

Safety

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Safety

5 VDC, 1V AC maximum on field wiring terminals.

24 VDC maximum on internal card surfaces.

2. Installation

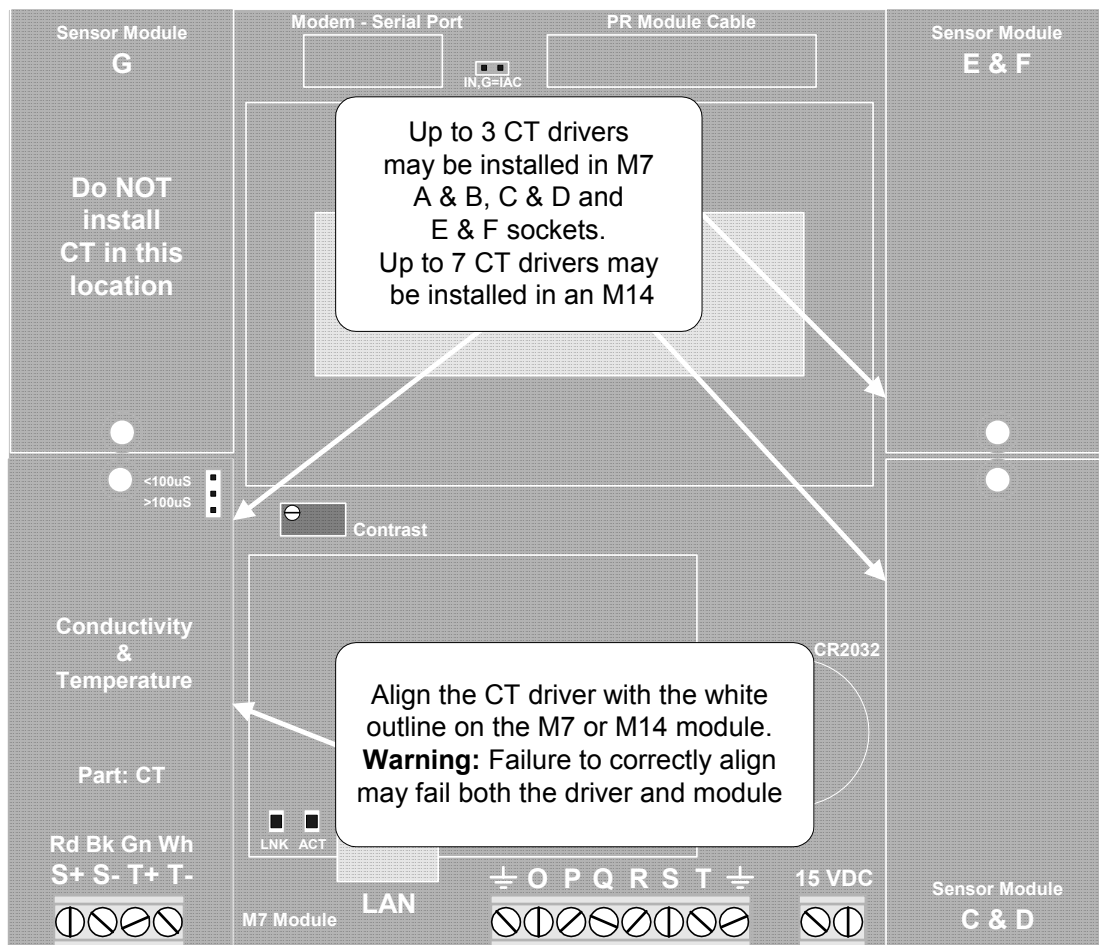
2.1 CT:Services

The CT driver measures conductivity and temperature, connecting to a single immersed sensor. Usually the sensor is installed in a cooling tower recirculating loop, although thermally compensated sensors may be installed in condensate streams, RO piping, downstream of sample coolers on boiler blowdowns...

Up to three CT's may be installed in an M7 controller and up to seven in an M14 controller. Thermal compensation of conductivity is provided by the controller software.

