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THOMSEN Messtechnik

# Sentinel LCT8

## High accuracy ultrasonic flow meter

### Certainty delivered

In an industry where reliability and performance are measured in terms of uncertainty, it's imperative to choose instrumentation that provides peace of mind. The Sentinel LCT8 is the newest addition to the Panametrics line of ultrasonic flow meters for high-accuracy metering applications.

Used primarily for measuring hydrocarbon liquids and water for critical use, the eight-path design of the LCT8 enables the meter to maintain performance in unstable conditions. Its eight chordal paths provide a stratified field that cancels the effect of swirl and flow disturbances caused by changing fluid properties or installation effects. Sentinel LCT8 delivers certainty in uncertain processes.

The LCT8 incorporates the groundbreaking design of the Sentinel LCT4, seamlessly integrating into a pipeline or process. When a smaller installation footprint is required or pressure drop is concerned, the eight-path design allows for shorter upstream and downstream lengths.

Against other flow technology meters, the LCT8 exemplifies the advantages of ultrasonic flow measurement, including:

- No drifting or required periodic calibration
- No pressure drop
- No restriction in the pipe
- No moving parts and no filters or strainers

### A true multi-viscosity meter

The LCT8 uses a number of proprietary algorithms to reduce viscosity effects, making it viscosity independent. No prover run or change of settings is required when the viscosity changes. The meter retains its accuracy over the whole range between minimum and maximum viscosity, using only one calibration curve.

### Applications

- Pipeline leak detection
- Liquid custody transfer measurement
- Allocation measurement
- Any critical liquid process

Panametrics
a Baker Hughes business

## Calibration

Laboratory calibration on the LCT8 is performed to match the application, using either a single fluid or multiple fluids. Each meter is calibrated to adhere to the OIML R117-1 international standard. Other specific calibrations are available upon request.

There is no need for recalibration when replacing transducers or electronics. Testing by NMI as part of the OIML certification is pending.

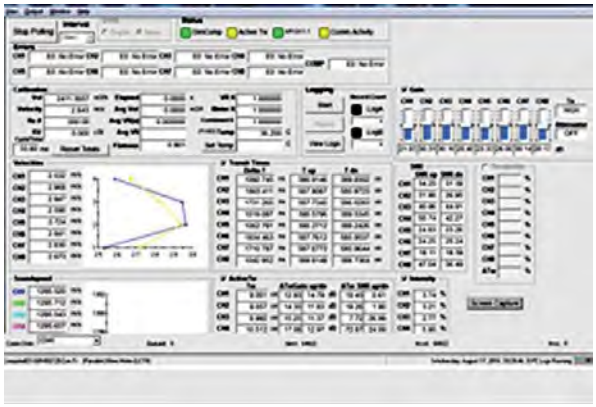
## Advanced electronics

The Sentinel LCT8 electronics has digital signal processors that pack significant power in a simple package. As a standard package, several inputs and outputs are available, including Modbus. The electronics is integrated with the flowcell body in a single unit, but can also be mounted remotely using an adapter and cable.

Local programming and diagnostic access is done via magnetic induction to preserve hazardous area integrity. USB and RS232 connections are available to link with Panametrics PanaView software.

## PanaView™ diagnostics

The PanaView software facilitates communication between the Sentinel LCT8 and a PC. Not only does this software provide real time flow data, but it is also capable of providing historical tracking of diagnostics and a full configuration audit trail. The PanaView diagnostic master screen is shown below.



## System weights

| Fully Assembled Dry Weight | | | | | | |
|---|---|---|---|---|---|---|
| Vessel Nominal Diameter | English [lb] | | | Metric [kg] | | |
| | 150# | 300# | 600# | 150# | 300# | 600# |
| 6" | 239 | 286 | 346 | 108 | 130 | 157 |
| 8" | 334 | 398 | 497 | 151 | 181 | 225 |
| 10" | 421 | 512 | 694 | 191 | 232 | 315 |
| 12" | 582 | 704 | 896 | 264 | 320 | 407 |
| 14" | 746 | 925 | 1077 | 339 | 420 | 488 |
| 16" | 978 | 1200 | 1469 | 444 | 545 | 666 |
| 24" | 2112 | 2660 | 3202 | 958 | 1207 | 1453 |

