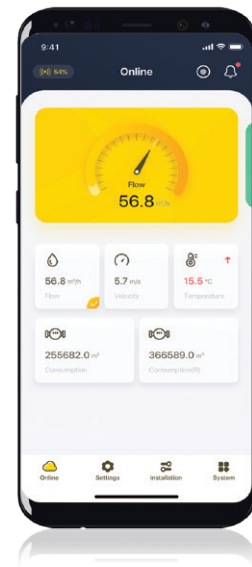


# S461

## Ultrasonic Flow Meter for Liquid

Clamp-on



**NON-INVASIVE  
MEASUREMENT**  
Through clamp-on  
sensors



**SMARTPHONE  
APP**  
Easy configuration



**ENERGY METER**  
Monitors of heat  
exchangers



**COMPACT DESIGN**  
Can be installed  
anywhere



**LOCAL  
DISPLAY**  
For instant values



**DATA  
LOGGER**  
8 million samples



**EASY  
INSTALLATION**  
Various installation  
options



**LOGGER DATA  
READOUT**  
Readout and share data  
through mobile App



## Benefits

- ✓ Noninvasive plug & play liquid measurement
- ✓ Easy and user friendly configuration through the dedicated smartphone app
- ✓ Various signal interfaces for easy connection: Modbus/RTU (standard), 4 ... 20 mA / Pulse / Alarm-Relay (option), Modbus/TCP (option)
- ✓ Bi-directional measurement for more flexibility
- ✓ Robust industrial design with versatile installation options for the display unit
- ✓ Can be used as energy meter to monitor heat exchangers

## Accurate Liquid Measurement

The SUTO ultrasonic clamp-on flow meter S461 has all it takes to measure reliable, easy and accurate flow and consumption of liquids. Based on the transit time technology this flow meter comes with unique features and outstanding performance.

The transducers are simply clamped onto the outside of the pipe and never come in contact with the fluid. The main unit is either installed onto the pipe as well, at the wall or onto a DIN rail.

The configuration and setup is made through the wireless smartphone app S4C-US which can be downloaded for free from the SUTO website, Google Play Store and the Apple App Store. The app allows the user to set up the device as well as reading live values, logger configuration and logger data read out.

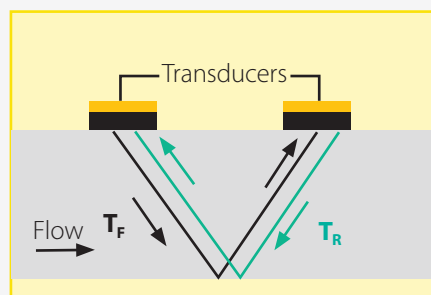
By adding 2 clamp-on temperature sensors the Energy Meter Version monitors the efficiency of heat exchangers.

The S461 comes also as portable version in a transport case.

## S461 and transducers mounted on pipe



## Transit Time Principle



$T_F$ : time in flow direction  
 $T_R$ : time in reverse flow direction

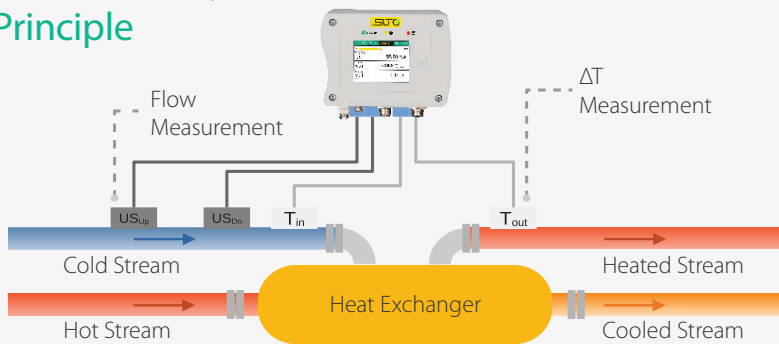
A number of pulses are transmitted from one transducer to the other and vice-versa. Sound waves travel faster with the direction of flow and slower against the direction of flow.

## Mobile App

Instant view of daily, weekly and monthly consumption through mobile app.



## Heat Recovery Principle



Heat exchangers transfer heat (energy) from a higher temperature medium (hot stream) to a colder one (heated stream). S461 measures the flow rate and the temperature difference between cold stream and heated stream. Based on these measurements the recovered energy will be calculated.

