



User's manual ESS3 S3 Station data logger



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1 Indications for explosion proof instruments

- **Application area and prescriptions**



These indications and warnings must be absolutely observed to guarantee a safe operation. The devices may only be used for the destined application. Employment is allowed in areas that are potentially explosive by gases or vapours. They are assigned to the explosion group and temperature class, indicated on the type plate. With the establishment and the exploitation of explosion protected control- and measuring-installations, the applicable national regulations and prescriptions have to be considered.

- **General indications**



For safe exploitation of the device, professional transport, appropriate storing and assembly as well as careful operation and maintenance, is necessary. Any intervention at the device must be carried out by authorized personal, exclusively using original spare parts. The electrical data, stated on the type plate and the test certificate as well as their special conditions have to be considered.

When operated in the open air, it is advised to protect the explosion protected devices against direct water influences

- **Assembly and maintenance**



Before assembling, it has to be checked, if the indication on the type plate corresponds with the required kind of protection for the potentially explosive area. At battery exchange, only an original battery block of the manufacturer with Ex. protection approval and Ex-characteristic on the packing and the battery block may be used. A duly grounding of the device is compulsory.

2 Technical data ESS3 S3 Station

Measuring ranges pressure:

0... 100	mbar
0... 250	mbar
0... 1	bar
0... 2,5	bar
0... 10	bar
0... 25	bar
0... 100	bar

Measuring range temperature:

-10... +40 °C

Measuring ranges impulses:

Impulses per volume unit can be frankly defined.

Other measuring ranges on request

Overpressure protection:	up to 1,3-times the end of the range
Connection:	½" male thread with 1/8" female thread
Accuracy:	± 0,09 % of full scale. (optional 0,05%)
Temp effect:	± 0,05% for 10 K from -20°C bis +40°C in average
Resolution:	less than ± 0,01 % full scale
Memory:	2 million measuring values
Power supply:	2 Lithium cells (2 x 3,6V / 35Ah)
Power consumption:	Power save: approx.. 90uA, active: approx.. 50mA
Battery operating time:	approx. 10 years at measuring rate of 1 per minute
Protection:	IP 54
Ex-proof protection:	Ex II 2G Ex ib IIB T4 Gb
Seal material:	NBR70 or Viton
Dimensions:	approx. 260 x 209 x 91 mm (W x H x D)
Weight:	approx. 3400 g
Operation temp.:	-20 ... +60°C
Storage temp:	-20 ... +60°C

Technical data interface assembly Reed/Namur-contacts

Art. No.: 01202199967:

Inherently safe circuit at terminals A1 ... A6 and B1 ... B6 with characteristic values: **$U_o = 7,5 \text{ V}$, $I_o = 24 \text{ mA}$, $P_o = 0,18 \text{ W}$, $L_o = 0 \text{ mH}$, $C_o = 0 \text{ uF}$**

Technical data interface assembly serial interface

Art. No.: 01202199968:

Inherently safe circuit at terminals E1 ... E3 with characteristic values: **$U_o = 30 \text{ V}$, $I_o = 32 \text{ mA}$, $P_o = 0,96 \text{ W}$, $L_o = 0 \text{ mH}$, $C_o = 0 \text{ uF}$**

Technical data impulse sensor

Art. No.: 01202199960:

Inherently safe circuit at the 3-pin bus with characteristic values:

$U_o = 7,5 \text{ V}$, $I_o = 1 \text{ mA}$, $P_o = 7,5 \text{ mW}$, $L_o = 0 \text{ mH}$, $C_o = 0 \text{ uF}$

Technical data ESS III modem:

Inherently safe circuit at terminals K1 ... K3 with characteristic values:

$U_o = 24 \text{ V}$, $I_o = 130 \text{ mA}$, $P_o = 3,12 \text{ W}$, $L_o = 0 \text{ mH}$, $C_o = 0 \text{ uF}$

IrDA-interface cable serial:

Connection: 9-pin D-SUB-Bus

IrDA-interface cable USB:

Connection: 4-pin USB-connector

3 Introduction

The ESS3 - system (electronic memory recorder) is a further development of the mechanical recorders which have been used for decades in the gas- and water industry.

The electronics are capable of simulating and storing all relevant data. The system is independent of power supply and robustly built which makes it universally applicable.

There are four instrument building groups all based on the same electronics.

1. ESS2 station recorder
In this instrument 4 measurement values are captured (with sensor-extension module up to 9 measurement values). All important information in a pressure reducer station can be recorded. They are an important help for real time monitoring. An additional module ESS3 modem can send mails and Sms. Graphs and breach of limit contacts can be telecommunicated wirelessly.
2. ESS3 for measuring gas pressure.
There has been given much attention foot high accuracy at lower measurement ranges, e.g. 100 mbar. At low temperatures e.g. -15 °C, changes of less than one mbar can be measured very accurate. With special calibration an accuracy of 0,1% can be achieved over the total environmental temperature range of -20 to +40°C
3. ESS3 for measuring water pressure.
The instruments are absolutely watertight and can even be over-floated by water for several days. The building form is constructed for under floor hydrants. The absolute pressure is measured
4. ESS3 DPK
The pressure test case is a composition of an ESS3 with a battery powered printer. For pressure tests locally at the site, a pressure test can be done and immediately printed. Out of pressure and temperature, the temperature compensated pressure is calculated. This is important for the evaluation of the tightness

The system has a large data memory and a large program memory. The program memory, which controls the operating system, can be updated by the customer himself. Older instruments can be updated with actual software

The pressure sensors are pre-calibrated in a sensor housing and can be exchanged. The evaluation unit is identical for all measurement ranges.

Both the evaluation unit and the sensor are explosion prove.

4 Systems Overview ESS3 Station

The ESS3 Station in its complete stage of expansion has 3 elements, the ESS3 Station, ESS3 Plus and ESS3 Modem. ESS3 Station and ESS3 Plus can be operated in ex room (intrinsically safe). ESS3 Modem is appropriate for operation in ex free zone.

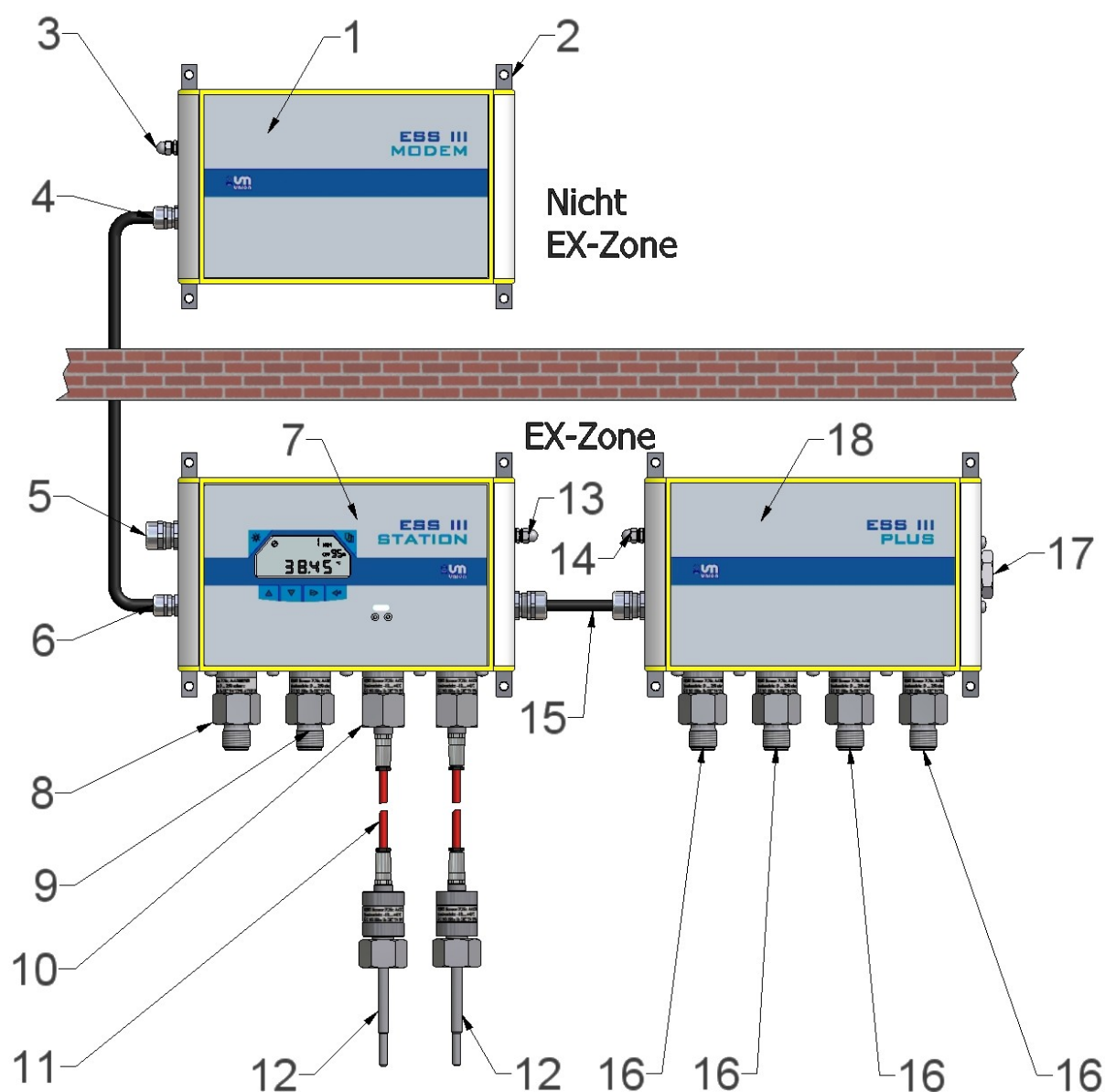


Figure 1: ESS3 systems overview

- | | | | |
|----|-----------------------------------|----|----------------------------------|
| 1 | ESS3 modem housing | 2 | Clips for fixing |
| 3 | Grounding ESS3 modem | 4 | Connection to ESS3 station |
| 5 | Impulse inputs/ power supply | 6 | Connection to ESS3 modem |
| 7 | ESS3 station housing | 8 | Sensor housing e.g. low pressure |
| 9 | Sensor housing e.g. high pressure | 10 | Sensor connection temperature |
| 11 | Sensor cable | 12 | Immersion sensor temperature |
| 13 | Grounding ESS3 station | 14 | Grounding ESS3 Plus |

