

Overview

The CALOMAT 6 gas analyzer is primarily used for quantitative determination of H₂ or He in binary or quasi-binary non-corrosive gas mixtures.

Concentrations of other gases can also be measured if their thermal conductivities differ significantly from the residual gases like Ar, CO₂, CH₄, NH₃.

Benefits

- Small T₉₀ time due to micromechanical-produced Si sensor
- Universally applicable hardware basis, high measuring range dynamics (e.g. 0 to 1 %, 0 to 100 %, 95 to 100 % H₂)
- Integrated correction of cross-interference, no external calculation required
- Open interface architecture (RS 485, RS 232, PROFIBUS)
- SIPROM GA network for maintenance and service information (option)
- Electronics and analyzer part: gas-tight separation, purgeable, IP65, long service life even in harsh environments
- EEx(p) for Zones 1 and 2 (in accordance with 94/9/EC (ATEX 2G and ATEX 3G), and Class I Div 2 (CSA) Ex(n))

Application**Fields of application**

- Pure gas monitoring (0 to 1 % H₂ in Ar)
- Protective gas monitoring (0 to 2 % He in N₂)
- Hydroargon gas monitoring (0 to 25 % H₂ in Ar)
- Forming gas monitoring (0 to 25 % H₂ in N₂)
- Gas production:
 - 0 to 2 % He in N₂
 - 0 to 10 % Ar in O₂
- Chemical applications:
 - 0 to 2 % H₂ in NH₃
 - 50 to 70 % H₂ in N₂
- Wood gasification (0 to 30 % H₂ in CO/CO₂/CH₄)
- Blast furnace gas (0 to 5 % H₂ in CO/CO₂/CH₄/N₂)
- Bessemer converter gas (0 to 20 % H₂ in CO/CO₂)
- Monitoring equipment for hydrogen-cooled turbo-alternators:
 - 0 to 100 % CO₂/Ar in air
 - 0 to 100 % H₂ in CO₂/Ar
 - 80 to 100 % H₂ in air
- Versions for the analysis of flammable and non-flammable gases or vapors for use in hazardous areas (Zone 1 and Zone 2)

Special versions**Special applications**

In addition to the standard combinations, special applications are also available upon request (e.g. higher sample gas pressure up to 2 000 hPa absolute).

Design**19" rack unit**

- With 4 HU for installation
 - in hinged frame
 - in cabinets with or without telescopic rails
- Front plate for service purposes can be pivoted down (laptop connection)
- Internal gas paths: stainless steel pipe (mat. no. 1.4571)
- Gas connections for sample gas inlet and outlet and for purging gas: fittings, pipe diameter of 6 mm or 1/4"

Field device

- Two-door enclosure (IP65) with gas-tight separation of analyzer and electronics sections
- Individually purgeable enclosure halves
- Stainless steel gas path and stubs (mat. no. 1.4571)
- Purging gas connections: pipe diameter 10 mm or 3/8"
- Gas connections for sample gas inlet and outlet: clamping ring connection for a pipe diameter of 6 mm or 1/4"

Display and control panel

- Large LCD panel for simultaneous display of:
 - Measured value (digital and analog displays)
 - Status bar
 - Measuring ranges
- Contrast of LCD panel adjustable using menu
- Permanent LED backlighting
- Washable membrane keyboard with five softkeys
- Menu-driven operation for parameterization, test functions, adjustment
- User help in plain text
- Graphic display of concentration trend; programmable time intervals
- Bilingual operating software German/English, English/Spanish, French/English, Spanish/English, Italian/English

Input and outputs

- One analog output per medium (from 0, 2, 4 to 20 mA; NAMUR parameterizable)
- Two analog inputs configurable (e.g. correction of cross-interference or external pressure sensor)
- Six binary inputs freely configurable (e.g. for measurement range switchover, processing of external signals from sample preparation)
- Six relay outputs freely configurable (e.g. failure, maintenance request, limit alarm, external solenoid valves)
- Each can be expanded by eight additional binary inputs and relay outputs (e.g. for autocalibration with max. four test gases)

Communication

RS 485 present in basic unit (connection from the rear; for the rack unit also behind the front plate).

Options

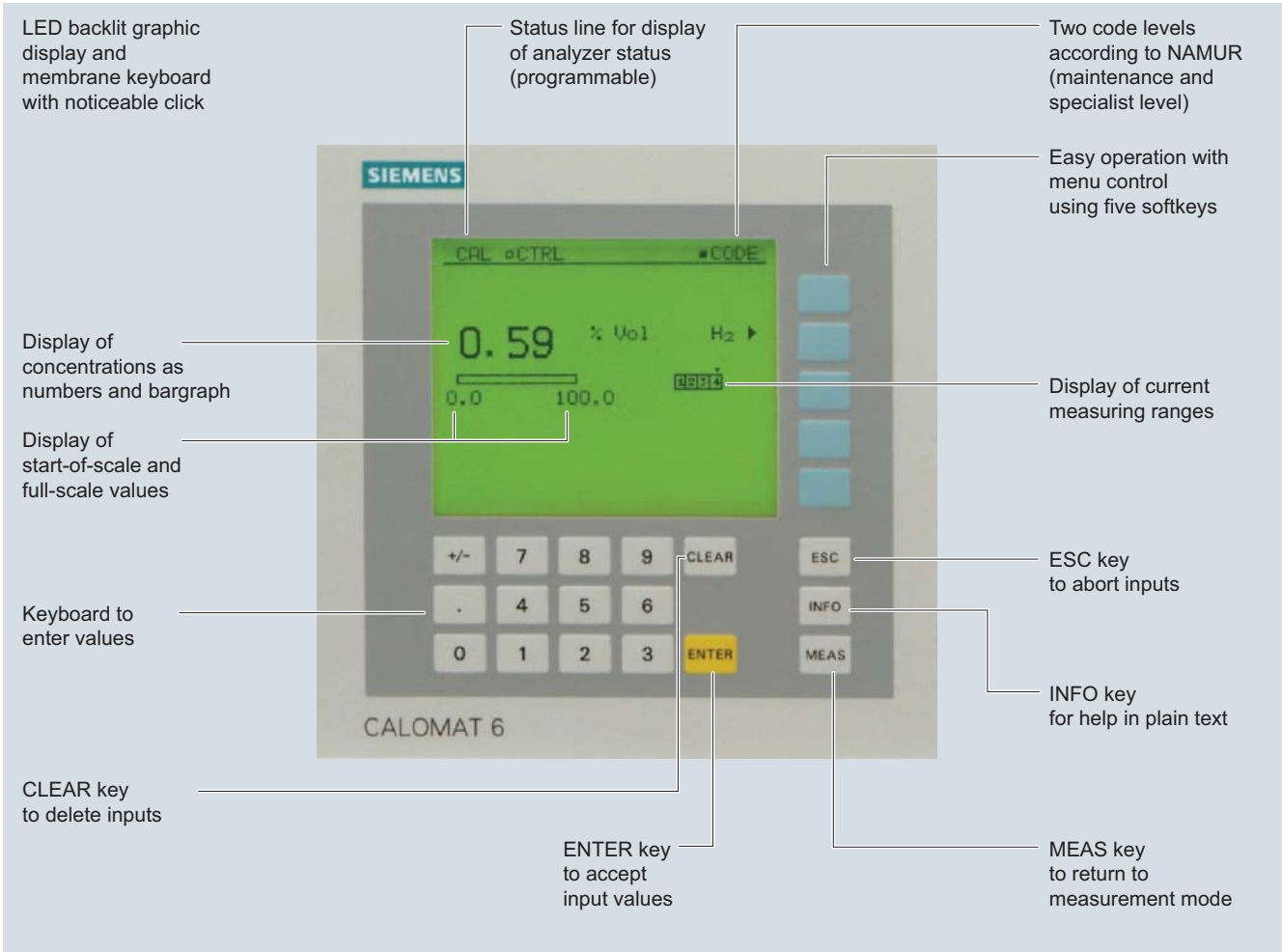
- RS 485/RS 232 converter
- RS 485/Ethernet converter
- RS 485/USB converter
- Connection to networks via PROFIBUS DP/PA interface
- SIPROM GA software as the service and maintenance tool



