English

Instruction and operation manual

Pressure sensor

Dear Customer,

Thank you for choosing our product.

The operating instructions must be read in full and carefully observed before you start 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.

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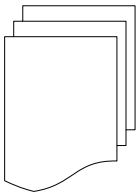
1 Safety instructions



Please check if this instruction manual matches with 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 pressure sensor at any time. In case of any obscurities or questions, regarding this manual or the product, please contact the manufacturer.

WARNING!

Compressed air!

Any contact with quickly escaping air or bursting parts of the compressed air system can lead to serious injuries or even death!

- Do not exceed the maximum permitted pressure range.
- Only use pressure tight installation material.
- Avoid that persons get hit by escaping air or bursting parts of the instrument.
- The system must be pressureless during maintenance work.

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.

ATTENTION!

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 and pressure.
- 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 at the sensors tip.
- Avoid condensation on the sensor element as this will affect the accuracy enormously.

Storage and transportation

- Make sure that the transportation temperature of the sensor is between -40 ... +85°C.
- For transportation it is recommended to use the packaging which comes with the sensor.
- Please make sure that the storage temperature of the sensor is between -40 ... +85°C.
- Avoid direct UV and solar radiation during storage.
- For the storage the humidity has to be <90%, no condensation.

2 Registered trademarks

SUTO®

Registered trademark of SUTO iTEC

MODBUS®

Registered trademark of the Modbus Organization, Hopkinton, USA

HART®

Registered trademark of the HART Communication Foundation, Austin, USA

PROFIBUS®

Registered trademark of the PROFIBUS User Organization, Karlsruhe, Germany

3 Application

The pressure sensor is designed to measure the pressure of compressed air and gases within the permissible operating parameter. Detailed parameters can be found in the technical data section.

The pressure sensor can measure pressure values in MPa, kPa, or bar.

The pressure sensor is mainly used in compressed air systems in industrial environment. It is not developed to be used in explosive areas. For the use in explosive areas please contact the manufacturer.

4 Features

- Highly accurate and affordable industrial pressure sensor
- Excellent anti-interference capability (EMC, EMI)
- Salt-spray, temperature and humidity test
- IP65 protection
- Modbus interface

5 Technical data

5.1 General

CE	
Parameters	Standard unit pressure: MPa
Sensor	Thin-film measuring cell
Measuring medium	Air, gas (non corrosive gas)
Measuring range	0 ... 1.6 MPa (g) (S694 2559) 0 ... 4.0 MPa (g) (S694 2562) 0 ... 0.16 MPa (abs) (S694 2563)
Temperature of the meas. medium	-40 ... +85°C
Operating pressure	2 x F.S.
Burst pressure	2.5 x F.S.
Storage temperature	-40 ... +85°C
Operating temperature	-40 ... +85°C
Casing material	Stainless steel
Protection class	IP65
Dimensions	See dimensional drawing on the next page
Screwing thread	G 1/4” A (ISO 228/1)
Electrical connection	M12, 5 pins
Stability	± 0.1% F.S.
Vibration resistance	20 … 2000 Hz, 25g
Weight	70g

5.2 Electrical data

Power supply	24 VDC (12 ... 36 VDC)

