Setting Up the 3620 Controller

There are 3 distinct steps that are required to successfully make a controller operational. These steps are: 1) mount all the hardware and electronics; 2) run the wiring; and 3) configure the controller for the installation site.

Step 1) Mount the hardware and electronics

Usually a site schematic has all the details of how and where to mount that particulars of the site. It might be wise to change the electronics mounting site if they are being positioned in a spot where dirt and water might be falling on them, such as beneath the access hatch of a vault, or if their position hampers access to the device. A little forethought before installation helps the electronics maintain robust operation.

Step 2) run the wiring

Again, the site schematic should call out the details of the wiring. Here are some general rules.

If wiring is run through a conduit the conduit should never open pointing to the sky, it should always open pointing down. This is particularly important if the conduit is outside. Many site problems are due to water collecting in the conduit.

Wiring that is exposed to the elements should incorporate a drip loop as it goes through a bulkhead or wall or enters a conduit. Water will flow along a wire, being pulled by gravity. If water flows down a wire and hits a bulkhead, it will flow through the bulkhead. Even if ample gasket material is put around the wire, capillary action will still suck water through that joint. Hang a drip loop in the wire run. Gravity will pull the water away from the joint to the bottom of the loop where it will drip harmlessly away.

Motors and other controlled devices should be wired to the pole and normally open contact of the relay output. This ensures that if the controller fails the contact opens and powers down the controlled device.

Alarms and other problem indicating devices should be wired to the pole and normally closed contact of the relay output. This ensures that if the controller fails the contact closes and activates the problem indicating device.

Carefully run the 4/20mA signal wiring. Common site problems are due to improper 4/20mA signal wiring. Every device on the loop is wired so that the positive terminal runs towards the positive side of the loop supply, even if it has to pass though other devices to get there. The same applies for the negative terminal of the device. If there are multiple devices on the loop, one might also have to consider the burden these devices put on the loop. The 3620 manual has a crude “typical” wiring schematic to use as a guide.

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Each device will have some listed power requirement or loop burden. For instance, a transducer might require a minimum of 14V, a loop powered display 5V, a signal isolator 7V, and the controller might have a 20 Ohm input. Using Ohm's law, that 20 Ohm input becomes 0.02A * 20 Ohms = 0.4V. Now total the requirements for all the devices in the loop, and 14 + 5 + 7 + 0.4 = 26.4V. A loop that requires 26.4V to operate but is powered by a 24V supply will not operate properly.

Programmable Logic Controllers (PLCs), auto dialers, and other devices are frequently added to loops to provide additional functionality. Adding these to the loop must be done with due consideration. Sometimes these devices provide a loop supply, and frequently they do not have isolated inputs. These devices should be added as a loop device, do not use the internal power supply. Also look carefully at the loop to ensure that there is only ONE point where the loop is electrically connected to earth ground. If there are more than one point connected to earth ground current from the loop can flow through that connection and make the loop malfunction. One possible solution is a signal isolator. Feel free to contact Devar with your issue, we have a variety of signal isolators that can solve your problem.

The Devar submersible pressure transducers have a red wire, a black wire, and a green / sheath wire. The red wire goes to the +24V supply, the black wire to the mA in, and the sheath wire should be earthed. The sheath is electrically isolated from the loop signal wires. If you are using a pressure transducer, look at the model number on the side of the transducer or the purchase order to find pressure range of the transducer. This will be come very important later. A common pressure range is 10 pounds.

Step 3) configure the controller for the installation site

The 3620 has a few things that must be set for it to operate properly. The first task is to set the scaling, the second task is to set the control points, and the third task is to set the operational features.

Set the Scaling

Setting the scaling means that you will set (program) the values that the 3620 will use to indicate what the transducer is measuring. This is done utilizing the pushbuttons on the 3620 to defines the values that are displayed when the input is 4mA and when the input is 20mA. As an example, let's say we have a 10 PSI transducer that is sitting one foot off the bottom of a tank. A 10 PSI transducer will measure 23.1 feet or 277.2 inches of water. That foot off the bottom is an offset, so when there is 10 feet of water in the tank, the transducer is only measuring 9 feet. In this case we want the 3620 to indicate 1.0 at 4mA input, and 24.1 at 20mA input.