Continuous Gas Analyzers, extractive CALOMAT 6

General information

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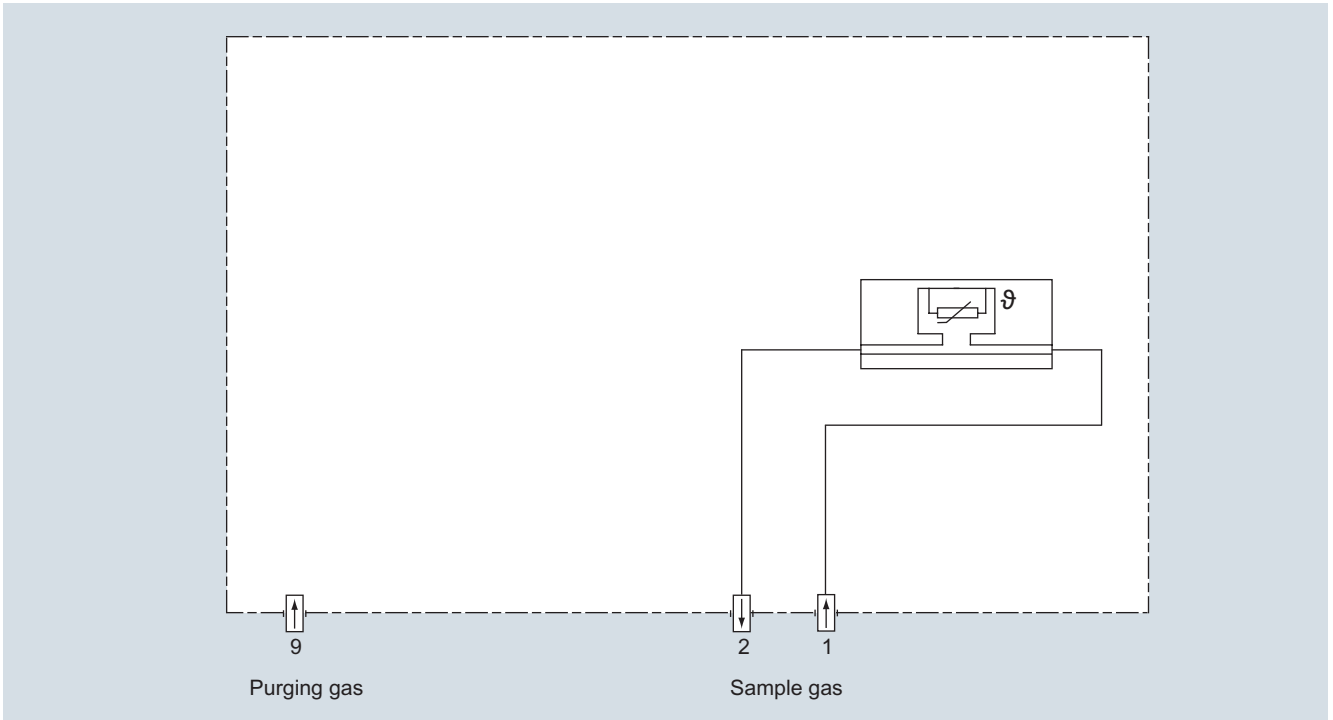


CALOMAT 6, membrane keyboard and graphic display

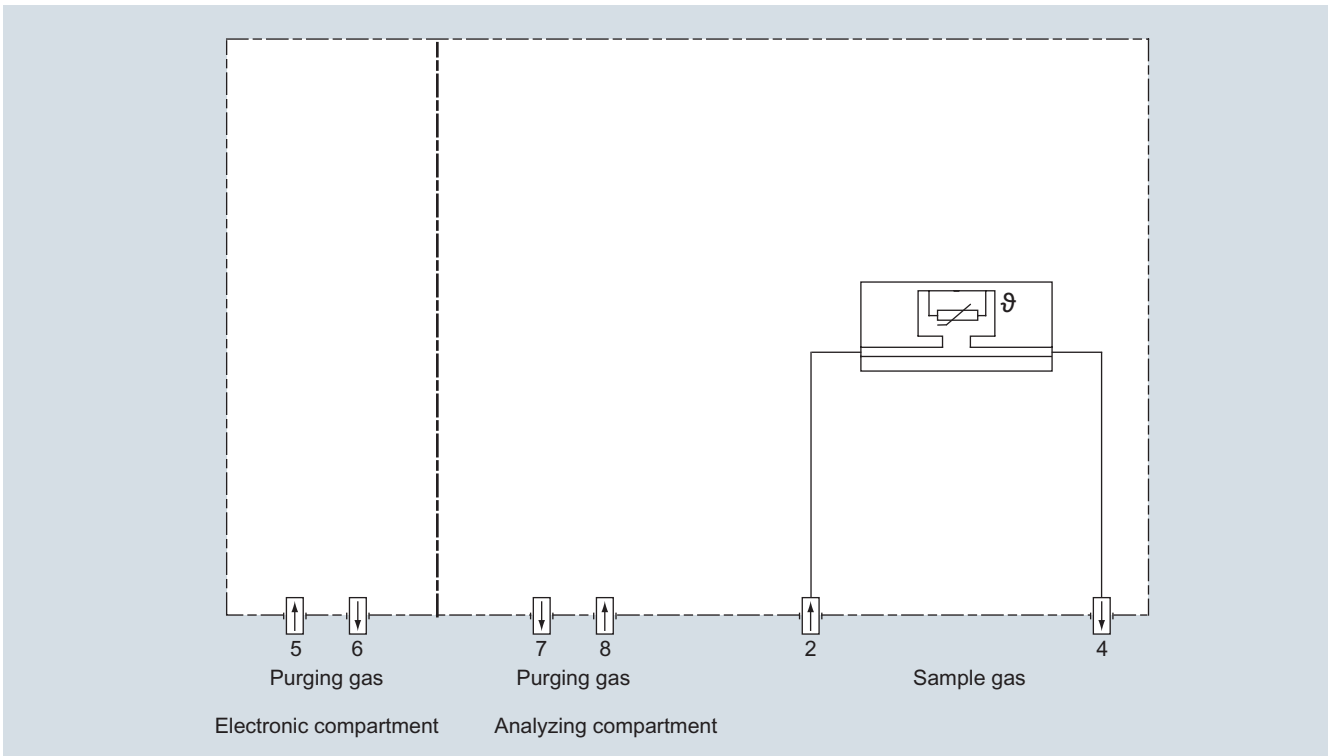
Designs – parts wetted by sample gas

| Gas path | | 19" rack unit | Field device | Field device Ex |
|------------|------------------|--|--------------|-----------------|
| With pipes | Bushing | Stainless steel, mat. no. 1.4571 | | |
| | Pipe | Stainless steel, mat. no. 1.4571 | | |
| | Sample cell body | Stainless steel, mat. no. 1.4571 | | |
| | O-rings | FFKM-Chemraz | | |
| | Sensor | Si, SiO _x N _y , AU, epoxy resin, glass | | |
| | Tightness | Leakage < 1 µl/s | | |
| | | | | |





CALOMAT 6, 19" rack unit, gas path



CALOMAT 6, field device, gas path



Continuous Gas Analyzers, extractive CALOMAT 6

General information

Function

Principle of operation

The measuring principle is based on the different thermal conductivity of gases.

The CALOMAT 6 works with a micromechanically produced Si chip whose measuring membrane is equipped with thin-film resistors.

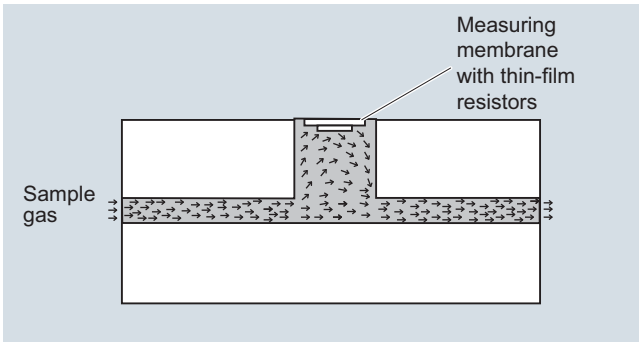
The resistors are kept at a constant temperature. This requires an current intensity depending on the thermal conductivity of the sample gas. This "raw value" is processed further electronically to calculate the gas concentration.

The sensor is located in a thermostatically-controlled stainless steel enclosure in order to prevent the influence of changes in ambient temperature.

To prevent the influence of changes in flow, the sensor is positioned in a bore located to the side of the main flow.

Note

The sample gases must be fed into the analyzers free of dust. Condensation (dew point sample gas < ambient temperature) is to be avoided in the measurement chambers. Therefore, the use of gas modified for the measuring tasks is necessary in most application cases.



CALOMAT, principle of operation

Essential characteristics

- Four freely parameterizable measuring ranges, also with suppressed zero point, all measuring ranges linear
- Smallest measuring spans up to 1 % H₂ (with disabled zero point: 95 to 100 % H₂) possible
- Measuring range identification
- Galvanically isolated measured-value output 0/2/4 to 20 mA (also inverted)
- Autoranging or manual measurement range switchover possible; remote switching is also possible
- Storage of measured values possible during adjustments
- Wide range of selectable time constants (static/dynamic noise suppression); i.e. the response time of the analyzer can be matched to the respective measuring task
- Short response time
- Low long-term drift
- Measuring point switchover for up to 6 measuring points (programmable)
- Measuring range identification
- Measuring point identification
- External pressure sensor can be connected – for the correction of sample gas fluctuations
- Automatic range calibration can be parameterized
- Operation based on the NAMUR recommendation

- Two control levels with their own authorization codes for the prevention of accidental and unauthorized operator interventions
- Simple handling using a numerical membrane keyboard and operator prompting
- Customer-specific analyzer options such as:
 - Customer acceptance
 - TAG labels
 - Drift recording
 - Clean for O₂ service

Measuring spans

The smallest and largest possible spans depend on both the measured component (type of gas) and the respective application.

The smallest possible spans listed below refer to N₂ as the residual gas. With other gases which have a larger/smaller thermal conductivity than N₂, the smallest possible span is also larger/smaller.

| Component | Smallest possible span |
|---------------------------------------|--------------------------|
| H ₂ | 0 ... 1 % (95 ... 100 %) |
| He | 0 ... 2 % |
| Ar | 0 ... 10 % |
| CO ₂ | 0 ... 20 % |
| CH ₄ | 0 ... 15 % |
| H ₂ in blast furnace gas | 0 ... 10 % |
| H ₂ in converter gas | 0 ... 20 % |
| H ₂ with wood gasification | 0 ... 30 % |

Influence of interfering gases

Knowledge of the sample gas composition is necessary to determine the influence of residual gases with several interfering components.

