

QUANTA®



Type T Thermocouple Digital Panel Meter QXXXXT

Operator's Manual



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It is the policy of NEWPORT to comply with all worldwide safety and EMC/EMI regulations that apply. NEWPORT is constantly pursuing certification of its products to the European New Approach 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 Electronics, 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 caution 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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SAFETY CONSIDERATIONS



This device is marked with the international Caution symbol. It is important to read this manual before installing or commissioning this device as it contains important information relating to Safety and EMC (Electromagnetic Compatibility).

Unpacking & Inspection



Unpack the instrument and inspect for obvious shipping damage. Do not attempt to operate the unit if damage is found.

This instrument is a panel mount device protected in accordance with Class I of EN 61010 (115/230 AC power connections). Installation of this instrument should be done by Qualified personnel. In order to ensure safe operation, the following instructions should be followed.

This instrument has no power-on switch. An external switch or circuit-breaker shall be included in the building installation as a disconnecting device. It shall be marked to indicate this function, and it shall be in close proximity to the equipment within easy reach of the operator. The switch or circuit-breaker shall not interrupt the Protective Conductor (Earth wire), and it shall meet the relevant requirements of IEC 947-1 and IEC 947-3 (International Electrotechnical Commission). The switch shall not be incorporated in the mains supply cord.

Furthermore, to provide protection against excessive energy being drawn from the mains supply in case of a fault in the equipment, an overcurrent protection device shall be installed.



- The **Protective Conductor** must be connected for safety reasons. Check that the power cable has the proper Earth wire, and it is properly connected. It is not safe to operate this unit without the Protective Conductor Terminal connected.



- Do not exceed voltage rating on the label located on the top of the instrument housing.
- Always disconnect power before changing signal and power connections.
- Do not use this instrument on a work bench without its case for safety reasons.
- Do not operate this instrument in flammable or explosive atmospheres.
- Do not expose this instrument to rain or moisture.
- Unit mounting should allow for adequate ventilation to ensure instrument does not exceed operating temperature rating.
- Use electrical wires with adequate size to handle mechanical strain and power requirements. Install without exposing bare wire outside the connector to minimize electrical shock hazards.

EMC Considerations

- Whenever EMC is an issue, always use shielded cables.
- Never run signal and power wires in the same conduit.
- Use signal wire connections with twisted-pair cables.
- Install Ferrite Bead(s) on signal wires close to the instrument if EMC problems persist.

NOTES, WARNINGS and CAUTIONS

Information that is especially important to note is identified by three labels:

- **NOTE**
- **WARNING**
- **CAUTION**
- **IMPORTANT**



NOTE: provides you with information that is important to successfully setup and use.



CAUTION or WARNING: tells you about the risk of electric shock.



CAUTION, WARNING or IMPORTANT: tells you of circumstances or practices that can effect the meter's functionality and must refer to accompanying documents.

1.0 MAIN ASSEMBLY Q2000 SPECIFICATIONS

1.1 GENERAL

The Q2000 main assemblies are identified by an initial designator (BQ2) plus a power/display option numeral, zero through nine (0-9).

The following table identifies the main assembly types:

Display Type	120 V ac	240 V ac	9-32 Vdc	5 V dc	24 V ac
LED	BQ20	BQ22	BQ24	BQ26	BQ28
LCD	BQ21	BQ23	BQ25	BQ27	BQ29

The QUANTA Digital Panel Meter/Controller consists of a main assembly, signal conditioner and interface options (if ordered) all housed in a 1/8 DIN case.

The main assembly consists of a main board and a display board which is permanently attached to it at a 90 degree angle.

The main board provides mounting for the power supply, circuit components, and connectors for plugging in the signal conditioner, optional analog card, and optional controller/communications interface card (requires removal of a bypass push-on jumper).

The display board includes the analog-to-digital converter, the LED or LCD display and the push-on jumper for programming the decimal points. Decimal point programming may also be done from the main board connector (J1).

QUANTA CROSS REFERENCE

CONFIGURED MODEL



MODULE NO.

	2 9					DISPLAY RESOLUTION ±1999 counts (3 1/2 digits) ±9999 counts (4 digits)	BQ2X BQ9X
		0 1 2 3 4 5 6 7 8 9 A B				DISPLAY TYPE & METER POWER (LCD is only available on Q2000 models) LED, 120 V ac (50/60 Hz) LCD, 120 V ac (50/60 Hz) LED, 240 V ac (50/60 Hz) LCD, 240 V ac (50/60 Hz) LED, 9-32 V dc (isolated) LCD, 9-32 V dc (isolated) LED, 5 V dc LCD, 5 V dc LED, 24 V ac LCD, 24 V ac LED, 26-56 V dc (isolated) LCD, 26-56 V dc (isolated)	BQ20 or BQ90 BQ21 BQ22 or BQ92 BQ23 BQ24 or BQ94 BQ25 BQ26 or BQ96 BQ27 BQ28 or BQ98 BQ29 BQ2A or BQ9A BQ2B
			0 1 2 3 4 5			ANALOG OUTPUTS ±1 or ±2 V (standard, all models) 0-5 V dc 0-10 V dc 0-1 mA, source or sink 4-20 mA, source or sink 4-20 mA, sink (high-compliance)	None BA01 BA01 BA01 BA01 BA02
				0 1 2 3 4 5		CONTROL OUTPUTS None Dual-setpoint 10 A relays Proportional 4-20 mA control, source or sink, plus drive for time-proportional solid-state relay Proportional 4-20 mA control, source or sink, plus time-proportional solid-state 2 A relay Parallel BCD (isolated) Single-setpoint 10 A relay	None BDT1 BDP1 BDP2 BDD2 BDS1
					A B C D E F G H J K T M R N O P E S Z	SIGNAL-CONDITIONER INPUTS DC voltage DC current AC voltage AC current True RMS voltage True RMS current Frequency/rate Type J thermocouple (°C or °F) Type K thermocouple (°C or °F) Type T thermocouple (°C or °F) RTD, normal resolution (°C or °F) RTD, high resolution (°C or °F) 3-wire ratio (potentiometer) 2- or 4-wire resistance Process signal (e.g., 4-20 mA, 1-5 V) Process signal plus excitation Strain gauge/low-level input Prototyping	BSCA BSCA BSCC BSCC BSCF BSCF BSCF BSCH1 BSCJ BSCK BSCT BSCM BSCR BSCA BSCR BSCP BSCE BSCS BSCZ

1.2 POWER

AC Models: 24/120/240 V +10/-15% 47-63 Hz
Common Mode Voltage: 1500 Vp test (354 Vp per IEC spacing)
DC Models: 5 V \pm 5% (5 V return common to signal LO)
9-32 V (300 V isolation from 9-32 V return to signal LO)

Source Impedance: 3 ohms
Ripple: 250 mV maximum
Power Consumption: 5 watts maximum

1.3 DISPLAY

LED: 14.2 mm (0.56 in), 7-segment light emitting diode
Lens color: Red
LCD: 12.7 mm (0.50 in), 7-segment liquid crystal
Lens color: Clear
Range: 0 to \pm 1999
Overload Indication: Three least significant digits blanked, "1" or "-1" displayed

1.4 CONVERSION

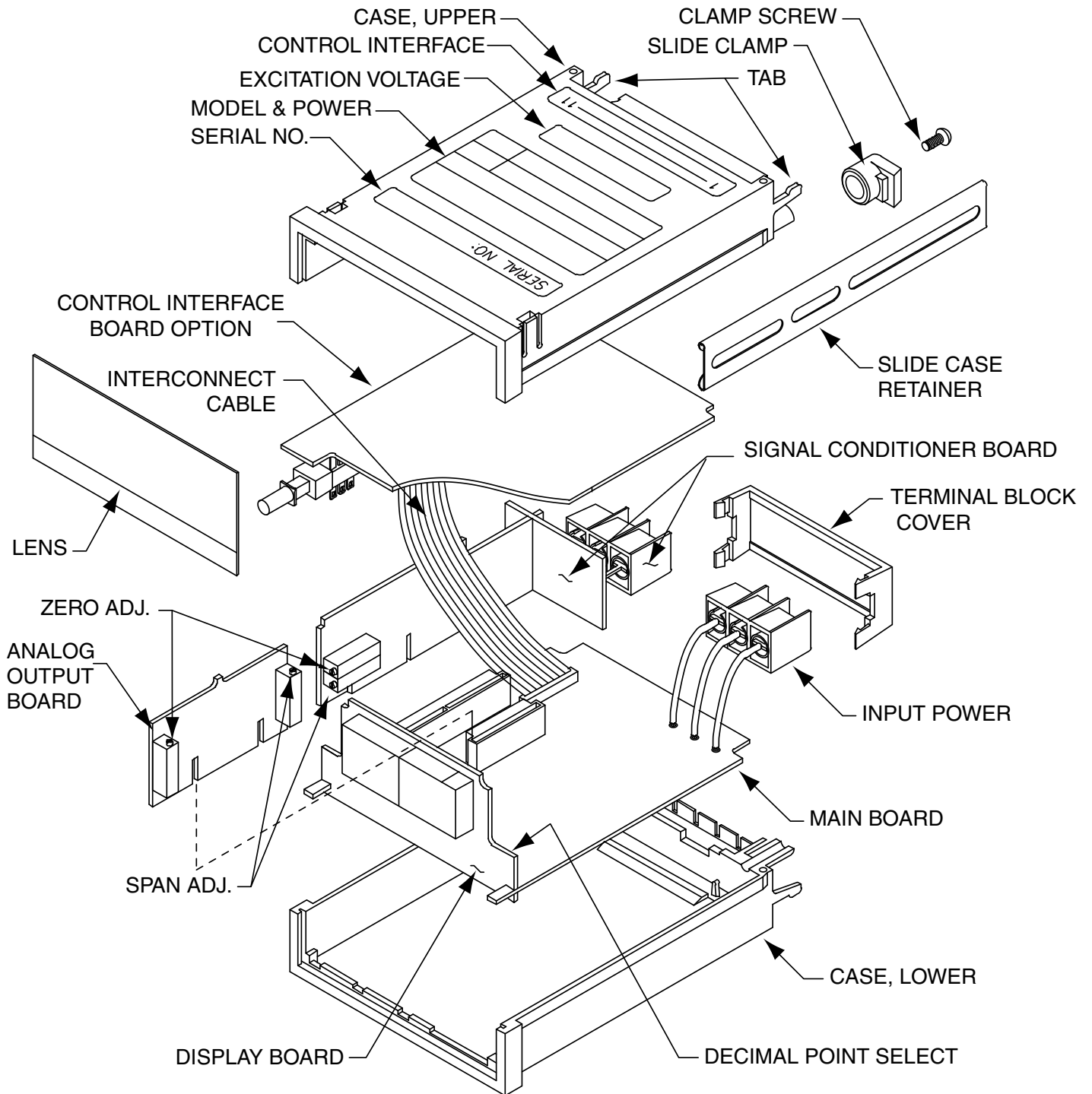
Technique: auto-zero, dual slope, average value
Signal Integration Period: 100 ms, nominal
Reading Rate: 2.5/s, nominal

1.5 ENVIRONMENTAL

Operating Temperature (Ambient): 0 to 60°C
Storage Temperature: -40 to 85°C
Humidity: To 95% RH, non-condensing, 0 to 40°C

1.6 MECHANICAL

Case Material: UL-rated 94V-0, polycarbonate
Weight: 0.57 kg (with interface board)

