

# MSP TURBO™ LIQUID FLOW CONTROLLER MODEL 2950

Designed specifically for leading edge microelectronic applications, this highly accurate, high-speed liquid flow controller pairs with MSP Turbo™ Vaporizers to provide unmatched liquid source vapor delivery performance, versatility, and longevity.



**Model Number:** 2950  
**Turndown Ratio** <sup>[2]</sup>: 50:1  
**Max Viscosity (cp)** <sup>[3]</sup>: 10  
**Accuracy % F.S.** <sup>[4]</sup>: ±1.0  
**Repeatability % F.S.** <sup>[4]</sup>: ±0.3  
**Linearity % F.S.** <sup>[4]</sup>: ±0.6  
**Reproducibility %F.S.:** ±1.0  
**Response time (s)** <sup>[5]</sup>: <0.3 to ±1% S.P.  
**Environmental Temperature (°C):** 15 to 45; 0-80% RH  
**Liquid Temperature (°C)** <sup>[6]</sup>: 15-30, 100% F.S.  
 15-40, <80% F.S.  
**Temperature Sensitivity (% F.S.)** <sup>[7]</sup>: ±0.1/°C  
**Max Pressure Drop (kPa/psig)** <sup>[8]</sup>: 90/13  
**Max Operating Pressure (kpa/psig)** <sup>[2]</sup>: 360/52  
**Leak Integrity (Pa m<sup>3</sup>/s, He):** ≤ 1×10<sup>-10</sup>  
**Power:** +10-30VDC;  
 Typical 1.0W (w/o EtherCAT)  
 1.5W (w/ EtherCAT)  
 Max. 15W  
**Wetted Materials:** 316SS, Nickel, Kalrez  
**Fittings (Inlet & Exit):**  
 Inlet 1/8" VCR male  
 Exit 1/8" VCR male  
**Interface:**  
 EtherCAT <sup>[9]</sup> 2xRJ45  
 RS485 9-pin D connector (male)  
 Analog 9-pin D connector (male)  
 Software communication via RS485  
**3 Output Control Signals:**

**1 Analog Input:**  
 1 Fixed, 1-130V (for Piezo Control)  
 2 Configurable  
 3 Options: 0-5V, 0-10V, 4-20mA, 1-5V, 2-10V, 0-20mA  
 Configurable  
 Options: 0-5V, 0-10V

Nominal Max Flow (g/min) <sup>[1]</sup>:

Model Number	TEOS Full Scale (g/min)	TEMAZr Full Scale (g/min)	H2O Full Scale (g/min)
2950-002	0.2	0.038	0.14
2950-01	1	0.19	0.73
2950-05	5	0.95	3.6
2950-10	10	1.9	7.3
2950-20	20	3.8	14
2950-30	30	5.7	21
2950-40	40	7.6	29

### Other Liquids

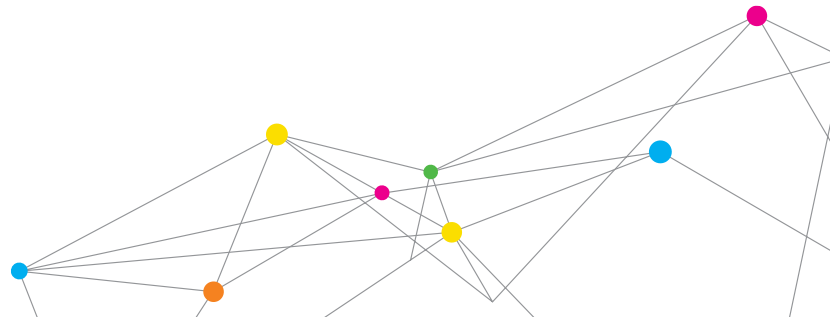
The full scale of the 2950 LFC is a function of liquid viscosity ( $\mu_{\text{liquid}}(\text{cP})$ ). To estimate the full scale (F.S.) of each model for your liquid, use the equation below:

$$F.S._{\text{Other Liquid}} = F.S._{\text{TEOS}} * \frac{0.65\text{cP}}{\mu_{\text{liquid}}(\text{cP})}$$

