FLOREX

PPI
The Perfection Experts

Flow Rate Indicator Cum Totaliser

User Manual

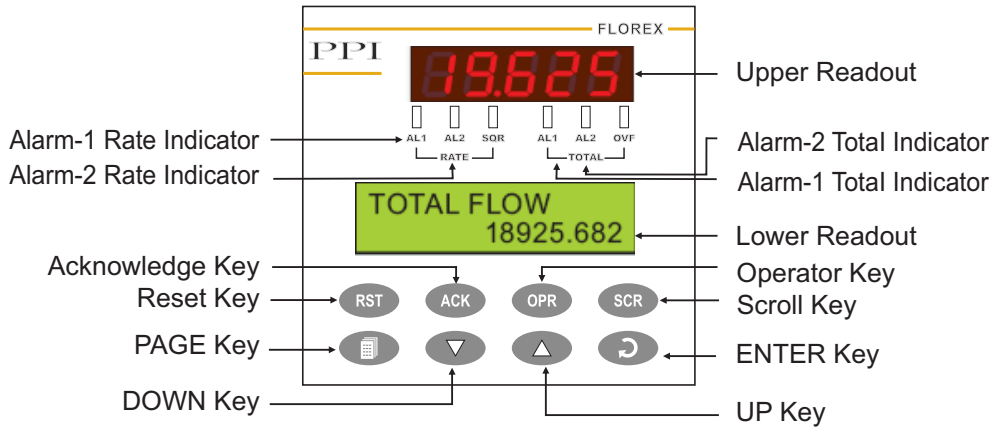
CONTENTS

Section 1

FRONT PANEL LAYOUT

The FLOREX front panel comprises of digital readouts, LED indicators and membrane keys as shown in Figure 1.1 below.

Figure 1.1



READOUTS

The Upper Readout is a 5 digit, 7-segment bright red LED display and usually displays the Flow Rate.

The Lower Readout is a 16 characters X 2 Rows LCD with Green Backlight and usually displays Total Flow. In View Only Mode, the Lower Readout scrolls the operator view only parameters. In Operator Mode, the Lower Readout displays operator and in Program Mode, the Lower Readout displays the programming parameter names and their corresponding values / options.

The indications on the Lower Readouts, in general, depend on the mode of operation and configuration parameters. Refer respective sections for more details.

INDICATORS

There are six front panel LED indicators viz. Three Red LED for Flow Rate Status and three Green LED for Flow Total status. These indicators show various statuses. The Table 1.1 below lists each LED indicator (identified by the front panel legend) and the associated status it indicates.

Table 1.1

Indicator	Function
AL1 RATE	Indicates Alarm-1 status if Alarm-1 for Flow Rate is set to other than 'none' • Flashes while the Alarm-1 is active. • Glows when the Alarm-1 is active and latched. • Remains OFF while the Alarm-1 is inactive.
AL2 RATE	Indicates Alarm-2 status if Alarm-2 for Flow Rate is set to other than 'none' • Flashes while the Alarm-2 is active. • Glows when the Alarm-2 is active and latched. • Remains OFF while the Alarm-2 is inactive.
SQR	• Glows while the Flow Rate is indicated by applying Square Root Calculation. • Remains OFF if the Flow Rate is indicated without applying Square Root Calculation.

Indicator	Function
AL1 TOTAL	Indicates Alarm-1 status if Alarm-1 for Flow Total is set to other than 'Enable' • Flashes while the Alarm-1 is active. • Glows when the Alarm-1 is active and latched. • Remains OFF while the Alarm-1 is inactive.
AL2 TOTAL	Indicates Alarm-2 status if Alarm-2 for Flow Total is set to other than 'Enable' • Flashes while the Alarm-2 is active. • Glows when the Alarm-2 is active and latched. • Remains OFF while the Alarm-2 is inactive.
OVF	• Glows while the Flow Total value overflows the maximum Total value. • Remains OFF while the Flow Total value is less than the set Total value.

KEYS

There are eight tactile keys provided on the front panel for configuring the FLOREX selecting View Only parameters, setting-up the program Mode and selecting Operation Parameters.

The Table 1.2 below lists each key (identified by the front panel symbol) and the associated function.

Table 1.2

Symbol	Key	Function
RST	RESET	Press to Reset the Flow Total value to zero.
ACK	ACKNOWLEDGE	Press to manually Acknowledge the Rate/Total Alarms if the Alarm latch is enabled.
OPR	OPERATOR	Press to access the Operator Mode.
SCR	SCROLL	Press to scroll through the various display fields individually on Lower Readout in View Only Mode.
	PAGE	Press to enter or exit set-up mode.
	DOWN	Press to decrease the parameter value. Pressing once decreases the value by one count; keeping pressed speeds up the change.
	UP	Press to increase the parameter value. Pressing once increases the value by one count;keeping pressed speeds up the change.
	ENTER	Press to store the set parameter value and to scroll to the next parameter on the PAGE.

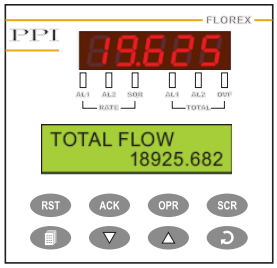
Section 2
BASIC OPERATIONS

POWER-UP

Upon switching on the power to the instrument, all displays and indicators are lit on for approximately 3 seconds during which time the instrument runs through a self-test sequence. This is followed by the indication of the instrument model name and firmware version on the Lower Readout as FLOREX S/W: 1 H/W: 1, for approximately 1 second.

MAIN DISPLAY MODE

Figure 2.1



After the Power-up display sequence, the Upper Readout starts showing the measured Flow Rate and the Lower Readout displays the accumulated Flow Total.

This is called the MAIN Display Mode and this is the one that shall be used most often. The MAIN Display Mode is depicted in Figure 2.1.

FIRST TIME / NEW INSTALLATION

For a first-time installation of a new instrument or if the instrument is removed from one application and installed on different application, it is recommended to subsequently observe the following sequence of parameter settings that are required for instrument's intended operation. (Refer *Section 3 : Pages & Parameters* for details on parameter settings).

1. Set the Input Configuration Parameters.
2. Set the Supervisory Parameters.
3. Set the Flow Rate Alarm Parameters (if required).
4. Set the Flow Total Alarm Parameters (if required).
5. Set the Retransmission Parameters (if required).
6. Set the Serial Configuration Parameters (if required)

Upon completion of parameters settings, the FLOREX reverts to MAIN Display Mode. The Florex, now, can be programmed to operate in the intended Operation Modes as described below.

OPERATION MODES

The FLOREX can be operated in the following operation modes.

Flow Rate Indication

The Florex accepts DC Linear Current / Voltage Input from the Flowmeters to measure the Flow Rate. The value of the Flow Rate is displayed in accordance with the value for Range Low / High and the Resolution selected on Input Configuration Page.

The measured value of Flow Rate can be directly displayed or by applying Square Root Function (if the Square Root Function is enabled on Input Configuration Page).

Totaliser Operation

The Totaliser mode is used primarily to monitor accumulated Flow Total. The calibrated analog signal (derived from Flow Rate Signal Input) is used to drive the Totaliser. The FLOREX keeps adding the currently measured value of Flow Rate with the previously measured value and displays the continuously updated accumulated Total Flow on the Lower Readout (Eight Digit, LCD) until the another view only parameter is selected on Lower Readout by pressing SCROLL key.

The Resolution for the Flow Total value is same as that selected for Flow Rate value. The Totaliser display may be reset from the Front Panel using RESET (RST) key.

Issuing Total Reset Command

The accumulated Flow Total can be Reset to 0 by issuing Total Reset Command. The 'Reset Command' can be locked under supervisory level Command. The 'Reset Command' can be locked under supervisory level and will be effective only if it is unlocked at operator level.

1. Press Total Reset (RST) key while the FLOREX is in MAIN Display Mode. The Lower Readout displays 

2. Use UP/DOWN key to adjust the value of the Passcode. Notice that this Passcode value should match with the value set for the 'Supervisory Passcode' on Utility Page.
3. Press ENTER key to Reset the Total value to 0.

Notice that upon resetting the Flow Total to 0, the FLOREX immediately starts accumulating the Flow Total if the Flow Rate is other than 0. If the set Passcode value does not match with the value set for the Supervisory Passcode set on Utility Page, the FLOREX reverts to MAIN Display Mode without resetting the accumulated Total.

If the value set for 'Supervisory Passcode' is set to 0, the Flow Total will immediately get Reset to 0 upon pressing ENTER key.

Batch Operation

The FLOREX can be configured to operate in Batch Control mode primarily used to control batches. The main difference between the Batch mode and Rate/Total mode is the relay operation. To configure the FLOREX in Batch Control Mode, the option for the parameter 'Total Alarm Logic' is to be set to 'Reverse' on Total Alarm Page.

The FLOREX is provided with Two Setpoints for Flow Total. The user can configure one setpoint as a Pre-warn value below the final Total Flow value.

The Batch mode allows the operator to "START" the batch upon power-up the FLOREX or issuing 'Reset Command' via the front panel RESET (RST) key. Once started, the output-1 and output-2 (Relay / SSR) will energize and send power to a flow control device (i.e. solenoid valve or pump). The flow sensor will send a signal to the FLOREX and total accumulation will begin.

When the Pre-warn value (Total Setpoint-1) is reached, Relay 1 will drop out (this is ideal for flow slow down). When the Batch amount is reached to the Final value (Total Setpoint-2), Relay 2 will drop out and the Batch will be completed. During batch is running, the setting of Flow Total Alarm Logic to 'Normal' from 'Reverse' is inhibited.

Alarm Operation

The FLOREX is provided with two independent alarm setpoints for Flow Rate as well as Flow Total. Depending upon the Alarm Type selected, the Flow Rate alarm is activated/de-activated by comparing the measured Flow Rate with the value set for the Alarm Setpoint by the set value for Alarm Hysterisis.

If the Total Alarm is enabled, the Total Alarm is activated by comparing the accumulated total with the set value for Total Alarm Setpoint.

(For more details on Alarm Parameters, Refer the respective sections of *Flow and Total Alarm Parameters.*)

Alarm Acknowledgment

The FLOREX is provided with the output (Relay/SSR) facilitating “hard” alarm for Flow Rate as well as Flow Total. That is, if any or both the alarms are activated (alarm condition is occurred), the output (Relay/SSR) associated with their respective alarms gets energized and sounds the buzzer/hooter.

The output (Relay/SSR) remains energized until the alarm condition is automatically / manually removed, by Auto Reset or the user manually acknowledges the alarm condition by pressing the Alarm Acknowledgment (ACK) key

Note that upon pressing this key, the Alarm output switched OFF but the Alarm LED indications will remain continue until the Alarm condition is removed. However, if the Alarm condition is not removed, the FLOREX continues to indicate the alarm status by flashing the alarm status LED indicators. If the Alarm condition is removed prior to acknowledging the alarm, the FLOREX will automatically switched OFF the alarm output and alarm indication. If the Alarm condition is removed after acknowledging the alarm, the FLOREX will activate the alarm only if new alarm condition will occur.

STORAGE OF MIN. & MAX. FLOW RATE

The FLOREX has a unique feature of view and store the Minimum and Maximum value of measured Flow Rate. This facilitates user to view the Maximum (Overshoot) and Minimum (undershoot) of Flow Rate from its present value. These values can be viewed by entering into Operator Page while the FLOREX is in MAIN Display Mode if this feature is enabled under supervisory level.

