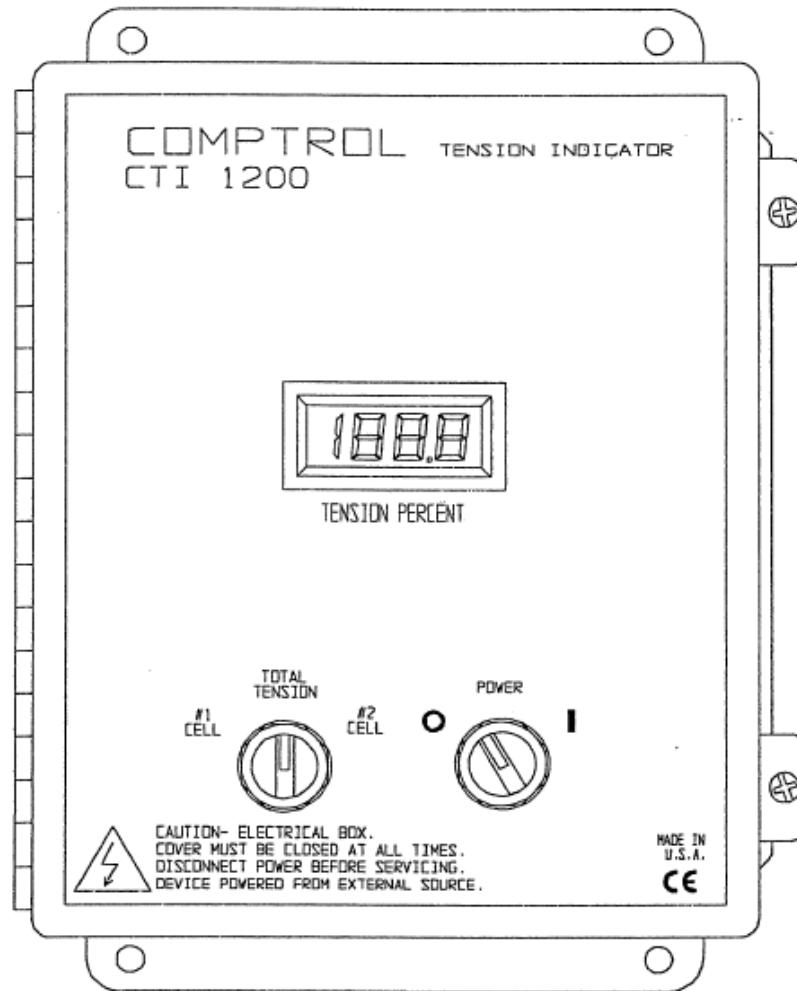


# MODEL CTI-1200-1 TENSION INDICATOR INSTALLATION AND CALIBRATION MANUAL

A-342



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Note that protective covers or guarding may not be shown in some illustrations to provide a clearer view of specific components or assemblies. All protective covers and guarding must be installed before operating the unit.

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## PART I -GENERAL INFORMATION

The CTI-1200 Tension Indicator is designed for applications utilizing one or two Comptrol loadcells to monitor web tension on continuous processing lines. It interfaces with Comptrol Monocells, Tensioncells, and Superloadcells. It provides DC power to the cells, as well as signal conditioning. An analog meter version is available as the CTI-1000. Both carry the CE label.

The cover of this manual shows the front panel of the CTI-1200. Unless otherwise specified at the time of order, the meter will be set to indicate 100.0 percent tension at full scale. However, the decimal can be set for 1.99, 19.99, 199.9, or 1999. (See Display Decimal Point on Page 2 and 3) The display full scale is also adjustable from 200-1999.

The CTI-1200 has an isolated output which signals composite tension. It is configurable for 0-10 volts or 4-20 mA with staple jumpers. Loop power is provided in the 4-20mA mode.

## PART II - INSPECTION UPON DELIVERY

Upon receipt:

1. Examine the exterior of the container for obvious damage or tampering.
2. Check the contents against the packing list.
3. Promptly report any damage or shortage to both the carrier and to Comptrol.

