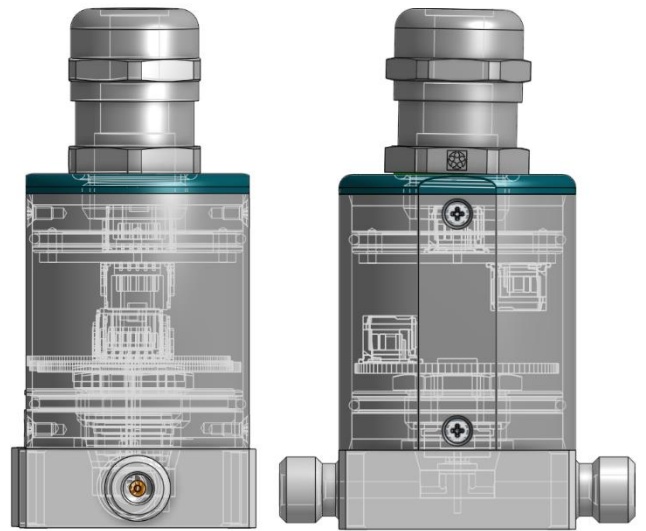


# TCD 3000 Transmitter Operating Manual v07





# TCD3000 Transmitter

## Operating Manual\_v07

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## 1. Intended Use

The device may only be put into operation by qualified personnel.

The specifications of the device and the operating instructions must be observed.

Only if the device is used properly, the repair costs will be covered during the warranty period. Please keep this manual for later use.

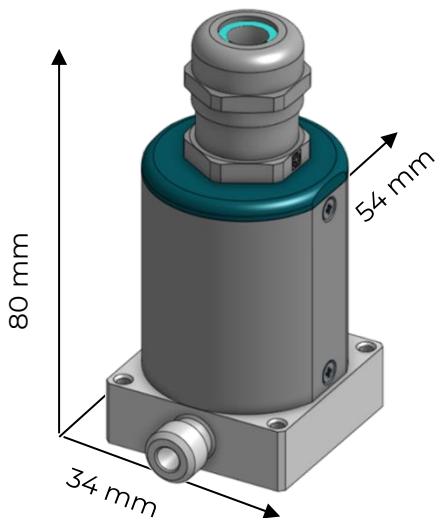
No corrosive gases as well as no condensate, dust, aerosols may be led into the device. Explosive gas mixtures may only be introduced into the unit with suitable measures such as flame arresters.

In the case of corrosive ambient atmospheres, contact Archigas for the appropriate design.

## 2. Description

The compact and robust transmitter TCD3000 is recommended for precise, fast and sensitive measurement of (quasi-) binary gas mixtures. The measurement is based on the thermal conductivity principle. This technology is extremely well suited for the measurement of gases with widely differing thermal conductivity, e.g. H<sub>2</sub> and Ar. By perfecting this method it has become possible to detect the measurement of even small concentrations of less ppm.

Due to the stainless-steel housing and the IP67 protection class, the unit can be used safely in harsh environments.



The unit is completely equipped with metal-to-metal connections, so that a high degree of tightness and pressure resistance over 200 bars can be guaranteed.

The gas-carrying parts and the sensor are corrosion-resistant:

The gas path is made of high-grade stainless steel 1.4404,

The sensor on the gas side is completely glazed.

In addition, the sensor is protected against condensation and dust.

The internal memory can store the curves for up to 99 gas pairs, so that the device can be easily adapted to changing measurement requirements.

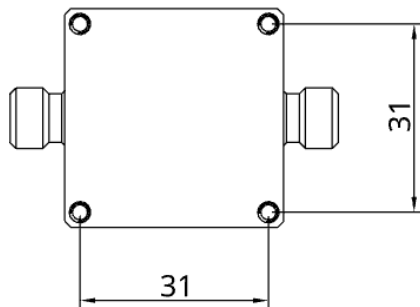
The unit is connected to the process via axial pneumatic connections M10.

Such a system makes assembly and disassembly in existing installations easier.

At the customer's request, the wide range of adapters is available.

