



Gasmess-Systeme GmbH

Instruction Manual

*ExTox* Control Units

ET-2D Series

## Foreword

We thank you very much for your confidence in our products and us, the ExTox Gasmess-Systeme GmbH.

The Control Units of the Series ET-2D as well as all other ExTox-Products and services stand for our high quality targets. Our business is the health protection of mankind, protection of the environment and installations. We are glad to take this responsibility. Our Quality Management System therefore follows ISO 9001 and our Production Monitoring is to keep the European Directives 2014/34/EU ("ATEX"). You profit of the high reliability due to modern sensor techniques and consequent interpretation acc. to the requirements of the regulations and standards valid for industrial application

The Control Units of the Series ET-2D are a compact and easily understandable system for up to two transmitters which covers also complex monitoring tasks. By means of their interfaces they are easy to integrate even in higher control and management systems. They could be used in combination with all ExTox Transmitters ExSens and Sens.

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BA\_ET-2D\_2017-05-16\_e.docX, Rev.: 16.05.2017

Software version ET-2D: REV170331

(Subject to technical changes)

## Content

1	Introduction.....	5
2	Features of the Control Units.....	6
3	Basic Functions .....	7
3.1	Operator Interface .....	7
3.2	Indication of measured values.....	7
3.3	Quit an Alarm .....	7
4	Operation of the Control Unit.....	8
4.1	Measuring Mode.....	8
4.2	Deactivation of Channel .....	8
4.3	Triggering of Alarms .....	9
4.3.1	Alarms of Channels 1 and 2.....	9
4.3.2	Alarm Smoke Detector.....	10
4.3.3	Quit an Alarm .....	10
4.4	Under-Scale and Over-Scale of Measuring Range .....	11
4.5	Fault .....	12
4.5.1	Fault at Channels 1 and 2.....	12
4.5.2	Fault Smoke Detector .....	12
4.6	Fault Control Unit.....	12
4.7	Maintenance Mode Control Unit .....	13
4.8	Programme Run Monitoring (Watchdog) .....	14
4.9	Initialisation (Start-up of System) .....	14
4.10	Analogue Outputs 4...20 mA/0...10V (only types with Option <u>A</u> ).....	14
4.11	Digital Inputs .....	14
4.12	Data Logger (only types with Option <u>D</u> ).....	14
5	Configuration of Control Unit .....	15
5.1	Configuration.....	17
5.1.1	Channel Configuration .....	17
5.1.2	Relay Configuration .....	19
5.1.3	Switching between Smoke Detector and digital inputs .....	21
5.1.4	Analogue Outputs .....	22
5.1.5	Digital Transmitter with serial Data transfer.....	22
5.2	Adjustment .....	23
5.2.1	Adjustment of 4...20 mA-Analogue-Transmitters .....	23
5.2.2	Adjustment of analogue outputs.....	24
5.3	System parameter .....	25

---

5.3.1	Time/Date.....	25
5.3.2	Settings for Control Unit Times.....	26
5.3.3	Settings for serial Interfaces.....	27
5.3.4	Data logger (only types with data logger hardware extension).....	28
5.3.5	Settings for the Display.....	28
5.3.6	Memory test.....	29
5.4	Maintenance.....	30
5.5	Fault Memory.....	31
5.6	Language.....	32
6	Application.....	33
6.1	Measuring Function.....	33
6.2	Use in combination with hazardous areas.....	33
7	Installation.....	34
7.1	Mechanical Installation.....	34
7.2	Electrical Installation.....	34
7.3	Smoke Detector.....	35
8	Maintenance of Gas Detection Systems.....	36
8.1	Basic Information.....	36
8.2	Visual Check.....	36
8.3	Functional Check.....	36
8.4	System Check.....	37
9	Options.....	37
10	Technical Data and Declaration of Conformity.....	37
	Annex: Protocol of serial data transfer.....	38

## 1 Introduction

This Instruction Manual generally describes operation, installation and maintenance of the following ExTox-Products:

Article-No.	ET-2D	ET-2DA	ET-2DD	ET-2DE	ET-2DAD	ET-2DAE	ET-2DDE	ET-2DADE
Wall mounted, 230 V AC	308000	308002	308004	308006	308008	308010	308012	308014
Wall mounted, 24 V DC	308001	308003	308005	308007	308009	308011	308013	308015
DIN-Rail, 24 V DC	308020	308021	308022	308023	308024	308025	308026	308027
DIN-Rail, 230 V AC	Type for 24 V DC + Power supply (Article-No. 940487)							

Type specific data for each device should be taken from a corresponding separate and specific Data Sheet. This Data Sheet forms consequently part of this Instruction Manual. References on the Data Sheet within this text are marked with  $\varnothing$  DB.

Please read this Instruction Manual carefully before installation and initial operation of the control unit. We kindly ask you to pay attention to all details and cross-references.

We kindly ask you not to repair the control unit or to perform any changes which go beyond the measures described herein. Otherwise you endanger your own safety and your warranty claims of merchantability. In such cases please contact ExTox or authorised ExTox Service Partner. Third parties take the responsibility for correct performance of work if maintenance and repairs are done by them.

On receipt of goods please take care that packing and consignment are not damaged and the goods supplied correspond to the articles described in the delivery note. Please do also compare with your order. In case of any damage please inform your forwarding agent and your supplier. Please keep the damaged packing.

Please keep in mind that control units are sensitive measuring devices and take special care when unpacking and installing them.

## 2 Features of the Control Units

Concentrations of flammable and toxic gases as well as of oxygen are centrally evaluated by the Control Units of the ET-2D series after measuring them safely with our ExTox transmitters. The Control Units could be combined with all ExTox-Transmitters ExSens and Sens.

The control units are available in wall mounted housing and for DIN-Rail installation. The power supply can flexibly be done with 230 V AC or 24 V DC. On request, we could supply you with corresponding uninterruptible power supplies for our control units.

The control units in combination with ExTox transmitters comply with EN 60079-29-1, EN 45544 and EN 50104 for gas detection systems. Furthermore, they are in conformity with the European Directives 2014/34/EU (ATEX), 2014/30/EU (EMC) und 2014/35/EU (LVD).



Fig. 1: ET-2D in Wall mounted housing

- 2 input channels for transmitter (4-20 mA, three-wire system)
- Line for up to 2 smoke detectors (Art.-No. 297000)
- Menu controlled configuration without further tools needed
- Illuminated graphic display for indication of measured values, messages and alarms
- LED-indication for alarms, operation, channel fault, device fault and service mode
- 2 freely adjustable alarm levels per channel (ascending, descending), latching configurable
- service mode, horn reset and re-triggering of alarms
- 5 relay outputs, potential free, freely configurable
- 2 relay outputs, potential free, for indication of device fault and activated service mode
- Extensions:
  - ET-2DA: 2 analogue outputs 4...20 mA, not isolated
  - ET-2DD: integrated Data logger
  - ET-2DE: connection to Ethernet-Network
- 2 Digital inputs, potential free (for smoke detectors)
- RS 232- and RS 485/RS422-Interface for data transfer of all measured values and status messages (Options: ProfiBus, ProfiNet, ModBus, ...)
- Measuring function for explosion protection: in conformity with Directive 2014/34/EU (ATEX)  $\text{CE} \text{ Ex II (3)G}$

### 3 Basic Functions

#### 3.1 Operator Interface

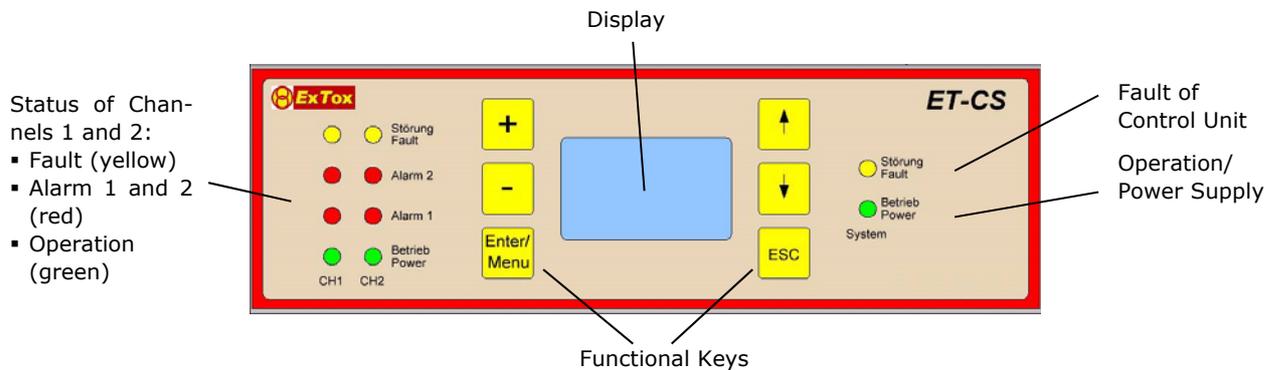


Fig. 2: Operator Interface ET-2D

Illumination of display is switched on by pressing any functional key. It turns off automatically after an adjustable waiting period, in case you do not press any key.

