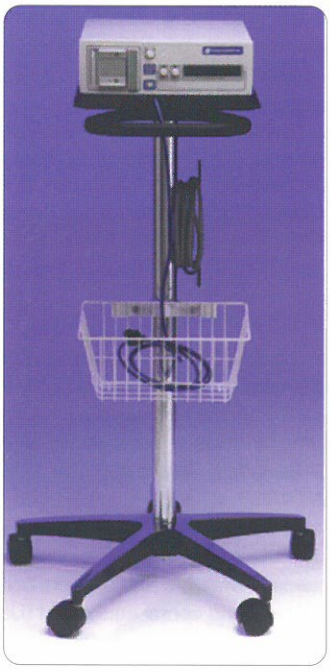
Transonic®
Surgical Flowmeters

HT313/HT323 (-CS) Specifications

Intraoperative Blood Flow Measurements

- Cardiothoracic
- Vascular
- Transplant
- Neurosurgery

"Push and Play" ease of operation with the essential features for measuring and documenting blood flow during surgery



The HT313 & Portable Trolley
A 2-meter extension cable allows positioning at the most convenient location in the OR.

Easy to Operate	Plug in flowprobe & measure
Large Display	Mean flow in ml or L/min can be read across room.
Documentation	A flow recording printout for your patient's chart.
FlowSound™	Listen to FlowSound while focus remains on the surgical field. Pitch equals volume flow.
Signal Quality Indicator	Indicates quality of ultrasonic contact.
Invert	Changes a negative reading to a positive reading so that the flowprobe can be applied to either side of the vessel.

Central Monitor Interface

Optional interface to central patient monitor station for continuous real-time display.

Transonic Systems Inc.
www.transonic.com

Transonic®
Surgical Flowmeters

HT313/HT323 (-CS) Specifications

PHYSICAL SPECIFICATIONS
single/dual channel flowmeters with built-in chart recorder; HT313(-CS): 10 lb. (4.5 Kg); HT323(-CS): 11 lb. (5 Kg); HT313(-CS)/HT323(-CS): 11" (27.8 cm) wide x 4" (9.12 cm) high x 14" (35.4 cm) deep; attached two meter flowprobe-to-flowmeter extension cable per channel, separate grounded medical grade power line-cord is supplied with the flowmeter.

INPUT POWER
Universal Power Supply; 50-60 Hz; 100-240 V ± 10% (automatic voltage adjustment)

FUSES
Both power entry conductors are protected by fuses (5 x 20 mm fuses)1.5A fast blo, mfg: bussman #GMA1.5, 250 VAC)

ELECTRICAL ISOLATION
Flowmeter cabinet is grounded; line to ground leakage current: less than 50 µA @100-120 V line, less than 100 µA @ 220-240 V line. All electronic components and cabling of the probe extension cable and probe are fully isolated to meet IEC "cardiac floating" specifications. Defibrillator protection: probes can remain attached to the patient during cardiac defibrillation for instantaneous report on restoration of flow.

AUTOMATIC METER ADJUSTMENTS
- Ultrasound frequency and insonification parameters
- Probe size and corresponding flow output ranges
- Volume flow calibration of connected flowprobe
- Flow sampling rate optimized for local acoustic conditions

DIGITAL IDENTIFICATION
Probe identification and calibration parameters are programmed on an EEPROM inside the probe connector.

FLOW MONITOR ANALOG OUTPUTS
Uniscale Output: 10 Hz low pass filtered; automatic gain adjustment for fixed scaling of multiple probe sizes. Accepts mini-phono connector. HT313: 1 uniscale output; HT323: 2 uniscale outputs.

AUXILIARY (-CS) OPTION FLOWMETER INPUTS
Two BNC connectors are provided on the rear panel as auxiliary input ports (i.e., pressure or EKG monitors). Each accepts a signal range of ± 5 Volts.
This option includes the FlowTrace software package.

FLOWSOUND™
Audio representation of flow sensed by the probe; one octave increase in sound pitch = 4x increase in volume flow.

ULTRASOUND SIGNAL QUALITY CHECK
Front panel ultrasound "container-style" level indicator provides visual feedback on ultrasound signal strength; automatically disables flow measurements when ultrasound signal conditions are insufficient. Front panel 6-digit display reports error condition.

CHART RECORDER
Prints a permanent record of pulsatile flow wave along with date stamp and values for mean, peak and minimum flow. Front panel push button engages the recorder; rear panel switch selects from 3 printing modes: "Slow" prints 20 cm flow record at 20 mm/sec; "Fast" prints 20 cm flow record at 40 mm/sec; "RUN/STOP" prints a continuous strip at 20 mm/sec.

COMPATIBLE ULTRASONIC TRANSDUCERS
These meters accept a range of HQ-Series probes for intraoperative surgical use. See probe specification sheets or your local representative for models, sizes and recommended uses.

ULTRASONIC FREQUENCY/PARAMETERS
The ultrasound output level of the flowsensors is factory-set and does not incorporate any interactive system features. These settings are made using "ALARA" principles (As Low As Reasonably Achievable), and are orders of magnitude below the FDA "preamendment levels," the USA insonification safety limits. All are probe size dependent.

