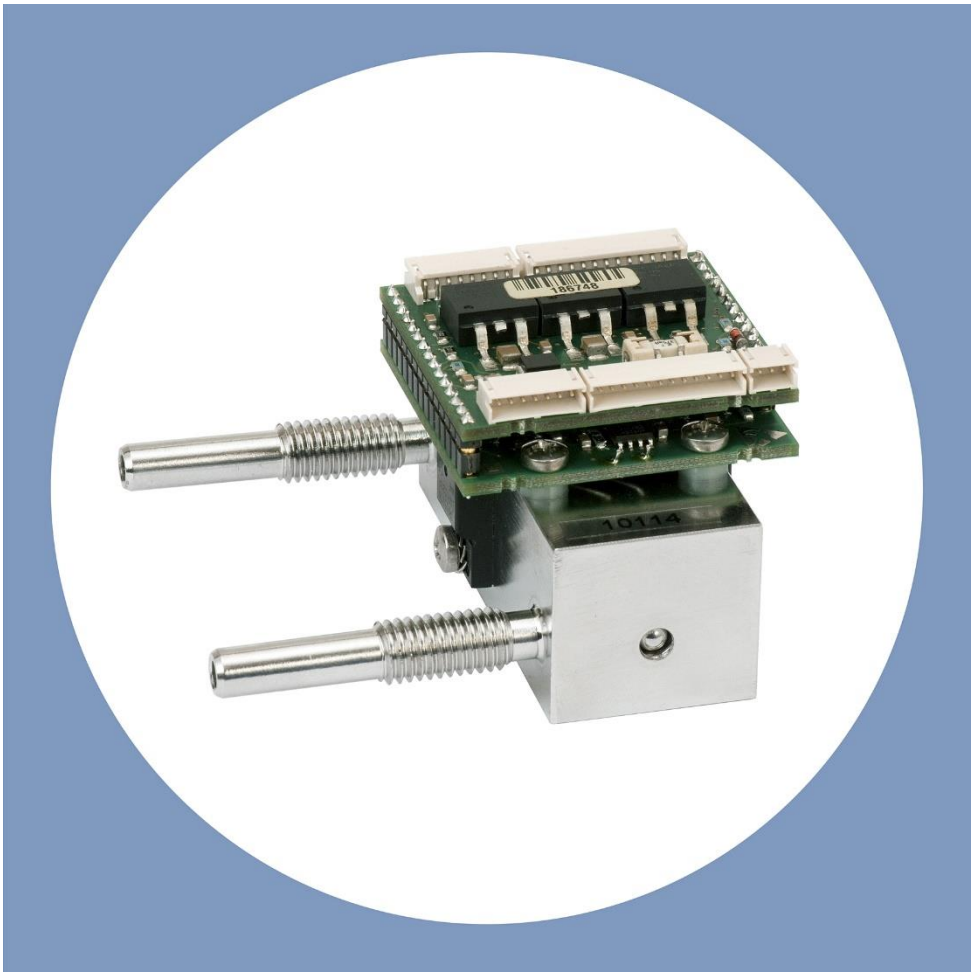
# FTC200-OEM

## Fast Thermal Conductivity Analyzer

## Operating Manual



1.09KD180125MPL1V05

1. Intended Use ..... 3
2. Description ..... 4
3. EMC ..... 5
4. Measuring gases and ranges ..... 5
5. Scope of Delivery ..... 5
6. Electrical Connection ..... 6
7. Pneumatic Connection ..... 7
8. Mounting ..... 7
8.1 Thermal Insolation ..... 8
9. Communication with the FTC200-OEM ..... 8
9.1. Remote Control via Serial Communication ..... 8
9.2. SetApp2.0 ..... 9
10. Specifications ..... 10

**Warning!**
"Warning" draws attention to application errors or actions that can lead to safety risks including the injury to persons or malfunctions – possibly even destruction of the device.

