

Instruction and Operation Manual

DP T20/T60/T100/ T20 P/T60 P/T100 P Dew Point Transmitter



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.

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

Revision: 2025-1

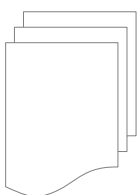


Last modifications: April, 2025

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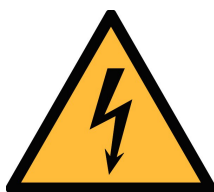
1 Safety Instructions



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 must be observed before and during installation, operation and maintenance. Therefore this instruction manual must be read carefully by the technician as well as by the responsible user or qualified personnel.

This instruction manual must be available at the operation site of the Dew Point Transmitter at any time. In case of any obscurities or questions, regarding this manual or the product, please contact the manufacturer.

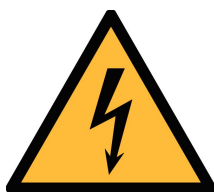


WARNING!

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 (see sensors label).
- Only use pressure tight installation material.
- Avoid that persons get hit escaping air or bursting parts of the instrument.
- The system must be pressure-less 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.

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.

Storage and transportation

- Make sure that the transportation temperature of the instrument is between -30 ... +70°C.
- For transportation it is recommended to use the packaging which comes with the instrument.
- Please make sure that the storage temperature of the instrument is between -20 ... +50°C.
- Avoid direct UV and solar radiation during storage.
- For the storage the humidity must be <95% rH, no condensation.

2 Registered Trademarks

Trademark	Trademark owner
MODBUS®	Modbus Organization, Hopkinton, USA

3 Application

The DP T20, DP T60, DP T100, DP T20 P, DP T60 P, and DP T100 P are industrial Dew Point Transmitters designed for measuring dew point and related parameters in compressed air or industrial gases under specified operating conditions.

The DP T20, DP T60, and DP T100 can measure dew point, temperature, and humidity. The DP T20 P, DP T60 P, and DP T100 P can also measure pressure.

Parameter	Default unit
Temperature	°C
Humidity	% rH
Dew point	°C Td
Pressure	bar(g)

The Dew Point Transmitters are mainly used in compressed air systems in the industrial environment, and not developed to be used in explosive areas. To use them in explosive areas, contact the manufacturer.

4 Features

- Different models applicable for different measuring ranges:
 - The DP T20 and DP T20 P measure down to -20°C Td.
 - The DP T60 and DP T60 P measure down to -60°C Td.
 - The DP T100 and DP T100 P measure down to -100°C Td.
- The display for viewing on-site values. It can be rotated 340° horizontally to ease your access to readings.
- Signal outputs: analog (3-wire 4 ... 20 mA) and Modbus/RTU.
- Measurement of pressure.
- IP65 casing for robust protection in rough industrial environment.
- Very fast response time ensures safe and reliable indication whenever dew points are out of valid ranges.
- High accuracy of $\pm 2^{\circ}\text{C Td}$ dew point.

5 Technical Data

5.1 General

CE			
Parameters	Standard unit dew point: °C Td Standard unit temperature: °C other units: °F, K Standard unit humidity: % rH Standard unit pressure: bar (g)		
Principle of measurement	Capacitive method and frequency method		
Measuring range	Type	Range	
	DP T20 DP T20 P	Dew point Relative Humidity Temperature Pressure	-20 ... +50°C Td 0 ... 90 % rH -30 ... +70°C 0 ... 1.6 MPa
	DP T60 DP T60 P	Dew point Relative Humidity Temperature Pressure	-60 ... +20°C Td 0 ... 90 % rH -30 ... +70°C 0 ... 1.6 MPa
	DP T100 DP T100 P	Dew point Relative Humidity Temperature Pressure	-100 ... +20°C Td 0 ... 90 % rH -30 ... +70°C 0 ... 1.6 MPa
Sensor	DP T20/DP T20 P/DP T60/DP T60 P: polymer DP T100/DP T100 P: QCM + polymer Temperature sensor: Pt100 Pressure sensor: Piezo resistive type		
Measuring medium	Air, Argon, O ₂ , N ₂ , CO ₂ *		
Response time (T90) @4 l/min	DP T20 DP T20 P	0 °C Td → -20 °C Td ≤ 50 sec -20 °C Td → 0 °C Td) ≤ 35 sec	
	DP T60 DP T60 P	0 °C Td → -60 °C Td ≤ 280 sec -60 °C Td → 0 °C Td ≤ 65 sec	
	DP T100 DP T100 P	0 °C Td → -80 °C Td ≤ 420 sec -80 °C Td → 0 °C Td ≤ 90 sec	
Ambient temperature	0 ... +50°C		
Ambient humidity	0 ... 95% rH		
Operating pressure	-0.1 ... 1.6 MPa		

Casing material	Casing: Aluminium alloy Process thread: Stainless steel 1.4301 (SUS 304) Display cover: PC + ABS
Protection class	IP65
Display	0.66" OLED display for displaying the measured value and unit 340° horizontally rotatable**
Dimensions	See dimensional drawing on the page 11
Screwing thread	G ½" thread (ISO 228/1)
Weight	180 g
* For CO₂, the measurement range of DP T60 and DP T60 P is limited to -40°C Td. ** The rotation force cannot exceed 3.0 N.m.	

