

# **DIGITAL INDICATOR**

Type 550-2B

**User Guide**

Document Ref: UD550-2B Rev 0



## WARNING!

It is important that this guide is read and fully understood before attempting installation or commissioning of the instrument. Instructions appearing in this document, and current safety legislation, must be observed to ensure personal safety and to prevent damage to the instrument or equipment connected to it.

The instrument should be installed, commissioned and operated only by suitably qualified and authorised personnel.

## Safety and EMC information

Safety: EN61010 -1

Immunity: EN50082-1

Emissions: EN50081-1

CE certified



The specifications for the instrument must not be exceeded. If the instrument is used in a manner not specified, the protection provided by the instrument may be compromised.



The instrument must be installed in an enclosure that provides adequate protection against electric shock.



Ensure that power to the instrument is switched off and signal wiring isolated from hazardous voltages before carrying out installation or maintenance.



The instrument is designed for installation in a clean, dry environment (Pollution degree 1). A *transparent rubber hood offering front of panel protection up to IP65 is available as an optional extra.*



Stroud Instruments Ltd strongly recommends that repairs and re-calibration work are done on a return to factory basis in order that our quality standards, product specifications and safety precautions are not compromised.



The instrument is double insulated

Note: Clean only with a soft dry cloth.

Continuous development may necessitate changes in these details without notice

## Specification

### DISPLAY

Type: 25mm high brightness red LED

Range: 4.5 digit (-19999 to +19999)

Sample rate: 2.5 per second

Overrange display: 1-----

Underrange display: -1-----

Polarity: automatic with '-' displayed

### ACCURACY

± 0.1% FS ±1 digit (when works calibrated)

### LINEARITY ERRORS

±1 digit

### INPUTS (others available to order)

Current 0-10mA, 4-20mA, 0-20mA

4-20mA two-wire transmitter

Voltage 0-1V, 0-5V, 1-5V

Input impedance: Current 100 ohms

Voltage 240k ohms

Input protection:

Voltage inputs 250V RMS

DC Current inputs 100mA

### CONFIGURATION

The instrument is configured by means of internal switches and link and external trim controls.

#### Internal user adjustable settings:

Scaling: any portion of the display range (minimum span 2000 counts)

Input signal type (see Inputs above)

True/raised zero input

Decimal points: switch selectable

Zero offset polarity

#### External control

Display blanking, Hold reading, Peak reading, Display brightness

### TEMPERATURE COEFFICIENT

± 100ppm/ deg C typ.

### ENVIRONMENTAL

Temperature range:

-10 to +50 deg C operating

-20 to +70 deg C storage

Humidity: 0-95% RH non-condensing

### MECHANICAL

Dimensions (mm):

144 (W) x 72 (H) x 159 (D)

Panel cut-out (mm):

68 (H) x 138 (W)

Weight: 450g

### CONNECTORS

Un-pluggable screw terminals (separate supply and signal)

Wire capacity: 0.2 - 2.5 sq. mm;  
(24 - 12 AWG)

### SAFETY and EMC

Safety: EN61010-1

Immunity: EN61000-6-2:1999

Emissions: EN50081-2:1994

FCC CFR47: July 2001

Part 15 Class A

CE certified

### POWER

DC supplies: 24 - 200 VDC

or AC supplies: 85 - 260 VAC

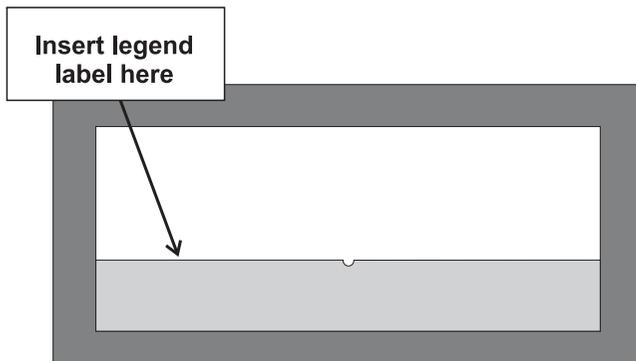
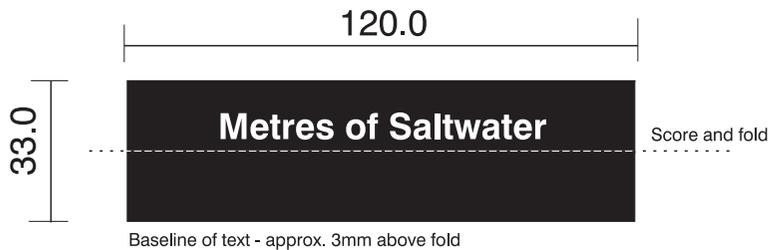
## Appendix 2 - Display window legend

The legend for the display window is easily changed. A pocket at the rear of the window is designed to hold a folded paper legend.