**Note!**
"Note" indicates an additional function or hint.

# 1. Intended Use

Only non-corrosive and condensate-,dust-, aerosol-, oil dust-free gases may be lead in the FTC-series gas analyser. Flammable gases require appropriate protective measures. Explosive gases may not be lead in the FTC.

Upon installation the protection class has to be considered. The ambient atmosphere may not be corrosive. OEM-device with protection class IP00 demand thermal and electric insulation, as well as mechanical protection for operation.

The specifications of the device and its manual have to be observed strictly. Please fill out questionnaire (2.01.1FB180619MPL1) for registration of your measuring task, if your intended use does not comply with intended use described above. Based on the information given in the questionnaire we will examine the measuring task and possibly authorise it.

Note: Please keep this manual for future use.

## 2. Description

The FTC200-OEM is a highly precise and stable Thermal Conductivity Detector (TCD). It is designed for the use as an OEM detector. Since it is not equipped with housing it has protection class 00 and no electro-magnetic shielding. It is not designed for the use in hazardous areas. As it is true for any OEM product, all this is in the hands of our customers.
For indication of the signal a 0 to 10V analog output is provided. For internal calibration, configuration and digital indication of the signal a TTL-level RS232 communication is required. For testing purposes we offer a RS232 to TTL level converter as well as two small windows programs for a PC in order for perform Offset and Gain calibration.
The thermal conductivity of a gas mixture depends on the individual gas components and on the composition of the mixture. Under certain conditions, therefore, the concentration of individual gas components can be determined by measuring the thermal conductivity. In other cases the identification of certain properties of gases is of special interest e.g. for quality control or safety reasons. Often these properties are related to the thermal conductivity and thereby identified. The concentration can be determined with high precision if one of the following conditions is met:

- The gas mixture consists of only two components, for example measuring $CO_2$ in $N_2$ or $H_2$ in$N_2$.
- The gas mixture consists of more than two components but only concentrations of two components vary.
- The thermal conductivity of two of three constituents is similar, e.g. measuring $H_2$ or He or $CO_2$ in a mixture of $O_2$ and $N_2$.
- In case, a cross sensitive gas may be measured separately and the signal of this measurement is fed into FTC200 where an internal routine compensates the cross sensitivity.

## 3. EMC

The product FTC200-OEM does not meet EMC requirements without proper shielding and housing. Means for EMC must be performed by the customer.

## 4. Measuring gases and ranges

| Measu-ring Gas | Carrier Gas | Basic range | Smallest range | Smallest suppressed zero range |
| --- | --- | --- | --- | --- |
| $H_2$ | $N_2$ or air | 0% - 100% | 0% - 0.5% | 98% - 100% |
| $H_2$ | Ar | 0% - 100% | 0% - 0.4% | 99% - 100% |
| $H_2$ | He | 20% - 100% | 20% - 40% | 85% - 100% |
| $H_2$ | $CH_4$ | 0% - 100% | 0% - 0.5% | 98% - 100% |
| $H_2$ | $CO_2$ | 0% - 100% | 0% - 0.5% | 98% - 100% |
| He | $N_2$ or air | 0% - 100% | 0% - 0.8% | 97% - 100% |
| He | Ar | 0% - 100% | 0% - 0.5% | 98% - 100% |
| $CO_2$ | $N_2$ or air | 0% - 100% | 0% - 3% | 96% - 100% |
| $CO_2$ | Ar | 0% - 60% | 0% - 10% | - |
| Ar | $N_2$ or air | 0% - 100% | 0% - 3% | 96% - 100% |
| Ar | $CO_2$ | 40% - 100% | - | 80% - 100% |
| $CH_4$ | $N_2$ or air | 0% - 100% | 0% - 2% | 96% - 100% |
| $CH_4$ | Ar | 0% - 100% | 0% - 1.5% | 97% - 100% |
| $O_2$ | $N_2$ | 0% - 100% | 0% - 15% | 85% - 100% |
| $O_2$ | Ar | 0% - 100% | 0% - 2% | 97% - 100% |
| $N_2$ | Ar | 0% - 100% | 0% - 3% | 97% - 100% |
| $N_2$ | $CO_2$ | 0% - 100% | 0% - 4% | 96% - 100% |
| $NH_3$ | $H_2$ | 0% - 100% | 0% - 5% | 95% - 100% |
| CO | $H_2$ | 0% - 100% | 0% - 2% | 99% - 100% |
| $SF_6$ | $N_2$ or air | 0% - 100% | 0% - 2% | 96% - 100% |