15 Connection to ESS3 Plus
17 Closing sensor ESS3 Plus

16 Sensors ESS3 Plus

4.1 ESS3 Station

The ESS3 Station is able to record up to 4 measurements pressure and/or temperature. Different kinds of sensors can be connected. The instrument identifies which sensors are connected with the measuring range and adapts it to the display. The four measurements will be called on and indicated on the display. Each of the 4 measurements can be parameterized and prepared separately according to the ESS3 philosophy.

The complete set of measurements of a sensor or all sensors that are connected are read out.

The instrument is able to administrate up to 6 Reed-contacts or 4 Namur-inputs. For this purpose an additional board (Art.-No. 01202199967) will be set into the station.

For the power supply an ex- protected lithium battery is used as standard. A direct supply by an intrinsic safe voltage source is also intended.

4.2 ESS3 Plus

The ESS3 Plus will be connected with a prepared cable at a distance of 40 cm. ESS3 Plus can administer max. 5 additional measurements, which are also administrated by the ESS3 Station. The ESS3 Station identifies the measurements connected to the ESS3 Plus and handles them accordingly. In the complete stage of extension the ESS3 Station can administer 9 measurements and the contact inputs in addition, instead of the 4 measurements.

4.3 ESS3 Modem

The ESS3 Modem will be installed outside the ex zone. By a three-conductor cable it will be connected with the ESS3 Station over an integrated ex-barrier. The modem sends the measurements of all connected sensors, contacts and impulses by SMS or E-mail to one or several receivers. The instrument will be supplied with a internal lithium cell or with external 24 volt. The lithium cells last up to 2 years according to the choice of the parameters.

Up to 5 receivers can be chosen. Depending on the data volume mails or SMS can be used. The kind of transmission is programmable by the user.

The measuring data are received and administered in the TfsWin III. Further processing is intended in EsapPro III or via interfaces in other programs.

The ESS3 modem is flexible connected with an antenna. The modem has a special connection that allows the use of different kinds of antennas.

5 Installation and commissioning

5.1 Installation of ESS3 Station

With the four mounting links the ESS3 modem is fixed on a wall inside the instrument. An external installation is only allowed, if the ESS3 modem is protected against climatic influences by an additional case.

The grounding at the grounding screw of the ESS3 modem has to be carried out according to instructions.

5.2 Installation of sensor connections

The ESS3 Station has several type plates. On the upper side of the instrument there is a serial number for the evaluation unit and at each sensor there is a one for the measuring range. The customer can change the sensors. Both terms are listed. The pressure has to be within the measuring range. Over pressure up to 1.3 of the measuring area is allowed. Feasible measuring data are only generated within -4% to +104% of the measuring area. The measuring area on the upper end ranges from about 104% and on the bottom to about 4% below the zero point. With this the zero point can be clearly controlled.

Pressure sensors are connected with the measuring point via the ½" connection or via a flexible cable that connects the sensor with the station. They can be 3m, 6m or 10 m long.

The temperature sensors are fixed with a coupling nut at the measuring point. The top of the sensor reaches into the gas flow directly or via an immersion sleeve. The sensor is connected with the ESS3 station via a cable.

5.3 Connection of the contact input

Has the ESS3 Station been installed with an interface component Reed/Namur-contact, up to 6 reed contacts or 4 Namur contacts are available to the user. Combinations are possible; however a maximum of 6 contacts is available.

Reed- and Namur-contacts are fed from the ESS3 station via an intrinsic safe electric system. It has to be guaranteed that only potential free Reed- or Namur-contacts are connected and that the conditions for the separation of intrinsic safe and not intrinsic safe electric systems according to DIN EN 60079-11 are observed. (e.g. slot indicator Type SJ... and SC... of Messrs. Pepperl + Fuchs GmbH). The total sum of external connected components (cable plus contact) must not exceed the following max. values for the type of protection „intrinsic safety” EEx ib IIB

$C_0 = 100\mu\text{F}$, $L_0 = 100\text{mH}$

Connection scheme:

Reed-contact 1: contact A1 – contact A2:	(or Namur-contact 1)
Reed-contact 2: contact A3 – contact A4:	(or Namur-contact 2)
Reed-contact 3: contact A5 – contact A6:	
Reed-contact 4: contact B1 – contact B2:	(or Namur-contact 3)
Reed-contact 5: contact B3 – contact B4:	(or Namur-contact 4)
Reed-contact 6: contact B5 – contact B6:	

5.4 Installation ESS3 Modem

With the four mounting links the ESS3 modem is fixed on a wall inside the instrument. An external installation is only allowed, if the ESS3 modem is protected against climatic influences by an additional case.

Attention! The modem must in any case be installed outside the Ex-Area.

The grounding at the grounding screw of the ESS3 modem has to be carried out according to instructions.

5.5 Connection of the ESS3 modem

The ESS3 modem is equipped with a voltage barrier that offers an intrinsic safe electric system for the connection of the ESS3 station. The connection cable ESS3 Station – ESS3 modem must not exceed the following max. values for the type of protection „intrinsic safety“ EEx ib IIB:

$$C_0 = 0,56\mu F, L_0 = 3mH$$

The regulations for the marking and laying of inherent safe cables must be adhered to. Screened cables with a minimum cable cross-section of 0,5 mm² per lead have to be used. The cable shielding has to be applied on the ESS3 modem as well as on the ESS3 Station.

Connection scheme:

ESS3 Station contact E1 connect with ESS3 Modem contact K1 (GND) ...
ESS3 Station contact E2 connect with ESS3 Modem contact K3 (RXD-Modem)
ESS3 Station contact E3 connect with ESS3 Modem contact K2 (TXD-Modem)

A connection of the ESS3 modem or the ESS3 Station with other instruments is not allowed.

Both the ESS3 modem as well as the ESS3 Station must be grounded at the grounding screws according to regulation.

5.6 Commissioning of ESS3 Station

On delivery of this instrument the battery is integrated ready for use. All sensors are integrated according the type ordered or must be connected by a cable plug connection. Number of sensor has to comply with the sensor connection on the instrument according to their description. An exchange will lead to wrong measurements.

At delivery the instrument is in the power save mode PWSV. In this mode the power consumption of the ESS3 is very low but it is still active and reacts on input commands. In this mode the instrument is stored.



By pushing button  “**enter**“, during the time the action bar is moving, the system is activated and switches to the measuring mode.

Attention: At releasing the button the function is executed. That applies to all actions of the ESS3 program.

In this mode the other 3 buttons are inactive.

The triangular buttons above the display have the following functions:



The background lighting of the display is switched-on with this button. It is turned-off after 30 seconds automatically, if no other button is used during that time. Otherwise the turn-on time extends by further 30 seconds. The lightning cannot be switched-off by pressing a button.



With this button you can jump from one sensor to the other in the supreme menu level. This button is only active on the supreme menu level and has no influence on the lower menu levels. In the lower levels you can jump from one sensor to the other with another shortcut.

All connected sensors are addressed to (one after the other), up to max. 9 sensors, if the ESS3 Plus is connected.

The switch is made to the measuring unit that is currently adjusted to e.g. measuring rate to measuring rate or min. indication to min. indication.

The ESS3 measures and stores the pressure. Usually now is measured with the adjustments set by the manufacturer. These are the adjustments that were active before switching the ESS in power save mode.

In this mode the instrument can be installed and than measures with the following, pre-adjusted parameters.

