SIEMENS

FIDAMAT 5E gas analyzer for Measurement of Total Hydrocarbon Content 7MB1420

Instruction Manual

Order no. C79000-B5276-C106-04

Contents Page

Note

Your attention is drawn to the fact that the contents of this Instruction Manual 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. These warranty conditions in the contract are neither extended nor limited by the contents of this Instruction Manual.

Also note that for clarity reasons this Instruction Manual cannot describe every possible problem in conjunction with 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.

Terms with the following meanings are used in this Instruction Manual and in the warning information on the product:

Danger in the sense of this Manual and the warning information on the product itself means that death, severe personal injury and/or substantial damage to property *will occur* if the appropriate safety precautions are not observed.

Warning in the sense of this Manual and the warning information on the product itself means that death, severe personal injury and/or substantial damage to property *can occur* if the appropriate safety precautions are not observed.

Caution in the sense of this Manual and the warning information on the product itself means that slight personal injury and/or damage to property can occur if the appropriate safety precautions are not observed.

A **note** in the sense of this Manual is important information on the product or the respective part of the Manual to which particular attention should be paid.

1 Introduction

1.1 General

Warning! **Certain parts in this electrical device contain dangerous voltages during operation.**

Failure to observe the warnings could therefore result in severe personal injury and/or damage to property.

Only suitably qualified staff should work on this device or in its vicinity. These should be thoroughly familiar with all warnings and maintenance measures according to this Manual.

Correct and safe operation of this device is dependent on proper handling, installation, operation and maintenance.

This device has left the factory in a perfect condition as regards safety. The notes and warnings in this Manual must be observed by the user if this state is to be maintained and hazard-free operation of the device assured.

1.2 Staff Qualifications

A qualified person in the sense of this Instruction Manual and the warning information is one who is familiar with the installation, construction and operation of the device and who has the appropriate qualifications, e.g.:

– is trained and authorized to energize, de-energize, ground and tag circuits and devices in accordance with established safety practices;

– is trained in the proper care and use of protective equipment in accordance with established safety practices;

– is trained in first aid.

2 Application

The FIDAMAT 5E is an analyzer for measuring total hydrocarbons. It operates according to the principle of flame ionization.

The analyzer is suitable for measuring all gaseous hydrocarbons. A heated line must be used for the connection to prevent condensation and adsorption in the gas line.

Warning! **Explosive gas mixtures must not be measured using the FIDAMAT. The analyzer must not be used in potentially explosive atmospheres.**

Order No.	Analyzer type
7MB1420-1	FIDAMAT 5 rack-mounted unit and bench-top unit for emission measurements
7MB1420-0	FIDAMAT 5 rack-mounted unit and bench-top unit for ambient measurements
7MB1420-2	FIDAMAT 5 rack-mounted unit for measurements with H_2/He as combustion gas
7MB1420-4	FIDAMAT 5 rack-mounted unit for shed measurements

3 Design

The device is available either as a bench-top unit fitted in a housing, or without a housing for installation in a 19-inch rack or 19-inch cabinet.

The FIDAMAT comprises two main sections, the analyzer section and the electronics with front panel controls.

Analyzersection

The analyzer section consists of the oven with sample gas filter, detector chamber and various restrictors. The oven is accessible from the side to enable modifications or repairs to be carried out in the installed condition without loosening the electric connections or gas piping connections. The sample gas filter is accessible from the front when the front panel has been folded out.

The analyzer section also contains the diaphram pump with separate oven for the pump head. The pump can be dismounted from the front without having to open the oven.

The analyzer section also contains pressure regulators, solenoid valves, pressure sensors and a flow sensor.

Electronics

The electronics consist of the input board which is integrated into the front panel, the motherboard with preamplifier board and the control board.

The motherboard contains the EPROMs for the software, the EEPROM for the parameter sets and the switch for the write-protected area on the EEPROM.

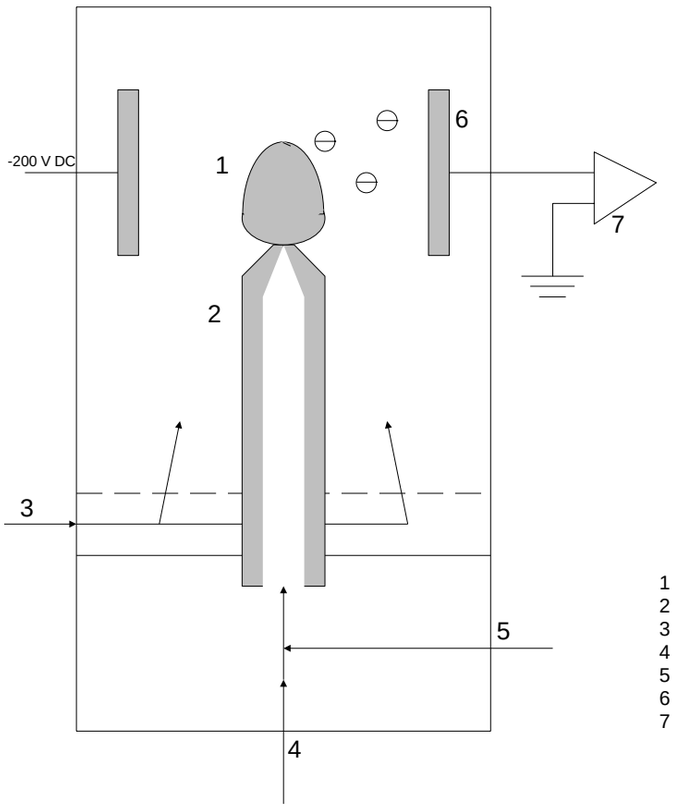
4 Mode of Operation

Electrons are released when hydrocarbons are combusted in a hydrogen flame. These electrons are collected at an electrode by means of an electric field and measured using a highly sensitive amplifier. The current is proportional to the quantity of organically-bound C atoms in the sample gas.

A diaphram pump draws the sample gas and generates a specific pressure. The sample gas is passed into the measuring chamber via an obstruction-resistant fused silica restrictor. The sample gas is mixed in the measuring chamber with hydrogen or hydrogen/helium (4:6) and with a specific amount of air and routed via the nozzle into the combustion chamber.

The hydrogen pressure is held constant by a pressure regulator. The balanced system of pump, restrictors and pressure regulators ensures that the sample gas pressure is kept constant.

The FIDAMAT operates largely automatically. If the parameters (pressures, temperatures) are set, the device starts up automatically when switched on and ignites when the setpoint temperature has been reached. The hydrogen and combustion air pressures are measured when switching on, and the control panel indicates if they are incorrectly set.



1 Flame
2 Quartz nozzle
3 Combustion air
4 Sample gas
5 H_2
6 Measuring electrode
7 Amplifier

Fig. 4 Principle of flame ionization detector

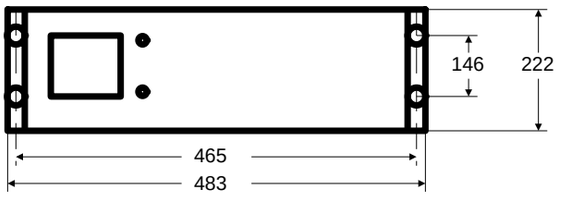
5 Technical Data

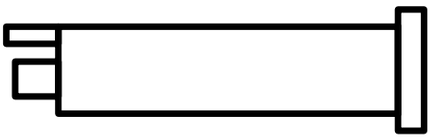
Number of measuring ranges	Max. 4, freely parameterizable
Switching ratio	Optional
Autoranging	Selectable Hysteresis: – Switchover to larger range at 90 % of span of smaller range – Switchover to smaller range at 80 % of span of smaller range
Output signals	At terminal strips X1, X2 and X3. A cable with a plug connector (Order No. W79070-U1610-M25) can be connected to these terminal strips
Analog	0/2/4 to 20 mA, max. resolution 0.1 %, max. load 750 Ω
Digital	RS232 serial interface as V.24 or TTY (20 mA)
Programming facilities (for setting of device-specific parameters using control panel)	Oven and pump temperatures, limits, measuring ranges, measured-value storage, time constant, 3-stage code for protection against unauthorized and unintentional use etc.
Device output	Floating contacts for: – Measure/calibrate signal – Ready/not ready signal – 4 selectable limit relays, max. 24 V/1 A, freely assignable to measuring ranges – 4 contacts for range identification, max. 24 V/1 A – Solenoid valve control, max. 24 V/1 A
Device input	4 floating contacts are required for range switching, span calibration, zero calibration, autocal
Measured-value display	Digital concentration display (5 digits with floating decimal point)
Resolution of digital display	0.1 % of measured value
Ripple of output signal	<0.5 % of 10 ppm C_1 with 5E-E
Noise	<0.5 % of 10 ppm C_3 with 5E-E <0.5 % of 10 ppm C_3 with 5E-A and 5E-AS <0.5 % of 10 ppm C_1 with 5E-I
Detection limit	0.1 ppm C_1 with 5E-E 0.1 ppm C_1 with 5E-A and 5E-AS 0.1 ppm C_1 with 5E-I

Repeatability	0.1 to 1 % of full-scale value, range-dependent
Characteristic	Linearization error <1 % of f.s.v.
Long-term drift	
Zero	
5E-E	<2 % of span/week with f.s.v. >10 ppm C_1, range-dependent
5E-A,5E-AS	<2 % of span/week with f.s.v. >10 ppm C_3, range-dependent
5E-I	< 2 % of span/day with f.s.v. 2 ppm C_1, range-dependent
Span	As for zero
Response time (T_{90} time) with time constant 0 s, set using function 13	<1 s without filter 2 to 3 s with filter
Warm-up time	Approx. 2 to 3 hours
Analyzer chamber temperature	110 to 200 °C, freely-selectable
Permissible storage temperature	–30 to +70 °C
Permissible ambient temperature (operation)	5 to 45 °C
Inlet pressure for hydrogen, combustion air, zero gas and calibration gas(es)	3 bar (45 psig) above atmospheric pressure
Position of use	Front panel vertical
Change in display through influencing variables	
Mains voltage variations (+10, -15 %)	<1 % of measured value
Ambient temperature variations	<1 % of measured value/10 K
Atmospheric pressure variations	<1 % of measured value /50 mbar
Frequency variations	<1 % of measured value for the permissible frequency range
Influence of position	<1 % of measured value with inclination <15°
Power supply	
Mains connection	AC 110, 120, 220, 230, 240 V, 48 to 63 Hz
Power consumption	Approx. 350 VA in start-up phase, approx. 150 VA during operation
Degree of protection	
Rack-mounted unit	IP 20 to DIN 40050
Bench-top unit	IP 21 to DIN 40050
Dimensions	See dimensional drawing
Weight	28 kg
Material of parts in contact with sample gas	PTFE, quartz (nozzle, fused silica), graphite (gaskets), stainless steel 1.4571 (316 SS)

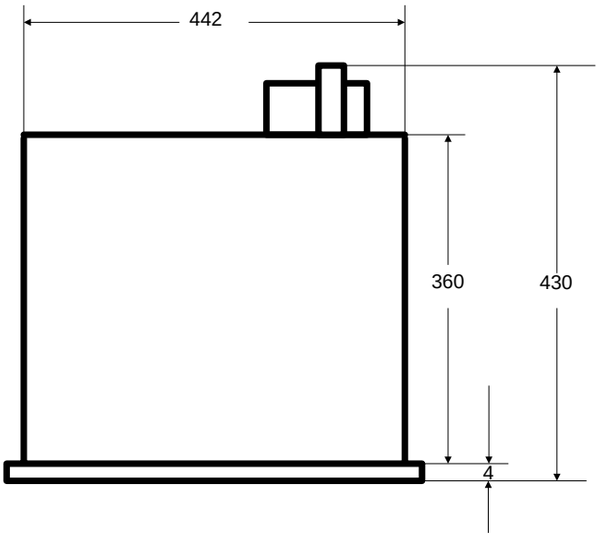
Gas consumption data	
5E-E	
Combustion gas	Approx. 350 ml/min (approx. 21 l/h)
Hydrogen	Approx. 20 ml/min (approx. 1.2 l/h)
Sample gas	Approx. 1 l/min (approx. 60 l/h)
Zero gas/calibration gas	Approx. 2 l/min (approx. 120 l/h)
5E-A (sample gas at standard pressure)	
Combustion gas	Approx. 350 ml/min (approx. 21 l/h)
Hydrogen/helium	Approx. 110 ml/min (approx. 6.6 l/h)
Sample gas	Approx. 1 l/min (approx. 60 l/h)
Zero gas/calibration gas	Approx. 2 l/min (approx. 120 l/h)
5E-AS	
Combustion gas	Approx. 350 ml/min (approx. 21 l/h)
Hydrogen/helium	Approx. 110 ml/min (approx. 6.6 l/h)
Sample gas	Approx. 1 l/min (approx. 60 l/h)
Zero gas/calibration gas	Approx. 2 l/min (approx. 120 l/h)
5E-I	
Combustion air:	None
Hydrogen	Approx. 30 ml/min (approx. 1.8 l/h)
Sample gas	Approx. 1 l/min (approx. 60 l/h)
Zero gas/calibration gas	Approx. 2 l/min (approx. 120 l/h)
Oxygen cross-sensitivity	5E-E: Approx. 30 ppm C_1
Length	Max. 30 m
Temperature	140 to 200 ˚C, freely-selectable
Power consumption (operation)	Approx. 150 VA
Power consumption (startup)	Approx. 350 VA

FIDAMAT 5E rack-mounted unit





Caution: Only mount FIDAMAT 5E on sliding rails or angled rails



Sample gas connection:

6 mm screw connection or
8 mm screw connection or
1/4" screw connection

Sample gas outlet:

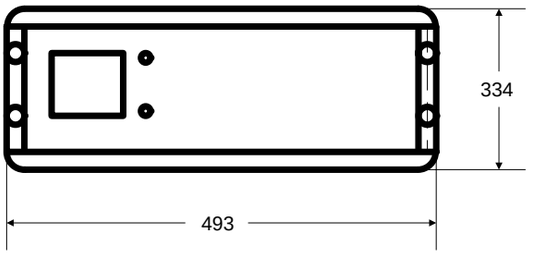
8 mm PVDF screw connection

Auxiliary gas connections:

6 mm screw connection or
1/4" NPT or
1/4" screw connection

All measures are in mm!

FIDAMAT 5E bench-top unit



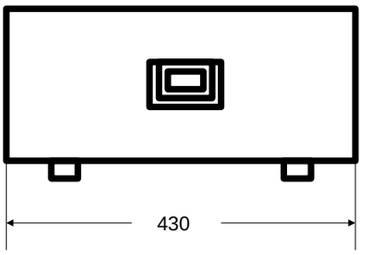


Fig. 5.1 Dimension drawings

6 Installation

6.1 Mounting

The FIDAMAT 5E should be installed or mounted in a vibration-free location.

Warning!

The device must not be used to measure explosive gases. Operation in potentially explosive atmospheres is not permitted. The permissible ambient temperature (Section 5, Technical Data) must be observed during operation.

The FIDAMAT 5E must only be mounted on sliding rails or angled rails.
See Section 5 for dimensional drawings.

6.2 Gas Supply

Warning!

When measuring toxic gases, the exhaust gas must be routed such that there is no danger to the environment. Gases which may lead to explosive mixtures must not be measured using the FIDAMAT.

A gas-tight hose or steel piping can be used for the sample gas inlet and outlet depending on the application, and must be connected leak-free to the gas connection.

The sample gas is drawn in by the diaphram pump (approx. 1 l/min) and should be available at atmospheric pressure if at all possible. The device can also be operated with a constant pressure above or below atmospheric of up to 100 mbar.

Note! **The useful life of the pump diaphram may be significantly reduced if the sample gas line is closed and the pump generates a vacuum.**

The minimum input pressure down to which a measurement is still possible is approx. 850 mbar abs. for the FIDAMAT 5E-E and 5E-I and 600 mbar abs. for the FIDAMAT 5E-A.

The exhaust line from the FIDAMAT 5E must always be routed with a downward gradient since water condenses in it. The internal diameter should not be less than 8 mm (the connection is provided for a hose 8 x 1 (10 mm external diameter)).

