The following chapter is dedicated to a variety of additional sensors which can be used to provide more in depth analysis of compressed air or gas systems.

SUTO offers stationary as well as portable instruments to measure power and current consumption of compressors or any electrical power consumer.

Through the connection of the meters to our displays and data loggers and in combination with the S4M analysis software, energy consumption can be visualized.
Read more on page 48
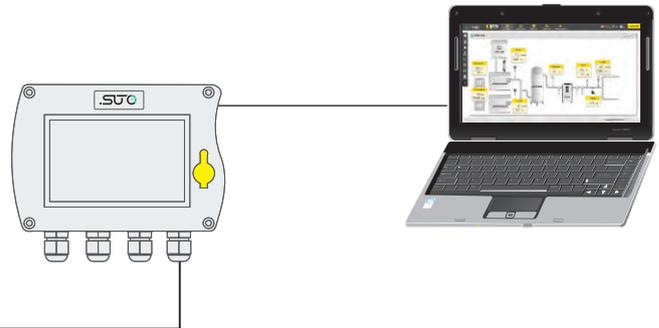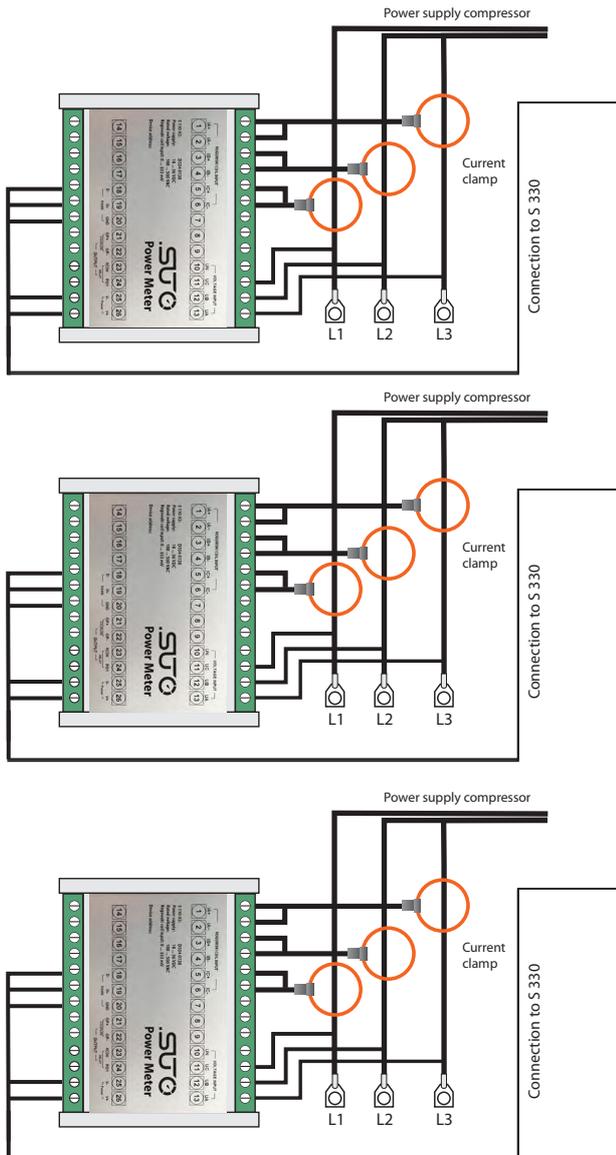
Power consumption measurement with several power meters S 110, data logger S 331 and analyzes with S4M

S 530 LEAK DETECTOR FOR PNEUMATIC SYSTEMS

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Leaks in compressed air systems can significantly increase the cost of running compressors. The detection of leaks is an important maintenance requirement which can be done by soapy water or ultrasonic sound.

Features

When gases are leaking through tubes and tanks an ultrasonic sound is produced which can be detected by the S 530 even from several meters away. The S 530 transforms these inaudible signals into a frequency which can be easily heard by using the supplied noise isolated headset. The integrated laser pointer helps to spot the leak from distance. In unpressurized systems an ultrasonic tone generator can be used whose sound will leak through small openings.
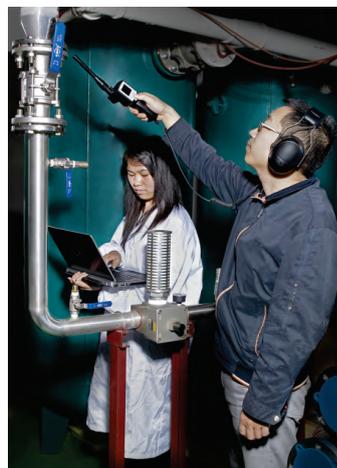
Leak detection with separated sensor

