

RTD Termination Panel

M/N 61C615

Instruction Manual J-3645-2

**RELIANCE
ELECTRIC** 

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WARNING

THIS UNIT AND ITS ASSOCIATED EQUIPMENT MUST BE INSTALLED, ADJUSTED AND MAINTAINED BY QUALIFIED PERSONNEL WHO ARE FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF ALL EQUIPMENT IN THE SYSTEM AND THE POTENTIAL HAZARDS INVOLVED. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN BODILY INJURY.

WARNING

INSERTING OR REMOVING THIS MODULE OR ITS CONNECTING CABLES MAY RESULT IN UNEXPECTED MACHINE MOVEMENT. TURN OFF POWER TO THE MACHINE BEFORE INSERTING OR REMOVING THE UNIT OR ITS CONNECTING CABLES. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN BODILY INJURY.

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1.0 INTRODUCTION

The 61C615 is an active termination panel that conditions and powers 100 ohm platinum Resistance Temperature Detectors used with the 61C613 analog input module.

Four input screw terminals are provided for each 3 wire RTD. A 4th terminal is used to connect the RTD shield to a common ground.

This manual describes the functions and specifications of the panel. It also describes how to install, set up, and service the panel.

Related publications that may be of interest:

- J-2605 AUTOMATE® 30/40 PRODUCT SUMMARY
- J-2611 DCS 5000 PRODUCT SUMMARY
- J-3613-1 16 CHANNEL ANALOG INPUT MODULE INSTRUCTION MANUAL
- IEEE 518 GUIDE FOR THE INSTALLATION OF ELECTRICAL EQUIPMENT TO MINIMIZE ELECTRICAL NOISE INPUTS TO CONTROLLERS FROM EXTERNAL SOURCES

2.0 MECHANICAL/ELECTRICAL DESCRIPTION

The following is a description of the termination connectors and electrical characteristics of the field connections.

2.1 Mechanical Description

The 61C615 is a 19" rack-mountable termination panel that includes two 6-foot, 50-wire twisted pair flat cables and a 6-foot power cable. A separately mounted ± 15 volt power supply is provided by the user. Refer to figure 2.1. Panel dimensions are listed in Appendix A.

When the panel is viewed from the front, the flat cable on the right side of the termination panel (TB2) is for analog inputs 8-15. It connects to the bottom connector on the 61C613. The flat cable on the left side of the termination panel (TB1) is for analog inputs 0-7. It connects to the middle connector on the 61C613. The top connector on the 61C613 module is not used.

The termination panel includes 64 clamp-type screw terminals for terminating field signals. A clear plastic shield is provided as a cover for the terminal strips.

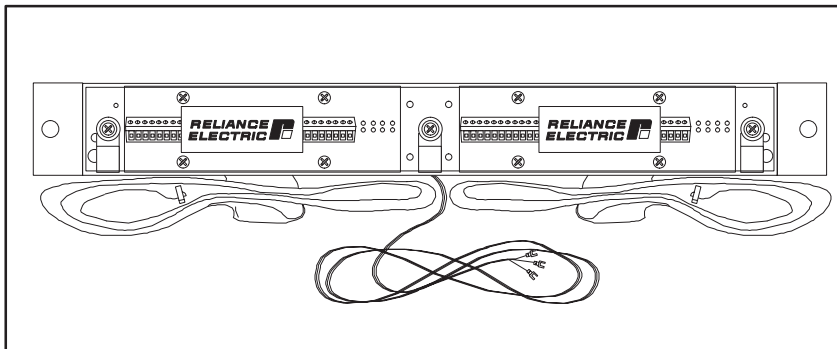


Figure 2.1- 61C615 Termination Panel

2.2 Electrical Description

The RTD termination panel is used to linearize and power 100 ohm platinum Resistance Temperature Detectors used with the 61C613 analog input module. The resistance change of the RTD with temperature is sensed by using the RTD as the external 4th arm of a bridge. The termination panel contains the internal portions of the bridge as well as the bridge excitation supply. See figure 2.2.

