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 [2]**:**	30:1
Max Viscosity (cp) [3]**:**	10
Accuracy % F.S. [4]**:**	±1.0
Repeatability % F.S. [4]**:**	±0.4
Linearity % F.S. [4]**:**	±0.6
Response time (s) [5]**:**	<0.3 to ±1% S.P.
Environmental Temperature (°C):	15-45; 0-80% RH
Liquid Temperature (°C) [6]**:**	15-35, 100% F.S. 35-40, <80% F.S.
Temperature Sensitivity (% F.S.) [7]**:**	±0.05/°C
Max Pressure Drop (kPa/psig) [8]**:**	90/13
Max Operating Pressure (kpa/psig) [2]**:**	360/52
Leak Integrity (Pa m³/s, He):	$\leq 1\times10^{-10}$
Power:	+10-30VDC;
Typical	1.0W (w/o EtherCAT) 1.5W (w/ EtherCAT)
Max.	15W
Wetted Materials:	316SS, Nickel, Kalrez, BNi-5
Fittings (Inlet & Exit):	
Inlet	1/8" VCR male
Exit	1/8" VCR male
Interface:	
EtherCAT [8]	2xRJ45
RS485	9-pin D connector (male)
Analog	9-pin D connector (male)
Software communication via RS485	
3 Output Control Signals:	1 Fixed, 1-130V (for Piezo Control) 2 Configurable 3 Options: 0-5V, 0-10V, 4-20mA, 1-5V, 2-10V, 0-20mA
1 Analog Input:	Configurable Options: 0-5V, 0-10V

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

Model Number	TEOS Full Scale (g/min)	TEMAZr Full Scale (g/min)	H20 Full Scale (g/min)
2950-002	0.2	N/A	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

Other Liquids

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

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

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 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 E56-0317 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, 45psi 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 35°C, the full scale is reduced to 80% of nominal.
[7] For every 1°C away from 23°C, accuracy can be degraded ±0.1%.
[8] Pressure drop in device - not including downstream valves, 23 ± 2°C.
[9] ETG.5003.2020 S (R) V1.1.0 compatible.

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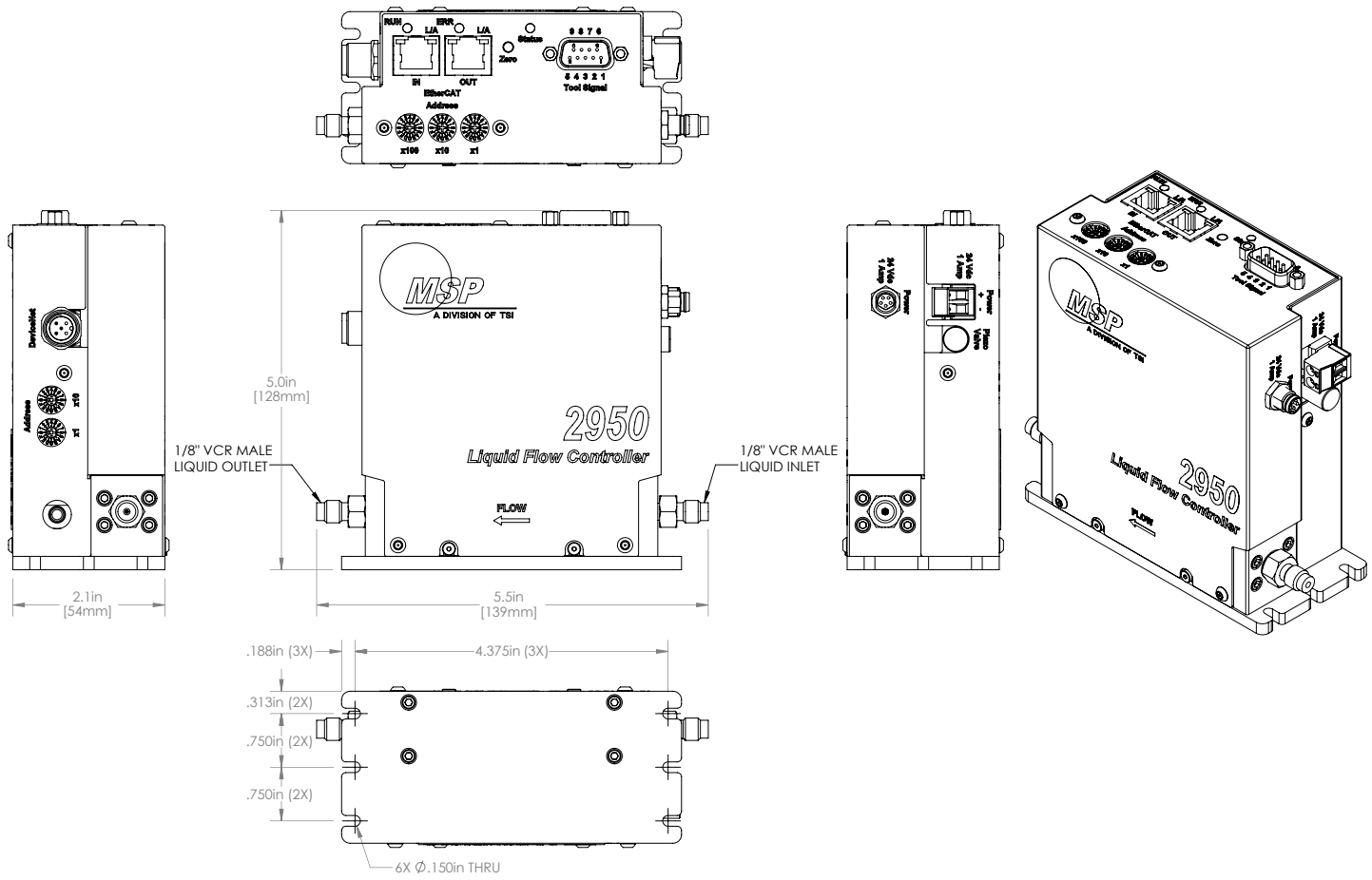

All specifications are subject to change without notification.

MSP - Visit our website **www.tsi.com/msp** for more information.

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