

QUANTA[®]



QXXXXH FREQUENCY/RATE

DIGITAL PANEL METER

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.

TABLE OF CONTENTS

SAFETY CONSIDERATIONS	iii
QUANTA CROSS REFERENCE	iv
Q2000 MAIN ASSEMBLY	
1.0 Specifications	1
2.0 Mechanical Assembly and Installation	4
3.0 Power and Signal Input Connections	5
4.0 Configuration Procedure	6
5.0 Configuration Charts	7
6.0 Tests and Diagnostics	9
7.0 Main Board Connector Assignments	10
8.0 Assembly Drawings	11
Q9000 MAIN ASSEMBLY	
9.0 Specifications	17
10.0 Mechanical Assembly and Installation	20
11.0 Power and Signal Input Connections	21
12.0 Configuration Procedure	22
13.0 Configuration Charts	23
14.0 Tests and Diagnostics	26
15.0 Main Board Connector Assignments	27
16.0 Assembly Drawings	28
SIGNAL CONDITIONER, BSCH1	
17.0 Specifications	31
18.0 Signal Input Connections	33
19.0 Test and Diagnostics	34
20.0 Configuration Procedure	34
21.0 Configuration Charts	36
22.0 Calibration for Q2000H / Q9000H	38
23.0 Drawings	39
INSTALLATION INSTRUCTIONS	
24.0 Digital Panel Meter Installation Instructions	41
25.0 Power Requirements and Connections	43

* The BSCH1 option board is compatible with both Q2000 and Q9000 main assemblies.

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.

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 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 BSCH1 BSCJ BSCK BSCT BSCM BSCR BSCA BSCR BSCP BSCE BSCS BSCZ

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 thru nine (0-9).

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	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).

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

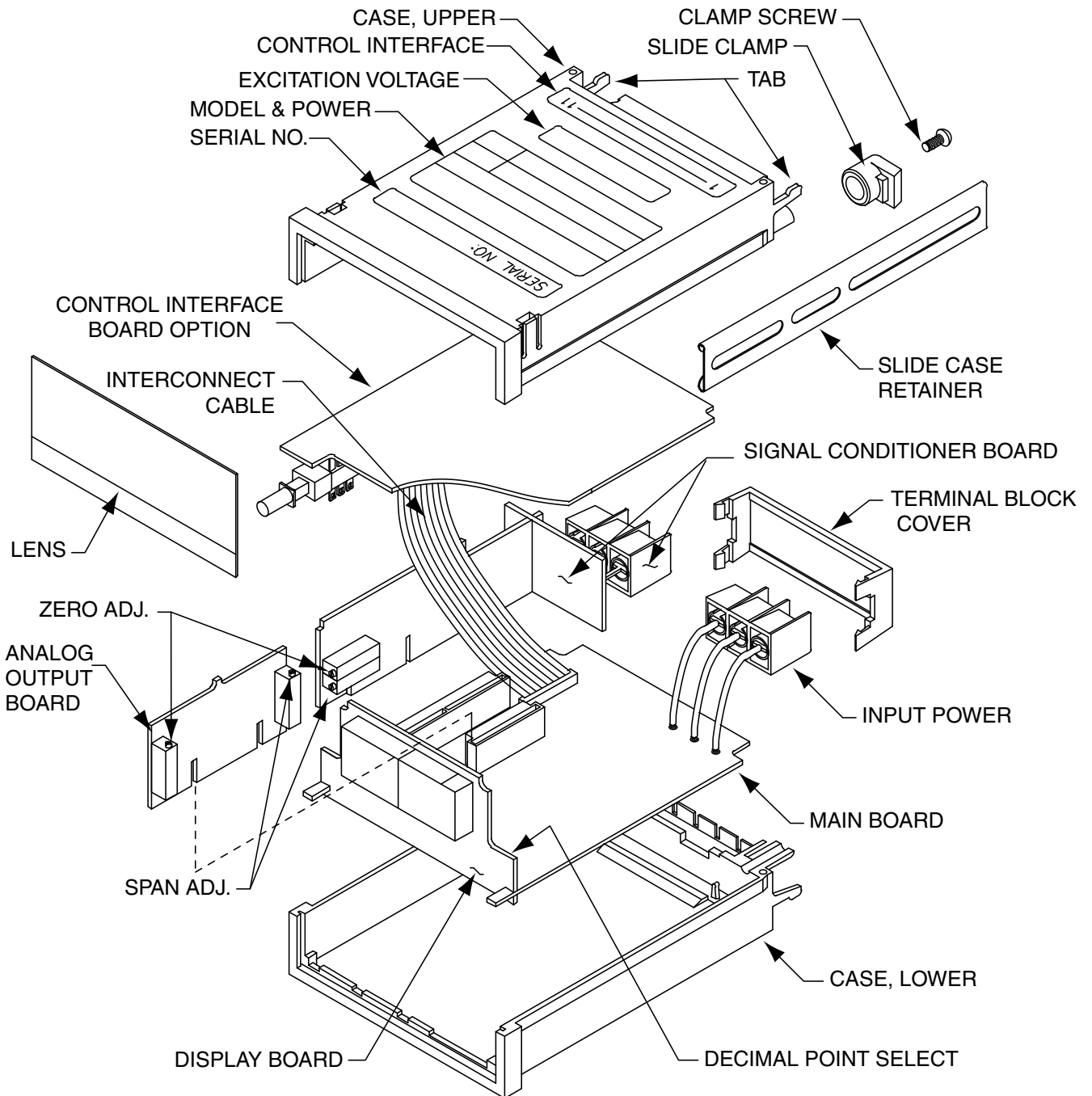
Technique: auto-zero, dual slope, average value
Signal
Integration Period: 100 ms, nominal
Reading Rate: 2.5/s, nominal

1.5 ENVIRONMENTAL

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

1.6 MECHANICAL

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

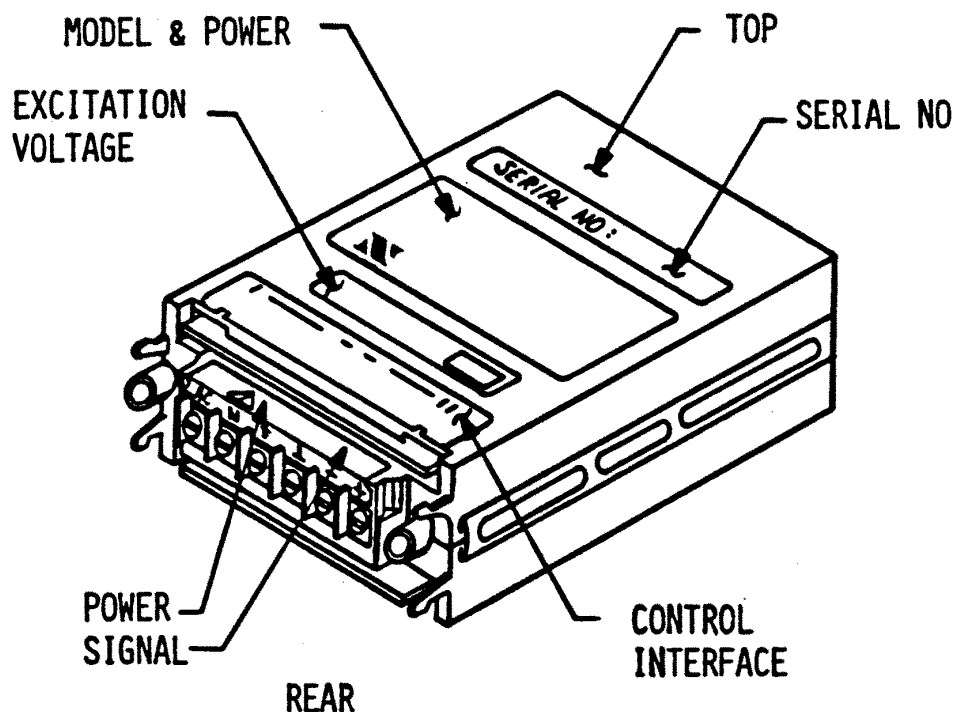


2.0 MECHANICAL ASSEMBLY & INSTALLATION

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)



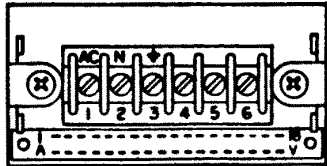
NOTE: READ LABELS FROM THE REAR

FIGURE 2. LABEL PLACEMENT

3.0 POWER & SIGNAL INPUT CONNECTIONS

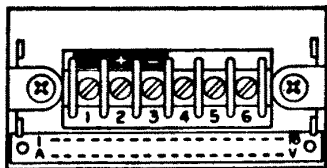
WARNING: Incorrect power input can damage your QUANTA PANEL METER

3.1 POWER CONNECTIONS



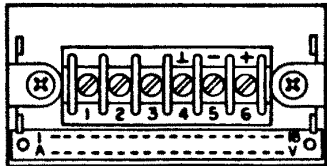
REAR TERMINAL VIEW

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



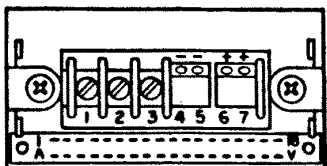
Terminal Connection	DC Versions
1	No connection
2	DC power +
3	DC power - (return)

3.2 SIGNAL INPUT CONNECTIONS



REAR TERMINAL VIEW

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



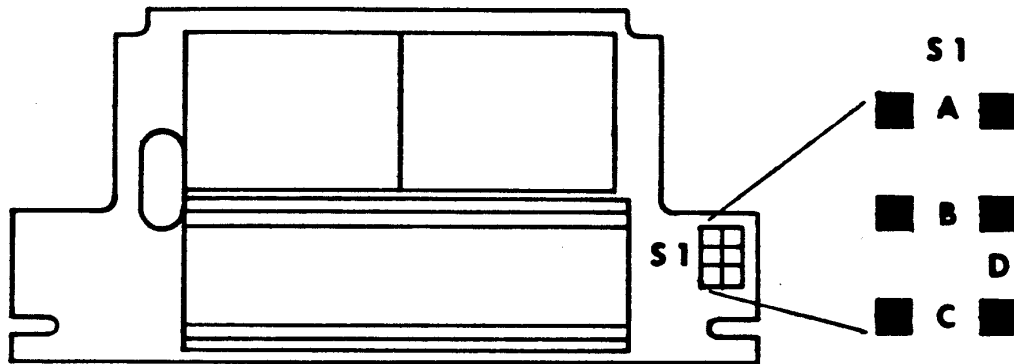
Terminal Connection	7 Terminal Versions Signal
4	-E (Excitation return)
5	-S (Signal LO input)
6	+S (Signal HI input)
7	+E (Excitation output)

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).

