

Instruction and operation manual

S 460-P

Portable ultrasonic controller



Dear Customer,

Thank you for choosing our product.

The operating instructions must be read in full and carefully observed before starting up the device. The manufacturer cannot be held liable for any damage which occurs as a result of non-observance or non-compliance with this manual.

Should the device be tampered with in any manner other than a procedure which is described and specified in the manual, the warranty is cancelled and the manufacturer is exempt from liability.

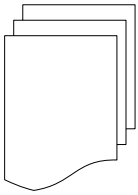
The device is destined exclusively for the described application.

SUTO offers no guarantee for the suitability for any other purpose. SUTO is also not liable for consequential damage resulting from the delivery, capability or use of this device.

Table of contents

1. Safety instructions.....	4
2. Application.....	6
3. Features.....	6
4. Technical Data.....	7
4.1 General.....	7
4.2 Electrical Data.....	7
4.3 Output-Signals.....	7
4.4 Accuracy	7
5. Determination of the installation point.....	8
6. Installation	9
6.1 Installation Requirements.....	10
6.2 Installation Procedure	10
6.3 Electrical Connection	12
6.4. Installation check up.....	12
7. Configuration.....	13
8. Signal outputs.....	15
8.1 Interface	15
9. Optional extra accessories.....	16
10. Calibration.....	16
11. Maintenance.....	16
12. Disposal or waste.....	16
13. Warranty.....	16

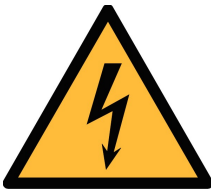
1. Safety instructions



Please check if this instruction manual accords to the product type.

Please observe all notes and instructions indicated in this manual. It contains essential information which have to be observed before and during installation, operation and maintenance. Therefore this instruction manual has to be read carefully by the technician as well as by the responsible user / qualified personnel.

This instruction manual has to be available at the operation site of the ultrasonic flow meter at any time. In case of any obscurities or questions, regarding this manual or the product, please contact the manufacturer.



WARNING!

Voltage used for supply!

Any contact with energized parts of the product, may lead to a electrical shock which can lead to serious injuries or even death!

- Consider all regulations for electrical installations.
- The system must be disconnected from any power supply during maintenance work.
- Any electrical work on the system is only allowed by authorized qualified personal.



WARNING!

Permitted operating parameters!

Observe the permitted operating parameters, any operation exceeding this parameters can lead to malfunctions and may lead to damage on the instrument or the system.

- Do not exceed the permitted operating parameters.
- Make sure the product is operated in its permitted limitations.

- Do not exceed or undercut the permitted storage and operation temperature.
- The product should be maintained and calibrated frequently, at least annually.

General safety instructions

- It is not allowed to use the product in explosive areas.
- Please observe the national regulations before/during installation and operation.

Remarks

- It is not allowed to disassemble the product.
- Always use spanner to mount the product properly.



ATTENTION!

Measurement values can be affected by malfunction!

The product must be installed properly and frequently maintained, otherwise it may lead to wrong measurement values, which can lead to wrong results.

- Do not exceed the maximum operation temperature of the transducer.
- Avoid condensation on the transducer element as this will affect the accuracy enormously.

Storage and transportation

- Make sure that the transportation temperature of the device is between -30°C ... 70°C .
- For transportation it is recommended to use the packaging which comes with the device.
- Please make sure that the storage temperature of the device is between -10°C ... 50°C .
- Avoid direct UV and solar radiation during storage.
- For the storage the humidity has to be $<90\%$, no condensation.

2. Application

The S 460-P is an ultrasonic flow meter which is designed to measure the flow and consumption of liquids within the permissible operating parameters. These parameters can be found in the technical data section. The ultrasonic transducer are simply clamped onto the outside of the pipe and never comes in contact with the fluid.

The S 460-P can measure the following liquids:

- Chemical addition
- Cooling and heating water
- Drinking water
- Broad range of refined hydrocarbons
- Potable water
- De-ionized and de-mineralized water
- Sanitary flow rate measurements
- Purified water

The default factory settings are: Velocity in m/s, Volume flow in m³/h and Total Consumption in m³. Other units can be programmed by the optional display or the service kit.

The S 460-P flow meter is not developed to be used in explosive areas. For the use in explosive areas please contact the manufacturer.

