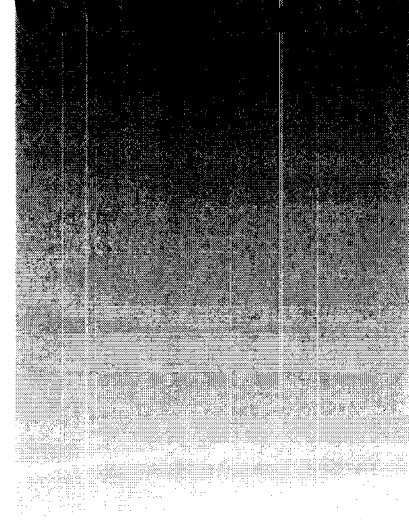


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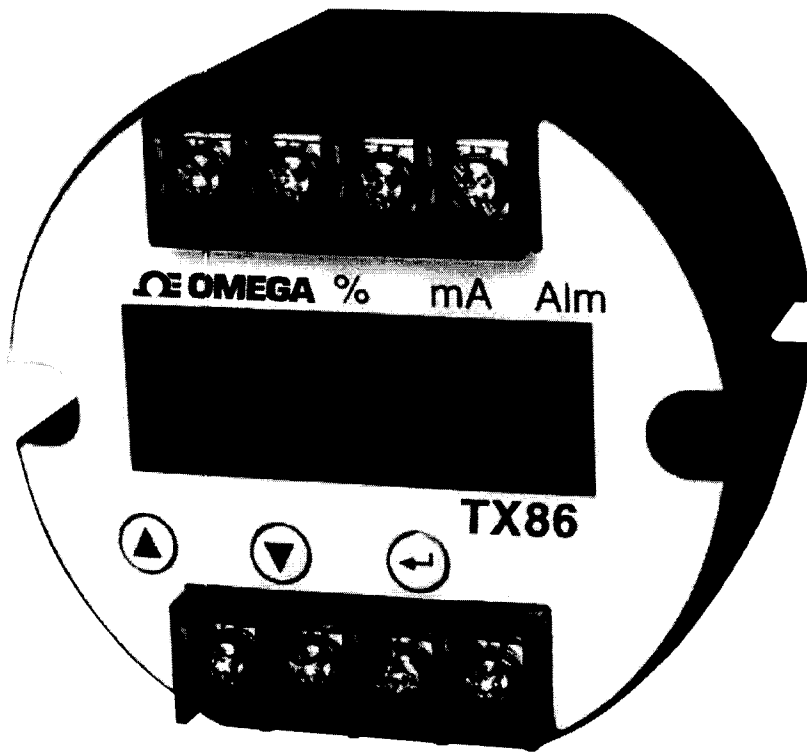
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WARNING: These products are not designed for use in, and should not be used for, human applications.

CONTENTS

1 Introduction	1
2. Electrical Installation	3
3. Configuration	4
3.1 Measuring Mode	4
3.2 Entering the Setup Mode	6
3.2.1 Select Sensor Input	9
3.2.2 Change ZERO	10
3.2.3 Change Full Scale	10
3.2.4 Set the CJC Source	10
3.2.5 Set the Dampening Time Constant	10
3.2.6 Set the Output Current	11
3.2.7 Set the Sensor Fail Safe Output	11
3.2.8 Set the Low Trip Point Value	11
3.2.9 Set the High Trip Point Value	11
3.2.10 Set the Dead Band of Trip Point	11
3.2.11 Set the Alarm Mode	12
3.2.12 Set the Offset resistance value of RTD @ 0°C	13
3.2.13 Set the Display Engineering Unit	13
4. Calibration	13
4.1 Calibration Equipment	13
4.2 Entering the Calibration Mode	13
4.2.1 Trim 4.00 mA	15
4.2.2 Trim 20.00 mA	15
4.2.3 Calibration 0.0 mV	15
4.2.4 Calibration 60.0 mV	16
4.2.5 Calibration 200 ohm	16
4.2.6 Calibration 1000 ohm	16
4.2.7 Calibration Internal Temperature Sensor	16
5. Error Code	17

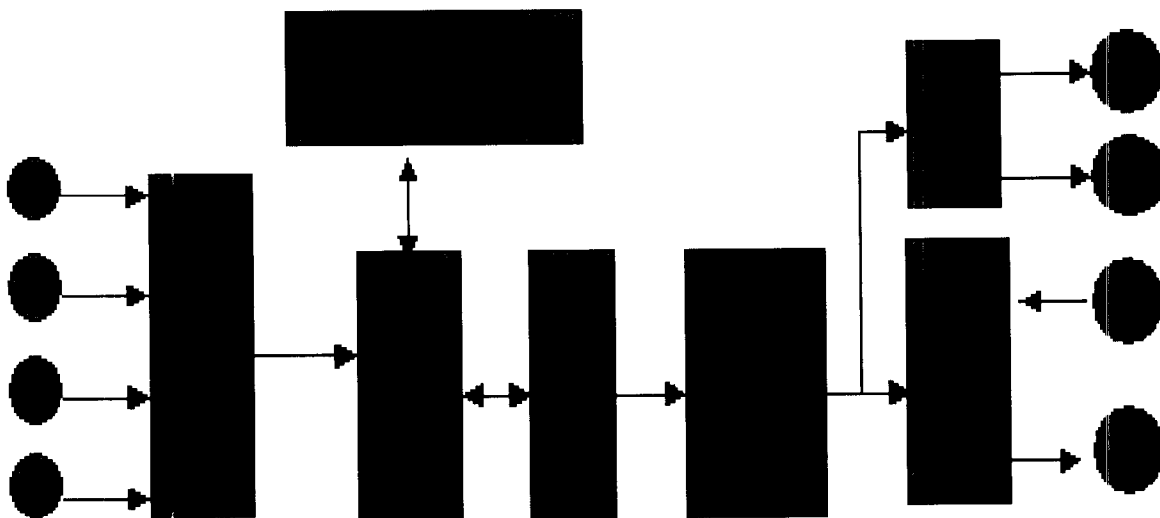
1. Introduction

This manual contains information for the installation and operation of model TX86 Universal Input Temperature Transmitter. The TX86 2-wire loop-powered, galvanic-Isolated, transmitter is a versatile instrument which indicates converts, and transmits the input signal from thermocouples, RTDs (Resistance Temperature Detectors), mV, Volt, Potentiometer or Ohm sensors into a linearized 4- 20 mA DC loop current needed by DCS, PLC, PC, SCADA system or Recorders.