In order to measure emissions it may be necessary to use a sample gas probe, sampling line and an additional filter (see accessories in Section 10). The FIDAMAT 5E contains two control circuits to heat these components. The heaters of these accessories must be powered externally (see Section 6.3).

The supply gases (hydrogen, combustion air, zero gas and calibration gas(es)) must be available with an inlet pressure of 3 bar above atmospheric. A higher zero gas and calibration gas pressure leads to an increased consumption, a lower pressure may lead to an incorrect measurement since additional sample gas may be drawn in.

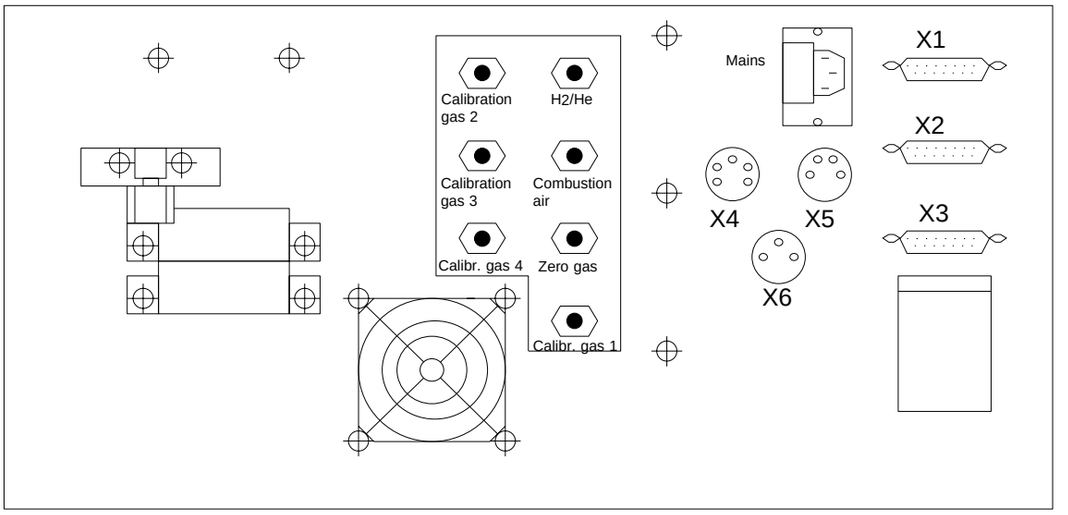


Fig. 6.1 Rear panel of FIDAMAT 5E

6.3 Electric Connections

Warning!

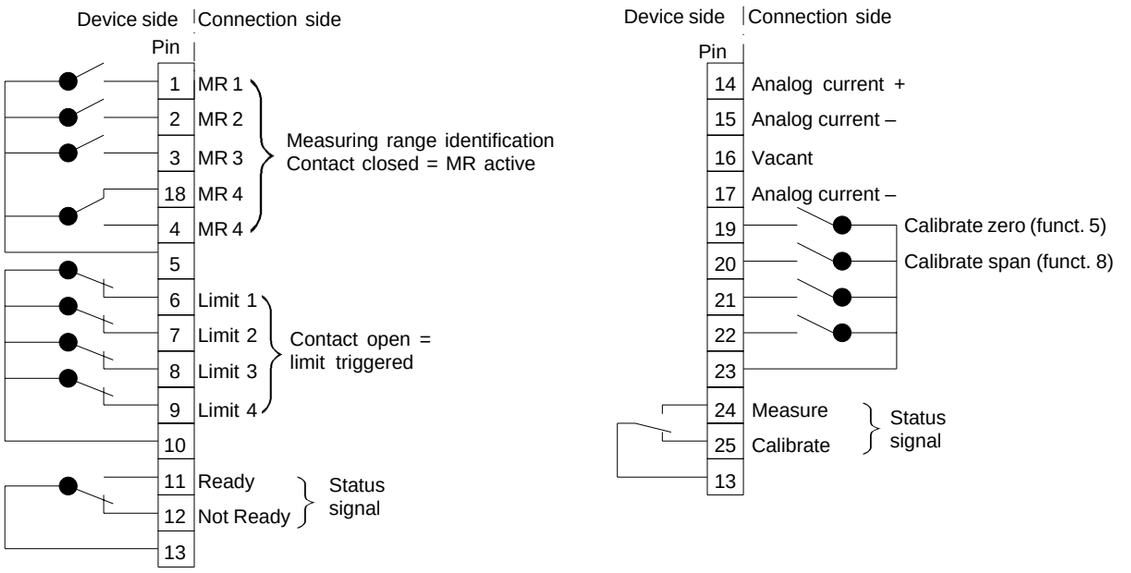
The following must be observed for the electric connections:
VDE 0100 “Regulations for the installation of power systems with mains voltages below 1000 V”.
A mains disconnection device must be provided in the building installation (see rating plate for loading capacity).

– Check that the local power supply agrees with that specified on the rating plate on the device.

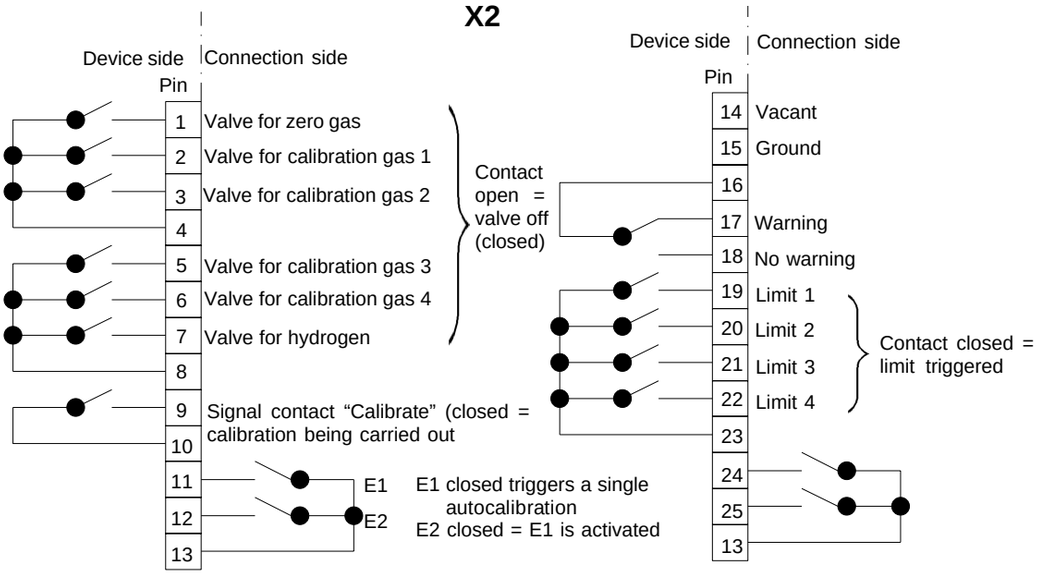
– The required signal cables must be connected to the 25-pin trapezoidal plugs X1, X2 and X3 and the 5-pin round plugs X4, X5 and X6 according to the pin assignment diagram.

Pin assignment diagram FIDAMAT 5E-E

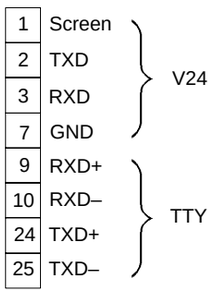
X1



X2

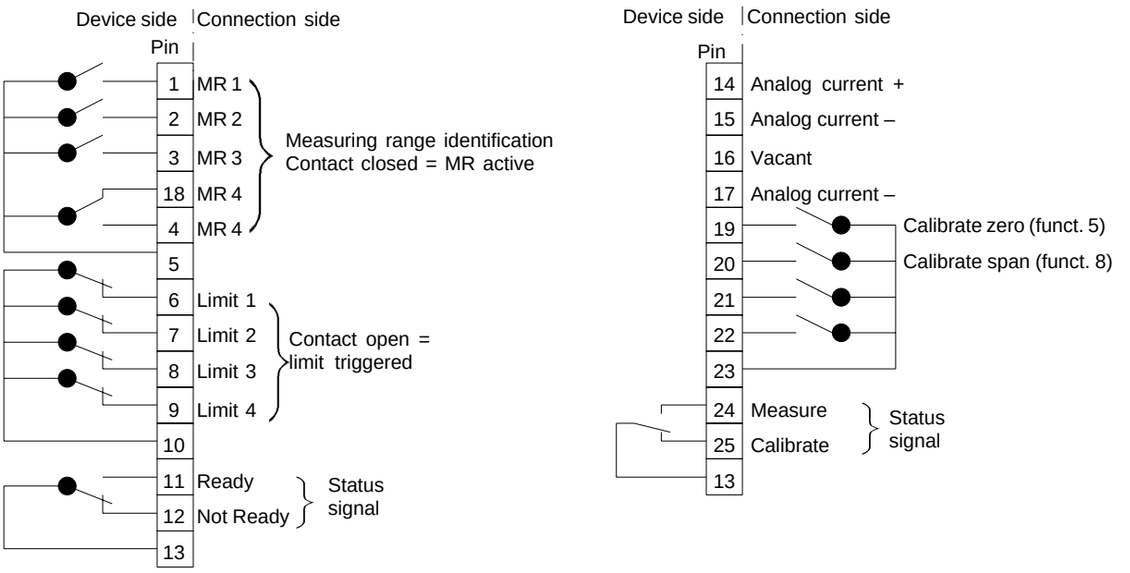


X3

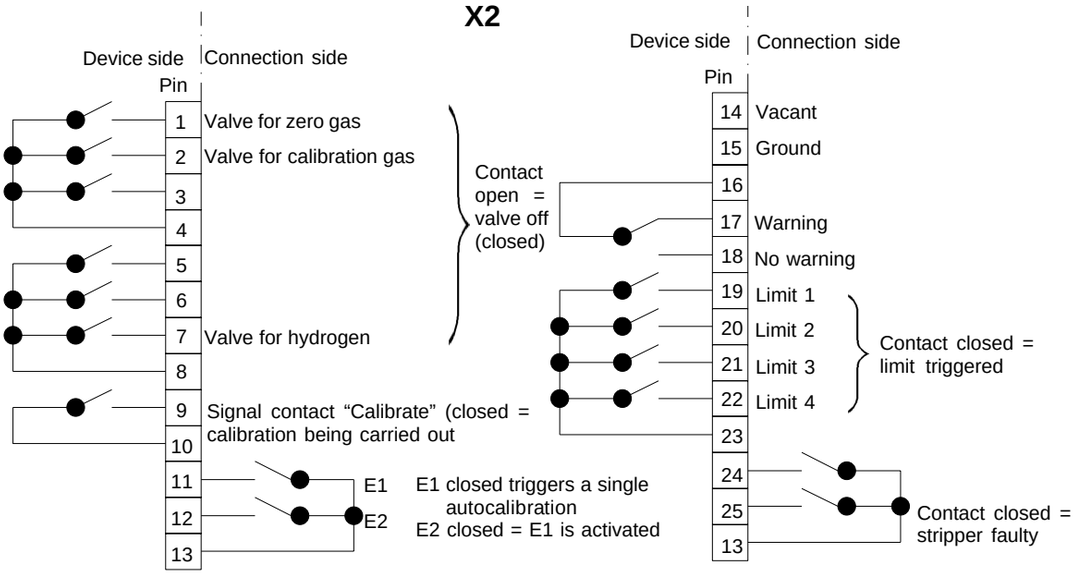


Pin assignment diagram FIDAMAT 5E-I

X1



X2



X3

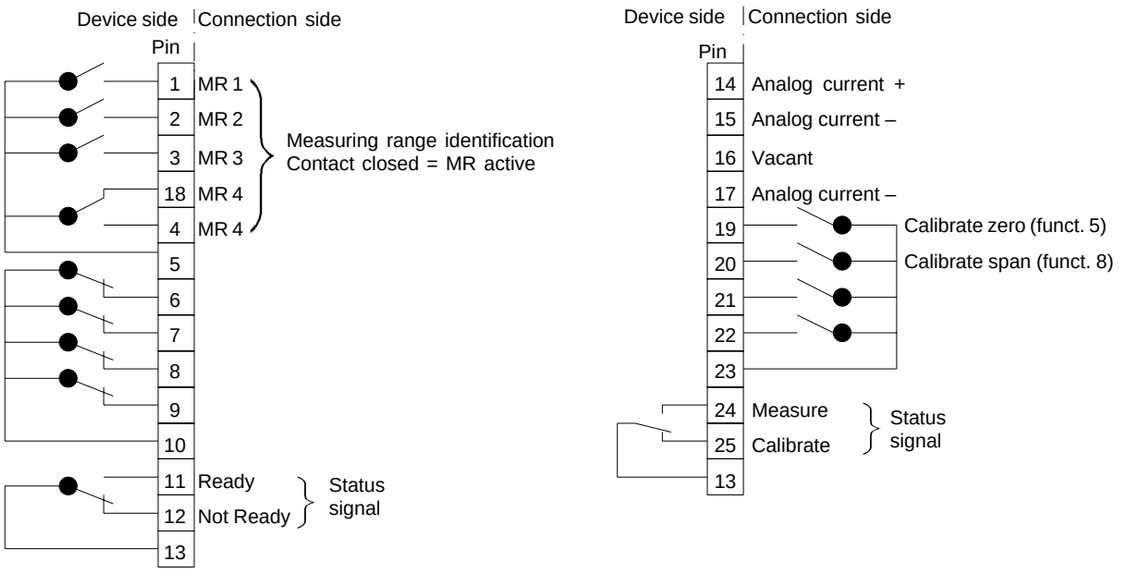
1	Screen
2	TXD
3	RXD
7	GND
9	RXD+
10	RXD–
24	TXD+
25	TXD–

V24

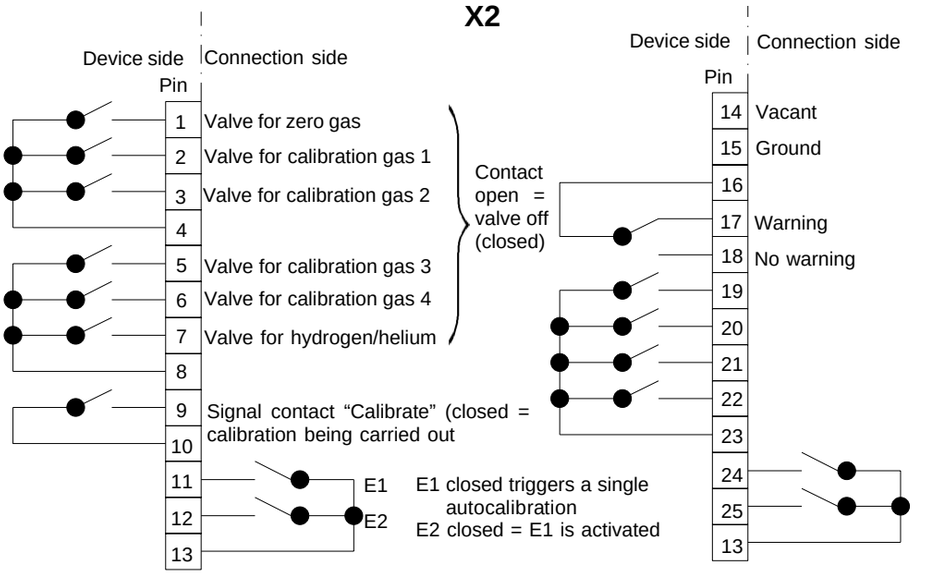
TTY

Pin assignment diagram FIDAMAT 5E-A

X1



X2



X3

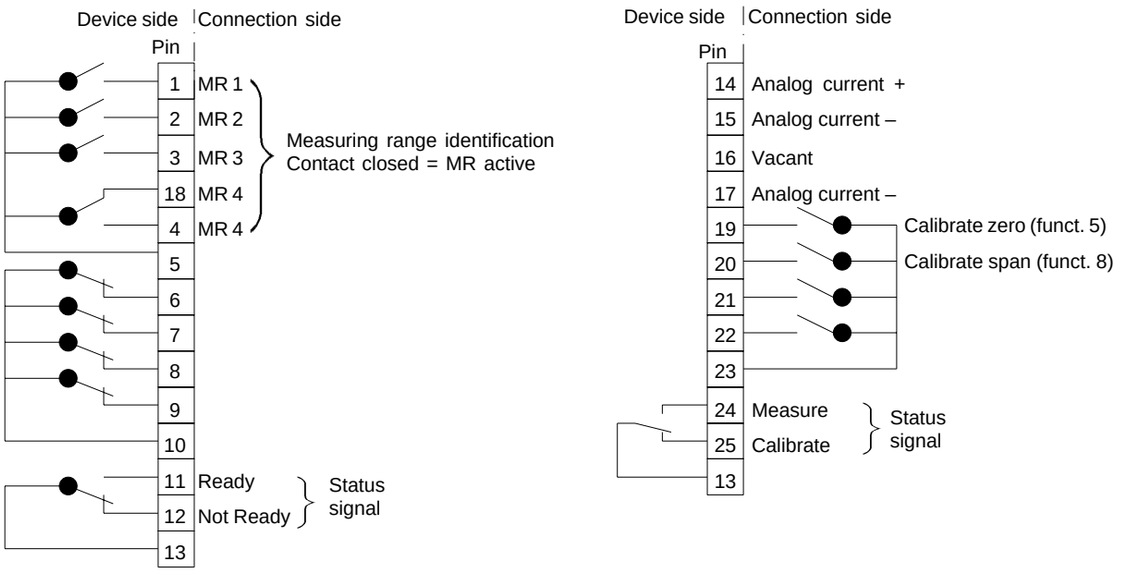
1	Screen
2	TXD
3	RXD
7	GND
9	RXD+
10	RXD–
24	TXD+
25	TXD–

