



PROCESS  
QUANTIFIED

55 Chase Street, 3<sup>rd</sup> Floor  
Methuen, MA 01844  
Phone: (978) 557-0057  
Fax: (978) 557-0058  
Email: info@kodaiflow.com

## Application Note KFR-TN.04

### Configuring Current Loop (4 to 20 mA)

#### CAUTION

*The current loops described in this application note are determined to be "Hazardous Live". Do not perform any wiring with any of the components or near by equipment energized. These instructions are for reference only. Installation may only be performed by certified personnel, taking full responsibility to follow all local codes, regulations and facility SOP, particularly to permits, training and lock-out/tag-out procedures.*

#### WARNING

*Improper installation of this equipment can cause damage to KFR transmitter and connected equipment. Please review instructions from other equipment vendors. If there are conflicts, please contact KFR before proceeding. KFR products are not for use in medical or life safety applications. Warranty is limited to value of supplied equipment.*

**Please read KFR.MN01 CRE1 Wiring and Installation Requirements before proceeding.**

#### Typical Circuits

Figure 1 and Figure 2 show two typical ways a loop output can be wired. In Figure 2, a panel meter has been added to provide a local read out of the flow value. The units can be wired in any order, but the low voltage side of the first device must be wired to the high voltage side of the second device. The total resistance of the loads in the loop should not exceed 200  $\Omega$ .

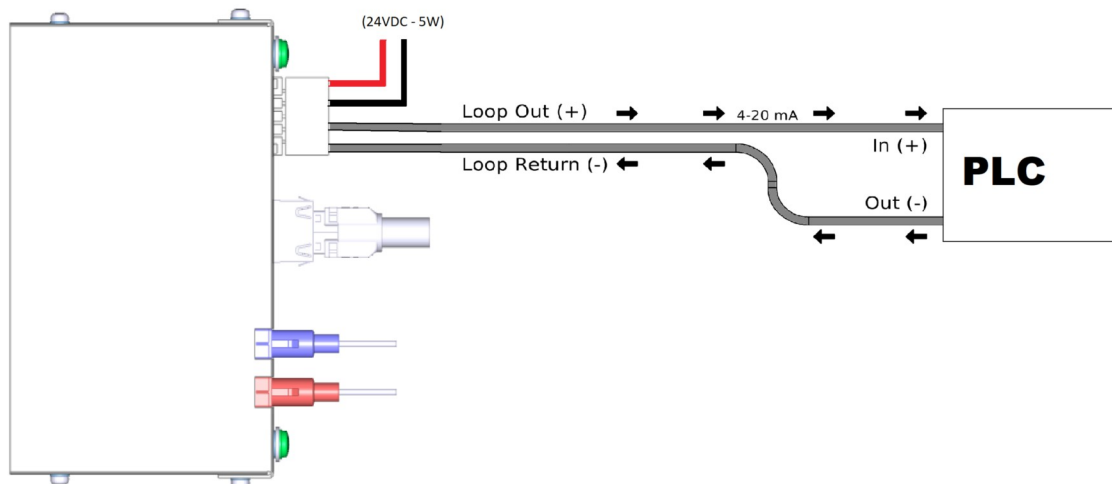


Figure 1 – Typical Current Loop Output to a PLC or SCADA.