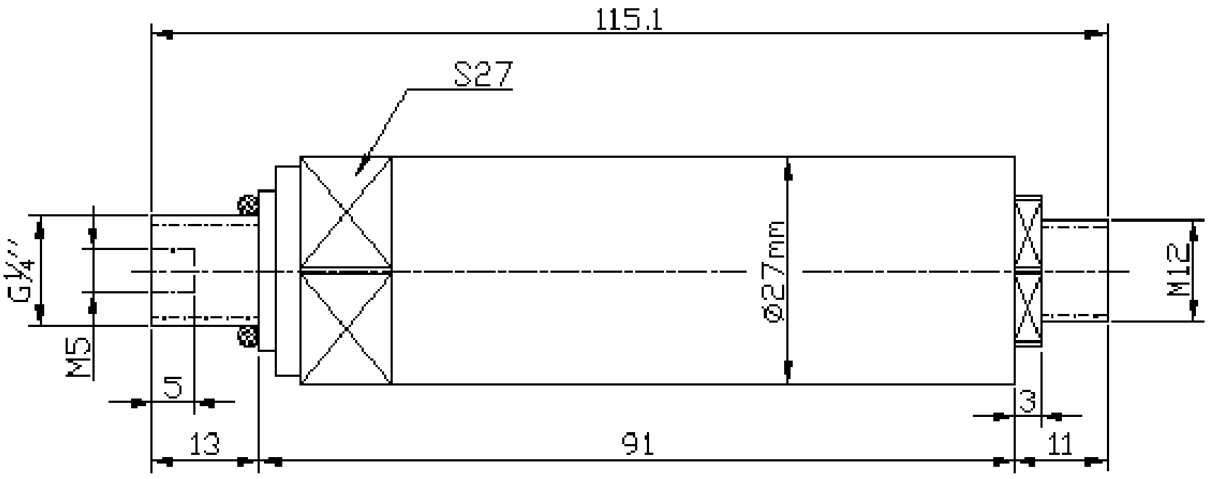
5.3 Output-signals

Modbus output	Modbus RTU Baud rate: 19200 Device address: last two digits of the serial number Framing/ Parity/ Stop bit: 8,N,1 Response timeout: 1 second Response delay : 0 ms Inter-frame spacing : 7 char

5.4 Accuracy

Accuracy	± 0.25% F.S.
Repeatability	± 0.1% F.S.

6 Dimensional drawing



7 Installation

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

Qty	Description	Item No.
1	Pressure sensor	S694 2559 (1.6 MPa) S694 2562 (4.0 MPa) S694 2563 (0.16 MPa)
1	M12 connector	C219 0060
1	Instruction manual	No P/N
1	Calibration certificate	No P/N

ATTENTION!

Wrong measurement is possible, if the sensor is not installed correctly.

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

7.1 Installation requirements

To install the sensor a ball valve or a nozzle is needed. The inner thread must be G 1/4”.

7.2 Installation procedure

The following steps explain the procedure of an appropriate installation

Installation of the sensor

Please screw the pressure sensor tightly to the nozzle.

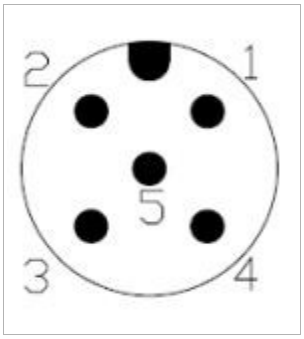
Removal of the sensor

Please loose unscrew the pressure sensor.

7.3 Electrical connection

The cables are connected to the sensor through the M12 connector.

Cable connection (Modbus)



Pin	Signal	Colour	Legend to pin assignment
1	N/A	brown	Not available
2	- VB	white	Negative supply voltage
3	+ VB	blue	Positive supply voltage
4	D+	black	Modbus data +
5	D -	grey	Modbus data -

ATTENTION!

Do not screw the M12 plug using force. Otherwise, it may damage the connecting pins.

8 Signal output

8.1 Modbus output

Modbus address	Data format	Channel description	Resolution	Function Code
0	UINT16	Pressure	1	3

Remarks:

- All numbers are in the big-endian format
- Function code: 03
- The measurement value is always available in the programmed physical unit.

8.2 Protocol format specification

The following table lists specifications for the Send and Return messages.