The following table lists the zero offsets expressed in % H₂ resulting from 10 % residual gas (interfering gas) in each case.

| Component | Zero offset |
|---|-------------|
| Ar | -1.28 % |
| CH ₄ | +1.59 % |
| C ₂ H ₆ (non-linear response) | +0.04 % |
| C ₃ H ₈ | -0.80 % |
| CO | -0.11 % |
| CO ₂ | -1.07 % |
| He | +6.51 % |
| H ₂ O (non-linear response) | +1.58 % |
| NH ₃ (non-linear response) | +1.3 % |
| O ₂ | +0.18 % |
| SF ₆ | -2.47 % |
| SO ₂ | -1.34 % |
| 100 % air (dry) | +0.27 % |

For residual gas concentrations differing from 10 %, the corresponding multiple of the associated value in the table provides an acceptable approximation. This is valid for residual gas concentrations up to 25 % (dependent on type of gas).

The thermal conductivity of most gas mixtures has a non-linear response. Even ambiguous results, such as e.g. with NH₃/N₂ mixtures, can occur within a specific concentration range.

In addition to a zero offset, it should also be noted that the gradient of the characteristic is influenced by the residual gas. However, this effect is negligible for most gases.

In case of correction of the influence of interfering gases with additional analyzers (ULTRAMAT 6/ULTRAMAT 23), the resulting measuring error can – depending on the application – amount up to 5 % of the smallest measuring range of the respective application.

Example of correction of cross-interference

Specification for the interface cable

| | |
|--------------------|--|
| Surge impedance | 100 ... 300 Ω , with a measuring frequency of > 100 kHz |
| Cable capacitance | Typ. < 60 pF/m |
| Core cross-section | > 0.22 mm ² , corresponds to AWG 23 |
| Cable type | Twisted pair, 1 x 2 conductors of cable section |
| Signal attenuation | Max. 9 dB over the whole length |
| Shielding | Copper braided shield or braided shield and foil shield |
| Connection | Pin 3 and pin 8 |

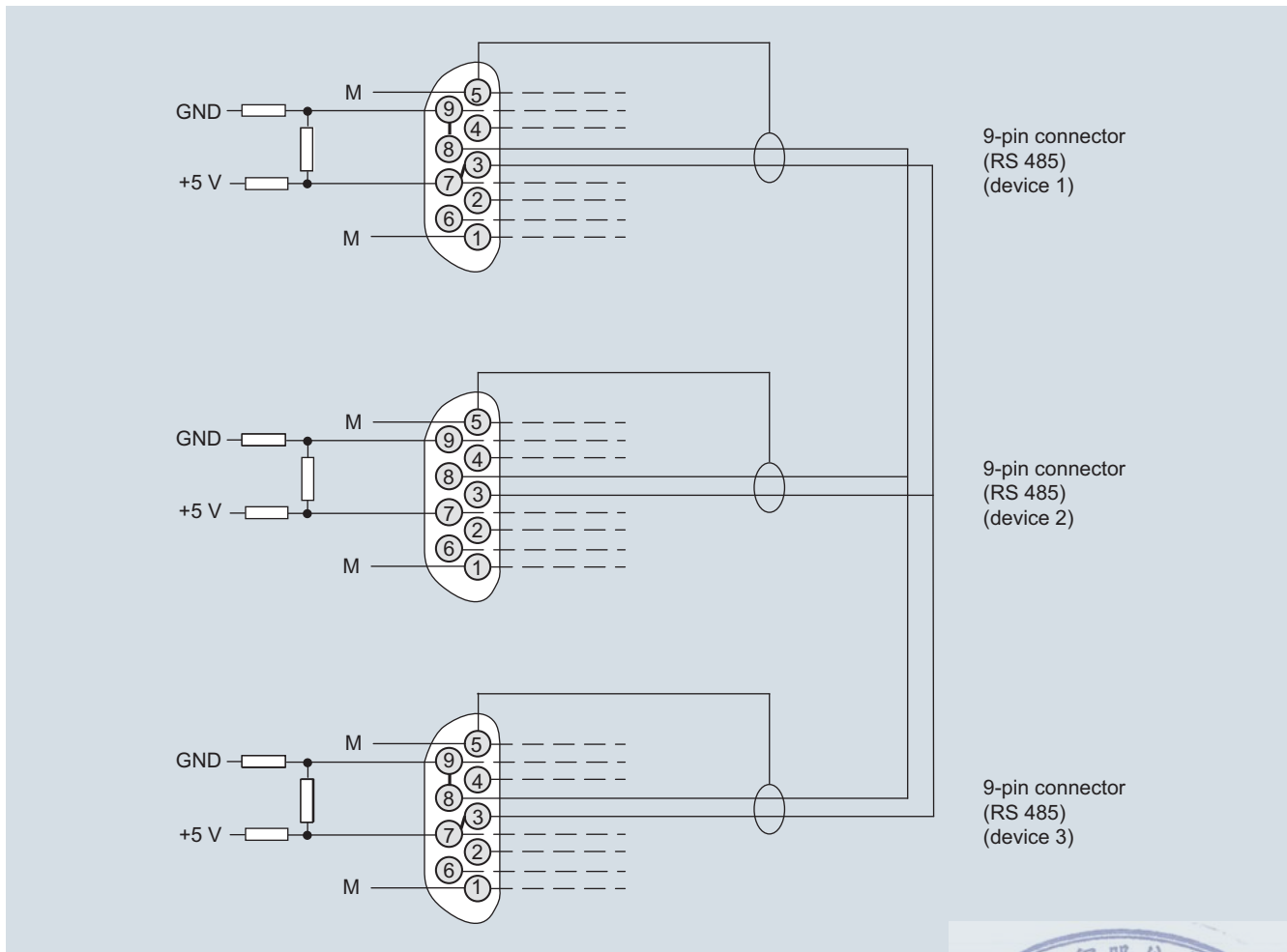
Bus terminating resistors

Pins 3-7 and 8-9 of the first and last connectors of a bus cable must be bridged (see image).

Note

It is advisable to install a repeater on the device side in the case of a cable length of more than 500 m or with high interferences.

Up to four components can be corrected via the ELAN bus, correction of cross-interference can be carried out for one or two components via the analog input.



Bus cable with plug connections, example



Continuous Gas Analyzers, extractive

CALOMAT 6

19" rack unit

Technical specifications

General (based on EN 61207/IEC 1207. All data refers to the binary mixture H₂ in N₂)

| | |
|---|--|
| Measuring ranges | 4, internally and externally switchable; automatic measurement range switchover also possible |
| Largest possible measuring span | 100 vol.% H ₂ (for smallest measuring span, see "Function") |
| Measuring ranges with suppressed zero point | Any zero point within 0 ... 100 vol.% can be implemented, smallest possible measuring span: 5 % H ₂ |
| Operating position | Front wall, vertical |
| Conformity | CE mark in accordance with EN 61326/A1 and EN 61010/1 |

Design, enclosure

| | |
|----------------------|----------------------------|
| Degree of protection | IP20 according to EN 60529 |
| Weight | Approx. 10 kg |

Electrical characteristics

| | |
|---|--|
| EMC (Electromagnetic Compatibility) (All signal lines must be shielded. Measured value deviations of up to 4 % of the smallest measuring range may occur in ranges with strong electromagnetic interference.) | In accordance with standard requirements of NAMUR NE21 (08/98) |
| Electrical safety | In accordance with EN 61010-1; overvoltage category II |
| Power supply (see rating plate) | 100 V -10 % ... 120 V +10 % AC, 48 ... 63 Hz or 200 V -10 % ... 240 V +10 % AC, 48 ... 63 Hz |
| Power consumption | Approx. 20 VA |
| Fuse values | 100 ... 120 V: 1.0T/250 200 ... 240 V: 0.63 T/250 |

Gas inlet conditions

| | |
|-----------------------------------|---|
| Sample gas pressure | 800 ... 1 100 hPa (absolute) |
| Sample gas flow | 30 ... 90 l/h (0.5 ... 1.5 l/min) |
| Sample gas temperature | Min. 0 to max. 50 °C, but above the dew point |
| Temperature of the measuring cell | Approx. 60 °C |
| Sample gas humidity | < 90 % relative humidity |

Dynamic response

| | |
|---|--|
| Warm-up period | < 30 min (the technical specification will be met after 2 hours) |
| Delayed display (T ₉₀) | < 5 s |
| Damping (electrical time constant) | 0 ... 100 s, parameterizable |
| Dead time (purging time of the gas path in the unit at 1 l/min) | Approx. 0.5 s |

Measuring response (relating to sample gas pressure 1 013 hPa absolute, 0.5 l/min sample gas flow and 25 °C ambient temperature)

| | |
|---------------------------|--|
| Output signal fluctuation | < ± 0.75 % of the smallest possible measuring range according to rating plate, with electronic damping constant of 1 s ($\sigma = 0.25 %$) |
| Zero point drift | < ± 1 %/week of the smallest possible measuring span according to rating plate |
| Measured-value drift | < ± 1 %/week of the smallest possible measuring span according to rating plate |
| Repeatability | < 1 % of the current measuring range |
| Detection limit | 1 % of the current measuring range |
| Linearity error | < ± 1 % of the current measuring range |

Influencing variable (relating to sample gas pressure 1 013 hPa absolute, 0.5 l/min sample gas flow and 25 °C ambient temperature)

| | |
|---------------------|--|
| Ambient temperature | < 1 %/10 K referred to smallest possible measuring span according to rating plate |
| Carrier gases | Deviation from zero point (for influence of interfering gas see paragraph titled "Interference influences") |
| Sample gas flow | < 0.2 % of the smallest possible span according to rating plate with a change in flow of 0.1 l/min within the permissible flow range |
| Sample gas pressure | < 1 % of the current measuring range with a pressure change of 100 hPa |
| Power supply | < 0.1 % of the current measuring range with rated voltage ± 10 % |