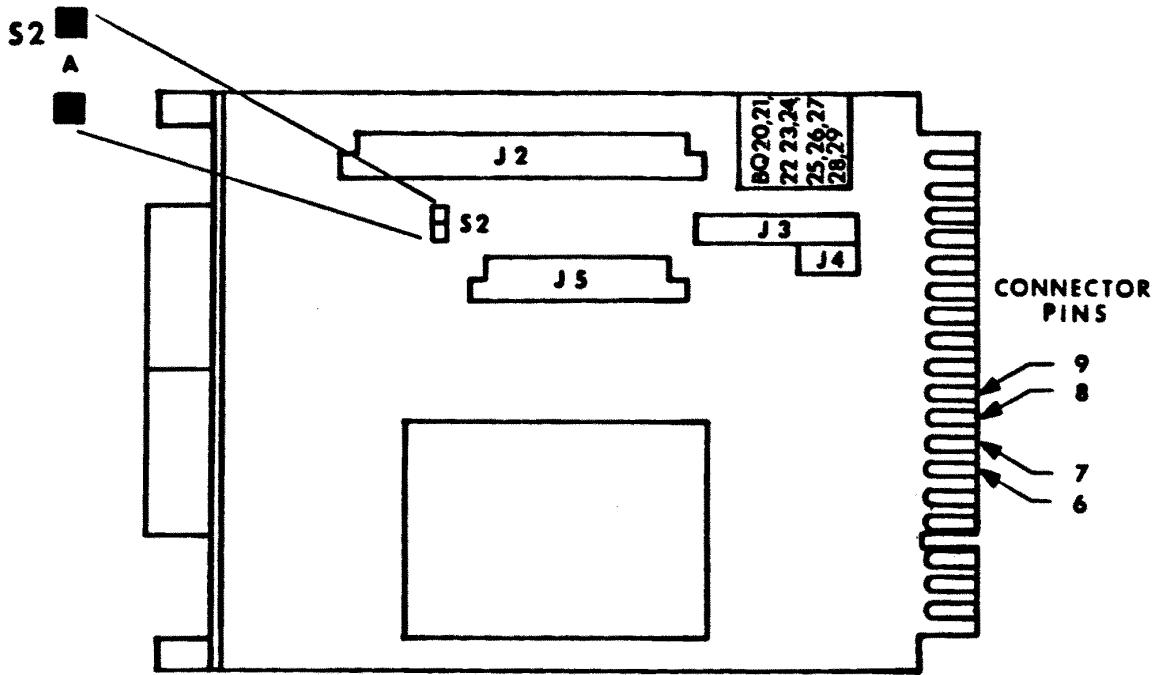
The main assembly can be configured using the push-on jumpers provided or already positioned on the pin forests. Pin forest designations are shown at the top of every page of the configuration charts.

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 PIN ASSIGNMENTS (J1)

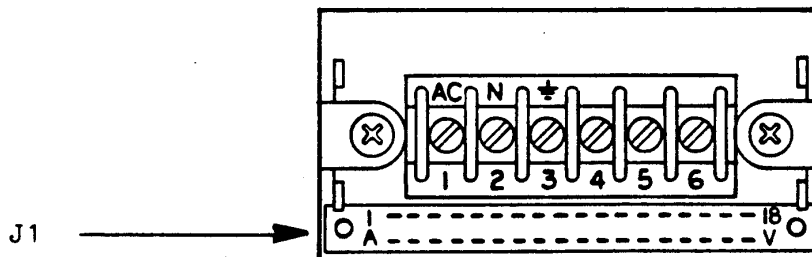
(Left to right, looking at the rear of the case)

<u>Connection</u>	<u>Function</u>	
A - 1	Spare	
B	Oscillator	40 kHz
2	-8.2 V dc Analog power	Analog power
C - 3	Spare	
D	+ Pol (sign)	+ Polarity Sign
4	<u>HOLD</u> (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	<u>10 mV Hysteresis</u>	- Excitation sense
S - 15	Analog Ground	
T - 16	Analog Option - Return	With analog option
U	Analog Option - Out	With analog option
17	+30 V dc	Unregulated power
V - 18	Spare	+ Excitation sense

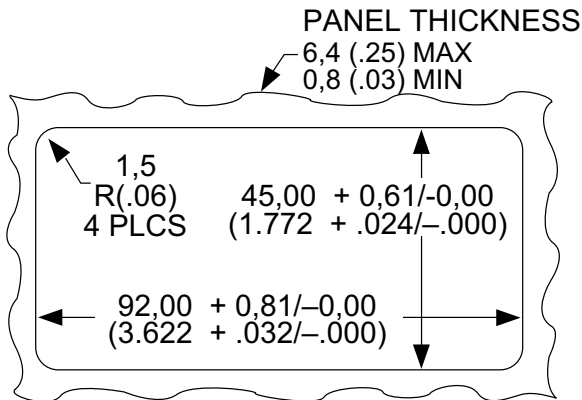
- Indicates common pin

CAUTION: A maximum total current of 50 mA is available for all signal conditioner excitation outputs, 4-20 mA controller and analog output combinations.

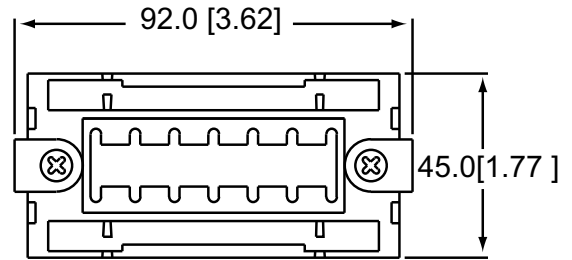
REAR TERMINAL VIEW



8.0 DRAWINGS
8.1 DIMENSIONS

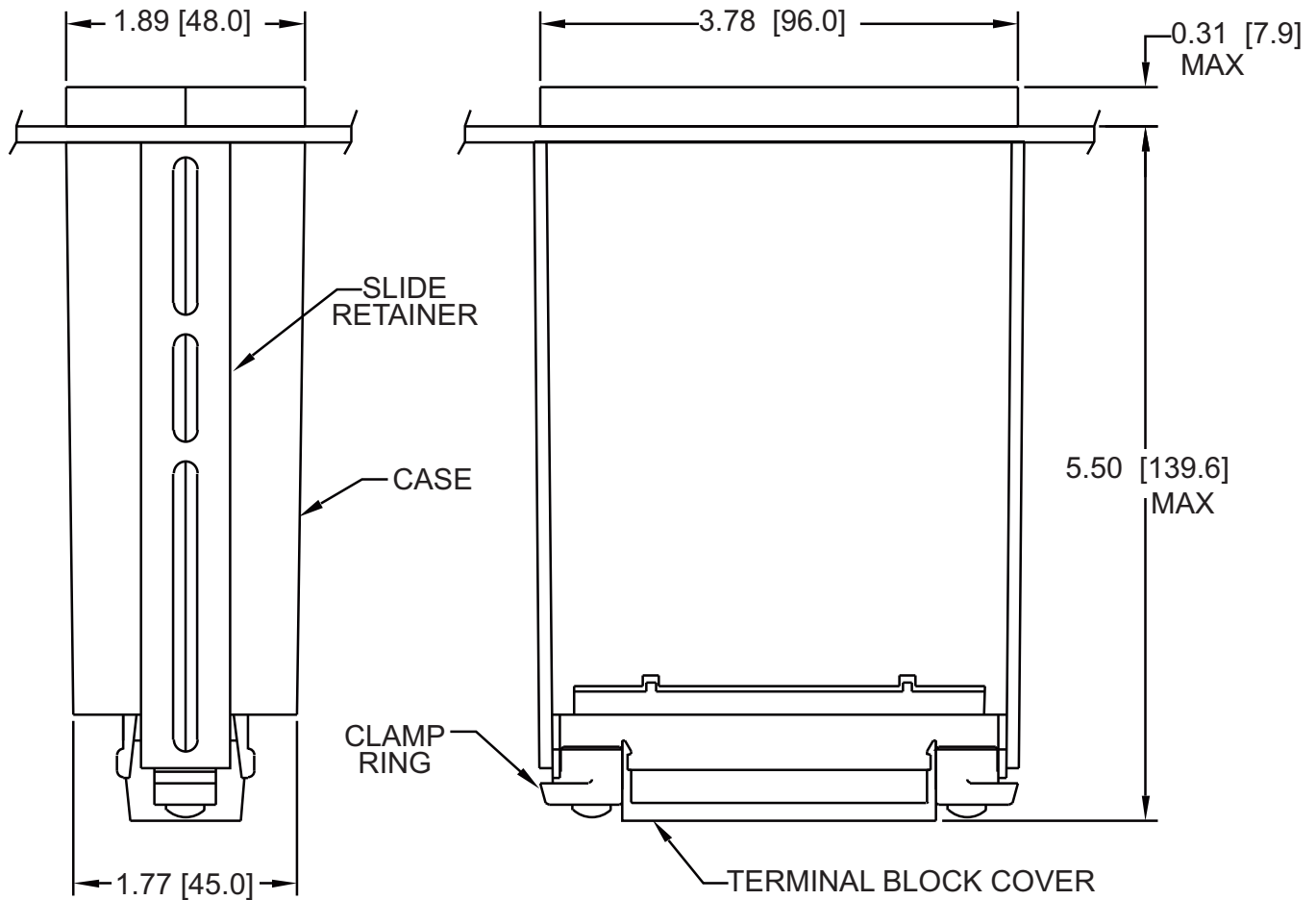


NOTE: Dimensions in Millimeters (Inches)