	Device address	Function code	Data address	Number of data read	16CRC code (Low +High)
Send	Address	03	00 00	00 01	CRC0 CRC1
	Device address	**Function code**	**Data byte**	**Pressure value**	**16CRC code (Low+High)**
Return	Address	03	02	P_hi P_lo	CRC0 CRC1

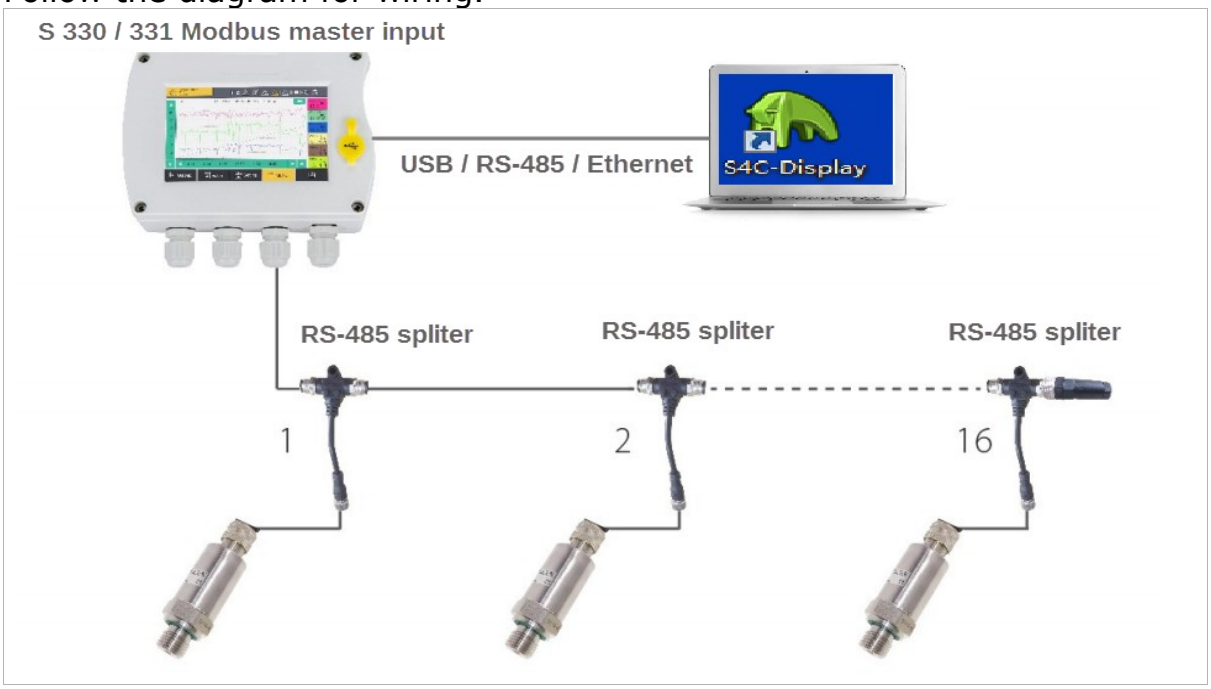
Example
Suppose the device address of the pressure sensor is 01 (Address=01), CRC0=84, and CRC1=0a. Then:
The Send command is 01 03 00 00 00 01 84 0a.
If the corresponding hexadecimal data is returned, the communication has been built. For example, the returned data is 01 03 02 02 AC B9 59. The '02 AC' is hexadecimal, and converted to 684 in decimal.

- For a 0 ... 1.6 MPa pressure sensor (S694 2559),
  Data output: 0 ... 2000 is corresponding to 0 ... 1.6 MPa, so the pressure is P=1.6*684/2000=0.5472 MPa.
- For a 0 ... 4.0 MPa pressure sensor (S694 2562).
  Data output: 0 ... 2000 is corresponding to 0 ... 4.0 MPa, so the pressure is P=4*684/2000=1.368 MPa.
- For a 0 ... 0.16 MPa pressure sensor (S694 2563).
  Data output: 0 ... 2000 is corresponding to 0 ... 0.16 MPa, so the pressure is P=0.16*684/2000=0.05472 MPa.