Remove the front panel of the 3620. There is a DIP switch to the left of the display. Make sure that position 6 is ON (to the right). There are several LED lamps on the right

side of the board with text alongside them, a FUNCTION pushbutton on the bottom right, and INCREASE and NEXT pushbuttons on the center left side. Pressing the FUNCTION will display the various settings of the 3620, and pressing the NEXT and INCREASE buttons will allow the settings to be changed. The 3620 lets the user know which setting is being display by lighting two of the LED lamps. These are, in the order the 3620 will display them:

1) "A" + "SET" – when the A channel will trip
2) "A" + "RESET" - when the A channel will clear
3) "B" + "SET" – when the A channel will trip
4) "B" + "RESET" - when the A channel will clear
5) "SET" + "DEC PNT" – move the decimal point
6) "SET" + "MINIMUM" - displayed value at 4mA input
7) "SET" + "MAXIMUM" - displayed value at 20mA input

Using the values of 1.0 for 4mA and 24.1 for 20mA, press the FUNCTION button until the "SET" + "DEC PNT" LEDs are lit. Use the NEXT button to move the decimal to the third digit. Press the FUNCTION button so the "SET" + "MINIMUM" LEDs become lit. The first digit will be blinking. We want the display to read "001.0". Use the INCREASE button to change the value of the blinking digit, use the NEXT button to change which digit blinks. When the display is adjusted to the desired value, press the FUNCTION button so the "SET" + "MAXIMUM" LEDs become lit. Use the NEXT and INCREASE buttons to change the displayed value to "024.1". Press the FUNCTION button when complete, the 3620 will display "SAVE to indicate these values were written to the unit. The 3620 will return to indicating the input signal.

Now is a good time to compare the depth of water in the tank and the display. If the 3620 is displaying some value well below the SET MINIMUM point, or even negative, the most likely cause is that the 4/20mA loop isn't operating. Troubleshooting a 4/20mA loop is covered in another document. The best check to perform is at two places: when the well is as full as possible and when the well is nearly empty. The error is the difference between the measured water in the well and what the 3620 is indicating. If the error is about the same at the high water and at the low water point, then the offset needs to be adjusted. If the error changes quite a bit between the high and low water points, then the scaling used for the transducer is probably wrong. The most common and frustrating problem is that the pressure range of the transducer isn't known. Making measurements and calculating the range of a transducer will be covered in another document. The scaling for common transducer pressure ranges are: 5PSI = 11.6', 10PSI = 23.1', 15PSI = 34.7' and 20PSI = 46.2'. If the display on the 3620 is low, you could try using the next range up. The "hunt and peck" method usually is a waste of time and should only be used as a last resort.

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Set the control points

The "A" + "SET", "A" + "RESET", "B" + "SET", and "B" + "RESET" are the control points. The channel will activate when the reading gets to the set point, and clear when it gets to the reset point. Determine where the control points are, then set accordingly using the instructions provided in the scaling section as a guide.

Setting the SET and RESET value to the same number will disable that channel. Setting both channels to the same SET value will cause both channels to activate simultaneously. This is important, and will be discussed in the next section.

Set the operational features

The DIP switch to the left of the display sets several operational features of the 3620.

The top position selects relay operation between ALARM (slide right) and CONTROL (slide left). An alarm is energized in the reset state and a control is energized in the tripped state. This is done so that if the 3620 fails, alarms will be tripped and controls will be reset.

The second position enables channel alternation (slide right). As an example lets configure a 3620 so that SET A is at 7.0, RESET A is at 3.0, SET B is at 7.5 and RESET B is at 3.0. The first time the level reaches 7.0, channel A trips and relay A activates pump A until the level drops to 3.0. The next time the level reaches 7.0, channel A trips but relay B activates pump B until the level drops to 3.0. Now let's assume a pump A fails and pump A should be called this time. When the level rises to 7.0, channel A is activated but pump A isn't functioning. The level continues to rise until the SET B level of 7.5 is reached, at which point channel B is activated and pump B is activated. This illustrates why the channel A and B SET points need to be at separate values.

Problems and troubleshooting

The most common problem phone support encounters is caused by a malfunctioning or improperly wired transducer. For example, have a 3620 scaled 0.0 to 23.1. If the display is reading about –5.8, then loop current is not flowing into the 3620. Possible causes are a failed 3620, a failed transducer, miswiring to the 3620 terminal block, a transducer wired backwards, broken loop wire, or some other failed or miswired loop device.

The second most common problem is the claim that the relays have failed. The relays on the 3620 are controlled by the internal microprocessor. Their failure rate is very, very low. Most of the complaints were resolved by setting up the relays properly. Please review relay wiring, setting the control points, and setting the operational features.