SIEMENS

OXYMAT 61

The Oxygen Analyzer For Standard Applications

7MB2001

Manual **09/01**



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Information for the User

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1.1 Information for our Customers



Please read this Manual before you start work!
It contains important information and data whose observance will guarantee correct functioning of the analyzer and also save you servicing costs. The information will significantly help you when using the equipment and will lead to reliable results.

This Manual refers to the software release version 4.2.1.

1.2 General Information

The product described in this Manual has left the factory in a perfect and tested condition as regards safety. In order to retain this state and to achieve correct and safe operation of this product, it must only be used in the manner described by the manufacturer. In addition, correct and safe operation of this product is dependent on proper transport, storage and installation as well as careful operation and maintenance.

This Manual contains the information required for approved use of the product described in it. The Manual has been prepared for technically qualified personnel who have been specially trained or who possess appropriate knowledge in the field of instrumentation and control, referred to further as automation technology.

Knowledge of the safety information and warnings present in this Manual and their technically correct implementation are prerequisites for danger-free installation and commissioning and for safety during operation and maintenance of the described product. Only a qualified person possesses the required specialist knowledge to correctly interpret the general safety information and warnings present in this Manual and to apply them to the specific case.

This Manual is included in the delivery of the analyzer, even if separate ordering has been made possible for logistic reasons. For clarity reasons this Manual cannot cover all possible details for all versions of the described product and cannot describe every possible case in connection with installation, operation, maintenance or the use in systems. Should you require further information, or should particular problems occur which are not handled in sufficient depth in this Manual, help can be requested through your local Siemens office or representative.

Note



When considering use of the analyzer for new research and development applications, we recommend that you discuss your application with our specialist department.

1.3 Notes on Using this Manual



This Manual describes the applications of the equipment and how you can start it up, operate and service it.

Of particular importance are the **warning and information texts.** These are separated from the remaining text, specially identified by appropriate pictograms (see examples on left), and provide valuable tips on how to avoid maloperations.



1.4 Danger Information

The following information serves on the one hand for your personal safety and also to protect the described product or connected devices from damage.

Safety information and warnings to prevent danger to the life and health of users or maintenance personnel or to prevent damage to property are emphasized in this Manual by the terms defined here. They are additionally identified by warning symbols (pictograms) matched to the significance of the accompanying text and which may therefore deviate from the examples shown here. The terms used in this Manual and the information on the product itself have the following meaning:



Danger
means that death, severe personal injury and/or substantial damage to property **will occur** if the appropriate safety precautions are not observed.



Warning
means that death, severe personal injury and/or substantial damage to property **can occur** if the appropriate safety precautions are not observed.



Caution
with a warning triangle means that slight personal injury **can occur** if the appropriate safety precautions are not observed.

Caution
without a warning triangle means that damage to property **can occur** if the appropriate safety precautions are not observed.

Attention
means that an undesirable effect or state can occur if the corresponding information is not observed.

Note
is important information on the product itself, the handling of the product or the respective part of the Manual to which particular attention should be paid.





Danger of burns
means that severe personal injury **can occur** if the appropriate safety precautions are not observed.

1.5 Approved Use

Approved use in the sense of this Manual means that this product may only be used for the applications described in the Catalog and in the Technical Description (see also Chapter 3 of this Manual) and only in conjunction with other devices and components which have been recommended or approved of by Siemens.

The product described in this Manual has been developed, manufactured, tested and documented taking into account the appropriate safety standards. No danger therefore exists in the normal case with respect to damage to property or the health of persons if the handling guidelines and safety information described for configuring, assembly, approved use and maintenance are observed. This device has been designed such that safe isolation is guaranteed between the primary and secondary circuits. Low voltages which are connected must also be generated using safe isolation.



Warning

Following removal of the housing or guard, or after opening the system cabinet, certain parts of these devices/systems are accessible which may carry dangerous voltages. Therefore only suitably qualified personnel may work on this device. These individuals must be thoroughly acquainted with all sources of danger and the maintenance measures as described in this Manual.

1.6 Qualified Personnel

Severe personal injury and/or extensive damage to property may occur following unqualified work on the device/system or the failure to observe the warnings described in the Manual or on the device/system cabinet. Therefore only suitably qualified personnel may work on this device/system.

Qualified persons in the sense of the safety information present in this Manual or on the product itself are persons who

- are either familiar as configuring engineers with the safety concepts of automation technology
- or have been trained as operators in the use of automation technology equipment and are acquainted with the contents of this Manual which refer to operation
- or have been appropriately trained as commissioning and/or maintenance personnel for such automation technology equipment or are authorized to energize, ground and tag circuits and devices/systems in accordance with established safety practices.

1.7 Warranty Information

Your attention is drawn to the fact that the contents of this product documentation are not part of a previous or existing agreement, commitment or statutory right and do not change these. All commitments on the part of Siemens are contained in the respective sales contract which also contains the complete and solely applicable warranty conditions. The warranty conditions in the contract are neither extended nor limited by the contents of this Instruction Manual.

1.8 Supply and Delivery

The respective scope of delivery according to the valid contract is listed on the shipping documents accompanying the delivery.

When opening the packaging, please observe the corresponding information on the packaging material. Check that the delivery is complete and undamaged. In particular, compare the Order Nos. on the labels (if present) with the ordering data.

Please retain the packaging material if possible so that you can reuse it if it is necessary to return the device. A form for this purpose can be found in Chapter 8.3.

1.9 Standards and Regulations

The harmonized European standards have been applied as far as possible to the specification and production of this device. If no harmonized European standards have been applied, the standards and regulations for the Federal Republic of Germany apply (see also the technical data in Chapter 3).

When using this product outside the range of applicability of these standards and regulations, the appropriate standards and regulations in the country of use must be observed.

1.10 Conformity Declaration

EG-Konformitätserklärung
EC Declaration of conformity
Déclaration ”CE” de conformité
Declaración CE de conformidad
Declaração CE de conformidade
Dichiarazione CE di conformità
EG-Verklaring van overeenstemming
EF-konformitetserklæring
Δηλωση συμμορφωσησζ EOK
EU Försäkran om överensstämmelse
EU-vaatimustenmukaisuusvakuutus

Hiermit erklären wir, daß unser Produkt, Typ:
We hereby declare that our product, type;
Nous déclarons par la présente que notre produit, type:
Por la presente declaramos que nuestro producto, tipo:
Com a presente, declaramos que o nosso produto, tipo:
Con la presente dichiariamo che il nostro prodotto tipo:
Hiermee verklaren wij dat ons produkt, type:
Hermed erklaerer vi, at vores produkt af typen:
Με την παρσυσα δηλωνουμε, οτι το προιον μαφ, τυπου:
Härmed försäkrar vi att var produkt, typ:
Taten vkuutamme, että tuotteemme, tyyppi:

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folgenden einschlägigen Bestimmungen entspricht:
complies with the following relevant provisions:
correspond aux dispositions pertinentes suivantes:
satisface las disposiciones pertinentes siguientes:
esta em conformidade com as disposições pertinentes, a saber:
è conforme alle seguenti disposizioni pertinenti:
voldoet aan de eisen van de in het vervolg genoemde bepalingen:
overholder følgende relevante bestemmelser:
αυταποκπιεται στσυφ ακολουθουφ σξετικουφ κανονισμουφ:
uppfyller följande tillämpliga bestämmelser:
täyttää seuraavat asiaankuuluvat vaatimukset:

Niederspannungsrichtlinie (72/23/EWG und 93/68/EWG)
Low voltage guidlines (72/23/EEC and 93/68/EEC)
Directive sur les basses tensions (72/23/CEE et 93/68/CEE)
Reglamento de baja tensión (72/23/MCE y 93/68/MCE)
Directriz relativa à baixa tensão (72/23/EWG e 93/68/EWG)
Direttiva sulla bassa tensione (72/23/CEE e 93/68/CEE)
Laagspanningsrichtlijn (72/23/EEG en 93/68/EEG)
Lavspændingsdirektiv (73/23/EØF og 93/68/EØF)
Κατευθυτηπια οδηγα πεπι ξαμηληζ τασηζ (72/23/EOK και 93/68/EOK)
Lågspänningsdirektiv (72/23/EEG ja 93/68/EEG)
Pienjännitedirektivi (72/23/ETY ja 93/68/ETY)

EMV-Richtlinie (89/336/EWG, 91/263/EWG, 92/31/EWG und 93/68/EWG)
EMC guideline (89/336/EWC, 91/263/EWC, 92/31/EWC and 93/68/EWC)
Directive CEM (89/336/CEE, 91/263/CEE, 92/31/CEE et 93/68/CEE)
Reglamento de compatibilidad electromagnética (89/336/MCE, 91/263/MCE, 92/31/MCE y 93/68/MCE)
Directriz relativa à compatibilidade electro-magnética (89/336/EWG, 91/263/EWG, 92/31/EWG e 93/68/EWG)
Direttiva sulla compatibilità elettromagnetica (89/336/CEE, 91/263/CEE, 92/31/CEE e 93/68/CEE)
EMV-richtlijn (89/336/EEG, 91/263/EEG, 92/31/EEG en 93/68/EEG)
Direktiv om elektromagnetisk forligelighed (89/336/EØF, 91/263/EØF, 92/31/EØF og 93/68/EØF)
Κατευθυτηπια οδηγα πεπι ηλεκτπομαγνητικηζ συμβατοτηταζ (89/336/EOK, 91/263/EOK, 92/31/EO και 93/68/EOK)
EMV-direktiv (89/336/EEG, 91/263/EEG, 92/31/EEG ja 93/68/EEG)
Sähkömagneettisen mukautuvuuden direktivi (89/336/ETY, 91/263/ETY, 92/31/ETY en 93/68/ETY)

Angewendete harmonisierte Normen, insbesondere:
Applied harmonized standards, in particular:
Normes harmonisées, notamment:
Normas armonizadas utilizadas, particularmente:
Nomas harmonizadas utilizadas, em particular:
Norme armonizzate applicate, particolarmente:
Grbruikte gehamiseerde normen, in het bijzondere:
Anvendte hasrmoniserede normer, især:
Εφαπμδσεθεντα εναπμονισμενα ππστν πα, ειδικστεπα:
Tillämpade harmoniserade standarder, särskilt:
Käytetyt yhdenmukaiset standardit, etenkin:

EN50081-1
EN50082-2
EN61010

SIEMENS

Siemens Aktiengesellschaft
Automation Group
Process Analysis Division
PI 2
D-76181 Karlsruhe

Karlsruhe, September 2001

(signed) Dr. Diedrich
(head of department)

(signed) van Dycke
(factory manager)

Installation Guidelines

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2.1 Safety Information



Warning

Certain parts in this analyzer carry dangerous voltages. The housing must be closed and grounded before switching on the analyzer. Death, personal injury and/or damage to property may result if this is not observed. Also refer to Section 2.5.

A standard analyzer must not be used in potentially explosive atmospheres. Use with gases with flammable components at concentrations above the lower explosion limit (LEL) must be clarified with the responsible Ex authorities, and is finally the responsibility of the owner.

Note with an internal supply of reference gas that the reference gas is mixed at approx. 0.5 l/min with the sample gas. Since this can lead to explosive mixtures in the case of flammable sample gases, only an external reference gas supply with nitrogen may be used in this case.

2.2 Installation Requirements

A location should be selected which is as free as possible from vibration.

The **OXYMAT 61** must be placed on supporting rails if it is to be fitted in a cabinet or desktop housing. Assembly only at the front is insufficient because the weight of the analyzer would place too great a load on the chassis.

When installing in switchgear cabinets, ensure that there is sufficient ventilation between the devices.

If the device is to be installed outdoors, ensure that it is protected from direct solar irradiation.

Make sure during operation that the permissible ambient temperature of 5 to 45 °C is retained (see Section 3.5 ”Technical data”).

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Magnetically sensitive devices should not be installed in the immediate vicinity of the **OXYMAT 61** since this analyzer emits magnetic stray fields as a result of its principle. Depending on the sensitivity, distances up to 50 cm are necessary (see also *function 57*).

2.3 Gas Connections and Internal Gas Paths

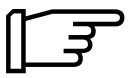
2.3.1 Sample Gas Line

All gas connections are couplings with a diameter of 6 mm or 1/4". Select a material which is suitable for the sample gas for the inlet and outlet piping.



Caution

The **OXYMAT 61** analyzers should normally be operated such that the sample gas pressure cannot build up in the analyzer section. If several analyzers are connected in series, make sure that the series-connected analyzer does not have a restrictor in the gas path (unrestricted exhaust outlet). The restrictor present in the gas path of the **OXYMAT 61** depending on the version may have to be removed. A restrictor may only be present between the sample gas inlet line and the first gas analyzer section.



Note!

Sample gas monitoring (pressure switch) for the series-connected analyzer sections has no function following removal of the sample gas restrictors. To avoid error messages, deactivate the corresponding messages ("Sample gas flow too low") in the configuration function of the software (Section 5.2.5, *function 87*, error S16). Also note in this case that the assignment of a relay with the error message "Flow of sample gas" has no function.

If the sample gas flows into an exhaust gas line, observe the following points:

- The flow resistance in the exhaust gas line should be kept small by using as short a line as possible or by adapting to a larger diameter.
- The exhaust gas line must be free of rapid changes in pressure. If this is not the case, either use a separate exhaust line or fit a surge tank with restrictor (> 1 l) between the analyzer and the exhaust line (pneumatic lowpass).



Warning

In the case of toxic or corrosive gases, or those which can lead to explosive gas mixtures, the exhaust should be routed such that there is no danger to persons or equipment and that the environment is not polluted.

2.3.2 Reference Gas Line

The **OXYMAT 61** is always equipped with reference gas connections. Couplings are present with a diameter of 6 mm or 1/4". Select a material which is suitable for the reference gas for the inlet and outlet piping.

A metal pipe must be used for the reference gas inlet if N_2 and O_2 are used as reference gases. The pipe must be as short as possible and have a small cross-section.

If air is used as the reference gas, it is recommendable to use an auxiliary drier in the suction line to prevent a volume error on the reference gas side caused by moisture.

When subsequently converting the analyzer to a different reference gas supply, the couplings and the reference gas restrictor (low-pressure operation 0.1 bar) must be replaced by trained servicing personnel.

2.3.3 Pressure Sensor

The **OXYMAT 61** has an internal pressure sensor for correction of the influence of pressure on the measured value.

This is fitted on the analyzer section, and directly measures the sample gas pressure using the reference gas supply. It need not be considered further during the installation.

2.4 Gas Conditioning

The sample gas must be sufficiently conditioned to prevent contamination of the parts through which it flows and the associated errors in measurement.

The **ULTRAMAT 6E/F** and **OXYMAT 6E/F** are usually preceded by

- a gas sampling device,
- a sample gas cooler,
- a filter and
- a gas suction pump (see Fig. 2-1).

Depending on the composition of the sample gas, additional equipment may be necessary such as e.g. a washbottle, additional filters and a pressure regulator.

Corrosive components or those which interfere with the measurement should be eliminated by appropriate series-connected absorption filters.

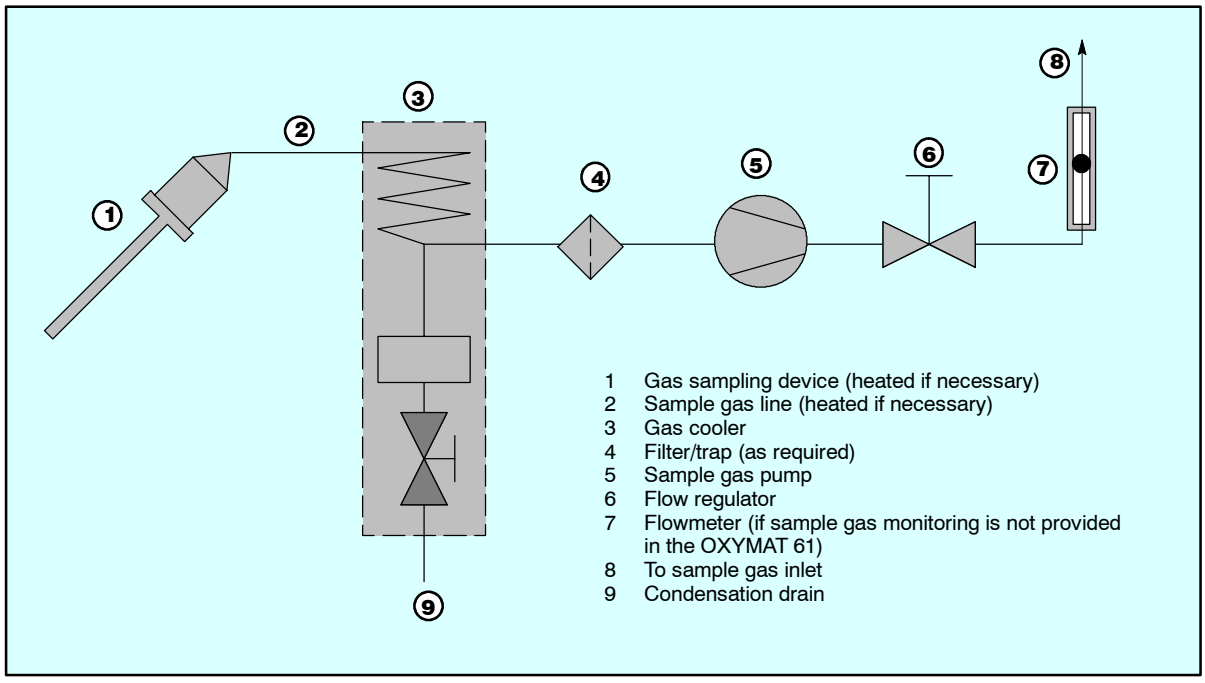


Fig. 2-1 Gas conditioning, example (not included in delivery)

2.5 Electric Connection



Warning

The following must be observed during the electric installation:

The respective country-specific standard for the installation of power systems with rated voltages below 1000 V (in Germany: VDE 0100).

The requirements of VDE 0165 (EN 60079–14) or equivalent international standards must be observed when installing gas-proof analyzers. Special care must be taken with the cable inlets (PG screwed glands) since the gas-proof function may be endangered if carried out improperly.

Torque and permissible diameter for the PG screwed glands:

- PG 13.5: 3.8 ±0.2 Nm; diameter 6 ... 12 mm
- PG 16: 5.0 ±0.2 Nm; diameter 10 ... 14 mm

Failure to observe these regulations may result in death, personal injury and/or damage to property.

2.5.1 Power Supply Connection

- The analyzer is supplied with an appliance plug which may only be connected to the power supply by qualified personnel (see Section 1.5). The power supply cable must include a protective earth conductor which must be connected to the chassis potential. The cross-section of the conductors must be ≥1 mm^2. The phase conductor must be connected to the identified position in the plug.
- The power cable must be routed separately from the signal cables.
- A circuit-breaker must be provided in the immediate vicinity of the analyzer (see rating plate for loading capacity). It must be readily accessible in this case.
- Check that the local mains voltage agrees with that specified on the label on the analyzer.

2.5.2 Connection of Signal Cables



Warning

The signal voltages must be electrically isolated extra-low voltages (SELV).

If signals (e.g. analog output 4 ... 20 mA) are to be routed into a potentially explosive atmosphere of zone 1, they must be intrinsically-safe. Supplementary retrofitting of the analyzer with energy-limiting modules is necessary.

The Ex identification of these modules must be clearly visible on the housing.

- The signal cables in the rack mount analyzer are connected to the D-SUB plugs at the rear.
- RC elements must be connected according to Fig. 2-2 as a measure to suppress the generation of sparks across the relay contacts (e.g. limit relays). Note that the RC element results in a drop-out delay for an inductive component (e.g. solenoid valve).

  The RC element should therefore be dimensioned according to the following rule-of-thumb:

  $R\ [\Omega] \approx 0.2 \times R_L\ [\Omega]$ $\qquad$ $C\ [\mu F] \approx I_L\ [A]$

  Additionally make sure that you only use a non-polarized capacitor C.

  When using direct current, it is possible to fit a spark suppression diode instead of the RC element.
- The cables to the relay outputs and binary inputs as well as the analog inputs and outputs must be screened. They must be connected to the corresponding trapezoidal plug (D-SUB plug) according to the pin assignment diagrams (Figs. 2-3 and 2-4). The conductor cross-section should be ≥0.5 mm^2. Cables of type JE-LiYCY ... BD are recommended. The cable length of the analog outputs depends on the load.

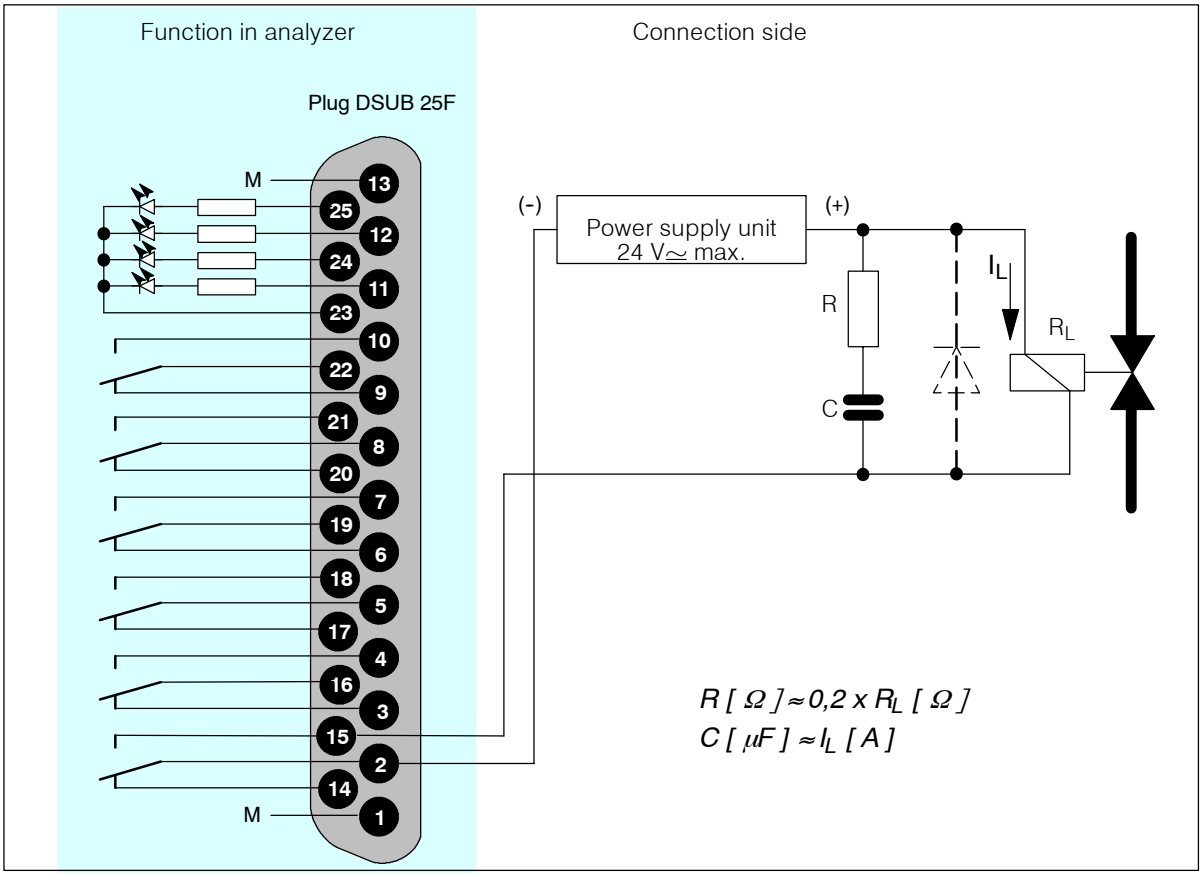


Fig. 2-2 Example of measure to suppress sparks on a relay contact (rack mount analyzer)

- The reference ground of the analog inputs is the housing potential.
- The analog outputs are floating, also with respect to one another.
- The interface cable (RS 485) must be screened and connected to housing potential. The cable screen must be connected with a large-area contact to the screen of the D-SUB plug. The conductor cross-section should be ≥0.5 mm^2. The interface cable must not be longer than 500 m.