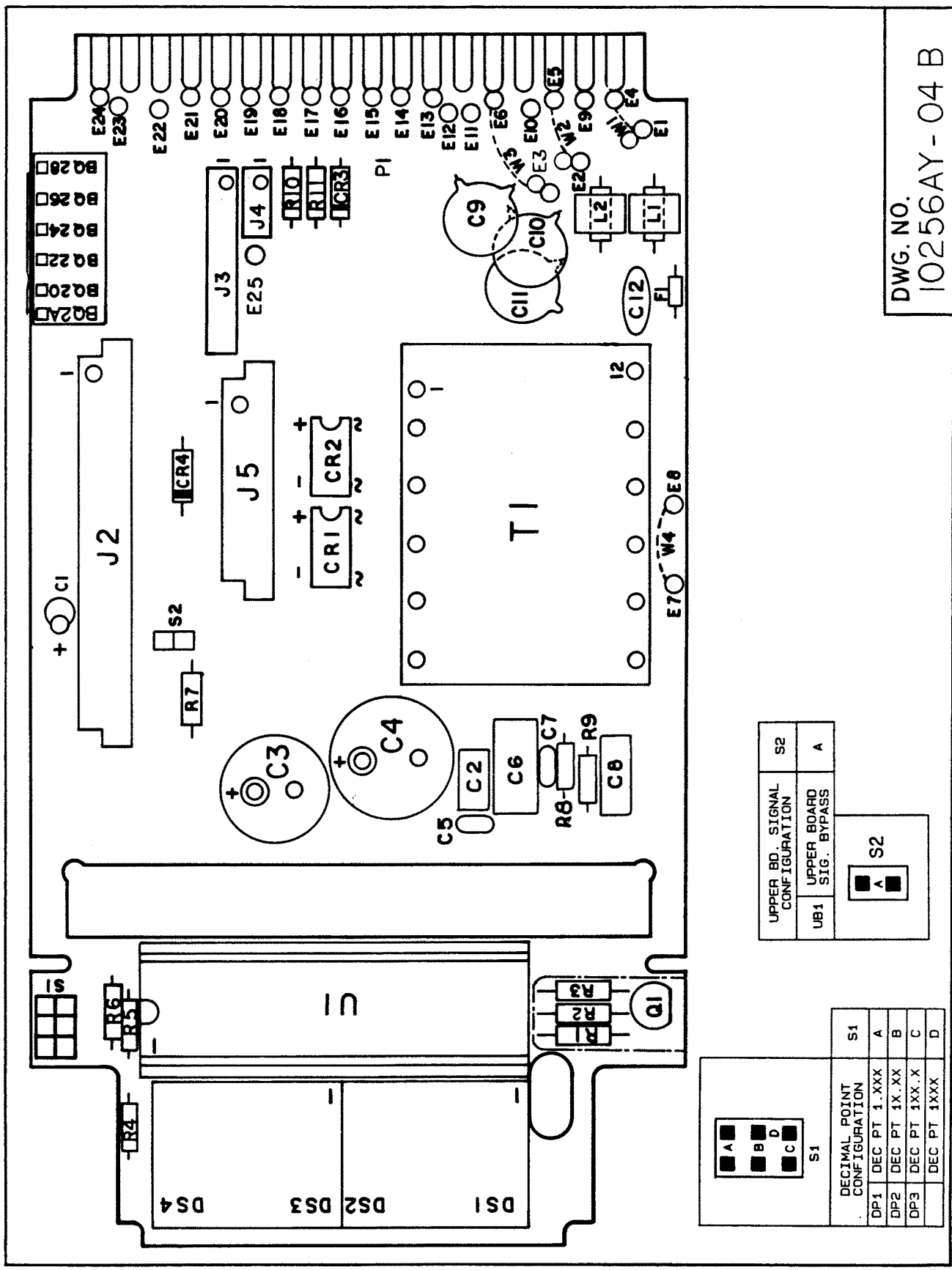


REAR VIEW

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

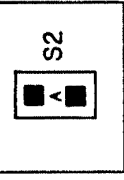


Notes: Dimensions are in inches ± 0.01 "
with millimeters in [] ± 0.25 mm.

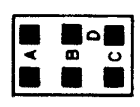


DWG. NO.
10256AY-04 B

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

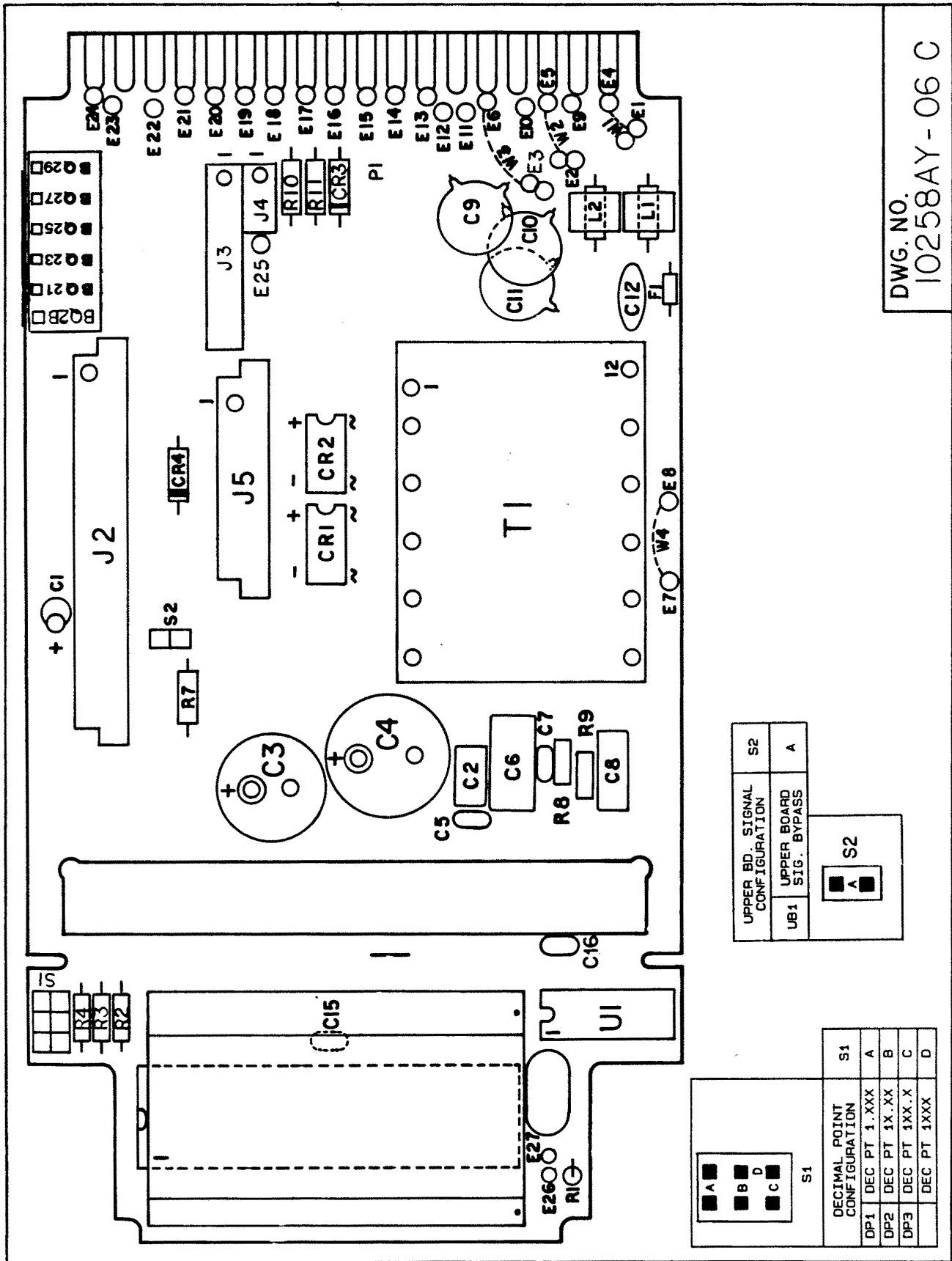


DECIMAL POINT CONFIGURATION		S1
DP1	DEC PT 1.XXX	A
DP2	DEC PT 1X.XX	B
DP3	DEC PT 1XX.X	C
	DEC PT 1XXX	D



8.3

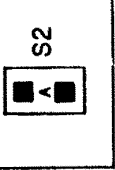
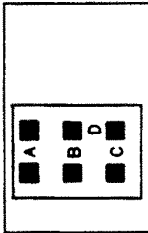
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DWG. NO.
10258AY-06 C

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



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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 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

