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User's Guide

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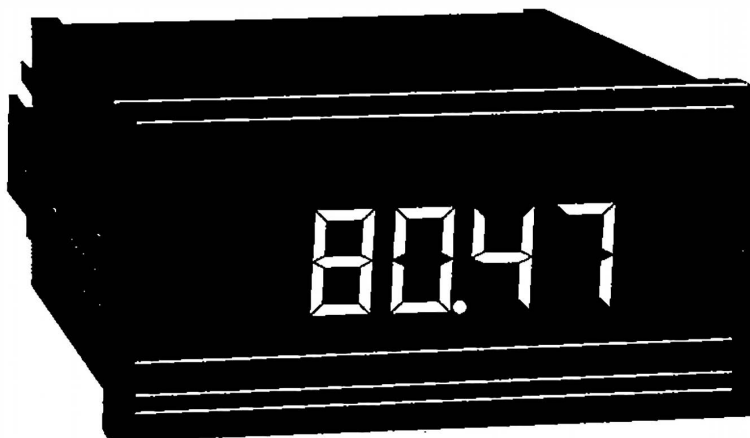
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DP302-P **Digital Panel Meter** **for Process Signal Inputs**



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The information contained in this document is believed to be correct but OMEGA Engineering, Inc. 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 connected applications.



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

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1.0 GENERAL INFORMATION

The hardware of the DP302 can be configured by push-on jumpers as either a process meter with zero and span adjustments (DP302-P), or as a main assembly which accepts plug-in signal conditioner boards (DP302).

1.1 MODEL *DP302-P*: PROCESS RECEIVER

Model DP302-P is a low cost, 3 ½ digit process receiver with zero and span adjustments of 2,000 counts for transmitter signals such as 4-20 mA, 1-5 V, and 0-10 V. The meter can be scaled to display readings directly in engineering units. No plug-in signal conditioner board is required.

Model DP302-P can be used in ratiometric pot-follower applications to determine parameters such as liquid level or valve setting from the position of a potentiometer wiper. The required external reference voltage can be derived from the meter's 4.7 V dc supply.

1.2 MODEL *DP302*: MAIN ASSEMBLY

Model DP302 is a 3 ½ digit main assembly that accepts plug-in signal conditioner boards. These include but may not be limited to the following:

EB1	Process input with excitation output
SB1	Strain input with excitation output

2.0 SPECIFICATIONS

2.1 ANALOG INPUT

Range	4-20 mA	1-5 V	0-10 V
Resolution	8 µA	2 mV	5 mV
Input resistance	13 Ω	1 MΩ	1 MΩ
Bias current	50 pA	10 pA	5 pA
Maximum input	55 mA	100 V	100 V

Configuration	Differential, bipolar
Zero range	Multiturn pot provides ± 1000 counts for the 4-20 mA and 1-5 V configuration; -1500 to +500 counts for the 0-10 V configuration
Span range	0 to 2000 counts with multiturn pot
NMR	56 dB at 50/60 Hz
Reference:	
Internal (std)	0.1 V dc with 3.9 k Ω source resistance
External (opt)	0.1V dc -50%/+100% with 10 M Ω input resistance

2.2 ACCURACY AT 25°C

Maximum error	$\pm 0.05\%$ of span ± 1 count
Span tempco	$\pm 0.01\%$ of span/ $^{\circ}\text{C}$
Zero tempco	± 0.1 count/ $^{\circ}\text{C}$
Step response	1 s
Warmup to accuracy	1 min

2.3 NOISE REJECTION

CMR	120 dB from DC to 60 Hz
CMV	1500 Vp per HV test; 354 Vp per IEC spacing

2.4 ANALOG-TO-DIGITAL CONVERSION

Technique	Dual-slope, average-value
Input integration period	100 ms
Read rate	2.5/s

2.5 DISPLAY

Type	7-segment, red LED
Digit height	14.2 mm (0.56 in)
Symbols	-1.8.8.8
Decimal points	3 positions programmable by jumpers behind lens or at connector, 10 mA sink
Overrange indication	3 least-significant digits blank

