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Instruction Manual 3620

TWO RELAY
INDICATOR / CONTROLLER



MANUAL NO. 990653

IMPORTANT INFORMATION
PLEASE READ

Each 3620 is shipped factory calibrated!

The **ONLY** step up required on a new unit is to scale the display to read in engineering units and to define the relay set and reset points. It is not necessary to sample the input unless the instrument is being recalibrated. Recalibration is a procedure which may be required after the instrument has been in service for one or more years. Please refer to the **Scaling, Control** setup and **Sample Input** sections of this manual for the methods to perform each of these steps. The following discussion explains WHY it is unnecessary to recalibrate the unit.

In analog meters, calibration and scaling are accomplished simultaneously: apply 4.000mA and turn a pot until the display indicates the desired number, then do the same for 20.000mA. In totally digital meters, there are no pots to turn. Calibrating a meter consists of sampling the input and scaling the display. An analog to digital converter measures the input and produces a digital result. Sampling the input is the process of allowing the 3620 to measure 4mA and 20mA signals and record the digital results for these inputs. Once sampled, it is only necessary to resample the input to accommodate the natural long term drift of the electronic components. Scaling the display causes the 3620 to indicate the proper values for the input. For example, scaling the display for a ten pound submersible pressure transducer would cause the 3620 to indicate 0.0 to 23.1ft for a 4 to 20mA input. So, scaling the display, which can be done over and over again, consists of defining the process values that correspond to the 4mA and 20mA endpoints.

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1.0 GENERAL INFORMATION

The 3620 is a four digit indicator containing two control relays and a 24V, 25mA, regulated power supply adequate for powering a 4/20mA loop powered transmitter. The 3620 is enclosed in a surface mountable, NEMA 4X, polycarbonate housing that can be ordered in an optional panel mount version. All wiring to the 3620 are made with screw clamp terminals. The power and relay wires are connected to the bottom power supply board and the input signal wires are connected to the top main board. Each 3620 leaves the factory fully calibrated and tested. Specific calibrations and relay control point settings can be requested when ordered. The 3620 is entirely digital, so changing the display scaling, setting the relay control points, et cetera, is easily accomplished in the field by utilizing the front panel pushbuttons.

2.0 POWER ON SEQUENCE

After applying power, the 3620 indicates the model number and the firmware build date, displays "run", measures the input, calculates and displays the process value, and trips or resets the control relays based on that process value. The relays will remain de-energized until the input is measured and evaluated. Once operating, the input is continuously measured and evaluated, even while the display is indicating one of the operational parameters. If an operational parameter is being displayed, the 3620 will return to indicating the process value after two minutes if no user input was detected.

3.0 FRONT PANEL DISPLAY AND CONTROLS

The process value is indicated on an seven segment, four digit, LED display. The indication range is -1999 to 9999, with a decimal point placeable to the right of any digit. It displays "-ovr" for values less than -1999 and "ovr" for values greater than 9999. The 3620 displays "ouch" if the input signal is larger than it can measure. The A and B LEDs indicate the status of the channel A and B controls. A lit LED indicates that a control has become SET. Removing the front cover will expose a DIP switch, three pushbutton switches, and six surface mount LEDs labeled SAMPLE, SET, RESET, DEC PNT, MINIMUM and MAXIMUM. Note that the underside of the label contains a short reference for setting up the unit

3.1 Pushbutton Switches

The three pushbuttons are labeled FUNCTION, INCREASE, and NEXT. Pressing the FUNCTION pushbutton selects which operational parameter is being displayed. An operational parameter can be edited while it is displayed by using the NEXT and INCREASE pushbuttons. Table 1 lists the operational parameters and the LED combinations that are used to indicate that parameter.

3.2 Editing an Operational Parameter

When a parameter is being displayed, one of the digits will be flashing. Pressing the NEXT pushbutton will change which digit is flashing, ie. first to second, second to third, etc.. Pressing the INCREASE pushbutton will change the value of the flashing digit, ie. 1 to 2, 2 to 3, etc.. The displayed parameter is saved when FUNCTION is pressed. The SET DEC PNT parameter allows the decimal point to be placed. Either INCREASE or NEXT moves the decimal point.

