Kodai Flow Research User Manual:

Installation of CRE1 Flow Transmitter

Document KFR.MN01.V2

Updated Feb. 6, 2022

CAUTION

The mains power on this equipment have been determined to be "Hazardous Live". Do not perform any wiring with any of the components or nearby equipment when 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.

Summary of Electronics Characteristics

Supply Voltage	*22-26VDC*
Typical Power Consumption	*4 Watts*
Maximum Ambient Temperature	*45 C (Non-Condensing)*
Cooling	*Passive Thermal Plane*

Area Requirements

The CRE1 Ultrasonic Flow Transmitter is designed to meet the requirements of IP20 per IEC 529. It must be installed in an approved enclosure for protection against ingress of dust, moisture, and corrosive agents, if these conditions are present. It meets the LVD, specifically IEC 61010.

Mechanical Mounting and Thermal Management

The CRE1 has a mounting adapter so it can bolted to the back plate of an electrical enclosure or a panel plate. If these points do not make a solid connection to protective ground, connect the case to protective ground using either of the green ground lugs at the end of the enclosure as shown in *Figure 1*.

When enclosing the CRE1 transmitter in protective area, install it in a manner that does not defeat the passive cooling or allow adjacent component to reject heat into the transmitter. The CRE1 has a thermal plane designed to move heat away from power conditioning and CPU circuits. If the mounting plate does not have sufficient capacity to remove heat from the thermal plane, space must be left for air to flow over the plane to reject 4 Watts with no more than a 10 C rise.

Figure 2 is a line drawing of the transmitter. The rear-mounting frame has points for M4X0.7 screws to fit a standard hole spacing of 50 mm. Select mounting screws screw and washers so that they do not extend into the frame more than 4 mm. Attempting to insert the screw past its bottom point could distort the enclosure.

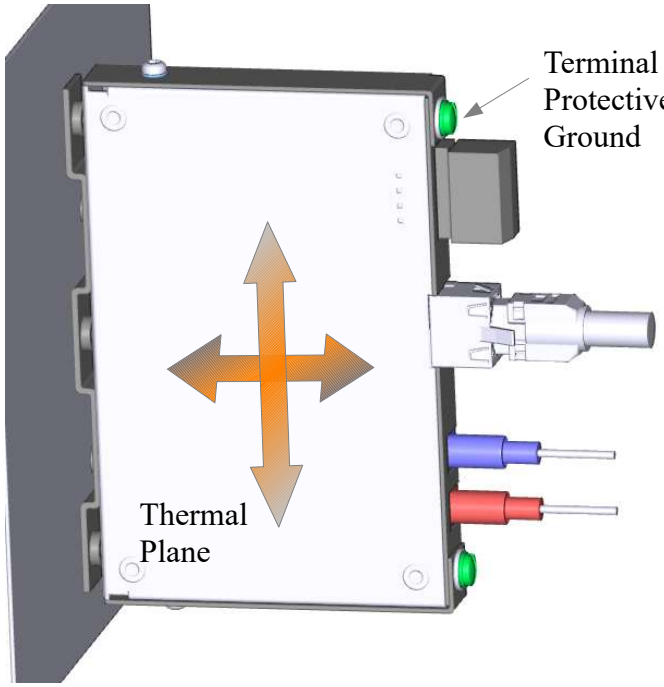

Figure 1 – Mounting of CRE1 inside enclosure.

