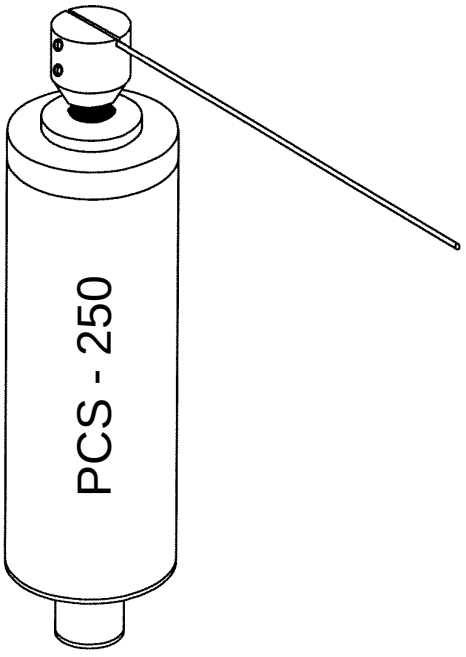
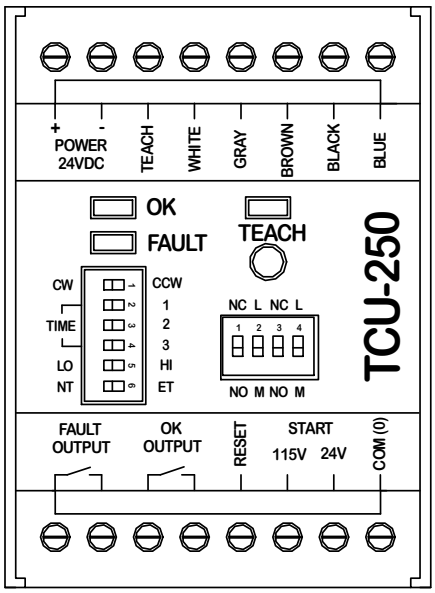
# PCS-250 SYSTEM

## INSTALLATION INSTRUCTIONS




Made in the USA

# PCS-250 SPECIFICATIONS

## TCU-250 Control Unit

Input: 24VDC, 250mA

Relay Outputs: 2A, 250VAC
*general use*

Ambient Temp: 55°C

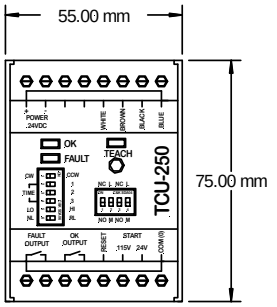
Wiring Terminals: 18-14AWG
*stranded copper wire only, 7 lb/in Torque. One wire per terminal.*

