

Flow-Through Copper Sensor Instructions

1.0 OPERATION

The copper flow through sensor is designed for out-of-tank monitoring of electroless copper and microetch solutions. The sensor is compatible with WCU series controllers; it is NOT compatible with Walchem W-10 series controllers. The sensor is designed with a glass tube that contains the copper solution that forms a fixed path length between the lamp and receptor module. The solution absorbs light at specific wavelengths in proportion to the copper concentration.

IN ORDER TO AVOID A SHIFT IN CALIBRATION CAUSED BY CONDENSATION, THE SENSOR COVER SHOULD NEVER BE REMOVED!

2.0 INSTALLATION

The flow through sensor is provided with a mounting plate and 20 feet of cable. Extension cable is available if the sensor cannot be placed within 20 feet of the controller. Maximum cable length is 80 feet. The flow through sensor/sample loop must be installed according to the following guidelines:

- Mount the sensor on a vibration-free, vertical surface so that the sensor tubing inlet connection is at the bottom and the outlet is at the top. The vertical orientation will prevent air bubbles from being trapped in the sensor.
- **IMPORTANT NOTE:** Take care to support the flexible plastic tubing that you attach to the inlet and outlet connectors so there is no pressure pushing or pulling the connectors from side-to-side. Failure to follow these instructions will result in internal leakage that may damage or destroy the sensor.
- Install a shut-off valve at the beginning of the sample loop so that the system may be shut off quickly if necessary.
- If a sample pump is to be used, it must be installed last, after the flow through sensor and the cooling coil or plate, if applicable.

Other installation guidelines that may be helpful in the overall system:

- Mount the sensor as close to solution as possible. Keep tubing distances to the sensor inlet as short as possible to avoid hydraulic lag time. Maximum recommended length of tubing from solution to sensor is 25 feet. If this is not possible, see Application Notes Section.
- The solution inlet should draw sample from an area of good solution movement in order to respond quickly to chemical additions. However, the solution inlet should not draw too near to where the chemistry is added to avoid artificial 'spikes' in concentration.
- The solution discharge should be open to atmospheric pressure to ensure proper flow.
- The cable connector to the controller is keyed, do not force!

then the volume of the system = $B (0.25\text{in}/2)^2 \times (360 \text{ in}) = 17.7 \text{ in}^3$

Note: 1 U.S. Gallon	=	231 U.S cubic inches
1 Liter	=	61.03 U.S. cubic inches

Volume of the system = $17.7 \text{ in}^3 / (231 \text{ in}^3 / \text{gallon}) = 0.0765 \text{ gallons}$

Maximum lag time = 0.60 minutes (previously calculated)

So, the minimum pump flow rate
= $0.0765 \text{ gallons} / 0.60 \text{ minutes} = 0.127 \text{ gal/min (483 mL/min)}$