2.5.3 Pin Assignments

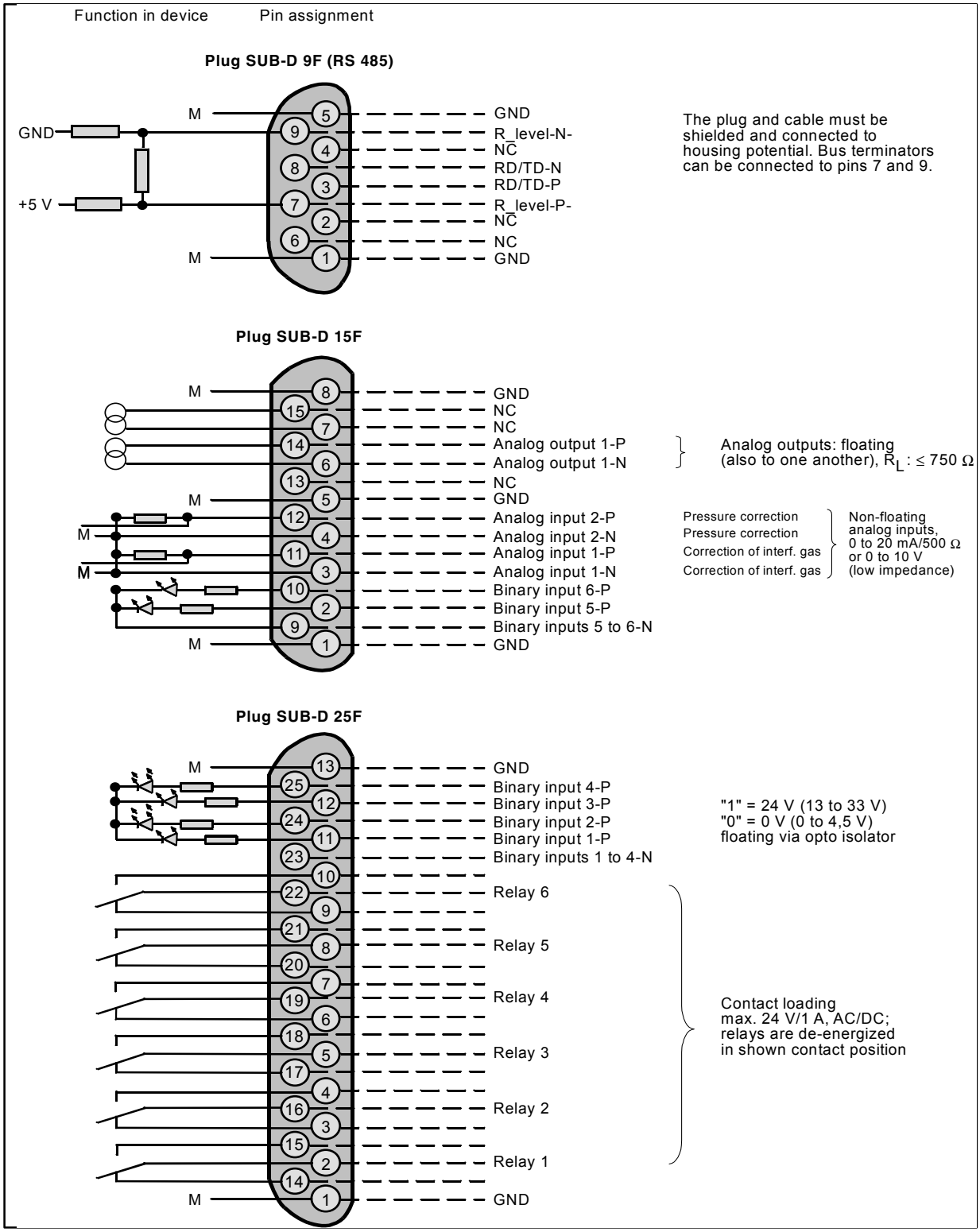


Fig. 2-3 Pin assignments of **OXYMAT 61**

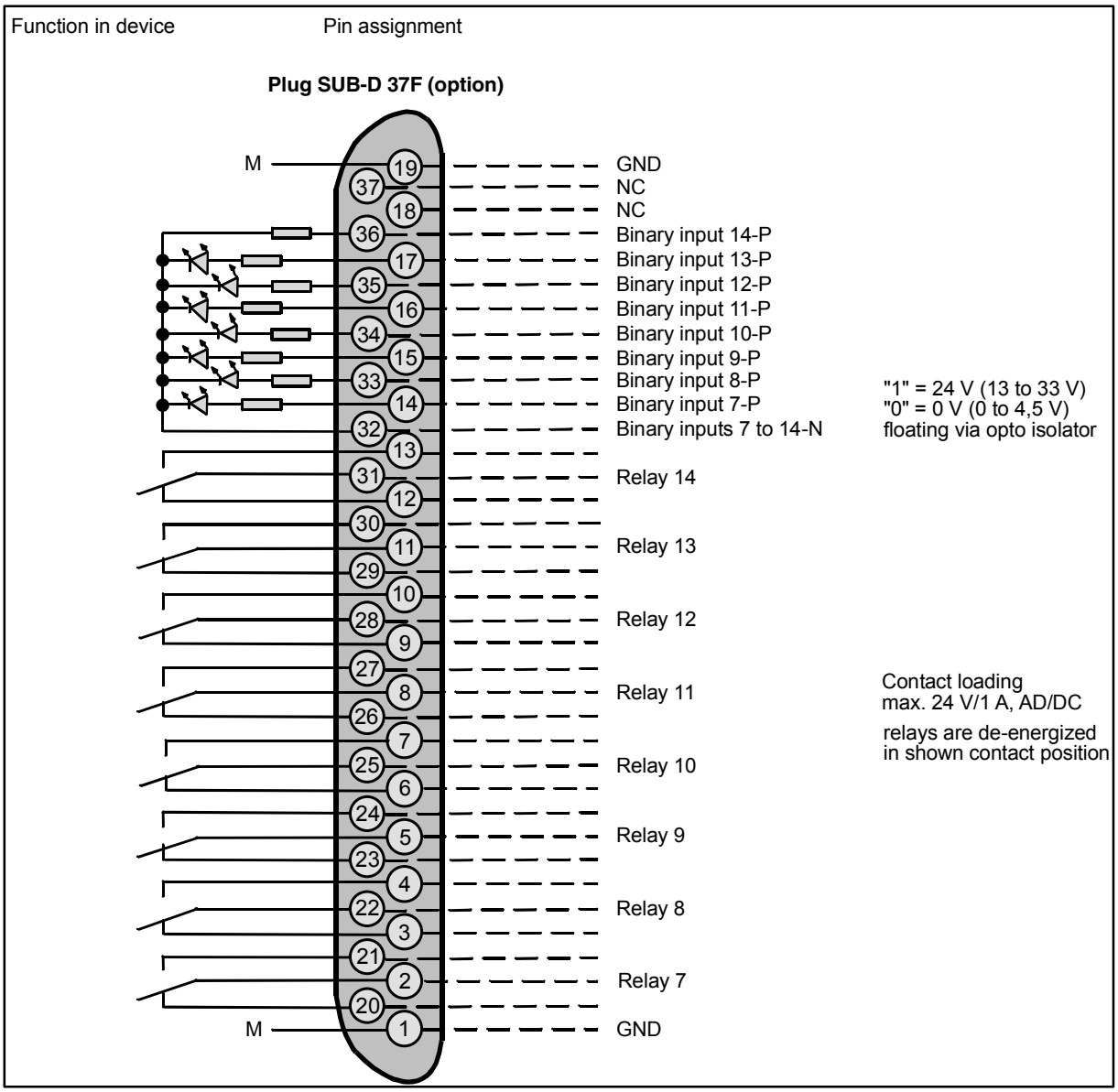


Fig. 2-4 Pin assignments of Autocal module **OXYMAT 61**

Other supplementary electronics (AK interface, Profibus, ...) are described in the supplied documents.

2.5.4 Example of Autocal Circuit

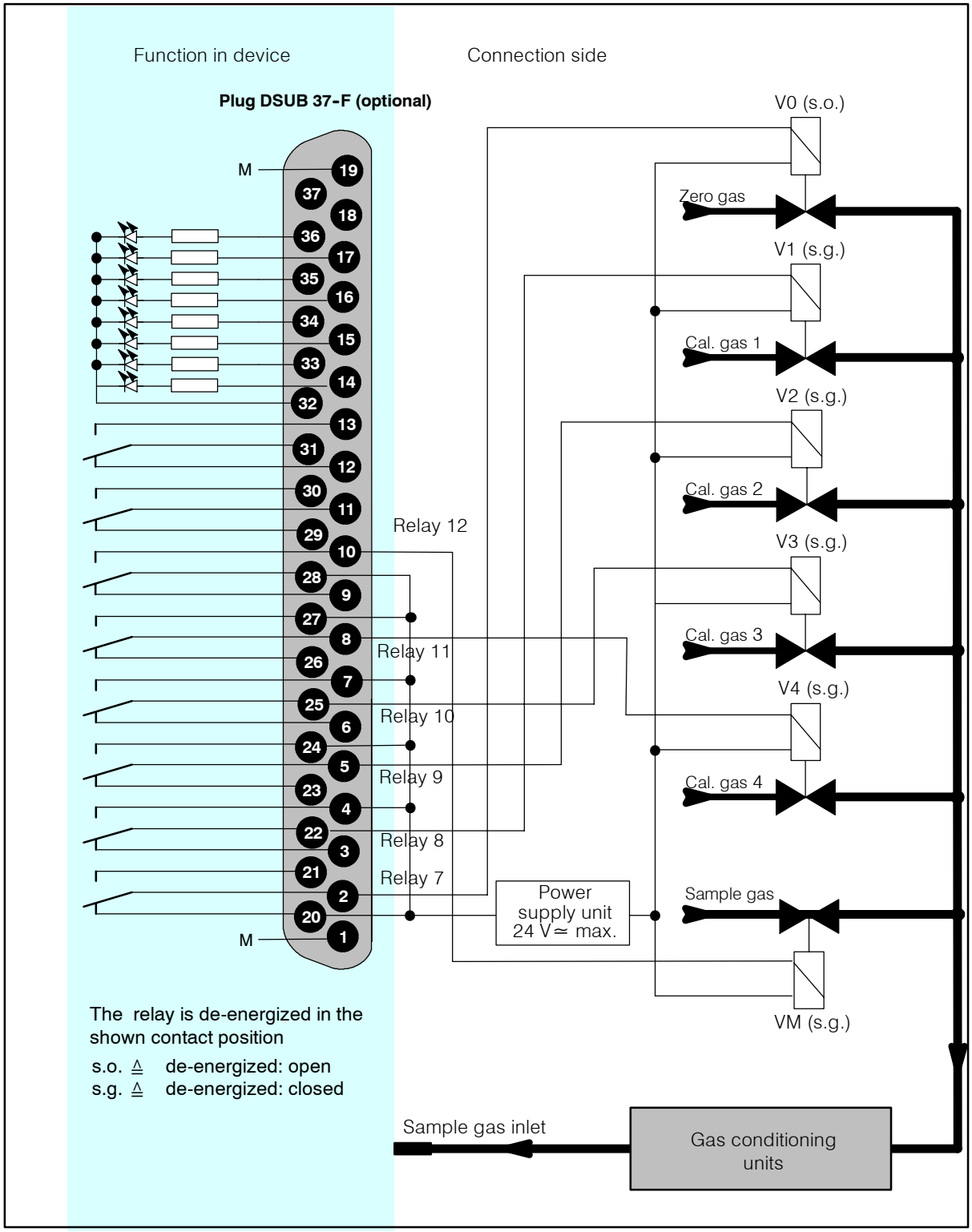


Fig. 2-5 Pin assignments and valve diagram "Autocal"

2.6 Dimensional Drawings

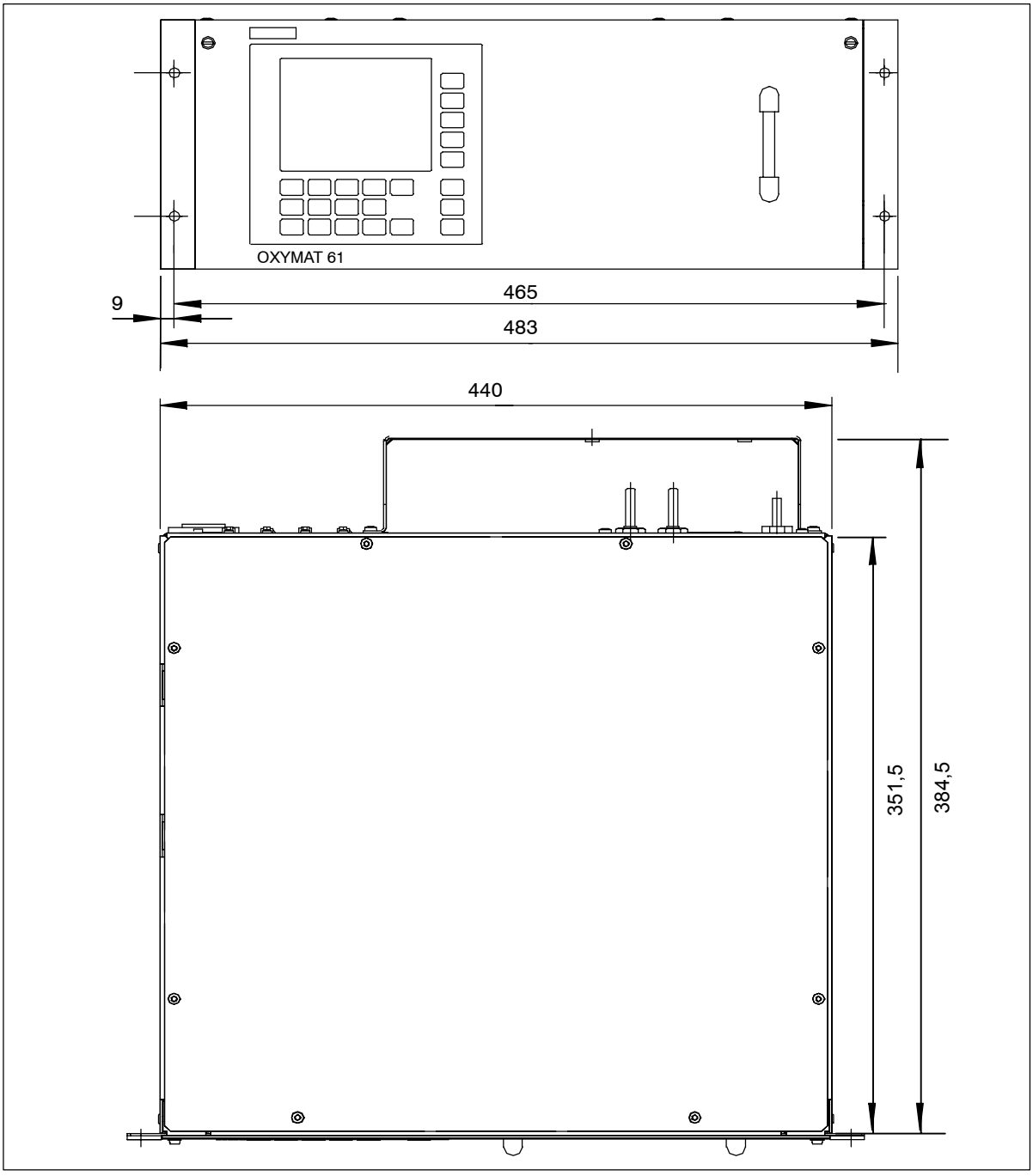


Fig. 2-6 Installation dimensions (front and plan views)

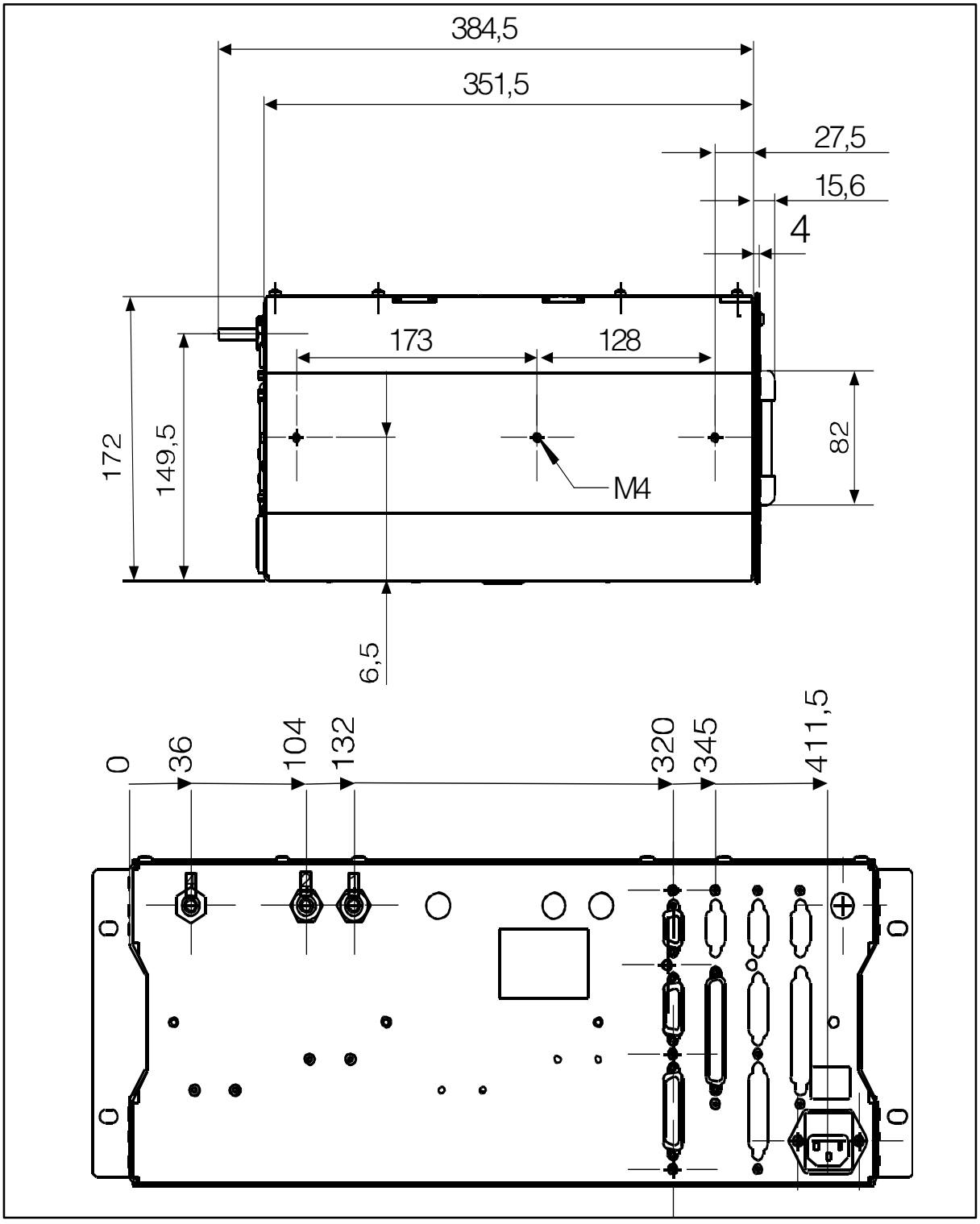


Fig. 2-7 Dimensional drawing for 7MB2001 (**OXYMAT 61**)

Technical Description

3

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3.1 Application

The **OXYMAT 61** gas analyzers operate according to the paramagnetic alternating pressure principle and are used to measure oxygen in gases.

Application examples

Measurement of O_2

- For boiler control in combustion plants
- In safety-relevant areas
- As reference variable for statutory emission measurements
- Automotive industry (test bay systems)
- Packaging industry
- In warning equipment
- In chemical plants
- In ultra-pure gases for quality monitoring

Special characteristics

- Four freely-programmable measuring ranges, also with suppressed zero, all measuring ranges linear
- Electrically isolated signal output 0/2/4 to 20 mA (also inverted)
- Autoranging, remote switching or manual range selection possible
- Storage of measured values possible during calibration
- Time constants selectable within wide limits (static/dynamic noise suppression); i.e. the response time of each component can be matched to the respective application
- einfache Handhabung durch menügesteuerte Bedienung
- Fast response time
- Low long-term drift
- Reference gas supply either externally (N_2, O_2 or air, approx. 3000 hPa) or using built-in reference gas pump (ambient air)
- Two-stage access code to prevent unintentional and unauthorized inputs
- Internal pressure sensor for correction of variations in sample gas pressure in the range from 700 to 1200 hPa (absolute)
- Automatic range calibration can be parameterized
- Operation based on NAMUR recommendations
- Fieldbus connection (option)
- Monitoring of sample gas (option)
- Monitoring of reference gas with reference gas connection 3000 to 4000 hPa
- Different smallest spans, depending on version 2.0 % or 5.0 % O_2
- Customer-specific analyzer options such as:
  - Customer acceptance
  - TAG labels
  - Drift recording
- Simple replacement of analyzer since electrical connections can be simply disconnected from it
- 19” unit with 4 HU, for installation in hinged bays
- 19” unit with 4 HU, for installation in cabinets, with or without telescopic rails
- Front panel can be swung down for servicing (laptop connection)
- Internal gas paths: FKM (Viton) tubing
- Gas connections for sample gas: pipe diameter 6 mm or $^1/_4$”
- Sample chamber made of stainless steel (mat. No. 1.4571)

3.2 Design

Display and control panel

- Large LCD panel for simultaneous display of:
  - Measured value (digital and analog displays)
  - Status line
  - Measuring ranges
- Contrast of LCD panel adjustable using menu
- Permanent LED backlighting
- Five-digit measured-value display (decimal point counts as digit)
- Washable membrane keyboard with five softkeys
- Menu-based operation for configuration, test functions, calibration
- User help in plain text
- Graphic display of concentration trend; programmable time intervals

Inputs and outputs

- Six freely-configurable binary inputs (e.g. range switching, processing of external signals from sample conditioning system)
- Six freely-configurable relay outputs (failure, maintenance request, maintenance switch, limit alarm, external solenoid valves)
- Two configurable analog inputs (e.g. correction of cross-interferences, external pressure sensor)
- Expandable by eight additional binary inputs and eight additional relay outputs for automatic calibration with up to four calibration gases

Communication

- RS 485 present in basic unit (connection at rear)

Options:

- AK interface for the automotive industry with extended functions
- Converter to RS 232
- Incorporation into networks via PROFIBUS DP/PA interface
- Siprom GA software as service and maintenance tool

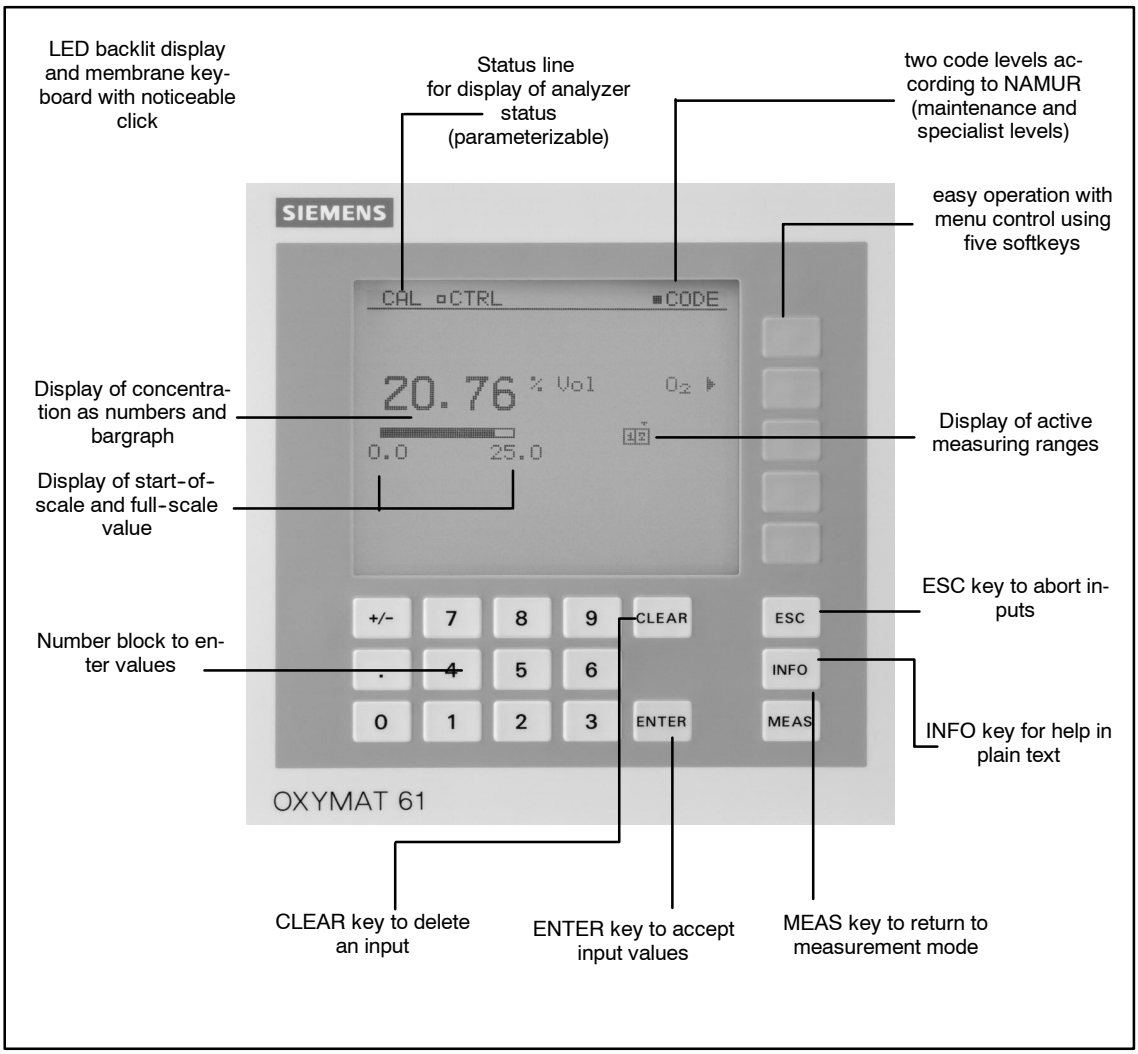
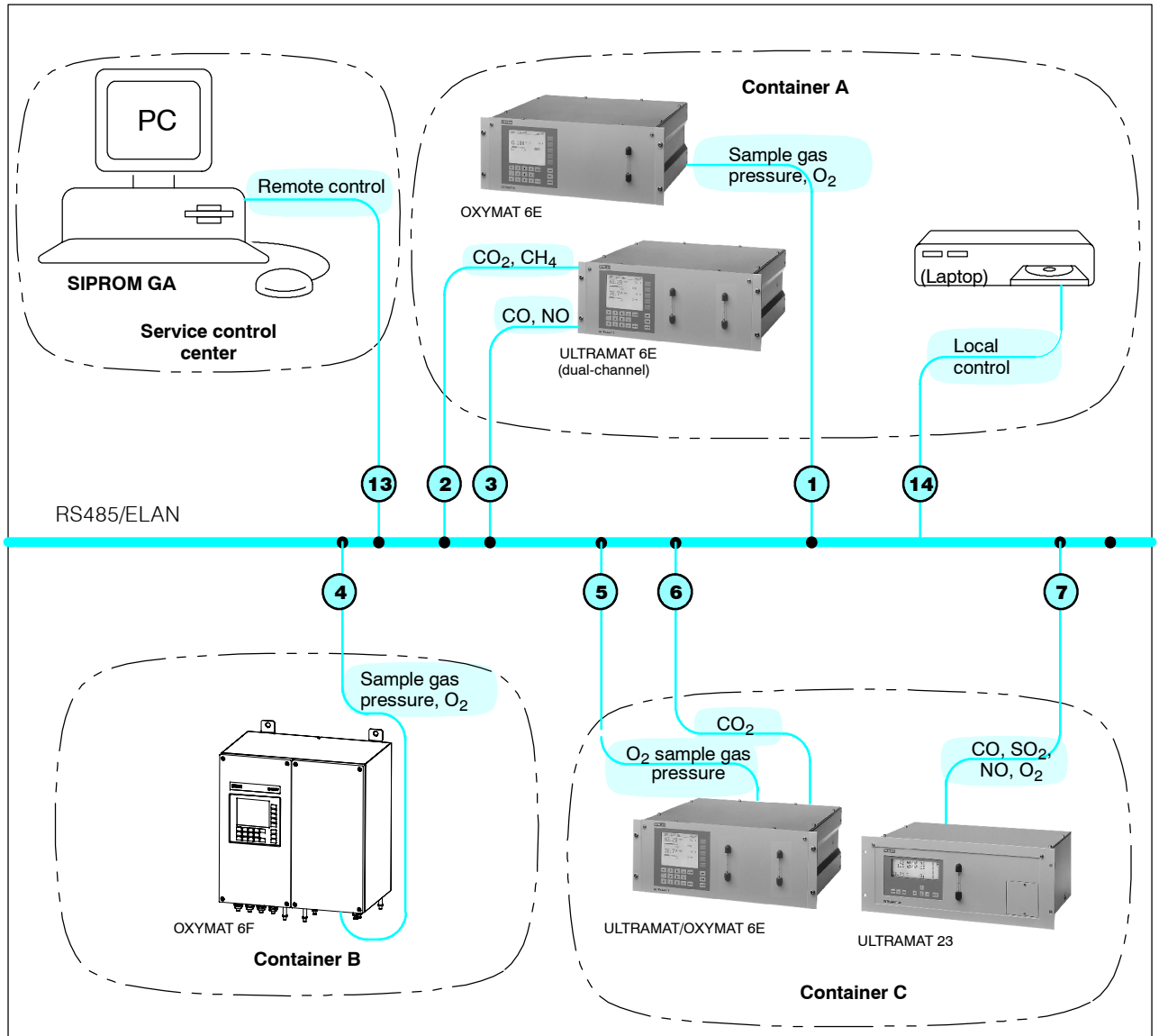


Fig. 3-1 Membrane keyboard and graphic display

3.3 Communications Interface



- **ELAN®**: **E**conomical **L**ocal **A**rea **N**etwork
- Networking of **ULTRAMAT 6**, **OXYMAT 6** and **ULTRAMAT 23** analyzers
- Central service control by coupling to a host computer
- Measured data available in ASCII format for further processing
- Remote operation and downloading of data via PC
- Remote communication via modem
- Up to 12 channel addresses (interfaces) for measured values (concentration, sample gas pressure etc.)
- SIPROM GA
- Profibus
- Technology: RS 485 / 9600 baud / data refresh 0.5 s / distance up to 500 m
- 1 ..... 12 = channel addresses
  13 and 14 = control addresses for PC etc.

