

# 558B



## CURRENT LOOP INDICATOR

Operator's Manual



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is the policy of NEWPORT to comply with all worldwide safety and EMC/EMI regulations that NEWPORT is constantly pursuing certification of its products to the European New Appliance Directives. NEWPORT will add the CE mark to every appropriate device upon certification.

The information contained in this document is believed to be correct but NEWPORT Electronic accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

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



This device is marked with the international caution symbol. It is important to read the Guide before installing or commissioning this device as it contains important information related to safety and EMC.

## TABLE OF CONTENTS

1.0	GENERAL INFORMATION	1
2.0	SPECIFICATIONS	2
2.1	Input	2
2.2	Accuracy at 25°C	2
2.3	Analog-To-Digital Conversion	2
2.4	Display	3
2.5	Environmental	3
2.6	Mechanical	3
3.0	MECHANICAL ASSEMBLY AND INSTALLATION	4
3.1	Safety Considerations	4
3.2	Intrinsic Safety Parameters for FM (Factory Mutual)	4
3.3	Installation/Removal	5
4.0	SIGNAL INPUT CONNECTIONS (P3)	6
5.0	CONFIGURATION	7
5.1	Standard Setup	7
5.2	Field Configuration Chart	7
6.0	CUSTOMER CONFIGURATION AND CALIBRATION	9
6.1	Formula	9
6.2	Configuration Procedures	10
6.3	Calibration	10
6.4	Factory-Setup Label	10
7.0	WIRING DIAGRAM	11
ILLUSTRATIONS		
Figure 3-1	Exploded View	5
Figure 3-2	DIN Case Dimensions	6
Figure 5-1	Main Board Jumper Locations	8
Figure 7-1	Wiring Diagram for 558B Usage for FM (Factory Mutual)	11

## UNPACKING INSTRUCTIONS

Remove the Packing List and verify that you have received all equipment, including the following:

QTY	DESCRIPTION
1	Current Loop Meter Indicator with all applicable connectors attached.
1	Owner's Manual
1	Factory Setup Label

If you have any questions about the shipment, use the phone number for the Customer Service Department nearest you.

When you receive the shipment, inspect the container and equipment for signs of damage. Note any evidence of rough handling in transit. Immediately report any damage to the shipping agent.



**Note** <sup>®</sup>

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The carrier will not honor damage claims unless all shipping material is saved for inspection. After examining and removing contents, save packing material and carton in the event reshipment is necessary.

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## 1.0 GENERAL INFORMATION

Model 558B two-wire current-loop indicator accepts 1-5 mA, 4-20 mA, or 10-50 mA process signals and digitally displays the process variable in percentage or engineering units of such measurements as pressure, flow, temperature and level. No separate power supply or power connections are required, since the 558B obtains operating power directly from the current loop with a voltage drop of less than 2.5 V. It can tolerate current overdrives up to 200 mA forward and 1000 mA reverse.

The compact 558B circuit is mounted in a black polycarbonate case with the standard 1/8 DIN panel-mount bezel and a depth of less than 110 mm (4.33 in). Five 12.7 mm (0.5 in) high liquid crystal 7-segment digits are used to display  $\pm 1999$  active counts plus one or two dummy right-hand zeros.

The 558B displays from -1999 to 1999 counts with the option of one or two dummy right-hand "0" digits. Zero suppression or elevation capability exceeds full scale. Program jumpers are used to scale the readout for percentage or engineering-unit display. Both zero and span are fine-tuned with multiturn potentiometers accessible through the display board, requiring lens removal for readjustment.

When removed from its case, the 558B can be programmed with gas-tight jumpers for three input ranges (1-5, 4-20 or 10-50 mA), four coarse zero ranges, four decimal-point locations and the dummy right-hand zeros. Two additional jumpers are provided to reverse the span slope so that increasing the input can cause a reading decrease; thus a 4-20 mA input can be programmed to produce a 2000 to -18000 reading when one dummy right-hand zero is also used.

## 2.0 SPECIFICATIONS

### 2.1 INPUT

Current	1-5 mA, 4-20 mA or 10-50 mA
Protection	200 mA max forward and 1000 mA max reverse
Voltage Drop	2.5 V max forward and 1.2 V max reverse
Span Range	100 to 2000 counts continuous adjustment with a multiturn potentiometer
Zero Range	The multiturn zero potentiometer can displace the displayed reading by $\pm 500$ counts from the center of each of the four overlapping zero ranges, provided that the resultant is within the $\pm 1999$ count display capability.
Span Slope	Positive or Negative
Normal Mode Rejection at 50/60 Hz	46 dB minimum