Applications

- Leak detection in compressed air, refrigerants, simply of any gas!
- Insulation test of doors and windows
- Detection of partial electrical discharges causing damages on insulations

Leak detection with focus tip

Leak detection with focus tube

Ultrasonic Leak Detector S 530

Contents of Set

Sensor
Focus tip
Cable
S530
Focus tube
Head set
Charger

Ultrasonic tone generator

Cost saving

Compressed air is one of the most expensive energy forms. In Germany alone, 60,000 pneumatic systems consume 14,000,000,000 kWh electricity every year. 15% to 20% of this could easily be saved (Peter Radgen, Fraunhofer Institute, Karlsruhe). A large portion of these costs are caused by leaks in compressed air systems, allowing the air to "escape" unused.

Calculation example at 0.6 MPa:

1 hole of 1mm diameter = 270 EUR/year

On/Off

Laser on/off

Adjust sensitivity

Order no.	Description
P601 0103	S 530 Leak Detector set consisting of:
P560 0102	S 530 Leak Detector
S605 0001	Sensor unit
A554 0102	Noise isolated headset
A530 0101	Focus tube and focus tip
A553 0101	Cable to detach sound probe from instrument
A554 0001	Battery charger
A554 0101	Transport case S 530
	Additional accessories not included in set:
A554 0103	Ultrasonic Tone Generator

S 110 POWER METER

S 110 hat rail mountable

The S 110 Power Meters are designed for easy installation and high accuracy. They measure the actual power consumption in kW and accumulate the Energy consumption in kWh of a 3-phase load. The S 110 can measure other parameters such as current, voltage, cos phi etc. Hat rail, wall mountable and portable versions are available.

S 110-P, for connection to S 551

S 330/331 can be used as stationary display of up to 16 power meters

Technical Data S 110		
Nominal voltage (L-N, L-L)	100 ... 500 VAC	
Voltage measurement	3PH4W, 3PH3W, 1PH2W	
Clamp sensor input range	external CT (333 mV only) external Rogowski coil	
Available clamp sensors	Rogowski coil	1 ... 100 A 10 ... 1000 A 30 ... 3000 A
Power range	up to 2000 kW (depends on Rogowski coil)	
Accuracy	Voltage: Current: Clamp: Energy:	0.2% 0.5% Class 1 Class 0.5
Output	Modbus RTU	
Supply	24 V DC / 3.5 W	
Operating Temperature	-25°C ... +55°C	
Dimensions	Hat rail version: Wall version: Portable:	122 x 87 x 23 mm 190 x 155 x 85 mm 177 x 177 x 60 mm

Rogowski coils with wide measuring range, high accuracy and easy installation

FURTHER USEFUL SENSORS AND SYSTEMS
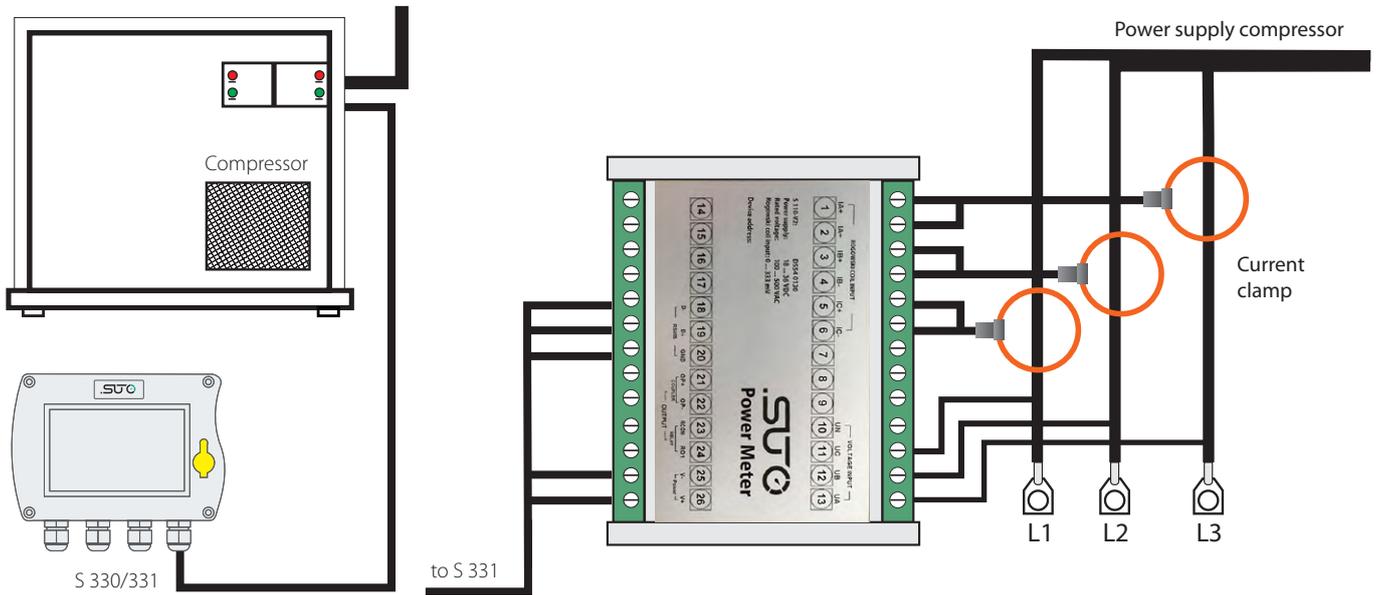
Installation