2.6 DIGITAL CONTROLS (REFERENCED TO SIG GND)

Logical '0'	0 to +1.4 V
Logical '1'	+3.7 V to +5.0 V
Display HOLD	'1' = latched reading
Display TEST	'1' = -1888 reading

2.7 POWER

Standard AC input voltage	115 V ac, $\pm 15\%$
Optional AC input voltage	230 V ac, $\pm 15\%$
AC frequency range	47 to 400 Hz
Optional DC input voltage	9-32 V dc, isolated to 300 V dc 26-56 V dc, isolated to 300 V dc
Power consumption	4 W
Output voltages	+4.7 V dc $\pm 5\%$ at 10 mA max -4.7 V dc $\pm 5\%$ at 10 mA max

2.8 ENVIRONMENTAL

Operating temperature	0 to 60°C
Storage temperature	-40 to +85°C
Relative humidity	95% RH to 40°C, (non-condensing)

2.9 MECHANICAL

Bezel	96 x 48 x 5.1 mm (3.78 x 1.89 x 0.20 inches)
Depth behind bezel with connector	104 mm (4.09 inches)
Panel cutout	92 x 45 mm (3.62 x 1.77 inches)
Weight	425 g (15 ounces)
Case material	94V-0 UL-rated polycarbonate
D1 connector	PCB edge connector with double row of 18 pins; 3.96 mm (0.156 inches) between pins
D4 connector	Barrier strip with #6 screw terminals for power and signal inputs (removes these inputs from D1)

3.0 MECHANICAL ASSEMBLY AND INSTALLATION

3.1 SAFETY CONSIDERATIONS

This instrument is protected according to Class I (Protective Earth) of the IEC (International Electrotechnical Commission) 348 and the VDE 0411 regulations. To ensure safe operation, follow the guidelines below:

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

POWER VOLTAGE: This instrument is delivered with the AC power input connected for 240 V ac in Europe (C1 option) or 120 V ac in the USA (unless the instrument is provided with the DC power input option). Verify that the instrument is connected for the correct power voltage rating before using. If incorrect, make the required change as described in Section 4.

POWER WIRING: This instrument has no power switch; it will be in operation as soon as the power is connected.

Verify that the power cable has the proper ground (earth) wire and that this wire is properly connected to an adequate ground (earth) point. The meter must be grounded in accordance with the latest local safety regulations.

If AC, the power cable must contain a protective ground conductor which is not disconnected (open) either inside or outside the instrument. No extension cables without grounding wires shall be used.

SIGNAL WIRING: Do not make signal wiring connections or changes while power is on.

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

FUMES AND GASES: Do not operate the instrument in the presence of flammable gases or fumes.

EXERCISE CAUTION: As with any electronic instrument, high voltages may be exposed when attempting to install, calibrate, or remove parts of the meter.

3.2 PANEL MOUNTING

NOTE: Dimensions are in millimeters $\pm 0,25$ mm and inches are in () ± 0.01 in.

