Safety

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Safety
30 VDC maximum on field wiring terminals.
30 VDC maximum on internal card surfaces.

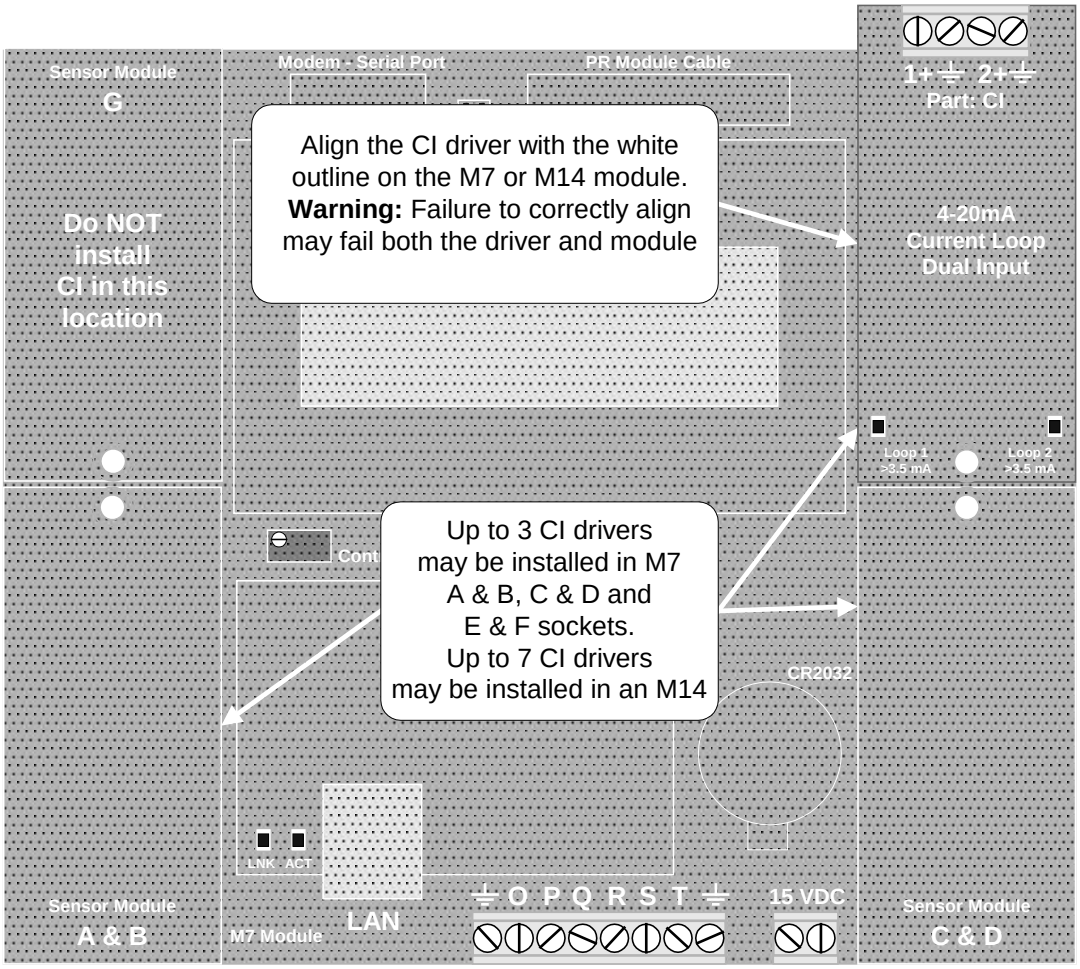
1. Installation

1.1 CI:Services

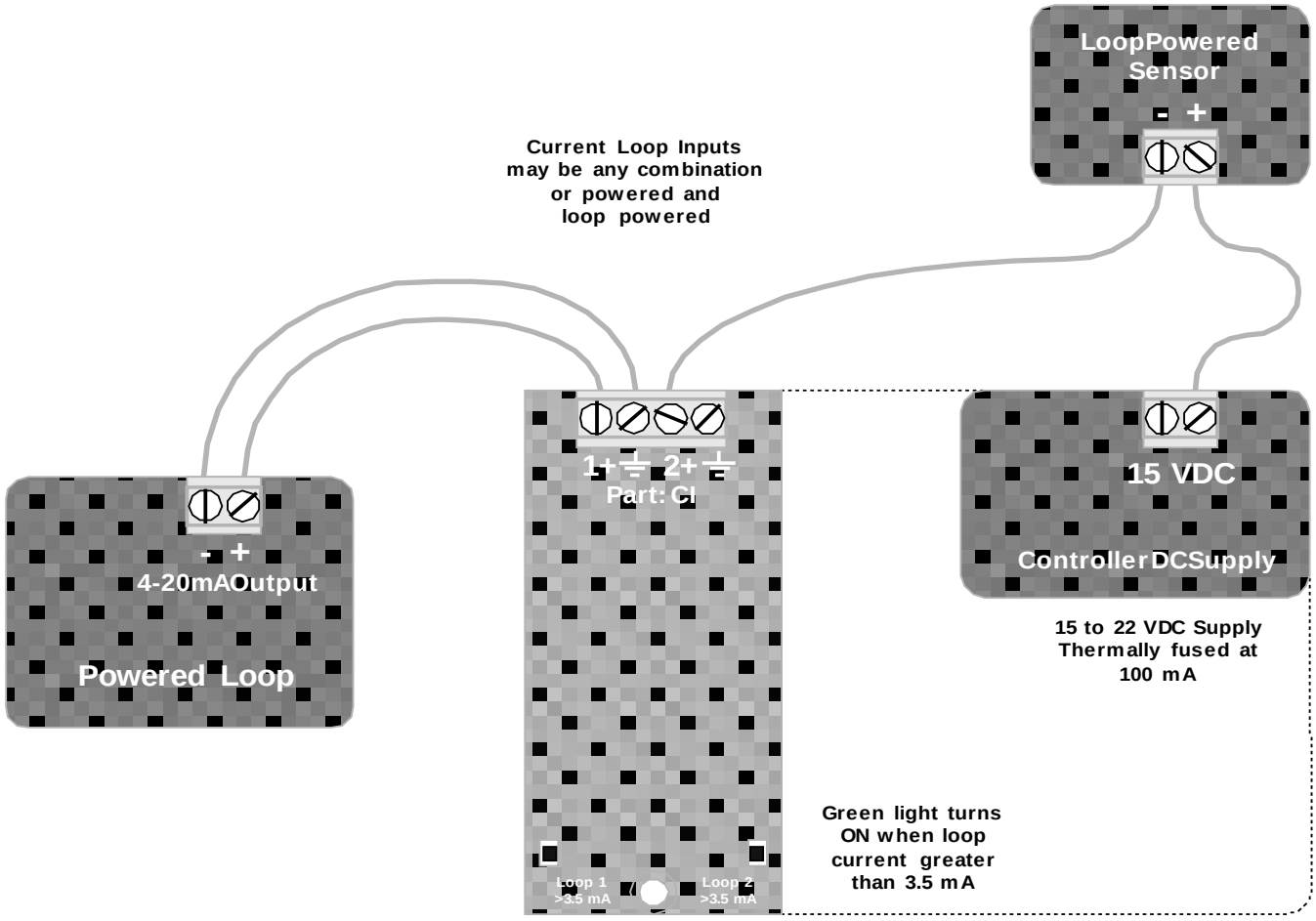
The CI driver measures two 4-20mA current loops.
The CI driver terminates each current loop with 50 ohms, referenced to electrical ground.
Each 4-20mA input is polarity and thermally protected.
Up to three CI drivers may be installed in an M7 controller and up to seven in an M14 controller.

1.2 Driver Card Installation

1. Enable both of the analog inputs at the driver socket location.
2. Turn OFF the controller AC power
3. CI drivers may be installed in any of the seven M14 controller slots and in any of the M7 slots with the exception of '**G**'. If installed in an M7 socket 'G', only loop 1 will be measured.
4. Turn ON the controller after installing the CI Driver and the controller will auto-configure, displaying both inputs as millivolt levels, 200mV=4mA to 1000mV=20mA.



1.3 Driver Wiring



AWG22 / 0.25 mm^2, current loop cabling may be extended several hundred feet or meters without causing measurement errors. The maximum cable length is determined by the open loop voltage and the cable gauge.

Do not install current loop cabling in the same conduit as AC power cabling.

Current loop cabling may share a common conduit with other sensors, water meter and contact set cabling.

