INSTRUCTION MANUAL

SM – 11 – B

CONTENTS

1.0   INTRODUCTION :

The Epoch Instruments **"SM-11-B"** 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-11-B**. Please go through this manual carefully before operating the instrument.
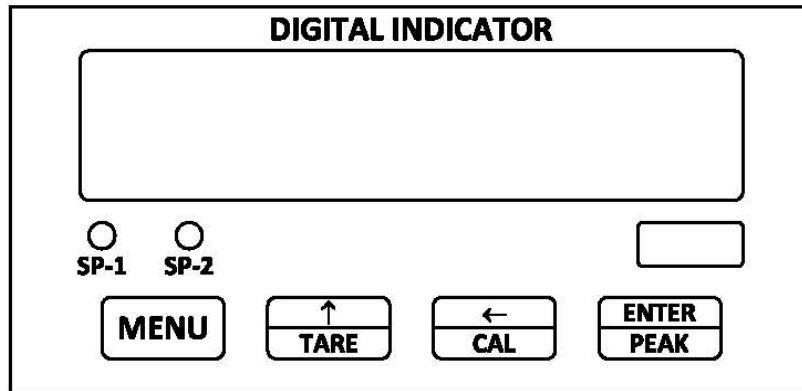
2.0   SPECIFICATIONS :

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	± 20000 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/50 Hz AC Mains
Update Rate	Variable from 4 Samples/sec To 100 Samples/sec.
Display Type	6 digits RED 0.56" Seven Segment LED.
Settable Parameters	Input range, Update rate, Gain, Offset, Range, Relay set pt. etc.
Front Panel Keys	❖ Menu : To scroll through the menus. ❖ Inc/Tare : Increments the displayed menu parameter. ❖ Shift/CAL : To shift the blinking digit/to Calibrate. ❖ Enter/Peak : Stores configuration/Toggle between Peak & Normal mode.
Physical Dimensions	48 x 96 x 110 mm
Enclosure Type	ABS Plastic Case
Operating Temp	0°C to 50°C
PC Connectivity	RS 232 C

3.0   KEYPAD DESCRIPTION :

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

<u>**FRONT PANEL**</u>

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.	**Hxxxxx**	---------	Relay #1 Hysteresis (LED #1 glows).
iv.	**Hxxxxx**	---------	Relay #2 Hysteresis (LED #2 glows).
v.	**R1OnLo/Hi**	---------	Relay #1 high/low operation.
vi.	**R2OnLo/Hi**	---------	Relay #2 high/low operation.
vii.	**rnG**	---------	Amplifier gain select.
viii.	**dP**	---------	Placing the Decimal Point.
ix.	**nxxxxx**	---------	Software Gain settings.
x.	**FIL xx**	---------	Digital filter coefficient.
xi.	**Step**	---------	Resolution.
xii.	**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 1 & 2 SET POINT (i xxxxx) :

The relay 1 and 2 operation point can be programmed from –19999 to +19999. When the 'i xxxxx' menu appears set the required value by using increment or decrement key. When the sign is '-', the first letter will look like 'r'.

4.2   RELAY 1 & 2 HYSTERESIS (H xxxxx) :

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

4.3   RELAY 1 & 2 POLARITY (r1 on xx or r2 on xx):

The relay1 or relay2 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   AMPLIFIER GAIN (rnG xx) :

Where 'xx' represents' the amplifier gain. The instrument has built In instrumentation amplifier with programmable gain. In this menu we can select the required amplifier gain depending on the input voltage. The values for amplifier gain are

08 = ± 20 mV,   07 = ± 40 mV,   06 = ± 80 mV,   05 = ± 160 mV,
04= ± 320 mV,   03 = ± 640 mV, 02 = ±1.25 V,   01 = ± 2.50 V

4.5   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.

4.6   SOFTWARE SCALING OR SPAN SETTING (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. **<u>The user need not set this value because it automatically gets set during calibration</u>**. 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) <u>:</u>

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, 50 &100.

4.10   SAVING USER MENU SETTINGS (Stor):

This menu is used to store all the settings in the non-volatile memory to avoid the lose 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

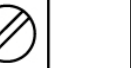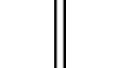***CAUTION : CONNECT AS PER THE STICKER ATTACH TO THE INDICATOR. THE DRAWING GIVEN BELOW IS A TYPICAL DIAGRAM. CHECK THE CONNECTIONS PROPERLY BEFORE POWERING THE INSTRUMENT.**

SM-11-B	LOAD CELL						AC MAINS	
	- SIG	+ SIG	- EXC	+ EXC			L	N
	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘
	1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16	
⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	
Tx	GND	NO	COM	NC	NC	NO	COM	
RS 232		RELAY - 2			RELAY - 1			

- ❖ 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 5000

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 (5Kg) over the load cell.
5. Press 'SHIFT/CAL' and 'ENTER/PEAK' keys together.
6. The display will show 'P 01' and starts counting up (Please enter the Password within 7 seconds).
7. Now enter password if the password is '1234' then press these keys in sequence 'MENU' 'INC' 'SHIFT' 'ENTER' 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 5000).
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 10 Seconds.

7.0   RS232 / RS485 PROTOCOL :

RS-232 / RS 485 data is sent at 9600 baud rate, 8 bit data, no parity and 1.5 stop bit. The data will be in ASCII format with "," (when in menu PC is selected) or <CR><LF> (when in menu Pr is selected) as the separator between two data. The data will be available as a continuous stream with a "+" or "-" sign.

e.g. : +23.000,+23.001,-10.234,-10.235 etc.

or

+23.000

+23.001

- 10.234

-10.235 etc.