

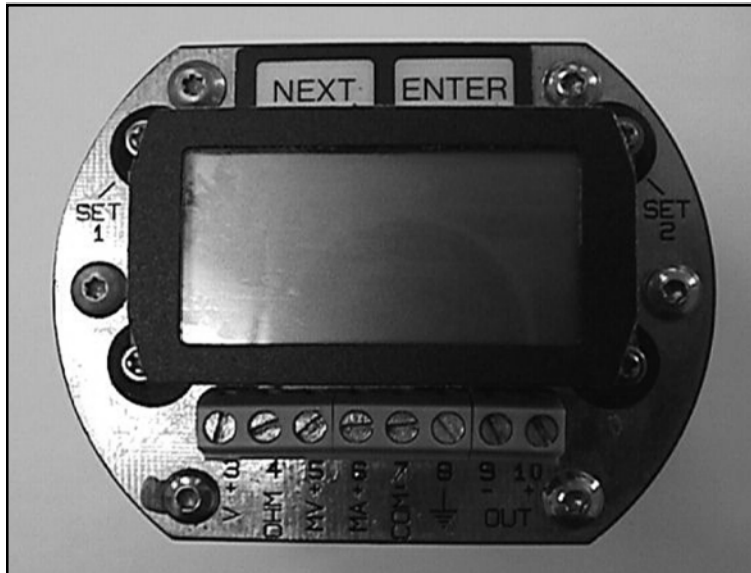


**MODEL SCI70**

**TWO-WIRE “SMART”**

**SIGNAL CONDITIONER**

**INSTALLATION AND OPERATION MANUAL**



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## **1.0 INTRODUCTION**

The SC170 is a programmable, two-wire, isolated signal conditioner that accommodates DC milliamperes, DC millivolts, DC volts, Potentiometer (slidewire), two and three wire resistance as inputs. This instrument is exceptionally versatile and can be used when any one or all of the following requirements exist:

- Signal isolation
- Conversion of signal types (e.g., Millivolt input to 4 to 20mA output)
- User-tailored noise filter to eliminate noise without damping
- Local digital display in engineering units
- Bar graph display indicating percent of span
- Local configuration without external calibration sources
- NIST traceable calibration warranted for 24 months.

The SC170 achieves its performance through the use of digital signal processing and microcontroller technologies. Many of the features, such as the automatic self diagnostics and the exceptional temperature stability, are transparent to the user.

It is simple to setup and operate the SC170 signal conditioner. It can be set up, with a smart local display, the LD-2, and a two-key keyboard, the KB-2. These accessories facilitate local configuration and ranging of the signal conditioner. In operation, the local LCD display indicates the measured signal and units of measurement to six digit resolution, an analog percent of range indication and also provides a seven-character alphanumeric label or message indication.

The SC170 signal conditioner does not have any potentiometers or switches to set, and there are no user-serviceable components inside the enclosure. It has a two-year NIST traceable calibration warranty. Opening the enclosure will void the manufacturer's warranty.

This manual is divided into several main sections. Section One, INTRODUCTION, describes briefly the signal conditioner and the organization of this manual. Section Two, UNPACKING AND INSTALLATION, contains much useful information for the first time installer. Section Three, SIGNAL CONDITIONER OPERATION, contains analog mode of operation. Section Four, CONFIGURATION, THE DISPLAY MODE, explains display mode. Section Five, APPLICATIONS INFORMATION, contains additional applications information. Section Six, SPECIFICATIONS, deals with the signal conditioner specification.

## **2.0 UNPACKING AND INSTALLATION**

### ***2.1 UNPACKING***

Remove the Packing List to check off the actual equipment received. If you have any questions on your shipment, please call DYNISCO INSTRUMENTS Customer Service Department at (508) 541-9400. Upon receipt of shipment, inspect the container for any signs of damage in transit. Especially take note of any evidence of rough handling. Report any apparent damage immediately to the shipping agent.

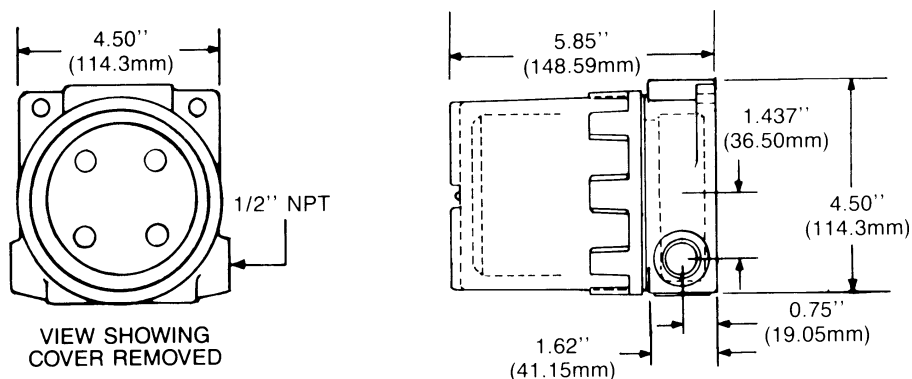
**NOTE:** The carrier will not honor any claims unless all shipping material is saved for their examination. After examining and removing the contents, save the packing material and carton in the event reshipment is necessary.

## 2.2 MECHANICAL INSTALLATION

### 2.2.1 Weather Proof Housing

Optional weather-proof and explosion-proof housings are available. The XP-HDC2-L accommodates a signal conditioner when the display option is not required. The XP-HDGC2-L, with its glass window, may be used when the display option is desired. These housings have appropriate mounting plates in the bottom to attach the SC170 in any of four orientations 90° apart. In addition special captive 6-32 machine screws are installed on the signal conditioner to facilitate installation and removal. These captive screws are installed only if the signal conditioner and housing are ordered at the same time. Figure 2-1 indicates the dimensions of these housings.

**Fig. 2-1 Optional Weather Proof Housing**



### 2.2.2 Conduit Mounting

The weather-proof housing has two 1/2" female NPT conduit entries. These can be used to mount the housing directly onto the 1/2" male NPT ends of conduits. Alternatively, a 1/2" union coupling can be placed between the weatherproof housing and the wiring from the signal source.