9 Configuration

To configure the pressure sensor, use the S330 / S331 display and the S4C-Display software

1. Follow the diagram for wiring.

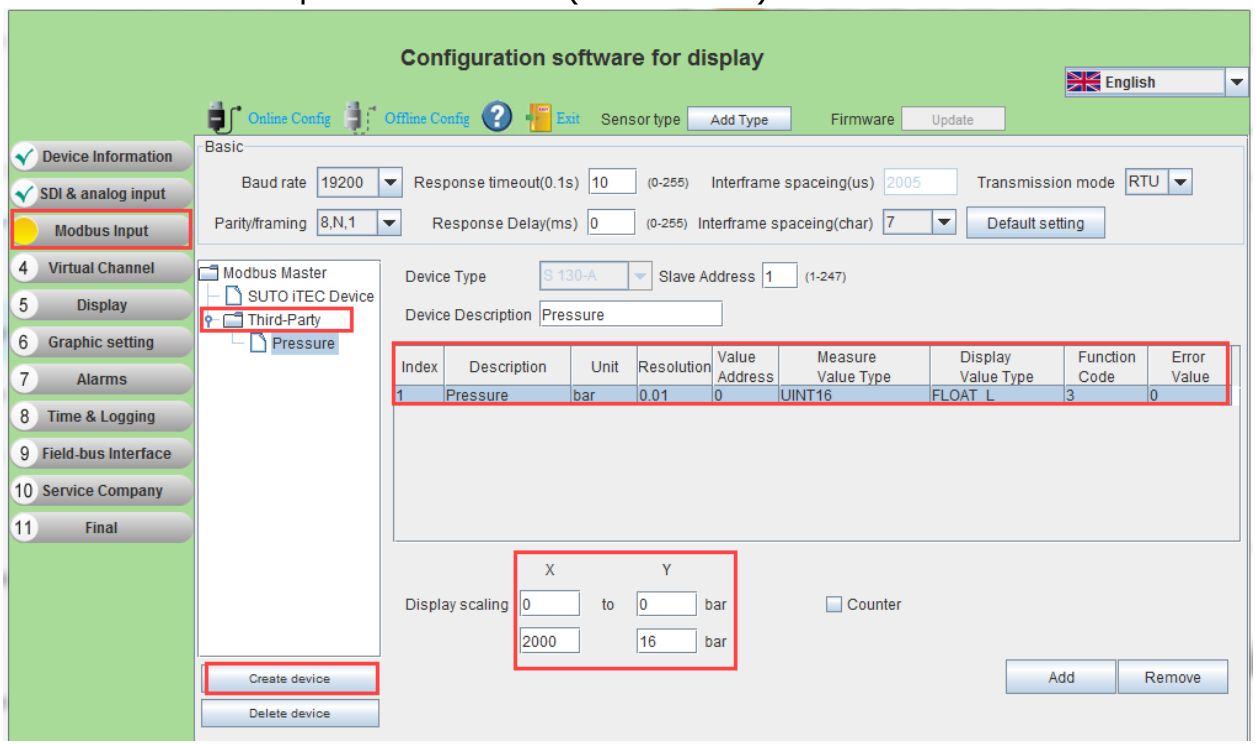


2. Launch the S4C-Display software, and make configuration as follows:
   A. Configure the pressure sensors as Modbus input devices to the S 330 / 331, which is a Modbus Master.
   B. Add the pressure sensor as a third-party device to the Modbus Master.
   C. Refer to the examples shown below to configure the sensor