Fig. 3-2 Various analyzers networked via RS 485

3.4 Mode of Operation

In contrast to almost all other gases, oxygen is paramagnetic. This property is utilized as the measuring principle by the OXYMAT channel.

Oxygen molecules in an inhomogeneous magnetic field are drawn in the direction of increased field strength due to their paramagnetism. When two gases with different oxygen concentrations meet in a magnetic field, a pressure difference is produced between them.

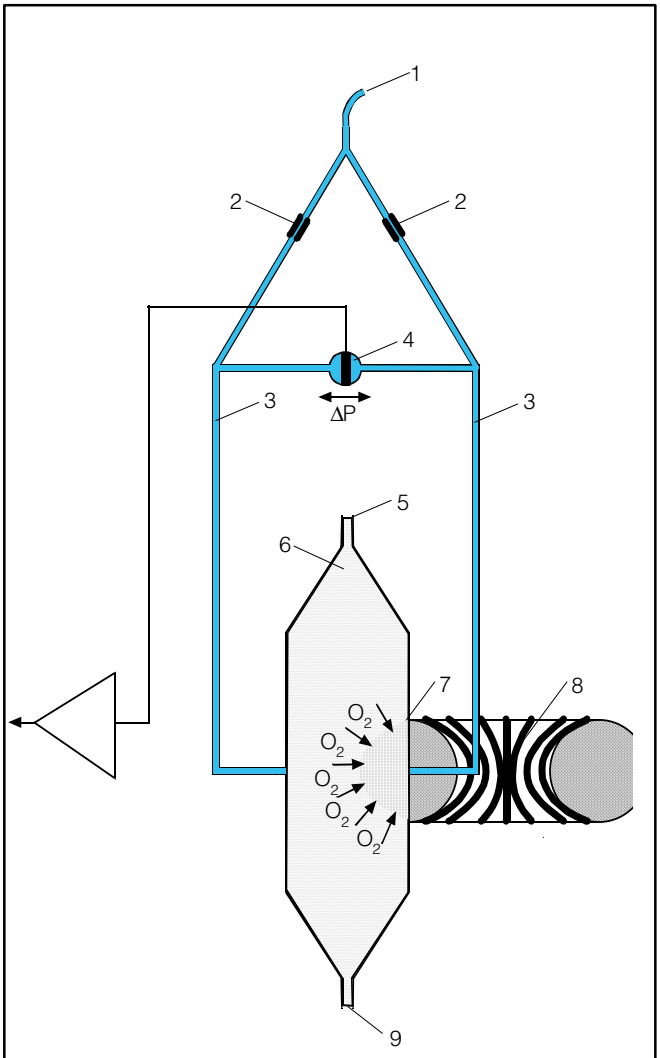
For the OXYMAT channel, one of the gases (1, Fig. 3-3) is a reference gas (N_2, O_2 or air), the other is the sample gas (5, Fig. 3-3). The reference gas is introduced into the sample chamber (6) through two channels (3). One of these reference gas streams meets the sample gas within the area of a magnetic field (7). Because the two channels are connected, the pressure, which is proportional to the oxygen concentration, causes a flow. This flow is converted into an electric signal by a microflow sensor (4).

The microflow sensor consists of two nickel grids heated to approx. 120 ºC which form a Wheatstone bridge together with two supplementary resistors. The pulsating flow results in a change in the resistance of the Ni grids. This results in a bridge offset which depends on the oxygen concentration in the sample gas.

Because the flow sensor is located in the reference gas stream, the measurement is not influenced by the thermal conductivity, the specific heat or the internal friction of the sample gas. This also provides a high degree of corrosion resistance because the flow sensor is not exposed to the direct influence of the sample gas.

By using a magnetic field with alternating strength (8), the effect of the background flow in the microflow sensor is not detected, and the measurement is thus independent of the instrument orientation.

The sample chamber is directly in the sample path and has a small volume. There is therefore a very short response time for the OXYMAT 61.



1 Reference gas input
2 Restrictors
3 Reference gas channels
4 Microflow sensor for measurement signal
5 Sample gas input
6 Sample chamber
7 Paramagnetic measuring effect
8 Electromagnet with alternating flux density
9 Sample gas and reference gas outputs

Fig. 3-3 Mode of operation

3.5 Technical Data

General technical data	
Measuring ranges	4, switchable internally and externally; autoranging is also possible
Smallest possible span [3]	2% v/v or 5% v/v O_2
Largest possible span	100 % v/v O_2
Measuring ranges with suppressed zero	Any zero point is possible between 0 and 100% v/v as long as a suitable calibration gas is used (see also Table 3.1)
Electromagnetic compatibility	Conforms to standard requirements of NAMUR NE21 (05/93) EN 50081-1, EN 50082-1
Degree of protection	IP 20 to EN 60529
Electrical safety	According to EN 61010-1 Category of overload III
Position of use	Front panel vertical
Dimensions	See Figs. 2-6 and 2-7
Weight	Approx. 13 kg

Power supply	
Power connection (see rating plate)	AC 100 to 120 V (rated range: 90 to 132 V), 48 to 63 Hz or AC 200 to 240 V (rated range: 180 to 264 V), 48 to 63 Hz
Power consumption	approx. 37 VA
Fuse ratings	100 ... 120 V 1T/250 200 ... 240 V 0.63T/250

Gas inlet conditions	
Permitted sample gas pressure	700 to 1200 hPa (external reference gas supply) atm. pressure range (with built-in pump)
Sample gas flow	18 to 60 l/h (0.3 to 1 l/min)
Sample gas temperature	0 to 50 °C
Sample gas humidity	< 90% RH [1]

Time response	
Warm-up time	< 30 min [2] at room temperature
Response time (T_{90} time)	3.5 s
Damping (electric time constant)	0 to 100 s parameterizable
Dead time (purging time of gas path in analyzer at 1 l/min)	Approx. 0.5 to 2.5 s depending on version
Time for internal signal processing	< 1 s

Pressure correction range	
Pressure sensor (internal or external)	700 to 1200 hPa absolute

Measuring response [3]	
Output signal variation	< ± 0.75 % of smallest possible measuring range according to rating plate with electronic damping constant of 1 s (this corresponds to ± 0.25 % at 2σ)
Zero drift	< 0.5% / month of smallest possible span acc. to rating plate
Measured-value drift	< 0.5% / month of respective span
Repeatability	< 1% of respective span
Linearity deviation	< 1% of respective span

Influencing variables [3]	
Ambient temperature	< 0.5% / 10 K, referred to the smallest possible span according to rating plate
Sample gas pressure	With pressure compensation switched off: 2% of span with 1% change in pressure With pressure compensation switched on: < 0.2% of span with 1% change in pressure
Residual gases	Deviation in zero point corresponding to paramagnetic/diamagnetic deviation of residual gas (see Table 3.2)
Sample gas flow	< 1% of smallest possible span according to rating plate with a change in flow of 0.1 l/min within the permissible flow range
Power supply	< 0.1% of output signal span with rated voltage ±10%

Electric inputs and outputs	
Analog output	0 / 2 / 4 to 20 mA. floating, max. load 750 Ω
Relay outputs	6, with changeover contacts, freely-parameterizable e.g. for range identification; loading capacity: AC/DC 24 V / 1 A floating
Analog inputs	2, designed for 0 / 2 / 4 to 20 mA, for external pressure sensor and correction of influence of residual gas (correction of cross-interference)
Binary inputs	6, designed for 24 V, floating, freely selectable e.g. for range switching
Serial interface	RS 485
Options	Supplementary electronics with 8 additional binary inputs and 8 additional relay outputs, e.g. for triggering automatic calibration; supplementary electronics for PROFIBUS PA and PROFIBUS DP

Climatic conditions	
Permissible ambient temperature	-30 to +70 °C during storage and transport +5 to +45 °C during operation
Permissible humidity	< 90% RH [1] as annual average for storage and transport [4]

[1] RH: relative humidity
[2] Maximum accuracy achieved after 2 hours
[3] Referred to 1 bar sample gas pressure, 0.5 l/min sample gas flow and 25 °C ambient temperature
[4] Dew point must not be fallen below
*) Based on DIN EN 61207/IEC 1207

3.6 Reference Gases, Zero Error

Measuring range	Recommended reference gas	Reference gas pressure	Remarks
0 to . . . % v/v O_2	N_2, 4.6	3000 to 4000 hPa absolute	The reference gas flow is set automatically to 5 to 10 ml/min (up to 20 ml/min when also flowing through compensation branch)
. . . to 100% v/v O_2 (suppressed zero with full-scale value 100% v/v O_2)	O_2		
Around 21% O_2 (suppressed zero with 21% v/v O_2 within the span)	Air	Atmospheric pressure with internal reference gas pump	

Table 3.1: Reference gases for OXYMAT channel

Residual gas (concentration 100 % v/v)		Zero deviation in % v/v O_2 absolute
Organic gases		
Acetic acid	CH_3COOH	-0.64
Acetylene	C_2H_2	-0.29
1,2 Butadiene	C_4H_6	-0.65
1,3 Butadiene	C_4H_6	-0.49
iso-Butane	C_4H_{10}	-1.30
n-Butane	C_4H_{10}	-1.26
1-Butene	C_4H_8	-0.96
iso-Butene	C_4H_8	-1.06
cyclo-Hexane	C_6H_{12}	-1.84
Ethene	C_2H_6	-0.49
Ethylene	C_2H_4	-0.22
Dichlorodifluoromethane (R12)	CCl_2F_2	-1.32
n-Heptane	C_7H_{16}	-2.4
n-Hexane	C_6H_{14}	-2.02
Methane	CH_4	-0.18
Methanol	CH_3OH	-0.31
n-Octane	C_8H_{18}	-2.78
n-Pentane	C_5H_{12}	-1.68
iso-Pentane	C_5H_{12}	-1.49
Propane	C_3H_8	-0.87
Propylene	C_3H_6	-0.64
Trichlorofluoromethane (R11)	CCl_3F	-1.63
Vinyl chloride	C_2H_3Cl	-0.77
Vinyl fluoride	C_2H_3F	-0.55
1,1 Vinylidene chloride	$C_2H_2Cl_2$	-1.22

Residual gas (concentration 100 % v/v)		Zero deviation in % v/v O_2 absolute
Noble gases		
Argon	Ar	-0.25
Helium	He	+0.33
Krypton	Kr	-0.55
Neon	Ne	+0.17
Xenon	Xe	-1.05
Inorganic gases		
Ammonia	NH_3	-0.20
Carbon dioxide	CO_2	-0.30
Carbon monoxide	CO	+0.07
Chlorine	Cl_2	-0.94
Dinitrogen monoxide	N_2O	-0.23
Hydrogen	H_2	+0.26
Hydrogen bromide	HBr	-0.76
Hydrogen chloride	HCl	-0.35
Hydrogen fluoride	HF	+0.10
Hydrogen iodide	HI	-1.19
Hydrogen sulphide	H_2S	-0.44
Oxygen	O_2	+100
Nitrogen	N_2	0.00
Nitrogen dioxide	NO_2	+20.00
Nitrogen oxide	NO	+42.94
Sulphur dioxide	SO_2	-0.20
Sulphur hexafluoride	SF_6	-1.05
Water	H_2O	-0.03

Table 3.2 Zero error due to diamagnetism and paramagnetism of residual gases with nitrogen as the reference gas at 60 °C and 1000 hPa absolute (according to IEC 1207/3)

Conversion to other temperatures:

The zero deviations listed in Table 3.2 must be multiplied by the correction factor (k):

- For diamagnetic gases: $k = 333\ K / \theta\ [°C] + 273\ K)$
- For paramagnetic gases $k = [333\ K / \theta\ (\ [°C) + 273\ K)]^2$

  (diamagnetic gases are all those with a negative zero deviation)

3.7 Materials in the Sample Gas Path

Standard		
Gas path		**19" rack unit**
Gas path with hose	Bushing Hose Sample chamber Sample chamber pipe socket Restrictor O-rings Hose connector	1.4571 titanium FKM (Viton) 1.4571 1.4571 PTFE (Teflon) FKM (Viton) Polyamide 6

Options		
Flowmeter	Metering pipe Float Float limit Elbows	Duran glass Duran glass PTFE (Teflon) FKM (Viton)
Sample gas pressure switch	Diaphragm Housing	FKM (Viton) PA 6.3 T

Start-up

4

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4.2 Preparation for Start-up 4–2
4.2.1 General Information 4–2
4.2.2 Special Preparations for Startup 4–2
4.3 Start-up and Operation 4–5

4.1 Safety Information



Caution

Certain parts in this analyzer carry dangerous voltages. The housing must be closed and grounded before switching on the analyzer. Death, personal injury and/or damage to property may result if this is not observed. Also refer to Section 2.5.

A standard analyzer must not be used in potentially explosive atmospheres. Use with gases with flammable components at concentrations above the lower explosion limit (LEL) must be clarified with the responsible Ex authorities, and is finally the responsibility of the owner.

When measuring toxic or corrosive gases, it may occur that sample gas collects in the analyzer as a result of leaks in the gas path. To prevent the danger of poisoning, or also of damage to parts of the device, the analyzer or the system must be purged with inert gas (e.g. nitrogen). The gas displaced by purging must be collected using suitable equipment and routed for environmentally-friendly disposal via an exhaust line.

4.2 Preparation for Start-up

4.2.1 General Information

Gas conditioning

Gas sampling devices, gas cooler, condensation vessel, filters and any controllers, recorders or indicators (if connected) should be made ready for operation (refer to respective Instruction Manuals).



Caution

Please observe the notes in Section 2.5 ”Electric Connection”!

Operation

Before connecting and switching on the analyzer, make yourself acquainted with operation (Chapter 5 of this Manual).

Interfaces

Prior to start-up, connect and parameterize the interfaces.

4.2.2 Special Preparations for Startup

Selection of reference gas

It should always be ensured that the various spans have at least one common point. This point is then defined as the ”physical zero” and applies to all measuring ranges. The reference gas can be selected once this point has been found.

The following example clarifies this:

Assume there are four measuring ranges:

17 – 22 %O_2
15 – 25 %O_2
0 – 25 %O_2
0 –100 %O_2

The range 17–22 % O_2 is common to all these measuring ranges. The physical zero must be present in this range. Air (20.95% O_2) is suitable as the reference gas in this case.

An exception can be made if the smallest measuring range is $\geq$ 5 % O_2 and the difference from the reference gas is not more than 20 % O_2. In this case the physical zero can also be outside the measuring range. The pressure correction (see *function 82* in Chapter 5) must be activated in this case since a pressure dependence exists as a result of the large zero offset.

The purity of the reference gas must be appropriate to the task.

Assembly of reference gas connection

The reference gas connection has a different design depending on the order:

- Air (low-pressure version)
  The reference gas (air) is sucked in by the internal pump. When fitting within a cabinet, ensure that the sucked air comes from outside the cabinet.
- Nitrogen, oxygen, air (high-pressure version)
  Check that the gas purity is appropriate (4.6)!
  The supply is from a cylinder with a pressure setting of 3000 to 4000 hPa above the sample gas pressure

  A sintered metal filter (porous filter) has been pressed into the coupling to prevent the entry of dirt into the gas path.

Application of reference gas

The reference gas must always be flowing for a certain time before measuring is started. The reference gas should continue to flow even if there is a temporary interruption in measuring. The resulting additional consumption is insignificant if there are no leaks in the reference gas line.

Compressed gas cylinder

If the reference gas is supplied from a cylinder, the reference gas line should be purged prior to start-up. Then check the line for leaks, since these are often greater than the actual consumption of reference gas. To do this, shut off the valve on the cylinder. The gas connection is sufficiently leak-proof if the pressure gauge on the reduction valve of the cylinder does not drop by more than 1000 hPa/min (15 psi/min). The reference gas pressure must always be more than 2000 hPa (30 psi) above the sample gas pressure.

Checking the reference gas pressure

Check the flow of the reference gas:
If the option ”Reference gas pressure switch” is present, note that the switching point of the pressure switch is factory-set to 2000 hPa (30 psi) above atmospheric pressure.

Checking the flow of reference gas

Check the flow as follows:

- Close sample gas inlet coupling.
- Connect a hose with an ID of 4 mm to the sample gas outlet coupling and dip into a beaker filled with water. The reference gas must escape slowly from the hose (1...2 bubbles/sec., or 2...4 bubbles/sec. with a flow-type compensation circuit).

Checking for leaks Hosed analyzers

Check for leaks in the sample gas path as follows:

- Block off the reference gas connection.
- Apply approx. 100 hPa (1.5 psi) to the sample gas path and close off pressure source.
- Wait for approx. 1 min. During this time, the inflowing sample gas has assumed the temperature of its environment.
- Note the pressure (can be read using *function 2*).
- Wait 15 minutes, and note the pressure again. The sample gas path is sufficiently leak-proof if the pressure has changed by a maximum of 1 hPa (1 mbar) within the 15 minutes.

4.3 Start-up and Operation

Switching on the power supply

The measured-value display appears after a short delay in the LCD. The status display appears above this in the top line (see Section 5.1 for more details).

The measuring head is in the warming-up phase for the first five minutes. The message **CTRL** (function check) is displayed during this time.

Spans

Define the desired spans (full-scale value – start-of-scale value) using *function 41*. The 0(2/4) and 20 mA of the analog output are assigned to the start-of-scale and full-scale values respectively.

In the case of several measuring ranges it is recommendable to assign the smallest span to range 1 etc. The following then applies: span1<span2<span3<span4.

Setting the physical zero

If the composition of the calibration and reference gases is the same, i.e. their O_2 difference is zero, a signal is not present. This is referred to as the physical zero. Depending on the reference gas, the physical zero can thus have a value of 0 to 100 % O_2. The setpoint of the physical value is entered using *function 22*.

Setpoint for sensitivity adjustment

The setpoints should be as far as possible away from the physical zero (at least 60 % of the respective span). The corresponding calibration gases should be available, and the setpoint is entered using *function 22*.

Single/total calibration

Set a total or single calibration using *function 23* or *52*.

A **single calibration** means that each range is calibrated with its own calibration gas.

With a **total calibration**, only the master range is calibrated (selected using *function 22*), the other ranges are determined according to the switching ratio.

Make sure that the gas flow is between 0.3 and 1 l/min.

Calibrating the zero

The physical zero is calibrated using *function 20*. It applies to all parameterized measuring ranges.

Calibrating the sensitivity

The sensitivity is calibrated in a similar manner using *function 21*.

Calibration examples

a) O_2 monitoring in gases
Oxygen is to be measured in N_2.
Measuring range: 0–0.5 % O_2;
reference gas N_2;
calibration gas: 0.43% O_2

Procedure	Function No.	Input	Remarks
Selection of start-of-scale and full-scale values of range	41	0 - 0.5	0 ⇒ 0(2/4)mA 0.5 ⇒ 20 mA
Input of setpoints for physical zero and sensitivity	22	0	Setpoint for physical zero
		0.43	Setpoint for sensitivity
Calibration of zero	20		Flow of N_2
Calibration of sensitivity	21		Flow of calibration gas

b) Room air monitoring
Measuring range 15 to 21% O_2;
reference gas: air (20.95% O_2);
calibration gas: 15.3% O_2

Procedure	Function No.	Input	Remarks
Selection of start-of-scale and full-scale values of range	41	15 - 21	15 ⇒ 0(2/4)mA 21 ⇒ 20 mA
Input of setpoints for physical zero and sensitivity	22	20.95	Setpoint for physical zero
		15.3	Setpoint for sensitivity
Calibration of zero	20		Flow of air
Calibration of sensitivity	21		Flow of calibration gas

c) O_2 measurement in flue gas
Measuring range: 0 –10% O_2 ;
reference gas: air;
calibration gas: N_2

Note:

The O_2 concentration of the reference gas is not in the measuring range 0 –10% O_2. However, since the span is > 5% it is permissible to violate this selection criterion of the reference gas. Please ensure that the pressure correction (see *function 82* in Chapter 5) is activated!

Procedure	Function No.	Input	Remarks
Selection of start-of-scale and full-scale values of range	41	0 -10	0 ⇒ 0(2/4)mA 10 ⇒ 20 mA
Input of setpoints for physical zero and sensitivity	22	20.95	Setpoint for physical zero
		0	Setpoint for sensitivity
Calibration of zero	20		Flow of air
Calibration of sensitivity	21		Flow of N_2

d) Monitoring of oxygen purity
Measuring range 95 – 100 % O_2;
reference gas: O_2;
calibration gas: 95.6 % O_2

Procedure	Function No.	Input	Remarks
Selection of start-of-scale and full-scale values of range	41	95 - 100	95 ⇒ 0(2/4)mA 100 ⇒ 20 mA
Input of setpoints for physical zero and sensitivity	22	100	Setpoint for physical zero
		95.6	Setpoint for sensitivity
Calibration of zero	20		Flow of pure O_2 (100 %)
Calibration of sensitivity	21		Flow of calibration gas

Please refer to Chapter 5 (Operation) for exact instructions concerning operation of the above-mentioned functions.

Compensation of temperature influence

Compensation of the influence of temperature is a fixed component in the software (firmware) of the **OXYMAT 61**.

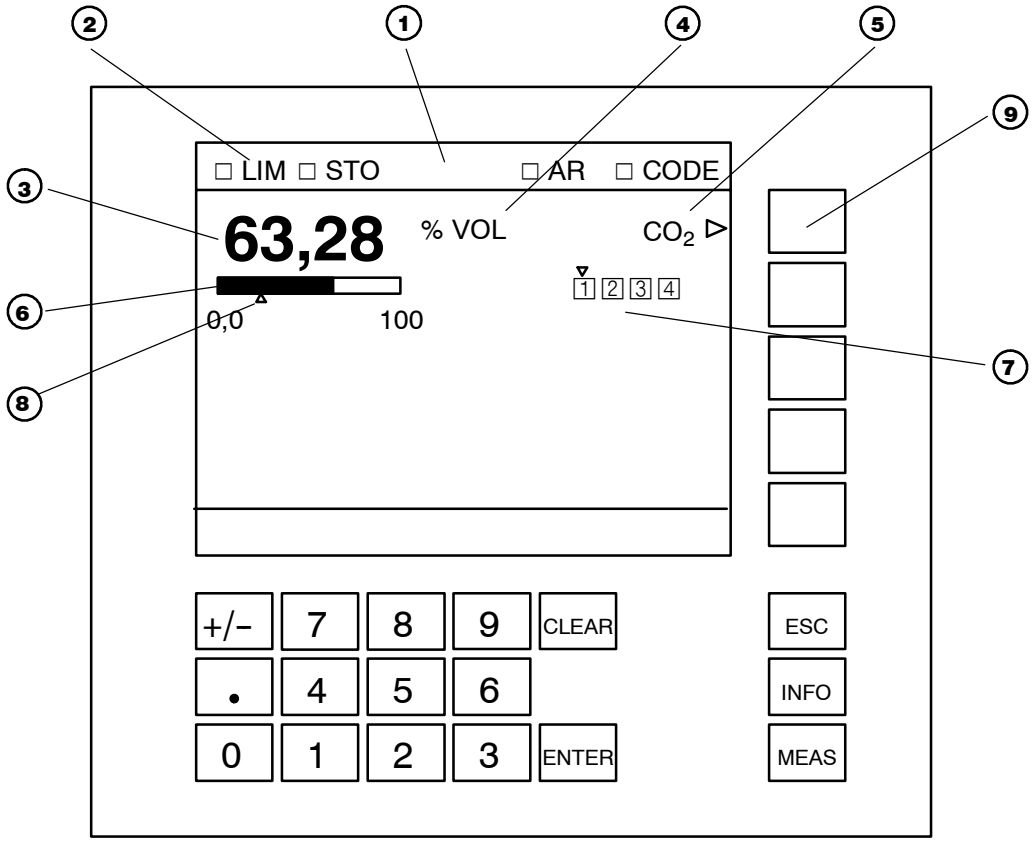
Noise suppression

Noise on the input signal can be suppressed using *function 50*. This function permits the setting of a lowpass filter which can be assigned a time constant up to 100 s.

Operation 5

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5.1 General



1. Status line (parameterizable using *function 53*)
2. Status display
   (e.g. ☐ LIM means: limit (alarm) signalling is active;
   ■ LIM means: limit (alarm) has been triggered)
3. Measured value
4. Display of dimension
5. Display of measured component
6. Analog measured-value display
   (display of measured value with start-of-scale and full-scale values of current range)
7. Display of activated measuring ranges with identification of current range
8. Limit mark on bargraph
9. Function keys with varying meaning (softkeys)

Fig. 5-1 Display and control panel

Switches/keys and their meanings

Key	Meaning
CLEAR	Deletes a commenced number input
ENTER	Every digit input (except fast selection of a function) must be confirmed using **ENTER**
ESC	Return by one step in the input structure. Modifications are imported
INFO	Help information
MEAS	Return from any position in the input structure to display mode (possibly with request whether to import the entered data). **Pressing the MEAS key again results in locking of analyzer**; i.e. changing to input mode again is only possible following input of the code.
Softkey	Varying meaning; possible in this case: • Selection of item in menu tree • Selection function • Switch function ON/OFF

Editing of inputs

The values in the menus shown in Chapter 5 should be understood as examples.

- An active input field is represented with colons (:10:) as limiters. The cursor is positioned as a flashing line underneath the number to be entered (e.g. :23.45:).
- The input is terminated by pressing the **ENTER** key, and the value stored. If several input fields are present in a menu, the cursor is automatically positioned to the next input field.



Caution
Each input value must be confirmed with **ENTER** before you leave the menu. Also the last of several values in a menu.

- The **CLEAR** key can be used to delete an input. The cursor then returns to the first position of the input field.

