AquiTron | AT-MSR-PT

Hand Held Service Tool

INSTALLATION & OPERATION INSTRUCTIONS

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leak detection solutions

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AT-MSR-PT

Hand Held Service Tool

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1 INTENDED USE

The Service Tool / Display is used as visual indication, operating, commissioning and calibration unit for gas detecting and measuring instruments of the series AT-DGC, AT-MSC and AT-SB2 Sensor boards. The intended use is defined in the user manuals of the individual devices.

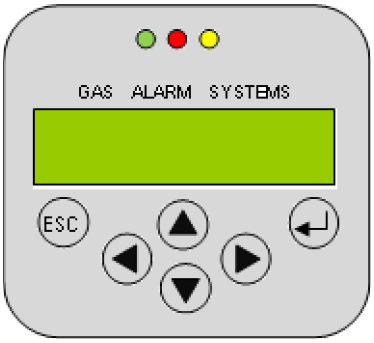
2 DESCRIPTION

The parameters, gas types, units, etc. specified in the description are only examples, the actual values at the time of delivery are shown in the attached configuration card. This description contains the maximum possible functionality ofthis tool Depending on the version some features described here are not available and therefore the menu items may be hidden.

3 OPERATION

The complete configuration and service are made via operating keys in combination with the LCD screen. Security has 4 code levels against unauthorized intervention.

PLEASE NOTE: Service tools supplied by Aquilar can only be used on Aquilar supplied systems, contact Aquilar Ltd for futher information.



Version for
AT-DGC/AT-MSC/AT-WSB
Operation is done via 6 pushbuttons.

3.1 FUNCTION OF THE KEYS AND LEDS ON THE KEYBOARD

Exits programming, returns to the previous menu level

Enters sub menus and saves parameter settings

Navigates within a menu, changes values


function

Changes cursor position


function

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The status LEDs indicate the operating state.

Green:	Continuous:	= Operating voltage
	Flashing:	= Maintenance message
Yellow:	Continuous:	= Failure
	Slowly flashing:	= Warming-up
	Fast flashing:	= Special mode
Red:		= Alarm

The backlight of the display changes green to red when an alarm is active

3.2 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 isn't overwritten) and back to higher menu level

3.3 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 AT-SC, the display shows DP = digital measuring point

For a measuring head with analog 4-20 mA signal AT-MC the display shows AP = Analog measuring point
The following number defines the bus address of the gas transmitter at DP. With AP, the number indicates the number of the analog input used
DP21: This is the measured value of the digital sensor head with bus address 21
AP11: This is the measured value of the analog sensor head connected to analog input 11

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3.4 CODE LEVELS

All inputs and changes are protected by a four-digit numeric password to stop unauthorized intervention according to the regulations of all national and international standards for gas warning systems. The status messages and measuring values are visible without entering a code

The access to a code level is cancelled if no buttons are pushed within 15 minutes or if there is no data communication between display and the controller

The code levels are classified in order of priority: 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 service mode

Project-based Service Tool Devices do NOT require a password. The authorization is transmitted via the internal device identifier. If the identifier is incorrect, 'Service not available' will be output if a noncompliance is detected

Code level 2: (code not changeable)

With code level 2, it is possible to temporarily lock/unlock sensors. This code word is only released by the installer to the end user in problem situations. To lock/unlock, the service mode must always be activated first after code release. This functionality is not available in the service tool and display

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 technician who has last changed it knows the code since it can only be changed individually via code level 1

Code level 4: (password 1234) (code not changeable)

Code level 4 allows the operator after activation of the operation mode “Service Mode” to read all parameters as well as all test functions of the alarm relays, analog outputs and LCD

Manual test function of the alarm relays (functional test of the connected actuators)

Manual test function of the analog outputs (functional test of the connected actuators)

Manual test function of the LCD (functional test of the LCD display and the LEDs)

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4 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 the display scrolls the information of all registered sensors in 5-second intervals. If alarms are active, only the values of the sensors currently in alarm status are displayed.

Power On Time
19s

Power On Time of the basic deviceSecond counter counts down, when communication display <> basic device is OK. In case of communication error the count-down will stop.

↓

Device Type

MSC = Multi Sensor Controller AT-DGC & Sensor Board

After about 5 sec. ↓

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

D1 CH4 % LEL
Warmup Time

D1 CH4 % LEL
1.8

↵ (Selection Main Menu)

Starting menu	Main menu		Submenu 1
	System Errors	↵	Reading and acknowledgement of errors
	▲ ▼		
	Alarm Status	↵	Display of the alarm status of active alarms
	▲ ▼		
	Relay Status	↵	Display of the relay status
	▲ ▼		
	Measuring Values	↵	Display of measuring values
	▲ ▼		
	Display Parameters	↵	General display parameters without safety relations
	▲ ▼		
	Installation & Calibration	↵	Reading and change of the relay, measuring point and system parameters as well as test and calibration functions

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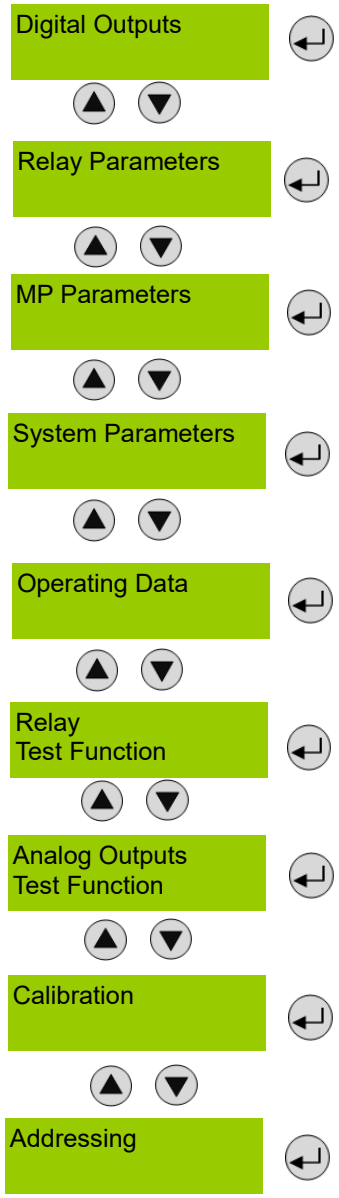
!! Service ON = Special mode = Fault message is active!!



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4.1 FAULT MANAGEMENT

A pending fault activates the yellow LED (Fault)

MP 1	Error
1	1T 2h 6‘

The integrated fault management records the first 50 occurred faults with time stamps in the menu “System Errors”. The timestamp shows the days, hours and minutes that have elapsed since the fault has occurred.

Additionally, a record of the faults occurs in the “Error memory”, which can only be read and deleted by the technician (code level 1 and 3).

4.2 ERROR MEMORY

The errors in the error memory can be viewed on the displays without entering a code but cannot be changed. The menu “Error Memory” in the main menu “System Errors” can only be opened via the code level 1 and 3.

In the error memory, the first 50 faults that have occurred and have already been acknowledged in the menu “System Errors” are listed for the service technician

Attention:
This memory should always be read during maintenance, relevant faults should be tracked, and finally the memory should be emptied.

4.3 SYSTEM MESSAGES AND SYSTEM ERRORS

For details about the error messages please refer to the respective User

4.4 ALARM STATUS

Display of the currently pending alarms in plain text in the order of their arrival. Only those measuring points are displayed, where at least one alarm is active.

Alarm Status → DP 1 ”A1 → P 1 Acknowledge? → free state ascertained?