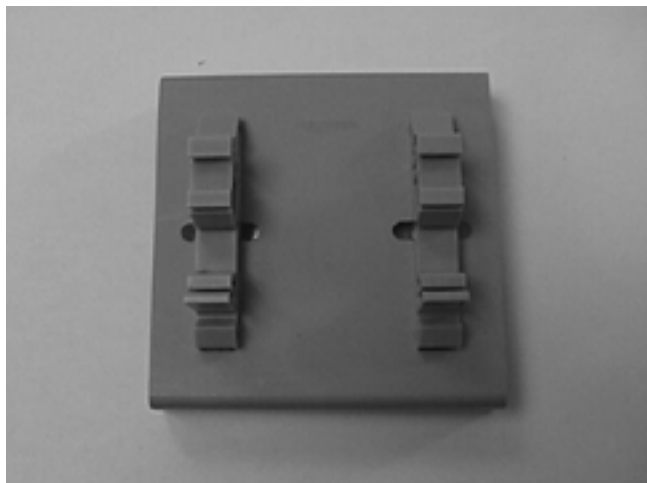
**Fig. 2-2 XP-HDGC2-L**



**Fig. 2-3 XP-HDC2-L**



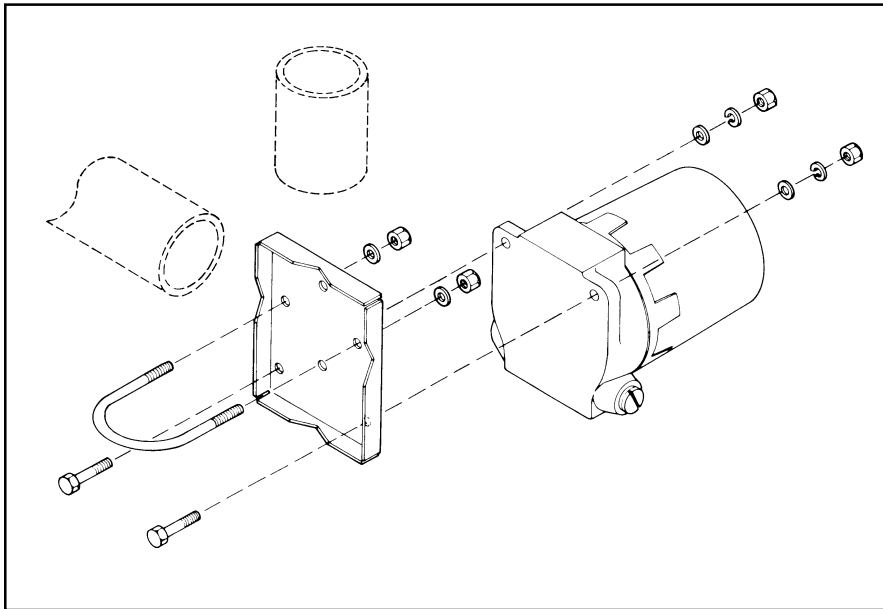
**Fig. 2-4 Din-Rail Kit**



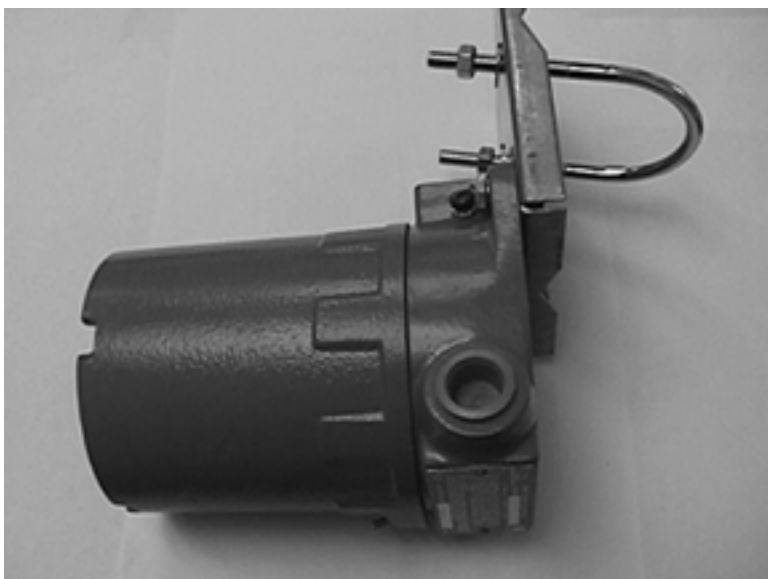
### 2.2.3 Pipe Mounting

A stainless steel bracket, the PB-2, is available for mounting the weatherproof housing onto any 2" pipe in any of four operations. The housing is attached to the bracket as shown in **Figure 2-5**.

**Fig. 2-5**



**Fig. 2-6 Pipe Mounting Bracket with XP-HDC2-L**



### 2.2.4 Surface Mounting

The weatherproof housings, type XP-HDC2-L and the XP-HDGC2L, have two mounting ears allowing them to be attached to any flat surface by means of two bolts. If the additional weather resistance is not required, the SC170 can be mounted directly on a flat surface by the two mounting ears found on these units. In applications requiring several signal conditioners, these can be mounted on the plate normally found inside of NEMA-4 rated rectangular metal enclosures.

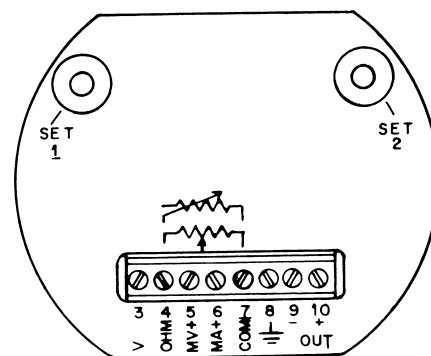
## 2.3 ELECTRICAL INSTALLATION

The SC170 has two groups of terminals.