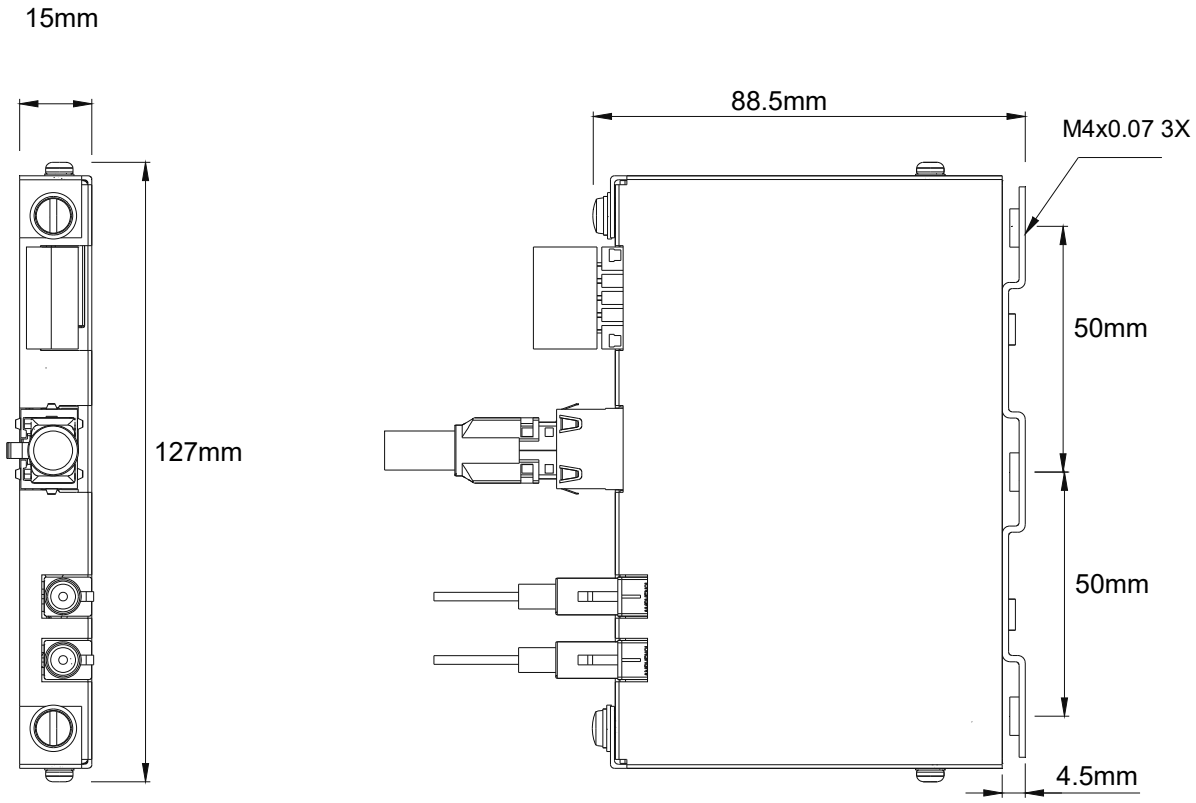

Figure 2 – Line Drawing of CRE1 Flow Transmiter.

CRE1 Ultrasonic Flow Transmitter Electrical Connections

Once mechanically secured, connect the wiring for the transmitter. The mechanical mounting is only meant to hold the electronics in position. The wires and cables must be secured correctly to place no load on the electronics.

Figure 3 is the wiring diagram for the electronics. Mains power and optional current loop is made by an BL-4 Weidmuller terminal block. Although the maximum current is 300 *mA*, a minimum wire gauge of 22 AWG is recommended. If the transmitter is going to be installed permanently without a loop output, it is recommended that the a 250 Ω resistor be installed between pin 3 and 4 of BL-4 connector to allow the loop output to without error. Adding this resistor will also allow the output to be used as a 1-5 V DC output.

