Kodai Flow Research User Manual:

Configuration of CRE Flow Transmitter

Document KFR.MN03.V2

Updated December 11, 2020

Disclaimer:

Use of this product is at the users own risk. No liability is implied except for the value of the measurement system. Every effort has been made to ensure the equipment is designed to meet required standards in safety, emissions, and susceptibility, however it is left to the user to insure no interference with other equipment exists, and that the installation complies with codes and regulations.

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

Introduction

The CRE1 Ultrasonic Flow Transmitter can be configured using the portable utility available for Windows tablets and Windows, Linux, and Mac OS laptops. Please see document KFR.MN02 for instructions on installing the Modbus Utility. This utility allows all the transmitter settings to be displayed in a single page for easier auditing and compliance with 'Copy Exactly!' quality programs.

Configuration Page

Connect the transmitter to power and insert the digital I/O cable into the RJ45 connector as shown in *Figure 1.* Refer to KFR.MN02 for details on serial port configuration.

Figure 1 – Electrical Connections for CRE1 Flow Transmitter.

Open the utility program. Select METER SETTINGS from the top menu (*Figure 2)*. The program will retrieve the current settings from the transmitter, then display the information in the configuration page, as shown in *Figure 3.*

Figure 2 – Select METER SETTINGS *to open the configuration page.*

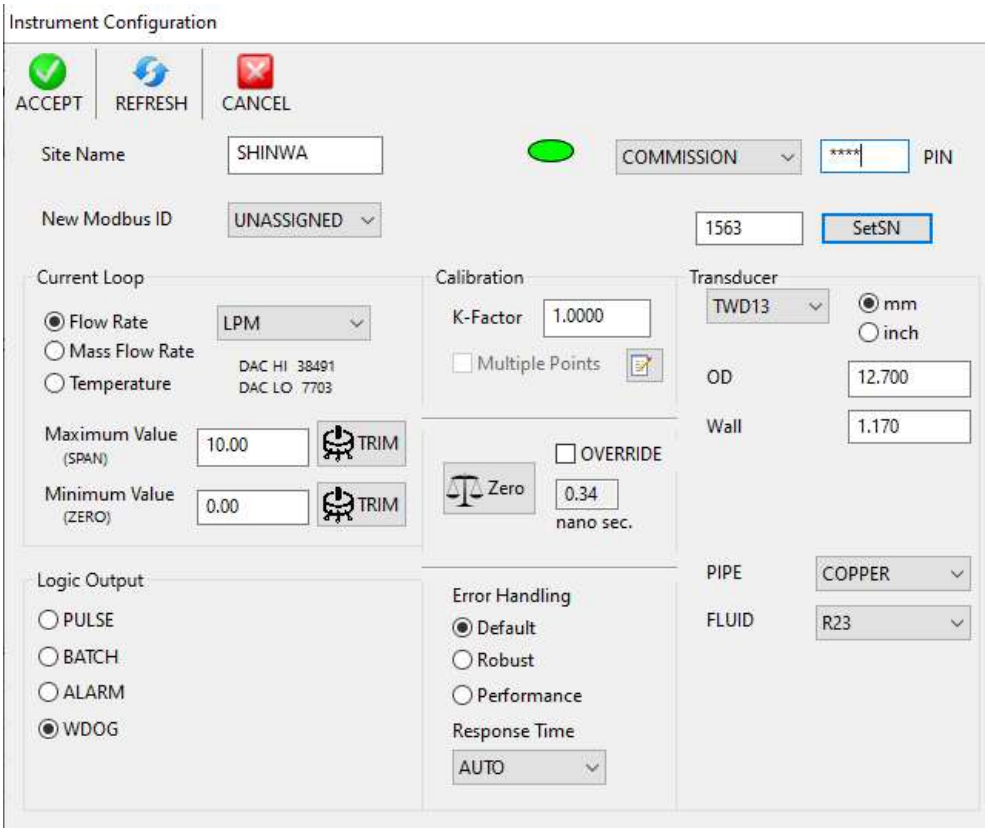


Figure 3 – The configuration page for a CRE Flow Transmitter.