Step through the following sequence to View and Reset the Minimum and Maximum value of Flow Rate, if this facility is enabled under supervisory level.

1. Press SCROLL key from MAIN Display until the Lower Readout displays 

   Notice that the Right Hand side of the Lower Readout shows the stored Minimum value of Flow Rate.

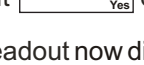
2. Press SCROLL key once again. The Lower Readout now displays 

   Notice that the Right Hand side of the Lower Readout shows the stored Maximum value of Flow Rate.

Issuing Min. / Max. Reset Command

Further, these stored values can be Reset by issuing the ‘Reset Command’. In Reset, the stored values of Minimum and Maximum Flow Rate get erased and overwritten with the present value of Flow Rate. The ‘Reset Command’ can be locked under supervisory level and will be effective only if it is unlocked at operator level.

1. Press Operator (OPR) key to enter into Operator Page from MAIN Display and keep pressing ENTER key until the Lower Readout displays 

Reset Min./Max. Command
2. Use UP key to set the option ‘No’ to ‘Yes’. The Lower Readout 

displays
3. Press ENTER key to register ‘Yes’ Command. The Lower Readout now displays 

4. Use UP/DOWN key to adjust the value of the Passcode. Notice that this Passcode value should match with the value set for the ‘Supervisory Passcode’ on Utility Page.
5. Press and release ENTER key.

The set value is registered and if matched with the ‘Supervisory Passcode’, the stored Min./Max. Value of Flow Rate will get erased and the present value of Flow Rate is stored as both Min./Max value of Flow Rate.

Notes:
1. The storage and view of Minimum & Maximum value of Flow Rate is available as long as this feature is Enabled on Supervisory Page. If this feature is disabled on Supervisory Page, the storage and view of Minimum & Maximum value of Flow Rate function will not be available.

2. In case Flow Rate Error conditions like Or (Over-Range) or Ur (Under- Range) occurs, even if the MAIN display of FLOREX flashes Error message, the FLOREX stores and views the actual counts available for Flow Rate Error condition as Minimum & Maximum value of Flow Rate instead of viewing Flow Rate Error message. It is, therefore, recommended to Reset these stored values upon removing the Flow Rate Error conditions to store and view the presently available values of Minimum & Maximum value of Flow Rate. Else, the FLOREX will continue to view the actual counts stored at the instant Flow Rate Error condition occurred.
3. If the power supply to the FLOREX is switched-off or a power-failure occurs while the Storage of Minimum & Maximum value of Flow Rate is enabled, upon resumption of power, if the power-on measured Flow Rate is found above the Maximum value or below the Minimum value stored prior to power-failure, the FLOREX stores and views the power-on measured Flow Rate as Minimum or Maximum value of Flow Rate, respectively. Else, the Minimum & Maximum value of Flow Rate stored prior to power-failure are remain intact.
4. By default, the Storage on Minimum & Maximum value of Flow Rate feature is disabled on Supervisory Page. Therefore, this feature will not be available upon carrying “Setting Default Value” procedure.

VIEW ONLY PARAMETERS

The Table 2.1 below describes the view only parameters followed by the definition of each parameter. Notice that these parameters are for view only. That is, their values can not be altered by the user.

The View Only parameters are selected to display on Lower Readout by pressing SCROLL (SCR) key while the FLOREX is in MAIN Display Mode. The user can revert to MAIN Display Mode from any parameter just by pressing ENTER key.

Table 2.1

Parameter Description	Settings (Default Value)
TOTAL TIME This parameter shows the Total Time elapsed from the Power-up of FLOREX. The Total Time is shown in Hour : Minute : Second Format. This parameter allows the user to view the Total Time within which the Total Flow is accumulated. This Timer is automatically get Reset upon resetting the accumulated Flow Total and re-starts counting the Time period again from 0 automatically.	Time (HH:MM:SS) 00:00:00
MINIMUM FLOW RATE This is parameter is available only if the ‘Storage of Minimum & Maximum of Flow Rate’ is enabled on Supervisory Page. This parameter views the currently stored Minimum value of Flow Rate.	MIN. FLOW RATE 0
MAXIMUM FLOW RATE This is parameter is available only if the ‘Storage of Minimum & Maximum of Flow Rate’ is enabled on Supervisory Page. This parameter views the currently stored Maximum value of Flow Rate.	MAX. FLOW RATE 100

Parameter Description	Settings (Default Value)
NO. OF OVERFLOWS This parameter shows the number of counts for which the accumulated Flow Total overflows from the maximum (99999999) counts. This parameter allows the user to count that how many times the Total Flow has overflow from the maximum counts. This parameter will automatically get Reset to 0 upon issuing Total Flow Reset Command.	NO.OF OVER FLOW 0

OPERATOR PARAMETERS

The FLOREX facilitates a separate group for Operator Parameters to provide operational ease for normal day-to-day operations and to avoid unauthorized access to the FLOREX Program Mode.

The Operator Mode can be entered by the Front Panel key labeled OPERATOR (OPR) and the list of various operator parameters can be set using UP/DOWN and ENTER key.

Step through the followings to adjust the Operator Parameter values.

1. While the FLOREX is in MAIN Display Mode, press and release the OPERATOR key. The Lower Readout displays the first -parameter in the list.
2. Use UP/DOWN key to set the value for various operator related parameters and press ENTER key to register the set value and scroll to next parameter in the list.

The Operator Parameters are listed in Table 2.2 below followed by their respective definitions.

Table 2.2

Parameter Description	Settings (Default Value)
ALARM ACKNOWLEDGE This command allows the user to manually acknowledge the “hard” alarm. This command is available and applicable only if the Alarm Latch is enabled, the alarm condition is occurred and not yet acknowledged. Once the alarm is acknowledged, this command will be available only if the alarm condition is occurred for the next time. This command has two possible settings. It serves as a Command to Acknowledge the hard (sounding of buzzer/hooter) and the alarm status indication	No Yes (Default : No)
MIN./MAX. RESET COMMAND This parameter is available and applicable only if the ‘Storage of Minimum & Maximum value of Flow Rate’ is enabled on Supervisory Page. It has two possible settings.	No Yes (Default : No)

Parameter Description	Settings (Default Value)
PASSCODE VALUE This parameter is available and applicable only if the 'Reset Command' for 'Storage of Minimum & Maximum value of Flow Rate' is set to 'Yes' on Operator Page. The numeric value entered for this parameter should match with the numeric value set for the 'Supervisory Passcode' for 'Reset Command' on Utility Page to make the 'Reset Command' effective. If the value entered for this parameter does not match with the value set for 'Supervisory Passcode' for 'Reset Command' on Utility Page, the 'Reset Command' will not be effective even if it is set to 'Yes' and the previously stored Minimum & Maximum value of Flow Rate will remain intact.	0 to 250 (Default : 0)
TOTAL RESET COMMAND *No :* If for any reason, the accumulated Flow Total is not to be Reset yet, issue this as a Command to intact the previously accumulated values. *Yes :* This Command Resets the previously stored accumulated Flow Total to 0. The 'Total Reset Command' will be effective only if the value entered for 'Passcode' matches with the 'Supervisory Code' for Reset Command set on Utility Page .	No Yes (Default : No)
PASSCODE VALUE The definition and operation of this parameter is same as that described for the parameter 'Passcode Value' for 'Min./Max. Reset Command', but applicable for 'Total Reset Command'. Note that the value set for 'Supervisory Passcode' is commonly applicable for both 'Min./Max. Reset Command' and 'Total Reset Command'.	0 to 250 (Default : 0)
FLOW ALARM-1 SETPOINT This parameter is available only if 'Flow Alarm-1 Type' is selected to other than 'None'. If the Alarm Type is selected as 'Process High', the alarm is activated whenever the measured Flow Rate is at or above the set value. Similarly, if the Alarm Type is selected as 'Process Low', the alarm is activated whenever the measured Flow Rate is at or below the set value.	0 to 30000 (Default : For Process Low : 0 , For Process High : 1000)
FLOW ALARM-2 SETPOINT The definition of this parameter is same as that described for Flow Alarm-1 Setpoint but applicable for Flow Alarm-2 Setpoint.	0 to 30000 (Default : For Process Low : 0 , For Process High : 1000)

Parameter Description	Settings (Default Value)
TOTAL ALARM-1 SETPOINT This parameter is available only if 'Total Alarm-1' is selected to 'Enable'. If enabled, the alarm is activated whenever the accumulated Flow Total is at or above the Total Alarm-1 Setpoint.	0 to 99999999 (Default : 5000000)
TOTAL ALARM-1 EXT. SETPOINT This parameter is available only if 'Total Alarm-1' is selected to 'Enable'. If enabled, the alarm is activated whenever the accumulated Flow Total is at or above the Total Alarm-1 Setpoint.	0 to 125 (Default : 0)
TOTAL ALARM-2 SETPOINT The definition of this parameter is same as that described for Total Alarm-1 Setpoint but applicable for Total Alarm-2 Setpoint.	0 to 99999999 (Default : 5000000)
TOTAL ALARM-2 EXT. SETPOINT The definition of this parameter is same as that described for Total Alarm-1 Setpoint but applicable for Total Alarm-2 Setpoint.	0 to 125 (Default : 0)

Note:

The Flow Alarm and Total Alarm Setpoints are available for adjustment only if their adjustment is enabled under supervisory level on Supervisory Page, else available for view only. (For more details on Alarm Parameters, Refer the respective sections of Flow and Total Alarm Parameters.)

Section 3
PAGES AND PARAMETERS

ORGANIZATION

The FLOREX requires various user settings that determine how the FLOREX will function or operate. These settings are called Parameters.

The parameters are always presented in a fixed format: The Upper Row of Lower Readout displays the parameter name (Identification Tag) and the Lower Row displays the options / set value. The parameters appear in the same sequence as listed in their respective sections.

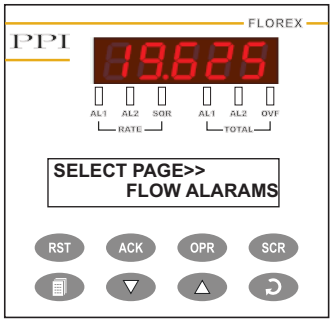
For convenience and ease of memorizing, the various parameters have been arranged in different groups depending upon the functions the parameters represent. Each group is assigned a unique Page Header for its access and the parameters within each group are presented for settings depending upon the function(s) selected.

PROGRAM MODE

The Program Mode allows the user to view or modify the parameter values. The entry from MAIN Display Mode to Program Mode requires appropriate setting of the Page Header. Follow the steps below to open a desired PAGE for setting the parameter values

1. Press and release PAGE key. The Upper Row of Lower Readout shows SELECT PAGE and the Lower Row shows first Page Header. See Figure 3.1.
2. Adjust the Lower Readout to the desired Page Header using the UP/DOWN keys. Pressing and releasing the UP or DOWN key once, access to the next or previous Page Header.
3. Press and release ENTER key. The Upper Row of Lower Readout shows the name of the first parameter listed in the Page and the Lower Row shows its current value / option.

