Partlow 1161 limit controller manual

I'm not robot!

Available Models: P1161100000 1/16DIN, LIMIT CONTROLLER 120V FM- cUR APPROVAL ONLY The Partlow 1161+ limit controller is the 1/16 DIN model from the Plus (+) Series, which also has 1/4 and 1/8 DIN models. Partlow 1161+ limit controllers incorporate numerous improvements in product specifications, communication, display interface, and software to provide ease of use, delivery, and value per dollar. More versatile features and user-friendly functionality have been added to the Partlow 1161+ limit controller including digital inputs, an easy-to-use human-machine interface, jumperless and auto-hardware configuration, 24VDC transmitter power supply, and MODBUS communication. These benefits will save you time (up to 50% on product set-up) and will virtually eliminate the possibility of operator errors. The Partlow 1161+ limit controller offers fail-safe protection and prevents damage to equipment and products. Partlow 1161+ limit controllers shut down a process when a preset temperature is reached and can't be reset by the operator until the process has returned to a safe operating condition. Use your Partlow 1161+ limit controller in any application where protection against out-of-range temperature conditions is a critical requirement. Features: Improved easy-to-use HMI Jumperless input configuration Auto-hardware recognition Improved Windows PC configuration software Process alarms Faster communication speeds in selectable MODBUS or ASCII format FM approved Backward compatible panel cutout, housing, and terminal wiring capability Optional digital input and remote reset Optional 10V SSR driver output Options: Models: Size: Power Supply & Digital I/O Output 1 and 2 Hardware Options None Mechanical relay 5A, form C; mechanical relay 5A, form A Communication Options: Additional Functions such as Auxiliary Control Functions, Output 3 and 4 Hardware Options, Isolated Input and Firmware available upon Request MIC 1161 1/16 DIN MICROBASED LIMIT CONTROLLER OPERATORS MANUAL FORM 3535 EDITION 1 © JAN. 1995 PRICE $10.00 Information in this installation, wiring, and operation manual is subject to change without notice. One manual is provided with each instrument at the time of shipment. Extra copies are available at the price published on the front cover. This is the First Edition of the MIC 1161 manual. It was written and produced entirely on a desk-top-publishing system. Disk versions are available by written request to the Partlow Publications Department. We are glad you decided to open this manual. It is written so that you can take full advantage of the features of your new MIC 1161 limit controller. NOTE: It is strongly recommended that Partlow equipped applications incorporate a high or low limit protective device which will shut down the equipment at a preset process condition in order to preclude possible damage to property or products. ! THE INTERNATIONAL HAZARD SYMBOL IS INSCRIBED ADJACENT TO THE REAR CONNECTION TERMINALS. IT IS IMPORTANT TO READ THIS MANUAL BEFORE INSTALLING OR COMMISSIONING THE UNIT. Table of Contents Product Description 1.1 1.1.1 GENERAL This instrument is a microprocessor based single loop limit controller, user configurable to either High Limit type or Low Limit type. The input is user configurable to directly connect to either thermocouple, RTD, mVDC, VDC or mADC inputs. The instrument can operate from a 90-264 VAC, 50/60 HZ power supply. Features include fail safe operation (relay de-energized by the limit exceeded condition), front panel Reset switch, time limit exceeded display and maximum/minimum tracking of excursions of the process variable. 1.1.2 DISPLAYS Each instrument is provided with dual displays and status indicators as shown in Figure 1-1. The upper display displays the value of the process variable. The lower display displays the setpoint value. Status indication is as shown in Figure 1-1, page 6. 