V24

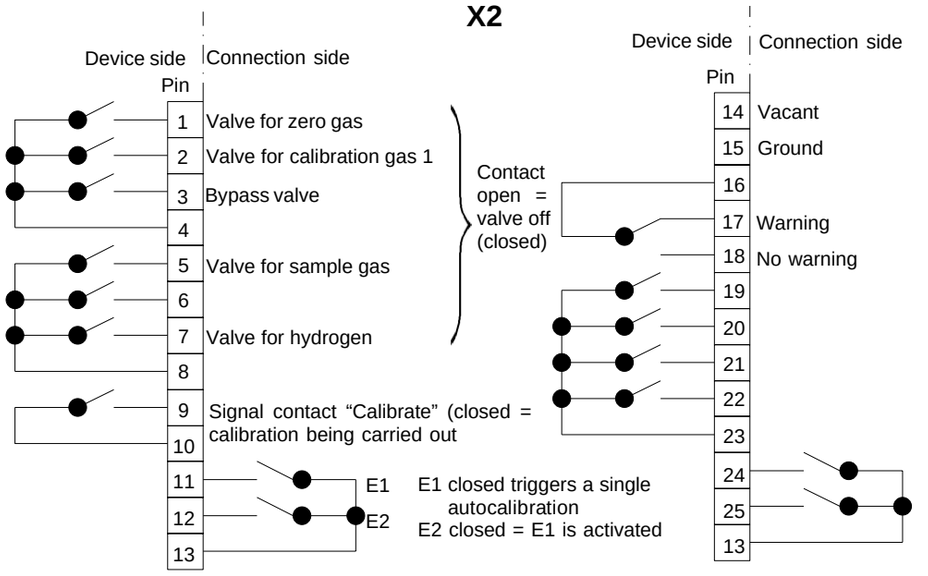
TTY

Pin assignment diagram FIDAMAT 5E-AS

X1



X2



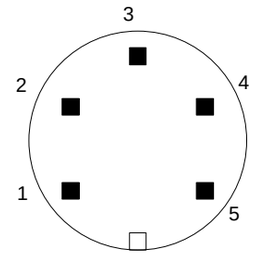
X3

1	Screen
2	TXD
3	RXD
7	GND
9	RXD+
10	RXD–
24	TXD+
25	TXD–

V24

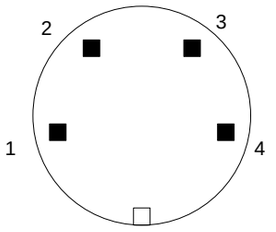
TTY

Pin assignment diagram



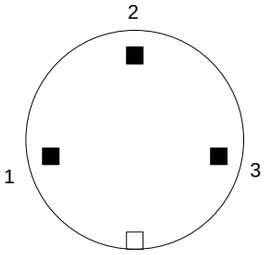
X4

1 Pt100 for heater of sample gas line
2 Pt100 for heater of sample gas line
3 Control output for heater of sample gas line +24 V
4 Control output for heater of sample gas line
5 Vacant



X5

1 Pt100 for heater of sampling probe
2 Pt100 for heater of sampling probe
3 Control output for heater of sampling probe +24 V
4 Control output for heater of sampling probe



X6

1 Control output for external pump +24 V
2 Control output for external pump
3 Vacant

7 Startup, Calibration

7.1 Startup

You should be acquainted with the operation of the FIDAMAT 5 (Section 8)!

Note! **The service life of the pump diaphragm may be considerably shortened if the sample gas line is closed and the pump generates a vacuum!**

A prerequisite for correct start-up is the presence of hydrogen and combustion air with the appropriate inlet pressures (3 bar above atmospheric).

The response time of the analyzer differs depending on its previous use. It is two to three hours in the case of run-in analyzers, and longer when starting up for the first time or if the analyzer is contaminated.

The analyzer displays the current software version when the power supply is connected. “Start” subsequently appears in the display. The analyzer is in the status “Not ready”.

Note! **If the displayed measured value starts flashing during the start-up phase, the analyzer must be recalibrated using functions 5 and/or 8.**

7.1.1 FIDAMAT 5E-E, 5E-A

The gas pressures for hydrogen and sample gas/combustion air are checked immediately at the start and following attainment of the oven temperatures. If the analyzer has already been used correctly, the startup is usually carried without adjusting the pressure regulators (adjustable screws on front panel or - with the FIDAMAT 5E-E (TÜV) - behind the front panel).

If the message “H2" appears on the display, the hydrogen pressure must be set to 1000 mbar (980 to 1020) overpressure using function 35 and the adjustable screw on the front panel. The analyzer automatically returns to ”Start" following termination of function 35.

If the message “Air” appears on the display, the sample gas pressure (combustion air pressure) must be set to 380 to 390 mbar using function 36 and the adjustable screw on the front panel. The analyzer automatically returns to “Start” following termination of function 36. The sample gas pressure should be checked again in the status “Measure”; it should be 500 mbar with the pump running. When restarting, the pressure without the pump may be higher than 390 mbar; it should not be adjusted in this case, otherwise 500 mbar will not be achieved in the status “Measure”.

The restart is carried out automatically. The analyzer automatically ignites the flame once the operating temperatures have been reached and remains in the status “Standby”, i.e. the pump is switched off and no sample gas can enter the FIDAMAT. Function 65 can then be used to set the analyzer to the status “Measure”. The hydrogen pressure should be checked again in this status: it should be 1000 mbar. The pressures need not be reset following a restart.

7.1.2 FIDAMAT 5E-I

With the FIDAMAT 5E-I, the sample gas pressure (approx. 550 mbar) is set automatically. The hydrogen pressure is set or corrected in the same manner as with the FIDAMAT 5E-E and 5E-A.

7.1.3 FIDAMAT 5E-AS

With the FIDAMAT 5E-AS, the excess sample air is output from the analyzer via the bypass. In calibration mode, the excess calibration gas is output via the gas outlet. Only one zero gas and one calibration gas are available for the analyzer.

7.2 Calibration

The calibration should be carried out using gases whose composition is very close to the sample gas. If it is necessary to measure methane in nitrogen, a calibration gas containing methane in nitrogen should also be used. If, for example, propane in synthetic air were used as the calibration gas in this case, the result would be falsified by the response factor of methane compaired to propane and by the oxygen error.

The calibration can be carried out in two manners:

– Via the gas connections on the rear of the analyzer. The inlet pressure must be 3 bar above atmospheric in this case

– Via the sample gas line, where the excess gas flows via a T-piece outside the analyzer.

In both cases, the setpoint for the span (function 7) must be entered prior to the calibration. This value can be checked using function 6 - a value must always be entered with function 7. Ensure before entering the value that the correct concentration unit has been selected, e.g. ppm C_3 (function 94).

The zero and span can then be adjusted using functions 5 and 8 (identifier 1 for all measuring ranges). Excess calibration gas flows via the sample gas line in both cases.

With the FIDAMAT 5E-AS, the excess calibration gas flows via the exhaust line during the calibration process. An external valve (shed valve) can be connected to prevent the calibration gas from flowing back via the sample gas line (see connection diagram for FIDAMAT 5E-AS). To prevent an overpressure from being generated in the analyzer, ensure that the excess calibration gas can be discharged at atmospheric pressure.

7.3 Automatic Calibration

Calibrations with zero and calibration gases can also be carried out automatically. The automatic calibration procedure is activated using function 22. Further parameter settings can be made using functions 40 to 48.

Fig. 7.1 shows the timing of the automatic calibration procedure.

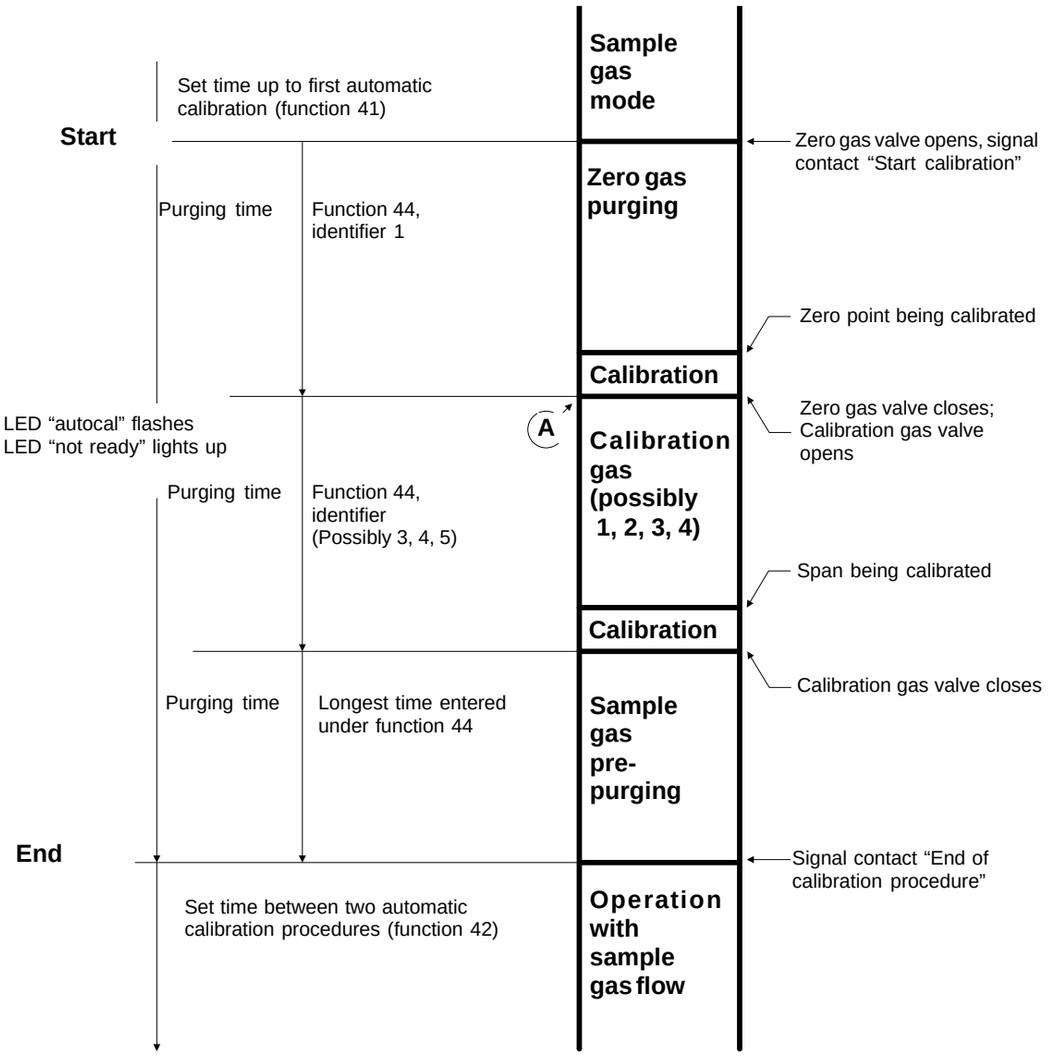


Fig. 7.1 Timing of automatic calibration procedure ("autocal")

The following points must be observed when using the automatic calibration:

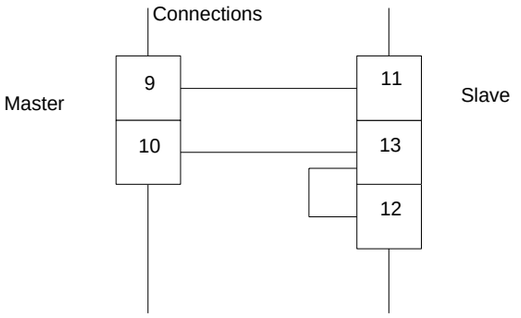
Calibration gas 1 is used for all measuring ranges if only one calibration gas is connected or if function 17 is set to total calibration in the case of two through four calibration gases.

The measuring ranges 1, 2, 3 and 4 are calibrated using the calibration gases 1, 2, 3 and 4 if four calibration gases are connected and function 17 set to individual calibration. The assignment between calibration gas 1 and measuring range 1, calibration gas 2 and measuring range 2 etc. must be observed.

The floating changeover contact “Calibration/Measurement” signals “Calibration” during the procedure.

In systems with several devices, one analyzer can assume a master function. The signal contact “End of calibration” closes for five seconds at the end of the calibration cycle. This contact can start the automatic calibration procedure for a second device. The second analyzer then has a slave function; the automatic calibration must be switched off for this analyzer using function 22, identifier 0.

Function 44 must be parameterized for the slave. The slave can trigger the automatic calibration procedure for a further analyzer at the end of its calibration etc.



An automatic calibration can be triggered at any time using function 40. Function 22 must not be activated in this case. The time up to the next calibration is not influenced by this.

If function 22 is set to 0, this does not change the time up to the next calibration procedure.

In the event of a power failure, the time up to the commencement of the next calibration procedure is shifted by the duration of the power failure. In the event of a longer failure, function 41 can be used to correct the time up to the next “autocal”.

Function 47 can be used to omit up to 99 zero and sensitivity calibrations. The times of the zero and sensitivity calibrations can be separated at position A (Fig. 7.1). This time consists of the time for the sample gas purging (function 44, identifier 2) and the time for the actual sample gas mode (function 47, identifier 1, max. 60 minutes). The signal contact “Measurement” is triggered during this time, but not the signal contact “End of calibration procedure”.