Figure 3.1



Adjusting Parameter Values

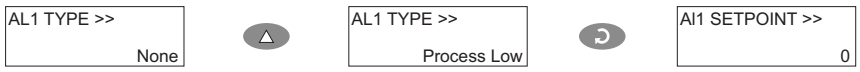
Once a PAGE is accessed, step through the following sequence to adjust the values of the desired parameters:

1. Press and release the ENTER key until the name for the required parameter appears on the Lower Readout. The last parameter in the list rolls back to the first parameter.
2. Use UP / DOWN keys to adjust the parameter value. Note that some parameters (examples; 'Alarm Setpoint', 'User Offset', etc.) have numeric values while others (examples; 'Alarm Logic', 'Time Base', etc.) have a series of options. If adjusting a numeric value; depressing the UP/DOWN key once, increases/decreases the parameters value by one digit. For parameters having a series of options, depressing the UP/DOWN key once takes you to the next/previous option. In each case, keeping the UP/DOWN key pressed speeds up the rate. If the value reaches the maximum / minimum settable value/option, the Lower Row starts flashing and the UP (if maximum value is reached) or DOWN (if minimum value is reached) key has no effect.

3. Press and release the ENTER key. The new value gets stored in the FLOREX's non-volatile memory and the next parameter in the list is displayed.

The Figure 3.2 illustrates the example of altering the value for the parameter 'Flow Alarm-1 Type'.

Figure 3.2



To exit the Program 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 FLOREX memory and the previous set value will be retained. Also, if the power failure occurs prior to pressing ENTER key, upon resumption of power, the FLOREX reverts to MAIN Display Mode without storing the altered value and retaining the previous set value.
2. If the FLOREX is left in Program Mode for more than 30 seconds without any key operation, the FLOREX automatically exits the Program Mode and returns to the MAIN Display Mode.

CONDITIONAL PARAMETERS

As discussed above the various parameters (user set values) are grouped and listed in separate PAGES. For convenience, each PAGE contains a list of parameters that relate to some specific functions or operations.

Note, however, that not all parameters are always presented to the user. Some parameters are presented only if the corresponding function is selected. Such parameters are called the conditional parameters, as their availability is dependent on the options selected for some other parameters (in the same or other PAGE). For example, consider the 'Alarm Parameters' contained in Flow and Total Alarm PAGE. These parameters are presented only if the respective 'Alarm Type' is selected to other than 'None'.

Suppressing the conditional parameters (if the conditions are not met) avoids ambiguity and makes the parameter list more comprehensive. Refer the definitions below each parameter table (listed in the following 6 sections) for the conditional parameters. Also note that the parameters appear in the same sequence as shown in the table for each PAGE

PARAMETER LOCKING

Though access to any PAGE is always permitted, the adjustment of the parameter values, however, can be Locked at the supervisory level. If the Lock is enabled, the parameter values in each PAGE can only be viewed but can not be adjusted. That is, the UP/DOWN key functions are inhibited. This feature facilitates the supervisory level to protect the parameter values from unauthorized tampering or accidental alterations by the operator.

The FLOREX is shipped from the factory in Unlocked (Lock disabled) condition. The user can enable the Lock once the initial configuration and installation is done.

For enabling / disabling the Lock, step through the following sequence:

Locking

1. Press and release PAGE key while the FLOREX is in the MAIN Display Mode. The Lower Readout displays SELECT PAGE >> FLOW ALARMS
2. Adjust the Lower Row to select Utilities Page using UP key and press ENTER key. The Lower Readout displays ENTER PASSCODE >> 0
3. Use UP key to set the value of the Pass Code to 22 and press ENTER key. The Lower Readout displays SELECT LOCK/UNLOCK
4. Press ENTER key. The Lower Readout displays LOCK >> NO Use UP key to set the option to Yes and press ENTER key.

The FLOREX returns to the MAIN Display Mode with the Lock enabled.

Unlocking

1. Press and release PAGE key while the FLOREX is in the MAIN Display Mode. The Lower Readout displays SELECT PAGE >> FLOW ALARMS
2. Adjust the Lower Row to select Utilities Page using UP key and press ENTER key. The Lower Readout displays PASS CODE >> 0
3. Use UP key to set the value of the Pass Code to 22 and press ENTER key. The Lower Readout displays SELECT LOCK/UNLOCK
4. Press ENTER key. The Lower Readout displays UNLOCK >> NO Use UP key to set the option to Yes and press ENTER key.
5. Repeat steps 1 through 4. This time the FLOREX returns to the MAIN Display Mode with the Lock disabled (Unlocked).

Notes:

1. Since there is no front panel indication of Lock enabled condition, ensure that the Lock is enabled by trying to adjust the parameter value on any valid PAGE in Program Mode.
2. If the 'Adjustment of Flow and / or Total Alarm Setpoint' is enabled under supervisory level on Supervisory Page, the respective 'Alarm Setpoint' can be adjusted on Operator parameter list even under parameter Lock enabled condition. The supervisory level, thus, can allow or disallow the 'Flow and/or Total Alarm Setpoint' adjustment to the operator by enabling or disabling the Adjustment of Flow and/or Alarm Setpoint' prior to Lock enabled.
3. If the 'Storage of Minimum & Maximum value of Flow Rate' is enabled under supervisory level on Supervisory Page, this feature will be available even under parameter Lock enabled condition.
4. The Parameter Locking is not applied for Operator Parameters. However, the supervisory level can allow or disallow the parameter adjustment to the operator by enabling or disabling the parameter adjustment on Supervisory PAGE prior to Lock enabled.
5. The facility for Setting Default Values by accessing 'Default Setting' is also inhibited under parameter Lock enabled condition.
6. The access to 'Supervisory Passcode' is also inhibited under parameter lock enabled condition.
7. The access to 'Factory Calibration Regain' is also inhibited under parameter lock enabled condition.
8. The access to 'User Calibration' is also inhibited under parameter lock enabled condition.
9. Notice that it requires setting Lock to 'Yes' once for Locking but twice for Unlock. Also, for Unlock, the setting to 'Yes' must be entered twice during the same duration for which the FLOREX is powered. That is, setting 'Yes' once prior to power loss and once after resumption of power shall not Unlock.
10. Do not forget to enable the Lock again if it was Unlocked for some parameter value alteration.

SETTING DEFAULT VALUES

The FLOREX is shipped from the factory with all the parameters set to their default factory set values. Thus, for the first-time installation there is no need for re-setting the parameters to their default values. However, in case the FLOREX is removed from a particular application and fitted on a different application, it is recommended to reset all the parameters to their default values before configuring the FLOREX for new installation.

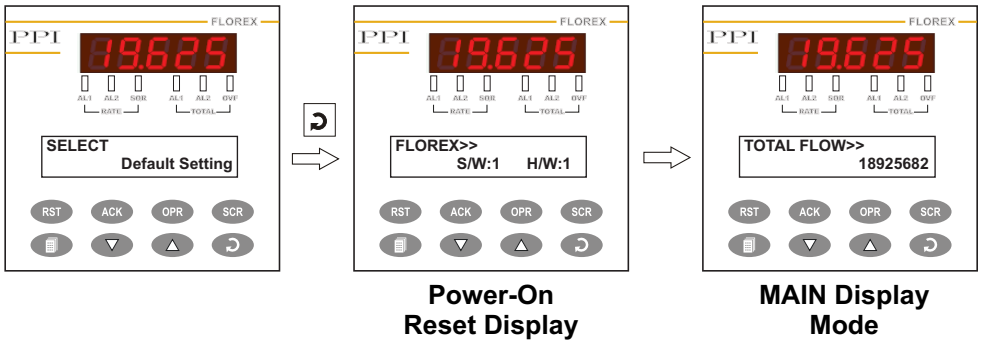
Follow the steps below for re-setting the parameters to default values :

1. Ensure that the FLOREX is Unlocked for parameter adjustments.
2. Press and release PAGE key while the FLOREX is in the MAIN Display Mode. The Lower Readout displays SELECT PAGE >> FLOW ALARMS
3. Adjust the Lower Row to select Utilities Page using UP key and press ENTER key. The Lower Readout displays PASS CODE >> 0
4. Use UP key to set the value of the Pass Code to 22 and press ENTER key. The Lower Readout displays SELECT >> Lock/Unlock
5. Keep pressing UP key until the Lower Readout displays SELECT >> Default Setting
6. Press and release ENTER key.

The FLOREX returns to the MAIN Display Mode by setting all the user set values to their respective Default settings.

The Figure 3.3 below illustrates the "Setting Default Value" display procedure.

Figure 3.3



Power-On Reset Display **MAIN Display Mode**

Note:

Notice that after carrying out the “Setting Default Value” procedure, all the resolution based parameters (like Flow Rate, Flow Total, ‘Alarm Setpoint’, ‘Alarm Hysterisis, ’User Offset’ etc.) are set to the resolution of “1” as by default, the value for the parameter Resolution on Input Configuration Page is set to 1.

Section 4

FLOW ALARM PARAMETERS

The Alarm Parameters are grouped on Flow Alarm Page. The FLOREX is provided with 2 independent “soft” alarms, that is, the alarms can be set and generated even if the corresponding output modules are not fitted or assigned to other function. The front panel indicators AL1 and AL2 for RATE indicate the alarm statuses. The alarm statuses are also available via digital communication, if the communication module is fitted.

For the “Process Alarm” function, the FLOREX continuously compares the measured Flow Rate with the ‘Flow Alarm Setpoint’. An alarm signal is generated if the Flow Rate falls outside the set alarm limit(s). Also, if the output modules (Flow AL-1 and Flow AL-2) are fitted, the Relay/SSR is energized under alarm condition and deenergized upon removal of the alarm condition depending upon the ‘Alarm Logic’ selected. The alarm switching is separated by a settable value of ‘Alarm Hysteresis’ to avoid fluctuations in alarm status near boundary conditions.

The Table 4.1 below lists the parameters followed by the definitions for each parameter.

Table 4.1

Parameter Description	Settings (Default Value)
ALARM-1 TYPE Select the Alarm-1 activation type. Selecting ‘None’ will disable the alarm and suppress all the related parameters for Alarm-1.	None Process Low Process High (Default : None)
ALARM-1 SETPOINT *(Available for Process High or Process Low Alarm-1 Type)* Sets Alarm limit independent of control setpoint.	0 to 30000 (Default : For Process Low: 0, For Process High: 1000)
ALARM-1 HYSTERESIS Sets differential (dead) band between Alarm-1 switching ON and OFF states.	1 to 30000 (Default : 2)
ALARM-1 INHIBIT Set to Yes to suppress Alarm-1 activation upon power-up or process start-up.	No Yes (Default : No)
ALARM-1 LOGIC *(Available if OP2 function is Alarm)* Select ‘Normal’ if Alarm-1 is to activate an Audio / Visual alarm. Select ‘Reverse’ if Alarm-1 is to Trip the system.	Normal Reverse (Default : Normal)
ALARM-1 LATCH *No* The Relay switches ON/OFF with Alarm switching. *Yes* The Relay Output switches (ON for Normal Logic / OFF for Reverse logic) upon Alarm activation. However, Alarm de-activation does not affect the Relay status. The Relay status can only be regained by pressing ‘Acknowledge-key’ provided the Alarm has de-activated.	Disable Enable (Default : Disable)
ALARM-2 TYPE Select the Alarm-2 activation type. Selecting ‘None’ will disable the alarm and suppress all the related parameters for Alarm-2.	None Process Low Process High (Default : None)

Parameter Description	Settings (Default Value)
ALARM-2 SETPOINT *(Available for Process High or Process Low Alarm-2 Type)* Sets Alarm limit independent of control setpoint.	0 to 30000 (Default : For Process Low: 0, For Process High: 1000)
ALARM-2 HYSTERESIS Sets differential (dead) band between Alarm-2 switching ON and OFF states.	1 to 30000 (Default : 2)
ALARM-2 INHIBIT Set to Yes to suppress Alarm-2 activation upon power-up or process start-up.	No Yes (Default : No)
ALARM-2 LOGIC *(Available if OP2 function is Alarm)* Select 'Normal' if Alarm-2 is to activate an Audio / Visual alarm. Select 'Reverse' if Alarm-2 is to Trip the system.	Normal Reverse (Default : Normal)
ALARM-2 LATCH *No* The Relay switches ON/OFF with Alarm switching. *Yes* The Relay Output switches (ON for Normal Logic / OFF for Reverse logic) upon Alarm activation. However, Alarm de-activation does not affect the Relay status. The Relay status can only be regained by pressing 'Acknowledge-key' provided the Alarm has de-activated.	Disable Enable (Default : Disable)

Section 5
TOTAL ALARM PARAMETERS

The Total Alarm Parameters are grouped on Total Alarm Page. The FLOREX is provided with 2 independent “soft” alarms, that is, the alarms can be set and generated even if the corresponding output modules are not fitted or assigned to other function. The front panel (green LED) indicators AL1 and AL2 for TOTAL indicate the alarm statuses. The alarm statuses are also available via digital communication, if the communication module is fitted.

