User Manual

PolyGard®2 CGC6 Compact Controller

March 27, 2023

July 25, 2023 – *Revision*

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1 General

It is important to read this user manual thoroughly and clearly in order to understand the information and instructions. The PolyGard®2 devices must be used within product specification capabilities. Due to on-going product development, MSR-Electronic GmbH | INTEC Controls reserves the right to change specifications without notice. The information contained herein is based upon data considered to be accurate. However, no guarantee is expressed or implied regarding the accuracy of these data.

1.1 Applicability

PolyGard®2-Series:

- CGC6 Compact Controller

1.2 Intended Use

The PolyGard®2 CGC6 Compact Controller is designed for detection and warning detection of toxic, combustible or dangerous atmosphere in many commercial and industrial applications.
The PolyGard®2 CGC6 must not be used in potentially explosive atmospheres.
The intended sites for indoor use within the ambient conditions defined in the technical data are all areas being directly connected to the public low voltage supply, e.g. residential, commercial and industrial ranges as well as small enterprises.

1.3 Safety

The operating instructions must be carefully read, understood and followed by all persons who install, use, maintain and check the product. The product can only fulfil its intended functions if it is installed, used, maintained, cared for and checked in accordance with the instructions provided by MSR-Electronic GmbH | INTEC Controls.

1.4 Responsibility Installer and Operator

It is the responsibility of the installer and operator to ensure that all PolyGard®2 equipment is installed and used in compliance with all national and local codes. The device must be checked for correct installation and functionality by a qualified person before measurement operation is started. In Germany, BGR 500 Chapter 2.33 must be applied for this purpose.
The PolyGard®2 devices are tested for function by the manufacturer before delivery. During commissioning, a documented functional test is also required. The installation should only be carried out by trained installation technicians, taking into account the current safety procedures for control installations.
The required equipotential bonding connections (also e.g. secondary potential to ground) or grounding measures are to be carried out according to the respective project regulations. It must be ensured that no ground loops are created in order to avoid undesired interference in the measurement electronics.
It is necessary to follow all instructions as well as the user documentation.

1.5 Services

It is recommended that PolyGard®2 equipment be inspected on a regular basis. Performance deviations can be corrected based on regular maintenance. Recalibration and parts replacement can be performed in the field by a qualified technician using the appropriate tools.
Alternatively, the easily removable, plug-in sensor head can be returned to INTEC Controls for service.
Regular maintenance is to be carried out according to the instructions.

1.6 Limited Warranty

MSR-Electronic GmbH | INTEC Controls does not assume any liability in case of improper or incorrect use of the device. The installer and operator are exclusively responsible for the design and use of the product. If the product is not used, maintained or repaired in accordance with the instructions for use, warranty and product liability claims as well as claims arising from any guarantees assumed by MSR-Electronic GmbH | INTEC Controls for the product will be forfeited.
MSR-Electronic GmbH | INTEC Controls warrants PolyGard®2 devices against defects in material or workmanship for a period of 2 years (1 year for sensors) from the date of shipment. Should a defect in material or workmanship occur during the warranty period, MSR-Electronic GmbH | INTEC Controls will repair or replace the unit at its option. This warranty does not apply to units that have been modified, after repair attempts, or that have been damaged unintentionally or intentionally. The warranty also does not apply to units in which the sensing element has been poisoned. The above warranty is in lieu of all other express warranties, obligations or liabilities.
This warranty applies only to PolyGard®2 units. MSR-Electronic GmbH | INTEC Controls is not liable for consequential damages resulting from the purchase or use of PolyGard®2 devices.

If the PolyGard®2 CGC6 needs to be returned, an authorized RMA number issued by INTEC Controls is required.

1.7 Dispose of Device

In accordance with Directive 2012/19/EU, the device must not be disposed of as municipal waste. Return the device for disposal to your national sales organisation, which you can contact if you have any questions about disposal.
Outside the EU, you have to consider the corresponding directives.

2 Functional Description

2.1 General

The CGC6 is designed as a gas detection system for connection of max. 10 DT6A Units (DT6A + Sensor SC2) via its own field bus. The function of the SC2 sensor head series is not the subject of this user manual but can be found in the respective SC2 User Manual.
The controller monitors the measured values and activates the alarm relays if the specified max. 4 alarm thresholds for pre- and main alarm are exceeded. The analog 4–20 mA output provides either a sum signal of all or certain measured values or the signal of one measured value.
The SIL2-compliant self-monitoring in the CGC6 as well as in the connected DT6A Units activates the fault signal in the event of an internal fault as well as in the event of a fault in the field bus communication (DT6A Unit) and in the event of a fault in the 4–20 mA output current signal.

2.2 Functional Output

SHORT DESCRIPTION OF THE FUNCTION DIGITAL OUTPUTS WITH RELAYS

Action Reaction (GS = Gas Signal) (AT =Alarm Threshold) (HS = Hysteresis)	**Alarm LED Display / WAO**	**Alarm 1 Relay 1**	**Alarm 2 Relay 2**	**Alarm 3 Relay 5 Flashing/ Warning light**	**Alarm 4 Relay 4 Horn**	**Relay 3 (collective fault)**
GS < AT 1	**GREEN**	Inactive	Inactive	**OFF**	**OFF**	Inactive
GS ≥ AT 1	**RED** slowly flashing	Active	Inactive	**OFF**	**OFF**	Inactive
GS ≥ AT 2	**RED** fast flashing	Active	Active	**OFF**	**OFF**	Inactive
GS ≥ AT 3	**RED** fast flashing	Active	Active	**ON**	**OFF**	Inactive
GS ≥ AT 4	**RED** fast flashing	Active	Active	**ON**	**ON**	Inactive
GS ≥ AT 4 Taste Hupe Aus	**RED** fast flashing	Active	Active	**ON**	**OFF**	Inactive
GS ≤ (AT 3 – HS)	**RED** fast flashing	Active	Active	**OFF**	**OFF**	Inactive
GS ≤ (AT 2 – HS)	**RED** slowly flashing	Active	Inactive	**OFF**	**OFF**	Inactive
GS ≤ (AT 1 – HS)	**GREEN**	Inactive	Inactive	**OFF**	**OFF**	Inactive
Maintenance due (no alarm, no fault)	**GREEN** flashing	Inactive	Inactive	**OFF**	**OFF**	Inactive
Internal error / fault	**YELLOW**	Inactive	Inactive	**OFF**	**OFF**	Active

Table 1: Function Digital Outputs with 3 Relays

Note 1:
Relay 1 and 2: Operating mode energized
Status Inactive: Alarm OFF = relay coil energized
Status Active: Alarm ON or device without tension = relay coil de-energized

Relay 3: Operating mode energized
Status Inactive: No fault = relay coil energized
Status Active: Fault or device-without tension-= relay coil de-energized

Relays 4 and 5: Open-collector / transistor output, operating mode de-energized
Status OFF: Alarm OFF or device-without tension
Status ON: Alarm ON

Note 2: Alarm thresholds can have the same value, therefore the relays and/or horn and warning light can be actuated together.

3 Installation

Check for completeness and accuracy using the delivery documents and the identification label on the device.

Electronics can be destroyed by electrostatic discharge (ESD). Therefore, the installation work should be done only by persons connected to ground, e. g. by standing on a conductive floor or by taking appropriate grounding measures (acc. to DIN EN 100015).

3.1 Mounting Instructions

When choosing the mounting location, you have to consider the ambient conditions in order to get representative measurement results. Please pay special attention to the following factors:

- External heat sources are not allowed on the installation site.
- Choose mounting location according to the local regulations.
- Consider ventilation conditions! Do not mount next to air passages or suction holes.
- The sample gas must pass the sensor even under adverse flow conditions. A flow test can be performed for instance with smoke tubes.
- If the flow conditions are > 6 m/s, it is advisable to use a wind shield.
- Mount the device at a location with minimum vibration and minimum variation in temperature (no direct sunlight).
- Avoid locations where water, oil etc. may influence proper operation and where mechanical damage might be possible.
- Provide adequate space around the sensor for maintenance and calibration work.
- Observe possible constructor's instructions
- **The installation height of the DT6A Unit depends on the relative gas density of the monitored gas type (see SC2 User Manual).**

3.2 Installation Work

Assembly work must only be carried out under gas-free conditions.
The housing must neither be spot-drilled nor drilled through outside the knockouts.
The installation position of the gas detector is always with the sensor head downwards, cables are introduced from above.

The housing is delivered in closed condition. Before breaking out the knockouts, the exact position and size of the cable entries must be determined.
INTEC Controls recommends using a protective cap (C2-Z1) until commissioning to protect the sensors on the DT6A Unit from dirt and damage. For sensors that can be poisoned by silicones, such as all semiconductor and heat tone sensors, it is imperative to use a protective cap (C2-Z1) and to remove it only after the silicones have dried and the unit is energized.

Mounting Procedure:

- Open housing cover.
- Break out the required knockouts on the housing for cable entries.
- Fix the CGC6 and the DT6A to the wall through the 4 marked mounting points of the housing (see Figure 1) .
- The dimensions XX depend on the type and can be read on the back of the housing.
- Close and screw the cover.

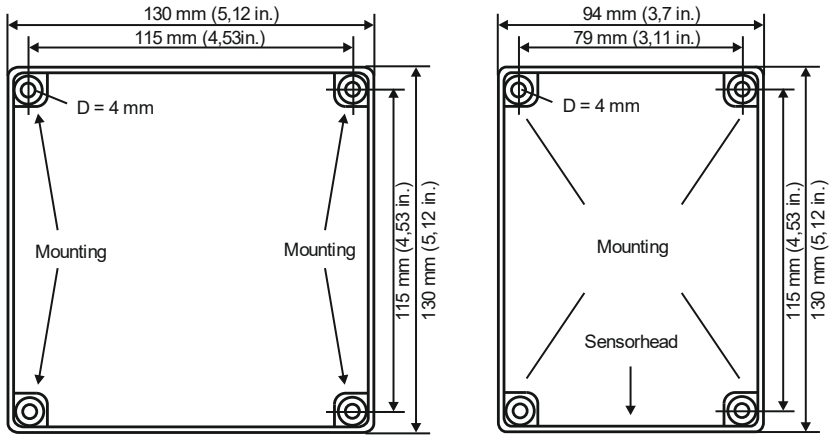


Figure 1: Installation of Controllers / of DT6A Unit

4 Electrical Connection

Assembly work must only be carried out under gas-free conditions!
Consider static electricity instructions (ESD)!

4.1 General Notes

- Installation and connection of the electrical installation should only be performed by a professional when de-energized, according to the connection diagram and in accordance with the relevant regulations.
- The technical requirements and regulations for wiring, electrical security, as well as project specific and environmental and local conditions etc. must be observed when mounting.
- All terminals are screw type. The permissible conductor cross section can be read from the Technical Data.
- When selecting and installing the cables you have to comply with the regulations concerning the RS-485 bus installation. The installations have to be executed in line topology. Cable lengths and types have to be considered as well.
- Avoid any influence of external interferences by using shielded cables for the bus line, but do not connect the shield.

- It is recommended to use the following cable types[1]:

	Europe	USA/Canada
Power supply 230 V	NYM-J 3 x 1.5 mm^2	14 AWG / 300 V
Alarm message 230 V (also possible together with power supply 230 V)	NYM-J X x 1.5 mm^2	14 AWG / 300 V
Signal message, bus connection, warning devices 24 V	J-Y(St)Y 2x2 x 0.8 mm^2	min. 300 V

Table 2: Recommended Cable Types

[1] The recommendation does not consider local conditions such as fire protection etc.

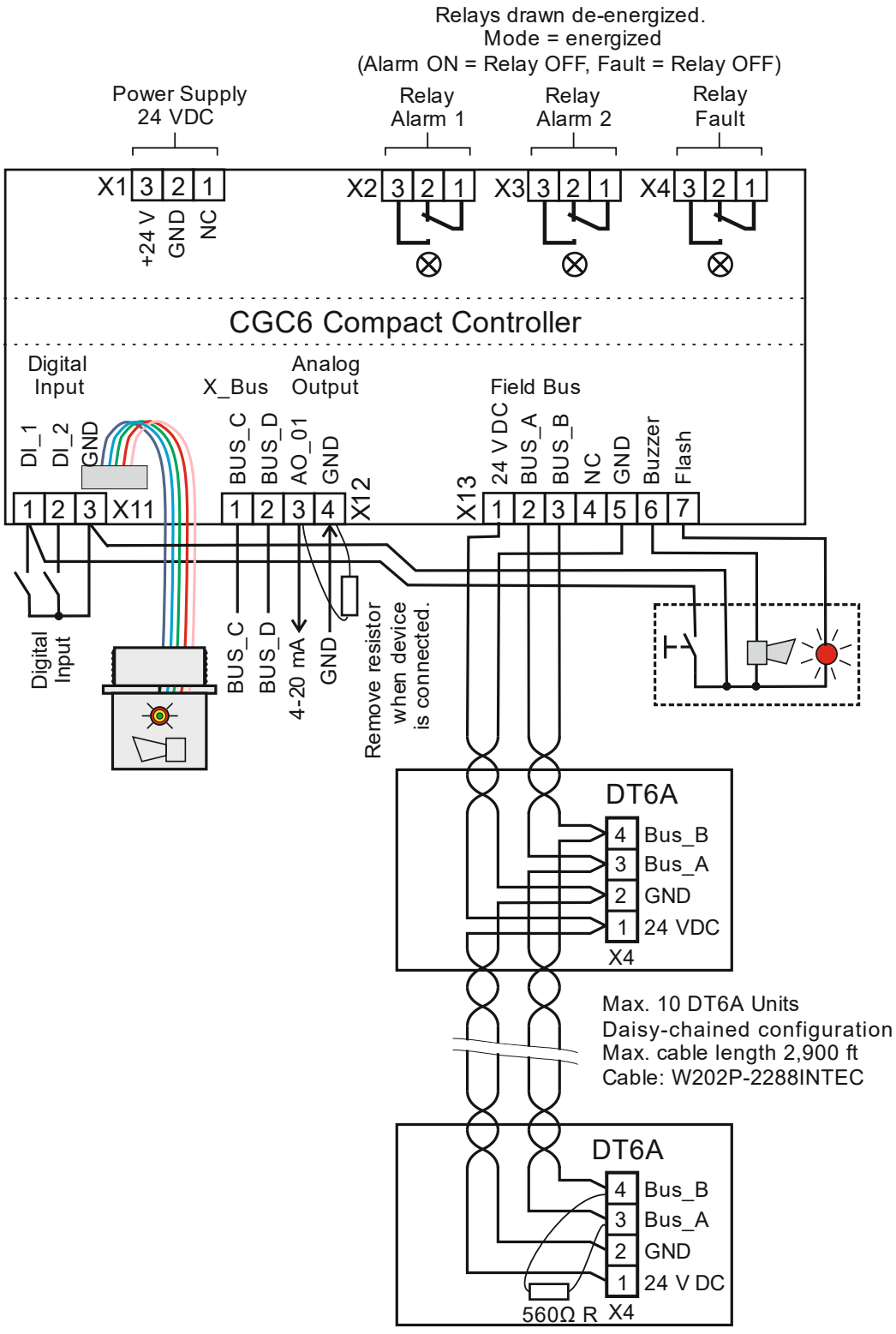
- Strip the wires as shortly as possible. It is important to ensure that bare wires, e.g. wire shields do not come into contact with the mounted PCB (risk of short-circuit).
- Low voltage wire and mains connected wire must be fixed separately by cable ties or similar, to secure against looseness.
- The alarm signals are available as potential-free change-over contacts. If required, the power supply is available at the L1 socket.
- Use copper conductors only, for the terminal is only for connection to copper wire.
- When choosing the option "Power Supply ≥ 90 VAC" you must make sure that a switch or a circuit breaker is provided in the building automation especially for the unit. It must be installed easily accessible near the unit. It has to be marked as a disconnecting device for the unit and shall meet the relevant requirements of UL/IEC 60947 and UL/IEC 60947-3.
- The exact position of the terminals for the transmitters and alarm relays is shown in the connection diagrams.