Table 1: LED Prompts And Operational Parameters

1 ST LED Lit	2 ND LED Lit	The Display Is Indicating
NO Surface Mount LEDs Lit		process value and Channels A & B control status
SET	A	value at which control A trips
RESET	A	value at which control A clears
SET	B	value at which control B trips
RESET	B	value at which control B clears
SET	DEC PNT	selected decimal point
SET	MINIMUM	value displayed at the minimum input (4mA)
SET	MAXIMUM	value displayed at the maximum input (20mA)

3.3 DIP Switch Configuration Settings

Position one of the DIP switch is at the top, sliding the switch to the right is ON.

- 1) ON, A and B relays operate as alarms (relay de-energized when tripped)
OFF, A and B relays operate as controls (relay energized when tripped)
- 2) ON, the A and B relays alternate activation
- 3) no function (LEAVE OFF)
- 4) no function (LEAVE OFF)
- 5) ON, allows sampling the input (LEAVE OFF)
- 6) ON, enables the pushbutton switches (setup lockout when OFF)

For position 5 refer to section 6 (SAMPLING THE INPUT) for further information.

4.0 CONTROLS A AND B

Controls A and B are single pole double throw relays. The relays are controlled by the SET and RESET parameters and by the DIP switch settings, position 1 CTRL/ALM and position 2 ALTERNATE. The SET parameter defines when the channel activates and the RESET parameter defines when it deactivates. An active channel is indicated by a lit LED. If DIP switch position ALT is ON, the relays alternate activation. When the DIP switch CTRL/ALM position is OFF the A and B relays are configured to function as controllers, and when ON the relays are configured to function as alarms. When configured as a controller, the relay is energize when the channel is SET (the ON condition), this causes the relay to go to

RESET (the OFF condition) when power fails. When configured as an alarm, the relays are energized when the channel is RESET (the NON-ALARM condition), this causes the relay to go to SET (the SET ALARM condition) on loss of power.

5.0 SCALING THE DISPLAY

Please read this section before sampling the input!

Scaling the display causes the 3620 to display the proper values for the input signal. From Table 1, the functions, SET & DEC PNT selects the position of the decimal point, SET & MINIMUM defines the display value that corresponds to a 4mA input, and SET & MAXIMUM defines the display value that corresponds to a 20mA input. How to use the pushbuttons to edit these parameters is fully described in section 3.2 Editing an Operational Parameter. **NOTE** that it is not necessary to sample the input when scaling the display. In fact, the display may be scaled with no input connected at all.

Example:

The input is from a 10 PSI (submersible) pressure transducer and the desire is to indicate the height of water in a tank in inches. Ten PSI corresponds to a water height of 277.2 inches. The transducer is sitting 4" from the bottom of the tank, so 4mA corresponds to 4" of water and 20mA corresponds to 4" + 277.2" = 281.2" of water. Press FUNCTION until SET and DEC PNT are lit. Press NEXT or INCREASE to move the decimal point to 012.3, then press FUNCTION. SET and MINIMUM are now lit. Use NEXT and INCREASE to change the display to 004.0, then press FUNCTION. SET and MAXIMUM are now lit. Use NEXT and INCREASE to change the display to 281.2, then press FUNCTION. None of the surface mount LEDs are lit and scaling the display is complete.

6.0 SAMPLING THE INPUT

Each 3620 is set up at the factory to the procedure contained in appendix A, which includes sampling the input and scaling the display. Assuming that the 3620 has been set up for a 4/20mA input, it will display the SET MINIMUM value when the input is 4mA and display the SET MAXIMUM value when the input is 20mA. If the display is not indicating properly, check the scaling parameters to ensure that the programmed values conform to the measurement range of the transmitter being used. Accessing the scaling parameters is described in the section 5.0 SCALING THE DISPLAY.

Sampling the input will improve the accuracy of indication in the 3620 in certain circumstances, such as correcting the error caused by long term ageing of electronic components. As an example, sampling the input will bring the 3620 into compliance if the SET MAXIMUM parameter is 23.10 and it displays 22.90 at a measured input of 20.000mA. Sampling the input on the 3620 consists of applying the endpoints of the input signal, such as 4mA and 20mA, and allowing the 3620 to measure them. When SAMPLE is lit, the number displayed is the magnitude of the input signal as a percentage of the maximum detectable input level. What is useful about this number is that it changes with the input. For instance, a problem with either the calibration

equipment, the 3620, or the wiring between the two should be suspected if 4mA and 20mA are applied and the numbers displayed are very different from the numbers expected for that input. The procedure to successfully sample the input is described in Appendix A, Sampling the Input.