Measuring rate	4 sec
Resolution	0.5 %
Storage mode	standard (static)
Upper target limit	off
Lower target limit	off
Average factor	1

5.7 Working with TfsWin III

The program TfsWin III reads the measurement data of the ESS3 and displays them. The program is indicating how to install the software. After starting the program the following display appears:

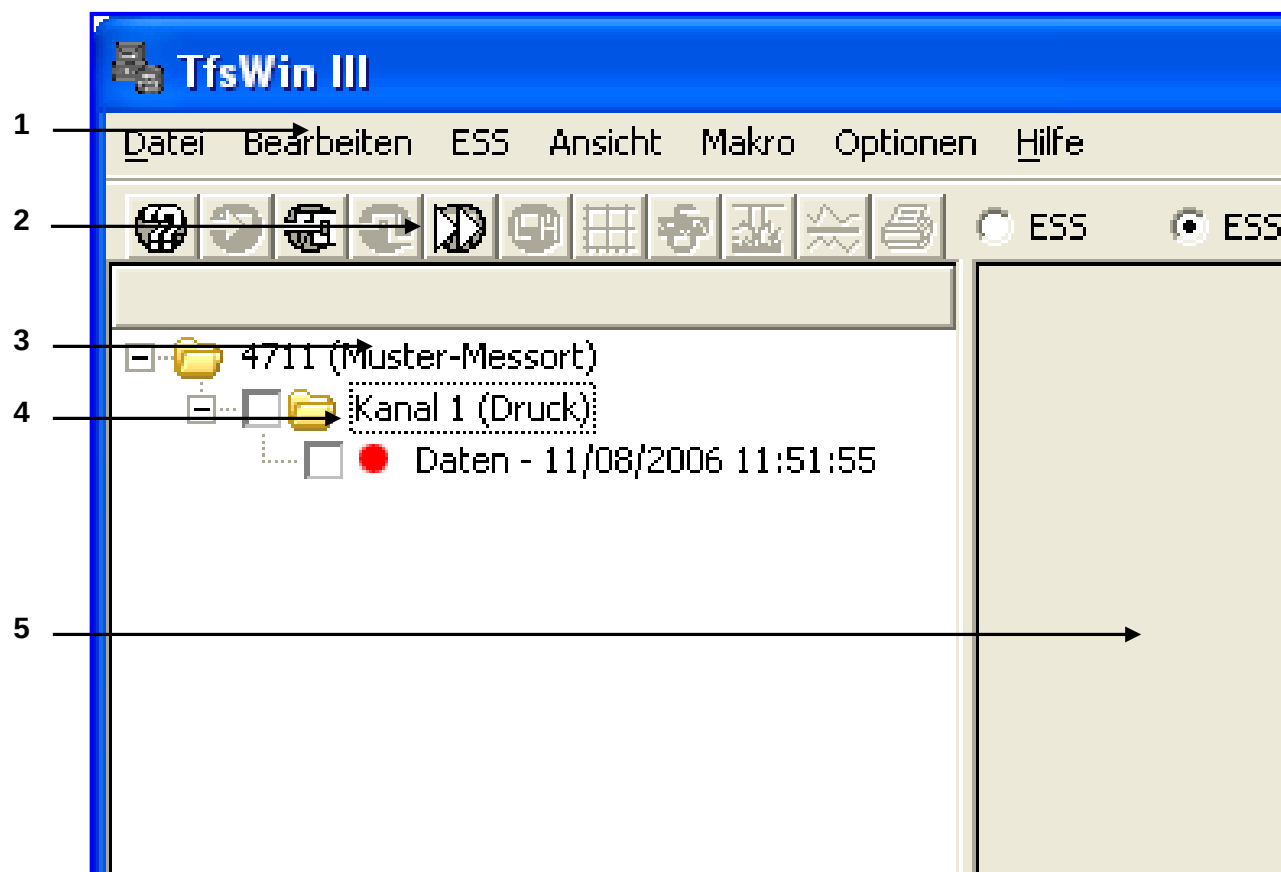


Figure 2: TfsWin III start display

- | | | | |
|---|----------------------------|---|----------|
| 1 | Menu bar | 2 | Icon bar |
| 3 | List of measurement places | 4 | Channel |
| 5 | Diagram field | | |

Example data can be displayed immediately. After marking the map „Channel 1 (print) in window 2, the parameters are displayed. The diagram (3) is displayed by marking „Data -11/08/2006 11:51:55”.

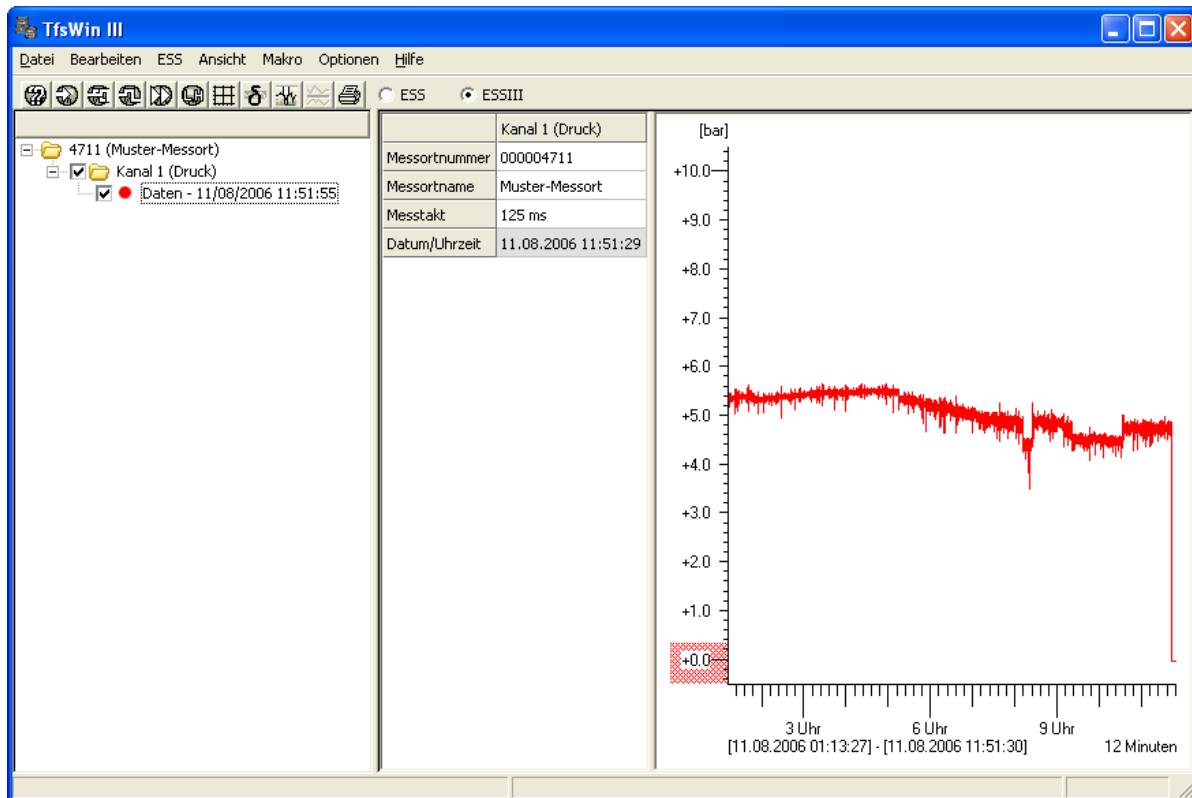


Figure 3: TfsWin III display with example curve

The measurement data are now transferred from the ESS3 to the PC. The IrDA-interface cable is available with an USB interface or with a serial interface. When using a serial interface, communication with the ESS3 can start immediately. With the USB cable the installation of a driver has to be confirmed during software installation.

5.7.1 Transfer to the PC

After the ESS3 has measured for some time, the measurement data can be read. The IrDA-cable is connected to the computer interface (serial or USB) and the transfer head is connected to the adapter pins at the ESS3. With menu point ESS / Receive measurement data (all channels) the transfer is started. After ending the transfer successfully the curve appears on the screen.

After the first test, in following chapters all functions of the ESS3 and TfsWin III will be explained.

6 Operation of the ESS3 Station

6.1 Overview of ESS3 Station

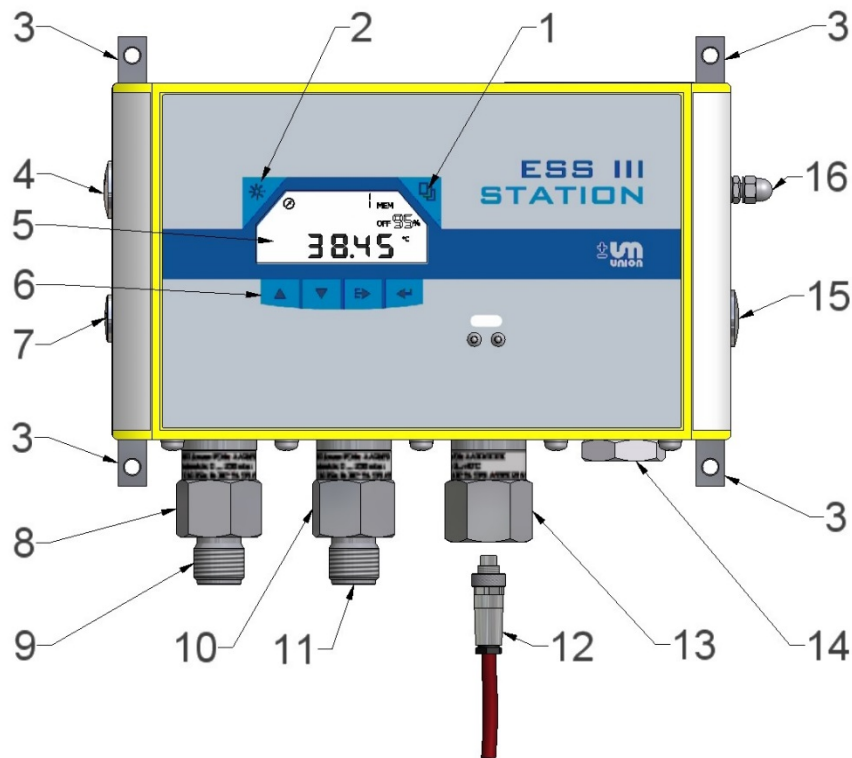


Figure 2: ESS3 Station

1	chose button Sensor	2	button lighting on
3	mounting links	4	blind plug external contacts
5	LC-Display	6	control key
7	connection modem	8	sensor case e.g. low pressure
9	connection G $\frac{1}{2}$ " external thread	10	sensor case e.g. high pressure
11	connection G $\frac{1}{2}$ " external thread	12	cabel sensor
13	sensor case cabel sensor	14	4-th sensor blind plug
15	connection ESS3 Plus	16	grounding connection

For position 1 the channel is chosen and shown on the display. All channels are treated equally, even if the ESS3 Plus is connected (max. 9 channels).