For the “Total Alarm” function, the FLOREX continuously compares the accumulated Total with the ‘Total Alarm Setpoint’. An alarm signal is generated if the Total Flow exceeds the set alarm limit(s). Also, if the output modules (Total AL-1 and Total AL-2) are fitted, the Relay/SSR is energized under alarm condition and de-energized upon resetting the Total Flow to 0. This also facilitate the user to configure the FLOREX in Batch Control Mode by setting the ‘Total Alarm Logic’ parameter to ‘Reverse’.

The Table 5.1 below lists the parameters followed by the definitions for each parameter.

Table 5.1

Parameter Description	Settings (Default Value)
ALARM-1 ACTIVATION This parameter can be set as ‘Enable’ or ‘Disable’ to allow the user to activate or de-activate the ‘Total Alarm’ function, respectively. If set to ‘Enable’, it activates the Total Alarm function and facilitates user to access Total Alarm parameters. This parameter is automatically set to ‘Disable’ upon changing the ‘Input Type’ parameter value.	Disable Enable (Default : Disable)
ALARM-1 SET POINT This parameter sets the Process High or Process Low limit for Alarm.	0 to 99999999 (Default : 5000000)
ALARM-1 EXTENSION SET POINT This parameter sets the extended limit for Total Alarm activation if the accumulated Total has exceeded the maximum counts (i.e. 99999999). The Final Total Flow SP is derived including the No. Of Overflows to derive the Final Total Setpoint as Final Total Flow SP = Alarm Ext. SP + (No. Of Overflows * 99999999)	0 to 125 (Default : 0)
ALARM-1 LOGIC Select ‘Normal’ if Alarm is to activate an Audio / Visual alarm. Select ‘Reverse’ if Alarm is to Trip the system.	Normal Reverse (Default : Normal)
ALARM-1 TIME This parameter allows the user to set the desired time duration for which the Total Alarm remains activated. Once activated, the Total Alarm will remain activated until the set value of Alarm Time is elapsed. Upon completion of the set time duration, the Total Alarm will be automatically get Reset. However, notice that while the time period is in progress, the user can manually acknowledge the alarm by pressing Manual Acknowledge (ACK) key. Notice that during Alarm Time is in progress if the power failure is occurred, upon resumption of power, the already elapsed time is igored and the Alarm Time will get reloaded.	0 to 125 (Default : 0)

Parameter Description	Settings (Default Value)
ALARM-2 ACTIVATION Definition same as Alarm-1 but applied to Alarm-2	Disable Enable (Default : Disable)
ALARM-2 SET POINT Definition same as Alarm-1 but applied to Alarm-2	0 to 99999999 (Default : 5000000)
ALARM-2 EXTENSION SET POINT Definition same as Alarm-1 but applied to Alarm-2	0 to 125 (Default : 0)
ALARM-2 LOGIC Definition same as Alarm-1 but applied to Alarm-2	Normal Reverse (Default : Normal)
ALARM-2 TIME Definition same as Alarm-1 but applied to Alarm-2	0 to 125 (Default : 0)

Note :

All Alarm parameters have the same definitions irrespective of whether applied to Alarm-1 or Alarm-2. Thus, in the following definitions of Total Alarm Parameters, the term Alarm, which means either Alarm-1 or Alarm-2, has been used to avoid repetitions of the definitions.

Section 6

RETRANSMISSION PARAMETERS

The Retransmission (Recorder) Output Parameters are grouped on Retransmission Page and allow the user to configure the FLOREX for Retransmission (Recorder) Output.

The Table 6.1 below lists the parameters followed by the definitions for each parameter.

Table 6.1

Parameter Description	Settings (Default Value)
RETRANSMISSION OUTPUT TYPE This parameter is available and applicable only if the FLOREX is ordered with 'Retransmission' (Recorder) output option and sets the range for the recorder signal output as 0-20 mA, 4-20 mA, 0-5 V or 0- 10 V. The FLOREX outputs a linear 0-20 mA, 4-20 mA, 0-5 V or 0-10 V signal, through the optional DC Linear output, proportional to the Flow Rate within 'Low Range' and 'High Range' values.	0 to 20 mA 4 to 20 mA 0 to 5 Volts 0 to 10 Volts (Default : 0 to 20 mA)
LOW RANGE *(Available for DC Linear Inputs)* Sets process value corresponding to minimum DC Linear signal input (e.g., 0V, 0mA, 4mA, etc.)	-19999 to 30000 (Default : 0)
HIGH RANGE *(Available for DC Linear Inputs)* Sets process value corresponding to maximum DC Linear signal input (e.g., 5V, 10V, 20mA, etc.)	-19999 to 30000 (Default : 1000)

Section 7

INPUT CONFIGURATION PARAMETERS

The Input Configuration Parameters are grouped on Input Config. Page and allows the user to configure the FLOREX to match with the available input sensor. It also presents the parameters for conditioning the input sensor signal.

The Table 7.1 below lists the parameters followed by the definition of each parameter.

Table 7.1

Parameter Description	Settings (Default Value)
INPUT TYPE Select Input type in accordance with the output of flowmeter connected for flowrate measurement. Ensure proper hardware jumper settings, if required.	Refer Table 7.2 (Default : 0 to 20 mA)
TIME BASE This Parameter allows the Time Base for the accumulation of Flow. The option for this parameter is 'Second', "Minute' or 'Hour'. If the option is selected to 'Second' the accumulated Flow Total display is updated for every 1 Second updation. Similar to 'Minute' and' Hour' time base option. The Total Flow is derived as per the option set for the 'Time Base' as described under. Total = Total + [(Flow Rate/5)/ (60^{x}) Where; x = 0 for Seconds , x = 1for Minutes , x = 2 for Hours	Second Minute Hour (Default : Seconds)
RESOLUTION This parameter sets the display resolution for the measured Flow Rate. All the resolution dependent parameters like ('Alarm Setpoint', 'Alarm Hysterisis', 'Range Low', 'Range High', 'User Offset for Flow Rate',etc.) are then displayed and set as per the resolution set by this parameter. Note that the internal resolution with which the input signals are measured is independent of the resolution set by this parameter and is always much higher. The resolution selected for Flow Rate is also applicable for the accumulated Flow Total. The default value of this parameter is automatically get loaded when 'Input Type' is altered.	Refer Table 7.2 (Default : 0)
PV RANGE LOW *(Available for DC Linear Inputs)* Sets process value corresponding to minimum DC Linear signal input (e.g., 0V, 0mA, 4mA, etc.)	Refer Table 7.2 (Default : 0)
PV RANGE HIGH *(Available for DC Linear Inputs)* Sets process value corresponding to maximum DC Linear signal input (e.g., 5V, 10V, 20mA, etc.)	Refer Table 7.2 (Default : 1000)
USER OFFSET This value is algebraically added to the measured PV to derive the final PV that is displayed and compared for alarm / control. Final PV = Measured PV + Offset	-19999 to 30000 (Default : 0)

Parameter Description	Settings (Default Value)
FILTER CONSTANT Sets the time constant, in seconds, for the low-pass digital filter applied to the measured PV. The filter helps smoothing / averaging the signal input and removing the undesired noise.	0.0 to 60.0 (Default : 0.5 sec.)
MINIMUM SCALE ACTIVATION This parameter can be set as 'Enable' or 'Disable'. If selected to 'Enable', this parameter allows the user.	Disable Enable (Default : Disable)
MINIMUM SCALE VALUE To set the value that should be continuously displayed even though the corresponding Input Signal is equal or below this set value.	0 to Max. Scale (Default : 0)
MAXIMUM SCALE ACTIVATION This parameter has the same definition as described above for but applicable for Maximum Scale.	Disable Enable (Default : Disable)
MAXIMUM SCALE VALUE This parameter has the same definition as described above for but applicable for Maximum Scale.	Min. Scale to 30000 (Default : 0)
SQUARE ROOT VALUE This parameter can be set as 'Enable' or 'Disable'. If enabled, the Square Root Function is activated and the Flow Rate value on the Upper Readout is displayed by applying Square Root Calculation. This parameter is mainly applicable when the Flowmeter is measuring the Flow Rate by Differential Pressure measurement across the Orifice Plate. In such cases, the Flowmeter produces the DC Linear signal that is proportional to the Differential Pressure and the Flow Rate will be the Square Root value of the Differential Pressure. In such cases, the user can activate the Square Root Function.	Disable Enable (Default : Disable)
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 for indication.	Slow Medium Fast (Default : Fast)

Table 7.2

0 to 20 mA	0 to 20 mA DC current	-19999 to 30000 units	User settable 1 / 0.1 / 0.01 / 0.001 units
4 to 20 mA	4 to 20 mA DC current		
0 to 50 mV	0 to 50 mV DC voltage		
0 to 200 mV	0 to 200 mV DC voltage		
0 to 1.25 V	0 to 1.25V DC voltage		
0 to 5 V	0 to 5V DC voltage		
0 to 10 V	0 to 10V DC voltage		
1 to 5 V	1 to 5V DC voltage		

Section 8
SUPERVISORY PARAMETERS

The Supervisory Parameters are grouped on Supervisory Page and pertain to the FLOREX's supervisory utility features to exercise the supervisory control over the operator level.

The Table 8.1 below lists the parameters required for the operations of the supervisory utility features followed by definition of each parameter.