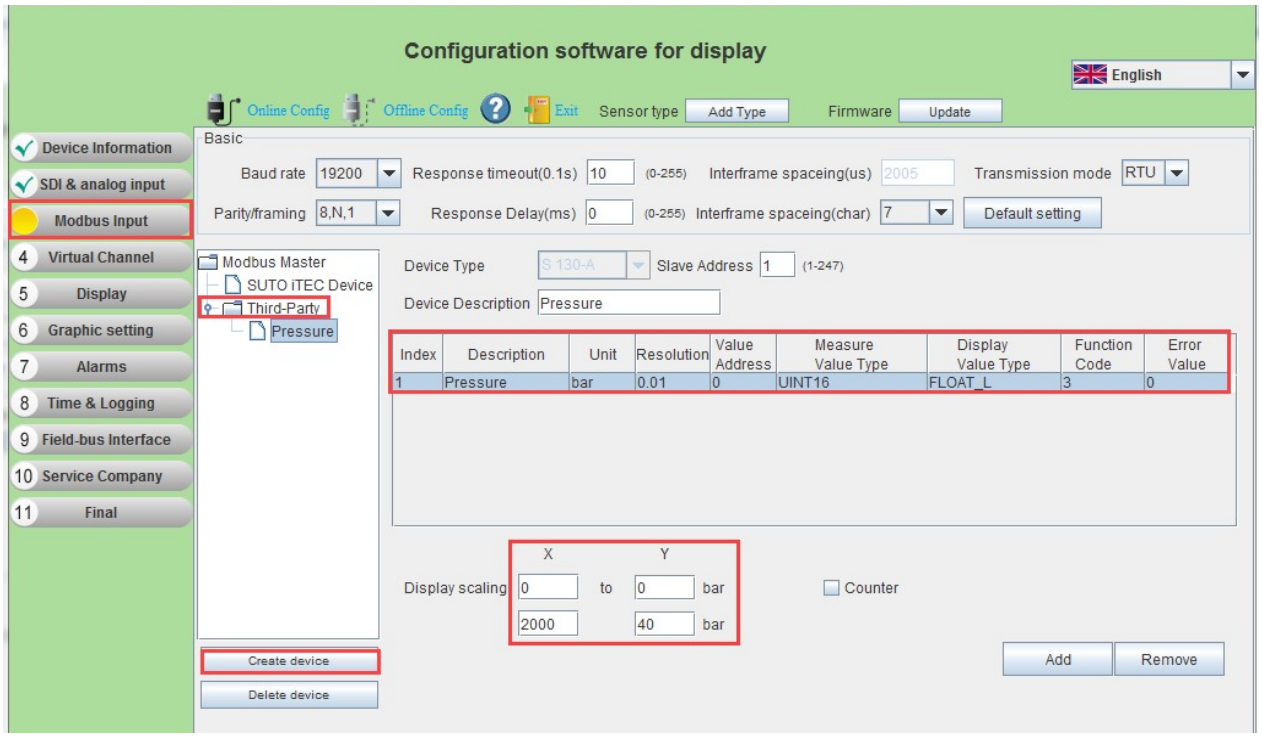
information including unit, resolution, value address (Modbus address), measure value type, function code, and display scaling.