## PART III - INSTALLATION

The CTI-1200 is housed in a stainless-steel enclosure with mounting flanges. Refer to the back cover for dimensions. There are four pre-punched holes for conduit. Two-hole seals are provided to cover unused holes. Loadcell and output cables may share a conduit, but the power wiring must be separate from both. For best interference rejection, mount the box to a grounded metal structure, or ground it with braid.

The enclosure may be mounted in any orientation. No ventilation is required, provided that the ambient temperature limitation is observed.

**NOTE:** A static strap is provided for use while installing or making internal adjustments to the CTI-1200.  
One end of the strap is clipped to the enclosure and the other is attached to the wrist.

### POWER CONNECTION

The CTI-1200 accepts single phase AC power at 50 or 60 Hertz. Voltage may be 110-125 or 220-240 with one side neutral. If both lines are hot with respect to ground, external fusing must be provided in both lines. Power and safety ground should be connected to J1 as labeled on the board. A ferrite choke (provided) should be clipped over all three wires within one inch of their entrance to the enclosure.

Configure the CTI-1200 for the power provided by setting SW2 to the proper voltage, and by installing the correct fuse in holder F1. It uses 5mm slow-blow fuses rated at 250VAC. A 0.2A fuse with UL/CSA approval is shipped in the holder for 115V power. A 0.1A fuse with SEMKO approval is provided for 230V power.

Switch SW1, located at the top of the board, interrupts power to the board when changing the fuse. During operation, it must be in the I position.

**NOTE:** The input power selector switch SW2 and fuse must correspond to the voltage of the input power source.

### LOADCELL CONNECTION

A Comptrol loadcell is equipped with either a 4-pin type MS connector, a terminal strip, or a pigtail. The following table shows typical wiring to each type. Cell #1 connects to J4, and Cell #2 connects to J5.

<b>J4/J5</b>	<b>CABLE</b>	<b>CONN.</b>	<b>TERM.</b>	<b>PIGTAIL</b>
+24	1 <sup>st</sup> pair	A	1	Red
RET	1 <sup>st</sup> pair	B	2	Black
In H	2 <sup>nd</sup> pair	C	3	Green
In L	2 <sup>nd</sup> pair	D	4	White

Connections to the loadcell depend on the geometry of the application. If the Resultant Load Force squeezes the load plate toward the base plate, the loadcell is operating in the compression mode. If the Resultant Load Force pulls the load plate away from the base plate, the unit is operating in the tension mode.

If a Tensioncell is operating in compression, or a Superloadcell or Monocell is operating in tension, the connections to "In H" and "In L" in the above table must be-reversed. The J Value on the Calibration Data Sheet provided with the loadcells will specify tension or compression.

Optimum cable for the loadcells contains two shielded twisted pairs, such as Belden 8723 or equivalent. Two single-pair cables are also acceptable. For best interference rejection, strip the cable shield back to within a few inches of where the cable enters the box. Connect the drain wire from the cable shield to the stud right next to the hole where it enters the box, not to the SHLD terminal on J4 or J5. The wire should be just long enough to reach from the hole to the stud to make the connection. Leave the loadcell end of the cable shield unconnected. Tape it.

If you are using a single loadcell, connect it to J4. Install a jumper between In H on J4 and J5. Install another jumper between "In L" on J4 and J5.

### OUTPUT CONNECTION

J6 provides the connection for the isolated output signal. This signal may be either 0-10V DC or 4-20mA DC depending on the setting of the V-I jumpers.

0-10V            Minimum load impedance is 5Kohm. Output impedance is 500 ohms.  
 V-I

4-20mA            Maximum load impedance is 1Kohm. The 80-166 provides loop power.  
 V-I

In either case, the output signal is available on J6 between terminals 'Out+' and 'Out-'. A terminal marked 'Shld' is also provided for a shield connection for this cable.