Table 8.1

Parameter Description	Settings (Default Value)
FLOW ALARM SP ADJUSTMENT ON OPERATOR PAGE Supervisory permission for Alarm setpoint adjustments on Operator Page. Set to 'Yes' for permission.	No Yes (Default : No)
TOTAL ALARM SP ADJUSTMENT ON OPERATOR PAGE This parameter can be set as 'Yes' or 'No' to allow the user to permit or restrict the adjustment of the 'Total Alarm Setpoint' on Operator PAGE, respectively. If set to 'Yes', it allows adjustment, else only view the set value.	No Yes (Default : No)
STORAGE OF MIN./ MAX. FLOW RATE ACTIVATION This parameter can be set as 'Yes' or 'No' to allow the user to activate or de-activate the 'Storage of Minimum & Maximum value of Flow Rate' feature, respectively. If set to 'Yes', it facilitates user to View or Reset the stored Minimum & Maximum value of Flow Rate on View Only Parameters.	No Yes (Default : No)

Section 9

SERIAL CONFIGURATION PARAMETERS

The Serial Configuration Parameters are grouped on Serial Config. Page and allows the user to configure the FLOREX to communicate with master devices like PC or Digital Recorders. The Digital (Serial) communications facilitate the FLOREX to communicate with a Master Device like Digital Recorder or PC via MODBUS (RTU) protocol, if hardware module (RS 485 / RS 232) is fitted. The parameters required for setting MODBUS communication are described as under:

Table 9.1

Parameter Description	Settings (Default Value)
BAUD RATE This parameter defines the communication speed expressed in "Bits per Second" (bps). The settable values are 4800, 9600, 19200, 38400 and 57600. The Baud Rate must be set to match the Baud Rate set for the Master Device.	4800 9600 19200 38400 57600 (Default : 9600 bps)
PARITY This parameter is a part of communication protocol and helps detecting communication errors. The settable values are 'None', 'Even', and 'Odd'. The parity type must be set to match the parity type set for the Master Device.	None Even Odd (Default : Even)
SERIAL ID This parameter assigns an identification number for the communication with Master Device. The Master Device uses this ID to uniquely address the instrument for data transactions. The settable values are from 1 to 127.	1 to 127 (Default : 1)
SERIAL WRITE PERMISSION The Read/Write parameters can be accessed for both reading and writing. The Read/Write parameters can only be accessed for reading. That is the parameter values cannot be altered through serial communication.	No Yes (Default : No)

Section 10

UTILITY PARAMETERS

The Utility Parameters are grouped on Utilities Page and allows the user to access the various Utilities of the FLOREX such as Locking/Unlocking, Supervisory Passcode, Default Setting, Factory Cal. Regain, User Calibration and User Linearisation.

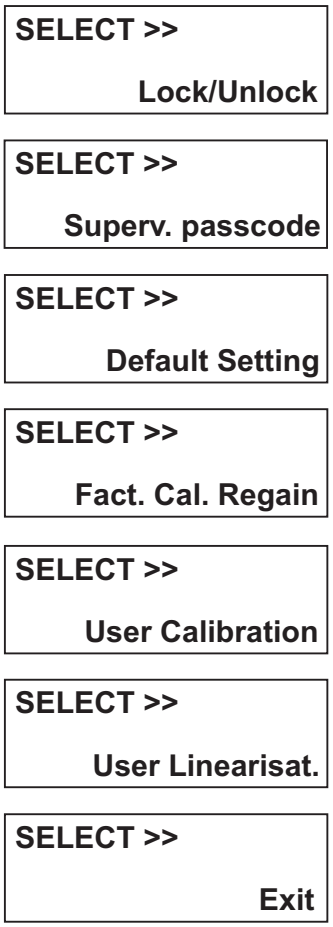
The Navigation Diagram below lists the various Utility Parameters required for accessing the various utilities of the FLOREX.

Step through the following procedure for accessing Utility Parameters.

1. Press and release PAGE key while the FLOREX is in the MAIN Display Mode. The Lower Readout displays SELECT PAGE >> FLOW ALARM
2. Adjust the Lower Row to select Utilities Page by pressing UP key and press ENTER key. The Lower Readout displays ENTER PASSCODE >> 0
3. Use UP key to set the value of the Pass Code to 22 and press ENTER key. The Lower Readout displays SELECT >> Lock/Unlock
4. Keep pressing UP key for accessing various Utility parameters as described below Navigation Diagram.

Step through the following procedure for accessing Utility Parameters.

1. Press and release PAGE key while the FLOREX is in the MAIN Display Mode. The Lower Readout displays
2. Adjust the Lower Row to select Utilities Page by pressing UP key and press ENTER key. The Lower Readout displays
3. Use UP key to set the value of the Pass Code to 22 and press ENTER key. The Lower Readout displays
4. Keep pressing UP key for accessing various Utility parameters as described below Navigation Diagram.



Lock/Unlock

This parameter allows the user to Lock / Unlock the adjustment of the parameter values. Refer, *Section 3 : Pages & Parameters* for further details.

Supervisory Passcode

The access to this parameter is allowed only if the FLOREX is Unlocked. The numeric value set for this paramete under supervisory level is a secret code that is commonly applicable for both Total Reset Command and Min./Max. Reset Command. These commands will be effective only if the value entered for Passcode on Operator Parameter matches with the value set for this parameter.

Default Setting

This parameter allows the user to set all the user settable parameters to their respective factory set default values. Refer, Section 3 : Pages & Parameters for further details.

Factory Calibration Regain

This parameter allows the user to regain the factory calibration for Analog Input. Refer, Appendix-A : Calibration for further details.

User Calibration

This parameter facilitates the user to carry out the calibration for Analog Input Group. Appendix-A : Calibration for further details.

User Linearisation

This parameter facilitates the user to linearize the Analog Input curve as per the user derived values. Refer, Appendix-B : linearisation for further details

Exit.

This parameter allows the user to exit the Utility parameter list and return to the MAIN Display Mode of the FLOREX.

Section 11

USER LINEARISATION PARAMETERS

The Linearisation Parameters are grouped on User Linearisation Page and accessed by entering the Utility Page. These parameters are generally required to linearise the Analog Input curve as per the user derived values.

The parameters required for User Linearisation are described as under:

Table 11.1

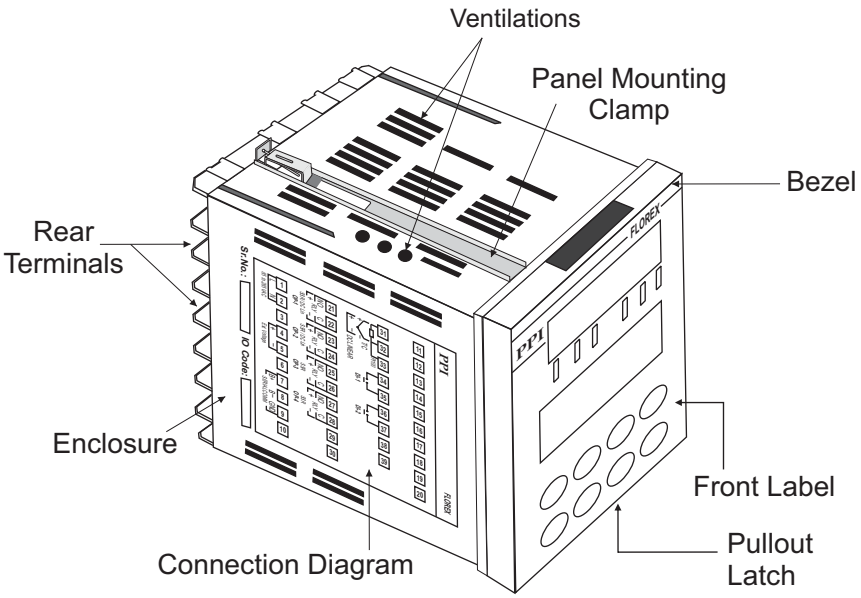
Parameter Description	Settings (Default Value)
USER LINEARISATION ACTIVATION This parameter can be set as 'Enable' or 'Disable' to allow the user to activate the user Linearisation function. If enabled, the user linearisation function is activated and the Flow Rate indication is displayed as per the derived values set by the user.	Disable Enable (Default : Disable)
TOTAL POINTS This parameter allows the user to select the Total Points for which the user linearisation is required. The total number available for actual points and derived points setting is dependent upon the value selected for this parameter. That is, the total number of availability of actual and derived points is restricted to the value set for this parameter.	1 to 32 (Default : 2)
POINTS NUMBER Select the break point for which the X, Y co-ordinates are to be set.	1 to Max. Selected (Default : 1)
ACTUAL POINT This parameter allows the user to select the actual point for which the user derived value is to be set. That is, the actual value of Flow Rate that the FLOREX is indicated for the corresponding Input Signal received from the Flowmeter as per the Input Type and Range Low/High setting of FLOREX.	-19999 to 30000 (Default : 0)
DERIVED POINT This parameter allows the user to set the user derived value for the selected actual value the actual point for which the user derived value is to be set. That is, the actual value of Flow Rate that the FLOREX is indicated for the corresponding Input Signal received from the Flowmeter as per the Range Low/High setting. As per the above example; for the actual value of Flow Rate (i.e. 50), if the user derived value is set to 60, the FLOREX will display the Flow Rate of 60 instead of 50 when it receives the Input Signal of 10 mA.	-19999 to 30000 (Default : 0)

Section 12

HARDWARE ASSEMBLY AND CONFIGURATIONS

The Figure 12.1 below shows the indicator outer-case viewed with front label upright.

Figure 12.1

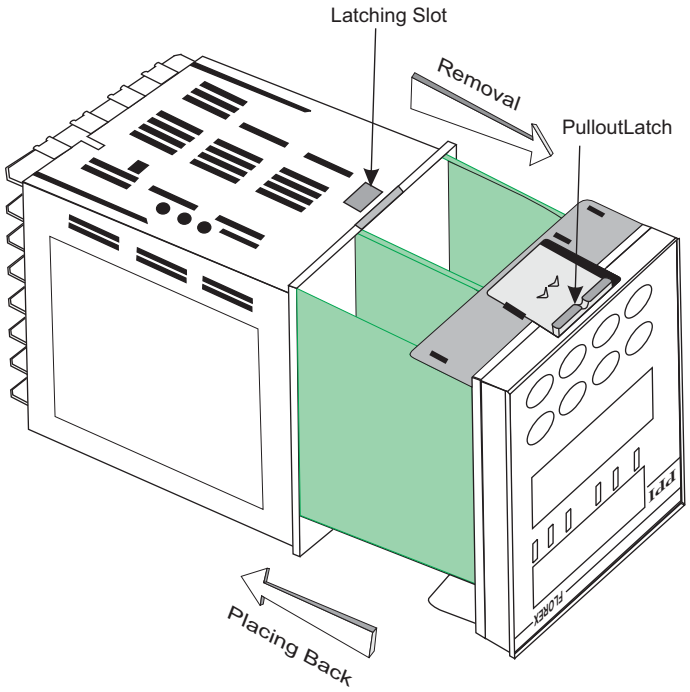


ELECTRONIC ASSEMBLY

The basic electronics assembly (without any plug-in modules), comprises of 4 Printed Circuit Boards (PCB). When viewed from the front; the CPU PCB is to the left, Power-supply PCB is to the right, Output PCB is in the center and the Display PCB is behind the bezel.

The electronic assembly can be removed from the plastic enclosure and placed back as described and illustrated in Figure 12.2.

Figure 12.2



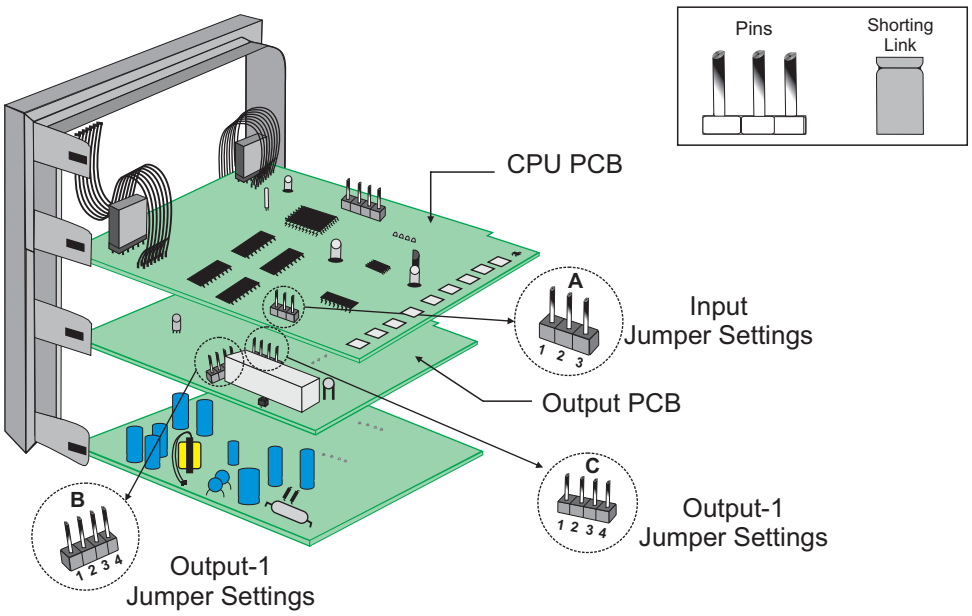
Removing Assembly from Enclosure

Hold the indicator upside down and press the pullout latch to unlock the front bezel from the enclosure (Refer Figure 12.2 above). Pull the bezel outward. The electronics assembly comes out with the bezel.