Electrical inputs and outputs

| | |
|------------------|--|
| Analog output | 0/2/4 ... 20 mA, isolated; load max. 750 Ω |
| Relay outputs | 6, with changeover contacts, freely parameterizable, e.g. for measuring range identification; load: 24 V AC/DC/1 A, isolated |
| Analog inputs | 2, dimensioned for 0/2/4 ... 20 mA for external pressure sensor and correction of cross-interference |
| Binary inputs | 6, designed for 24 V, isolated, freely parameterizable, e.g. for measurement range switchover |
| Serial interface | RS 485 |
| Options | AUTOCAL function with 8 additional binary inputs and relay outputs each, also with PROFIBUS PA or PROFIBUS DP |

Climatic conditions

| | |
|--|--|
| Permissible ambient temperature | -30 ... +70 °C during storage and transportation, 5 ... 45 °C during operation |
| Permissible humidity (dew point must not be undershot) | < 90 % relative humidity as annual average, during storage and transportation |



Continuous Gas Analyzers, extractive
CALOMAT 6

19" rack unit

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| Selection and ordering data | | Article No. | |
|--|---|--------------------|----|
| CALOMAT 6 gas analyzer 19" rack unit for installation in cabinets | | 7MB2521-00-0-A | |
| <p>Click on the Article No. for the online configuration in the PIA Life Cycle Portal.</p> <p>Connections for sample gas Pipe with 6 mm outer diameter Pipe with 1/4" outer diameter</p> | | Cannot be combined | |
| <u>Measured component</u> | <u>Smallest/largest measuring range</u> | | |
| H ₂ in N ₂ | 0 ... 1/100 % | AA | |
| H ₂ in N ₂ (blast furnace gas measurement) ¹⁾ | 0 ... 5/100 % | AW | |
| H ₂ in N ₂ (converter measurement) ¹⁾ | 0 ... 5/100 % | AX | |
| H ₂ in N ₂ (wood gasification) ¹⁾ | 0 ... 5/100 % | AY | |
| H ₂ in Ar | 0 ... 1/100 % | AB | |
| H ₂ in NH ₃ | 0 ... 1/100 % | AC | |
| He in N ₂ | 0 ... 2/100 % | BA | |
| He in Ar | 0 ... 2/100 % | BB | |
| He in H ₂ | 0 ... 10/80 % | BC | |
| Ar in N ₂ | 0 ... 10/100 % | CA | |
| Ar in O ₂ | 0 ... 10/100 % | CB | |
| CO ₂ in N ₂ | 0 ... 20/100 % | DA | |
| CH ₄ in Ar | 0 ... 15/100 % | EA | |
| NH ₃ in N ₂ | 0 ... 10/30 % | FA | |
| H ₂ monitoring (turbo generators) | | GA | GA |
| • CO ₂ in air | 0 ... 100 % | | |
| • H ₂ in CO ₂ | 0 ... 100 % | | |
| • H ₂ in air | 80 ... 100 % | | |
| <u>Add-on electronics</u> | | | |
| Without | | 0 | |
| AUTOCAL function | | | |
| • With 8 additional digital inputs and outputs | | 1 | |
| • With 8 additional digital inputs/outputs and PROFIBUS PA interface | | 6 | 6 |
| • With 8 additional digital inputs/outputs and PROFIBUS DP interface | | 7 | 7 |
| <u>Power supply</u> | | | |
| 100 ... 120 V AC, 48 ... 63 Hz | | 0 | |
| 200 ... 240 V AC, 48 ... 63 Hz | | 1 | |
| <u>Explosion protection</u> | | | |
| Without | | A | |
| Certificate: ATEX II 3G, flammable and non-flammable gases | | B | |
| FM/CSA certificate – Class I Div 2 | | D | |
| <u>Language (supplied documentation, software)</u> | | | |
| German | | 0 | |
| English | | 1 | |
| French | | 2 | |
| Spanish | | 3 | |
| Italian | | 4 | |

¹⁾ Ready to enter external correction of cross-interferences for CO, CO₂ and CH₄ (CH₄ only for blast furnace gas and wood gasification).



Continuous Gas Analyzers, extractive

CALOMAT 6

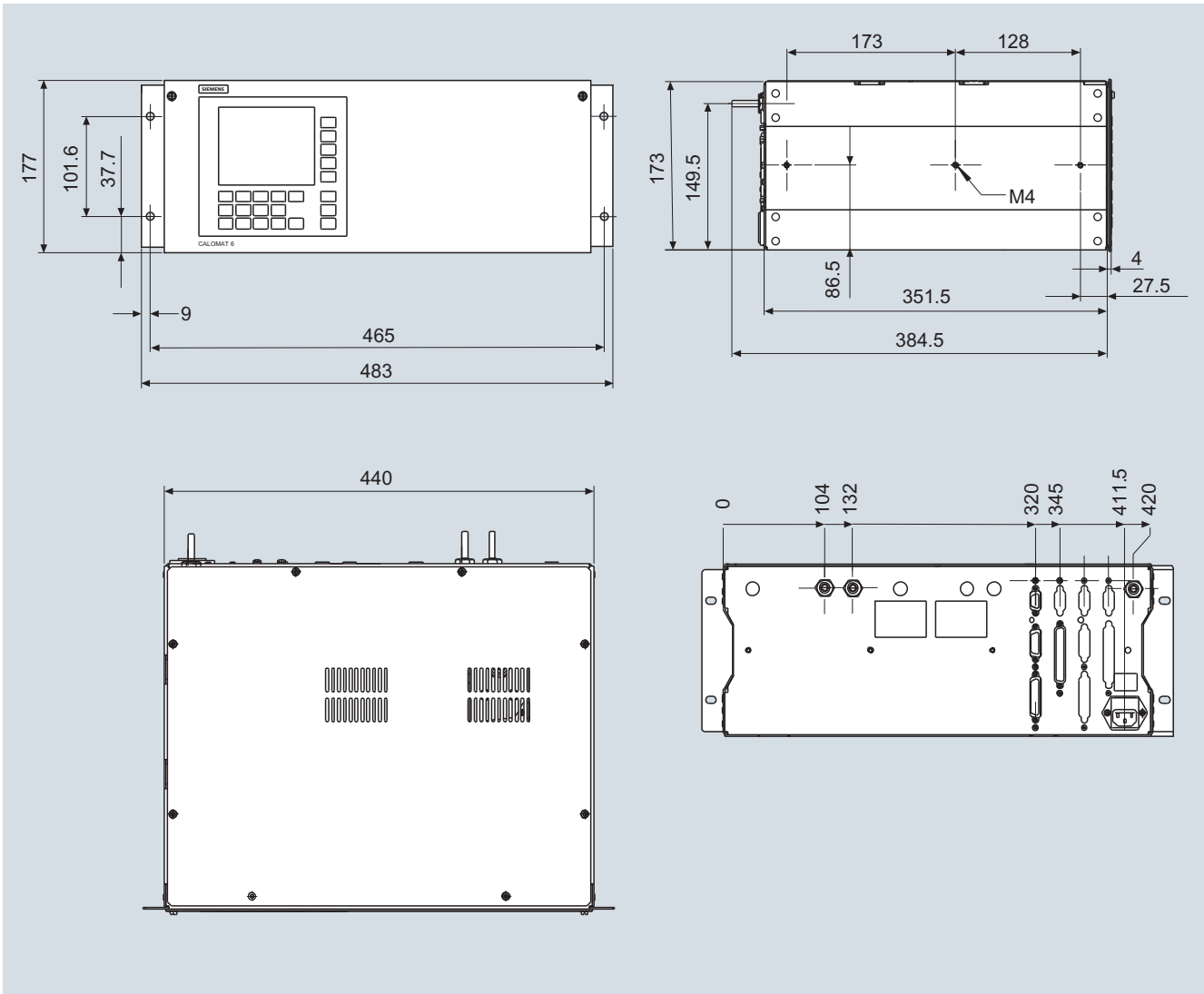
19" rack unit

Selection and ordering data

| <i>Additional versions</i> | Order code |
|--|--------------------------|
| Add "-Z" to Article No. and specify Order codes. | |
| Telescopic rails (2 units) | A31 |
| TAG labels (specific lettering based on customer information) | B03 |
| Clean for O ₂ service (specially cleaned gas path) | Y02 |
| Measuring range indication in plain text, if different from the standard setting | Y11 |
| <i>Accessories</i> | Article No. |
| RS 485/Ethernet converter | A5E00852383 |
| RS 485/RS 232 converter | C79451-Z1589-U1 |
| RS 485/USB converter | A5E00852382 |
| AUTOCAL function with 8 digital inputs/outputs | C79451-A3480-D511 |
| AUTOCAL function with 8 digital inputs/outputs and PROFIBUS PA | A5E00057307 |
| AUTOCAL function with 8 digital inputs/outputs and PROFIBUS DP | A5E00057312 |
| Set of Torx screwdrivers | A5E34821625 |