Cable containing a shielded twisted pair will minimize noise pickup. For best interference rejection, strip the cable shield back to within a few inches of where the cable enters the enclosures. Connect the drain wire from the cable shield to the stud right next to the hole where it enters the box, not to the J6 "Shld" terminal. Do not connect the other end of the shield. Tape it.

If the isolated output is being used, the downstream equipment should be connected while performing the initial calibration procedure.

### **DISPLAY DECIMAL POINT**

Comptrol sets the digital panel meter decimal point per customer order when it ships. Changing it requires a pencil soldering iron with grounded tip, rosin-core solder, and solder wick. Switch off the main disconnect SW1 while working on the circuitry

On the back of the digital panel meter is a printed circuit board, with several split pads. The three pads labeled (SG1, SG2, and SG3) on the bottom right corner are used to set the decimal point placement as follows:

SG1 = 1.999                    SG2 = 19.99                    SG3 = 199.9

If all of the gaps are open, there will be no decimal point display (1999). To enable a specific decimal point, it is necessary to close the gap in the respective pad with solder. When re-assigning decimal places, remember to open previously closed solder gap using solder wick to remove the solder.

NOTE: Turn off power to the board and meter at SW1, before working on the circuitry.

### **PART IV- CALIBRATION**

#### **NOTES ON CALIBRATION**

To calibrate the CTI-1200 a calibrated load must be applied on the measuring roll. In the case of tension measurement, the easiest and most accurate way is referred to as a "pull test". One or more cables ropes, or straps are threaded through the web path, and weights are hung from one end to produce the required load. Make sure that THEY ARE CAPABLE OF SAFELY SUPPORTING THE LOAD.

The cable should follow the web path at least over the preceding roll, over the measuring roll, and over the succeeding roll. It doesn't matter which end gets tied off and which gets the weights, except that there should be no driven rolls between the measuring roll and the weights.

When using a single cable, position it at the center of the web, and apply a weight equal to the maximum web tension. Note that this applies a point load to the weakest part of the roll. If the full-scale load has the potential to deform the roll, use multiple cables & weights distributed symmetrically about the center of the measuring roll. When using multiple cables, it is impossible to apply the weights to all cables simultaneously, so they will need to slip to equalize tension. Place something soft between the cables and the rolls. This also protects the surface of the roll.

#### **INITIAL CALIBRATION**

A static strap is provided for use while making internal adjustments to the CTI-1200. One end of the strap is clipped to the enclosure and the other is attached to the wrist.

The following procedures assume the loadcells have been properly installed. Refer to the appropriate Loadcell documentation for detailed information for installing the loadcell before proceeding.

**NOTE:** Maximum accuracy is obtained when the pull test simulates full scale tension. If this is not practical, a portion of full scale may be used. When the calibration procedure calls for setting a meter or voltage to full scale, use the same proportion.

If the isolated output is being used, the downstream equipment should be connected while performing the initial calibration procedure.

Apply power and turn on the power switch. If the switch does not illuminate, skip to the troubleshooting section. For maximum accuracy, the loadcells should be allowed to stabilize for twenty minutes after any power interruption before calibrating.

Remove all load except tare weight from the measuring roll.

**NOTE:** Clip one end of the static strap to the enclosure and the other to your wrist before making internal adjustments to the CTI-1200.

Attach the negative lead from a digital voltmeter to TP7.

- Adjust ZERO & FINE ZERO in the CH1 group for zero volts at TP1.
- Adjust ZERO & FINE ZERO in the CH2 group for zero volts at TP2.

Using a nonmetallic screwdriver, adjust the screw on the panel meter face for a reading of zero.

If the isolated output is not being used, skip this section.

- If using 0-10V output, measure voltage across Out+ and Out- on J6.
- If using 4-20mA output, measure current going out of Out+ on J6.
- Adjust ZERO in the OUTPUT group for a reading of zero volts or 4mA.

Apply full scale load to the measuring roll.

Attach the negative lead from a digital voltmeter to TP7.

- Adjust SPAN & FINE SPAN in the CH1 group for 10 volts at TP1.
- Adjust SPAN & FINE SPAN in the CH2 group for 10 volts at TP2.

