Clamp-Type Ultrasonic Flow Meter

Caloriena

Specifications

Archive	Date	Author
Rev 1.0.0	2012 / 07 / 30	M.Shiraishi
Rev 3.0.0	2012 / 11 / 5	M.Shiraishi
Rev 4.0.0	2013 / 03 / 15	M.Shiraishi
Rev 5.0.0	2013 / 09 / 25	M.Shiraishi
Rev 6.0.0	2014 / 02 / 18	M.Shiraishi

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1・Summary

The **Caloriena** is the first ultrasonic flow meter that is able to measure both the flow rate and temperature of a liquid without physical contact. It is also easy to measure calories consumed without attaching a thermometer.

As a flow meter, the **Caloriena** has an ultra-high resolution allowing it to measure even the slightest flow. Furthermore, unlike electromagnetic flow meters, the **Caloriena** is able to integrate down stream and up stream flows as well as measure flow pulse. There is no need to attach several measuring instruments.

2・Components

The **Caloriena** flow-measuring device is consisted of three main components. The controller, sensor cables and an ultrasonic sensor as illustrated below.
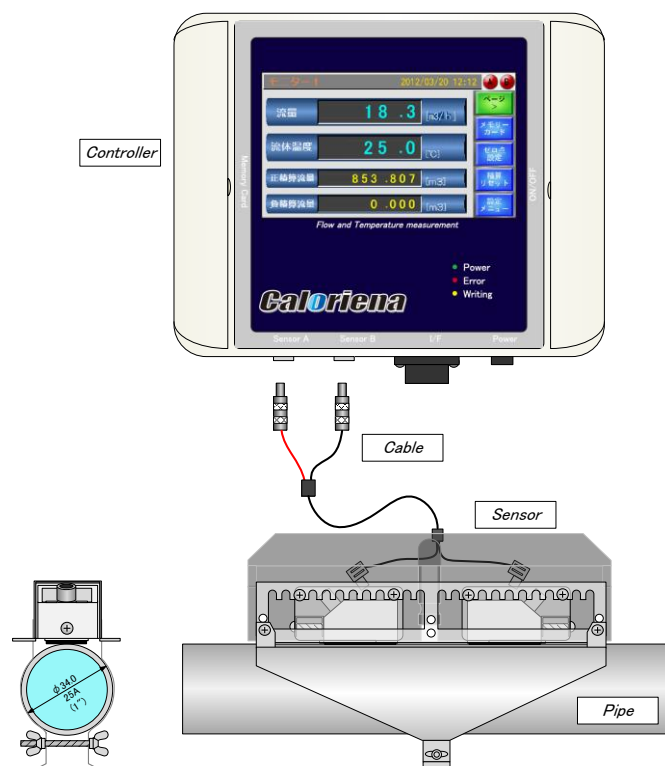
Controller:

The controller is connected to the ultrasonic sensor via sensor cables.

It is used to set particular settings and parameters, as well as monitor measurements.

Ultrasonic Sensor:

The Sensor consists of the ultrasonic sensors and a mounting bracket. It can be easily be attached to any pipe by 2 screws. Depending on the pipe size, the sensors are divided into 2 categories:
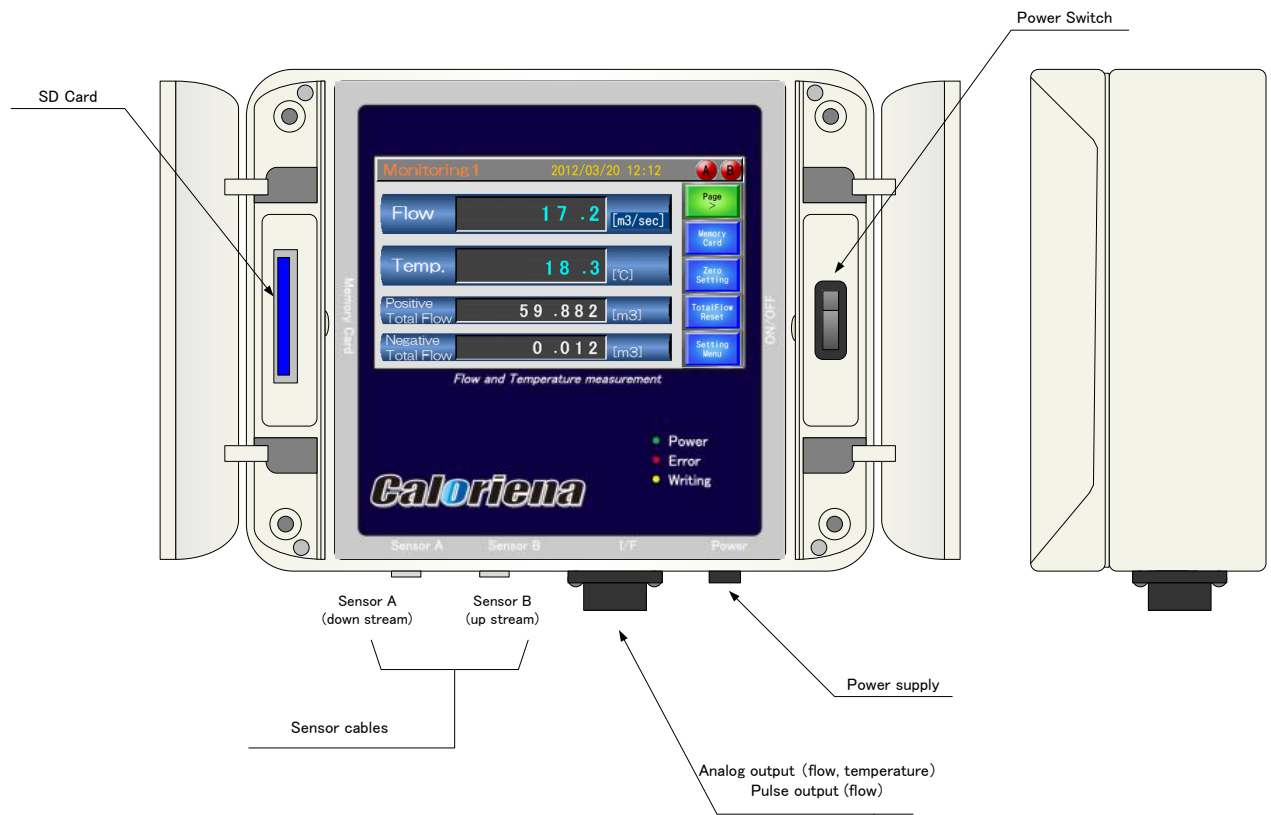
V1 Type: 20A（3/4"）～ 100A（4"）
V2 Type: 100A（4"）～ 300A（12"）