#### 3.2 Indication of measured values

The indication of measured values is automatically displayed after switching on the ET-2D and course of run-in-period.

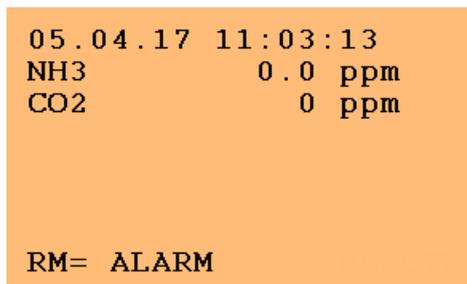


Fig. 3: Indication of measured values (Path: MEASURED VALUES)

During normal operation the displays indicates:

- Line 1: Date (dd.mm.yyyy) and time (hh:mm:ss)
- Line 2: Measuring channel 1 including gas type, actual measured value and measurand
- Line 3: Measuring channel 2 including gas type, actual measured value and measurand
- Line 8: RM: OK or ALARM (only on activated smoke detector function)

You can switch from this indication of measured values to the menu for configuration (see Chapter 5) via functional key . Pressing the functional key  several times always leads back to the indication of measured values.

#### 3.3 Quit an Alarm

For quitting an alarm the following key combinations are available.

 and 	Quit a latching alarm (Channels 1 and 2, if the alarm condition is no longer present)
 and 	Quit all acoustic messages, i. e. horn reset. (Relays K1 to K5, if configured as reset-able, see chapter 5.1.2)
 and 	Quit of a smoke detector alarm (If the alarm condition is no longer present)

## 4 Operation of the Control Unit

In the following chapters the features which especially mark the operating modes are emphasized by bold print.

### 4.1 Measuring Mode

There are no faults and alarms. The measured value is within the range of 0 % to 100% of end value of measuring range.

<u>Status-LEDs Channel 1/2</u>	
Fault channel (yellow):	off
Alarm 1, 2 (red):	off
Operation Channel (green):	on, if channel activated
<u>Status-LEDs Control Units</u>	
Fault Control Unit (yellow):	off
Operation Control Unit (green):	on
<u>Display</u>	
Measured value:	actual measured value (0 to end of measuring range)
<u>Relays</u>	
K1 to K5:	not triggered
K6 (device fault):	closed
K7 (Maintenance):	closed

### 4.2 Deactivation of Channel

A channel can temporarily be taken out of monitoring, for example if works on the transmitter have to be performed which might lead to false alarms. Deactivation and later reactivation can be performed by means of channel configuration. (see Chapter 5.1.1)

*Attention:* This function should only be used if a gas hazard can definitely be excluded, e. g. by using a portable gas detector.

<u>Status-LEDs Channel 1/2</u>	
Fault channel (yellow):	off
Alarm 1, 2 (red):	off
Operation Channel (green):	<b>off</b> , on deactivated channel
<u>Status-LEDs Control Unit</u>	
Fault Control Unit (yellow):	off
Operation Control Unit (green):	on
<u>Display</u>	
Measured value:	actual measured value (0 to end of measuring range)

### Relays

K1 to K5:	not triggered
K6 (device fault):	closed
K7 (Maintenance):	closed

## 4.3 Triggering of Alarms

### 4.3.1 Alarms of Channels 1 and 2

A configured alarm level is triggered on minimum one channel.

If the alarm is configured as latching, it has to be reset manually in case the alarm condition is no longer present. Non latching alarms disappear automatically in case the alarm condition is no longer present.

In case a relay has been configured as reset-able (Horn relay) – see Chapter 5.1.2 -, it can be quit even if the alarm condition is still present. In general this function may only be used for acoustical messages such as for example horn, buzzer.

### Status-LEDs Channel 1/2

Fault Channel (yellow):	off
Alarm 1, 2 (red):	<b>on, for triggered alarms</b>
Operation Channel (green):	on, if channel is activated

### Status-LEDs Control Unit

Fault Control Unit (yellow):	off
Operation Control Unit (green):	on

### Display

Measured Value:	actual measured value (0 to end of measuring range)
-----------------	---

### Relays

K1 to K5:	<b>triggered, if alarm condition contains active alarms</b>
K6 (device fault):	closed
K7 (maintenance):	closed

### 4.3.2 Alarm Smoke Detector

The optical smoke detector DP721R (Art.-No. 297000) can be connected to the ET-2D. The smoke detector has to be activated in configuration (see Chapter 5.1.3).

*Attention:* Before connection of a smoke detector additionally jumper settings on the electronic PCB have to be performed. These have already been performed factory sided in case the purchase order also included the configuration of smoke detectors. In case an existing gas detection system should be converted, please contact the ExTox-Service.

Alarms triggered by the smoke detector are always latching due to the internal connection.

<u>Status-LEDs Channel 1/2</u>	
Fault Channel (yellow):	off
Alarm 1, 2 (red):	off
Operation Channel (green):	on, if channel activated
<u>Status-LEDs Control Unit</u>	
Fault Control Unit (yellow):	<b>on</b>
Operation Control Unit (green):	on
<u>Display</u>	
Measured value:	<b>RM=ALARM</b>
<u>Relays</u>	
K1 to K4:	not triggered
<b>K5:</b>	<b>triggered</b>
K6 (Control unit fault):	closed
K7 (Maintenance):	closed

### 4.3.3 Quit an Alarm

Non latching alarms disappear automatically in case the alarm condition is no longer present.

Latching alarms and the alarm of the smoke detector can only be quit in case the alarm condition is no longer present.

Setting of latching / non-latching alarms is performed in the menu channel configuration, see Chapter 5.1.1.

 and 	Quit a latching alarm (Channels 1 and 2, if the alarm condition is no longer present)
 and 	Quit all acoustic messages, i. e. horn reset. (Relays K1 to K5, if configured as reset-able, see chapter 5.1.2)
 and 	Quit of a smoke detector alarm (If the alarm condition is no longer present)

#### 4.4 Under-Scale and Over-Scale of Measuring Range

The measured value is within the range below 0 % and above 100% of end value of measuring range.

In the field of gas detection slight under-scale of measuring range is not completely avoidable due to deviations caused by changing operating conditions and drift. Measures for correction of zero point should only be taken in case under-scale of measuring range exceeds permanently appr. 5 % of end value of measuring range.

In case of Over-Scale of measuring range due to high gas concentrations corresponding maintenance measures for the individual transmitter should be taken on short notice, e. g. calibration and adjustment.

*Attention:* For transmitters based on the measuring principle catalytic combustion and semiconductor the sensor signal might fall again into the measuring range due to the suppression of oxygen at very high concentrations of flammable gases. When using ExTox-Transmitters nevertheless safe measurement is ensured. In case of Over-Scale of measuring range the indication of measured value remains at the end value of measuring range, even in case the transmitter signal falls again. The indication of measured values and alarm indication are not updated until quit of alarm has been performed according to Chapter 4.3.1.

In any way please check before quitting the alarm that the gas concentration is really below the alarm levels again.

##### Status-LEDs Channel 1/2

Fault channel (yellow):	off
Alarm 1, 2 (red):	on, for triggered alarms
Operation Channel (green):	on, if channel activated

##### Status-LEDs Zentrale

Fault Control Unit (yellow):	off
Operation Control Unit (green):	on

##### Display

Measured value:	<b>actual measured values in the range &lt; 0 or end value of measuring range</b>
-----------------	---

##### Relays

K1 to K5:	triggered, if alarm condition contains activated alarm
K6 (Fault control unit):	closed
K7 (Maintenance):	closed

## 4.5 Fault

### 4.5.1 Fault at Channels 1 and 2

Reason for a channel fault might in general be a transmitter fault, interruption of transmitter power supply, interruption or short circuit of transmitter cable.