Adjust SUM in the METER SPANS group for full scale on the panel meter (between 200-1999).

- Hold the panel switch at #1 CELL, and adjust CH1 in METER SPANS for full scale on the panel meter.
- Hold the panel switch at #2 CELL, and adjust CH2 in METER SPANS for full scale on the panel meter.

If the isolated output is not being used, skip this section.

- If using 0-10V output, measure voltage across Out+ and Out- on J6.
- If using 4-20mA output, measure current going out of Out+ on J6.
- Adjust SPAN in the OUTPUT group for 10 volts or 20 mA.

The panel meter is normally damped with a time constant of 0.5 seconds. Turning SUM DAMP counterclockwise extends the time constant up to 2.5 seconds ONLY when displaying total tension. After placing the system in operation, adjust the SUM DAMP to attain the desired time constant.

## **PERIODIC CALIBRATION**

The following procedure may be used to check and trim calibration during scheduled shutdowns. The switch and meter referred to are on the front panel. The loadcells should be allowed to stabilize for 20 minutes after any power interruption before calibrating.

- Remove all load except tare weight from the measuring rolls.
- Hold the switch at #1 CELL and adjust ZEROs in the CH1 group for zero on the meter.
- Hold the switch at #2 CELL and adjust ZEROs in the CH2 group for zero on the meter.
- Apply full scale load to the measuring roll.
- Hold the switch at #1 CELL and adjust SPANS in the CH1 group for full scale on the meter.
- Hold the switch at #2 CELL and adjust SPANS in the CH2 group for full scale on the meter.
- The meter face and front panel may be cleaned with a household glass cleaner.

## **PART V - TROUBLESHOOTING**

Each procedure starts with a major symptom. Execute each test in turn until one reaches a conclusion. If the problem persists, contact Comptrol.

**NOTE:** Clip one end of the static strap to the enclosure and the other to your wrist before making internal adjustments to the CTI-1200.

### **POWER SWITCH DOES NOT ILLUMINATE WITH POWER APPLIED**

SW1 on the PC Board is a main disconnect. Make sure it is the I POSITION.

Unplug J4 and J5. If this turns the light on, there is a short between +24 and RET on one of the loadcell cables, or loadcells.

Turn off SW1 and inspect the fuse. Unless the 0.1A fuse was used with 115 volts, a blown fuse probably signifies damage on the 80-166 main board. Only try replacing it once. Don't forget to turn SW1 back on. Replacement should be 5 mm slow blow, rated for 250V. 115VAC = 0.2Amps. 230VAC = 0.1Amps.

The light is an LED so it is probably not burned out. Do not replace it with a regular filament bulb. If 24VDC is present between X1 and X2, the LED is defective and needs to be replaced.

### **POWER SWITCH GOES DARK AFTER A FEW MINUTES**

The LED bulb in the power switch runs off the 24-volt power to the loadcells, and is protected by a thermal switch. If a loadcell is drawing excessive current (more than 50mA) or the LED bulb was improperly replaced with a filament bulb, the supply will shut off in a few minutes.

### **INCORRECT OUTPUT POLARITY UNDER LOAD**

The connections to "In H" and "In L" have been reversed, or the loadcell mounting angle is wrong. Review the loadcell connection section, and the Calibration Data Sheet which came with the cell. Don't just switch the wires.

**NO OUTPUT FROM ONE CELL**

Swap J4 and J5. If the problem stays with one channel of the CTI-1200, the board has a defective input. Replace the board. Don't forget to switch J4 and J5 back again.

If the voltage between "In H" and "In L" is zero with the power off, and not zero with it on, but doesn't change under load, the loadcell is defective or its mounting is incorrect.

The problem is with the loadcell or its cable. The following facts will help in checking the wiring:

The board is providing 24VDC between +24 and Ret. A good cell will draw 18-45 mA

The output section of the cell is completely isolated. It should read 15-25Kohms with no power on.

All four cell connections should be completely isolated from the cell housing.

