE Set to 'Yes' for downloading the configuration file from the PC Tool to UniRec-CZ through RS485 Serial Port.	No Yes (Default : No)

Section 13

UTILITIES

Table : 13.1

Parameter Description	Settings (Default Value)
LOCK **UNLOCK** These parameters lock or unlock parameter settings. Locking inhibits editing (modifying) of parameter values to prevent any inadvertent changes by the operator. The Parameters 'Lock' and 'Unlock' are mutually exclusive. When in locked condition, the instrument asks for UNLOCK (Yes / No). Set the parameter to 'Yes' and the instrument returns to Main Mode. Access this parameter again to set the value for UNLOCK to 'Yes'. The instrument returns to Main mode with lock open. For locking, the parameter LOCK needs to be set to 'Yes' only once.	No Yes (Default : No)

Section 14

EXIT

Table : 14.1

Parameter Description	Settings (Default Value)
EXIT Select 'Yes' to exit the setup mode and revert to the Main display mode.	No Yes (Default : No)

Section 15

MECHANICAL INSTALLATION

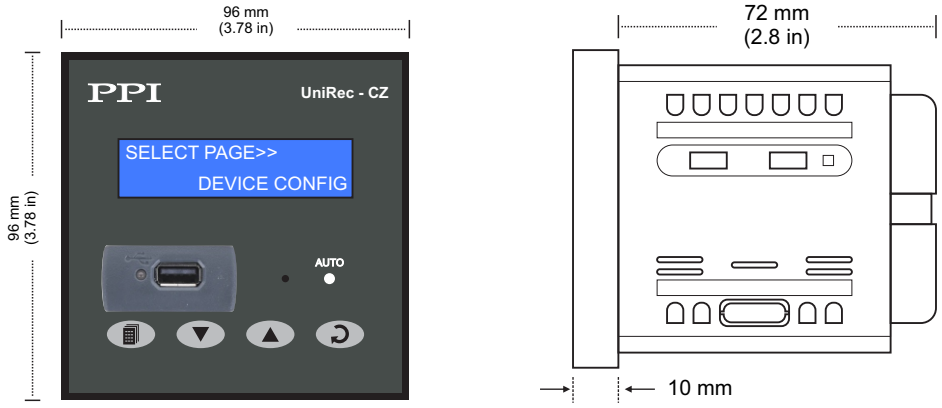
The following precautions should be strictly observed while installing the Recorder:

1. The place of installation should be free of corrosive/combustible gases and electrically conductive pollution.
2. Ensure that the place of installation is not subject to rapid ambient changes that can cause condensation. Also the Ambient Temperature and Relative Humidity surrounding the controller should not exceed the maximum specified for the proper operation of the Recorder.
3. The place of installation should be adequately protected against excessive electrostatic or electromagnetic interference.
4. The Recorder should not be subject to direct vibration or shock.
5. The Recorder should not be exposed to dust, salt air, direct sunlight or radiant heat.

OUTER DIMENSIONS

The Figure 15.1 shows the outer dimensions of the Recorder.

Figure 15.1

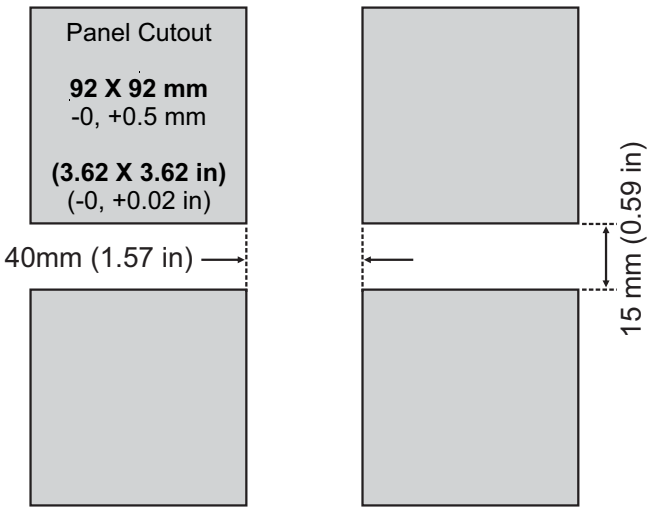


Front View **Side View**

PANEL CUTOUT AND RECOMMENDED MINIMUM SPACING

The Figure 15.2 shows the panel cutout requirements for a single Recorder and also the minimum spacing recommended if several Recorders are required to be mounted on a single panel.

