

# INSTRUCTION MANUAL

## SM – 15 – A



# **EPOCH**

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**1.0 INTRODUCTION :**

The Epoch Instruments “**SM-15-A**” is a microcontroller based, versatile process controller instrument. This precision instrument is ideally suited for industrial and laboratory applications. The instrument is designed to accept signals from load cells..

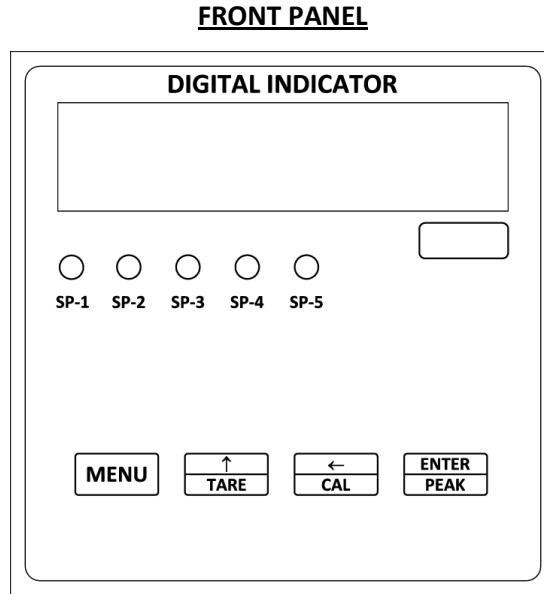
This manual contains the information about **SM-15-A**. Please go through this manual carefully before operating the instrument.

**2.0 SPECIFICATIONS : (Ref “SM-15-A” Brochure for Additional Information)**

Input Type	Strain Gauge Full Bridge Sensors
Input Range	Selectable : a) ± 20 mV                      e) ± 320 mV b) ± 40 mV                      f) ± 640 mV c) ± 80 mV                      g) ± 1.28 V d) ± 160 mV                     h) ± 2.56 V
Resolution/Counts	± 19999 Counts
Accuracy	± 1 digit (± 0.01% full scale)
Thermal Drift	<100 ppm/°C
Excitation Voltage	5 VDC (± 1%)
Min Bridge Resistance	85 Ω (4 off 350 Ω Sensors in Parallel)
Power	230 V AC
Update Rate	Variable from 4 Samples/sec To 100 Samples/sec.
Display Type	6 digit RED/GREEN 0.56” Seven Segment LED.
Settable Parameters	Input range, Update rate, Gain, Offset, 4-20 mA O/P Range, Relay set pt. etc.
Front Panel Keys	Menu : To scroll through the menus. Inc/Tare: Increments the displayed menu parameter and Tare the reading. Shift/Cal: shifts the displayed menu parameter and for Calibration. Enter : Stores configuration/Toggle between Peak & Normal mode.
Physical Dimensions	96 x 96 x 110 mm
Proportional Output	4 – 20 mA (Load Resistance < 250 Ω)
Enclosure Type	ABS Plastic Case
Operating Temp	0°C to 50°C
PC Connectivity	RS 232

### 3.0 KEYPAD DESCRIPTION:

The front panel of the instrument consists of 4 keys whose description is given below :



### 3.1 MENU:

Pressing the menu key repeatedly enables the user to scroll through the different menus available in the instrument. The sequence in which the menus appear is shown below (See section 4.0 for description of Menus).