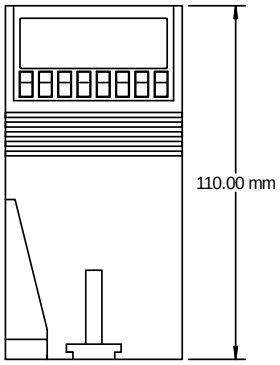
Housing Matl.: Polycarb UL94V1

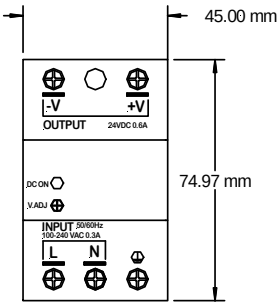
Terminal Matl.: Polycarb UL94V2

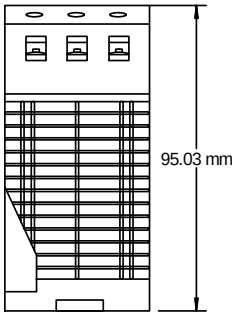
Mounting: 35mm DIN Rail

IND. CONT. EQ. 35BY




## 24VDC Power Supply

Input Power: 110-240VAC

Output Voltage: 24VDC

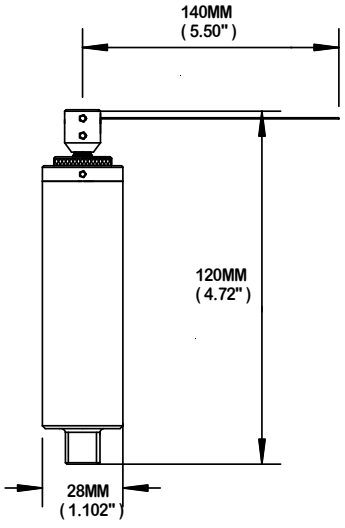
Output Power: 15W

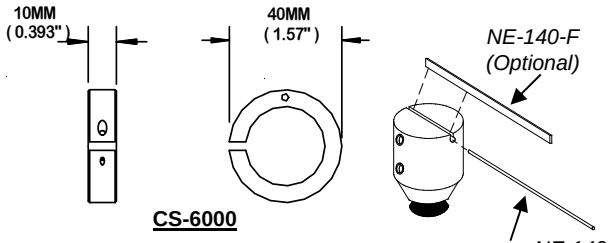
Operating Temp: 0-55 C

Mounting: 35mm DIN Rail

Optional power supply required for 110 - 240 VAC operation

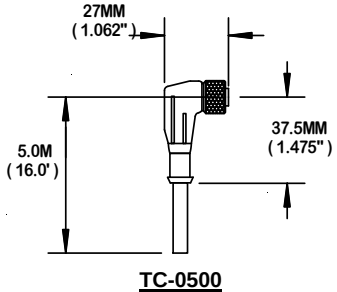
## PCS-250 SENSOR




**CS-6000**

**SA-5000**




**TC-0500**

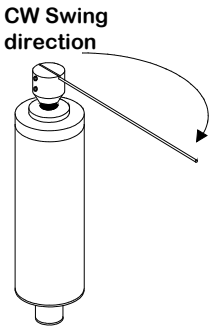



FIG 1.

## 1) Before you start

The PCS-250 Sensor is a self teaching device. It has the capability of swinging Clockwise (CW) or counterclockwise (CCW) up to 300º. The CW or CCW selection is made on the TCU via a dip switch. If you are looking at the sensor with the sensing needle cap facing you , a CW selection will mean that the sensing needle will swing clockwise as shown in FIG 1.

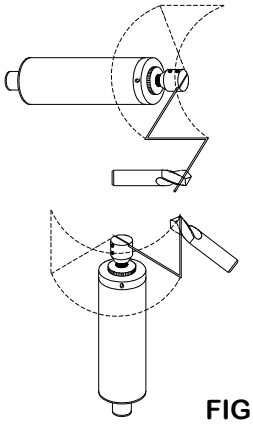


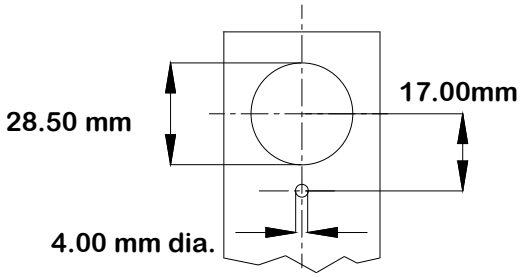
FIG 2.

## 2) Where and how to mount the sensor

There are several options when mounting the sensor. The space available in the tooling area will determine the easiest mounting method and location. With all machine power off, hand hold the sensor in the tooling area to imagine its best placement. Remember the sensor can swing CW or CCW. Although most applications involve straight sensing needles, keep in mind that the needle can be bent into many different configurations, as shown in FIG 2.

## 3) Fabricating a mounting bracket

Once you have determined the placement you will need to fabricate a mounting bracket that will hold the sensor into place. Everything else you will need is provided. The split ring clamps the sensor body to the bracket and holds the sensor securely. The most common bracket configuration is shown in FIG 3, but is by no means your only option.



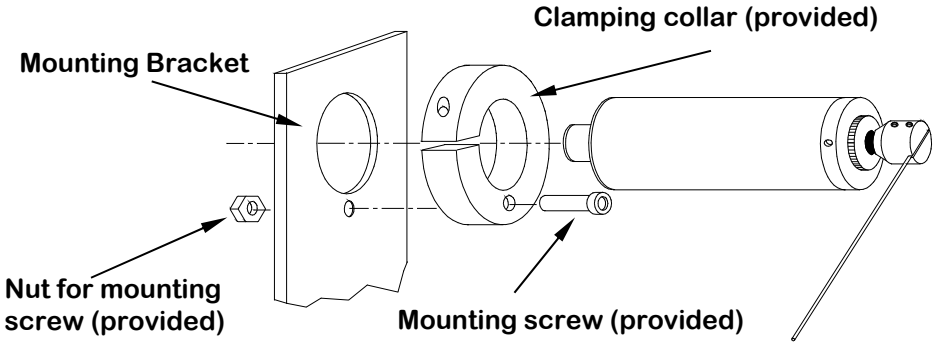




FIG 3

4) Mounting the bracket and sensor

**Mount the fabricated bracket and attach the clamping ring. Slide the sensor into the clamping ring but do not tighten in to place. Slip on the swing arm assembly ( you do not need to secure it ) and move the sensor forward or backward until the sensing needle is positioned approximately 1.60 mm back from the tip of the tool as shown in FIG 4. Also make sure that the sensing needle extends past the center line of the tool. When this position is realized, secure the sensor body into place by tightening the clamping ring. Remove the swing arm assembly.**