5.2 Electrical Data

Power supply	15 ... 30 VDC
Current consumption	50 mA @ 24 VDC

5.3 Output Signals

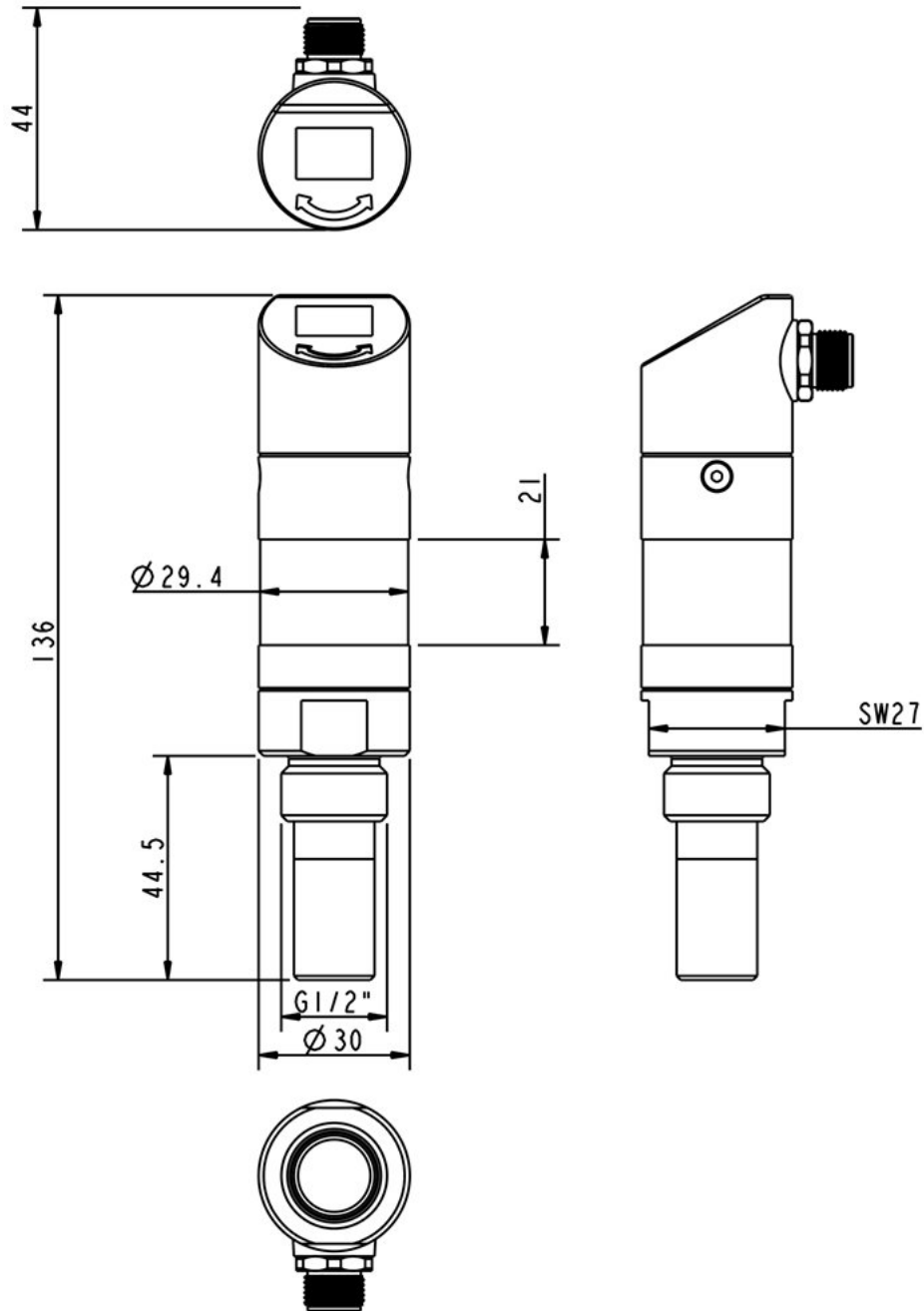
Analog output	4 ... 20 mA 3-wire		
Analog output scaling	Type	Scaling	
	DP T20 DP T20 P	4 mA 20 mA	= -20°C Td = +50°C Td
	DP T60 DP T60 P	4 mA 20 mA	= -60°C Td = +20°C Td
	DP T100 DP T100 P	4 mA 20 mA	= -100°C Td = +20°C Td
Modbus output	Modbus/RTU		
Modbus communication	Mode: RTU Baud rate: 19200 Device address: last 2 digits of serial number Framing / parity / stop bit: 8 / N / 1 Response time: 1 second Response delay: 0 ms Inter-frame spacing: 7 char		

5.4 Accuracy

Accuracy	Dew point: ±1 °C Td (0 ... 20°C Td) ±2 °C Td (-70 ... 0 / +20 ... +50 °C Td) ±3 °C Td (-100 ... -70 °C Td) Temperature: ± 0.3°C Pressure: 0.5% FS
Repeatability of dew point	±0.5 °C
Stated accuracy at	Ambient/process temperature 23 °C ± 3 °C Ambient/process humidity <95% rH, no condensation Air flow > 2 l/min at sensor tip
Flow rate	To reach a fast response time please ensure a flow rate of 2... 5 l/min at the sensor tip. Note: If the measuring chamber with quick connector is used, this flow rate will be maintained by the chamber at a pressure > 0.3 MPa.

6 Dimensional Drawing

Unit: mm



7 Installation

Before installing the device, make sure that all components listed below are included in your package.