Dimensional drawings



CALOMAT 6, 19" unit, dimensions in mm

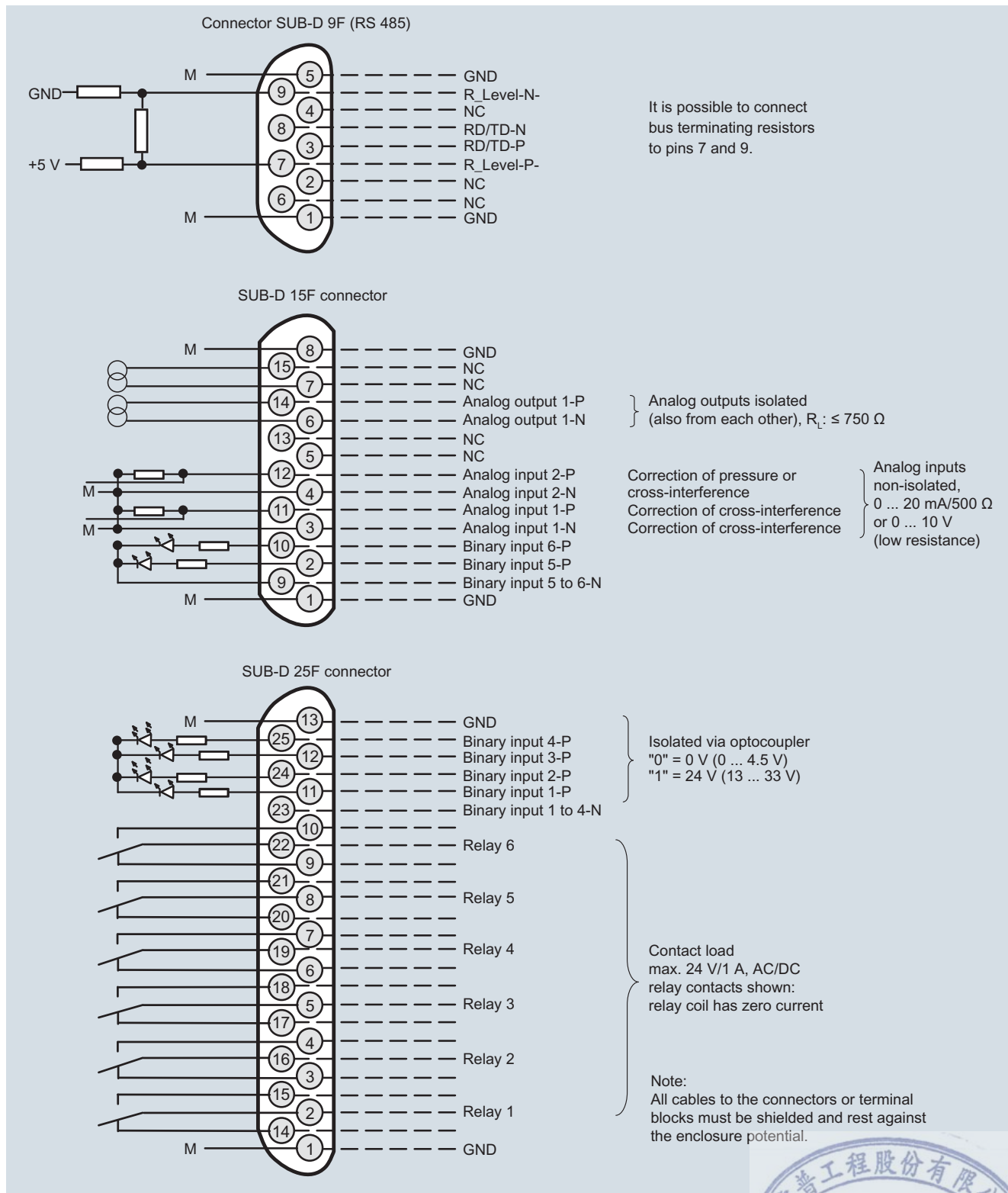


Continuous Gas Analyzers, extractive CALOMAT 6

19" rack unit

Schematics

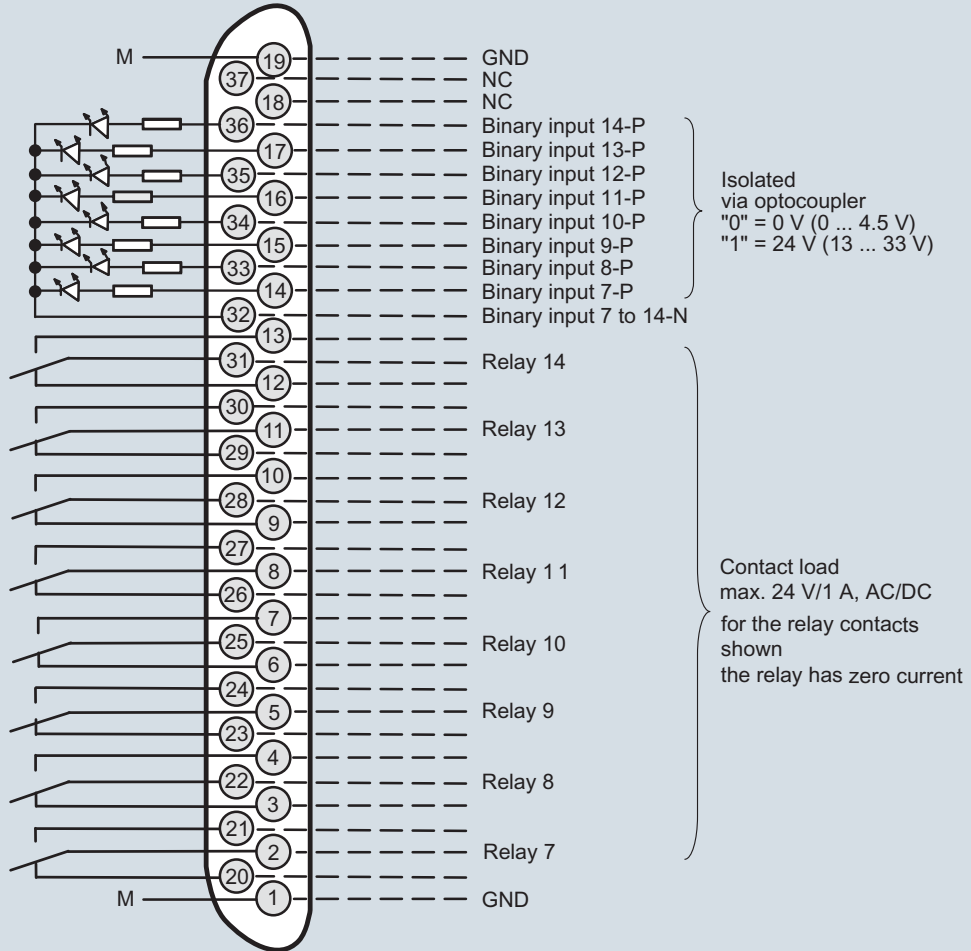
Pin assignment (electrical and gas connections)



CALOMAT 6, 19" unit, pin assignment



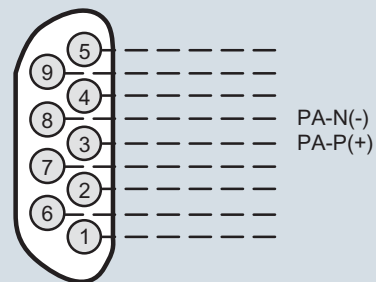
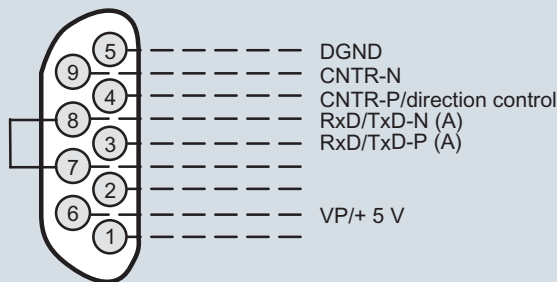
Connector SUB-D 37F (option)



Connector SUB-D 9F
PROFIBUS DP

optional

Connector SUB-D 9M
PROFIBUS PA



Note:

All cables to the connectors or terminal blocks must be shielded and rest against the enclosure potential.