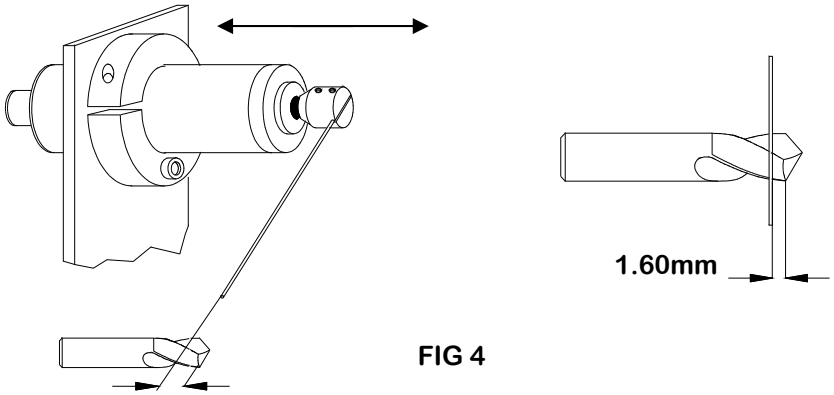



**FIG 4**

5) Final sensor set-up

**Install the sensor control unit into the machines electrical cabinet in accordance with the TCU installation instructions. Connect the cable to the sensor and power up the control unit. Be sure the cable is properly positioned to avoid any interference with the machines operation. NOTE: if the cable needs to be repositioned while attached to the sensor, rotate the entire sensor to avoid damage to the connector. Make sure that the dip switch on the control unit is set to correspond to the CW or CCW direction you have selected. Put the swing arm assembly back on and position it where you want the needle swing to start.**

**Note: The most common swing angle is 90° or less, but you may start up to 300° away from the tool if necessary for needed clearance.**

**Once you have selected the starting point, secure the swing arm assembly to the sensor. The sensor is now ready to learn the location of the tool. Press the teach button on the control unit. The yellow LED will illuminate indicating the system is ready to learn the tool position. Press the teach button again or apply a start signal. The needle will swing and contact the tool. The sensor has now learned the location of the tool. Once another start signal is applied and the sensor's swing angle is not repeated ( plus or minus a small factory preset value) a fault condition will occur. Refer to the Teach Button section in the TCU installation instructions for more details.**

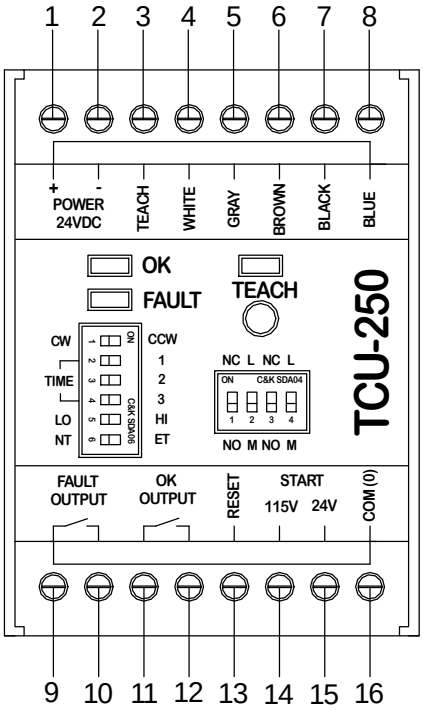
# TCU Terminal Descriptions

**Terminals 1 & 2:** The TCU operates with 24VDC, note that terminal 1 is + and terminal 2 is - . This unit requires a minimum supply of 250 mA. When powering the TCU with an existing 24VDC power supply, confirm that the supply is capable of additional output capacity to power the TCU.

**Terminal 3** . Is used as a remote Teach function. The required input is + 24VDC for a minimum of 100mS. (OPTIONAL)

**Terminals 4, 5, 6, 7 & 8:** Sensor cable connection, as indicated. The preferred method is to connect the cable directly from the sensor to the TCU. If the TCU and sensor need to be connected via external junction box, avoid wiring near electromagnetic or high current devices.

**DO NOT** connect the braided shield in the supplied sensor cable to the machine ground !




**Terminals 9 & 10:** are dry contacts ( internal relay ) capable of switching 2A @ 250 VAC. The contact operation can be configured eliminating peripheral devices for interfacing the TCU ( *see Relay Control Switches* , page 5)

**Terminals 11 & 12:** are dry contacts ( internal relay ) capable of switching 2A @ 250 VAC. The contact operation can be configured eliminating peripheral devices for interfacing the TCU ( *see Relay Control Switches* , page 5)

**Terminal 13:** Is used to reset the TCU after a fault condition has been detected. The required input is + 24VDC for a minimum of 100mS. (OPTIONAL)

**Terminals 14, 15 & 16** are used to activate the checking sequence when required in your application. T-16 is the common for either a 115VAC start signal (T-14 ) or a 24VDC start signal ( T-15 ). The TCU recognizes a change of state in the circuit to activate the checking sequence. A minimum duration of 100mS is required regardless of the of the signal utilized, ( HI – LO – HI ) or ( LO – HI – LO ).