2.2 Driver Card Installation

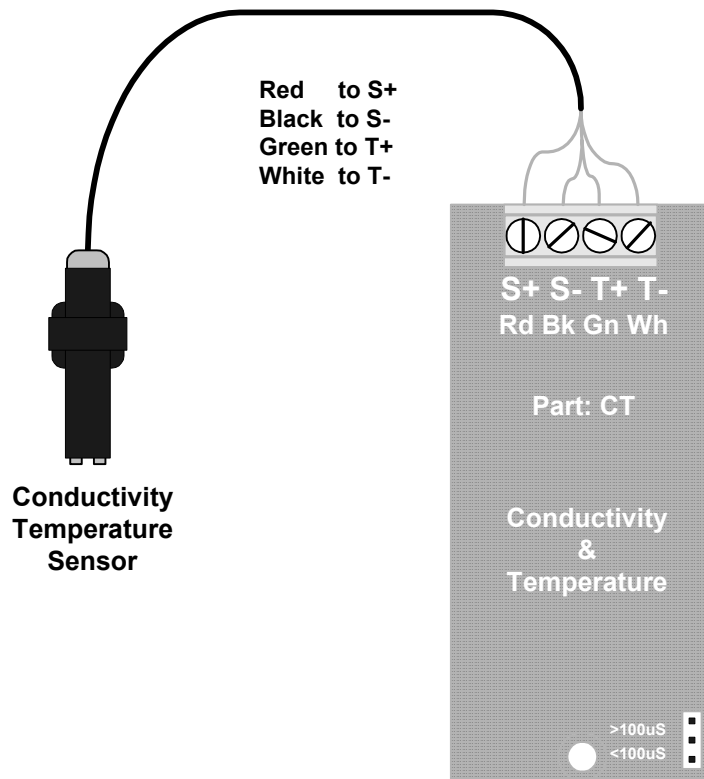
1. Enable both of the analog inputs at the driver socket location.
2. Turn OFF the controller AC power
3. CT drivers may be installed in any of the seven M14 controller slots and in any of the M7 slots with the exception of 'G'.
4. Turn ON the controller after installing the CT Driver and the controller will auto-configure, displaying both conductivity and temperature on the LCD display and browser.



2.3 Sensor Types

Aquatrac type A261200 cooling tower and A261016 hot water, boiler-condensate sensors
Both of these sensors contain a 10mV/K type sensor rated up 125C.

2.4 Sensor Wiring



Conductivity sensor cabling may be extended up to 200ft / 60m, using two pair AWG22 / 0.25 mm², cable spliced to the sensor cable using wire nuts or crimped connectors located in an electrical fitting or enclosure.

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

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

2. Configuration - Operation

2.1 Range Selection

Cooling towers – Waste Water – RO Streams:

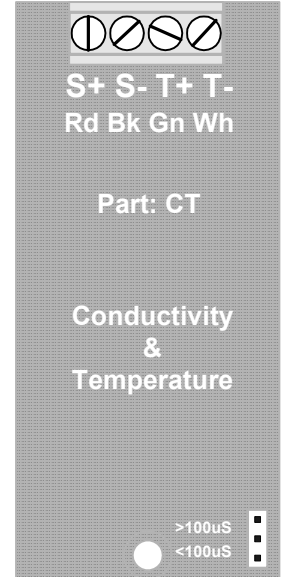
The default range for the CT driver is >100uS. Installing a jumper on the >100uS pins does not change the default range. Use this range for conductivities from 100uS to 20,000uS.

Condensate – Low Conductivity:

Jumper the <100uS pins for conductivities in the 1 to 100uS range. Constant pressure condensate conductivities may also be measured with the single or dual **B** driver using sensors without thermal compensation.

Changing Ranges:

Turn controller OFF before changing ranges
Controllers check range on power up, loading default Offset and Gain on range change.



| | | |
|---|--------|-------------------------------------|
| Conductivities greater than 100uS | >100uS | <input type="checkbox"/> |
| | <100uS | <input type="checkbox"/> |
| Conductivities less than 100uS (Install jumper) | >100uS | <input type="checkbox"/> |
| | <100uS | <input checked="" type="checkbox"/> |

CT: Conductivity-Temperature

2.2 Diagnostics

Technical

2.2.1 Conductivity Input

| Parameter | LCD Display | Browser | Value : Use |
|-----------------|-------------|---------|---|
| Sensor Location | | OK | C: Installation slot. LCD displays slot letter on screen. |
| Input Card Type | OK | OK | Conductivity: verifies driver card type |
| Current State | OK | OK | Operational / Alarmed: |
| Displayed Value | OK | OK | 1088 uS: Current measured conductivity, display user set units, 'uS' default. Displayed with user set resolution |
| Period Maximum | | OK | 1094 uS: Data from current log interval. Used to assess controls. |
| Period Minimum | | OK | 1082 uS: |
| Period Average | | OK | 1086 uS: |
| Sample Size | | OK | 426: Samples in Period Max. Min. & Average |
| Current Period | | OK | 36 minutes: Elapsed time in current log period |
| Log Period | | OK | 60 minutes: User set log period 5 to 1440 minutes |
| Compensation | OK | OK | Thermal Compen. / None: |
| Measured Level | OK | OK | 184.9 mV: Raw sensor level in mV, before Gain & Offset after ID Level correction. |
| Gain Multiplier | OK | OK | 5.6420: Calibration adjusts Gain. Displayed Value = Measured Level x Gain Multiplier + Offset Adjust Thermal Compensation is applied after Gain & Offset if selected |
| Default Gain | OK | OK | 5.6000: Factory default Gain. Gain selected by Input Card ID |
| Offset Adjust | OK | OK | -35.0000: Offset. May be user adjusted. |
| Default Offset | OK | OK | -35.0000: Factory default Offset. Offset selected by Input Card ID |
| Input Card ID | OK | OK | 77 mV: Drive level at >100uS range. Design level = 75mV. 1007 mV: Drive level at <100uS range. Design level = 1005mV. |
| Drive Level | OK | | 0.0 mV: Unused in CT driver. |