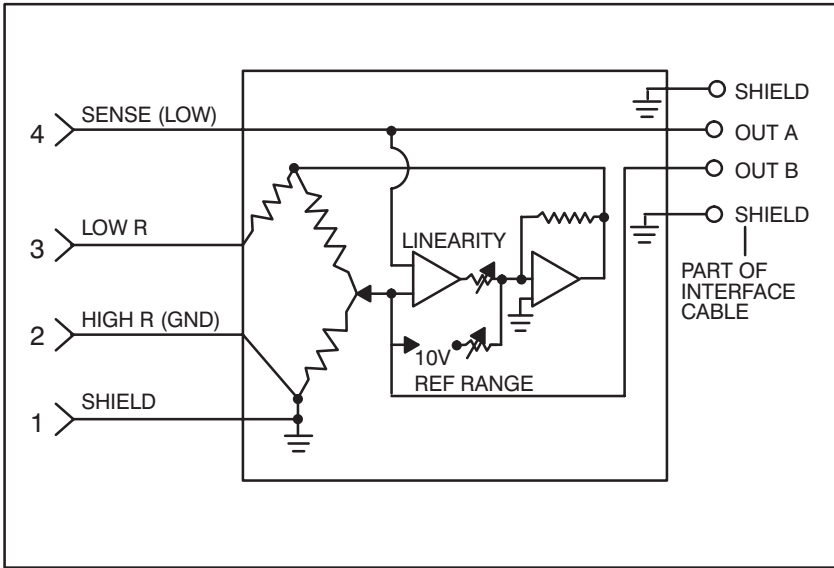


Figure 2.2- Typical Input Circuit

A three-wire connection to each RTD allows the effects of lead resistance (up to 5 ohms per lead) to be compensated out. A separate shield connection is also provided. The shield is grounded at the termination panel.

The supply for each bridge is modified by the output of a linearizing amplifier to compensate for both bridge and RTD nonlinearities. Three potentiometers are included for each channel to adjust offset, range, and linearity. Nominal full scale is 200 mVolts for a 200 deg. C span, or 100mVolts, depending upon how the panel is calibrated.

3.0 INSTALLATION

This section describes how to install and remove the termination panel and its cable assembly.

3.1 Wiring

The installation of wiring should conform to all applicable codes.

To reduce the possibility of electrical noise interfering with the proper operation of the control system, exercise care when installing the wiring from the system to the external devices. For detailed recommendations refer to IEEE 518.

3.2 Initial Installation

WARNING

THERE IS NO ISOLATION BETWEEN THE INDIVIDUAL CHANNELS ON THE TERMINATION PANEL. DO NOT CONNECT DIFFERENT CHANNELS ON THE SAME TERMINATION PANEL TO COMMON POINTS OF DIFFERENT POTENTIALS. (FOR EXAMPLE, THIS PANEL SHOULD NOT BE CONNECTED TO RTD DEVICES USED TO MONITOR MOTOR TEMPERATURES BECAUSE THE RTD DEVICES WILL FLUCTUATE IN COMMON MODE VOLTAGE LEVEL BETWEEN THE DIFFERENT MOTORS.) FAILURE TO OBSERVE THIS PRECAUTION MAY DESTROY THE TERMINATION PANEL DUE TO EXCESSIVE CURRENTS FLOWING IN THE COMMON WIRING.

Use the following procedure to install the module:

- Step 1. Turn off power to the system. All power to the rack as well as all power to the wiring leading to the termination panel should be off.
- Step 2. Mount the termination panel. It should be mounted to permit easy access to the screw terminals on the terminal board. Make certain that the terminal board is close enough to the rack so that the cable will reach between the terminal board and the module. The panel should be located so that the flat cables can be routed to the front of the module without coming in contact with high voltage wires.
- Step 3. Mount the external power supply. It must be located within a 6-ft cable run of the termination panel. It should be located so that the power cable can be routed to the termination panel without coming in contact with high voltage wires.
- Step 4. Connect the power cable on the termination panel to the power supply.
- Step 5. Fasten field wires to the terminal strip. Make certain that all field wires are securely fastened. The shield should be terminated at the panel. Do not connect the shield at both ends of the cable. Typical field signal connections are shown in figure 3.1.