Graphic styling elements

■ Switching function (ON status)
□ Switching function (OFF status, also status display in the status line)

▶ Entry into a subsequent menu

● Triggering of a function (e.g. start calibration, ...)

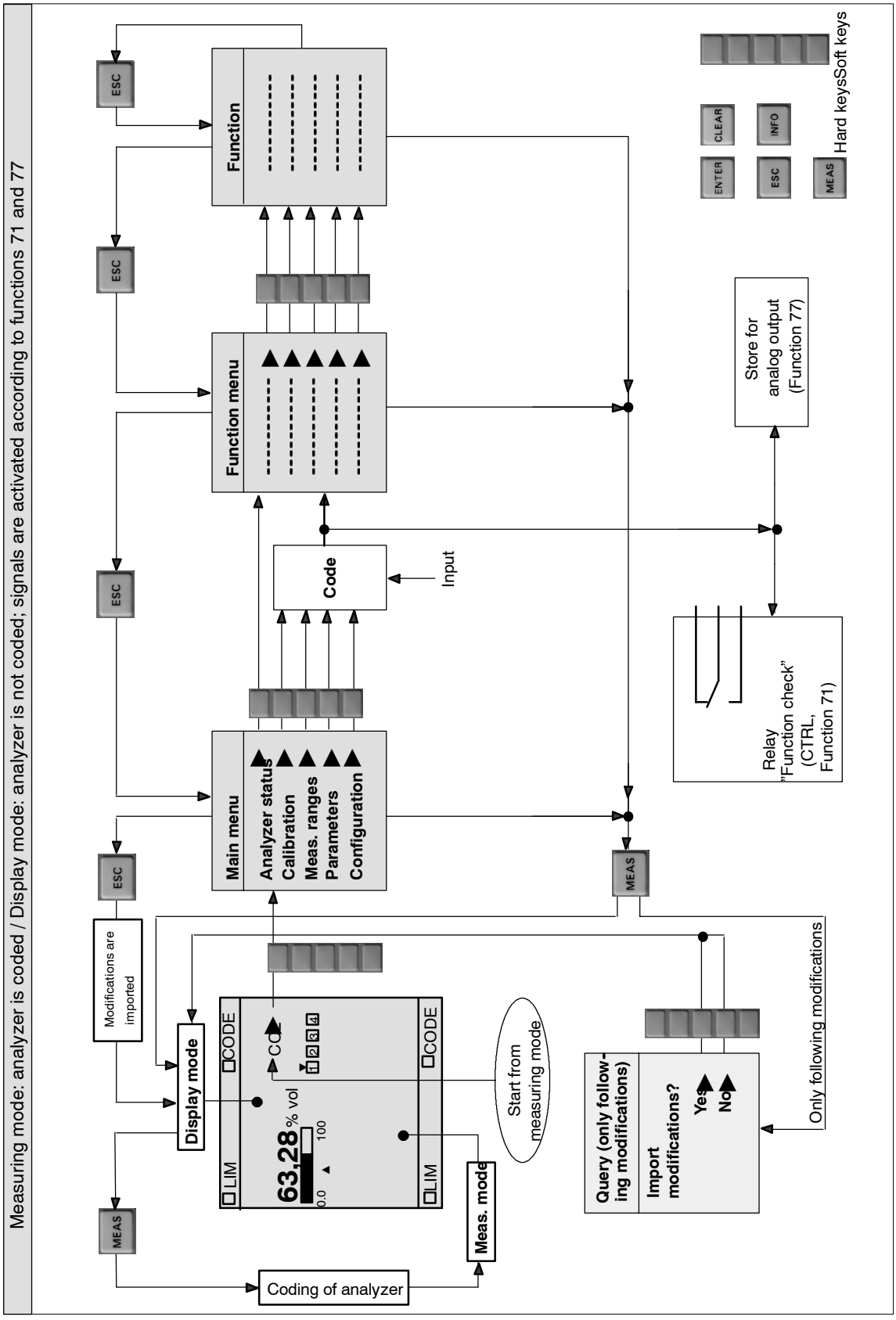
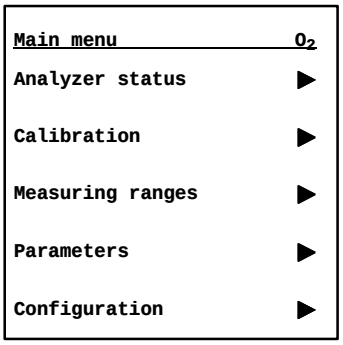


Fig. 5-2 Input sequence

Input sequence

Entry into main menu

The analyzer is in **measuring mode**. The measured component is shown on the right of the display, together with an arrow pointing to the right (▶). A softkey is assigned to this component. The main menu is called by pressing this softkey.



The main menu consists of the following items (followed by the associated code level):

Analyzer status	Not coded
Calibration	Code of level 1
Measuring ranges	Code of level 1
Parameters	Code of level 1
Configuration	Code of level 2

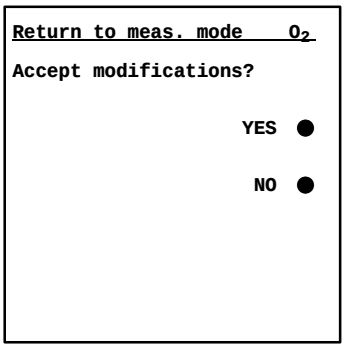
The code for level 1 is factory-set to the value ”111”, that for level 2 to the value ”222”.

Entering a submenu

Following the selection of a submenu, you will be asked to enter the code of the input level (exception: submenu ”Analyzer status” is not coded and is thus freely-accessible). Decoding of level 2 also decodes level 1. External signalling via a relay contact is possible when decoding if a corresponding relay has been configured with **CTRL** under *function 71*. The warming-up and calibration phases of the analyzer or the channel are then also signalled via this relay contact. The measured-value memory becomes active together with the decoding if it has been switched on under *function 77*. The coding of a channel can be recognized by the symbol ■ CODE in the display (**display mode**), and decoding by the symbol □ CODE.

Return to measuring mode

MEAS key: Returns immediately to display mode from any position in the menu structure. A commenced input is aborted.



The adjacent question is displayed before the return is carried out.

Pressing either the YES or NO softkey returns to **display mode**. The modifications are finally imported into the working area of the parameter memory if you press YES, or rejected with NO.

Pressing the **ESC** key returns to the last function display.

ESC key: Leads back step-by-step to display mode. Modifications are imported without questioning.

Coding of analyzer

After returning to **display mode** using **ESC** or **MEAS**, the analyzer can be coded again (□ CODE) by pressing the **MEAS** key again, thus entering **measuring mode**. All statuses produced by the decoding (see above) are cancelled by this.

Fast selection of functions

A ”Power user” input has been introduced to permit immediate switching from the measuring display to the desired function display if frequent inputs are necessary. It is then possible to directly access the desired function by bypassing the menu levels. The ”Power user” input can only be started from **measuring mode** and comprises the following input steps:

- Enter number of desired function in measuring display using the digit keys.
- Press the softkey next to the desired component.
- You will then be requested to enter the code if the desired function is protected by a code.

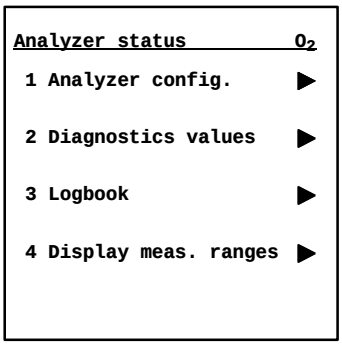
5.2 Summary of Input Functions

The following list summarizes the analyzer functions. This list corresponds to software release version 4.

Main menu item (section)	Function number	Function designation
5.2.1 Analyzer status	1	Analyzer configuration
	2	Diagnostics values
	3	Logbook
	4	Display measuring ranges
5.2.2 Calibration (code 1)	20	Zero calibration
	21	Span calibration
	22	Setpoints for zero/span
	23	Total/single range calibration
	24	Autocal
5.2.3 Measuring ranges (code 1)	40	Select ranges
	41	Define ranges
5.2.4 Parameters (code 1)	50	Electric time constants
	51	Limits
	52	On/off configurations
	53	Status messages
	54	Graphic signal display
	55	Select display digits
	56	LCD contrast
	57	Magnetic field frequency
	58	Date/time
	59	Sample point selection
	60	Setup logbook
	61	Shock compensation (not active)
5.2.5 Configuration (code 2)	70	Analog output
	71	Relay outputs
	72	Binary inputs
	73	ELAN configuration
	74	Reset
	75	Save data, load data
	76	Suppress noise signals
	77	Store analog output
	78	Calibration tolerances
	79	Codes for input levels
	80	Analyzer test
	81	Select language
	82	Pressure correction
	83	Interference correction
	84	Phase adjust
	85	Switch valves
	86	Linear temperature compensation
	87	Error On/Off
	88	AK configuration
	89	Sample chamber heater (not with **OXYMAT 61**)
	90	PROFIBUS configuration

Table 5-1 Summary of input functions

5.2.1 Analyzer Status



The adjacent display appears following selection of the diagnostics functions in the main menu by pressing the first softkey (”Analyzer status”).

The diagnostics functions are freely-accessible. You will not be asked to enter a code.

1 Analyzer configuration

Important manufacturing data of the analyzer are visible when you select this function:

- Firmware No.
  Order No. of software stored in the EPROM
- Order No.
  Information on ordering data of analyzer
- Serial No.
  Information on date of manufacture and consecutive number of analyzer
- Hardware version
  Information on hardware design of analyzer
- Software version and date
  Information on scope of analyzer functions

2 Diagnostics values

The most important internal values are listed under *function 2*. They may be of interest for assessing faults or adjustment operations.

3 Logbook

All faults which led to a maintenance request (**W**) or fault message (**S**) are listed in the logbook (see also Section 6.6).

Limit alarms (**LIM**) and function check (**CTRL**) are also recorded. However, these do not trigger a maintenance request or fault message.

The logbook contains a maximum of eight pages, each of which can accommodate four messages. It operates according to the principle of a circulating buffer, i.e. the oldest message is overwritten when all eight pages are full.

The logbook entries can be deleted or blocked (*function 60*), or also switched off individually (*function 87*).

4 Display measuring ranges

The measuring ranges defined using *function 41* are listed using *function 4*. However, they cannot be modified in this menu.

Note

If a fault occurs whose error message is switched off by *function 87*, there is no reaction at the interface which may be configured. This applies to the ELAN interface as well as to the analog and relay outputs.

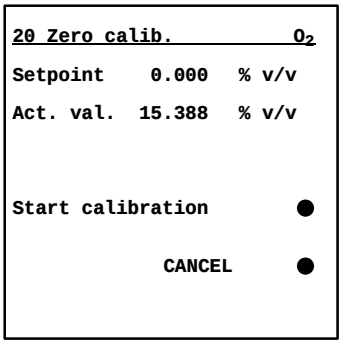
5.2.2 Calibration

The **OXYMAT 61** permits either a manual or automatic calibration. The latter (autocal: *function 24*) is only possible with an option board which contains 8 additional binary inputs and 8 additional relay outputs.

The setpoints for the zero and sensitivity adjustments must be set under *function 22*.

The corresponding gases must be applied manually for *functions 20* and *21*.

20 Zero calibration



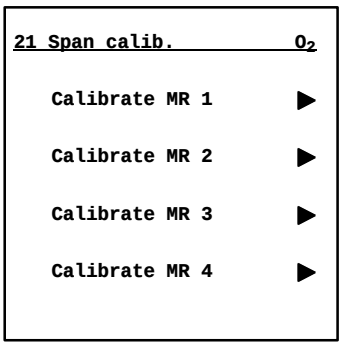
The zero is calibrated simultaneously for all measuring ranges, even if the sensitivity is calibrated individually for the ranges.

The calibration procedure should only be triggered when the measured value (actual value) has stabilized following application of the zero gas.

If the measured value is unsteady, increase the time constant (*function 50*) prior to the calibration.

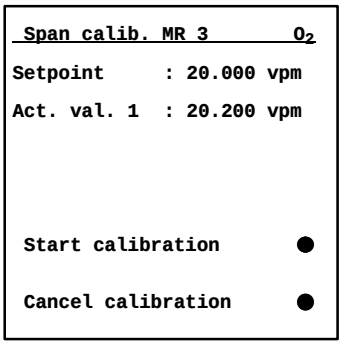
21 Span calibration

A single or total calibration is carried out depending on the setting of *function 23* (component-specific).



Single calibration:
The display lists the ranges which were previously defined using *function 41*. The adjacent display is therefore an example of the single calibration of four ranges.

If you now wish to calibrate e.g. range 3, press the corresponding softkey.

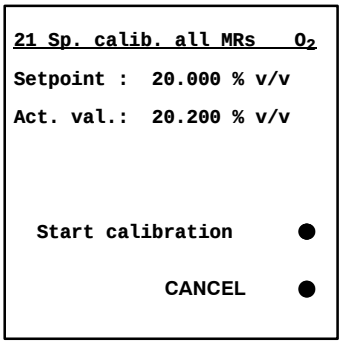


The display lists the setpoint and the current value of range 3.

Once the actual value has stabilized, the calibration procedure can be triggered by pressing 4th softkey. The actual value is then set to coincide with the setpoint.

If an incorrect calibration has been carried out by mistake (e.g. with an incorrect calibration gas), the original value can be loaded again by pressing the softkey ”Cancel calibration”.

Total calibration:



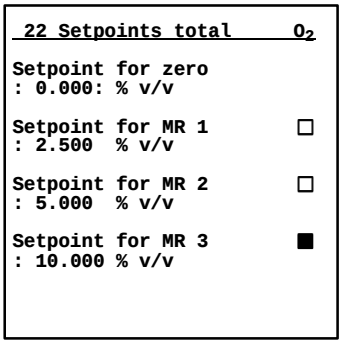
With a total calibration, all measuring ranges are calibrated together. The ”master” range is defined using *function 22*. It is advisable to select the largest range for this.

The display lists the setpoint and the current value of the ”master” range.

Once the actual value has stabilized, the calibration procedure can be triggered by pressing 4th softkey. The actual value is then set to coincide with the setpoint.

If an incorrect calibration has been carried out by mistake (e.g. with an incorrect calibration gas), the original value can be loaded again by pressing the softkey ”Cancel calibration”.

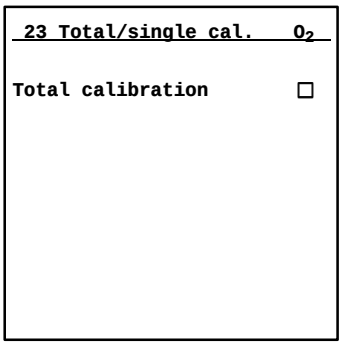
22 Setpoints total



The adjacent example shows the setpoint input for a total calibration. The third measuring range has been selected as the master range.

It is not possible to select a master range for a single calibration.

23 Total/single range calibration

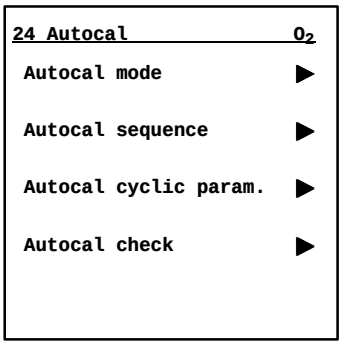


These functions are used to select a total or single calibration of the measuring ranges.

A total calibration means that a ”master range” is calibrated and that all other ranges are calculated by means of a ratio.

If this function is not activated, each range is calibrated individually.

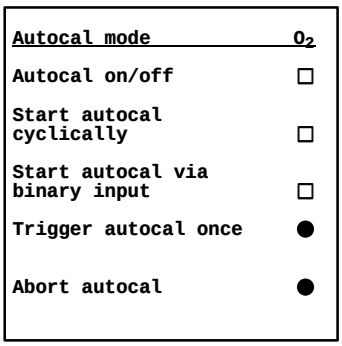
24 Autocal



The automatic calibration (Autocal) can only be carried out if the analyzer contains the supplementary electronics (option).

If this is not the case, a corresponding warning is output on the display when you select an autocal parameter.

Autocal mode



You can use this subfunction to parameterize the various operating modes of the autocal function.

In mode “Start autocal cyclically”, an autocal is started after a specific time (see “Autocal cyclic parameter” for details).

Autocal on/off

In the status ”Autocal off” (representation □), the switches ”Start autocal cyclically” and ”Start autocal via binary input” can no longer be activated. ”Trigger autocal once” is also switched off. The cycle time continues, but an automatic calibration is not triggered.

Start autocal cyclically

Autocal can be activated in a regular, repetitive cycle if the ”Time from autocal to autocal” has been previously set.

Start autocal via binary input

Autocal can be activated via a binary input if you have configured this using *function 72*.

The modes ”Start cyclically” and ”Start via binary input” can be activated simultaneously in order e.g. to check a weekly calibration and to control this check via a binary input.

Trigger autocal once

In addition, an autocal sequence can be started in the status “Autocal on” at any time using the softkey ”Trigger autocal once” providing the analyzer is ready for measurement (i.e. calibration or warming-up phase not currently running). A sequence triggered in this manner has no influence whatsoever on the time cycle of an autocal, i.e. the cycle time continues irrespective of this.

When triggered, the point disappears until the process has been finished.

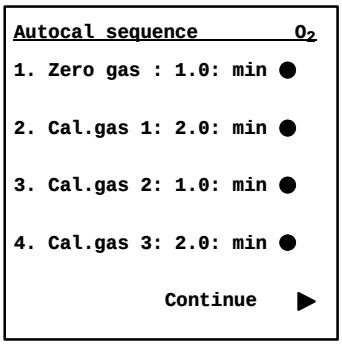
Abort autocal

An automatic calibration procedure can be interrupted at any time when being carried out using the key ”Abort autocal”. All calibration data which have been determined so far are rejected, and the calibration data (zero and sensitivity) prior to starting the autocal are used further.

The abort has no influence on the time cycle. All valid adjustment procedures are retained.

Autocal sequence

This subfunction can be used to combine several calibration phases into one autocal sequence.



The sequence of the automatic calibration can be freely defined. It is possible to ”compose” a sequence from up to 12 different phases.

In addition to the connection of one zero gas and up to four calibration gases per component, it is also possible to program purging with sample gas, an intermediate sample gas mode, and a signalling contact. This signalling contact is available if it has been previously assigned to a relay output using *function 71*.

Intermediate sample gas mode

An intermediate sample gas mode may be necessary if the system is only permitted to leave measuring mode for a specific period. If the total time then required for purging is greater than the permissible loss time, a return must be made to measuring mode between the calibrations (intermediate sample gas mode).

Signalling contact

The signalling contact can be used e.g. to trigger the automatic calibration of a second analyzer or to signal the start or end of the autocal function.

Relay outputs

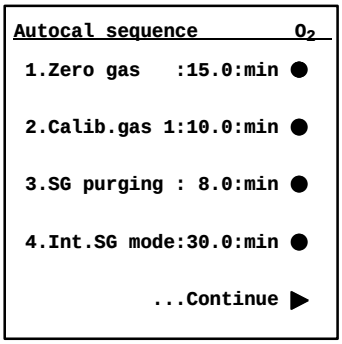
If relay outputs have been assigned for sample gas, zero gas, calibration gases and/or measure/calibrate (*function 71*), these are switched to trigger the corresponding solenoid valves. The same also applies to the signalling contact ”Autocal”; this is closed for approx. one second when the command is executed.

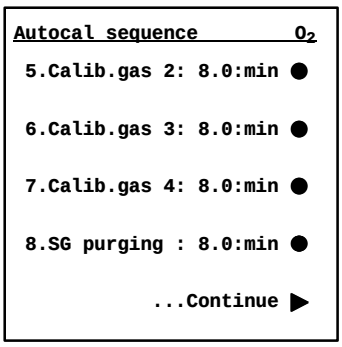
Example

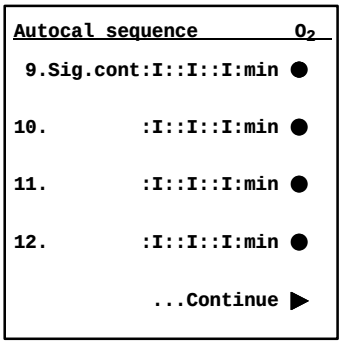
The following sequence is to programmed:

1. Zero gas calibration following 15 minutes purging with zero gas
2. Calibration with gas 1 following purging for 10 minutes
3. Purging with sample gas for 8 minutes
4. Intermediate sample gas mode for 30 minutes
5. Calibration with gas 2 following purging for 8 minutes
6. Calibration with gas 3 following purging for 8 minutes
7. Calibration with gas 4 following purging for 10 minutes
8. Purging with sample gas for 8 minutes
9. Brief signalling contact in order to start ”Autocal” on a further analyzer or channel

The defined autocal sequence is shown in the adjacent displays.







List for the Autocal sequence:

Step	Component	Autocal sequence
Zero gas 1	Component 1	Function code 1
Zero gas 2	– " –	Function code 2
Calibration gas 1	– " –	Function code 3
Calibration gas 2	– " –	Function code 4
Calibration gas 3	– " –	Function code 5
Calibration gas 4	– " –	Function code 6
Purge sample gas		Function code 7
Immediate sample gas mode		Function code 8
Signalling contact		Function code 9

Note!



Zero gas 2: only required with Autocal in absorber mode

Autocal cyclic parameter

```
 Autocal cycle              O2

Time from autocal to auto-
cal (cycle time):    2:[h]

Time up to first autocal
cycle            :  15:[min]

Carry out span calibration
for each 8th cycle

Total range calibration
calib. gas 1
```

This subfunction can be used to parameterize various time constants for activating a cyclic, repetitive autocal.

- Time from autocal to autocal (cycle time).
  Any setting between 0 and 1000 (hours) is accepted by the analyzer.
- Time up to first autocal cycle (starting at time of setting).
  If "0" is entered here and if autocal is switched on (see "Autocal on/off"), the analyzer commences immediately with the autocal sequence.

If autocal is switched off, the analyzer only starts an autocal sequence if autocal is switched on within one minute of entering the "0". If this is not the case, the complete time between two autocal sequences elapses starting with input of the "0".

The internal clock continues even when autocal is switched off! It starts at "01.01.1995 00:00" when the analyzer is switched on, and must be set to the current time using *function 58*.

- Number of cycles until the span calibration is carried out.

  The zero is calibrated with each autocal. If it is unnecessary to also calibrate the sensitivity each time the zero is calibrated – e.g. in order to save calibration gas – a value >1 must be entered in the line ”Carry out calibration with calibration gas every : : cycle”.

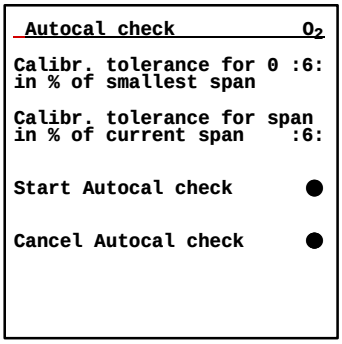
The information in the last lines indicates that the entered parameters refer to a total calibration with calibration gas for measuring range 3. This range has been previously selected using *function 22*.

Note



Access to *functions 20* and *21* is blocked as long as autocal is active (Autocal ■). A corresponding message is output in the display if this function is then selected.

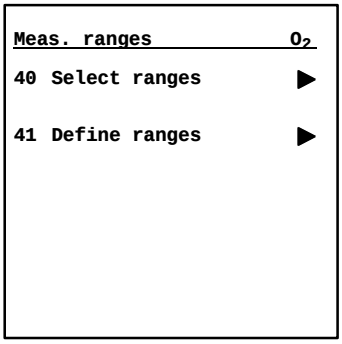
The “Autocal check” is used to check the calibration. The sequence parameterized in the menu “Autocal sequence” is executed as for “Autocal”. However, in contrast to “Autocal”, no new calibrations are triggered, only the deviations with respect to selectable calibration tolerances are checked.



Autocal check sequence:

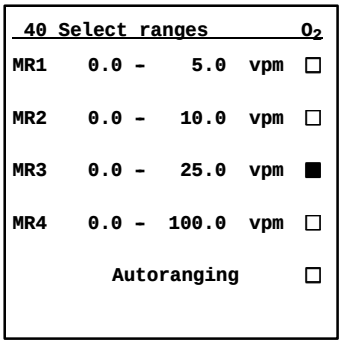
1. Enter the desired calibration tolerances in the menu “Autocal check”. If necessary, select the relay output and the binary input for “Autocal check”.
2. Start the “Autocal check” using the button in the menu “Autocal check” or via the binary input.
3. The analyzer then carries out a sequence as parameterized in the menu “Autocal sequence”.
4. If a calibration limit is violated, the maintenance request W10 is set and, if parameterized, also the relay “AcalChk Dif.”.
5. Both of these are reset following a fault-free Autocal.

5.2.3 Measuring Ranges



The adjacent display appears following selection of the range functions in the main menu by pressing the third softkey ("Measuring ranges").

40 Select ranges

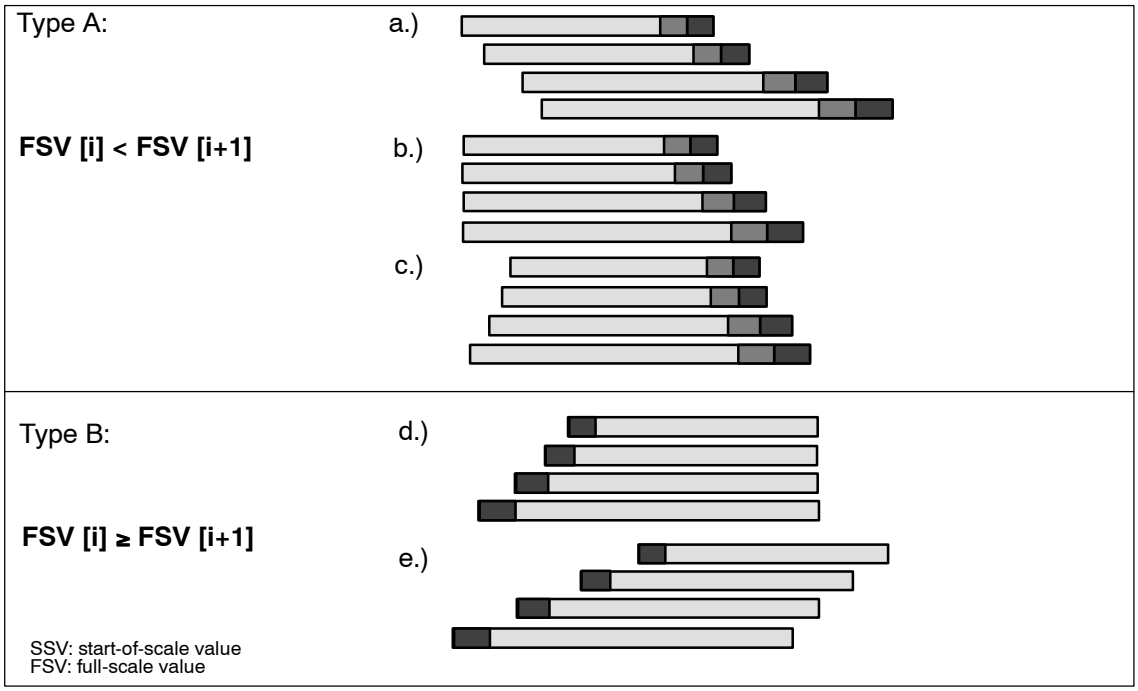


It is possible to select one measuring range or to switch to autoranging. All selection possibilities are subject to mutual interlocking.