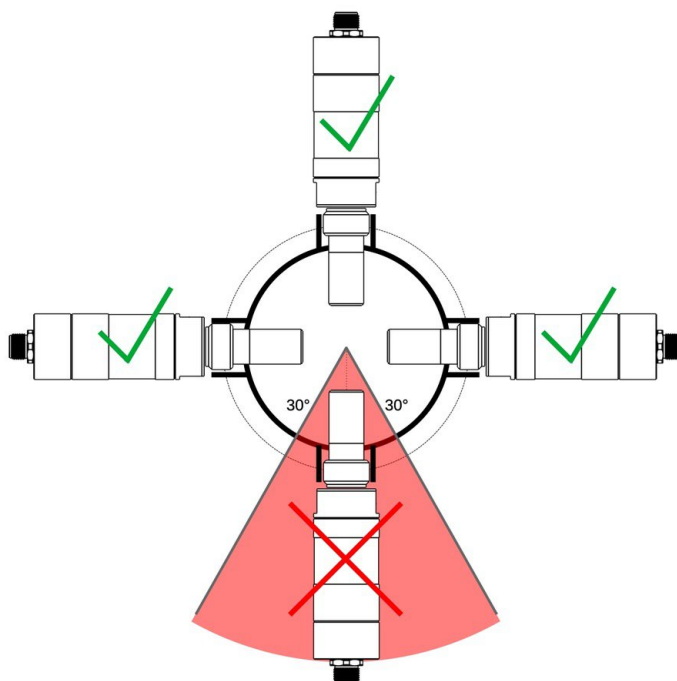
Qty	Description
1	One of Dew Point Transmitters below: - DP T20, DP T60, DP T100: 3-wire analog & Modbus/RTU outputs - DP T20 P, DP T60 P, DP T100 P: 3-wire analog & Modbus/RTU outputs, integrated pressure sensor
1	Depending on orders: M12 plug or M12 cable
1	Instruction manual
1	Calibration certificate

7.1 Installation Requirements

- The Dew Point Transmitter is for indoor use only! At an outdoor installation, it must be protected from solar radiation and rain.
- It is strongly recommend not to install the Dew Point Transmitter permanently in a wet environment, which usually exists right after a compressor outlet.
- The flowing air or gas must pass the sensor tip for a proper measurement. This can be realized with a measurement chamber.

For an installation without the measuring chamber, you must insert the device to the required depth, as described in section [7.2.3 Install without Measuring Chamber](#).

- Sensor orientation requirement



Install the device only in the recommended area, as shown in picture on the left.

The angle between the device and the centre vertical line of the tube must be greater than 30°.

An upside down installation is not permitted.

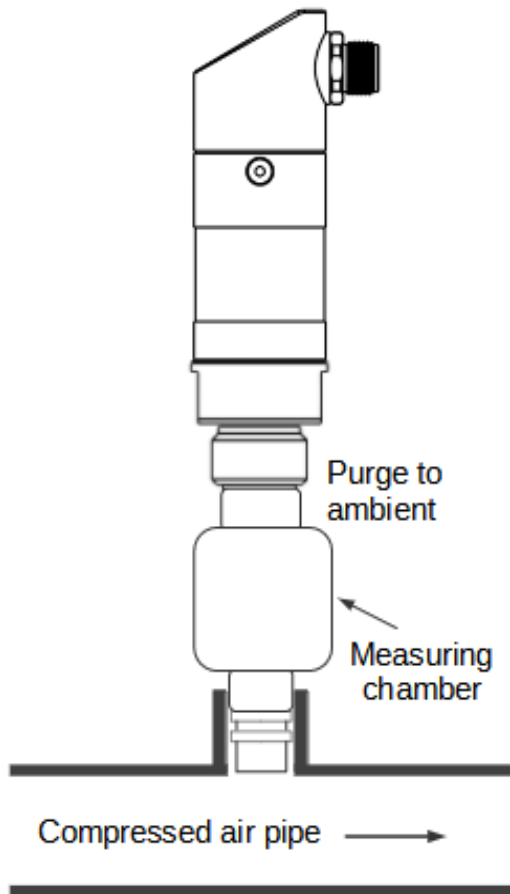


ATTENTION!

Wrong measurement is possible if the instrument is not installed correctly.

7.2 Installation Procedure

7.2.1 Install using a Measuring Chamber with Quick Connector



1. Mount the transmitter on the measuring chamber by using the G1/2" connection.
2. Make sure the transmitter is tightly sealed, therefore the sealing ring on the transmitter must be used.
3. Connect the measuring chamber to the compressed air system using a quick connector. Make sure the Dew Point Transmitter is screwed on the chamber before connecting. The measuring chamber will create a purge flow.

7.2.2 Install using a By-pass Measuring Chamber

With the by-pass measuring chamber, two installation methods are available.

Method 1: Full pass through by-pass installation

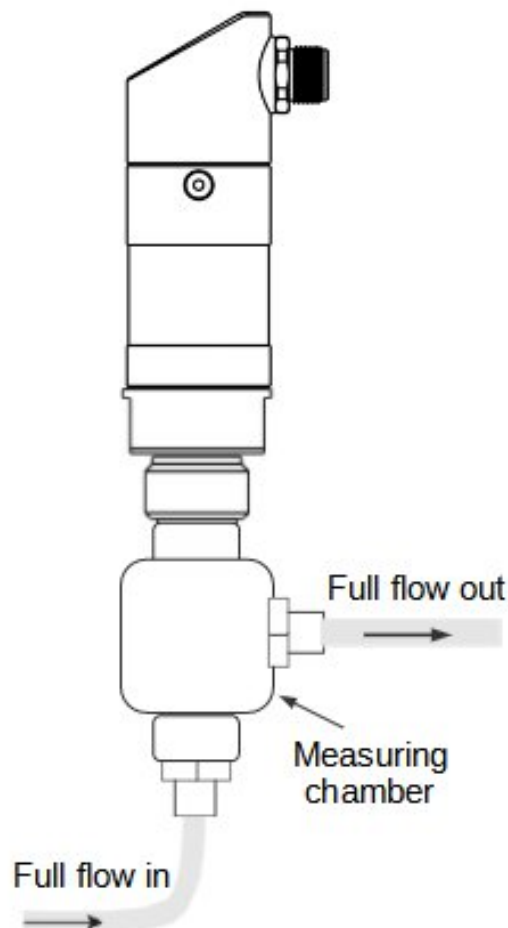
This method is to be used when the full air flow is passing through the measuring chamber.