The input current of the channel is outside the limits fixed in ET-2D , i. e. the (un-processed) transmitter input current is below 1.5 mA or above 21.5 mA.

If the channel fault is configured as latching, it has to be reset manually in case the alarm condition is no longer available (see Chapter 5.1.1).

#### Status-LEDs Channel 1/2

Fault Channel (yellow): **on for the respective channel**

Alarm 1, 2 (red): on, for triggered alarms

Operation Channel (green): on, if channel activated

#### Status-LEDs Control Unit

Fault Control unit (yellow): off

Operation Control Unit (green): on

#### Display

Measured value: **0 or end value of measuring range**

#### Relays

K1 to K5: triggered, if alarm condition contains activated alarms

K6 (Fault control unit): closed

K7 (Maintenance): closed

### 4.5.2 Fault Smoke Detector

A fault of the smoke detector is indicated in case of cable break or removing the smoke detector from the socket. The ET-2D behaves like in case of alarm (see Chapter 4.3.20) with the exception that the message disappears automatically in case the fault is no longer present.

## 4.6 Fault Control Unit

A fault of Control Unit is indicated in case one of the activated components shown on Picture 4 signalise fault. (1) indicates the activated status and (0) the deactivated status.

```

===== FAULTRELAYS =====
> TRANSMITTER      = 0
  POWER SUPPLY     = 1
  POWER SUPPLY     = 0
  CHECKSUM ERROR= 1
  DATALOGGER      = 0
  
```

Fig. 4: Fault relay (Path: MEASURED VALUES > SETUP > CONFIGURATION > RELAYCONFIGURATION > FAULTRELAY)

In the basic settings faults of power supply (power=1) and memory (memory fault =1) trigger a fault of control unit.

*Attention:* the reaction on fault of control unit and faults of single transmitters differ in many safety concepts. Due to this transmitter fault is not activated in the basic settings of ET-2D, different from Picture 4. Please make sure that both types of messages are suitably processed in your safety concept. The transmitter fault can be indicated via one of the freely adjustable relays or subsequently be included in the fault of control unit by means of activation.

The control unit tries to continue normal operation, especially messages and relays are not reset (except from relay K6). But it cannot be excluded that the control unit may adapt undefined states depending on cause of fault.

The fault of control unit is non-latching, that means the control unit continues normal operation in case of return to the admissible voltage range or in case of faultless passing the fault check.

Please check the power supply of the device. In case of a memory fault please contact the ExTox-Service.

*Attention:* Please keep in mind that in case of a fault of control unit not all relays are resetted. Please include the relay Fault Control Unit (K6) suitably into your safety concept so that a loss of safety function is recognized.

Status-LEDs Channel 1/2

Fault Channel (yellow):                    **on for the respective channel**

Alarm 1, 2 (red):                         on for triggered alarms

Status-LEDs Control Unit

Fault Control Unit (yellow):            **on**

Relays

K6 (Fault control unit):                 **open**

(With the exception of the described reactions the system status can be undefined.)

#### 4.7 Maintenance Mode Control Unit

The Control Unit ET-2D can be switched into maintenance mode. Activation and settings are described in Chapter **Fehler! Verweisquelle konnte nicht gefunden werden..**

*Attention:* In maintenance mode there is no evaluation of alarms and faults.

Status-LEDs Channel 1/2

Fault Channel (yellow):                 off

Alarm 1, 2 (red):                         off

Status-LEDs Control Unit

Fault Control Unit (yellow):            off

Operation Control Unit (green):       **blinking**

Relays

K1 to K5:                                    open

K6 (Fault Control Unit):                open

K7 (Maintenance):                        open

#### 4.8 Programme Run Monitoring (Watchdog)

The control unit disposes of a programme sequence monitoring by means of a Watchdog element working independently. In case this watchdog recognizes an interruption of the regular course it triggers a reset of the control unit. Then the initialisation (see Chapter 4.9) is passed.

If the control unit does not enter normal operation again after reset, please contact the ExTox-Service.

#### 4.9 Initialisation (Start-up of System)

After connecting the control unit to the power supply it is passing an initialisation phase. The company name, the Internet Address of ExTox as well as the installed software version are indicated on the start screen for 120 seconds. The remaining time until starting normal operation a countdown running downwards is displayed.

#### 4.10 Analogue Outputs 4...20 mA/0...10V (only types with Option **A**)

A current corresponding to the transmitter measured value after passing the evaluation of measured values in the control unit is issued at the analogue outputs as long as it is in the range of 4 to 20 mA. Lower and/or bigger transmitter input currents are indicated at the analogue outputs of the control unit on 4 and/or 20 mA (0...10V).

Please pay attention to the fact that the output current must not correspond to the input current of the transmitter due to the evaluation of measured values.

*Attention:* The 4...20 mA-outputs are activated as standard. Before changing to the output of 0...10 V-Signals additionally jumper settings on the electronic PCB have to be performed. These have already been performed factory sided in case the purchase order also includes the configuration of the outputs. In case an existing gas detection system should be converted, please contact the ExTox-Service.

#### 4.11 Digital Inputs

The digital inputs D1 and D2 are normally without function, if they are not configured for connection of smoke detectors (see 5.1.3). They can be used for customer specific requirements (special software). On demand please do not hesitate to contact ExTox.

#### 4.12 Data Logger (only types with Option **D**)

The data logger disposes of an USB-Port, which serves for an USB-stick and/or SD-Card-Adapters. The USB-Port is located inside the housing lid for wall mounted types and at the right side of the control unit for DIN-Rail types.

All relevant operating data is stored as data set on the storage medium in intervals of 10s.

*Attention:* In order to start data recording the requested settings have to be configured in the menu Data Logger. Before removing the SD-card the STATUS has to be changed to OFF in order to avoid possible loss of data.

All data is stored in files per day named CSyymmdd.DAT (for example CS160122.DAT for the 2016-01-22).

## 5 Configuration of Control Unit

The ET-2D disposes of a multiplicity of configuration possibilities which enable an individual adaptation to the corresponding measuring task. This chapter describes how to change configuration parameters and its functions.

Picture 5 shows the Setup-Menu. Out of this menu you get into all submenus of the menu structure.

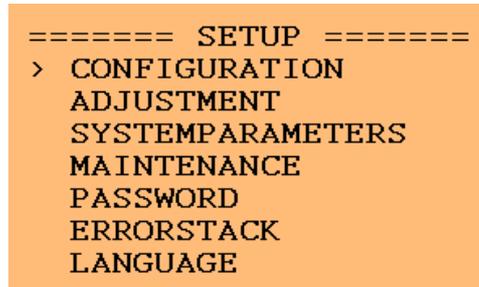


Fig. 5: survey on setup menu structure (Path: MEASURED VALUES > SETUP)

### Basic Function of the configuration menu

Out of the indication of measured values you can switch by means of functional key  to the menus belonging to configuration of parameters. Pressing the functional key  several times always leads back to the indication of measured values.

Navigation in and between the menus as well as changing of parameters is done via the six functional keys of ET-2D.

Some of the functional keys dispose of a repeat function, that means when pressing them for a longer time value ranges and selected lists are run through faster.

	<ul style="list-style-type: none"> <li>▪ Access to menu of configuration and its submenus</li> <li>▪ Confirmation/storing of changes in parameters: In case changes are stored successfully "!!! STORE PARAM !!!" is indicated in the first line of the display for a short time.</li> </ul>
 	<ul style="list-style-type: none"> <li>▪ Navigation of the cursor in the menus</li> </ul>
 	<ul style="list-style-type: none"> <li>▪ Change of parameters</li> <li>▪ Change between parameter options in select lists</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Leave menu: by pressing the key several times you always get back to indication of measured values</li> </ul>

During navigation in the menus and configuration of parameters evaluation of measured values, alarms and faults is continued, that means the safety function remains unimpaired.

### Password Release

The control units dispose of three password protected Access Levels which are protected by four figure combinations ("password"). Without password release the settings could only be read, but not changed.

The passwords for all three levels are recorded on the test certificate which is added to the documentation of your control unit. Please make sure that the passwords are only handed over to the allowed persons.