Placing Assembly Back into Enclosure

Hold the Enclosure and the Bezel such that the Latching Slot on the Enclosure and the Pullout Latch on the Bezel face upward (See Figure 12.2). Insert the bezel gently into the Enclosure until the Bezel snap fits.

Figure 12.3



INPUT : Jumper Settings

In addition to parameter settings, the Input Type selection also requires proper jumper settings. For the jumper settings; Pins & Shorting-Link arrangement, marked 'A', is provided on the CPU PCB as shown in Figure 12.3.

For DC Linear Current Inputs (0-20 mA or 4-20 mA), short the Pins 2 & 3 using Shorting-Link as shown in Figure 12.4 (b). For all other Input types, short the Pins 1 & 2 using Shorting-Link as shown in Figure 12.4 (a).

Figure 12.4 (a)

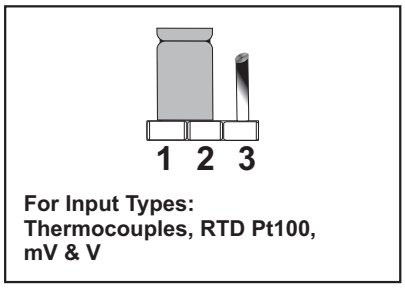
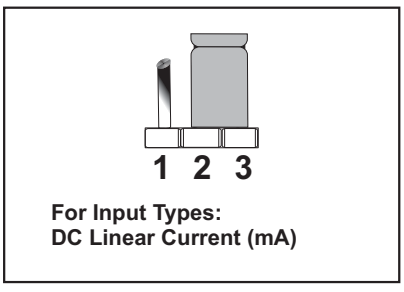


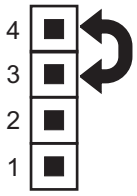
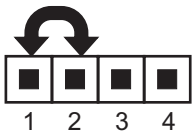
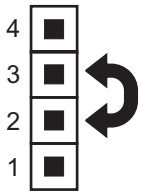
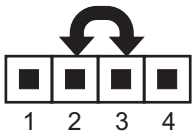
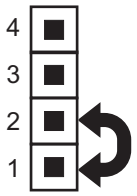
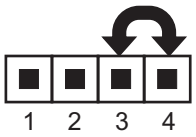
Figure 12.4 (b)



OUTPUT-1 : Jumper Settings

The Output-1 Type is user selectable as Relay, SSR, DC Volts or DC Current. Besides the parameter settings, the Output-1 configuration requires proper jumper settings. The jumper setting are provided as Pins & Shorting Link arrangement (marked 'B' & 'C') on Output PCB, as shown in Figure 12.3 and listed in Table 121.1 below.

Table 12.1
Output-1 Jumper Settings

Output Type	Jumper Setting - B	Jumper Setting - C
Relay		
SSR Drive		
DC Linear Current (or Voltage)		

OUTPUT PLUG-IN MODULES (OP2, OP3,OP4 & OP5)

The indicator supports 3 types of 'Plug-in Modules' that can be used as outputs (OP2, OP3, OP4 & OP5).The 3 types are; (a) Relay /SSR Module, (b) DC Linear Voltage Module and (c) DC Linear Current Module.

Figure 12.5(a)

Relay/SSR Module - Bottom View

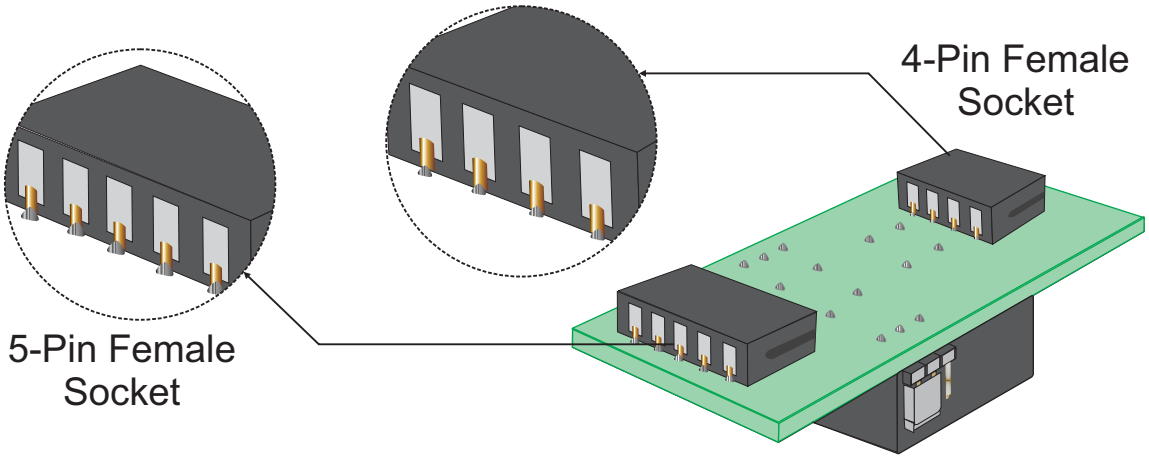


Figure 12.5(b)

Mounting Parts for Output Modules

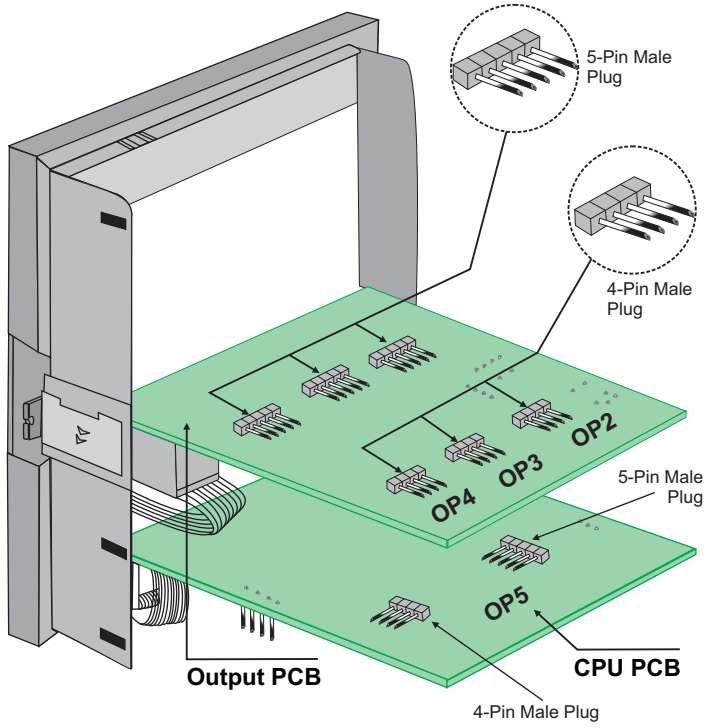
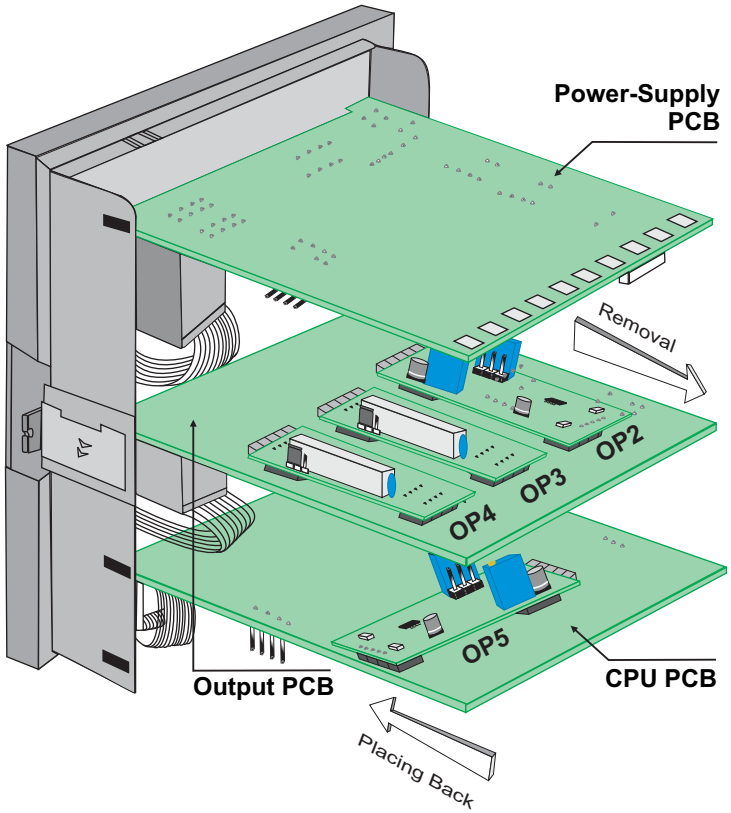


Figure 12.6



Each Module is provided with one 4-Pin & one 5-Pin Female Socket that can directly fit into corresponding male plugs provided on either *Output PCB (OP2, OP3 & OP4) or CPU PCB (OP5). Refer Figure12.5(a) & 12.5(b).* These modules are either pre-fitted while the indicator is shipped from the factory or can be fitted later by the user.

The Figure12.5(a) shows the 4 & 5 Pin Female Socket mounted on the bottom side of the output modules. The Figure 12.5(b) shows the 4 & 5 Pin Male Plugs Mounted on the CPU & Output PCBs. For clarity, the modules and the Power-Supply PCB are not shown in the figure.

The Figure12.6 shows the Output Modules fitted in their respective positions on the CPU & Output PCBs. For OP2, OP3 & OP4 modules; push the modules towards front for mounting and pull the modules towards back for removal. For OP5 module; push the module towards right for mounting and pull the module towards left for removal.

(a) Relay / SSR Module

The Relay/SSR Module is supported by OP2, OP3 & OP4.The module can be configured to function as either Relay or SSR Output by appropriate jumper settings, 'A' and 'B',as shown in Figure 12.7(a) & 12.7(b) and Table 12.2 below. Use *Shorting - Link* for jumper settings.