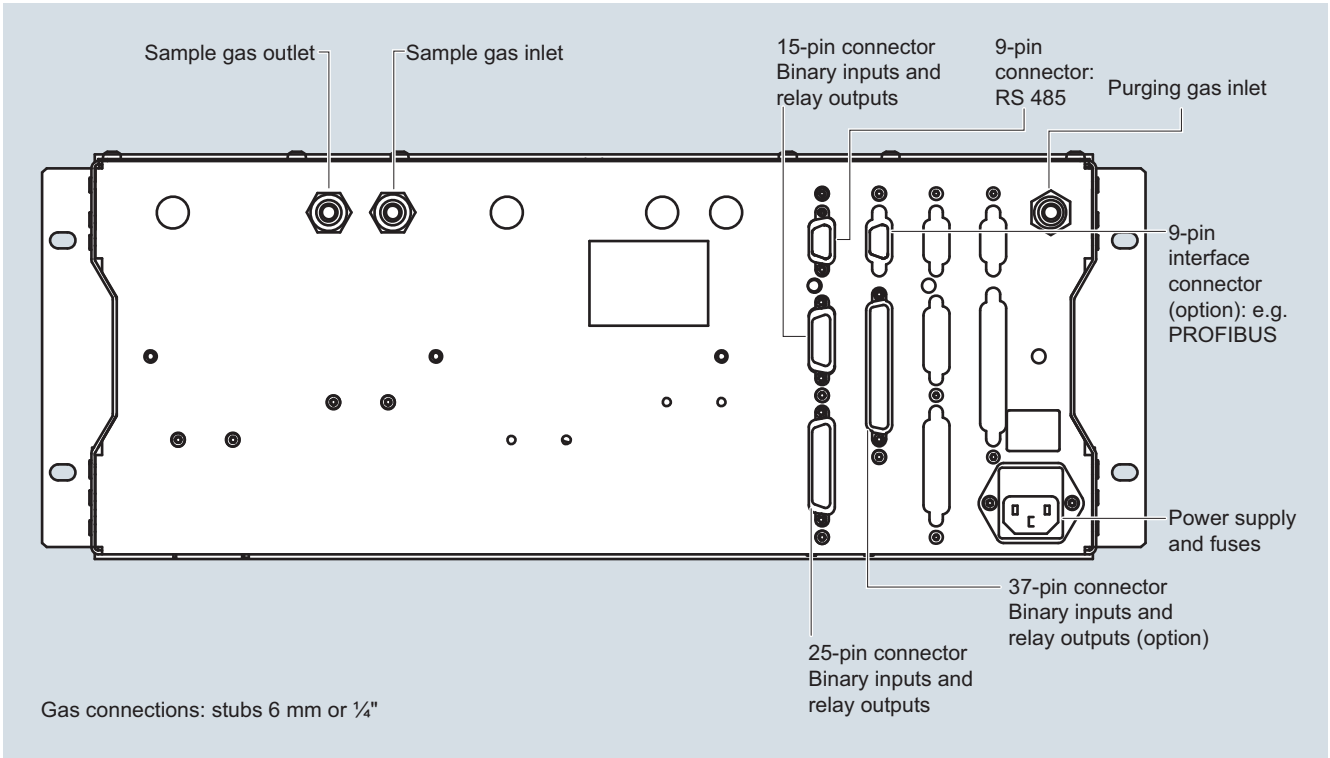
CALOMAT 6, 19" unit, pin assignment of AUTOCAL board and PROFIBUS connectors



Continuous Gas Analyzers, extractive CALOMAT 6

19" rack unit

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CALOMAT 6, 19" unit, gas and electrical connections



Technical specifications**General** (based on DIN EN 61207 / IEC 1207. All data refers to the binary mixture H₂ in N₂)

| | |
|---|--|
| Measuring ranges | 4, internally and externally switchable; automatic measuring range changeover also possible |
| Largest possible measuring span | 100 vol.% H ₂ (for smallest measuring span, see "Function") |
| Measuring ranges with suppressed zero point | Any zero point within 0 ... 100 vol.% can be implemented; smallest possible measuring span: 5 % H ₂ |
| Operating position | Front wall, vertical |
| Conformity | CE mark in accordance with EN 61326/A1 and EN 61010/1 |

Design, enclosure

| | |
|----------------------|----------------------------|
| Degree of protection | IP65 according to EN 60529 |
| Weight | Approx. 25 kg |

Electrical characteristics

| | |
|--|---|
| EMC (E lectromagnetic C ompatibility) (All signal lines must be shielded. Measured value deviations of up to 4 % of the smallest measuring range may occur in ranges with strong electromagnetic interference.) | In accordance with standard requirements of NAMUR NE21 (08/98) |
| Electrical safety | In accordance with EN 61010-1; overvoltage category II |
| Power supply (see rating plate) | 100 V -10 % ... 120 V +10 % AC, 48 ... 63 Hz or 200 V -10 % ... 240 V +10 % AC, 48 ... 63 Hz |
| Power consumption (unit) | Approx. 20 VA |
| Fuse values | 100 ... 120 V: 1.0T/250 200 ... 240 V: 0.63 T/250 |

Gas inlet conditions

| | |
|-----------------------------------|---|
| Sample gas pressure | 800 ... 1 100 hPa (absolute) |
| Sample gas flow | 30 ... 90 l/h (0.5 ... 1.5 l/min) |
| Sample gas temperature | Min. 0 to max. 50 °C, but above the dew point |
| Temperature of the measuring cell | Approx. 60 °C |
| Sample gas humidity | < 90 % relative humidity |
| Purging gas pressure | |
| • Permanent | 165 hPa above ambient pressure |
| • For short periods | Max. 250 hPa above ambient pressure |

Dynamic response (relating to sample gas pressure 1 000 hPa absolute, 0.5 l/min sample gas flow and 25 °C ambient temperature)

| | |
|------------------------------------|--|
| Warm-up period | < 30 min (the technical specification will be met after 2 hours) |
| Delayed display (T ₉₀) | < 5 s |
| Electrical damping | 0 ... 100 s, parameterizable |
| Dead time (at 1 l/min) | Approx. 0.5 s |

Measuring response (relating to sample gas pressure 1 013 hPa absolute, 0.5 l/min sample gas flow and 25 °C ambient temperature)

| | |
|---|---|
| Output signal fluctuation (maximum accuracy achieved after 2 hours) | < ± 0.75 % of the smallest possible measuring range according to rating plate, with electronic damping constant of 1 s (σ = 0.25 %) |
| Zero point drift | < ± 1 %/week of the smallest possible measuring span according to rating plate |
| Measured-value drift | < ± 1 %/week of the smallest possible measuring span according to rating plate |
| Repeatability | < 1 % of the current measuring range |
| Detection limit | 1 % of the current measuring range |
| Linearity error | < ± 1 % of the current measuring range |

Influencing variables (relating to sample gas pressure 1013 hPa absolute, 0.5 l/min sample gas flow and 25 °C ambient temperature)

| | |
|---------------------|--|
| Ambient temperature | < 1 %/10 K referred to smallest possible measuring span according to rating plate |
| Carrier gases | Deviation from zero point (for influence of interfering gas see paragraph titled "Interference influences") |
| Sample gas flow | < 0.2 % of the smallest possible span according to rating plate with a change in flow of 0.1 l/min within the permissible flow range |
| Sample gas pressure | < 1 % of the current measuring range with a pressure change of 100 hPa |

Electrical inputs and outputs

| | |
|------------------|--|
| Analog output | 0/2/4 ... 20 mA, isolated; load max. 750 Ω |
| Relay outputs | 6, with changeover contacts, freely parameterizable, e.g. for measuring range identification; load: 24 V AC/DC/1 A, isolated |
| Analog inputs | 2, dimensioned for 0/2/4 ... 20 mA for external pressure sensor and correction of cross-interference |
| Binary inputs | 6, designed for 24 V, isolated, freely parameterizable, e.g. for measurement range switchover |
| Serial interface | RS 485 |
| Options | AUTOCAL function with 8 additional binary inputs and relay outputs each, also with PROFIBUS PA or PROFIBUS DP |

Climatic conditions

| | |
|--|--|
| Permissible ambient temperature | -30 ... +70 °C during storage and transportation, 5 ... 45 °C during operation |
| Permissible humidity (dew point must not be undershot) | < 90 % relative humidity as annual average, during storage and transportation |



Continuous Gas Analyzers, extractive CALOMAT 6

Field device

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Selection and ordering data

Article No.

CALOMAT 6 gas analyzer

For field installation

7MB2511-0-A Cannot be combined

Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

Connections for sample gas

Ferrule screw connection for pipe, outer diameter 6 mm
Ferrule screw connection for pipe, outer diameter 1/4"

| Measured component | Smallest/largest measuring range |
|--|----------------------------------|
| H ₂ in N ₂ | 0 ... 1/100 % |
| H ₂ in N ₂ (blast furnace gas measurement) ¹⁾ | 0 ... 5/100 % |
| H ₂ in N ₂ (converter measurement) ¹⁾ | 0 ... 5/100 % |
| H ₂ in N ₂ (wood gasification) ¹⁾ | 0 ... 5/100 % |
| H ₂ in Ar | 0 ... 1/100 % |
| H ₂ in NH ₃ | 0 ... 1/100 % |
| He in N ₂ | 0 ... 2/100 % |
| He in Ar | 0 ... 2/100 % |
| He in H ₂ | 0 ... 10/80 % |
| Ar in N ₂ | 0 ... 10/100 % |
| Ar in O ₂ | 0 ... 10/100 % |
| CO ₂ in N ₂ | 0 ... 20/100 % |
| CH ₄ in Ar | 0 ... 15/100 % |
| NH ₃ in N ₂ | 0 ... 10/30 % |
| H ₂ monitoring (turbo generators) | |
| • CO ₂ in air | 0 ... 100 % |
| • H ₂ in CO ₂ | 0 ... 100 % |
| • H ₂ in air | 80 ... 100 % |

Add-on electronics

Without

AUTOCAL function

- With 8 additional digital inputs and outputs
- With 8 additional digital inputs/outputs and PROFIBUS PA interface
- With 8 additional digital inputs/outputs and PROFIBUS DP interface
- With 8 additional digital inputs/outputs and PROFIBUS PA Ex-i interface

Power supply

100 ... 120 V AC, 48 ... 63 Hz

200 ... 240 V AC, 48 ... 63 Hz

Explosion protection, incl. certificate

Without

Acc. to ATEX II 3G, non-flammable gases

Acc. to ATEX II 3G; flammable gases²⁾

FM/CSA certificate – Class I Div 2

According to ATEX II 2G, leakage compensation²⁾

According to ATEX II 2G, continuous purging²⁾

ATEX II 3D certificate; potentially explosive dust atmospheres

- In non-hazardous gas zone
- In Ex zone acc. to ATEX II 3G, non-flammable gases
- In Ex zone acc. to ATEX II 3G, flammable gases²⁾

Language (supplied documentation, software)

German

English

French

Spanish

Italian

0
1

AA
AW
AX
AY
AB
AC
BA
BB
BC
CA
CB
DA
EA
FA
GA

AA
AW
AX
AY
AB
AC
BC
EA
FA
GA

GA

0
1
6
7
8

6
7
8

6
7
8

A
B
C
D
E
F
G
H
J

B
D
E
F

0
1
2
3
4

¹⁾ Ready to enter external correction of cross-interferences for CO, CO₂ and CH₄ (CH₄ only for blast furnace gas and wood gasification).