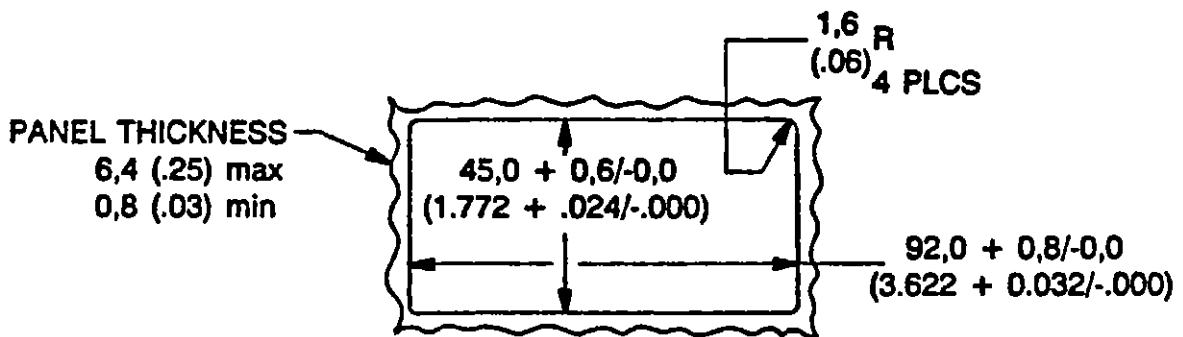
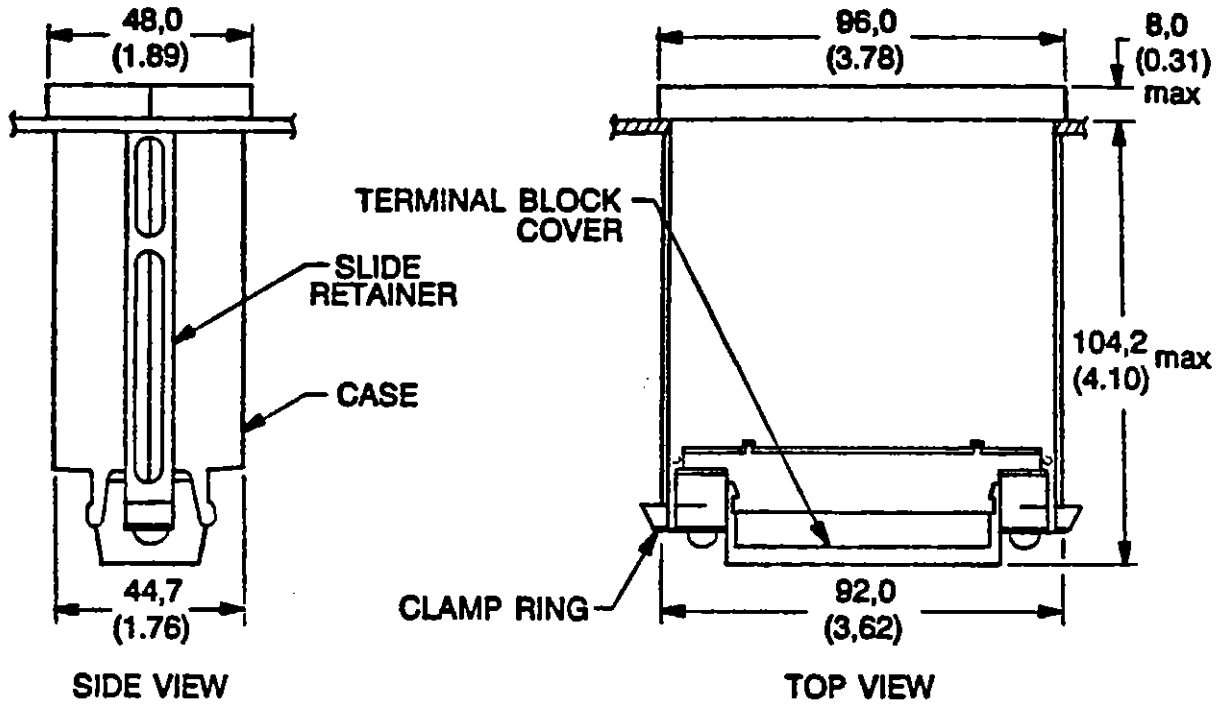