8 Operation

8.1 Description of Control Panel

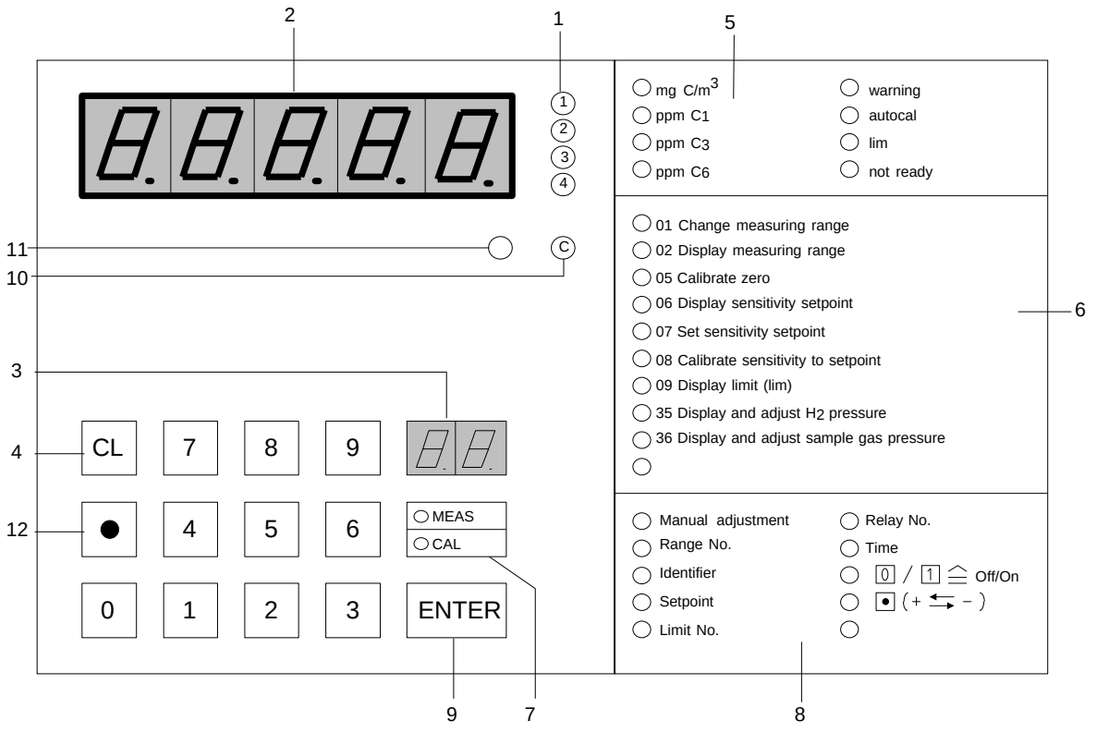


Fig. 8.1 Control panel of FIDAMAT 5E

(1) **Display of selected measuring range** 1 to 4

(2) **Large display:** concentration display, parameter display, fault display, status display

(3) **Small display:** display of selected function codes; if the small display is dark, the large display outputs the measured value

(4) **Clear key** to return to basic status or to delete faulty input

(5) **Display of operating states and concentration units:**

"ppm C_1“, ”ppm C_3“, ”ppm C_6“, ”mgC/m^3“= display of concentration unit
”warning" = common status for warnings
"autocal" = The LED lights up when “autocal” is activated, the LED flashes during the automatic calibration
"lim" = The LED lights up if limits are activated; the LED flashes if one limit (or several) is triggered
"not ready" = common status for error messages

(6) **Function table** for the most important functions

(7) **Switchover from measurement to calibration mode** and simultaneous signalling of these statuses via a contact

(8) **Operatorprompting:** the corresponding LED flashes here if further inputs are required for the entered functions

(9) Every input must be terminated by the **"ENTER"** key apart from the code number

(10) **Flame monitor:** The LED lights up when the flame is burning and goes out when the flame is off.

(11) **LED "Autoranging"** lights up when the corresponding function (20) is active.

(12) **Dot key** with the following meaning:
– Decimal point
– Change of sign when entering values
– Start point of code entries

8.2 Input Example

You wish to switch over the measuring range

Every input - apart from the codes - must be terminated by "ENTER".
Press the CL key in the event of a faulty input.

The analyzer is in measurement mode. This means:
The green LED lights up for "**MEAS**" next to "MEAS/CAL".

Input: **.111** (see next paragraph)
Since the desired function is in function group 1, it is not necessary to enter any further codes.

Input: press the **MEAS/CAL** key
The green LED lights up next to "**CAL**".
The calibration status is thus signalled via pins 24/25 on plug X1.

Input: **1**
The **1** appears in the small display and thus confirms the input.

Input: **ENTER**
The measured value disappears in the large display, and a line appears on the right.
The green LED lights up in field 6 in front of "Switch over measuring range".
The green LED simultaneously flashes in front of "Range No." in field 8 and thus requests the input of the new range number.

Input: **3**
Measuring range **3** is selected. The input is output in the large display.

Input: **ENTER**
The measured value appears in the large display.
The LED "**3**" lights up in field 1 and indicates that range 3 is active.

Input: press the **MEAS/CAL** key
The green LED lights up next to "**MEAS**".
If a control panel is present, the status "Measure" is signalled to it.

8.3 Coding and Organization of Operating Function Groups

The functions are combined into groups according to their type:

Function groups	Types of function
0	Display functions
1	Calibration and adjustment functions
2	Functions for input of application parameters
3	Functions for input of device parameters

To prevent important parameters from being deleted or modified by mistake, there are several function levels which can only be accessed using special codes. Note that the decimal point key must be pressed before entering a code.

The factory settings for the codes of the three levels are:

Level 1 .111
Level 2 .222
Level 3 .333

The codes can be redefined using function 50. Function 50 also enables the device protection by codes to be switched off for a certain time or permanently.

The CAL key must be pressed to signal an intervention on the device to the control room if applicable. The device is automatically recoded by pressing the MEAS key.

All operations permissible for a level can be carried out if you are in level 1, 2 or 3. Higher function levels also include the lower function levels. For example, from function level 3 you can execute all operations of levels 0 to 3, and from level 2 all operations of levels 0 to 2.

A description of the operation functions is provided in the appendix.

8.4 Organization of Data Storage

The EPROM and the EEPROM contain three parameter sets:

- Basic factory-set data
- User-specific data
- Current data.

All parameters required to operate the FIDAMAT 5E are stored in the EPROM and are protected by hardware (basic factory-set data). These data can be loaded into the current parameter memory using function 53. The user-specific data set is overwritten in the process, however. The basic factory-set data can only be overwritten by a hardware intervention.

A second parameter set (user-specific data) is present in an area of the EEPROM which can be overwritten. The user can store a standard parameter set for his application here (see functions 55 and 57).

The third data set (current data) is the set which is automatically loaded when the analyzer is switched on. This data set is modified according to the inputs. Note therefore when switching off the analyzer and restarting that it is the current data set which was parameterized when the analyzer was switched off which is loaded and not the user-specific data set.

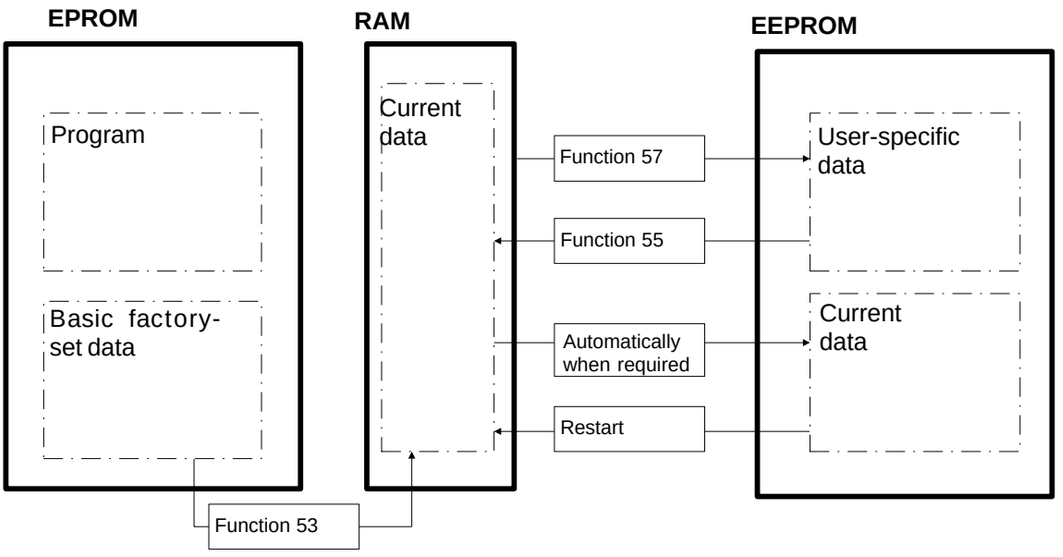


Fig. 8.2 Organization of data storage

9 Maintenance, Warnings and Error Messages

9.1 Maintenance

In the FIDAMAT 5E it is only necessary to regularly service the **pump**. It is recommendable to replace the pump diaphram every six months. The pump can be removed from the front of the analyzer. Ensure that the gas connections on the pump are not damaged.

A pump fault is indicated by a reduced flow (often indicated in advance by warning 66) and by increased noise on the measured signal.

The **filtercartridge** must be replaced depending on the application. The gaskets and the pressure ring must also be replaced to ensure that the filter does not leak.

9.2 Warnings and Error Messages

9.2.1 Warnings

The symbol  precedes each warning.

The LED “warning” flashes on the control panel. The cause of the warning can be scanned using “ENTER”. Further measurements are possible in this state. The analyzer may fail if the cause of the warning is not eliminated.

Number in display	Cause of warning	Causes, notes
71	Pt100 temperature of physical section faulty or outside the limits	
72	The 2nd Pt100 temperature of the pump (check measurement) is faulty or outside the limits	
73	Temperature of electronics section outside the limits (0 to 80 ˚C) or sensor faulty	
74	Fan faulty	
75	Temperature deviation in pump comparison (2nd Pt100)	
76	The flow of control air is too high	Filter increasingly contaminated, pump diaphram leaks, line increasingly blocked
77	The flow of control air is too low	The outlet restrictor or the gas outlet is blocked
78	Temperature of physical section outside the limits (0 to 80 ˚C)	
79	Hydrogen pressure outside the limits	The limits defined in function 37 have been violated. Hydrogen input pressure is too high or too low; this warning may also be produced if the limits are too close and there are extreme variations in atmospheric pressure.

Number in display	Cause of warning	Causes, notes
80	Sample gas pressure outside the limits	The limits defined in function 38 have been violated. Combustion air pressure (control air) is too high or too low; **sample gas inlet faulty** (pump, filter, lines); this warning may also be produced if the limits are too close and there are extreme variations in atmospheric pressure
81	Flame out	
82	Difference between last and current zero calibrations >6 %	The exact value for new/old can be scanned using function 96
83	Output current 1 used for internal value	See function 62
84	Measured value exceeds full-scale value of largest measuring range	Redefine full-scale value (function 12)
85	Stripper (option) faulty	
86	Incorrect device configuration (only in “autocal” mode)	Inform service
87	Less than four setpoints have been entered (only in “autocal” mode)	Upon changeover from total to single calibration only the measuring ranges with set values will be calibrated
88	Incorrect measured value	Recalibrate device using function(s) 5 and/or 8

9.2.2 Faults

The symbol  precedes each fault.

The LED “not ready” flashes on the control panel. One of the following error messages appears when you press “ENTER”.

Number in display	Error message	Comment
1	Slave faulty	Pull mains plug immediately, inform service
2	Hardware fault	Inform service
3	Heating has switched off	RESET
4	EEPROM jumper must be set	Inform service
8	Parameter storage test not carried out	See u8, next page but one
9	EPROM faulty	Order replacement from manufacturer
19	Sensitivity too low	Incorrect calibration gas, incorrect measuring range, see functions 2 and 6
40	Oven temperature outside limits or Pt100 faulty	Check contacts
41	Pump temperature outside limits or Pt100 faulty	Check contacts
42	Sample gas probe temperature outside limits or Pt100 faulty	Check contacts
43	Sample gas line temperature outside limits or Pt100 faulty	Check contacts
44	Flame monitor faulty	Check contacts
45	Flow sensor temperature outside limits or Pt100 faulty	Check contacts
46	Flow outside limits or sensor faulty	Check contacts
47	Sample gas pressure too high or too low or pressure sensor faulty	Check cylinder pressure, readjust, check pressure sensor

Number in display	Error message	Comment
48	Hydrogen pressure too high or too low or pressure sensor faulty	Check cylinder pressure, readjust, check pressure sensor
49	High-voltage outside limits	Check whether high-voltage line is connected
50	Operating voltages outside setpoints	Check power supply and connections on transformer
51	Flow too high	Check outlet restrictor, examine for leaks
52	Flow too low	Filter contaminated, pump faulty, line blocked
53	Oven temperature setpoint exceeded or fallen below	
54	Pump temperature setpoint exceeded or fallen below	
55	Heated line temperature setpoint exceeded or fallen below	
56	Sample gas probe temperature setpoint exceeded or fallen below	
57	Combustion air/sample gas pressure too low	Combustion air line interrupted
60	Flame does not ignite (30 min)	Check gas flows
61	Pump does not start	Check sample gas pressure (380 to 390 mbar without pump)

Number in display	Cause of error	Comment
8	Parameter storage test not carried out	
	A: Analyzer does not react to ENTER	Press dot key for 30 sec until function 50 appears in the small display; recode the analyzer. Then reload basic data into RAM using function 53 or 55.
	B: One of the following error numbers is displayed when you press ENTER. A further number may be displayed when the error has been eliminated.	Correct the value in the corrresponding function using the following table.

	Cause	**Check/ input using function No.**
2 3 4	Code 1 Code 2 Code 3	50 50 50
5	Assignment of current output 1	62, identifier 0
11	Number of measuring ranges	51
12	Measuring range	1
15 16	Sensitivity adjustment Sensitivity setpoint	17 7
17 18	Start-of-scalevalue Full-scalevalue	11 12
20	Limits	18 / 19
21	Zero	5
22	Sensitivity	17 / 7 / 8
37	Limits of time constant T_{90}	13
38	Dynamic noise rejection	14
200	Baud rate	80
201	Transmission procedure	81
202	Start, end, don't care characters	82
203	Calibration of analog current	Contact service
204	Adjustment of preamplifier	Contact service

10 Spare Parts and Accessories

	Order No.
Flame ionization detector, complete, 5E-E and 5E-I	C79451-A3405-B510
Flame ionization detector, complete, 5E-A and 5E-AS	C79451-A3405-B578
FID cover complete with thermocouple line	C79451-A3405-B501
Quartz nozzle for FIDAMAT 5E-E and 5E-I	C79402-Z1282-C1
Quartz nozzle for FIDAMAT 5E-A and 5E-AS	C79402-Z1282-C2
Clamping screw in the FID	C79211-A3003-C15
Nut for M5 connection	C79451-A3040-D126
Outer ring for M5 connection	C79451-A3040-D121
Graphite gasket for M5 connection	C79451-A3040-D102
Clamping ring for M5 connection	C79451-A3040-D112
Nut for M7 x 0.75 connection, tube 1.5 to 3.0	C79451-A3040-D127
Outer ring for M7 x 0.75 connection, tube 1.5 to 3.0	C79451-A3040-D122
Graphite gasket for M7 x 0.75 connection, pipe 1.5	C79451-A3040-D103
Clamping ring for M7 x 0.75 connection, pipe 1.5	C79451-A3040-D113
Graphite gasket for M7 x 0.75 connection, pipe 3.0	C79451-A3040-D105
Clamping ring for M7 x 0.75 connection, pipe 3.0	C79451-A3040-D115
Sample gas filter, complete	C79451-A3405-B21
Filter cylinder 3 µm	C79127-Z970-C1
Gasket, sample gas filter	C79451-A3405-C43
Gasket, sample gas filter	C79451-A3405-C44
Spring washer for sample gas filter	C79451-A3405-C47
Sample gas restrictor (fused silica), complete, 5E-E, 5E-A, 5E-AS	C79451-A3405-B173
Sample gas restrictor (fused silica), complete, 5E-I	C79451-A3405-B174
Crimp restrictor 1, hydrogen, 5E-E	C79451-A3405-C152
Crimp restrictor 1, hydrogen, 5E-I	C79451-A3405-C161
Crimp restrictor 1, hydrogen/helium, 5E-A and 5E-AS	C79451-A3405-C163