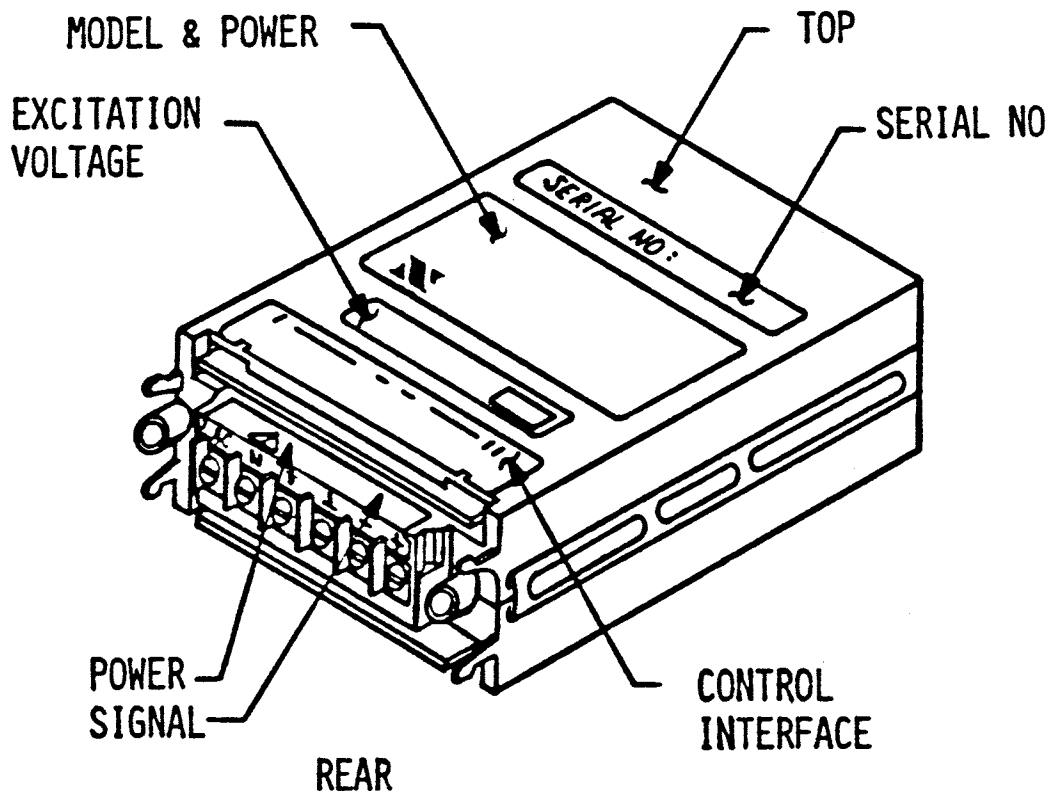


2.0 MECHANICAL ASSEMBLY & INSTALLATION

2.1 PANEL MOUNTING PROCEDURE (SEE FIGURE 1)

1. Remove the main board edge connector (J1), if installed.
2. Remove the interface board connector (J2), if installed.
3. Loosen two clamp screws on the rear of the case enough to rotate the two slide clamps.
4. Slide the two slide retainers toward the rear of the case and remove them.
5. From the front of the panel, insert the meter into the panel cutout.
6. Slide the slide retainers back onto the case and push up tightly against the rear of the panel.
7. Rotate the slide clamps back into their original position and tighten enough to hold the case in place. Overtightening can break the clamps.
8. Install any connectors removed.

2.2 LABELS (SEE FIGURE 2)



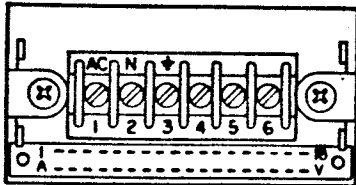
NOTE: READ LABELS FROM THE REAR

FIGURE 2. LABEL PLACEMENT

3.0 POWER & SIGNAL INPUT CONNECTIONS

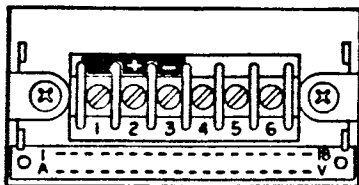
WARNING: Incorrect power input can damage your QUANTA PANEL METER

3.1 POWER CONNECTIONS



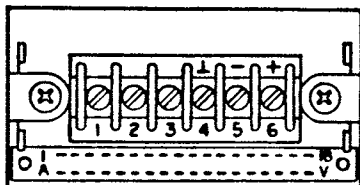
REAR TERMINAL VIEW

Terminal Connection	AC Versions	Wire Color
1	AC power HI	Black
2	AC power LO (neutral)	White
3	AC power GND	Green



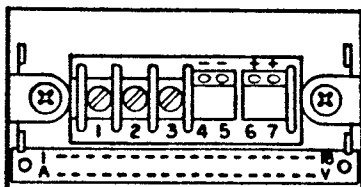
Terminal Connection	DC Versions
1	No connection
2	DC power +
3	DC power - (return)

3.2 SIGNAL INPUT CONNECTIONS



REAR TERMINAL VIEW

Terminal Connection	6 Terminal Versions Signal
4	Analog GND
5	Signal LO
6	Signal HI



Terminal Connection	7 Terminal Versions Signal
4	-E (Excitation return)
5	-S (Signal LO input)
6	+S (Signal HI input)
7	+E (Excitation output)

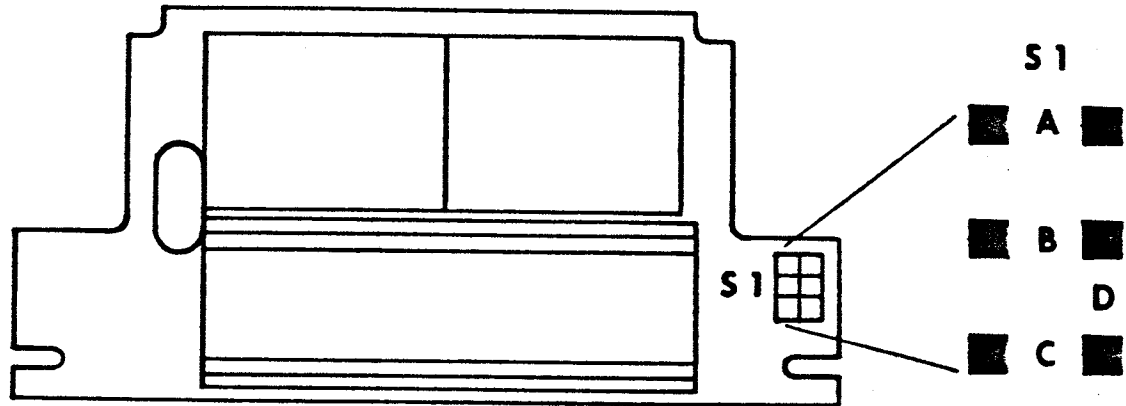
4.0 CONFIGURATION PROCEDURE

This procedure is used to set the decimal point of the display and interface board signal bypass selections for the configuration of the QUANTA Q2XXXX Display and power options (BQ20 through BQ29).

The main assembly can be configured using the push-on jumpers provided or already positioned on the pin forests. Pin forest designations are shown at the top of every page of the configuration charts.

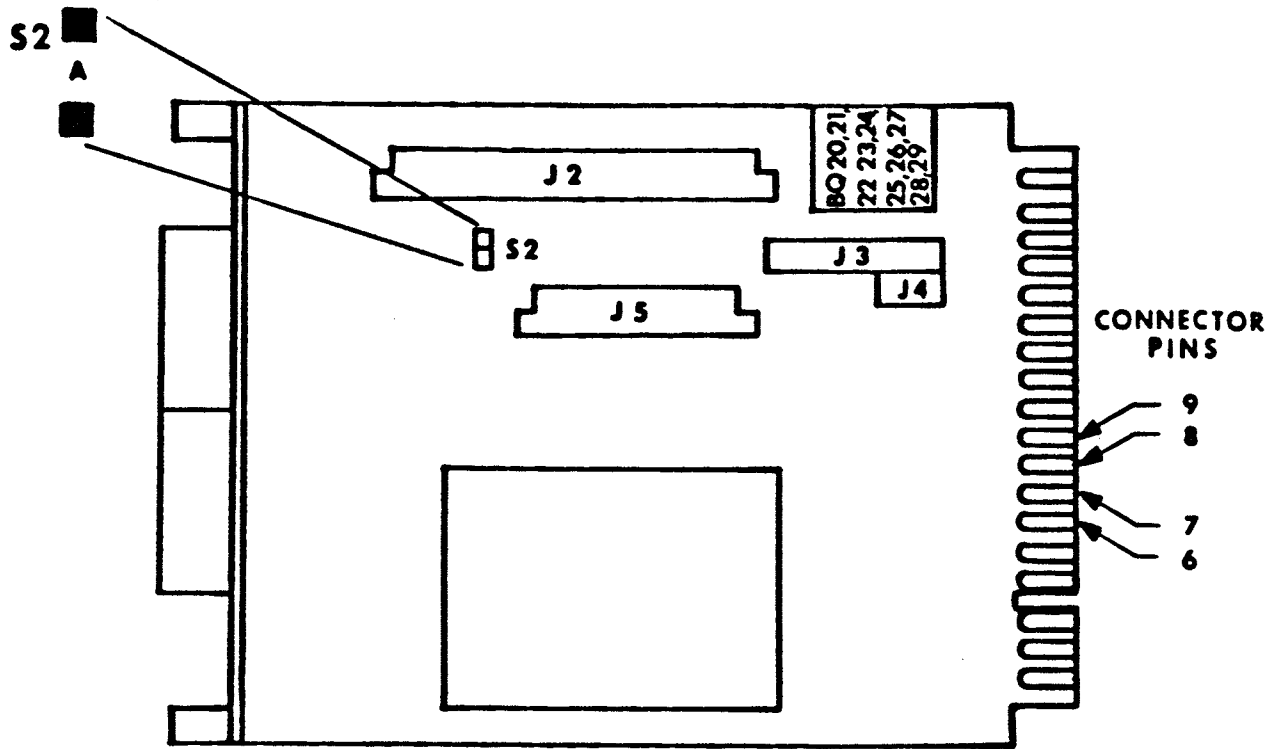
5.0 CONFIGURATION CHARTS

5.1 DECIMAL POINT SELECTION



Step 1: Remove all push-on jumpers not used in the desired configuration(s).		
Step 2: Select the desired configuration from the chart below, then install the push-on jumpers indicated.		
Decimal Point Selection	S1	Alternate Decimal Point Selection Using Main Assembly Board (J1) Connector
Decimal Point (1.999)	A	Connect J1-K/9 to J1-6
Decimal Point (19.99)	B	Connect J1-J/8 to J1-6
Decimal Point (199.9)	C	Connect J1-H/7 to J1-6
No Decimal Point (1999)	D	No Connection

5.2 INTERFACE BOARD SIGNAL BYPASS SELECTION



Step 1: Check your QUANTA part number for a zero (0) in the following position; Q2XX0X. If there is a zero (0) in that position, interface board signal bypass is required.	
Step 2: Remove all push-on jumpers not used in the desired configuration(s).	
Step 3: Select the desired configuration from the chart below, then install the push-on jumpers indicated.	
Interface Board Signal Configuration	S2
Interface Board Signal Bypass	A

6.0 TESTS & DIAGNOSTICS

6.1 TEST CONFIGURATION REQUIREMENTS

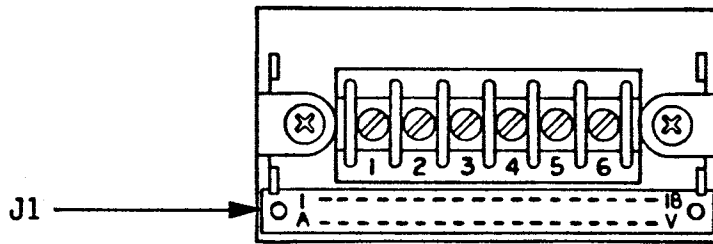
The QUANTA main assembly is designed to function with a signal conditioner board as a minimum configuration. There is no provision for testing a main assembly alone.

6.2 SIGNAL INPUT REQUIREMENTS

Signal input requirements for your configuration are identified in the signal conditioner section of this manual.