Level	Rights	Access via Menu
none	Indication of all parameter settings, memory tests, system voltage, analogue inputs <ul style="list-style-type: none"> <li>▪ Quitting of alarms</li> <li>▪ Reset of horn relay</li> <li>▪ Change of language for indication on display</li> </ul>	-
1	<ul style="list-style-type: none"> <li>▪ Setting of Date and Time</li> </ul>	Password
2	<ul style="list-style-type: none"> <li>▪ Configuration of channels</li> <li>▪ Activation of maintenance mode</li> <li>▪ Selection of Language</li> </ul>	Password
3	<ul style="list-style-type: none"> <li>▪ Configuration of Channels and Smoke detector function</li> <li>▪ Configuration of relays</li> <li>▪ Adjustment of Channels</li> <li>▪ Setting of system parameters</li> </ul>	Password

In order to release one level you have to enter the menu UNLOCK PASSWORD (Fig. 6) by means of the functional keys.

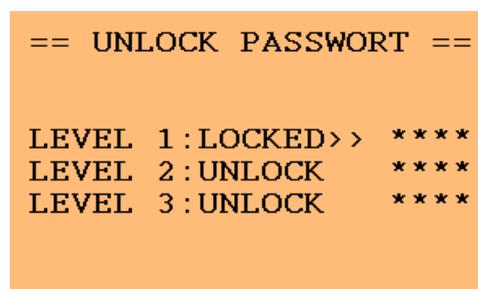


Fig. 6: Password release (Path: MEASURED VALUES > SETUP > PASSWORD)

- There you have to move the cursor (>>) via functional key  to the requested access level.
- Entering the password can only be done by pressing the keys  (1<sup>st</sup> digit),  (2<sup>nd</sup> digit),  (3<sup>rd</sup> digit) and  (4<sup>th</sup> digit) several times.

Note: only the actual set figure is indicated in the display. All other positions show "\*" to ensure confidentiality.

- After all four figures have been entered correctly please use the key  in order to switch to another access level. On doing this the entered password is checked and in case of a positive result the indication changes from "locked" to "free".
- By means of key  the menu *Password release* is left and all requested settings can be performed in the different menus.

In case there is no selection or setting done at the control units for ca. 10 minutes the Access Level is automatically locked again.

### General Notes

The menus are described in detail in the following submenus. The figure shown before indicates the corresponding display. The following information is indicated in the tables of each submenu for each parameter:

- Menu text: Denomination in the menu on the display
- Selection: setting options for the parameter
- Function: Description of the effects on the behaviour of the control unit.

## 5.1 Configuration

```
==== CONFIGURATION ====
> CHANNELCONFIG.
  RELAYCONFIGURATION
  SMOKE DETECTOR
  ANALOG OUTPUTS
  SERIAL TRANSMITTER
  ET-2D
```

Fig. 7: Configuration (Path: MEASURED VALUES > SETUP > CONFIGURATION)

### 5.1.1 Channel Configuration

```
===== > CHANNEL1 =====
GAS   :      NH3
DIM   :      ppm
D.P.  :      0.0 TR : A
RANGE:      50.0 HYS: 0
A1    :      20.0 CM1: 0
A2    :      40.0 CM2: 0
MODE  :      ON  CMF: 0
```

Fig. 8: Channel Configuration (Path: MEASURED VALUES > SETUP > CONFIGURATION > CHANNELCONFIG.)

Access Level to perform changes of the parameter settings: 2 and 3

Menu text	Selection	Function
CHANNEL	1 or 2	Selection of channel to be configured.
GAS	List	The chemical totals formula and/or short term belonging to the measured gas. It is indicated during measuring operation when showing the measured value.
DIM	ppm, %(v/v), %LEL	Unit for the measuring range. It is indicated during measuring operation when showing the measured value.

Menu text	Selection	Function
DP	0, 0.0	It is fixed whether the measured value is displayed with decimal point.  <i>Attention:</i> The change of this parameter affects also the settings of end value of measuring range and alarm levels.
RANGE	0.1 to 5000.0, 1 to 50000	Fixes the end value of measuring range.  <i>Attention:</i> Please pay attention to the correct selection of the measuring range. In order to allow flexible adjustment even for special measuring tasks no plausibility checks are integrated, e. g. limitation to 100 for dimensions % LEL.
AL1, AL2	0 to End value of measuring range (MBE)	Fixes the two alarm levels and the direction of exceeding for triggering of alarms.  a. Values of alarm levels are in <i>ascending</i> order ( $0 \leq AL1 < AL2 \leq MBE$ ): alarms are triggered on <i>exceeding</i> .  b. Values of alarm levels are in <i>descending</i> order ( $MBE \geq AL1 \geq AL2 \geq 0$ ): alarms are triggered on <i>under-run</i> .  If you use the Adjustment Function of the control unit (see 5.2.1) please pay attention to the remarks for selection of alarm levels described therein.
MODE	ON, OFF, (TIMER)	Switches on or off the evaluation of channel. The status is indicated by means of the status LED operation during measuring operation. (On = green LED on, Off = green LED off)
TR	A or D	A: Analogue 4...20 mA-Transmitter, for example ExTox ExSens/Sens. Connection to clamps CH1/CH2 (25 to 32).  D: ExTox-Transmitter/sensor with serial digital data transfer: connection to COM1.  <i>Attention:</i> For ExTox-Transmitters of the ExSens and Sens Series you have to choose setting A. Setting D is subject to future applications.

Menu text	Selection	Function
HYS	0 to 5	<p>Fixes the alarm hysteresis in percent of the end value of measuring range. A non-latching alarm expires only when it is around the value of hysteresis below the alarm level. This function serves for prevention of permanent repeating of alarm triggering due to slight variations of measured values around the alarm level.</p> <p>Example: Measuring range 100 ppm, Hysteresis 3 %, Alarm level 10 ppm. The alarm does not expire until 7 ppm is under run.</p> <p>Standard setting: 0 %</p> <p><i>Attention:</i> combination of low alarm levels with too high hysteresis values may lead to a very late reset or even non-reset of alarms.</p>
SH1, SH2, SHF	0 or 1	<p>Indicates whether the alarm/fault is latching (1) or non-latching (0).</p> <p>A non-latching alarm/fault stops if the alarm condition is no longer present. Please keep in mind the alarm hysteresis (see above). A latching alarm has always to be reset manually.</p> <p>Standard setting: SH1=0, SH2=1, SHF=0.</p> <p><i>Attention:</i> In general at least Alarm level 2 has to be latching in all common safety concepts. Changing the standard settings for Alarm level 2 should only be considered if function of latching for this alarm has already been realised in the downstream periphery.</p>

### 5.1.2 Relay Configuration

RELAY	1	2	3	4
MODE	>+	+	+	+
RESET	0	1	0	1
A1 . 1	1	0	0	0
A2 . 1	0	1	0	0
A1 . 2	0	0	1	0
A2 . 2	0	0	0	1
F	0	0	0	0

Fig. 9: Relay Configuration (Path: MEASURED VALUES > SETUP > CONFIGURATION > RELAYCONFIGURATION)

Access level to perform changes of parameter settings: 3

In this menu the triggering conditions for the five freely configurable relays K1 to K5 of ET-2D can be configured.

*Note:* Information on safety-related design of relay wiring and configuration can be taken from our ExTox-Homepage.

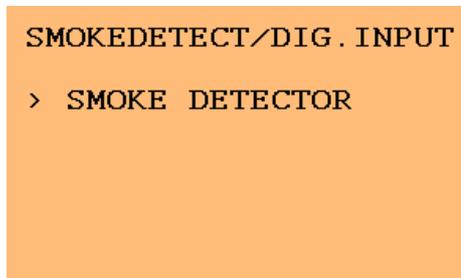
Menu text	Selection	Function
RELAIS	1 to 5	<p>The parameters of the corresponding relay are indicated in the column below the number of relay.</p> <p><i>Attention:</i> When activating the smoke detector the relay K5 is fix related to its alarm(MODUS=0, RESET=0). Settings for relay K5 in this menu are not effective.</p>
MODE	-, +	<p>Indicates whether the relay opens (-) or closes (+) on presence of triggering conditions.</p> <p>-: The relay closes in measuring operation if there is no alarm or fault.</p> <p>+: The relay opens in measuring operation if there is no alarm or fault.</p> <p>The setting determines whether an alarm is triggered (-) or not triggered (+) at the control unit in case of a loss of power supply.</p> <p>Independently of that you fix by choosing the change-over contact whether you use the closed current or the operating current principle for the connected peripheral devices.</p> <p>In safety orientated connections the mode (-) in combination with the closed current principle is generally used. For operation of optical or acoustic indicators the mode (+) is selected.</p> <p>Standard setting: (-)</p>
RESET	1 (On), 0 (Off)	<p>Indicates that the relay could be reset manually in case the triggering conditions are still fulfilled (On).</p> <p><i>Attention:</i> This function shall only be used for quitting an acoustic message (horn reset).</p> <p>Otherwise the relay is reset automatically if the triggering condition is no longer fulfilled (Off).</p> <p>Standard setting: 0 (Off)</p>
A1.1, A1.2, A2.1, A2.2, F	0, 1	<p>Indicates whether the alarm or channel fault is considered when evaluating the triggering condition (1). In case of (0) the alarm or fault is not considered for the relay.</p> <p>The following assignment is valid:</p> <p>A1.1: Alarm 1, Channel 1 A1.2: Alarm 2, Channel 1 A2.1: Alarm 1, Channel 2 A2.2: Alarm 2, Channel 2 F: Transmitter fault, Channel 1 or Channel 2</p> <p>The alarms and faults selected in the matrix are linked logically-OR, that means presence of one alarm or fault leads to triggering of the relay.</p>