	Order No.
Crimp restrictor 2, combustion air	C79451-A3405-C153
Crimp restrictor 3, auxiliary air, 5E-E	C79451-A3405-C154
Crimp restrictor 3, auxiliary air, 5E-A	C79451-A3405-C164
Crimp restrictor 3, auxiliary air, 5E-AS	C79451-A3405-C224
Crimp restrictor 4, exhaust, 5E-E and 5E-AS	C79451-A3405-C155
Crimp restrictor 4, exhaust, 5E-A	C79451-A3405-C168
Crimp restrictor 5, zero gas, calibration gas(es)	C79451-A3405-C156
Damping restrictor 7	C79451-A3405-B172
Diaphram gas supply pump, 5E-E, 5E-I and 5E-AS	C79451-Z1030-U1
Diaphram gas supply pump, 5E-A	C79451-Z1030-U3
Set of gaskets for diaphram pump	C79451-Z1030-U2
Heating cartridge, complete, pump oven	C79451-A3405-B100
Temperature sensor, complete, pump oven	C79451-A3405-B104
Temperature sensor, complete, FID oven and physical section	C79451-A3405-B103
Flat heater element, FID oven, bottom	C79451-A3405-B101
Flat heater element, FID oven, top	C79451-A3405-B102
Cable connector for input signal	C79451-A3405-B109
Cable connector for FID voltage	C79451-A3405-B110
Cable connector for pressure sensor for combustion air	C79451-A3405-B105
Cable connector for pressure sensor for hydrogen	C79451-A3405-B106
Fan, complete with cable connector	C79451-A3405-B111
Flow monitor	C79451-A3407-B53
Overflow valve 5E-I, complete	C79402-Z1518-C1
Solenoid valve for H_2, H_2/He and combustion air, complete	C79451-A3040-B206
Solenoid valve for combustion air/control air, complete	C79451-A3040-B207
Solenoid valve for control air, complete	C79451-A3040-B210
Solenoid valve for bypass gas, complete	C79451-A3101-B176
Solenoid valve for zero gas/calibration gas 1, complete	C79451-A3405-B37
Solenoid valve for calibration gases 2 to 4, complete	C79451-A3405-B38

	Order No.
Solenoid valve for for H_2, combustrion air, control air, bypass gas	C79402-Z871-A5
Solenoid valve for for H_2, zero gas, calibration gases	C79402-Z871-A7
Gasket, diameter 4 mm	C79451-A3040-C331
Gasket, diameter 6 mm	C79451-A3040-C354
Gasket, diameter 10 mm	C79451-A3040-C353
O-ring, diameter 10 mm	F79402-E871-A1
Pressure controller, hydrogen, combustion air/sample gas	C79451-A3405-B20
PTFE gasket for M7 x 0.75 connection, tube 1.5	C79451-A3040-D101
Elbow compression gland	C75304-Z1209-C2
Union nut for pipe 6 Clamping ring, front, pipe 6 Clamping ring, rear, pipe 6	set of spare parts C79451-A3405-D60
Union nut for pipe 8 Clamping ring, front, pipe 8 Clamping ring, rear, pipe 8	set of spare parts C79451-A3405-D61
Union nut for pipe R1/4" Clamping ring, front, pipe R1/4" Clamping ring, rear, pipe R1/4"	set of spare parts C79451-A3405-D62
Analyzerfuse,T4.0A/250V	W79054-L1011-T400
Analyzerfuse,T6.3A/230V	W79054-L1011-T630
Motherboard	C79451-L3405-B507
Preamplifier board	C79451-A3405-B508
Control board	C79451-A3405-B509
ROM, motherboard D3, 5E-E	S79610-G104-A901
ROM, motherboard D4, 5E-E	S79610-G104-A902
ROM, motherboard D3, 5E-I	S79610-G112-A901
ROM, motherboard D4, 5E-I	S79610-G112-A902
ROM, motherboard D3, 5E-A	S79610-G114-A901
ROM, motherboard D4, 5E-A	S79610-G114-A902
ROM, motherboard D3, 5E-AS	S79610-G170-A901
ROM, motherboard D4, 5E-AS	S79610-G170-A902

	Order No.
Display board (front panel)	C79451-A3210-A502
Touch pad keyboard with labels, German	C79451-A3405-D52
Touch pad keyboard with labels, English	C79451-A3405-D53
Touch pad keyboard with labels, French	C79451-A3405-D54
Touch pad keyboard with labels, Spanish	C79451-A3405-D55
Touch pad keyboard with labels, Italian	C79451-A3405-D56
See Catalog PA 10 for accessories	
Heated sample gas line	
Heated sample gas probe	
Stripper	

11 Appendix

11.1 Gas Flow Diagrams

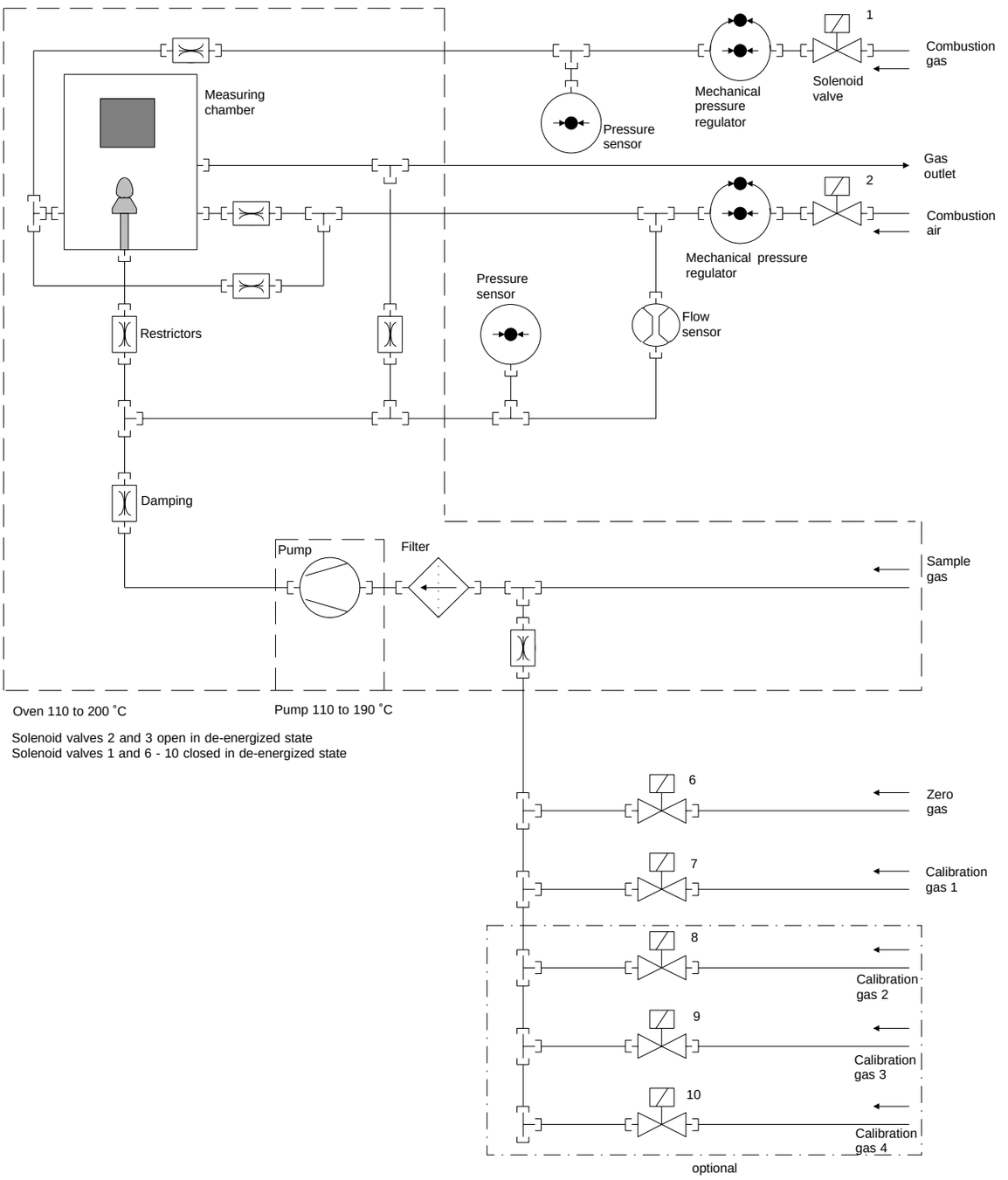


Fig. 11.1 FIDAMAT 5E-E for hydrocarbon measurements in the chemical industry, automobile industry and emission plants

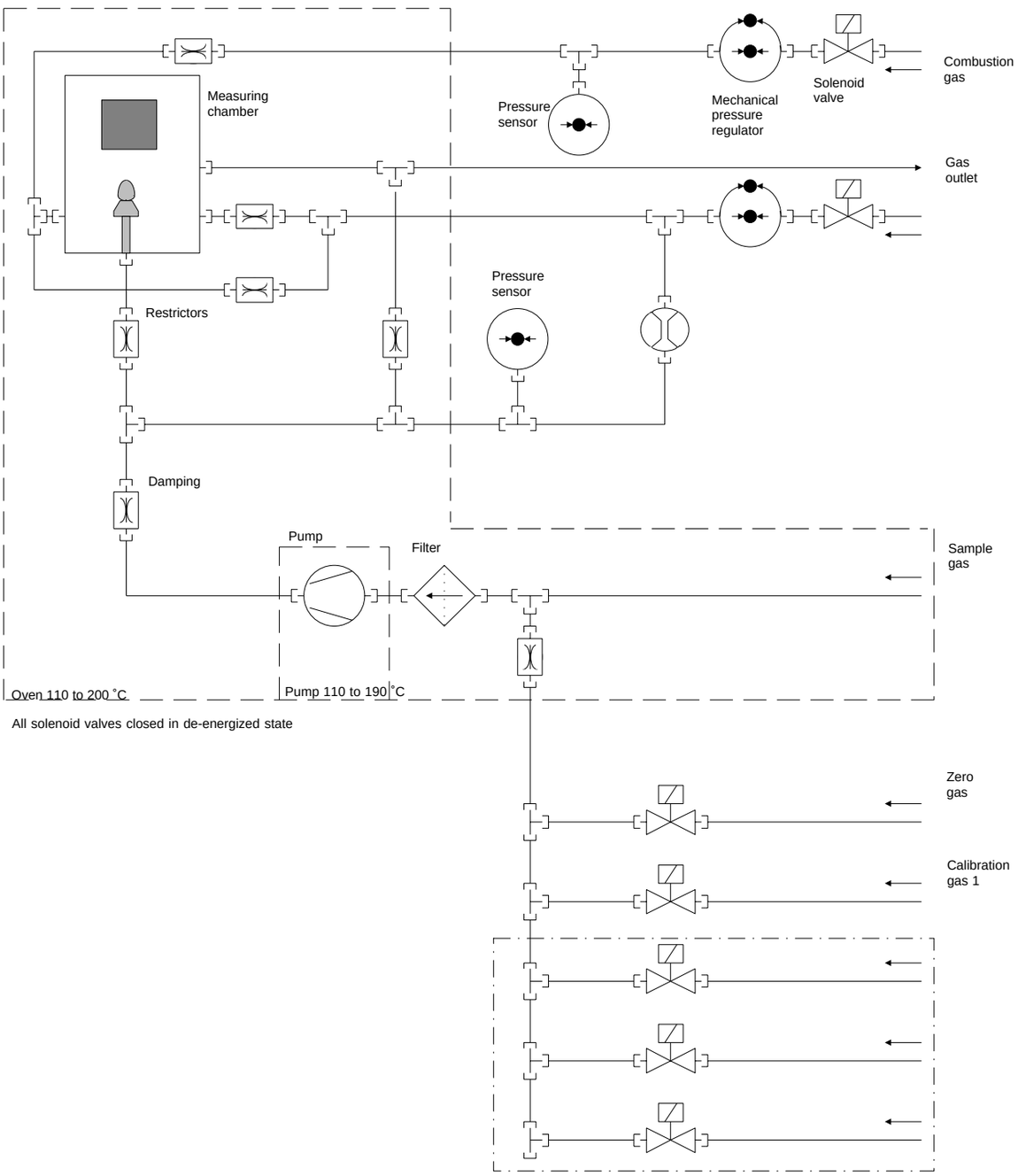


Fig. 11.2 FIDAMAT 5E-I for ambient measurements of hydrocarbons (e.g. TLV measurements)