7.0 MAIN BOARD CONNECTOR PINOUTS (J1)
 (Left to right, looking at rear of case)

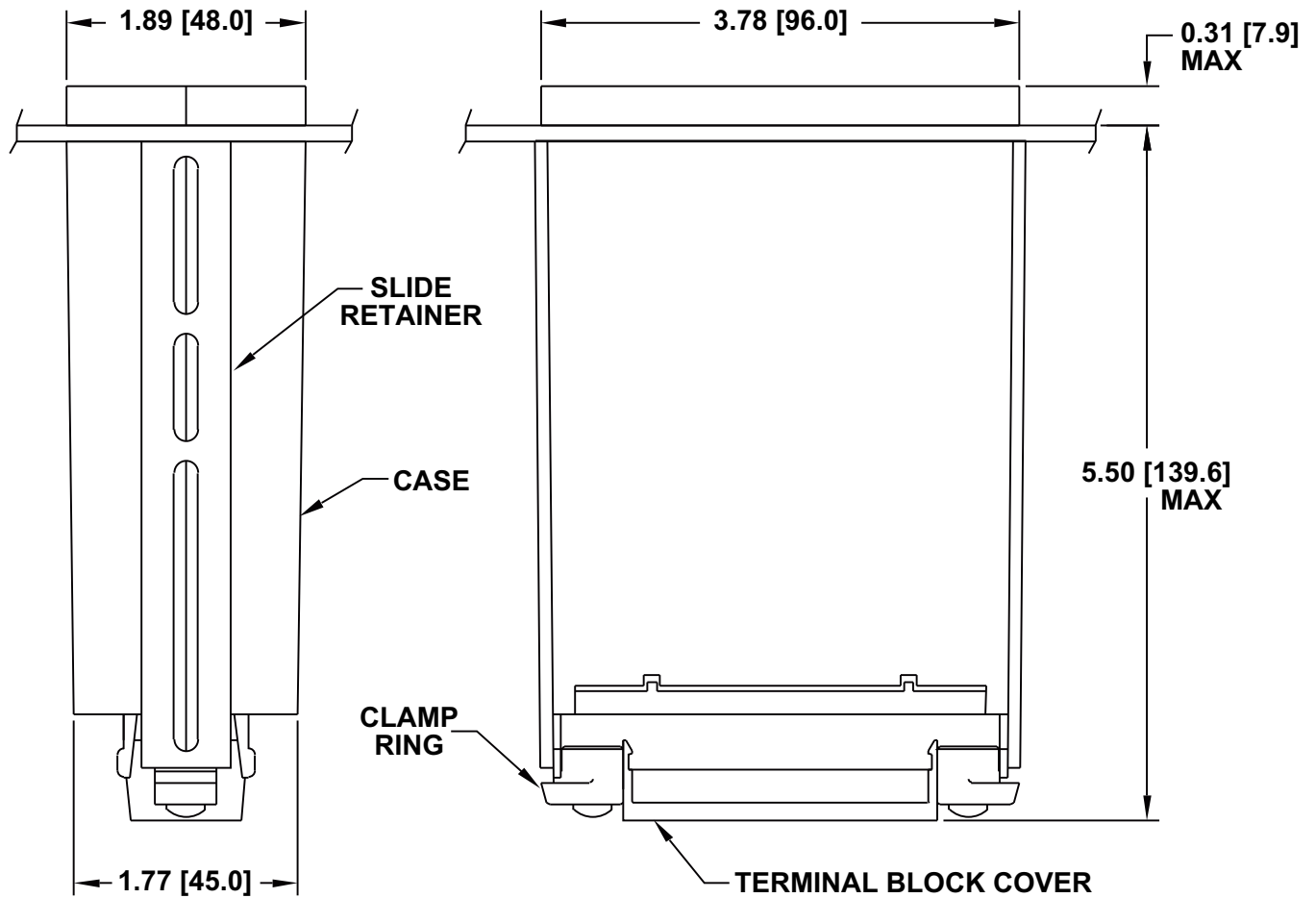
Connection	Function	
A - 1	Spare	
B	Oscillator	40 kHz
2	-8.2 V dc	Analog power
C - 3	Spare	
D	+ Pol (sign)	+ Polarity sign
4	HOLD	LED version only
E - 5	Spare	
F	Buffer	Integrator output
6	Digital Ground	
H - 7	199.9 (Decimal point)	Use with pin 6
J - 8	19.99 (Decimal point)	Use with pin 6
K - 9	1.999 (Decimal point)	Use with pin 6
L - 10	Test (LED version only)	Use with pin M/11
M - 11	+5 V dc	Analog & digital power
N - 12	Analog output	Standard 1 mV/count
P - 13	Spare	
R - 14	Spare	Used with H & S options - Excitation sense
S - 15	Analog Ground	
T - 16	Analog Option - Return	Used with analog option
U	Analog Option - Out	Used with analog option
17	+30 V dc	Unregulated power
V - 18	Spare	Used with S option + Excitation sense
-	Indicates common pin.	
	50 mA maximum power available from all internal sources.	



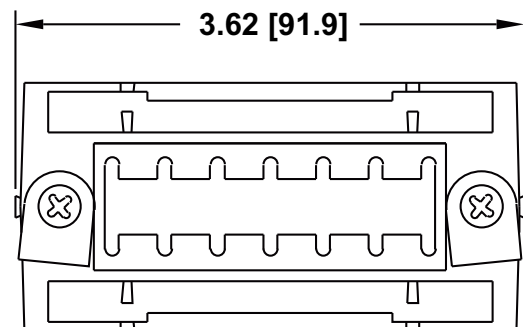
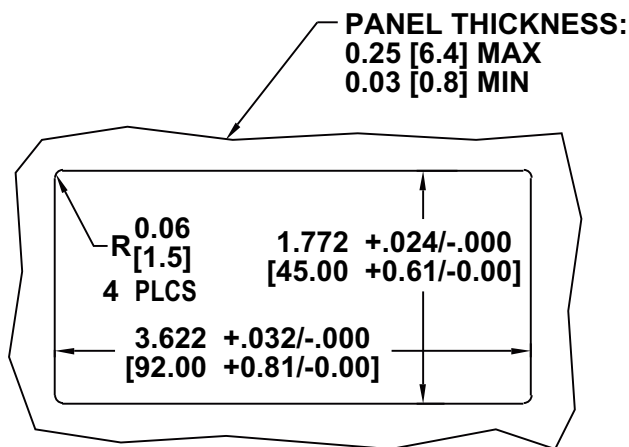
REAR TERMINAL VIEW

8.0 DRAWINGS

8.1 DIMENSIONS

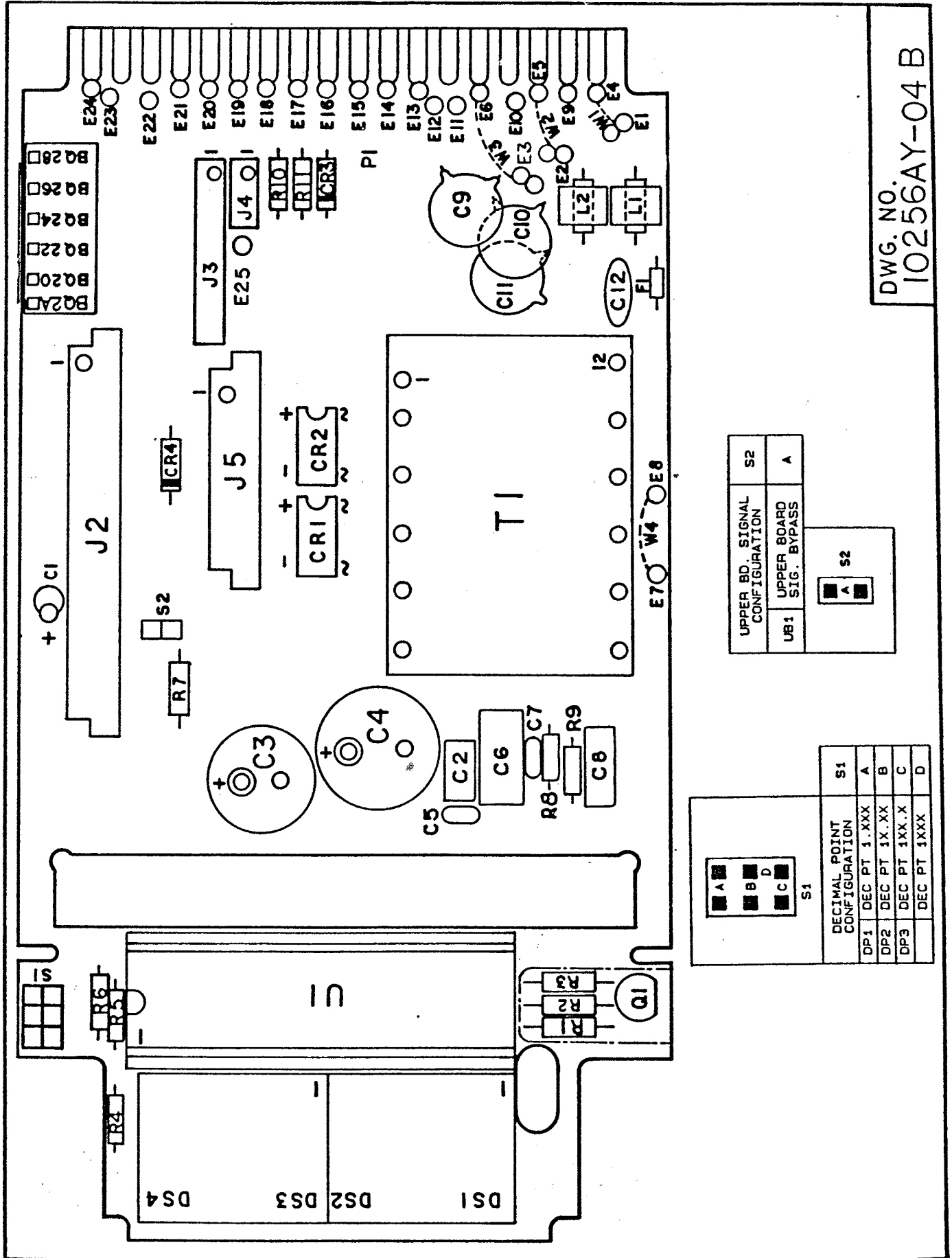


Notes: Dimensions are in inches ± 0.01 " with millimeters in [] ± 0.25 mm.



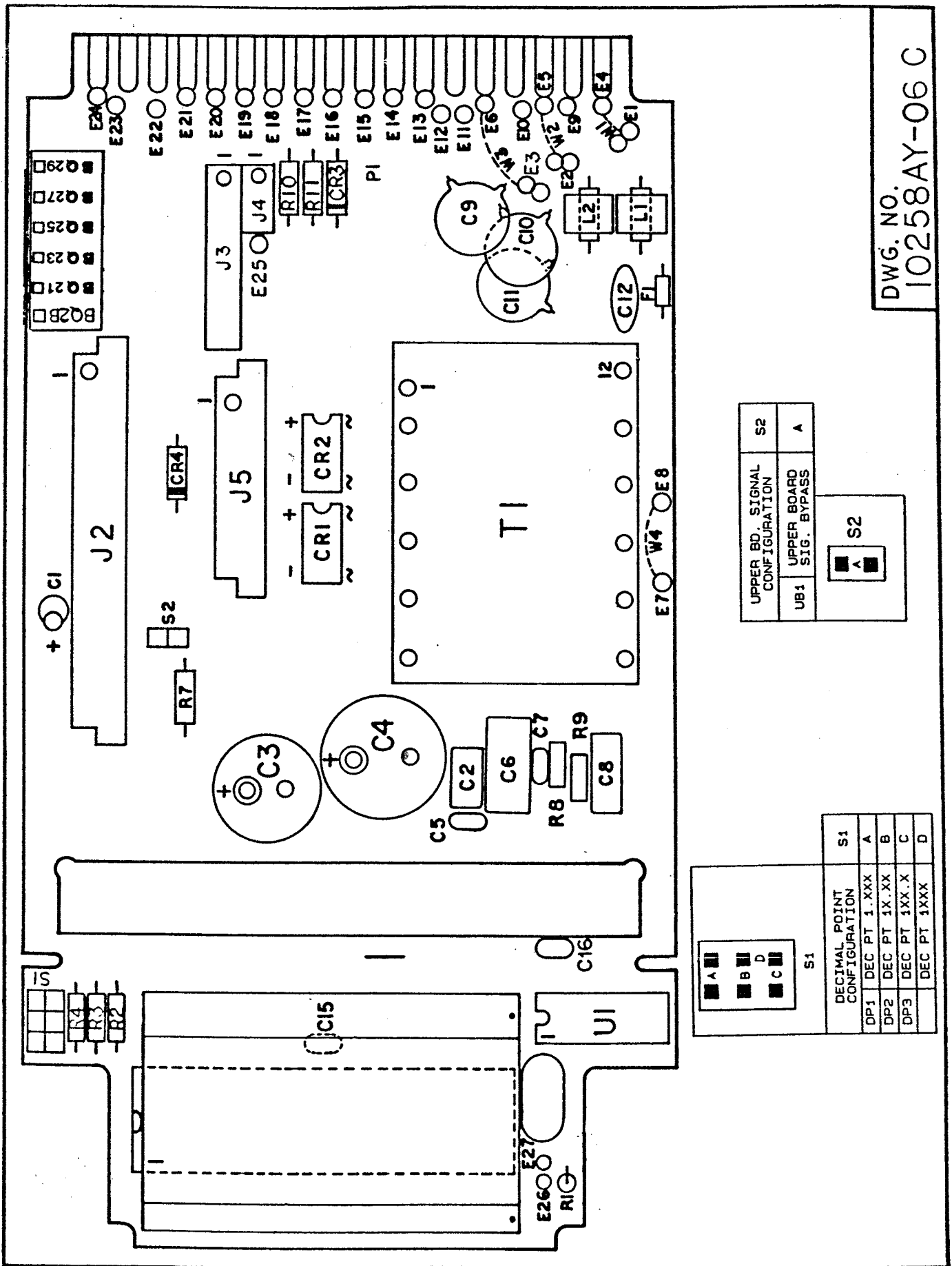
Terminal block cover and bezel not shown for clarity. Clamp rings rotated and slide retainers removed as shown for installation.