Other gases and ranges on request.

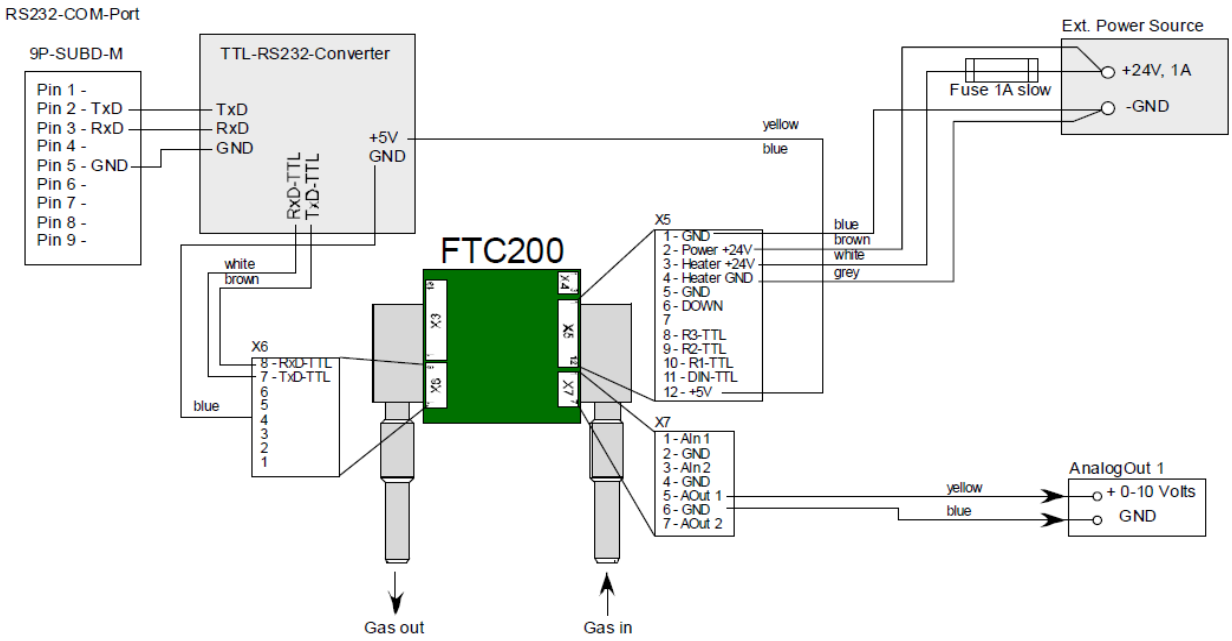
## 5. Scope of Delivery

- FTC200-OEM TC-Detector
- 12 pole JST-Connector with 1m open end wires
- 8 pole JST-Connector with 1m open end wires
- 7 pole JST-Connector with 1m open end wires

- optional: RS232-TTL-converter and PC tools for calibration

# 6. Electrical Connection

## Basic connection diagram FTC200-OEM




Connector X5:

Pin 01 – GND=Ground
Pin 02 – Power +24VDC = Power supply electronic, +24Volts
Pin 03 – Heater +24VDC = Power supply heater, +24Volts
Pin 04 – Heater GND
Pin 05 – GND
Pin 12 – +5VDC=+5Volts from internal voltage regulator