4.2 Terminal Connection

Attention:
Connecting the 24 V field bus voltage to the terminals BUS_A / BUS_B can destroy the Board completely!

- Open the cover.
- Insert the cables from above and connect them.
- Close the cover.

ELECTRICAL CONNECTIONS



Terminating resistor 560Ω R at the last DT6A Unit

5 Commissioning

5.1 General Notes

All devices without exception run through a complete functional test before delivery.
However, transportation, storage, installation or special environmental conditions may lead to (mostly small) deviations. It is therefore necessary that a person authorized by the manufacturer or alternatively an expert puts the device properly into operation and performs a functional test.

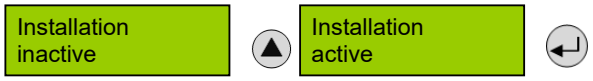
Only trained technicians should perform the following when commissioning:

- Check for correct mounting location and height.
- Check if connection is correct according to connection diagram.
- Check that the board is firmly seated in the housing.
- Check power voltage.
- Calibrate the sensors of the DT6A Unit (if not already factory-calibrated).
  - See User Manual SC2.

- For commissioning, the CGC6 and the associated DT6A Units must be wired and ready for operation according to the wiring diagram.
- During commissioning, all connected DT6A Units (max. 10) are registered on the CGC6 without tools by assigning an address using the key on the DT6A Unit.
- The DT6A Units are already completely initialised and parameterised at the factory. The status "Not registered" is indicated by the LED (green=OFF, yellow=ON).
- First, the installation mode is activated on the CGC6 in the "Installation & Calibration" menu (installation active). This puts the CGC6 into a kind of search mode for the login request of a new DT6A Unit.
- If the CGC6 detects a registration request, it assigns the smallest free address to it and transfers the data stored in the DT6A Unit for gas type, measuring range, alarm thresholds, etc. to the corresponding MP parameter address.
- After registration of the DT6A Unit, standard values for all relevant parameters are already stored in the CGC6, so that no further adjustments are necessary here. For project-specific adaptations, the parameters can be changed individually on the display.
- From chapter 8 onwards you will find the menu and parameter description.
- After commissioning, the error memory must be reset in the display (see section 8.1.1).

5.2 Registration of a DT6A Unit

Select CGC6 mode "Installation active" (see chapter 8.6 Installation and Calibration).



DT6A Unit: Green LED OFF, yellow LED ON = Not registered

- Start the installation mode on the DT6A Unit by pressing the button for approx. 10 seconds. The change of the operating mode is signalled by the yellow LED with 2 off-pulses within the 10 seconds.
- After successful registration, the DT6A Unit signals the address by flashing the 2 LEDs (valency: yellow = 1; green = 5), e.g. 1x green and yellow simultaneously and then 2x yellow = address 7.
- The DT6A Unit then switches to measuring mode (green LED=ON, yellow LED=OFF).

All further DT6A Units are now registered with the same procedure.

5.3 Check Registration

After registration of all DT6A Units, the "Measured values" menu is used to check whether the correct gas type and measured value are displayed for all registered DT6A Units.
If an DT6A Unit is missing, the registration procedure must be repeated for this unit.
If the message "Comm. Error" is displayed instead of the measured value, the sensor head is disconnected, or the field bus connection is interrupted at the DT6A Unit.

5.4 Retrieving the address again

The address can be queried at any time by pressing the button and releasing it after 3 seconds.

5.5 Reset to Factory Settings

Pressing the button for approx. 30 seconds resets the device to the delivery status (no address).

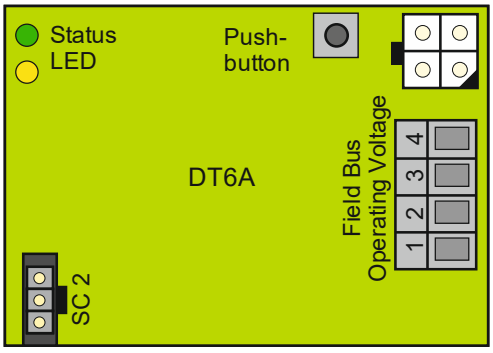


Figure 3: DT6A Unit

5.6 Deregistration of a DT6A Unit

To cancel registration of an DT6A Unit, you must navigate to the "Deregister Unit" menu (see chapter 8.6 Installation and Calibration).

By pressing the Enter and ↑ keys on the display, the desired unit is selected and deregistered by pressing the Enter key on the CGC6 again.

On the CGC6, the measuring point of the deregistered unit is set to inactive again and the address is noted as "Free" again. The deregistered unit can be re-integrated at any time.

If the log off is repeated for a unit that has already been deregistered, the message "Komm. Error" is displayed.

6 Operating Modes

During operation, the unit can assume different operating modes. A distinction is made between the warm-up phase, measuring mode and special mode, whereby special mode is divided into 2 different subcategories.

6.1 Restart (Diagnostic and Warm-up Stage)

The device is designed in a way that it generally runs through all internal device tests (diagnostics) in the Board and in the connected sensor head(s) after each power-up or processor reset before the measuring operation starts. That means that the processor's internal components and the associated program and working memories as well as the other components of the input and output units are tested. This process takes approximately 0.5 seconds.
When all diagnostics have been successful, the warm-up phase of the sensor element starts. The warm-up is necessary for the sensor element in the sensor head to assume a stable state after return of the voltage without triggering a pseudo alarm. The duration of the warm-up phase depends on the type of sensor used and can be read from the User Manual of the SC2/MC2 or SSAX1-2. If several sensors are connected, the duration of the warm-up phase depends on the sensor head with the longest warm-up phase.
During the warm-up phase, the yellow LED flashes every 2 seconds and "Power ON Time" appears in the display.
Subsequently, the display shows

- the current bus address at the top left,
- the gas type in the top centre and
- the unit at the top right.

"Warm-up Time" appears in the lower section of the display (see starting menu chapter 8).

After the end of the warm-up phase, measurement operation starts and the necessary diagnostic functions continue to run in the background.

6.2 Measuring Mode

In normal operating mode = **measuring mode**, there are no faults present, the gas concentration of the active sensors is continuously polled, checked for plausibility, output on the analog output (if available) and provided on the field bus. The gas concentration is displayed on the built-in display.
When the alarm evaluation is activated, only with alarm threshold > 0, the gas signal is checked with each measurement cycle, if it is ≥ alarm threshold (alarm evaluation for increasing concentration) respectively ≤ alarm threshold (alarm evaluation for falling concentration) and if exceeding respectively falling below, the alarm LED and the optional alarm relay are triggered. If the value falls below / exceeds the alarm threshold minus / plus the set hysteresis again, the alarm is automatically cancelled.
The gas detector continuously monitors itself, the measurement signal, the analog output, the alarm relay and the communication to the sensor head.
The device continuously monitors itself, the measurement signal, the analog output, the alarm relay and the communication to the sensor head.

If the measurement signal falls below the zero point, this will be tolerated

- for combustible gases with catalytic bead sensor element (Pellistor) up to a limit of - 10 % of the measuring range (- 10 % LEL), the analog output signal drops down to 2.4 mA and within this range no error is generated;
- for toxic gases with electrochemical sensor element and gases with IR-Premium sensor element up to a limit of – 4.5 % of the measuring range (- 1.125 % vol for O_2), the analog output signal drops down to 3.3 mA and within this range no error is generated.

Active dead band suppresses the 4–20 mA signal around the zero point (see chapter 8.11.5).
If the measurement signal exceeds the full-scale value, this will be tolerated up to a limit of + 6 % of the measuring range, the analog output signal increases up to ≥ 21.2 mA and there will be still no error generated.

6.3 Special Mode

6.3.1 Maintenance and Calibration Mode

The operator may set the gas detector in the Special Mode only when gas-free state is ensured (no alarm), because the alarm function is not available in this mode.

While the Board is in maintenance/calibration mode (manual Special Mode), the status "Special Mode" is displayed and/or sent to the GC-06 Controller. In Special Mode operation the query of the gas concentrations is slightly delayed, but there is no alarm evaluation. The flashing yellow LED and the display indicate the Special Mode. A fault overlays the LED display by continuous operation of the yellow LED.
The operator can activate the Special Mode on the internal display. This mode includes commissioning, calibration, testing, repair and decommissioning.
Pending alarms are held in active Special Mode, but new alarms are not generated.
The operator can exit the Special Mode after completion of work; if there are no further entries or operations, the unit will automatically return to the measurement mode after 15 minutes.

6.3.2 Faults

See chapter 8.1

7 Display Unit for CGC6 Series

7.1 Intended Use for the Display Unit

The display is used as visual indication, operating, commissioning and calibration unit for the CGC6 series.

7.2 Description

The parameters, gas types, units, etc. specified in the description are only examples.

7.3 Operation

The complete configuration and service are made via operating keys in combination with the LC display screen. Security is provided via 2 code levels against unauthorized intervention. Operation is done via 6 pushbuttons.

Figure 4: Display CGC6

7.4 Function of the Keys and LEDs on the Keypad

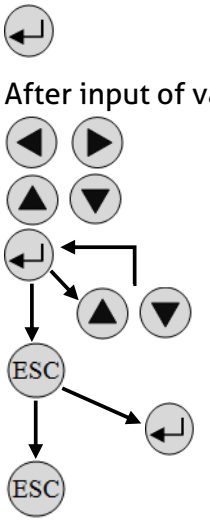
ESC	Exits programming, returns to the previous menu level.
↵	Enters sub menus and saves parameter settings.
▲ ▼	Navigates within a menu, changes values.
◀ ▶	Changes cursor position.

7.4.1 Status LEDs

The status LEDs indicate the operating state.

Green	Continuous	= Operating voltage
	Flashing	= Maintenance message
Yellow	Continuous	= Failure
	Slowly flashing	= Warm-up
	Fast flashing	= Special Mode
Red	Alarm	= Alarm

7.4.2 Setting / Changing of Parameters and Set Points



Open desired menu window.
Code input field opens automatically if no code is approved.

After input of valid code, the cursor jumps onto the first position segment to be changed.

Push the cursor onto the position segment, which is to be changed.

Set the desired parameter / set point with the keys.

Input of value finished.

Change further parameters in the same menu.

Save the changed value?

YES, and back to higher menu level.

NO, (previous value is not overwritten) and back to higher menu level.

7.5 Measuring Point

The term measuring point (MP) refers to the representation and processing (parameterization) of the measured value of a connected gas sensor head.
For a measuring head with digital communication (SC2 series), the display shows:
DP = digital measuring point.
The following number defines the bus address of the gas transmitter at DP.
DP10: This is the measured value of the digital sensor head with bus address 10.

7.6 Code Levels

All inputs and changes are protected by a 4-digit numeric code (= password) against unauthorised intervention according to the regulations of all national and international standards for gas warning systems. The menu windows of status messages and measured values are visible without entering a code.
The access to a code level is cancelled if no button is pushed within 15 minutes or if you return to start menu.

The code levels are classified in order of: code level 1 has top priority.

Code level 1 (code not changeable)

Code level 1 is intended for the service technician of the installer to change parameters and set points. This password allows working on all settings. For opening the parameter menus, you must first activate the Special Mode after code release (see chapter 8.6).

Code level 3 (customer password is settable)

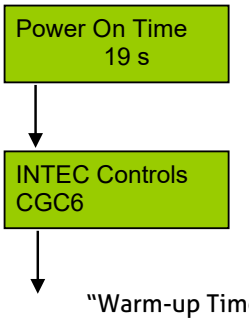
Customer password is inactive in delivery state and is activated by entering a value. Same behaviour as code level 1, only changing the own customer password is not possible.
Only the service technician who has last changed it knows the code since it can only be changed individually via code level 1.

8 Menu Overview

Menu operation is done via a clear, intuitive and logical menu structure. The operating menu contains the following levels:

- Starting menu with indication of the device type if no MP is registered. Otherwise scrolling display of the gas concentrations of all registered sensors in consecutive order in 5-second intervals. If alarms are active, only the values of the sensors currently in alarm status will be displayed.
- Main menu
- Submenu 1–3

Starting Menu



Power-On Time of the master device (CGC6)
Second counter counts down, when communication display <> master device is OK.
In case of communication error, the count-down will stop.

After about 5 sec.