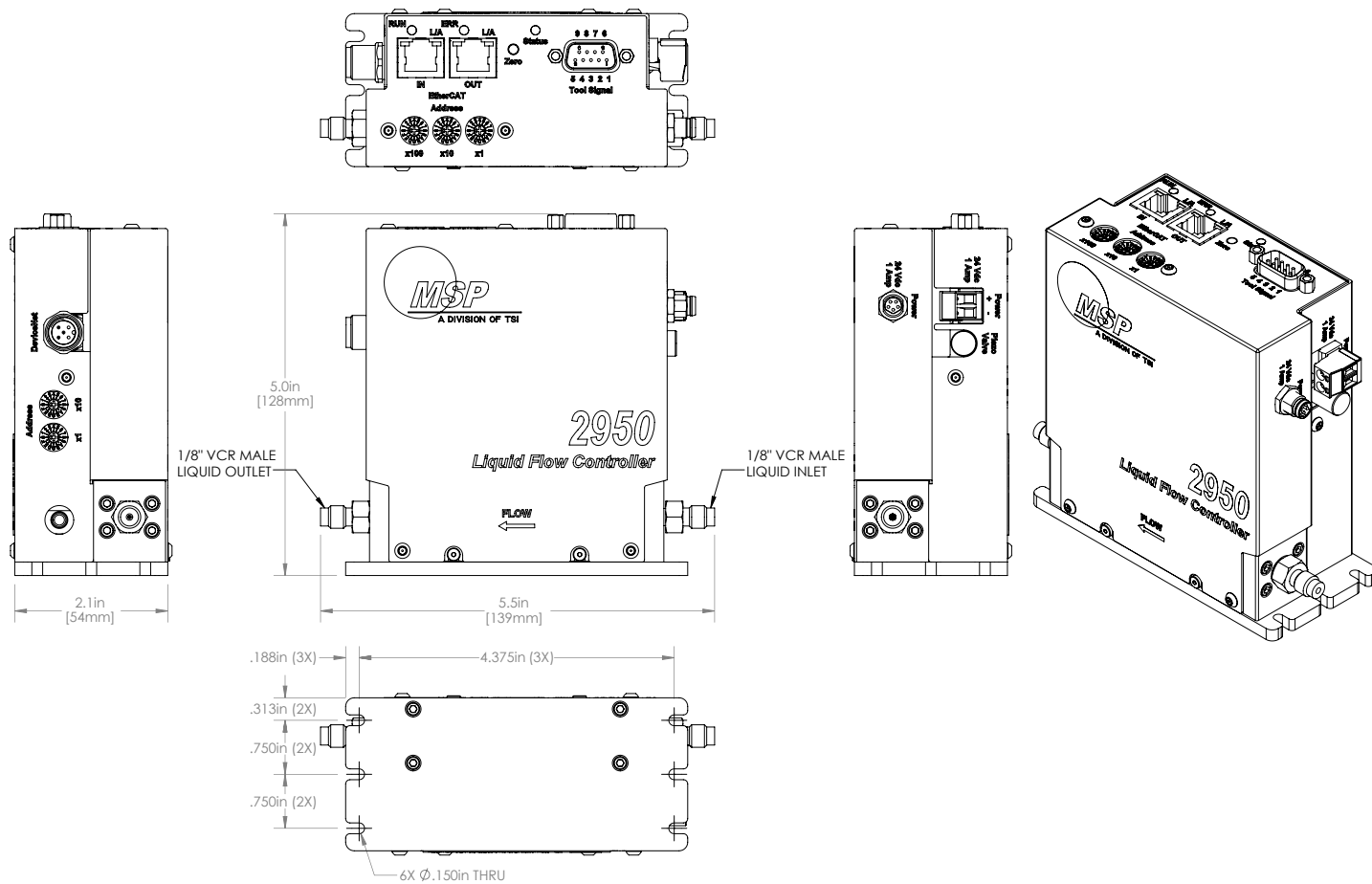
### Factory Calibration:

TEOS used for factory calibration. For use with other liquids a factory calibration adjustment or field calibration with reference flow meter can be performed using 2950 Configuration Software. Factory calibration for other liquids may be possible. Visit [www.tsi.com/contact](http://www.tsi.com/contact) to request more information.

[1] Nominal max flow determined using TEOS as reference liquid at 23±2°C. Flow rate range is a function of specified liquid.  
 [2] Determined using TEOS as reference liquid at 23±2°C.  
 [3] Higher viscosities will result in lower max flow ranges. Consult MSP for more information on use at higher viscosities.  
 [4] Accuracy, repeatability, linearity and reproducibility tested to SEMI E56-0309 using TEOS at 23±2°C.  
 [5] Response time determined using TEOS as reference liquid at 23±2°C, when paired with MSP "PE" Turbo-Vaporizer™, full scale flow, optimized PID, 50psi line pressure. Specification applies to all models except 2950-002, which has a response time 2-3 times slower due to the extremely low flow rate.  
 [6] If the liquid temperature goes above 30°C, the full scale is reduced to 80% of nominal.  
 [7] ±0.1°C away from 23°C.  
 [8] Pressure drop in device - not including downstream valves, 23 +/- 2°C.  
 [9] ETG.5003.2020 S (R) V1.1.0 compatible.



# MSP TURBO™ LIQUID FLOW CONTROLLER MODEL 2950



All specifications are subject to change without notification.

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