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

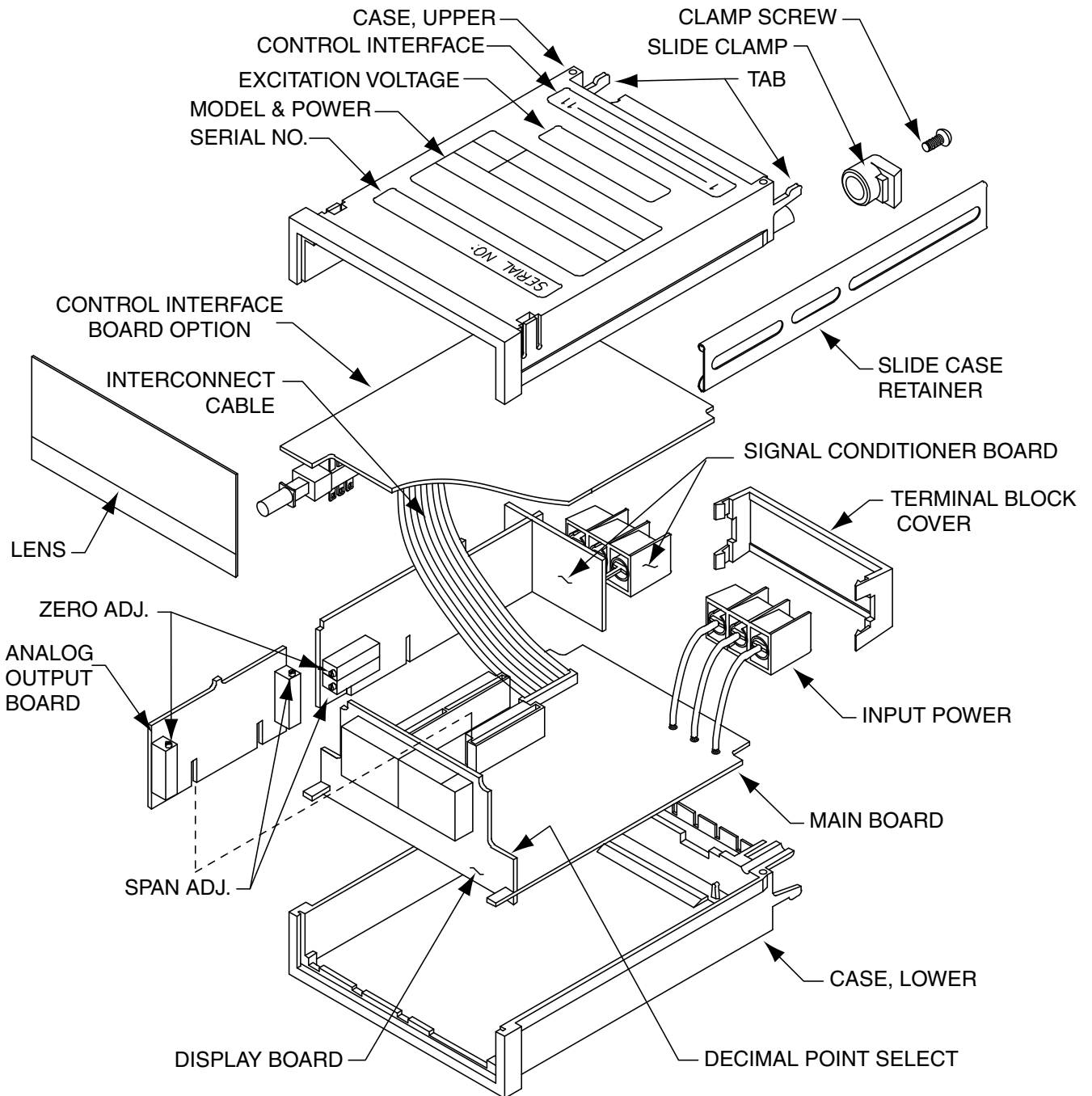
Technique: Auto-zero, dual slope, average value
Signal
Integration Period: 100 ms, nominal
Reading Rate: 2.5/s, nominal

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)

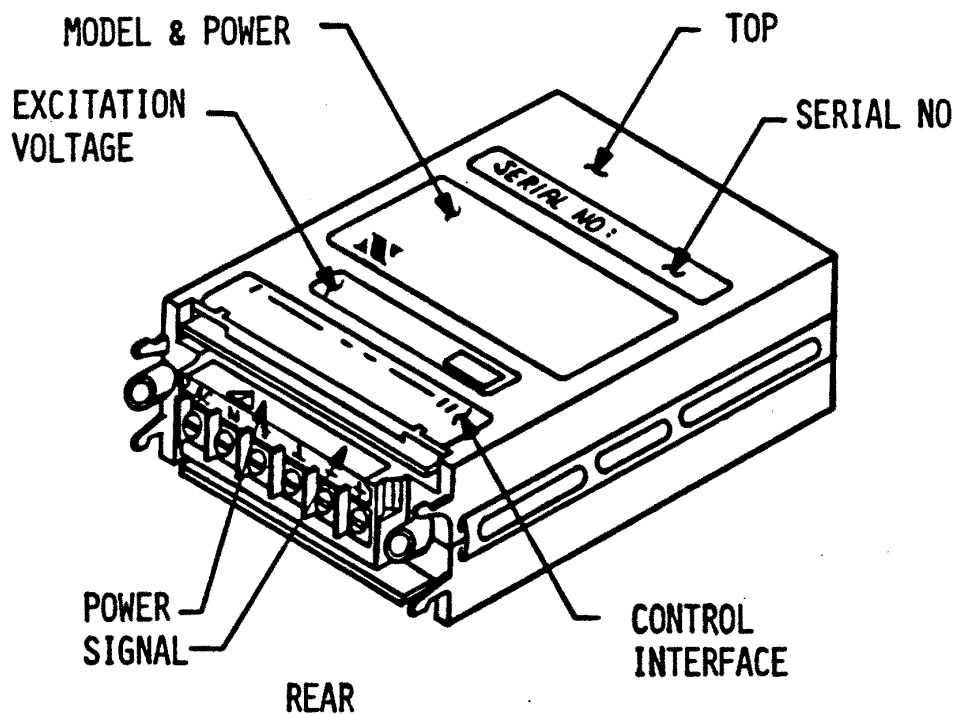


10.0 MECHANICAL ASSEMBLY & INSTALLATION

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)



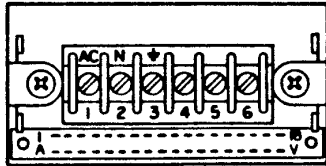
NOTE: READ LABELS FROM THE REAR

FIGURE 4. LABEL PLACEMENT

11.0 POWER & SIGNAL INPUT CONNECTIONS

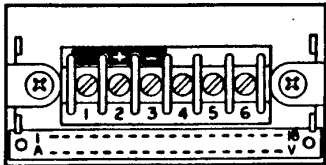
WARNING: Incorrect power input can damage your QUANTA PANEL METER.

11.1 POWER CONNECTIONS



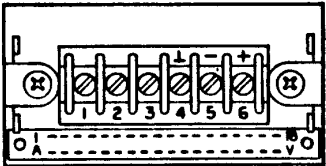
REAR TERMINAL VIEW

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



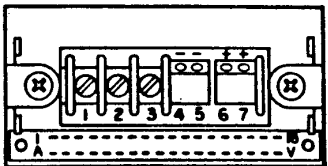
Terminal Connection	DC Versions
1	No connection
2	DC power +
3	DC power - (return)

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)

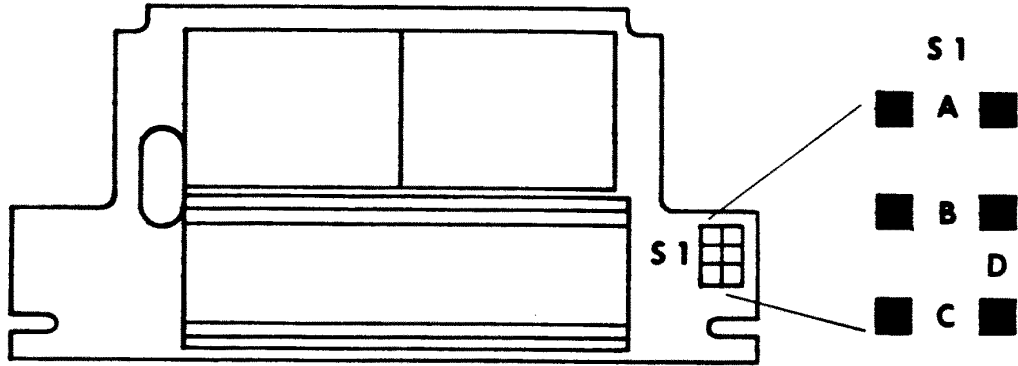
12.0 CONFIGURATION PROCEDURE

This procedure is used to set the decimal point of the display and interface board signal bypass selections for the configuration of the QUANTA Q9XXX 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.