Figure 3-1 DIN Case Dimensions

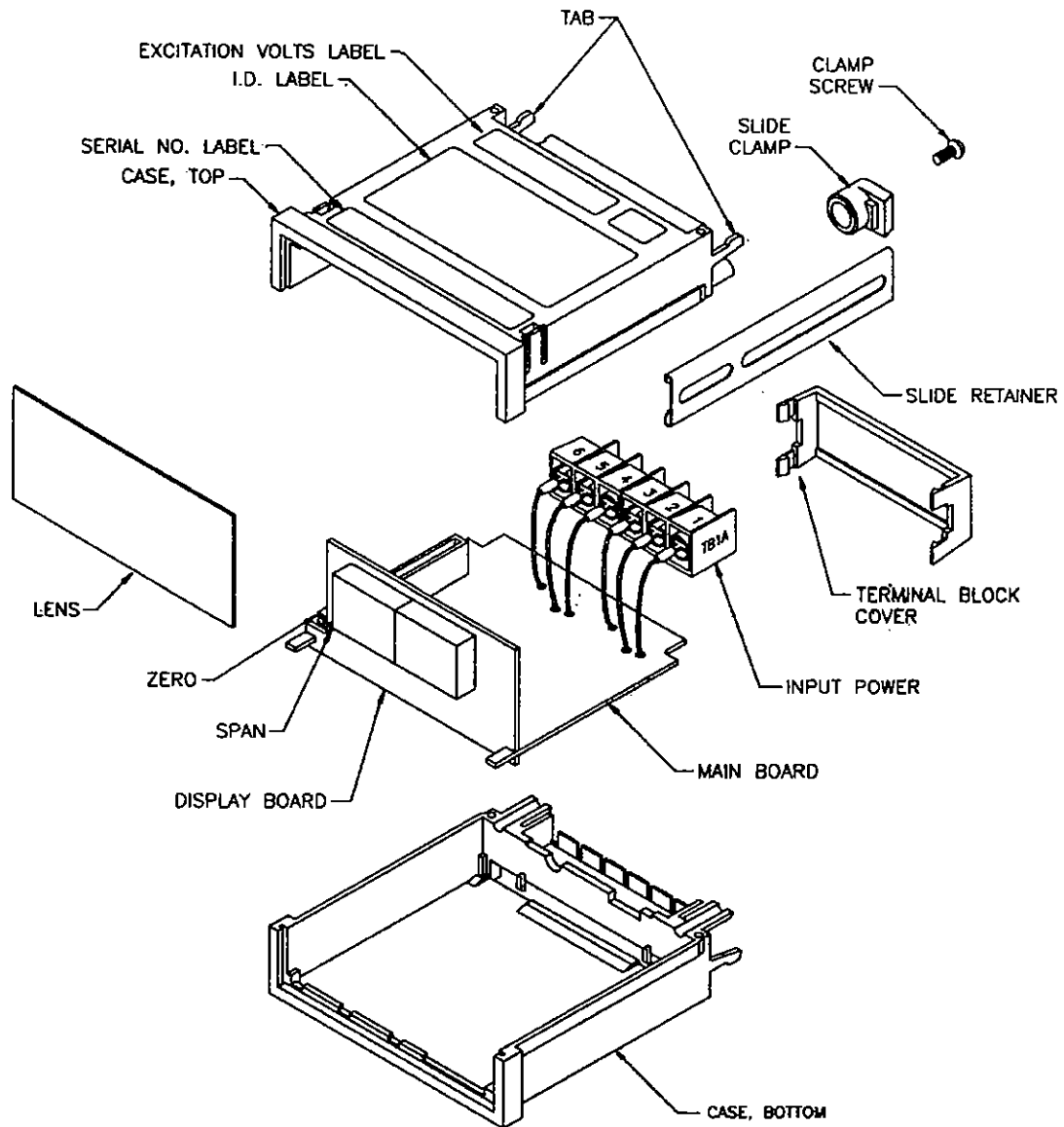


Figure 3-2 Exploded View

1. Remove main board edge connector J1, if installed.
2. Loosen the two clamp screws on rear of case until slide clamps can be rotated. Push the two slide retainers toward the rear of the case, and remove them.
3. Working from the front of the panel, insert meter into panel cutout.
4. Insert slide retainers back onto the case, and push them up tightly against the rear of the panel.
5. Rotate slide clamps back into original position and tighten clamp screws just enough to hold the case in place. **NEVER OVERTIGHTEN CLAMP SCREWS.**
6. Install any connectors that have been removed.