| Range | Default Gain | Calibration Gain Span | Default Offset |
|--------|--------------|-----------------------|----------------|
| >100uS | 5.6 | 2.5 to 10 | -35 |
| <100uS | 0.4 | .25 to .55 | -10 |

Calibration: A calculated gain outside of the Calibration Gain Span requires a user selected Override to complete calibration.

Driver Verification Test:

Connect 1K ohm resistor to 'S+' & 'S-'. Set Range to '>100uS'. Measured Level = 187.5mV +/-5mV

2.2.2 Temperature Input

| Parameter | LCD Display | Browser | Value : Use |
|-----------------|-------------|---------|---|
| Sensor Location | | OK | D: Installation slot. LCD displays slot letter on screen. |
| Input Card Type | OK | OK | Temperature: verifies driver card type |
| Current State | OK | OK | Operational / Alarmed: |
| Displayed Value | OK | OK | 78.47 F: Current measured conductivity, display user set units, 'F'/'C' are defaults. Displayed with user set resolution. 'Metric' switch selects 'C' as default. |
| Period Maximum | | OK | 78.55 F: Data from current log interval. |
| Period Minimum | | OK | 78.30 F: |
| Period Average | | OK | 78.45 F: |
| Sample Size | | OK | 1320: Samples in Period Max. Min. & Average |
| Current Period | | OK | 37 minutes: Elapsed time in current log period |
| Log Period | | OK | 60 minutes: User set log period 5 to 1440 minutes |
| Compensation | OK | OK | None: |
| Measured Level | OK | OK | 2988.1 mV: Raw sensor level in mV, before Gain & Offset. 10mV/K = 298.8K, 25.8C |
| Gain Multiplier | OK | OK | 0.18: Gain. May be user adjusted. |
| Default Gain | OK | OK | 0.18: Factory default Gain. Gain selected Metric switch. Metric Default Gain = 0.1 |
| Offset Adjust | OK | OK | -461.4: Calibration adjusts Offset. Displayed Value = Measured Level x Gain Multiplier + Offset Adjust. . |
| Default Offset | OK | OK | -459.4: Factory default Offset. Offset selected by Input Card ID Metric Default Offset = -273 |
| Input Card ID | OK | OK | 3003 mV: Ignored by controller, card ID set by conductivity input. |
| Drive Level | OK | | 0.0 mV: Unused in CT driver. |

| Units | Default Gain | Calibration Offset Span | Default Offset |
|-----------------------|--------------|-------------------------|----------------|
| F | 0.18 | -430 to -590 | -459.4 |
| C / Metric Option Set | 0.10 | -253 to -293 | -273.0 |

Calibration: A calculated offset outside of the Calibration Offset Span requires a user selected Override to complete calibration.

Driver Verification Test:

Connect 1K ohm resistor to 'T+' & 'T-'. Measured Level = 680 +/-5mV
 Measured Level = 680uA thermal sensor drive x 1K ohm

3. Specifications

| Range / Function | | Drive |
|---|--|--|
| >100uS 100 – 10,000uS | Resolution: 1uS Accuracy: +/-5uS | 75mV AC |
| >100uS 10,000 - 20,000uS | Tracks reduced resolution & accuracy | 75mV AC |
| <100uS 1-100 uS | Resolution: 1uS Accuracy: +/-1uS | 1005mV AC |
| Temperature 32 – 250F 0 – 125C | Resolution: 0.1F / 0.1C Accuracy: 1 F/C Temperature compensation of conductivity is %/Degree from 70F or 20C | 680uA Constant current. 5 VDC MAX. |
| | | |

Notes:

1. Accuracy stated after sensor calibration.
2. Exclude errors due to extending sensor cabling.