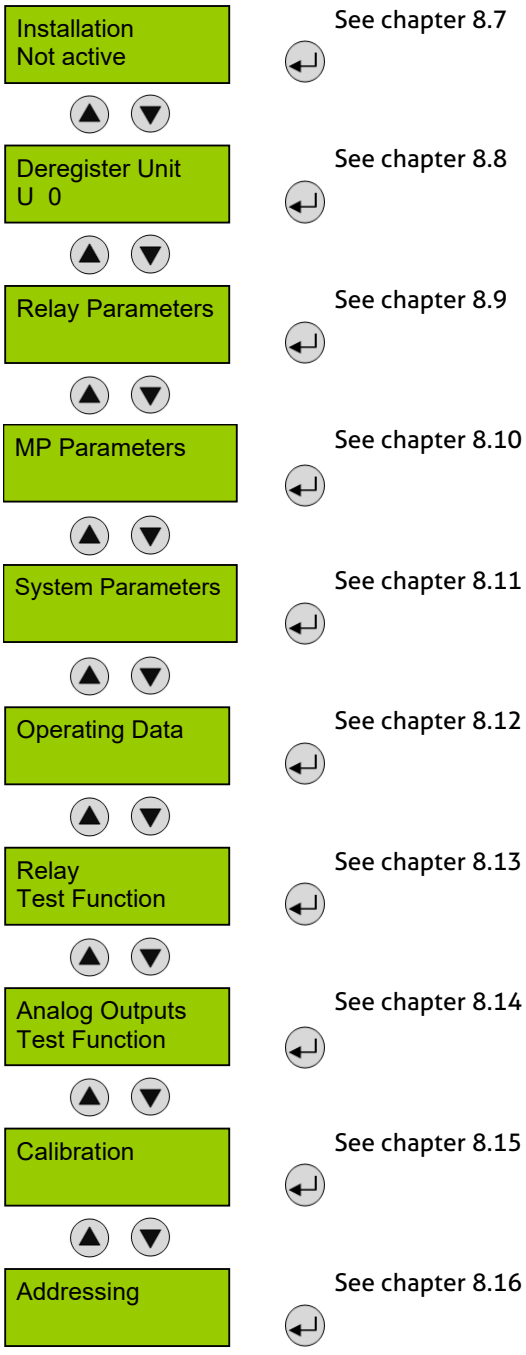
"Warm-up Time" is displayed. As soon as the sensor warm-up period has expired, the measured value is displayed = measuring mode.

Selection Main Menu

Starting Menu	Main Menu	Submenu 1
	Error Status	Reading and acknowledgement of errors (see chapter 8.1)
	Alarm Status	Display of the alarm status of active alarms (see chapter 8.2)
	Relay Status	Display of the relay status (see chapter 8.3)
	Measuring Values	Display of measured values (see chapter 8.4)
	Display Parameters	General display parameters without safety relations (see chapter 8.5)
	Installation & Calibration	Reading and change of the relay, measuring point and system parameters as well as test and calibration functions (see from chapter 8.6)

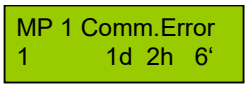
The following menu items of "Installation & Calibration" are only accessible in Service ON mode (access only via code level 1 or 3).

!!Service ON = Special Mode = Fault message is active!!



8.1 Error Status

A pending fault activates the yellow LED (Fault).
The integrated fault management records the first 50 faults occurred with time stamps in the menu "System Errors". The timestamp shows the days, hours and minutes that have elapsed since the fault has occurred.



If the cause of the fault is eliminated, the fault message is automatically acknowledged. The first 50 automatically acknowledged fault messages are logged on the displays in the error memory.

8.1.1 Error Memory

The menu "Error Memory" in the main menu "System Errors" can be opened via code level 1 or 3. In the error memory, the first 50 faults that have occurred and have already been acknowledged in the menu "Error Status" are listed for the service technician in a power failure safe way.

Attention:
This memory should always be read out after commissioning/maintenance, relevant faults should be tracked and entered in the service logbook, and finally the memory should be emptied.

8.1.2 System Messages and System Errors

The warning device includes a diagnostic module for the continuous monitoring of the relevant functions and parameters as well as a processor-independent watchdog. These features set the device into the safe mode "Fault" in case of an internal or external error. The following table shows all possible errors, possible causes, the related troubleshooting and the resulting device status.

Once the cause has been eliminated, the warning device restarts with the diagnostic mode on its own. It is not necessary to acknowledge the error message. In the event of an error, the error is output as plain text instead of the measured value and in the Error status menu. In case of 2 or more errors, the value is output with a cumulative, bit-coded error code.

	Cause	Remedy	Fault Relay	Analog Output	Display	
					Error Code	Text Mess.
Error messages from the CGC6						DPX
Temperature < -20 °C > +60 °C	Ambient temp.	Temp.!	Error	< 2 mA	0x8040h	Overtemp.
Measured value processing	Internal	Replace device			0x8002h	ADC error
RAM / ROM / µC error					0x8008h	CPU error
EEPROM error					0x8010h	EE error
No response alarm relay					0x8020h	I/O error
Deviation of analog output signal < 5 % >	Short-circuit or Interruption at the analog output	Check wiring / load		X mA	0x8020h	I/O error
	Internal	Replace device				
Communication error to sensor head or to DT6A Unit	Sensor head / DT6A Unit not fitted	Check		< 2 mA	0x9000h	Comm. error
	Internal	Replace SC2 / DT6A Unit				
Hardware Watch Dog triggered	Internal, < system voltage, µC defect.	Replace device		< 1 mA	Reset	Reset
Operating voltage limits exceeded too high / too low	External	Check voltage		< 2 mA	0x8008h	Tension
	Internal	Replace device				
Maintenance due	Maintenance date reached	Perform maintenance	No effect		0x0080h	Maintenance
Manual Special Mode	See chapter Special Mode	Remove cause Special Mode	Error		0x0800h	

Table 3: Error Messages

8.2 Alarm Status

Display of the currently pending alarms (max. 4) in plain text, sorted by MP addresses. Only those measuring points are displayed, where at least one alarm is active.
Alarms in latching mode and the overrange message can be acknowledged in this menu via code levels 1 and 3 (only possible if the alarm is not active anymore).

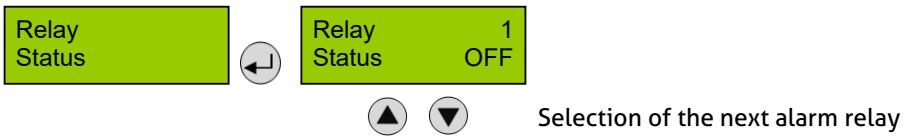
Symbol	Description	Function
DP 1	Measuring Point	Digital measuring point X = 1–10, where an alarm is pending
'A1 ''A1	Alarm status	'A1 = Alarm 1 active ''A1 = Alarm 1 in latching mode, can be acknowledged

Table 4: Alarm Status Display

8.3 Relay Status

Reading of the current status of alarm relays.
The actual relay status is displayed, depending on the relay mode (energized <> de-energized).

Selection of the alarm relay 1; 3, 4, 5
Alarm relay 1, alarm relay 2, alarm relay 5 (transistor output for warning/flashing light), alarm relay 4 (transistor output for horn)

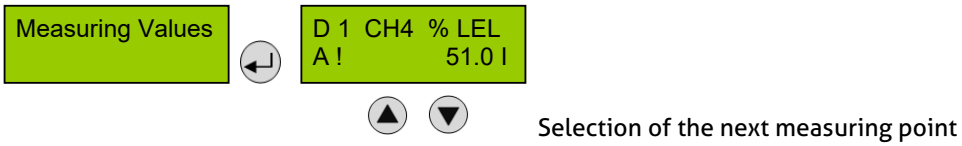


Symbol	Description	Function
1	Alarm Relay	Alarm relay = 1, 2, 4, 5
OFF	Relay Status	Relay OFF
ON	Relay Status	Relay ON

Table 5: Relay Status Display

8.4 Menu Measuring Values

In this menu, the display shows the measured value with gas type and unit. If the alarm evaluation is defined via the average, the display additionally shows the average value (A) to the left of the current value (C).



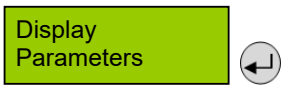
Symbol	Description	Function
D 1[1]	Meas. Point No.	Digital measuring point 1 = 1–10
CH4	Gas type	Display of gas type (must comply with gas type of sensor head)
% LEL	Gas unit	Unit (depending on gas type)
51,0 C 48,0 A	Measured value	C = Current measured value (current value) of the gas concentration A = Arithmetic average of the gas concentr. (only if average is active)
A!	Alarm	At least one alarm has been released at this MP.
#	Maint. info	Sensor head: maintenance due (maintenance date exceeded)
Comm. error	Fault MP	Communication error, sensor head <> CGC6
Underrange	Meas. range monitoring	Meas. signal < admissible range (< zero point – 4.5 %, -10 % for Pellistors)
Overrange[2]		Meas. signal > admissible range (> full scale value + 6 %)
Warm-up	Warm-up time	Warm-up of the sensor is active

Table 6: Measured Value Display

[1] Display of the address number the sensor head is registered under in the field bus
[2] Acknowledgement in the Alarm Status menu

8.5 Display Parameters

In the menu Display Parameters, you can find the general, security irrelevant parameters in the display device. These parameters can be changed during operating mode via code level 1 or 3.



8.5.1 Software Version

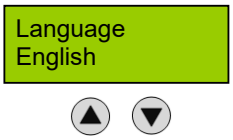
Software version of display and CGC6 (factory set)

Symbol	Description	Function
XXXXX YYYYY	Software version display Software version CGC6	XXXXX Software-Version YYYYY Software-Version

Table 7: Software Display

8.5.2 Language

Selection of the menu language

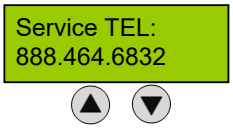


Symbol	Description	Default	Function
English	Language	English	German English USA English French Italian

Table 8: Language Selection

8.5.3 Service Phone Number

The service phone no. can be individually defined.



Symbol	Description	Function
0853....	Phone No.	Definition of the individual service phone no

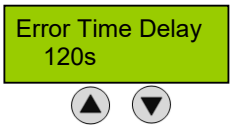
Table 9: Service Phone

8.5.4 Customer Password

Storage of an individual customer password in the display for changing parameters (see chapter 7.6, Code Level 3). Changing the password only via code level 1. This menu item will only appear after having entered the password of code level 1.

Code-Ebene 1 Enter new customer password

8.5.5 Error Time Delay

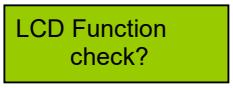


Symbol	Description	Default	Function
s	Delay	0s	Definition of a delay time after an error reported by the basic board has occurred (only fault indication on the display, no effect on the function or outputs) Entry is 4-digit in the range of 0–9999 seconds.

Table 10: Error Time Delay

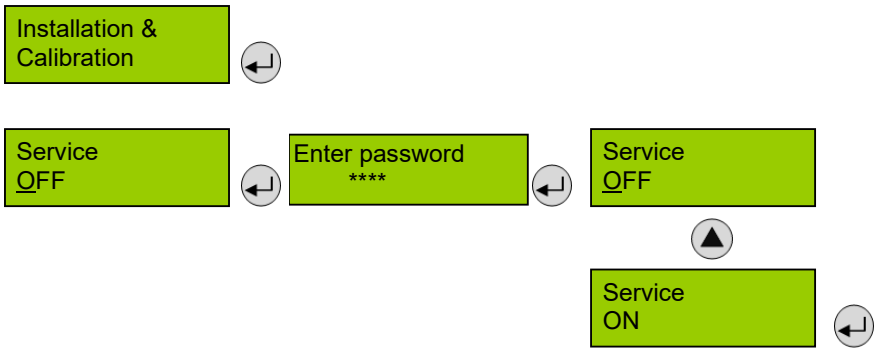
8.5.6 LCD Function

Testing the LCD hardware. All LEDs light up for about 2 seconds. The backlight is yellow (green and red are activated at the same time). All points are displayed on the LCD.



8.6 Installation and Calibration

The following menus are only accessible in the Service ON state (only via code level 1 or 3)
!!Service ON = Special Mode = Fault signal is active!!



8.7 Installation

Installation mode see chapter 8.7

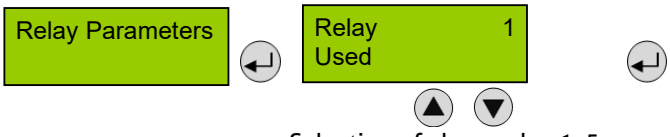
8.8 Deregister Unit

Deregistration of a Unit see chapter 8.8

8.9 Relay Parameters

Note:
Relay 3 is the fault message relay and cannot be defined as an alarm relay. The following parameters cannot be changed for relay 3.

Reading and changing of the parameters separately for each alarm relay

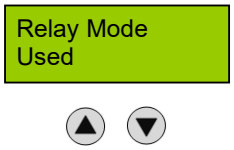


Selection of alarm relay 1–5

8.9.1 Relay Mode

Relay 3: Parameter assignment "Not used" cannot be changed.

Registration of the alarm relays



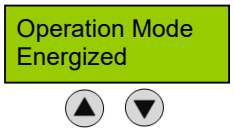
Symbol	Description	Default	Function
Used	Mode	Used	Used = Relay is registered and can be assigned to an alarm. Not Used = Relay is not registered.

Table 11: Relay Mode

8.9.2 Relay Operation Mode

Relay 3: The parameter setting "Energized" cannot be changed.
Relays 4 and 5 are designed as open collectors, therefore the operating mode "De-energized" cannot be changed.

The terms "energized / de-energized" are only derived from the terms "energized / de-energized to trip" principle used in safety technology but are not necessarily identical with the "energized / de-energized to trip" principle, as this defines the current flow via the contacts.
The terms "energized / de-energized" used by MSR | INTEC Controls refer ONLY to the control of the relay coil, not to the relay contacts and their current flow (as these are designed as changeover contacts and can thus be used in both principles as desired). The status LEDs directly next to the relays (not on PX2) indicate the coil status in analogy (LED off = coil de-energized).



Symbol	Description	Default	Function
De-energized	Mode	De-energized	De-energized: (used as normally open contact for signalling) Alarm off and/or device failure = relay coil and LED current-free Alarm on and device OK = Relay coil and LED powered. Energized: (used as normally open contact for safety shutdown of fans/machines, as even in the event of supply failures, the system switches to the safe side) Alarm off and device OK = Relay coil and LED powered. Alarm on or device failure = relay coil and LED current-free

Table 12: Relay Operation Mode

8.9.3 Relay Function Static/Flashing

Relay 3: The parameter setting "No" cannot be changed.

The function "Flashing" offers a connection option for warning devices to improve visibility. The frequency is about 1 second with an impulse/pause rate of 1:1.
If "Flashing" is set, the output circuit mustn't be used as a safe output anymore.
The combination of relay mode energized and flashing operation makes no sense and is therefore suppressed.

Symbol	Description	Default	Function
No	Function	No	Yes = Relay function flashing in case of alarm No = Relay function static in case of alarm

Table 13: Relay Function

8.9.4 Signal Source

Relay 3: Parameter setting "Local" cannot be changed.

The signal source determines whether the relay is triggered by an alarm in the I/O board = CGC6 (local) or from the central unit (remote).

Symbol	Description	Default	Function
Local	Signal source	Local	Local = The relay activation is based on local settings and alarms. Remote = The relay is controlled by the central unit.

Table 14: Signal Source

8.9.5 Alarm Trigger Quantity

Relay 3: Parameter setting "1" cannot be changed.

In some applications it is necessary that the relay switches only at the n^{th} alarm. Here you can set the number of active alarms necessary for relay tripping. For safety applications, the relay must always switch on the 1^{st} alarm.