The start input can also be used as a RESET function. After the error condition has been corrected ( replace broken tool ) applying a start signal will cause the sensor to begin the scan sequence touching and confirming the tool has been replaced in-turn resetting the fault condition on the control unit.

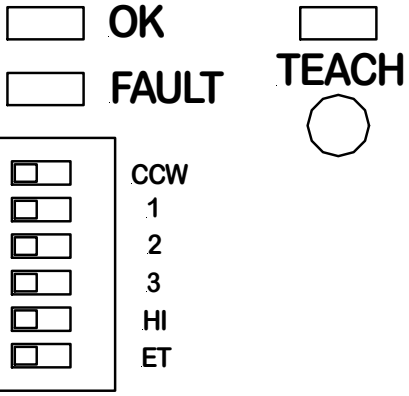
Certain solid state devices, although in their off ( LO ) state, may output a small amount of current. Depending on the operating characteristics of these devices, the TCU may not recognize a change of state. If this condition occurs in your application you may need to incorporate an external relay to activate the checking sequence.

## Sensor Control Unit Switches

*Please Note: Unless otherwise specified when ordered, the TCU-250 Control Unit has been preset with a CW direction, #2 Time Setting and a HI Rate.*

**OK LED** (See Relay Control Switches Below)
The OK LED will illuminate at power on. When a start signal is initiated the LED will momentarily turn off. If a good condition has been detected the LED will again illuminate.

**FAULT LED** (See Relay Control Switches Below)
When a fault or broken tool condition is detected the FAULT LED will illuminate momentarily or until the unit is reset if the relay is set to Latch.




**TEACH LED and Push Button**
After the sensor has been installed you must teach the system the location of the tool or object to be monitored. Push the teach button one time, and the teach LED will illuminate. Push the teach button again and the sensor will begin its learn cycle. A start signal can also be applied to begin the learning cycle. The system stores the information in memory and does not require another learning cycle when power has been removed.

**CW / CCW Switch**
This switch selects the desired swing rotation of the sensor.

**Time Switches**
These switches control the amount of time the sensor rotates during the scanning sequence. Since it takes a greater amount of time to swing the sensing needle 180° than 90° a greater amount of time needs to be set. If the sensor will not reach its end or fault position with the tool removed simply set more time. NOTE: If a TIME selection has not been made the Control Unit operates at a default LO-LO setting used for very small micro-drill applications only. (See LO/HI Switch settings below with regards to V-seal in Swing Arm Assembly).

**LO / HI Switch**
Selects the rate at which the sensor swings. "LO" rate is a slower swing rate generally used for micro tool detection. NOTE: The V-seal in the swing arm assembly provides additional protection against contaminants and should not be removed in most applications. The V-seal may however restrict the sensors motion when the swing rate is set on "LO". If your application does not allow "HI" rate operation, you may remove the V-seal from the swing arm assembly to determine if this solves the problem.

**NT / ET Switch**
Selects the tolerance width relative to the taught value. NT = Normal Tolerance ( factory preset )
ET = Extended Tolerance. This feature is used when monitoring multiple tools of different diameter, primarily on CNC machining centers.