In above illustration a power meter is installed directly into the connection box of the compressor. The Rogowski coils can be easily fixed. The voltage connection can be drawn from other available connection points. A separate cable connects the S 110 power meter to the S 330/331 with Modbus RTU and 24 VDC power supply. The power meter could also be installed into the connection cabinet where the power supply for the compressor is coming from. If no hat rail mounting is available, there is a wall mountable version of the S 110 power meter.

Order no.	Description
Stationary	
D554 0130	S 110 power meter, hat rail, Modbus RTU, 24 VDC supply
S554 0140	Rogowski coil for S 110, 1000 A, 100 mm diameter, 1.8 m cable, open ends
S554 0141	Rogowski coil for S 110, 3000 A, 150 mm diameter, 1.8 m cable, open ends
S554 0142	Rogowski coil for S 110, 100 A, 16 mm diameter, 1.8 m cable, open ends
Portable	
P554 0134	Portable power meter S 110-P, Modbus RTU, including 4 test leads, 4 test clips, connection cable to S 551
S554 0160	Rogowski coil for S 110-P, 1000 A, 100 mm diameter, 1.8 m cable, connector to S 110-P
S554 0161	Rogowski coil for S 110-P, 3000 A, 150 mm diameter, 1.8 m cable, connector to S 110-P
S554 0162	Rogowski coil for S 110-P, 100 A, 16 mm diameter, 1.8 m cable, connector to S 110-P
Options	
A554 0035	Transport case S 551 for sensors and cables

SUTO provides a calibration service for all its sensors as well as on-site testing. Please contact our service for inquiries. Dew point and flow calibration service is performed in the SUTO Test & Calibration Labs in Germany and China (Asia market). For other physical units we have contract partners in Germany. All references are traceable to national standards and are re-calibrated in regular intervals.

Dew point calibration service

- Accuracy: 0.1°Ctd
- Calibration range: -75°Ctd ... +15°Ctd
- Reference: Dew point mirror MBW 373

Flow calibration service

- Accuracy: 0.5% of reading
- Pressure: 0 ... 0.6 MPa
- Medium: Air

- Calibration range: 0 ... 4000 sm³/h
- Pipe diameter: DN25 ... DN100
- Reference: Turbine flow sensors

On-Site testing

For on-site testing we can offer:
- Dew point measurement
- Flow /consumption measurement
- Pressure measurement
- Temperature measurement
- Leak detection
- Data logging over days and weeks

Order no.	Description
R200 0001	Flow calibration with certificate
R200 0005	Oil & grease free cleaned option for flow sensors (for Oxygen it is already included in A1009)
R200 0020	Real gas calibration in selected gas to ensure best accuracy
R200 0030	Pressure sensor calibration 16 bar(g) type, at 3 points
R200 0120	General service and re-calibration S 120
R200 0130-A	Calibration particle counter S 130-A
R200 0130-B	Calibration particle counter S 130-B
R200 0130-C	Calibration particle counter S 130-C
R200 0130-D	Calibration particle counter S 130-D
R200 0130-E	Calibration particle counter S 130-E
R200 0131	Calibration particle counter S 131
R200 0600	S 600 calibration and service
R699 3396	Dew point sensor calibration

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C190 0002

Description	Closing cap for S 421/S 452 material: 1.4404.
Application	To close the measuring sections in case the sensor unit is removed.