8.2 Q2000 LED MAIN ASSEMBLY



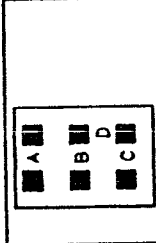
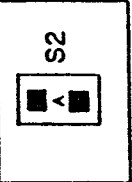
DWG. NO. 10256AY-04 B

8.3 Q2000 LCD MAIN ASSEMBLY



DWG. NO.
10258AY-06 C

UPPER BD. SIGNAL CONFIGURATION		S2
UB1	UPPER BOARD SIG. BYPASS	A



DECIMAL POINT CONFIGURATION		S1
DP1	DEC PT 1.XXX	A
DP2	DEC PT 1X.XX	B
DP3	DEC PT 1XX.X	C
	DEC PT 1XXX	D

9.0 MAIN ASSEMBLY Q9000 SPECIFICATIONS

9.1 GENERAL

QUANTA Q9000 main assemblies are identified by an initial designator (BQ9) plus a power/display option numeral: 0, 2, 4, 6 or 8.

The following table identifies the main assembly types:

Display Type	120 V ac	240 V ac	9-32 V dc	5 V ac	24 V ac
LED	BQ90	BQ92	BQ94	BQ96	BQ98

The QUANTA Digital Panel Meter/Controller consists of a main assembly, signal conditioner and interface options (if ordered) all housed in a 1/8 DIN case.

The main assembly consists of a main board and a display board which is permanently attached to it at a 90 degree angle.

The main board provides mounting for the power supply, circuit components, and connectors for plugging in the signal conditioner, optional analog card, and optional controller/communications interface card (requires removal of a bypass push-on jumper).

The display board includes the analog-to-digital converter, the LED display and the push-on jumper for programming the decimal points. Decimal point programming may also be done from the main board connector (J1).

9.2 POWER

AC Models: 24/120/240 V +10/-15% 47-63 Hz
Common Mode Voltage: 1500 Vp test (354 Vp per IEC spacing)
DC Models: 5 V \pm 5% (5 V return common to signal L0)
9-32 V (300 V isolation from 9-32 V return to signal L0)
Source Impedance: 3 ohms
Ripple: 250 mV maximum
Power Consumption: 5 watts maximum

9.3 DISPLAY

LED: 14.2 mm (0.56 in), 7-segment light emitting diode
Lens color: Red
Range: 0 to \pm 9999, digits flash form 10K-20K counts
Overload Indication: Four digits flash zeros at 20K and above

9.4 CONVERSION

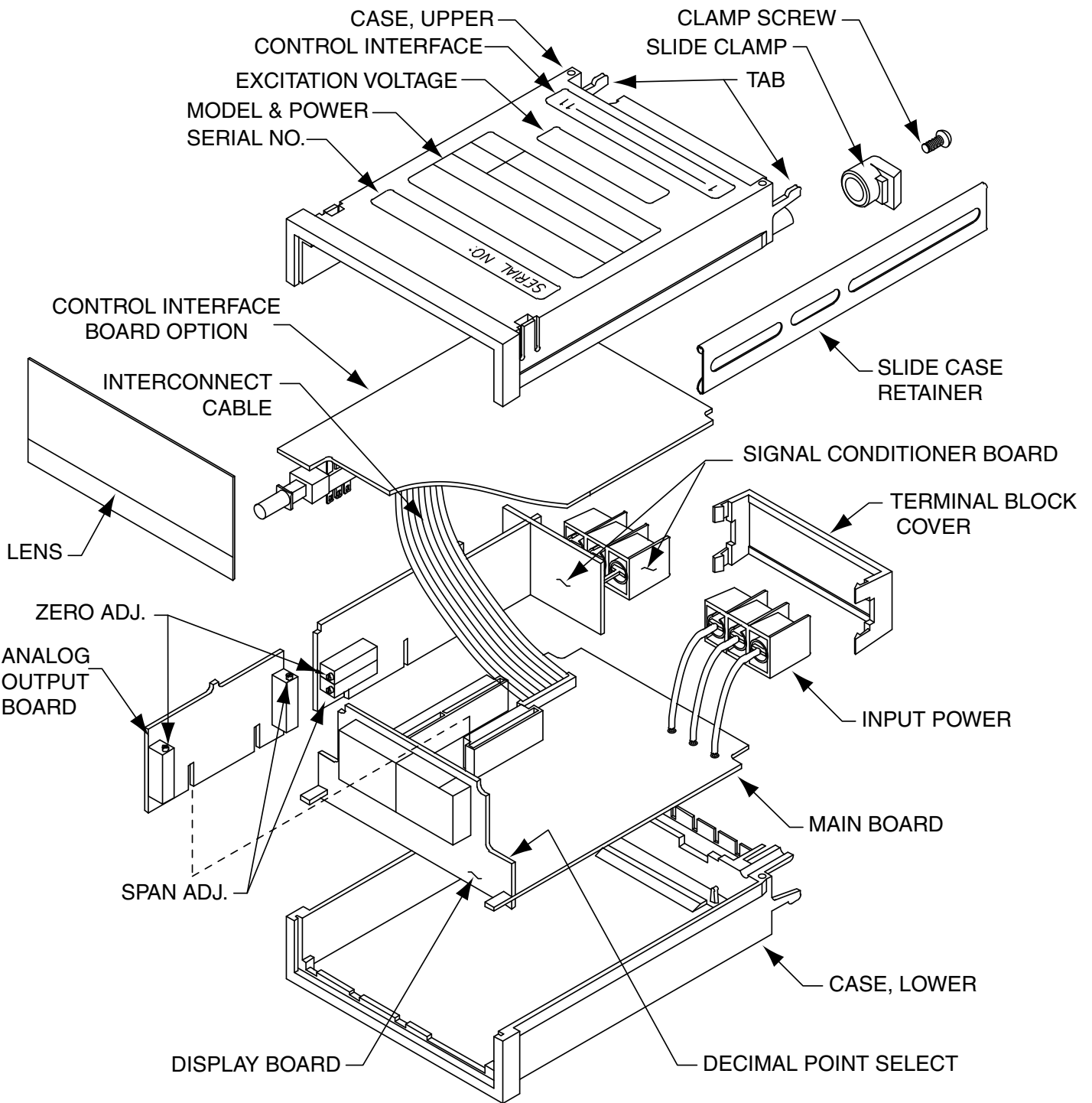
Technique: Auto-zero, dual slope, average value
Signal
Integration Period: 100 ms, nominal
Reading Rate: 2.5/s, nominal

9.5 ENVIRONMENTAL

Operating Temp. (Ambient): 0 to 60°C
Storage Temp.: -40 to 85°C
Humidity: To 95% RH, non-condensing, 0-40°C

9.6 MECHANICAL

Case Material: UL-rated 94V-0, polycarbonate
Weight: 0.57 kg (with interface board)

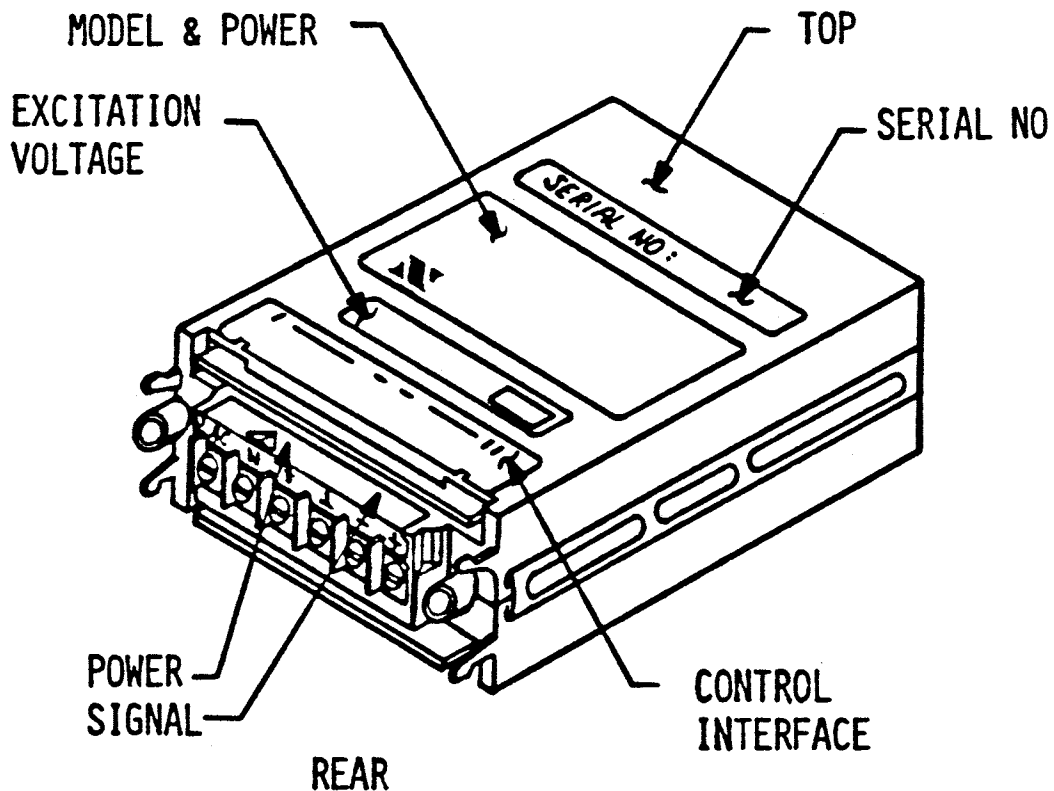


10.0 MECHANICAL ASSEMBLY & INSTALLATION

10.1 PANEL MOUNTING PROCEDURE (SEE FIGURE 3)

1. Remove the main board edge connector (J1), if installed.
2. Remove the interface board connector (J2), if installed.
3. Loosen two clamp screws on the rear of the case enough to rotate the two slide clamps.
4. Slide the two slide retainers toward the rear of the case and remove them.
5. From the front of the panel, insert the meter into the panel cutout.
6. Slide the slide retainers back onto the case and push up tightly against the rear of the panel.
7. Rotate the slide clamps back into their original position and tighten enough to hold the case in place. Overtightening can break the clamps.
8. Install any connectors removed.

10.2 LABELS (SEE FIGURE 4)



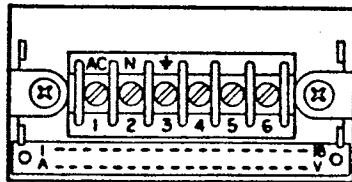
NOTE: READ LABELS FROM THE REAR

FIGURE 4. LABEL PLACEMENT

11.0 POWER & SIGNAL INPUT CONNECTIONS

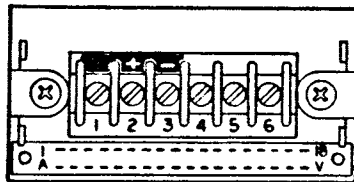
WARNING: Incorrect power input can damage your QUANTA PANEL METER.