Select User

Only Field, Factory, and Commission users can modify the configuration of a transmitter. All other users can just view the settings. Field users can only change the calibration factors and other settings needed at the point of installation. Factory users can set the sensor which the transmitter is mated, and all other application specifics. Commission allows serial numbers and tracking information to be set as the transmitter enters service. Select the user type from the menu on the top left and enter the provided PIN. This prevents accidental changes and leaves an audit trail to verify what changes were made.

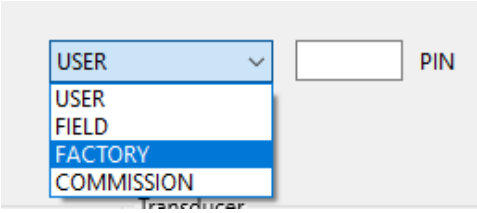


Figure 4 – The USER select section.

Modbus Address

The top left corner of the page is where the Modbus address can be set. With the terminal connected only to the CRE1, select the address from 1 to 32 on from the drop down menu (*Figure 5*). The CRE1 uses a standard Modbus RTU-16 protocol. It can operate on a RS485a/b bus with equipment from other vendors. It is the users responsibility to ensure that the unit is assigned a unique address and no conflicts exist with other vendors. ***ASSIGN THE TRANSMITTER ADDRESS BEFORE INSTALLING IT ON A POPULATED BUS!***

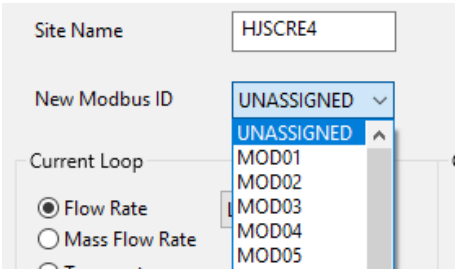


Figure 5 – Assigning Modbus address and site name.

After the settings have been saved to the transmitter. Remember to change the address on the terminal program to match the meter you wish to log data. In this section there is also a place to give the transmitter a unique name. The name can consist of up to eight, uni-code characters.

Sensor Configuration (Factory Users Only)

Select the type of sensor from the drop down menu (*Figure 6*). For the TWD series clamp-on cells, the standard diameter and wall thickness for the tubing that these frames fit. If there is a discrepancy, contact KFR factory before installing.

Set the material of the tubing or pipe. TWD sensors are designed for PFA or PTFE tubing only.

Select the fluid under test. If your fluid is not an option, contact KFR for the closest alternative.

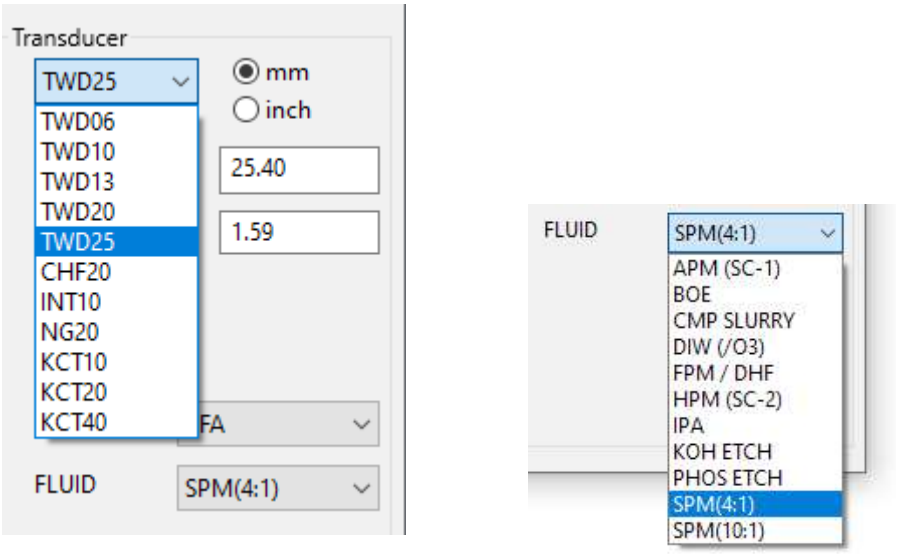


Figure 6 – Sensor settings.