Symbol	Description	Default	Function
1	Number of Alarms	1	1 = Number of pending alarms for triggering the alarm relay

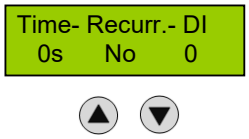
Table 15: Alarm Quantity

8.9.6 Horn Function

Note:
This feature is not allowed for safety-related alarm messages because the output is resettable.

Relay 3: The parameter setting "0s, No, 0" cannot be changed.

The horn function of the alarm relay is activated if at least one of the 2 parameters (time or assignment to digital input) is set.
The horn function retains its functionality even for alarms in latching mode.



Symbol	Description	Default	Function
Recurrence	Mode	No	No = Automatic reset of the relay after time has elapsed. Yes = Recurrence function
Time		120	Enter time for automatic reset function or recurrence function in s 0 = No acknowledgement function Entry in the 4-digit range from 0–9999 seconds. The actual recurrence time for the return after acknowledgement in the display starts 10 s later.
DI		0	0–2 = Assignment, which digital input resets the relay

Table 16: Horn Function

Horn function resettable:

The following possibilities to acknowledge are available for the alarm relay as horn relay:

- By pressing the left button (ESC). Only available in main menu.
- Automatic reset at the end of the pre-set time (active if value > 0).
- By a physically available internal/external pushbutton (assignment of the appropriate digital input DI 1–2).

Due to fixed polling cycles, external buttons must be pressed for a few seconds before the reaction occurs. After successful acknowledgment, the horn remains permanently reset until all assigned alarms for this relay function are inactive again. Only then it is triggered anew in case of an alarm.

Alarm or relay 4 is only an example in the following function diagrams and applies in analogy to all alarms/relays.

Acknowledge the horn relay:

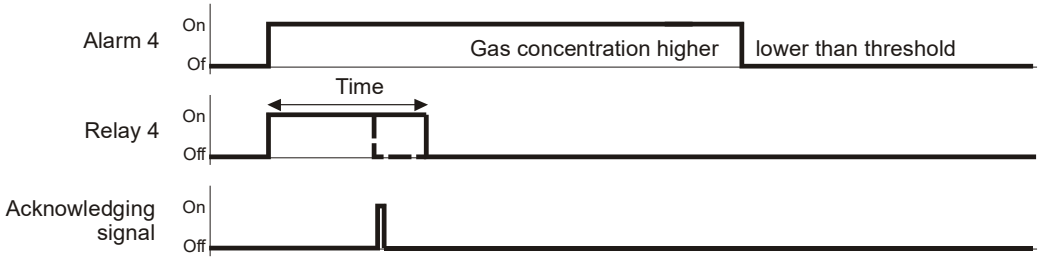


Figure 5: Acknowledgement of the Horn Relay

- Reset command by timer, external push-button or the ESC operating key.

Recurrence of the horn relay:
After an alarm has been triggered, the horn will remain active until a reset action is done. After acknowledgment of the horn relay (via the ESC button or externally via digital input) a timer starts. When this time has run out and the alarm is still acting, the relay is set again. This process is repeated endlessly as long as the associated alarm remains active.

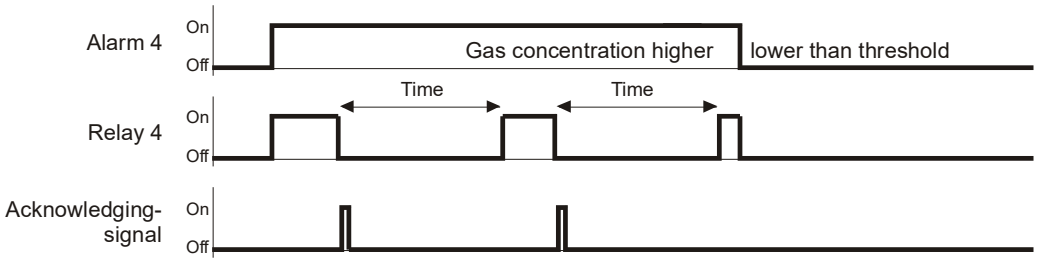


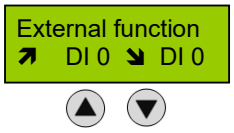
Figure 6: Recurrence of the Horn Function

- Reset command by external push-button or the ESC operating key.

8.9.7 External Override

Relay 3: The parameter setting "DI 0" cannot be changed.

Note:
Manual operation of the alarm relays via DI does not start the "Special Mode", as this is a deliberate and configured functionality. The use of the override should be used with caution, particularly the function "External OFF".
Assignment of a digital input (DI) for the external switching on and off of the alarm relay.
This function has priority to gas alarm.
If External ON and External OFF are configured to the same relay and both are active at the same time, so in this state, the External OFF command has priority. In this mode, too, the relay works respecting the parameter settings "Static/Flashing" and "Energized/De-energized".



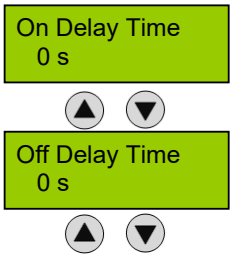
Symbol	Description	Default	Function
↗ DI 0	External ON	0	As long as DI 1–2 is closed, relay switches ON.
↘ DI 0	External OFF	0	As long as DI 1–2 is closed, relay switches OFF

Table 17: External Override

8.9.8 Delay Mode of Alarm Relay

Relay 3: The parameter setting "0" cannot be changed.

Definition of the time for switch-on and switch-off delay of the alarm relays.



Symbol	Description	Default	Function
0 s	Switch-ON Delay Time	0	≥ 1 (max. 9999 sec.): Relay is only activated at the end of the defined time. 0 = No delay
0 s	Switch-OFF Delay Time	0	≥ 1 (max. 9999 sec.): Relay is only deactivated at the end of the defined time. 0 = No delay

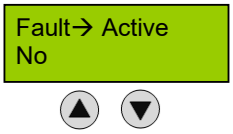
Table 18: Delay Alarm Relays

8.9.9 Assignment to Fault

Relay 3:
The parameter setting “No” cannot be changed.

In case of a device fault, the alarm relay is triggered in addition. In this mode, too, the relay works respecting the parameter settings "Static/Flashing" and "Energized/De-energized".

Note:
When a fault is activated, this output is not considered a collective fault output according to EN 50271 (functional safety), since in the event of a functional failure of the processor, no run monitoring with independent watchdog acts on this output and thus in this case the contact could remain unchanged.



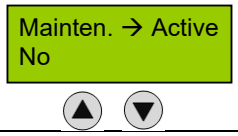
Symbol	Description	Default	Function
No	No assignment	No	Relay is not activated in case of a device fault.
Yes	Assignment to fault	Yes	Relay is activated in case of a device fault.

Table 19: Assignment to Fault

8.9.10 Assignment to Maintenance Message

Relay 3: Parameter setting "No" cannot be changed.

In case of a pending maintenance, the alarm relay is triggered in addition. In this mode, too, the relay works respecting the parameter settings "Static/Flashing" and "Energized/De-energized".

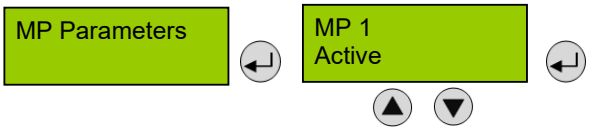


Symbol	Description	Default	Function
No	No assignment	No	Relay is not activated in case of a maintenance message.
Yes	Assignment to maintenance	Yes	Relay is activated in case of a maintenance message.

Table 20: Assignment to Maintenance

8.10 MP Parameters

Reading and changing of the parameters for each measuring point via code level 1 or 3.



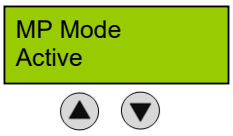
Selection of measuring point 1–10

8.10.1 Activate/Deactivate MP

Attention:
Deactivation of an DT6A Unit does not cause a fault message.

The physically present DT6A Unit is registered at the basic device (CGC6) for its evaluation. After activation, the measured gas signal is evaluated, and the sensor head specifications are monitored. Existing alarms and faults are cleared with deactivation of the sensor.

Up to 10 DT6A Units can be connected.



Symbol	Description	Default	Function
Active	MP Mode	Inactive	Active = Measuring point activated in the basic device. Inactive = Measuring point not activated in the basic device.

Table 21: Activation/Deactivation of MP

8.10.2 Selection of Gas Type and Measuring Range

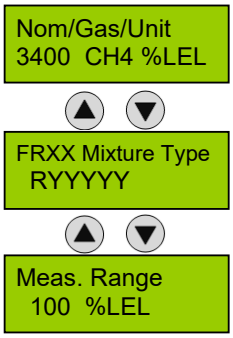
The gas type to be monitored and the range are set in the 2 menus. The basic unit continuously checks the set gas type and the measuring range if they match with the gas type and the measuring range of the connected digital sensor head. If they do not match, an error message is output.

Select the 4-digit, internal MSR | INTEC Controls type; then the type of gas and the associated unit will appear on the right next to it. It should be noted that for some gases there are various sensor technologies and units, therefore the associated sensor head types with the respective unit are listed in the table column Table 23.

In the CGC6, this data is automatically taken over by the DT6A Unit after its registration.

The presentation of measured values, alarm thresholds and hysteresis depend on the measuring range. If the measuring range is <10, there are 3, if <100, there are 2, if <1000, there is one decimal place. If ≥ 1000, the display is without decimal place.
The resolution and accuracy of the calculation is not affected by the different measuring ranges.

Selectable additional information of freon type:
Menu only displayed if a Freon group has been selected as the gas type before and stored. In the 2nd line then the actual Freon name is entered. These Freons are listed in the following table under the Freon groups in the column Formula.



Symbol	Description	Function
3400	Internal Mfg type	Selection of gas type from internal list (must correspond with the sensor head).
CH4	Formula of gas type	Formula (gas type) is firmly assigned to the Mfg type.
%LEL	Unit of gas type	Unit is firmly assigned to the Mfg type.
100	Measuring range	Set measuring range (must correspond with the sensor head).

Table 22: Selection Gas Type and Measuring Range

Type	Sensor Head Type SC2, SX1, SSAX1, AT6	Gas Type	Formula	Meas. Range[1]	Unit
1110	E1110-XX	Carbon monoxide	CO	0–300	ppm
1130	E1130-XX	Nitrogen dioxide	NO_2	0–30	ppm
1129	E1129-XX	Nitrogen monoxide	NO	0–100	ppm
1195	E1195-XX	Oxygen	O_2	0–25	% vol
1125	E1125-XX	Ammonia	NH_3	0–300	ppm
I464	I464-X	Carbon dioxide	CO_2	0–2000	ppm
I564	I564	Carbon dioxide*	CO_2	0–2000	ppm
S164	I-S1164-X	Carbon dioxide*	CO_2	0–2000	ppm
I464	I464-X	Carbon dioxide	CO_2	0–5	% vol
I564	I564	Carbon dioxide*	CO_2	0–5	% vol
S164	I-S1164-X	Carbon dioxide	CO_2	0–5	% vol
3400	P3400-A	Methane	CH_4	0–100	% LEL
I400	I400-A	IR-Methane	CH_4	0–100	% LEL
I400	I400-B	IR-Methane	CH_4	0–100	% vol
M400		MPS-Methan	CH_4	0–100	% LEL
M4XX		MPS-Combustible*	CnH2n+2	0–100	% LEL
S400	S400-A	IR-Methane	CH_4	0–100	% LEL
3480	P3480-A	Propane	C_3H_8	0–100	% LEL
I480	I480-A	IR-Propane	C_3H_8	0–100	% LEL
I480		IR-Propane*	C_3H_8	0–100	% vol
M480		MPS-Propane*	C_3H_8	0–100	% LEL
I580		IR-Propane*	C_3H_8	0–100	% vol
S480	S480-A	IR-Propane	C_3H_8	0–100	% LEL
3440	P3440-A	Hydrogen	H_2	0–100	% LEL
3408	P3408-X	Ammonia	NH_3	0–100	% LEL
3485	P3485-A	Acetone	$(CH_3)_2CO$	0–100	% LEL
3430	P3430-A	Benzene	C_6H_6	0–100	% LEL
3425	P3425-A	Ethyl alcohol	C_2H_5OH	0–100	% LEL
3427	P3427-A	Ethyl acetate	$C_4H_8O_2$	0–100	% LEL
3410	P3410-A	Ethylene	C_2H_4	0–100	% LEL
3460	P3460-A	n-Butane	C_4H_{10}	0–100	% LEL
3491	P3491-A	n-Heptane	C_7H_{16}	0–100	% LEL
3435	P3435-A	n-Hexane	C_6H_{14}	0–100	% LEL
3482	P3482-A	Isopropyl alcohol	C_3H_8O	0–100	% LEL
3498	P3498-A	JP8*	JP8	0–100	% LEL
3450	P3450-A	Methanol	CH_3OH	0–100	% LEL
3458	P3458-A	Methyl ethyl ketone MEK	C_4H_8O	0–100	% LEL
3470	P3470-A	n-Octane	C_8H_{18}	0–100	% LEL
3475	P3475-A	n-Pentane	C_5H_{12}	0–100	% LEL
3490	P3490-A	Toluene	C_7H_8	0–100	% LEL
3448	P3448-A	Butyl acetate	$C_6H_{12}O_2$	0–100	% LEL
3415	P3415-A	Cyclohexane	C_6H_{12}	0–100	% LEL
3472	P3472-A	Cyclopentane	C_5H_{10}	0–100	% LEL
3420	P3420-A	Ethane	C_2H_6	0–100	% LEL
3468	P3468-A	Isobutanol / Isobutyl alcohol	$C_2H_6O_2$	0–100	% LEL
3473	P3473-A	Methyl acetate	$C_3H_6O_2$	0–100	% LEL
3495	P3495-A	Nonane	C_9H_{20}	0–100	% LEL
3402	P3402-A	LPG	LPG	0–100	% LEL
3496	P3496-A	Petrol Vapours	Petrol	0–100	% LEL