Connector X6:

Pin 07 – TxD-TTL = Serial TxD, TTL-level
Pin 08 – RxD-TTL = Serial RxD, TTL-level
Pin 04 – GND

Connector X7:

Pin 01 – AIn1 = Analog input, 0-10Volts, 50kOhm
Pin 02 – GND
Pin 03 – AIn2 = Analog input, 0-10Volts, 50kOhm
Pin 04 – GND
Pin 05 – AOut1 = Analog output, 0-10Volts, $R_L$>1kOhm
Pin 07 – AOut2 = Analog output, 0-10Volts, $R_L$>1kOhm

## 7. Pneumatic Connection

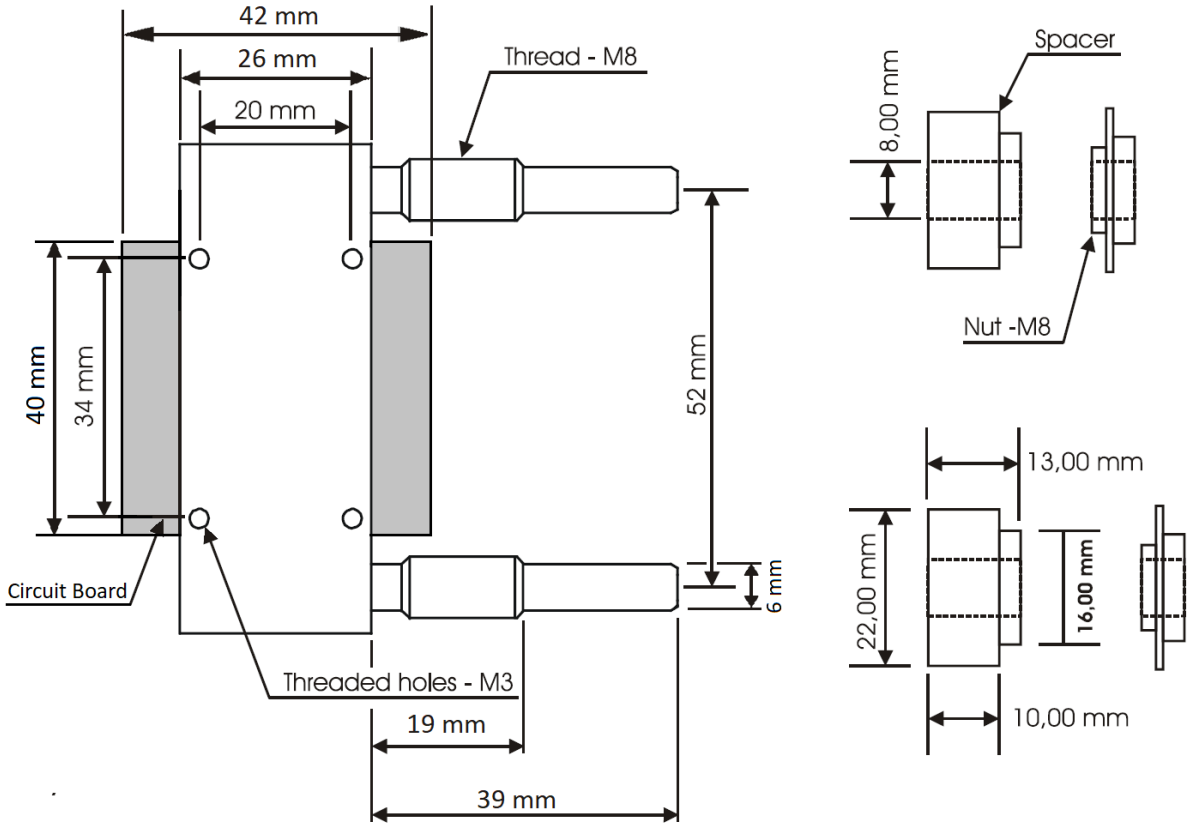
Looking at the FTC200-OEM on the side of gas tubes with the PCB up, the gas inlet is on the right-hand side. Gas inlet and outlet tubes – as well as the body - are stainless steel (LF316ti). The outer diameters of the tubes are 6mm. The gas must not contain dust, condensate and potentially condensing matter. The inner gas duct is stabilized onto 63°C (hotter versions on demand). Depending on mounting, thermal insulation, sample flow and temperature and ambient conditions, the temperature of the inlet tube maybe significant lower. This fact might give reason to condensation at dew points well below 50°C. With proper heated lines and insulated connectors, a dew point up to 50°C is permissible.