The TX86 is a state of the art microprocessor based advanced Digital and Analog meter with electronic circuitry that enable it to provide a high degree of performance and flexibility yet at a reasonable cost and ease of use. The TX86 consists of 3 front push-buttons, a 4-digit 7-segment high bright LED module and 5 associated LED Lamps for engineering units and alarm status. The display is used to indicate the values of the measured parameters during Measuring Mode, and to provide prompting and programming instructions during the Setup Mode and Calibration Mode.

The Setup Mode may be used by an user who wishes to re-configure the transmitter for new applications. The Calibration Mode may be used by an user who wishes to maintain the high performance level of the unit. All the working parameters and calibration data are saved on an EEPROM. If power to the transmitter is lost, the unit will resume normal operation with the last configured parameters. The transmitter's output range can be set anywhere within the operating range of the input sensor type.

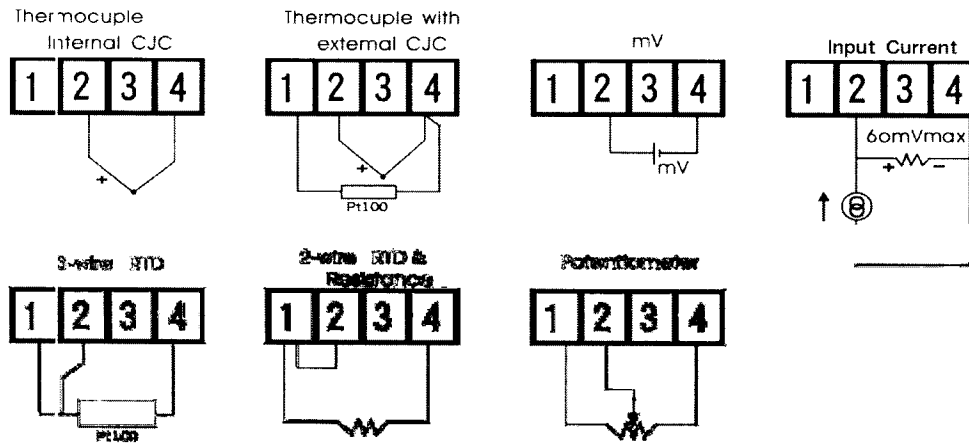
The TX86 provides one galvanic isolated solid state relay alarm output which can be programmed as high or low trips with normally open or close contacts for a variety of control applications.



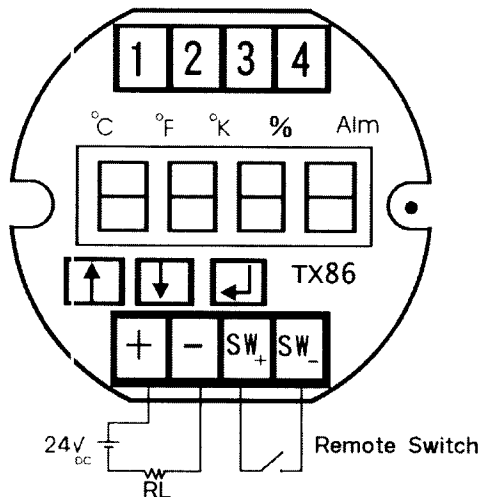
<Fig1> Block Diagram

2. Electrical Installation

The terminal blocks allow for wires of up to 2.5 mm to be fitted. Connect the sensor wires to the appropriate screw terminals as indicated below. Pay attention to correct polarity when connecting thermocouples.



<Fig. 2> Input Connection Diagram



<Fig.3> Output Connection Diagram

The power supply of 12~ 30Vdc is connected terminal +, terminal -, together with the signal by the two leads connected to the measurement output. When a corrected loop power is applied, the unit will display L-01 during loading working parameters from EEPROM and will execute a self-test procedure. The built-in solid-state single pole alarm output stress capacity is 40 Vdc Max. 30 mA Max. between terminal SW+ and terminal SW-.

3. Configuring the TX86

The TX86 may be supplied factory configured for the working parameters as specified by the customer at time of order. Use this manual in order to alter and modify the existed working parameters

Keyboard Description:

← ENTER key: Choose current display parameter or value as the correct and valid one. Also use to enter into one of the programming states.

▲ : UP key: Use to increase the numerical value of the display. Also use to scroll upwards through the program menu during Measuring, Setup and Calibration Mode.

▼ : DOWN key: Use to decrease the numerical value of the display. Also use to scroll downwards through the program menu during Setup and Calibration Mode.

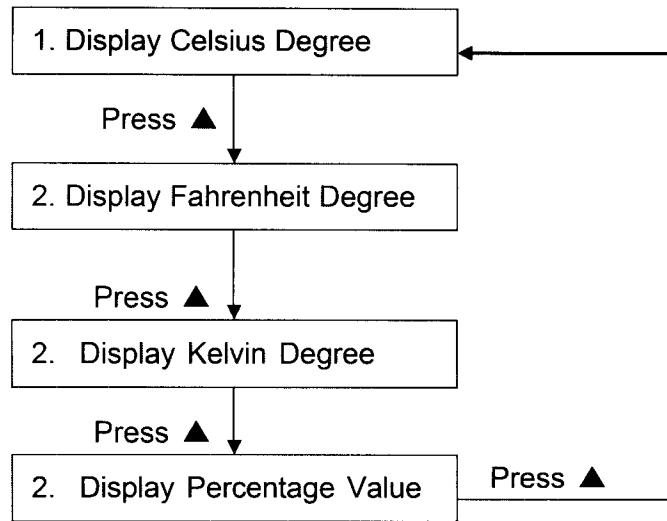
The TX86 Setup and Calibration functions are configured through a two level of access push button sequences. In order to friendly use, the menu is divided into three main categories Measuring, Setup and Calibrate Mode. The TX86 enters Measuring Mode automatically after power applied.