Calibration Factors

In the center of the page is the area for entering calibration information. The first is a zero offset. It is like the TARE function in the scale. To use this, insure the flow is blocked and the transmitter is running error free. Then select the *Zero* button (*Figure* 7). The computer inside the transmitter will measure the electronics delay, and force the meter to read zero. If a sensor has been calibrated separately from the transmitter, the zero offset can be manually entered by selecting the override box and typing the offset into the textbox in nanoseconds (10^{-9} seconds).

The meter can then be calibrated against a reference and a K-Factor can be entered. If a multi-point calibration table is required, select the notepad icon. A window will appear to enter the interpolation table entered.

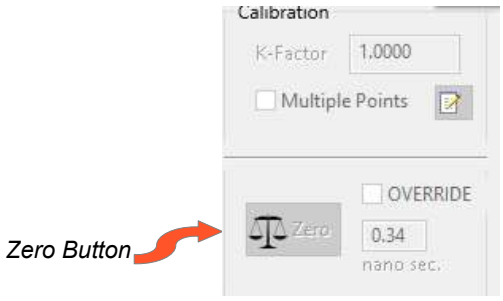


Figure 7 – Entering calibration constants.

Response Time

In the bottom center of the configuration page is the response time setting. Using the pick box (*Figure 7*), select the time frame to dampen the output of the flow transmitter. *AUTO* is the default value. In this mode, the computer in the transmitter uses a statistical algorithm to remove pulsation from pumps and process, but still allows it to respond to step changes in the flow. All other settings have a fixed response time.

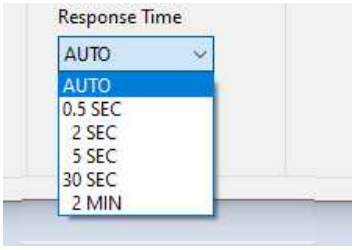


Figure 8 – Selecting the response time.

Error Handling

Just above the response time is a group of radio dials to control the error handling settings. The computer scans multiple parameters of each measurement to make sure each is a valid measurement. Because setting the limits for each of these tests is complicated and prone to error, the CRE transmitter has grouped them into 3 setting levels. Just as some cars have economy, off-road, and highway settings, the transmitter allows the user to select Default, Robust, and Performance. Use default mode unless directed by a service engineer.

Figure 9 – Setting the error handling mode.

Default Error Handling – Select this mode for normal industrial applications. The tolerances are wide enough to handle moderate fluctuations in temperature, pulsations and bubbles up to 5% of volume but still respond quickly to faults like dry-pipe and bubbles up to 5% of volume.

Robust Error Handling – Select this mode for extreme application with unstable flow, rapid temperature fluctuations and high percentage of bubbles. The tolerances are tightened to ensure bad measurements are ignored. In this mode, the meter does not respond as fast to a dry-pipe condition and the response time can be slower.

Performance Error Handling – Select this mode for good conditions where precision and response time are most important. This mode has high tolerances and will quickly issue an error and zero the output if correct conditions are not met.

Current Loop Output

The CRE1 transmitter has one current loop output for legacy applications. This loop can be found next to the mains power (see *Figure 1*), and shares the same ground plane as the input power, so it can be set up as a standard 3 or 4 wire configuration. The loop drives a current that varies, from 4 *mA* to 20 *mA,* proportional to the programmed limits. The first step is to select what measurement is to be transmitted, flow rate, mass rate, or temperature. Then select the units the output is defined. In the configuration, shown in Figure 10, the output is the volumetric flow rate in liters per minute. Enter the maximum value, also called SPAN, in the top box. Enter the minimum value, also called ZERO, in the lower box. In the example, the transmitter will force a current of 4mA for flow rates of 0 lpm and below. It will transmit 20 mA for flow rates of 15 lpm and above. The current will be proportional for flow rates between 0 and 15 lpm. The ultrasonic meters are bi-directional, so enter a negative value for the lower limit if reverse flow is expected.