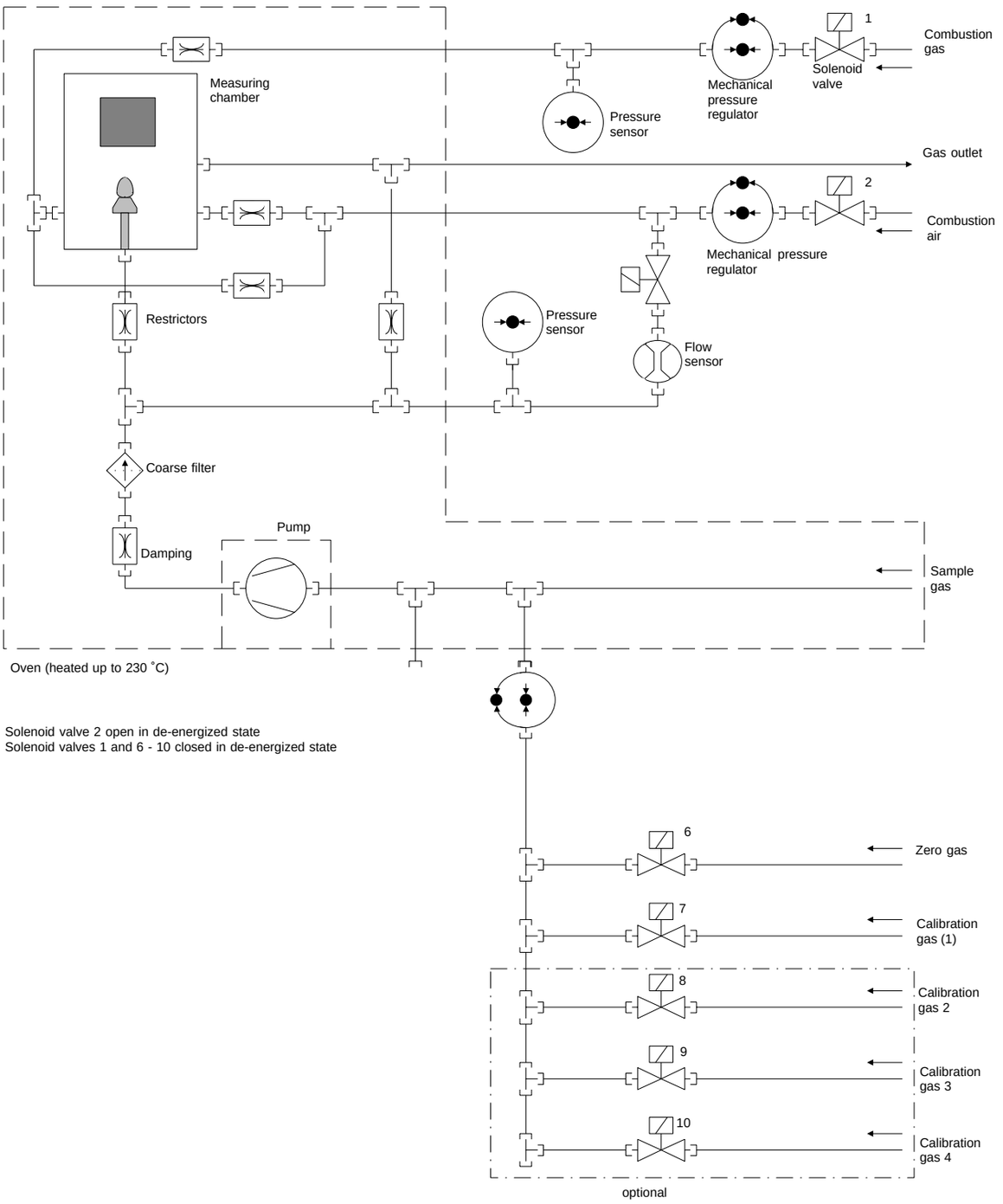


Fig. 11.3 FIDAMAT 5E-A for measurements using H_2/He

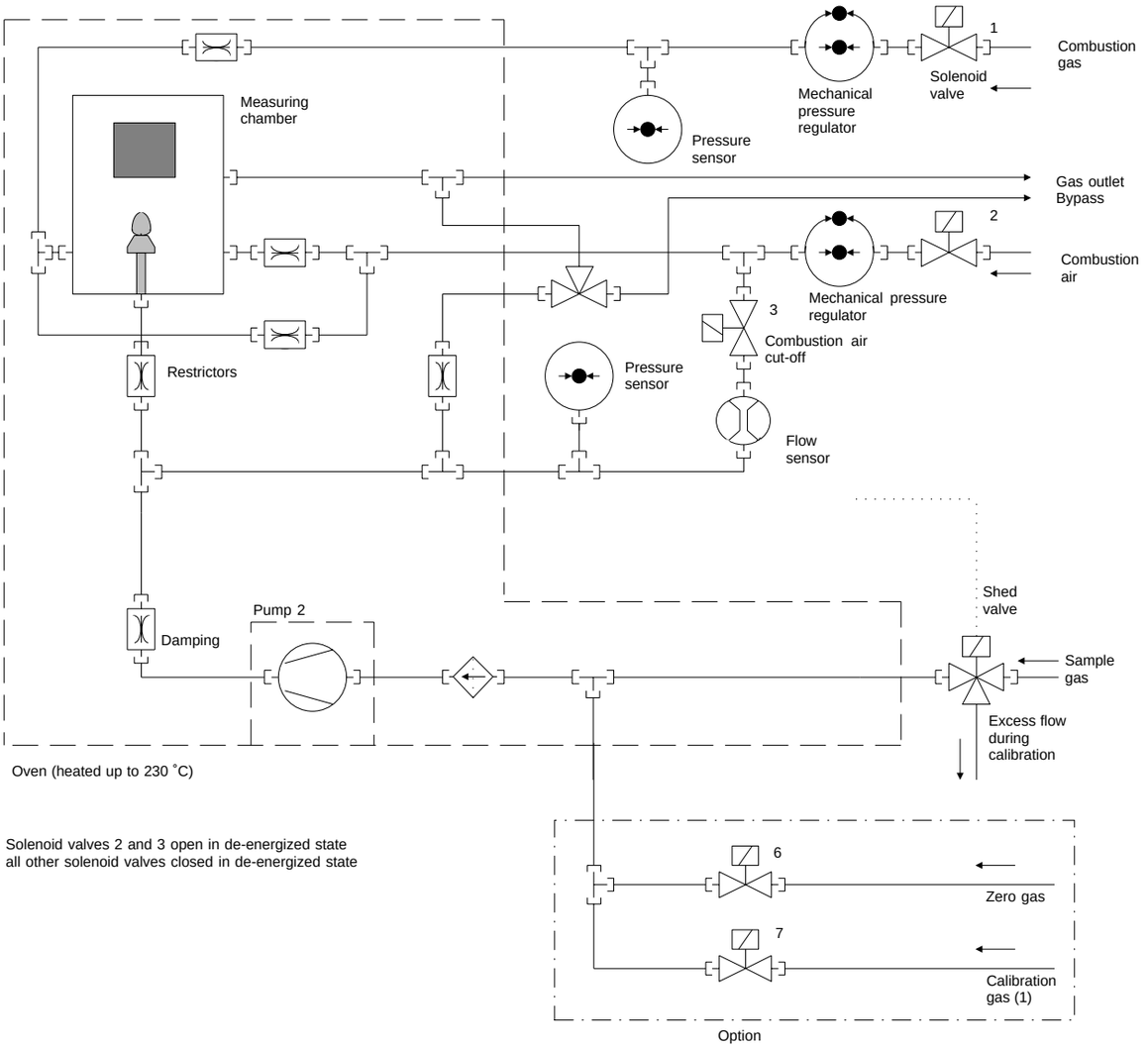


Fig. 11.4 FIDAMAT 5E-AS for shed measurements

11.2 Layout Diagrams of Important Electronic Components

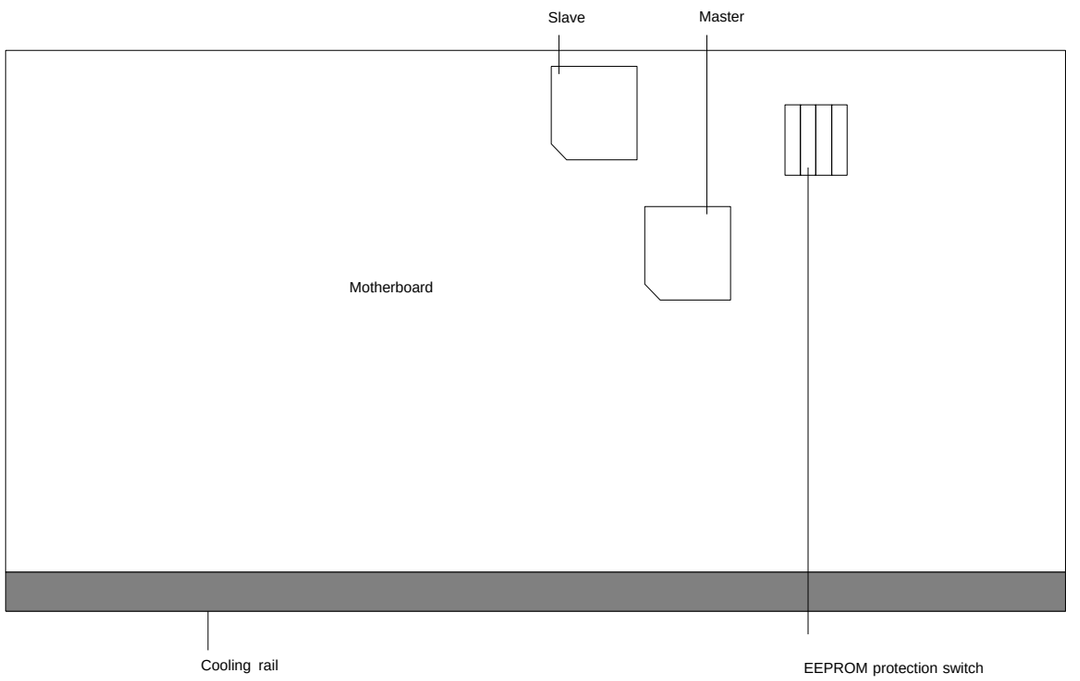
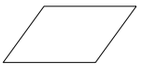


Fig. 11.5 Motherboard (top) and control board

11.3 Summary of Operating Functions

Symbols in the sequence diagrams

	Display of set value and possible adjustment for a new value. When entering values make sure to enter the sign first!
	ENTER key (importing of number)
	Display output in large display (the measured value is displayed again after approx. 3 s)
	Input
*	Function protected by code 1 (function level 1)
**	Function protected by codes 1 and 2 (function level 2)
***	Function protected by codes 1, 2 and 3 (function level 3)

Symbols in the display

—	Enter identifier
CAL	The MEAS/CAL key must be pressed
ILL	Illegal code, illegal identifier, non-existent function number entered
cod	Enter code according to function level
	Error message
	Current status of limit (upward violation)
	Current status of limit (downward violation)
	Warning

Remarks

The input can be interrupted at any time using the CL key; the old values are then retained and the system returns to the start of the function or partial function.

Survey of operating functions

A Display and switch over measuring ranges, switch over display

* 1 Change measuring range

2 Display measuring range

** 20 Autoranging on/off

* 94 Switch over between mg/m^3 and ppm

B Calibration of measuring ranges

* 5 Calibrate zero

6 Display sensitivity setpoint

* 7 Adjust sensitivity setpoint

* 8 Calibrate senstitivity to setpoint

* 17 Switch over from total calibration to individual calibration

C Autocalibration

** 22 "autocal" on/off

** 40 Trigger single “autocal”

** 41 Set time up to first “autocal”

** 42 Set time between two “autocals”

43 Display time between two “autocals”

** 44 Set purging times

45 Display purging times

C Autocalibration(continued)

46 Display time up to next “autocal”

** 47 Set sample gas time between zero and sensivity calibrations; set calibrations to be omitted

** 48 Signal contact at start/end of “autocal”

D Temperatures, pressures, flow, limits

9 Display limits

** 18 Set limits to upward or downward exceeding

** 19 Set limit

** 23 Limit monitoring on/off

** 30 Display, enter actual temperature and setpoint temperature of oven

** 31 Display, enter actual temperature and setpoint temperature of pump

** 32 Display, enter actual temperature and setpoint temperature of heated line

** 33 Display, enter actual temperature and setpoint temperature of sample gas probe

** 34 Display, set max. temperature deviation

* 35 Display, set H_2 pressure

* 36 Display, set sample gas pressure

* 37 Enter tolerance for hydrogen pressure

* 38 Enter tolerance for sample gas pressure

*** 39 Probe and/or heated line present/not present

E Time constants

** 13 Set time constant T_{90}

** 14 Set dynamic time constant T_D (dynamic noise rejection)

F Measured-value memory, current output

** 21 Measured-value memory on/off

** 24 Set current output

G Redefine measuring ranges

** 11 Define start-of-scale values of measuring ranges

** 12 Define full-scale values of measuring ranges

** 51 Select number of valid measuring ranges

I Further display functions

15 Display compensated background current (zero calibration)

60 Display internal values

61 Display measured variables

K Adjustment and calibration functions

*** 71 Compensation of temperature influence on zero

*** 73 Compensation of temperature influence on measured value

L Test functions, RESET, switch-off (continued)

* 29 Measure during warming-up phase

** 49 Switch valves individually

*** 53 Load basic factory-set data

*** 55 Load user-specific data

*** 57 Store user-specific data

*** 62 Reproduce internal values on analog signal, channel 1

*** 65 STANDBY

*** 67 Ignite flame

*** 68 RESET

69 LED check, software No.

*** 77 Suppression of brief noise signals

*** 78 Suppression of negative measured values

*** 79 Pause

* 92 Display warnings and brief errors

96 Display Δ zero calibration

*** 99 Switch analyzer on/off

M Reprogram, activate, deactivate codes

*** 50 Reprogram, activate/deactivate codes

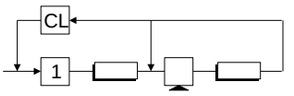
*	1	Change measuring range	A
	2	Display measuring range	A
*	5	Calibrate zero	B
	6	Display sensitivity setpoint	B
*	7	Adjust sensitivity setpoint	B
*	8	Calibrate senstitivity to setpoint	B
	9	Display limits	D
**	11	Define start-of-scale values of measuring ranges	G
**	12	Define full-scale values of measuring ranges	G
**	13	Set time constant T_{90}	E
**	14	Set dynamic time constant T_D (dynamic noise rejection)	E
	15	Display compensated background current (zero calibration)	I
*	17	Switch over from total calibration to individual calibration	B
**	18	Set limits to upward or downward exceeding	D
**	19	Set limit	D
**	20	Autoranging on/off	A
**	21	Measured-value memory on/off	F
**	22	"autocal" on/off	C
**	23	Limit monitoring on/off	D
**	24	Set current output	F
*	29	Measure during warming-up phase	L
**	30	Display, enter actual temperature and setpoint temperature of oven	D
**	31	Display, enter actual temperature and setpoint temperature of pump	D
**	32	Display, enter actual temperature and setpoint temperature of heated line	D
**	33	Display, enter actual temperature and setpoint temperature of sample gas probe	D

**	34	Display, set max. temperature deviation	D
*	35	Display, set H_2 pressure	D
*	36	Display, set sample gas pressure	D
*	37	Enter tolerance for hydrogen pressure	D
*	38	Enter tolerance for sample gas pressure	D
**	39	Probe and/or heated line present/not present	D
**	40	Trigger single “autocal”	C
**	41	Set time up to first “autocal”	C
**	42	Set time between two “autocals”	C
	43	Display time between two “autocals”	C
**	44	Set purging times	C
	45	Display purging times	C
	46	Display time up to next “autocal”	C
**	47	Set sample gas time between zero and sensivity calibrations; set calibrations to be omitted	C
**	48	Signal contact at start/end of “autocal”	C
**	49	Switch valves individually	L
***	50	Reprogram, activate/deactivate codes	M
**	51	Select number of valid measuring ranges	G
***	53	Load basic factory-set data	L
***	55	Load user-specific data	L
***	57	Store user-specific data	L
	60	Display internal values	I
	61	Display measured variables	I
***	62	Reproduce internal values on analog signal, channel 1	L
***	65	STANDBY	L

***	67	Ignite flame	L
***	68	RESET	L
	69	LED check, software No.	L
***	71	Compensation of temperature influence on zero	K
***	73	Compensation of temperature influence on measured value	K
***	77	Suppression of brief noise signals	L
***	78	Suppression of negative measured values	L
***	79	Pause	L
*	92	Display warnings and brief errors	L
*	94	Switch over between mg/m^3 and ppm	A
	96	Display Δ zero calibration	L
***	99	Switch analyzer on/off	L

A Display and switch over measuring ranges, switch over display A

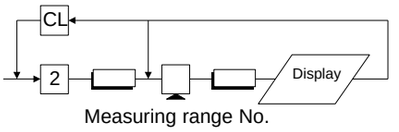
* 1 Change measuring range



There are four measuring ranges. The measuring range which is switched on is indicated to the right of the display. The number of active measuring ranges can be defined using function 51.
The start-of-scale and full-scale values of the measuring range can be freely selected.

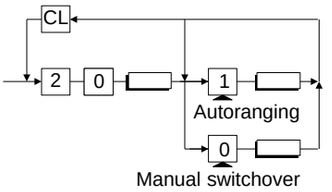
Factory setting: 4

2 Display measuring range



The start-of-scale and full-scale values of the measuring range are output in succession in the display.

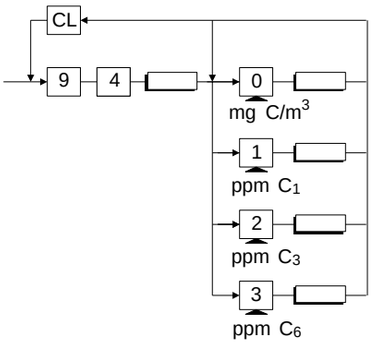
** 20 Autoranging on/off



This function only applies to the recorder output (see plug connector X1). The current measured value is always output on the display even if it exceeds the current measuring range.
The displayed value flashes when the measuring range(s) is exceeded.

Factory setting: 1

* 94 Switch over between mg/m^3 and ppm

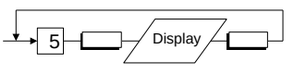


The LED on the right of the display indicates the concentration unit of the display.

Factory setting: 0

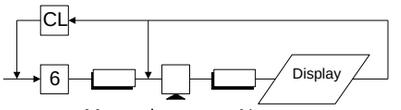
B Calibration of measuring ranges B

* 5 Calibrate zero



Zero gas is applied after pressing 5 and ENTER until the displayed measured value is imported as the new zero by pressing ENTER again. The LED “not ready” lights up during the adjustment. The zero of all measuring ranges is calibrated.
The calibration procedure can be aborted by pressing the CL key.

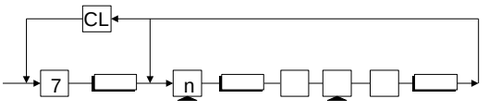
6 Display sensitivity setpoint



Measuring range No.

The setpoint is displayed which was used for the last calibration. The measuring range in which the setpoint is present is output to the right of the display.
In the case of four calibration gas connections, note that calibration gas 1 is assigned to range 1, calibration gas 2 to range 2 etc.

* 7 Adjust sensitivity setpoint



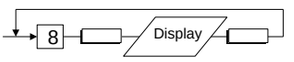
Identifier Setpoint

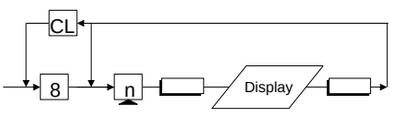
Identifier: 1 = calibration gas 1 for range 1 (to 4)
2 = calibration gas 2 for range 2
3 = calibration gas 3 for range 3
4 = calibration gas 4 for range 4

The setpoint must be reset when the calibration gas is changed.
In the case of a total calibration (function 17), all four ranges are calibrated using a calibration gas.
If there is more than one calibration gas connection present, that gas will be used as calibration gas of which the setpoint had last been entered.
When working with a measurement-point switchover function, it is possible to measure different gases without an error as a result of different response factors. This is on the condition that each range is calibrated with the gas to be measured.
The identifiers 2, 3 and 4 can only be selected if four calibration gas connections are present.

* 8 Calibrate sensitivity to setpoint

Total calibration





Individual calibration

Identifiers: same as function 7

The sequence is analogous to function 5.