### 3. Mounting

The TCD3000 is designed for wall fastening. M3 bolts fit for the four mounting holes. There are 7 mm spacers in the couch perimeter.



### 4. Pneumatic Connection

The pneumatic connections of TCD3000 are bidirectional.

The units are delivered with fittings for 6mm pipes. The metal-sealing fittings can be mounted radially. This makes the device very easy to mount and dismount.

Flow range is designed for 10 l/h -120 l/h.

The following options are available on request:

- Reduction of pipe diameter,
- larger/smaller flow range,
- larger pressure range.

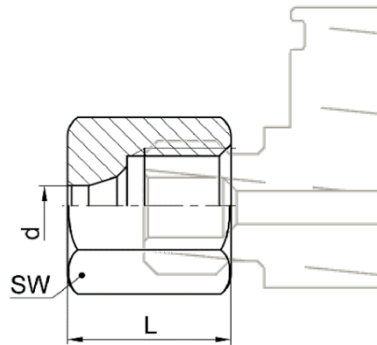
For installation, use dimensionally accurate, cleanly cut and deburred tubes with a smooth surface. The fitting needs a straight pipe end of at least 1.5 x d.

Insert the tube as far as possible into the fitting.

Screw fitting nut on by hand as far as it will go.

Tighten the fitting nut with an open-end wrench by approx. 1¾ turns. The tube must be pressed against the main part.

SW = 12 mm  
 d = 6 mm  
 L = 15.5 mm










**Important!** Please check the technical tightness of your installation after completing it.

## 5. Electrical installation

For electrical connection 3 m sheathed cable with diameter 5.7 mm is used. For bending radius the following specifications must be kept:

Moved: min. 43 mm, Fixed: min. 23 mm

For the connection 7 AWG26 wires with the following assignment are provided:

<b>Power supply 12-36 VDC</b>		pink	Power cable
		yellow	Power cable*
		blue	Ground
<b>Analog output 4-20 mA</b>		green	Current output 4-20 mA
		grey	Ground
<b>Digital output RS485</b>		brown	RS485-A
		white	RS485-B
<b>Shield</b>			Ground

\* If the power cable is over 10 m it is necessary to connect both pink and yellow wires to the power supply unit.

## 6. Serial communication

The TCD3000 is being operated via the RS485 interface with 3,3V differential output voltage magnitude.

The following parameters should be set:

Speed:	38400
Data:	8 bit
Parity:	none
Stop bits:	1 bit
Flow control:	none
New-line	
Receive:	CR+LF
Transmit:	CR+LF

After starting the unit, the following information will be shown:

**Initialisation complete!**

**For help, send the following command: A?**

The communication consists of Unit address (standard "A"), and the following commands.

A!: after sending a command, the unit receives the following information back:

address; serial number; measured value in mV; concentration in ppm; unit temperature in °C; unit status.

State list:

0x0000: Unit ready for measurement

0x0001: Unit warms up

0x0002: Unit error

**A!**

**A; 1; 345.415491; 1060.001; 100.43; 0x0000**

If you want to make changes to the device, you should log in to the device.

By sending the command AE@119977 you get the authorization to make the calibration or device address change.

## a. Calibration

The device is set to a measuring range ordered by the customer. The beginning and the end of the measuring range correspond to the calibration points.

The device recognises the calibration point itself when a gas corresponds to the beginning or end of the measuring range. If gas deviates by 5% from calibration point, calibration is aborted.

For one-point calibration, AO (address + 'O') command is sent. For calibration, both the beginning and the end of the measuring range can be used.

For two-point calibration, AS (address + 'S') command is sent twice: first time at one and second time at the other side of the measuring range. The order of the calibration points does not matter.

After each calibration process, the unit sends back the current data set with the measured value.

**AO**

**A; 1; 1060.001; 0.000000; 100.43; 0x0000**

Please note that calibration should only be carried out when the signal has stabilised.

## b. Change of the device address

All commands for the device start with the device address. By default, this address is the letter "A". The device address can always be seen at the device start.