Standard Configuration *Series ET-2D* at delivery:

- Relay 1: 1. Alarm of channel 1, Mode: -, Reset: 0
- Relay 2: 2. Alarm of channel 1, Mode: -, Reset: 0
- Relay 3: 1. Alarm of channel 2, Mode: -, Reset: 0
- Relay 4: 2. Alarm of channel 2, Mode: -, Reset: 0
- Relay 5: Transmitter fault, Channel 1 or Channel 2, Mode: -, Reset: 0  
(*Attention*: special case for K5 in combination with smoke detectors)

Please see attached test certificate for configuration at delivery.

### 5.1.3 Switching between Smoke Detector and digital inputs



*Fig. 10: Smoke Detector/Dig.Input (Path: MEASURED VALUES > SETUP > CONFIGURATION > SMOKE DETECTOR)*

Access level to perform changes of parameter settings: 3

Menu text	Selection	Function
-	SMOKE DETECTOR, DIG.INPUTS	<p>SMOKE DETECTOR: The input <i>Digital In</i> (Clamps 37 to 40) is used for evaluation of smoke detectors. Function and Installation of smoke detectors are described in Chapters 4.3.2 and/or 7.3.</p> <p>Attention: When activating the smoke detector relay K5 is fixed to its alarm (MODE=0, RESET=0).</p> <p>DIG.INPUTS: the input <i>Digital In</i> (Clamps 37 to 40) offers two digital inputs with status On (&gt; 20V) and Off (&lt; 5 V). These digital inputs are normally without function. They can be used for customer specific requirements (special software). On demand please do not hesitate to contact ExTox.</p>

### 5.1.4 Analogue Outputs

```

== ANALOG OUTPUTS ==

CHAN. 1 : 4-20mA
CHAN. 2 : 0-10V
    
```

Fig. 11: Analogue Outputs (Path: MEASURED VALUES > SETUP > CONFIGURATION > ANALOG OUTPUTS)

It is impossible to change any parameters within this menu.

Menu text	Selection	Function
CHANNEL 1, CHANNEL 2	4-20 mA, 0-10 V	The configuration of analogue outputs (option) is indicated. The measured value can be issued as current signal 4...20 mA or as voltage signal 0...10 V.  Note: This setting cannot be changed by the user. In case you need an adaptation, please do not hesitate to contact the ExTox-Service.

### 5.1.5 Digital Transmitter with serial Data transfer

Note: not usable for ExTox-Transmitters of ExSens and Sens Series. These functions are subject to future applications.

```

== SER. TRANSMITTER ==

> TRANSM. 1 : STATE
  TRANSM. 2 : STATE
  TRANSM. 1 : CONFIG.
  TRANSM. 2 : CONFIG.
    
```

Fig. 12: Status and Configuration of serial transmitters  
(Path: MEASURED VALUES > SETUP > CONFIGURATION > SERIAL TRANSMITTER)

Out of this menu only submenus are selected. It is impossible to change any parameters within this menu.

## 5.2 Adjustment

```

===== ADJUSTMENT =====
> MEASURING CHANNELS
    ANALOG OUTPUTS
    
```

Fig. 13: Adjustment (Path: MEASURED VALUES > SETUP > ADJUSTMENT)

Out of this menu only submenus are selected. It is impossible to change any parameters within this menu.

Menu text	Selection	Function
MESS-CHAN- NELS	-	Access to the submenu for adjustment of Channels 1 and 2.

### 5.2.1 Adjustment of 4...20 mA-Analogue-Transmitters

*Note:* only applicable if analogue 4...20mA-Transmitter (Type „A“) is configured in channel configuration (see 5.1.1).

```

===== ADJUSTMENT =====
                NH3          CO2
GAIN: >+1.000      +1.000
ZERO:  0.000      0.000
Iact:  5.771      6.296
Icor:  5.771      6.296
VAL.:   5.5        717
    
```

Fig. 14: Menu of Adjustment for analogue transmitters  
(Path: MEASURED VALUES > SETUP > ADJUSTMENT > MEASURING CHANNELS)

Access level to perform changes of parameter settings: 3

This chapter describes the additional option of an adjustment of transmitters at the control unit.

If the control unit ET-2D is used with transmitters which dispose of a linear 4-20 mA output, the current input of 4 mA is interpreted as zero point and the input current of 20 mA as end value of measuring range. In between conversion is done linear according to the following formula:

$$\text{Measured Value} = \frac{(\text{Measured Current}) - 4 \text{ mA}}{16 \text{ mA}} \cdot \text{End Value of Measuring Range}$$

Corrections of settings are in general done at the transmitter itself and not at the control unit.

In case this is impossible, such as for example due to the fact that the transmitter is hardly accessible for maintenance purposes, the control unit offers the additional option of a device internal adjustment. To perform this, the measured current value is converted with an offset and a gain factor after recording of the transmitter signal. After that formation and evaluation of the measured value are done. Necessary settings can be performed in the menu points SENS and ZERO. These corrections correspond to the adjustment of zero point and sensitivity at the transmitter itself.

*Attention:* The range of correction values is limited to restrict the adjustment to convenient tolerance range as far as measuring techniques are concerned. Further corrections have to be performed directly at the corresponding transmitter. If necessary, the sensor element has to be replaced.

Description of the adjustment procedure

The adjustment is done in two steps. During application of zero gas first of all the offset "ZERO" is changed until the actual corrected value indicated on the display "Icor" is 4 mA. Then the gain is adjusted while applying test gas until the actual value "Val." indicated on the display corresponds to the nominal value.

The formula mentioned above to convert the measuring value changes when using this form of adjustment. It is then:

$$\text{Measured Value} = \frac{(\text{Measured Current} + \text{ZERO}) - 4 \text{ mA}}{16 \text{ mA}} \cdot \text{SENS} \cdot \text{End Value of Measuring Range}$$

Menu text	Selection	Function
Gas 1, Gas 2	-	Measured gas set for Channel 1 and/or 2.
SENS	0.500 to 2.000	Correction value for sensitivity. Explication within the text above. At value 1.000 not correction will take place.
ZERO	-2.000 to 2.000	Correction value for zero point in mA. Explication within the text above. At value 0.000 not correction will take place.
Iist	-	The input current of the transmitter is indicated in mA <u>before</u> correction in SENS and ZERO.
Icor	-	The transmitter signal is indicated in mA <u>after</u> correction in SENS and ZERO.
MESS	-	The measured value evaluated by the control unit <u>after</u> correction is displayed.

*Attention:* a gain of < 1 limits the effectively useable measuring range. On a minimal gain of 0.5 it is only 50 % of the original measuring range. When selecting the alarm levels please ensure that they can still be triggered safely. For complete use of the adjustment range ExTox therefore recommends to avoid alarm levels > 50 % of the measuring range.

5.2.2 Adjustment of analogue outputs

It is impossible to change any parameters within this menu. The indicated values only serve for factory alignment of the analogue outputs.

### 5.3 System parameter

```

== SYSTEMPARAMETERS =
> REALTIME CLOCK
  TIME SETTINGS
  COM PORTS
  DATA LOGGER
  LC-DISPLAY
  MEMORY TEST
    
```

Fig. 15: System parameters (Path: MEASURED VALUES > SETUP > SYSTEMPARAMETERS)

Out of this menu only submenus are selected. It is impossible to change any parameters within this menu.