For position 2 the display can be lightened. The light turns off after a period of 30 seconds.

6.2 ESS3 sensors for the station

The ESS3 Station can have up to 4 sensors. The sensors have their own ex-admission and can be changed and completed by qualified personnel. They have been adjusted by the manufacturer and can be used immediately. The electronic system of the central unit identifies the new sensor when booting the system and considers it for software and display.

The following sensors are available:

- Pressure sensor for direct assembly to the ESS3 Station (screw sensor pressure)
- Pressure sensor via sensor cable connected with the ESS3 Station (cabel sensor pressure)
- Temperature sensor via sensor cable connected with the ESS3 Station (cabel sensor temperature)
- Impulse sensor for the direct assembly, impulse connection via plug connection (screw sensor impulse)

6.2.1 Connection of the ESS3 sensors

Pressure sensor for direct application:

The sensor (1) is directly fixed to the ESS3 case. The pressure is led via a pressure cable to the sensor case.

Pressure sensor connected via sensor cable:

The sensor (9) is fixed by a $\frac{1}{2}$ " thread a the measuring point. The sensor cable (7) connects the sensor with the sensor electronic (2). It has to be guaranteed, that sensor and sensor electronic match together. The type plates of the sensor (14) and the sensor electronic (13) must have the same serial number.

Temperature sensor connected via sensor cable:

The temperature sensors are fixed directly at the point of measurement by the $\frac{3}{4}$ " coupling nuts (11). The sensor cable (7) connects the sensor electronic (2).

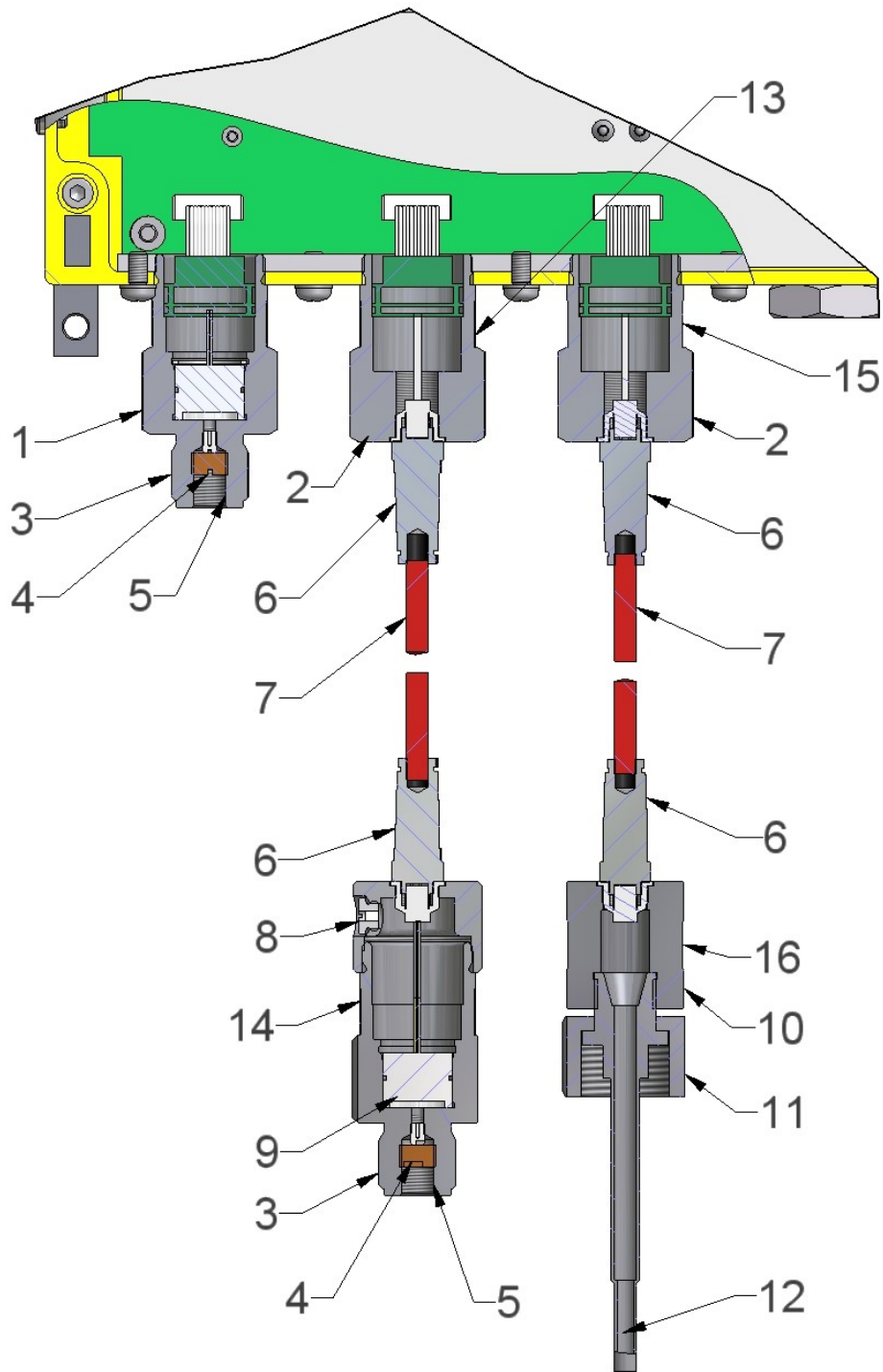


Figure 3: ESS3 Station with sensors

- | | | | |
|----|--------------------------------|----|-----------------------------|
| 1 | sensor case (screw sensor) | 2 | sensor case (cabel sensor) |
| 3 | 1/2" thread pressure sensor | 4 | filter |
| 5 | 1/8" thread Minimes-connection | 6 | connector sensor cabel |
| 7 | sensor cabel | 8 | ventilation pressure sensor |
| 9 | pressure sensor cell | 10 | case temperature sensor |
| 11 | G 3/4"coupling nut | 12 | temperature sensor PT1000 |
| 13 | type plate pressure sensor | 14 | type plate pressure sensor |

15 type plate temperature sensor

16 type plate temperature sensor

6.2.2 ESS3 Station display indications

All fields for display indications are described. Several segments show symbols and numbers in different formats and text.

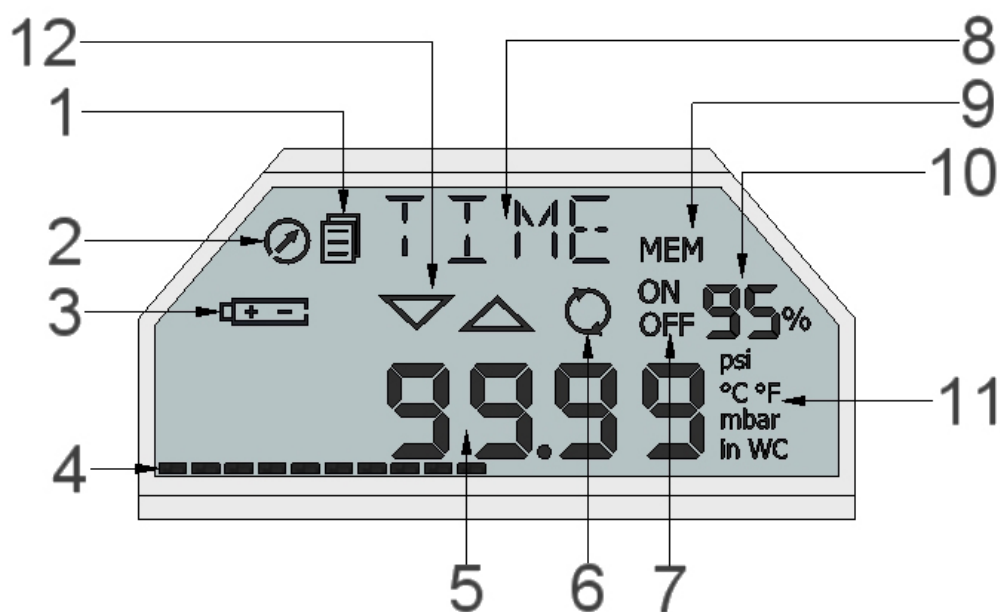


Figure 6: ESS3 display indications

- | | | | |
|----|--------------------------|----|---------------------------|
| 1 | Menu mode | 2 | Measuring rate indication |
| 3 | Battery indication | 4 | Action bar |
| 5 | Numeric indication field | 6 | Storage mode |
| 7 | Storage on/off | 8 | Menu indication field |
| 9 | Memory | 10 | Remaining memory |
| 11 | Units | 12 | Alarm limits |

6.2.3 Menu mode

The symbol  for menu appears only in the different menu modes and not in the measuring mode.