3・General Specifications

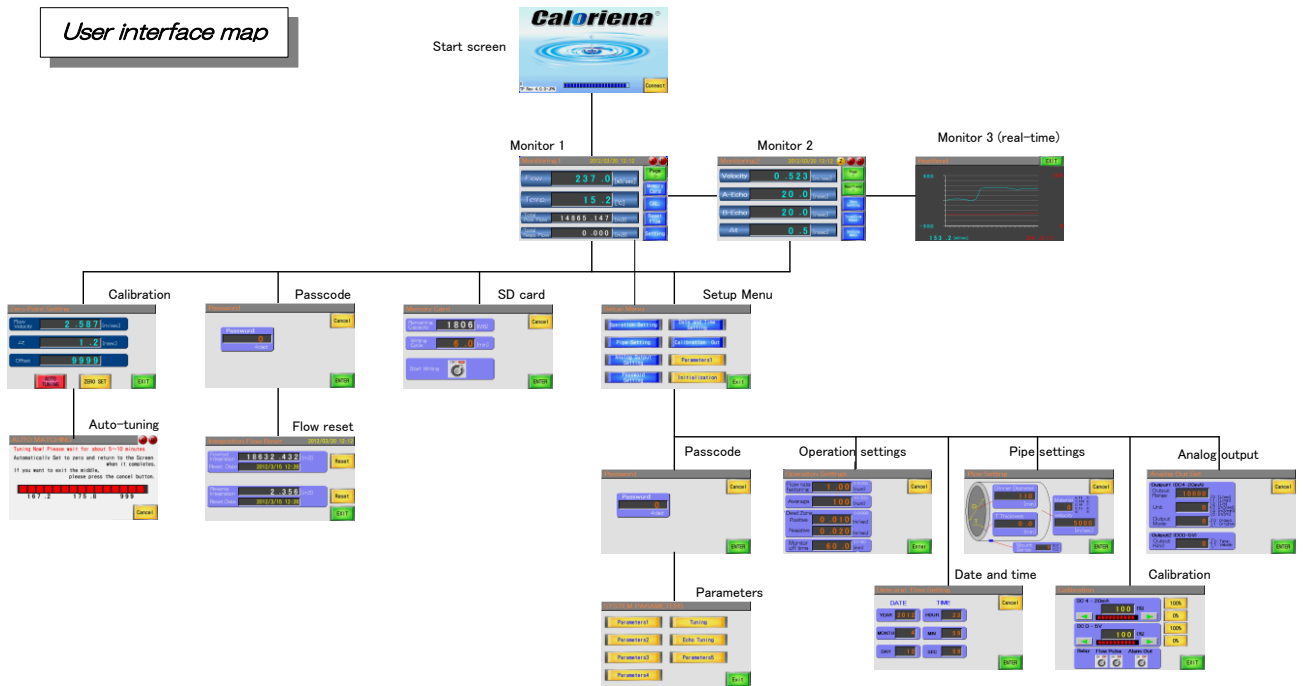| Categories	Specifications	Notes
Target Liquids	Water, Pure water	Other liquids such as juice, milk, etc. are also measurable
Requirements Upon measuring	Full pipe with no air bubbles、 solid particles or impurities.	
Components	Controller, ultrasonic sensors and cables	
Measurement method	Transit-time	
Installation method	Clamp-type with mounting bracket	1 screw for pipes ≤DIN100 Velcro Straps for pipes ≥DIN125
Pipe material	Stainless steel (SST, AISI, SUS), Polyvinyl chloride (PVC), Carbon steel (SGP), Vinyl chloride (VU), Polyethylene (PE), etc.	When there is air inside the pipes it cannot be measured.
Pipe diameter range	DIN25~DIN300 (1"~12")	Mounting bracket differs by pipe size
Flow Velocity range	0.000 ～ ±5.000 [m/sec]	Depends on pipe size
Flow Velocity resolution	0.003 [m/sec] ／@50A	Depends on pipe size
Flow rate accuracy	±0.6%／RD (Velocity ≧0.5 [m/sec]) ±2%／RD (Velocity <.0.5 [m/sec])	
Repeatability	±1%	
Temperature range	0.0 ～ 50.0 [℃]	Pipe materials with poor heat conductivity may trigger measurement delays.
Temperature measurement method	Velocity-temperature relationship	Water only
Temperature resolution	0.1 [℃]	
Temperature accuracy	±1.0 [℃]	
Data format	CSV format onto inserted SD card User sets writing frequency	

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4・Controller Specifications

Categories	Specification		Notes
Physical dimensions	H130-W160-D60		Excluding protrusions
Power supply	DC12V		DC5V～DC26V
Power consumption	Approximately <5VA		
User interface	4.3" color touch panel (LCD)		QVGA（480×272）
Analog output	Ch1	DC4～20mA（DC 0～24mA）	User sets velocity Max resistance 500Ω
	Ch2	DC0～5V	Liquid temperature 0~100°C or Velocity ±5.000 m
Digital output (PhotoMOS Relay) DC30V 1A	Ch1	Positive flow rate pulse	Pulse rate settings
		Negative flow rate pulse	
	Ch2	Error	Measurement Error
Recording media	SD Card		MAX 2GB
Computer communication interface	RS485（Modbus RTU）		9,600～38,400bps（Optional with SD）
Internal memory	Nonvolatile memory		Internal FRAM
Date and time	Built in Circuit board Battery replacement unnecessary Fully charged, will last up to a week.		monthly lag by 30s
Base Material	ABS resin		
Weight	Approx. 0.5kg		Excluding sensor and cables
Installation	Screw or DIN rail		
Operating temperature range	−5 ～ 50℃		Without condensation
Storage temperature	-10 ～ 60℃		

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4-1 • Controller Dimensions [mm]

4-2・User Interface Map

User interface map

Start screen

Monitor 1   Monitor 2   Monitor 3 (real-time)