Autoranging is only possible under the following conditions:

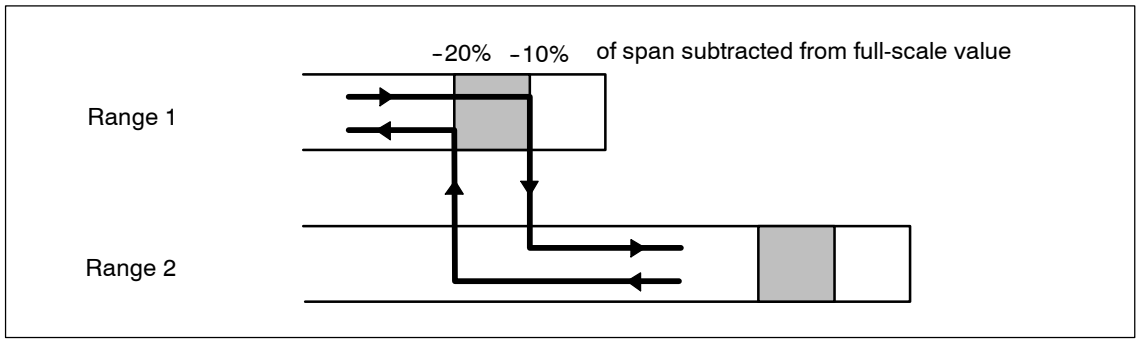
- At least two ranges must be available. A range is considered as present if the start-of-scale value is not equal to the full-scale value.
- The spans must become greater.
- The ranges must be adjacent to one another or overlap.

This results in the following permissible constellations:

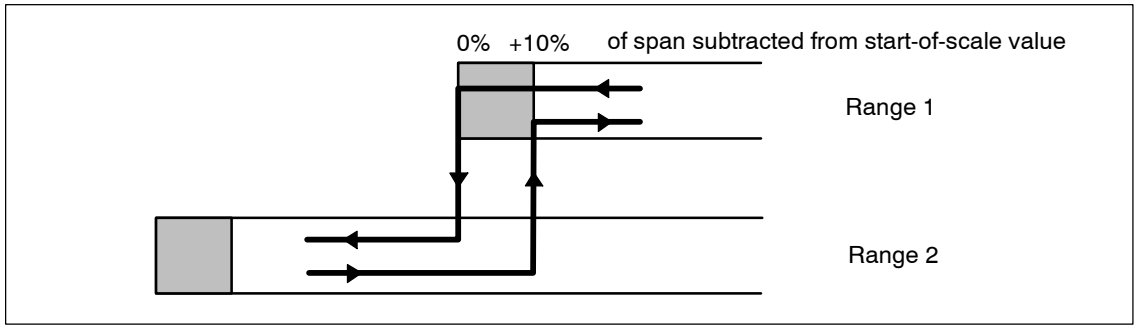


A differentiation is made between two types of range::

Type A: The full-scale value must be smaller than the subsequent full-scale value.
The following applies to autoranging:



Type B: The start-of-scale value must be greater than or equal to the subsequent full-scale value. Since the spans must become larger at the same time, the start-of-scale values of the subsequent ranges are always smaller.
The following applies to autoranging:



41 Define ranges

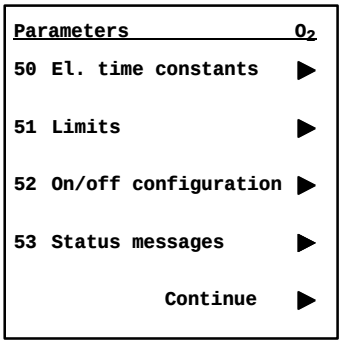
```
 41 Define ranges          O2
No.  Start value  End value
1  : 0.000 :  : 10.0: % v/v
2  : 0.000 :  : 50.0: % v/v
3  : 0.000 :  :100.0: % v/v
4  : 0.000 :  :500.0: % v/v

Ranges not plausible!
```

Up to four measuring ranges can be defined whose start-of-scale values are assigned to the bottom value (0/2/4 mA) and whose full-scale values are assigned to the top value (20 mA) of the analog output.

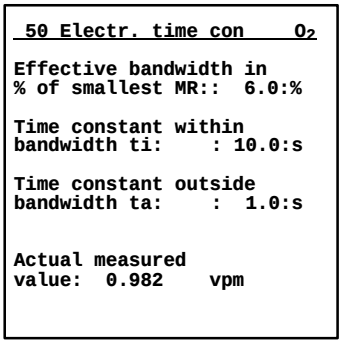
If the message “Ranges not plausible” is displayed, this means that autoranging is not possible.

5.2.4 Parameters



The adjacent display with selection of the parameter functions *50* to *53* appears following selection of the parameter functions. You can branch to the parameter functions *54* to *61* by pressing the fifth softkey (... Continue).

50 Electric time constants



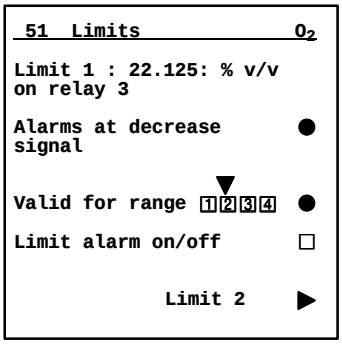
This function can be used to set various time constants to reduce the noise superimposed on the measured value. The reduction in noise approximately corresponds to that of a low-pass filter with a corresponding time constant.

The time constant t_i is effective within a parameterizable interval defined in % of the smallest measuring range. On the one hand, this dampens small changes in measured value (e.g. noise), but becomes immediately ineffective when the signal passes through the effective interval. In this case, the signal is dampened by the external time constant t_a.

You can set values up to 100 % for the effective interval, and values up to 100 s for the time constants t_i and t_a. Appropriate combination of these three parameters permits the implementation of a low display delay (90 % time) despite high noise suppression.

The effect of the set damping parameters can be observed in the bottom line in which the ”real” measured value is displayed (in % of full-scale value).

51 Limits



The analyzer can monitor up to 4 limits which you can assign to the measuring ranges as desired.

Any relay can be assigned to each limit (see *function 71*). If this has not been configured, ”–” appears in the limit display.

Only positive limit values up to 100 % can be parameterized.

It is additionally possible to select whether an alarm is to be output when the entered limit is exceeded or fallen below.

The assignment of the limit to the measuring ranges is achieved by repeatedly pressing the third softkey. Pointers above the bordered range numbers move in the process and show the ranges in which the limit monitoring is to be active (all ranges in the adjacent example).

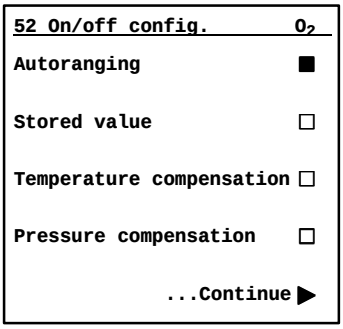
Limit monitoring can be switched off individually for each limit (see also *function 52*).

Resetting of limit alarm:

If the limit relay has been triggered, this status is also retained if the measured value returns to the permissible range again. The triggering of a limit relay is registered in the logbook (*function 3*). The limit relay is automatically reset as soon as the cause for its setting is no longer present.

The program jumps to limit display 2 etc. when you press the fifth softkey ("...Continue").

52 On/off configurations



Channel-specific on/off configurations (e.g. flow check for sample gas) can only be called **using the first component**.
This function permits simple switching on and off of the functions listed in the adjacent display.

This simplified input means that it is not necessary to pass through the various menu levels for these functions.

It is possible to switch up to four functions on and off in each of the displays which can be called. Switched-on configurations are identified by ■ , switched-off ones by □. The next display can be selected in each case using the fifth softkey ("...Continue").

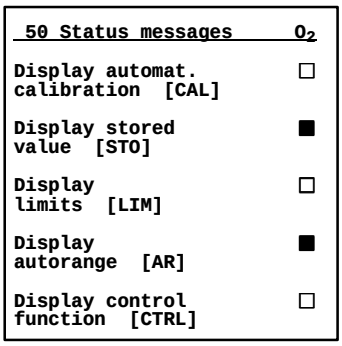
The following configurations can be switched on and off using *function 52*:

Designation	No.	Remarks
Total calibration	23	
Autocal	24	Only with supplementary electronics
Autoranging	40	
Limit monitoring 1	51	
Limit monitoring 2	51	
Limit monitoring 3	51	
Limit monitoring 4	51	
Blocking of logbook	60	
Suppression of negative measured values	70	
Store analog output	77	
Signalling of tolerance violation	78	
Temperature compensation of zero	86	
Temperature compensation of sensitivity	86	
Flow check for sample gas		
Flow check for reference gas		
Fault / maintenance request / CTRL to NAMUR	72	
Measuring head heater		

Table 5-2 Functions accessible using *function 52*

Apart from the functions listed in Table 5-2, further service functions can be addressed using *function 52*. These are reserved for servicing personnel and are only visible following input of the service code (code stage 3).

53 Status messages



This function can be used to display - in the status line - up to four different statuses which can be assumed by the analyzer.

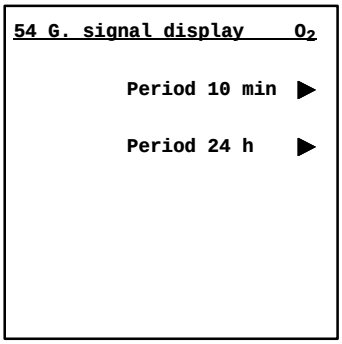
Status	Output in display depending on *functions 52* and *53*				
	Fct. 53 □	*Fct. 52* □ *Fct. 53* ■	*Fct. 52* ■ *Fct. 53* ■		
Calibration: CAL	None	CAL	□ CAL	■ CAL	Calibration running
Stored value : STO	None	STO	□ STO	■ STO	Analog output connected to memory (see also *function 77*)
Limit: LIM	None	LIM	□ LIM	■ LIM	Upward or downward violation of limit (see also *function 51*)
Autoranging: AR	None	AR	□ AR	■ AR	During switching over of ranges
Function check: CTRL	None	CTRL	□ CTRL	■ CTRL	Analyzer is decoded Warming-up phase Calibration running

Table 5-3 Status messages

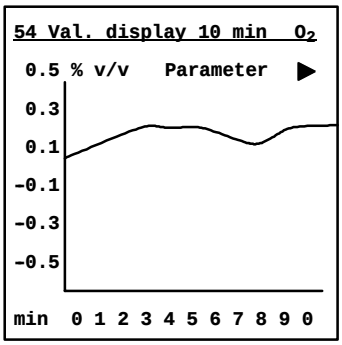
The type of status ”Code” is always present in the status line.

If a fault occurs during operation, the message ”Maintenance request” or ”Fault” appears in the status line depending on the importance of the fault. This message is output alternately with the status messages.

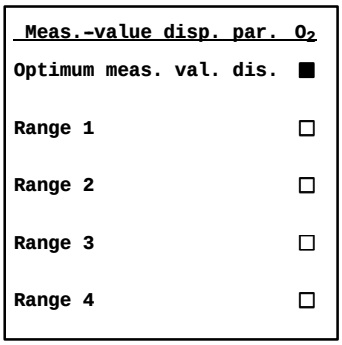
54 Graphic signal display



Using this function you can follow the trend of the measured values for the last 10 minutes or 24 hours in the display.

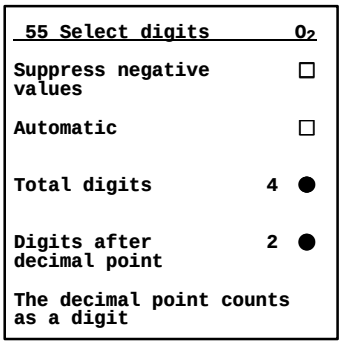


When you select a time axis (period), the measured value is displayed as a trend. The most recent value is at the far right on this axis.



A specific range can be assigned under ”Parameter” to the measured-value axis. Also possible is a facility for an ”Optimum measured-value display”. This means that the software automatically carries out scaling of the measured-value axis when this parameter is activated. The scale is matched to the scatter of the measured values.

55 Select display digits

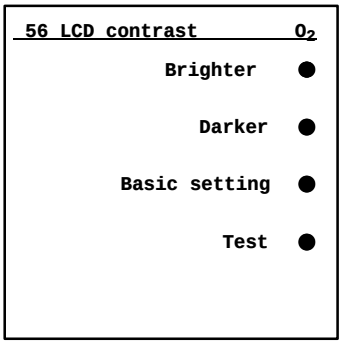


This function permits you to suppress the output of negative values.

It is also possible to select the total number of digits and the number of decimal places.

Note that a maximum of four digits can be displayed which can be distributed before and after the decimal point.

56 LCD contrast



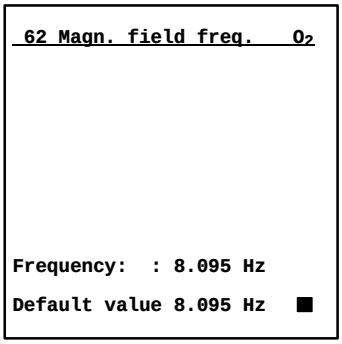
You can adjust the display contrast using this function.

If the contrast is maladjusted you can reestablish the factory setting by pressing the third softkey (”Basic setting”).

It is additionally possible to carry out an LCD test by pressing the fourth softkey (”Test”). Various test displays are then output in succession.

If the LCD contrast is extremely maladjusted, and if the analyzer is in measuring mode, you can reestablish the basic setting by pressing the following key sequence:
8 8 8 8 **ENTER**.

57 Magnetic field frequency



By adjusting the magnetic frequency, this function can be used e.g. to minimize vibration-dependent frequencies superimposed on the analog output. In the most favorable case, the superimposed frequencies can be eliminated completely.

You must enter the desired value in the editing field ”Frequency” using *function 57*. Values between 7 and 11 Hz are permissible.

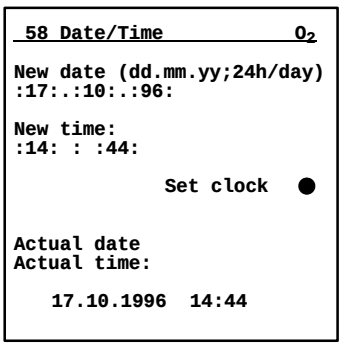
If the change to a particular frequency has not resulted in the desired success, try again by entering other frequencies.

You can set the frequency of 8.095 Hz stored in the basic factory data by pressing the fifth softkey.



Caution
New adjustment of the zero and sensitivity is necessary following each change in frequency.

58 Date/time



The analyzer has a system clock which is not protected against power failure (not a real-time clock). The clock commences at 1.1.1995 when the analyzer is started.
This function permits you to exactly set the date and time.

This is particularly important to be able to assign a specific point in time to faults stored in the logbook. This can be advantageous when troubleshooting.

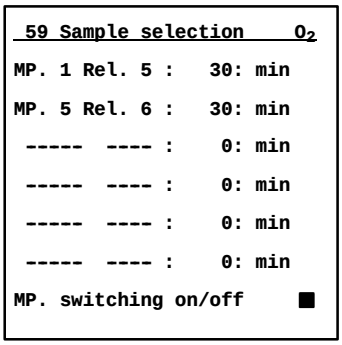
An editing field appears when you call this function in which you can enter the day, month and year as the ”New date”. Hours (24-hour system) and minutes are entered as ”New time”.

The set data are imported when you press the third softkey (”Set clock”). The data then appear as an active display at the bottom of the display.

Caution

The date and time are deleted in the event of a power failure and must then be reset.

59 Sample point selection



You can use this function to assign up to six measuring points to the analyzer and to switch these over automatically.

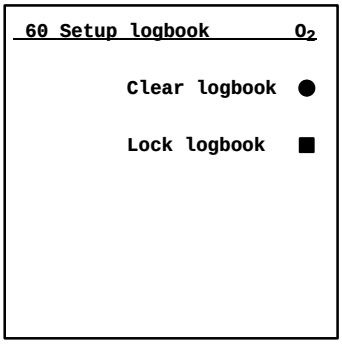
A prerequisite is that the measuring point relays, which then trigger the corresponding solenoid valves, have first been parameterized using *function 71* (”Relay outputs”).

A time duration is also assigned to each measuring point relay and must be entered into the appropriate editing field using *function 59*. Values between 0 and 60000 minutes are possible.

You can switch the measuring point switching on and off by pressing the fifth softkey.

It is additionally possible to assign a signal relay to each measuring-point relay. This permits signalling of the measuring point separate from the measuring point relay. These signal relays must also have already being configured using *function 71*.

60 Setup logbook



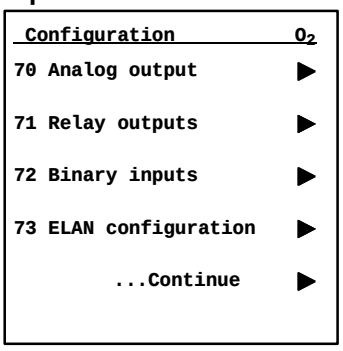
You can use this function to delete logbook entries (see also *function 3*) or to lock them.

Status messages, maintenance requests or faults cannot be suppressed by this function; the appear even if the logbook is locked.

5.2.5 Configuration

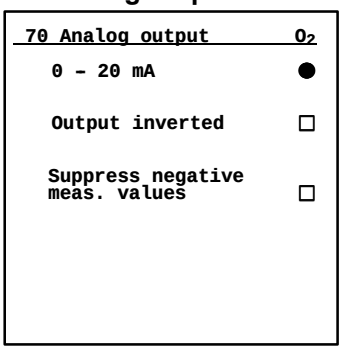
All functions of this block are only accessible via the code for level 2.

Input menu



Following selection of the configuration functions in the main menu by pressing the fifth softkey ("...Continue"), you can branch to the further configuration functions.

70 Analog output



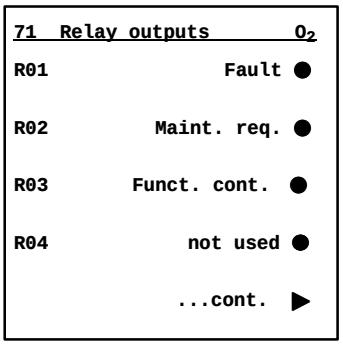
With this function you can define the start-of-scale value of the measuring range (0, 2 or 4 mA).

Select the desired value by pressing the softkey assigned to it; the other two values are reset at the same time.

In addition, the analog output can be displayed in reversed form; e.g.
0 to 10% CO $\triangleq$ 0 to 20 mA $\rightarrow$ 0 to 10% CO $\triangleq$ 20 to 0 mA.

Negative measured values: if negative measured values have an unfavorable effect on further processing, activate this function to set the negative measured values to 0 (or 2/4) mA at the analog output. (Digital interface in analogous manner). The correct measured value is still output in the display.

71 Relay outputs



Six freely-configurable relays are available per channel in the basic version. Their switchable output contacts (max. 24 V AC/ DC / 1 A) can be used for signalling, controlling valves etc. If six relays are insufficient, it is possible to retrofit eight further relays with additional electronics (option). Each relay can be assigned one of the functions listed in Table 5.4, but each function may only be assigned once. This means, for example, that the fault signal cannot be applied to two relays.

Refer to the terminal assignment diagram in Section 2.5 "Electric connection" for the assignments of the individual relays when de-energized. On delivery, the relays are preset as shown.

Up to four relays can be configured in one menu. Switching to further menus – and thus to further relays – is always carried out by pressing the fifth (last) softkey (”...Continue”).

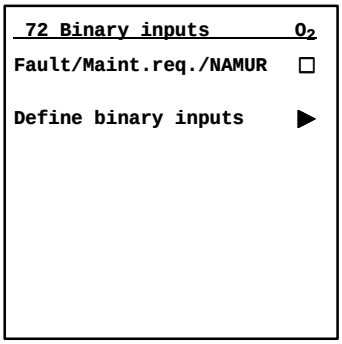
Caution

Every change to the configuration of the relay outputs should always be stored in the user data memory using *function 75*.
If this is not done, the danger exists that a previous (undesired) configuration is called when selecting ”Load user data” (*function 75*).

Function	Relay is de-energized with	Relay is energized	Remarks
Vacant			Relay permanently de-energized
Fault	Fault		Also output in display (in measuring mode) (see Section 6.6)
Maintenance request	Maintenance request		
Calibration		Calibration running	For information
Range 1 (...4)		Range 1 (....4) on	For range identification
Limit 1 (...4)	Limit 1 (...4) has been triggered		Limit signalling
Function check (CTRL)	Function check on	Decoding, warming-up phase, autocal running	Signalling with: ● Analyzer is decoded ● Warming-up phase (30 min) ● Calibration running (Autocal)
Sample gas		Supply of sample gas	Triggering of valves with autocal
Zero gas		Supply of zero gas	
Calibration gas 1(...4)		Supply of calibration gas	
Meas. point 1 (...6)		Meas. point 1 (...6) selected	For gas sampling via solenoid valves at different measuring points
Signal from meas. point 1 (...6)		Meas. point 1 (...6) selected	For measuring point identification (parallel to measuring point)
Signalling contact		When signalling, the relay is briefly energized	e.g. with autocal: control of a 2nd analyzer
Flow of gas		Sample gas flow too low	For information
Pressure of reference gas		Pressure of calibration gas too low	For information
Autocal check		Autocal difference too large (*function 24*)	

Table 5-4 Relay assignments

72 Binary inputs



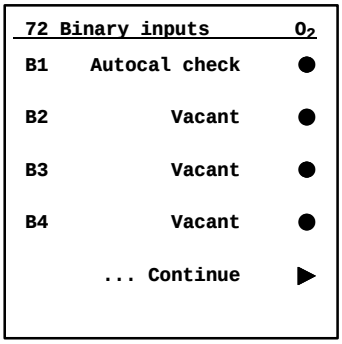
Six floating binary inputs [”0” = 0 V (0...4.5 V); ”1” = 24 V (13...33 V)] which you can configure freely are available in the basic version. If these six inputs are insufficient, you must fit additional electronics with a further eight binary inputs (option).

The mode for the binary inputs is defined here. With “NAMUR” (■) mode, the binary inputs respond as identified by “N” in Table 5-5.

If “NAMUR” mode is not activated (□), the binary inputs respond compatible to the older software release versions V4.3.0 (identified by “X” in Table 5-5).

You can assign one of the **control functions** listed below to each input, but each function must only be assigned once.

Refer to Section 2.5 ”Electric connection” for the assignments of the individual inputs.
No binary channels are already assigned on delivery.
Up to four relays can be configured in one menu. Switching to further menus – and thus to further relays – is always carried out by pressing the fifth (last) softkey (”...Continue”).



Caution

Every change to the configuration of the binary inputs should always be stored in the user data memory using *function 75*.
If this is not done, the danger exists that a previous (undesired) configuration is called when selecting ”Load user data” (*function 75*).

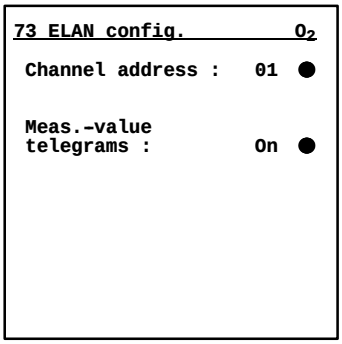
Control functions/ NAMUR

Function	Required control voltage			Remarks / effects
	0 V	24 V	24 V pulse (1 s)	
Vacant				No effect when triggered
External fault 1, 2, ..., 7	N	X		e.g. Signal from gas conditioning: condensation overflow, gas cooler faulty etc. (see also Section 6.6)
External maintenance request 1, 2, ..., 7	N	X		
Deletion of logbook entries			N, X	Following deletion, the analyzer is set to the initial state. If the cause of a fault or maintenance request has not been eliminated, the corresponding message appears in the logbook again.
Function check (CTRL) 1 ... 4	N	X		Relay must be configured to function check using *function 71* if e.g. the function is to be checked with a second analyzer.
Start Autocal			N, X	Autocal must be parameterized (*functions 23*, *24* and *25*)
Measuring range 1 (... 4) on		N, X		For remote range switching (switch off autoranging (*function 52*))
Zero gas on		N, X		Relay must be configured with *function 71* to zero gas, calibration gas or sample gas, and the corresponding valves must be connected. Only applies to total calibration since only one calibration gas can be considered (*function 22*).
Calibration gas on				
Sample gas on				
Start zero calibration			N, X	
Span calibration				
Autorange		N, X		Automatic switching over of measuring ranges
Autocal check		N, X		Start Autocal check (*function 24)*
Measuring protection		N, X		You can define a binary input “Measuring protection” with the following effects: If the analyzer is in the status “Measure” (not carrying out function check), it remains in this status, i.e.: - The analyzer can no longer be opened - The analyzer can no longer be set to “Remote”. The message “Measuring protection switched on” is output in the status line of the measurement display

Table 5-5 Control functions

The meanings of “N” and “X” in the columns “Required control voltage” are described in *function 72* “Binary inputs”.

73 ELAN configuration



The parameters for an ELAN network can be set in this dialog.

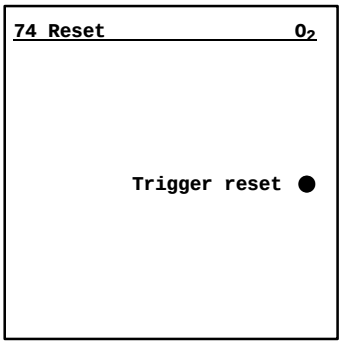
- Channel address
  The channel address for this analyzer can be set here. Addresses between 1 and 12 can be set. Each address must only be used **once** in an ELAN network. Addresses of analyzers used to correct the pressure or the influence of interfering gases must not be entered at this point.
- Measured-value telegrams (on/off)
  The automatic, cyclic transmission of measured values every 500 ms can be switched on/off here.



Tip!

For further details on ELAN, refer to the ELAN interface description (C79000-B5274-C176, German/English).

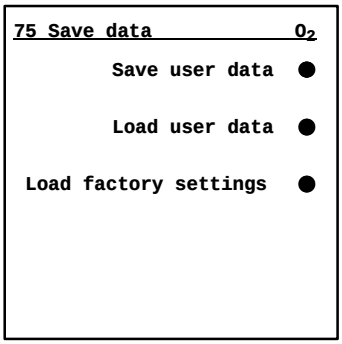
74 Reset



This function is used to carry out a cold restart of the analyzer, e.g. in the event of a fault in program execution.