3.1 Measuring Mode

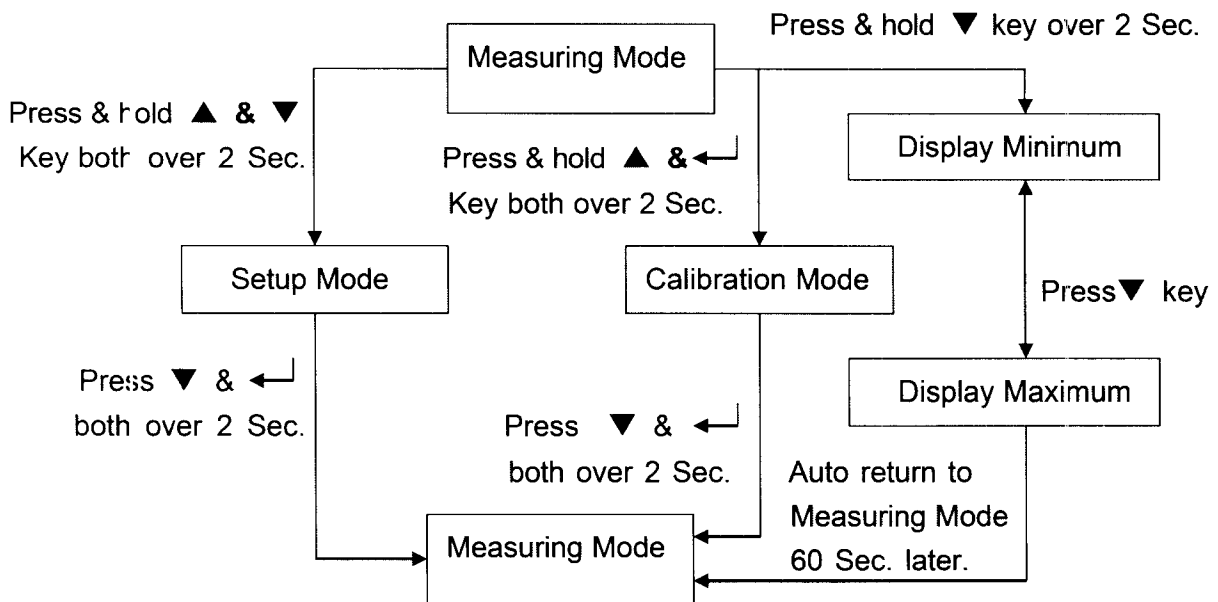
This is the normal operating mode after power on. In Measuring Mode, use all of the working parameters which were used in the Setup Mode. The unit equipped with a 16 bit A/D & D/A converter enables higher accuracy for converting the input and transmitting the output signal and displays the measured variable on the high bright LED indicator. The transmitter also checks temperature drift compensation every 5 minutes and performs a real-time self-diagnostic check. The sensor input circuit is monitored for open and short-circuits and the output current responds in a defined value if one is detected.

There are three temperature degree units Celsius, Fahrenheit, Kelvin and % can be displayed by LED lamp by pressing ▲ key during Measuring Mode see < Fig 4>. Lead-wire compensation is provided only for 3-Wire RTD. Short the lead wires when using an external 2 wire resistance thermometer Pt100 as a Cold Junction Compensation for thermocouple measurement. When measuring variable alarm conditions the built-in solid-state single pole relay will be energized or un-energized depending on Alarm Mode set and associated LED lamp indication. Please allow review of Maximum (associated Celsius lamp flash) and Minimum (associated Fahrenheit lamp flash) values during unit start-up or of the last push of the ENTER button (zero display) by pressing and holding of the ▼ key for over 2 seconds. To re-zero the input reading (input signal amplitude less $\pm 0.5\text{mV}$, $\pm 0.5\text{ Deg. C}$ or $\pm 0.5\text{ Ohm}$) or to clear the Min/Max values, please press and hold the ENTER key for 2 seconds until the display shows 0.000 see <fig. 6>

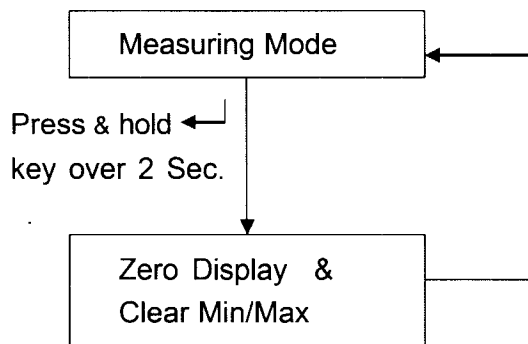
Note: Press ▼ prior to pressing ← is recommended for 2-key operation.