To change the address e.g. from "A" to "B" you should send the following command:

**AC@B**

## 7. Specifications

Dimensions with connectors; weight	B=54 mm, H=80 mm, D=34 mm; ~500g
Power supply	24V DC ( $\pm 12V$ ), 1 A
Digital Output	RS485 or TTL Baud rate 38400 / Data 8bit
Analog Output	4-20 mA, 3-wire connection
Ambient temperature range	-10°C to 50°C
Warm up time	Approx. 1 min
Flow rate	10l/h-120l/h
T90-time	<1s
Noise	< 10 ppm
Drift at zero point	<100 ppm per week
Repeatability	< 50 ppm
Error due to change of ambient temperature	< 50 ppm per 10°C
Error due to change of flow at 70l/h	< 50 ppm per 10l/h
Gas pressure (absolute)	200 bara
Error due to change of pressure (above 800hPa)	< 50 ppm per 10hPa

All data refer to 0,5 vol% H<sub>2</sub> in N<sub>2</sub>



## 8. Measurement Components and Ranges

Measuring Gas	Carrier Gas	Basis Range	Smallest Range
Hydrogen (H <sub>2</sub> )	Nitrogen (N <sub>2</sub> ) or Air	0% – 100%	0% – 0.2%
Oxygen (O <sub>2</sub> )	Nitrogen (N <sub>2</sub> )	0% – 100%	0% – 15%
Helium (He)	Nitrogen (N <sub>2</sub> ) or Air	0% – 100%	0% – 0.8%
Carbon dioxide (CO <sub>2</sub> )	Nitrogen (N <sub>2</sub> ) or Air	0% – 100%	0% – 3%
Nitrogen (N <sub>2</sub> )	Argon (Ar)	0% – 100%	0% – 3%
Oxygen (O <sub>2</sub> )	Argon (Ar)	0% – 100%	0% – 2%
Hydrogen (H <sub>2</sub> )	Argon (Ar)	0% – 100%	0% – 0.1%
Helium (He)	Argon (Ar)	0% – 100%	0% – 0.5%
Carbon dioxide (CO <sub>2</sub> )	Argon (Ar)	0% – 60%	0% – 10%
Argon (Ar)	Carbon dioxide (CO <sub>2</sub> )	40% – 100%	–
Methane (CH <sub>4</sub> )	Nitrogen (N <sub>2</sub> ) or Air	0% – 100%	0% – 2%
Methane (CH <sub>4</sub> )	Argon (Ar)	0% – 100%	0% – 1.5%
Argon (Ar)	Oxygen (O <sub>2</sub> )	0% – 100%	0% – 3%
Nitrogen (N <sub>2</sub> )	Hydrogen (H <sub>2</sub> )	0% – 100%	0% – 2%
Oxygen (O <sub>2</sub> )	Carbon dioxide (CO <sub>2</sub> )	0% – 100%	0% – 3%
Hydrogen (H <sub>2</sub> )	Helium (He)	20% – 100%	-
Hydrogen (H <sub>2</sub> )	Methane (CH <sub>4</sub> )	0% – 100%	0% – 0.5%
Hydrogen (H <sub>2</sub> )	Carbon dioxide (CO <sub>2</sub> )	0% – 100%	0% – 0.5%
Sulfur hexafluoride (SF <sub>6</sub> )	Nitrogen (N <sub>2</sub> ) or Air	0% – 100%	0% – 2%
Nitrogen dioxide (NO <sub>2</sub> )	Nitrogen (N <sub>2</sub> ) or Air	0% – 100%	0% – 5%
Hydrogen (H <sub>2</sub> )	Oxygen (O <sub>2</sub> )	0% – 100%	0% – 0.2%
Argon (Ar)	Xenon (Xe)	0% – 100%	0% – 3%
Neon (Ne)	Argon (Ar)	0% – 100%	0% – 1.5%
Krypton (Kr)	Argon (Ar)	0% – 100%	0% – 2%
Extinguishing gas (R125)	Nitrogen (N <sub>2</sub> ) or Air	0% – 100%	0% – 5%
Deuterium (D <sub>2</sub> )	Nitrogen (N <sub>2</sub> ) or Air	0% – 100%	0% – 0.5%
Deuterium (D <sub>2</sub> )	Helium (He)	0% – 100%	0% – 5%