i.	i xxxxx	-----	Relay #1 set point (LED #1 glows)
ii.	i xxxxx	-----	Relay #2 set point (LED #2 glows)
iii.	i xxxxx	-----	Relay #3 set point (LED #2 glows)
iv.	i xxxxx	-----	Relay #4 set point (LED #2 glows)
v.	i xxxxx	-----	Relay #5 set point (LED #2 glows)
vi.	Hxxxxx	-----	Relay #1 Hysteresis (LED #1 glows)
vii.	Hxxxxx	-----	Relay #2 Hysteresis (LED #2 glows)
viii.	Hxxxxx	-----	Relay #3 Hysteresis (LED #2 glows)
ix.	Hxxxxx	-----	Relay #4 Hysteresis (LED #2 glows)
x.	Hxxxxx	-----	Relay #5 Hysteresis (LED #2 glows)
xi.	R1OnLo/Hi	-----	Relay #1 high/low operation
xii.	R2OnLo/Hi	-----	Relay #2 high/low operation
xiii.	R3OnLo/Hi	-----	Relay #3 high/low operation
xiv.	R4OnLo/Hi	-----	Relay #4 high/low operation
xv.	R5OnLo/Hi	-----	Relay #5 high/low operation
xvi.	rnG	-----	Amplifier gain select.
xvii.	dP	-----	Placing the Decimal Point.
xviii.	nxxxxx	-----	Software Gain settings.
xix.	FIL xx	-----	Digital filter coefficient.
xx.	Sxxxxx	-----	Resolution.
xxi.	Γ or Fxxxxx	-----	For 4 mA Output.
xxii.	Lxxxxx	-----	For 20 mA Output.
xxiii.	Stor	-----	Saving User menu settings.

### **3.2 INC/TARE :**

'INC/TARE' key is used to increment the value of the blinking digit in menu. In the calibration mode, when not in menu, this key is used for resetting the Peak value and if it is pressed for more than 5 sec, it will tare the reading.

### **3.3 SHIFT/CAL :**

'SHIFT/CAL' key is used to shift the blinking digit in the calibration mode. And also used for Calibration.

### **3.4 ENTER/PEAK :**

This Key is used to store all the settings in the non volatile memory and it will be loaded while powering up. Press enter key to save the changes made in the menus. When 'ENTER' is pressed the display will blink once to indicate that the settings have been stored. In the normal mode, when not in menu, this key is used to switch between normal mode and peak mode.

#### **4.0 DESCRIPTION OF MENUS :**

##### **4.1 RELAY SET POINT (i xxxxx) :**

The relay 1, 2, 3, 4 & 5 operation points can be programmed from –19999 to +19999. When the ‘i xxxxx’ menu appears set the required value by using INCREMENT and SHIFT key. When the sign is ‘-’, the first letter will look like ‘r’.

##### **4.2 RELAY HYSTERESIS (H xxxxx) :**

The relay 1 and 2 Hysteresis can be set from 0 to 19999. When the ‘H xxxxx’ menu appears use increment and Shift key to set the required value

##### **4.3 RELAY POLARITY (r1 on xx or r2 on xx):**

The relay 1, 2, 3, 4 & 5 polarity is also programmable. The relay can be programmed to operate above the set point (high) or below the set point (low). The menu toggles between ‘r1OnLo’ / ‘r1OnHi’ and ‘r2OnLo’ / ‘r2OnHi’ when increment key is pressed.

##### **4.4 OFF SET PROGRAMMING (uxxxxx) :**

The off set can be programmed from –20000 to +20000. When ‘offset’ menu appears use increment or decrement key to set the required value. Also when you tare the value, the offset is automatically set. When the sign is ‘-’, the first letter will look like ‘o’.

##### **4.5 AMPLIFIER GAIN (rnG) :**

In this function we can select the amplifier gain depending on the input voltage. The values are

07 = ± 20 mV, 06 = ± 40 mV, 05 = ± 80 mV, 04 = ± 160 mV,  
03 = ± 320 mV, 02 = ± 640 mV, 01 = ±1.28 V, 00 = ± 2.56 V

#### **4.6 DECIMAL POINT (dP) :**

In this function we can place the decimal point wherever required and also we can remove the decimal point if it is not required. When 'dP' menu appears use increment key to move the decimal point in to the required position.

#### **4.7 SOFTWARE SCALING (nxxxxx) :**

It is used to scale the display to the required engineering unit. This software scaling makes the calibration of the unit easy. By adjusting this value, the unit can be calibrated to the required engineering units. **The user need not set this value because it automatically gets set during calibration.** This value actually represents the division factor used to divide the raw ADC counts to get the meaningful process value.

#### **4.8 FILTER COEFFICIENT (Fil xx) :**

The digital filter coefficients can be set from 1 to 9. These values affect the sampling rate and stability. Lower values will give higher sampling rates and higher values will give more stability.

#### **4.9 RESOLUTION (Sxxxxx) :**

The Resolution can be set to 1, 2, 5 & 10.