C190 0060

Description	Thread adaptor, G1/2' internal to PT1/2' external, SUS303.
Application	Used to adapt S 401 or S 450 to a PT thread ball valve.

C190 0065

Description	Thread adaptor, G1/2' internal to NPT1/2' external, SUS303.
Application	Used to adapt S 401 or S 450 to a NPT thread ball valve.

C190 0116

Description	Flow conditioner.
Application	Wafer type flow conditioners, which is flanged between two flanges 5-8 times diameter upstream of the flow meter. Please specify nominal pipe diameter and pressure.

A530 1105 / A530 1106 / A530 1111 / A530 1113

Description	High pressure installation device. To be used for pressure > 1.5 MPa.
Application	For safety reasons we recommend using this installation device whenever the operating pressure exceeds 1.5 MPa. * A530 1105 - High pressure installation device for S 400/S 401-220mm * A530 1106 - High pressure installation device for S 450-220mm * A530 1111 - High pressure installation device for S 400/S 401-400mm * A530 1113 - High pressure installation device for S 450-400mm

A530 1108

Description	SUTO spot drilling device.
Application	This drilling tool is used to drill holes into compressed air pipes under pressure through a ball valve.

A553 0121

Description	Sensor cable, 6 pole, AWG22, 7.5 mm outer diameter, w/ shielding, black (per meter)
Application	Sensor cable for S 450 sensor, US flow meter and power meter

A553 0122

Description	Sensor cable, 5 pole, AWG24, 5.0 mm outer diameter, black (per meter)
Application	Standard sensor cable for flow and dew point sensors

A553 0123

Description	RS-485 cable 3 pole with shielding, AWG 24
Application	RS-485 connection cable

A553 0104

Description	Sensor cable 5 m, with M12 connector, open wires, AWG24 (0.2 mm^2)
Application	Cable can be used to connect SUTO sensors to a PLC or power supply.

A553 0105

Description	Sensor cable 10 m, with M12 connector, open wires, AWG24 (0.2 mm^2)
Application	Cable can be used to connect SUTO sensors to a PLC or power supply.

A554 0009

Description	Power supply for hat rail, input: 85 ... 264 VAC, output: 24 VDC, 60W.
Application	This power supply can be used to supply sensors with 24 VDC/2.5A. It's mounted on a hat rail.

A554 0007

Description	Power supply wall mountable, input: 85 ... 264 VAC, output: 24 VDC, 15W, without cable
Application	This power supply is used to supply 24 DC to sensors and other devices.

A554 0008

Description	½" G type ball valve
Application	This is a proper ball valve for the installations of flow sensors S 401/S 450.

P554 0009

Description	Wall thickness meter
Application	The instrument is used to measure the wall thickness of pipes. Too often the inner diameter of pipes is not exactly known, but this information is required for an accurate flow measurement. By measuring the wall thickness and the pipe size the exact inner diameter can be calculated.

A554 0107

Description	Mains unit 100-240 VAC/24 VDC, 0.5A for S 401/S 201 series, 2 m cable
Application	Simple power supply for a portable S 421 or S 401 solution (Special plug on request)

A554 2005

Description	Service kit for sensor configuration including software
Application	This service kit can be used for all SUTO sensors to change settings and check sensors.

For overview of sensor power consumption please refer to page 75.

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A699 3491	
Description	Measuring chamber, 2 l/min @ 0.8 MPa, fast connector, without filter, max. pressure 1.5 MPa, suitable for all SUTO dew point sensors.
Application	For easy connection and disconnection to compressed air system through quick-disconnector.

A699 3493	
Description	By-pass-type chamber with 6 mm hose in and out connection up to 1.5 MPa.
Application	This chamber can be used in applications where the measured gas is by-passed through the chamber.

A699 3500	
Description	Measuring chamber, 4 l/min @ 0.8 MPa, hose fast connector, with filter, recommended pressure range 0.3 ... 1.5 MPa, convenient dew point measurement of gas/air with S 505.
Application	The sample gas/air is connected to the chamber through a 6 mm Teflon® hose. The chamber is mounted to the S 505 through the 1/2 " G-type thread connection. Parking and measurement position is selected through the handle at the chamber, which allows quick measurement results.

A699 3501	
Description	By-pass-type chamber with 6 mm hose in and out connection up to 1 MPa, convenient dew point measurement of gas/air with S 505.
Application	This chamber can be used in applications where the measured gas is by-passed through the chamber to avoid any gas/air loss. The chamber is mounted to the S 505 through the 1/2 " G-type thread connection. Parking and measurement position is selected through the handle at the chamber, which allows quick measurement results.