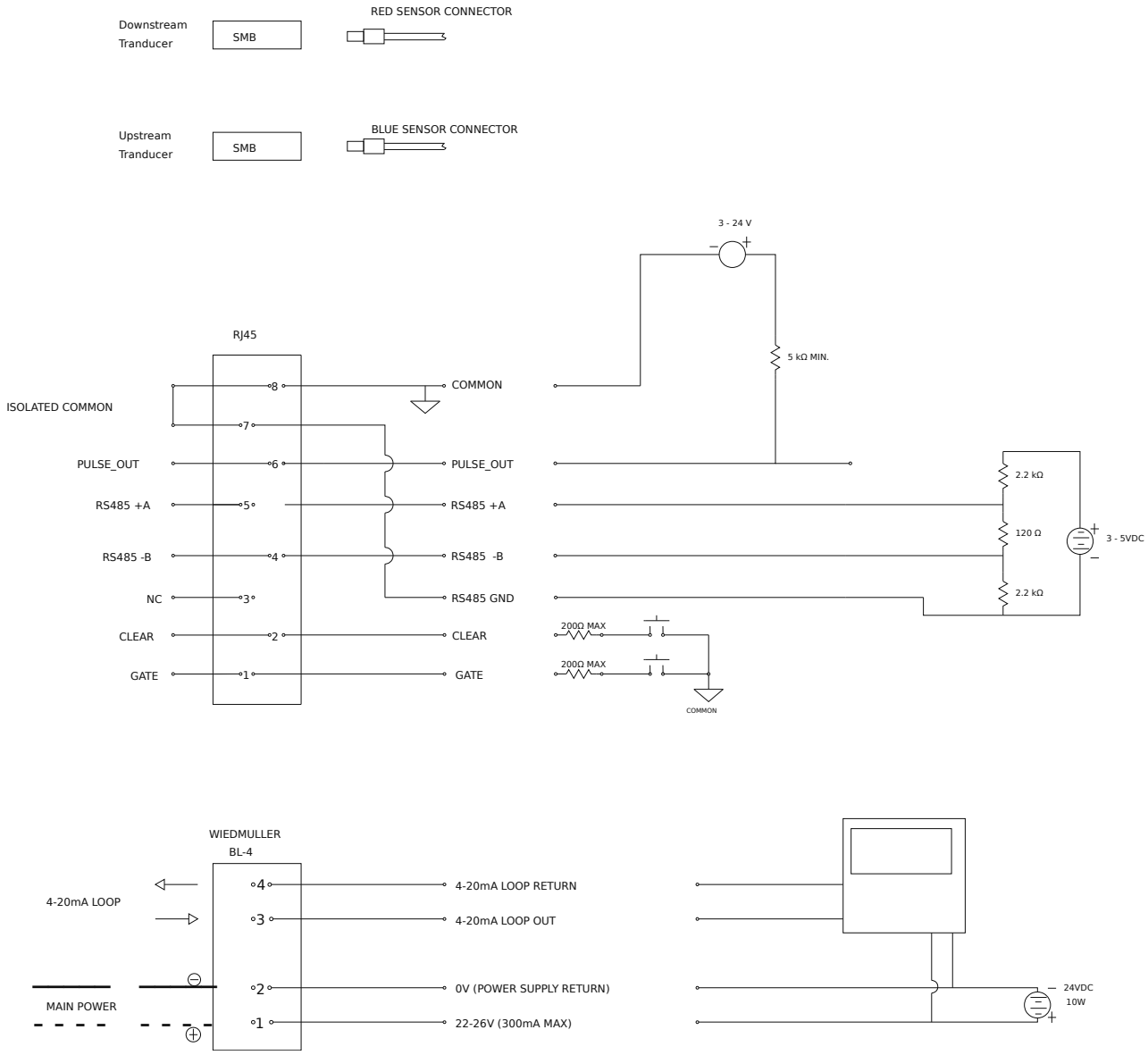

Figure 3 – CRE1 Wiring Diagram.

The RJ45 connector in the center of the transmitter contains all the isolated logic connection for a PLC and HMI interface. The logic lines are isolated by maximum of 500VDC from the mains common or protective earth. However the user should provide circuitry that prevents the digital equipment from floating more than 200 volts from the protective earth. The logic inputs, output and RS485 serial communication share a common voltage reference.

The serial communicates using a two-wire RS485 with the standard Modbus CRC16 protocol. The +A line is connected to pin 5 of the RJ45 connector and -B to pin 4. A terminal resistor may be required if the length of the serial bus is long. An optional bias circuit may be required at the bus master as shown. KFR provides a cable to be used with a PC or Tablet for configuring the transmitter and logging data. Please see KFR.MN02 and KFR.MN03 for detailed instructions.

Pins 1 and 2 are are self-biased logic out lines. Shorting pin 1 to common (pin 7 and 8) causes the transmitter to pause the accumulating total and the process timer. Shorting pin 2 to common clears the totals and resets the timer to zero. These functions can be used in calibration facilities or to measure batch diagnostics. They can also be combined with the logic output (pin 6) to provide limited PLC function for batch fill control.

The logic output on pin 6 requires an external bias voltage between 3VDC and 24VDC relative to isolated common with an output impedance of at least 5 kΩ. This output can be configured to provide a pulse(25ms) after accumulating a volume to mimic a PD meter, or go permanently high when a volume total has been reached. It can also be used to alarm when an error condition exist, or just send a period pulse to indicate the transmitter is functional. The LED next to pin 8 in the RJ45 connector illuminates when logic out is true.

The ultrasonic sensors are connected to the transmitter using FAKRA-type SMB connector. The Downstream is code D (dark red) and Upstream sensor is code C (blue). The ultrasonic sensors can be attached with out the optional locking housing buy just matching the color code as shown in *Figure 4*.