Type	Sensor Head Type SC2, SX1, SSAX1, AT6	Gas Type	Formula	Meas. Range[1]	Unit
3497	P3497-A	Styrene*	C_8H_8	0–100	% LEL
3493	P3493-A	Xylene*	C_8H_{10}	0–100	% LEL
3480	P3480-C	Propane	C_3H_8	0–5000	ppm
3481	P3481-B	Propene	R1270	0–30	% LEL
3494	P3494-A	Butadiene	C_4H_6	0–100	% LEL
3405	P3405-A	Acetylene*	C_2H_2	0–100	% LEL
I495		Acetylene*	C_2H_2	0–100	% LEL
M200		MPS-R32	R32	0–100	% LEL
I200		IR-R32	R32	0–100	% LEL
C160		VOC*	VOC	0–2000	ppm
2189	S2189-X	Ethylene	C_2H_4	0–1000	ppm
2125	S2125-X	Ammonia	NH_3	0–3000	ppm
2053		Xylene*	C_8H_{10}	0–300	ppm
D184		Sulphur hexafluoride*	SF6	0–1000	ppm
1199	E1199-XX	Ethylene oxide	C_2H_4O	0–10	ppm
1135	E1135-XX	Bromine*	Br2	0–2	ppm
1182	E1182-XX	Hydrogen fluoride*	HF	0–10	ppm
1192	E1192-XX	Nitrous oxide*	N_2O	0–2000	ppm
1183	E1183-XX	Hydrogen cyanide	HCN	0–100	ppm
1185	E1185-XX	Formaldehyde	CH_2O	0–10	ppm
1186	E1186-XX	Hydrogen chloride	HCL	0–20	ppm
1188	E1187-XX	Silane*	SiH_4	0–50	ppm
1189	E1189-XX	Ethylene	C_2H_4	0–200	ppm
1190	E1190-XX	Ozone	O_3	0–10	ppm
1193	E1193-XX	Chlorine	CL_2	0–20	ppm
1196	E1196-XX	Sulphur dioxide	SO_2	0–100	ppm
1197	E1197-XX	Hydrogen sulphide	H_2S	0–200	ppm
1198	E1198-XX	Fluorine*	F_2	0–2	ppm
1187	E1187-XX	Phosphine*	PH_3	0–5	ppm
1194	E1194-XX	Hydrogen	H_2	0–1000	ppm
1181	E1181-XX	Chlorine dioxide*	ClO_2	0–1	ppm
1147	E1147-XX	Phosgene*	$COCl_2$	0–1	ppm
2059		FR01*	R12	20–2000	ppm
2061	2061-XX	FR02	R23 R508b	20–2000	ppm
2063	2063-XX	FR03	R1234yf R452a R513a R454c R455a R454b R1234ze	20–2000	ppm
2064	2064-XX	FR04	R123 R1233zd*	20–2000	ppm
2066		FR05*	R11	20–2000	ppm

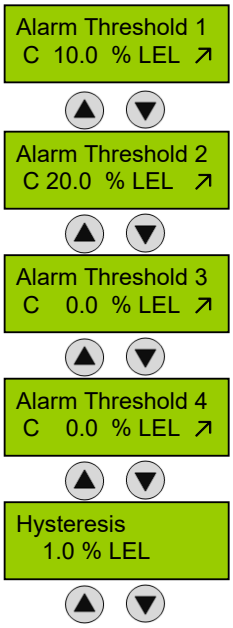
Type	Sensor Head Type SC2, SX1, SSAX1, AT6	Gas Type	Formula	Meas. Range[1]	Unit
2070	2070-XX	FR06	R22 R401a R401b R402a R402b R403a R408a R409a R411a	20–2000	ppm
2077	2077-XX	FR07	R134a R407a R416a R417a R422a R422d R427a R437a R438a R449a R407f R450a	20–2000	ppm
2080	2080-XX	FR08	R125 R32 R404a R407c R410a R434a R507a R448a R452b R143a	20–2000	ppm
2020	2020-XX	FR LFL	R32 R454b R455a R1234yf R1234ze	0–50	%LEL
1184		Arsine*	AsH_3	0–1	ppm
EXT	Connection option for sensors with 4–20 mA signal	Temp	Temp		°C
EXT		Temp	Temp		°F
EXT		Humidity	Hum.		% RH
EXT		Pressure	Press		mbar
EXT		TOX	TOX		ppm
EXT		Combustible	Comb		% LEL
5XXX		TVOC group*	TVOC		ppm
5XXX		TVOC group*	TVOC		% vol
EXT	Conn. option f. sensors with 4–20 mA signal	External	External		%
EXT		Digital[2]	Digital		%

Table 23: Gas Type and Measuring Range

* Not available yet.
[1] Different measuring ranges are possible, but not listed here.
[2] The use with the measuring range value: 1 results in a binary value output of the values 0 or 1.

8.10.3 Alarm Thresholds / Hysteresis

In the CGC6, this data is automatically taken over by the DT6A Unit after its registration. This data is only intended as default values and can be changed at any time.
In this menu the alarm thresholds, the hysteresis, the trigger function increasing/falling as well as the activation by the current or average value are assigned.



Symbol	Description	Default	Function
C	Evaluation	C	C = Alarm evaluation via current value of the MP A = Alarm evaluation via average value of the MP
10 % LEL	Threshold 1 Threshold 2 Threshold 3 Threshold 4 Hysteresis	XX XX XX XX XX	increasing/falling: ↗ ↘ Gas concentration > < Alarm Threshold 1 = Alarm 1 Gas concentration > < Alarm Threshold 2 = Alarm 2 Gas concentration > < Alarm Threshold 3 = Alarm 3 Gas concentration > < Alarm Threshold 4 = Alarm 4 Gas concentration < > (Alarm Threshold X –/+ Hysteresis) = Alarm X OFF
↗		↗	↗= Alarm release at increasing concentrations ↘= Alarm release at falling concentrations

Table 24: Alarm Thresholds / Hysteresis

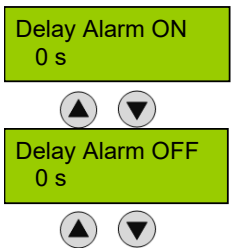
Note:
Alarm evaluation: For monitoring combustible gases and oxygen, alarm evaluation via the average value (A) is not permitted. According to EN 60079-29-1 and EN 50104, the triggering of the alarms for the above-mentioned gases is only valid when triggered by the current value (C).
For each measuring point 4 alarm thresholds are available for free definition. If the gas concentration is higher than the set alarm threshold, the associated alarm is activated. If the gas concentration falls below the alarm threshold minus the hysteresis the alarm is reset again. In the mode "Alarm at falling" the corresponding alarm is set in case of falling below the set alarm threshold and reset again when exceeding the alarm threshold plus hysteresis.

The presentation of the alarm thresholds depends on the set measuring range (see chapter "Gas Type and Measuring Range" above). Unused alarm thresholds have to be defined with 0, in order to avoid undesired alarms.
Higher level alarms automatically activate the lower-level alarms. For this reason, the alarm thresholds and hysteresis are only accepted if a few simple rules are followed:

1. Alarm thresholds must be ≤ full scale value, but no more than 16,000.
2. In case of increasing alarm thresholds, the thresholds must also be indicated in increasing order.
3. In case of falling alarm thresholds, the thresholds must also be indicated in descending order.
4. In case of a mixed setting e.g. for O_2 the falling alarm thresholds must be given first and then the increasing ones.
5. Hysteresis must not be 0 if at least one alarm threshold is set. If this is the case, the basic unit calculates the smallest possible hysteresis and stores it.
6. The hysteresis can be maximum as big as half of the smallest alarm threshold. Here too, the basic unit limits when saving.

8.10.4 Delay for Alarm ON and/or OFF

Assignment of a time for delayed switching on/off of the alarms.
Function only active in current value operation.
According to EN 60079-29-1 and EN 50104, delayed triggering of the alarms is not permitted for combustible gases and oxygen.



Symbol	Description	Default	Function
0 s	Delay Alarm	0 s	Gas concentration > alarm threshold + set time = Alarm ON Gas concentration < alarm threshold – hysteresis + set time = Alarm OFF Entry is 4-digit in the range of 0–9999 seconds.

Table 25: Delay for Alarm ON and/or OFF

8.10.5 Average Value Overlay (VDI 2053 Functionality)

The alarm evaluation of the operation mode "Average" is overridden by the current value, if this exceeds the alarm threshold defined in the menu "System Parameters AV Overlay" (see 8.11.3). The overlay is delayed by the time factor entered in the menu there. The function of the average overlay is only evaluated for the gas type CO and is activated here.

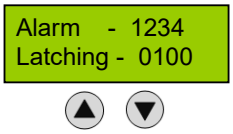
Symbol	Description	Default	Function
Yes	AV Overlay	Yes	Yes = Average value overlay activated (for CO) No = Average value overlay not activated

Table 26: Average value overlay

8.10.6 Assignment of Latching Mode <> Alarm

In this menu you can assign the latching mode to each alarm.

Note:
The acknowledgment of an alarm in latching mode is done in the menu Alarm status (see chapter 8.2).

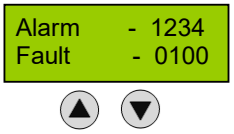


Symbol	Description	Default	Function
Alarm			Presentation of the alarms 1–4; under each alarm you can activate the latching with 1.
Latching	Assignment of latching function yes/no	0 0 0 0	0 = no latching; alarm resets automatically if gas concentration again < alarm threshold – hysteresis (increasing)↗ gas concentration again > alarm threshold + hysteresis (falling)↘ 1 = latching; alarm remains active, if gas concentration < alarm threshold – hysteresis (increasing) ↗ gas concentration > alarm threshold + hysteresis (falling)↘ until reset by the operator

Table 27: Assignment Latching Mode <> Alarm

8.10.7 Assignment of MP Fault <> Alarm

In this menu you can define, which alarms should be activated by a fault at the measuring point. If the fault is cleared, the alarm is automatically reset.



Symbol	Description	Default	Function
Alarm			Presentation of the alarms 1–4; you can define with 1 under each alarm that the alarm should be activated in case of MP fault.
Fault	Assignment of MP fault to alarm	0 0 0 0	0 = Alarm is not activated in case of MP fault. 1 = Alarm is activated in case of MP fault.

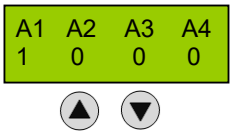
Table 28: Assignment MP Fault <> Alarm

8.10.8 Assignment of Alarm <> Alarm Relay

In the CGC6 these data are automatically set to 1, 2, 5, 4.
These data are only intended as default values and can be changed at any time.

Each of the 4 alarms can be assigned to any alarm relay 1, 2, 4, 5 registered in the menu Relay Parameters by entering the relay address right under the alarm. One alarm relay can be assigned to multiple alarms. Unused alarms aren't assigned.

The fault relay cannot be used for alarm message (relay address 3).



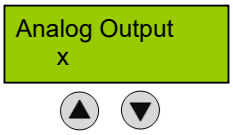
Symbol	Description	Default	Function
Alarm	A1 A2 A3 A4		Presentation of the alarms 1–4; you can assign an alarm relay to each alarm by setting a relay address.
	Assignment of alarm relay	A1 = X A2 = X A3 = X A4 = X	X = Assignment of an alarm relay (relay address 1, 2, 4, 5) to an alarm

Table 29: Assignment Alarm <> Alarm Relay

8.10.9 Assignment of MP <> Analog Output

The measuring signal can be assigned to an analog output by entering the address of the analog output instead of x (default value is 0, not assigned).
If 0 is set here, there is no assignment and thus no monitoring of the electric current signal.

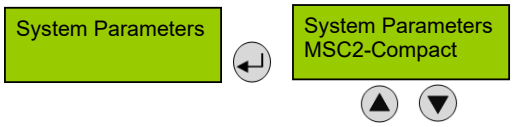
Note:
The analog output is configured in the menu "System Parameters", "AO Function".



Symbol	Description	Function
x	Address AO	0 = No assignment to analog output 1 = Assignment to an analog output by entering the AO address

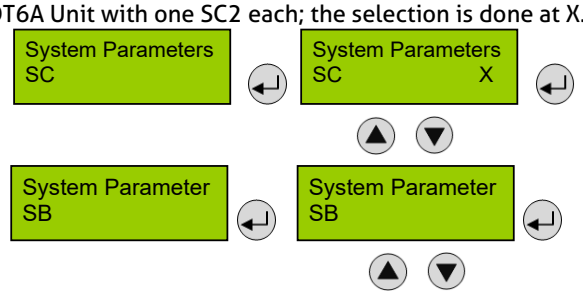
Table 30: Assignment MP <> Analog Output

8.11 System Parameters



Selection of the device, CGC6, DT6A Unit or sensor head, whose data should be processed or read.
MSC2-Compact = CGC6
SC2 = Sensor head
SB = DT6A Unit

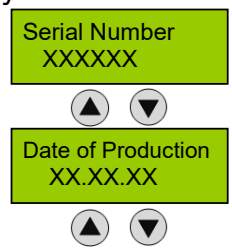
The CGC6 can manage several DT6A Unit with one SC2 each; the selection is done at X.



The system parameters Maintenance Interval and Error Time can be changed, all other parameters of the sensor head can only be read.

8.11.1 System Information

Menu not shown for sensor heads SC2 (info readable only from the laser engraving).

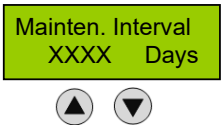


Symbol	Description	Function
XXXX	Serial Number	Serial number (factory set)
XX.XX.XX	Date of Production	Date of production (factory set)

Table 31: System Information

8.11.2 Maintenance Interval

Input of the maintenance interval in days. If you enter < 10 days, the function is not active.
The maintenance interval in each sensor head can be individually adjusted downwards. This means that several maintenance messages are possible for each complete unit. If the maintenance interval is active, the accumulated maintenance message can only be acknowledged by a calibration (on the head).



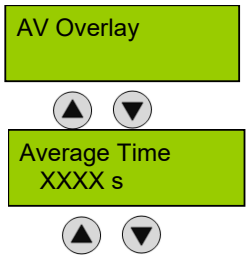
Symbol	Description	Default	Function
XXXX	Days	0	Maintenance interval

Table 32: Maintenance Interval

8.11.3 Average Function

The menu can only be read out on the DT6A. The parameters are set in the CGC6. With SC2, only the menu "Average time" is displayed.

In the menu “Average Time” you can define the time base (minimum 30 s) for the calculation of the arithmetic average value (30 measurements within the time base). This average value can be used for alarm evaluation as an alternative to the current value. The selection which value should be used for evaluation is defined separately for each alarm in the menu “Alarm Threshold X”. In the average evaluation mode, the average value is indicated in the menu “Measuring Values” next to the current value.
The alarm evaluation of the operation mode “Average” is overridden by the current value, if this exceeds the alarm threshold defined in the menu "System Parameters AV Overlay". The overlay is delayed by the time factor entered in the menu there. The function of the average overlay can only be activated for the gas type CO.