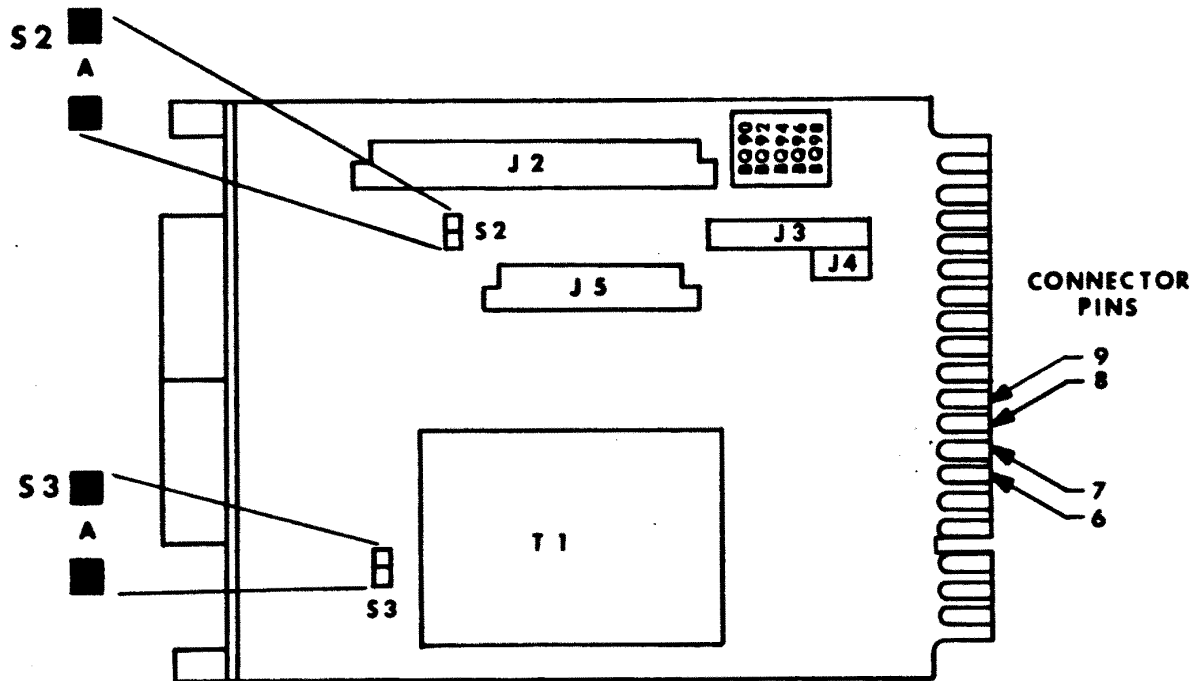
13.0 CONFIGURATION CHARTS

13.1 DECIMAL POINT SELECTION



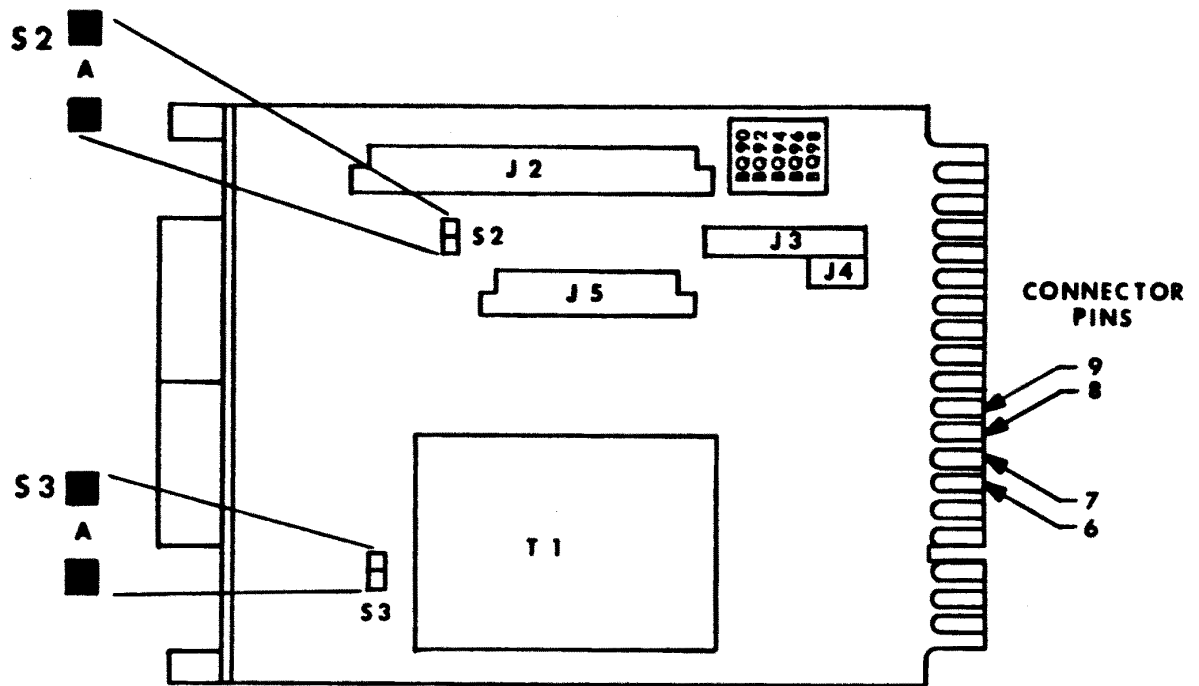
Step 1: Remove all push-on jumpers not used in the desired configuration(s).		
Step 2: Select the desired configuration from the chart below, then install the push-on jumpers indicated.		
Decimal Point Selection	S1	Alternate Decimal Point Selection Using Main Assembly Board (J1) Connector
Decimal Point (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 PIN ASSIGNMENTS (J1)

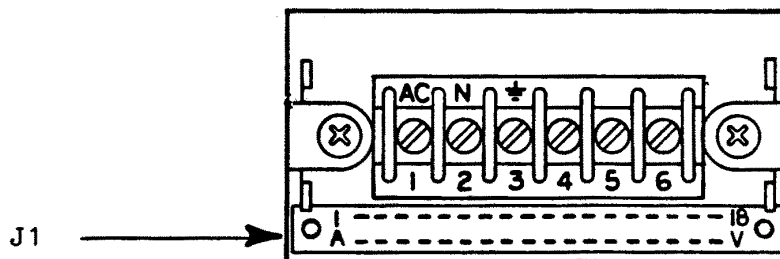
(Left to right, looking at the rear of the case)

<u>Connection</u>	<u>Function</u>	
A - 1	Spare	
B	Oscillator	40 kHz
2	-8.2 V dc Analog power	Analog power
C - 3	Spare	
D	+ Pol (sign)	+ Polarity Sign
4	<u>HOLD</u> (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	<u>Spare</u>	
R - 14	10 mV Hysteresis	- Excitation sense
S - 15	Analog Ground	
T - 16	Analog Option - Return	With analog option
U	Analog Option - Out	With analog option
17	+30 V dc	Unregulated power
V - 18	Spare	+ Excitation sense

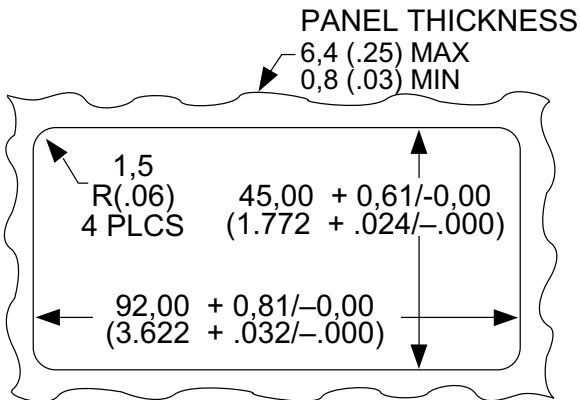
- Indicates common pin

CAUTION: A maximum total current of 50 mA is available for all signal conditioner excitation outputs, 4-20 mA controller and analog output combinations.

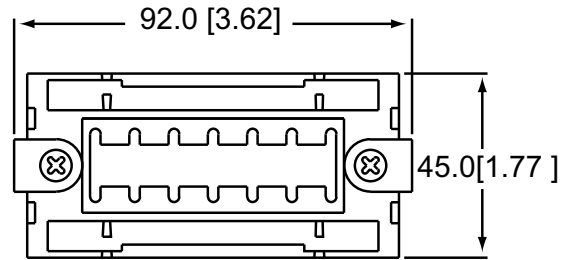
REAR TERMINAL VIEW



16.0 DRAWINGS
 16.1 DIMENSIONS

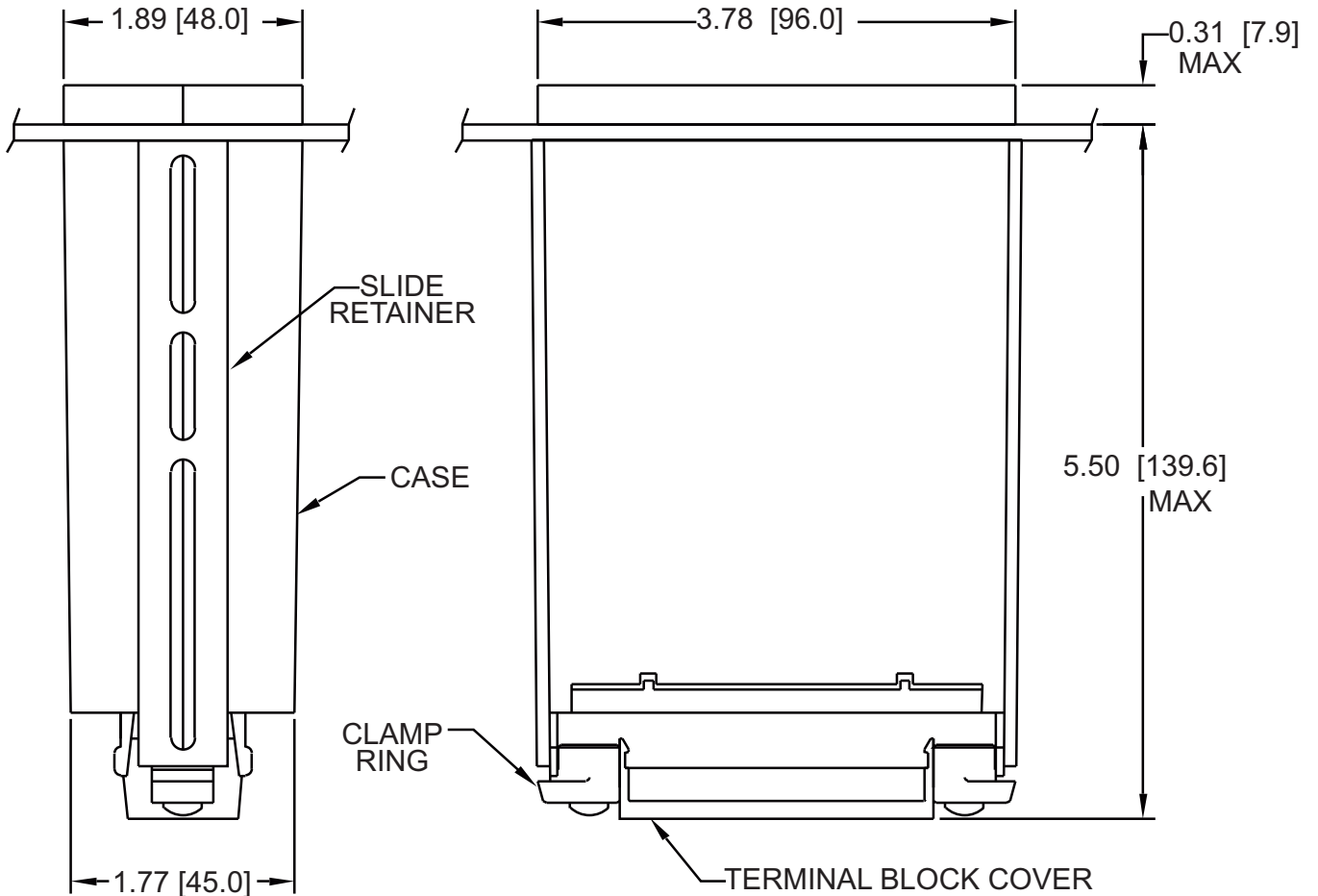


NOTE: Dimensions in Millimeters (Inches)