#### **4.10 4 mA Output (Γxxxxx or Fxxxxx) :**

To Calibrate 4 – 20 mA Output. This setting will determine the minimum value at which 4 mA output is available.

#### **4.11 20 mA Output (Lxxxxx) :**

To Calibrate 4 – 20 mA Output. This setting will determine the maximum value at which 20 mA output is available.

#### **4.12 SAVING USER MENU SETTINGS (Stor):**

This menu is used to store all the settings in the non-volatile memory to avoid the loss of setup when power fails. Press **ENTER** key when 'Stor' appears on the display to save the changes made in the menus.

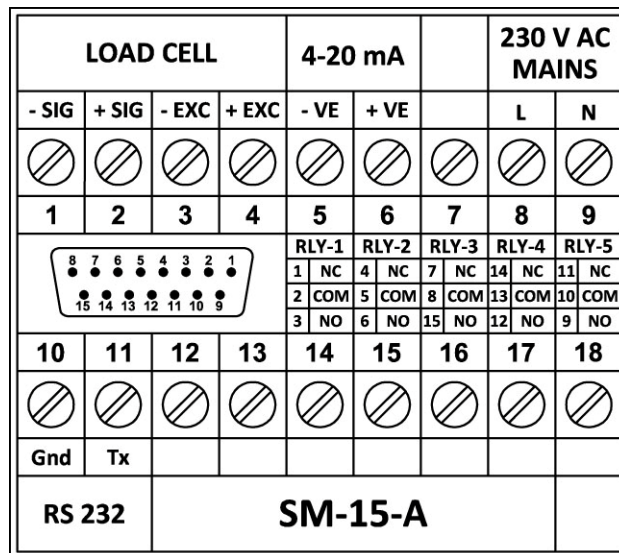
## 5.0 INSTRUMENT SETUP :

Connect the Input Sensor (e.g. Load Cell) to the back panel connector.

The Back panel connection diagram is shown below

### BACK PANEL

**\*CAUTION :** CONNECT AS PER THE STICKER ATTACH TO THE INDICATOR. THE DRAWING GIVEN BELOW IS A TYPICAL DIAGRAM. CHECK THE CONNECTIONS PROPERLY BEFORE POWERING THE INSTRUMENT.



- ❖ Switch on the Power supply.
- ❖ Calibrate the instrument if needed. (See section 6.0 for Calibration).
- ❖ Output is displayed on the LED display.



## **6.0 INSTRUMENT CALIBRATION :**

The instrument is to be calibrated properly before you start using it. The process of calibration involves the process of applying an input of known quantity to the instrument and setting the display to get the required reading.

**For Example :** *Calibrating with 5 Kg, to get a reading of 5.000*

1. Connect the load cell to the instrument as described in the "Instrument Setup".
2. Set the menus to appropriate values.
3. Without placing any weight, TARE the reading. so that display shows zero.
4. Place the known weight (5 Kg) over the load cell.
5. Press 'SHIFT/CAL' and 'ENTER/PEAK' keys together.
6. The display will show 'P 01' and starts counting up.
7. Now enter password If the password is '1234' then press these keys in sequence-'MENU' 'INC/TARE' 'SHIFT/CAL' 'ENTER/PEAK' if the password entered is wrong. It shows 'FAIL' and goes back to normal mode. If the password entered matches then the display will show 'PASS' and then shows some reading and the last digit starts blinking.
8. Using 'INC' key & 'SHIFT' key set the display to the required value.(in this example set it to 5.000)
9. Now press 'MENU' key. The instrument automatically calculates the calibration coefficients and stores them in non-volatile memory. This completes the calibration.
10. Keep different weights and check whether showing proper results.

### **NOTE :**

1. Pressing 'Enter' key will toggle the display between normal value, the PEAK (Max.) value and the Valley (Min) value. When PEAK is displayed, a 'P' will be displayed in front of the value and when Valley is displayed, 'u' will be displayed in front of the value. Since sign is displayed in the same digit as 'P' and 'u', for positive values, the middle segment of 'P' will disappear and for negative values, 'u' will look like 'o'.
2. Pressing 'INC' key will reset the PEAK.
3. To Tare the value, press 'INC' key for 5 Seconds.