### 2.2 ACCURACY AT 25°C

Maximum error	$\pm 0.1\% R \pm 1$ count
Zero tempco	$\pm 0.1$ ct/K typ, $\pm 0.3$ ct/K max
Span tempco	$\pm 0.005\% S/K$ typ, $\pm 0.015\% S/K$ max

### 2.3 CONVERSION

Technique	Dual-slope, average value with autozero correction
Polarity	Determined automatically at the end of input integration period
Input integration period	100 milliseconds (nominal value)
Reading rate	2.5/second

## 2.4 DISPLAY

Type	7-segment LCD
Color	Black digits with white background
Symbols	-1.8.8.8.0.0, 12.7 mm (0.5 in) height
Polarity	Minus sign
Overrange	Three least-significant digits blank
Extra digits	One or two dummy right-hand zeros, jumper-selectable
Decimal points	Four positions, jumper-selectable
Lifetime (to 2:1 contrast ratio)	More than 30,000 hours
Temperature derating	2:1 for each 10°C above 60°C
Humidity derating	2:1 for each 10%RH above 60%RH

## 2.5 ENVIRONMENT

Standard operating temp	0 to 55°C
Extended operating temp option (conformally coated)	-40 to +85°C
Humidity	To 95% at 40°C
Bezel cover option	Splash-proof

## 2.6 MECHANICAL

Weight	170 g (6 oz)
Case material	Black polycarbonate, 94V-0 flammability rating
Case size	
Bezel (HxWxT)	48 x 96 x 7.67 mm
Depth behind bezel with mounting hardware	Less than 110 mm
Panel cutout (HxW)	45 x 92 mm
Electrical connections	3-terminal screw clamp connector
Wire size	0.13 mm <sup>2</sup> - 2.5 mm <sup>2</sup> (AWG 26-14)

### 3.0 MECHANICAL ASSEMBLY AND INSTALLATION

#### 3.1 SAFETY CONSIDERATIONS

To ensure safe operation, follow the guidelines below:

*VISUAL INSPECTION:* Do not attempt to operate the instrument if damage is found.

*SIGNAL WIRING:* Insert the proper plus and minus signal wires into the plug-in screw-clamp connector terminals marked plus and minus. Ensure that the wires are securely clamped in the plug-in connector by rotating the screws in the plug-in connector clockwise but do not exceed a torque of .5 newton-meter (.37 pound-foot). Then plug the connector firmly into the socket located on the rear panel of the meter.

*RAIN OR MOISTURE:* Do not expose the instrument to condensing moisture.

#### 3.2 INTRINSIC SAFETY PARAMETERS FOR FM (FACTORY MUTUAL)

Certificate No. 2Y4A4.AX

V max=12.5 V,

I max=250 mA

Intrinsically Safe for Class I, II and III, Division 1, Groups, A,B,C,D,E,F and G hazardous locations.

Ci=8.6  $\mu$ F

Li=0 mH



### 3.3 INSTALLATION/REMOVAL

The 558B is housed in a 1/8 DIN case. The electronic circuitry can be installed or removed from the front and is attached to the case with two M4 screws through the rear panel.

#### Panel Mounting

1. Remove the two thumbnuts on the rear of the case.
2. Slide the sleeve off the case (see Figure 3-1 Exploded View).
3. Verify the panel cutout dimensions in Figure 3-2 Case Dimensions. Insert the case in the panel cutout from the front and slide the sleeve on from the rear. Install the two thumbnuts to secure the sleeve to the case.

#### Main Board Access:

1. Case must be removed from sleeve.
2. Remove lens from case.
3. Slide main board from front of case.

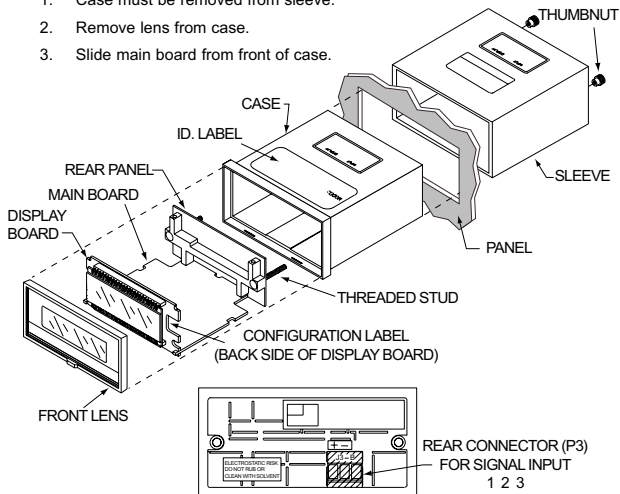
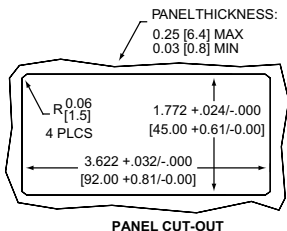
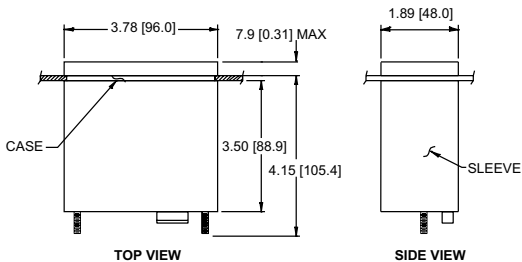