Terminals 1 and 2 also serve as the mounting screw locations for the LCD display. These terminals, designated as SET 1 and SET 2, in conjunction with terminal 7 as common, are used for setup, configuration and trim purposes. The SET 1 and the SET 2 terminals are marked as such and are located near the upper left and upper right areas of the signal conditioner cover. There is a slanted line pointing directly from the word SET 1 towards the corresponding terminal inside of a round black insulating area. The SET 2 terminal can be found similarly on the right-hand side of the signal conditioner.

Terminals labeled 3, 4, 5, 6, and 7 are used in various connections to accommodate the different input signals. Terminal 8 is used to ground the enclosure.

Terminals 9 and 10 are the 4 to 20mA output terminals. These are normally connected to the corresponding polarity terminals of the power supply of the current loop. Refer to Figure 2-7 for the terminal connections arrangement.



**Fig. 2-7 Terminal Connections**



### ***2.3.1 Output Terminals***

The output terminals 9 and 10 are connected to a power supply having a nominal 24 Volt DC voltage and capable of supplying 100mA for the SC170. In the analog mode, these signal conditioners require a maximum of 23mA. The + OUT and - OUT terminals of the power supply. The maximum series resistance in the circuit (including wiring lead resistance) can be calculated using the formula:

$$R_s = \frac{V_s - 12}{0.023}$$

The following chart gives maximum series resistance:

<b>Max. Series Resistance <math>R_s</math></b>	<b>Supply Voltage <math>V_s</math></b>
1300 ohms	42.0 Volts
520 ohms	24.0 Volts
417 ohms	21.6 Volts
250 ohms	18.0 Volts
0 ohms	12.0 Volts

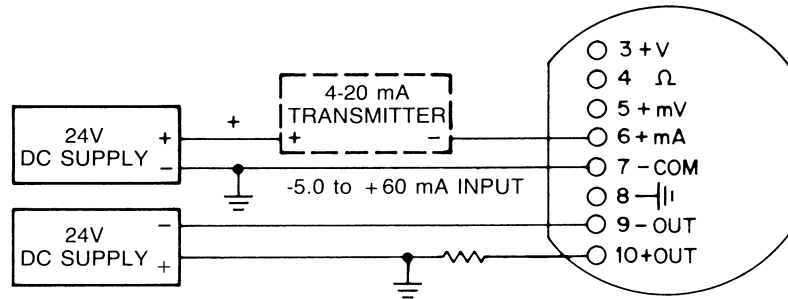
### ***2.3.2 Case Ground***

Terminal 8 provides a connection to the metal enclosure of the signal conditioner. For safety, optimum performance and EMI immunity the case of the instrument should be connected to a good local earth ground. When using grounded sensors that are connected to the local electrical ground, then the signal conditioner case should be connected to that same ground point.

### 2.3.3 Input Terminals

#### 2.3.3.1 DC Milliampere Input

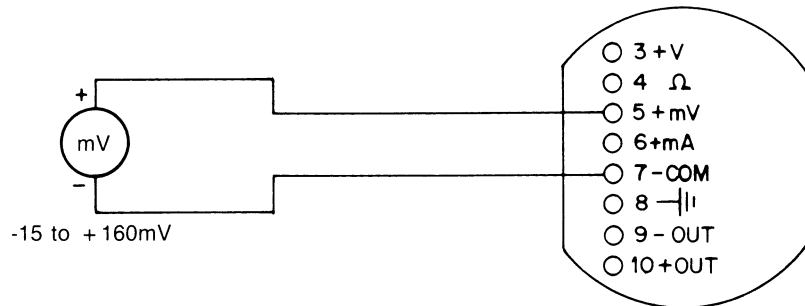
Apply signal to 6(+) and 7(-).



**Fig. 2-8 Typical Connection for Milliampere Input**

#### 2.3.3.2 DC Millivolt Input

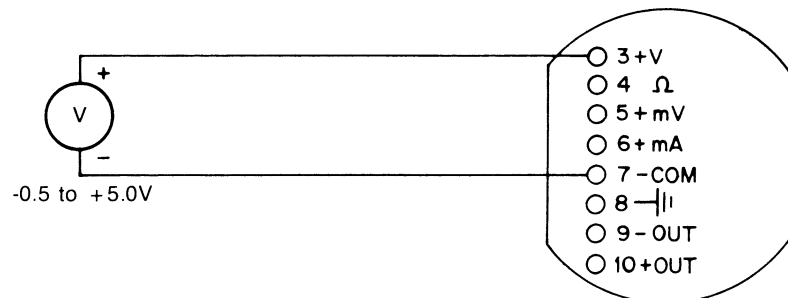
Apply signal to 5(+) and 7(-).



**Fig. 2-9 Typical Connection for Millivolt Input**

#### 2.3.3.3 DC Volt Input

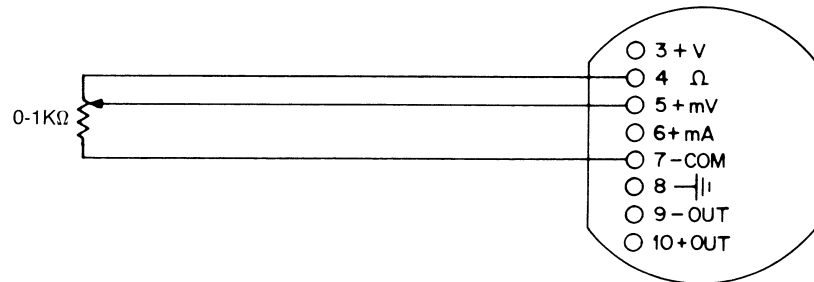
Apply signal to 3(+) and 7(-).



**Fig. 2-10 Typical Connection for Voltage Input**

### 2.3.3.4 Potentiometer

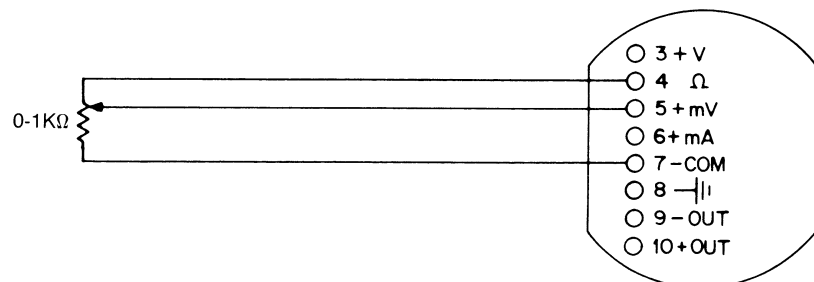
Connect high side to 4, center wiper to 5 and low side to 7.