4.0 POWER AND SIGNAL INPUT CONNECTIONS

CAUTION: Incorrect power input can damage your panel meter.

4.1 INSTALLING OPTION C1 (230 V ac)

If this option is to be used, it must be installed prior to any power and signal connections. Option C1 is 230 V ac $\pm 15\%$, 47-400 Hz operation. To change the meter in the field from 115 V ac operation, follow this procedure:

1. Refer to Figures 4-1 and 4-2. Remove power lines from the meter, then remove the meter from the case.
2. Remove jumpers W8 and W9 on the transformer.
3. Add jumper W4 on the printed circuit board. The meter is now wired for 230 V ac operation.

NOTE: To change the meter from 230 V ac to 115 V ac operation, reverse the above procedure.

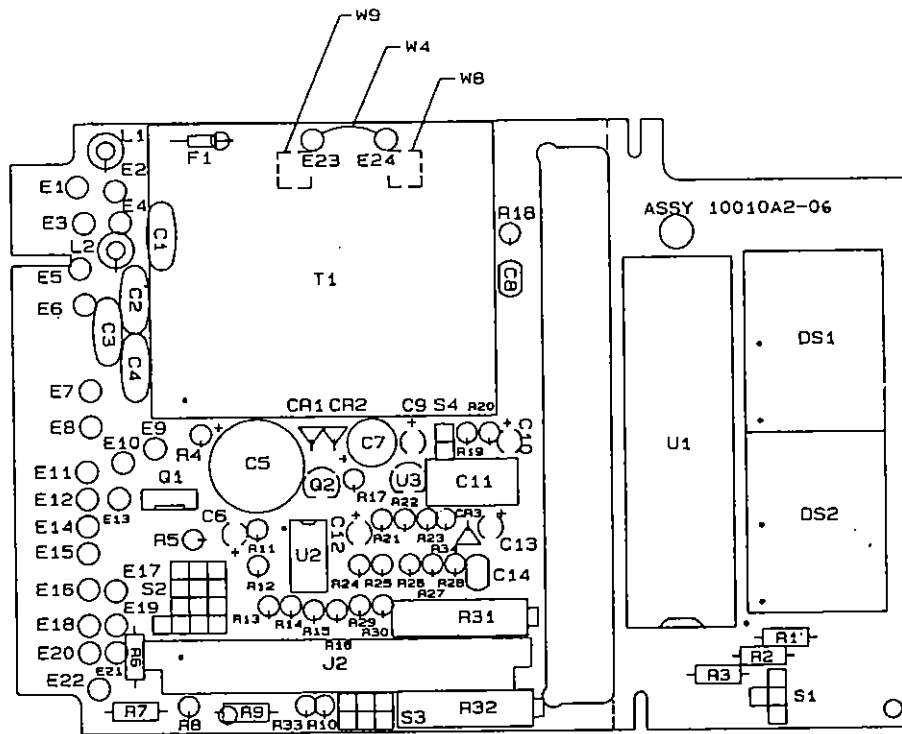


Figure 4-1 Changing Operating Voltage

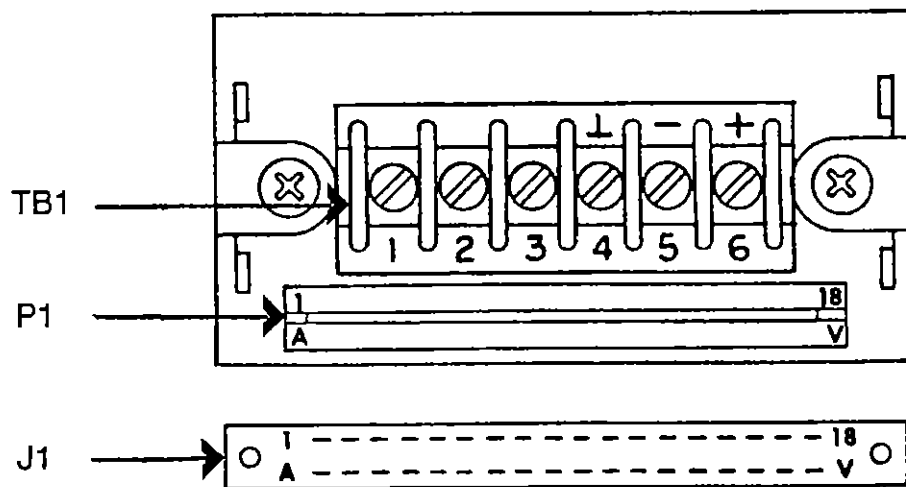


Figure 4-2 Rear View of Case with Connectors

4.2 POWER CONNECTIONS

TB1 Connection	~ AC Power Operation	Wire Color		DC Power Operation
		USA	Other	
1	AC LINE (L)	BLACK	BROWN	N/C
2	AC NEUTRAL (N)	WHITE	BLUE	+DC PWR
3	AC EARTH GROUND	GREEN	GREEN / YELLOW	-DC RETURN

4.3 SIGNAL INPUT CONNECTIONS