11.1 POWER CONNECTIONS



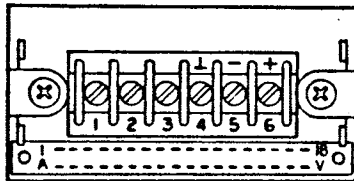
REAR TERMINAL VIEW

Terminal Connection	AC Versions	Wire Color
1	AC power HI	Black
2	AC power LO (neutral)	White
3	AC power GND	Green



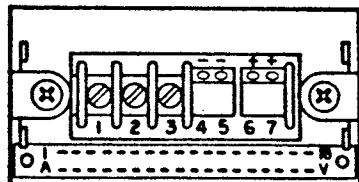
Terminal Connection	DC Versions
1	No connection
2	DC power +
3	DC power - (return)

11.2 SIGNAL INPUT CONNECTIONS



REAR TERMINAL VIEW

Terminal Connection	6 Terminal Versions Signal
4	Analog GND
5	Signal LO
6	Signal HI



Terminal Connection	7 Terminal Versions Signal
4	-E (Excitation return)
5	-S (Signal LO input)
6	+S (Signal HI input)
7	+E (Excitation output)

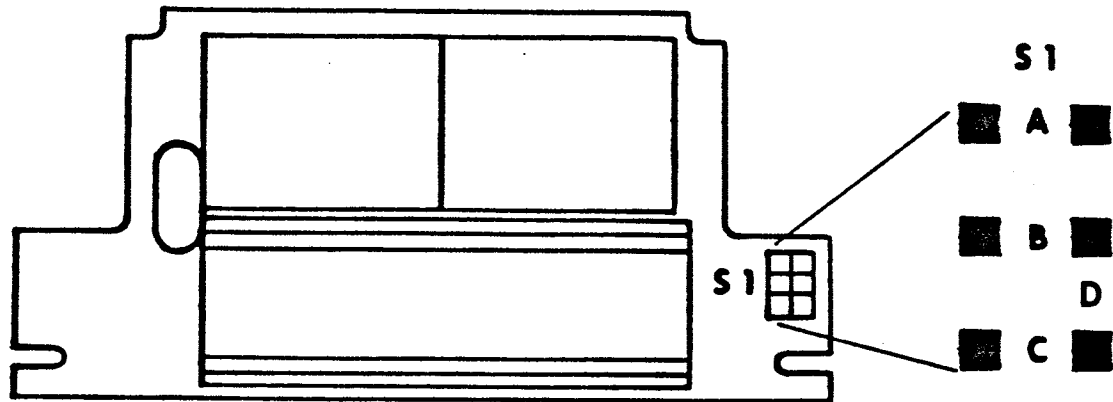
12.0 CONFIGURATION PROCEDURE

This procedure is used to set the decimal point of the display and interface board signal bypass selections for the configuration of the QUANTA Q9XXXX display and power options (BQ90 through BQ98).

The main assembly can be configured using the push-on jumpers provided or already positioned on the pin forests. Pin forest designations are shown at the top of every page of the configuration charts.

13.0 CONFIGURATION CHARTS

13.1 DECIMAL POINT SELECTION

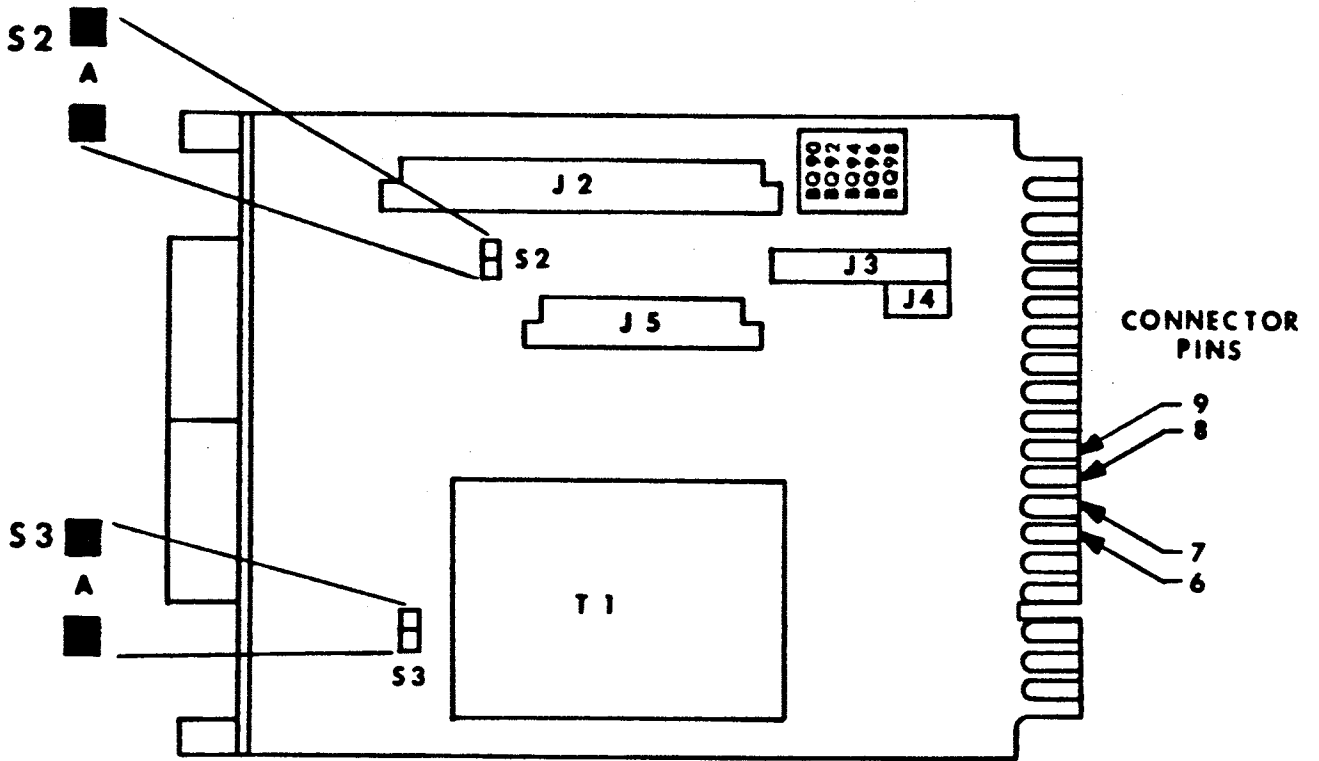


Step 1: Remove all push-on jumpers not used in the desired configuration(s).

Step 2: Select the desired configuration from the chart below, then install the push-on jumpers indicated.

Decimal Point Selection	S1	Alternate Decimal Point Selection Using Main Assembly Board (J1) Connector
Decimal Point (9.999)	A	Connect J1-K/9 to J1-6
Decimal Point (99.99)	B	Connect J1-J/8 to J1-6
Decimal Point (999.9)	C	Connect J1-H/7 to J1-6
No Decimal Point (9999)	D	No connection

13.2 INTERFACE BOARD SIGNAL BYPASS SELECTION



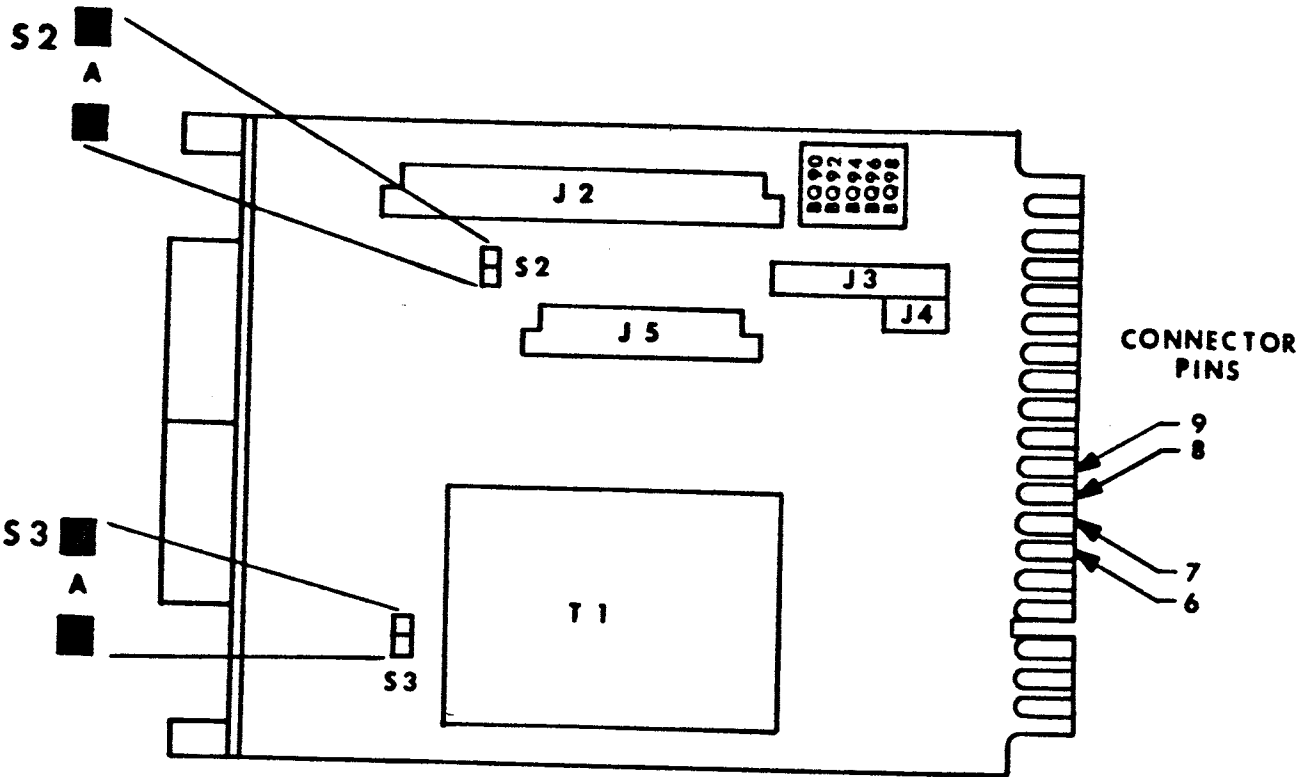
Step 1: Check your QUANTA part number for a zero (0) in the following position; Q9XX0X. If there is a zero (0) in that position, interface board signal bypass is required.

Step 2: Remove all push-on jumpers not used in the desired configuration(s).

Step 3: Select the desired configuration from the chart below, then install the push-on jumpers indicated.

Interface Board Signal Configuration	S2
Interface Board Signal Bypass	A

13.3 REFERENCE VOLTAGE (RV1, RV2)



Step 1: Remove all push-on jumpers not used in the desired configuration(s).

Step 2: Select the desired configuration from the chart below, then install the push-on jumpers indicated.

Reference Voltage Configuration		S3
RV1	1 Volt	A
RV2	2 Volts	-

14.0 TESTS & DIAGNOSTICS

14.1 TEST CONFIGURATION REQUIREMENTS

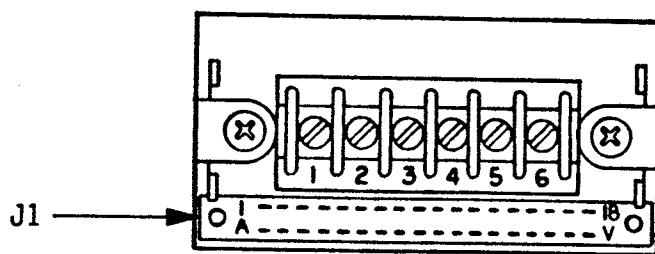
The QUANTA main assembly is designed to function with a signal conditioner board as a minimum configuration. There is no provision for testing a main assembly alone.

14.2 SIGNAL INPUT REQUIREMENTS

Signal input requirements for your configuration are identified in the signal conditioner section of this manual.