<Fig. 4> Change displayed engineering units during Measuring Mode



< Fig. 5 > Flow chart of Operating Mode



< Fig 6 > operation of Zero display & Clear Min/Max values

3.2 Entering the Setup Mode

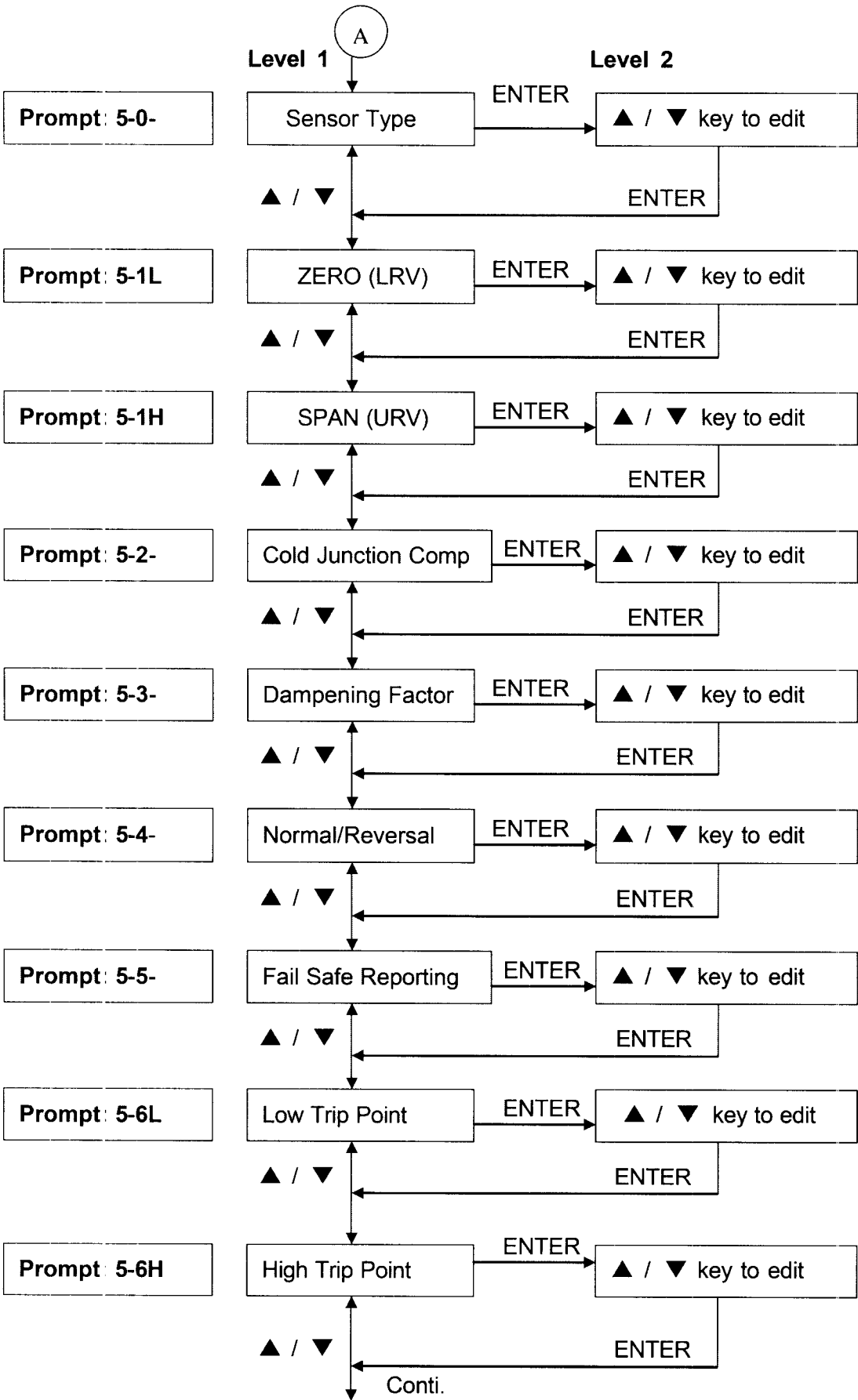
To start the Setup Mode, first press and hold ▲ key and ▼ key simultaneously until the prompt is displayed during Measuring Mode see< Fig 5>. The Setup Mode will allow the user to do the following:

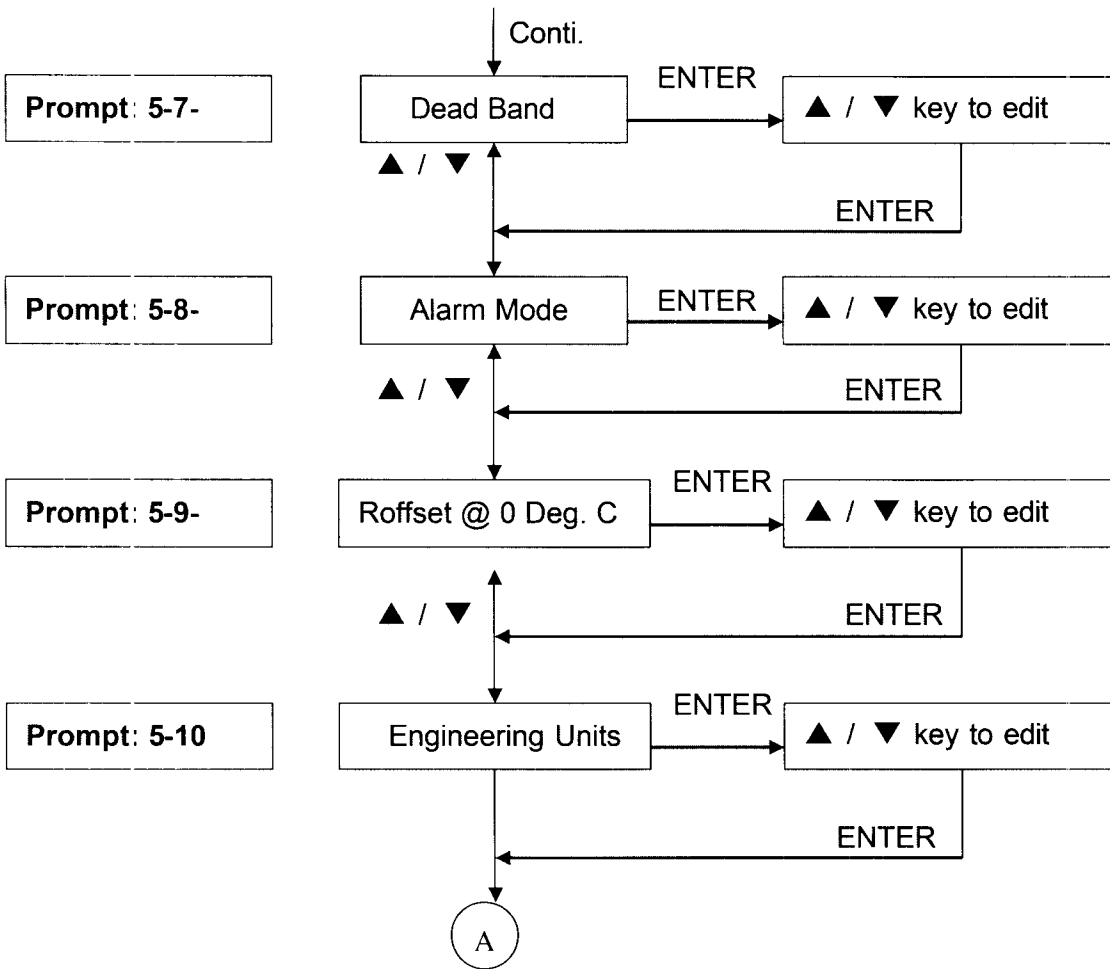
- Change a Sensor type Input.
- Change the 4mA Lower Range Value. (Zero point)
- Change the 20mA Full Scale Value. (Span point)
- Change the source of Cold Junction Compensation.
- Change the Dampening Constant.
- Change the Normal or Reversal Output Current.
- Change the Sensor Fail Safe detection.
- Change the Low Trip Point.
- Change the High Trip Point.
- Change the Dead Band of Trip Point
- Change Alarm Mode
- Change offset resistance value of RTD @ 0
- Change the Display Engineering Unit