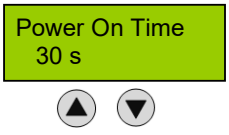
Symbol	Description	Default	Function
XXXX	Seconds	900	Time base for average calculation (> 30 s)

Table 33: Average Function

8.11.4 Power-On Time

Value can be read with sensor head SC2 but cannot be changed

Gas sensor elements need a warm-up period, until the measuring process reaches stable conditions. During this warm-up period the sensor signal can lead to an unwanted triggering of a pseudo alarm. Therefore, the “Power On Time” is started at each CGC6, DT6A Unit and sensor head after power-on or voltage recovery. While this time is running out, the device is in Special Mode and does not activate alarms. “Power On Time” appears in the starting menu. During this phase, the sensor head transmits "Warm-up time" instead of the measured value.
The Power On Time of the individual components may be different. Only when the longest time has expired, the system starts the measuring operation.
The recommended Power On Time is also dependent on the type of gas and can be found in the respective user manual.



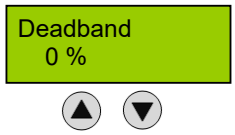
Symbol	Description	Default	Function
XX	Seconds	30	Power-On time

Table 34: Power-On Time

8.11.5 Deadband

Menu not available for sensor head SC2.
Menu is displayed for DT6A, but the parameters are set by the CGC6.

The unwanted noise of the measured value around the zero point, caused by the basic drift of the sensor, can be suppressed by activating a deadband with a range of ± 10 % of the measuring range depending on device.
If the measured value is within the set % value, the display shows 0. Natural zero-point fluctuations of sensors downwards or upwards can thus be suppressed in the display. If the measured value is smaller than the deadband, but still larger than the underrange limit (- 4.5 % of the measuring range, for Pellistor sensors for combustible gases - 10 %), the measured value is displayed and the corresponding analog value is output. If the measured value is smaller than the underrange limit (< - 4,5 %/ < -10 % of the measuring range), the fault signal (underrange) is triggered. This has priority over the deadband function.
If the default value is 0, the suppression is switched off.
The suppression also affects the analog output because the measured value must have the same effect on all existing output channels.
When opening the service mode, the deadband function switches off automatically.



8.11.6 AO Function

Menu not available for DT6A and SC2.

This menu is for the configuration of the analog output.
After registration, each analog output checks the current signal for plausibility. Signal deviations of more than 5 % from the nominal value will generate an error message (causes: short circuit or interruption of cable, actuator not connected).

The steepness of the current signal can be adjusted in the range of 10–100 % in case of local control.

If several measuring points are assigned, you can define whether the minimum, the maximum or the average of all the assigned signals is output. It is likewise possible to define which signal of the measuring points (source), average or current value, is output.

If the 4–20 mA signal is used as a safe signal according to EN 50271 (SIL level), the following mandatory parameters must be used:

Selection of analog signal:	**100**:	100 % gas signal = 20 mA (standard signal)
Selection source:	**CF**:	Source current value signal with fault message
Selection of operating mode:	**Max**:	Output of the maximum value of the assigned MP

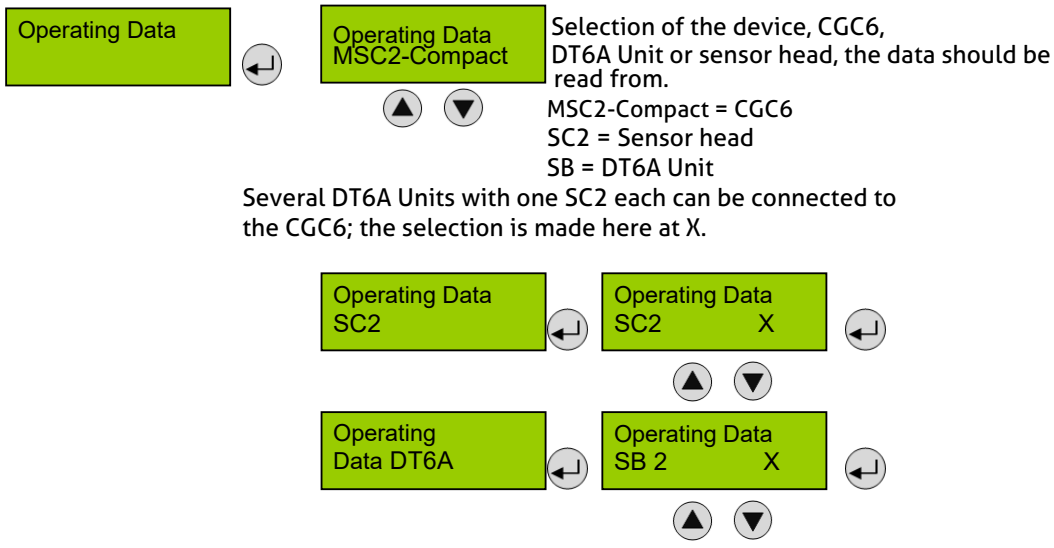
Symbol	Description	Default	Function
Analog Output 1	Selection of channel		Selection of the analog output 1
0 10-100 %	Selection of output signal	100 %	0 = Analog output is not used, no monitoring of the electric current signal ≥ 10 = Local control and definition of the signal slope 10 = 10 % gas signal = 20mA (high sensitivity) 100 = 100 % gas signal = 20mA (standard signal))
C	Selection of source	M	C = Source is current value A = Source is average value CF = Source is current value and additional fault message at AO AF = Source is average value and additional fault message at AO
Max.	Selection of mode	Max.	Min. = Displays the minimum value of all assigned MP Max. = Displays the maximum value of all assigned MP Average = Displays the average value of all assigned MP

Table 35: AO Function

8.12 Operating Data

This menu is for retrieving relevant operational data of the CGC6, DT6A Unit and sensor head. No changes or interventions are possible.

Note:
The operating data is transferred to the non-volatile data memory EEPROM once a week and saved. In the event of a power failure, information may therefore be missing for up to 7 days.



Press the ↵ key to read in the operating data. The text 'Please wait...' appears during the read-in process. If the operating data could not be read in, the display returns to the previous menu item. As soon as the operating data could be read in, the first subordinate menu item is displayed.

Not for SC2 sensor head	Serial Number XXXX	Serial number of the device
Not for SC2 sensor head	Date of Production XX.XX.XX	Date of production of the device
Not for CGC6 Not for DT6A Unit	Software Version XXXXX	Software-Version serves as info for support
	Days of Operation X days	Current operating days, counts continuously how many days the unit has been operated on voltage → serves as info for support
Not for CGC6 Not for DT6A Unit	Gas Conc. Counter 0 10%MR/Day	Gas concentration counter* Unit: 10 % of measuring range per day Continuously counts the amount of gas measured per unit of time → serves as info for support

* Determination of the pending gas concentration as a function of the time per day (daily quantity):

(gas concentration x time unit) / 24

The total gas concentrates result from the addition of 10 % of all calculated daily quantities.

Gas concentration = % of measuring range
Time unit = Duration of exposure in h
24 = factor conversion into days

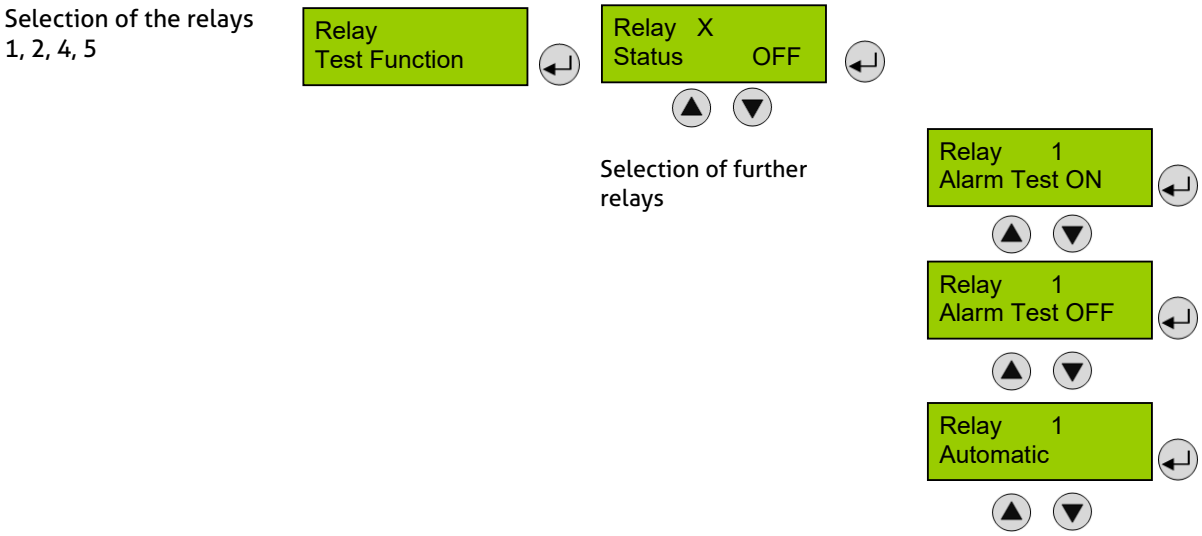
Not for CGC6 Not for DT6A Unit	Operating days expected XXXX	Expected life time of the sensor head. Is continuouosly recalculated on the basis of calibrations and concentrations counter. → Customer info to be able to plan exchange
	Min. Temperature 25 °C	Peak hold value of the lowest temperature measured (initial value = 70°C) is updated only after 7 days when restarting.
	Max. Temperature	Peak hold value of the highest temperature measured (initial value = -35°C) is updated only after 7 days when restarting.
	Last Tool Nr.	Displays the tool number the last access was performed with → serves as info for support to localise operating errors.
Not for DT6A Unit Not for SC2 sensor head	Analog Output 1 Offset 295	Display of zero offset of analog output 1 (non-standardised value)

Not for CGC6 Not for DT6A Unit	Number of Calibr. 1	Number of gain calibrations performed on the device since factory initiation → serves as info for support.
Not for CGC6 Not for DT6A Unit	Zero xxxxx Gain yyyyy	Current zero offset and gain value (not standardized) → serves as info for support.
Not for CGC6 Not for DT6A Unit	Sensitivity 100%	Sensitivity of the sensor at the last calibration compared to the new sensor (1st factory calibration) = ageing info.
Not for CGC6 Not for DT6A Unit	Maintenance Days Last xxx	Display of remaining maintenance days of the last gain calibration → serves as info for support for determining the regular calibration.
Not for CGC6 Not for DT6A Unit	Days of operation Last xxx	Counted days of operation during the last gain calibration → serves as info for support. for determining the regular calibration.
Not for CGC6 Not for DT6A Unit	Maintenance Days Currently xxx	Current remaining days until next maintenance date (down counter) is set to calibration interval value again during gain calibration → info for customers when (in how many days) to calibrate.
Not for CGC6 Not for DT6A Unit	Max. Current Value 0	Peak hold for the highest current value measured of the sensor head→ serves as info for support.

8.13 Test Function for Alarm Relays

In this menu, the alarm relays can be manually turned on and off in order to test their function.
This menu is only available in Special Mode. The fault relays cannot be tested because they are always dropped out in Special Mode.
The manual operation takes priority over activation by a gas alarm. However, the external activation of the alarm relays via a digital input takes priority over the manual test function.
The test mode simulates an alarm for the relay and the relay accepts the alarm status. The test function is cancelled again by selecting "Automatic" or by exiting the Special Mode.

The testing is possible via code levels 1 and 3.

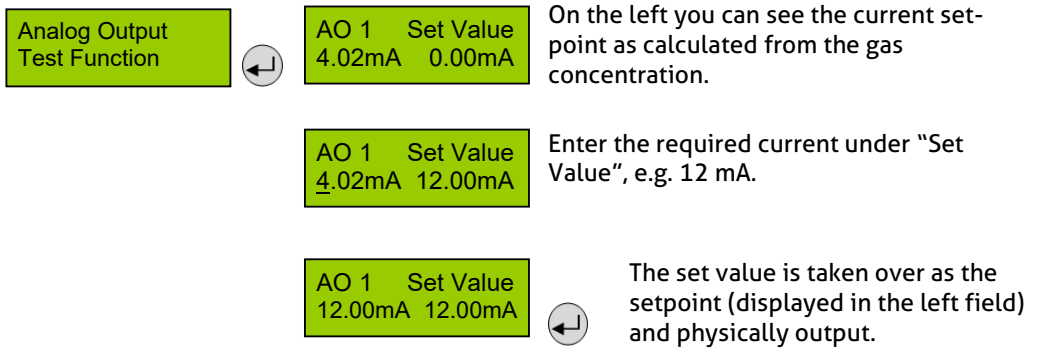


Symbol	Description	Default	Function
Status	Relay No. X	-	X = 1, 2, 4, 5 Select the relay
ON	Relay Status	OFF	Status OFF = Relay off (no gas alarm) Status ON = Relay on (alarm)
Test ON	Test of the alarm message	Autom	Alarm Test ON = Relay manually set in alarm status Alarm Test OFF = Relay manually set in "no alarm" status Automatic = Reset of manual intervention, relay in automatic mode

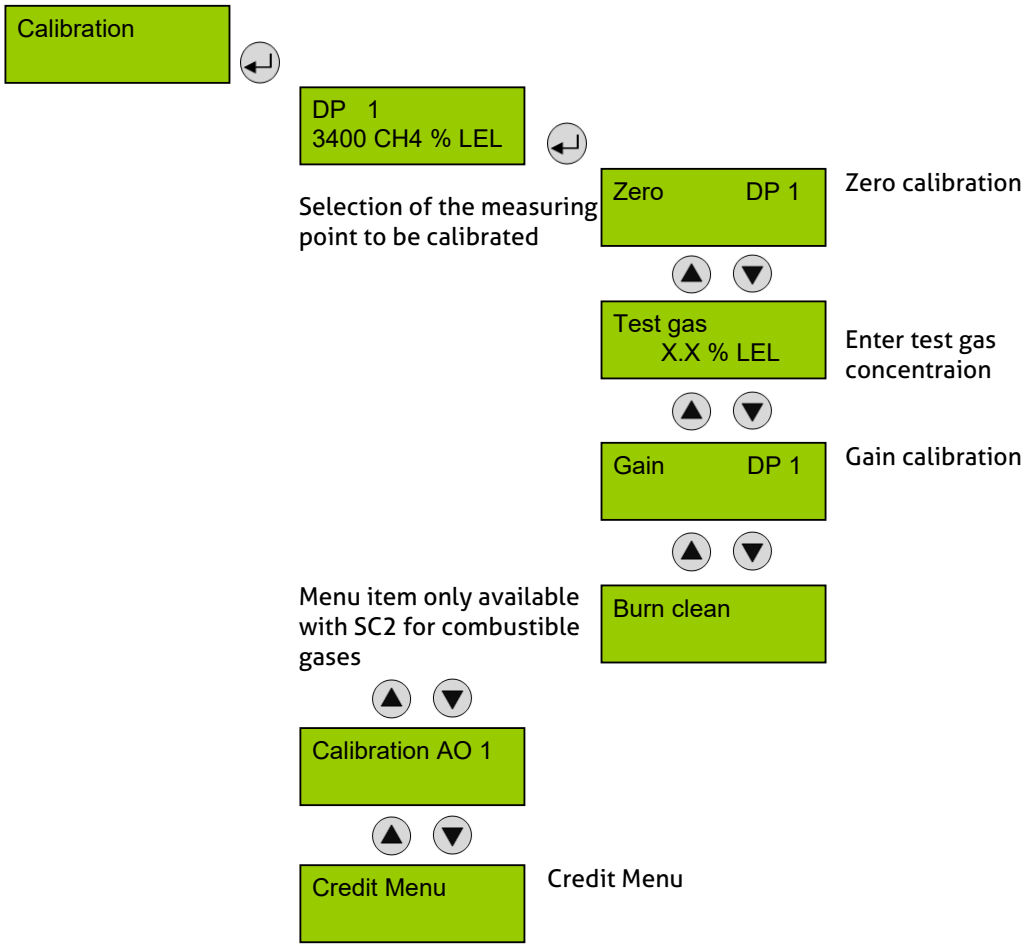
Table 36: Test Function Alarm Relays

8.14 Test Function for Analog Output

In this menu, you can define a desired value in the range of 0–22 mA for the analog output in order to test its function. This value is then directly available at the output.
This menu is only available in Special Mode.
The manual operation has priority over the activation by the gas concentration.
The testing is possible via code level 1 and 3.
When the menu is exited, the actual electric current signal is immediately output again.
The test function is only possible for a local, active analog output.