15.0 MAIN BOARD CONNECTOR PINOUTS (J1)
 (Left to right, looking at rear of case)

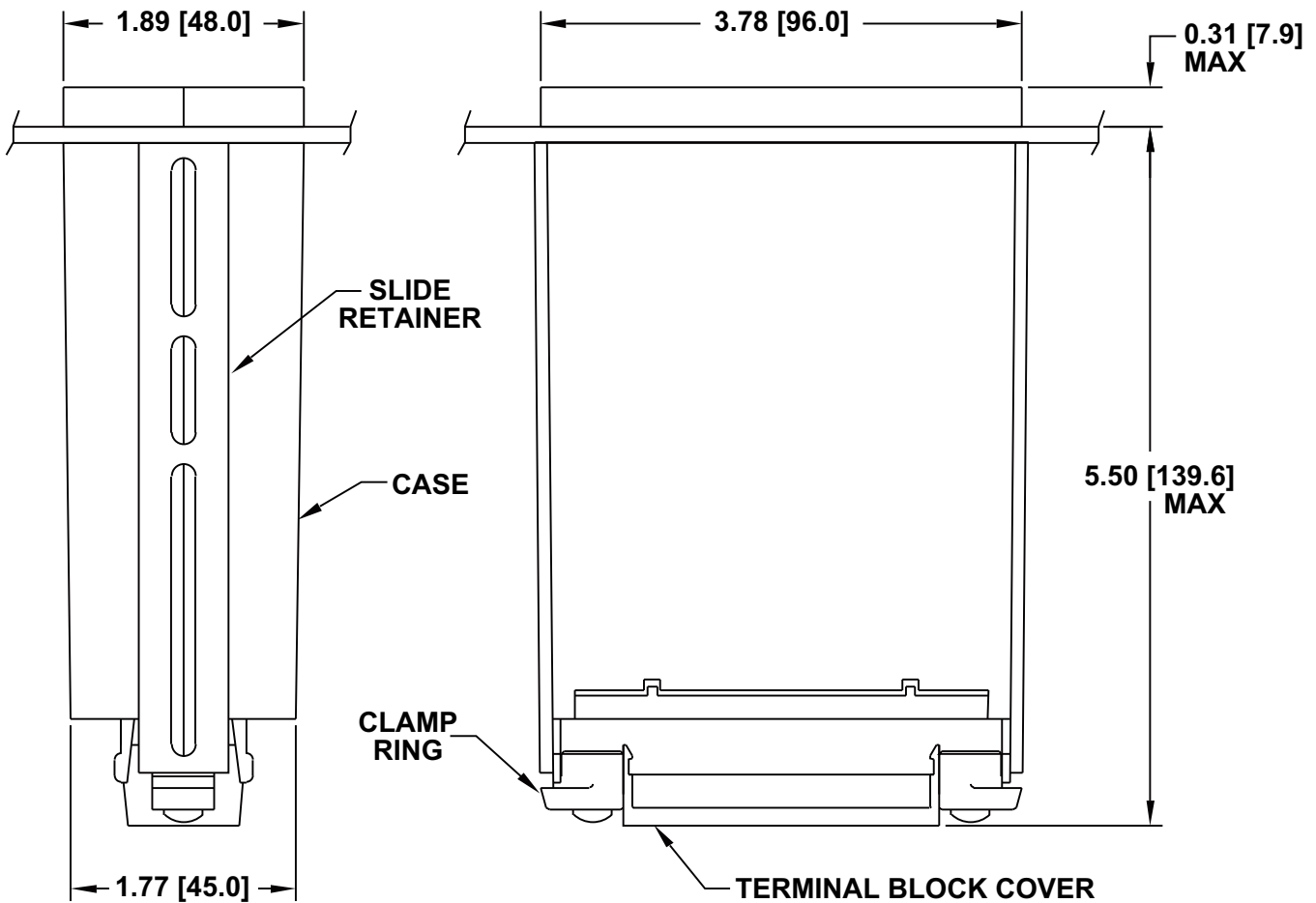
<u>Connection</u>	<u>Function</u>	
A - 1		Spare
B	Oscillator	100 kHz
2	-8.2 V dc	Analog power
C - 3	Spare	
D	+ Pol (sign)	+ Polarity sign
4	HOLD	LED version only
E 5	Spare	
F	Buffer	Integrator output
6	Digital Ground	
H - 7	XXX.X (Decimal point)	Use with pin 6
J - 8	XX.XX (Decimal point)	Use with pin 6
K - 9	X.XXX (Decimal point)	Use with pin 6
L - 10	TEST	Use with pin M/11
M - 11	+5 V dc	Analog & digital power
N - 12	Analog output	Standard 1 mV/count
P 13	Spare	
R	Spare	
14	Used with H & S options - Excitation sense	
S - 15	Analog Ground	
T - 16	Analog Option - Return	Used with analog option
U	Analog Option - Out	Used with analog option
17	+30 V dc	Unregulated power
V - 18	Spare	Used with S option
-	+ Excitation sense Indicates common pin 50 mA maximum power available from all internal sources.	



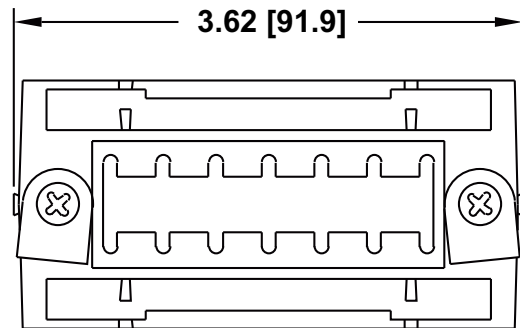
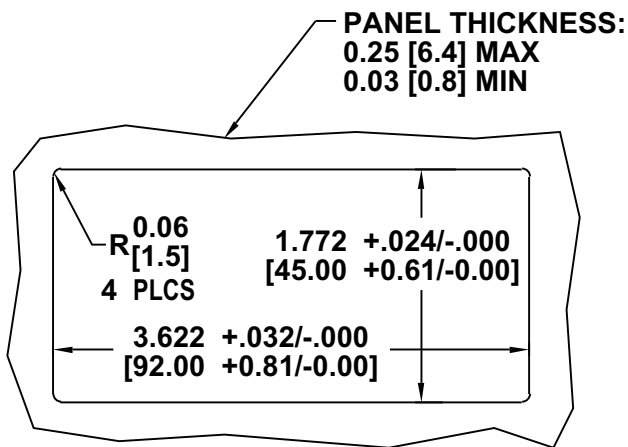
REAR TERMINAL VIEW

16.0 DRAWINGS

16.1 DIMENSIONS



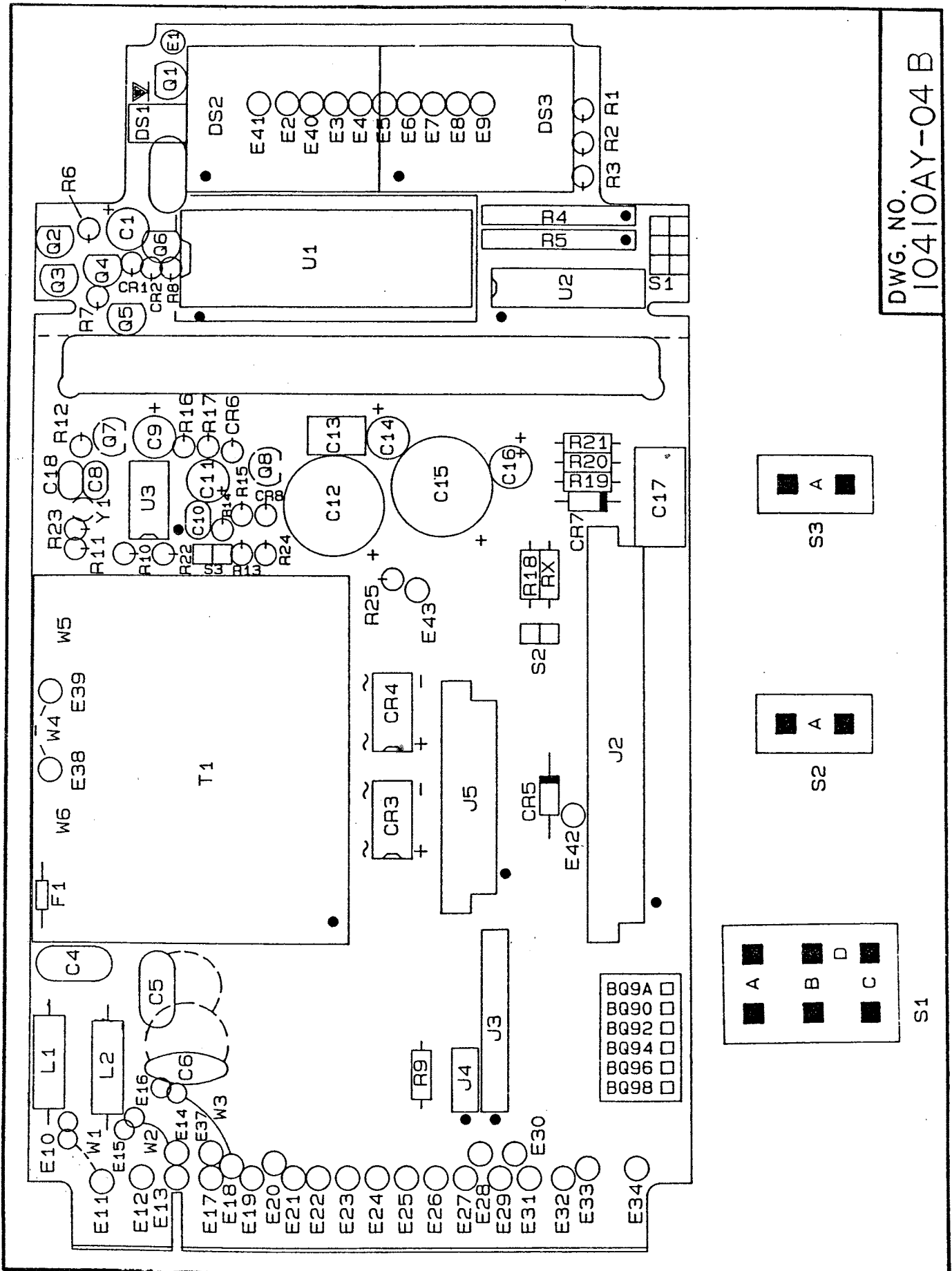
Notes: Dimensions are in inches ± 0.01 " with millimeters in [] ± 0.25 mm.



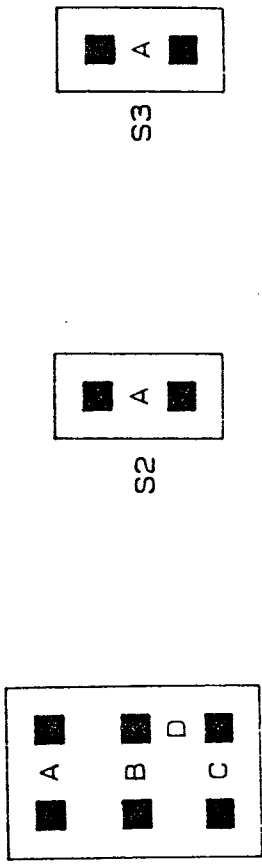
Terminal block cover and bezel not shown for clarity. Clamp rings rotated and slide retainers removed as shown for installation.

FIGURE 6. PANEL CUTOUT DIMENSIONS AND INSTALLATION

16.2 Q9000 LED MAIN ASSEMBLY



DWG. NO.
10410AY-04 B



17.0 SPECIFICATIONS: BSCT, TYPE T THERMOCOUPLE

17.1 GENERAL

The BSCT will measure the temperature using an ANSI type "T" thermocouple. The digital display can be scaled by internal push-on jumpers for °C or °F. The basic board is identified as a BSCT (Q2000T or Q9000T). The Q2000 or Q9000 prefix is determined by the main assembly board used with the BSCT option board.

The Q2000T has a high-accuracy temperature range of -184°C to +371°C, or -300°F to +700°F. The Q2000T displays temperatures beyond this range (except beyond 1999°), but the specified accuracy is not guaranteed.

The Q9000T has a high-accuracy temperature range of -184.0°C to 371.0°C, or -300.0°F to 700.0°F. The Q9000T displays temperature beyond this range, but the specified accuracy is not guaranteed for such readings.

17.2 TEMPERATURE SENSOR (customer-supplied)

Type	Thermocouple
Material	
Type T	Copper-Constantan
Calibration	NBS (based on IPTS-68)
Lead Resistance, max	
Type T	200 ohms

17.3 INPUT SIGNAL CONDITIONER

Configuration	Single-ended (+T/C lead connected to analog ground through 10 ohms)
Polarity	Bipolar
Zero	Adjustable ±5°C (±10°F)
Overvoltage Protection (SIG LO to HI or SIG GND)	120 V RMS (continuous), 240 V RMS (30 s max)
Sensor Break Detection	
Q2000T	3 least-significant digits blanked
Q9000T	4 digits flash zeros
Sensor Break Detection Current	0.5 uA
NMR at 50/60 Hz	70 dB
Common Mode	
Analog ground to ac power ground	
CMR at dc to 60 Hz	120 dB
CMV at dc to 60 Hz	±1500 Vp per HV test ±354 Vp per IEC spacing
Linearization	POLYLOG III

Accuracy at 25°C

°F or °C Scale Selection

By internal push-on jumpers

Reference Junction Tempco
from 10°C to 40°C

±0.06 degree/degree

Span Tempco from 10° to 40°C

0.01% R/°C

Warmup time

Less than 15 minutes

Q2000T

MODEL	RANGE	ACCURACY ±1/2 COUNT	RESOLUTION
BSCT °C	-184 to +371°C	-184 to -59°C: ±1.5% R -59 to +93°C: ±1°C +93 to +371°C: ±0.6% R	1°C
BSCT °F	-300 to +700°F	-300 to -75°F: ±1.5% R -75 to +200°F: ±1.5°F +200 to +700°F: ±0.5% R	1°F

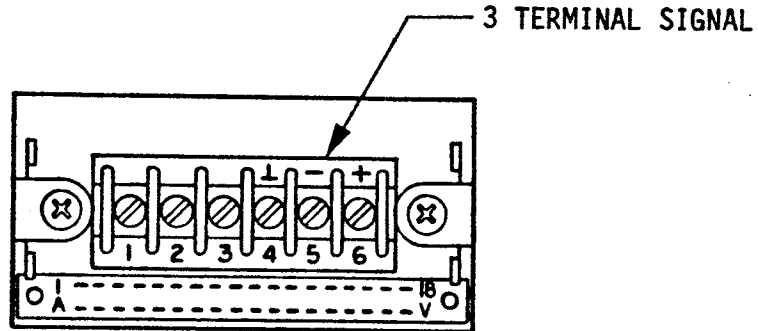
Q9000T

MODEL	RANGE	ACCURACY ±2 COUNTS	RESOLUTION
BSCT °C	-184.0 to +371.0°C	-184 to -59°C: ±1.5% R -59 to +93°C: ±1°C +93 to +371°C: ±0.6% R	0.1°C
BSCT °F	-300.0 to +700.0°F	-300 to -75°F: ±1.5% R -75 to +200°F: ±1.5°F +200 to +700°F: ±0.5% R	0.1°F

18.0 SIGNAL INPUT CONNECTIONS (TB1) (SEE FIGURE 5)

18.1 The signal input connections for the BSCT Type T, Thermocouple signal conditioner are made at the standard 3-terminal barrier strip:

<u>Terminal Connection</u>	<u>Signal</u>	<u>Type T Thermocouple</u>
4	Analog ground	● RED
5	- Signal LO	● ———
6	+ Signal HI	● ———
		BLUE



REAR TERMINAL VIEW

FIGURE 5. SIGNAL INPUT CONNECTIONS

19.0 TESTS AND DIAGNOSTICS

- The signal conditioner board BSCT is designed to function with a main assembly as a minimum configuration. There is no provision for testing a signal conditioner board alone.
- Signal input requirements for your configuration are identified in the specifications for the BSCT signal conditioner.
- Operating power and connections for your configuration are identified in the Main Assembly Section of this manual.