### Removing the display window

- (1). Loosen the two screw clamps securing the instrument to the control panel sufficient to enable the instrument bezel to be unclipped (gently pull the top edge, at one of the corners, towards you) and then remove the display window.

### Legend dimensions



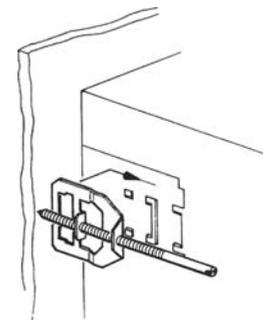
## Installation

### Location

- The instrument is designed for installation in a clean, dry environment
- Do not install near to switch gear, motor controllers or other sources of strong magnetic fields.
- Avoid exposure to direct sunlight and ensure the ambient temperature of the enclosure that the unit is mounted in will not exceed the specification.

### Fixing

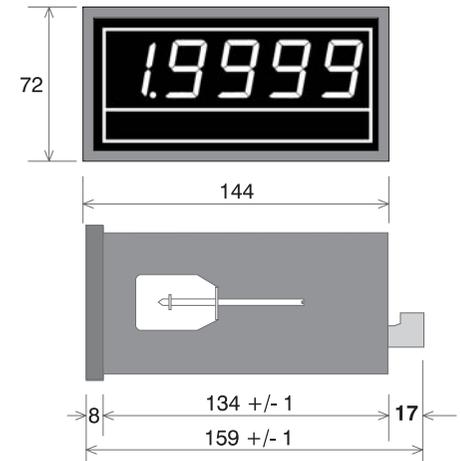
1. From the front of the control panel insert the instrument into the cut-out.
2. From the rear of the control panel fit the two screw clamps as shown and tighten screws to secure.



**NB Do not over tighten!**

### Dimensions & Panel cut out

Panel cut-out  
68mm (+0.7, -0) x 138mm (+1, -0)

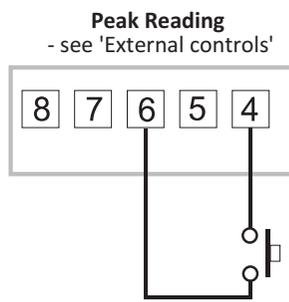
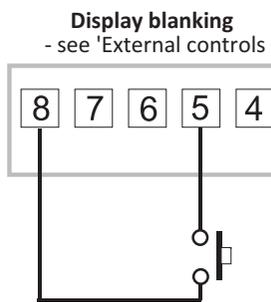
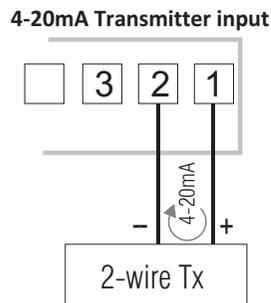
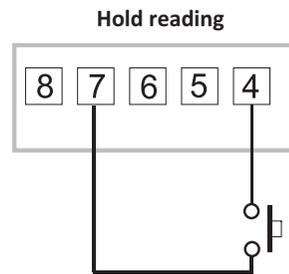
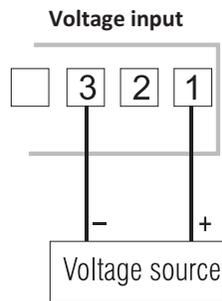
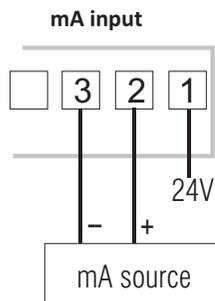
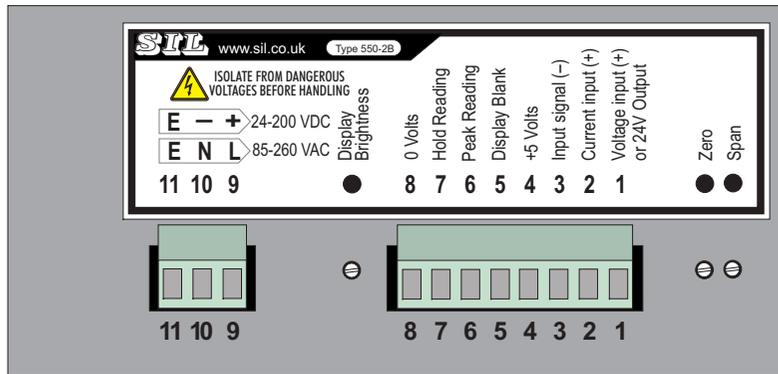


### Wiring and connections

Unpluggable screw terminal connectors are provided which will accept wires 0.2 - 2.5 sq. mm (24 - 12 AWG).