Figure 3-1 Exploded View (includes rear panel)



NOTES: DIMENSIONS ARE IN INCHES [MILLIMETERS].

**Figure 3-2. DIN Case Dimensions**

#### 4.0 SIGNAL INPUT CONNECTIONS (P3)

The signal input connections for all meters are made at connector P3 as follows (see Figure 3-1):

P3 Connection	Signal
1	Signal Hi
2	Signal Lo
3	No Connection

## 5.0 CONFIGURATION

The standard 558B meter is factory-configured for an input of 4-20 mA to display 00.0 to 100.0. Field configuration for input current range, decimal point location, dummy right-hand zero digit, coarse zero range selection, and reverse span slope may be done by relocating internal push-on jumpers and adjusting the span and zero potentiometers. Refer to Figure 5-1 for the span and zero potentiometers and internal jumper locations.

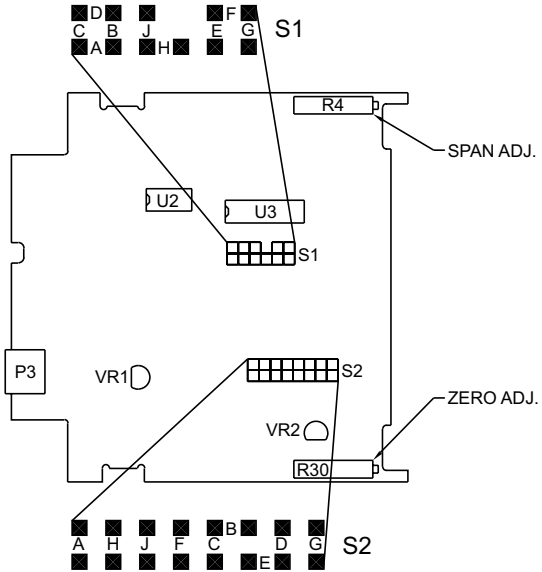
### 5.1 STANDARD SETUP

Unless the customized configuration option is specified, jumpers are factory-installed at S1-H, S2-C, S1-B, S1-C and the unit is calibrated for 4-20 mA = 00.0 to 100.0.

### 5.2 FIELD CONFIGURATION CHART

<b>CONFIGURATION</b>	<b>JUMPER INSTALLATION</b>
1.5 mA Input	None
*4-20 mA Input	S1-H
10-50 mA Input	S1-J
*Normal Span Slope	S1-B, S1-C
Reverse Span Slope	S1-A, S1-D
Decimal Point 1.999 (DP1)	S2-E
Decimal Point 19.99 (DP2)	S2-D
*Decimal Point 199.9 (DP3)	S2-C
Decimal Point 1999. (DP4)	S2-B
Decimal Point 19990. (DP5)	S2-F
Dummy Right-Hand Zero (DRHZ)	S2-A
Dummy Right-Hand Zeroes (2DRHZ)	S2-G, S2-H, S2-J, S2-A
Zero Range -2510 to -1420 (ZR1)	S1-G
Zero Range -1580 to -420 (ZR2)	S1-F
*Zero Range -470 to +850 (ZR3)	None
Zero Range +760 to +2000 (ZR4)	S1-E

\*Standard factory setup



**Figure 5-1 Main Board Jumper Locations**

## 6.0 CUSTOMER CONFIGURATION AND CALIBRATION

Use this procedure to determine the configuration of the 558B customized setup. The procedure is general; customers can specify any two current inputs and their corresponding digital readings. Pin-groups are shown in Figure 5-1.

### 6.1 FORMULA

Base all your calculations on either the 1-5, 4-20 or 10-50 mA range.

1. Determine the lowest input current, I1, which is specified by the customer:

$$I1 = \text{_____ mA}$$

2. Determine the highest input current, I2, which is specified by the customer:

$$I2 = \text{_____ mA}$$

3. Determine the reading, N1, at input current I1, which is specified by the customer.

$$N1 = \text{_____ counts}$$

4. Determine the reading, N2, at input current I2, which is specified by the customer:

$$N2 = \text{_____ counts}$$

5. Calculate the Gain, G1:

$$G1 = \frac{(N2 - N1)}{(I2 - I1)} = \text{_____ counts per mA}$$

(If G1 is greater than 125, it is out of range for a standard unit.)