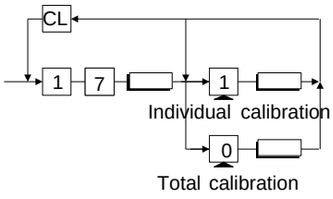
Total calibration:
A calibration gas is used to calibrate measuring range 1. The other measuring ranges are also calibrated.
If there is more than one calibration gas connection present, that gas will be used as calibration gas of which the setpoint had last been entered.

Individual calibration:
In the case of four calibration gas connections, calibration gas 1 is used for range 1, calibration gas 2 for range 2 etc. in the case of one calibration gas connection, the set range is calibrated. This procedure can be repeated for the various measuring ranges.

The LED “not ready” lights up during the adjustment. The original measuring range is selected following the adjustment.
The calibration procedure can be aborted by pressing the CL key.

B Calibration of measuring ranges B

** 17 Switch over from total calibration to individual calibration



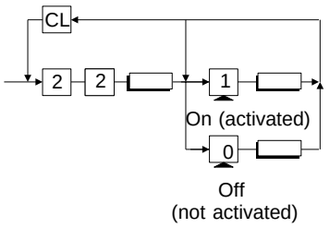
Total calibration:
The calibration applies to all four measuring ranges.

Individual calibration:
Each measuring range is calibrated separately. If four calibration gas connections are present on the analyzer, note that range 1 is calibrated with calibration gas 1, range 2 with calibration gas 2 etc.

Factory setting: 0

C Autocalibration C

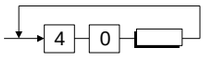
** 22 "autocal" on/off



Autocal has been programmed using functions 40 ff.
The LED “autocal” flashes during the automatic calibration.
The calibration is repeated at an interval defined in function 42.

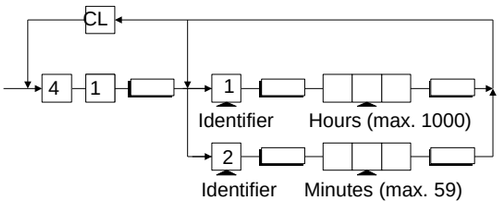
Factory setting: 0

** 40 Trigger single “autocal”



An automatic calibration (zero, calibration gas(es)) is triggered. The autocalibration cycle is not influenced by this.

** 41 Set time up to first “autocal”

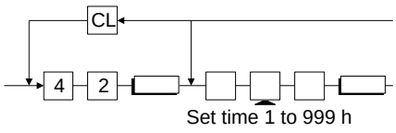


The time is defined when the first calibration procedure is to be automatically triggered. Further automatic calibration procedures are carried out according to the time defined in function 42.

The calibration procedure can only be triggered when the analyzer is in the “Measure” status.

Factory setting: 24/0

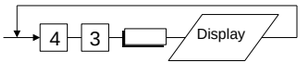
** 42 Set time between two “autocals”



The cyclic repetition of the calibration procedure is defined here. If a time setting which has already been imported is modified, the new time only becomes effective following the next autocal. This time can be defined using function 41.

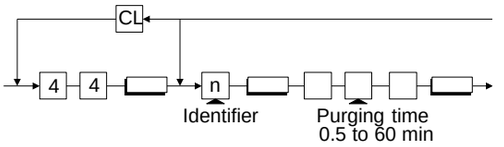
Factory setting: 168

43 Display time between two “autocals”



The time is output on the display in hours.

** 44 Set purging times



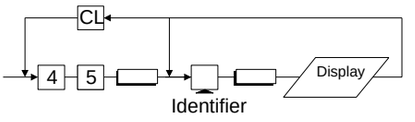
The flow of calibration gas is enabled during the purging time. The time parameterized under identifier 2 is also used as the prepurging time for the sample gas following the calibration.

Identifier: n
1 = zero gas
2 = calibration gas (1)
3 = calibration gas 2 (option)
4 = calibration gas 3 (option)
5 = calibration gas 4 (option)
6 = all calibration gases (option)

Identifiers 3 to 5 are only relevant if 4 calibration gas connections are present.
The corresponding measuring range is not calibrated if the purging time = 0.

Factory setting: 1 min for all gases

45 Display purging times

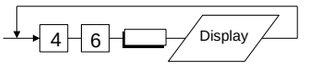


The purging time is output on the display in minutes.

Identifier: n =
1 = zero gas
2 = calibration gas 1
3 = calibration gas 2
4 = calibration gas 3
5 = calibration gas 4

Identifiers 3 to 5 are only relevant if 4 calibration gas connections are present.

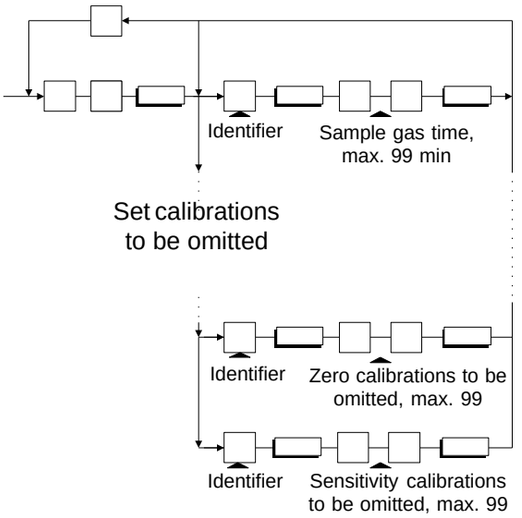
46 Display time up to next “autocal”



The hours and minutes up to the next autocal are output in succession in the display.

C Autocalibration C

** 47 Set sample gas time between zero and sensitivity calibrations; set calibrations to be omitted



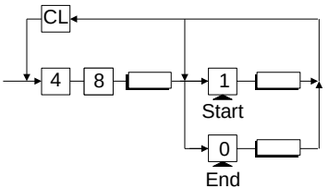
This function is selected if zero and sensitivity calibrations are not to be carried out directly in succession. The total time between the zero and sensitivity calibrations comprises the sample gas time and the time selected under function 44, identifier 2.

Factory setting: 0

If a number is entered under identifier 2 for zero calibrations to be omitted, the number under identifier 3 is automatically set to zero and vice versa.

Factory setting: 0/0

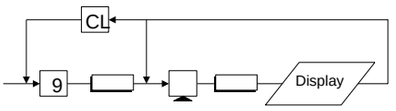
** 48 Signal contact at start/end of “autocal”



Plug connector X2, pins 9 and 10

Factory setting: 1

9 Display limits



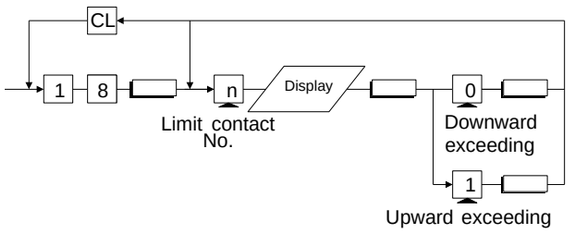
Limit contact No., the associated symbol for upward/downward violation appears to the left of the number

This function displays the limit associated with the limit contact. The measuring ranges are displayed (LEDs) in which the limit is active.

Upward violation

Downward violation

** 18 Set limits to upward or downward exceeding



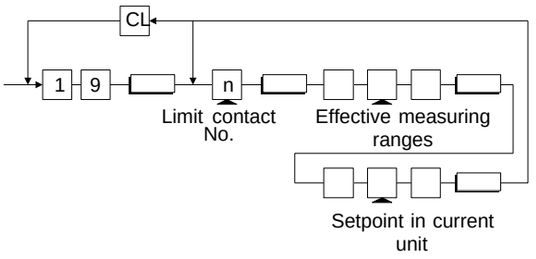
The selected limit contact can be set to upward or downward exceeding.
The LED “lim” flashes when the limit contact is triggered.

Switches with upward exceeding

Switches with downward exceeding

Factory setting: 4

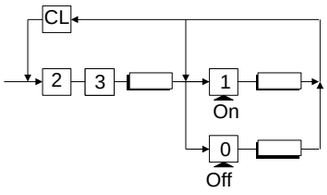
** 19 Set limit



There are 4 limits which can be freely assigned to the measuring ranges. The input “Effective measuring ranges” defines the range in which the limit is triggered. The measuring ranges must be entered in ascending order.
The setpoint must be entered in the currently selected unit (ppm C_1, ppm C_3, ppm C_6 or mg/m^3) which is output to the right of the display.
The programmed limit monitoring can be switched on and off using function 23.

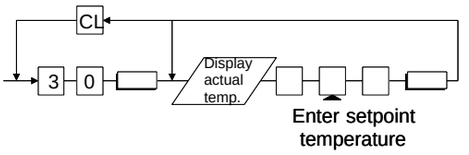
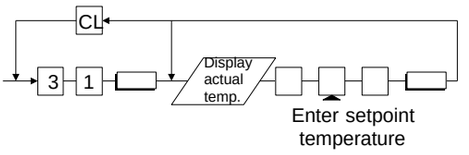
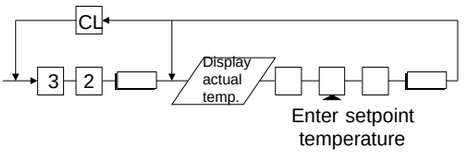
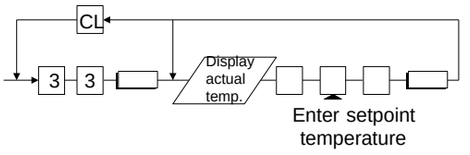
Factory setting for setpoints: 0

** 23 Limit monitoring on/off

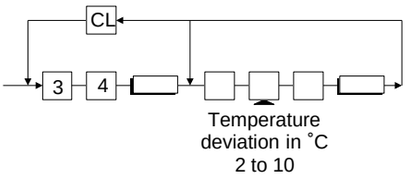


If “On” is set, the associated limit relay is triggered when a limit is violated. The LED “lim” flashes.
If “Off” is set, no limit relay is activated.

Factory setting: 0

** 30 Display, enter actual temperature and setpoint temperature of oven  	The temperatures of the oven are in ˚C. The minimum value is 110 ˚C, the maximum value 200 ˚C. The actual temperature is initially displayed for approx. 3 s, and then the setpoint temperature. Factory setting: 200
** 31 Display, enter actual temperature and setpoint temperature of pump  	The temperatures of the pump are in ˚C. The minimum value is 110 ˚C, the maximum value 190 ˚C. The actual temperature is initially displayed for approx. 3 s, and then the setpoint temperature. Factory setting: 190
** 32 Display, enter actual temperature and setpoint temperature of heated line  	The temperatures of the heated line are in ˚C. The minimum value is 110 ˚C, the maximum value 200 ˚C. The actual temperature is initially displayed for approx. 3 s, and then the setpoint temperature. Factory setting: 190
** 33 Display, enter actual temperature and setpoint temperature of sample gas probe  	The temperatures of the sample gas probe are in ˚C. The minimum value is 110 ˚C, the maximum value 200 ˚C. The actual temperature is initially displayed for approx. 3 s, and then the setpoint temperature. Factory setting: 190

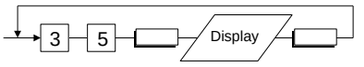
** 34 Display, set max. temperature deviation



This function defines how far the temperatures of the oven, pump, heated sample gas line and sample gas probe may deviate upwards or downwards from the setpoint temperature. A warning is output if the temperature deviates by more than this value for one of the four heaters.

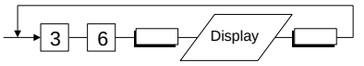
Factory setting: 5

* 35 Display, set H_2 pressure



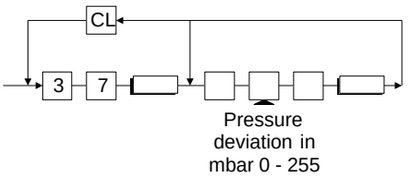
The hydrogen pressure is output on the display in mbar and can be adjusted using the top screw on the front panel. The technical data refer to an overpressure of 1000 mbar.

* 36 Display, set sample gas pressure



The sample gas pressure is output on the display in mbar and can be adjusted using the bottom screw on the front panel. The technical data refer to an overpressure of 500 mbar.

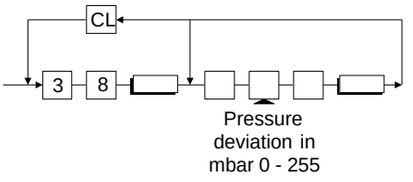
* 37 Enter tolerance for hydrogen pressure



The entered pressure deviation, usually 50 to 100 mbar, specifies the maximum permissible deviation from the setpoint which has been set using function 35.
A warning is output if the hydrogen pressure exceeds or falls below this value.

Factory setting: 50

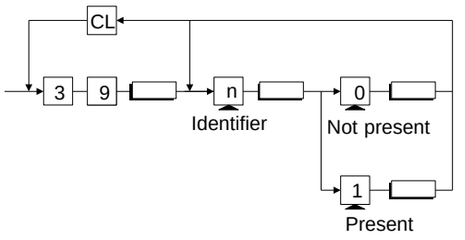
* 38 Enter tolerance for sample gas pressure



The entered pressure deviation, usually 50 to 100 mbar, specifies the maximum permissible deviation from the setpoint which has been set using function 36.
A warning is output if the sample gas pressure exceeds or falls below this value.

Factory setting: 50

*** 39 Probe and/or heated sample gas line present/ not present



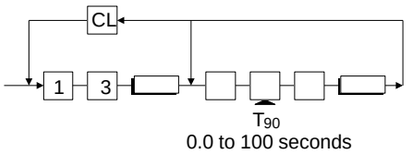
Identifier 1 = probe
Identifier 2 = heated line

The device configuration is defined by this function.

Factory setting:
Identifier 1: 0
Identifier 2: 0

E Time constants E

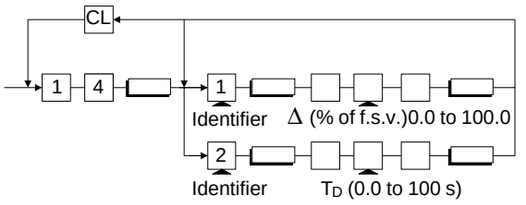
** 13 Set time constant T_{90}



The time constant T_{90} (0.1 to 100 s) is used to reduce the noise. The signal delay increases with increasing T_{90}.

Factory setting: 0.0

** 14 Set dynamic time constant T_D (dynamic noise rejection)

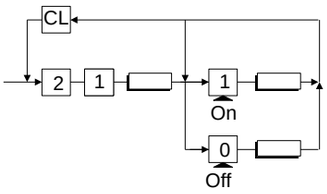


The time constant T_D applies to small changes in signal without a defined range Δ (in % of respective f.s.v.). The time T_{90} defined in function 13 applies to larger changes in signal. T_D must be larger than T_{90}. In this manner, noise is optimally suppressed in the case of small changes; in the case of larger changes ($> \Delta$), the modified signal is recorded faster by automatic switching over to the time constant T_{90}.

Factory setting: 3.0/1.0 (FID 5E-I, -A, -AS)
8.0/3.0 (FID 5E-E)

F Measured-value memory, current output F

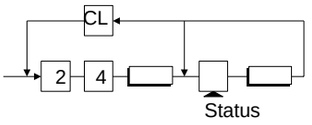
** 21 Measured-value memory on/off



If the measured-value memory is switched on, the last measured value is stored when the CAL key is pressed. It is then present at the mA output until the analyzer is reset to the measurement status by pressing the MEAS key.
The measured value is also stored in the display in the event of an error.