1. Connect the inlet of the chamber using a 6 mm teflon hose to your system.

Note: The full flow must pass the measuring chamber. Ensure a certain flow rate to get fast response time.

2. Connect the outlet of the chamber to your system using the 6 mm hose quick connector.

See figure below for details.

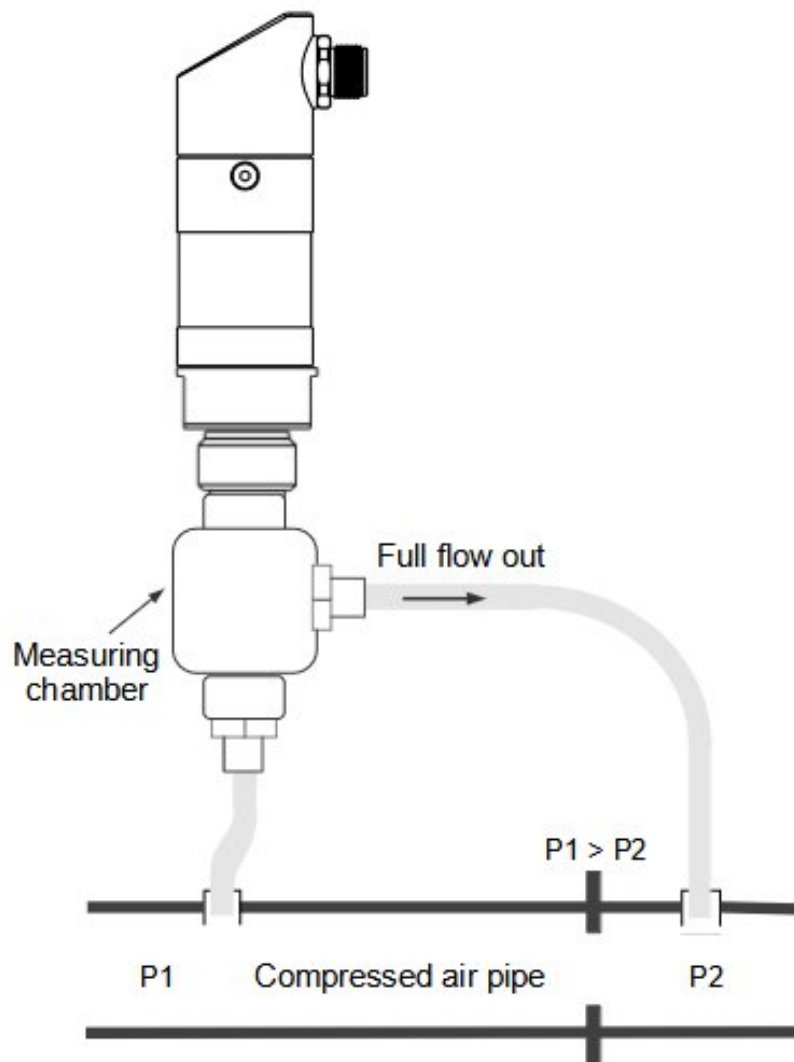


Method 2: By-pass installation

Note: In order to use the measurement chamber in a by-pass you must ensure a pressure difference between P1 and P2 as indicated in the picture below.

1. Connect the inlet of the chamber to your pipe system.
2. Connect the outlet of the chamber to your pipe system where the pressure is known to be lower than the inlet pressure.

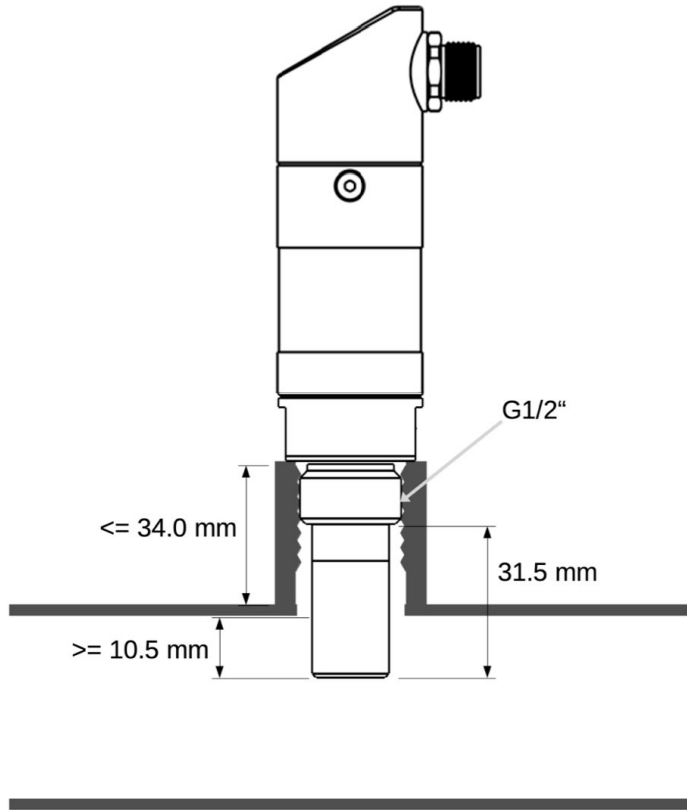
Note: The pressure difference $P1 > P2$ is needed to create a by-pass flow through the chamber. If there is no pressure difference between P1 and P2, there will be no flow through the chamber and therefore the response time will be very slow or the device will not even respond at all to the dew point changes.