Symbol	Description	Function
AP 1	Measuring Point No.	Analog measuring point X = 1 X, where an alarm is pending
DP 1	Measuring Point No.	Digital measuring point X = 1 X, where an alarm is pending
‘A1 “A1	Alarm status	‘A1 = Alarm 1 active “A1 = Alarm 1 in latching mode, can be acknowledged

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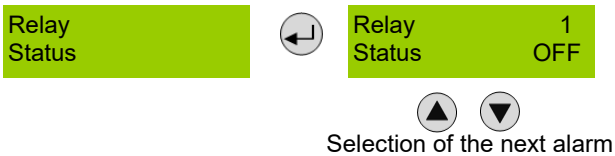
4.5 RELAY STATUS

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

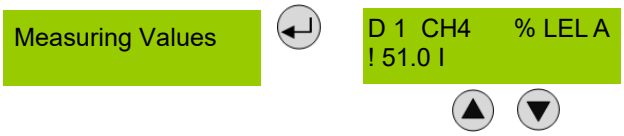


Selection of the next alarm relay

Symbol	Description	Function
1	Alarm Relay	Alarm relay = 1 X
OFF	Relay Status	Relay OFF
ON	Relay Status	Relay ON

4.6 MENU MEASURING VALUES

In this menu, the display shows the measuring 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
A 1[1]	Meas. Point No.	Analog measuring point 1 = 1 - X
D 1[2]	Meas. Point No.	Digital measuring point 1 = 1 - X
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 indication	At least one alarm has been released at this MP.
#	Maint. info	Sensor head: maintenance due (maintenance date exceeded)
?	ConfigError	Gas type or meas. range doesn't agree with sensor head.
Comm. err.	Fault MP	Communication error, sensor head <> I/O board
Underrange	Meas. range monitoring	Meas. signal < admissible range (< zero point – 6 %)
Overrange[3]		Meas. signal > admissible range (> full scale value + 6 %)
Gesperrt	MP Gesperrt	MP wurde vom Betreiber vorübergehend am Controller gesperrt.
Run-in	Run-in time	Running-in period of the sensor active

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4.7 DISPLAY PARAMETERS

In the menu Display Parameters, you can find the general, security irrelevant parameters in the display device. These can be changed in operating mode.

Display
Parameters

4.7.1 SOFTWARE VERSION

Software Version
XXXXX -YYYYY

Software version of the display and of the basic board (factory set)

Symbol	Description	Function
XXXXX YYYYY	Software Version of the display Soft-ware Version of the basic board	XXXXX Software Version YYYYY Software Version

4.7.2 SERIAL NUMBER

Menu only available with AT-MSR-PT

Serial Number
XXXX

Serial number of the Service Tool

4.7.3 LANGUAGE

Language
English

Selection of the menu language (only code level 1 and 3)

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

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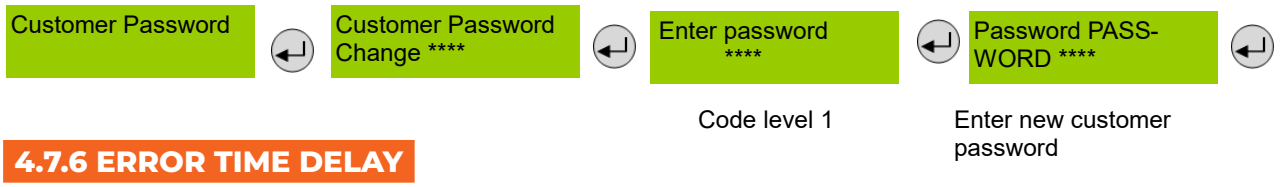
4.7.4 SERVICE PHONE NUMBER

The service phone no. can be individually defined (only code level 1 and 3).

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

4.7.5 CUSTOMERS PASSWORD

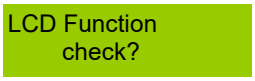
Storage of an individual customer's password in the display for changing parameters. Changing the password only via code level 1. This menu item will only appear after having entered the password of code level 1.



4.7.6 ERROR TIME DELAY

Symbol	Description	Default	Function
s	Delay	120s	(Only code levels 1 and 3) Definition of a delay time after a communication error Display <> Basic Board has occurred (only fault indication on the display, no effect on the function or outputs)

4.7.7 LCD FUNCTION



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

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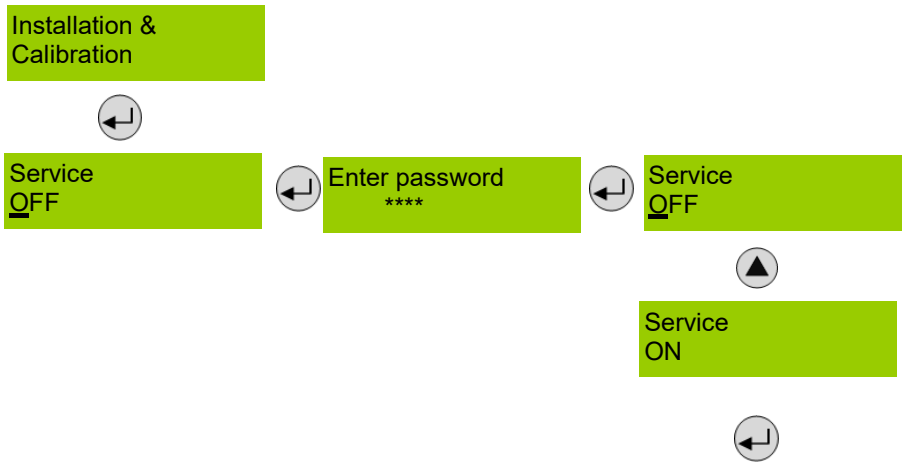
4.7.8 INSTALLATION AND CALIBRATION SECTION

If parameters are changed with the Service or PC Tool, they must be checked again for correctness by reading them back! The following menus are only accessible in the Service ON state (password protected) !! Service ON = Special mode = Fault signal is active!

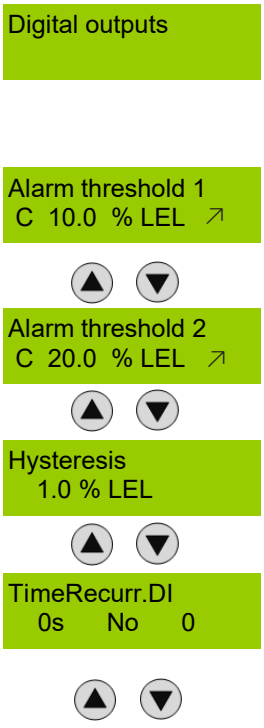
With code level 4 for reading the parameters With code level 1 or 3 for changing the parameters

Activate service mode.



4.7.9 DIGITAL OUTPUTS

This menu item is only available with the AT6 display!
Alarm thresholds can be set for the two display-internal digital outputs.
Unlike MP parameters, these alarm thresholds operate independently of each other.



The first alarm threshold refers to the second digital output, since the first is reserved for the horn. It controls the LED on the WAO, if connected.

The second alarm threshold refers to the horn of the WAO or the optional internal horn.

In addition to the alarm thresholds, the horn function for the internal horn can be set here. Acknowledgement on the display is made by pressing the ESC key in the main menu.

External acknowledgement of the horn via the digital input is only possible if a digital input is available.