2. Configuration - Operation

2.1 Diagnostics

Parameter	LCD Display	Browser	Value : Use
Sensor Location		OK	C: Installation slot. LCD displays slot letter on screen.
Input Card Type	OK	OK	4-20mA Input: verifies driver card type
Current State	OK	OK	Operational / Alarmed:
Displayed Value	OK	OK	1836 gpm: Current measured conductivity, display user set units, '---' default. Displayed with user set resolution
Period Maximum		OK	1920 gpm: Data from current log interval. Used to assess controls.
Period Minimum		OK	1110 gpm:
Period Average		OK	1412 gpm:
Sample Size		OK	1110: Samples in Period Max. Min. & Average
Current Period		OK	46 minutes: Elapsed time in current log period
Log Period		OK	60 minutes: User set log period 5 to 1440 minutes
Compensation	OK	OK	None / Rate-to-Volume:
Measured Level	OK	OK	787.5 mV: Raw sensor level in mV, before Gain & Offset after ID Level correction.
Gain Multiplier	OK	OK	3.1250: Calibration adjusts Gain. Displayed Value = Measured Level x Gain Multiplier + Offset Adjust
Default Gain	OK	OK	1.0000: Factory default Gain. Gain selected by Input Card ID
Offset Adjust	OK	OK	-625: Offset. May be user adjusted.
Default Offset	OK	OK	0.0000: Factory default Offset. Offset selected by Input Card ID
Input Card ID	OK	OK	2218 mV: Design level = 2216mV.

Driver Verification Test:
Connect a 2K ohm (Optionally use 2 x 1K, 5%, 1/4W) resistor between controller +15 VDC terminal and CI Driver terminal **1+.**
Measured Level will be nominally 500mV if the +15VDC terminal is @ 20VDC.
Actual Level varies with the unregulated +15VDC supply and equals: 49.9 x (VDC / (2000 + 49.9)) , where the controller terminate the loop with 49.9 ohms and a 2,000 ohm test resistor is instlled.

2.2 Calibration

Current loops require two point calibration to convert the measured current into end user units.

The current loop may be calibrated using either the Keypad or the Browser, by either calculating the Offset & Gain or driving the current loop between two values.

Two Point Calibration.

1. Configure the device or sensor controlling the current loop to operate at 4mA.
2. Select Sensors / Calibrate and @ 'Enter first value' key the 4mA level in site units. For example if your current loop was spanned 0-2500GPM = 4-20mA, you would key 0 & Enter
3. Configure the device or sensor controlling the current loop to operate at 20mA.
4. Key the 20mA level @ the 'Enter second Value' prompt. In our example you would key 2500 & Enter
5. The controller will then calculate the Offset & Gain required to convert the measured current to user units. In our 0-2500GPM example Gain = 3.125 & Offset = 625.

Any two loop currents may be used to calibrate. The previous 4mA & 20mA example is the optimum. Accuracy improves as the difference between the two calibration currents increase.

Calculating Offset & Gain

1. The input Offset Adjust and Gain Multiplier may be manually set using Sensors / Configuration.
2. This method to convert a measured current to a user value may be used if it's not easy to drive the current loop between 4 & 20 mA.

At 4mA the 50ohm loop terminating resistor measures 200mV (50 x 0.004).
At 20mA the 50ohm loop terminating resistor measures 1000mV (50 x 0.020).
As the current loop varies from 4-20mA, the controller measures a mV change from 200 to 1000; an 800mV change.

If the site 4mA_Level & 20mA_Level are known.
Gain Multiplier = (20mA_Level – 4mA_Level) / 800
Offset Adjust = -200 x Gain Multiplier

Example: 4mA_Level = 0 GPM & 20mA_Level = 2500 GPM
Gain Multiplier = 2500 /800 = 3.125
Offset Adjust = -200 x 3.125 = -625

Check: At 4mA we'll measure 200mV and display 200 x 3.125 – 625 = 0 GPM
At 20mA we'll measure 1000mV and display 1000 x 3.125 – 625 = 2500 GPM

3. Specifications

Function		**Notes**
Resolution	0.0125% of span, 2uA	Most current loop sources are 10 bit , resolution; typically 0.1% of span. In this case, the source of the current loop or loop powered sensor constrains overall accuracy and resolution.
Accuracy	+/- .05% of span	
Max Input Voltage	30VDC	Input is polarity protected to 50VDC and thermally fused at 100mA. Common, electrical ground inputs are not fused.
Terminated Loop Indicator	Green LED ON at loop currents greater than 3.5mA	Visual indication of correct loop wiring polarity and active loop power.

Notes:

1. Accuracy stated after calibration.
2. Resolution Example: If 4-20mA represents 0-2500GPM and the current transmitter has 10 bit resolution, then flow rate would change in increments of 2.5 GPM.