To set the pressure unit to bar

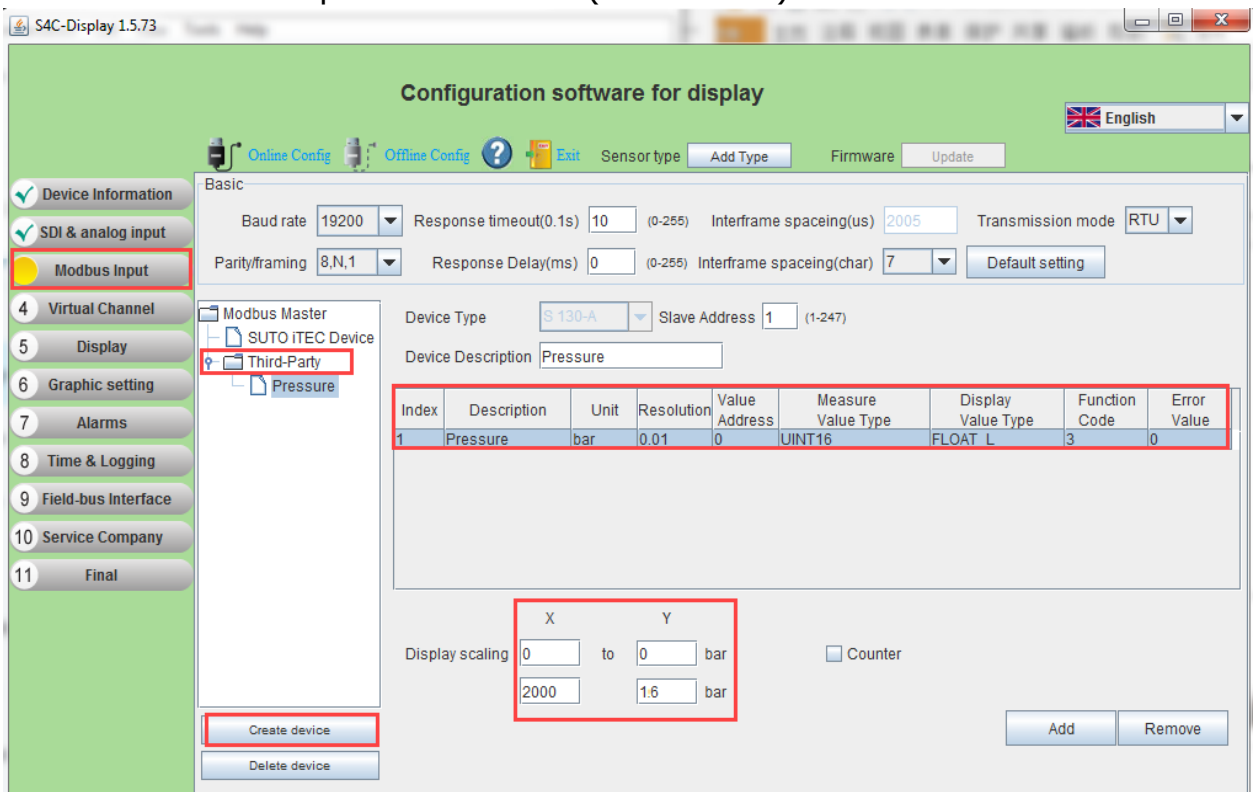
- 0 ... 1.6 MPa pressure sensor (S694 2559)



- 0 ... 4.0 MPa pressure sensor (S694 2562)