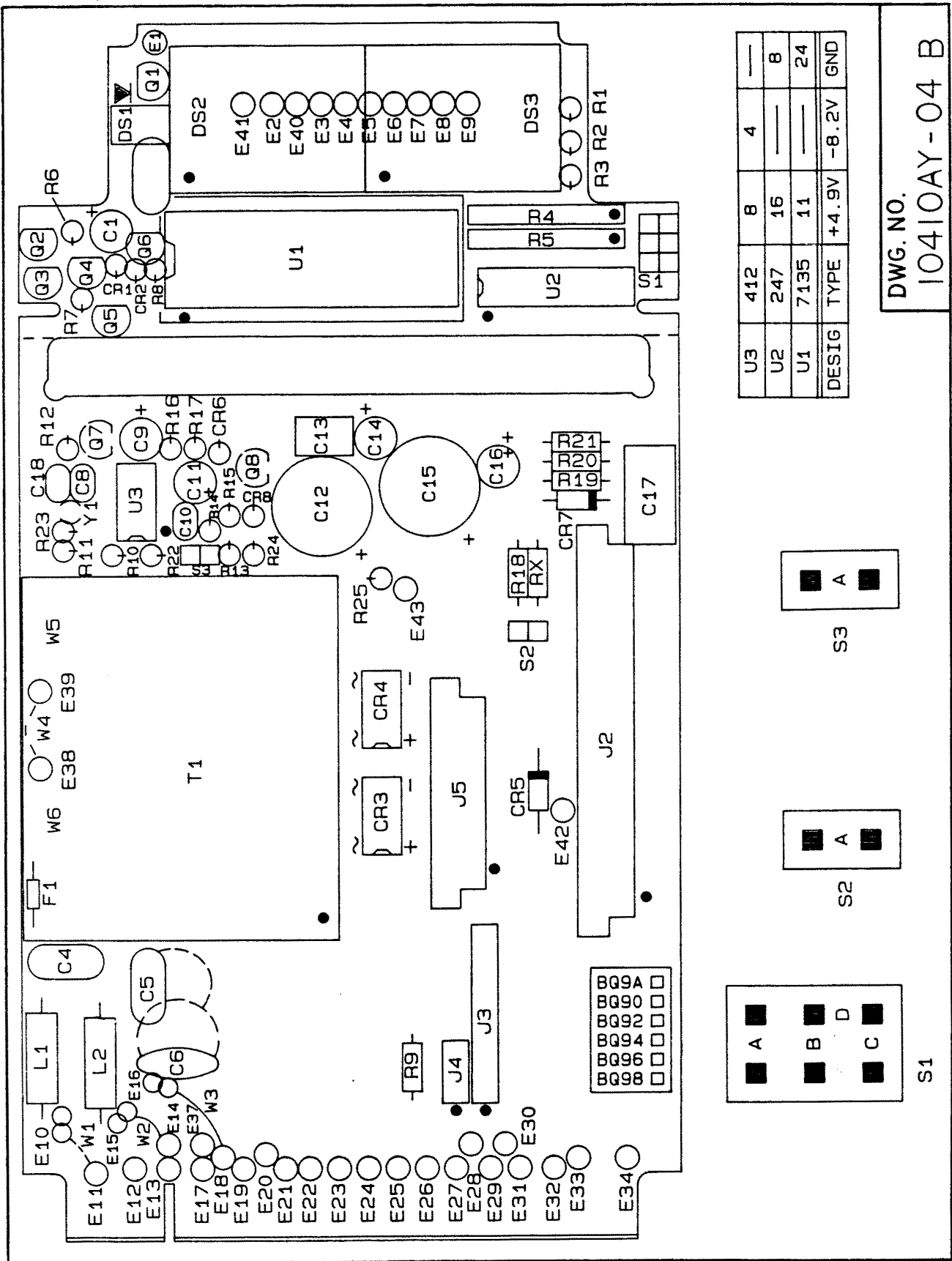
REAR VIEW

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



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

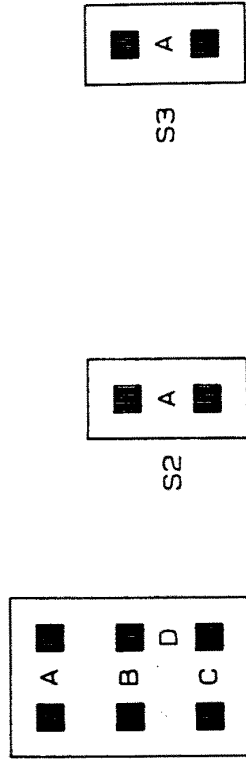
16.2 Q9000 LED MAIN ASSEMBLY



U3	412	8	4	—
U2	247	16	—	8
U1	7135	11	—	24
DESIG	TYPE	+4.9V	-8.2V	GND

DWG. NO.

10410AY-04 B



16.3

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Q9000H1 FREQUENCY/RATE INPUTS

FULL SCALE RANGE	MINIMUM INPUT WITH		INPUT RESISTANCE	MINIMUM FREQUENCY
	10 mV HYSTERESIS * SELECTION	100 mV HYSTERESIS * SELECTION		
100 to 2000 Hz	15 mV p-p	125 mV p-p	150 kOhm	5% of full scale
2000 to 5000 Hz	30 mV p-p	125 mV p-p		
5000 to 20000 Hz	90 mV p-p	175 mV p-p		

* 10 mV or 100 mV hysteresis can be selected by rear-connector or internal push-on jumper.

Zero Adjustment

Externally adjustable by potentiometer from 400 to 9000 counts dependent on full scale

Trigger Level Adjustment

Externally adjustable by potentiometer from -1 V to +4 V with 100 mV hysteresis or -0.1 V to +0.4 V with 10 mV hysteresis

Full-scale Frequency Adjustment

Externally adjustable by potentiometer (internally by push-on jumpers)

Full-scale Frequency Range

100 Hz to 20 kHz

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

Accuracy at 25°C, 115 V ac

Maximum Error

Q2000H1

±0.1% FS ±1 count

Q9000H1

±0.1% FS ±2 counts

Reading Tempco

±0.01% R/°C

Zero Tempco

±0.1 count/°C

Warmup to rated accuracy

Less than 1 minute

Full-scale step response

3.0 s

Minimum Reading

Q2000H1

100 counts (without display noise)

Q9000H1

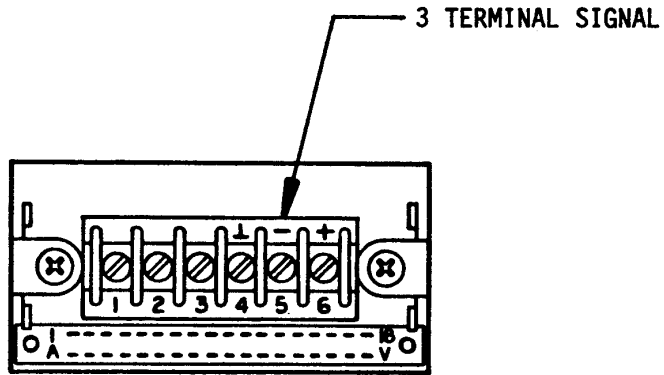
500 counts (without display noise)

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

The signal input connections for the Q2000H1 and Q9000H1 Frequency/Rate signal conditioner are made at the standard 3-terminal barrier strip:

<u>Terminal Connection</u>	<u>Signal</u>	<u>Input</u>
4	Signal HI (ac coupled)	● ————— AC
5	Signal LO	● ————— COUPLED
6	Signal HI (dc coupled)	●

<u>Terminal Connection</u>	<u>Signal</u>	<u>Input</u>
4	Signal HI (ac coupled)	●
5	Signal LO	● ————— DC
6	Signal HI (dc coupled)	● ————— COUPLED



REAR TERMINAL VIEW

FIGURE 5. SIGNAL INPUT CONNECTIONS

19.0 TESTS AND DIAGNOSTICS

- The signal conditioner board BSCH1 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 BSCH1 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 4, 5 and 6 on barrier strip (TB1).
2. Apply proper power for your configuration to terminals 1, 2 and 3 on barrier strip (TB1). Display will read approximately zero (0000).

20.0 CONFIGURATION PROCEDURE

20.1 GENERAL

Use this procedure to determine the configuration of the BSCH1 Frequency/Rate Option.