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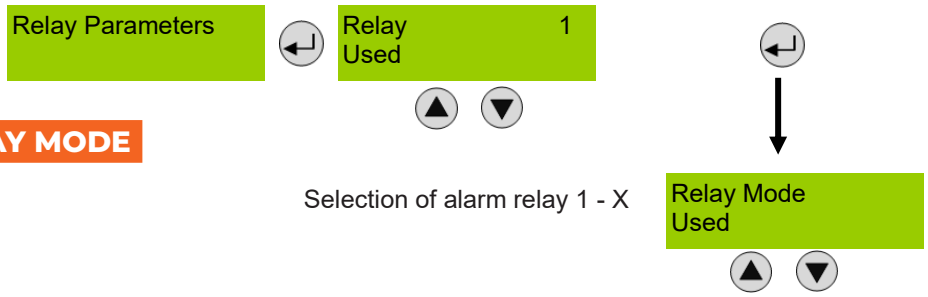
4.8 MENU RELAY PARAMETERS

Reading and changing of the parameters separately for each alarm relay. Changes only via code level 1.



4.8.1 RELAY MODE

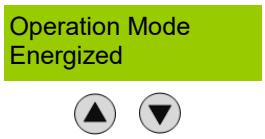
The fault relay can be registered here as an additional alarm relay. This registration has no influence on the function as fault relay. No parameter changes are possible here.

The relay switches off in addition when the assigned alarm is active.

Symbol	Description	Default	Function	
Used	Mode	Used	Used Not Used	= Relay is registered and can be assigned to an alarm = Relay isn't registered

4.8.2 RELAY OPERATION MODE

Changes to the following relays are not accepted by the base unit:



The terms energized / de-energized come from the terms "energized / de-energized to trip" principle used for safety circuits. The terms refer to the activation of the relay coil, not to the relay contacts (as they are executed as changeover contacts and available in both principles).

The LEDs at the modules show the state in analogy. (LED off -> relay coil current-free)

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4.8.3 RELAY FUNCTION STATIC/FLASHING

Changes to the following relays are not accepted by the base unit:

The function "Flashing" offers a connection option for warning devices to improve visibility. The frequency is 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 with flashing operation makes no sense and is therefore suppressed.

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

4.8.4 SIGNAL SOURCE

The signal source determines whether the relay is triggered by an alarm in the I/O board (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 activated by the central unit.

4.8.5 ALARM TRIGGER QUANTITY

Changes to the following relays are not accepted by the base unit

Here you can set the number of active alarms necessary for relay tripping. For security applications, the relay must always switch on the first alarm.

Symbol	Description	Default	Function
1	No. of Alarms	1	1 = Number of pending alarms for triggering the alarm relay

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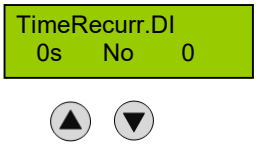
4.8.6 HORN FUNCTION

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

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

Symbol	Description	Default	Function
Recurrence	Mode	No	No = Automatic reset of the relay after time has expired. Yes = Recurrence function
Time		120	Enter time for automatic reset function or recurrence function in s 0 = No reset function
DI		0	0 – X = Assignment, which digital input resets the relay



Horn function resettable:

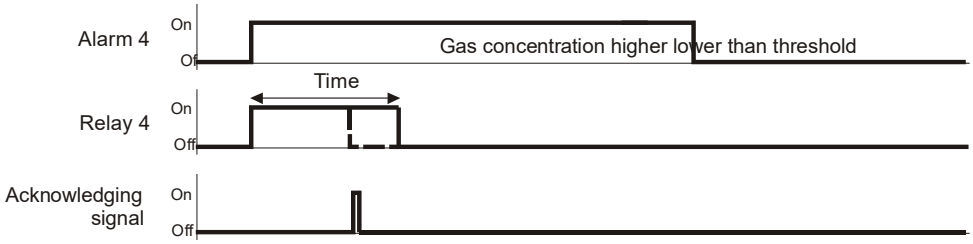
The activated horn can be reset with this function.

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 preset time (active, if value > 0).
By a physically available internal/external pushbutton (assignment of the appropriate digital input

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.

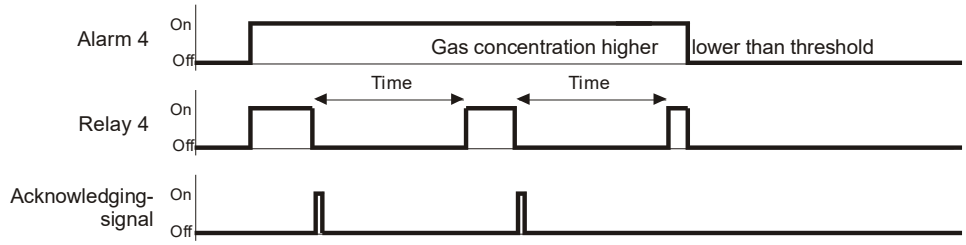
Acknowledge the horn relay



Reset command by timer, external push-button or one of the operating keys.

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 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.



Reset command by external push-button or one of the operating keys.

4.8.7 EXTERNAL OVERRIDE

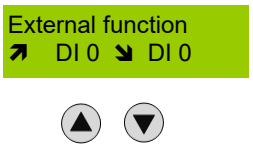
Manual operation of the alarm relays via digital input does not start the "special mode", as this is a deliberate and configured functionality. The use of the override should be used with caution, particularly the function "External OFF".

Assignment of a digital input (DI) for the external switching on and off of the alarm relay.

This function has priority to gas alarm.

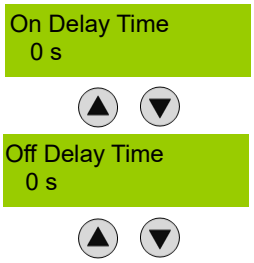
If External ON and External OFF are configured to the same relay and both are active at the same time, so in this state, the External OFF command has priority. In this mode, too, the relay works respecting the parameter settings "Static / Flashing" and "Energized / De-energized".

Symbol	Description	Default	Function
DI 0	External ON	0	As long as DI 1X is closed, relay switches ON
DI 0	External OFF	0	As long as DI 1X is closed, relay switches OFF.



4.8.8 DELAY MODE OF ALARM RELAY

Symbol	Description	Default	Function
0 sec.	SwitchON Delay Time	0	≥ 1: Relay is only activated at the end of the defined time. 0 = No delay
0 sec.	SwitchOFF Delay Time	0	≥ 1: Relay is only deactivated at the end of the defined time. 0 = No delay

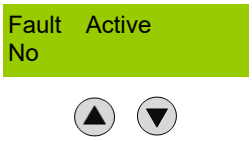


4.8.9 ASSIGNMENT TO FAULT

In case of a device fault, the alarm relay is triggered in addition

This relay output must not be used as a safe error output

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.



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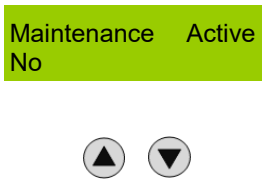
4.8.10 ASSIGNMENT TO MAINTENANCE MESSAGE

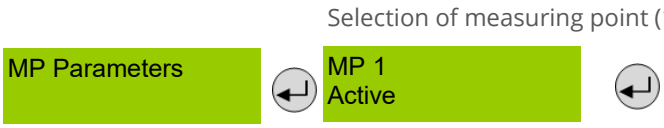
In case of a pending maintenance, the alarm relay is triggered in addition

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.



4.9 MP PARAMETERS

Reading (code level 1) and changing (code level 1) of the parameters for each measuring point.