²⁾ Only in connection with an approved purging unit.



Selection and ordering data

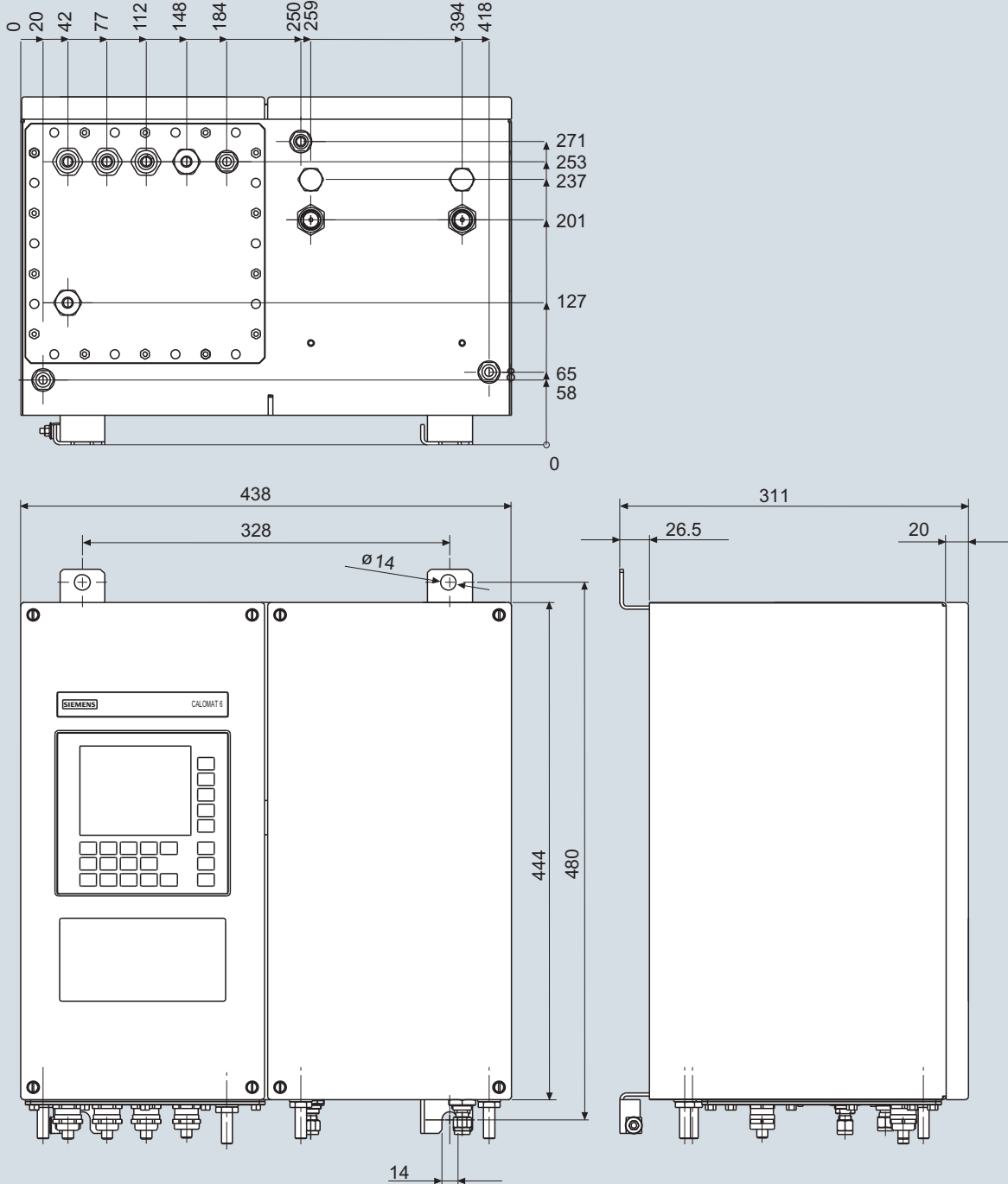
| <i>Additional versions</i> | Order code |
|--|------------------------|
| Add "-Z" to Article No. and specify Order codes. | |
| TAG labels (specific lettering based on customer information) | B03 |
| BARTEC EEx p control unit "Leakage compensation" | E71 |
| BARTEC EEx p control unit "Continuous purging" | E72 |
| Clean for O ₂ service (specially cleaned gas path) | Y02 |
| Measuring range indication in plain text, if different from the standard setting | Y11 |
| <i>Additional units for Ex versions</i> | Article No. |
| <u>ATEX Category II 2G (zone 1)</u> | |
| BARTEC EEx p control unit, 230 V, "leakage compensation" | 7MB8000-2BA |
| BARTEC EEx p control unit, 115 V, "leakage compensation" | 7MB8000-2BB |
| BARTEC EEx p control unit, 230 V, "continuous purging" | 7MB8000-2CA |
| BARTEC EEx p control unit, 115 V, "continuous purging" | 7MB8000-2CB |
| Ex isolation amplifier | 7MB8000-3AB |
| Ex isolating relay, 230 V | 7MB8000-4AA |
| Ex isolating relay, 110 V | 7MB8000-4AB |
| Differential pressure switch for corrosive and non-corrosive gases | 7MB8000-5AA |
| Stainless steel flame arrestor | 7MB8000-6BA |
| Hastelloy flame arrestor | 7MB8000-6BB |
| <u>ATEX Category II 3G (zone 2)</u> | |
| BARTEC EEx p control unit, 230 V, "continuous purging" | 7MB8000-2CA |
| BARTEC EEx p control unit, 115 V, "continuous purging" | 7MB8000-2CB |
| <u>FM/CSA (Class I Div. 2)</u> | |
| Ex purging unit Minipurge FM | 7MB8000-1AA |
| <i>Accessories</i> | |
| RS 485/Ethernet converter | A5E00852383 |
| RS 485/RS 232 converter | C79451-Z1589-U1 |
| RS 485/USB converter | A5E00852382 |
| AUTOCAL function with 8 digital inputs/outputs | A5E00064223 |
| AUTOCAL function with 8 digital inputs/outputs and PROFIBUS PA | A5E00057315 |
| AUTOCAL function with 8 digital inputs/outputs and PROFIBUS DP | A5E00057318 |
| AUTOCAL function with 8 digital inputs/outputs and PROFIBUS PA Ex i (firmware 4.1.10 required) | A5E00057317 |
| Set of Torx screwdrivers | A5E34821625 |



Continuous Gas Analyzers, extractive CALOMAT 6

Field device

Dimensional drawings

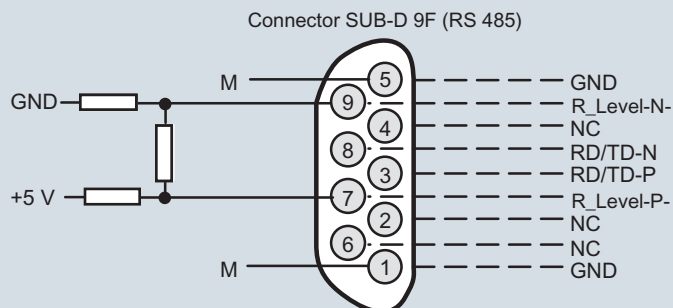


CALOMAT 6, field unit, dimensions in mm

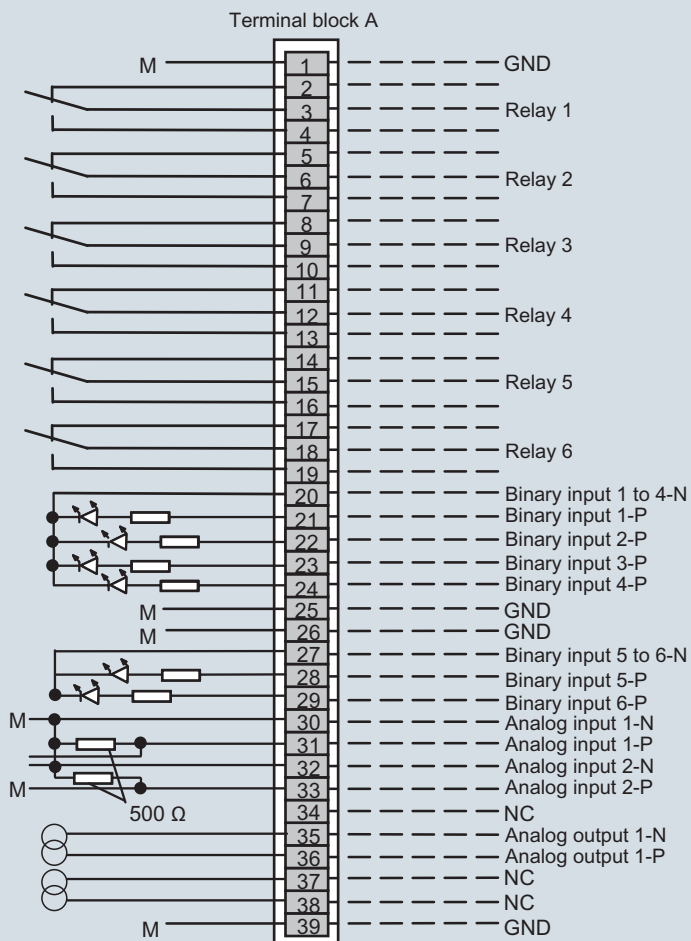


Schematics

Pin assignment (electrical and gas connections)



It is possible to connect bus terminating resistors to pins 7 and 9.