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

20.2 GLOSSARY

The chart below explains various terms which appear throughout the following procedure:

<u>Selection</u>	<u>Range</u>
HFR1	100/200 Hz
HFR2	200/400 Hz
HFR3	400/800 Hz
HFR4	500/1000 Hz
HFR5	1/2 kHz
HFR6	2/4 kHz
HFR7	2.5/5 kHz
HFR8	5/10 kHz
HFR9	10/20 kHz
HS1	100 mV hysteresis
HS2	10 mV hysteresis

20.3 SELECTION

20.3.1 Hysteresis Selection (HS1,2)

Standard units will be configured as a HS1 (100 mV hysteresis). If a 10 mV hysteresis is desired, then HS2 should be selected.

20.3.2 Full Scale Frequency Range Selection (HFR1,2,3,4,5,6,7,8,9)

1. Determine the desired maximum input frequency (F) in Hertz.

F = _____

2. Determine the desired display reading (R) for the frequency given above.

R = _____

3. Determine the full-scale input frequency range number (RN).

Q2000H1

Q9000H1

$$RN = F \times \frac{2000}{R}$$

$$RN = F \times \frac{10000}{R}$$

RN = _____

RN = _____

4. Select the required full-scale frequency range which the full-scale input frequency range number (RN) falls between the upper and lower limits of that range.

HFR1 = 100/200 Hz

HFR6 = 2 kHz/4 kHz

HFR2 = 200/400 Hz

HFR7 = 4 kHz/5 kHz

HFR3 = 400/800 Hz

HFR8 = 5 kHz/10 kHz

HFR4 = 500 Hz/1 kHz

HFR9 = 10 kHz/20 kHz

HFR5 = 1 kHz/2 kHz

HFR = _____

5. Proceed to Installation (Section 20.4).

20.4 INSTALLATION

20.4.1 General

Select the Hysteresis (HS1,2) and Frequency Range (HFR1-9), required and install the push-on jumpers as per the appropriate Subsection in Section 21.0.

20.4.2 Reference Voltage (Q9000H1 only)

Select reference RV2 by removing any jumpers in the S3 position as per Subsection 13.3 in Main Assembly Section BQ90/BQ98.

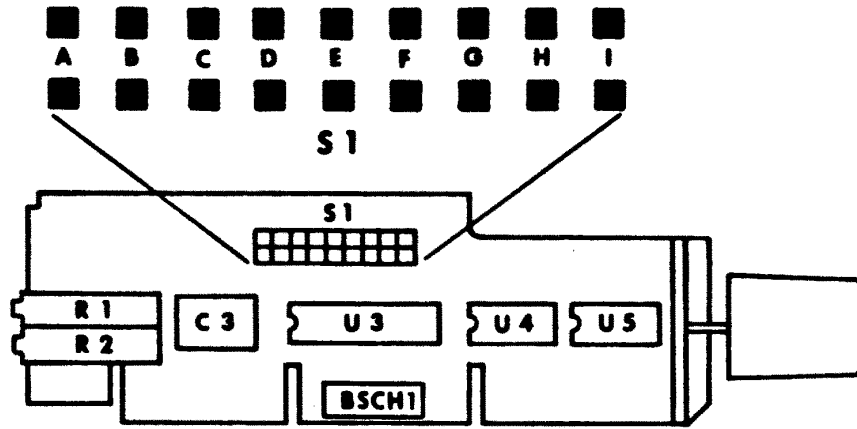
20.4.3 Decimal Point

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.

21.0 CONFIGURATION CHARTS

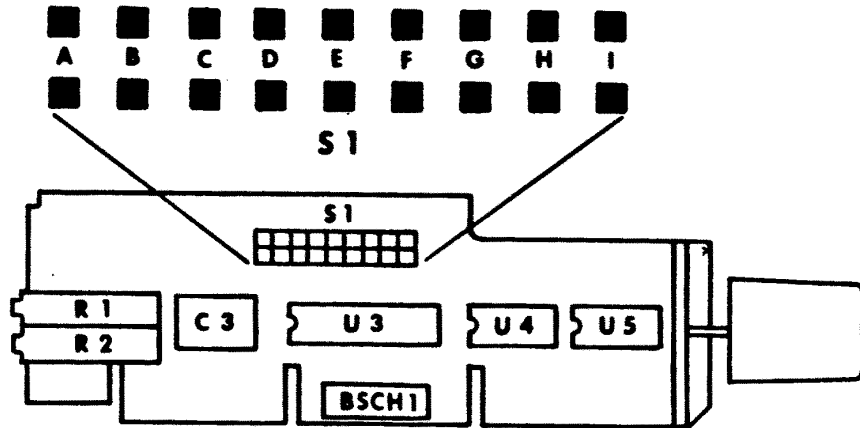
21.1 HYSTERESIS (HS1, 2)



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.		
Hysteresis Configuration *		S1
HS1	100 mV Hysteresis	-
HS2	10 mV Hysteresis	A

* Used on the Q2000H1 or Q9000H1

21.2 FREQUENCY RANGE (HFR1,2,3,4,5,6,7,8,9)



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.			
Frequency Range Configuration *		S1	
HFR1	100/200 Hz	B	I
HFR2	200/400 Hz	B	H
HFR3	400/800 Hz	C	H
HFR4	0.5/1 kHz	B	G
HFR5	1/2 kHz	B	F
HFR6	2/4 kHz	C	F
HFR7	2.5/5 kHz	D	G
HFR8	5/10 kHz	D	F
HFR9	10/20 kHz	E	F

* Used on the Q2000H1 or Q9000H1

22.0 CALIBRATION FOR Q2000H1 & Q9000H1 (BSCH1)

NOTE: The BSCH1 option is an improved version of the BSCH option. It is compatible with both Q2000 and Q9000 main assemblies.

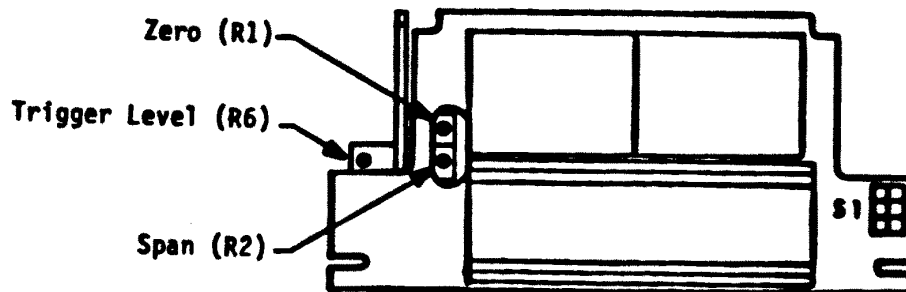
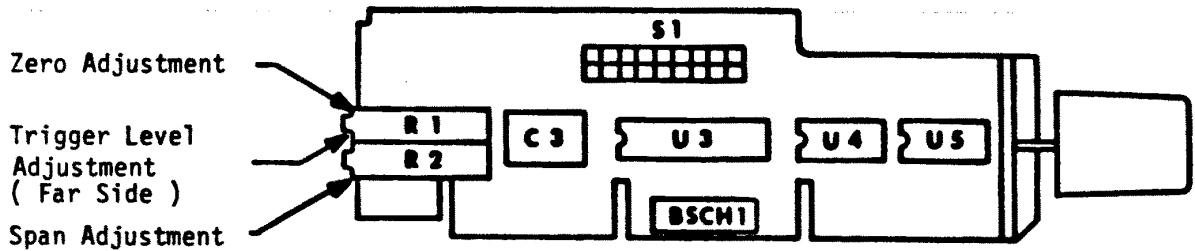
22.1 FREQUENCY RANGES (H1-9)

1. Apply an input frequency equal to a display reading of zero and adjust R1 for zero display reading.
2. Apply an input frequency equal to the Full-Scale Frequency (F).
3. Adjust R2 to read the desired Display Reading (R) for the maximum input frequency ± 1 count.