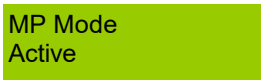


4.9.1 ACTIVATE - DEACTIVATE MP

The physically present sensor head is registered at the basic device 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

Attention: Deactivation of a sensor head does not cause a fault message

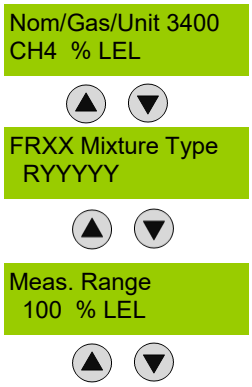
Symbol	Description	Default	Function
Active	MP Mode	Not active	Active = Measuring point activated in the controller. Not active = Measuring point not activated in the controller.



4.9.2 SELECTION OF GAS TYPE AND MEASURING RANGE

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 second 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	Default	Function
3400	Internal 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 type.
%LEL	Unit of Gas Type	----	Unit is firmly assigned to the type.
100	Measuring Range	----	Set measuring range (must correspond with the sensor head).



The gas type to be monitored and the range are set in the two 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 don't match, an error message is output

In the analog sensor head, control for compliance is not possible; nevertheless, the correct gas type and measuring range for the display and evaluation must be selected as well

Select the 4-digit, internal 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

The presentation of measured values, alarm thresholds and hysteresis depends on the measuring range. If the measuring range is <10, there are three, if <100, there are two, 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

Type	Sensor Head Type SC	Gas Type	Formula	Meas. Range[1]	Unit
1110	E1110X	Carbon monoxide	CO	0300	ppm
1130	E1130X	Nitrogen dioxide	NO_2	030	ppm
1129	E1129X	Nitrogen monoxide*	NO	0100	ppm
1195	E1195X	Oxygen	O_2	025	% Vol
1125	E1125X	Ammonia	NH_3	0300	ppm
I464	I1464	Carbon dioxide	CO_2	02000	ppm
I564	I1564	Carbon dioxide	CO_2	02000	ppm
S164	I1164A	Carbon dioxide	CO_2	02000	ppm
I464	I1464	Carbon dioxide	CO_2	05	% Vol
I564	I1564	Carbon dioxide	CO_2	05	% Vol
S164	I1164B; C	Carbon dioxide	CO_2	05	% Vol
3400	P3400A	Methane	CH_4	0100	% LEL
I400	I3400A	IRMethane	CH_4	0100	% LEL
I400		IRMethane	CH_4	0100	% Vol
I500		IRMethane	CH_4	0100	% UEG

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Type	Sensor Head Type SC	Gas Type	Formula	Meas. Range[1]	Unit
I500		IRMethane	CH_4	0100	% Vol
3480	P3480A	Propane	C_3H_8	0100	% LEL
I480	I3480A	IRPropane	C_3H_8	0100	% LEL
I480		IRPropane	C_3H_8	0100	% Vol
I580		IRPropane	C_3H_8	0100	% UEG
I580		IRPropane	C_3H_8	0100	% Vol
3440	P3440A	Hydrogen	H_2	0100	% LEL
3408	P3408A	Ammonia	NH_3	0100	% LEL
3485	P3485A	Acetone	$(CH_3)_2CO$	0100	% LEL
3430	P3430A	Benzene	C_6H_6	0100	% LEL
3425	P3425A	Ethyl alcohol	C_2H_5OH	0100	% LEL
3427	P3427A	Ethyl acetate	$CH_3COOC_2H_5$	0100	% LEL
3410	P3410A	Ethylene	C_2H_4	0100	% LEL
3460	P3460A	nButane	C_4H_{10}	0100	% LEL
3491	P3491A	nHeptane	C_7H_{16}	0100	% LEL
3435	P3435A	nHexane	C_6H_{14}	0100	% LEL
3482	P3482A	Isopropyl alcohol	$(CH_3)_2CHOH$	0100	% LEL
3498	P3498A	JP8*	JP8	0100	% LEL
3450	P3450A	Methanol	CH_3OH	0100	% LEL
3458	P3458A	Methyl ethyl ketone MEK	C_4H_8O	0100	% LEL
3470	P3470A	nOctane	C_8H_{18}	0100	% LEL
3475	P3475A	nPentane	C_5H_{12}	0100	% LEL
3490	P3490A	Toluene	C_7H_8	0100	% LEL
3448	P3448A	Butyl acetate	$C_6H_{12}O_2$	0100	% LEL
3415	P3415A	Cyclohexane	C_6H_{12}	0100	% LEL
3472	P3472A	Cyclopentane	C_5H_{10}	0100	% LEL
3420	P3420A	Ethane	C_2H_6	0100	% LEL
3468	P3468A	Isobutanol / Isobutyl alcohol	$C_2H_6O_2$	0100	% LEL
3473	P3473A	Methyl acetate	$C_3H_6O_2$	0100	% LEL
3495	P3495A	Nonane	C_9H_{20}	0100	% LEL
3402	P3402A	LPG	LPG	0100	% LEL
3496	P3496A	Petrol Vapours	Petrol	0100	% LEL
3497	P3497A	Styrene*	C_8H_8	0100	% LEL
3493	P3493A	Xylene	C_8H_{10}	0100	% LEL
3405	P3405A	Acetylene*	C_2H_2	0100	% LEL
I495		Acetylene	C_2H_2	0100	% UEG
I595		Acetylene	C_2H_2	0100	% UEG
C160		VOC	VOC	02000	ppm
2189		Ethylene	C_2H_4	01000	ppm
2125		Ammonia	NH_3	03000	ppm
2053		Xylene	C_8H_{10}	0300	ppm
D184		Sulphur hexafluoride	SF_6	01000	ppm
1199	E1199X	Ethylenoxid	C_2H_4O	010	ppm
1135	E1135X	Bromine	Br_2	02	ppm
1182	E1182X	Hydrogen fluoride*	HF	010	ppm
1192	E1192X	Nitrous oxide	N_2O	02000	ppm
1183	E1183X	Hydrogen cyanide	HCN	0100	ppm
1185	E1185X	Formaldehyde	CH_2O	010	ppm
1186	E1186X	Hydrogen chloride	HCL	020	ppm
1188	E1187X	Silane*	SiH_4	050	ppm

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Type	Sensor Head Type SC	Gas Type	Formula	Meas. Range[1]	Unit
1189	E1189X	Ethylene	C_2H_4	0200	ppm
1190	E1190X	Ozone	O_3	0200	ppm
1193	E1193X	Chlorine	CL_2	020	ppm
1196	E1196X	Sulphur dioxide	SO_2	0100	ppm
1197	E1197X	Hydrogen sulphide	H_2S	0200	ppm
1198	E1198X	Fluorine*	F_2	02	ppm
1187	E1187X	Phosphine*	PH_3	05	ppm
1194	E1194X	Hydrogen*	H_2	01000	ppm
1181	E1181X	Chlorine dioxide*	ClO_2	01	ppm
1147	E1147X	Phosgene*	$COCl_2$	01	ppm
2059		FR01*	R12	20 - 2000	ppm
2061	2061-XX	FR02	R23 R508b	20 - 2000	ppm
063	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
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 R143b	20 - 2000	ppm

*Not available yet

Different measuring ranges are possible, but not listed here
The use with the measuring range value: 1 results in a binary value output of the values 0 or 1

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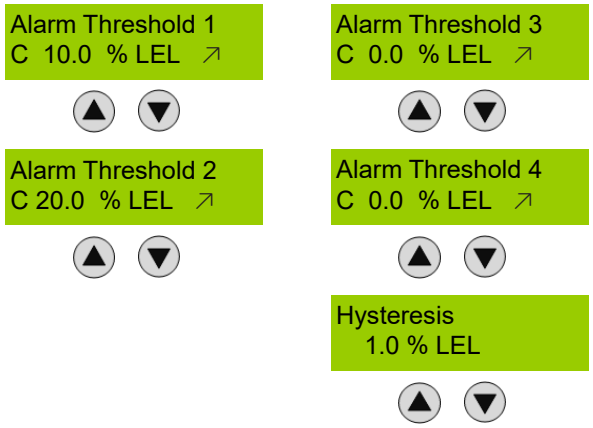
4.9.3 ALARM THESHOLDS/HYSTERESIS



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

Note:

Alarm evaluation: For monitoring flammable gases and oxygen, alarm evaluation via the average value (A) is not permitted. The type examination certificate according to EN60079-29-1 is only valid when the alarms are triggered by the current value (A) for the above-mentioned gases.