**Fig. 2-11 Typical Connection for Slideware/Resistance**

### 2.3.3.5 Three wire Ohms

Connect high side of the resistor to 4, one wire from the low side to 5, and the second wire from the low side to 7.



**Fig. 2-12 Typical Connection for Slidewire/Resistance**

### 2.3.3.6 Two wire Rheostat (Ohms)

Connect high side to 4 and low side to 7.

## 3.0 SIGNAL CONDITIONER OPERATION

### 3.1 IN A HURRY?

When in a hurry, this short set of instructions and references will help get the signal conditioner running.

### 3.1.1 Factory Configuration

Milliampere mode,	Analog Output
4.00mA Input	= 4.00mA Output
20.00mA Input	= 20.00mA Output
Sensor Fail-safe	= 21.00mA

On special request the factory will set the signal conditioner to any desired configuration. Special configurations are identified on a tag attached to the unit.

### 3.1.2 Analog Operating Mode

If the unit was ordered with the standard factory configuration, the input required is a 4 to 20mA current loop. The packing slip should indicate if the unit was set up to any other customer requested special configuration. If there is a need to change the configuration of the signal conditioner, or to re-range it, refer to the procedures described in SECTION 4.

**NOTE:** Even when “In a Hurry”, the use of an appropriate power supply is important. A 24V DC supply having a current handling capacity of at least 0.1A is commonly used. Do not use a power supply whose output voltage drops to 20 volts or below when a 0.1 ampere load is connected to it. Always use a DC (direct current) supply, or suitable size battery. Never connect the signal conditioner directly to 115VAC.

With the power supply off, connect the + side of the power supply to the +OUT terminal of the signal conditioner. Connect the - side of the power supply through an optional 250 ohm resistor to the -OUT (9) terminal of the signal conditioner. Connect the input terminals 6 and 7 in series with the current loop to be measured. Terminal 6 should be more positive than 7.

Current Input High (+MA) (6)  
Current Input Low (-COM) (7)

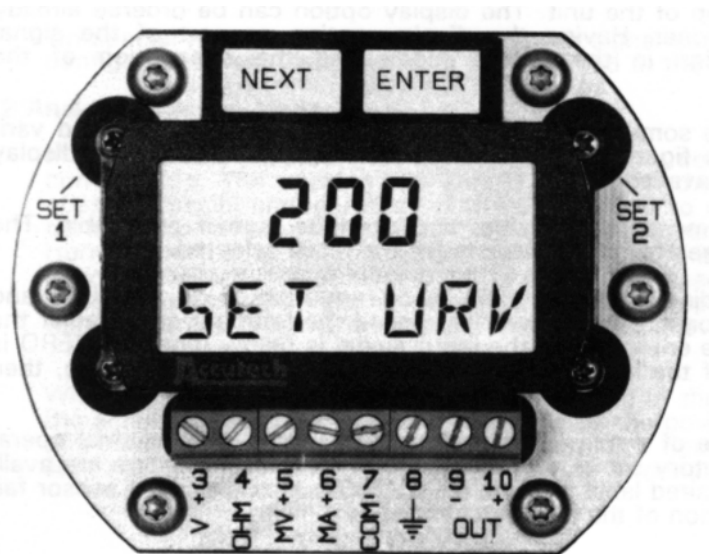
To connect other sensors to the input refer to Section 2.3.32 for the proper sensor connections.

The output can be monitored by connecting a milliammeter in series with either of the two output terminals, or by connecting a high impedance voltmeter across the optional 250 ohm resistor. Now turn on the power supply. In about 5 seconds the SC170 loop current will settle to its normal value in the range of 4 to 20mA. In this configuration the SC170 is a loop-powered isolator. The output current will duplicate the current applied to the input terminals.

### 3.1.3 Analog Operating Mode With Display

If the signal conditioner was ordered with the display option, it will have a small local LCD display module plugged in and attached to the top of the unit. The display option can be ordered already installed on the SC170 signal conditioner. Having the display option as part of the signal conditioner does not affect its operation in the analog mode and the description of the previous section applies.

However, the display option does provide some very useful local indication of the measured temperature and other diagnostic functions. The Figure 3.1 below indicates the arrangement of the display screen and some of the symbols that are available.



**Fig. 3-1 Appearance of the Local Displays (LD-2)**

In operation, the top row displays the measured variable and a minus sign if applicable. The number of decimal places displayed changes to be appropriate for the input selected.

The mid portion is an analog bar graph display showing the % of range based on the ZERO and FULL SCALE setting of the signal conditioner. When power is applied the leftmost segment of the bar graph, the 0% and the 100% become energized. If the input signal is below what the ZERO is set to, then the left arrow is energized. If the input signal is above the FULL SCALE setting, then the right arrow becomes energized.

The bottom portion of the LCD is capable of displaying alphanumeric messages. In normal operation this row shows a label, which is factory set to display SC170. Seven characters are available. The user may order a desired label in place of SC170.

In the event of certain signal conditioner failure modes, the indication changes to

### **S FAULT**

In the event of certain signal conditioner failure modes the indication changes to

### **X FAULT**

This LCD display takes full advantage of the precision of these signal conditioners. The digital display of measurement does not include the small D/A error otherwise present in the analog output. It provides highly accurate local indication of the measurement, local fault diagnostics, and signal conditioner identification. The LCD continues to display the measured variable even if it is beyond the zero and span limits set for the analog output. The value of this display as a set-up, calibration and reconfiguration tool may even be greater, as will be seen in later chapters.

## **4.0 CONFIGURATION USING THE TWO-LINE DISPLAY**

To configure a transmitter using the **DISPLAY MODE**, LD-2 local LCD display and the KB-2 two key keyboard are required. The transmitter can also be purchased with these options already installed. These inexpensive options make the reconfiguration, or re-ranging of the transmitter very simple and easy to follow. Without the use of a calibrator, or any other tools, the transmitter can be set up for a different sensor, or the new range limits can be set much like one would set the time on a digital watch.