Transducer excitation: Burst of 10 to 24 waves
Transducer excitation frequency: 1.2 MHz to 4.8 MHz
Transducer excitation rate: 1.2 KHz to 14 KHz

automatically reduced further when probe operates in adverse acoustic conditions that would degrade measurement accuracy.

USB-PORT
Optically isolated output connector meeting IEC0601patient isolation. Permits connection to a laptop or other data monitor computer. The ± 5V analog flow signals (and pressure, EKG Signals for -CS option meters) are digitized at 100 sampling Hz rate with 12-bit resolution. Data is supplied at 19200 Baud for use with FLOWTRACE software

REGULATORY COMPLIANCE
Transonic Systems flowmeters and sensors comply with USA standards for medical and dental equipment (UL2601-1), and with European standards for medical and ultrasonic apparatus (IEC0601-1). These products are are CE marked per 93/42EEC Annex II. Transonic Systems is an ISO9001/EN46001-certified facility.

Transonic Systems Inc.
www.transonic.com

Flowprobe Selection Guide

PERIVASCULAR FLOWPROBE SERIES & AVAILABLE SIZES		
SUFFIX	**DESCRIPTION**	**SIZES (mm)**
-FMC	Coronary	1.5, 2, 3, 4
-FMV	Vascular	1.5, 2, 3, 4, 6, 8, 10, 12, 14
-FME	Carotid (L-reflector for carotid endarterectomy)	4, 6, 8, 10
-FTV	OptiMax® (hands-free, J-reflector)	4, 6, 8, 10, 12
-FTE	OptiMax® (hands-free, L-reflector carotid endarterectomy)	4, 6, 8, 10, 12
-FMU	Microvascular (handle)	0.7, 1, 1.5, 2, 3
-AU	Cardiac Output COnfidence Flowprobe®	8, 10, 12, 14, 16, 20, 24, 28, 32, 36
-MB	Intracranial Charbel Micro-Flowprobe® (long bayonet handle)	1.5, 2, 3
-MB-S	Extracranial EC-IC Bypass: Micro-Flowprobe (short bayonet handle)	3, 4, 6
-FSB	Basic (no handle, L-reflector, sliding cover)	1.5, 2, 3, 4, 6, 8, 10, 12, 14

Recommended Sizes and/or Flowprobe Series for Specific Vessels or Applications

CARDIAC SURGERY		
CABG: ON OR OFF PUMP	Probe Size (mm)	Probe Series
Arterial conduits	1.5, 2, 3, 4	-FMC
Saphenous vein	2, 3, 4	-FMC
CARDIAC OUTPUT		
Ascending aorta	28, 32, 36	-AU
Pulmonary artery	24, 28, 32	-AU
Pediatric heart	8, 10, 12, 14, 16, 20	-AU

TRANSPLANT SURGERY			
LIVER	Probe Size (mm)	Probe Series	
Hepatic artery	4, 6, 8	-FMV	-AU
Portal vein	10, 12, 14	-FMV	-AU
KIDNEY			
Renal artery	4, 6	-FMV	-FSB
Renal vein	10	-FMV	-FSB
External iliac artery	6, 8	-FMV	-FSB
Hypogastric artery	4, 6	-FMV	-FSB
PANCREAS			
Common iliac artery	8	-FMV	-FSB

CEREBROVASCULAR SURGERY			
ANEURYSM CLIPPING	Probe Size (mm)	Probe Series	
Cerebral arteries	1.5, 2, 3	-MB	-MR
EC-IC BYPASS			
Extracranial	3, 4, 6	-MB-S	MR-S
Intracranial	1.5, 2, 3	-MB	-MR
AVM, TUMOR RESECTION, DURAL FISTULA			

VASCULAR SURGERY					
CAROTID ENDARTERECTOMY	Probe Size (mm)	Probe Series			
Common carotid artery	8, 10	-FTE	-FME		-FSB
External carotid artery	6	-FTE	-FME		-FSB
Internal carotid artery	6	-FTE	-FME		-FSB
AV FISTULAS & GRAFTS					
Radial artery	2, 3	-FMV			-FSB
Brachial artery	3, 4, 6	-FMV	-FTV		-FSB
Graft venous outflow	4, 6	-FMV	-FTV		-FSB
ABDOMINAL					
Renal bypass	4, 6	-FMV	-FTV		-FSB
Aortoiliac shunt					
aorta	16, 20			-AU	
common iliac	10, 12	-FMV	-FTV	-AU	-FSB
Portocaval shunt	10, 12, 14	-FMV	-FTV	-AU	-FSB
Splenorenal shunt	10, 12, 14	-FMV	-FTV	-AU	-FSB
LOWER EXTREMITY BYPASS					
Profunda femoris	8	-FMV	-FTV	-AU	-FSB
Common femoral	8, 10	-FMV	-FTV	-AU	-FSB
Popliteal	4, 6	-FMV	-FTV		-FSB
Tibial	3, 4	-FMV	-FTV		-FSB

MICROVASCULAR SURGERY		
REATTACHMENTS/FLAPS	Probe Size (mm)	Probe Series
Microvessels in hand, wrist	0.7, 1, 1.5, 2, 3	-FMU