Figure 12.7(a)

Jumper Setting 'A' - Viewed facing module

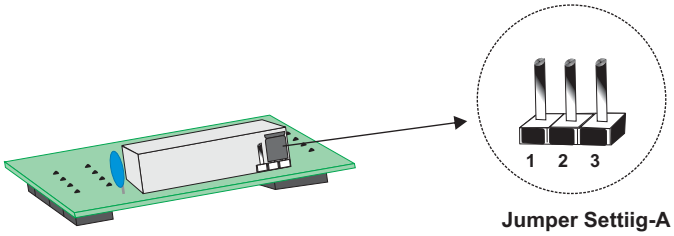


Figure 12.7(b)

Jumper Setting 'B' - Viewed facing module

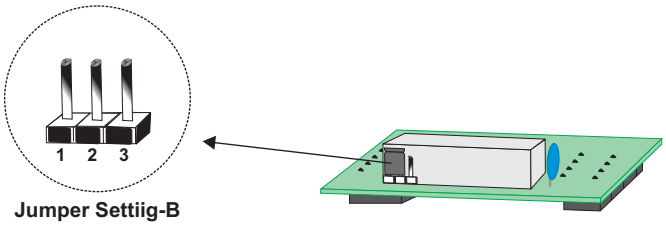
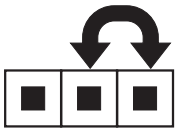
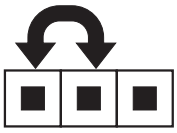
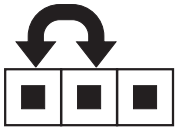
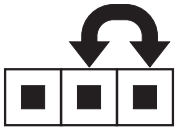


Table 12.2

Output Type	Jumper Setting - A	Jumper Setting - B
Relay		
SSR		

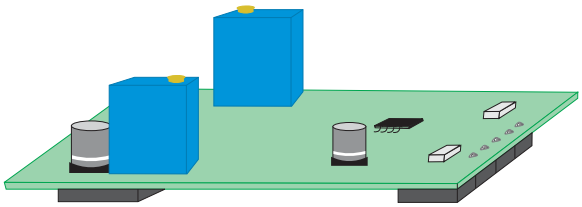
(b) DC Linear Voltage Module

(c) DC Linear Current Module

The DC Linear Module, shown in Figure 12.8 below, is factory configured for either Current or Voltage output and is supported by OP2 & OP5. The DC Current Module can be configured to output either 0-20 mA or 4-20 mA by appropriate parameter setting. Similarly, the DC Voltage Module can be configured to output either 0-5 V or 0-10 V by appropriate parameter settings.

Figure 12.8

DC Voltage/Current Module

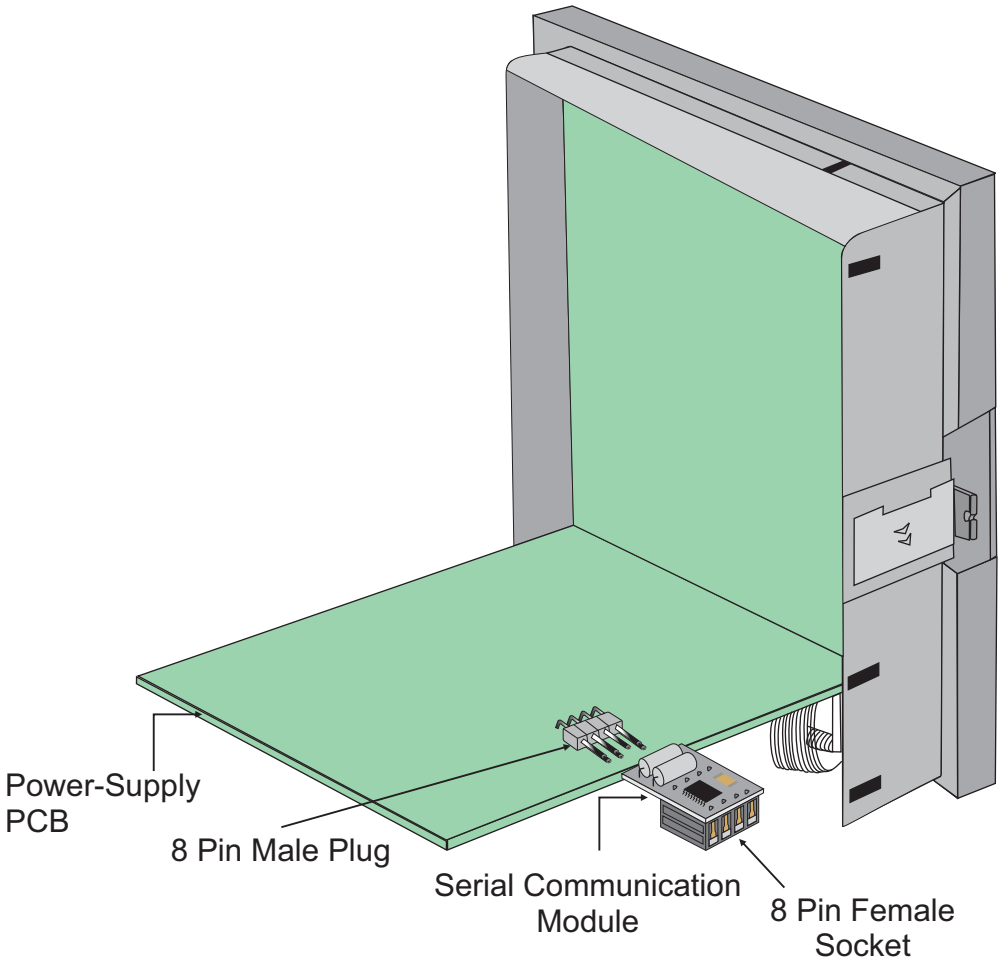


Serial Communication Plug-in Module

The 4-Pin Male Plug for mounting the Serial Communication Module is located on the Power-supply PCB, as shown in the Figure 12.9 below. The Serial Communication Module is provided with a 4-Pin female sockets on the bottom side for the mounting purpose. To plug (or unplug) the module simply insert (or remove) the socket into (or from) the plug.

Figure 12.9

Mounting Serial Communication



Section 13

MECHANICAL INSTALLATION

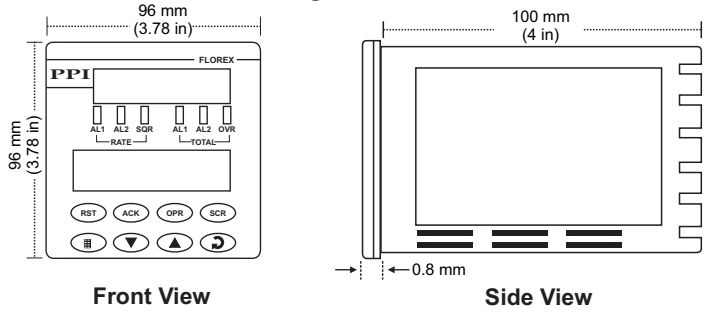
The following precautions should be strictly observed while installing the indicator:

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 indicator should not exceed the maximum specified for the proper operation of the indicator.
3. The place of installation should be adequately protected against excessive electrostatic or electromagnetic interference.
4. The indicator should not be subject to direct vibration or shock.
5. The indicator should not be exposed to dust, salt air, direct sunlight or radiant heat.

OUTER DIMENSIONS

The Figure 13.1 shows the outer dimensions of the indicator.

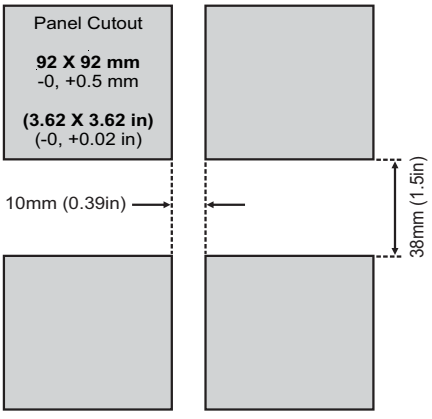
Figure 13.1



PANEL CUTOUT AND RECOMMENDED MINIMUM SPACING

The Figure 13.2 shows the panel cutout requirements for a single indicator and also the minimum spacing recommended if several indicators are required to be mounted on a single panel.

Figure 13.2



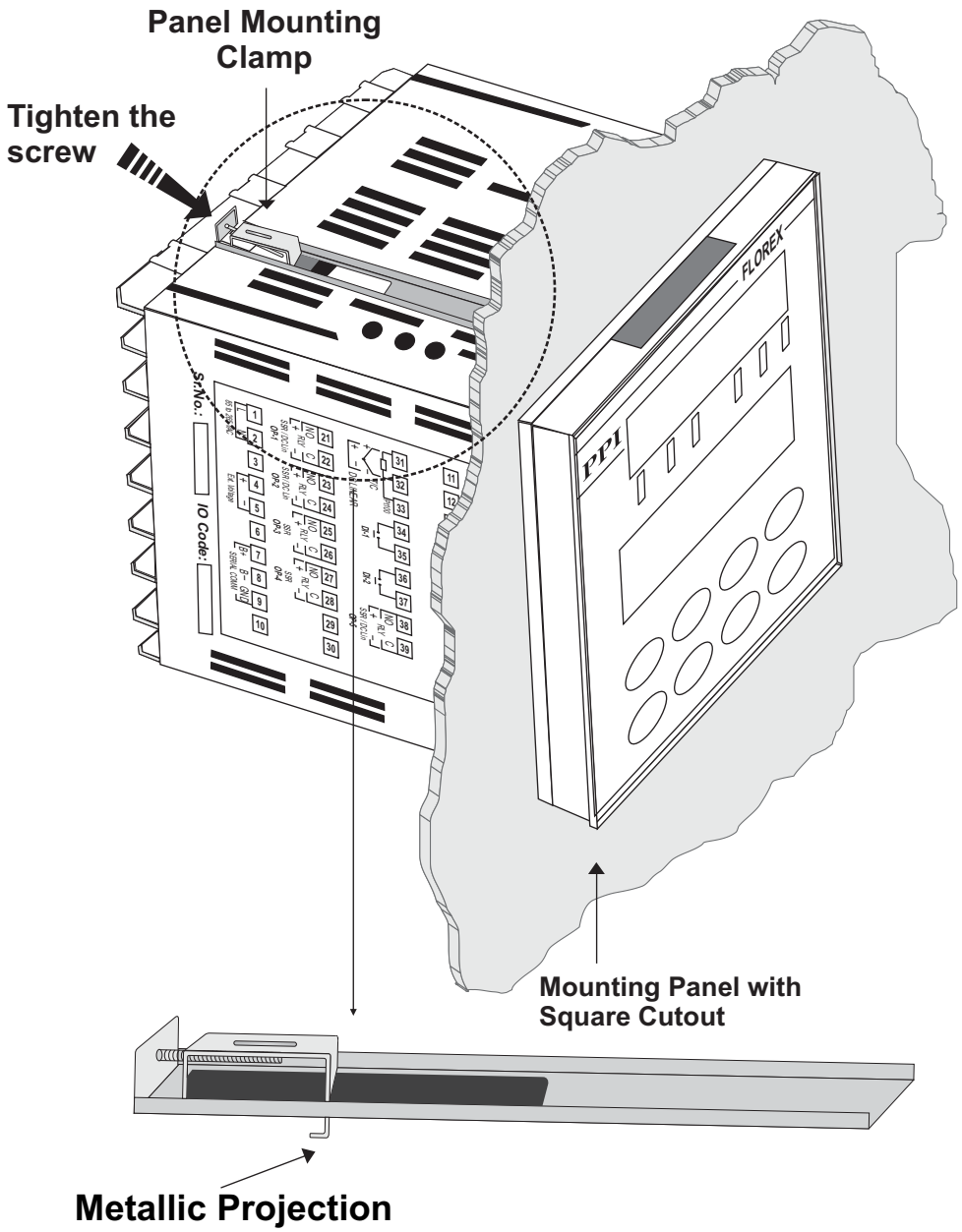
PANEL MOUNTING

Follow the steps below for mounting the indicator on panel:

1. Prepare a square cutout to the size shown in Figure 13.2.
2. Remove the Panel Mounting Clamp from the indicator Enclosure.