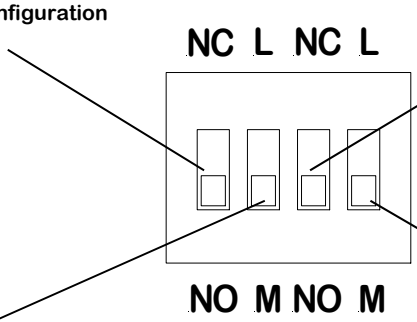
## Relay Control Switches

**These switches are used to set condition and the operation of the controls internal relays.**

These feature has been added for increased interface flexibility

FAULT Relay Contact Configuration
NO= Normally open
NC= Normally closed

OK Relay Contact Configuration
NO= Normally open
NC= Normally closed




FAULT Relay Operation
M= Momentary
L= Latch

OK Relay Operation
M= Momentary
L= Latch

# TCU Installation Guide

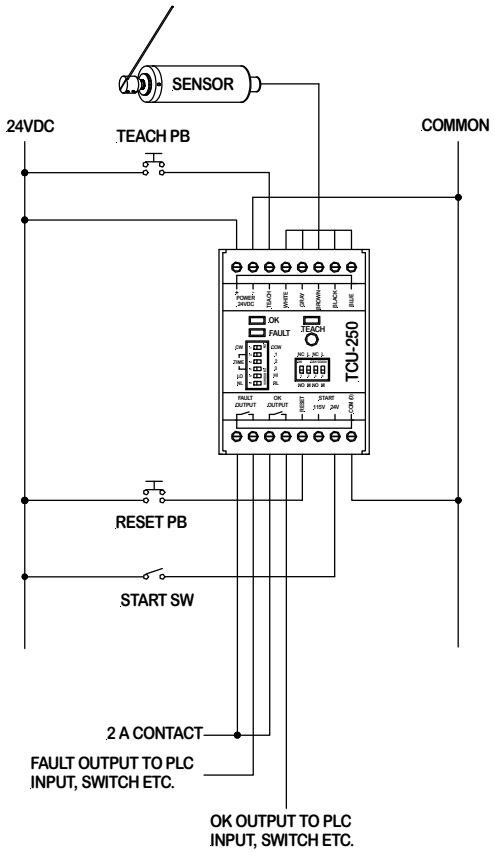
**ESD/EMF PROTECTION: The TCU is a microprocessor based unit. When mounting the TCU in the machines electrical cabinet avoid placing it near sources which might produce ESD (electro static discharge), or EMF ( electro magnetic frequencies ), such as large motor starters or high current devices. ESD/EMF may interfere with the units operation.**

**The cable supplied with the sensor is fully shielded. The preferred installation method is to connect the sensor cable directly to the TCU. If your installation requires connecting the sensor to the TCU via a junction box/terminal strip, avoid wiring near EMF sources. The distance of the sensor connection to the TCU should not exceed 50m (165').**

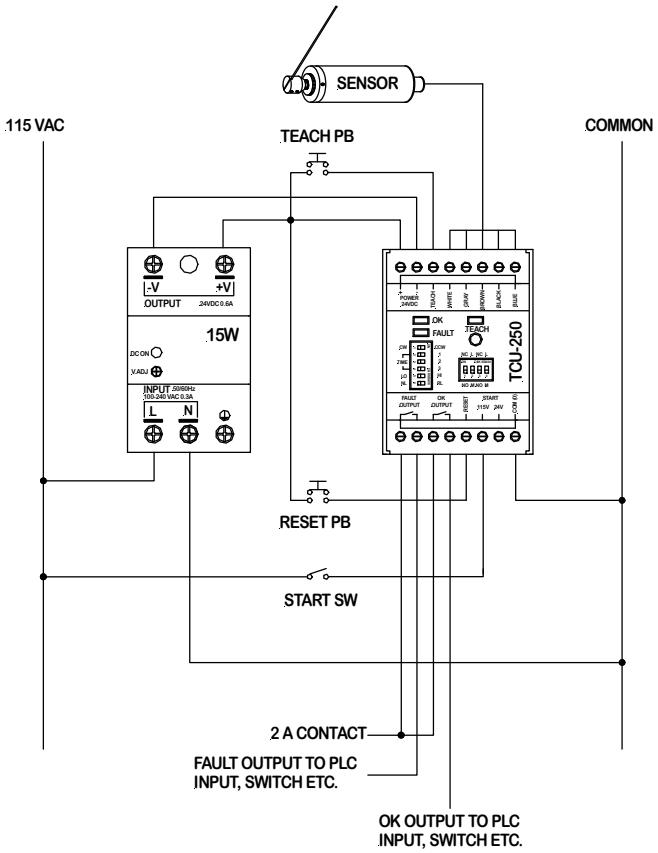
**Special length shielded cables are available upon request.**

**Below is a basic wiring diagram for 24VDC and 115VAC machine control voltages. For any questions or installation assistance contact 1-855-866-5911.**

BASIC WIRING DIAGRAM TCU-250/24VDC




BASIC WIRING DIAGRAM TCU-250/100-240VAC



# PCS-250 System
# Trouble Shooting Guide

**Please refer to the section that best describes the problem you are having. Determine if you can answer YES to all of the questions. If not, attempt to correct the condition. If at anytime you have questions, please contact our service department at 1-855-TOOL-911 (855-866-5911).**

**SYSTEM FAULT** (Red and green lights are illuminated simultaneously.)

- Has a time been selected on the TCU-250?
- Is the PCS-250 connected properly?
    - Color coded wires of cable should be attached to the correct terminals on the TCU-250
    - Cable should be screwed tight to the PCS-250
    - The inside of the PCS-250 connector should be dry
- Manually move the sensing needle away from the start position. Does the sensing needle return to the start position on its own?
- Is there approximately 4.1VDC across the blue and black terminals on the TCU-250? (The PCS-250 must remain connected to the TCU-250 for this measurement.)
- Is there 24VDC across the Power terminals on the TCU-250?
    - If not, see **No Power** to TCU-250

**TCU-250 WILL NOT START** (Lights remain steady, PCS-250 does not swing and TCU-250 gives no output when a start signal is applied.)