1.1.3 ALARMS Alarm indication is standard on all instruments. Up to two alarm outputs are possible. Alarm type may be set as Process Direct or Reverse (high or low), Logical Combination of the two alarms and Annunciator Direct or Reverse. Alarm status is indicated by LED. 1.1.4 PROCESS VARIABLE/SETPOINT VALUE RE-TRANSMISSION OUTPUT If the instrument is specified with this option, this output may be scaled over any desired range and re-transmitted. FIGURE 1-1 Keys and Indicators TOP 1161 OUT EXCEED ALM RESET Installation and Wiring 2.1 Electrical code requirements and safety standards should be observed and installation performed by qualified personnel. The electronic components of the instrument may be removed from the housing during installation. To remove the components, grip the side edges of the front panel and pull the instrument forward. During re-installa- tion, the vertically mounted circuit boards should be properly aligned in the housing. Ensure that the instrument is correctly orientated. A stop will operate if an attempt is made to insert the instrument incorrectly. CAUTION: This stop can be over-ridden with enough force. If in doubt, check orientation again! Recommended panel opening sizes are illustrated in Figure 2-1, page 8. After the opening is properly cut, insert the instrument into the panel opening. Ensure that the panel gasket is not distorted and that the instrument is positioned squarely against the panel. Slide the mounting clamp into place on the instrument (see Figure 2-3, page 9) and push it forward until it is firmly in contact with the rear face of the mounting panel. Note: The mounting clamp tongues may engage either on the sides or the top/bottom of the instrument housing. Therefore, when installing several instruments side-by-side in one cut out, use the ratchets on the top/bottom faces. FIGURE 2-1 Panel Cut-Out Dimensions 45 mm +0.5 - 0.0 (1.77" +.024 - .000) PANEL 45 mm +0.5 - 0.0 CUTOUT (1.77" +.024 - .000) SIZE FIGURE 2-2 Main Dimensions 110 mm (4.33 in.) 48 mm (1.89 in) Side View 10 mm (0.39 in.) 48 mm (1.89 in.) FIGURE 2-3 Panel Mounting the Controller Mounting Clamp Controller Housing Tongues on mounting clamp engage in ratchet slots on controller housing Preparation for Wiring 2.2 2.2.1 WIRING GUIDELINES Electrical noise is a phenomenon typical of industrial environments. The following are guidelines that must be followed to minimize the effect of noise upon any instrumentation. 2.2.1.1 INSTALLATION CONSIDERATIONS Listed below are some of the common sources of electrical noise in the industrial environment: •Ignition Transformers •Arc Welders •Mechanical contact relay(s) •Solenoids Before using any instrument near the device listed, the instructions below should be followed: 1.If the instrument is to be mounted in the same panel as any of the listed devices, separate them by the largest distance possible. For maximum electrical noise reduction, the noise generating devices should be mounted in a separate enclosure. 2.If possible, eliminate mechanical contact relay(s) and replace with solid state relays. If a mechanical relay being powered by an instrument output device cannot be replaced, a solid state relay can be used to isolate the instrument. 3.A separate isolation transformer to feed only instrumentation should be considered. The transformer can isolate the instrument from noise found on the AC power input. 4.If the instrument is being installed on existing equipment, the wiring in the area should be checked to insure that good wiring practices have been followed. 2.2.1.2AC POWER WIRING Neutral (For 115 VAC) It is good practice to assure that the AC neutral is at or near ground potential. To verify this, a voltmeter check between neutral and ground should be done. On the AC range, the reading should not be more than 50 millivolts. If it is greater than this amount, the secondary of this AC transformer supplying the instrument should be checked by an electrician. A proper neutral will help ensure maximum performance from the instrument. 2.2.1.3WIRE ISOLATION Four voltage levels of input and output wiring may be used with the unit: •Analog input or output (i.e. thermocouple, RTD, VDC, mVDC, or mADC) •SPDT Relays •AC power The only wires that should run together are those of the same category. If they need to be run parallel with any of the other lines, maintain a minimum 6 inch space between the wires. If wires must cross each other, do so at 90 degrees. This will minimize the contact with each other and reduces “cross talk”. “Cross Talk” is due to the EMF (Electro Magnetic Flux) emitted by a wire as current passes through it. This EMF can be picked up by other wires running in the same bundle or conduit. In applications where a High Voltage Transformer is used (i.e. ignition systems) the secondary of the transformer should be isolated from all other cables. This instrument has been designed to operate in noisy environments, however, in some cases even with proper wiring it may be necessary to suppress the noise at its source. 