**INCORRECT VOLTAGE AT TP1 or TP2**

Attach meter negative lead to TP7 and check TP8 (-15V) and TP9 (+15V). They should not deviate by more than 0.8 volts. If more, replace the board.

Measure the voltage between "In H" and "In L". The board should be able to achieve zero at the test points with a tare voltage between +/-6.4 volts. It should be able to produce full scale for any input change of at least 0.6 volts. If the cell voltage is out of range, check the geometry of the installation against the Calibration Data Sheet which came with the loadcell. If the cell inputs are within these ranges, the board is defective.

**INCORRECT VOLTAGE/CURRENT AT OUTPUT**

Attach the voltmeter negative lead to TP10 and check TP11 (-15V) and TP12 (+15V). They should not deviate by more than 0.8 volts. If more, replace the board.

If the board is configured for voltage output, remove the cable from J6 and recheck. If it works now, check the load being provided by the downstream equipment. It must be at least 5Kohms.

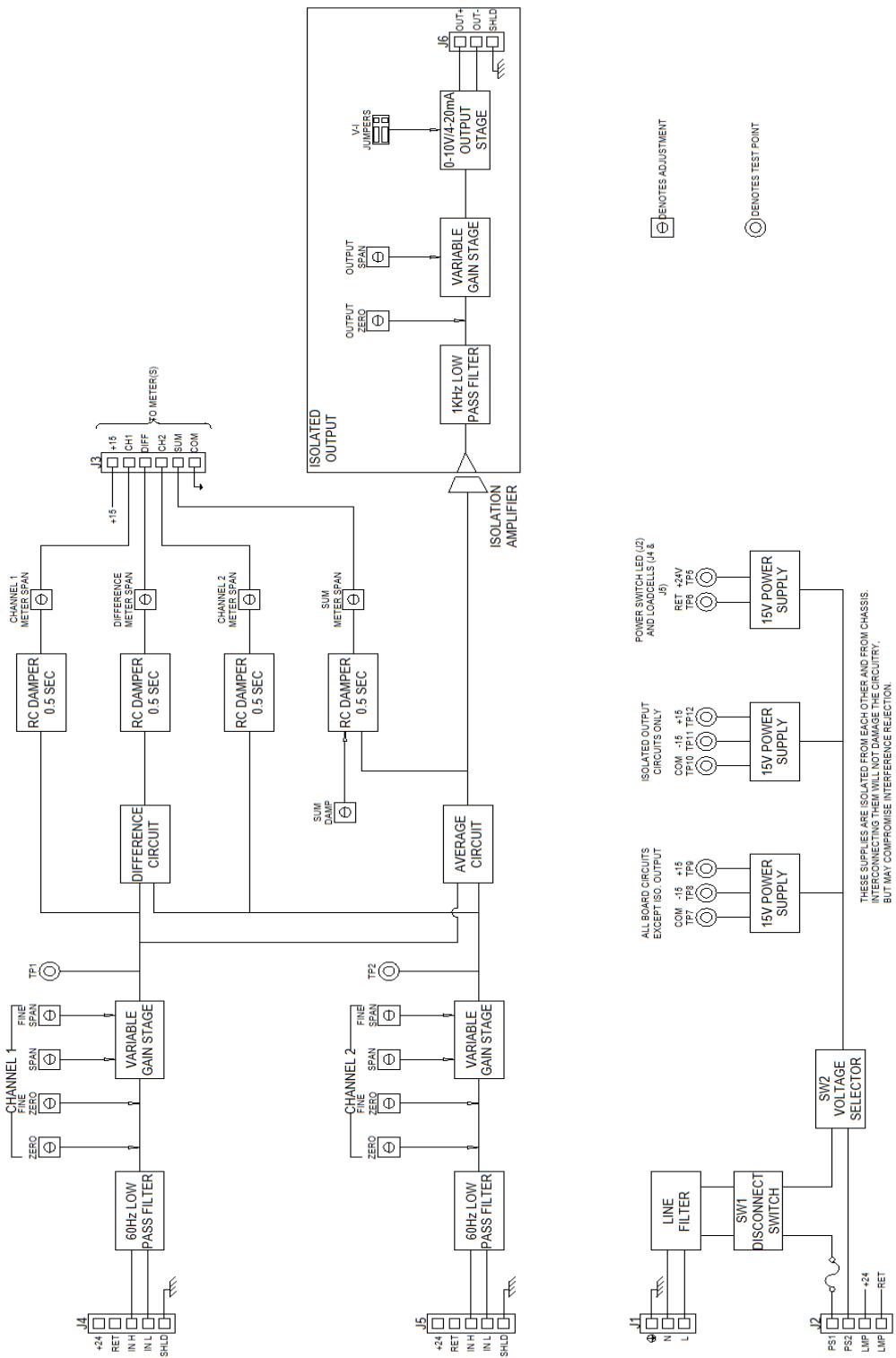
If the board is configured for current output, remove the cable J6 and attach the meter across Out+ and Out-. If it works now, check the load provided by the downstream equipment. It must be less than 1000 ohms and not have any voltage sources. The CTI-1200 provides loop voltage.