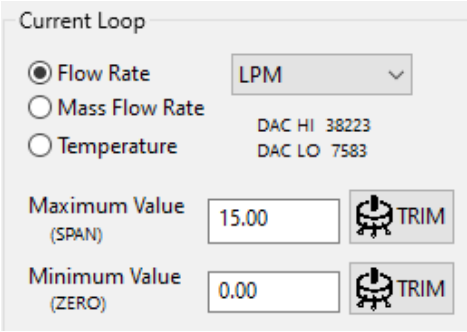
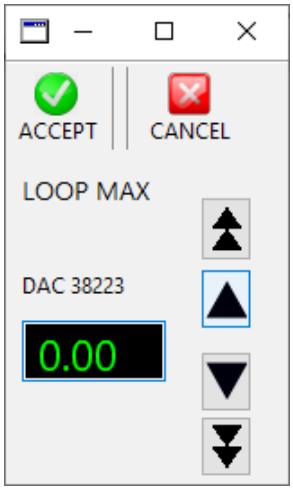


Figure 10 – Current Loop Configuration.

The current outputs are factory calibrated, but it is possible to trim them to get an exact match with the current indicator or PLC. First, verify that the Span and Zero of the indicator match those programmed into the transmitter. ***Do not use the trim process to modify the scale of the indicator.***

Press the TRIM button next to the Zero box. This causes the transmitter to drive 4mA exactly. Adjust the zero setting on the indicator until the displayed value matches the value in the text box. Then select "Cancel" on the pop-up control, as shown in *Figure 11*.



Alternately, you can leave the indicator as found and adjust the zero point using the up and down controls on the pop-up. The green numbers indicate the amount of the adjustment in mA. Do not make adjustments greater than 0.2 mA. This will reduce the accuracy of the loop. Calibrate the indicator instead. If the adjustments are correct, press "ACCEPT" to save the adjustments. Press "CANCEL" to abandon changes.

Repeat the process for the Span value by selecting the trim icon next to the maximum value box.

These changes will not take effect until the new configuration has been saved to the transmitter and it has reset.

Figure 11 – Trim Control.

Logic Settings

The CRE1 transmitter also has one logic output for integration into PLC networks. This output is an optically isolated, passive input that operates in open collector mode the LED aligned with pin 1 of the RJ45 connector flashes when the output is true. The output and the two logic inputs share a common ground with the RS485 input. The bias voltage should be between 5VDC and 24VDC with minimum impedance of 100 ohms. See wiring and installation guide for more details.

The logic output can be set for one of four modes:

Pulse Output – The logic output will pulse true for 25 milliseconds each time the volume specified has accumulated (*Figure 12*). Provides an output similar to tilt cup or gear meter.

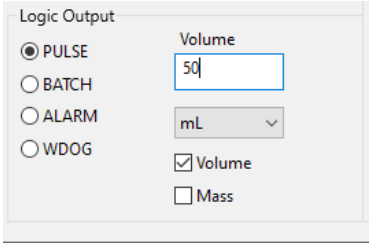


Figure 12 – Pulse Output.

Batch Output – The logic output will drives true and stays true once the accumulated volume is greater than the entered value, as shown in *Figure 13*.

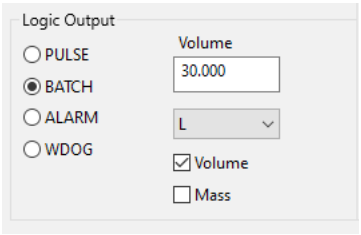


Figure 13 – Batch Output.

Alarm Output – The logic output will drives true when and alarm condition occurs (*Figure 14*). The user can set it to only alarm on dry pipe, wrong fluid, or all types of errors.

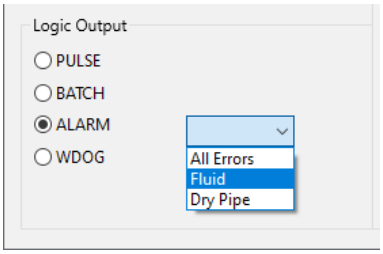


Figure 14 – Logic Alarm.

WDOG Output – The logic output will pulse true for 50 milliseconds twice a second to prove the transmitter is functioning properly. This gives a visual indicator and the logic output can be routed to the control system for monitoring

Updating Transmitter Settings

Once all the settings are as required, select the ***ACCEPT*** icon from the top menu, as shown in *Figure 15*. Select ***CANCEL*** icon to abandon changes and return to main terminal. ***Refresh*** icon clears the changes and reloads the original settings. You will be queried to confirm that you really want to change settings.

Figure 15 – Page Top Menu.

Reminder: If a new Modbus address (ID number) has been assigned to the transmitter, the new address must be selected in the COMM settings continuing to communicate with the transmitter.