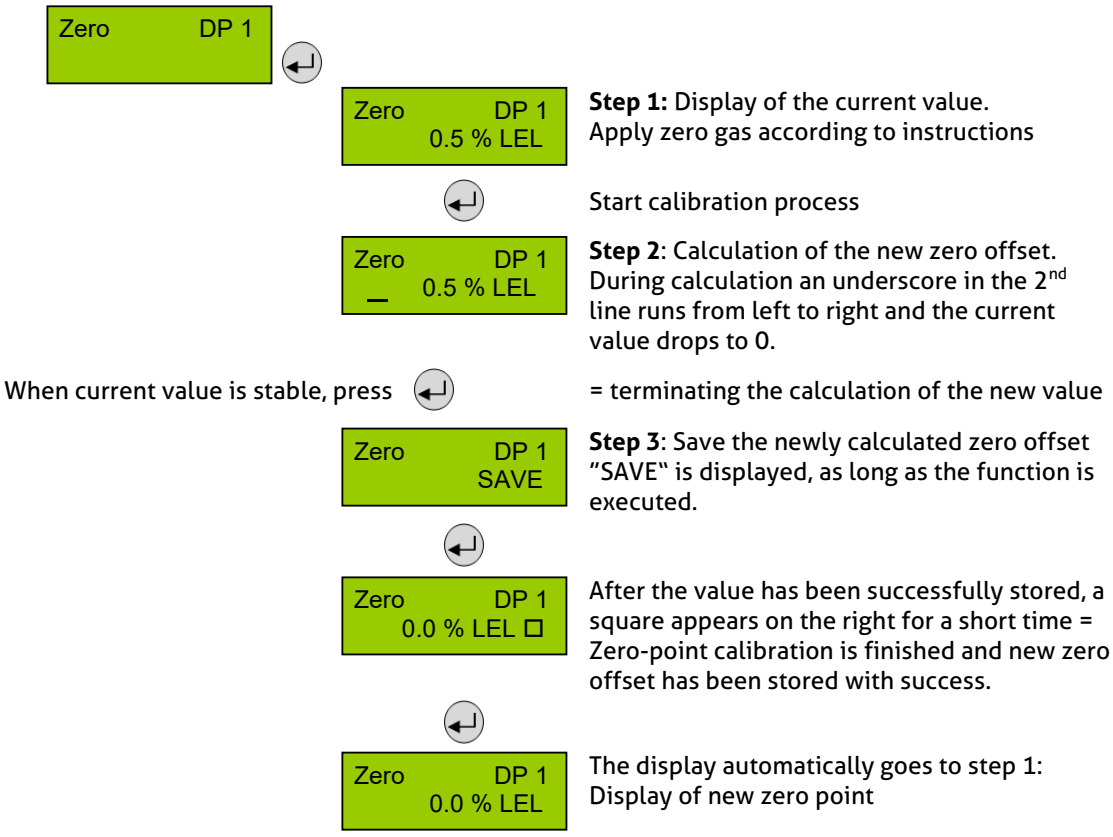


8.15 Calibration



8.15.1 Zero Calibration

The gas application with the defined calibration adapter, the allowable gas pressure and flow rate and the zero gas to be used can be found in the user manual of the respective sensor head. The specified warm-up times etc. must be strictly observed.



Step 1: Display of the current value. Apply zero gas according to instructions

Step 2: Calculation of the new zero offset. During calculation an underscore in the 2nd line runs from left to right and the current value drops to 0.

Step 3: Save the newly calculated zero offset "SAVE" is displayed, as long as the function is executed.

After the value has been successfully stored, a square appears on the right for a short time = Zero-point calibration is finished and new zero offset has been stored with success.

The display automatically goes to step 1: Display of new zero point

During the calculation phase, the following messages may occur:

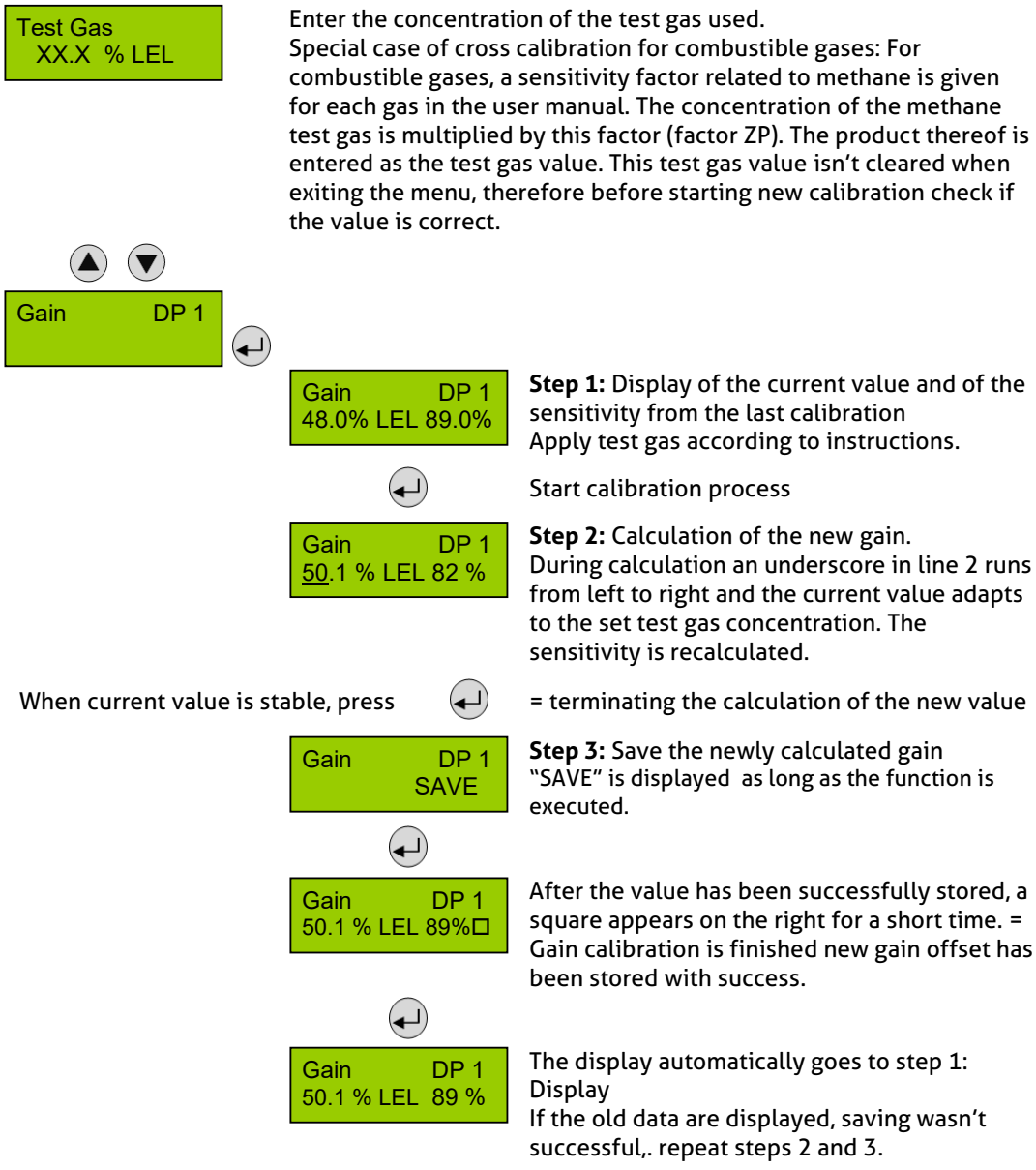
Message	Description
Current value too high	Wrong gas for zero point calibration (> 10 %)
Current value unstable	Is displayed as long as the deviation between 2 measuring cycles (100 ms) is > 3 %. It automatically extinguishes when the sensor signal becomes stable.
Time too short	The message "value unstable" starts an internal timer (20 s). Once the timer has run out and the current value is still unstable, the text is displayed. The process starts over again. If the value is stable, the current value is displayed and the calibration procedure is continued. If the cycle is repeated several times, an internal error is present. Stop the calibration process by exiting the calibration menu and replace the sensor head.

Table 37: Possible Messages during Zero Calibration

When aborting the zero-offset calibration, the offset value will not be updated. The sensor head continues to use the "old" zero offset.

8.15.2 Gain Calibration

The gas application with the defined calibration adapter, the allowable gas pressure and flow rate and the test gas to be used can be found in the user manual of the respective sensor head. The specified warm-up times etc. must be strictly observed.



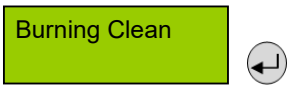
During the calculation phase, the following messages may occur:

Message	Description
Current value too high	Test gas concentration > than set value. Internal error → Replace sensor head.
Current value too low	No test gas or wrong test gas applied to the sensor
Test gas too high	The set test gas concentration must be between 30 % and 90 % of the measuring range.
Test gas too low	
Current value unstable	Appears when the sensor signal does not reach the zero point within the target time. Disappears automatically when the sensor signal is stable.
Time too short	The message "value unstable" starts an internal timer. Once the timer has run out and the current value is still unstable, the text is displayed. The process starts over again. If the value is stable, the current value is displayed and the calibration procedure is continued. If the cycle is repeated several times, an internal error is present. Stop the calibration process and replace the sensor head.
Sensitivity <	Sensitivity of the sensor head < 30 %, calibration no longer possible→ Replace sensor head.
Internal error	Internal , unrecoverable error → Replace sensor head.

Table 38: Possible Messages during Gain Calibration

8.15.3 Burning Clean

With the function Burning Clean, the Pellistor sensor is operated with a higher heating temperature for a limited period in order to remove any soiling on the heating wire which may adversely affect the sensitivity.



Start = Starting the cleaning function
Cancel = Manual abort

The menu is only displayed for SC2 sensor heads with Pellistor sensor element.

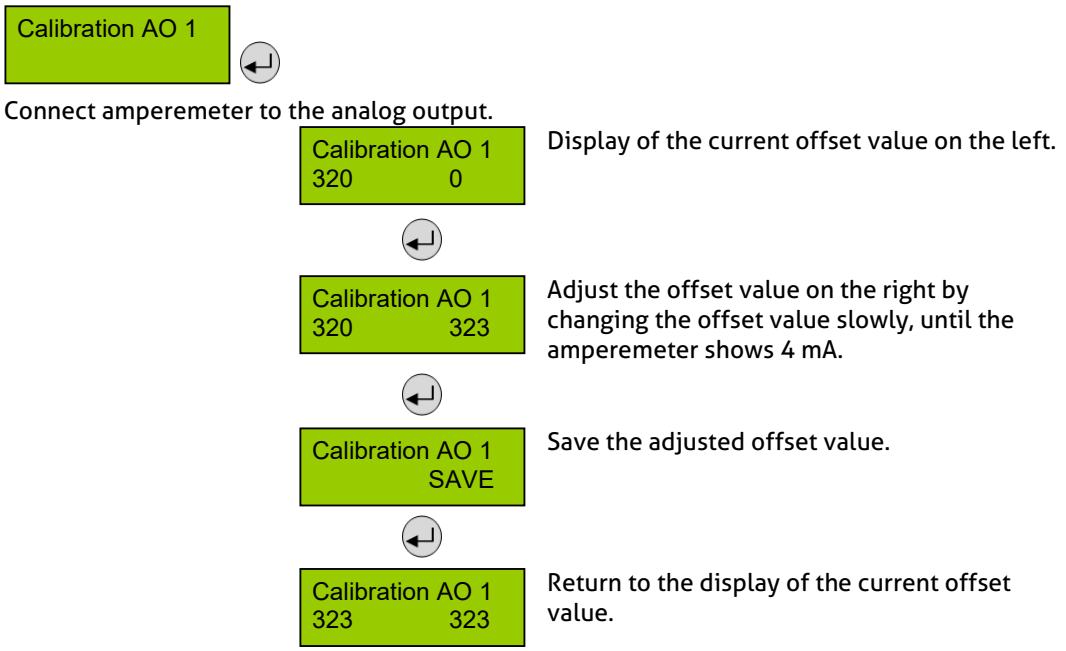
Before the start and during the complete burning process, test gas must be applied in the middle LEL range, preferably hydrogen, in order to achieve an increased combustion.
The gas supply is carried out with the specified calibration adapter, the permissible gas pressure and the flow rate can be found in the user manual of the sensor head.
The operation can be stopped at any time with abort.

The Special Mode is activated when burning clean is active.

Note:
The cleaning cannot reverse or improve a natural aging!

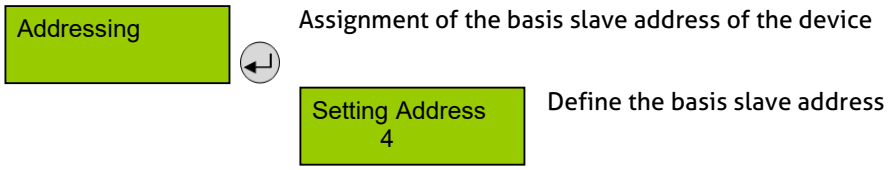
8.15.4 Zero Calibration of Analog Output

In this menu, you can correct the accuracy of the analog output signal at the 4-mA point (zero). The correction is only possible when the analog output is in active mode.
The error message of the output signal monitoring is suppressed as long as the menu Calibration AO is open. For measuring the actual current, connect an amperemeter (measuring range > 20 mA DC) or voltmeter (via shunt resistor) to the analog output.