For each measuring point four 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 threshold plus hysteresis.

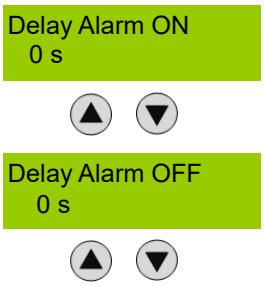
The presentation of the alarm thresholds depends on the set measuring range: See chapter Gas Type and Measuring Range.

The alarm thresholds are freely selectable in the range from 0 to 100 % of the measuring range.
The alarm threshold is only stored, if the value is ≥ the low-order alarm threshold.
Unused alarm thresholds have to be defined with 0, in order to avoid undesired alarms.
In case of a higher-level alarm the lower-level alarm remains triggered, too.
Lowest possible hysteresis: 3 % of the lowest alarm threshold
Highest possible hysteresis: 50 % of the lowest alarm threshold

4.9.4 DELAY FOR ALARM ON AND/OR OFF

Menu item (function) “Delay Alarm ON” is not available for ATEX device series

Symbol	Description	Default	Function
0 s	Delay Alarm	0 sec.	Gas concentration > alarm threshold + set time = Alarm ON Gas concentration < alarm threshold – hysteresis + set time = Alarm OFF



Function only active in Current Value Mode.

4.9.5 AVERAGE OVERLAY

The alarm evaluation of the operation mode “Average” is overridden by the current value, if this one exceeds the alarm threshold and delay time defined in the menu "System Parameters AV Overlay". The overlay is delayed by the time factor entered in the local menu. The function of the average overlay is only activated for the gas type CO.

Symbol	Description	Default	Function
No	Overlay of alarm release by current value	No	No = Average overlay not active. Yes = Average overlay active

4.9.6 LATCHING MODE ASSIGNED TO ALARM

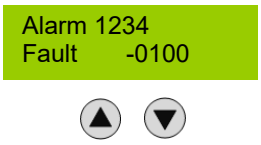
In this menu you can assign the latching mode to each alarm.

Symbol	Description	Default	Function
Alarm			Presentation of the alarms 1 to 4; under each alarm you can activate the latching with 1.
SBH	Assignment of latching function yes/no	0 0 0 0	0 = no latching; alarm resets automatically if gas concentration again < alarm threshold minus hysteresis 1 = latching; alarm remains active, if gas concentration < alarm threshold minus hysteresis, until reset by the operator.

4.9.7 MP FAULT ASSIGNED TO ALARM

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

Symbol	Description	Default	Function
Alarm			Presentation of the alarms 1 to 4; you can define with 1 for 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 isn't activated in case of MP fault. 1 = Alarm is activated in case of MP fault.

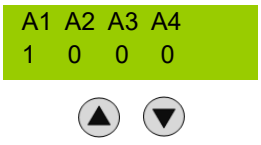


4.9.8 MP ALARM ASSIGNED TO ALARM RELAY

Each of the four alarms can be assigned to any alarm relay 1 – X 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 number of physically present alarm relays depends on the device type.

For ATEX rated devices there is only one alarm relay (address 1), the fault relay can also be used for alarm message (address 2). When doing so, the relay has to be registered in the menu Relay Parameters. The fault message function, however, remains unaffected.

Symbol	Description	Default	Function
Alarm	A1 A2 A3 A4		Presentation of the alarms 1 to 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) to an alarm



4.9.9 MP ASSIGNED TO ANALOG OUTPUT

Symbol	Description	Default	Function
X y	Address AO		X = Assignment of an analog output by entering the AO address Y = Assignment of a second analog output by entering the AO address

The measuring signal can be assigned to two analog outputs by entering the address of the analog output instead of x and y. The number of physically available analog outputs depends on the device type. If 0 is set here, there is no assignment and no output monitoring.

The analog outputs are configured in the menu System Parameters, AO Function.

4.10 MENU SYSTEM PARAMETERS

System parameters of the sensor heads can only be read, not changed.

System Parameters

Selection of the device, sensor head or basic device whose data should be processed.
AT-SC/MC = Sensor head

The display automatically recognizes the connected basic unit.

System Parameters
PX2

If the basic unit can manage more than one AT-SC/MC, the selection is done at X.
Only if AT-SC/MC is connected, the menu “Serial Number” will open.

System Parameters
SC

System Parameters
SC X

4.10.1 SYSTEM INFORMATION

Menu not shown for sensor heads (info only by laser engraving).

Serial Number
XXXX

Menu not shown for sensor heads (info only by laser engraving).

Date of Production
XX.XX.XX

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

4.10.2 MAINTENANCE INTERVAL

Input of the maintenance interval in days. If you enter < 10 days, the function is not active

The maintenance interval can be set on the basic unit for information on the connected analog inputs and iadjusted in each sensor head. 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 (at the analog input or at the head).

See the user manual of the corresponding device for individual maintenance

Symbol	Description	Default	Function
XXXX	Days	0	Maintenance interval

Maint. Interval
XXXX Days

4.10.3 AVERAGE FUNCTION

Menu not displayed with AT-SC sensor heads

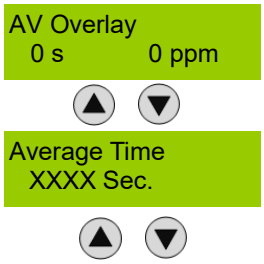
Value cannot be changed for AT-SC

In the menu “Average Time” you can define the time base 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 mode, the average value is indicated in the menu “Measuring Values” next to the current value

The alarm evaluation of the operating mode “Average Value” is overlaid by the current value, when the current value exceeds the alarm threshold defined in the menu “AV-Overlay”. The overlay is delayed by the time factor defined in this menu. The average overlay function is only available for the gas type CO

Both menus are available and operable in the basic device. The menu "Average Time" is also available in the sensor head for reading the time base

Symbol	Description	Default	Function
XXXX	Seconds	900	Time base for average calculation
0 s	Seconds	120	Delay time in case of overlay by the current value
0 ppm	Alarm Threshold	100	Alarm threshold that triggers the overlay by the current value



4.10.4 POWER ON TIME

Value can be read with sensor head AT-SC but cannot be changed

Gas sensors need a running-in period, until the chemical process of the sensor reaches stable conditions. During this running-in period the sensor signal can lead to an unwanted triggering of a pseudo alarm. Therefore, the Power On time is started at each basic unit and each sensor head after power-on or voltage recovery. While this time is running out, the device is in special mode and doesn’t activate alarms. The 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. On the AT-SC , the factory set maintenance intervals can only be read out

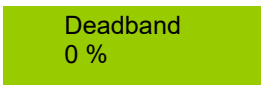
Symbol	Description	Default	Function
XX	Seconds	30	Power On time

4.10.5 DEADBAND

Menu not available for sensor heads AT-SC

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.