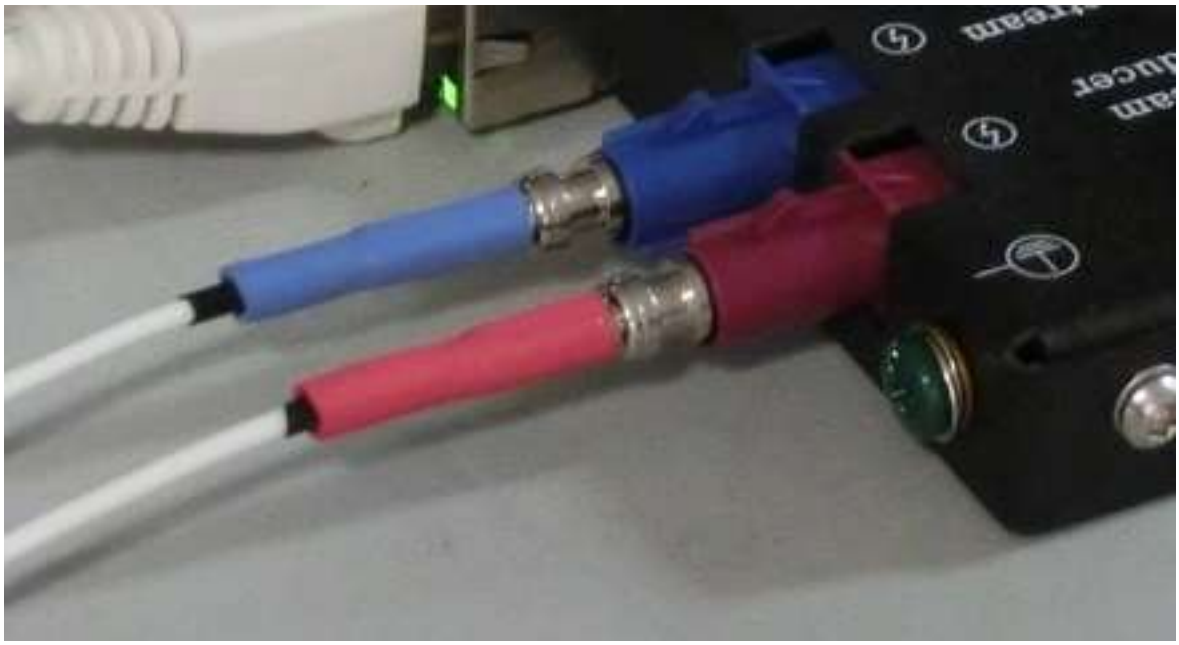

Figure 4 – Connect Sensor cables to color coded FAKRA ports.

If a more robust connection is desired, a keyed locking housing is provided. Be sure the cable is routed correctly and in its final position before installing the locking housing as shown in *Figure 5*. Slip the keyed housing over the connector body till it clicks, then secure with locking pin. To remove, pull out the locking pin, then push the connector out of the housing with a piece of 6mm plastic tube or rod.

Wiring requirement may vary for specific sensors. Please check the technical notes for the specific sensor. For sensors that provide increased protection (*ie*. IP67), the dual cables will have a molded node (Figure 6), so that they can seal on a single cable gland when going though an area boundary (Figure 7).

Figure 5 – Coded locking housing for sensor cable.

Figure 6 – Dual cable with molded sealing node.

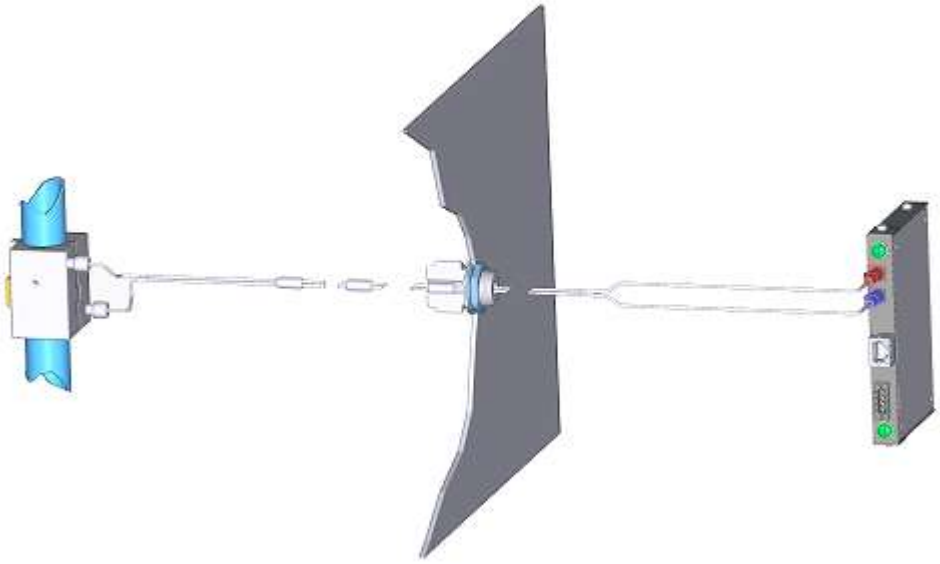

Figure 7 – Sealing on molding at area boundaries.

In some cases, extension cables will be provided for long runs to the sensor. Pre-run the extensions and secure them before connecting to either the transmitter or the sensors. ***Cables can be very heavy and the sensor mounts cannot support this weight. Failure to secure lines can damage equipment and result in severe injury.***