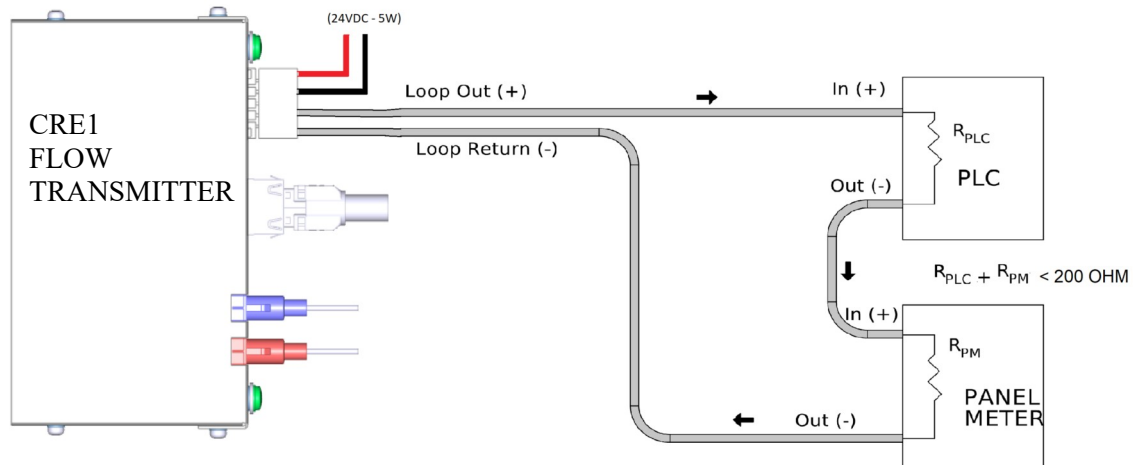


Figure 2 – A Current Loop with a Second Device in Series.

### Preparing PLC or SCADA Inputs

Before connecting the transmitter to the loop, connect a certified 4-20mA calibrator to the circuit and test the response to each current level (Figure 3). If the indicator was shipped matched to the transmitter follow these steps.

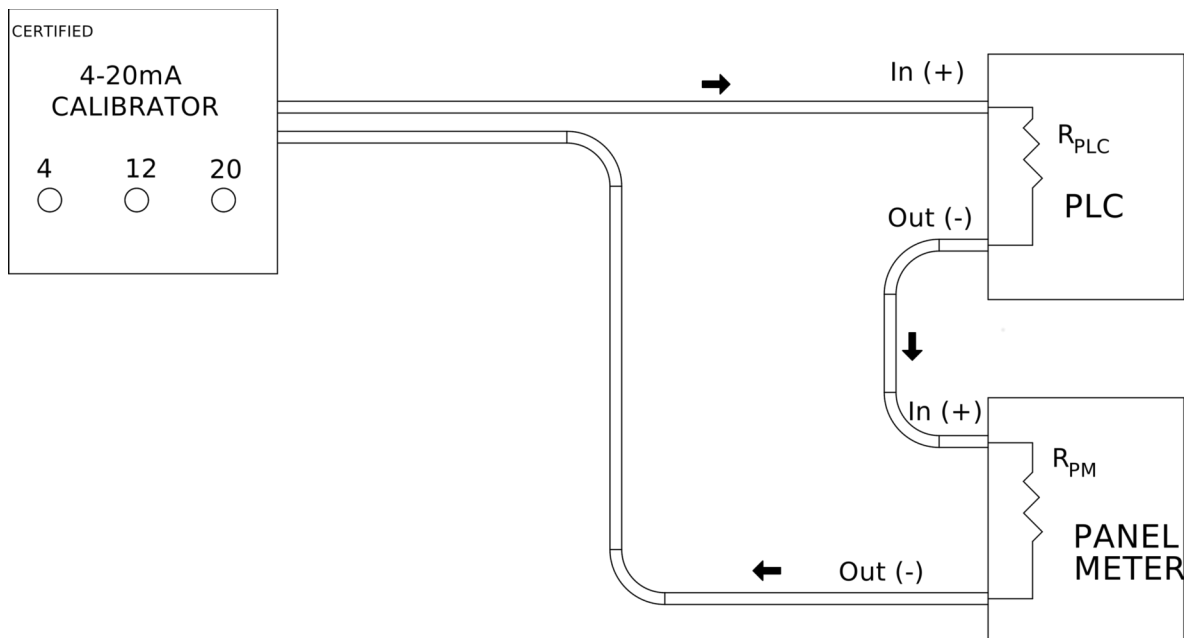


Figure 3 – Using a calibrator to test the inputs to current loop.

1. Check that the panel meter reads within 0.3%FS of the correct low and high values when the 4mA and 20mA are applied (respectively).
2. Set the calibrator to 4mA, adjust the “zero” pot on the PLC to match the reading on the panel meter.
3. Set the calibrator to 20mA, adjust the “span” pot till the PLC matches the panel meter.
4. Set the calibrator to 12 mA and verify the two devices agree.
5. Wire in the transmitter, ***no trimming is necessary.***

If an indicator is installed in series with the panel meter, but has not been matched with a particular transmitter, follow steps 1-4 from above. Wire in the transmitter and follow the steps for trimming the loop in the next section. If no loop calibrator is available, the flow transmitter can be used to transmit a hi or low current to set the PLC to match the indicator, but this is not the preferred method.