6.2.4 Measuring rate indication

The measuring rate indication is blinking in the measuring rate. It changes from visible to invisible when 1 cycle is ended.

6.2.5 Battery indication

The battery symbol appears, when the capacity of the battery is at 5%. It mainly depends on the measuring rate if the instrument can go on functioning for weeks or even months. See the table in this manual.

6.2.6 Action bar

The action bar moves from left to right. When the ESS3 needs some time for a certain action, the action bar shows the status. Releasing the button executes the instruction.

6.2.7 Numeric display field

In this segment all numeric indications with the corresponding formats are displayed. The appropriate format, date, number or in special cases even short information, is switched on with the matching menu point.

6.2.8 Storage mode

The memory switches from standard (static) storage to rolling storage.

The standard (static) memory is written until completely full. Only after deleting the old values, new values will be stored.

The rolling  Memory overwrites the oldest values and stores the actual values. Deleting the memory starts a new measurement.

6.2.9 Storage on-off

The memory can be switched on or off. With memory switched off measuring continuous with the actual parameters. Values are not stored.

6.2.10 Menu display field

In this field all menus are displayed. The abbreviations of all menus are described in chapter 5.6.5.

6.2.11 Remaining memory

The remaining memory is indicated in steps of 5%. After the first stored value the indication switches from 100% to 95%.

6.2.12 Units

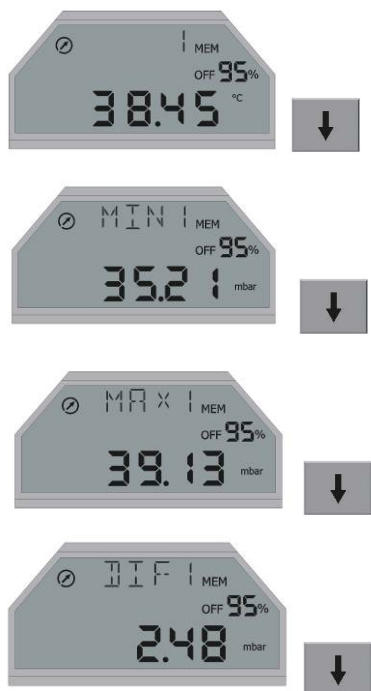
In Europe the units mbar, bar und °C are intended. In the Anglo-Saxon region the units °F, wc and psi are intended. Software conversion by the manufacturer.

6.3 Measuring with the ESS3 Station

In the menu measuring the menu symbol does not appear. With the buttons „up“ and „down“ the actual meas. value (1), minimal meas. value (MIN1), maximal meas. value (MAX1) and difference value (DIF1) are displayed. The 1 indicates the current channel. For an instrument with 2, 3 or 4 channels this indication is 2, 3 or 4. Change of the channels will be done with the button „channel“.

MIN-, MAX- or DIF-values can be reset to the actual measurement value by pressing ESC for a longer time (2 sec). After the left to right movement of the action bar and releasing the button the value will be updated. The value is recalculated from this time.

The DIF-value shows the difference between the actual measurement value and the value at the last reset.



6.3.1 Main menu

By pressing the button



“enter“

you always get in the main menu on the position INFO. The menu symbol appears.
With the buttons

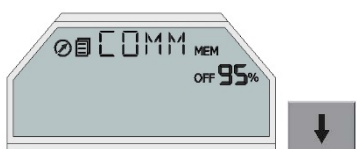
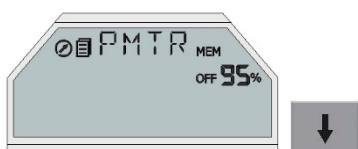
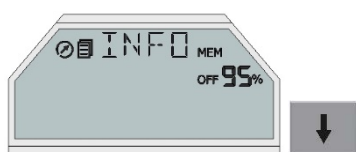


„up“ or



„down“

the three menus of the upper menu level are attended cyclically.



The abbreviations from the main menu have the following meaning:

INFO Information in the system, only indications

PMTR Parameters, may be changed.

COMM Commands, may be executed.

Each of these 3 parameters leads to a lower menu level with the button



“enter“

6.3.2 Menu INFO - INFO

In the Info-menu different information is presented. It is not possible to change anything. Changes are only possible in the menu PMTR and in the software Tustin III .

Because some information is channel-specific, exchange of the channel is excluded. The data, assigned to the individual channel, may be displayed. The menu KANL is only visible when more channels are available. The menu level consists of 12 Menu points

- | | |
|---------|-------------------------------|
| 1. CHNL | Channel choice, if available) |
| 2. RANL | Range low |
| 3. RANH | Range high |
| 4. MEM | Capacity of the memory |

5. RMEM	Remaining memory
6. TYPE / NR / SNEU	Serial number and type of the evaluation unit
7. TYPE / NR / SNOS	Serial number and type of the sensor
8. CALI	Calibration
9. DATE	Date
10. TIME	Time
11. VERS	Version
12. BALT	Battery life-time

6.3.2.1 RANL/RANH (Range low/high)

The lower measurement limit from the channel is indicated. The measuring value can be 4% below this limit. Result can then be a negative value. If the pressure gets lower than 4%, the display shows stripes at the lower edge. The upper measuring limit is treated in the same way.

6.3.2.2 MEM (Memory) - Total memory

Here the total available memory of the corresponding channel is indicated. The total memory of 2 million measurements will be evenly spread over the existing channels. If one channels contains more than 1 million measurements the display will be limited to 999 999 measurements. However, internally the larger memory will be used..

6.3.2.3 RMEM (Remaining memory)

Here the remaining memory is indicated. The indication is limited to 999 999 measurements as shown under MEM.

6.3.2.4 SNEU (Serial no. evaluation unit)

In a 2 sc. Rate the serial numbers of the evaluation unit are indicated.

6.3.2.5 SNOS (Serial No of sensor)

In a 2 sec. rate the number of the sensor is indicated.

6.3.2.6 CALI (Calibration date)

The date of the last calibration is indicated in the format TT.MM.JJ.

6.3.2.7 DATE (Date)

Here the actual date is indicated in the format DD.MM.JJ (days, months and years)..

6.3.2.8 TIME (Time)

Here the actual time is indicated in the format HH:MM:SS. (hours, minutes and seconds).

6.3.2.9 VERS (Version)

The version number of the software is indicated in the format 1.00.00.

6.3.2.10 BALT (Battery Low Time)

Here the earliest date on which the battery will be empty is indicated. It depends on the measuring rate. If the measuring rate is changed or if the ESS3 Station is put into operation, a new date is only available after a waiting period of 10 minutes.

6.3.3 Menu PMTR - Parameter

In the menu parameters the measuring rate and the time can be changed. The measuring rate can be set up for each channel separately.

- | | |
|---------|----------------------------------|
| 1. CHNL | Channel adjustment) |
| 2. SMPR | Adjustment of the measuring rate |
| 3. CLCK | Time adjustment |
| 4. PASS | Set keyword |

Further parameter adjustments will be carried out by the Tfs Win III software.

6.3.3.1 CHNL (Channel)

With „enter“ an instrument with more channels can be switched from one channel to another. All indications have the channel number as index.

6.3.3.2 SMPR (Sample rate)

With „enter“ the measuring rate is adjusted. The changing of the measuring rate is indicated by blinking. With „up“ the measuring rate goes up from milliseconds via seconds via minutes and hours to 6 hours maximum. With „down“ the measuring rate goes in the other direction. „Enter“ confirms the chosen value.

6.3.3.3 CLCK (Clock)

„enter“ leads to the indication DATE. It can be changed immediately. With „up“ the date goes forward, with „down“ backwards. When the date is confirmed with „enter“ the time appears in the menu TIME. Time is set analogously and confirmed with „enter“ . After this the menu is in position TIME.

6.3.3.4 PASS (Password)

Unauthorized access to the ESS3 can be forbidden with a password (four figure number). The default setting is 0000. At this setting the password is inactive. When this number is changed, it has to be entered at the next access. The number is valid until a different number is set.

6.3.4 Menu Comm (Commands)

The menu COMM has 2 menu points.

DEL Delete

PWSV Power save

In this menu 2 adjustments are made. They must be confirmed with „yes“ or „no“ and „on“ or „off“.

6.3.4.1 DEL (Delete)

Deleting is confirmed with „enter“, the indication is blinking. With „up“ or „down“ the choice is made. With „yes“ there will be deleted. All data are finally deleted. A new measurement is started, „no“ returns to the menu.