Menu text	Selection	Function
REAL TIME CLOCK	-	Time/Date
TIME SETTINGS	-	Settings for system times
COM PORTS	-	
DATA LOGGER	-	
LC-DISPLAY	-	
MEMORY-TEST	-	

#### 5.3.1 Time/Date

```

===== TIME/DATE =====
HH:MM:SS DD.MM.YY
12:13:27 05.04.17
^^
    
```

Fig. 16: Setting of Time and Date (Path: MEASURED VALUES > SETUP > SYSTEMPARAMETERS > REAL TIME CLOCK)

Access Level to perform changes of parameter settings: 1

Menu text	Selection	Function
HH	0 to 23	Hour of control unit time <i>Attention:</i> The real time clock of the control unit does not automatically switch between summer and winter time. If date and time are not displayed automatically after lapse of power supply and re-initiation, this data could be entered manually.
MM	0 to 59	Minutes of control unit time
SS	0 to 59	Seconds of control unit time
DD	01 to 31	Day of control unit date

Menu text	Selection	Function
MM	01 to 12	Month of control unit date
YY	00 to 99	Year of control unit date

### 5.3.2 Settings for Control Unit Times

```

=== TIME SETTINGS ===
> MAINTEN. : 60MIN
  A-DELAY  : 0SEC
  F-DELAY  : 0SEC
  
```

Fig. 17: Time settings (Path: MEASURED VALUES > SETUP > SYSTEMPARAMETERS > TIME SETTINGS)

Access level to perform changes of parameter settings: 3

Menu text	Selection	Function
MAINTEN.	1 to 1440	Duration after that the maintenance mode is automatically left. Standard setting: 30 Minutes
A.-DELAY	0 to 60	A triggering delay in seconds can be adjusted for the alarm levels. Standard setting: 0 s <i>Attention:</i> Deviations from standard setting may influence the effectivity of the safety concept.
F.-DELAY	0 to 60	A triggering delay in seconds can be adjusted for transmitter fault. Standard setting: 0 s <i>Attention:</i> Deviations from standard setting may influence the effectivity of the safety concept.

### 5.3.3 Settings for serial Interfaces

```

== SETUP COM-PORTS ==
DEV.-ADDR: > A
COM1 BAUD: 115000
COM1 PROT: ExTox
COM2 BAUD: 115000
COM2 PROT: ExTox
COM3 BAUD: 115000
COM3 PROT: ExTox
    
```

Fig. 18: Settings for serial Interfaces (Path: MEASURED VALUES > SETUP > SYSTEMPARAMETERS > COM PORTS)

All serial interfaces work with fixed settings: 8 Data bits, 1 Stop bit, no parity, no handshake.  
Access level to perform changes of parameter settings: 3

Menu text	Selection	Function
DEV.-ADDR	A-P	System address for ET-VIEW (Accessories: Software for visualisation of the values of one or more ExTox Control Units on a PC)
COM1(2,3) BAUD	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115000	Selection of transfer rate in Baud/s for the three serial interfaces COM 1, COM 2 and COM3.  COM3 is only available for internal purposes. Use is only possible with corresponding factory-sided configuration at the connections RS422. Please contact ExTox on demand.  Standard setting: 115000 Baud/s
COM1(2,3) PROT	OFF, ExTox, ProfiBus, Ethernet, Transm., ET-VIEW	Selection of data protocol, which is issued via the corresponding serial Interface.  OFF: data transfer not activated  ExTox: all measured values and messages are issued via the data protocol described in the annex.  ProfiBus: option for extension (not active at the moment).  Ethernet: connection of the optional remote indication of measured values (Art. 825019).  Transm.: This function is reserved for future applications (not active at the moment).  Standard setting: COM1: ExTox, COM2: OFF. COM3: ET-VIEW

### 5.3.4 Data logger (only types with data logger hardware extension)

```

===== DATA LOGGER =====
FREE          1909216 kB
INTERVAL      :    10 s
    
```

Fig. 19: Data logger menu (Path: MEASURED VALUES > SETUP > SYSTEMPARAMETERS > DATA LOGGER)

Access level to perform changes of parameter settings: 3

The format of data recording and the data content correspond to the protocol described in the attachment.

Menu text	Selection	Function
FREE	-	The free storage space of the USB-Stick is indicated in kByte.
INTERVAL	OFF, 10 s, 60 s, 600 s	Data recording on the USB-stick (see Chapter 4.12) is done by selecting a recording interval of 10 s, 60 s or 600 s.  In case there is no data logger or storage medium connected, the warning message: "No Data logger" is displayed.  After changing to OFF all data which has not yet been stored is written on the stick and then recording is stopped.  <i>Attention:</i> Before removing the SD-card the STATUS has to be changed to OFF in order to avoid possible loss of data.  Standard setting: OFF

### 5.3.5 Settings for the Display

```

===== LCD =====
> AUTO-OFF      3600 s
  CONTRAST      20
    
```

Fig. 20: Display settings (Path: MESSWERTANZEIGE > SETUP > SYSTEMPARAMETERS > LC-DISPLAY)

Access level to perform changes of parameter settings: 3

Menu text	Selection	Function
AUTO-OFF	0 to 86399	On-time of display illumination after last entry. After this illumination is switched off. When pressing any key again display illumination is automatically activated again. Standard setting: 3600 Seconds
CONTRAST	15 to 30	Setting of contrast for adaptation of angle of view onto the display. Contrast increases with ascending value. Standard setting: 20

### 5.3.6 Memory test

```

===== MEMORY TEST =====
PROG . FLASH :      OK
CONF . FLASH :      OK
RAM           :      OK
    
```

Fig. 21: Memory test (Path: MEASURED VALUES > SETUP > SYSTEMPARAMETERS > MEMORY TEST)

In ET-2D all memory elements in hardware are continuously checked by a test running in the background.

By means of the key combination  and  active fault messages can be quit.

Access level to perform changes of parameter settings: 3

Menu text	Selection	Function
PROG.FLASH	-	Status of the continuous test of the Flash-Memory for the programme memory. OK: no fault, ERROR: fault recognised
CONF.FLASH	-	Status of the continuous test of the Flash-Memory for configuration data OK: no fault, ERROR: fault recognised
RAM	-	Status of the continuous test of the volatile RAM-Memory OK: no fault, ERROR: fault recognised

## 5.4 Maintenance

```

MAINTEN:      3592s ==
>K1=0 DE1=0 A1= 5828
  K2=0 DE2=0 A2= 6342
  K3=1 RM =1 P  =----
  K4=1          FL=----
  K5=0          T  =----
  K6=0          rH=----
  K7=1 U1/U2=3.3/23.9
  
```

Fig. 22: Maintenance menu (Path: MEASURED VALUES > SETUP > MAINTENANCE)

Access level to activate maintenance mode: 2

When selecting this menu maintenance mode is automatically activated.

*Attention:* there is no evaluation of alarms in maintenance mode.

By means of the key  you can leave the menu while the maintenance mode is still active and you can perform works at the gas detection system.

By pressing key  (in menu maintenance) maintenance mode can be stopped manually at any time. The maintenance mode is automatically stopped after course of timer for the adjustable maximum time duration (see 5.3.2). It is changed directly to the indication of measured values.

*Note:* Der Timer is started again when switching to the maintenance menu and when activating/deactivating a relay (see table).

Within this menu you can only enter data in the 1. column (K1 to K7).

Menu text	Selection	Function
MAINTEN.	-	The remaining time is indicated until the control unit automatically stops maintenance mode and returns to measuring operation. Maximum duration of maintenance can be set in the system parameters (see 5.3.2).
K1 to K7	-	When pressing the keys  or  the corresponding relay 1 to 7 is activated (1) or deactivated (0).
DE1, DE2	-	Status of digital inputs. 1 is indicated for an input voltage of > 20 V, otherwise 0.
RM	-	Status of smoke detector: 1 = Alarm, 0 = no Alarm  <i>Attention:</i> This status is only significant in case the digital inputs are configured for smoke detectors (see 5.1.3).
A1, A2	-	Analogue input currents of transmitters on Channel 1 and/or 2. Currents is displayed in $\mu\text{A}$ , that means $4000 \mu\text{A} = 4 \text{ mA}$ (Zero point) and $20000 \mu\text{A} = 20 \text{ mA}$ (end value of measuring range).  <i>Attention:</i> values of transmitters/sensors with digital data transfer are not displayed (see 5.1.5).