!!! Important Notice !!!
Condensate will destroy the sensing element immediately (condensate and dust tolerant version on request).

Optimal flow is in between 60l/h and 80l/h. If the flow is kept stable during measurement as well as during calibration a range from 10l/h to 100l/h is possible.

## 8. Mounting

The bottom view of the FTC200-OEM shows four M3 thread holes which may be used for the fixation of the detector. Use insulating spacers (min. 4mm) and stainless-steel screws in order to minimize heat flow from the 63°C hot detector body. For bulkhead mounting two spacer and two M8 nuts are available on request.




## 8.1. Thermal Insulation

The integration the FTC200-OEM into a custom housing is mandatory, since the device should be prevented from draught and touch for specified performance. It may not be exposed to airflow, e.g. from fans. The use of additional insolation is optional, but maybe necessary for ambient temperatures below 0°C. Do not use flammable material for insulation. In case it is in contact to the metal body, the material used must be temperature resistant up to 120°C. It may not cover the PCBs. We recommend an insulation material that is heat resistant up to 170°C.
The device is equipped with a temperature fuse switching off at 110°C on the surface of the stainless-steel body.
This device is specified for an ambient temperature at direct place of operation between -10°C to 50°C. Please consider the waste heat of other units nearby. They may not cause a temperature enhancement.
Do not mount the device directly on a surface to prevent strong thermal contact. Use spacers with a length of 4mm that are temperature-resistant up to 100°C.

# 9. Communication with the FTC200-OEM

## 9.1. Remote Control via Serial Communication

The FTC200-OEM is equipped with a RS232-interface. A dedicated manual is available. Please ask Messkonzept for the manual “Remote Control via Serial Communication”.

## 9.2. SetApp2.0

Messkonzept offers a software for the operation of our devices. It enables monitoring of measuring values and managing the settings of the FTC devices. Especially for the OEM series the SetApp2.0 makes calibration, setting thresholds and other things much easier. The SetApp2.0 can be found on our website in the download section.[1]

[1] www.messkonzept.de

# 10. Specifications

| | |
| --- | --- |
| Dimensions with connectors; weight | B=64mm, H=40mm, D=75mm; ~ 350g |
| Power supply | 24V DC (20V to 30V), 700mA |
| RS232 - Baudrate / Data | 19200 / 8bit |
| Ambient temperature range | -10°C to 50°C, depending on mounting and thermal insulation |
| Linearity | < 1% of range |
| Warm up time | Approx. 20min; 1h for small ranges |
| Flow rate | 10l/h-100l/h, recommended 60l/h to 80l/h |
| T90-time | <1sec at flow rate higher 60l/h |
| Noise | < 1% of smallest range |
| Drift at zero point | < 2% of smallest range per week |
| Repeatability | < 1% of range |
| Error due to change of ambient temperature | < 1% of smallest range per 10°C |
| Error due to change of flow at 70l/h | < 1% of smallest range per 10l/h |
| Gas pressure (absolute) | 2000kPa (20bar) |
| Error due to change of pressure (above 800hPa) | < 1% of smallest range per 10hPa |

Note: The values given above refer to H2 in N2, they may vary for other gas pairs.