### Adjusting the Transmitter Settings

If the transmitter is not part of a packaged kit with a pre-calibrated indicator, the loop will need to be configured.

#### Step 1.

Confirm the range of flow the loop should indicate. If flow rates exceed the limits, the values will be truncated. If reverse or bi-directional flow is possible, use a negative number for the low limit (ZERO). Use a value at least 25% greater than the maximum expected value. For example, if the expected flow rate on a system is 0-40 liter per minute, the high limit should be set to 50 *lpm*. Best practice would be to set the low limit to -10 *lpm* so that accidental reverse flow would be detected by operators relying only on the loop signal.

#### Step 2.

Scale the indicator or logging device to the values determined in Step 1.

On old analog indicators, set the position of the decimal point using switches in the back. Attach a loop-calibrator like the one shown in Figure 4. (As the CRE1 has a traceable calibration, there is no need to spend much on this tool) Transmit 4mA on the loop, then adjust the “ZERO” pot screw till the reading indicator displays the correct low value.



Switch the transmitter to 20 mA. Adjust the “SPAN” pot screw till the reading indicator displays the correct high value.

You may have to repeat this process a couple of times as the span setting will shift the zero slightly.

On digital indicators, follow manufacturers instructions to input the decimal position and the scale factors for low and high values. Technical note KFR-TN.14 details the steps for setting up a MT4W panel display by Autonics as an example.

Step 3.

Power the CRE1 and connect to the unit using the CRE1 modbus utility. For detailed instructions on using the CRE1 Setup Utility, please read manual section KFR.MN03. Select "METER SETTINGS" to bring load the settings. Select the USER and enter the associated PIN to authorize changes. The current loop details are in a box on the center left page as shown in Figure 4.

Set the property to be displayed and the units the data the value is measured. Enter the Maximum and Minimum values from Step 1 and Step 2 in the text boxes provided.

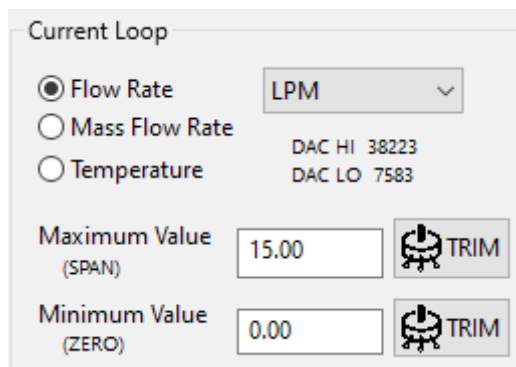


Figure 4 – Loop Calibrator

Make sure the indicator is operating correctly then press the "TRIM" button for the Minimum Value. This causes the CRE1 to transmit 4mA. The indicator should read approximately the correct low limit. If it does not please check the wiring of the loop. A pop-up window will allow small corrections to the current (Figure 5).

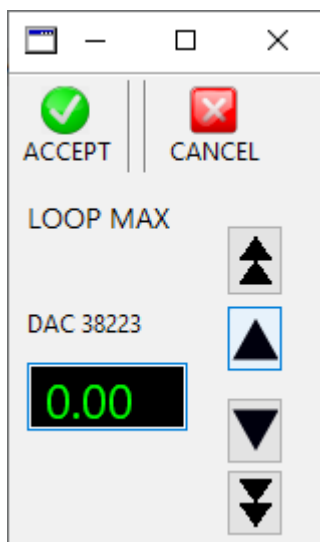


Figure 5 – Trim Function

Adjust the loop output until the desired low or high value is displayed. The pop-up box will display which limit is being adjusted, the amount the current is offset in *mA*, and the DAC value for this current level. The DAC value is the 16-bit integer setting of the digital to analog converter that relates to this current level.

Once the desired low limit is set, press accept. Repeat this process for the high limit.

Save the settings by selecting accept on the main settings page. A message will indicate the electronics have been updated.

*END OF TECHNICAL NOTE*