Each of these function prompts are presented in sequence on the LED display. Using ▲ key or ▼ key to scroll the Setup Mode menu. To perform the displayed function press the ENTER key, the unit will response by displaying the existing code or working parameter, press▲ key or ▼ key to increase or decrease the displayed value to what you want to configure. Finally press the ENTER key again to save the edited parameter into Non-Volatile Memory to display the next function prompt. The functions are described in detail below and summarized on the Keyboard Flow Chart see< Fig. 7 >.

Displayed Prompt	Function
5-0-	Set the Sensor Type Input
5-1L	Set the 4mA for Lower Range Value (Zero)
5-1H	Set the 20mA for Full Scale Value (Span)
5-2-	Set the Source of Cold Junction Compensation
5-3-	Set the Dampening Time Constant. (Digital Filter)
5-4-	Set the Normal or Reversal Output Current
5-5-	Set the Sensor Fail Safe Reporting (Upscale or Downscale)
5-6L	Set the Low Trip Point Value
5-6H	Set the High Trip Point Value
5-7-	Set the Dead Band of Trip Point
5-8-	Set the Alarm Mode
5-9-	Set the Offset resistance value of RTD @ 0°C
5-10	Set the Displayed Engineering Unit

Table 1 Setup Mode





<Fig 7 > Flow Chart of Setup Mode

- Note:
1. Only level 1 can be quitted from Setup Mode to return back to Measuring Mode
 2. During level 2 routine, you can scroll the display values by holding down the ▲ / ▼ keys to edit ZERO, SPAN, Low Trip Point, High Trip Point and Roffset parameters (continuous setting).
 3. For single setting, press and hold until the displayed value change then release the key
 4. For sensor input types resistance and potentiometer, their measuring range can be ZERO and SPAN value. Example: A potentiometer input type is connected to the unit, it's measuring range is 0/1000 ohm so the ZERO has to be set at 0 and the SPAN has to be set at 1000 for display scale and loop current transmitting.

3.2.1 Select a Sensor Input

The select sensor is the first function in the sequence. Thermocouple, RTD, Resistance or mV can be selected. The displayed prompt is **5-0-**, press ENTER key, the transmitter will response by displaying the existing Sensor Code. Press▲key or ▼ key select Sensor Code until the sensor is set correctly, press ENTER key again to save and quit the function. Default Sensor Cold is 0.

Sensor Type	Code	Measuring Range	Min. Span
Thermocouple-T type	0	From -100 to 400 °C	50 °C
Thermocouple-R type	1	From 0 to 1700 °C	200 °C
Thermocouple-S type	2	From 0 to 1700 °C	200 °C
Thermocouple-B type	3	From 400 to 1800 °C	200 °C
Thermocouple-J type	4	From -100 to 750 °C	50 °C
Thermocouple-E type	5	From -100 to 750 °C	50 °C
Thermocouple-K type	6	From -100 to 1300 °C	50 °C
Thermocouple-N type	7	From -100 to 1300 °C	50 °C
Pt100, $\alpha = 0.00385$	8	From -200 to 850 °C	50 °C
Pt200, $\alpha = 0.00385$	9	From -200 to 400 °C	50 °C
Pt500, $\alpha = 0.00385$	10	From -100 to 200 °C	50 °C
Pt1000, $\alpha = 0.00385$	11	From -100 to 200 °C	50 °C
Pt100, $\alpha = 0.00392$	12	From -100 to 800 °C	50 °C
Cu 10	13	From -100 to 260 °C	50 °C
Ni 120	14	From -80 to 260 °C	50 °C
Resistance	15	From 50 to 2000 ohm	50 ohm
Potentiometer	16	From 50 to 2000 ohm	50 ohm
Millivolt	17	From -5 to 60 mV	2 mV

Table 2 Sensor Input Type Code and its Measuring Range

3.2.2 Change ZERO

The function display prompt is **5-1L**, press ENTER key, the transmitter will respond by displaying the existing ZERO value. Press▲key or ▼ key to increase /decrease the displayed value until the parameter is set correctly, press ENTER key again to save and quit the function. The adjustable ZERO range from -999 to SPAN, The engineering unit is limited to Celsius only.

Note: 1. If a new ZERO value is higher than the existing SPAN value, then the SPAN has to change to ZERO first.

2. The ZERO is not beyond the limited range as listed in Table 2

3.2.3 Change Full Scale (SPAN)

The function display prompt is **5-1H**, press ENTER key, the transmitter will response by displaying the existing SPAN value. Press ▲ key or ▼ key to increase /decrease the value until the parameter is set correctly, press ENTER key again to save and quit the function. The adjustable SPAN range from ZERO to + 9999, The engineering unit is limited Celsius only

Note: 1 If the new SPAN is lower than the existing ZERO value then the ZERO has to change to SPAN first.