- Is the start signal being applied to the correct terminals?
    - Terminals 15 & 16 are for a 24VDC start signal.
    - Terminals 14 & 16 are for a 115VAC start signal.
- Is the correct start signal being applied?
    - The signal can be AC or DC voltage. Polarity does not matter.
    - The TCU-250 can be started with a *low, high, low* sequence or *a high, low, high* sequence. The TCU-250 will always start on the transition from *low* to *high*.
    - Is the *high* condition either 24V or 115V?
    - Is the *low* condition 0 V?
        - The *low* condition ***must be 0 V***. If the *low* condition is not an absolute 0 V, the TCU-250 may not recognize it.
    - Is each change in condition being held for at least 100ms?
    - In an environment with a lot of electrical noise, (ie: large motors or motor starters), the *high, low, high* sequence will block any noise from accidentally starting the TCU-250.
- Is the start signal being applied ***after*** the TCU-250 has completely finished its last cycle?

**NO OUTPUT FROM TCU-250**

- Does the PCS-250 swing when the TCU-250 is given a start signal?
    - If not, see **TCU-250 Will Not Start**
- Is the red or green light illuminated, and at its normal intensity?
    - If not, see **No Power to TCU-250**
- The outputs from the TCU-250 are momentary (500 ms.). Can your application use an output of this duration?
    - The outputs from the TCU-250 can be set to latch. (See Installation Instructions)
- With tool present, give the TCU-250 a start signal. Do contacts 11 & 12 close (or open momentarily depending on face plate settings)?
    - This same tool check can be done for the fault output by removing the tool and checking across contacts 9 & 10.

# PCS-250 System
# Trouble Shooting Guide

**NO POWER TO TCU-250** (No lights illuminated when TCU-250 is powered up and no power to PCS-250.)

- If 115VAC, is the power supply supplied by Allora being used?
- Is there a clean 24VDC being supplied to the power terminals on the TCU-250?
- Is there no more than two TCU-250's running on one power supply?
- Is there 110-120VAC being supplied to the power supply?
- Is the power supply sending 24VDC to the power terminals on the TCU-250?

**NO POWER TO PCS-250**

- Are one or more lights on the TCU-250 illuminated?
    - If not, see **No Power to TCU-250**
- Is the PCS-250 connected properly?
    - Color coded wires of cable should be attached tot he correct terminals on the TCU-250.
    - Cable should be screwed tight to the PCS-250 connector.
    - The inside of the PCS-250 connector should be dry.
- Manually move the sensing needle away from the start position. Does the sensing needle return to the start position on its own?
    - Is there approximately 4.1VDC across the blue and black terminals on the TCU-250? (The PCS-250 must remain connected to TCU-250 for this measurement.)
    - Is there 24VDC across the Power terminals on the TCU-250?
        - If not, see **No Power to TCU-250**

**NO FAULT SIGNAL WHEN TOOL IS BROKEN OR FAULT SIGNAL WHEN TOOL IS OKAY**

- Was the TCU-250 taught the tool's position?
    - To teach the TCU-250, press and release the teach button. The yellow teach light will illuminate. Press and release the teach button a second time, or give the TCU-250 a start signal. The TCU-250 will run through one cycle, the yellow light will turn off, and the green light will illuminate. The TCU-250 is now taught that tool's current position.
- Is the tool within the PCS-250's swing angle?
    - The sensing needle's tip should extend over the tool's centerline
    - The sensing needle should contact the tool at least 1.60mm from the tool's tip.
- Is the sensing needle supplied by Allora being used?
- Is the clamping collar tight on the PCS-250?
- Is the swing arm assembly tight on the PCS-250?
- Is there enough time set on the TCU-250 for the PCS-250 to reach its full swing angle?
- Have any objects obstructing the swing angle of the PCS-250 been removed?
- With power disconnected from PCS-250, can the sensing needle be moved freely back and forth without any binding?
    - Look for metal chips which may be packed around the seals on the PCS-250 or between the PCS-250 and the swing arm assembly.
    - Look for large chip "bird's nests" that may be getting caught on the PCS-250, or on the tool.
- Is the PCS-250 connected properly?
    - Color coded wires of cable should be attached to the correct terminals on the TCU-250.
    - Cable should be screwed tight to the PCS-250 connector.
    - The inside of the PCS-250 connector should be dry.
- Is the PCS-250 returning to its start position at the end of each cycle?

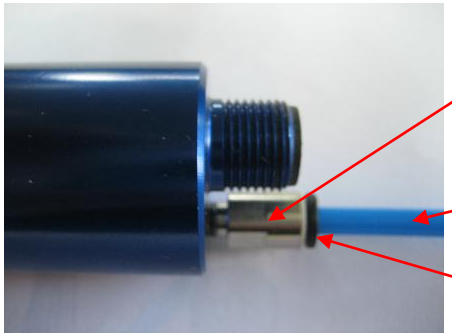
- The V-seal in the swing arm assembly provides additional protection against contaminants and should not be removed in most applications. The V-seal may however restrict the sensors motion when the swing rate is set on “LO”. If your application does not allow “HI” rate operation, you may remove the V-seal from the swing arm assembly to determine if this solves the problem.