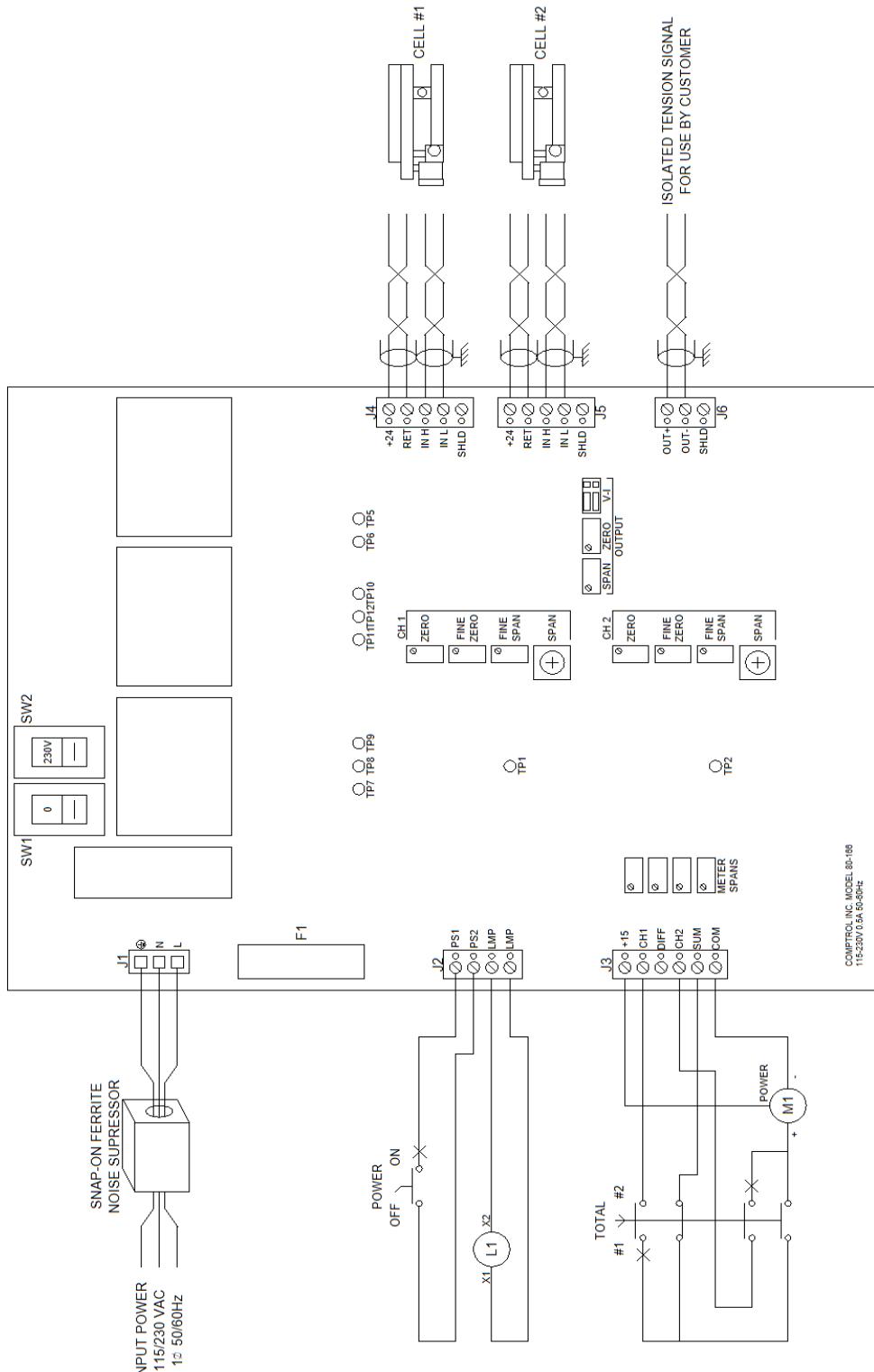
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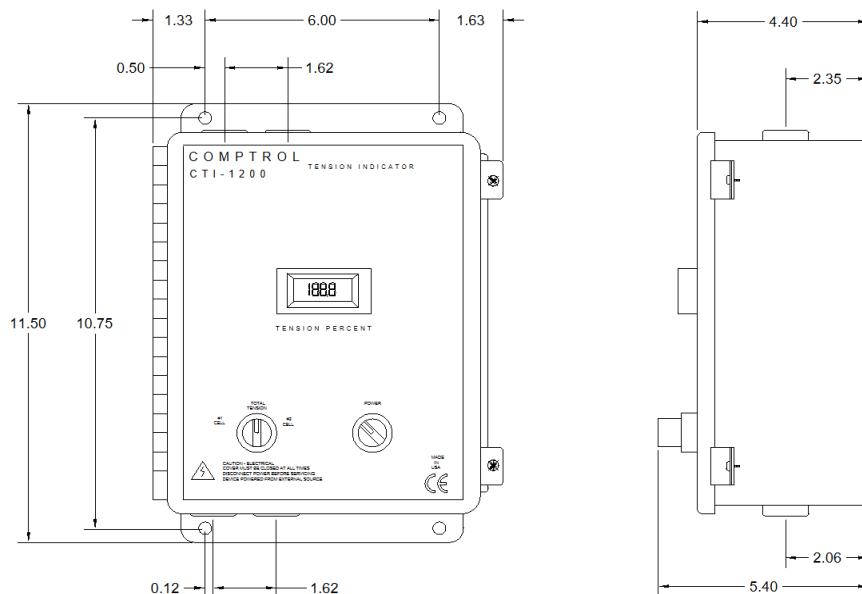


**BLOCK DIAGRAM**



## CONNECTION DIAGRAM

### CTI-1200-1 DIMENSION DRAWING



Note: All dimensions in inches unless otherwise specified

### SPECIFICATIONS

Power In.....	120/240 VAC, 1 Phase, 50-60 HZ, <1.0 Amp
Output (Proportional to Tension) .....	0-10 VDC or 4-20 mA DC
Transducer Supply.....	24 VDC
Ambient Temperature .....	0-104°F
Meter Scales .....	Customer Specific (No Charge)
Standard .....	Percent (0-100)
Approximate Weight .....	12 lbs.
Enclosure Dimensions .....	11.50" X 8.96" X 4.40"

Specification and dimensions subject to change without notice.

## **DECLARATION OF CONFORMITY**

Manufacturer's Name ..... Comptrol

Manufacturer's Address..... 34700 Lakeland Blvd  
Eastlake, OH 44095 Model

Number: ..... CTI-1200-1

Description ..... Tension Indicator

Type of Equipment ..... Industrial Control

Application of Council Directives... 73/23/EEC(LVD), 89/336/EEC(EMC)

Standards: ..... EN61010-1, EN50081-2, EN50082-2

Compliance is contingent upon installation as detailed in Part III of the manual.