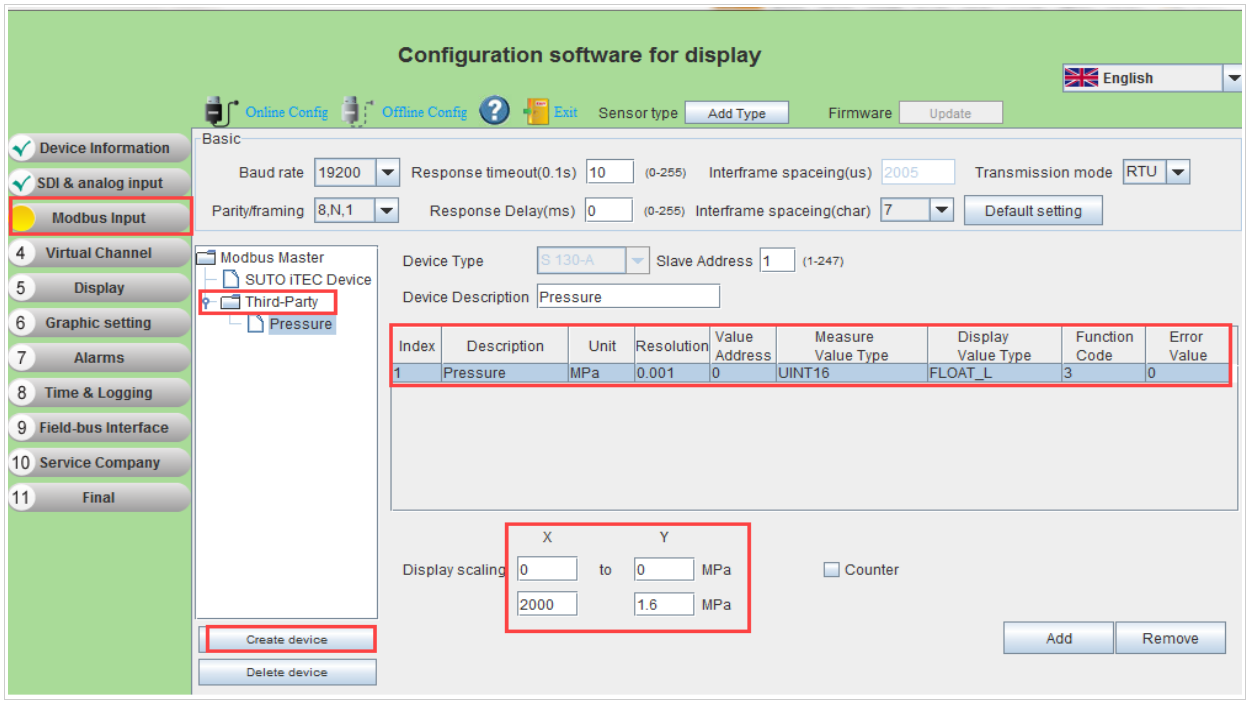


- 0 ... 0.16 MPa pressure sensor (S694 2563)