2 The SPAN is not beyond the limited range as listed in Table 2

3.2.4 Set the Cold Junction Compensation (CJC)

The function display prompt is **5-2**, press ENTER key, the transmitter will response by displaying the existing CJC Code. Press ▲ key or ▼ key to increase /decrease the Code until the parameter is set correctly, press ENTER key again to save and quit the function. Code = 0 means the internal temperature sensor is a CJC source, Code = 1 means using an external 2 wire Pt100 ($\alpha = 0.00385$) as a CJC source. Default Cold is 0

Cold Junction Compensation	Code
Internal	0
External	1

Table 3 CJC source

3.2.5 Set the Dampening Time Constant

The function display prompt is **5-3**, The Dampening Time Constant provides a measure of the time over which the input signal will be averaged for stable, smooth and noise free output. Press ENTER key, the transmitter will response by displaying the existing Code. Press ▲ key or ▼ key to increase /decrease the Code until the parameter is set correctly, press ENTER key again to save and quit the function. Default Cold is 0.

Dampening Time Constant (Seconds)	Code
Disable	0
2	1
4	2
6	3
8	4
16	5
32	6
64	7

Table 4

3.2.6 Set the Normal or Reversal Output Current

The function display prompt is **5-4**, press ENTER key, the transmitter will response by displaying the existing Code. Press▲key or ▼ key to increase /decrease the Code until the parameter is set correctly, press ENTER key again to save and quit the function. Code=0 means Normal output (4/20 mA). Code=1 means Reversal output (20/4 mA). Default Code is 0

Output Current	Code
4 – 20 mA	0
20 - 4 mA	1

Table 5

3.2.7 Set the Sensor Fail Safe Reporting

The function display prompt is **5-5**. Fail-safe reporting allows the transmitter to change the 4-20mA loop to indicate a failure condition. This failure may be a sensor failure or the unit failure, press ENTER key, the transmitter will response by display the existing Code. Press▲key or ▼ key to increase /decrease the Code until the parameter is set correctly, press ENTER key again to save and quit the function. Code=0 means a loop current of less than 3.8 mA (Downscale). Code=1 means a loop current above 21.0 mA (Upscale) when a failure has occurred. Default Code is 0

Fail-safe reporting	Code
Downscale	0
Upscale	1

Table 6

3.2.8 Set the Low Trip Point Value (LTP)

The function display prompt is **5-6L**, press ENTER key, the transmitter will response by displaying the existing Low Trip Point value. Press▲key or ▼ key to increase/decrease the value until the parameter is set correctly, press ENTER key again to save and quit the function. The Low Trip Point Value must be greater than or equal to ZERO. Default value is ZERO. The engineering unit is limited to Celsius only

3.2.9 Set the High Trip Point Value (HTP)

The function display prompt is **5-6H**, press ENTER key, the transmitter will response by displaying the existing High Trip Point value. Press▲key or ▼ key to increase /decrease the value until the parameter is set correctly, press ENTER key again to save and quit the function. The High Trip Point Value must be lesser than or equal to SPAN. Default value is SPAN. The engineering unit is limited to Celsius only.

Note: The relationship of $ZERO \leq LTP \leq HTP \leq SPAN$ has to be followed

3.2.10 Set the Dead Band (Hysteresis) of Trip Point

The function display prompt is **5-7**, press ENTER key, the transmitter will response by displaying the existing Dead Band value. Press▲key or ▼ key to increase /decrease the value until the parameter is set correctly, press ENTER key again to save and quit the function. Default value is 1.

WARNING: The alarm should not be used for critical safety applications such as an emergency shut down system.

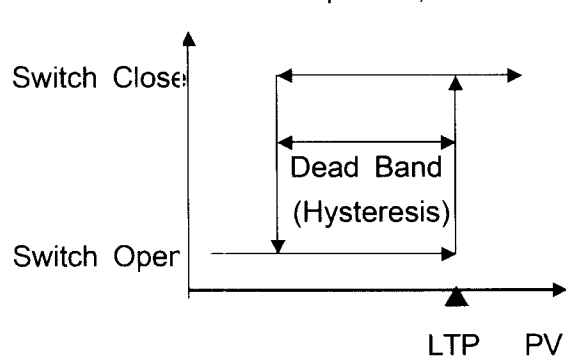
3.2.11 Set the Alarm Mode

The function display prompt is **5-8**, press ENTER key, the transmitter will response by displaying the existing Alarm Mode Code. Press ▲ key or ▼ key to increase /decrease the value until the parameter is set correctly, press ENTER key again to save and quit the function. Default Code is 0.

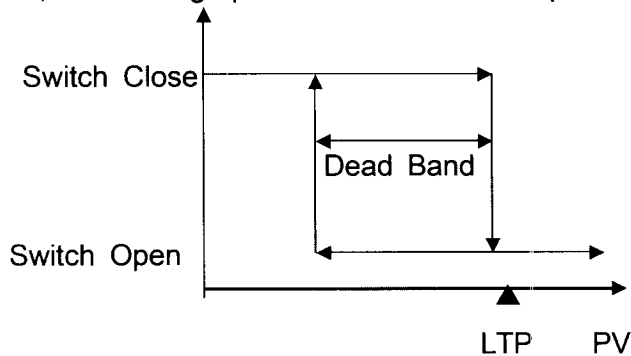
Alarm Mode	Code
Disable	0
Mode 1	1
Mode 2	2
Mode 3	3
Mode 4	4

Table 7

1. Mode 1: $PV > \text{Low Trip Point}$; Alarm occurred, SSR change position from Open to Close
2. Mode 2: $PV < \text{Low Trip Point}$; Alarm occurred, SSR change position from Close to Open