If the default value is 0, the suppression is switched off



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 dead band but still larger than -10 % of the measuring range, the measured value is displayed and the corresponding analog value is output. If the measured value is greater than -10 % of the measuring range, the fault message is triggered

The suppression also affects the analog output, because the measured value must not have a different display depending on the output

When the calibration mode is opened, the dead band function switches off automatically

4.10.6 AO FUNCTION

Menu not available for sensor heads AT-SC

This menu is for the configuration of the analog outputs. The number of physically available analog outputs depends on the device type (AT-MSC Max of 3 AT-MC Sensors)

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)

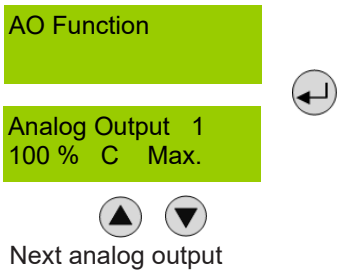
The analog output can be activated by the local device as well as by a higher-level controller. With the PX2 series, only the local control is possible

The steepness of the current signal can be adjusted in the range of 10 to 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) is output

If the 4 - 20 mA signal is used as a safe signal (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 - X
0 1 10- 100 %	Selection of output signal	100 %	0 = Analog output is not used, no monitoring of the feedback 1 = Control by central controller ≥ 10 = Local control and definition of the signal slope 10 = 10 % gas signal = 20mA (high sensitivity) 100 = 100 % gas signal = 20mA (standard signal) For PolyXeta®2, the fixed setting is 100 and cannot be changed.
C	Selection of source	A	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 For PolyXeta®2, the fixed setting is CF and cannot be changed.
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 For PolyXeta®2, the fixed setting is Max. and cannot be changed.

4.10.7 RELAY MULTIPLICATION

Menu only available for AT-DGC

With the relay multiplication table, it is possible to assign an additional alarm relay to an alarm. This corresponds in the end to one multiplication of the source alarm situation per entry

The additional relay follows the alarm status of the source but uses its own relay parameters to allow different needs of the doubled relay. So, the source relay can be configured, for example, as safety function in de-energized mode, but the doubled relay can be declared with flashing function or as horn function

There is a maximum of two entries for IN relays and OUT relays. Thus, it is possible, for example, to expand one relay to two others or to double max. two relays

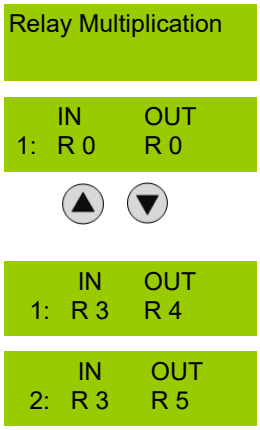
In the column IN (source), you can set the relay assigned to an alarm in the menu MP Parameter

In the column OUT (target), you can enter the relay needed in addition

Note:

Manual intervention in the menu Relay Status or override in external ON or OFF by external DI do not count as alarm status, so they do only affect the IN relay. If this is also desired for the OUT relays, it has to be configured separately for each OUT relay

Number	Description	Default Status	Function
0-5	IN AR Relay	0	0 = Function off X = Relay X should be multiplied (information source).
0-5	OUT AR Relay	0	0 = Function off X = Relay X (target) should switch together with IN relay.



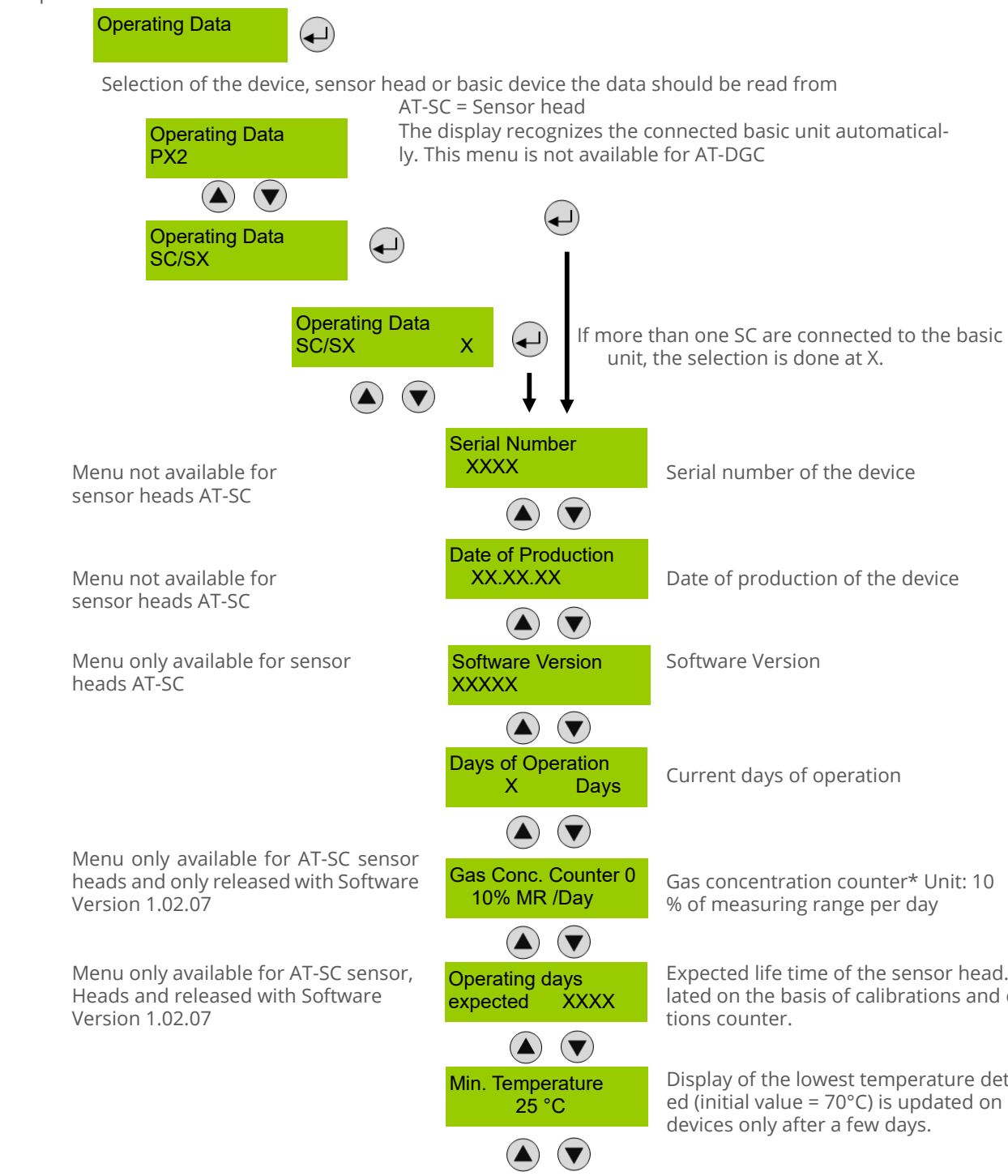
Example:
2 relay contacts are needed with the same effect as relay 3

Entry: 1: IN R3 OUT R4
Entry: 2: IN R3 OUT R5

If relay 3 is activated via an alarm, the relays R3, R4 and R5 will switch at the same time

4.11 OPERATING DATA

This menu is used to retrieve relevant operational data of the sensor head and the basic unit. No changes or interventions are possible