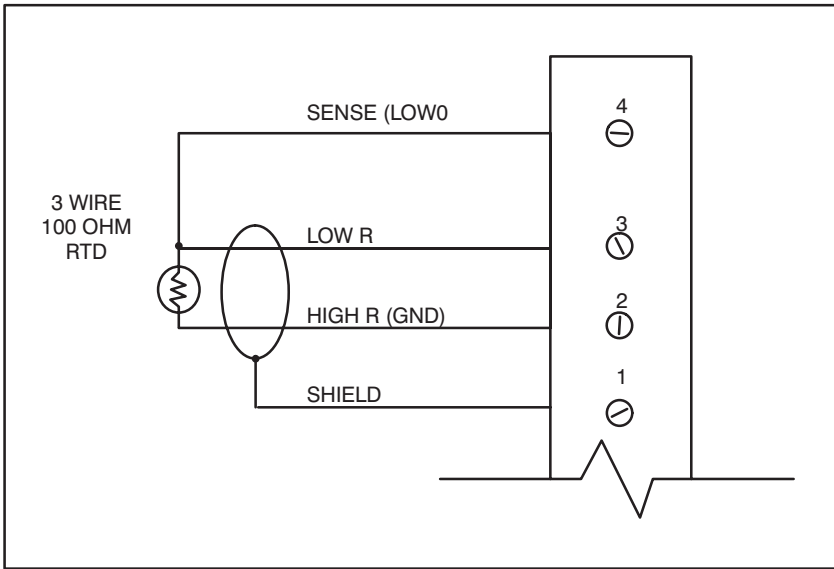


Figure 3.1 - Typical Field Signal Connections

- Step 6. Connect the 50-pin flat cables to their corresponding connector on the analog input module (61C613). Attach the cables by aligning the triangle marks on the cable end and the board socket. Input channels 0-7 (TB1) use the middle connector on the input module. Input channels 8-15 (TB2) use the bottom connector. If the rack contains more than one analog input module, make certain that the connectors are the proper ones for this module.
- Step 7. Turn on power to the system.
- Step 8. Verify the installation. Refer to the instruction manual for the 16 Channel Analog Input Module (J-3613-1).

3.3 Field Calibration

The termination panel is adjusted for European curve RTDs (alpha temperature coefficient of 0.00385 ohms/ohm/degree C) and includes an allowance for 0.1 ohm lead resistance. For lead resistance greater than 0.1 ohm, the following procedure can be used to calibrate the input for maximum accuracy:

1. The offset adjustment should not normally need further field adjustment. If it becomes necessary, substitute a precision 100 ohm resistor in place of the RTD and adjust the offset potentiometer for an output of zero volts. The offset potentiometers are located at the back of the panel. Each channel has a separate offset adjustment labeled "OS".
2. Adjust the gain potentiometer so that total bridge voltage is 256.3mV across the 100 ohm resistor. The gain potentiometers are located at the back of the panel. Each channel has a separate gain adjustment labeled "GN".

- Force the RTD to a known temperature or simulate a known temperature by connecting a precision resistor at the RTD end of the field wiring. For example, if $R = 182.0$ ohms, then look up in the table in Appendix B the resistor values above and below 182.0 ohms. With these values and their equivalent temperatures, interpolate to find the expected temperature.

<u>Deg. C</u>	<u>OHMS</u>
210	179.51
X	182.0
220	183.17

$$X = 216.80 \text{ deg. C}$$

- Adjust the linearity potentiometer for the corresponding simulated temperature. The temperature should be at the upper end of the operating range and must be well away from 0 deg C. The linearity potentiometers are located at the back of the panel. Each channel has a separate linearity adjustment labeled "LI".

3.4 Panel Replacement

Use the following procedure to replace a termination panel:

- Step 1. Turn off power to the rack and all connections.
- Step 2. Use a screwdriver to loosen the screws holding the field wires to the termination panel. Make certain that the wires are tagged so that they can be replaced in the correct order.
- Step 3. Remove the 50-pin flat cables from the back of the termination panel.
- Step 4. Remove the termination panel.
- Step 5. Follow steps 2-6 in the installation procedure, section 3.2.

4.0 DIAGNOSTICS AND TROUBLESHOOTING

For details on how to troubleshoot the termination panel, refer to the instruction manual for the 16 Channel Analog Input Module (J-3613-1).

Appendix A

Technical Specifications

Ambient Conditions

- Storage temperature: -40°C - 85°C
- Operating temperature: 0°C - 55°C
- Humidity: 5-90% non-condensing

Dimensions

- Height: 1.7 inches
- Width: 19.0 inches
- Depth: 1.6 inches behind rack rails
2.5 inches in front of rack rails

Input Circuit

- Number of inputs: 16
- Type: 100 ohm (@ 0°C) platinum RTD
- Resistance curve: European. Alpha = 0.00385 ohms/ohm/deg. C
- Isolation: All channels on panel have a common ground. Entire panel may operate at non-zero common mode voltage depending on input board common mode range and power supply isolation.
- Connections: Screw-activated, clamp type barrier strips. Accommodates 24 to 14 AWG wire. Four connections/RTD.