2.2.1.4 USE OF SHIELDED CABLE Shielded cable helps eliminate electrical noise being induced on the wires. All analog signals should be run with shielded cable. Connection lead length should be kept as short as possible, keeping the wires protected by the shielding. The shield should be grounded at one end only. The preferred grounding location is the sensor, transmitter or transducer. 2.2.1.5 NOISE SUPPRESSION AT THE SOURCE Usually when good wiring practices are followed no further noise protection is necessary. Sometimes in severe electrical environments, the amount of noise is so great that it has to be suppressed at the source. Many manufacturers of relays, contactors, etc. supply “surge suppressors” which mount on the noise source. For those devices that do not have surge suppressors supplied, RC (resis- tance-capacitance) networks and/or MOV (metal oxide varistors) may be added. Inductive Coils - MOV’s are recommended for transient suppression in inductive coils connected in parallel and as close as possible to the coil. See Figure 2-4, page 12. Additional protection may be provided by adding an RC network across the MOV. FIGURE 2-4 0.5 mfd 1000V 115V 1/4W 230V 1W Contacts - Arcing may occur across contacts when the contact opens and closes. This results in electrical noise as well as damage to the contacts. Connecting a RC network properly sized can eliminate this arc. For circuits up to 3 amps, a combination of a 47 ohm resistor and 0.1 microfarad capacitor (1000 volts) is recommended. For circuits from 3 to 5 amps, connect 2 of these in parallel. See Figure 2-5. FIGURE 2-5 MOV R C Inductive Coil 2.2.2 SENSOR PLACEMENT (Thermocouple or RTD) Two wire RTD’s should be used only with lead lengths less than 10 feet. If the temperature probe is to be subjected to corrosive or abrasive conditions, it should be protected by the appropriate thermowell. The probe should be positioned to reflect true process temperature: In liquid media - the most agitated area In air - the best circulated area THERMOCOUPLE LEAD RESISTANCE Thermocouple lead length can affect instrument accuracy since the size (gauge) and the length of the wire affect lead resistance. To determine the temperature error resulting from the lead length resistance, use the following equation: Terr = TLe * L where; TLe = value from appropriate table L = length of leadwire in thousands of feet TABLE 1 Temperature error in °C per 1000 feet of leadwire AWG Thermocouple Type: NO. J K T R S E B N C 10 .34 .85 .38 1.02 1.06 .58 7.00 1.47 1.26 12 .54 1.34 .61 1.65 1.65 .91 11.00 2.34 2.03 14 .87 2.15 .97 2.67 2.65 1.46 17.50 3.72 3.19 16 1.37 3.38 1.54 4.15 4.18 2.30 27.75 5.91 5.05 18 2.22 5.50 2.50 6.76 6.82 3.73 44.25 9.40 8.13 20 3.57 8.62 3.92 10.80 10.88 5.89 70.50 14.94 12.91 24 8.78 21.91 9.91 27.16 27.29 14.83 178.25 37.80 32.64 See next page for Table 2 TABLE 2 Temperature error in °F per 1000 feet of leadwire AWG Thermocouple Type: NO. J K T R S E B N C 10 .61 1.54 .69 1.84 1.91 1.04 12.60 2.65 2.27 12 .97 2.41 1.09 2.97 2.96 1.64 19.80 4.21 3.66 14 1.57 3.86 1.75 4.81 4.76 2.63 31.50 6.69 5.74 16 2.47 6.09 2.77 7.47 7.52 4.14 49.95 10.64 9.10 18 4.00 9.90 4.50 12.17 12.28 6.72 79.95 10.64 9.10 20 6.43 15.51 7.06 19.43 19.59 10.61 126.90 26.89 23.24 24 15.80 39.44 17.83 48.89 49.13 26.70 320.85 68.03 58.75 Example: A instrument is to be located in a control room 660 feet away from the process. Using 16 AWG, type J thermocouple, how much error is induced? Terr = TLe * L TLe = 2.47 (°F per 1000 ft) from Table 2 Terr = 2.47 (°F/1000 ft) * 660 ft Terr = 1.6°F RTD LEAD RESISTANCE RTD lead length can affect instrument accuracy, since the size (gauge) and length of the wire affect lead resistance. To determine the temperature error resulting from the lead length resistance, use the following equation: Terr = TLe * L where; TLe = value from Table 3 if 3 wire RTD or Table 4 if 2 wire RTD L = length of lead wire in thousands of feet TABLE 3 3 Wire RTD AWG NO. Error °C Error °F 10 ± 0.04 ± 0.07 12 ± 0.07 ± 0.11 14 ± 0.10 ± 0.18 16 ± 0.16 ± 0.29 18 ± 0.26 ± 0.46 20 ± 0.41 ± 0.73 24 ± 0.65 ± 1.17 TABLE 4 2 Wire RTD AWG NO. Error °C Error °F 10 ± 5.32 ± 9.31 12 ± 9.31 ± 14.6 14 ± 13.3 ± 23.9 16 ± 21.3 ± 38.6 18 ± 34.6 ± 61.2 20 ± 54.5 ± 97.1 24 ± 86.5 ± 155.6 Example: An application uses 2000 feet of 18 AWG copper lead wire for a 3 wire RTD sensor. What is the worst case error due to the leadwire length? Terr = TLe * L TLe = ± .46 (°F/1000 ft) from Table 3 Terr = ± .46 (°F/1000 ft) * 2000 ft Terr = ± 0.92°F

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