You must wait for the warming-up time following triggering of this function. The analyzer is only fully ready for use following this time.

75 Save data, load data

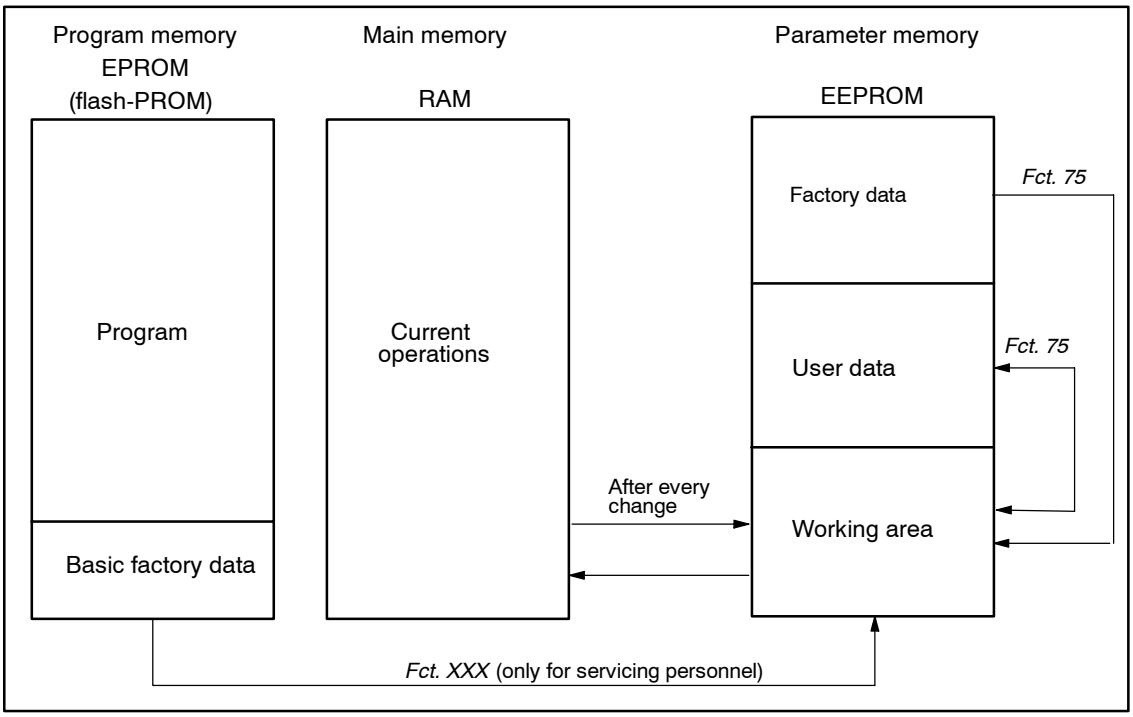


You can use this function to save user-specific data in the user data memory.

This should always be carried out e.g. following successful starting-up of a system. All individual settings are then saved and can be recalled if necessary (load user data).

This is significant if repairs or maintenance are to be carried out on an analyzer or e.g. new parameter settings are to be tried.

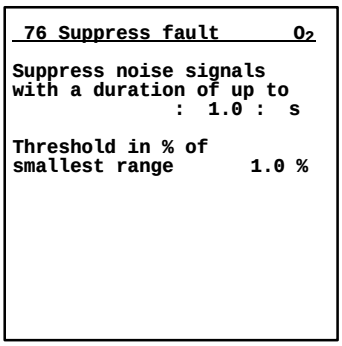
The following Fig. provides a summary of the interactions between the various memory components.



The basic status of the analyzer (factory settings) can be reestablished using the function "**Load factory settings**" (*function 75*).

76 Suppress noise signals

This function is used to eliminate undesirable spikes which exceed an adjustable threshold of the smallest measuring range.



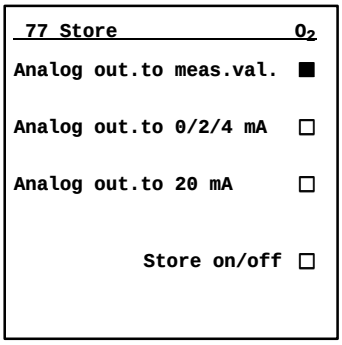
Spikes are caused by electromagnetic interferences or occasional mechanical shocks. These interferences can be suppressed by entering an "action time" of 0 to 5 s. This time means that spikes with a shorter duration are suppressed and no longer influence the measured values..

The input can be made in steps of 0.1 s..

If a change in concentration occurs directly after a fault, there may be a delay in its display.

The settings of *function 50* ("Electric time constants") must be taken into account when activating this function.

77 Store analog output



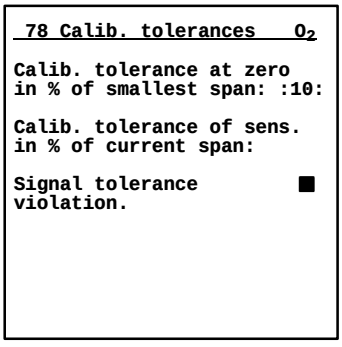
You can use this function to define the response of the analog output or the digital interface with certain analyzer statuses:

In the event of a fault (**S**), **CTRL** (decoding; calibration; warming-up phase), either

- the last measured value
- or 0 (2/4) mA
- or 20 mA

is output at the analog output.

78 Calibration tolerances



Using this function it is possible to signal changes in the zero or sensitivity compared to the last calibration as a "Maintenance request" if a relay output was configured to "Maintenance request" using *function 71*.

The analyzer must also be set to "**Total calibration**" (using *function 22*) for this function to be effective.

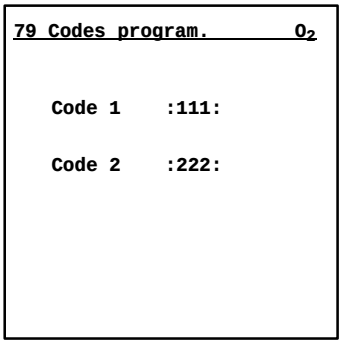
The calibration tolerance, adjustable from 0 to 99 %, refers at the zero to the smallest measuring range (or span) and at the sensitivity to the measuring range (or span) in which the total calibration is carried out.

This can be clarified by an example:

Measuring range 1:	95...100% O_2
Measuring range 2:	90...100% O_2
Smallest span:	100 – 95% O_2 = 5% O_2
Range in which calibration is carried out:	Range 2
Calibration tolerance:	6%
Response threshold for zero:	5% O_2•0.06=0.3 % O_2
Response threshold for sensitivity:	10% O_2•0.06=0.6 % O_2

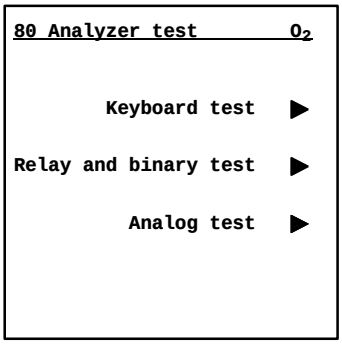
If the zero (sensitivity) differs from the last calibration by more than the parameterized value, the correspondingly configured relay signals a maintenance request.

79 Codes for input levels



You can use this function to replace the factory-set codes (”111” for level 1, ”222” for level 2) by your own. The value ”000” for a code means that disabling is not present and that complete access is possible to the corresponding input level.

80 Analyzer test



The analyzer test comprises

Keyboard test	Analyzer-specific
Relay and binary test	Channel-specific
Analog test	Channel-specific.

- **Keyboard test**
  The keyboard test can be used to check various keys on the input panel.
  The five softkeys at the right margin can make the associated point disappear or appear.
  If the digit keys and the sign key are pressed, the corresponding digit is stored in the editing field in the bottom line of the display.

  A message is output in plain text when you press the **INFO** key; the **MEAS** and **ESC** keys retain their return functions.

- **Relay and binary test**



Caution

First remove data plugs (X3, X5, X8, X10).

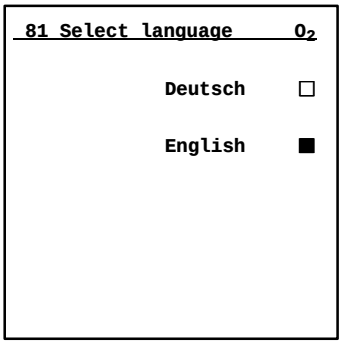
The first display shows 6 of the relay and binary channels. With an option board, a further 8 channels are present on a second page.
Individual relays can be activated using the relay test. This is carried out using the input field. A ”1” makes the relay pull up, a ”0” makes it return to the de-energized state.
Digits other than 0 and 1 are not accepted by the input field.
After leaving *function 80*, the relays reassume the status which they had prior to selection of the relay and binary test.
The column ”Binary” shows the current status of the binary inputs in this display..

- **Analog test**

  The analog test can be used to parameterize the analog output with a constant current of 0 – 24000 μA for test purposes.

  The analog input permanently shows the input currents in μA.

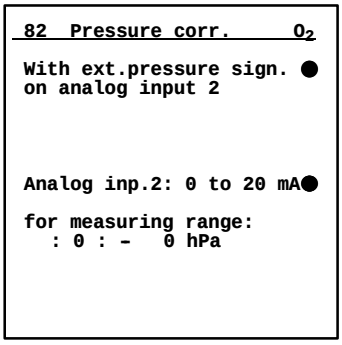
81 Select language



You can use this function to switch the analyzer to a second dialog language.

The analyzer is delivered in the ordered language. If English is set as the first language, Spanish is set as the second language. Otherwise, English is usually present as the second language.

82 Pressure correction



You can use this function to select

- Pressure correction using an internal pressure sensor
- Pressure correction using an external pressure*) sensor via analog input 2 (example as shown on left)
- Pressure correction using an external pressure sensor*) via ELAN (RS 485)

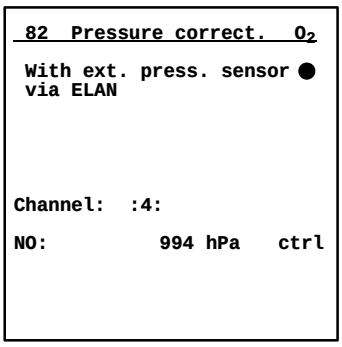
*) An external pressure sensor is not required for the OXYMAT 61; the pressure range of 700...1200 hPa to be corrected is covered by the internal pressure sensor.

It is also possible to switch off the pressure correction using *function 52* ("On/off configurations").

The **OXYMAT 61** permits the correction of variations in the sample gas pressure from 700 ... 1200 hPa absolute (7 to 30 psig).

The external pressure sensor must be equipped with a diaphragm suitable for the application. Its analog input signal range must be 0(2/4) to 20 mA or 0(1/2) to 10 V.

82 Pressure correction with external pressure sensor via ELAN



Function not necessary



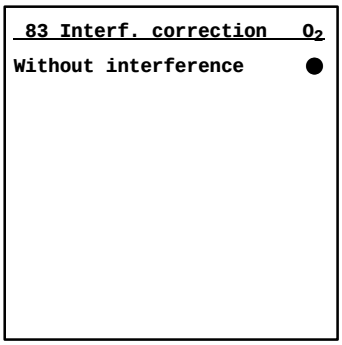
Note

The measured value “Pressure” is an internal value in the **OXYMAT 61** gas analyzer which can be applied via the ELAN to a further analyzer. It is also possible to use other pressure measuring instruments if they possess the ELAN. The item “Measured-value telegrams” under *function 73* must be set to “On” on the analyzer delivering the pressure value.

83 Interference correction

Caution
The correction of cross-interference is cancelled for the duration of a calibration (zero or sensitivity). The correction is reactivated when the calibration has been terminated and a return made to measuring mode..





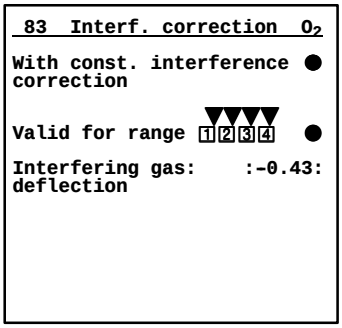
Note
Correction of cross-interference is usually only meaningful if the O_2 equivalent to be corrected is not larger than the smallest span.

If the reference gas and residual gas (sample gas without O_2 component) have different compositions, a zero offset occurs as a result of the paramagnetic or diamagnetic difference between the two gases. To compensate this offset, the analyzer must be informed of the value of the zero offset.

When correcting the cross-interference, it is necessary to differentiate whether the residual gas has a constant or variable composition.

The type of residual gas influence is first defined by pressing the first softkey. The following possibilities exist:

- No interference correction
- Correction of cross-interference for constant influence of residual gas
- Correction of cross-interference for variable influence of residual gas via analog input
- Correction of cross-interference for variable influence of residual gas via ELAN



Correction of cross-interference with **constant influence of interfering gas**:

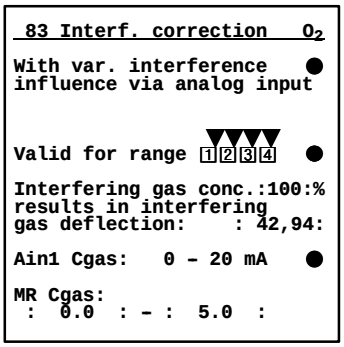
With a constant residual gas composition and a low O_2 concentration there is a residual gas influence which only varies as a result of variations in the O_2 concentration and can thus be considered as being approximately constant**.**

The value of the zero offset (O_2 equivalent) must be passed on to the device (see example 1).

Example 1:
Sample gas without O_2 (zero gas) is 50 % propane, residual gas is N_2. N_2 is used as the reference gas.

- The diamagnetic zero offset (O_2 equivalent) of propane is -0.86 % O_2. With a concentration of 50 %, the O_2 equivalent is -0.43 % .
- Enter the O_2 equivalent (-0.43 % in this case).

continued...



The conditions are different with a **variable residual gas composition**:

This residual gas influence must be measured using another analyzer and then applied as an analog or digital signal (via ELAN) to the **OXYMAT 6E**/**F** for calculation of the cross-interference.

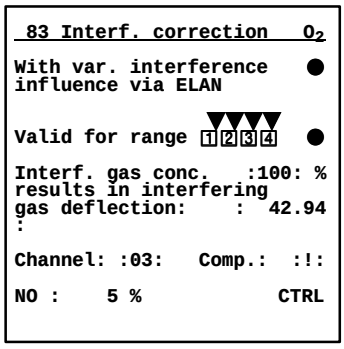
The O_2 equivalent to be entered must always be that of the pure residual gas.

Internal calculation of the actual O_2 offset is possible by entering the measuring range of the residual gas analyzer in % as well as its current output.

Example 2:
A sample gas consists of 4% NO and 96% N_2. It is to be monitored for O_2.

The O_2 equivalent of 100% NO is 42.94% O_2.

The NO analyzer has a measuring range of 5 % NO and an analog output of 4 – 20 mA.



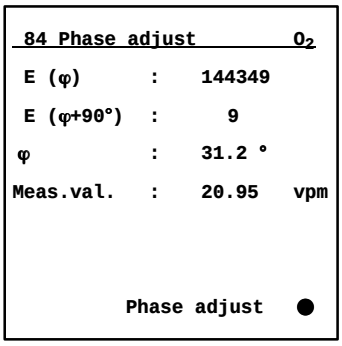
If correction of cross-interference is to be carried out via the RS485 serial interface (ELAN), the same inputs must be made as for **correction of the cross-interference via analog input**.

The following are required in addition:

Channel number and component number of the cross-interference gas analyzer. The type of gas, the measuring range and possibly the analyzer status which are assigned to the channel and the component are then displayed (see also *function 82* “Pressure compensation”).

The item “Measured-value telegrams” under *function 73* must be set to “On” on the analyzer (channel) delivering the pressure value.

84 Phase adjust

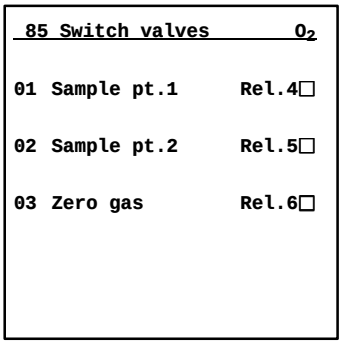


The physical principle of the measurement together with the mechanical design result in a delayed reaction (phase offset) of the analog measured-value signal compared to the clock signal of the magnet controller.

The gain is automatically set by as large a signal as possible (sample gas: e.g. air), so that V assumes a value of approx. 500,000. The phase angle φ is subsequently calculated using this signal value and saved, where V is maximized and W minimized.

This angle has been determined in the factory and should not be changed.

85 Switch valves

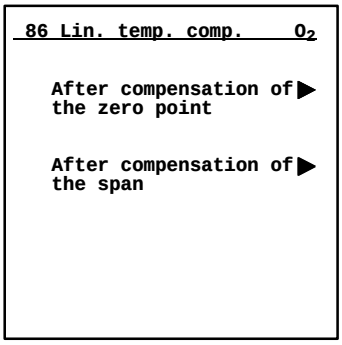


It is possible to manually switch up to six valves per channel using this function. This is achieved using the relays assigned to the individual valves. The relays are located on the mother-board and option board.

A prerequisite is that the corresponding relays have first being configured using *function 71* (”Relay assignment”). The function ”Switch valves” only applies to the relay configurations ”Zero gas”, ”Calibration gas 1...4” and ”Sample gas”.

Only one valve of a maximum of six can be switched at a time since the corresponding relays are mutually interlocked under this function.

86 Linear temperature compensation



The **OXYMAT 61** is temperature-compensated for the span. If an additional temperature error occurs during operation, e.g. as a result of slight contamination of the cell, it can be compensated using this function.

Temperature compensation for zero:

Starting with an average temperature T_M it is possible to define two different correction variables for ranges with a higher or lower temperature.

Example:

If an increase in temperature of the receiver chamber from T_M au T_M' results in a change in zero by e.g. +0.3% (relative) referred to the difference between 100% O_2 and the start-of-scale value of the smallest span, the value

$$\Delta = -\frac{(+\ 0.3)}{|T_M - T_M'|} \times 10 \quad [\%/10°C]$$

must be entered under "Δ" for a temperature increase.

A factor can be determined in the same manner for a decrease in temperature.

If only one correction value is determined, it is meaningful to enter the same value for the second correction value but with the opposite sign.

Temperature compensation for measured value:

The procedure is the same as for the zero, except that the percentage change applies to the measured value itself.

Example:
If the measured values changes from 70 % to 69 % when the temperature increases by 4°C, the percentage change is

$$\frac{(70 - 69)}{70} \times 100 = 1.42 \quad [\%/4°C]$$

and

Δ = 3.55 [%/10°C].

Note



If the zero changes negatively on changes in temperature, Δ has a positive sign. The same applies to a measured value which becomes smaller.

87 Error On/Off

```
 87 Error On/Off          O2

S1
Parameter memory          ■

S2
Chopper motor faulty      ■

S3
Microflow sensor          ■

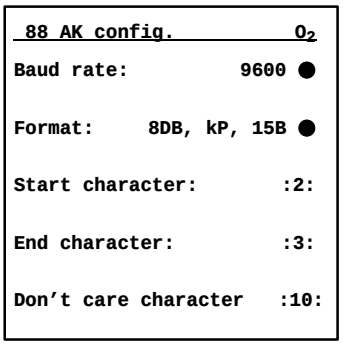
S4
External fault            ■

              .Continue   ▶
```

Signalling of maintenance requests and faults (see Tables 6.3 and 6.4) can be switched off individually using this function so that neither an entry in the logbook, nor a status signal nor external signalling takes place.

Error messages which do not apply to this analyzer are identified by the absence of text following the error number.

88 AK configuration



DB = data bits

kP = no parity

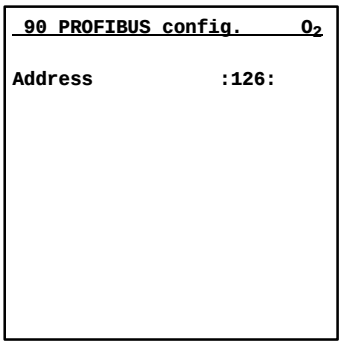
uP = odd parity

gP = even parity

The following serial interface parameters can be set:

Baud rate:	300; 600; 1200; 2400; 4800; 9600 (basic setting: 9600)
Transmission format:	7 data bits, no parity bit, 2 stop bits 7 data bits, even parity, 1 stop bit 7 data bits, odd parity, 1 stop bit 8 data bits, no parity bit, 1 stop bit*) 7 data bits, even parity, 2 stop bits 7 data bits, odd parity, 2 stop bits 8 data bits, even parity, 1 stop bit 8 data bits, odd parity, 1 stop bit 8 data bits, no parity bit, 2 stop bits *) Basic setting
Start character:	All characters from 1 to 255 are possible, but must not be same as end character. Basic setting: 2 (STX)
End character:	All characters from 1 to 255 are possible, but must not be same as start character. Basic setting: 3 (ETX)
Don't care character:	All characters from 1 to 255 are possible, but must not be same as start or end character. Basic setting: 10 (Line Feed)

90 PROFIBUS configuration



This function can only be called if the channel contains additional PROFIBUS electronics.

You can use this function to set the PROFIBUS station address. The address range is from 0 to 126.

Maintenance

6

6.1 Analyzer Section 6-3
6.1.1 Design of Analyzer Section 6-3
6.1.2 Dismantling the Analyzer Section 6-4
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Warning

All gas lines and the power supply must be interrupted before opening the device.

Only carry out adjustments using a suitable tool to avoid short-circuits on the electronic boards.

Dangerous gas may be discharged if assembly or calibration are carried out incorrectly, resulting in a danger to health (poisoning, burns) as well as corrosion damage on the device.

When using analyzers in potentially explosive atmospheres, ensure **before opening** the analyzer that there is **no danger of explosion**.

The analyzer must be subject to annual maintenance with respect to checking of its electrical safety and functional accuracy, in particular with respect to absence of leaks in the gas path (containment system).

Owners can judge whether the maintenance interval can be extended in individual cases if no negative influences with respect to chemical corrosion on the gaskets in the sample gas path are expected.

6.1 Analyzer Section

6.1.1 Design of Analyzer Section

Analyzer section

The analyzer section consists of the magnetic circuit, measuring chamber and measuring head. See also the exploded view (Fig. 6-1).

- **Magnetic circuit**
  A magnetic pole shoe is adhered in each part of the casing. The cut strip-wound core is pressed onto this by a spring. This design means that the forces of the magneto striction are kept away from the measuring chamber.
- **Measuring chamber**
  The measuring chamber consists of a 1-mm thick center plate from which the sample gas channel is punched, and two 0.3 mm thick cover plates which contain the openings for supply of the sample and reference gases. The **OXYMAT 61** can be used for almost all compositions of sample gas since the gas only comes into contact with the chamber plates and these can be made of many different types of corrosion-resistant materials. The other channels of the measuring system are flushed with reference gas. Within the complete analyzer section, the measuring chamber is fitted between the two parts of the casing.
- **Measuring head**
  The measuring head contains the two microflow sensors of the measuring and compensation circuits. These are fitted in a temperature-controlled aluminium block. A strong magnetic field is required to produce the measuring effect, and this results in interferences in the microflow sensors. To minimize this effect, the aluminium block with the preamplifier electronics is screened.

  The screening consists of a shielding cup and a restrictor board. the latter contains restrictors whose function is described in Chapter 3. The two parts are made of material with high permeability.

Reference gas path

The reference gas line is a restrictor which reduces the applied reference gas pressure such that a flow of 5 ... 20 ml/min results.

Remove the reference gas line as follows:

- Loosen the screwed joint of the reference gas line from the coupling and the analyzer section.
- Unscrew the reference gas line.

Assemble in the reverse order.



Warning

It is essential to make sure that no liquid or dust can enter the coupling or the reference gas line!

Warning

It is essential to make sure that no liquid or dust can enter the coupling or the reference gas line!

6.1.2 Dismantling the Analyzer Section

Removal of measuring head

- Disconnect the measuring head cable from its plug connection.
- Loosen socket screws and remove measuring head.
- Reassemble in the reverse order. It is essential to ensure that all O-rings are re-inserted!

Warning

The shield cup must not be removed from the measuring head!

Cleaning the measuring chamber

The measuring chamber is not usually susceptible to faults. If condensation is passed through the analyzer as a result of a fault in the gas conditioning, there is a temporary fault in the measurement (highly oscillating display), but the **OXYMAT 61** is ready for measuring again once the measuring chamber has dried out. However, one of the inlets for the reference gas could become blocked in the case of extremely high contamination, and the measurement will then fail (extremely large variations in measured-value display). In such a case, clean the measuring chamber as follows:

- Remove measuring head according to Section ”Removal of measuring head”.
- Clean the measuring chamber by passing compressed air into it. The compressed air passes through the sample gas outlet and through the reference gas channels in the upper part of the casing.

  You can also flush the measuring chamber with trichloroethylene or alcohol. Subsequently dry it with a flow of dry gas.
- Replace the measuring head.

If the cleaning procedure described above does not lead to the desired result, you must remove the measuring chamber and clean it in an ultrasonic bath. It may also be necessary to replace the measuring chamber.