7.2.3 Install without Measuring Chamber

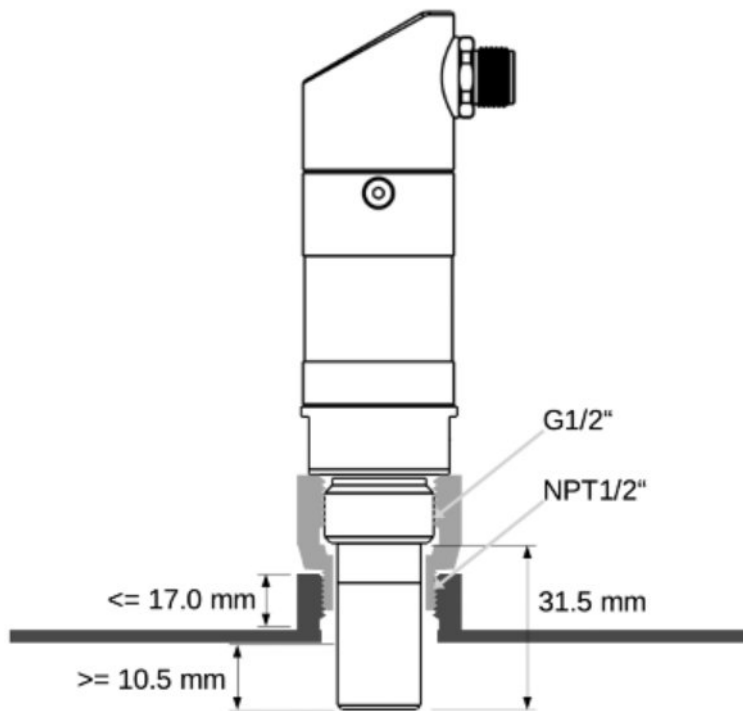
This is the full flow installation. The sensor is in the pipe.

Method 1: Install through a nozzle



- Install the device only if the system is pressure-less.
- Check the size of the nozzle and make sure that no less than 1/3 of the sensor tip is inside of the pipe.
- The inner thread of the nozzle must be G 1/2".

Method 2: Install with NPT thread adapter



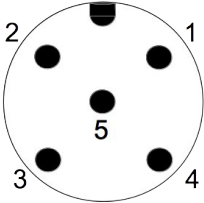
- Install the device only if the system is pressure-less.
- Please check the size of the nozzle and make sure not less than 1/3 of the sensor tip is inside of the pipe.
- The thread adapter is used to adapt from G 1/2" sensor side to NPT 1/2" process connection.

7.3 Remove the Dew Point Transmitter

Unscrew the device off the measurement chamber or from the nozzle. Please make sure that the system is pressure-less before the Dew Point Transmitter is removed.

7.4 Electrical Connection

Pin assignment of the M12 connector

	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5
	+I _a	-V _B	+V _B	D+	D-
	Brown	White	Blue	Black	Gray

Legend to pin assignment

+I _a	Active 4 ... 20 mA signal	D+	Modbus/RTU data +
-V _B	Negative supply voltage	D-	Modbus/RTU data -
+V _B	Positive supply voltage		

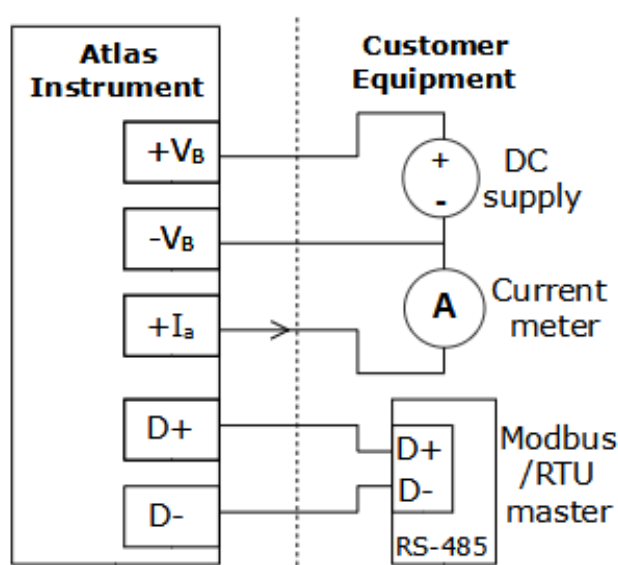


ATTENTION!

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

7.5 Connection with Customer Equipment

The figure below shows how outputs connect with the customer equipment. In the figure, the **Atlas Instrument** indicates the DP T20, DP T60, DP T100, DP T20 P, DP T60 P, or DP T100 P.



8 Display

The Dew Point Transmitter series are equipped with an display. The display shows the live values of dew point, temperature, humidity and pressure.

8.1 Displayed Values

The display automatically cycles through all values every 3 seconds. This means the display is showing every 3 seconds the live values of dew point, temperature, humidity and pressure and is cycling through these automatically.

8.2 Display Rotation

The display can be easily rotated by 340° to fit your application. To do this, loosen the two hex-screws at both sides of the dew point transmitter. Do not full unscrew them, only loosen them. Now you can turn the display by 340°. When the desired position is achieved, tighten the two hex-screws from both sides to fix the display position.

9 Signal Outputs

9.1 Analog Output

The Dew Point Transmitter provides a 3-wire analog output with range 4 ... 20 mA. The 3-wire analog output is an active current output.

9.1.1 Scaling

The following table shows the standard scaling of the analog output.

Type	Scaling	
DP T20, DPT20 P	4 mA	= -20°C Td
	20 mA	= +50°C Td
DP T60, DPT60 P	4 mA	= -60°C Td
	20 mA	= +20°C Td
DP T100, DPT100 P	4 mA	= -100°C Td
	20 mA	= +20°C Td

For other ranges, please contact the manufacturer. The analog output can be allocated to the temperature, dew point, and humidity.

9.2 Modbus/RTU Interface

The default settings of the Modbus interface are as follows.