The S 460-P flow meter is mainly used in industrial environment.

3. Features

- Use the proven clamp-on transit-time correlation technique.
- Easy to install for permanent and temporary installations.
- High accuracy.
- Physical units can be selected.
- Suitable for DIN15 – DIN6000.
- Plug and play for display and data logger of the manufacturer.
- Data analysis via S4M software.

4. Technical Data

4.1 General

CE	
Parameters	Standard unit flow: m ³ /h other units: m ³ /min, l/min, l/s, cfm, kg/h, kg/min, kg/s Standard unit velocity: m/s
Principle of measurement	clamp-on transit-time correlation technique
Sensor	Transducer
Measuring medium	Different kinds of Liquid
Operating temperature	Transducer: -30... 90°C Controller: -20... 60°C
Housing material	PVC
Protection class	IP65
Dimensions	177 mm x 177 mm x 60 mm
Tube diameter	Depend on the transducers: TS-2: DN32... DN100, TM-1: DN100... DN700, TL-1: DN300... DN6000
Weight	2.55 kg

4.2 Electrical Data

Power supply	24 VDC, 1.5 W
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4.3 Output-Signals

Interface	Modbus RTU
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4.4 Accuracy

Accuracy	±1%
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5. Determination of the installation point

In order to maintain the accuracy stated in the technical data, the transducer must be installed at a straight pipe length full of liquid. The piping can be in vertical or horizontal position. The following table shows examples of optimum locations.

Piping Configuration and Transducer Position	Upstream Dimension	Downstream Dimension
	L up x Diameters	L dn x Diameters
	10D	5D
	10D	5D
	10D	5D
	12D	5D
	20D	5D
	20D	5D
	30D	5D

Principles to select an optimum location:

- Install the transducers on a longer length of the straight pipe. The longer the better and make sure that the pipe is completely full of liquid.

- Make sure that the temperature on the location does not exceed the range for the transducers. Generally, the closer to the room temperature, the better.
- Take the pipe fouling into consideration. Select a straight length of a relatively newer pipe. If the condition is not satisfying, consider the fouling thickness as part of the liner for a better result.

Remarks

Some pipes have a kind of plastic liner and between the outer pipe and the liner there may be a certain thickness difference that will prevent the ultrasonic waves from direct travelling. Such conditions will make the measurement impossible. Whenever possible, try to avoid this kind of pipes. If that is impossible, plug-in transducers are necessary that are installed permanently on the pipe by drilling holes on the pipe while liquid is running inside.



ATTENTION!

Wrong measurement is possible, if the transducers are not installed correctly.

- The device is for indoor use only! At an outdoor installation, the device must be protected from solar radiation and rain.

6. Installation

Please make sure that all components listed below are included in your package.

Qty	Description	Item No.
1	Portable ultrasonic flow meter	P554 0070
1	Ultrasonic transducer pair	S694 4603/ S694 4604/ S694 4605
2	5 m connection cable to transducers	A553 0124
1	5 m connection cable to S 551	A553 0121
1	Metal stretcher	A554 0077
1	Coupling agent	A554 0075
1	Instruction manual	No P/N

6.1 Installation Requirements

Before installing the ultrasonic flow meter, the following parameters needed to be configured for a proper measurement:

- Pipe outer diameter
- Pipe wall thickness
- Pipe inner diameter
- Pipe material
- Fluid type
- Transducer type
- Installation method
- US transmitter space
- Flow unit
- Consumption unit

The setting can be done by using the S 551 user interface. For this please see chapter configuration.

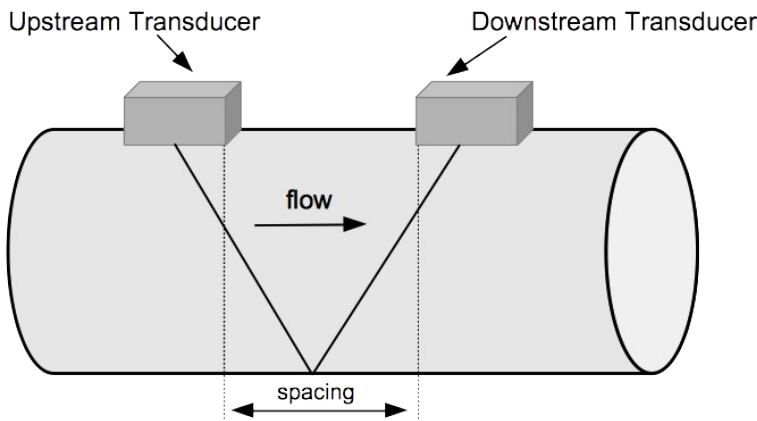
6.2 Installation Procedure

The following steps explain the procedure of an appropriate installation.