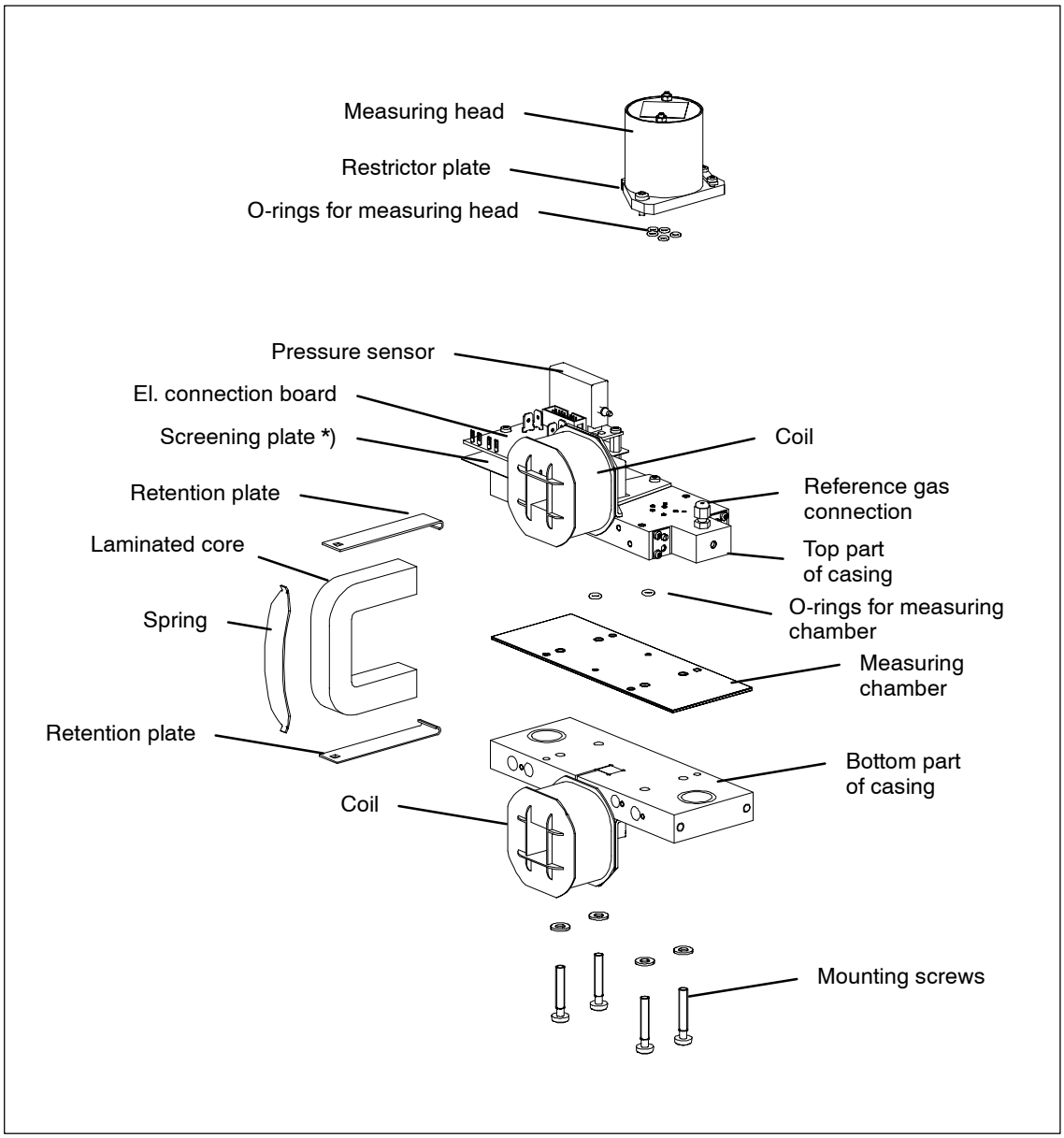


Fig. 6-1 **OXYMAT 6** analyzer section

Removal of analyzer section in rack-mounted analyzer

Proceed as follows:

- Pull out the magnetic field cable from the connector on the magnetic field connection board.
- Unscrew the reference gas inlet pipe from the analyzer section.
- Disconnect hoses at appropriate position.
- Dismount the analyzer section together with the retention plate and take out of the analyzer (together with the sample gas lines in the case of the piped version).
- Dismount analyzer section from retention plate.
- Unscrew sample gas lines from analyzer section.

Removal of measuring chamber

Proceed as described below:

- Remove measuring head according to Section ”Removal of measuring head”.
- Insert a suitable tool (e.g. screwdriver) between the retention plate and the laminated core (U-shaped core) and push out the plate until the tension spring is released.
- Remove the laminated core and the retention plate.
- Loosen the four mounting screws and pull the two parts of the casing apart.

The measuring chamber is now accessible and can be removed.

Reassemble in the reverse order.

The following must be observed:

- Check all O-rings, and replace if damaged.
- Tighten the mounting screws in a diagonally opposite sequence with a torque of 6 Nm.

Calibration

Following replacement of a measuring head or reassembly of the analyzer section it is necessary to recalibrate the analyzer as described in Section 5.2.2 ”Calibration”.

Leak test

Each maintenance operation or servicing measure concerning the analyzer section or gas path must be followed by a leak test as described in Section 4.2.2.

If the leak test leads to a negative result, replace all gaskets and hoses or pipes.

6.1.3 Adjustment of Reference Gas Pressure Switch (3000 ... 4000 hPa)

To adjust the reference gas pressure switch, connect an appropriate manometer to the sample gas inlet via a T-piece. A hexagon nut is located between the pressure switch contacts to permit adjustment of the pressure switching point. Adjust as follows:

- To increase the switching point, rotate the nut in the clockwise direction until the switching contact opens (check using a continuity tester) at a defined pressure (read on the monitor).
- The lower switching point can be determined by reducing the pressure until the contact closes (lower switching point). A hysteresis of < 800 hPa (0.8 bar) is present between the top and bottom switching points.
- The pressure switch can be loaded up to 0.6 MPa (6 bar).

6.1.4 Removal of Sample Gas Restrictor

The sample gas restrictor must be removed if it is blocked by condensation or if it must be disconnected for other reasons (e.g. when using the **OXYMAT 61** in certain test setups together with **ULTRAMAT 6** analyzers). Proceed as follows:

Hosed version of analyzer (rack-mounted analyzers)

If a flowmeter (option) is not present, the sample gas restrictor is located in the sample gas hose between the pipe inlet coupling and the analyzer section or – with the flowmeter present – between this and the analyzer section. The restrictor is secured using a hose clamp.

Remove as follows:

- Loosen the hose section containing the restrictor.
- Remove the restrictor clamp.
- Push the restrictor out of the hose using a suitable tool (rod or similar).

6.2 Replacement of Motherboard and Option Board

The motherboard and option board can be fitted or replaced simply.

Removal of motherboard

Proceed as follows:

- Disconnect analyzer from power supply.
- Unscrew housing cover and remove.
- Disconnect data plug from rear panel.
- Unscrew the three M3 screws located between the plugs.
- Disconnect plugs of ribbon cables from the motherboard.
- Remove motherboard.

Removal of option board

Proceed in the same manner as for the motherboard. In contrast to the latter, the option board is only secured to the rear panel using two screws.

Installation

Install the two boards in the reverse order.

6.3 Replacement of Fuses



Warning

Disconnect the analyzer from the power supply before replacing fuses!

In addition, the information described in Section 1.5 concerning operating/maintenance personnel applies.

The analyzer has several fuses whose ratings depend on various conditions (e.g. analyzer version, mains voltage, heater).

You can obtain the appropriate fuse values from the spare parts list (Section 7, item O2.4).

Voltage	Fuse rating
200 ... 240 V	0.63 T/250
100 ... 120 V	1 T/250

Table 6-1 Fuse ratings in Amps

Fuses F3, F4

The fuses are located in a drawer above the mains socket. To replace the fuses, lever out the drawer using a screwdriver and pull out.

6.4 Cleaning the Analyzer

Surface

The front panel can be washed. Clean using a sponge or cloth soaked in water contained cleansing agent. The surface of the display area in particular must only be cleaned using a slight pressure to prevent damage to the thin foil. Make sure that no water enters the analyzer when cleaning.

Caution
The control panel (keyboard and window) of analyzers used in potentially explosive atmospheres must only be cleaned using a moist cloth.

Interior

If necessary, the inside can be carefully blown out using a compressed air gun after opening up the analyzer.

6.5 Maintenance Request and Fault Messages

The **OXYMAT 61** is able to recognize irregularities in the functions. These appear either as a ”Maintenance request” or a ”Fault” in the status line. These are recorded in the **logbook** (*function 3*) at the same time and can also be called from there. A corresponding report is acknowledged by pressing a key next to it. However, this appears again if the cause has not been eliminated.

If a new message occurs, the report stored in the logbook is shifted by one memory location. A total of 32 locations are available, and the oldest of the 32 reports is deleted when a new report occurs. A power failure deletes all reports.

Function 60 can be used to switch off the logbook or also to delete the messages present in it.

The output of messages can be particularly inconvenient during test runs. They can therefore be switched off using *function 87*. It is not recommendable to use this facility during normal operation.

Maintenance request

If references to modifications of device-internal parameters occur, “Maintenance request” is output in the status line of the display. Such modifications need not influence the measuring ability of the analyzer at the time they occur. However, to guarantee reliable measurement in the future, it may be necessary to carry out remedial measures.

If the relay output of the analyzer has been configured accordingly (see also Section 5, *function 71*), it is also possible to output a signal.

6.5.1 Maintenance Request

The following error messages necessitate a maintenance request (output in display) and are signalled externally if a corresponding relay has been configured using *function 71*.

Maintenance requests can be individually deactivated using *function 87*.

No.	Error message	Possible causes	Remedy	Remarks
W1	Calibration tolerance violated	Calibration gas has been replaced	Repeat calibration	See also *function 78* for calibration tolerance. Drift of analyzer according to technical data: zero: 1% of full-scale value/week, sensitivity: 1% of full-scale value/week.
		Drift response	Check whether drift is normal	
W2	Signal voltage too high with zero adjustment	Reference gas contains too much oxygen	Check reference gas	Zero gas and reference gas should be identical
W3	Signal voltage too low with sensitivity adjustment	Calibration gas contains too little oxygen	Check calibration gas	
		Calibration gas flow too low	Check calibration gas flow and correct if necessary	
		An incorrect measuring range has been selected for the calibration	Select correct range	
W4	Set clock	Device has been switched off	New input of date and time	See *function 58*
W5	Diagonal voltage of microflow sensor too large	Drift in one of the grid resistors	No immediate need for action	Order new measuring head if necessary

Continued ...

No.	Error message	Possible causes	Remedy	Remarks
W5	Temperature LCD too high or too low	Ambient temperature outside range specified in technical data: 5 °C ... 45 °C	Make sure that the ambient temperature is in the range 5 °C ... 45 °C	
W6	Temperature of analyzer section	Ambient temperature too high (≥45 °C)	Check ambient temp. (max. 45°C), especially with analyzers fitted in systems	
		Measuring head temperature too high (≥78 °C) (only applies to non-heated version)	Contact servicing department if necessary	
		If a lower setpoint temperature has been selected for a heated sample chamber, or if the heater has been switched off, the message W7 appears until the new setpoint temperature has been reached	**Not a fault!** Please wait until the analyzer section has cooled down to the new setpoint temperature.	
W7	Temperature of measuring head outside tolerance	Deviation from setpoint temperature greater than ±3 °C (see also S7)	If temperature remains constant: no immediate need for action; otherwise: contact servicing department	
W8	External maintenance request	Signal from outside	Check	*Function 72* must be configured accordingly

Table 6-2 Causes of maintenance requests

6.5.2 Faults

The faults listed below lead to a fault message (output in display) and are signalled externally if a corresponding relay has been configured using *function 71*. Immediate remedial measures must always be carried out here by qualified maintenance personnel.

Faults can be individually deactivated using *function 87*.

No.	Fault message	Possible causes	Remedy
S1	Parameter memory test unsuccessful	EEPROM contains incorrect or incomplete data in working area	1. Carry out RESET or switch the analyzer off and on again If error message S1 appears again: 2. Load user data (*function 75*) 3. Contact servicing department Leave analyzer in operation to assist troubleshooting by the servicing staff
S2	Magnetic field supply faulty	Ribbon cable connection interrupted	Check connection
		Motherboard faulty	Contact servicing department
S3	Microflow sensor faulty	One half of the grid has been destroyed	Replace measuring head or contact servicing department
S4	External fault message	External signalling	Check *Function 72* must be configured accordingly

Continued...

No.	Fault message	Possible causes	Remedy
S5	Temperature of analyzer section too high or too low	Ambient temperature outside range specified in technical data: 5 °C ... 45 °C	Make sure that the ambient temperature is in the range 5 °C ... 45 °C
		Measuring head temperature too high (≥80 °C) (only applies to non-heated version	Carry out restart (RESET) If unsuccessful, contact servicing department
		Temperature sensor faulty ⇒ Temperature rises above setpoint temperature	Carry out restart (RESET) If unsuccessful, contact servicing department
S7	Measuring head temperature outside tolerance	More than ±5 °C deviation from the setpoint temperature (75 °C or 91 °C), dependent on selected temperature of analyzer section	Replace measuring head or contact servicing department
S8	Signal of selected pressure sensor outside tolerance	Sample gas blocked at outlet (> 2000 hPa with internal or > 3000 hPa with external pressure sensor) or system pressure too high	**Caution** The internal pressure sensor will be destroyed if the system pressure exceeds 4000 hPa! 1. Eliminate flow resistance at analyzer outlet until the sample gas pressure is below 2000 or 3000 hPa again 2. or regulate the system pressure accordingly 3. Check for leaks (see Section 4.2.2 ”Preparations for Startup”) If leaks present: contact servicing department

Continued...

No.	Fault message	Possible causes	Remedy
S8	Signal of selected pressure sensor outside tolerance	Sample gas pressure too low (< 500 hPa) (0.5 bar)	Set system pressure to > 500 hPa (0.5 bar)
S9	Signal too large	Sample gas pressure >3000 hPa; O_2 concentration in range 2000 ... 3000 hPa bar too large	Reduce pressure or O_2 concentration or contact servicing department
S11	Reference gas supply failed	Reference gas line leaks, is interrupted or blocked	Check reference gas flow (see Section 4.2.2 ”Preparations for Startup”)
		Reference gas source empty	Connect new reference gas source
S12	Mains power supply	Mains voltage outside tolerance	Mains voltage must be within tolerance limits specified on rating plate
S14	Measured value greater than full-scale value (+5%)	Sample gas pressure exceeds pressure correction range of 2000 or 3000 hPa	Check sample gas pressure and reduce if necessary or switch over to an external pressure sensor with a suitable measuring range
		Incorrect calibration of measuring range	Repeat calibration, and check calibration gas if necessary
S16	Sample gas flow too low		Ensure that the flow is sufficiently high

Table 6-3 Causes of fault messages

6.5.3 Further Errors

In addition to the error messages recorded in the logbook, the following effects can lead to an unsteady display:

Cause	Remedy
Unsteady sample gas flow	A damping unit must be fitted into the sample gas line
Pressure surges or variations in the sample gas outlet	Route sample gas outlet separate from the outlets of the other analyzers and/or fit a damping unit into the sample gas outlet.
Sample chamber is contaminated; typically occurs if condensation has inadvertently entered the measuring chamber	Clean measuring chamber (see Section 6.1.2 ”Dismantling the Analyzer Section”)
Sample gas flow is too large (> 1 l/min). Turbulences occur in the measuring chamber.	Restrict the sample gas flow to ≤ 1 l/min
Excessive vibrations at mounting location	Change magnetic field frequency and/or increase electric time constant.
Occurrence of sporadic spikes	See also *function 76*; contact servicing department if necessary
Fluctuations in output signal	Change the magnetic field frequency
Green LED at rear (rack-mounted analyzer) or underneath the cassette (wall mount analyzer) flashes at a specific cyclic interval (not regular flashing)	Contact servicing department

Table 6-4 Causes of unstable measured-value display

Spare Parts List

7

7.1 General 7-2
7.2 Analyzer Section 7-4
7.3 Electronics 7-6
7.4 Gas Path 7-8

7.1 General

Diese Ersatzteilliste entspricht dem technischen Stand Oktober 2001.

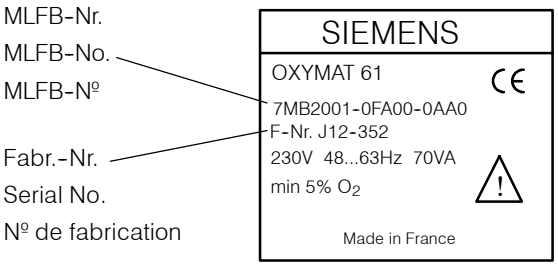
Am Typenschild ist das Baujahr des Gasanalysengerät (verschlüsselt) aufgeführt.

This Parts List corresponds to the technical state of October 2001.

The rating plate shows the year of construction (coded) of the gas analyzer.

Cette list de pièces de rechange correspond au niveau technique de'l Octobre 2001.

La plaque signalétique de l'analyseur indique l'année de fabrication (codifié) de l'appareil.



Hinweis für die Bestellung

Die Ersatzteilbestellung muß enthalten:

1. Menge
2. Bezeichnung
3. Bestell-Nr.
4. Gerätename, MLFB und Fabr.-Nr. des Gasanalysengerätes, zu dem das Ersatzteil gehört.

Ordering instructions

All orders should specify the following:

1. Quantity
2. Designation
3. Order No.
4. Name of gas analyzer MLFB-No. and Serial No. of the instrument to which spare part belongs.

Indications lors de la commande

La commande de pièces de rechange doit comporter:

1. Quantité
2. Désignation
3. Nº de réferénce
4. Nom, type et Nº de fabrication de l'analyseur de gaz pour lequel est destiné la pièce de rechange.

Bestellbeispiel:

2 Meßköpfe
C79451-A3460-B25
für OXYMAT 61
Typ 7MB2001-0FA00-0AA0
Fab.-Nr. J12-352

Example for ordering:

2 Measuring heads
C79451-A3460-B25
for OXYMAT 61
type 7MB2001-0FA00-0AA0
Serial No. J12-352

Exemple de commande:

2 têtes de mesure
C79451-A3460-B25
pour OXYMAT 61
type 7MB2001-0FA00-0AA0
Nº de fab. J12-352

Wir haben den Inhalt der Druckschrift auf die Übereinstimmung mit der beschriebenen Hard- und Software geprüft. Dennoch können Abweichungen nicht ausgeschlossen werden, sodaß wir für die vollständige Übereinstimmung keine Gewähr übernehmen. Die Angaben in dieser Druckschrift werden jedoch regelmäßig überprüft, und notwendige Korrekturen sind in den nachfolgenden Auflagen enthalten. Für Verbesserungsvorschläge sind wir dankbar.

We have checked the contents of this manual for agreement with the hardware and software described. Since deviations cannot be excluded entirely, we cannot guarantee full agreement. However, the data in this manual are reviewed regularly and any necessary corrections are included in subsequent additions. Suggestions for improvement are welcomed.

Nous avon vérifié la concordance du contenu de ce document avec les charactéristiques du matériel et du logiciel. Toutefois des divergences ne sont pas à exclure ce qui ne nous permet pas de garantir une conformité intégrale. Les informations contenues dans ce document sont régulièrement vérifiées, et les indispensables corrections apportées dans les éditions suivantes. Nous vous remercions pour toutes propositions visant à améliorer la qualité de ce document.

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Sous réserve de modifications techniques

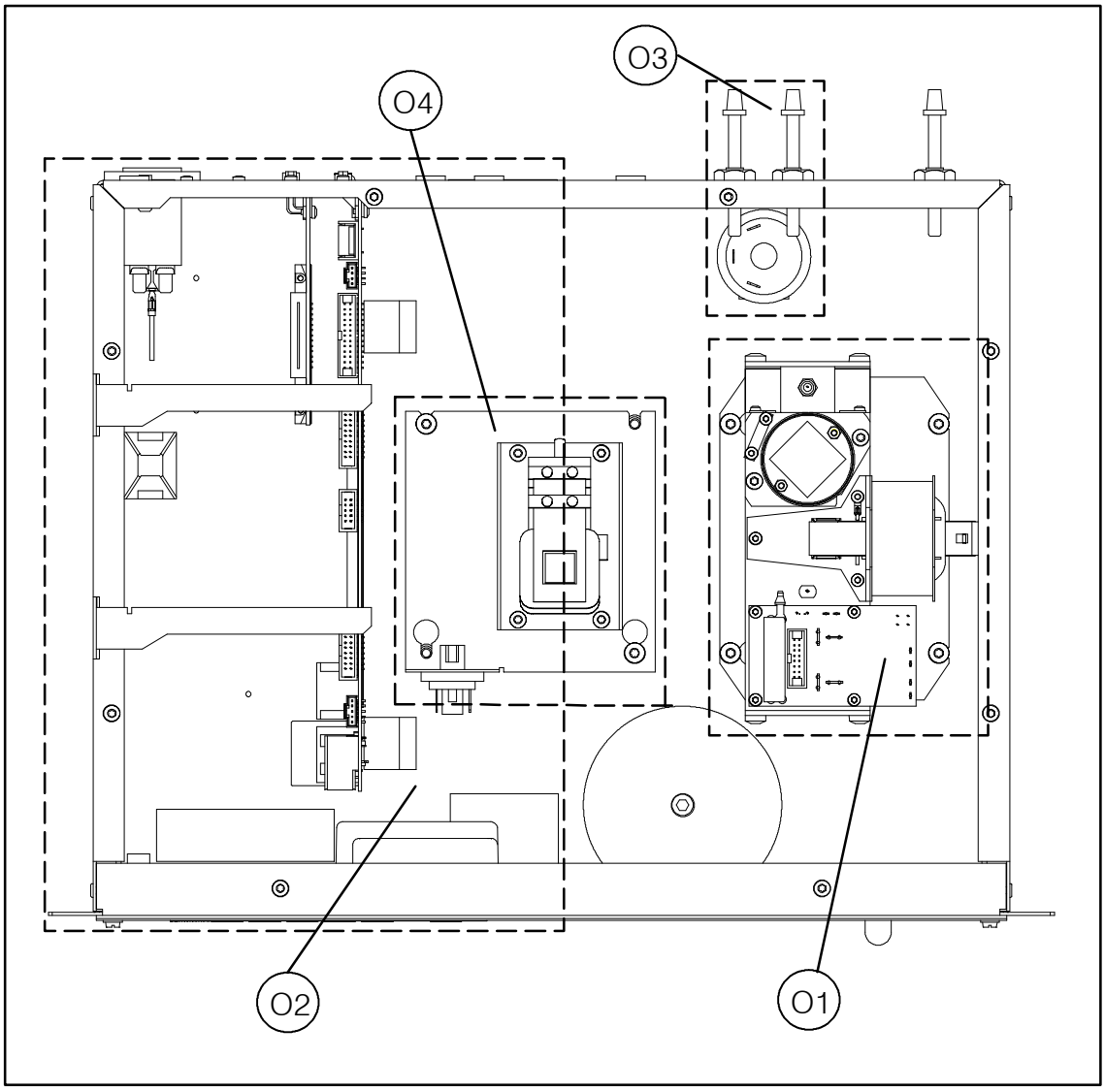
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Übersicht Baugruppen / Overview / vue d'ensemble

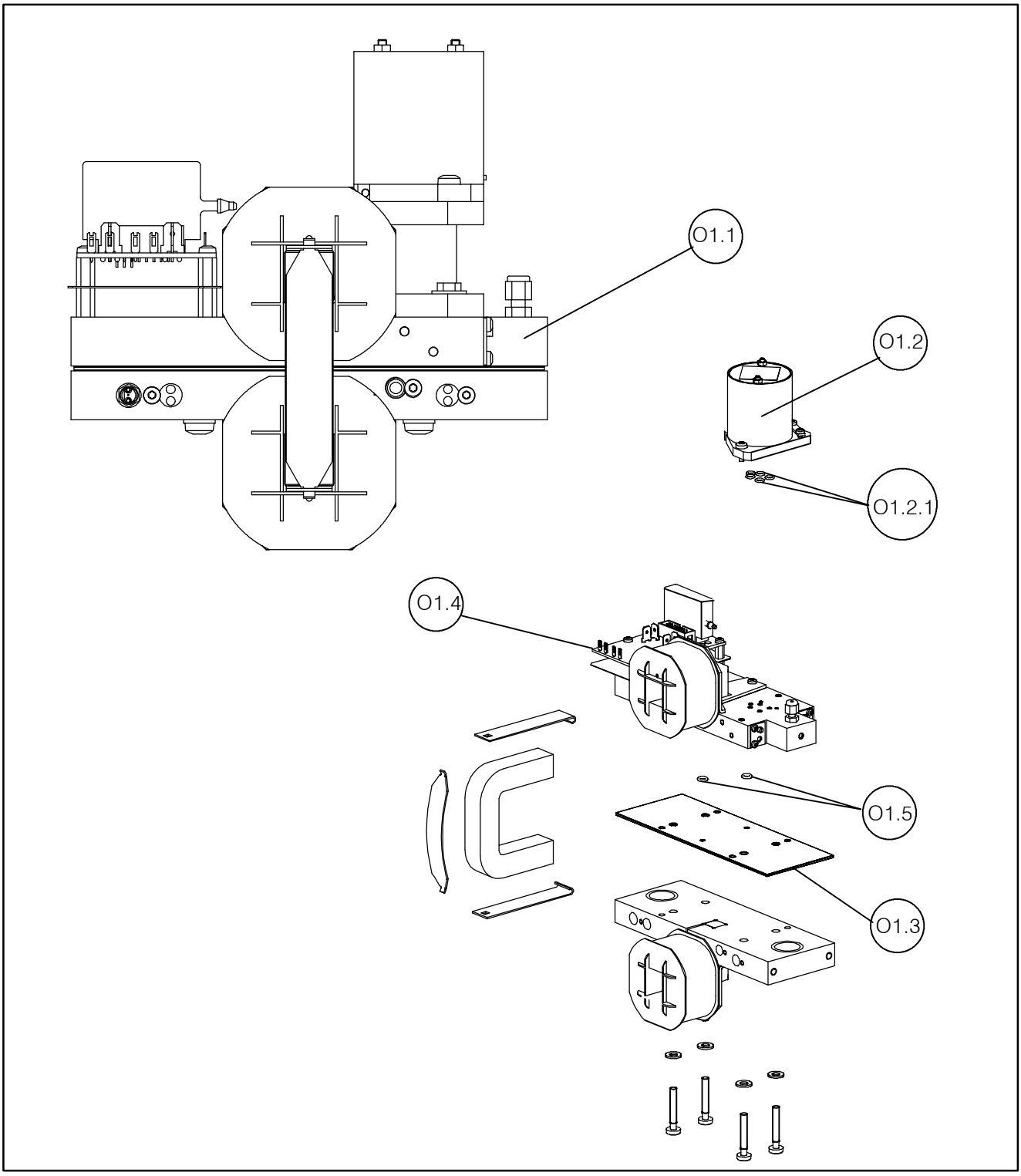
OXYMAT 61 (7MB2001)



O1	Analysierteil Analyzer section Partie analytique
O2	Elektronik Electronics Electronique
O3	Meßgasweg Hosing system for sample gas Circuit du gaz de mesure
O4	Vergleichsgasweg Hosing system for reference gas Circuit du gaz de référence