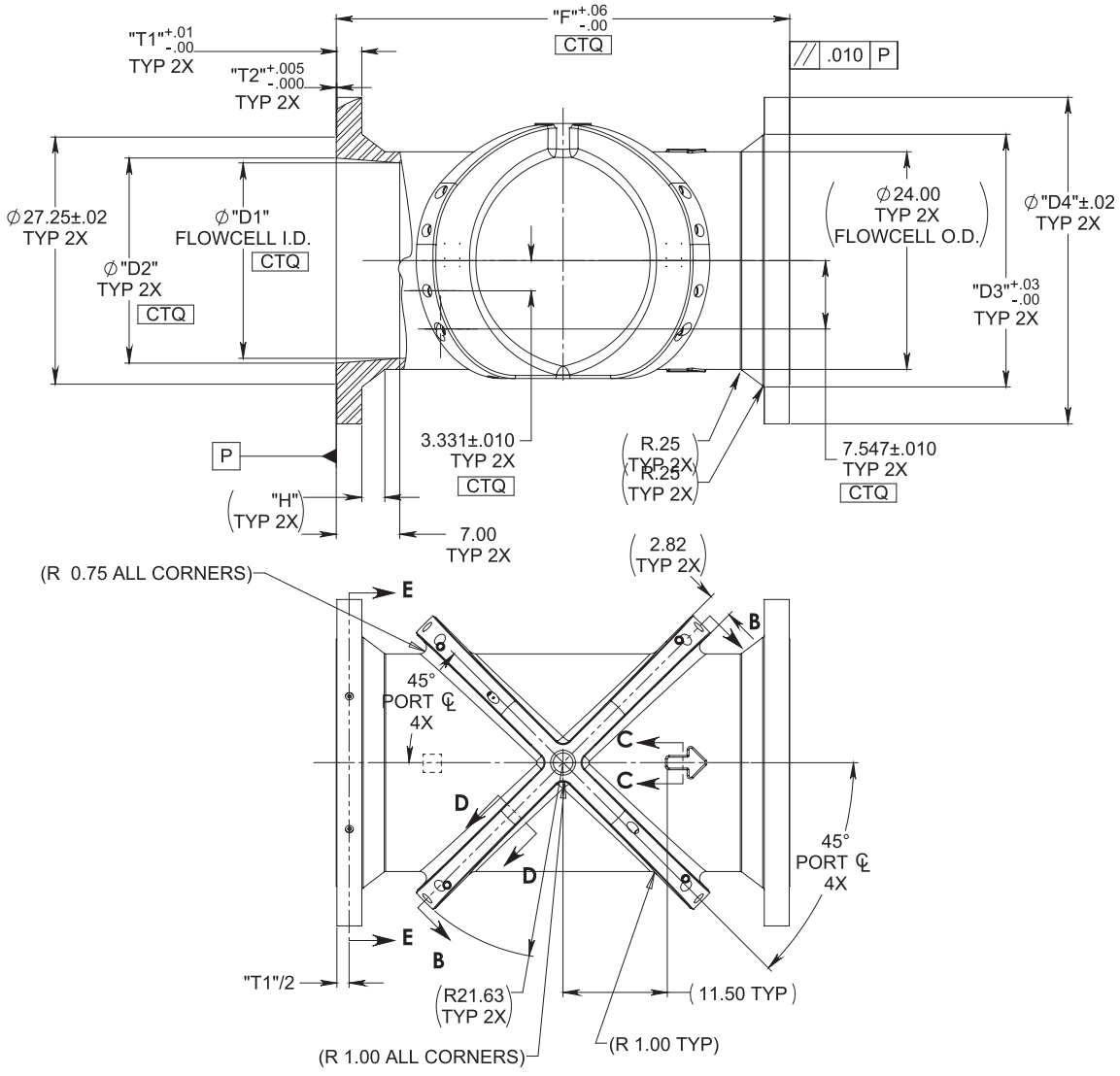
Typical 24" flowcell

## Flow ranges

| Velocity | | | | | | Volumetric[2, 3] | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal size | | Vmin | Vmax | Vmin | Vmax | Qmin | Qmax | Qmin | Qmax | Qmin | Qmax |
| in. | mm | ft/s | ft/s | m/s | m/s | m3/h | m3/h | gal/m | gal/m | bbl/h | bbl/h |
| 6 | 150 | 1 | 40 | 0.3 | 12.2 | 20 | 818 | 90 | 3602 | 129 | 5147 |
| 8 | 200 | 1 | 40 | 0.3 | 12.2 | 35 | 1417 | 156 | 6237 | 223 | 8913 |
| 10 | 250 | 1 | 40 | 0.3 | 12.2 | 56 | 2233 | 246 | 9831 | 351 | 14049 |
| 12 | 300 | 1 | 40 | 0.3 | 12.2 | 80 | 3203 | 353 | 14100 | 504 | 20150 |
| 14 | 350 | 1 | 40 | 0.3 | 12.2 | 98 | 3905 | 430 | 17191 | 614 | 24566 |
| 16 | 400 | 1 | 40 | 0.3 | 12.2 | 129 | 5172 | 569 | 22772 | 814 | 32542 |
| 18 | 450 | 1 | 40 | 0.3 | 12.2 | 165 | 6618 | 728 | 29137 | 1041 | 41637 |
| 20 | 500 | 1 | 40 | 0.3 | 12.2 | 206 | 8241 | 907 | 36285 | 1296 | 51852 |
| 24 | 600 | 1 | 40 | 0.3 | 12.2 | 301 | 12022 | 1323 | 52932 | 1891 | 75639 |

1. Based on nominal sch 40S/STD inner diameter
2. These flowrates comprise product capability.
3. OIML R117 applications will be limited based on ranges detailed in certificate