# Installation Notes for Air Pressurized Sensors (AP)

**Note**: The Air Pressurized (AP) sensor option is recommended for extreme cutting tool environments. These instructions are based on using an Allora supplied Filter/Regulator/Dryer kit, part # AP-1000.

- Install the PCS sensor in accordance with the PCS Installation Instructions and Safety First Bulletin.

-The tube fittings provided are quick connect type. To insert tube, push the tube into the fitting to full depth. To remove tube, push the tube clamping collar in and pull tube out. The sensor head fitting is shipped with a blanking plug inserted into the fitting. Remove the blanking plug and insert the tube. **To avoid contaminants entering the sensor, reinsert the blanking plug if the air tube is ever removed.**




- Install the Filter / Regulator / Gage in the customary fashion outside of the machining area and machine enclosure and in accordance with the included manufacturer's Installation and Service instruction sheet. An L shaped mounting bracket for the Filter / Regulator / Gage is included with AP-1000 Kit. Connect the provided ¼" NPT fitting into the filter/ regulator / gage in the normal fashion. Cut the tube to the required length and insert the tube into the ¼" NPT fitting.

***PLEASE NOTE:* This is a low pressure air connection installation requiring clean, dry, air. Recommended regulator pressure is 1-4 PSI (0.07 - 0.28 bar), not to exceed 5 PSI (0.35 bar).**

- A supplemental in-line dryer is included in the AP-1000 Kit to assist in removing remnant moisture and contaminants.


This is a disposable inline dryer which should be replaced when the beads turn pink in color. Shut off air supply when installing or replacing. Remove both port plugs and install between air line and regulator / filter. **All connections to the in-line dryer should be hand tightened only**

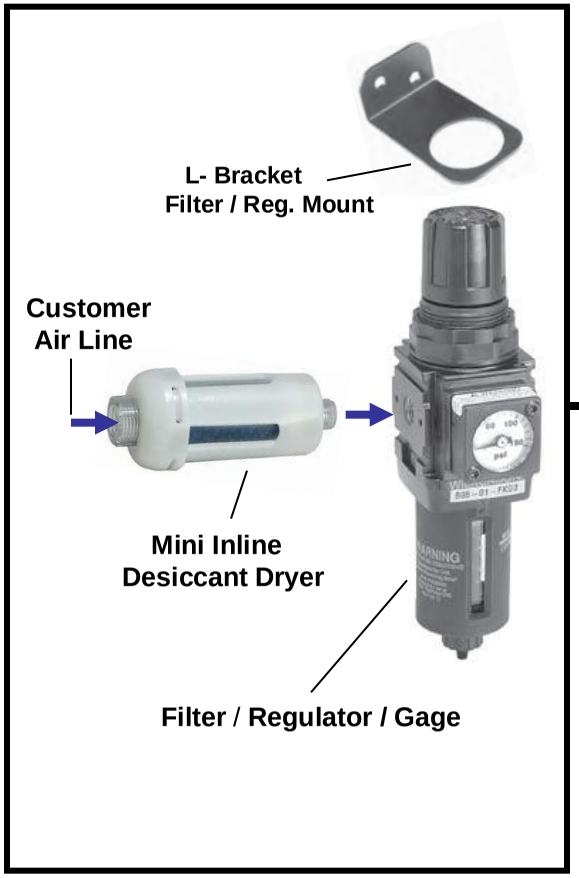
**Warning:** adhere to all safety labeling. Dryers exposed to solvents and oils containing a chemical base may crack or rupture the product. Do not install inside the machine.

-Air Tubing: Cut the provided tubing as required for the application. See reverse side for various connection illustrations suggestions. Take care not to kink or over- bend the air tube.