Contact load max.
24 V/1 A, AC/DC; relay contacts shown: relay coil has zero current

Isolated via optocoupler
"0" = 0 V (0 ... 4.5 V)
"1" = 24 V (13 ... 33 V)

Isolated via optocoupler
"0" = 0 V (0 ... 4.5 V)
"1" = 24 V (13 ... 33 V)
Correction of cross-interference } Analog inputs non-isolated, 0 ... 20 mA or 0 ... 10 V (internal resistance ≤ 500 Ω)
Pressure correction }

Analog outputs isolated

Note:
All cables to the connectors or terminal blocks must be shielded and rest against the enclosure potential.

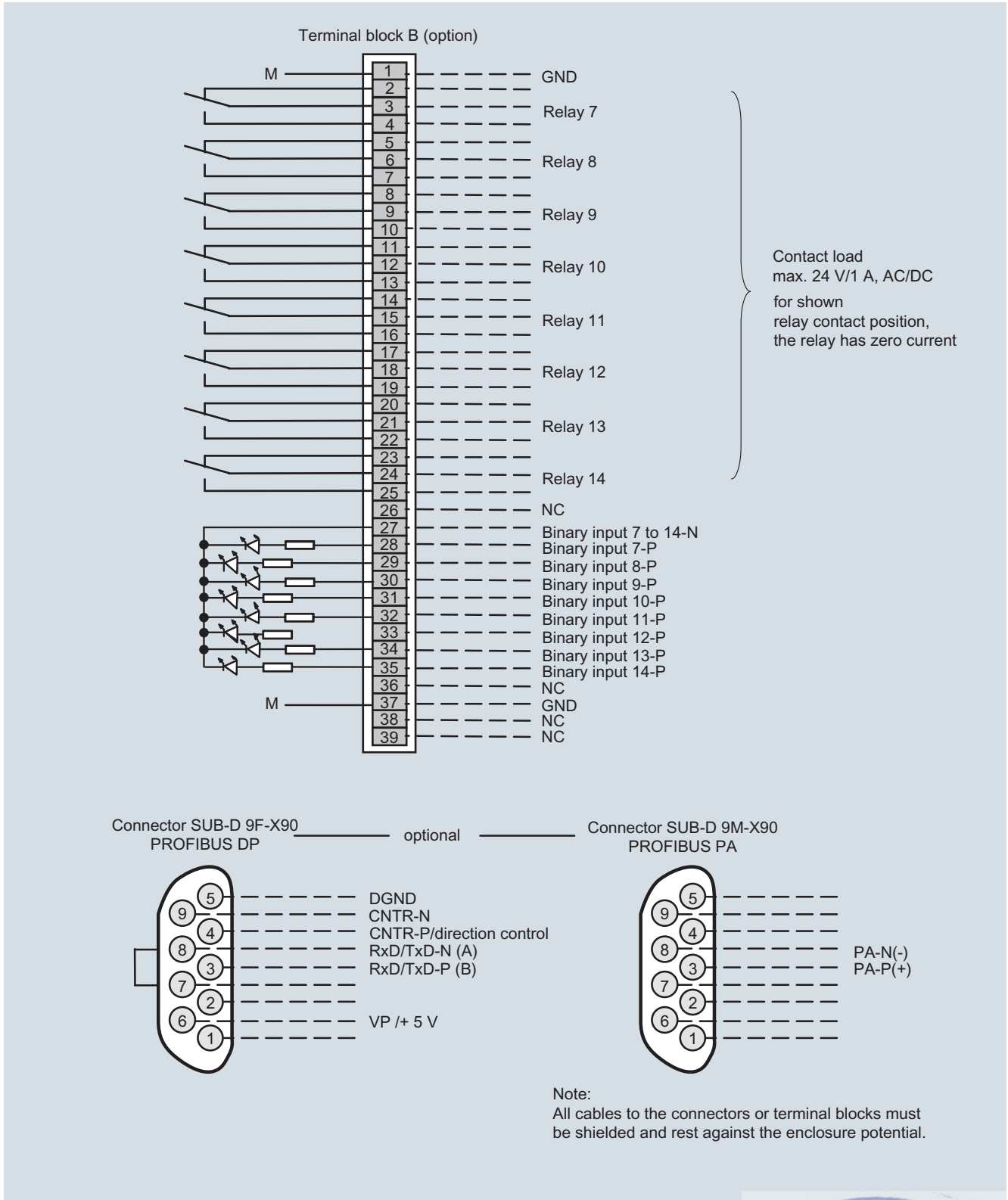
CALOMAT 6, field unit, connector and terminal assignment



Continuous Gas Analyzers, extractive CALOMAT 6

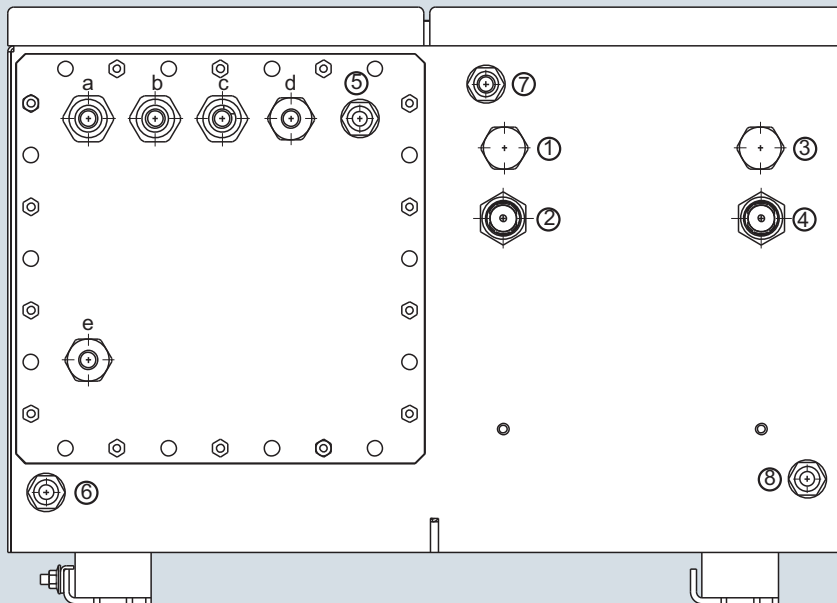
Field device

1



CALOMAT 6, field unit, connector and terminal assignment of the AUTOCAL board and PROFIBUS connectors





Gas connections

- | | | |
|-----|--|--|
| ① | not used | } Clamping gland for pipe Ø 6 mm or 1/4" |
| ② | Sample gas inlet | |
| ③ | not used | |
| ④ | Sample gas outlet | |
| ⑤-⑧ | Purging gas inlets/outlets stubs Ø 10 mm or 3/8" | |

Electrical connections

- | | |
|-------|--|
| a - c | Signal cable (Ø 10 ... 14 mm) (analog + digital): cable gland M20x1.5 |
| d | Interface connection: (Ø 7 ... 12 mm) cable gland M20x1.5 |
| e | Power supply: (Ø 7 ... 12 mm) cable gland M20x1.5 |

CALOMAT 6, field unit, gas and electrical connections



Continuous Gas Analyzers, extractive

CALOMAT 6

Documentation

Selection and ordering data

| Operating instructions | Article No. |
|--|--------------------|
| CALOMAT 6 | |
| Thermal conductivity gas analyzer | |
| • German | A5E00116454 |
| • English | A5E00116455 |
| • French | A5E00116456 |
| • Italian | A5E00116457 |
| • Spanish | A5E00116458 |
| Gas analyzers of Series 6 and ULTRAMAT 23 | |
| Schnittstelle/Interface PROFIBUS DP/PA | |
| • German and English | A5E00054148 |

Suggestions for spare parts

Selection and ordering data

| | 7MB2521 | 7MB2511 | 7MB2511 Ex | 2 years (quantity) | 5 years (quantity) | Article No. |
|--|---------|---------|------------|--------------------|--------------------|--------------------------|
| Analyzer unit | | | | | | |
| Measuring cell | x | x | x | 1 | 1 | A5E00095332 |
| O ring (set of 4) | x | x | x | 1 | 2 | A5E00124182 |
| Electronics | | | | | | |
| Fuse (device fuse) | | | x | 1 | 2 | A5E00061505 |
| Front plate without LC display | x | | | 1 | 1 | C79165-A3042-B508 |
| Motherboard, with firmware: see spare parts list | x | x | x | - | 1 | |
| Adapter plate, LCD/keyboard | x | x | | 1 | 1 | C79451-A3474-B605 |
| LC display (non-Ex version) | x | | | 1 | 1 | W75025-B5001-B1 |
| Line transformer, 115 V | x | x | x | - | 1 | W75040-B21-D80 |
| Line transformer, 230 V | x | x | x | - | 1 | W75040-B31-D80 |
| Connector filter | x | x | x | - | 1 | W75041-E5602-K2 |
| Fusible element, T 0.63/250 V | x | x | | 2 | 3 | W79054-L1010-T630 |
| Fusible element, 1 A, 110/120 V | x | x | x | 2 | 3 | W79054-L1011-T100 |

If the CALOMAT 6 is supplied with a specially cleaned gas path for high oxygen context ("Cleaned for O₂ service"), please ensure that you specify this when ordering spare parts. This is the only way to guarantee that the gas path will continue to comply with the special requirements for this version.