3. Insert the rear of the indicator housing through the panel cutout from the front of the mounting panel.
4. Hold the indicator gently against the mounting panel such that it positions squarely against the panel wall (see Figure 13.3). Apply pressure only on the bezel and not on the front label.
5. Fix the Mounting Clamps (one after the other) such that the metallic projection fits in the square hole provided on the top and bottom sides of the enclosure. Tighten the clamp screw until the clamps firmly secures against the panel wall.

Figure 13.3



Section 14

ELECTRICAL CONNECTIONS

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

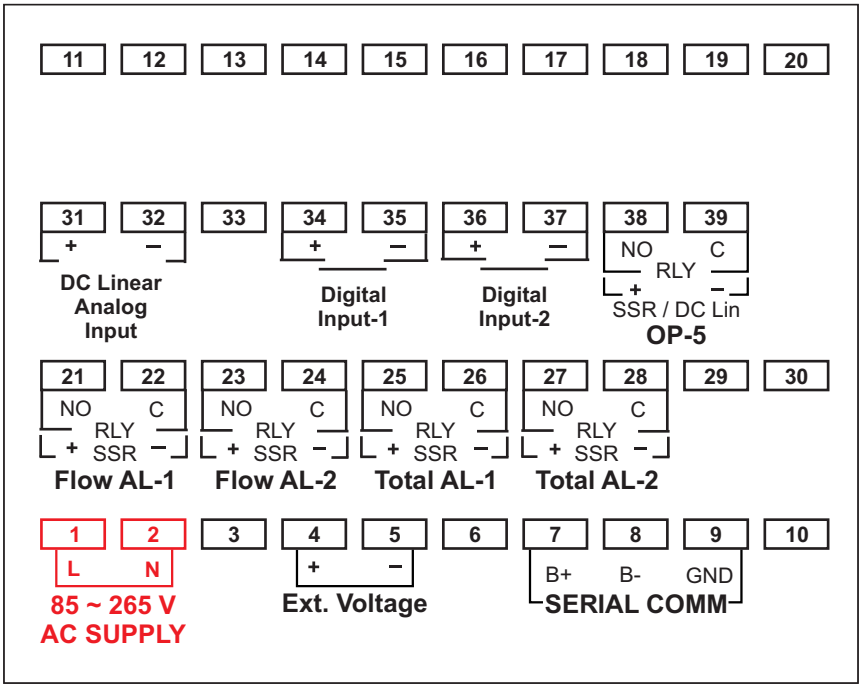
1. The user must rigidly observe the Local Electrical Regulations.
2. Do not make any connections to the unused terminals for making a tie-point for other wires (or for any other reasons) as they may have some internal connections. Failing to observe this may result in permanent damage to the FLOREX.
3. Run power supply cables separated from the low-level signal cables (like DC voltage/current, 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 FLOREX 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 FLOREX supply is switched-off while making / removing any connections or removing the FLOREX from its enclosure.

CONNECTION DIAGRAM

The Electrical Connection Diagram is shown on the left side of the FLOREX enclosure. The diagram shows the terminals viewed from the REAR SIDE with the FLOREX label upright. Note that the Alarm Outputs and the Serial Comm. are applicable only if the respective plug-in modules are fitted.

The rear panel electrical wiring connection diagram is shown in Figure14.1 below.

Figure 14.1



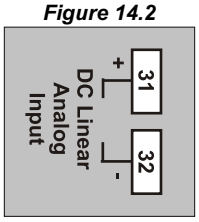
DESCRIPTIONS

The back panel connections are described as under:

INPUT (Terminals 31 and 32)

The FLOREX accepts DC Linear Current/Voltage (mV,V,mA) as input from Flowmeters. The types and ranges are described in S*ection 6 : Retransmission Parameters*.

Figure 14.2



DC linear mV / V / mA

Use a shielded twisted pair with the shield grounded at the signal source for connecting DC Linear Voltage (mV / V) source. Connect common (-) to terminal 32 and the signal (+) to terminal 31, as shown in Figure 14.2. The DC Linear Current (mA) source is also connected in the similar way.

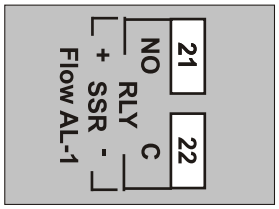
OUTPUT- 1 (Terminals 21 and 22) & **OUTPUT- 2** (Terminals 23 and 24)

The Output-1 module and Output-2 (if fitted) can be configured as either Relay or DC Voltage pulses for driving SSR for Flow Alarm-1 and Flow Alarm-2 output. The configuration is through hardware jumper settings. The Jumper setting for Output-1 is available on the CPU board and for Output-2 is available on the module.

Similar to Output-1, the Output-2 module (if fitted) can be configured as either Relay or DC Voltage pulses for driving SSR for Alarm.

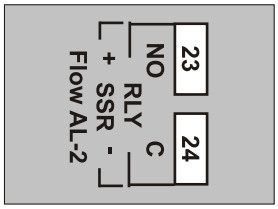
The terminals for Relay, DC Voltage pulses output for SSR for Output-1 and Output-2 are shown in Figure 14.3(a), 14.3(b), respectively.

Figure 14.3(a)



Relay / SSR Connections for Flow Alarm-1

Figure 14.3(b)



Relay / SSR Connections for Flow Alarm-2

Relay

Potential-free Relay changeover contacts N/O (Normally Open), C (Common) and N/C (Normally Close); rated 2A/240 VAC (resistive load) are provided as Relay output.

Drive for SSR

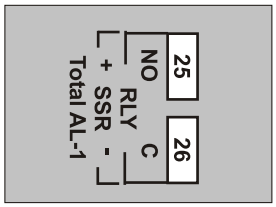
DC Voltage level is generated for switching the external SSR (Solid State Relay). Connect (+) and (-) terminals of SSR to terminals marked as (+) & (-), respectively. Use zero-crossover, 3 to 30 VDC operated SSR, rated approximately 1.5 times the actual load rating. Use appropriate Heat Sink for mounting the SSR for load rating exceeding 10 A in case the Alarm Function is used for tripping the loads.

OUTPUT- 3 (Terminals 25 and 26) & **OUTPUT- 4** (Terminals 27 and 28)

Similar to the Output-1 module and Output-2 (if fitted), the Output-3 (if fitted) and Output-4 (if fitted) can be configured as either Relay or DC Voltage pulses for driving SSR for Total Alarm-1 and Total Alarm-2 output. The configuration is through hardware jumper settings available on the respective module.

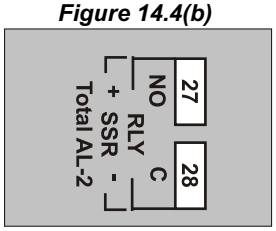
The terminals for Relay, DC Voltage pulses output for SSR for Output-3 and Output-4 are shown in Figure 14.4(a), 14.4(b), respectively.

Figure 14.4(a)



Relay / SSR Connections for Total Alarm-1

Figure 14.4(b)



Relay / SSR Connections for Total Alarm-2

Relay

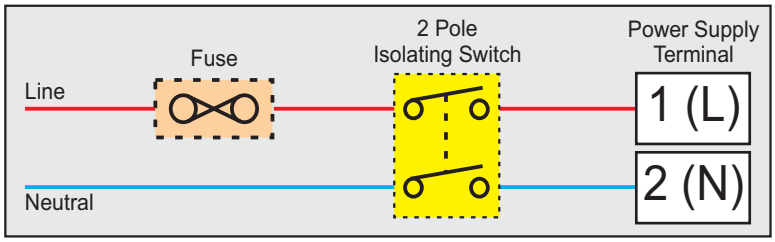
Potential-free Relay changeover contacts N/O (Normally Open), C (Common) and N/C (Normally Close); rated 2A/240 VAC (resistive load) are provided as Relay output.

Drive for SSR

DC Voltage level is generated for switching the external SSR (Solid State Relay). Connect (+) and (-) terminals of SSR to terminals marked as (+) and (-), respectively.

POWER SUPPLY (Terminals 1 & 2)

Figure 14.5



As standard, the FLOREX is supplied with power connections suited for 85 to 264 VAC line supply. Use well-insulated copper conductor wire of the size not smaller than 0.5mm² for power supply connections. Connect Line (Phase) supply line to terminal 1 and the Neutral (Return) supply line to terminal 2 as shown in Figure 14.5 above. The FLOREX is not provided with fuse and power switch. If necessary, mount them separately. Use a time lag fuse rated 1A @ 240 VAC.

For DC Supply, connect Signal (+) & Common (-) to FLOREX terminals 1 & 2, respectively.

Warning

The FLOREX is designed for installation in an enclosure which provides adequate protection against electric shock. Local regulations regarding electrical installation should be rigidly obsereved. Consideration should be given to prevention of access to the Power Supply terminals by unauthorised personel. If the Relay contacts are to carry mains (line) voltage, it is recommended that the Relay contacts mains (line) supply should be switched and fused in a similar manner but should be separate from the FLOREX mains (line) supply.

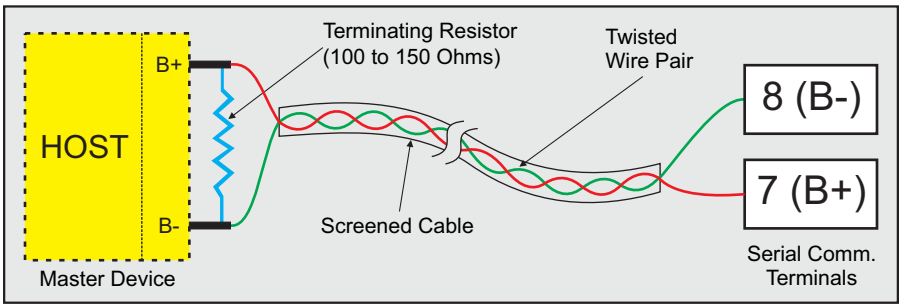
SERIAL COMMUNICATION PORT (Terminals 7 and 8)

If the optional plug-in communication board is fitted, connect terminal 7 and 8 of the FLOREX to (+) and (-) terminals of the Master device. In case of RS485 port, connect terminal 7 and 8 of the FLOREX to (+) and negative (-) terminals of the master device. In case of RS232 port connect terminal 7 to TXD (Transmit) and Terminal 8 to RXD (Receive) and Terminal 9 to GND (Ground).

To ensure reliable operation of the Serial Communication Link (without data corruption due to line noise or reflections), use a pair of twisted wires inside screened cable with the terminating resistor (100 to 150 Ω) at one end, as shown in Figure 14.6.

SERIAL COMMUNICATION PORT (Terminals 7 & 8)

Figure 14.6



Notes :

1. The communication cable should be a pair of twisted wires inside screened cable as shown in Figure 14.6 above. It should have less than 100 ohms / km nominal DC resistance (Typically 24 AWG or thicker). Connect the terminating resistor (Typically 100 to 150 ohm) at one end to improve noise immunity.
2. Run the communication cables separated from cables (like power supply, Relay/Contactor cables etc.). If the cables are run through conduit use a separate conduit for communication cables.
3. Communication cables may run through low level signal cables (like DC Linear Current/Voltage outputs) if these cables are not exposed to an interference source.
4. Do not use redundant wires in communication cables for other signals.
5. Ensure that the cable is 'daisy chained' between FLOREXs for multi-dropped wiring. That is, run from one FLOREX to the next to the final FLOREX in the chain.

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