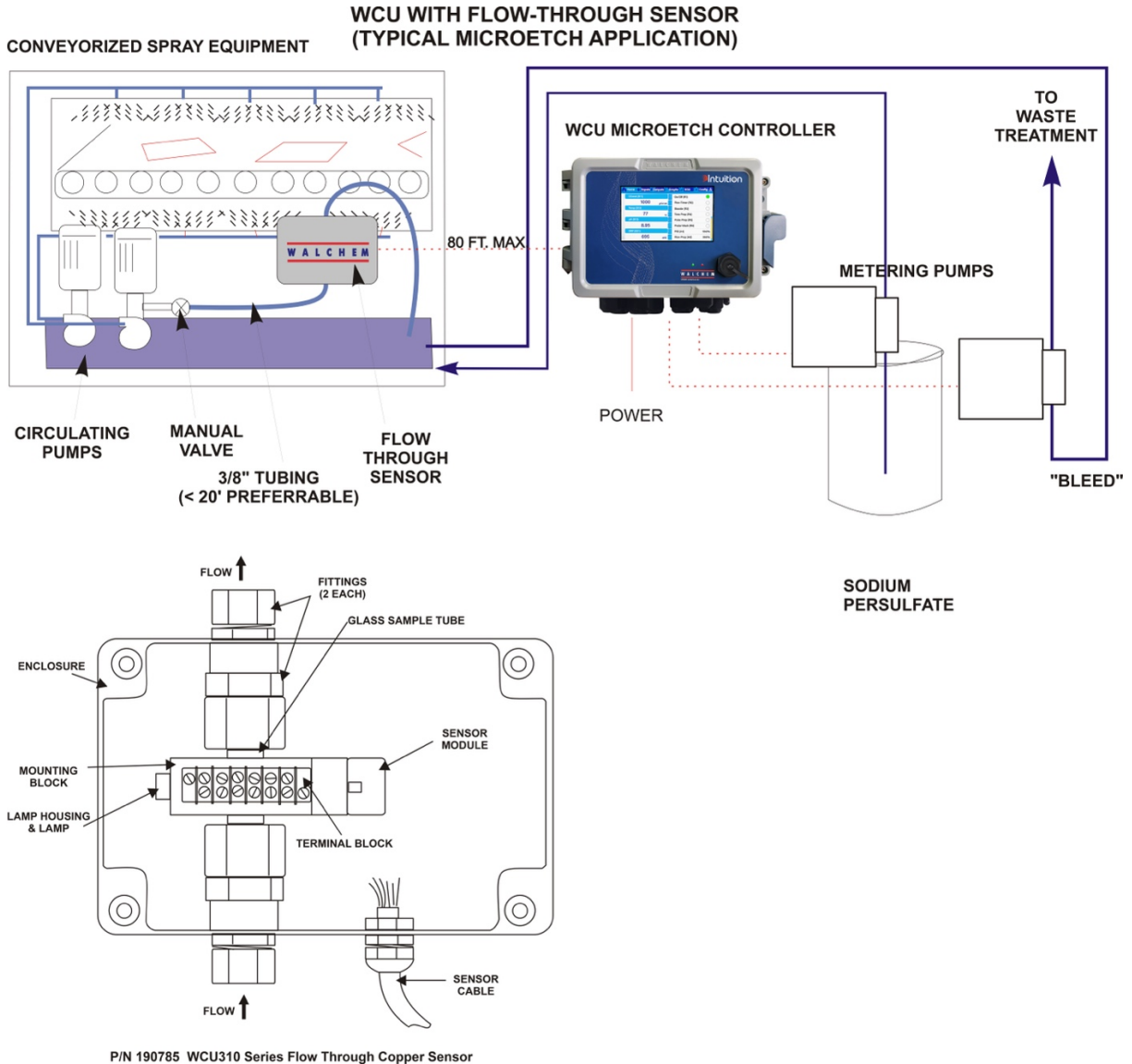
Caution: The calculated pump flow rate is the minimum required to obtain the desired control band, however, if the flow rate increases over the recommended rate of 500 mL/min (approx. 0.13 gal/min) the rate of cooling will decrease. This may be compensated for by re-evaluating the system criteria: length / desired control band or to double up on the cooling plate/coil.

Consult factory with any further installation questions.

3.0 MAINTENANCE

The sensor should be examined periodically for signs of plate-out or other coatings in the glass tube. To avoid scratching the sensitive surface, chemical cleaning is preferred over mechanical cleaning methods. Plate-out should be removed using nitric acid, or a persulfate or peroxide/sulfuric etch.

Field repairs of the sensor should not be attempted. Call your distributor to arrange for factory service. Expedited service is available at no extra cost.



NOTE: TO PREVENT CALIBRATION SHIFTS DUE TO CONDENSATION FORMING ON THE SAMPLE TUBE INSIDE THE COVER OF THE SENSOR, DO NOT REMOVE THE SENSOR'S COVER FOR ANY REASON!