6. Calculate the Required Zero Range number, RZR:

$$RZR = N1 - (I1 \times G1) = \text{_____}$$

7. Select the Zero Range required from the following chart where the Required Zero Range number falls between the upper and lower limits of that range:

$$ZR1 = -2510 \text{ to } -1420$$

$$ZR2 = -1580 \text{ to } -420$$

$$ZR3 = -470 \text{ to } +850$$

$$ZR4 = +760 \text{ to } +2000$$

$$ZR = \text{_____}$$

## 6.2 CONFIGURATION PROCEDURES

1. Remove all push-on jumpers.
2. For an input current range of 1-5 mA, no jumper is required.  
For 4-20 mA input, install a push-on jumper at S1-H.  
For 10-50 mA input, install a push-on jumper at S1-J.
3. If N2 (Section 6.1) is less than N1, reverse the signal polarity by removing jumpers from S1-B and S1-C and reinstalling jumpers at S1-A and S1-D.
4. Select the zero range required (ZR1-4) and install the push-on jumper as indicated in the configuration chart (Section 5.2).
5. If a decimal point is required (DP1-5), install a push-on jumper as indicated in the configuration chart (Section 5.2).
6. If one dummy right-hand zero is required, install jumper at S2-A.
7. If two dummy right-hand zeros are required, install jumpers at S2-A, S2-G, S2-H, and S2-J.

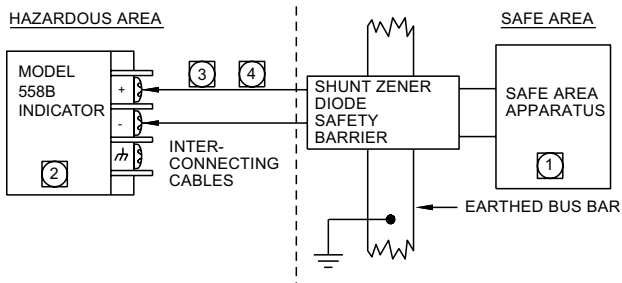
## 6.3 CALIBRATION

1. Apply an input current (I1) and adjust the zero pot (Z) to read N1.
2. Apply an input current (I2) and adjust the span pot (S) to read N2.
3. Repeat steps 1 and 2 as required to set N1 and N2 to within  $\pm 1$  count.

## 6.4 FACTORY-SETUP LABEL

The label on the meter shows the factory-configured input and display settings. If the configuration is changed, use the extra label included with the meter to indicate the new settings.

## 7.0 WIRING DIAGRAM



### NOTES:

- ① Apparatus which is unspecified except that it must not be supplied from nor contain under normal or abnormal conditions a source of potential with respect to Earth in excess of 250V R.M.S. or 250V D.C.
- ② The following output parameters apply;  $V_{max}=12.5V$ ,  $I_{max}=250mA$ ,  $C_i=8.6\mu F$ ,  $L_i=0mH$
- ③ The Interconnecting Cable may be a twin pair, or a pair contained in a type A or type B multicore cable provided that the peak voltage of any circuit contained within the multicore does not exceed 60 volts.
- ④ The capacitance or inductance or inductance to resistance (4/R) ratio of the Interconnecting Cable must not exceed the values specified for the barrier in use.
- 5 The electrical circuit in the Hazardous Area must be capable of withstanding without breakdown an A.C. test voltage of 500V R.M.S. to Earth or frame for one minute.

**Figure 7-1 Wiring Diagram for 558B Usage for FM (Factory Mutual)**

## Warranty/Disclaimer

NEWPORT ELECTRONICS, INC. warrants this unit to be free of defects in materials and workmanship for a period of one (1) year from date of purchase. In addition to NEWPORT's standard warranty period, NEWPORT ELECTRONICS will extend the warranty period for one (1) additional year if the warranty card enclosed with each instrument is returned to NEWPORT.

If the unit should malfunction, it must be returned to the factory for evaluation. NEWPORT's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by NEWPORT, if the unit is found to be defective it will be repaired or replaced at no charge. NEWPORT'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 being damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of NEWPORT's control. Components which wear are not warranted, including but not limited to contact points, fuses, and triacs.

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## Return Requests/Inquiries

Direct all warranty and repair requests/inquiries to the NEWPORT Customer Service Department BEFORE RETURNING ANY PRODUCT(S) TO NEWPORT. PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM NEWPORT'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 NEWPORT:

1. P.O. 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 NEWPORT for current repair charges. Have the following information available BEFORE contacting NEWPORT:

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

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