Output Circuit

- Linearized range: -20 to $+250$ deg. C
- Sensitivity: .5mV/deg. C
- Zero point: 0 deg. C
- Linearization error
for 0.1 ohm lead resistance: <0.1 deg. C (-20 to 250 deg. C)
for 0.1 to 0.2 ohm resistance: $<0.1\%$ reading + 0.1 deg. C
(-20 to 250 deg. C)
or
 $<.25$ deg. C (-20 to 200 deg. C)
- Temperature variation (0-55 deg. C): 0.5% of reading, 0.2mVolts max
- Connections: 50 wire twisted pair flat cable per 8 channels, 6 ft long. One end hardwired into panel; other end terminated in a connector (3M part no. 3425-6050).

Appendix A

(Continued)

Power Requirements

- +15 Volts: 100 mA
- -15 Volts: 160 mA
- Voltage tolerance: $\pm 1\%$
- Voltage temp Coef.: 0.02%/deg.C
- Line regulation: 0.1%
- Load regulation: 0.1%
- Ripple: <2 mVolts RMS
- Protection: Each line fused at 1A and reverse voltage protected.
- Fuse type: Littelfuse 276001
- Connector: 3 wire cable, 6 ft. long with spad lugs
 - +15 Volts - yellow
 - 15 Volts - violet
 - ground - gray

WARNING

UNUSED INPUTS SHOULD BE CLOSED. OPEN INPUTS CAN CAUSE -15V CURRENT TO INCREASE BY 15MA PER CHANNEL AND +15V CURRENT TO INCREASE BY 10MA PER CHANNEL. JUMPER "SENSE" TO "HIGH R" (GROUND) AT ALL UNUSED INPUTS. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN BODILY INJURY OR DAMAGE TO EQUIPMENT.

Appendix B

Platinum RTD Temperature-Resistance Values European Curve

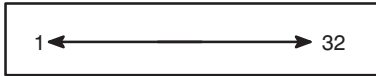
Alpha = 0.00385 ohms/ohm/deg.C

Deg.C	ohms	Deg.C	ohms
-150	39.65	180	168.47
-140	43.80	190	172.16
-130	47.93	200	175.84
-120	52.04	210	179.51
-110	56.13	220	183.17
-100	60.20	230	186.82
-90	64.25	240	190.46
-80	68.28	250	194.08
-70	72.29	260	197.70
-60	76.28	270	201.30
-50	80.25	280	204.88
-40	84.21	290	208.46
-30	88.17	300	212.03
-20	92.13	310	215.58
-10	96.07	320	219.13
0	100.00	330	222.66
10	103.90	340	226.18
20	107.79	350	229.69
30	111.67	360	233.19
40	115.54	370	236.67
50	119.40	380	240.15
60	123.24	390	243.61
70	127.07	400	247.06
80	130.89	410	250.50
90	134.70	420	253.93
100	138.50	430	257.34
110	142.28	440	260.75
120	146.06	450	264.14
130	149.82	460	267.52
140	153.57	470	270.89
150	157.32	480	274.25
160	161.05	490	277.60
170	164.76	500	280.93

Appendix C

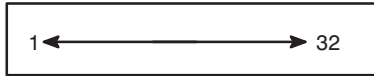
Field Connections

TB1



Pin	Channel	Input
1	0	Shield
2	0	High R
3	0	Low R
4	0	Sense
5	1	Shield
6	1	High R
7	1	Low R
8	1	Sense
9	2	Shield
10	2	High R
11	2	Low R
12	2	Sense
13	3	Shield
14	3	High R
15	3	Low R
16	3	Sense
17	4	Shield
18	4	High R
19	4	Low R
20	4	Sense
21	5	Shield
22	5	High R
23	5	Low R
24	5	Sense
25	6	Shield
26	6	High R
27	6	Low R
28	6	Sense
29	7	Shield
30	7	High R
31	7	Low R
32	7	Sense
33		n.c.
34		n.c.
35		n.c.
36		n.c.

TB2



Pin	Channel	Input
1	8	Shield
2	8	High R
3	8	Low R
4	8	Sense
5	9	Shield
6	9	High R
7	9	Low R
8	9	Sense
9	10	Shield
10	10	High R
11	10	Low R
12	10	Sense
13	11	Shield
14	11	High R
15	11	Low R
16	11	Sense
17	12	Shield
18	12	High R
19	12	Low R
20	12	Sense
21	13	Shield
22	13	High R
23	13	Low R
24	13	Sense
25	14	Shield
26	14	High R
27	14	Low R
28	14	Sense
29	15	Shield
30	15	High R
31	15	Low R
32	15	Sense
33		n.c.
34		n.c.
35		n.c.
36		n.c.

R = resistance n.c. = no connection

Appendix D

Related Components

M/N 61C613 16 Channel Analog Input Module

For additional information

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