Figure 15.2

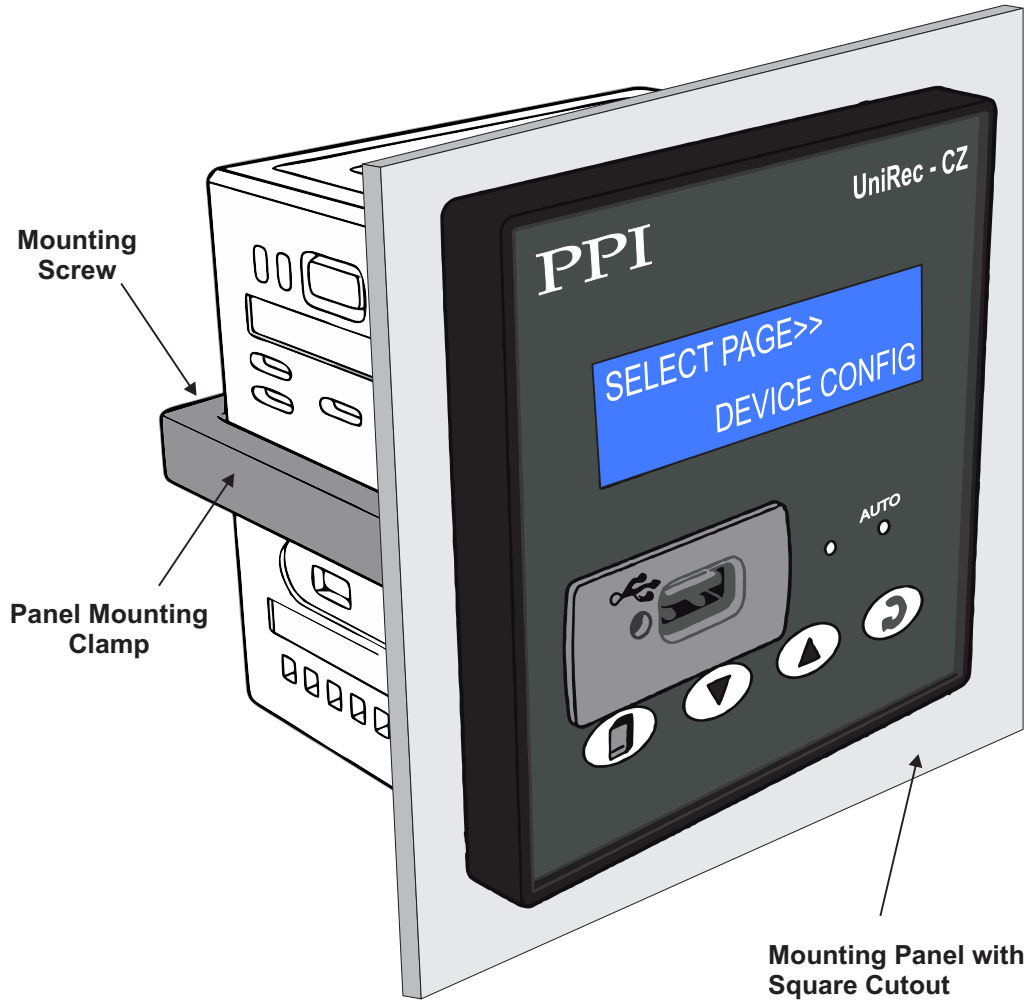


PANEL MOUNTING

Follow the steps below for mounting the Recorder on panel:

1. Prepare a square cutout to the size shown in Figure 15.2.
2. Remove the Mounting Clamps from the Recorder Enclosure.
3. Insert the rear of the Recorder housing through the panel cutout from the front of the mounting panel.
4. Hold the Recorder gently against the mounting panel such that it positions squarely against the panel wall, see Figure 15.3. Apply pressure only on the bezel and not on the front label.
5. Fix the Mounting Clamps on each side (Left & Right) and tighten the screws until the clamps firmly secures against the panel wall.

Figure 15.3



Section 16

ELECTRICAL CONNECTIONS

WARNING

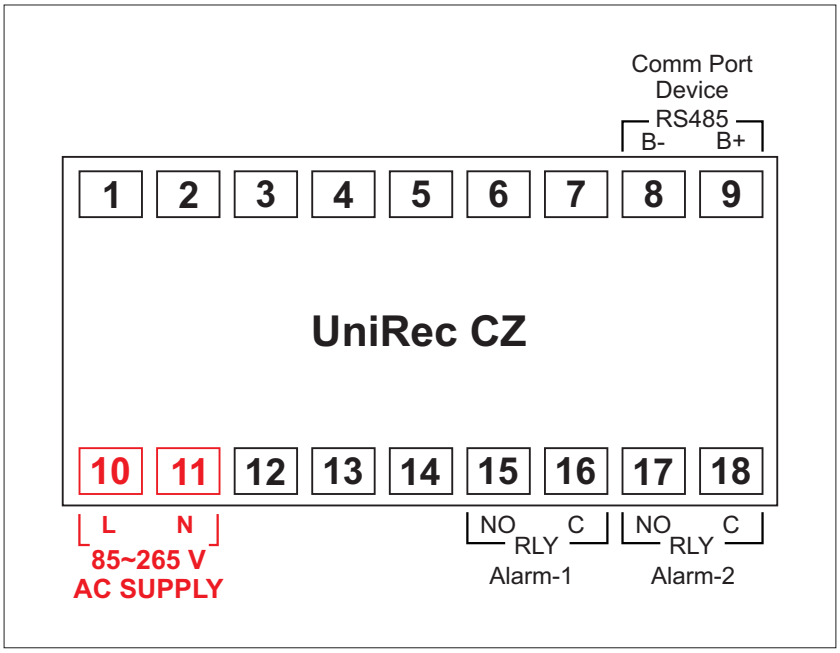
MISHANDLING/NEGLIGENCE CAN RESULT IN PERSONAL DEATH OR SERIOUS INJURY.