Calibration   Passcode   SD card   Setup Menu

Auto-tuning   Flow reset

Passcode   Operation settings   Pipe settings   Analog output

Parameters   Date and time   Calibration

<Monitor Screen example>

Monitor Screen

5・Ultrasonic Sensor Specifications

Categories	Specification				Notes
Sensor	Ultrasonic vibrator				
Frequency bandwidth	2MHz~5MHz				
Installation	Mounting bracket with butterfly screws				Depends on pipe size
Connecting cables	Coaxial cable				50Ω
Connector	LEMO-0				
Mounting bracket	Pipe size	Bracket type	Notches	Velocity resolution [m/sec]	
	DIN25	V1 Type	1-1	0.004	
	DIN32		1-2	0.003	
	DIN50		2-3	0.003	
	DIN80	V1 Type V2 Type	4-4	0.002	
	DIN100		5-6	0.003	
	DIN125	V2 Type	2-3	0.002	
	DIN150		3-4	0.002	
	DIN200		5-6	0.001	
	DIN250		7-8	0.001	
	DIN300		9-9	0.001	
Mounting bracket material	SUS304				
Water repellence	IP65				With cover on
Weight	200g				With cover: excluding cables
Operating temperature range	0°C~50°C				

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5-1 • Ultrasonic Sensor Dimensions [mm]

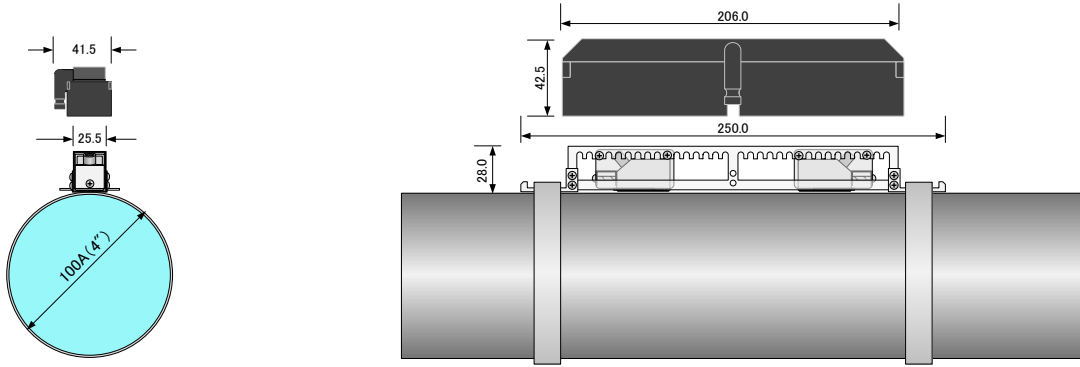Installment Example: for 25A V-type mounting bracket