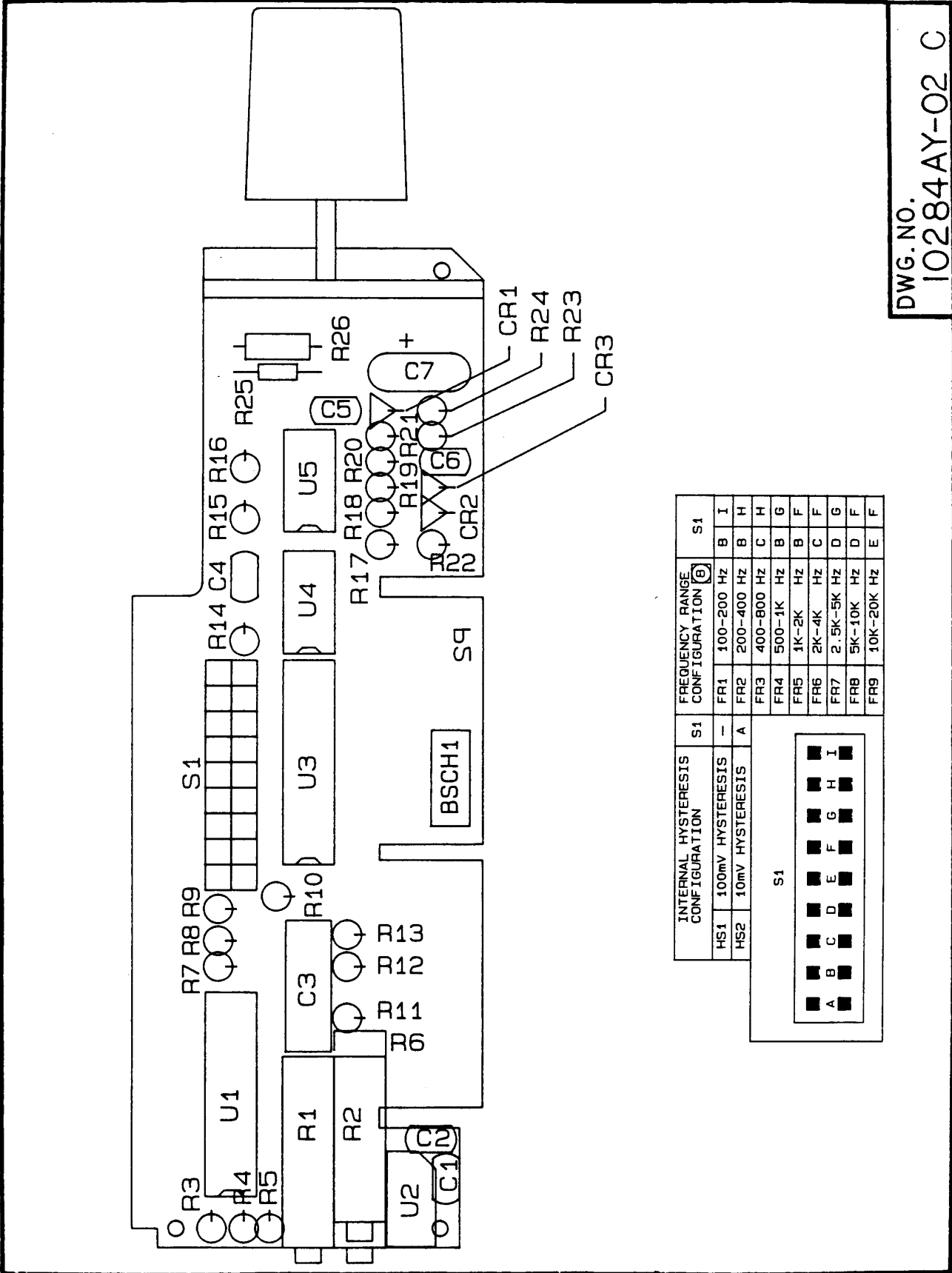
22.2 TRIGGER LEVEL ADJUSTMENT

NOTE: Use only if input signal does not trigger display.

1. The trigger level adjustment (R6), is located to the left of R2. The trigger level is preset to approximately 0 V dc.



23.0 DRAWINGS
 23.1 BSCH1 ASSEMBLY DIAGRAM



DWG. NO.
 10284AY-02 C

23.2

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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 25.0)
      :
      : .--- Analog output (see Analog Output Manual)
      : :
      : : .--- Control output (see Controller/
      : :   Interface Manual)
      : : :
      : : : .--- Signal input (Section 25.3)
      : : : :
Model number Q2 _____
Model number Q9 _____
=====
```

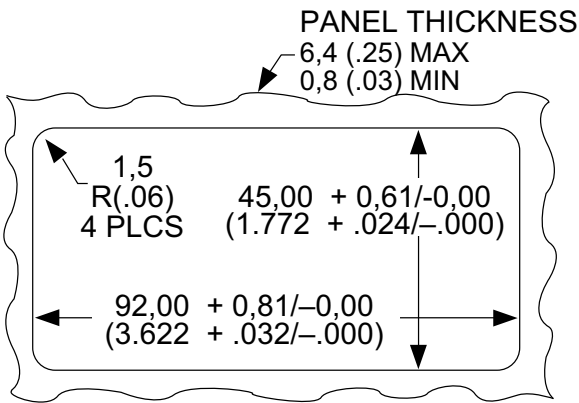
24.1 UNPACKING & INSPECTION

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

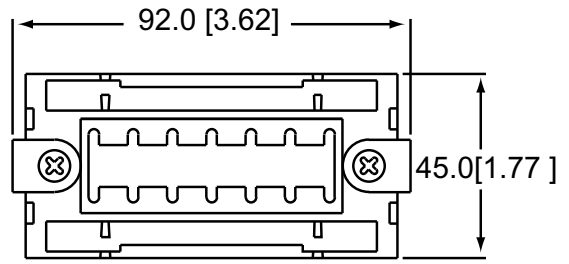
Unpack the instrument and inspect for obvious shipping damage. Notify the freight carrier immediately upon discovery of any shipping damage.

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 prinped circuit board connections. Install the upper printed circuit board edge connector, if used.

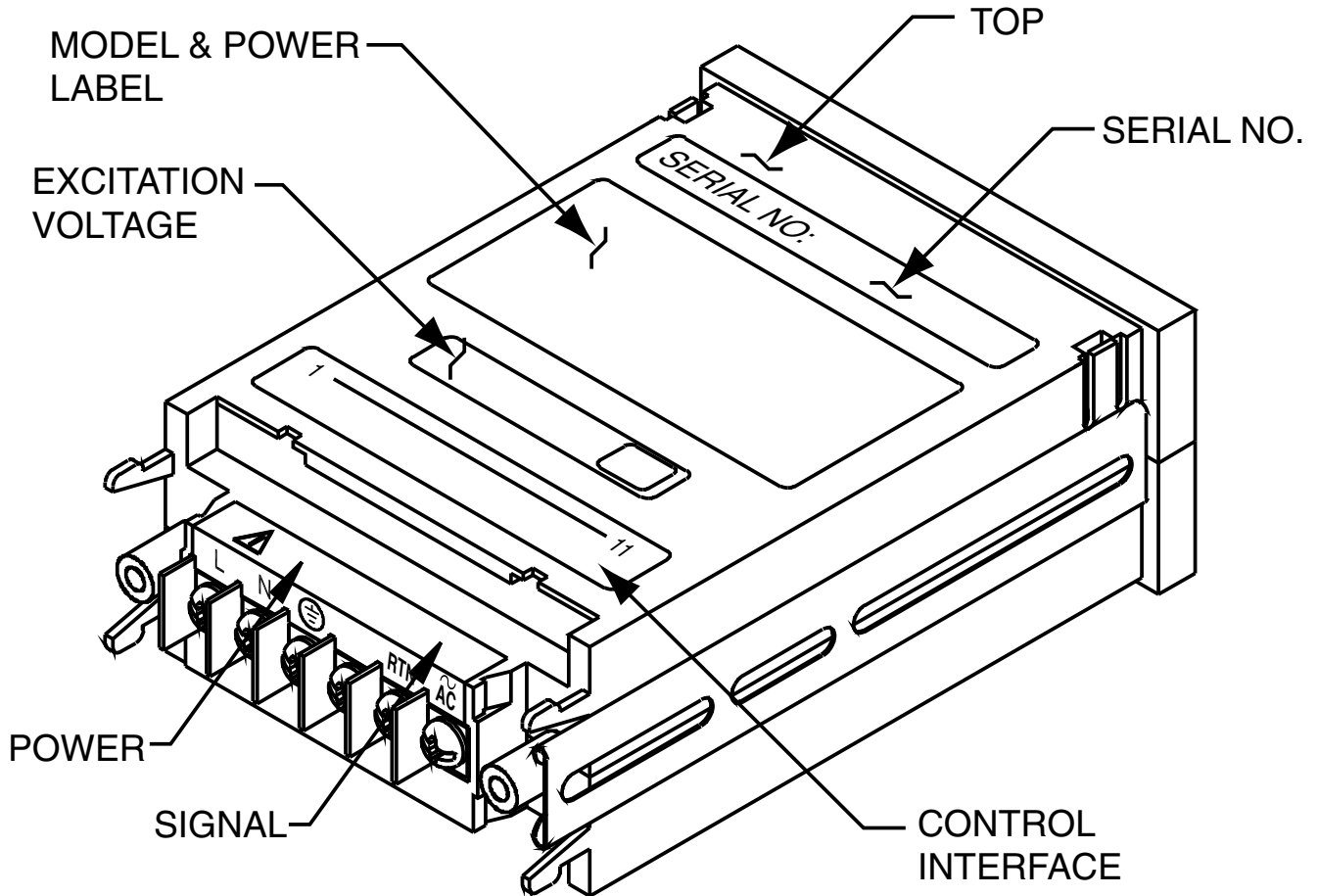


NOTE: Dimensions in Millimeters (Inches)



REAR VIEW

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

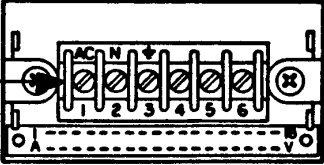


25.0 POWER REQUIREMENTS AND CONNECTIONS (TB1)

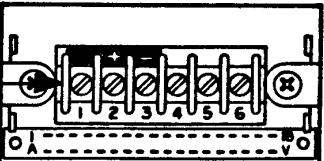
25.1 The standard meter is wired to operate from one of five power sources.

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

25.2 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

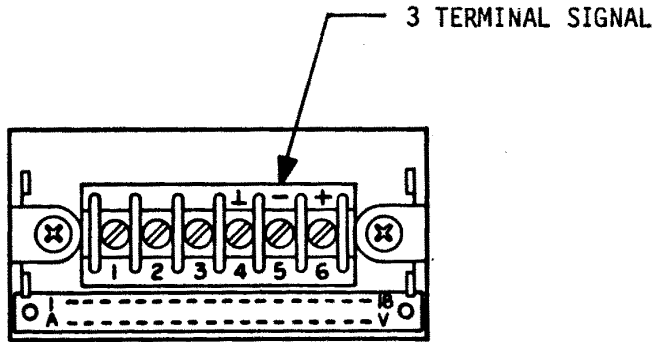
	TB1 Terminal Connection	DC Operation
		5 V or 9-32 V
	1	No Connection
	2	DC power +
	3	DC power - (return)

25.3 SIGNAL INPUT CONNECTIONS (TB1)

The signal input connections for the BSCH1 signal conditioner are made at the same terminal barrier strip, TB1, as follows:

<u>Terminal Connection</u>	<u>Signal</u>	<u>Input</u>
4	Signal HI (AC coupled)	● ——— AC
5	Signal LO	● ——— COUPLED
6	Signal HI (DC coupled)	●

<u>Terminal Connection</u>	<u>Signal</u>	<u>Input</u>
4	Signal HI (AC coupled)	●
5	Signal LO	● ——— DC
6	Signal HI (DC coupled)	● ——— COUPLED



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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