Menu text	Selection	Function
P, FL, T, rH	-	Atmospherical pressure (hPa), Flow-through (FL), Temperature (°C) and relative Humidity (%).  <i>Note:</i> In control unit ET-2D these values are not available. "---" is displayed as value.
U1, U2	-	Voltage of both supply levels 3.3 V and 24 V.

## 5.5 Fault Memory

```
==== ERRORSTACK ====
--05.04.17 12:11:07--
EGES= 38 EAKT= 38
K1A1=0 K2A1=1 PROG=0
K1A2=0 K2A2=1 CONF=0
K1F =0 K2F =0 RAM =0
U3V3=0 FLOW=0 USB =0
U24V=0 RMEL=1
```

Fig. 23: Fault Memory (Path: MEASURED VALUESANZEIGE > SETUP > ERRORSTACK)

In the fault memory (ERROR STACK) all changes of alarm and fault status are stored following the principle "Message occurs/Message leaves" with corresponding time stamp. Maximum 1000 of the recent status messages are stored. When selecting the menu the recent message is displayed.

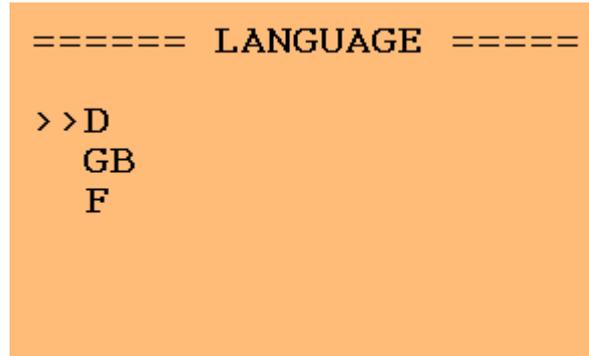
Access level to leaf through the fault memory: 3

It is impossible to change any parameters within this menu.

Menu text	Selection	Function
2 <sup>nd</sup> line (yy.mm.dd, hh:mm:ss)	-	Date and time of entry
EGES	-	Number of stored messages
EAKT	-	Current number of indicated messages (1 = oldest message, EGES = recent message)
K1A1, K1A2, K2A1, K2A2	-	Status of Alarm (A) 1 and/or 2 of channel (K) 1 and/or 2 (0 = no Alarm, 1 = Alarm triggered)
K1ER, K2ER	-	Transmitter fault of channel (K) 1 and/or 2 (0 = no fault, 1 = fault)
PROG, CONF, RAM	-	Result of memory test for flash memory (PROG), Configuration-Flash Memory (CONF) and volatile memory (RAM) (0 = no fault, 1 = fault)
U3V3, U24V	-	Status of power supply for levels 3.3 V and/or 24 V (0 = no fault, 1 = fault)
FLOW	-	Message flow-rate monitoring (0 = no fault, 1 = fault) <i>Note:</i> for control unit ET-2D without function

Menu text	Selection	Function
USB	-	Status USB-Data logger (0 = no fault, 1 = fault) <i>Note: only if data logger installed (option)</i>
RMEL		Status smoke detector (0 = no Alarm, 1 = Alarm triggered) <i>Note: only if smoke detectors configured (see 5.1.3)</i>

## 5.6 Language



*Fig. 24: Language (Path: MEASURED VALUES > SETUP > LANGUAGE)*

Access Level to perform changes in language: 2

Actual German, English and French are implemented. The language selection menu might be extended on customer specific demand (Special software).

## 6 Application

### 6.1 Measuring Function

The use of Gas Detection Systems for explosion and health protection requires special care. Besides qualified support of ExTox and the detailed information in the Instruction Manuals as well as Technical Data Sheets (TDB) there are several guides to assist you for the safe use and operation of Gas Detection Systems. These guides deal with the selection, installation, initial operation and regular maintenance.

Furthermore there could be national regulations. In Germany there are for example the guidelines of DGUV<sup>1</sup>-Information 213-056 and 213-057.

Denomination	Title
EN 60079-29-2	Explosive atmospheres – Part 29-2: Gas detectors – Selection, installation, use and maintenance of detectors for flammable gases and oxygen
DGUV-I 213-057, Merkblatt T023	Gas Detection Equipment for Explosion Protection – Use and Operation (English version available in 2017)
Merkblatt T055	Mess- und Warngeräte für den Explosionsschutz – Antworten auf häufig gestellte Fragen (available in German only)
EN 45544-4	Workplace atmospheres - Electrical apparatus used for the direct detection and direct concentration measurement of toxic gases and vapours- Part 4: Guide for selection, installation, use and maintenance
DGUV-I 213-056, Merkblatt T021	Gas Detection Equipment for Toxic Gases/Vapours and Oxygen – Use and Operation (English version available in 2017)

DIN-Standards available at VDE-Verlag, Frankfurt or Beuth-Verlag, Berlin; DGUV-I available at Jedermann-Verlag, Heidelberg

### 6.2 Use in combination with hazardous areas

The Control Unit itself may not be installed in hazardous areas, but it is allowed to use the control unit in combination with explosion protected transmitters. Please note the corresponding installation Notes for each individual transmitter.

All types of control units can be used for measuring function in combination with hazardous areas of Zone 2.

Please pay attention to the remarks regarding configuration of the control unit and its function in the safety system when using the detection system in combination with hazardous areas.

<sup>1</sup> DGUV: Deutsche Gesetzliche Unfallversicherung (German Statutory Accident Insurance)

## 7 Installation

### 7.1 Mechanical Installation

The control unit should be installed at an easily accessible place outside the monitored area to enable the safe reading out of messages at every time and to ensure an easy maintenance.

Please note the indicated operation temperature (°DB). The control unit should be installed protected against weather conditions, such as for example driving rain, and bigger climatic fluctuations. If necessary, a suitable protection has to be provided.

The dimensions for assembly and further installation dimensions could be taken from the Technical Data Sheet (°DB).

The type in wall mounted housing is fix screwed up.

The type for DIN-Rail installation disposes of fixtures with which the housing is snapped on the DIN-Rail.

The control units may not be installed in hazardous areas.

### 7.2 Electrical Installation

The electrical installation shall only be done by electro specialists according to the installation regulations on the subject. There are especially regulations for the Installation of Information Engineering IEC 60364 (in Germany VDE 0800) and for lightning protection according to EN 62305 (in Germany DIN V VDE V 0185). The power supply of the control unit has to meet the requirements of an arrester of Class C or of Type 2. Please note that there might be special requirements in case control unit and transmitters are installed in separated rooms.

The control units are designed for industrial application. *Warning:* The control units are Class A devices. It may cause radio interferences in living quarters. In this case the user may demand performances of suitable measures.

When running the cable you should pay attention to the fact that the cables for the gas sensors should better be run separately and protected against mechanical damages.

On the type in wall mounted housing the housing has to be opened. To do this you have to insert a screw driver in the small slot at the right side of the front plate and open the lock. The cover can now be opened to the left side. The connections are in the bottom part of the housing. The big cable gland M20x1.5 serves for the power supply cable.

The control unit starts operation automatically with connection to the power supply.

You could find the connection scheme for input and output in the Technical Data Sheets (°DB) and also marked by stickers on the system. Connection is done via plug clamps. Remove the plug before connecting the cable to avoid mechanical damage. After the assembly is done you could connect the plug again.