Installation of the transducers

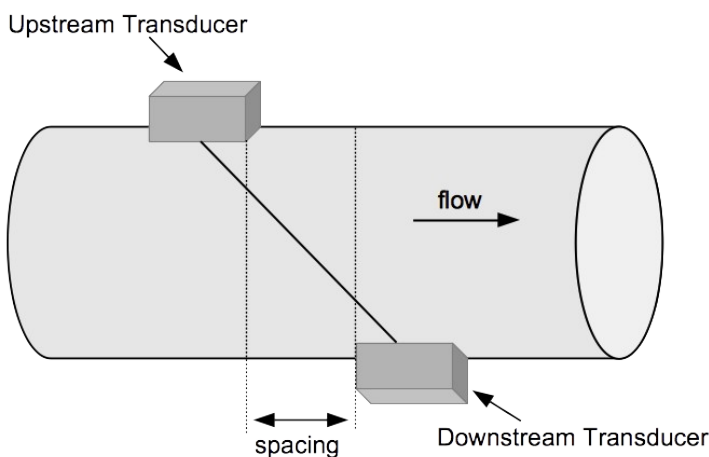
The measurement is realized by measuring the travelling time difference of the ultrasonic signals. That is why the alignment and the spacing of the transducers are critical factors for the accuracy of the measurement and the performance of the system. Please following the steps for a proper installation:

1. Locate an optimum position where the straight pipe length is sufficient and where the pipe is in a good condition, e.g. newer pipes with no rust and ease of operation.
2. Clean any dust and rust.
3. The specific installation distance of the tow transducers is shown in the menu with the menu number 25. Take care that the transducer spacing is as close as possible to the spacing value which is shown at the display.
4. Please choose one of the two installation methods:



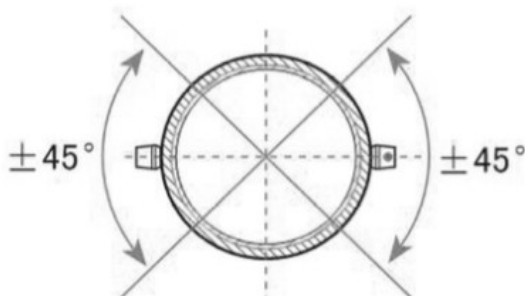
V-Method:

The transducers are mounted on the same side of the pipe and the sound crosses the pipe twice. It is commonly used when the pipe inner diameter ranging from 15 mm to 200 mm. When the spacing is bigger it is a W-Method so that the sound crosses the pipe four times. It is used with a diameter from 15 mm to 50 mm.



Z-Method:

The transducers are mounted on opposite sides of the pipe and the sound crosses the pipe once. It is commonly used when the pipe diameter is above 200 mm.



By using the Z-Method please consider, that the transducers should be mounted so that they are inside of the 45° like shown in the picture.

5. Before attaching the transducers please grease the underside of the transducers with the coupling agent.
6. To attach the transducer on the pipe please use the metal stretcher and leave no gap between the pipe surface and the

transducers.



ATTENTION!

The stretcher is under tension. Please open it carefully!

Removal of the transducer


1. Hold the transducer.
2. Release the metal stretcher.
3. Remove the coupling agent from the underside of the transducer.

Installation of the housing

Because of the casing the S 460-P no need a costly installation. Just connect the sensors like described in the chapter electrical connection.

6.3 Electrical Connection

Please observe the following steps for an adequate electrical installation:

	<ol style="list-style-type: none">1. Connect the S 460-P with the S 551 with the provided cable.2. Connect the cable with the blue connector to the "UP" pin.3. Connect the the cable with the red connector to the "Down" (DN) pin.
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6.4. Installation check up

After the sensor installation is completed an installation check-up is required. This ensures that the signal strength and signal quality of the transducers are in a valid range.