## Dimensions



# Specifications

## Flowcell dimensions

| | | Dimensions in English units (rounded) | | | Dimensions in metric units (rounded) | | |
|---|---|---|---|---|---|---|---|
| Diameter (inches) | Flange class | L (in) | H2 (in) | A (in) | L (mm) | H2 (mm) | A (mm) |
| 6 | 150# | 22 | 23 | 15.97 | 559 | 563 | 406 |
| | 300# | 24 | 23 | 15.97 | 610 | 582 | 406 |
| | 600# | 26 | 24 | 15.97 | 660 | 601 | 406 |
| 8 | 150# | 26 | 25 | 16.86 | 660 | 621 | 428 |
| | 300# | 28 | 26 | 16.86 | 711 | 640 | 428 |
| | 600# | 30 | 26 | 16.86 | 762 | 659 | 436 |
| 10 | 150# | 28 | 27 | 19.14 | 711 | 675 | 486 |
| | 300# | 30 | 28 | 19.14 | 762 | 694 | 486 |
| | 600# | 32 | 29 | 20.00 | 813 | 726 | 508 |
| 12 | 150# | 30 | 29 | 20.97 | 762 | 732 | 533 |
| | 300# | 32 | 30 | 20.97 | 813 | 751 | 533 |
| | 600# | 36 | 31 | 22.00 | 914 | 770 | 559 |
| 14 | 150# | 36 | 32 | 23.39 | 914 | 792 | 567 |
| | 300# | 38 | 33 | 23.00 | 965 | 818 | 584 |
| | 600# | 40 | 33 | 23.75 | 1016 | 828 | 603 |
| 16 | 150# | 38 | 35 | 23.88 | 965 | 882 | 605 |
| | 300# | 40 | 36 | 25.50 | 1016 | 908 | 648 |
| | 600# | 42 | 37 | 27.00 | 1067 | 927 | 686 |
| 18 | 150# | 38 | 38 | 26.56 | 965 | 945 | 675 |
| | 300# | 40 | 39 | 28.00 | 1016 | 983 | 711 |
| | 600# | 44 | 41 | 29.25 | 1118 | 1037 | 743 |
| 20 | 150# | 46 | 39 | 28.88 | 1168 | 983 | 734 |
| | 300# | 48 | 41 | 30.50 | 1219 | 1021 | 775 |
| | 600# | 50 | 43 | 32.00 | 1270 | 1078 | 813 |
| 24 | 150# | 48 | 43 | 32.38 | 1219 | 1088 | 822 |
| | 300# | 50 | 45 | 36.00 | 1270 | 1138 | 914 |
| | 600# | 52 | 46 | 37.00 | 1321 | 1151 | 940 |

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## Operation and performance

**Fluid types**
Liquid hydrocarbons, crude and refined products, other liquids

**Linearity**
± 0.12% of measured volume for flow rates between 1 and 33 ft/s (0.3 and 10 m/s)

**Repeatability**
0.02%

**Uncertainty**
± 0.027% according to API MPMS 5.8

**Viscosity range**
0 to 660 cSt

**Reynolds range**
> Re 10,000, consult Panametrics for lower Reynolds numbers

**Process temperature**
Standard; -40 to +140°C (-40 to +248°F)

**Ambient temperature**
-40 to +60°C (-40 to 140°F)

**Storage temperature**
-40 to +85°C (-40 to +176°F)

## Meter body

**Meter body materials**
- Carbon steel SA216 Gr. WCB (Carbon steel)
- Low temperature carbon steel SA352 Gr. LCB (Low temp carbon steel)
- Stainless steel SA351 Gr. CF8 (304SS)
- Stainless steel SA351 Gr CF8M (316SS)
- Other materials available upon request

**Pipe sizes**
6 in. to 24 in.

**Flange ratings**
- 150 #
- 300 #
- 600 #

**Pipe schedules**
- Standard: 40/40S, 80/80S and 0S
- Optional: STD, XS and others available upon request

**Recommended installation requirement**
Minimum 5 pipe diameters upstream and 3 pipe diameters downstream

## Electronics

**Electronics enclosure material**
- Standard: Epoxy coated aluminium
- Optional: Stainless steel A351, Gr 316/316L

**Environmental protection**
IP66

**Power supply**
- 100 to 240 VAC
- 12 to 32 VDC

**Power consumption**
7 W

**Display**
High-contrast 128 x 64 pixel LED graphical display

**Outputs**
- Two isolated frequency/pulse outputs
- Two alarm relays
- One 4/20 mA output

**Inputs**
- Two 4/20 mA inputs and one 100 ohm RTD input for temperature, pressure and density input (optional)
- Three 4/20 mA inputs for temperature, pressure and density input (optional)

**Digital interfaces**
- PanaLink over RS232/485/USB
- Modbus RTU over RS232/485

**Flow computer functionality**
Integrated flow computer with full P and T volume corrections according to API 11.1

**Hazardous area certifications**
- USA/Canada: Class 1, Div 1, Groups B, C, & D
- Europe: ATEX II 2 G Ex d IIB+H2 (Ex de as option)
- IEC Ex: Ex d IIB+H2 (Ex de as option)

**CE compliance**
- 2004/108/EC EMC Directive
- 2006/95/EC LVD Directive

**Custody transfer performance approvals**
Multiple country-specific approvals available upon request.

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