A699 3496	
Description	Measuring chamber for dryer installation, 2 l/min @ 0.8 MPa, hose fast connector, without filter, max. pressure 1.5 MPa
Application	The sample gas/air is connected to the chamber through a 6 mm Teflon® hose. The chamber is mounted to stationary S 2XX dew point sensors through the 1/2 " G-type thread connection. This chamber can be conveniently mounted to the frame or cabinet of a dryer.

A699 3690	
Description	Chamber for atmospheric pressure dew point.
Application	This chamber is used where the gas is supplied under pressure (up to 1.0 MPa) but the measurement should be under atmospheric conditions. The measurement result will be atmospheric dew point.

A699 3590	
Description	High pressure chamber up to 35 MPa.
Application	In applications where the pressure is exceeding 1.5 MPa, this chamber can be used. Through the adjustable valve a small purge is set to ensure a gas flow through the sensor element (response time).

A554 0054

Description	Compressed air quick coupling, female side R ½" thread
Application	Connect this quick coupling to a 1/2" ball valve to set up a quick connector for measurement of dewpoint, oil and particle

A554 0026

Description	Coalescing filter, with quick connect at inlet for 6 mm hose and thread nibble for connection to measuring chamber.
Application	Eliminates liquid water and oil from entering the measuring chamber and sensor unit.

Dew point sensor protection caps

Application	Protection caps are used to protect the dew point sensor element from machanical impacts or dust. The proper cap selection depends in application. Please contact customer service

A554 0002

Description	Test pot 11.3% RH.
Application	Is used to check dew point sensors. The pot creates a constant relative humidity of 11.3%. The resulting dew point is depending on the ambient temperature, at 25°C it is equal to -6.3°C.

D500 0005

Description	S 51 panel meter, with 4-20 mA input and 2 alarm outputs, 85 ... 240 VAC supply, 96 x 48 mm panel
Application	Installations in dryers or similar equipment as dew point indicator

C219 0055

Description	M12 connector with RS-485 termination resistor, 120 Ω
Application	Termination resistor for enhancing communication stability of RS-485 network. Connect it to the final device of RS-485 network

A554 3310

Description	M12 RS-485 (Modbus) splitter
Application	Stationary Modbus splitter for easier wiring

For overview of sensor power consumption please refer to page 75.

ACCESSORIES

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A554 0013	
Description	RS-485 / Ethernet gateway Protocol: - Modbus RTU - Modbus TCP
Application	Converts RS485 physical layer to Ethernet and RTU protocol to Modbus TCP protocol.

A554 0011	
Description	RS-485 Repeater
Application	A repeater is used whenever the bus length of RS-485 exceeds 500 m. After every 500 m of cable distance a repeater is recommended.

A554 0331	
Description	RS-485 / USB converter
Application	This converter brings RS-485 to the USB port of the PC.

D554 0031	
Description	Current meter, 0-20 mA, 8 channels, Modbus RTU
Application	For connecting up to 8 sensors with 0 ... 20 mA / 4 ... 20 mA signal via RS-485 to S 330 / 331.

D554 0032	
Description	Pulse meter, 7 channels, Modbus RTU
Application	For connection up to 7 sensors with pulse output signal via RS-485 to S 330 / 331.

A554 0087	
Description	USB OTG memory stick
Application	USB memory drive for transferring data between SUTO data loggers (S 331 / 551 / 120 with display / S 130 with display) and a PC. The USB drive has a USB-A and a Micro-USB connector.

For setting up a system in which sensor and modules need to be supplied by an external power supply please consider below consumption for selecting the correct power supply set up.

Sensor / Device	P/N	Power [W]
S 450 / 452	S695 045X	5.0
S 401 / 421	S695 4XXX	5.0
S 201	S699 041X	1.3
S 220 / 212 / 215 / 217	S699 041X	1.0
Pressure sensor	S694 XXXX	0.5
S 320 (24 VDC version)	D500 03XX	5.0
Analog input modules (8 Ch.)	D554 0031	1.3
S 110	D554 0030	3.5
Pulse input module (7 Ch.)	D554 0032	0.7
S 460	P554 007X	1.5
S 120 (without display)	S604 120X	10.0
S 130 (without display)	S604 130X	10.0
S 330 / 331	D500 033X	10.0
S 430	S695 430X	3.0
Temperature sensor	S693 000X	0.5
S 415	S695 415X	3.0
S 418	S695 418X	3.0
S 230	S699 0230 / S699 0231	1.0

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