- Segregate power supply and signal wiring.
- Use screened cable for all signal wiring with the screen earthed at one end only.
- All connections should be made using ferrules to avoid short-circuits between adjacent terminals.

## Signal connections



### Note:

The instrument must be set up for the type of input to be measured - see Configuration.

## Appendix 1 - Calibration Examples

### Example 1 - To display 0-1500

- (i) Set J2, (see page 6) to '0' (Park position -no offset)
- (ii) Set SW2, (Table 3) to 11111111
- (iii) With input signal at zero value, Adjust Zero Trim until display reads zero
- (iv) Set SW1, (Table 2) to 10001111
- (v) With input signal at full scale, adjust Span Trim until display reads 1500

### Example 2 - To display 100-1270

- (i) Set J2 to '+' (positive offset)
- (ii) Set SW2 to 01111111
- (iii) With input signal at zero value, adjust Zero Trim until display reads 100
- (iv) Range required is  $1270-100 = 1170$ . Set SW1 to 00101111
- (v) With input signal at full scale, adjust Span Trim until display reads 1270
- (vi) Check zero repeating steps (v) and (vi) as required.

### Example 3 - To display -500 to 15000

- (i) Set J2 to '-' (negative offset)
- (ii) Set SW2 to 01011111
- (iii) With input signal at zero value, adjust Zero Trim until display reads -500
- (iv) Range required is  $15000-(-500) = 15500$   
Set SW1 to 01000110
- (v) With input signal at full scale, adjust Span Trim until display reads 15000
- (vi) Check zero steps (v) and (vi) as required.

### Example 4 - To display 0-1000 reverse reading, i.e. 0 at 20mA, 1000 at 4mA

- (i) Set J2 to '-' (negative offset)
- (ii) Set JP2 to "Negative sign disabled ('park' position)" see page 6)
- (iii) Set SW2 to 10101111
- (iv) Adjust Zero Trim until display reads -1000
- (v) Range required: is  $0-(-1000) = 1000$   
Set SW1 to 01101111
- (vi) Adjust Span Trim until display reads 0000
- (vii) Check zero steps (v) and (vi) as required.

## Zero offset polarity

The engineering units displayed when the input signal is at zero may be a true zero, a negative or a positive quantity. Link J2 must be set accordingly (see page 6).

## Span/Zero fine trimming

**NB** Span and Zero may be accessed via either rear or front panel - locations as selected by J15 / J16, see page 6.

For the final setting up of Span and Zero the instrument is returned to its case and switched on.

1. With the input signal at its 'zero' value adjust the Zero Trim control to obtain the required readout.
2. With the input signal at its full scale value adjust the Span Trim control to obtain the required readout.

**NB** If a zero offset is used, i.e. the display is other than all zeros with input signal at its zero value, some interaction between the full scale and zero settings will occur and the fine trimming of span and zero may have to be repeated until the desired readings are obtained.

## Decimal point setting

The decimal point required is set by SW4 (for location see page 6).

SW4 (1 = 'ON')			Decimal Position
DP.ON	SET 1	SET 2	
1	1	1	<b>18888</b>
0	1	1	<b>1888.8</b>
0	1	0	<b>188.88</b>
0	0	1	<b>18.888</b>
0	0	0	<b>1.8888</b>

## External controls

See page 3 for Signal Connections.

### Peak reading

When activated (Term. 6 to Term. 4) only the highest input signal reading is displayed. Initially, the current measurement is displayed. The next sample is then compared to the current result. If the new value is larger than the previous peak value, the new value is displayed. If the new value is less than the previous peak value, the display remains unchanged.

### Hold reading

This holds the readout at the value currently sampled by the analogue to digital converter. Hold is activated by connecting Term. 7 to Term. 4.

### Display blanking

The display may be blanked (switched off) by a connecting Term. 7 to Term. 8 (0V)

### Display brightness

The brightness of the display may be adjusted via the rear panel control.

### Display messages

**On power up:** For a short period the 550-2B performs internal self-checking and calibration procedures during which a sequence of numbers are displayed.