TB1 Connection	Signal
4	ANA GND
5	SIG LO
6	SIG HI

4.4 MAIN BOARD CONNECTOR PIN ASSIGNMENTS (J1)

(Left to right, looking at rear of case)

CONNECTION	FUNCTION	EXPLANATION
A	Spare	
1	No connection	
B	No connection	
2	Spare	
C	Spare	
3	No connection	
D	No connection	
4	No connection	
E	No connection	
5	No connection	
F	No connection	
6	DIGITAL GND	
H - 7	199.9 DP	
J - 8	19.99 DP	
K - 9	1.999 DP	
L - 10	LAMP TEST	Lights all display segments
M - 11	+4.7 V dc	Analog and digital power
N	-4.7 V dc	Analog and digital power
12	Spare	
P	+REF	Reference voltage
13	Spare	
R - 14	HOLD	Hold last display reading
S	Spare	
15	No connection	
T	ANA GND	Analog and digital ground
16	Spare	
U	No connection	
17	Spare	
V	Spare	
18	ANA OUT	

* - * Indicates common pin

5.0 MAIN BOARD CONFIGURATION

The following procedures are used to select the various configurations of the main board.

5.1 DECIMAL POINT SELECTION

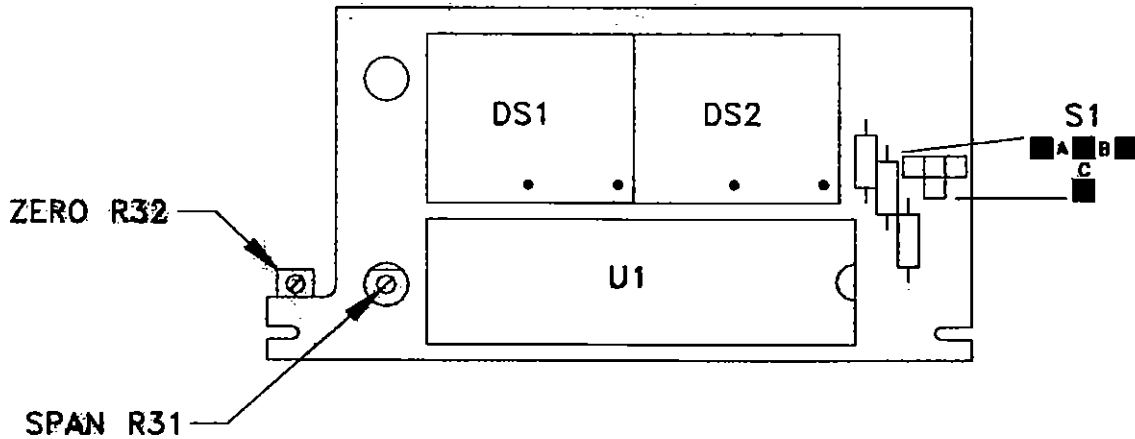


Figure 5-1 Display Board Jumper Locations

Remove all push-on jumpers not used in the desired configuration. Install appropriate jumpers as indicated in the chart below.