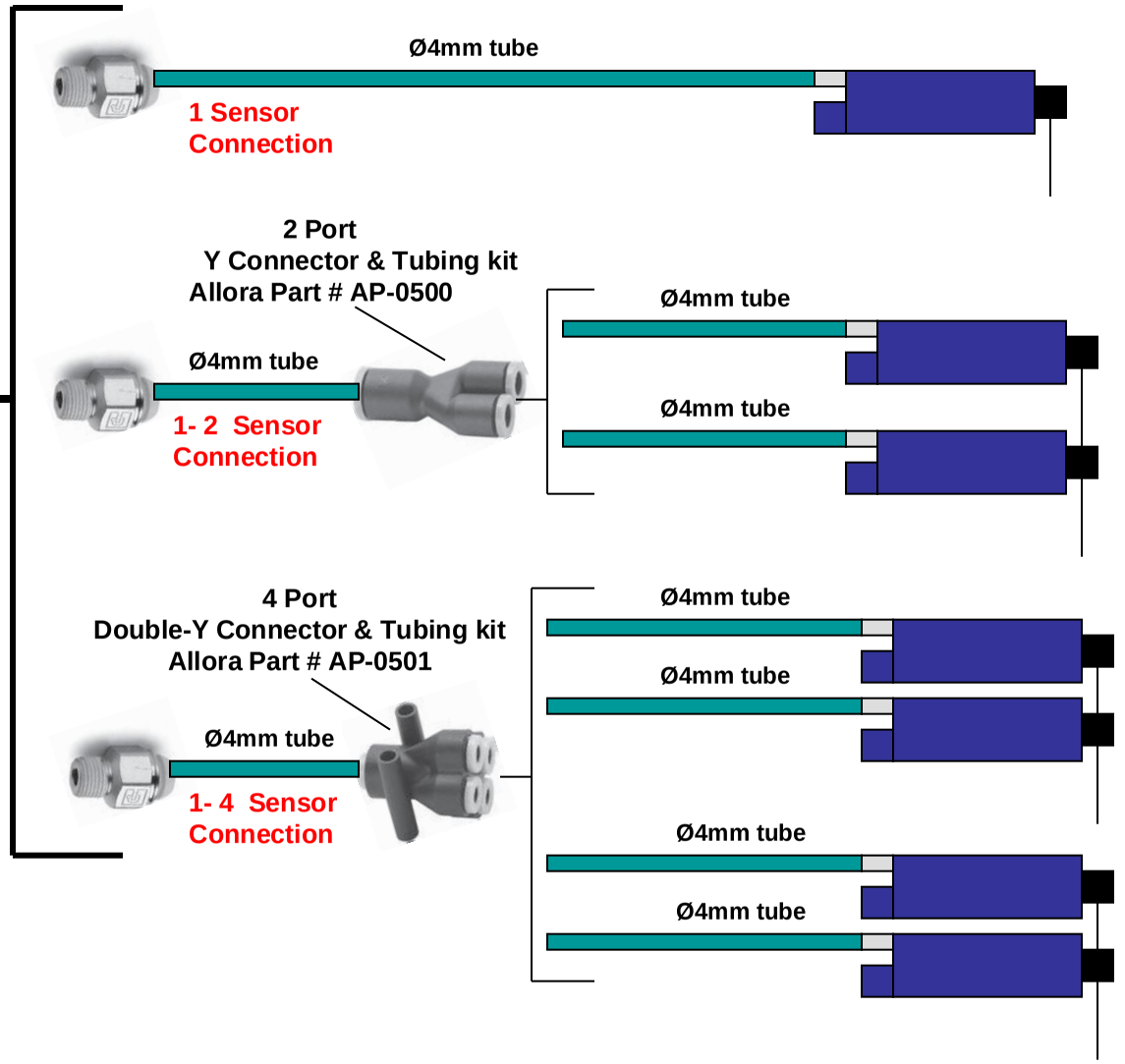
-Due to very low pressure and flow, once the system is connected, we recommend you keep the air on including periods for machine cleaning. Always avoid direct, concentrated air hose cleaning of the sensor, especially at the front end of the sensor as this can force contaminants into the sensor. Turn the air off if servicing any part of the system.

**Air Pressurized (AP) Sensor Connection Options** – Single AP Sensors are supplied with an air tube and a ¼" NPT fitting for connection to the filter/regulator. Some machines may utilize more than one sensor. One Allora AP-1000 Kit (or customer supplied equivalent) can be used to supply one or multiple AP Sensors as illustrated below. Two AP sensors can be accommodated with the use of a Y connector while more than two are accommodated with a Double-Y connector. If any Y or Double-Y connector ports are not utilized, block the unused ports with a blanking plug.

## Allora AP-1000 Kit




## Connection Options



CE

**Positive Contact Control Units conform with the EEC directive EMC 89/336/EEC as amended by 92/31/EEC and 93/68/EEC.**

**In compliance with the directive, the EC Declaration of Conformity and related Technical Documentation is maintained at the following address for inspection by the appropriate officials:**

**RoHS Compliant**

**Positive Contact – Hazardous Materials**

All **Positive Contact** products and packaging are manufactured with RoHS compliant materials. They are free of Bromide Halogens (PBB, PBDE), Mercury, Cadmium, and Chrome 6+.
All **Positive Contact** products are Lead Free.
All **Positive Contact** products comply with current EU environmental standards, including directive amendments regarding the use of perfluorooctane sulfonates, (PFOS).
All **Positive Contact** products and packaging are free of any material containing Asbestos.
All **Positive Contact** foam packaging is free of CFC's, HCFC's or HFC's. The foam and its ash is non-toxic, landfill safe and recyclable.