QIRF

REFRIGERANT GAS TRANSMITTER/SENSOR

COMMISSIONING MANUAL

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1. Function and Configuration

Note: This commissioning manual is only for the QIRF with Display Software Version V2.01 or late and MySensor Software Version V1.03 or late. Early version software doesn't have the ACT/REF voltage showed on the LCD.

Note: All QIRFs have been fully calibrated in factory. Normally zero cal or span cal are not necessary when the detector is installed on-site. However, if the ACT/REF voltages changed upon installation due to vastly different environmental conditions, the zero cal may require adjustment. However no span cal is needed.

1.1 QIRF Working Mode

QIRF has working mode:

- Warm-up Mode: to heat up Optical Block and initialize components.
- Monitoring Mode: to measure the gas concentration and output signals.
- Zeroing Calibration Mode: QIRF is performing Zeroing Calibration.
- Span Calibration Mode: QIRF is performing Span Calibration.

1.2 System Initialization

When the QIRF smart sensor is turned on, it initializes hardware and software. As the transmitter is warming up, the optical block is heated to a constant temperature, and the LCD will display that the transmitter is in warming-up procedure.

In warm-up mode, the reading of the transmitter will always be zero and the analog output will always be 4mA. The controller (M-Controller and/or Q4 Controller) will display "Warming up" on its LCD display.

The time for stabilizing the optical block temperature depends on the ambient temperature and power supply voltage. The lower the ambient temperature and supply voltage, the longer it takes for the unit to warm-up. At 25°C, with a 24V supply voltage, it takes 15 minutes to reach the set temperature.

Once the temperature is stable, the unit will continue to display that it is in warm-up mode, and it will display the Zero/Cal Timer countdown time. At this point, the detector is in the process of stabilizing, which can take several hours. The default warm-up time is 45 Minutes. The display will indicate the ACT (active IR channel) and REF (reference IR channel) voltages.

Warm-up mode can be aborted only after the temperature is stable by pressing key [ESC] for 3 seconds. The warming-up timer can be set again in [MENU]=>[System Setting]=>[Zero/Cal Timer].

If the warming-up procedure is not aborted, the transmitter automatically starts zeroing calibration once the timer runs down fully, then it will automatically enter into monitoring mode.

2. Commissioning Procedure

1. Check if the power supply is sufficient for all the QIRF detectors. Each detector will draw maximum 1.0Amp at 24VDC during warm procedure.

2. Check voltage of the power supply.

3. Power up the QIRF.

4. After 20 minutes, check the ACT and REF voltages. If many detectors are powered up together, it may require longer (1 to 2 hours) to wait for all devices to be stable. The adjustments below should be performed only when the ACT and REF parameters of the QIRF are stable.

5. Check if the ACT and REF voltage in right range

    - The best range for ACT and REF voltage range is

        i. 1.0V to 1.5V in dry environment

        ii. 1.5V to 2.0V in high humidity environment

    - Hint: Click [Up] Key, the voltage screen will be held for 30 seconds

6. If REF voltage is out of range, open the QIRF enclosure lid, and then carefully adjust the pot on the left side PCB

    - Clockwise turn will increase the REF voltage

    - Counterclockwise turn will decrease the REF voltage

    - Note: the voltage has 1 to 2 minutes to fully stabilize after any pot adjustment

    - Note: If the REF voltage cannot be adjusted in the right range, the unit should be returned to QEL for repair/evaluation

7. If ACT voltage is out of range, a zeroing cal will bring it to normal range

    - Abort warming-up procedure by pressing [ESC] key for 3 seconds

    - Enter [Menu]->[Zero CAL] to perform zeroing calibration

    - Enter [Menu]-> [System Setting]=>[Zero/Cal Timer] to enable timer again

8. Record the ACT and REF voltage.

9. Wait >30 minutes, then compare the current voltage with the recorded values; if the both voltages show no change, or if they are shifted by the same amount, then the detector is working normally. Leave the detector in Warm-up mode, so it will perform zero-cal again after 24 hours, which should be sufficient time for the detector to stabilize in the environment.

10. For those environments that are not suitable for zero-cal (for example, if the unit is operating in an environment where an existing leak is suspected), abort the warming-up procedure, which will force the unit return to monitoring mode.

3. Site Service

11. The ACT and REF voltage should be checked to find if they are out of range. Got to [MENU]=>[System Setting]=>[Zero/Cal Timer] to enable the time, so the ACT/REF voltage reading will be shown on the LCD

12. An error message 'PH-Dirty' may be caused if the REF voltage is out of range. If this is the case, perform step 5 to step 9 in the above commissioning procedure.

4. Troubleshooting

SYMPTOMS	PROBABLE CAUSE	SUGGESTED SOLUTION
RS-485 RX LED or TX LED constantly ON	• RS-485 bus connection has problem • RS-485 Driver U7 is damaged • Controller side RS-485 Driver has problem	• Disconnect the Cable to isolate the problem • Replace U7 IC on display board • Replace RS-485 Driver in Controller
In Warm Up Mode too long	• In Warming up process • Temperature sensor defective • Heater is defective	• Wait for the block to warm up • Check IR Block Assembly • Check IR Block Assembly
Error Report [PH-DIRTY] [LP-SHORT] /[LP-OPEN] [CAL-ERR]	 • IR Source or Lamp Dirty • Gas Sample Cell Dirty • Signal Fault • Drift too much • Lamp Short/Open • Calibrating Error • Other Error	 • Return to Factory • Return to Factory • Return to Factory • Re-zeroing calibration • Check IR Block Assembly • Recalibration • Adjust Ref pot • Check Gas Flow • Use different calibration gas • Replace weak IR Source Assembly • Replace Broken IR Detector Assembly • Return to Factory
IR Source LED is constant ON or OFF, not blinking	• Main Board has problem • Heater is short/Open	• Check Firmware and Driver • Check IR Block Assembly
Reading abnormally high or low or jumping around randomly	• Dirty Sensor Block • Excessive moisture • Weak IR Source • Temperature Sensor Loose	• Return to Factory • Add filter to gas inlet • Replace IR Source Assembly • Check IR Block Assembly