NOTE: If using Main Assembly Q2000, refer to Section BQ20/BQ29.
If using Main Assembly Q9000, refer to Section BQ90/BQ98.

- Inspect the QUANTA panel meter for physical damage. If damage is apparent, resolve the damage with the shipper or your supplier.

19.1 FUNCTIONAL ELECTRICAL TESTING

NOTE: Perform this test after your meter has been configured.

1. Short terminals 5 and 6 on barrier strip (TB1).
2. Apply proper power for your configuration to terminals 1, 2 and 3 on barrier strip (TB1).
3. Display will read approximately ambient room temperature.

20.0 CONFIGURATION PROCEDURE

20.1 GENERAL

Use this procedure to determine the configuration of the BSCT thermocouple option.

Configure the unit using the push-on jumpers provided separately or already positioned on the pin forest. Pin forests designations are shown with each configuration chart.

20.2 INSTALLATION

Select the degrees format required after calibration.

If a decimal point is required, refer to the appropriate Main Assembly Section for location and configuration procedure.

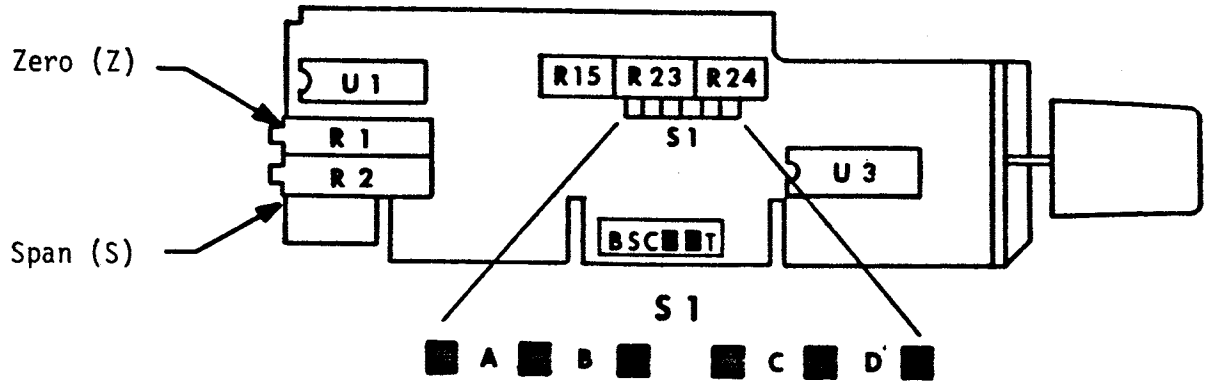
NOTE: If using Main Assembly Q2000, refer to Section BQ20/BQ29.
If using Main Assembly Q9000, refer to Section BQ90/BQ98.

20.2.1 Reference Voltage

Select reference RV1 by installing jumper A as per Subsection 5.3 in Main Assembly Section BQ90/BQ98.

21.0 CONFIGURATION CHART

21.1 DEGREES (TDF1, TDC1)



Step 1: Remove all push-on jumpers not used in the desired configuration(s).

Step 2: Select the desired configuration from the chart below, then install the push-on jumpers indicated.

Degrees Configuration *		S1	
TDF1	Degrees "F"	B	D
TDC1	Degrees "C"	A	C

* Used on Q2000T or Q9000T

22.0 CALIBRATION

22.1 DEGREES CALIBRATION Q2000T

The following procedure is for use with a precision millivolt source connected as shown in figure below. Alternately a standard thermocouple calibrator can be used which does not require an ice bath for cold junction compensation. When using a thermocouple calibrator dial in the temperature required for each reading in the procedure. In either case, ensure that the correct thermocouple wire is used between the calibrator or cold junction, and the meter screw terminals.

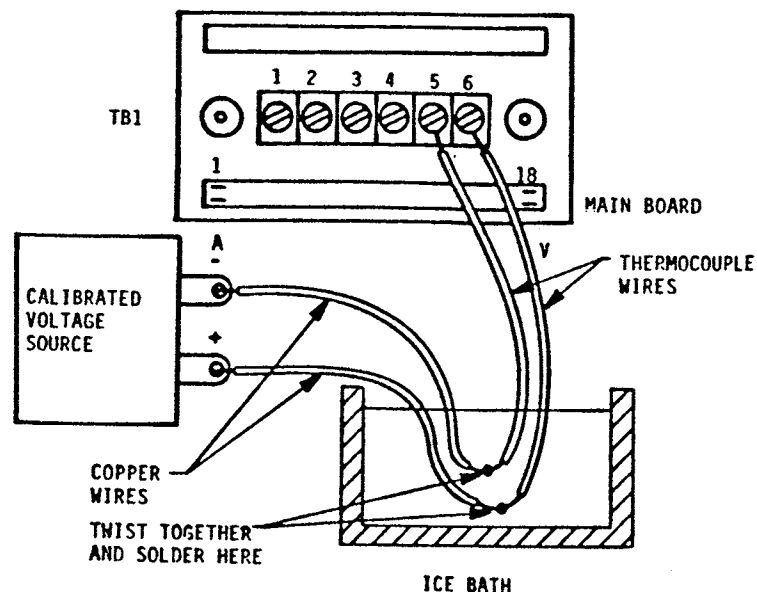
NOTE: After calibration is completed, adjust the zero for each thermocouple used.

22.1.1 Calibration for °C

1. Install push-on jumpers S1-A and S1-C as shown in the configuration chart (Section 20.0).
2. Apply an input of 0 V and adjust R1 (zero) for a reading of 000.
3. Apply an input of +19.09 mV and adjust R2 (span) for a reading of 371.
4. Apply an input of -5.32 mV and adjust R15 for a reading of -182. Calibration for degrees Celsius is now complete.

22.1.2 Calibration for °F

1. Perform steps 1 through 3 in Subsection 22.1.1.
2. Remove push-on jumpers S1-A and S1-C and place the jumpers on S1-B and S1-D as shown on the configuration chart (Section 5.0).
3. Apply an input of -0.66 mV and adjust R1 (zero) for a reading of 000.
4. Apply an input of +19.09 mV and adjust R24 for reading of 700. Calibration for degrees Fahrenheit is now complete.



22.2 DEGREES CALIBRATION Q9000T

For the following procedure, use a precision millivolt source connected as shown in the figure below. Alternately, a standard thermocouple calibrator can be used which does not require an ice bath for cold junction compensation. When using a thermocouple calibrator dial in the temperature required for each reading in the procedure. In either case, ensure that the correct thermocouple wire is used between the calibrator or cold junction, and the meter screw terminals.

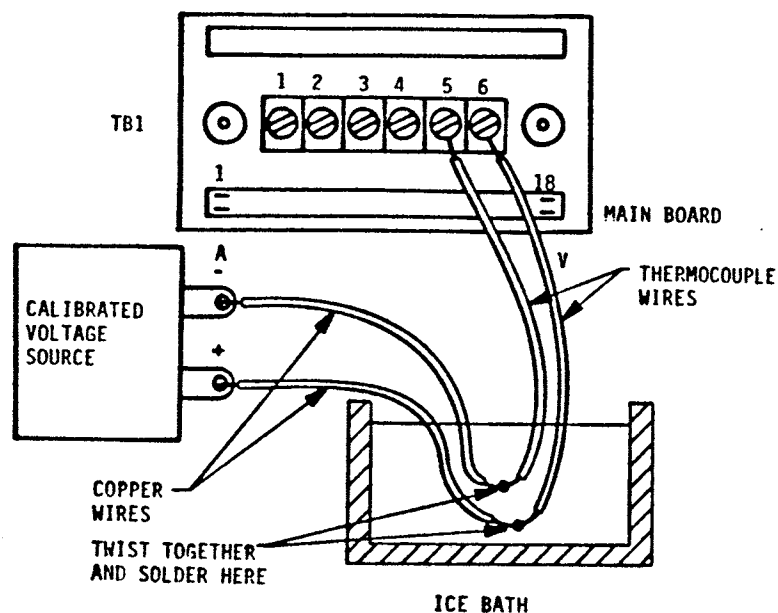
NOTE: After calibration is completed, adjust the zero for each thermocouple used.

22.2.1 Calibration for °C

1. Install push-on jumpers S1-A and S1-C as shown in the configuration chart (Section 20.0).
2. Apply an input of -0.02 mV and adjust R1 (zero) for a reading of 000.0.
3. Apply an input of $+19.09$ mV and adjust R2 (span) for a reading of 371.0.
4. Apply an input of -5.32 mV and adjust R15 for a reading of -182.0 . Calibration for degrees Celsius is now complete.

