TS410 Tubing Flow Module

Precision Volume Flow Measurements for In Vitro & Extracorporeal Tubing

Gold Standard Ultrasonic Transit-Time Technology

Whether you require tubing flow measurements in the animal lab or in the R&D engineering suite, Transonic’s TS410 Tubing Flow Module gives you precision volume flow measurements in tubing with user-friendly features applicable to laboratory bench settings, in vitro and extracorporeal use.

- True Volume Flow
- Measurement Capability for Diverse Fluids: Blood, Saline, Water, Cell Culture, Physiological Buffers, Blood Analogs such as Glycerine/Water Solutions
- Programmable Alarm Conditions:
  - High / Low Flow Threshold Alarm
  - Bubble / “Received Signal” Alarm
  - On-site recalibration of Flowsensors for new parameters or conditions

ALL TYPES OF FLOW CIRCUITS
- Circulatory support device development (VAD Performance & Artificial Heart)
- Isolated heart and perfused organ studies
- Mock circulatory models
- Non-contact sterile flow measurement of biologicals and bioreactors
- Flow phantoms and any experimental, or non-human clinical or process application where flow measurement in tubing is needed.

COMPATIBLE FLOWSENSORS
- ME-PXN Inline Flowsensors
- ME-PXL Clamp-on Sterile Tubing Flowsensors

TS410 Flow Module requires a T400 Console in order to take measurements. Consoles can hold multiple Modules of various functionality.
TS410 Tubing Flow Module Specifications

**GENERAL FEATURES**
Size: 5.125” h x 4” w x 9.062” d  
Weight: 2.3 lbs.  
Module fits 2 Console slots (20HP) in T402 or T403 Consoles  
Power: Derives input power from Transonic® 400-Series Consoles. Installation in a Console is required.

**OPERATIONAL TECHNOLOGY**  
Ultrasonic Transit-time

**FLOWSENSOR COMPATIBILITY**  
ME-PXL- & ME-PXN-Series

**SENSOR CONNECTOR**  
Front panel 16-pin connector. Accepts research Inline and Clamp-on Flowsensors and extension cables with male CC16 or CP16 connectors.

**AUTOMATIC ADJUSTMENTS**  
Sensor size identification and corresponding flow output ranges. Volume flow calibration and serial number displayed of active Flowsensor.

**DIGITAL DISPLAY**  
4-Digit (14 segment) LED displays Flow / Sensor data / Error Messages  
Bar Indicator Light: Displays received signal for continuous monitoring of Sensor signal quality.

**LCD DISPLAY**  
One line 16-character alpha numeric LCD displays program parameters, Sensor and Meter status, alarm settings. Default displays Sensor serial number.

**SET-UP/STATUS & PROGRAM PARAMETERS**  
**STATUS MODE:** (White labels) Status message displayed on LCD.  
- Sensor Status: sensor type & calibration  
- Meter Status: Active flowmeter settings & alarm status  
- Alarm Mute: Audible alarm On/Off

**PROGRAM MODE:** (Blue labels)  
- Sensor Controls: Select pre-programmed factory calibration options; Adjust Flowsensor gain to change calibration on-site.  
- 1/4 Flow Scale: increases flow gain by factor of 4 for low flow measurements.  
- Calibrate Scale: sets output to 0 and 1 Volt to calibrate external recording devices with scale factor flow.  
- Invert flow: inverts polarity of analog outputs & flow display  
- Alarms Menu: 3 level program to select, set thresholds, and activate Alarms for “Low Flow”, “High Flow” and “Received Signal” Interruption

**FILTER PROPERTIES**  
- 0.1, 10, 40 Hz: 2nd order Butterworth, with a third passive pole at 160 Hz  
- 160 Hz: 3rd order Butterworth

**FLOW OUTPUT**  
Front panel mounted BNC output connector & rear panel terminal block:  
- Pulsatile/Average Volume Flow  
- Filtering controlled by front panel selectable filters  
- Voltage range: -5 to + 5 volts  
- Output resistance: 500 Ohm  
- Full Range for Flow: -5 to +5 V (bidirectional flows, with range of 5 x scale factor flow)

**AUTOMATIC DIGITAL SENSOR ID & CALIBRATION**  
TS410 reads operational data (size, scale & calibration) programmed in the sensor’s EPROM.

**ULTRASONIC FREQUENCY RANGE**  
600 KHz to 14.4 MHz; Sensor size dependent

**SIGNAL OUTPUTS**  
8 accessible signals via 400-Series Flowmeter Console’s back-panel terminal block: Pulsatile Volume Flow; Mean Volume Flow; Received Signal Amplitude (2); Phase (4)

**SYNCHRONIZATION**  
Rear panel jumpers select synchronization mode  
- Self-Triggering Mode: “SYNC IN” to “SYNC OUT” jumper on each Module  
- Sequential Triggering Mode: “SYNC IN” crossed to “SYNC OUT” between Modules

www.transonic.com