## Applications

- Cooling / Heating / Process Water
- Purified Water Measurement
- Fuel, Oils, Petroleum Products
- Water Treatment
- Food / Beverage
- HVAC / Energy System Audits
- Sanitary flow metering
- Hydraulic System Test
- Pharmaceutical Industry

## Convenient Storage

Transport casing holding up to 2 transducer pairs, T-Sensors, belt and metal stretchers, power bank, cables, charger and documentation



## Mobile Power

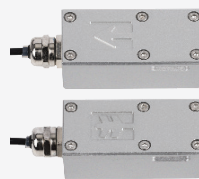
S461 powered by power bank with connection cable A553 0154

**Note:** power bank must be sourced locally due to shipping restrictions [USB-C, 20 V, min. 100 mA]

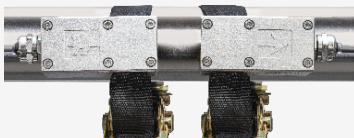
## Accessories



A wall thickness meter is recommended for accurate readings



UTH-S transducer for higher temperature applications



Belt stretcher for temporary installation



Transducer mounting fixture simplify the flow transducer installation



# Technical Data

## Measurement

### Flow

Accuracy	1.0 % o. RDG $\pm$ 0.01 m/s
Selectable units	Metric: m/s, m <sup>3</sup> /h, m <sup>3</sup> /min, l/min, m <sup>3</sup> Imperial: ft/min, cfm, cfs, USG/min, IG/min, bbl/min
Measuring range	0.03 ... 12 m/s
Repeatability	0.2 % o.RDG
Transducer	Ultrasonic transducer
Sampling rate	5 samples / sec
Response time (t90)	0.1 sec

### Consumption

Selectable units	Metric: m <sup>3</sup> , l Imperial: cf, IG, UG, bbl
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### Temperature

Accuracy	0.5 °C
Selectable units	Metric: °C. Imperial: °F
Measuring range	-40 ... +130 °C
Sensor	Pt1000

### Energy Flow

Selectable units	Metric: GJ/h, kJ/h, kcal/h Imperial: MBtu/h, Btu/h
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### Energy

Selectable units	Metric: GJ, kJ, kcal, kWh, MWh Imperial: Mbtu, Btu
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## Signal / Interface & Supply

### Analog output (Option)

Signal	4 ... 20 mA (4-wire), isolated
Scaling	0 ... max flow, freely adjustable
Load	max. 250 Ohm
Update rate	100 ms

### Pulse output (Option)

Signal	Switch output, normally open, nominal value: 24 VDC/0.5 A
Scaling	1 pulse per consumption unit (selectable)

### Fieldbus

Protocol	Modbus/RTU (Standard) Modbus/TCP and PoE (Option)
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### Supply

Voltage supply	20 ... 28 VDC
Current consumption	150 mA @ 24 VDC

## General data

### Configuration

Wireless	S4C-US App for mobile phones
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### Display

Size/Resolution	2.4" color (640 x 480) graphic display, 1 touch button
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### Data Logger

Storage	8 Mio. values
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### Material

Main Casing	PC + ABS
Transducer	UT-S: Industrial synthetic plastics UTH-S: Aluminum

### Miscellaneous

Electrical connection	2 x M12 D code (4 pole): transducer 2 x M12 (5 pole): Signals/Supply. (8-pole x-coded) for TCP 2 x M8 (4 pole): Pt1000 (Energy Meter Version)
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Protection class	Main casing: IP65. Transducer: IP68
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Approvals	CE, RoHS, FCC
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Dimensions	Main unit: 124 x 102 x 70 mm UT-S Transducer: 64 x 30 x 27 mm UTH-S Transducer: 68 x 34 x 34 mm
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Weight	1.2 kg
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### Operating conditions

Fluids	All acoustically conductive liquids with less than 10 % gaseous
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Medium temperature	-40 ... +130 °C
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Ambient temperature	Main unit: 0 ... +50 °C UT-S Transducer: 0 ... +80 °C UTH-S Transducer: -40 ... +130 °C
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Ambient humidity	< 99 % rH
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Storage temperature	-30 ... 70 °C
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Transport temperature	-30 ... 70 °C
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Pipe sizes	DN40 ... DN1200
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## Flow Ranges