Model 3620:

Input: 85-265 V ac, 1 ph, 50/60 Hz.

Output - 2 relay output:

1 ph; 10 A, 240 V ac; 8 A, 24 V dc; 1/3 HP, 120 V ac; 1/2 HP, 240 V ac - 60 $^{\circ}$ C ambient.

1 ph; 9 A, 240 V ac; 7.2 A, 24 V dc; 1/4 HP, 120 V ac; 1/3 HP, 240 V ac - 70 $^{\circ}$ C ambient.

Terminal Torque all models: 7 lb. in.

ENVIRONMENTAL RATING (for models 332 and 3020): Type 1 (for front face only)

All 3660 and 3661 Models: Type 1 and 12K

All 3620 Models: Type 1 and 12.

Operating Ambient: 70 $^{\circ}$ C

7.0 SPECIFICATIONS

GENERAL

Power	85-265VAC, 1 ph, 50/60 Hz
Operating Temperature	-20°C to 70°C
Dimensions	Front Bezel 80mm H x 140mm W x 26mm 3.15"H x 5.52"W x 1.03"D
	Overall 80mm H x 140mm W x 66.5mm D 3.15"H x 5.52"W x 2.62"D
	Panel Cutout 80mm H x 140mm W 3.15"H x 5.52"W
Weight	0.522Kg = 1.15lbs. = 18.4oz
Display	four digits, 0.54" high, 7 segment, high efficiency red LED.
User Input	three buttons and a six position DIP switch
Relay Output	SPDT (form C) relays; all ratings 1ph
	60°C ambient 10A: 240VAC 8A: 24VDC; 1/3 HP @ 120VAC; 1/2 HP @ 240 VAC
	70°C ambient 9A: 240VAC; 7.2A: 24VDC; 1/4 HP @ 120VAC; 1/3 HP @ 240 VAC
A, B Relay Failsafe Operation	Controller SW4 pole 1 OFF: Relays energized when tripped Alarm SW4 pole 1 ON: Relays energized when reset
Loop Power Supply	Unregulated, nominal 22V @ 24mA, measured between 24V and COM (24V and RETURN with -I option)
Terminal Torque	7 lb. in.
Environmental Rating	Type 1 and 12.
UL File Number	E229432
<u>INPUT</u>	
A/D converter	16 bit Delta - Sigma type
Reference	2.5V ±15ppm / °C typical
Voltage Input Impedance	1M Ohms
Current Input Impedance	10 Ohms
-3dB frequency	6 Hz.
Standard inputs	4/20mA (default), 0/20mA, 0/10V, 0/5V, and 1/5V available
Display update rate	2 Hz
Accuracy	± 0.05% of selected input
Displayable numeric range	-1999 to 9999 with decimal point to right of any digit
Display Scaling	define process values at minimum and maximum input signals

FACTORY DEFAULT SETUP FOR 3620

Required test equipment:

- 1) Precision Current supply sourcing 4.000mA and 20.000mA $\pm 0.5\mu\text{A}$, such as the Devar 18-MSA.
- 2) Current monitor resolving 1 μA while indicating 20mA with an accuracy of 0.05%. A Keithley model 191 on the 2V range measuring the voltage drop across a 10 Ω 0.01% precision wire wound resistor in series with the input signal is suitable.

Sampling the Input:

- 10) Disconnect power from the unit, remove unit from mounting and / or disassemble to facilitate access. BEWARE OF HIGH VOLTAGE AREAS!
- 20) Attach positive wire of the 18-MSA to the 10 Ω resistor. Attach the other side of the resistor to the +IN terminal of the 3620, which is the second terminal up from the bottom of J1. Attach the negative wire of the 18-MSA to the COM terminal of the 3620, which is the bottom terminal of J1. Put the Keithley model 191 on the 2V range and attach the probes to the 10 Ω resistor. Put the 18-MSA on source.
- 30) SW4 is located to the left side of the display. Put poles 4 OFF and 5,6 ON. The settings of the other poles are unimportant.
- 40) Apply power to the 3620.
- 50) The display indicates "CAL". Press the FUNCTION pushbutton.
- 60) The status LEDs will indicate SAMPLE MINIMUM. Apply 4.000mA to the input. By design, the display should indicate 16.10 ± 2.00 .
- 70) Press the INCREASE pushbutton to accept this as the minimum input signal. The prompt "SAVE" confirms the new input.
- 80) The status LEDs now indicate SAMPLE MAXIMUM. Apply 20.000mA to the input. By design, the display should indicate 80.48 ± 5.00 .
- 90) Press the INCREASE pushbutton to accept this as the maximum input signal. The prompt "SAVE" confirms the new input.
- 100) The display now indicates "CAL". Put SW4 position 5 OFF to exit the sample input routine.

FACTORY DEFAULT SETUP FOR 3620

Input Span	0/20mA	4/20mA	0/5V	1/5V	0/10V
Nominal A/D results at Sample Points					
Sample Minimum	0.00	16.10	0.00	18.25	0.00
Sample Maximum	80.48	80.48	91.23	91.23	91.23
Assembly No.	516211-01		516211-02		516211-03

Notes:

- A) timer exits the sampling the input routine after 2 minutes of inactivity.
- B) Pressing FUNCTION safely cycles through "CAL", SAMPLE MINIMUM and SAMPLE MAXIMUM without saving the current reading.

Setup Control Parameters and Scaling

- 10) Disconnect power from the unit, remove unit from mounting and / or disassemble to facilitate access. BEWARE OF HIGH VOLTAGE AREAS!
- 20) SW4 is located to the left side of the display. Put poles 1,3,4,5 OFF and 2,6 ON.
- 30) Apply power to the 3620. The display indicates the model number, the build date, "run", and tries to indicate a process value based on the input.
- 40) Press the FUNCTION pushbutton. The status LEDs indicate SET A and the display indicates the current setting with the first digit flashing. Use NEXT and INCREASE to set the value according to the table below. Use the NEXT button to change which digit is flashing. Use the INCREASE button to change the value of the flashing digit. When complete, press FUNCTION to save the displayed parameter and proceed to the next parameter, which will be indicated by the lit status LEDs. Edit the control parameters to conform to the values in the table. These parameter values will scale the 3620 to indicate inches of water for a 10PSI (0/277.2 inches) pressure transducer and set the controls for a duplex pump down installation.

1 ST LED lit	2 ND LED lit	factory setting	
SET	A	036.0	Lead Pump On
RESET	A	006.0	Lead Pump Off
SET	B	048.0	Lag Pump On
RESET	B	006.0	Lag Pump Off
SET	DEC PNT	123.4	Resolution = 0.1 inch
SET	MINIMUM	000.0	Display at 4 mA
SET	MAXIMUM	277.2	Display at 20 mA

3620 Duplex Pump Controller Quick Setup

Step 1: Install and wire. Refer to diagrams on next page

Step 2: Scale the display so the 3620 will indicate the values that the transducer is measuring. Use the FUNCTION button to select the parameter to change, then use the NEXT and INCREASE buttons to change it. A 10lb submersible pressure transducer measures 0" to 277.2" of water above it. To scale a 3620 for this transducer, change SET DEC PNT to 123.4, SET MINIMUM to 000.0, and SET MAXIMUM to 277.2.

4mA = _____ 20mA = _____

Step 3: determine the control points. The point the pump comes on is the SET point, the point it turns off is the RESET point.

	SET (pump on)	RESET (pump off)
Pump A	_____	_____
Pump B	_____	_____

Step 4: Setting SW4 pole 2 ON causes the relays to alternate activation.