Mode	RTU
Baud rate	19200
Device address	Last two digits of serial number
Framing / parity / stop bit	8 / N / 1
Response time	1 second
Response delay	0 ms
Inter-frame spacing	7 char

Response message that the device returns to the master:

- Function code: 03

The information for the byte order is shown in the table below.

Byte order for 2-byte and 4-byte data

Byte Order	Sequence				Data Type
	1st	2nd	3rd	4th	
1-0-3-2	Byte 1 (MMMMMMMM*)	Byte 0 (MMMMMMMM *)	Byte 3 (SEEEEEEE)	Byte 2 (EMMMMMMM *)	FLOAT
1-0-3-2	Byte 1	Byte 0 LSB	Byte 3 MSB	Byte 2	UINT32 INT32
1-0	Byte 1 MSB	Byte 0 LSB	---	---	UINT16 INT16
1-0	Byte 1 XXX *	Byte 0 DATA	---	---	UINT8 INT8

Byte order for 8-byte data

Byte order	Sequence								Data Type
	1st	2nd	3rd	4th	5th	6th	7th	8th	
1-0-3-2-5-4-7-6	Byte 1	Byte 0	Byte 3	Byte 2	Byte 5	Byte 4	Byte 7	Byte 6	User defined

* S: Sign, E: Exponent, M: Mantissa, XXX: no value

Explanations of MSB and LSB

MSB MSB refers to Most Significant Byte first, which follows the Big-Endian byte order.

For example, if the main system follows the MSB first order:

When the 4-byte floating number, in the order of Byte1-Byte0-Byte3-Byte2, is received from the slave (sensor), the master must change the byte order to Byte3-Byte2-Byte1-Byte0 for the correct display of the value.

LSB LSB refers to Least Significant Byte first, which follows the Little-Endian byte order.

For example, if the main system follows the LSB first order:

When the 4-byte floating number, in the order of Byte1-Byte0-Byte3-Byte2, is received from the slave (sensor), the master must change the byte order to Byte0-Byte1-Byte2-Byte3 for the correct display of the value.

9.2.1 Holding Register Table for Modbus/RTU

Modbus Register Address	Channel description	Read/Write	Data Type	Data Length
2000	Group ID	R	INT16U	2-Byte
2001	Device ID	R	INT16U	2-Byte
2002	Serial number	R	INT32U	4-Byte
2004	FW/HW	R	INT16U	2-Byte
2005	Calibration date	R	DOUBLE	8-Byte
2009	Valid days from calibration date	R	INT16U	2-Byte
2010	Measuring Channel number	R	INT16U	2-Byte
2011	Device name	R	string	16-Byte
2100	Alternative humidity unit One byte on byte 0 of the holding register (see "unit" table on next page for details)	R/W	INT16U	2-Byte
2101	Static pressure (in bar(g))	R/W	FLOAT	4-Byte
2103	Atmospheric pressure (in hPa)	R/W	FLOAT	4-Byte
2200	Unit+Resolution+Data type of Dew point	R	INT16U	2-Byte
2201	Unit+Resolution+Data type of Alternative humidity	R	INT16U	2-Byte
2202	Unit+Resolution+Data type of Pressure	R	INT16U	2-Byte
2203	Unit+Resolution+Data type of Temperature	R	INT16U	2-Byte
2300	Status	R	INT16U	2-Byte
2301	Channel Value of Dew point	R	FLOAT	4-Byte
2303	Channel Value of Alternative humidity	R	FLOAT	4-Byte
2305	Channel Value of Pressure	R	FLOAT	4-Byte
2307	Channel Value of Temperature	R	FLOAT	4-Byte

“Unit+Resolution+Data type” Channel

- First byte is unit.

1	°C	8	g/kg	36	MPa(g)
2	°F	9	g/m ³	38	bar(g)
3	% rH	30	ppm[v]	39	psi(g)
4	°C Td	31	°C Td atm.	54	g/m ³ atm.
5	°F Td	32	°F Td atm.	55	mg/m ³ atm.
7	mg/m ³	35	kPa(g)		

- Second byte:

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Data type:				Resolution:			
0 float				0 0			
1 4-byte unsigned integer				1 0.0			
2 double				2 0.00			
				3 0.000			
				4 0.0000			

- “Status” channel

The highest bit is used for indicating if any setting is changed by users. The rest bits are used for indicating if the measuring channels that follows the Status channel are working properly or not.

Bit	Description
15	0: Sensor settings have never been changed since last reading from the master. 1: Sensor settings have been changed since last reading from the master
0	0: The 1st measuring channel that follows the Status channel (addressed 2301) is working properly. 1: This measuring channel is not working properly.
1	0: The 2nd measuring channel that follows the Status channel (addressed 2303) is working properly. 1: This measuring channel is not working properly.

2	0: The 3rd measuring channel that follows the Status channel (addressed 2305) is working properly. 1: This measuring channel is not working properly.
3	0: The 4th measuring channel that follows the Status channel (addressed 2307) is working properly. 1: This measuring channel is not working properly.
4 ... 14	Not used

9.2.2 Connect Modbus/RTU Devices to a Master

The Dew Point transmitters with a Modbus/RTU output can be connected to a Modbus master.