Decimal Point	S1	Alternate decimal point selection using main board connector J1.
1.999 DP	A	Connect K or 9 to 6
19.99 DP	C	Connect J or 8 to 6
199.9 DP	B	Connect H or 7 to 6
1999 DP	REMOVED	—

5.2 INPUT RANGE SELECTION

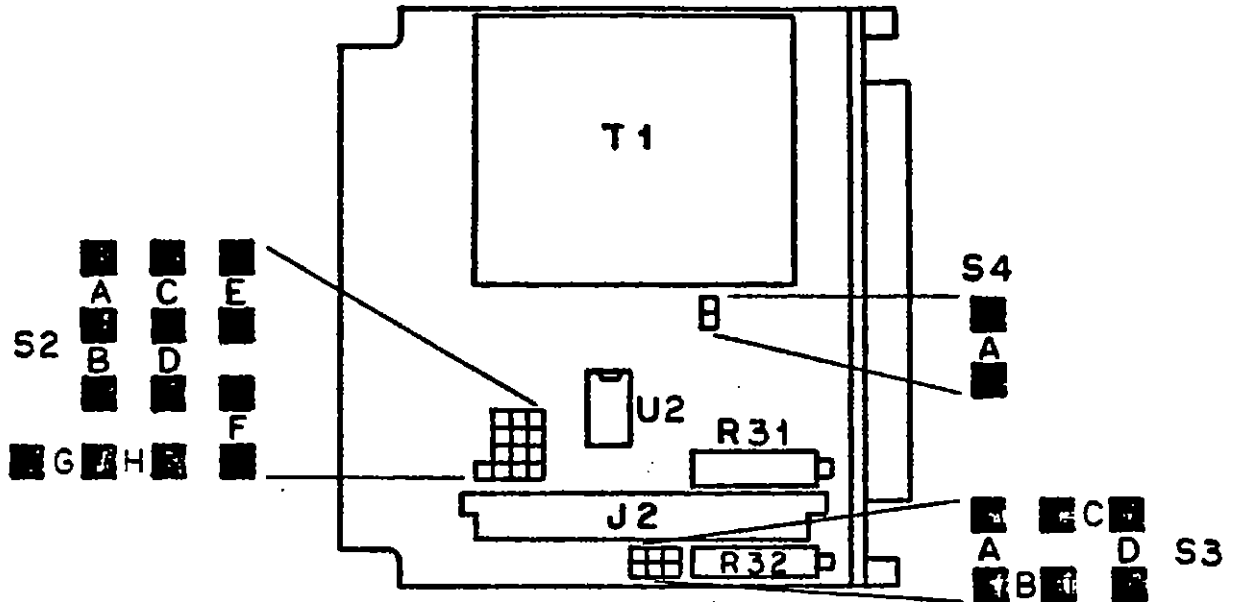


Figure 5-2 Main Board Jumper Locations

Remove all push-on jumpers not used in the desired configuration. Install appropriate jumpers as indicated in the chart below.