7.2 Analyzer Section

OXYMAT 61



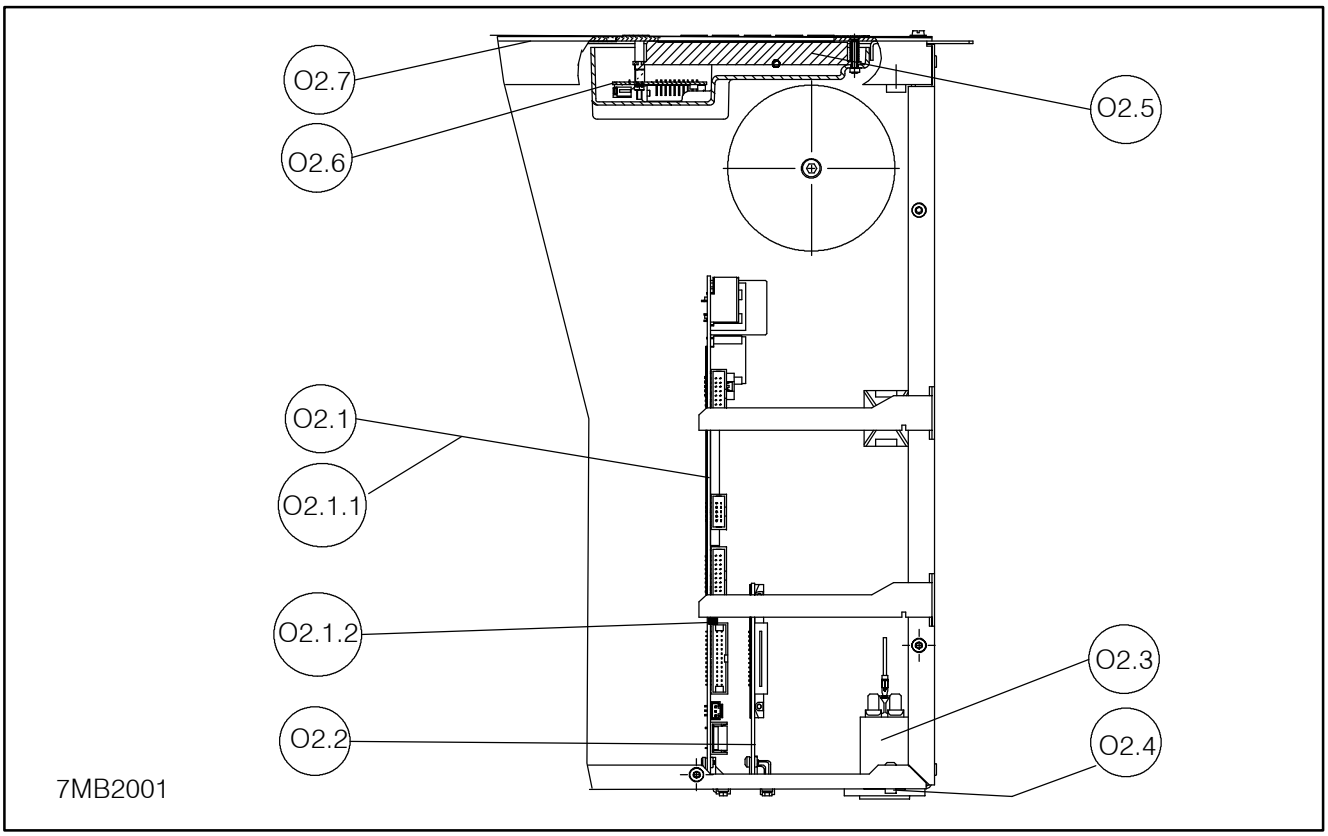
Bezeichnungen siehe Seite 7-5
Designation see page 7-5
Désignation voir page 7-5

Analysierteil / Analyzer section / Partie analytique

OXYMAT 61

Teil-Nr. **Part No.** **Pièce Nr.**	**Bezeichnung** **Designation** **Désignation**	**Bestell-Nr.** **Order No.** **Nr. de référence**	**Bemerkungen** **Remarks** **Remarques**
O1.1	Analysierteil komplett, W.-Nr. 1.4571 Analyzer section, mat. No. 1.4571 Partie analytique, Nr. du mat. 1.4571	C79451-A3460-B31	ohne beströmten Kompensationszweig without flow-type compensation side circuit de compensation fermé
O1.2	Meßkopf Measuring head Tête de mesure	C79451-A3460-B525	ohne beströmten Kompensationszweig without flow-type compensation side circuit de compensation fermé
O1.2.1	O-Ring O-ring Joint torique	C79121-Z100-A32	1 Stück 1 Part 1 Pièce
O1.3	Meßkammer, W.-Nr. 1.4571 Sample cell, mat. No. 1.4571 Cellule de mesure, Nr. du mat. 1.4571	C79451-A3277-B535	ohne beströmten Kompensationszweig without flow-type compensation side circuit de compensation fermé
O1.4	Magnetanschlußplatte Magnet connecting board Platine de raccordement de l'électro-aimant	C79451-A3474-B606	
O1.5	O-Ring, FKM (VITON) O-ring, FKM (VITON) Joint torique, FKM (VITON)	C71121-Z100-A159	1 Stück 1 Part 1 Pièce

7.3 Electronics



Bezeichnungen siehe Seite 7-7
Designation see page 7-7
Désignation voir page 7-7

Elektronik / Electronics / Electronique OXYMAT 61

Teil-Nr. Part No. Pièce Nr.	Bezeichnung Designation Désignation	Bestell-Nr. Order No. Nr. de référence	Bemerkungen Remarks Remarques
O2.1	Grundplatte Motherboard Carte életronique	C79451-A3480-D501	Grundplatte u. Firmware; deutsch Motherboard a. Firmware; german Carte électronique et Firmware; allemande
		C79451-A3480-D502	Grundplatte u. Firmware; englisch Motherboard a. Firmware; english Carte électronique et Firmware; anglais
		C79451-A348-D503	Grundplatte u. Firmware; französisch Motherboard a. Firmware; french Carte électronique et Firmware; français
		C79451-A3480-D504	Grundplatte u. Firmware; spanisch Motherboarda. Firmware; spanish Carte électronique et Firmware; espagnol
		C79451-A3480-D505	Grundplatte u. Firmware; italienisch Motherboard a. Firmware; italian Carte électronique et Firmware; italien
O2.1.1	Grundplatte ohne Firmware Motherboard without Firmware Carte électronique sans Firmware	C79451-A3474-B601	
O2.1.2	Firmware (FlashPROM)	C79451-A3480-S501 C79451-A3480-S502 C79451-A3480-S503 C79451-A3480-S504 C79451-A3480-S505	deutsch / german / allemande englisch / english / anglais französisch / french / français spanisch / spanish / espagnol italienisch / italian / italien
O2.2	Optionsplatte Option board Platine optional	C79451-A3480-D511	Relais Relays Relais
		A5E00057307	PROFIBUS PA PROFIBUS PA PROFIBUS PA
		A5E00057312	PROFIBUS DP PROFIBUS DP PROFIBUS DP
		A5E00057164	Firmware-Update Profibus Firmware update Profibus Mise à jour firmware Profibus
O2.3	Steckerfilter Plug with filter Prise avec filtre	W75041-E5602-K2	
O2.4	G-Schmelzeinsatz G-type fuse Fusible		
	T 0,63A / 250V T 1A / 250V	W79054-L1010-T630 W79054-L1011-T100	200V ... 240V 100V ... 120V
O2.5	LC-Display LC-Display carte d'áffichage de LC	W75025-B5001-B1	
O2.6	Adapterplatte, LCD/Tastatur Connection board Carte de connexion	C79451-A3474-B605	
O2.7	Frontplatte Front panel Plaque frontale	A5E00105014	mit Folien-Tastatur with sealed keyboard avec clavier à membrane

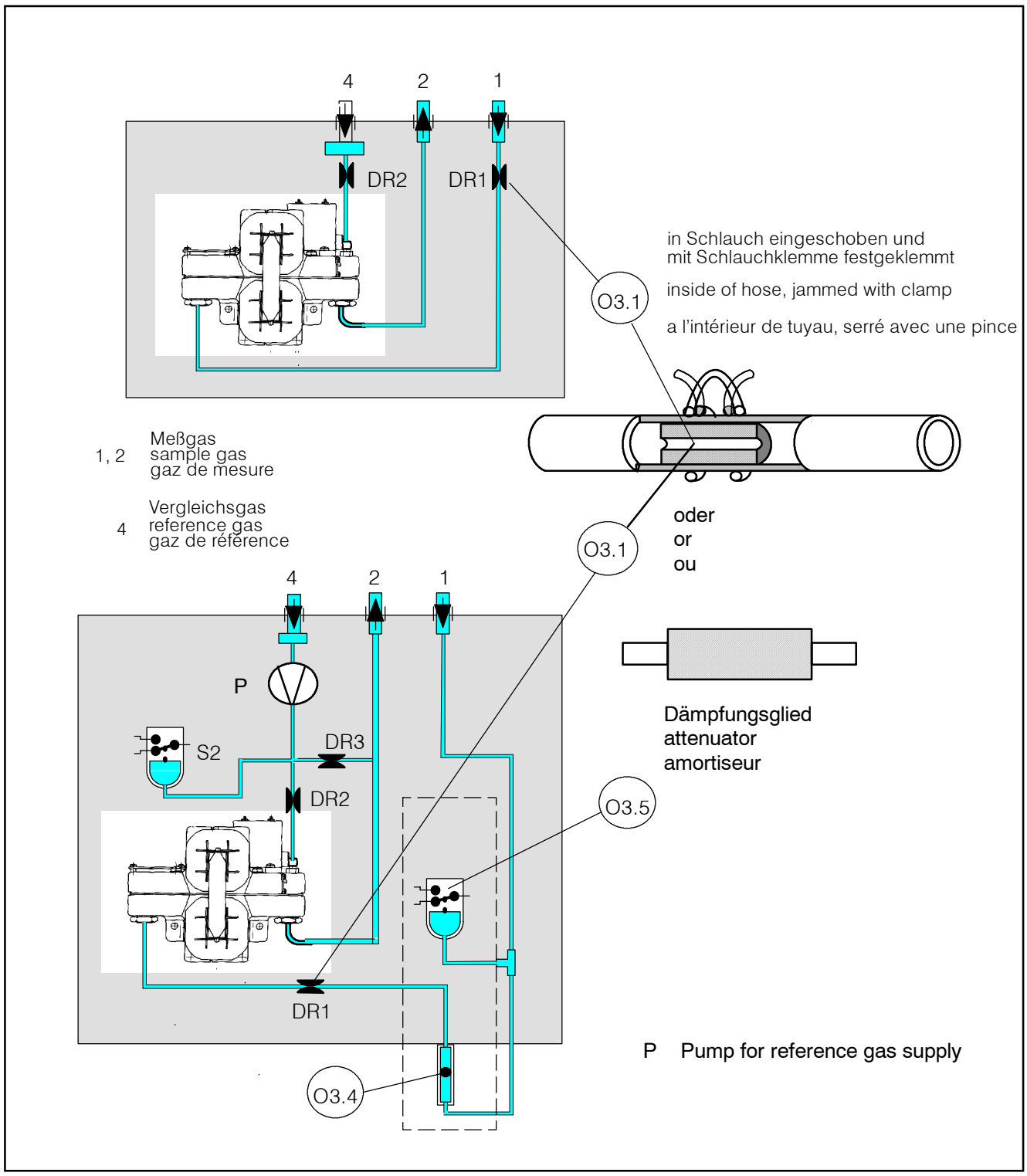
* beheizt / heated version / version chauffée

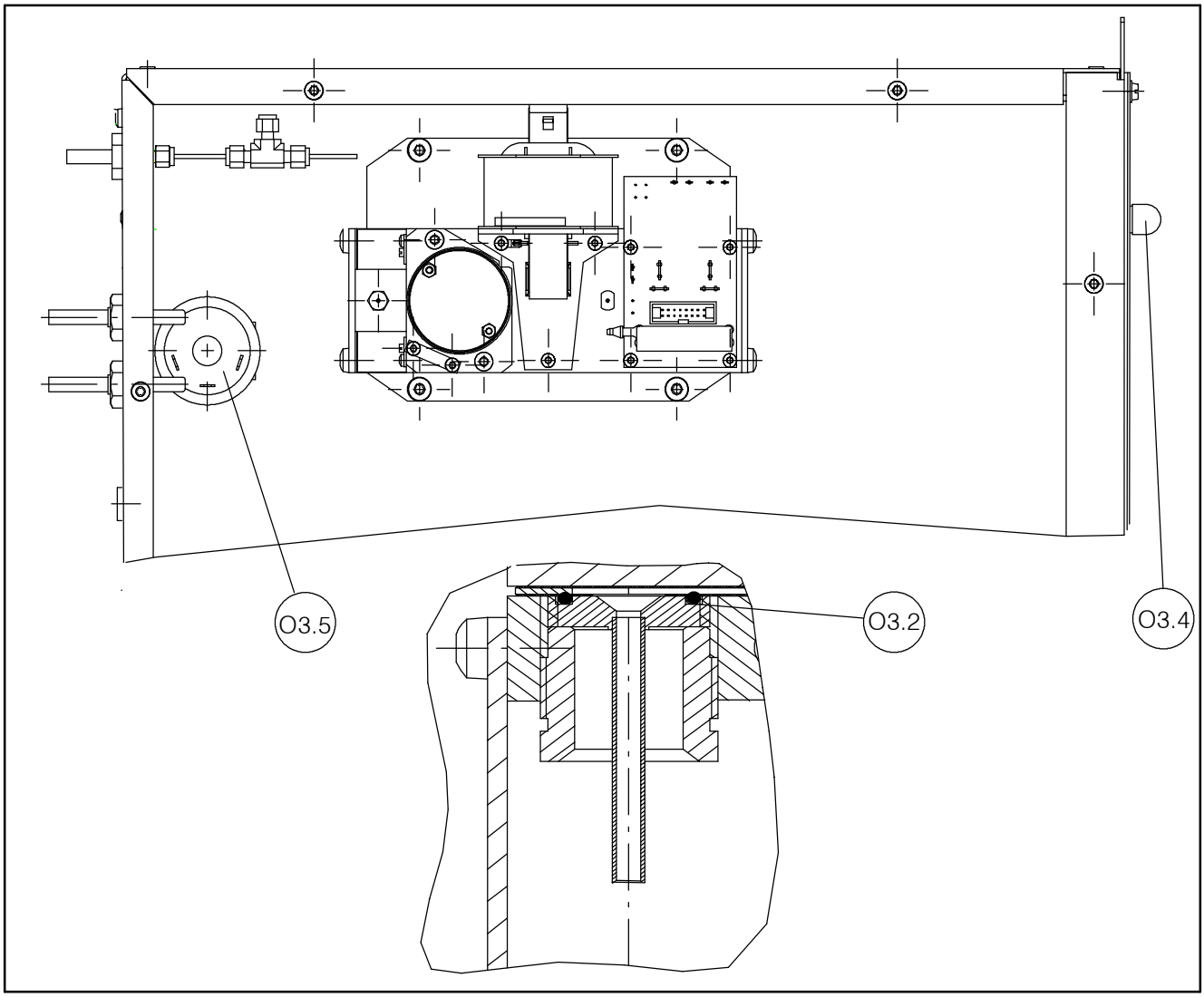
7.4 Gas Path

Gasweg, Schlauch

Hosing system for gas, hose

Circuit du gaz, tuyau souple





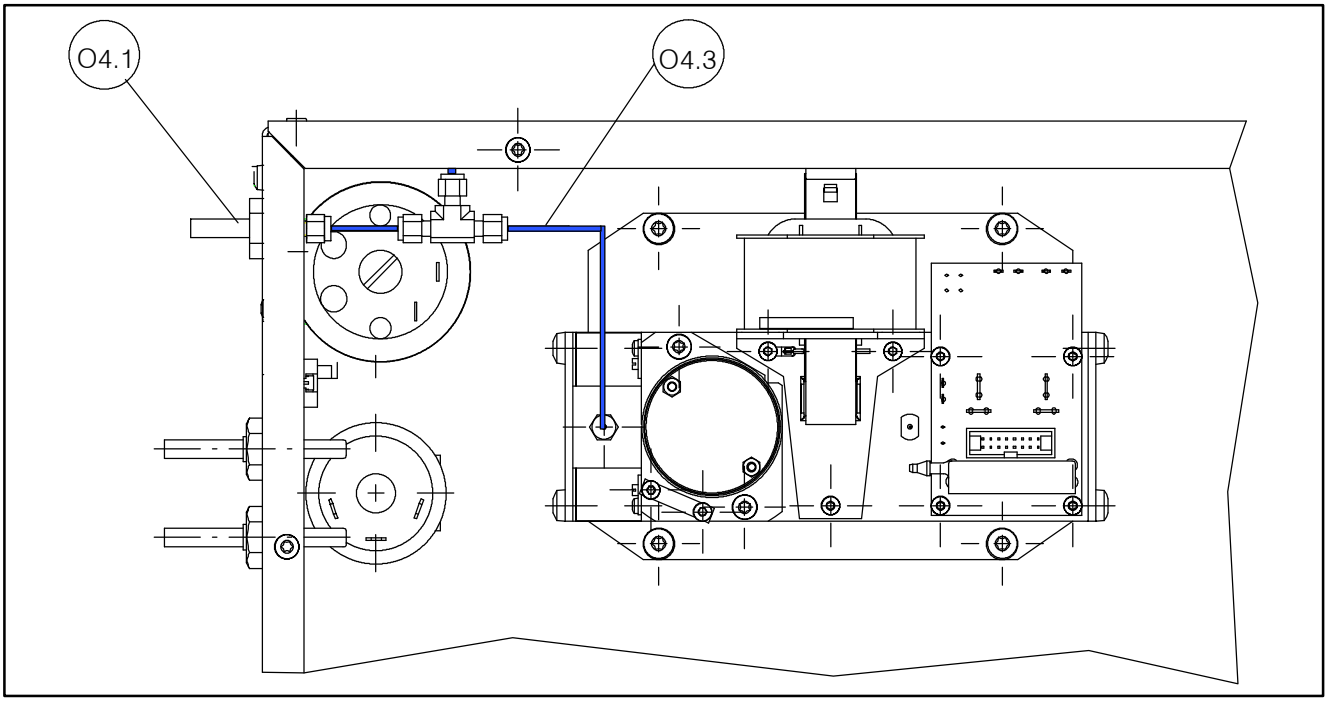
Teil-Nr. Part No. Pièce Nr.	Bezeichnung Designation Désignation	Bestell-Nr. Order No. Nr. de référence	Bemerkungen Remarks Remarques
O3.1	Drossel Restrictor Etranglement	C79451-A3480-C10	Gasweg Schlauch Hosing system for sample gas in plastic Circuit du gaz de mesure en tuyau
O3.1	Dämpfungsglied Attenuator Amortisseur	A5E00118236	Dämpfungsglied mit Schlauch Attenuator with hose Amortisseur avec tuyau
O3.2	O-Ring, FKM (VITON) O-ring, FKM (VITON) Joint torique, FKM (VITON)	C74121-Z100-A6	1 Stück 1 Parts 1 Pièces
O3.4	Strömungsmesser Flowmeter Débitmétre	C79402-Z560-T1	
O3.5	Druckschalter Pressure switch Pressostat	C79302-Z1210-A2	

Vergleichsgasweg

Hosing system for reference gas

Circuit du gaz de référence

OXYMAT 61, external reference gas supply 3000 ... 4000 hPa (3 ... 4 bar)



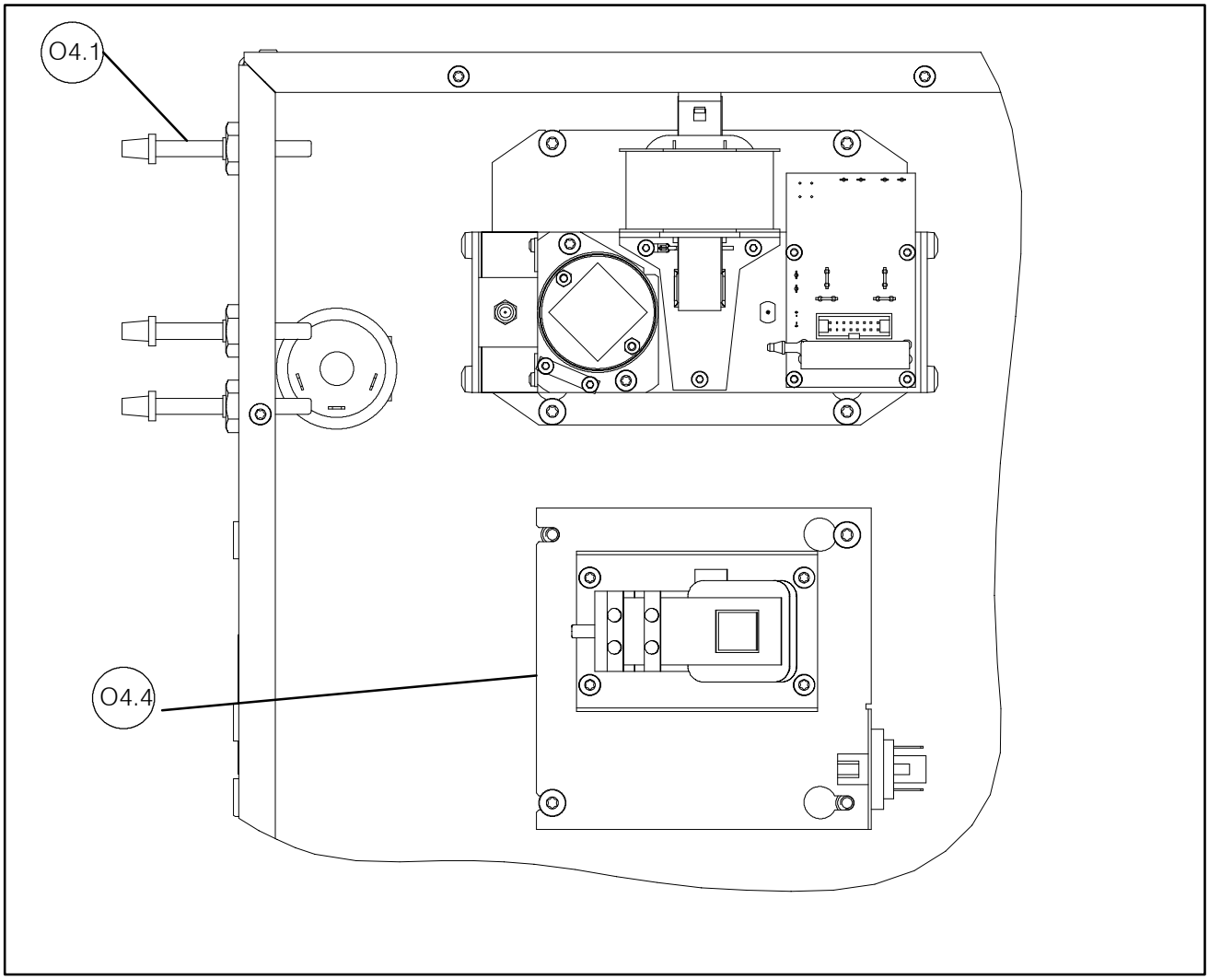
Bezeichnungen siehe Seite 7-11
Designation see page 7-11
Désignation voir page 7-11

Vergleichsgasweg

Hosing system for reference gas

Circuit du gaz de référence

OXYMAT 61, internal reference gas supply 700 ... 1200 hPa (0.7 ... 1.2 bar)



OXYMAT 61

Teil-Nr. **Part No.** **Pièce Nr.**	**Bezeichnung** **Designation** **Désignation**	**Bestell-Nr.** **Order No.** **Nr. de référence**	**Bemerkungen** **Remarks** **Remarques**
O4.1	Stutzen, kpl., 7MB2021 Connection, male Raccord mâle Stutzen, kpl., 7MB2021 Connection, male Raccord mâle	 C79451-A3480-B1 C79451-A3480-B2	Ø 6 mm, 3000 hPa Ø 6 mm, 3000 hPa Ø 6 mm, 3000 hPa 1/4“, 3000 hPa 1/4“, 3000 hPa 1/4“, 3000 hPa
O4.3	Kapillarrohr Capillary Capillaire	C79451-A3480-D518	3000 hPa, Rohr und Verschraubungsteile 3000 hPa, pipe and parts for connection 3000 hPa, tube et piéces pour raccordement
O4.4	Vergleichsgasversorgung	A5E00114838	Pumpenmodul mit Verschlauchung

Appendix

8

8.1 List of Abbreviations 8–2

8.2 Returned Deliveries 8–3

8.1 Safety Information

A	Ampere
EEPROM memory	Electrically erasable programmable read-only
e.g.	for example
EPROM	Erasable programmable read-only memory
fA	Femtoampere (10^{-15} Ampere)
GAL	Gate array logic, can be written once
He	Helium
H_2	Hydrogen
hPa	Hectopascal (1 hPa corresponds to 1 mbar)
IC	Integrated circuit
kΩ	Kiloohm
l	Liter
mA	Milliampere
max.	Maximum
mbar	Millibar
mg	Milligram
min	Minute
min.	Minimum
ml	Milliliter
mm	Millimeter
mΩ	Milliohm
MΩ	Megohm
mV	Millivolt
m^3	Cubic meter
No.	Number
Ω	Ohm
pA	Picoampere
pF	Picofarad
ppm	Parts per million
PTFE	Polytetrafluoroethylene (commercial name e.g. Teflon)
RAM	Random access memory
s	Second
V	Volt
vpm	Volume per million
°	Degree
°C	Degrees centigrade
”	Inch (1” = 25.4 mm)
>	Greater than
<	Less than
≧	Equal to or greater than
≦	Equal to or less than
Δ	Difference

8.2 Returned Deliveries

The gas analyzer or spare parts should be returned in the original packing material. If the original packing material is no longer available, wrap the analyzer in plastic foil and pack in a sufficiently large box lined with padding material (wood shavings or similar). When using wood shavings, the stuffing should be at least 15 cm thick on all sides.

When shipping overseas, the analyzer must be additionally sealed air-tight in polyethylene foil at least 0.2 mm thick with addition of a drying agent (e.g. silica gel). In addition, the transport container should be lined with a layer of union paper.

Please photocopy the form printed overleaf, fill in, and enclose with the returned device.
In case of guarantee claim, please enclose your guarantee card.

Addresses for Returned Deliveries

Spare parts service

- Please send your orders for spare parts to the following address:
  SIEMENS SPA
  CSC
  Tel.: (00333)88906677
  Fax: (00333)88906688
  1, chemin de la Sandlach
  F–67506 Haguenau
- DP order form receiver: 0011E

Repairs

To enable fast detection and elimination of faults, please return the analyzers to the following address until further notice:
SIEMENS SPA
CSC
Tel.: (00333)88906677
Fax: (00333)88906688
1, chemin de la Sandlach
F–67506 Haguenau

- DP order form receiver: 0011E

( ) Repair **( ) Guarantee**

Name of customer	
Address	
Person responsible	
Delivery address	
Telephone Fax E-Mail	
Address for returned delivery (if different from above)	
Customer (original) Order No.	
Siemens (original) order confirmation No.	
Device name	
MLFB No.	
Serial No.	
Designation of returned part	
Description of fault	
Process data at position of use	
Operating temperature	
Operating pressure	
Composition of sample gas	
Duration of use/ date of first use	

Repair report			
RH-Nr.:	Arrival date:	Ready:	Technician:

Do not fill in this block; for internal use only

Siemens AG
Automation & Drives Division
A&D Process Instrumentation Group
D-76181 Karlsruhe

Siemens Aktiengesellschaft

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