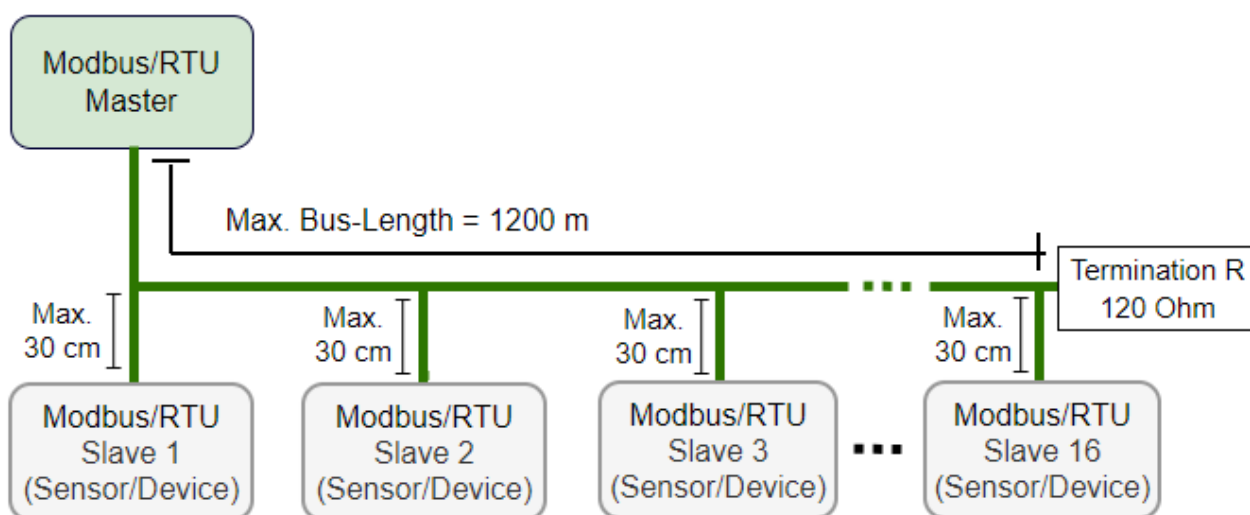
See below specifications of the Modbus/RTU connections.

9.2.2.1 Modbus/RTU Cable Length

A Modbus/RTU bus line has limitations which shall not be exceeded, otherwise the communication might not be stable.

- The maximum total bus length must not exceed 1200 m.
- The stub length to each node must not exceed 30 cm.

See the picture below for details.

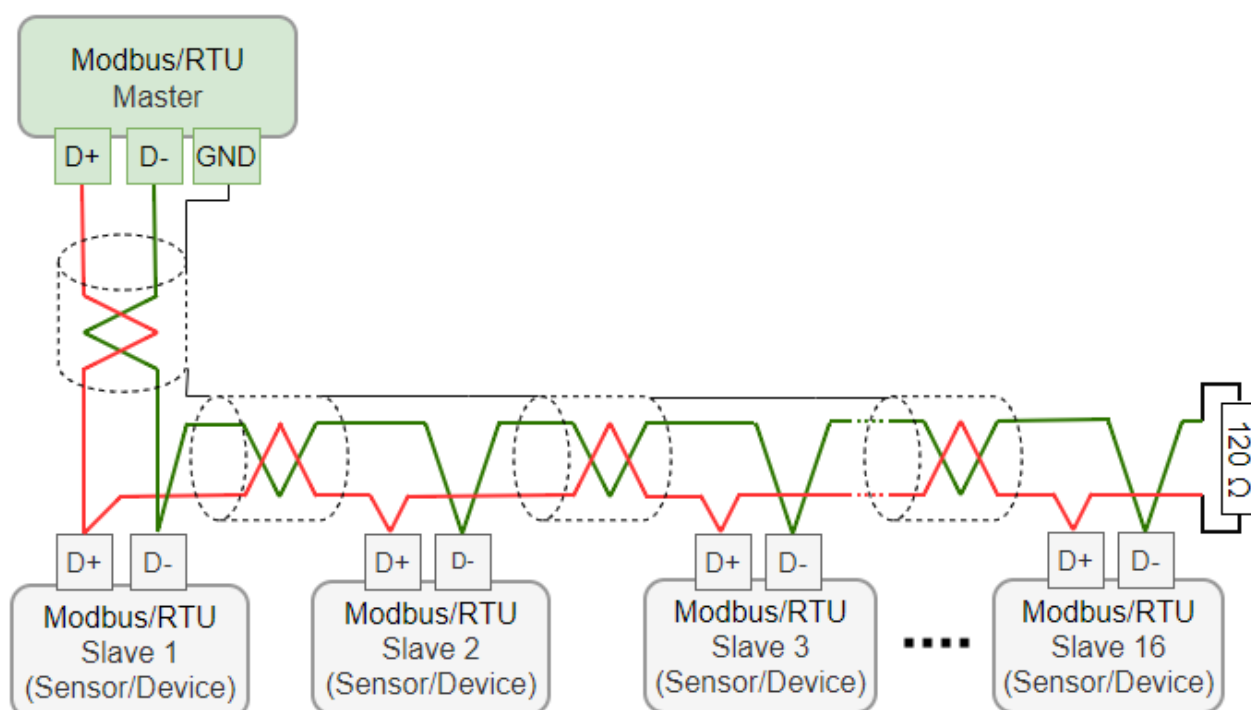


9.2.2.2 Modbus/RTU Wiring and Cable Type

To ensure a stable communication a twisted-pair bus cable must be chosen to set up the Modbus/RTU communication.

- Bus-cable specifications must follow the EIA485 Standard, must be twisted pair and shielded, for example 2 x 2 x 0.22 mm², Li-2YCY.
- The shield must be connected at one end to the master GND connection.
- At the end of the bus, a 120 Ohm resistor should be placed a termination resistor.