1. The user must rigidly observe the Local Electrical Regulations.
2. Do not make any connections to the unused terminals for making a tie-point for other wires (or for any other reasons) as they may have some internal connections. Failing to observe this may result in permanent damage to the recorder.
3. Run power supply cables separated from the low-level signal cables (like Thermocouple, RTD, DC Linear Current / Voltage, etc.). If the cables are run through conduits, use separate conduits for power supply cable and low-level signal cables.
4. Use appropriate fuses and switches, wherever necessary, for driving the high voltage loads to protect the recorder from any possible damage due to high voltage surges of extended duration or short-circuits on loads.
5. Take care not to over-tighten the terminal screws while making connections.
6. Make sure that the power supply is switched-off while making / removing any connections.

CONNECTION DIAGRAM

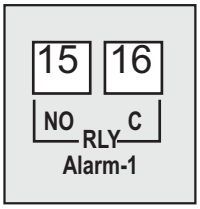
The Electrical Connection Diagram is shown on the Top Side of the enclosure. Refer figure 16.1.

Figure 16.1



ALARM-1 RELAY OUTPUT

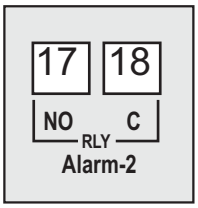
Figure 16.2



This relay output status is determined by logically ORing the Alarm-1 status of all the devices. Potential-free Relay changeover contacts NO (Normally Open) and C (Common) rated 2A/240 VAC (resistive load) are provided as Relay output.

ALARM -2 RELAY OUTPUT

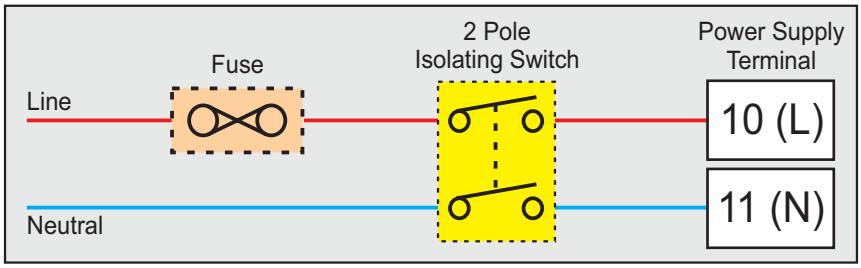
Figure 16.3



This relay output status is determined by logically ORing the Alarm-2 status of all the devices. Potential-free Relay changeover contacts NO (Normally Open) and C (Common) rated 2A/240 VAC (resistive load) are provided as Relay output.

POWER SUPPLY

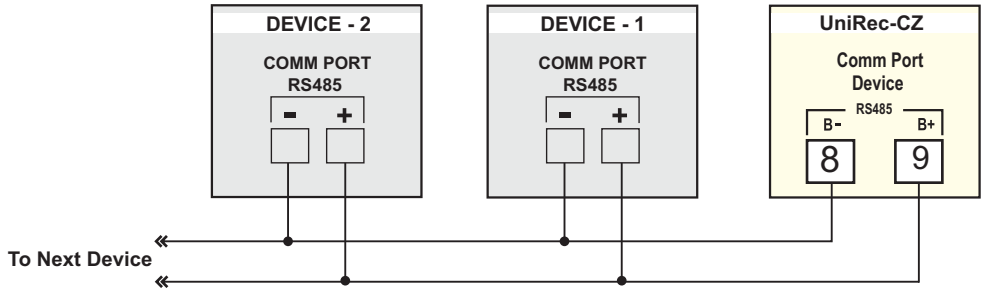
Figure 16.4



As standard, the UniRec-CZ is supplied with power connections suited for 85 to 264 VAC line supply. Use well-insulated copper conductor wire of the 2 size not smaller than 0.5mm for power supply connections. Connect Line (Phase) supply line to terminal 10 and the Neutral (Return) supply line to terminal 11 as shown in Figure 16.4. The controller is not provided with fuse and power switch. If necessary, mount them separately. Use a time lag fuse rated 1A @ 240 VAC.

COMMUNICATION PORT FOR INTERFACING WITH DEVICES

Figure 16.5



The UniRec-CZ is connected to 1 or more Devices using RS485 Serial Communication Port. The wiring connections for interfacing is shown in the figure 16.5. For reliable noise free communication, use a pair of twisted wires inside screened cable. The wire should have less than 100 ohms / km nominal DC resistance (Typically 24 AWG or thicker).

Process Precision Instruments (An ISO 9001 : 2008 Company)
101, Diamond Industrial Estate, Navghar, Vasai Road (E), Dist. Palghar - 401210, Maharashtra, India
Sales : 8208199048 / 8208141446 Support : 07498799226 / 08767395333
sales@ppiindia.net www.ppiindia.net