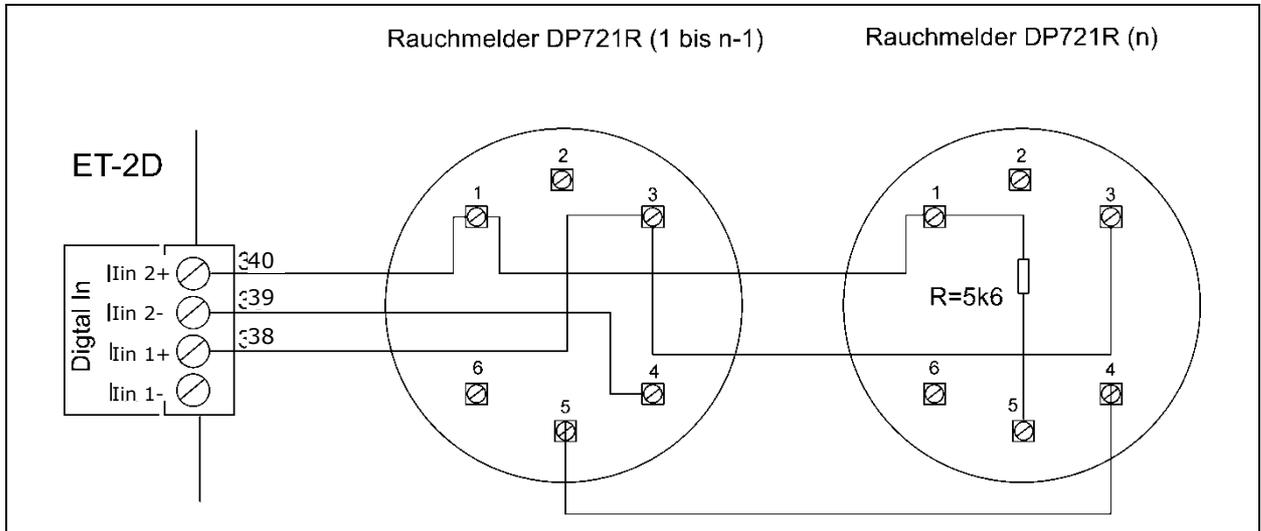
The connection PCB shows a spatial separation of the transmitter inputs and the relay outputs. The overlapping of lines between these two areas within the housing and on the PCB should be avoided. It should especially be ensured that correct isolation is kept in case cables of different voltage get in contact. We recommend not removing the protection isolation directly after the cable gland but only close to the corresponding clamp.

Normally the shield of the transmitter cable should not be passed into the control unit ET-2D. PE-lines can be connected to the clamp SHLD of the corresponding channel.

Please bear in mind that the cable glands have to be firmly tightened to ensure the sufficient strain-relief. Not used cable glands have to remain closed with already installed plugs.

### 7.3 Smoke Detector

Optical smoke detectors DP721R (Art.-No. 297000) can be connected to ET-2D. Up to 2 smoke detectors can be run in one line. The smoke detector(s) is/are connected according to below wiring scheme.



In all smoke detectors resistors ( $R = 5.6 \text{ k}\Omega$ ) have to be installed according to above figure. The resistors are included in the red protection caps or already installed.

## 8 Maintenance of Gas Detection Systems

The following descriptions are generally valid for Gas Detection Systems of the company ExTox GmbH consisting of the herein described control unit and connected transmitters.

### 8.1 Basic Information

Maintenance done by specialists is an indispensable measure for checking and keeping the functionality of gas detection systems. Maintenance comprises sight inspection, functional and system test of the complete system.

You as user of the gas detection system bear the responsibility for the correct performance of the maintenance. ExTox as manufacturer can only place all necessary details to build up your specific maintenance concept at your disposal. We are glad to support you with this task and to submit a maintenance quotation acc. to your special requirements.

National valid regulations to define maintenance intervals may exist. In Germany it is for example necessary to keep Betriebssicherheitsverordnung (BetrSichV) and in certain applications the regulations of DGUV-Information 213-056 (Merkblatt T 021) and 213-057 (Merkblatt T 023) (see 6.1). ExTox recommends generally speaking the application of the measures described in the information of the professional associations as well as the maximum calibration intervals even if the application does not fit into their scope.

<b>Maximum Intervals</b>	
Explosion protection (T 023)	Toxic Gases/Vapours and Oxygen (T 021)
1 Month (Visual Check)	1 Month (Visual Check)
4 Months (Functional Check)	4 Months (Functional Check)
1 Year (System Check)	1 Year (System Check)

Independently ExTox recommends for all of her supplied transmitters regular calibration and adjustment with test gas during functional and system checks. Please see also the details in the corresponding Technical Data Sheets (☞DB). An extension to 12 months might only be possible in special cases of existing experiences on similar applications. The functionality of the Control Unit has to be tested as well.

The results of each maintenance should be documented. Valid regulations could additionally demand this.

Hereafter the main contents of the intended checks are described. You will find details in the above mentioned bulletins.

Most important is the testing of the connected transmitters. Control of the gas detection system and its correct functionality are also checked.

### 8.2 Visual Check

You have to check your system on mechanical damages, dust, dirt, state of a sampling system if included. Furthermore indications and status messages have to be checked.

### 8.3 Functional Check

The functional check also comprises calibration by means of application of test gases and a suitable system for application of test gas. When calibrating the indication of measured values at application of test gas is determined and compared with the nominal values. In case the settings are corrected additionally the process is called adjustment. In case of combination

with sampling systems their correct function has also to be checked. It is not necessary to trigger the switching functions.

A functional check should only be done, if there is no alarm present. You should ensure the same environmental conditions during this process as valid for the measuring process. For example a transmitter used in cold storage houses should not be adjusted under normal ambient temperatures, as there might be more or less remarkable deviations.

Make sure that measures have been taken to avoid unintended triggering and transmission of alarms before applying test gas. Activate the alarm bypass in maintenance mode at your ExTox Control Unit, deactivate automatically triggering protection measures or inform the responsible maintenance personnel. The measures corresponding to your application have to be determined and the person in charge for maintenance has to be familiar with all details.

#### 8.4 System Check

The system check additionally comprises the triggering of switching functions; check of system parameters and of indication and recording facilities.

### 9 Options

Article-Number	Description
297000	Optical Smoke Detector DP721R
825009	ProfiBus®-Interface Module
825017	ModBus®-Interface Module
825022	ProfiNet®-Interface Module
825019	Remote Indication 4-Channels
940487	Power Supply (for DIN-Rail type and 230 V-supply)

### 10 Technical Data and Declaration of Conformity

The Data Sheet of the control unit contains all technical data (☞DB).

Data sheets and EU-Declaration of Conformity are added to the documentation separately.

## Annex: Protocol of serial data transfer

The following table describes the content of the data protocols being issued via the serial interface, as long as setting "EXTOX" is selected (see Chapter 5.3.3).  
On ET-2D the data content of bytes 38...73 is not available.

Byte	Content	Remark	Example
0...9	Date	YYYY.MM.DD	2017.03.31
10	Separator	Semicolon	;
11...18	Time	HH:MM:SS	12:36:14
19	Separator	Semicolon	;
20	System state	0=Air, 1=Flushing, 2=Measure	2
21	Separator	Semicolon	;
22	Measuring point	actual measuring point (1,2)	2
23	Separator	Semicolon	;
24...29	Meas. value Ch. 1 Measuring point 1	4000-20000 µA (Format:xxxxxx)	__7560(=7,560 mA)
30	Separator	Semicolon	;
31...36	Meas. value Ch. 2 Measuring point 1	4000-20000 µA (Format:xxxxxx)	_16300(=16,300 mA)
37	Separator	Semicolon	;
38...43	Meas. value Ch. 1 Measuring point 2	4000-20000 µA (Format:xxxxxx)	__8300(=8,300 mA)
44	Separator	Semicolon	;
45...50	Meas. value Ch. 2 Measuring point 2	4000-20000 µA (Format:xxxxxx)	_12400(=16,300mA)
51	Separator	Semicolon	;
52	Atm. Pressure	P in hPa (Format xxxx.x)	_963.5
58	Separator	Semicolon	;
59	Flow-Through	Litre/h (Format:xxxx.x)	__50.3
65	Separator	Semicolon	;
66	Temperature	T in °C (Format: xxxx.x)	__27.2
72	Separator	Semicolon	;
73	rel. Humidity	rH in % (Format: xxxx.x)	__43.2
79	Separator	Semicolon	;
80	Alarm1/Channel1	0=no Alarm, 1=Alarm	0
81	Separator	Semicolon	;
82	Alarm2/Channel1	0=no Alarm, 1=Alarm	0
83	Separator	Semicolon	;
84	Alarm1/Channel2	0=no Alarm, 1=Alarm	0
85	Separator	Semicolon	;
86	Alarm2/Channel2	0=no Alarm, 1=Alarm	0
87	Separator	Semicolon	;
88	reserved		
89	Separator	Semicolon	;
90	Fault Channel1	0=no fault, 1=Fault 0	
91	Separator	Semicolon	;
92	Fault Channel2	0=no fault, 1=Fault 0	
93	Separator	Semicolon	;
94	Carriage Return		\$0d
94	Line Feed		\$0a