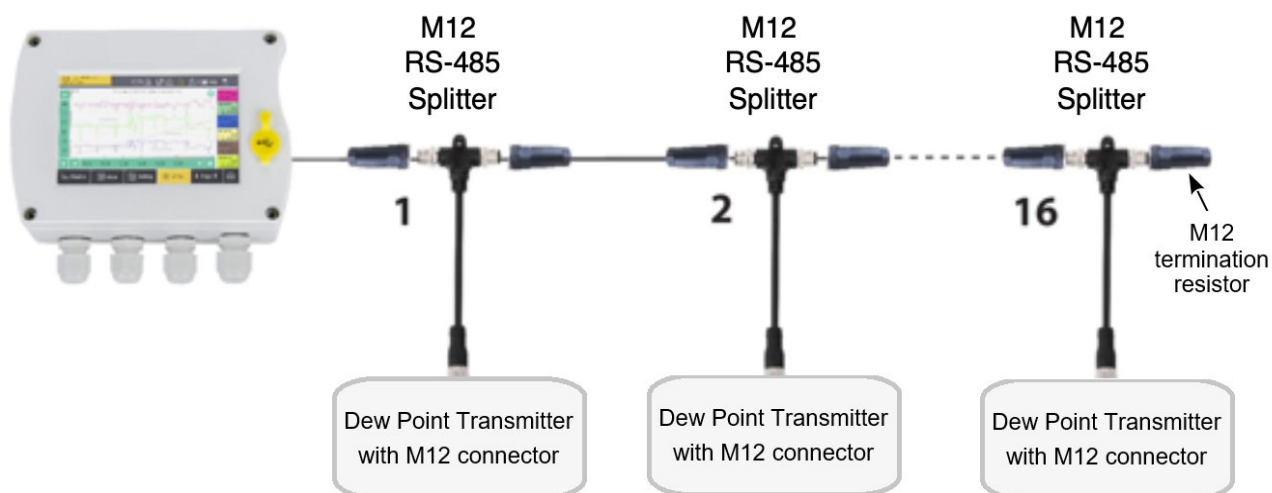
See the below picture for details.



9.2.2.3 Daisy-Chain using RS-485 Splitter

The Dew Point transmitters with M12 connectors can be easily connected in a Modbus/RTU daisy-chain using a M12 RS-485 splitter. Furthermore this allows to easily place the M12 termination resistor at the last splitter in the bus-chain.

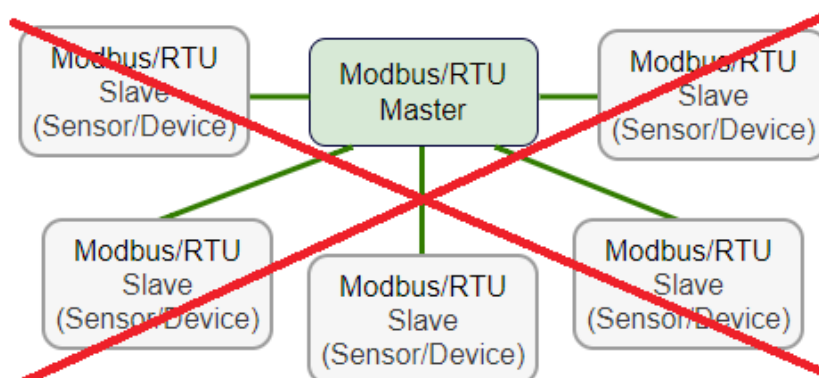
See below example for reference.



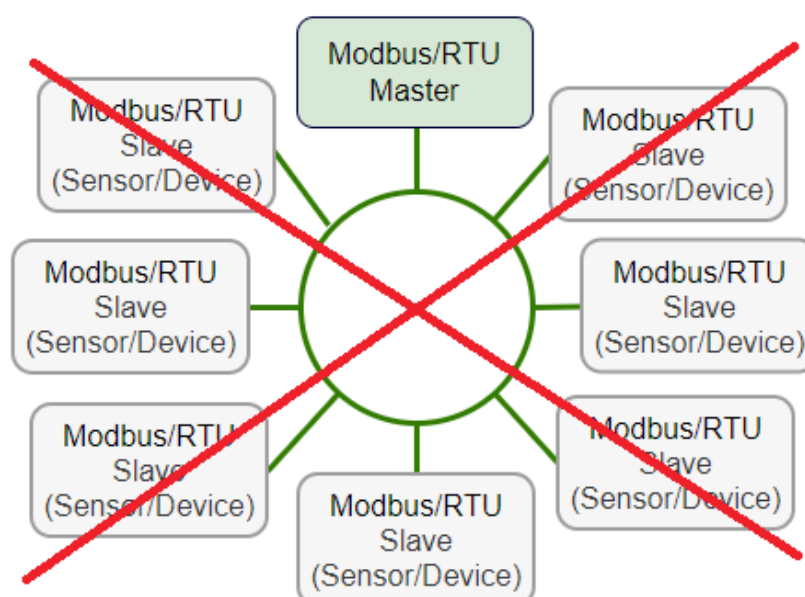
9.2.2.4 Topology of Modbus/RTU Daisy-Chain

The recommended bus topology is to connect devices as a daisy-chain, as shown in the figure in section 9.2.2.1 Modbus/RTU Cable Length. Other connection topologies are not recommended and should be avoided.

Avoid a connection of slaves to the master in ring or star topology.



Avoid a star topology



Avoid a ring topology

10 Optional Measuring Chambers

There are different types of measuring chambers for example measuring chamber with quick connector, by-pass chamber with in and out connection, measuring chamber for dryer installation, or high pressure chamber.

For more information, please contact your distributor or the manufacturer.

11 Calibration

The instrument is calibrated ex work. The exact calibration date is printed on the certificate that is supplied together with the instrument . The accuracy of the instrument is regulated by the on-site conditions, and parameters such as oil, high humidity, and other impurities can affect the calibration and furthermore the accuracy. The calibration is excluded from the instrument warranty. Please contact the manufacturer for details.

12 Maintenance

Please observe from time to time the sinter cap. If it appears to be dirty, it is recommended to replace it for this please contact the manufacturer.



ATTENTION!

Contaminated filters can lead to longer response time and to wrong measurements.

13 Disposal of 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.



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DP T20_T60_T100_IM_EN_V2025-1