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	Max. Temperature 31 °C	Display of the highest temperature detected at the device With restart, value (initial value = -35°C) is updated only after a few days.
	Last Tool No.	Displays the tool number the last access was performed with
	Analog Outp. 1 Offset 295	Display the zero offset of analog output 1 (internal value)
	Analog Outp. 2 Offset 295	Display of the zero offset of analog output 2
Menu not available for and AT-SC sensor head.	Analog Inputs…… …X	Selection of analog input The operating data for analog input refer to the 4 – 20 mA signal!
Menu only available for AT-SC sensor head	Number of Calibr. 1	Number of calibrations performed
Menu only available for AT-SC sensor head	Zero xxxxx Gain yyyyy	Current zero offset and gain value (not standardized)
Menu only available for AT-SC sensor head	Sensitivity 100%	Sensitivity of the sensor at the last calibration compared to new sensor
Menu only available for AT-SC sensor head	Maintenance Days Last xxx	Display of the days differing from the nominal maintenance date (fixed value)
Menu only available for AT-SC sensor head	Days of operation Last xxx	Days of operation since the last calibration (fixed value)
Menu only available for AT-SC sensor head	Maintenance Days Currently xxx	Currently remaining days until next maintenance date (down counter)
Menu only available for AT-SC sensor head	Max. Current Value 0	Maximum measured current value of the sensor head

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4.12 TEST FUNCTION FOR RELAYS

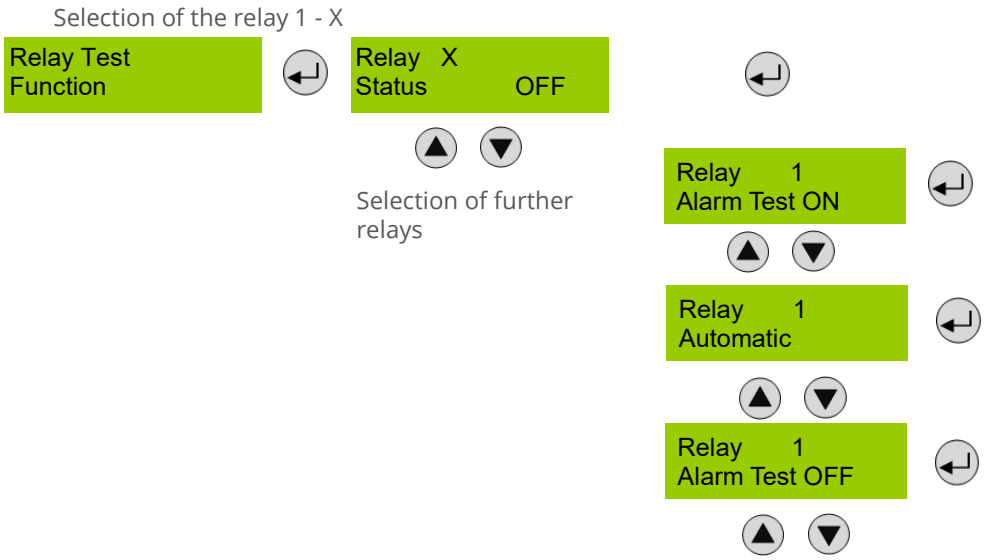
In this menu, the alarm relays can be manually turned on and off in order to test their function

This menu is only available in special mode and only for the locally controlled relays. The relays in remote mode must be tested from AT-DGC

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 deleted by selecting "Automatic" or by exiting the Special Mode

The testing is possible via code levels 1, 3 and 4.



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

4.13 TEST FUNCTION FOR ANALOG OUTPUT

In this menu, you can define a desired value in 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, 3 and 4
When the menu is exited, the actual current signal is immediately output again. The entry field shows 0 meaning test function inactive.
The test function is only possible for an active analog output

Analog Output Test Function	AO 1 Set Value 4.02 mA 0.00 mA	On the left you can see the current set-point as calculated from the gas concentration.
	AO 1 Set Value 4.02 mA 12.00 mA	Enter the required current under “Set Value”, e.g. 12 mA
	AO 1 Set Value 12.00 mA mA	 The set value is accepted as set-point (by displaying it on the left) and is physically output.

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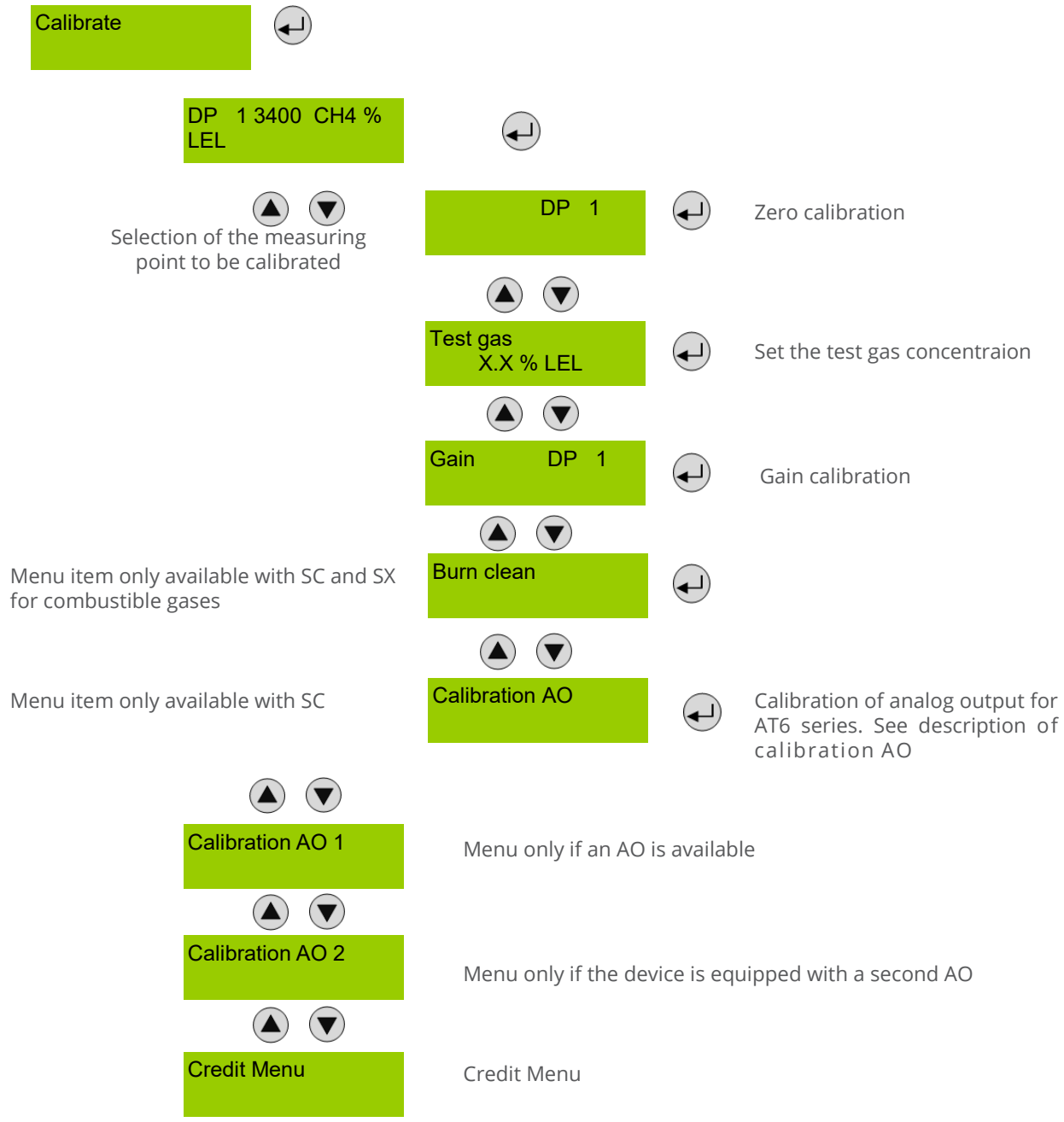
4.14 CALIBRATION

This is the menu overview of the calibration. The calibration description can be found on the following pages.