8.16 Addressing

The CGC6 does not have an interface for communication with a higher-level system, so it is not necessary to enter an address.



9 Configuration and Parameter Cards

Commission:		Order number:	
Customer:		Service technician:	
Commissioning - company:		Date:	

9.1 Configuration Card System Parameters

Serial No.	Date of Production	Mainten. interval	Customer Password	AV Overlay		AV Time	Power On Time	Error Time	CFM dupl.
Note down	Note down	1900	****	V-time	ppm	900	30	30	0

Analog Output 1		
Output Signal	Source	Operating Mode
100 %	CV	AV

9.2 Configuration Card Alarm Relays / Signal Outputs

Relay No.	Active Inactive	Mode	Stat. Flash	Reset	Horn		Extern. On	Extern. Off	Delay at ON	Delay at OFF	Fault ORed	Maint. ORed
				Time	Recurr.	DI	DI	DI	s	s		
Default	Inactive	De-en.	Stat.	0	No	0	0	0	0	0	OFF	OFF
R 01	Active	Energized	Stat	0	No	0	0	0	0	0	OFF	OFF
R 02	Active	Energized	Stat	0	No	0	0	0	0	0	OFF	OFF
R 03*	Inactive	Energized	Stat	0	No	0	0	0	0	0	OFF	OFF
Horn	Active	De-en.	Stat	0	No	0	0	0	0	0	OFF	OFF
LED red	Active	De-en.	Stat	0	No	0	0	0	0	0	OFF	OFF

* R03 is defined as a fault signal relay. Changes to the parameters listed here are not possible.

9.3 Configuration Card (Digital Measuring Points)

The parameters depend on the registered gas type

DP No.		MP Status	Locked	Gas Type		Measuring Range	Alarm Thresholds			Hysteresis	AV Delay Alarm (s)		CV - AV	Assignment Latching				Assignment Fault < > Alarm				Assignment Alarm <> Alarm Relay				AO1
				Gas	Unit		A1	A2	A3		At ON	At Off		A1	A2	A3	A4	A1	A2	A3	A4	A1	A2	A3	A4	
		Inactive	Non	CO2	ppm	300	30	60	120	15	0	0	MW	0	0	0	0	1	1	0	0	R1	R2	R5	R4	0
01																									
02																									
03																									
04																									
05																									
06																									
07																									
08																									
09																									
10																									

9.4 Stored threshold values for alarm triggering

Code	Toxic gases	Formula	Measuring range	Alarm threshold 1	Alarm threshold 2	Alarm threshold 3	Alarm threshold 4	Hysteresis
E1110-E	Carbon monoxide	CO	0–250 ppm	25	150	150	150	10
E1110-F	Carbon monoxide	CO	0–300 ppm	30	60	150	150	10
E1125-B	Ammonia	NH_3	0–300 ppm	80	250	250	250	15
E1125-D	Ammonia	NH_3	0–1000 ppm	250	800	800	800	50
E1130-A	Nitrogen dioxide	NO_2	0–10 ppm	3	5	5	5	1
E1130-B	Nitrogen dioxide	NO_2	0–20 ppm	2	5	5	5	0.5
E1130-C	Nitrogen dioxide	NO_2	0–30 ppm	3	6	15	15	1
E1183-B	Hydrogen cyanide	HCN	0–50ppm	10	20	20	20	5
E1185-B	Formaldehyde	CH_20	0–10 ppm	3	5	5	5	1
E1190-A	Ozone	O_3	0–5 ppm	1	2	2	2	0,5
E1193-C	Chlorine	CL_2	0–10 ppm	3	5	5	5	1
E1195-AX	Oxygen	O_2	0–25 % vol	19	17	17	17	1
I464-D	Carbon dioxide	CO_2	0–5000 ppm	1000	1500	1500	1500	100
I464-B	Carbon dioxide	CO_2	0–5 % vol	1,5	3	3	3	1
I-S1164-B	Carbon dioxide	CO_2	0–5 % vol	1,5	3	3	3	1
20XX-XX-A	FR01, FR04, FR06, FR07, FR08	HFKW	20–2000 ppm	700	1000	1000	1000	50
34XX-X	All Ex-gases (cf. DB_SC2-Ex)		0–100 % LEL	10	20	20	20	5

The thresholds for the gas types not listed are stored according to the following formula:

	Alarm threshold 1	Alarm threshold 2	Alarm threshold 3	Alarm threshold 4	Hysteresis
All other gases	25 % of measuring range	50 % of measuring range	50 % of measuring range	50 % of measuring range	ca. 6 % of measuring range

However, all standard alarm thresholds can be changed at any time (see 8.10.3).

10 Maintenance and Inspection

It is obligatory to perform maintenance regularly in order to maintain safety, measuring and warning functions of the gas alarm device. The maintenance includes visual, functional and system inspections and must only be carried out by appropriately qualified personnel.
When carrying out maintenance and repair work according to the user manual, only use original spare parts from MSR-Electronic | INTEC Controls. Repairs or changes of the warning devices not complying with the maintenance manual or carried out by unauthorized persons can affect proper equipment and safety features and always result in a termination of the manufacturer's warranty and the test certificate. For regular maintenance und calibration by trained technicians we recommend concluding a service contract with MSR-Electronic | INTEC Controls or one of their authorized partners.
According to EN 45544-4, inspection and service must be executed at regular intervals. The maximum intervals have to be determined and observed by the person responsible for the gas warning system according to the legal requirements. MSR-Electronic | INTEC Controls recommends applying the inspection and maintenance intervals as prescribed in the general regulations of the gas measuring technique like EN 50545, VDI-2053, EN 60079-29-1 etc. The inspection interval normally is 3 months. The recommended service interval depends on the connected sensor and can be read from the User Manual SC2. If different intervals are valid, always consider the shortest one.
Inspections and services must be documented. The date for the next maintenance has to be affixed to the sensor.

10.1 Inspection

Gas sensors should be controlled regularly by a competent person according to EN 45544-4.
The following has to be checked in particular:

- Maintenance/calibration interval not exceeded.
- Visual check of the unit including sensor head and cables for mechanical damage, vandalism etc.
- Check the unit including sensor head for dust, dirt and moisture deposits and clean it with a dry cloth if necessary.
- The filter at the gas inlet has to be replaced if extremely dirty.

10.2 Functional Test

The functional test should be carried out during commissioning, during each maintenance or sensor replacement, but at least once a year.

Trip Test with Reference Gas

- Check alarm relays (only necessary if the alarm relay is used):
  - Apply test gas with a concentration ≥ of the set alarm threshold. The alarm relay must change into the alarm status and the actuated device goes into alarm.
    When applying a reference gas with a concentration > alarm threshold 2, the set alarm thresholds are exceeded, and all output functions are activated. It is necessary to check if the connected output functions are working correctly (e.g. the horn sounds, the fan switches on, devices shut down). By pressing the push-button on the horn, the horn acknowledgment must be checked. After removal of the reference gas, all outputs must automatically return to its initial position.

- Check analog output (only necessary if the analog output is used):
  - Apply test gas. Check the proper reaction of the connected actuator(s).

10.3 Maintenance and Calibration

New SC2 sensor heads are always delivered factory-calibrated by MSR-Electronic | INTEC Controls. This is documented by the laser engraving indicating the calibration gas. A repeated calibration is not necessary during commissioning if the device is still in its original packaging and the calibration doesn't date back more than 12 months for CO_2 sensors and 3 months for all other gases. When performing maintenance, you have to do the calibration and the functional test in addition to the inspection.
The procedure for calibration and test gas application can be found in the User Manual SC2.

As long as the calibration menu is open and the sensor is gassed with test gas, the alarm release is blocked.
Prior to calibration the sensor must be connected continuously to the power supply for stabilization for a running-in period (see User Manual SC2).

The function control/calibration must be documented by a protocol stating at least:

- Identification of the gas warning device
- Type and concentration of the zero gas and test gases used
- Display before and after calibration with zero and test gas
- Response time
- Deficiencies fixed and measures started with the date and name of the person responsible for the functional check.

10.4 Repairs

Please always apply the user manual and maintenance instructions when repairing and replacing parts of the gas warning device. For safety reasons replace parts only by original spare parts from the manufacturer.
Appropriate technical qualification is necessary for further repair work, which may only be carried out by the manufacturer or by trained and authorized service partners.
The responsibility for proper operation and condition of the gas detection device after repair lies with the technician who has done the work and/or with the entrepreneur.
After repair before recommissioning, you have to check the function and the system depending on the type of repair.

11 Technical Data

SPECIFICATIONS (CGC6 CONTROLLER)

Electrical	
Power supply	24 VDC ± 20%, reverse polarity protected
Power consumption	
- base w/o sensor	60 mA (1.5 VA)
- sensor (DT6A-Series)	*See DT6A specifications*
- horn/warning light (WAO)	Max. 40 mA (1.0 VA)
Overvoltage	category I
Alarm relay (2)	250 VAC, 5 A, potential-free, change-over contact (SPDT)
Fault relay (1)	250 VAC, 5 A, potential-free, change-over contact (SPDT)
Transistor output (2)	24 VDC / 0.1 A (switching to plus)
Digital input (2)	24 VDC, 10 mA (potential-free contact against GND)
Analog output (1)	Proportional, overload and short-circuit proof, load ≤ 500 Ω 4-20 mA = range 2.4-4 mA = underrange > 20-21.2 mA = overrange < 2.0 mA = fault
Outgoing line for field bus	24 VDC for max. 10 DT6A Units., overload and short-circuit proof, reverse-polarity protected
Field bus for DT6A Unit	RS-485 / 19200 Baud (max. cable length 2,900 ft)
Environmental	
Temperature range	-4°F to +140°F (-20°C to +60°C)
Humidity range	15-95% RH non-condensing
Pollution degree	2 (indoor installation only), not suitable for wet environments
Temperature - storage	-4°F to 149°F (-20°C to +65°C)
Physical	
Housing type C	Polycarbonate
Burning behavior	UL 94 V2
Housing color	RAL 7032 (light gray)
Dimensions housing (W x H x D)	
- Type C	130 x 130 x 75 mm (5.11 x 5.11 x 2.95 in.)
Weight	Max. 1.32 lb (0.6 kg)
Protection class	IP65
Installation	Wall mounting
Cable entry	Standard 6x M20/25
Connection type	
- Field bus (DT6A Unit)	Pluggable screw-type terminals, 0.25-1.3 mm²
- DI/AO	Pluggable screw-type terminals, 0.25-1.3 mm²
- Power supply, relays	Pluggable screw-type terminals, 0.25-2.5 mm²
Display	
- LCD	2 lines, 16 characters each, background highlighted in 2 colors
Operation	Menu driven via 6 pushbuttons

Visual / Audible Indicator (WAO)	
Color / mode	Red = Alarm; Yellow = Fault; Green = Power (Normal); Green (flashing) = Service
Acoustic pressure	> 85 dB (A) (distance 0.1 m)
Frequency	2300 Hz ± 300 Hz
Conforms to	EMC Directives 2014/30/EU, LVD 2014/35/EU, CE, EN 61010-1:2010, EN 50271, IEC/EN 61508-1-3, EN 60079-29-1, EN 50104, EN 50545-1 Certified to ANSI/UL 61010-1 CAN/CSA-C22.2 No. 61010-1
Warranty	Two years material and workmanship, 12 months normal exposure for sensor element

ACCESSORIES

Installation Cable	**W202P-2288INTEC** Cable, 20 AWG, 2 pairs, stranded, red/black, blue/green (shielded), Plenum rated; 1000 foot box
Calibration Kits	
- carbon monoxide	**CALKIT-PG2-CO** Sensor calibration adapter w/ tube and cup, 500 mL/min. regulator, 17L 200 ppm carbon monoxide, 17L 99.99% nitrogen, carrying case
- combustible gases	**CALKIT-PG2-COMB** Sensor calibration adapter w/ tube and cup, 150 mL/min. regulator, 17L 2.5% methane, 17L 99.99% nitrogen, carrying case
- nitrogen dioxide	**CALKIT-PG2-NO2** Sensor calibration adapter w/ tube and cup, 500 mL/min. regulator (stainless steel), 70L 10 ppm nitrogen dioxide, 70L 99.99% nitrogen, carrying case
- carbon monoxide & nitrogen dioxide	**CALKIT-PG2-CO-NO2** Sensor calibration adapter w/ tube and cup, 500 mL/min. regulator (for CO), 500 mL/min. regulator (stainless steel, for NO2), 17L 200 ppm carbon monoxide, 70L 99.99% nitrogen, 70L 10 ppm nitrogen dioxide, and (2) carrying cases

SPECIFICATIONS (DT6A SENSOR)

Electrical	
Power supply	24 VDC ± 20%, reverse-polarity protected
Power consumption	
- base unit	10 mA max.
- w/ CO sensor	12 mA max.
- w/ NO_2 sensor	12 mA max.
- w/ CH4 sensor	60 mA max.
Overvoltage Category I	
Output for local bus	5 VDC, 250 mA max. Overload, short-circuit and reverse-polarity protected
Sensors	SC2 Series
- performance	*See SC2 datasheet for specific gases*
- coverage	*See SC2 datasheet for specific gases*
- storage time	6 months (for sensor elements)
Serial Interface	
Local bus	1-wire / 19200 baud
Field bus	RS-485 / 19200 baud; max. cable length 2,900 ft
Tool bus	2-wire / 19200 baud
Ambient Conditions	
Temperature range	-31°F to 140°F (-35°C to +60°C) Pay attention to the temperature range of the SC2 used
Humidity range	15-90% RH non-condensing
Pollution degree	2 (installation only indoors), not suitable for wet environment
Permissible height	5000 ft (1500 m) above sea level
Storage temperature	-4°F to 149°F (-20°C to +65°C) Pay attention to the temperature range of the SC2 used
Physical	
Housing type A	Polycarbonate
Burning behavior	UL 94 V2
Housing color	RAL 7032 (light gray)
Dimensions (W x H x D)	3.7 x 5.1 x 2.2 in. (94 x 130 x 57 mm)
Weight	0.7 lb (0.3 kg)
Protection class	IP65
Installation	Wall mounting
Wire connection	
- Field bus	Pluggable screw-type terminal 0.25-2.5 mm^2 (24 to 10 AWG)
- Local bus for SC2	3-pin connector
Knockout for integration of sensor	3x M25 for M25 housing