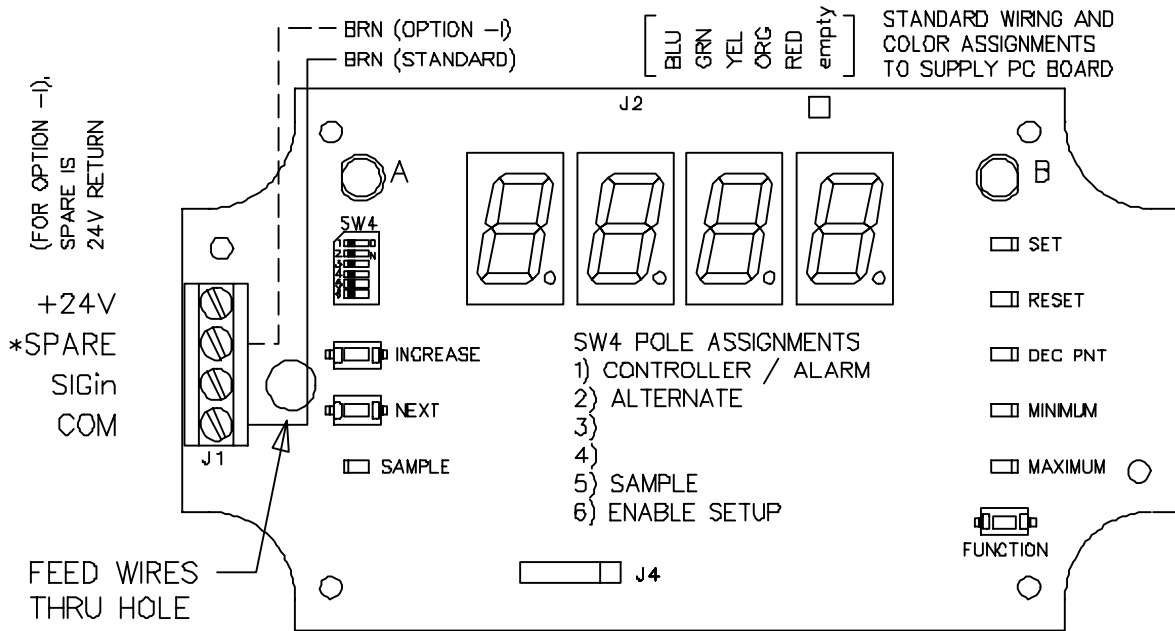
ALTERNATE: SW4 pole 2 ON

DON'T ALTERNATE: SW4 pole 2 OFF

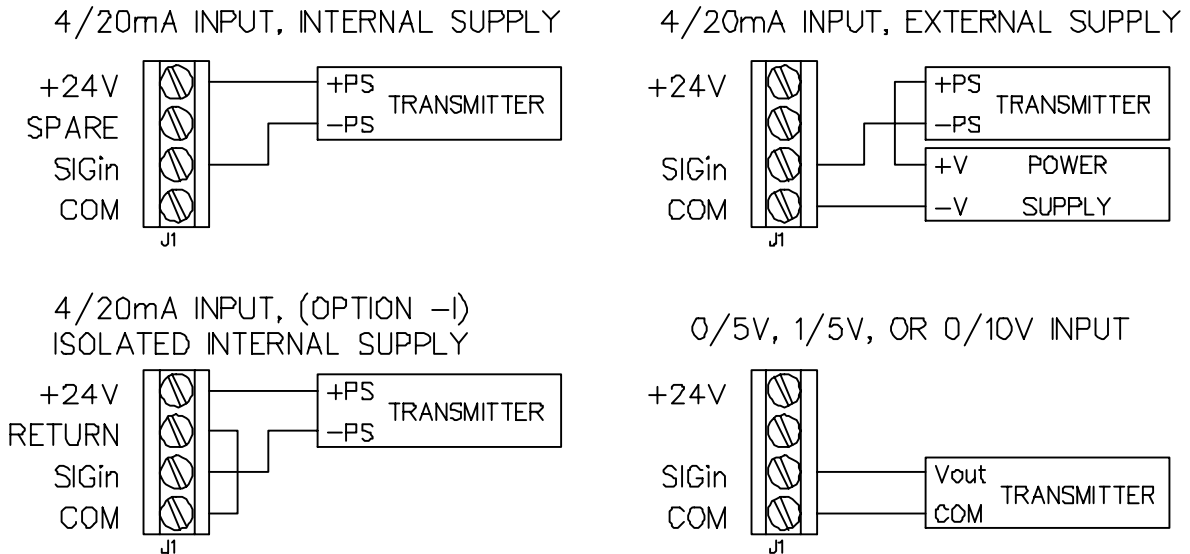
Step 5: Set SW4 pole 1 (CTRL/ALM) OFF, which causes relay A and B to energize in the controller mode. This ensures that the pumps do not activate should power to the 3620 fail.