	Valid range:
Signal strength	60.0... 99.9
Signal quality	60.0... 90.0
Transit time ratio	97... 103

A few seconds after the sensor signal indicated that the value is in a valid range. Please contact the manufacturer if there is an error and provide the error code e.g. 0x0000.

If the Signal Strength is not in the valid range:

- relocate the transducers to a better position.
- try to apply more coupler or clean the surface.
- adjust the transducers both vertically and horizontally while checking the varying signal strength and stop at the highest position (check the transducers spacing to make sure the transducers spacing is the same as shown at the display).

If the signal quality is not in the valid range:

- Interferences of other instruments and devices such as a powerful converter working nearby. Try to relocate the flow meter to a new place where the interferences can be reduced.
- Bad sonic coupling for the transducers with the pipe. Try to apply more coupler or clean the surface.
- Relocate the transducers to a better position.

If the transmit time ratio is not in the valid range the user should check:

- if the pipe parameters are correctly entered.
- If the actual spacing of the transducers is right and the same as shown at the display
- if the transducers are installed properly in the right directions.
- If the mounting location is good and if the pipe has changed shape or if there is too much fouling inside the pipes.

7. Configuration

Please connect the S 460-P to the S 551 to configure the settings of the ultrasonic controller. Please follow the following steps:

1. Press the On / Off button and the device will start up

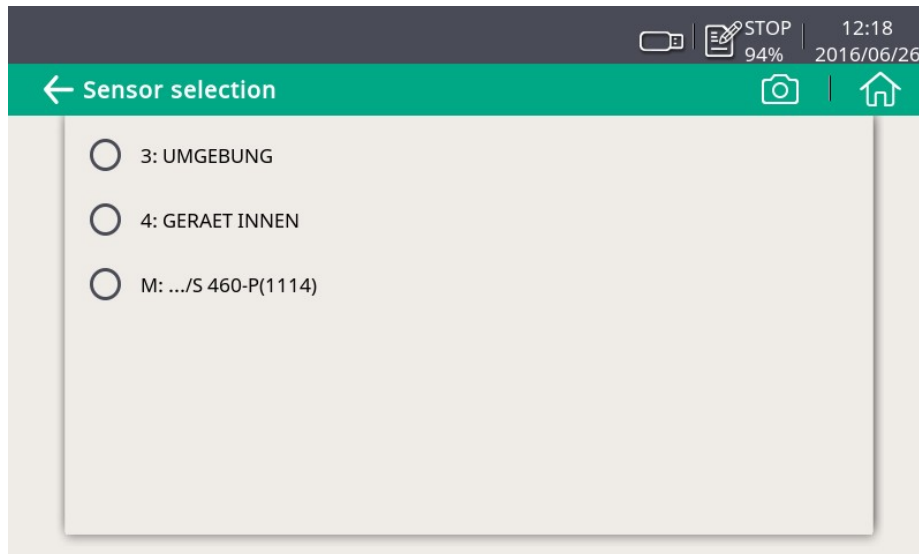


When the S 551 starts up it will display the start up screen for a few seconds. During this time the sensor connections are established and a few other initialisation tasks are performed.

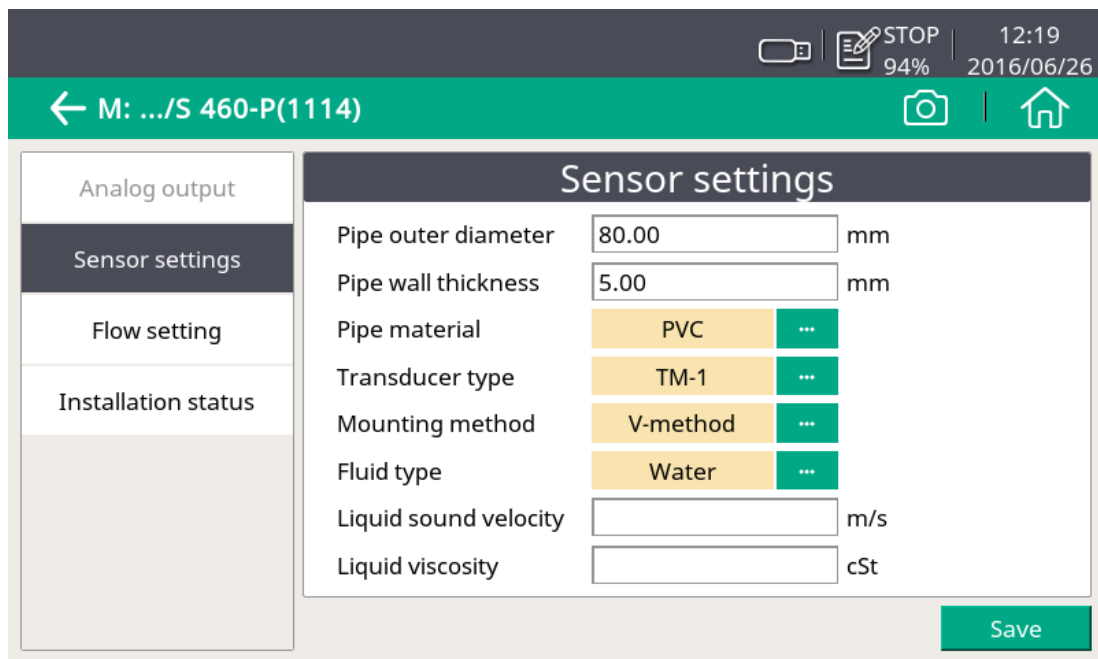
2. After a dozen seconds the Value screen is showing.
3. To configure the settings please press the "Menu" button. The main menu is showing:

<p>Group list: Assembly factory (1 of 2)</p>						Status bar
<div style="display: flex; flex-wrap: wrap; justify-content: space-around;"> <div style="text-align: center; margin: 10px;"> <p>Sensor setting</p> </div> <div style="text-align: center; margin: 10px;"> <p>Alarm status</p> </div> <div style="text-align: center; margin: 10px;"> <p>Logger</p> </div> <div style="text-align: center; margin: 10px;"> <p>Logging file list</p> </div> <div style="text-align: center; margin: 10px;"> <p>System setting</p> </div> <div style="text-align: center; margin: 10px;"> <p>Communication</p> </div> </div>						Function buttons
<div style="display: flex; justify-content: space-between; align-items: center;"> Graphic 23 Value Setting MENU Page </div>						
<p>Quick buttons</p>						

4. Please press "Sensor setting". The S 551 will identify the S 460-P automatically.
5. Choose the S 460-P.



6. Now the window is shown, where all settings can be done.



8. Signal outputs

8.1 Interface

The data can be transmitted via RS-485 Modbus to a data collection system or software.

9. Optional extra accessories

It is possible to order also following extra accessories:

- Ultrasonic sensor pair, DN32... DN100, screw terminal for stationary or socket terminal for portable, TS-2.
- Ultrasonic sensor pair, DN100... DN700, screw terminal for stationary or socket terminal for portable, TM-1.
- Ultrasonic sensor pair, DN300... DN6000, screw terminal for stationary or socket terminal for portable, TL-1.
- Transportation case.

10. Calibration

In certain installations the display will show a non-zero flow even if there is absolutely no flow. In this case, a zero point calibration is recommended. Make sure that there is zero flow in the pipe before activating this function in the sensor menu.

11. Maintenance

To clean the device and its accessories it is recommended to use moist cloth only.



ATTENTION!

Do not use isopropyl alcohol to clean the display!

12. Disposal or waste

Electronic devices are recyclable material and do not belong in the household waste.

The device, the accessories and its packings must be disposed according to your local statutory requirements. The dispose can also be carried by the manufacturer of the product, for this please contact the manufacturer.

13. Warranty

SUTO provides a warranty for this product of 24 months covering the material and workmanship under the stated operating conditions from the date of delivery. Please report any findings immediately and within the warranty time. If faults occurring during the warranty time SUTO

will repair or replace the defective unit, without charge for labour and material costs but there is a charge for other service such as transport and packing costs.

Excluded from this warranty is:

- Damage caused by:
 - Improper use and non-adherence to the instruction manual.
 - Use of unsuitable accessories.
 - External influences (e.g. damage caused by vibration, damage during transportation, excess heat or moisture).

The warranty is cancelled:

- If the user opens the measurement instrument without a direct request written in this instruction manual.
- If repairs or modifications are undertaken by third parties or unauthorised persons.
- If the serial number has been changed, damaged or removed.

Other claims, especially those for damage occurring outside the instrument are not included unless responsibility is legally binding.

Warranty repairs do not extend the period of warranty.



ATTENTION!

Batteries have a reduced warranty time of 12 month.

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