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4.14.1 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 operating instructions of the respective sensor head. The specified warm-up times etc. must be strictly observed.

Step 1: Display of the current value

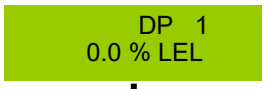
Apply test gas according to instructions.

Start calibration process.

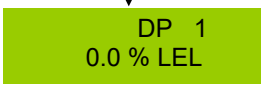
Step 2: Calculation of the new zero offset During calculation an underscore in line 2 runs from left to right and the current value drops to zero.

When the current value is stable, press for terminating the calculation of the new value.

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 occure:

Message	Description
Current value too high	Wrong gas for zero point calibration (>10 %)
Current value unstable	Is displayed as long as the deviation between two measuring cycles (100mS) 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.

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

4.14.2 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 operating instructions of the sensor head. The specified warm-up times etc. must be strictly observed.

Enter concentration of the test gas used
Special case Cross calibration for combustible gases: For combustible gases, a sensitivity factor related to methane is given in the operating instructions for each gas.The concentration of the methane test gas is multiplied by this factor (factor ZP). The product thereof is entered as test gas value
This value isn't cleared when exiting the menu, therefore before restarting calibration, always check if the value is correct

Step 1: Display of the current value and of the sensitivity from the last calibration

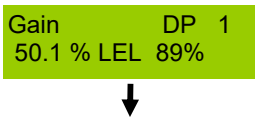
Apply test gas according to instructions

Start calibration process.

Step 2: Calculation of the new gain
During calculation an underscore in line 2 runs from left to right and the current value adapts to the set test gas concentration. The sesitivity is recalucated, too

When the current value is stable, press  for terminating the calculation of the new value

Step 3: Save the newly calculated gain
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.= Gain calibration is finished and new gain offset has been stored with success

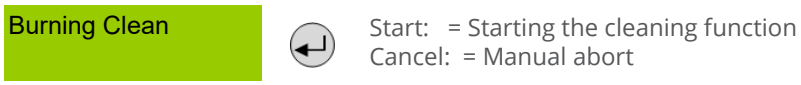
The display automatically goes to step 1: Display

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.
Interner Fehler	Internal , unrecoverable error Replace sensor head.

4.14.3 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 AT-SC and AT-SC Pellistor sensors.

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 operating 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.

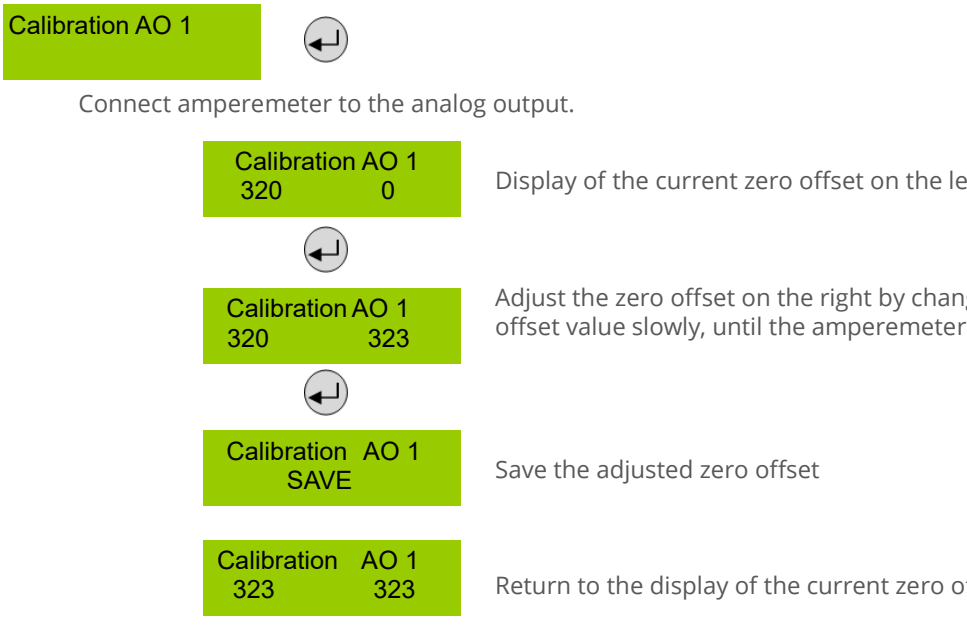
Note:

The cleaning cannot reverse or improve natural degradation

4.14.4 ZERO-POINT CALIBRATION OF ANALOG OUTPUT

With this menu item you can correct the zero-point of the analog output (4mA). The zero-point correction is only possible when the analog output is in active mode.

The error message of the output monitoring is suppressed as long as the menu Calibration AO is open. Therefore, connect the amperemeter (measuring range 20 mA DC) to the analog output only after having opened the menu



4.15 ADDRESSING

Addressing

Assignment of the basis slave address of the device for field bus operation

Set Address
4

Define the basis slave address

The data of the sensor head (AT-SC) assigned at input 1 are sent with this basis slave address to the gas controller via the fieldbus.
The base unit requires / occupies a slave address for each connected sensor head. In the next menu, you can enter the number of occupied addresses. When the number is > 1, the address(es) following the basis address is / are automatically occupied.

If an address is assigned, it is displayed in the menu Measurement Values next to the letter D (digital measuring point).

MP Mode
active bus

Define the MP mode.

Symbol	Description	Default	Function
active	MP mode	inactive	active = Measuring point is activated on the device. inactive = Measuring point is not activated on the device.
bus	Connection mode	bus	bus = Measured value comes from the connected SC. analog = Measured value comes from 4 – 20mA input.

Selection gas type and range

Nom. / Gas / Unit
1110 CO ppm

Define gas type.

Meas. Range
300 ppm

Define measuring range.
See 4.9.2

Config. DP X
not available

If the number of addresses is less than the number of possible measurement points, the remaining measuring points are displayed as ‘not available". No intervention is possible here

AquiTron

AT-MSR-PT
Hand Held Service Tool

4.16 HARDWARE CONNECTIONS

The AT-MSR-PT is a versatile tool for the programming, calibration and troubleshooting . To function properly, it must be attached onto the specific products with the corresponding keyed plugs. Observe the connection types below and make sure that the components are correctly and firmly latched before attempting any operation outlined in this manual.

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5 NOTES AND GENERAL INFORMATION

For the installation and the use, it is important to read the user manual carefully. The AT-MSR Range may only be used for applications in accordance to the intended use. The appropriate operating and maintenance instructions and recommendations must be strictly followed.

5.1 INTENDED PRODUCT APPLICATION

The system is designed and manufactured for control applications, for energy savings and air quality compliance in commercial buildings and manufacturing plants.

5.2 INSTALLERS RESPONSIBILITIES

It is the installer's responsibility to ensure that the system is installed in compliance with all national and local regulations and requirements. All installation shall be undertaken by technicians familiar with proper installation techniques and with codes, standards and safety procedures for controlled installations.

The equipotential bonding required (also e.g. secondary potential to earth) or grounding measures must be carried out in accordance with the project requirements. It is important to ensure that no ground loops are formed to avoid unwanted interference in the electronic measuring equipment.

It is also essential to follow strictly all instructions as provided in the user manual.

5.3 MAINTENANCE

We recommend checking the system regularly. Due to regular maintenance differences in efficiency can easily be corrected. Re-calibration and replacement of parts can be conducted on site by a qualified technician with the appropriate tools.

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