3620 Wiring Diagram

DISPLAY (DIGITAL) PC BOARD

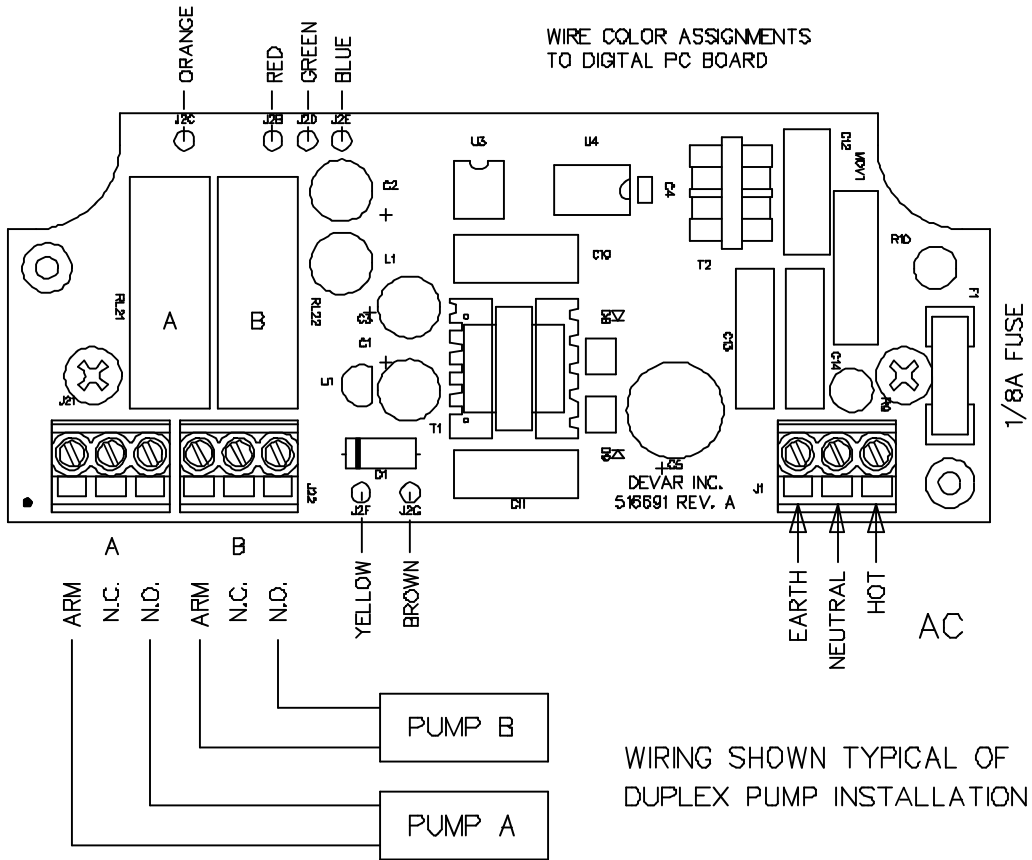


WIRING TRANSMITTER TO DISPLAY BOARD



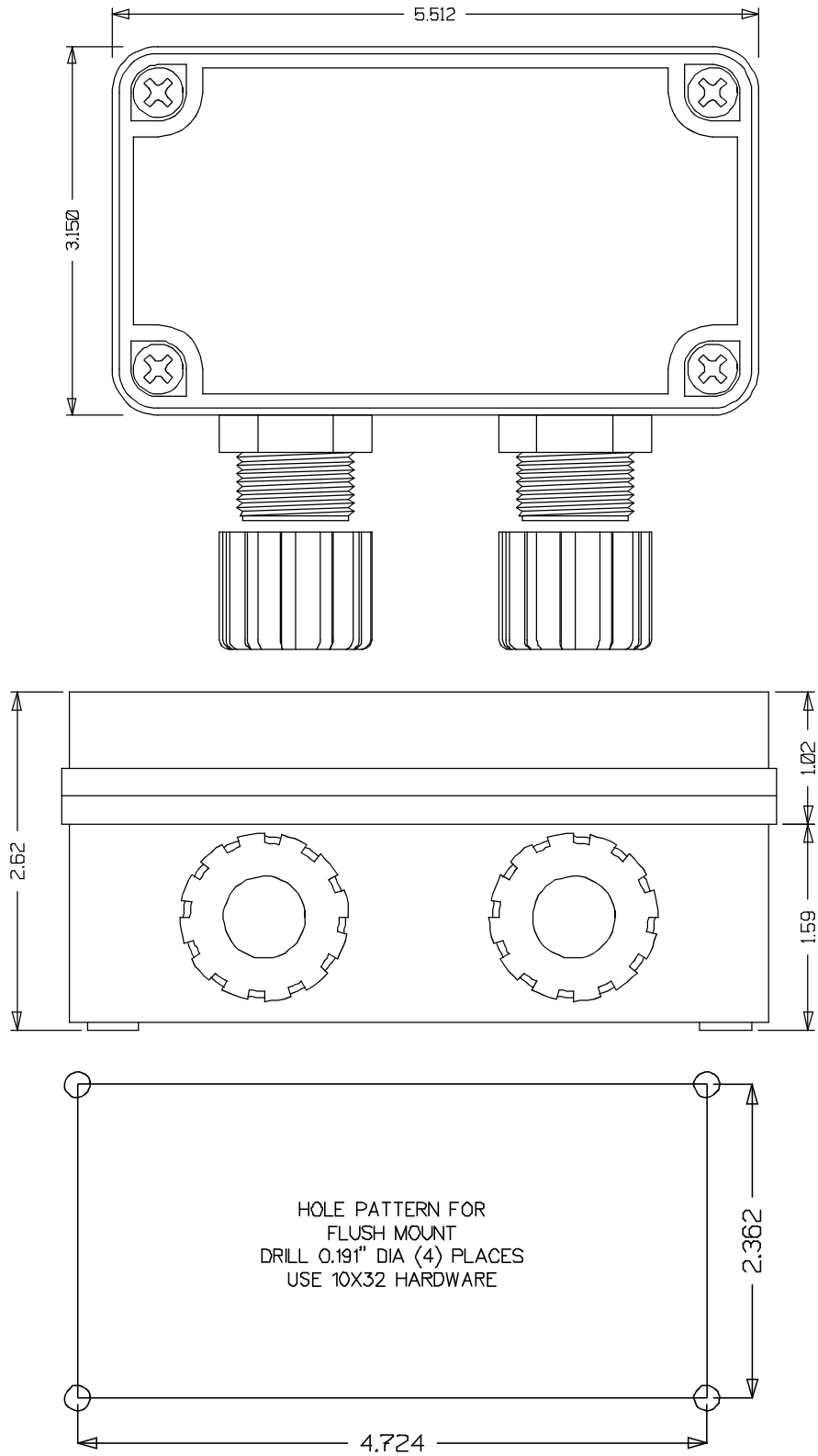
3620 Wiring Diagram