In the event that the KB-2 or LD-2 keyboard and display are not purchased at the same time as the transmitter, follow carefully the field installation instructions supplied with the display to avoid damage to the transmitter or the display.

### **4.1 ENTERING THE DISPLAY MODE**

To start the **DISPLAY MODE**, first connect the transmitter to an appropriate DC power supply. Typically a 24VDC supply is connected with the + side to signal conditioner terminal (10) and - side to terminal (9). A series resistor in the loop is optional, but not required. A sensor may be connected to the transmitter's input terminals, but this is not required for setting up the transmitter.

Once the transmitter is powered up, it comes on in the normal operating mode that it was previously set to. The standard factory set-up puts the transmitter in the analog operating mode. With the standard factory set-up and no sensor connected, the LD-2 display will give the following indication:

< 0% ■■■■■■■■ 100%>  
**S FAULT**

The transmitter is indicating **SENSOR FAULT**, since no sensor is connected, and the analog output is indicating greater than 100%, loop current at 21.00mA, which is the standard over range condition. Please note that if you plug the display in to the transmitter while the transmitter is powered up, you may not start the menu sequence at the beginning. You should power down the transmitter without disconnecting the display or simply wait about two minutes for the transmitter to reset itself.

Press the key marked **NEXT**. The display starts to alternate asking if the user wishes to enter the **DISPLAY MODE**,

**DISPLAY**      **MODE ?**

#### Display Mode

The answer would be yes, therefore, press the Enter key. This will allow you to configure the transmitter using the DISPLAY MODE. A flow chart summarizing the operation of the DISPLAY MODE appears at the end of this manual.

Note that when more than seven characters are required to describe a function, the display keeps sequencing through two or more screens. In this manual, the sequencing of the display is indicated by placing the two or more parts of the message adjacently. With some functions, the LD-2 display indicates a numeric value and unit of measurement on the top line of the display in addition to the message on the lower display line.

### ***4.2 DISPLAY MODE OPERATION***

The **DISPLAY MODE** will allow the user to do the following:

- Select a Sensor Input
- Change the 4mA Lower Range Value (CHANGE ZERO)

- Change the 20mA Full Scale Value (CHANGE FULL SCALE)
- Change the Sensor Fail Safe detection (SELECT SENSOR FAIL SAFE)
- Change the Transmitter Fail-Safe detection (SELECT XMITTER FAIL SAFE )
- Trim the 4.0mA output current (TRIM 4 MA)
- Trim the 20.0mA output current (TRIM 20 MA)

Each of these functions is presented in sequence on the LCD display. If the indicated function need not be performed, press **NEXT**, and the next function is displayed on the screen. To perform any function, press the **ENTER** key. This will cause additional screens to be displayed which enable you to perform the function. These are described in detail below and summarized on the LD-2 flowsheet found in the rear of this booklet.

### 4.3 *SELECT A SENSOR INPUT*

The **SELECT INPUT** is the first function in the sequence. The display will read as follows to indicate this position on the menu:

<b>SELECT</b>	<b>INPUT ?</b>
---------------	----------------

If the sensor does not require changing, then press **NEXT** and skip to Section 4.4 of this manual; otherwise press **ENTER**. After pressing the **ENTER** key, the display will change to:

<b>MAMPS</b>
--------------

Indicating that the transmitter is set to a milliamper input. If this is the desired sensor, then press **ENTER**. otherwise press **NEXT** repeatedly to sequence through the available sensors. Each time **NEXT** is pressed, the next available sensor selection is displayed.

<b>MVOLTS</b>	(Millivolts)
---------------	--------------

Press the **NEXT** key to go the next sensor

<b>VOLTS</b>	(Volts)
--------------	---------

<b>RHEOST</b>	(Rheostat, or 2 wire ohms)
---------------	----------------------------



**OHMS 3W** (three wire ohms)

**SLIDEW** (Slidewire or Potentiometer)

One can stop at any one of the input type selections and pressing of the **ENTER** key changes the signal conditioner mode to that input type. If no input change is desired, then without sequencing through the various inputs options, but just pressing the **ENTER** key will allow one to confirm the input selection and leave it unchanged. We will assume that the input is left as **MAMPS.** After pressing **ENTER,** the display returns to:

**SELECT**      **INPUT ?**

Press next to go to the next menu option.

#### 4.4 CHANGE ZERO

The display will then alternate between the following screens to indicate that one may now change the zero, or 4mA output point.

**4.00**  
**CHANGE**      **4.00**  
**ZERO ?**

The numeric value seen on the upper portion of the screen is the current ZERO value of the transmitter. One can now change this ZERO, or LOWER RANGE VALUE, (LRV), totally independent of the FULL SCALE, or UPPER RANGE VALUE, (URV), without the use of any calibrators or external sensor inputs. To change the ZERO, press **ENTER.** The display changes to

**04.000**  
**PLUS ?**

indicating that the existing zero is set to “plus” 004.00. The question mark (?) indicates a question asking if this value is to remain positive (PLUS ?). By repeatedly pressing the **NEXT** key the display will alternate

**-04.000**      **04.000**  
**MINUS ?**      **PLUS ?**

After deciding whether the zero value, LRV, is to remain positive (PLUS), press the **ENTER** key. In this example assume it is to remain positive. The display changes to

<b>4000.00</b> <b>TENS ?</b>
---------------------------------

and the leftmost digit position will start blinking (shown here in italics) asking if the tens position needs to be changed. To change the thousands position, start pressing the **NEXT** key and the leftmost digit will increment through 1 2 3 4 5 6 7 8 9 0. Stop pressing the **NEXT** key at any of the numerals desired, then press **ENTER** to accept the selection. If the numeral selected before pressing **ENTER** was 0, then the display would change to