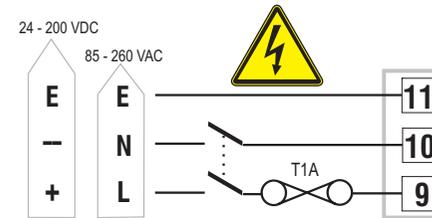
**Error messages:** The instrument detects over-range and under-range conditions displaying as follows:

Condition	Display
Over-range	<b>1-----</b>
Under-range	<b>-1-----</b>

## Power supply connections

- This instrument is equipped with a universal power supply and may be operated from either of the following supply ranges:  
DC supplies: 24 - 200 VDC  
AC supplies: 85 - 260 VAC

- Power supply wiring to the instrument should be protected by a 1A time-delay fuse fuse and double pole switch - see below. The switch should be clearly marked as the isolating switch for the instrument.



## Configuration

The instrument is configured by means of internal switches, links and trim controls.

**WARNING:** Switch off power and isolate signal and other wiring from dangerous voltages before proceeding

## Access to adjustments

1. Unplug the two connectors from the rear of the instrument
2. Loosen the two screw clamps securing the instrument to the control panel sufficient to enable the instrument bezel to be unclipped (gently pull the top edge, at one of the corners, towards you) and remove the display window.
3. Withdraw the printed circuit assembly from the enclosure.
4. Set the configuration options as per the instructions on the following pages.

## Span and zero fine trimming

Two sets of span and zero trim controls are provided; (i) accessed externally at the rear panel and (ii) located behind the display window. The set of trim controls made available for use are controlled by links J15 and J16. See Fig. 1 Location of adjustments

## Input signal

**Input signal type,** voltage or current, is selected by Link J4 (see page 6). When current is selected a 24V (24mA) auxiliary supply, e.g. for powering a 2 wire transmitter, is available on input terminal 1.

**Input signal ranges** are selected by switch SW3 (location, see page 6) - see Table 1.

Table 1 - Input signal range selection

Input	SW3 1 = 'ON'					
	1	2	3	4	5	6
0-1V	0	0	0	0	0	0
0-5V	0	0	1	0	0	0
1-5V	1	1	0	0	0	0
0-10mA	0	0	0	0	0	1
0-20mA	0	0	0	1	0	0
4-20mA	1	0	0	0	1	0

## Full scale (Span) and Zero

Scaling in engineering units may be set to any portion of the display range i.e. within the range -19999 to +19999; NB span must be a minimum of 2000 counts.

The required readouts at span and zero are set initially by internal switches (coarse setting) and then the span and zero fine trimming controls.

For electrical safety, Span and Zero switch settings are carried out with the instrument

unplugged and withdrawn from its case. Fine trimming of span/zero is achieved after the instrument is returned to its case and reconnected.

*NB Allow a one hour warm up period before adjusting span and zero.*

### Span and Zero (coarse) selection

NB in the following procedure decimal points are ignored.

Table 2 and switch SW1 are used for setting Span. Table 3 and SW2 are used for setting Zero. The tables give approximate display readouts expected for each switch when set in its 'OFF' position (all others to 'ON').

In each case the sum of the table readouts giving a reading nearest to, but not greater than, the desired display is used to determine the switch settings required.

1. Turn Span fine trimming control fully clockwise.
2. From the appropriate table select the value nearest to, but not greater than, the Desired Readout.
3. Subtract the selected table value from the Desired Readout noting the remainder and the corresponding switch position to be set to 'OFF'.
4. Repeat the process substituting the 'Remainder' from the current calculation for the 'Desired Readout' in Step 1 until remainder is less than -100 (i.e. between 0 and minus 100).
5. Any difference between the Desired Value and the final 'Remainder' may be set with the fine trim controls.

NB See example on page 6.

Table 2 - coarse span display selection

SW1 switch set to 'OFF'	Approximate Readout
8	12550
7	6300
6	3200
5	1600
4	800
3	400
2	200
1	100

Table 3 - coarse zero display selection

SW2 switch set to 'OFF'	Approximate Readout
8	13900
7	7100
6	3600
5	1800
4	900
3	450
2	230
1	110
If no offset is required, set all switches to 'ON'	0

### Example span setting:

Desired Readout 15000

Table 2 nearest reading is 12550 (SW2-8 to 'OFF')

15000 minus 12550 = 2450

Table 2 nearest reading = 1600 (SW2-5 to 'OFF')

2450 minus 1600 = 850

Table 2 nearest reading = 800 (SW2-4 to 'OFF')

850 minus 800 = 50

Table 2 nearest reading = 100 (SW2-1 to 'OFF')

50 minus 100 = -50

- trim this remainder using the appropriate trim control.

*Note: The tables give approximate readouts only and actual results may vary between instruments due to component tolerances. If the remainder in the above procedure cannot be trimmed out by the span & zero fine trim controls, further adjustment of switch positions will be necessary.*

**NB.** See Appendix 1 for more calibration examples.

Fig 1 - Location of Adjustments