6.3.4.2 PWSV (Power save)

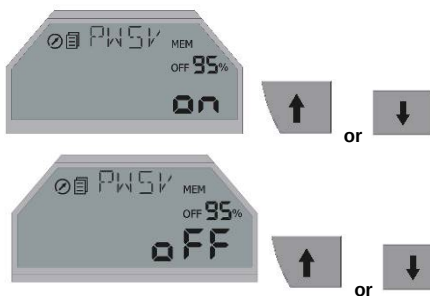
Power save wird aktiviert, wenn das Gerät lange nicht benutzt wird. Es wird fast ausgeschaltet und benötigt wenig Energie.

 „enter“ leads to menu DEL

 „up“ or „down“ 

Leads to menu PWSV

 „enter“ leads to a blinking display, which can be changed with „up“ or „down“ from „on“ to „off“.



Pushing  „enter“ again confirms the blinking value.

After confirming „on“ the menu symbol  appears for 120 seconds. The 120 seconds are counted down, and then the PWSV starts with the indication:



The power consumption of the ESS3 is very low in this mode. The instrument is not completely switched off, it can be reactivated.

To switch from power save to measuring mode, „enter“ must be pushed as long as the action bar moves from left to right. After that the instrument goes in the measuring mode. Pushing „enter“ shortly leads to the menu INFO. From there PWSV is attended in the usual way and can be deactivated.

6.3.5 All abbreviations in the Menus

In this chapter all abbreviations which may occur are listed.

AVRG	Average Meaning: average Unit: number of measurement. values Description: Number of measuring values to be averaged	DATE	Date Meaning: date Unit: --- Description: Indication of a date
BAUD	Baudrate Meaning: Baudrate Unit: Bit/s Description: Indication of speed for data transfer		
BALT	Battery life time Meaning: Battery life time Unit: --- Description : Date till the battery operates normally		
CALI	Calibration date Meaning: calibration date Unit: --- Description: Indication of the last calibration date of the channel		
CHNL	Channel Meaning: channel Unit: --- Description: Set up the active channel		
CLCK	Clock Meaning: time Unit: --- Description: Indication of the actual time of the ESS3		
CNCL	Cancel Meaning: cancel Unit: --- Description: interrupt of print		
COMM	Commands Meaning: command Unit: --- Description: Main menu with submenus		

DAYS	Days Meaning: days Unit: --- Description: Unit for the duration of the pressure test	LAL	Lower alarm limit Meaning: lower alarm limit Unit: unit of the active channel Description: set lower alarm limit
DEL	Delete Meaning: delete Unit: --- Description: Delete measurement memory	LANG	Language Meaning: language Unit: --- Description: language for the printouts
DIF1	Difference value Meaning: difference value Unit: unit of the active channel Description: Indication of the difference value of the active channel	LEAK	Leaking Meaning: leaking (untight) Unit: --- Description: Result of a pressure test
END	End of pressure probe Meaning: end Unit: --- Description: Status: pressure test has ended successfully	LPRF	Leak proof Meaning: leak proof (tight) Unit: --- Description: Result of a pressure test
ERR1	Error pressure probe 1 Meaning: error 1 Unit: --- Description: Error in pressure test (memory full)	LAL	Lower alarm limit Meaning: lower alarm limit Unit: unit of the active channel Description: Setting the lower alarm limit
ERR2	Error pressure probe 2 Meaning: error 2 Unit: --- Description: Error in pressure test (Pressure test could not be started)	LTL	Lower target limit Meaning: lower target limit Unit: unit of the active channel Description: Setting of the measurement storage in limits (on/off)
H	Hour Meaning: hour Unit: --- Description: Unit for the duration of the pressure test, measuring rate	LTST	Leak test Meaning: leak test Unit: --- Description: Main menu with sub-menus
INFO	Information Meaning: information Unit: --- Description: Main menu with sub menus	MAX1	Maximal value Meaning: maximum value Unit: --- Description: Indication of the maximum measured value
		MEM	Memory Meaning: memory Unit: --- Description: Memory capacity of the channel

MIN	Minutes Meaning: minutes Unit: --- Description: Unit for the duration of the pressure test . measuring rate
MIN1	Minimal value Meaning: minimal value Unit: --- Description: Indication of the minimal measured value
MNTP	Minimal test pressure Meaning: minimal test pressure Unit: unit of the channel for the pressure test Description: Setting of the test pressure of the pressure test
MNTT	Minimal test time Meaning: test time Unit: s, min, h Description: Setting the testing time of a pressure test
MS	Milliseconds Meaning: milliseconds Unit: --- Description: Unit for setting the measuring rate
MXΔP	Maximal pressure loss Meaning: maximal pressure drop Unit: unit of the channel for the pressure test Description: Set the pressure drop for a pressure test
NO	Number Meaning: serial number Unit: --- Description: display of the serial number of device/sensor
LNO	Location number Meaning: N°. of measurement place Unit: --- Description: Input of the measurement place number
OFF	Off Meaning: off Unit: --- Description: Off

ON	On Meaning: on Unit: --- Description: On	RESO	Resolution Meaning: resolution Unit: --- Description: Set the resolution of the range steps
PASS	Password Meaning: password Unit: --- Description: Input of the password	RMEM	Remaining memory Meaning: remaining memory Unit: --- Description: remaining free memory of values
PMTR	Parameters Meaning: parameters Unit: --- Description: Main menu and submenus	RSET	Reset Meaning: reset Unit: --- Description: Clears the min/max values Chancel the printout
POPT	Print options Meaning: printing option Unit: --- Description: Set the printing options (graphic/text)	RUN	Running Meaning: running Unit: --- Description: Status: ESS3 is executing a pressure test
PRNT	Print Meaning: print Unit: --- Description: Print a pressure test	S	Seconds Meaning: seconds Unit: --- Description: Unit for the duration for the pressure test . Measuring rate
PRNT	Printing Meaning: printing Unit: --- Description: Printing is in progress	SHRT	Shortcut Meaning: shortcut Unit: --- Description: Short activation of a pressure test
PWSV	Power save Meaning: power save Unit: --- Description: Status: ESSIII is in power consumption saving mode or switch on or off the saving mode (on/off)	SMOD	Storage mode Meaning: storage model Unit: --- Description: Setting of the storage model (standard/rolling)
RANH	Range high Meaning: upper value measurement range Unit: unit of the active channel Description: Indication of the upper range value of the channel	SMPR	Sample rate Meaning: measuring rate Unit: --- Description: Setting of the measuring rate
RANL	Range low Meaning: lower measurement range Unit: unit of the active channel Description: Indication of the lower range value of the channel	SNEU	Serial number evaluation unit Meaning: serial No evaluation unit Unit: --- Description: Indication of the serial no. of the device (Type/number)

SNOS Serial number of sensor

Meaning: serial number of sensor
Unit: ---
Description:
Indication of the serial nr. of the sensor
(Type/number)

STOP Stop

Meaning: stop
Unit: ---
Description:
Status: „Start measurement later“ is active
(measurement is running) or stop a running
pressure test

STRT Start

Meaning: start
Unit: ---
Description:
Calm down time up to the start of the
pressure test

TEMP Temperature

Meaning: temperature
Unit: ---
Description:
Use temperature channel for the pressure
test (yes/no)

TIME Time

Meaning: time
Unit: ---
Description:
Indication/setting of date and time

TYP1 Pressure probe type 1

Meaning: pressure probe type 1
Unit: ---
Description:
Pressure test type 1 – start pressure test

TYP2 Pressure probe type 2

Meaning: pressure probe type 2
Unit: ---
Description:
Pressure test type 2 – start pressure test

TYP3 Pressure probe type 3

Meaning: pressure probe type 3
Unit: ---
Description:
Pressure test type 3 – start pressure test

TYPE Type

Meaning: serial number
Unit: ---
Description:
display of the type number of
device/sensor

UAL Upper alarm limit

Meaning: upper alarm limit
Unit: unit of the active channel
Description:
set upper alarm limit

UTL Upper target limit

Meaning: upper target limit
Unit: unit of the active channel
Description:
set upper target limit

VERS Version

Meaning: version
Unit: ---
Description:
Indication of the Firmware-version

WAIT Wait

Meaning: wait for start
Unit: ---
Description:
Status: „Start measurement later“ is active
(measurement is stopped) or Status: a
pressure test is started or a pressure test is
evaluated

ZOOM Zoom

Meaning: zoom
Unit: ---
Description:
Setting the zoom for the print (on/off)

01:15 „Time“

Meaning: time
Unit: min:s, h:min or days:h
Description:
Status: time at start of pressure test

7 Working method of the ESS3-System

The pressure (temperature) is recorded by a piezo resistant sensor (1 x Pt 1000) and converted to an electrical signal. After amplification, an AD converter passes the digital signal to a microprocessor.

The ESS3 records the current pressure in a free selectable time interval (measuring rate) and stores the value according to specific criteria (average factor, resolution) in a not volatile memory. The ESS3 displays the current measuring value without applying the set parameters.

All parameters can be changed by the program TfsWin III. For this purpose the data is exchanged via an infrared link. The functions can be changed at choice.