防塵カバー
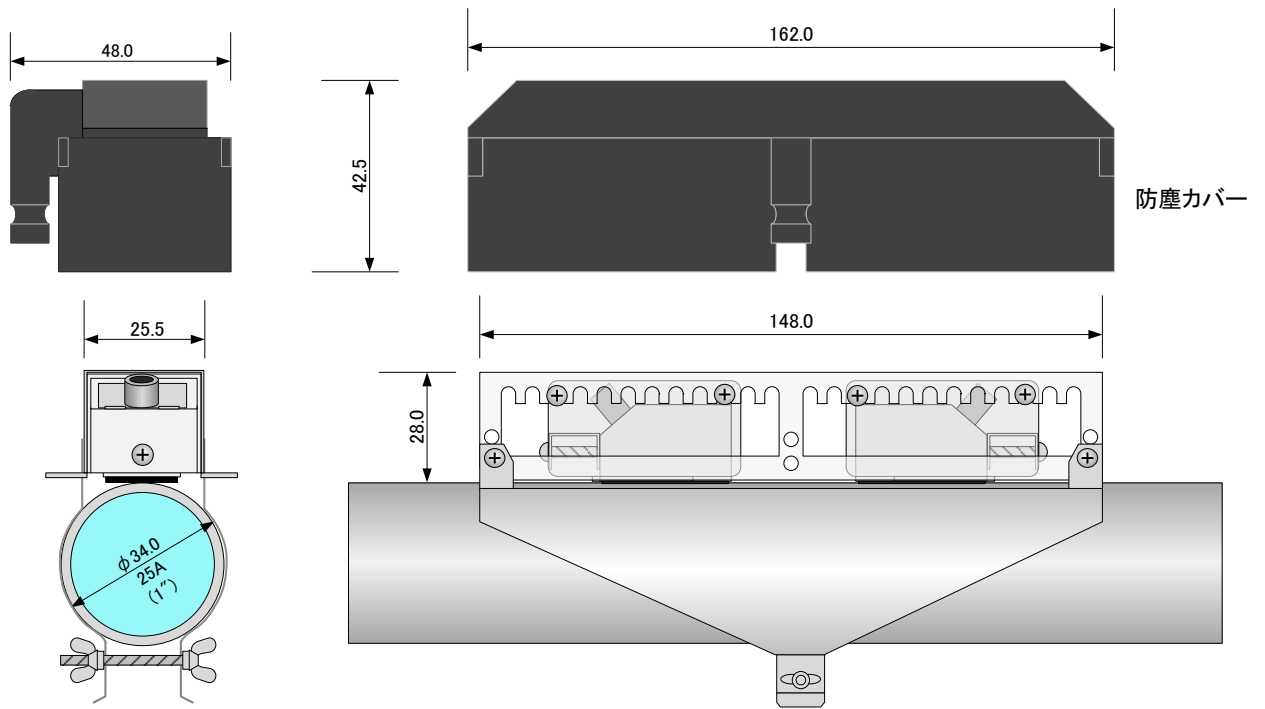
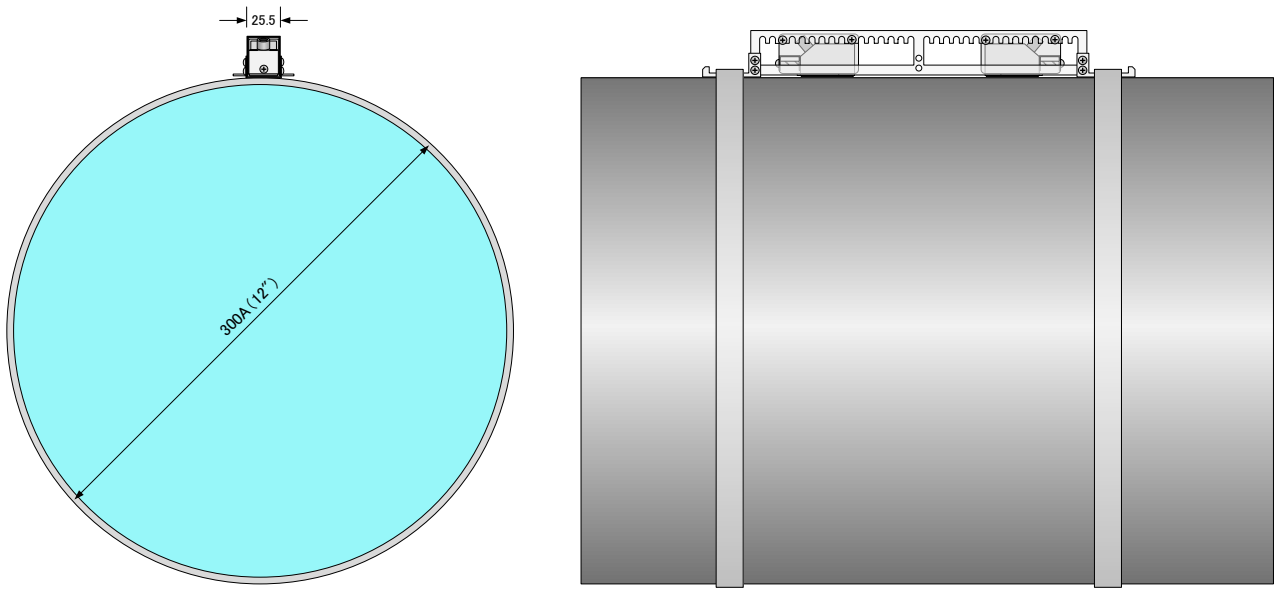Installment Example: for DIN50 V-type mounting bracket
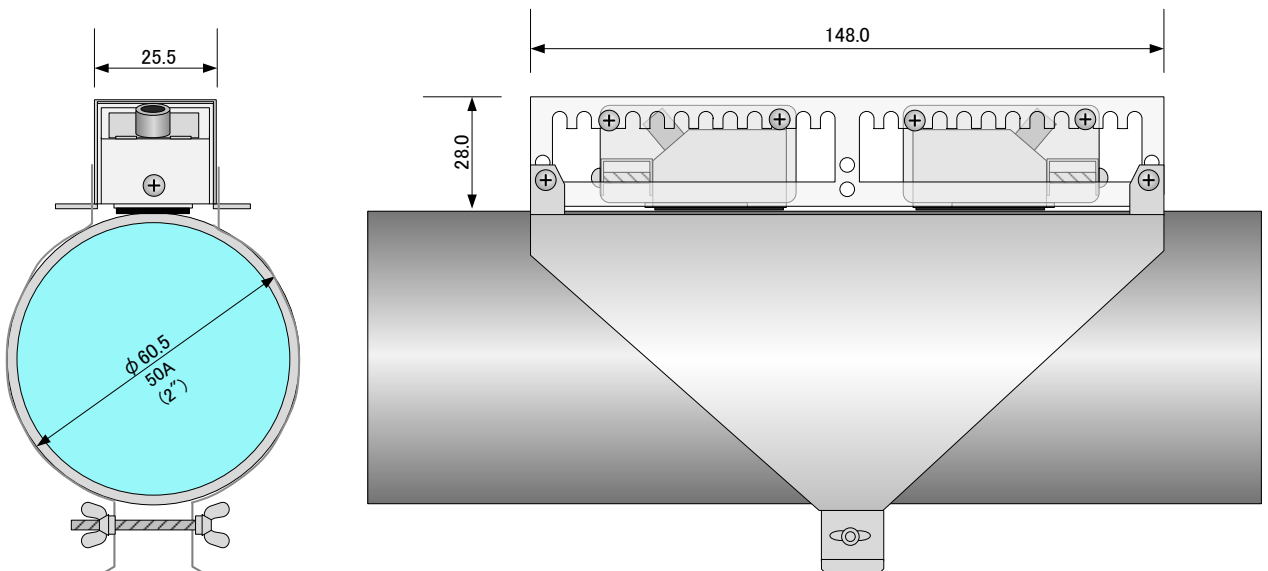
The V Type mounting brackets can measure between 25A~90A depending on the position you tap into.