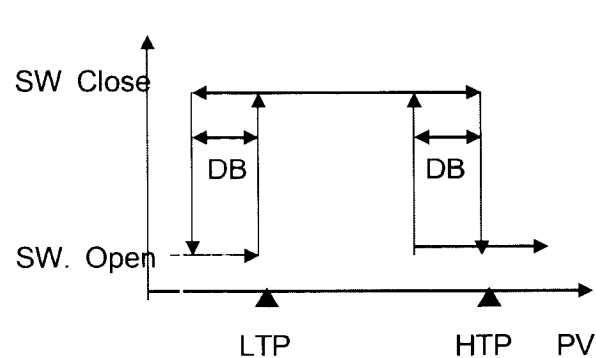


<Fig. 8-a > MODE 1

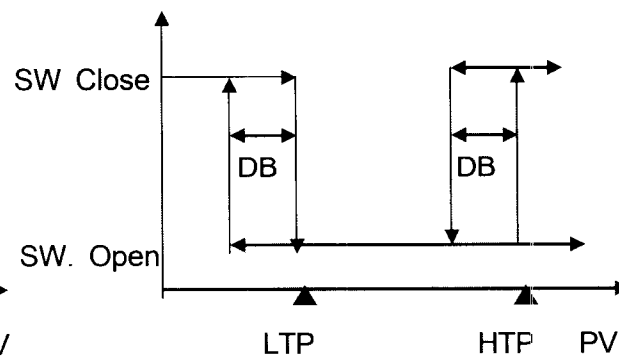


< Fig. 8-b > MODE 2

3. Mode 3: $LTP < PV < HTP$; Alarm occurred, SSR change Position from Open to Close
4. Mode 4: $LTP < PV < HTP$; Alarm occurred, SSR change Position from Close to Open



<Fig. 8-c> MODE 3



< Fig. 8-d> MODE 4

< Fig 8 > Alarm Mode

Note: PV= Process Value, LTP= Low Trip Point, HTP= High Trip Point, DB= Dead Band
The relation of $ZERO \leq LTP < HTP \leq SPAN$ has to be obeyed.

3.2.12 Set the offset resistance value of RTD @ 0°C

The function display prompt is 5-9, press ENTER key, the transmitter will response by displaying the existing offset resistance value. Press ▲ key or ▼ key to increase /decrease the value until the parameter is set correctly, press ENTER key again to save and quit the function. For example, the sensor input Pt100 resistance is 100.15 ohm @0°C, the offset value 0.15 ohm (100.15 – 100.0 = 0.15) has to be set for high accuracy measuring. Default value is 0.00 ohm

3.2.13 Set the displayed Engineering Unit

The function display prompt is 5-10, press ENTER key, the transmitter will response by displaying the existing Engineering Unit code. Press ▲ key or ▼ key to increase /decrease the value until the parameter is set correctly, press ENTER key again to save and quit the function.

Engineering Unit	Code
°C	0
°F	1
Kelvin	2
%	3

Table 8

4. Calibrate the Transmitter

Do not start any calibration procedure without first reading and fully understanding this manual. Improper operation may cause the loss of calibration data. Warm up the transmitter and calibration equipment for a least 5 minutes.

4.1 Calibration Equipment:

DC mV, Thermocouple and RTD Simulator: Simulating input signal to transmitter

5 1/2 Multi-meter; Monitor output current from a transmitter

Power Supply: 24 Vdc nominal

4.2 Entering the Calibration Mode

To start the Calibration Mode, first press and hold ▲ key and ENTER key simultaneously until the Calibration Mode prompt is displayed during the Measuring Mode see < Fig.5>

The Calibration Mode will allow the user to do the following:

Trim 4 mA

Trim 20 mA

Calibration 0 mV

Calibration 60 mV

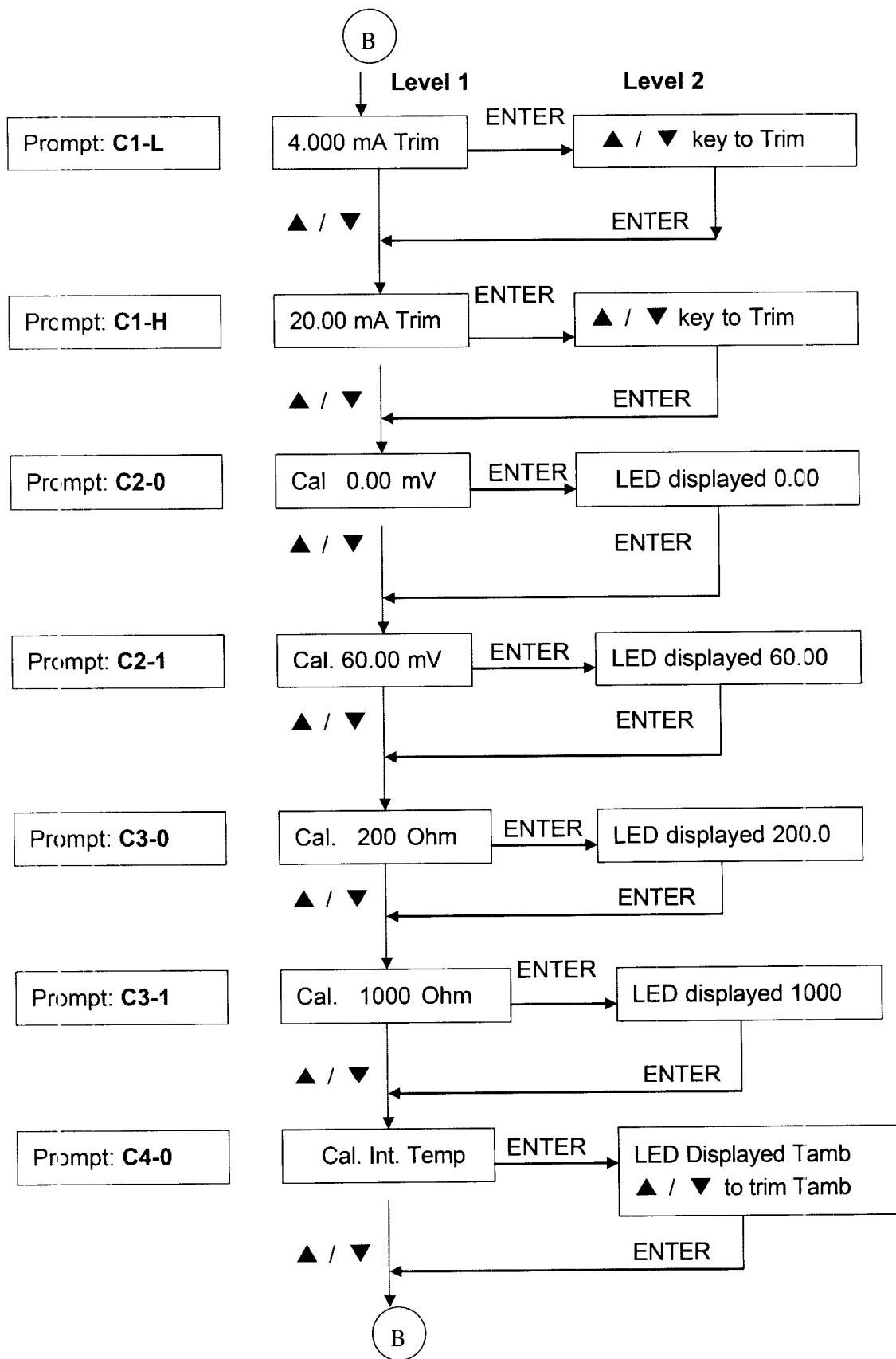
Calibration 200 ohm

Calibration 1000 ohm

Calibration internal CJC

Displayed Prompt	Function
C1-L	Trim 4.00 mA
C1-H	Trim 20.00 mA
C2-0	Calibration 0.0 mV
C2-1	Calibration 60.0 mV
C3-0	Calibration 200 ohm
C3-1	Calibration 1000 ohm
C4-0	Calibration Internal Temp. Sensor

Table 9 Calibration Mode



<Fig. 9 > Flow Chart of Calibration Mode

Note: 1. You can only quit from the Calibration Mode from level 1 routine.

2. The longer you hold ▲ or ▼ key the more you will change the output current when trimming 4.00 mA, 20.00 mA parameters

4.2.1 Trim 4.00 mA

The function display prompt is **C1-L**, press ENTER key, the transmitter will respond by displaying 4.000 and also display an output milliamp current equal to its internal set 4mA. This 4 mA value should be read on an external Multi-meter. Press ▲ key or ▼ key to increase /decrease the output current: until 4.00mA current is read correctly, press ENTER key again to save and quit the function. It is advisable to use a higher accuracy Multi-meter to read the output current.

4.2.2 Trim 20.00 mA

The function display prompt is **C1-H**, press ENTER key, the transmitter will respond by displaying 20.00 and also display an output milliamp current equal to its internal set 20mA. This 20 mA value should be read on an external Multi-meter. Press ▲ key or ▼ key to increase /decrease the current until 20.00mA current is read correctly, press ENTER key again to save and quit the function.

Note: These functions are only for the purpose of adjusting the loop current to be exactly 4.00/20.00 mA according to the plant's local standard. This is not to re-range the transmitter.

4.2.3 Calibration 0.0 mV (offset)

The function display prompt is **C2-0**. this function has to be done for all calibrations. Connect a DC mV Simulator to the input terminals number 2 and 4, set the calibrator's output equal to 0.0 mV or short the input terminals number 2 and 4, press ENTER key, the transmitter will respond by displaying value 0.000, press ENTER key again to execute and quit the function. The % indicator lamp will brighten for 2 seconds to indicate the calibration is OK. The Kelvin Degree indicator lamp will brighten for 2 seconds to indicate the calibration failed. **Note: this Cal.0 mV has to be executed first before performing calibration 60 mV, 200 ohm and 1000 ohm procedures.**

4.2.4 Calibration 60.00mV (Full Scale)

The display prompt is **C2-I**, Connect a DC mV Simulator to the input terminals number 2 and 4, set the Simulator output equal 60.0 mV. press ENTER key, the transmitter will respond by displaying value 60.00, press ENTER key again to execute and quit the function. The % indicator lamp will brighten for 2 seconds to indicate the calibration is OK, The Kelvin Degree indicator lamp will brighten for 2 seconds to indicate the calibration failed. **Note: this Cal. 60 mV has to be executed first before performing calibration 200 ohm and 1000 ohm procedures.**

4.2.5 Calibration 200 ohm

The function display prompt is **C3-0**, Connect a precision 200 Ohm reference resistor to the input terminals number 1 and 4. Press ENTER key, the transmitter will respond by displaying value

200.0, press ENTER key again to execute and quit the function. The % indicator lamp will brighten 2 seconds to indicate the calibration is OK, The Kelvin Degree indicator lamp will brighten 2 seconds to indicate the calibration failed.

Note: Recommend Calibration voltage procedures have to be executed prior to resistance calibration.

4.2.6 Calibration 1000 ohm

The function display prompt is **C3-1**. Connect a precision 1000 Ohm reference resistor to the input terminals number 1 and 4. Press ENTER key, the transmitter will respond by displaying value 1000, press ENTER key again to execute and quit the function. The % indicator lamp will brighten 2 seconds to indicate the calibration is OK, The Kelvin Degree indicator lamp will brighten 2 seconds to indicate the calibration failed.

4.2.7 Calibration Internal Temperature Sensor

The function display prompt is **C4-0**, Place the transmitter inside an environmental test chamber. Press ENTER key, the transmitter will respond by displaying an internal temperature, Press ▲ key or ▼ key to increase /decrease the temperature displayed until the internal temperature is matched correctly with the reference temperature, press ENTER key again to save and quit the function.

WARNING: Internal temperature sensors positioned under the input terminals will have a temperature difference as compared to input terminals of thermocouple connection.

Return to Measuring Mode from Setup/Calibration Mode

At any Setup/Calibration Mode Function's prompt, press and hold ▼ and ENTER key simultaneously until the measured parameter is displayed see < Fig.5>

5. Error Code

When Sensor input wires are broken, or are beyond acceptable range, or there is an external Cold Junction Compensation error or an internal component failure, the instrument will display an Error Code.

Err1: Sensor input wires are broken or the input signal is beyond the acceptable range. Check input wires or signal amplitude for a solution

Err2: Cold Junction Compensation error. Check CJC sensor for a solution

Err3: Internal electronics components failure. Returned to Omega Engineering for evaluation.

Err4: The unit was operated at a dangerous ambient temperature (over 75 Deg. C). Check the operation temperature

Err5: Internal electronics components failure. Returned to Omega Engineering for evaluation.

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by it will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESS OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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