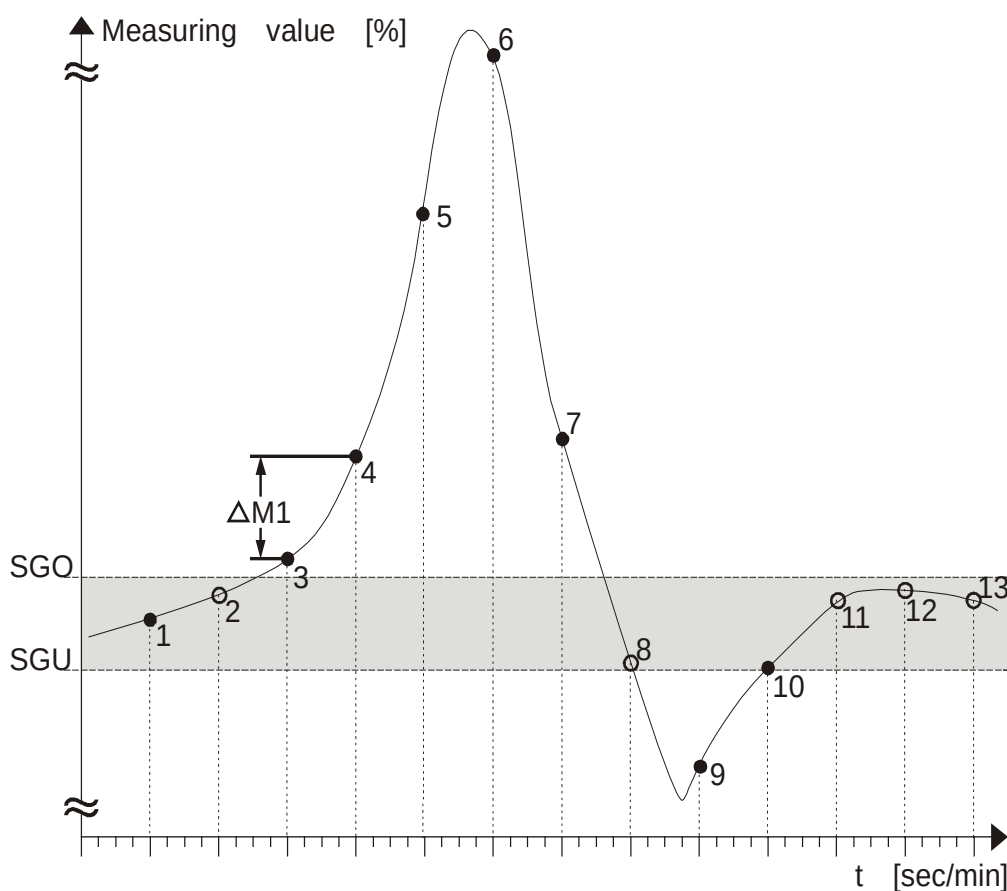


Figure 7: System of measuring point storage

1 Meas. point stored ●

2 Meas. point not stored ○

7.1 Storing measuring values

The computer can strongly reduce the measurement data without loss of information. The instrument carries out measurements in pre-set time intervals (measuring rate). Only the measuring values which deviate from the previously stored measuring value by a free selectable amount (the resolution). The time is continuously registered. This process saves memory space.

7.2 Target limits

Upper target limit (SGO) and lower target limit (SGU) can be preset with the program TfsWin III. Depending of parameter „Store within limits“ only measuring values are stored which are higher than the upper target limit (M3, M4, M5, M6, M7) or lower than the lower target limit (M9).

Measuring points on the lower and upper target limit are considered as being within the limits. Therefore they are stored.

The start value M0 is stored independently of the storage criteria.

The target limits can be deactivated, if SGO and SGU are set at the same value (e.g. 0) or any other equal value.

7.3 Alarm limits

Alarm limits can be switched on or off with the program.

7.4 Resolution

The in % of the measuring range indicated resolution is also a criterion for the storage of a measuring value. If the difference between the measuring value and the previously stored measuring value is less than the resolution, the measuring value is not stored.

7.5 Measuring rate and battery life time

7.5.1 Measuring rate

The measuring rate defines the time interval between two measurements. It can be set from 125 milliseconds to seconds and minutes up to 6 hours. The input of milliseconds, seconds, minutes and hours cannot be mixed. The input value must be in complete seconds, minutes and hours. Measuring rates below 1 second can only be set as a multiple of 125ms. The smallest possible measuring rate depends on the number of connected sensors and is number of sensors * 125ms.

7.5.2 Battery life time

The measuring rate is crucially for the battery life time. Measuring rates of 125 ms are only significant for short time measurements. Table 1 gives examples of measuring rates with the calculated battery life time.

7.6 Measuring average factor

The measuring average factor indicates the number of measuring values to be averaged (e.g. 3, three values are averaged). The new (resulting) measuring value is stored, as far as resolution and target limits allow this.

7.7 Storage of min-max-values

The ESS3 stores minimal and maximal values, which are calculated from the last reset-time.

7.8 DIF Value

The Dif-value shows the difference between the actual measuring value and the value at the last reset. That gives an overview about falling or rising trend of a measurement.

7.9 Time

The ESS3 has a clock with date and time. At the start of a measurement date and time are stored.

ESS3 knows summer- and wintertime (firmware 1.12 or later). The curves overlap each other this means that at a certain time 2 measurements exist or a gap of an hour. The EsapPro III software can process this.

7.10 Remaining memory

The memory has a capacity of totally 2 million measuring rates including the relative time for all channels and will be split up equally over all channels. The remaining memory is defined in number of measuring values and can be read with TfsWin III. Not all memory locations are available for data. Every transmission takes some memory space.

A full memory will not accept any new measuring values, the clock continues. Only the rolling memory stores measuring values even if the memory display shows „0“. The oldest measuring values will get lost in favour of the newest. The ESS3 has stored its data history. It is equivalent to the length of the rolling memory.

7.11 Resolution of the measuring value

ESS have a resolution of less than 0,01% of the measuring range. Temperature errors in the electronic unit and the sensor and the condition of the sensor membrane determine the final error.

As an option there is ESS3 with a resolution of 0,004 %. For temperature sensors the display resolution is limited to 0,01 °C., independent of the measuring range. .

7.12 Zero point correction

The zero point can be corrected with TfsWin III. With a vented unit the ESS3 displays 0. Small deviations may be within the accuracy limits. In case of low measuring ranges (e.g. 0 - 100 mbar) the zero point is location dependent. The zero point should be adjusted in the measurement position (horizontally or vertically).

8 TfsWin III

TfsWin III transfers, manages and changes all parameters in the ESS3. In the ESS3 itself only specific parameters may be changed and indicated.

8.1 Installation of the program

The program is running with Win Vista, WinXP and Win2000. The installation-CD starts setup automatically. In case the auto run function is not active, setup.exe is started.

A request to choose an installation language appears, here in English.

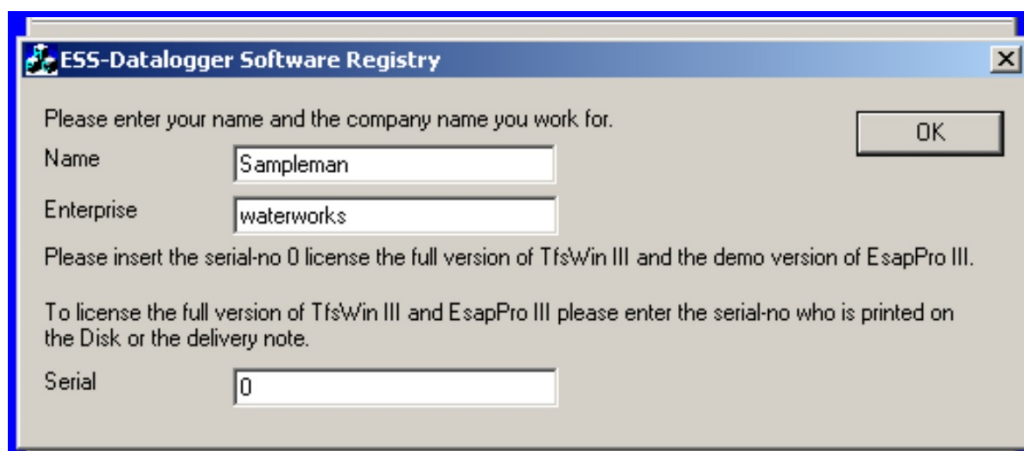


After the confirmation with OK, all other applications should be closed.

As standard the program is suggesting the path C:\Programme\Union\EsapPro III. This suggestion can be confirmed or changed. If there exists an earlier version of an EsapPro III installation, it is absolutely necessary to remove the earlier version with the de-installation/uninstall program before the new installation is started. (see de-installation).

The installation program creates desktop- and quick launch icons, if these options are selected.

After the summary of the installation options registration of the program is requested.



If TfsWin III is used without EsapPro III, the preset „0“ should be confirmed. When EsapPro III was acquired, the serial number, mentioned on the delivery note, must be entered instead of the 0. Now EsapPro III is licensed.

With a unlicensed EsapPro III, it is possible to test all functions with test data.

In this dialogue the language of TfsWin III can be chosen.