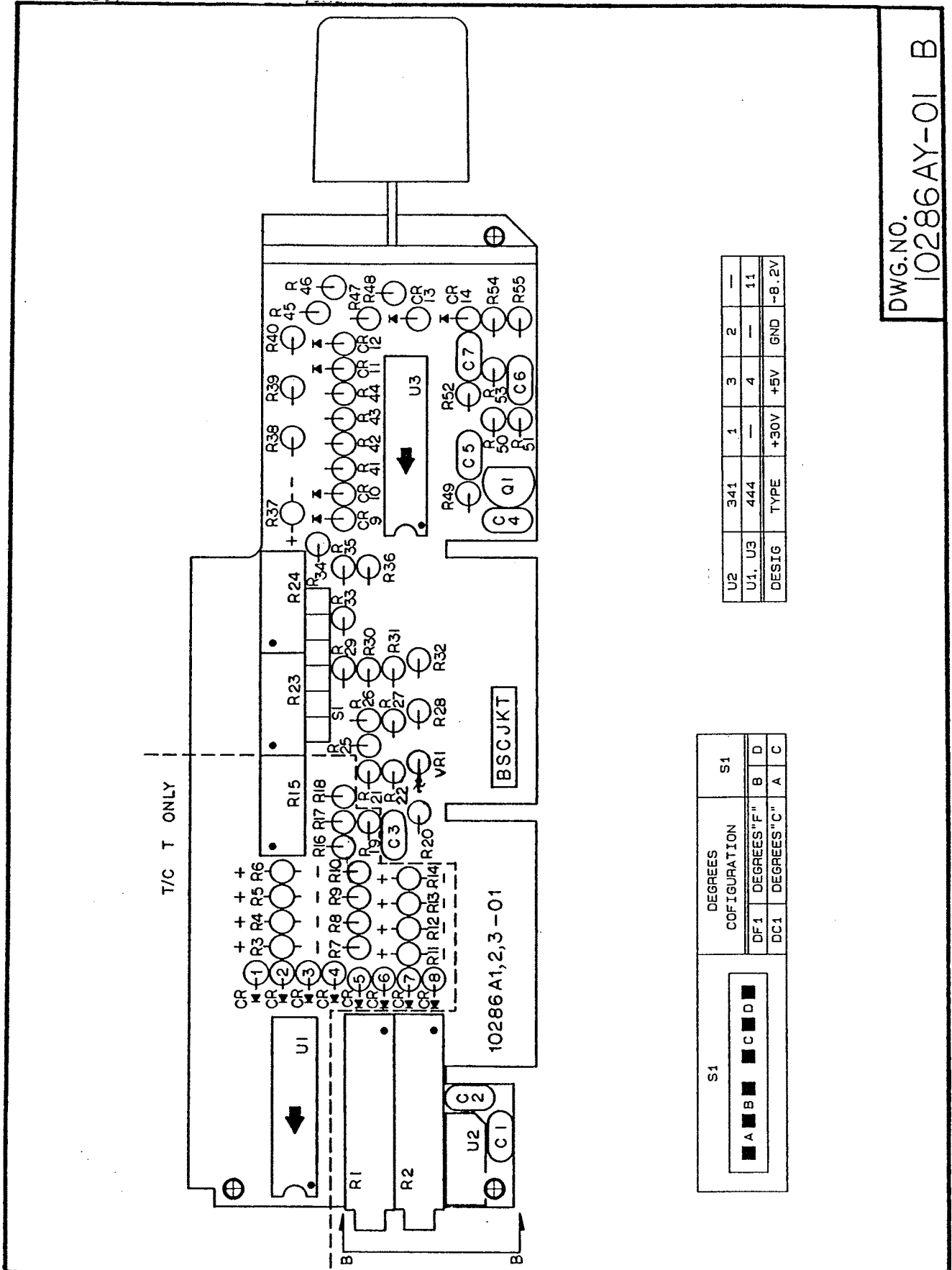
22.2.2 Calibration for °F

1. Perform steps 1 through 3 in Subsection 22.2.1.
2. Remove push-on jumpers S1-A and S1-C and place the jumpers on S1-B and S1-D as shown in the configuration chart.
3. Apply an input of -0.66 mV and adjust R1 (zero) for a reading of 000.0.
4. Apply an input of $+19.09$ mV and adjust R24 for reading of 700.0. Calibration for degrees Fahrenheit is now complete.



23.0 DRAWINGS

23.1 BSCT ASSEMBLY DRAWING



24.0 DIGITAL PANEL METER INSTALLATION INSTRUCTIONS

IMPORTANT:

For proper installation electrical connections must be made according to the model number on the meter label. Write the model number in the following space and use the appropriate instructions for your model number.

```

      .--- Power requirement (Section 24.3)
      :
      : .--- Analog output (see Analog Output Manual)
      :
      : .--- Control output (see Controller/
      :                       Interface Manual)
      :
      : .--- Signal input (Section 25.0)
      :
      :
Model number Q2 _____
Model number Q9 _____

```

=====

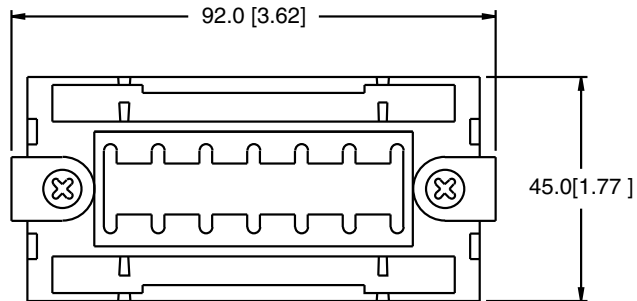
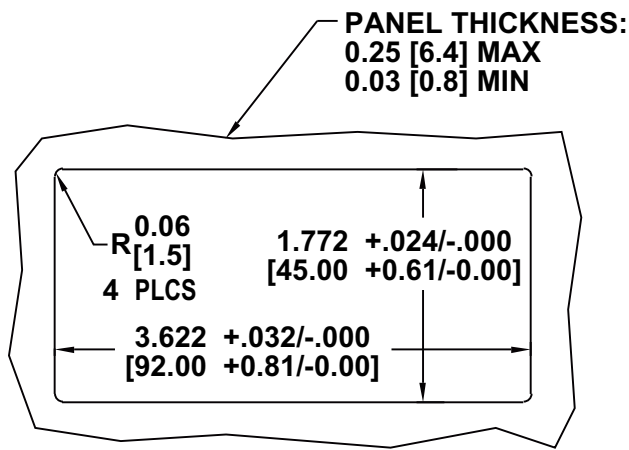
24.1 UNPACKING & INSPECTION

Your QUANTA digital panel meter was systematically inspected and tested, then carefully packed before shipment.

Unpack the instrument and inspect for obvious shipping damage. Notify the freight carrier immediately upon discovery of any shipping damage.

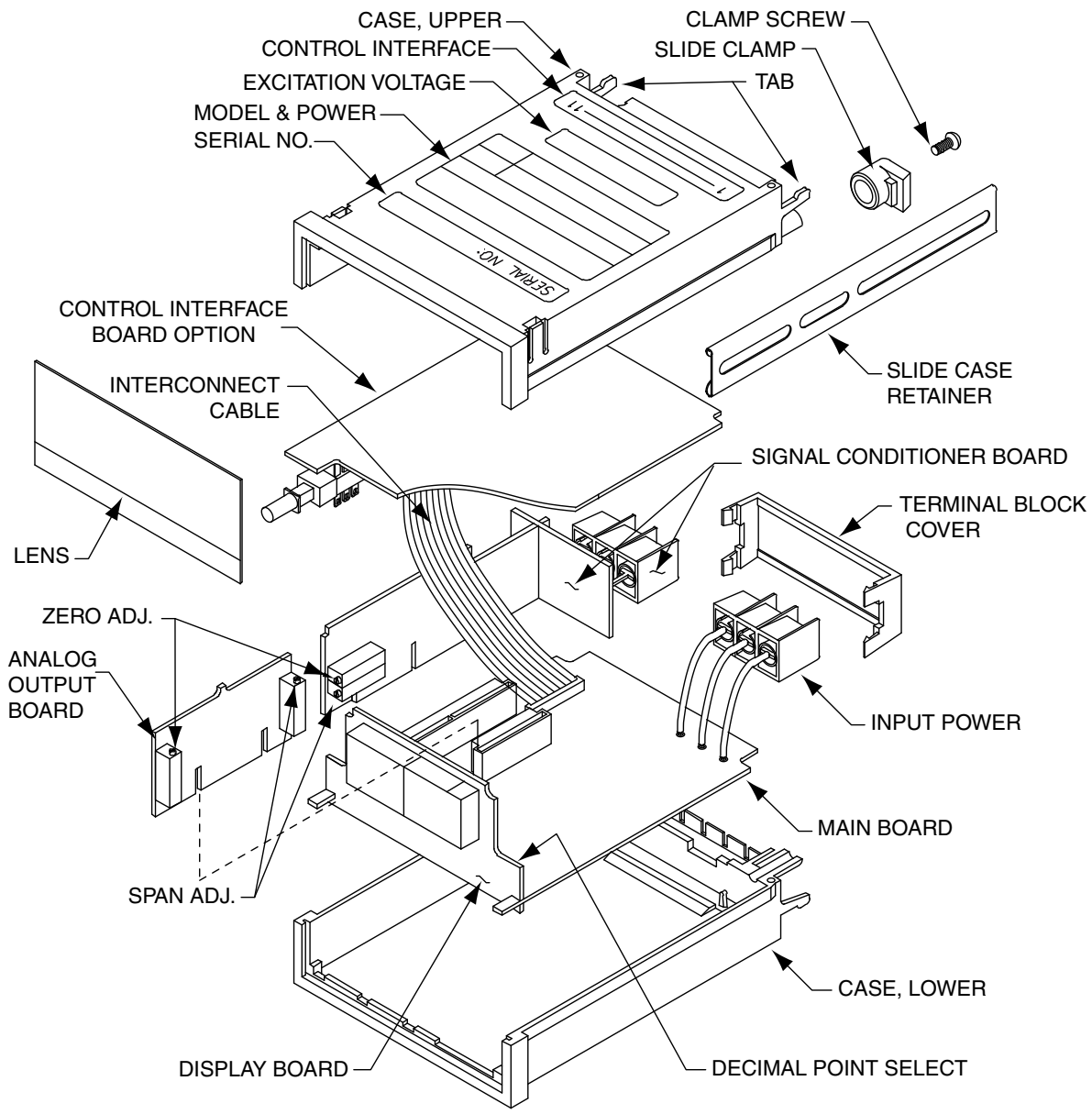
24.2 MECHANICAL INSTALLATION

1. Insure that the panel cutout dimensions are as shown on Figure 6.
2. Remove the lower printed circuit board edge connector, (if installed) J1, by pushing two molded plastic tabs away from the connector body and pulling the connector off the printed circuit board. Remove the printed circuit board edge connector, J2, if upper board output option was ordered.
3. Loosen two clamp screws on the rear of the case enough to rotate the two slide clamps.
4. Slide the two slide retainers toward the rear of the case and remove them.
5. From the front of the panel, insert the meter into the panel cutout.
6. Slide the slide retainers back onto the case and push up tightly against the rear of the panel.
7. Rotate the slide clamps back into their original position and tighten enough to hold the case in place. Overtightening can break the clamps.
8. Install the lower printed circuit board edge connector, if supplied, by pushing it on to the printed circuit board connections. Install the upper printed circuit board edge connector, if used.



REAR VIEW

(TERMINAL BLOCK COVER AND BEZEL NOT SHOWN FOR CLARITY)
 SLIDE CLAMPS ROTATED AND SLIDE RETAINERS
 REMOVED AS SHOWN FOR INSTALLATION.



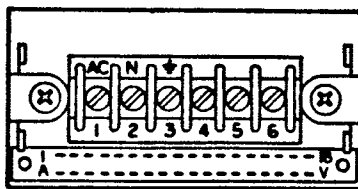
24.3 POWER REQUIREMENTS AND CONNECTIONS (TB1)

24.3.1 The standard meter is wired to operate from one of five power sources.

Models	Power Requirements
Q20XXX, Q21XXX, Q90XXX	120 V ac (50-60 Hz)
Q22XXX, Q23XXX, Q92XXX	240 V ac (50-60 Hz)
Q24XXX, Q25XXX, Q94XXX	9-32 V dc
Q26XXX, Q27XXX, Q96XXX	5 V dc
Q28XXX, Q29XXX, Q98XXX	24 V ac (50-60 Hz)

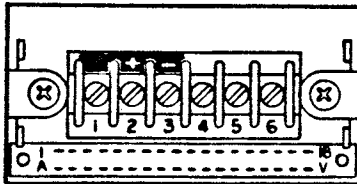
24.3.2 Regardless of the power source used, connections are made to the same terminal barrier strip, TB1, as follows:

TB1 Terminal Connection	AC Operation	Wire Color
	24 V, 120 V, 240 V	
1	AC power HI	Black
2	AC power LO (neutral)	White
3	AC power GND	Green



REAR TERMINAL VIEW

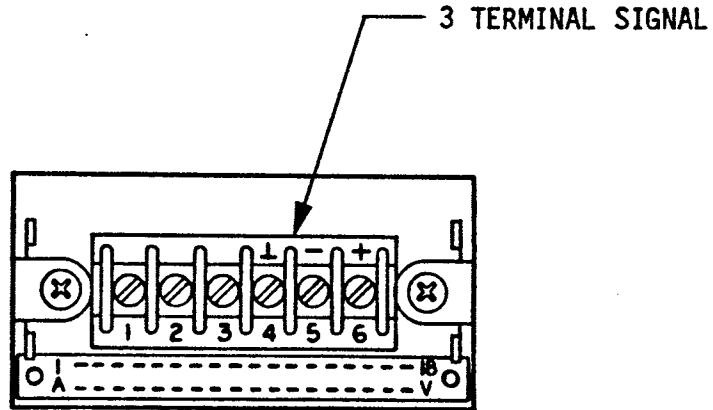
TB1 Terminal Connection	DC Operation
	5 V or 9-32 V
1	No Connection
2	DC power +
3	DC power - (return)



25.0 SIGNAL INPUT CONNECTIONS (TB1)

The signal input connections for the BSCT (Q2XXXT) Type T, thermocouple signal conditioner are made at the standard 3-terminal barrier strip:

<u>Terminal Connection</u>	<u>Signal</u>	<u>Type T Thermocouple</u>
4	Analog Ground	● Red
5	- Signal LO	● —————
6	+ Signal HI	● ————— ●
		Blue



REAR TERMINAL VIEW

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.

NEWPORT'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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