Installment Example: for 100A V2 type mounting bracket

41.5

25.5

100A(4")

206.0

42.5

250.0

28.0

Installment Example: for 300A V2 type mounting bracket

25.5

300A(12")

Mounting bracket dimensions depend on pipe size as the two examples are shown above.

　　　　V1 type is compatible with sizes ranging from 100A~150A.

　　　　V2 type is compatible with sizes ranging from 200A~300A.

Mounting brackets are available in various sizes. Please contact us for more info

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6・Measurement Data Specifications

No.	Category	Range	Units	Note
1	Flow rate	User sets sensitivity range	[L/sec] [L/min] [L/hr] [m^3/sec] [m^3/min] [m^3/hr]	Flexible
2	Velocity	±10.000	[m/sec]	Fixed
3	Temperature	0~50.0	[°C]	Fixed
4	Total Positive Flow	0~999999.999	[m^3]	
5	Total Negative Flow	0~999999.999	[m^3]	

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7．Measuring range

Pipe Size		Accuracy [m]	Working Range [m]	Notes
25A		0.004	±10.000	
32A		0.003	±5.000	
50A		0.003	±10.000	
80A	V1 Type	0.002	±7.000	
	V2 Type	0.003	±10.000	
100A	V1 Type	0.001	±5.000	
	V2Type	0.003	±5.000	
125A		0.002	±5.000	
150A		0.002	±5.000	
200A		0.001	±5.000	
250A		0.001	±5.000	
300A		0.001	±5.000	

Notice

These specifications are as of February 18th, 2014.

The contents and specifications of the *Caloriena* may change without notice. We cannot guarantee that the *Caloriena* can fully function in particular measurement environments, or with certain pipe materials. Please contact us before purchasing the *Caloriena*. We also provide the *Caloriena* on lease.

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