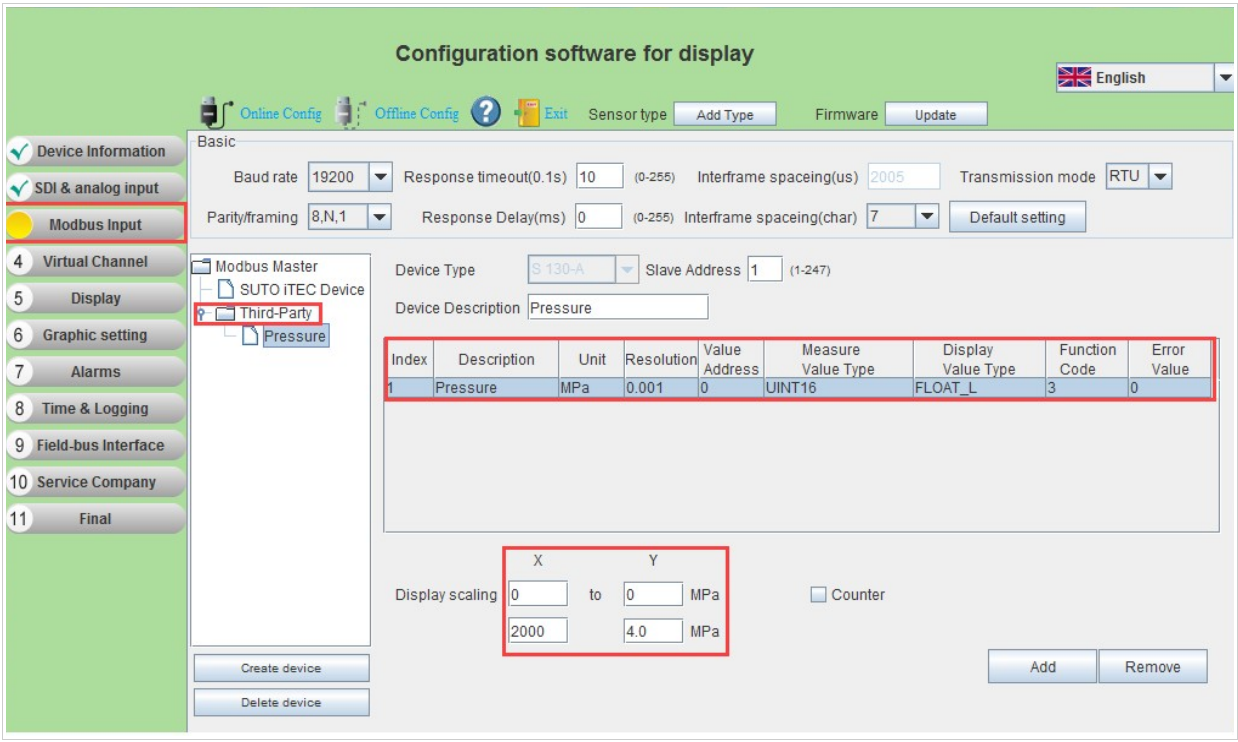


To set the pressure unit to MPa

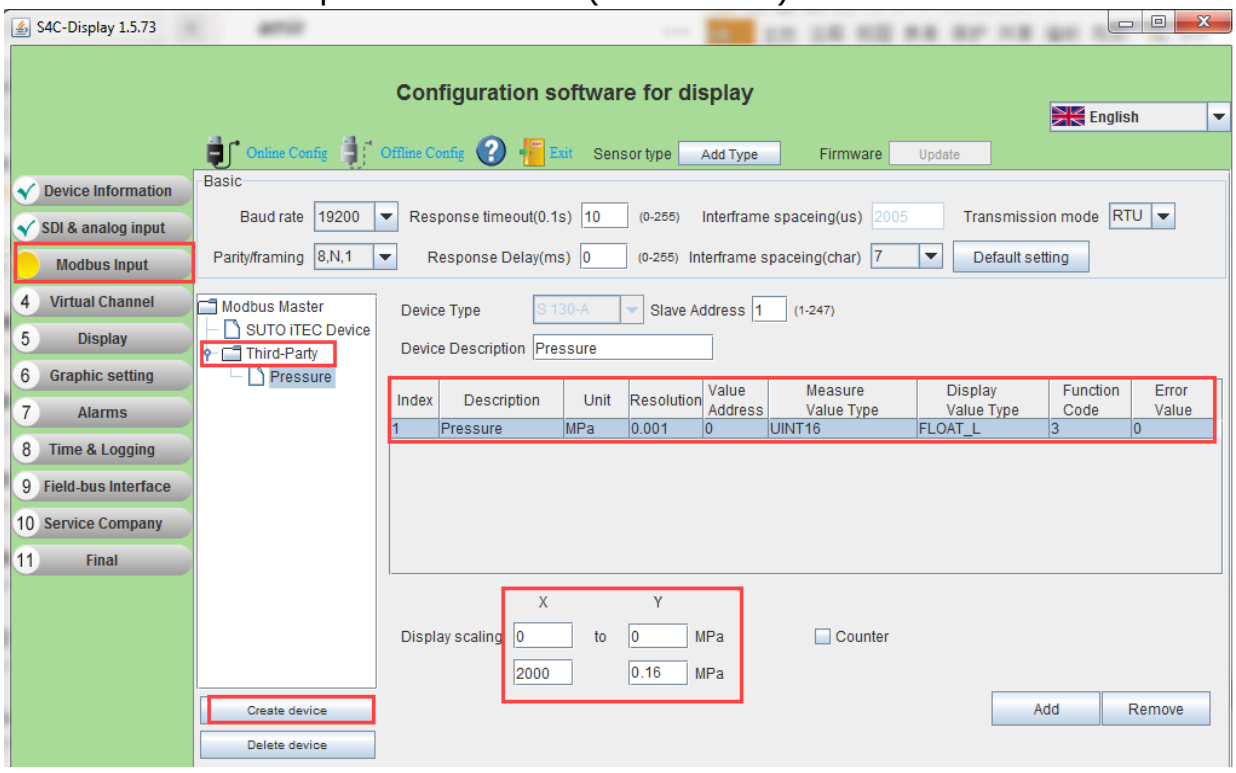
- 0 ... 1.6 MPa pressure sensor (S694 2559)



- 0 ... 4.0 MPa pressure sensor (S694 2562)



- 0 ... 0.16 MPa pressure sensor (S694 2563)



10 Calibration

The sensor is calibrated ex work. The exact calibration date is printed on the certificate which is supplied together with the sensor. The accuracy of the sensor is regulated by the on site conditions, parameters like oil, high humidity or other impurities can affect the calibration and furthermore the accuracy. However we recommend to calibrate the instrument at least once per year. The calibration is excluded from the instruments warranty. For this please contact the manufacturer.

11 Maintenance

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

ATTENTION!

Do not use isopropyl alcohol to clean the sensor and its accessories !

12 Disposal or waste

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

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S694_2559_2562_2563_Pressure_sensor_im_en_2020-1_Intenational