POWER SUPPLY / RELAY PC BOARD



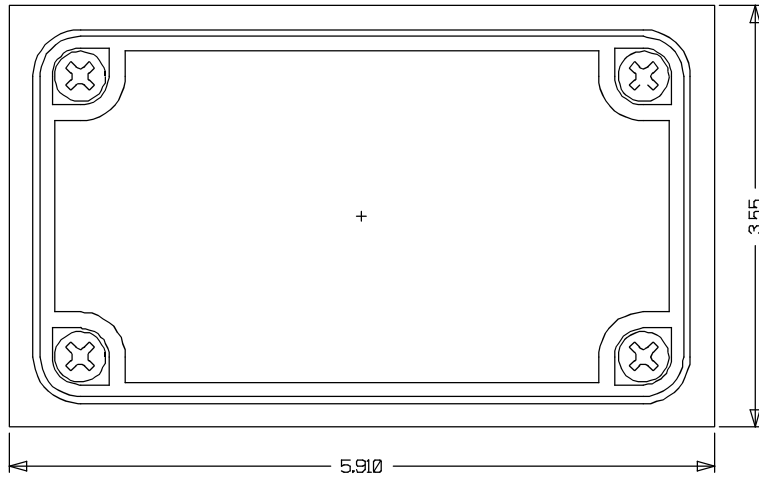
General Dimensions

Standard Flush Mount



General Dimensions

Panel Mount Option



Panel Cutout: 5.45 X 3.07 ± 0.015"