DN	DO	Max flow		
		l/min	m <sup>3</sup> /h	cfm
40	48	905	54	32
50	60	1,414	85	50
65	76	2,389	143	84
80	88	3,619	217	128
100	114	5,655	339	200
125	139	8,835	530	312
150	165	12,723	763	449
200	219	22,618	1,357	799
250	273	35,341	2,121	1,248
300	323	50,891	3,054	1,797
500	508	141,365	8,482	4,992
1000	1016	565,458	33,929	19,970
1200	1219	814,260	48,858	28,756

Remarks: DN: nominal inner diameter

DO: outer diameter (depends on standard and material)

# Ordering

Please use the following tables to assist in placing your order with our sales staff.

## S461 Ultrasonic Flow Meter For Liquids

Order No.	Description
D695 4610	S461 Ultrasonic flow meter for liquids main unit, USB, data logger and display
<b>Main unit mounting</b>	
A4603	Pipe/Wall mounting plate (for pipe mounting please order metal stretcher separately)
A4604	35 mm DIN hat rail mounting plate
A4602	No mounting
<b>Signal outputs</b>	
A4605	Modbus/RTU
A4606	Modbus/RTU + 4 ... 20 mA, Pulse / Alarm
A4607	Modbus/RTU + Modbus/TCP
<b>Clamp-on ultrasonic flow transducers</b>	
A4610	UT-S, Ultrasonic transducer pair, DN40 ... DN1200, 5 m cable, M12 connector, 0 ... +80 °C, IP68 (includes coupling agent)
A4611	UTH-S, Ultrasonic transducer pair, DN40 ... DN1200, 5 m cable, M12 connector, -40 ... +130 °C, IP68 (includes coupling agent)
<b>Transducer unit mounting (Metal stretcher)</b>	
A695 4601	Pair of metal stretcher for pipe sizes: DN40 ... DN65
A695 4602	Pair of metal stretcher for pipe sizes: DN80 ... DN100
A695 4603	Pair of metal stretcher for pipe sizes: DN125 ... DN150
A695 4604	Pair of metal stretcher for pipe sizes: DN200 ... DN300
A695 4605	Pair of metal stretcher for pipe sizes: DN350... DN500
A695 4608	Pair of belt stretcher for temporary installations, used for pipe sizes: DN40...DN500

## S461 Installation Optional Accessories

Order No.	Description
<b>Transducer unit mounting (Guided mounting fixture)</b>	
A695 4617	Transducer mounting fixture for UT-S ultrasonic flow transducer pair, uses metal stretchers to fix, the max. supported pipe size is DN300
A695 4618	Transducer mounting fixture for UTH-S high-temperature ultrasonic flow transducer pair, uses metal stretchers to fix, the max. supported pipe size is DN300

## S461 Accessories

Order No.	Description
A553 0104	Sensor cable, 5 m, M12 connector, open wires
A554 0105	Sensor cable, 10 m, M12 connector, open wires
A554 0107	Main unit 100....240 VAC/24 VDC, 0.5 A for SUTO sensors, 1,5 m cable, M12 connector
A554 4625	Transport casing S461 dimensions: 560 x 450 x 160 mm (portable unit)
A553 0159	S461 flow transducer extension cable pair, 5 m, M12 4-pole male/female
A695 4610	Coupling agent for flow sensor installation, 65 g
A553 0154	Cable to connect power bank, 1.8 m, USB-C connector for power bank, M12 connector
P554 0009	Ultrasonic thickness meter*

## Calibration & Services

Order No.	Description
R200 4610	Calibration S461 together with transducer pair

## Ordering Example

**Example:** S461 Ultrasonic Flow Meter for Liquids, Pipe/Wall mounting plate, Modbus/TCP output, UT-S transducers, pipe size DN 300

**Order Code:** D695 4610. A4603. A4607. A4610. A695 4604

\* Only accurate measurements are possible with the S461/S462, if the exact pipe wall thickness is set correctly.



Please use the following tables to assist in placing your order with our sales staff.