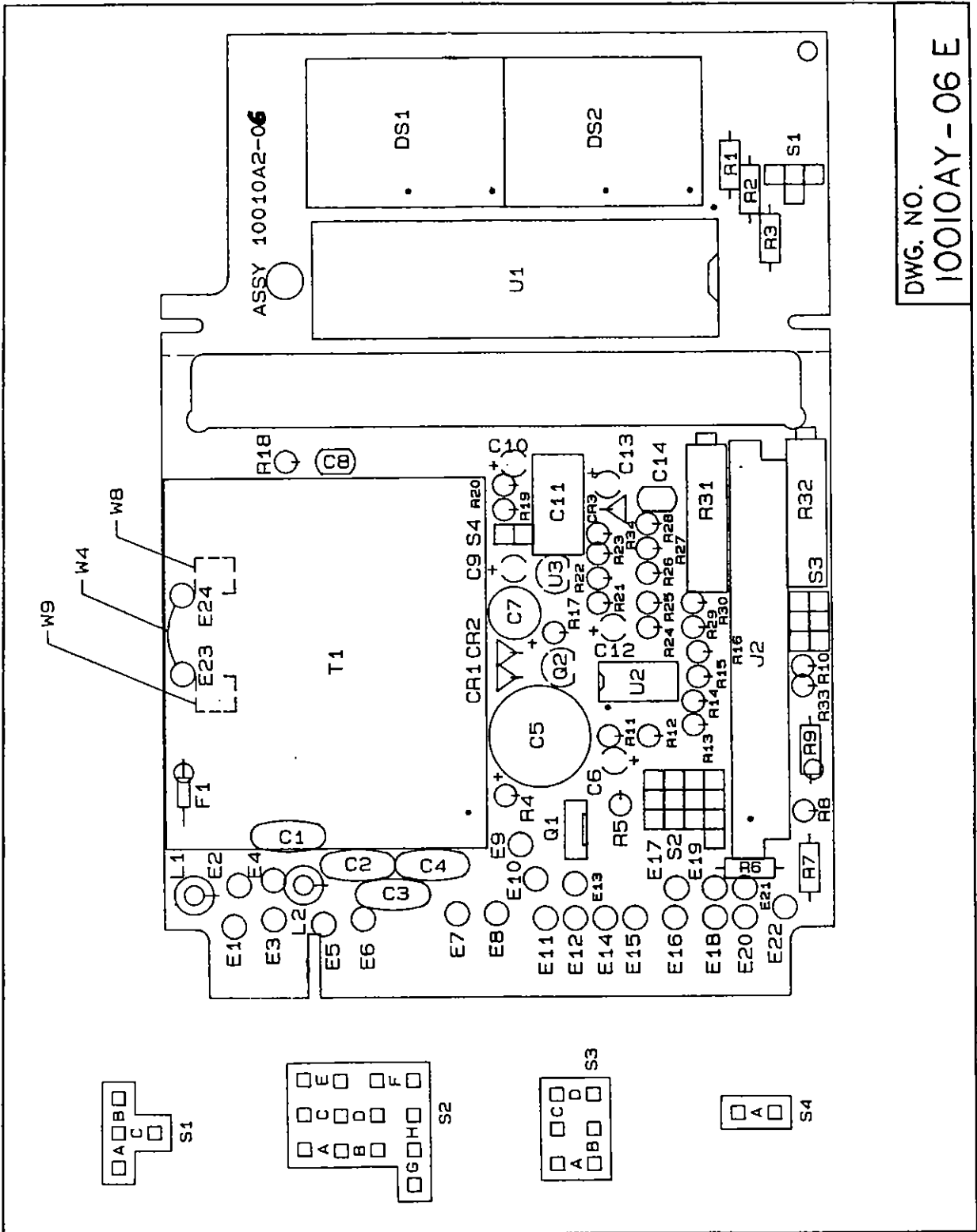
Input Ranges	S2	S3	S4
4-20 mA	A,C,F,G,E	A,D	A
1-5 V dc	A,C,E,F	B,D	A
0-10 V dc	A,C,F,H,E	B,D	A

6.0 CALIBRATION

The following calibration procedures apply to units that have been configured per Sections 4 and 5.

1. Refer to Figure 4-2. Apply the minimum input signal to TB1-5 (SIG LO) and TB1-6 (SIG HI).
2. Refer to Figure 3-2 for the location of the zero and span adjustments. Adjust R32 (Zero) to the desired low reading ± 1 count.
3. Adjust R31 (Span) to the desired high reading ± 1 count.
4. Repeat steps 2 and 3 until the meter is calibrated to within ± 1 count.

7.0 DRAWINGS



DWG. NO.
10010AY-06 E

Figure 7-1 Assembly Diagram



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 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.

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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. 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 OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

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