<b>400.00</b> <b>ONES ?</b>
--------------------------------

and the second digit from the left will start blinking (shown here in italics) asking if the hundreds position needs to be changed. As before, to change the number in this digit position repeatedly press the **NEXT** key until the desired numeral is reached. Then press **ENTER** to go to the next lower significant digit position. Each time the **NEXT** key cycles through the ten choices for that digit position and the **ENTER** key enters the selected number. The digit position being changed is the one that is blinking. The legend on the display will change successively to

<b>040.00</b> <b>TENS ?</b>
--------------------------------

<b>004.00</b> <b>ONES ?</b>
--------------------------------

<b>000.40</b> <b>TENTHS ?</b>
----------------------------------

<b>00.040</b> <b>HUNDTH ?</b>
----------------------------------

After the hundredth's digit position has also been changed to the desired value, the next pressing of the **ENTER** key returns the transmitter to the alternating display of **CHANGE ZERO.** Since changing of the zero has just been completed, press the **NEXT** key to proceed to the next menu selection, **CHANGE FULL SCALE.**

#### 4.5 CHANGE FULL SCALE

<b>200.00</b> <b>CHANGE</b>	<b>200.00</b> <b>FULL</b>	<b>200.00</b> <b>SCALE ?</b>
--------------------------------	------------------------------	---------------------------------

To change the full scale value press **ENTER**. The procedure for selecting Plus or Minus is identical to that described for changing the **ZERO**. Similarly, the procedure for changing each of the digit positions is identical to that described for changing the **ZERO**. Once the steps of changing the **FULL SCALE** have been completed and the **ENTER** key is pressed at the end of the procedure, the display returns to **CHANGE FULL SCALE**. Press **NEXT** for the next function **SELECT SENSOR FAIL SAFE**.

When the desired fail-safe condition is displayed, pressing the **ENTER** key will change to the new setting and the screen returns to the **SELECT SENSOR FAIL SAFE** display. Pressing the **NEXT** key will bring up the **XMITTER FAIL SAFE** selection screen.

#### 4.6 SELECT FAIL-SAFE

<b>SELECT</b>	<b>FAIL</b>	<b>SAFE</b>
---------------	-------------	-------------

Fail-safe allows the transmitter to change the 4-20mA loop to indicate a failure condition. This failure may be a sensor failure or a transmitter. In any event, the user may select to drive the loop to 22.0mA, corresponding to the "HI" selection; to 3.6mA, corresponding to the "LO" selection or to turn the function "OFF"

<b>LOW</b>
------------

<b>HIGH</b>
-------------

<b>OFF</b>
------------

#### 4.7 TRANSMITTER FAIL SAFE

Using a similar procedure as above (4.6) the signal conditioner fail safe condition can be changed to High, Off or Low. When a selection is completed and the screen is back to the main menu item: press the **NEXT** key to bring up the next selection.

#### 4.8 TRIM 4.0MA

TRIM
------

4 MA ?
--------

This allows trimming of the 4.00mA output current.

**NOTE:** This function is only for the purpose of adjusting the 4.00mA limit of the transmitter loop current to be exactly 4.00mA according to the plant's local standard. This is NOT for the purpose of ranging the transmitter!

If trimming the 4.00mA limit is still desired then press **ENTER**. The transmitter will now output a milliamp current equal to its internally set 4mA. This 4 mA value should be read on an external meter and compared to a local standard. It is advisable to use a very good voltmeter to make these comparisons. It is very possible that the transmitter will be more accurate than a great many voltmeters. In this case, trimming will make the transmitter less accurate rather than more accurate!

Once trimming the 4.00mA value has been selected, the display will alternate as follows:

RAISE
-------

MA OUT ?
----------

By pressing the **NEXT** key the display then alternates as

LOWER
-------

MA OUT ?
----------

When it is decided whether to raise or lower the output current, then press **ENTER** and the display changes to one of the following depending on whether the raise or lower function has been selected.

NEXT = +
----------

NEXT = -
----------

Now every time the **NEXT** key is pressed, the display blinks, and the 4.0mA output limit decreases (-), or increases (+). The decrease or increase is in approximately 2.0 microampere increments.

**NOTE:** The 4.0mA limit is factory calibrated to a precision standard. Do not arbitrarily trim the output unless a qualified and accurate local standard is available to measure the adjusted 4.0mA output! Also note that the 4.0mA limit should not be trimmed by more than about  $\pm 50\mu\text{A}$ , or transmitter operation may be impaired.

Once the desired trim is reached, pressing **ENTER** will return to one of the corresponding **TRIM 4mA** screen. At this point one may still go back and do further trimming of the 4.0mA limit by pressing the **ENTER** key, or pressing the Next key changes to the next function.