Factory setting: 0

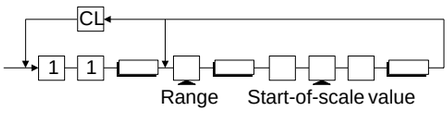
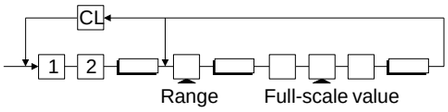
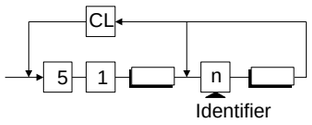
** 24 Set current output



Status
0 0 to 20 mA
1 2 to 20 mA
2 4 to 20 mA

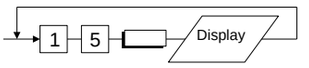
Factory setting: 2

G Redefine measuring ranges G

** 11 Define start-of-scale values of measuring ranges  	The start-of-scale values can be set as desired. The only condition is that the full-scale value set using function 12 is greater than the start-of-scale value set here. The unit displayed when the setting is made applies as the unit to the value entered here (switch over unit using function 94). Factory setting: 0
** 12 Define full-scale values of measuring ranges  	The full-scale values can be set as desired. The only condition is that the start-of-scale value set using function 11 is greater than the full-scale value set here. The unit displayed when the setting is made applies as the unit to the value entered here (switch over unit using function 94). Factory setting: 30/300/3000/30000
** 51 Select number of valid measuring ranges  	The number of valid measuring ranges is selected. Autoranging (function 20) only takes place within the selected ranges. Identifier: 1 = measuring range 1 2 = measuring ranges 1 and 2 3 = measuring ranges 1, 2 and 3 4 = measuring ranges 1, 2, 3 and 4 Factory setting: 4

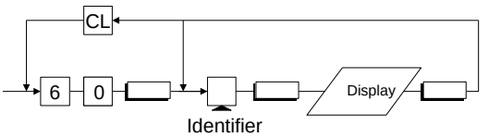
Further display functions

15 Display compensated background current (zero calibration)



The current compensated in the zero is displayed here in pA.

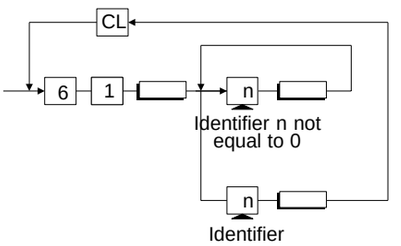
* 60 Display internal values



Identifier: n =

1	=	Oven temperature (100 to 200 ˚C)
2	=	Physical section temperature (10 to 60 ˚C)
3	=	Pump temperature (110 to 190 ˚C)
4	=	Pump temperature comparison (110 to 190 ˚C)
5	=	Sampling temperature (110 to 190 ˚C)
6	=	Sample gas probe temperature (110 to 190 ˚C)
7	=	Flame temperature (230 to 300 ˚C)
8	=	Temperature of flowmeter (10 to 80 ˚C)
9	=	Temperature of board (10 to 70 ˚C)
10	=	Flow (50 to 2000 ml/min according to analyzer status)
11	=	Pressure of sample gas/combustion air (mbar abs.)
12	=	Hydrogen pressure (~ 1000 mbar absolute)
13	=	Fan current (50 to 200 mA)
14	=	FID voltage (200 V)
15	=	+15 V
16	=	–15 V
17	=	+24 V

61 Display measured variables

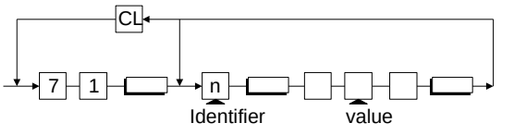


Identifier: n =

0	=	Measured value
1	=	Raw measured value (pA)
2	=	Analog current
3	=	Current following adjustment of preamplifier
4	=	Current following zero adjustment

Terminating this function via CL key sets the identifier automatically to 0.

*** 71 Compensation of temperature influence on zero



Identifier	Value
1	Basic temperature (Temperature 0)
2	$\frac{\text{(Value 2 - Value 0)}}{\text{(Temp. 2 – Temp. 0)}} * 1000$
3	$\frac{\text{(Value 0 - Value 1)}}{\text{(Temp. 0 – Temp. 1)}} * 1000$

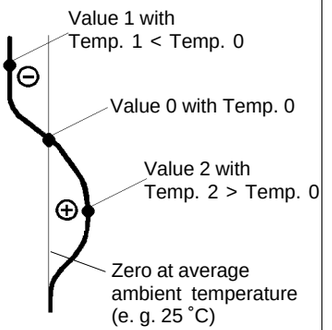
Identifier	Setpoint
1	Temperature of analyzer section with average ambient temperature (in °C; see function 60, identifier 2)
2	Change in display with increase in temperature (function 61, identifier 4)
3	Change in display with reduction in temperature (function 61, identifier 4)

Procedure

1. Calibrate zero of basic temperature (function 5)
2. Switch on measuring range 1
3. Select function 71 and enter a value of zero for identifiers 2 and 3
4. Measure (see example)
5. Enter identifier and setpoints under function 71

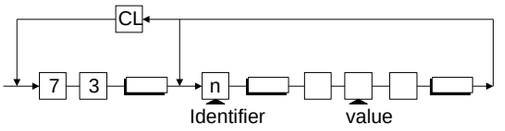
Caution! Function 71 might influence zero!

Example:



Value 0, 1, 2 is the measured value (as indicated under function 61, identifier 4)

*** 73 Compensation of temperature influence on measured value



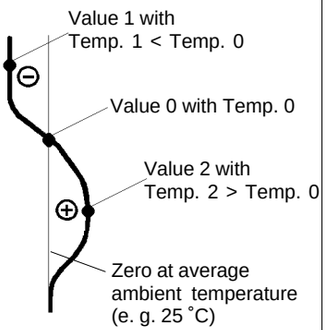
Identifier	Value
1	Basic temperature (Temperature 0)
2	$\frac{\text{(Value 2 - Value 0)}}{\text{(Temp. 2 – Temp. 0)}} * 1000$
3	$\frac{\text{(Value 0 - Value 1)}}{\text{(Temp. 0 – Temp. 1)}} * 1000$

Identifier	Setpoint
1	Temperature of analyzer section with average ambient temperature (in ˚C; see function 60, identifier 2)
2	Change in display with increase in temperature
3	Change in display with reduction in temperature

Procedure

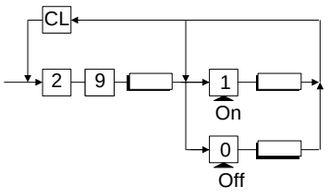
1. Calibrate sensitivity at basic temperature (function 8)
2. Switch on measuring range matching the calibration gas used
3. Select function 73 and enter a value of zero for identifiers 2 and 3
4. Measure (see example)
5. Enter identifier and setpoints under function 73

Example:



Value 0, 1, 2 is the measured value

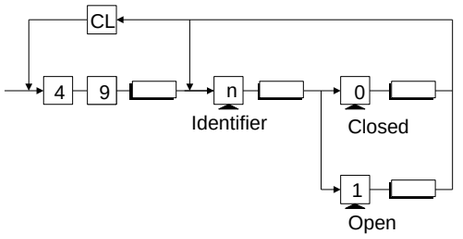
** 29 Measure during warming-up phase



The measured signal can be observed during the warming-up phase.

Factory setting: 0

** 49 Switch valves individually



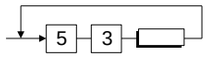
The various gas valves can be switched individually independent of the operating mode “autocal”.

The identifiers are type-dependent as shown in the following list.

Type FIDAMAT 5E-	E	I	A	AS
Hydrogen valve	1	1	1	1
Combustion air valve	2		2	2
Control air valve				3
Zero gas valve	3	2	3	4
Calibration gas 1 valve	4	3	4	5
Calibration gas 2 valve	5		5	
Calibration gas 3 valve	6		6	
Calibration gas 4 valve	7		7	
Bypass gas valve			6	

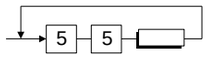
With the FIDAMAT 5E-E and 5E-A the lines are flushed in the event of a power failure (combustion air valve open in de-energized state).

*** 53 Load basic factory-set data



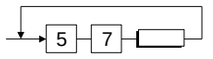
Programming with original data (status when delivered from factory).
Servicing function!
The device carries out a restart when this function is triggered.

*** 55 Load user-specific data



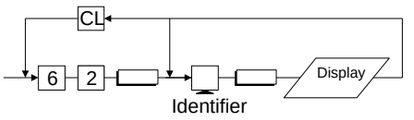
The application parameters present in the basic data memory can be transferred to the main memory.
The device carries out a restart when this function is triggered.

*** 57 Store user-specific data



A parameter configuration defined by the user can be held in the memory. This data set is loaded automatically each time the device is switched on.

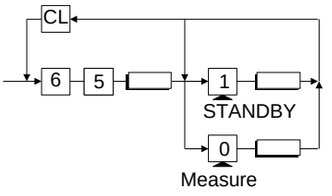
*** 62 Reproduce internal values on analog signal, channel 1



Identifier: n =

0	=	Measured value
1	=	Oven temperature ˚C
2	=	Physical section temperature ˚C
3	=	Pump temperature ˚C
4	=	Pump temperature comparison ˚C
5	=	Sampling temperature ˚C
6	=	Sample gas probe temperature ˚C
7	=	Flame temperature ˚C
8	=	Temperature of flowmeter ˚C
9	=	Temperature of board ˚C
10	=	Flow (ml/min)
11	=	Pressure of sample gas/combustion air (mbar abs.)
12	=	Hydrogen pressure (mbar abs.)
13	=	Fan current (mA)
14	=	FID voltage (V)
15	=	+15 V
16	=	–15 V
17	=	+24 V
18/19/20/21/22/23	=	–1/0/4/10/20/21 mA
24	=	raw current, corresponding to the measuring range
25	=	current prior to zero, corresponding to the measuring range

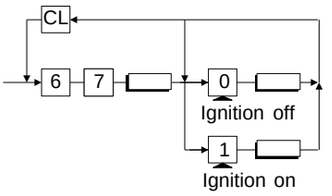
*** 65 STANDBY



The sample gas pump is switched off in the STANDBY status. Gentle backflashing of the sample gas line takes place.

Factory setting: 1

*** 67 Ignite flame



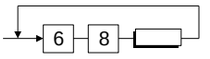
The analyzer attempts to ignite the flame for approx. 20 minutes.

The ignition process starts automatically and can be terminated by entering “0".

The procedure is terminated automatically when the flame is ignited.

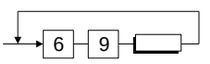
Factory setting: 0

*** 68 RESET



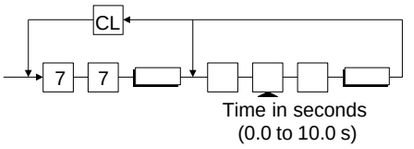
This function must be used in the event of faults in the program sequence. The analyzer is set to the status of the warming-up phase.

*** 69 LED check, software No.



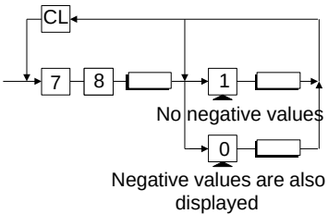
All LEDs light up. After 5 seconds, the two software versions appear in succession in the display.

*** 77 Suppression of brief noise signals



The entered time corresponds to a dead time which will be effective only if the measured value exceeds the value entered under function 14, identifier 2. The original value remains until the measured value falls below the value entered under function 14, identifier 1. If the value is 0, the dynamic time constant entered under function 14, identifier 2 is active (normal operation).

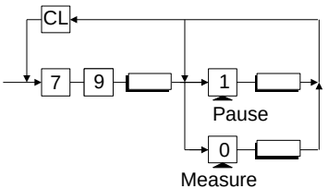
*** 78 Suppression of negative measured values



The display and output of negative values can be suppressed using this function. The analyzer then displays a value of 0.00 in these cases.

Factory setting: 0

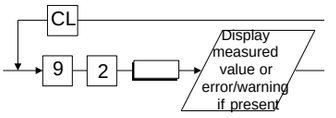
*** 79 Pause



The pause function closes the hydrogen valve - thus extinguishing the flame - and switches off the pump. The heaters remain in operation. The start function opens the hydrogen valve, ignites the flame and switches the sample gas pump on again. The startup phase is thus shortened from approx. 1 to 2 hours (when starting up from cold) to approx. 15 minutes

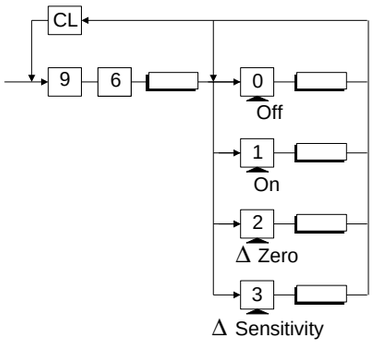
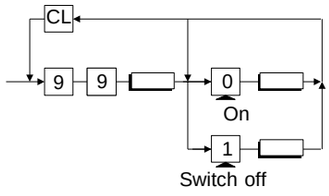
Factory setting: 0

* 92 Display warnings and brief errors



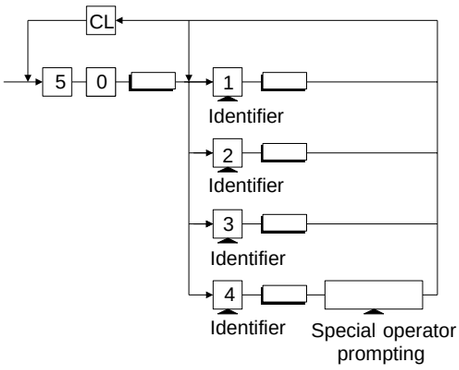
The measured value is displayed if function 92 is switched on. The function number 92 appears in the small display. The measured value is deleted in the large display when an error occurs, and the error code is displayed.

No other function can be called when function 92 is active.

* 96 Display Δ zero calibration  	This function can be used to automatically compare the previous and new zero and sensitivity calibrations. A warning is output if the difference between the two calibrations is >6 %. The values can be viewed using identifiers 3 and 4. The warning LED is cancelled when function 96 is called, and the status signal at plug X2 is set to “No warning” again.
*** 99 Switch analyzer on/off  	Identifier 1 switches off the device in a controlled manner. No sample gas is left in the analyzer. The hydrogen and sample gas supplies are interrupted. Heaters are switched off. Combustion air is supplied for a further 30 seconds. Small quantities of combustion air may reach the process during this time. The device startup is initiated using identifier 0. Factory setting: 0

Reprogram, activate and deactivate codes

*** 50 Reprogram, activate/deactivate codes



Identifiers

1 = codes are active

2 = codes are not active; all operating functions are freely accessible. The codes are automatically reactivated if a function is not selected within 15 minutes.

3 = codes are permanently inactive. They are activated again by identifier 1.

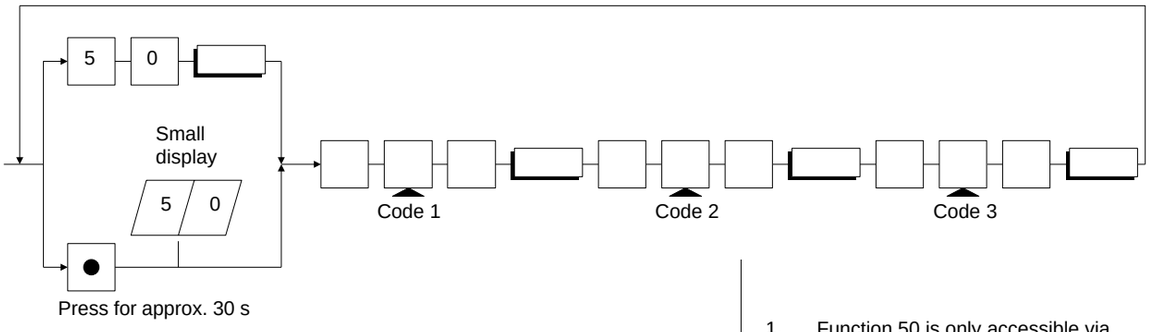
4 = reprogram codes (see special sheet in appendix).

Factory setting: 1

11.4 Special Sheet for Storage of Current Coding

FIDAMAT 5E gas analyzer

Function and code	Remarks
*** 50 **Reprogram of codes**	



Press for approx. 30 s

Current codes

Code 1	Code 2	Code 3
111	222	333

1. Function 50 is only accessible via the current codes (1 to 3)
2. Code 1 is omitted if it is programmed to 000.
3. The current codes can be bypassed using a time function if they are no longer known and thus reprogrammed.

This sheet should be removed from the Instruction Manual and stored separately.

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