## S461 Ultrasonic Flow & Energy Meter For Liquids

Order No.	Description
D695 4611	S461 Ultrasonic flow & energy meter for liquids main unit, USB, data logger, display and 2 additional M8 temperature inputs
<b>Main unit mounting</b>	
A4603	Pipe/Wall mounting plate (for pipe mounting please order metal stretcher separately)
A4604	35 mm DIN hat rail mounting plate
A4602	No mounting
<b>Signal outputs</b>	
A4605	Modbus/RTU
A4606	Modbus/RTU + 4 ... 20 mA, Pulse / Alarm
A4607	Modbus/RTU + Modbus/TCP
<b>Clamp-on ultrasonic flow transducers</b>	
A4610	UT-S, Ultrasonic transducer pair, DN40 ... DN1200, 5 m cable, M12 connector, 0 ... +80 °C, IP68 (includes coupling agent)
A4611	UTH-S, Ultrasonic transducer pair, DN40 ... DN1200, 5 m cable, M12 connector, -40 ... +130 °C, IP68 (includes coupling agent)
<b>Temperature sensors</b>	
A4616	Clamp-on temperature sensor pair, 5 m cable, M8 connector -10 ... +130 °C, IP42, for S461 energy meter only (includes metal stretchers)
A4617	Insertion temperature sensor pair, 5 m cable, PT1000 Class B, M8 connector, -10 ... +250 °C, 6 x 150 mm sensor tube, for S461 energy meter only
<b>Transducer unit mounting (Metal stretcher)</b>	
A695 4601	Pair of metal stretcher for pipe sizes: DN40 ... DN65
A695 4602	Pair of metal stretcher for pipe sizes: DN80 ... DN100
A695 4603	Pair of metal stretcher for pipe sizes: DN125 ... DN150
A695 4604	Pair of metal stretcher for pipe sizes: DN200 ... DN300
A695 4605	Pair of metal stretcher for pipe sizes: DN350 ... DN500
A695 4608	Pair of belt stretcher for temporary installations, used for pipe sizes: DN40 ... DN500

## S461 Installation Optional Accessories

Order No.	Description
<b>Transducer unit mounting (Guided mounting fixture)</b>	
A695 4617	Transducer mounting fixture for UT-S ultrasonic flow transducer pair, uses metal stretchers to fix, the max. supported pipe size is DN300
A695 4618	Transducer mounting fixture for UTH-S high-temperature ultrasonic flow transducer pair, uses metal stretchers to fix, the max. supported pipe size is DN300
<b>Insertion temperature sensor unit mounting</b>	
A554 6003	Compression fitting 6 mm, G1/2", PTFE ring, 0.6 Mpa
A554 6004	Compression fitting 6 mm, G1/2", metal ring, 1.6 Mpa

## S461 Accessories

Order No.	Description
A553 0104	Sensor cable, 5 m, M12 connector, open wires
A554 0105	Sensor cable, 10 m, M12 connector, open wires
A554 0107	Main unit 100....240 VAC/24 VDC, 0.5 A for SUTO sensors, 1,5 m cable, M12 connector
A554 4625	Transport casing S461 dimensions: 560 x 450 x 160 mm (portable unit)
A553 0159	S461 flow transducer extension cable pair, 5 m, M12 4-pole male/female
A553 0163	S461 temperature sensor extension cable pair, 5 m, M8 4-pole male/female
A695 4610	Coupling agent for flow sensor installation, 65 g
A553 0154	Cable to connect power bank, 1.8 m, USB-C connector for power bank, M12 connector
P554 0009	Ultrasonic thickness meter*

## Calibration & Services

Order No.	Description
R200 4614	Calibration insertion temperature sensor with S461 to achieve system accuracy of $\pm 0.15$ K at calibration point (Calibration range: -10 ... 80 °C)
R200 4610	Calibration S461 together with transducer pair
R200 4613	Calibration clamp-on temperature sensor S461

## Ordering Example

**Example:** S461 ultrasonic flow & energy meter, main unit wall mounting, Modbus/TCP output, flow transducers 0 ... 80 °C, clamp-on temperature sensor, pipe size DN 300

**Order Code:** D695 4611. A4603. A4607. A4610. A4616. A695 4604

\* Only accurate measurements are possible with the S461/S462, if the exact pipe wall thickness is set correctly.