#### 4.9 *TRIM 20.MA*

TRIM	20 MA ?
------	---------

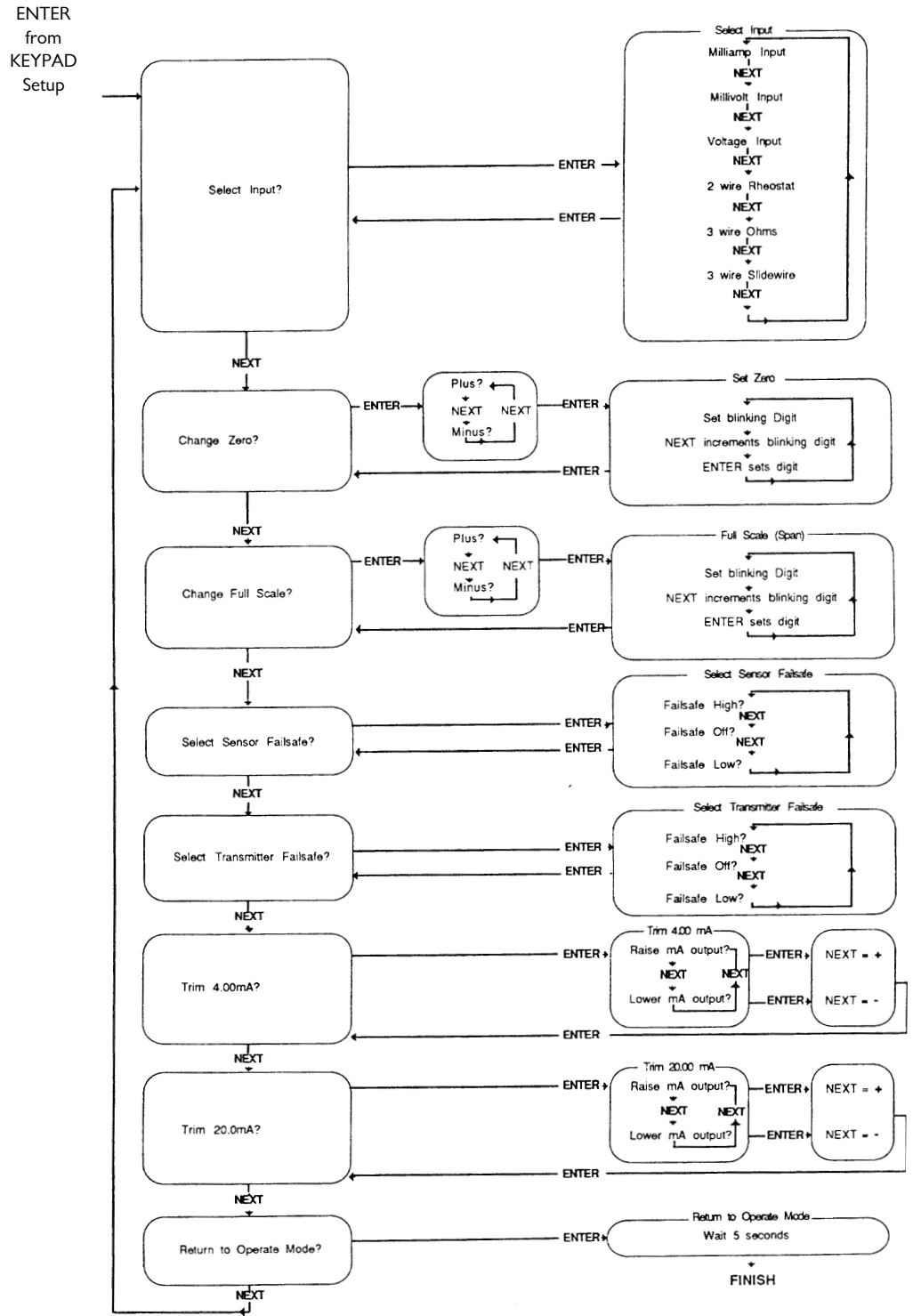
Trimming of the 20.0mA current limit is done in exactly the same manner as was described for trimming the 4.0mA point. Similarly the same precautions apply. After completing the trim 20.0mA pressing the Next key brings up the menu option.

RETURN	TO	OPERATE	MODE ?
--------	----	---------	--------

If all of the set-up and re-ranging operations have been satisfactorily completed, then pressing **ENTER** will return the transmitter to the normal operate mode. Pressing the **NEXT** key at this point will return the display to the first screen in the sequence, **SELECT INPUT.**

Note again, that whenever the transmitter is in the display set-up mode, if no activation of the keyboard occurs for approximately 2-1/2 minutes, the transmitter returns to the operate mode. One can also return to the operate mode at any point in the **DISPLAY MODE** by removing power from the transmitter for about 30 seconds, then reapplying power.

**SC170 Programmable Signal Conditioner  
DISPLAY Mode Configuration Setup Flowchart**

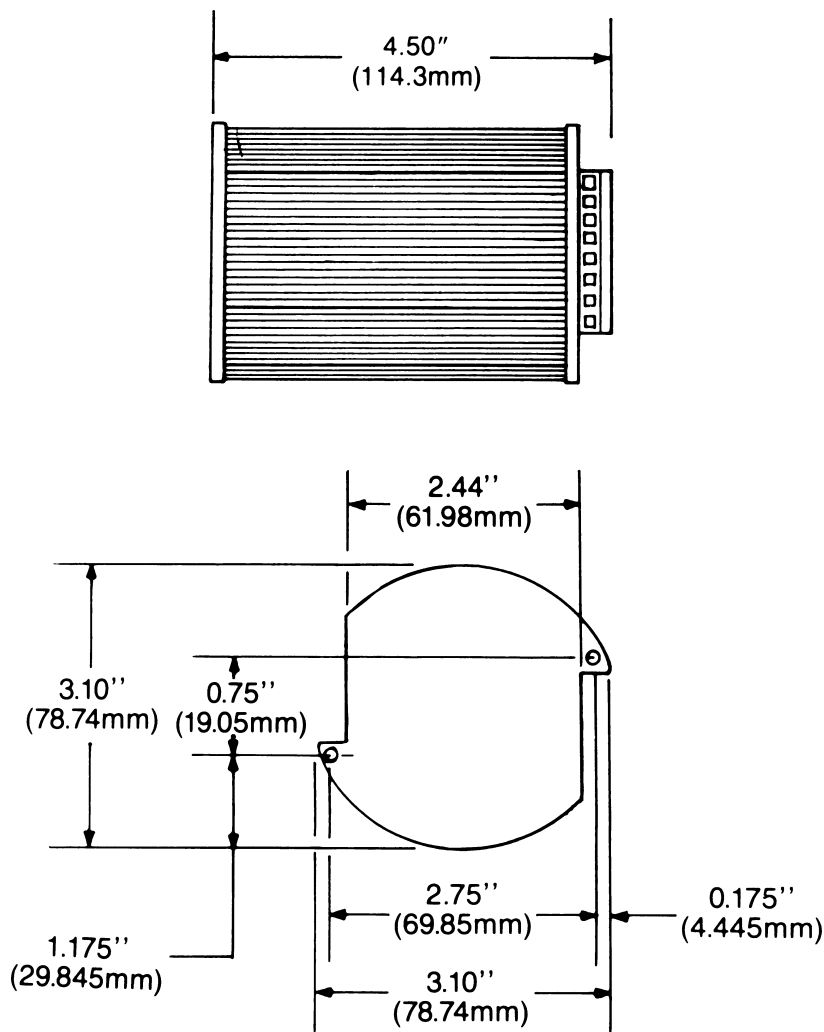


**Fig. 4-1 Dynisco SC170 Configuration Flowchart  
LD-2 / KB-2**

## 5.0 ACCESSORIES & INFORMATION

Other accessories available from Dynisco are:

LD-2	Local Display
XP-HDC2-L	Explosion/Weather proof Housing (No Display Option)
XP-HDGC2-L	Explosion/Weather proof Housing with mounting lugs and glass window
PB-2	Pipe mount bracket (for 2" pipe)
PS-2412	Power Supply, 24/28 VDC, 1.2/0.8A
PS-2405	Power supply, 24 VDC, 0.5A



**Fig. 5-1 Mechanical Dimensions**

## 6.0 SPECIFICATIONS

### INPUT TYPE & RANGE:

DC Milliamp	-5.0 to +60.0 mA
DC Millivolt	-15.0 to +160 mV
DC Volt	-0.5 to +10.0 V
Potentiometer, 3 wire	0.0 to 10.0 Kohm
Resistance, 2or 3 wire	0.0 to 10.0 Kohm

### INPUT RESISTANCE:

DC Milliamp	2.75 Ohms
DC Millivolt	>10M Ohms
DC Volt	1.0M Ohms

### ISOLATION: 850 VDC or peak AC

### LINEARIZATION:

Square, square root, log, and in to +/- 0.05% of input. Custom linearization user programmable at 21 points. Two selected functions and custom linearization can operate on the input signal.

### OUTPUT: Analog, Two wire 4 to 20mA

### MINIMUM OUTPUT RANGE: None

### OUTPUT RANGING ADJUSTMENTS:

Analog Zero: 100% of sensor range, non-interlacing  
 Analog full scale: Normal or reverse acting

### OUTPUT RESOLUTION:

Analog, 2.1 uA:

### ACCURACY:

Includes repeatability, hysteresis, load and ambient temperature effect and uncertainty of factory NIST traceable calibration equipment. Enhanced accuracy calibrations available from the factory.

### OUTPUT ACCURACY:

**+/- 0.04% of the millivolt or ohm equivalent reading, or the accuracy from the table below, whichever is greater.**

Input type	Accuracy
Milliamp	+/-0.005mA
Millivolt	+/-0.008mV
Volt	+/-0.003V
Resistance	+/-0.12ohm

### TRANSMITTER REPEATABILITY:

One half of accuracy.



**REFERENCE CONDITION ACCURACY:**

One half of the accuracy specified above. The transmitter is then referenced to the prevailing conditions and transmitter accuracy at this reference condition will include repeatability, linearity, and hysteresis effects.

**DYNAMIC RESPONSE:**

Turn On Time: Less than 5 seconds after power up  
Ambient Temperature Gradient: Automatic compensation to 20°C/Hour Change  
Update Time: 0.15 second digital, 1.0 seconds  
Response to Step Input: 0.25 Seconds, Typical

**OPERATING TEMPERATURE RANGE:**

-40°F to +167°F (-40°C to +75°C)      Electronics  
-4°F to +158°F (-20°C to +70°C)      Display

**STORAGE TEMPERATURE RANGE:**

-58°F to +185°F (-50°C to +85°C)

**AMBIENT TEMPERATURE STABILITY:**

Self-correcting over the operating temperature range.

**LONG TERM STABILITY:**

Less than 0.05% of reading plus  $\pm 3.6\mu\text{A}$  per year.

**AUTOMATIC DIAGNOSTICS:**

Every 3 seconds the SC170 signal conditioner performs self-checks for zero, span, each open resistance lead, signal over the range condition and signal conditioner malfunction.

**FAILSAFE:**

User settable 21mA, 3.9mA, or OFF

**INTERCHANGEABILITY:**

All units interchangeable without field calibration.

**EMI/RFI IMMUNITY:**

Less than 0.5% of reading (SAMA PMC 33.1c test method) 20KHz to 1000MHz, 10 V/meter.

**COMMON MODE REJECTION:**

120dB

**REVERSE POLARITY PROTECTION:**

42 VDC applied with either polarity

**POWER AND LOAD:**

Supply voltage (no load resistance); 12 to 42VDC;

Supply voltage (with load resistance);

$V_{\text{supply}} = (12) + (R_{\text{load in Kohm}}) \times (23\text{mA})$

Supply Voltage Effect: < +/-0.005% of Span per Volt

**WEIGHT:**

12 oz.

**STANDARD CONFIGURATION:**

Factory configured as a loop isolator for 4.0mA, to 20mA input.

Configurations can be user performed. Special configurations are available to suit your requirements. See Price List.

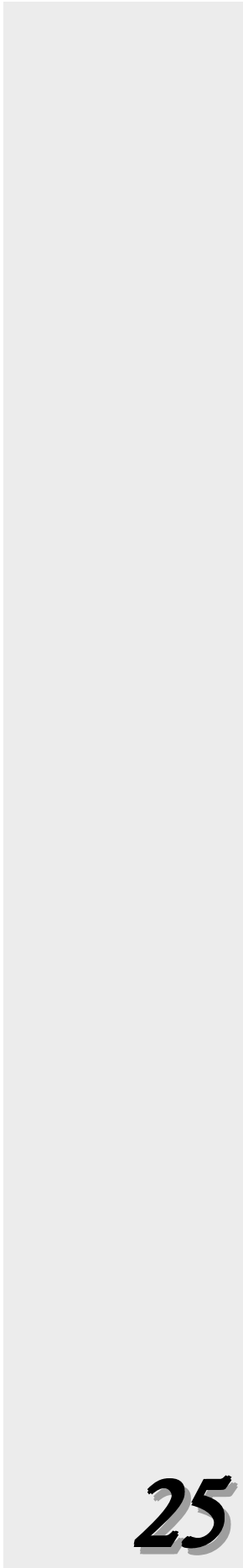
**OPTIONS:**

LD-2 Local Displays.

**PACKAGING:**

The SC170 is packaged in rugged, nickel-plated aluminum enclosure suitable for mounting on a flat surface. The metal enclosure is totally sealed against moisture and provides excellent immunity to the effects of electromagnetic interference (EMI/EFI). For hazardous environments, the SC170 will fit within an available explosion proof housing.

**NOTES**



**NOTES**

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