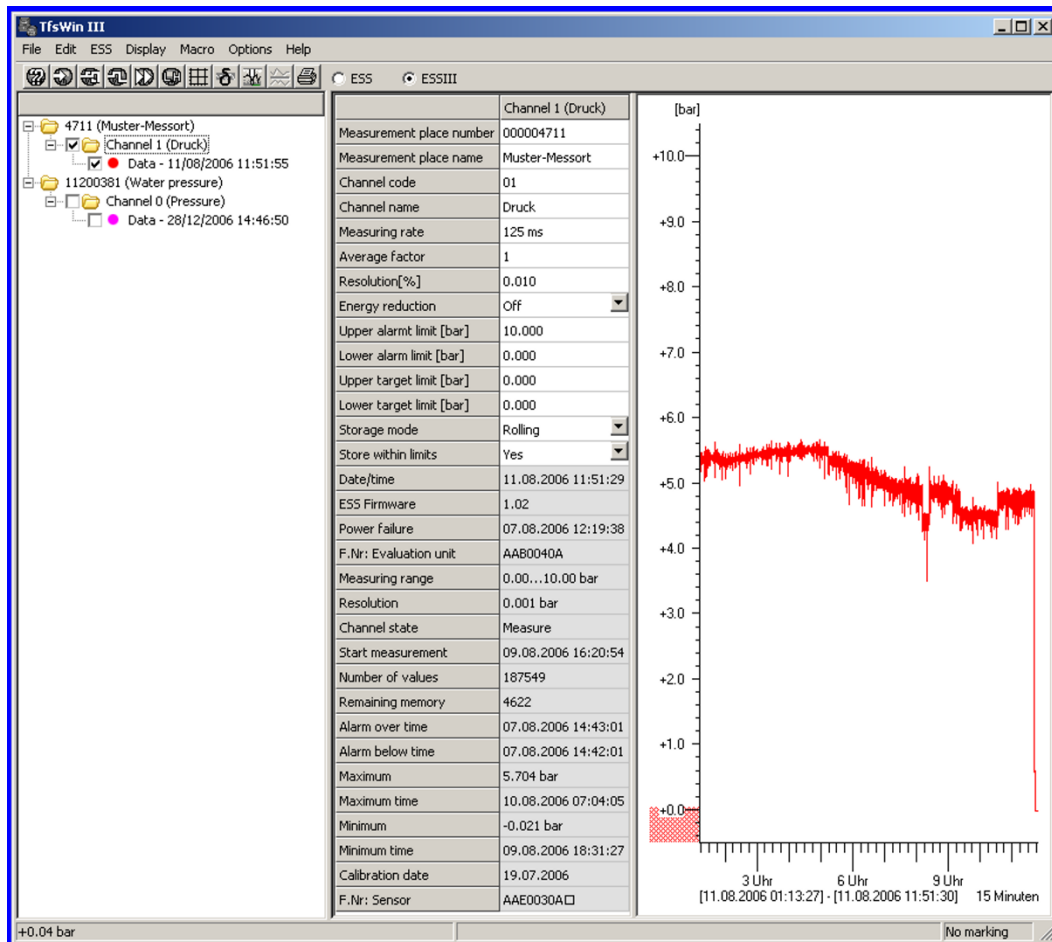
Anschließend wird die Sprache für EsapPro III gewählt.

8.2 Installation of the IrDA-interface cable

The IrDA-interface cable exists with serial connection (9-pin D-Sub-connector) and with USB connection. With the serial version no further installation is needed, with the USB-version the USB-drivers will be installed.

8.3 Functions of TfsWin III

After the start of TfsWin III, the display area is divided in three parts. At the left the measurement data and parameters are presented in a tree-structure. In the middle the parameters of the selected ESS3 are presented. The parameters in white fields can be changed, parameters in grey fields are produced by the ESS3 and are only displayed. At the right the measurement curve appears.



Tree: The tree is divided in three sections.

In the upper section the measurement place number and the measurement name are displayed. One section down, all channels of the corresponding measurement place appear. Most of the time this is an ESS3 with one channel, ESS3 with more channels will display all channels. When the channel is selected the parameters are displayed in the middle section and can be changed. Multiple selections are possible.

In the third section, below the channels, the measurement data are displayed. With repeated readings, date and time appear under each other. Several measurement data may be selected. When more data sets are selected the display of the parameters is deactivated automatically. This also applies to measurement data.

Parameters: The parameters control the measuring profile of the ESS3. After the first start of TfsWin III only measurement place name, measurement place number, measuring rate and date/time are displayed. The other parameters can be displayed with the menu „Options/display configuration“.

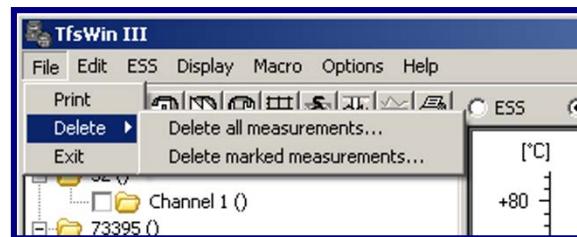
Diagram: In the diagram the measuring values are displayed related to the time. When there are different readings of measurement places/channels, in the tree diagram an allocation with colours is arranged for curves and scales. A rectangle, created with the left mouse button held down and after that a click with the right mouse button enlarges the diagram as often as needed. A click with the right mouse button in the free field reduces the diagram again.

8.4 Menus

The pull down menus follow the Windows-philosophy. The most important instructions can be done with buttons. All menus will be described systematically.

8.4.1 File

In the file menu the measurement data will be managed.



Print

The actual diagram, with all displayed information will be printed.

Delete / delete all readings

Here all measurement places with all measurements and parameters will be finally deleted.

Delete / delete marked readings

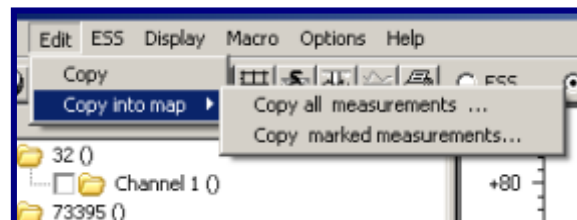
Only the marked measurements or parameters will be deleted. Different meas. data and parameters cannot be marked and deleted. For that purpose multiple deleting may be necessary.

Exit

The program is closed. Several parameters and measurements will remain intact

8.4.2 Edit

Here measuring data are copied



Copy

Data with a blue background are copied to the Windows clipboard. From there they may be exported to other programs (e.g. Excel) with the function „paste from clipboard”.

Copy into map / copy all readings

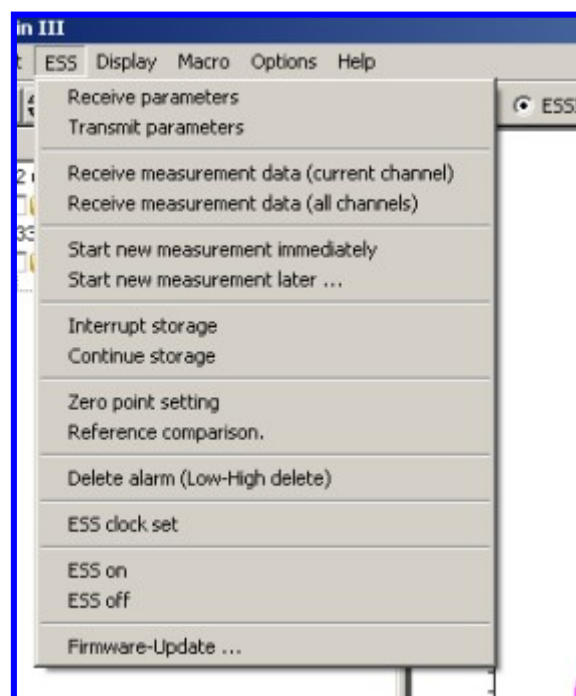
With this function all measurement data are copied to a selected map. E.g. the data can be archived or be imported in EsapPro III, not installed on the computer, by means of an external memory device (e.g. USB-stick) .

Copy into map / copy marked readings.

Here, only marked measurements are copied

8.4.3 ESS

The menu ESS controls the communication with the ESS3. The interface cable must be connected to the ESS3.



Receive parameters

All parameter data are transferred from ESS3 to the PC. Not all parameters are displayed in the field. The parameters can now be changed (changeable parameters are displayed on a white background) and then be transmitted with „Transmit parameters“.

Transmit parameters

Transmits all parameters from PC to the ESS3. Parameters that were changed in TfsWin III, appear on a red background to indicate that the parameters from TfsWin III and ESS3 are not consistent. After transfer the red background disappears. ESS3 and TfsWin III now contain the same parameters.

Receive measurement data (all channels)

Here, measurement data and parameters of all channels are transferred to the PC and saved. In the tree the new measurement is displayed and saved.

Receive measurement data (current channel)

With this command one specific channel is read from an ESS3 with more channels. The channel is selected in the tree.

Start new measurement immediately

All measurement data in the ESS will be finally deleted. The memory is completely free for a new measurement. It starts immediately.

Start new measurement later

The measurement data are finally deleted. A new measurement starts at a later time. This can be set in the following dialogue.

Interrupt storage

The storage is interrupted. This causes a gap in the diagram.

Continue storage

Measurement data are stored again from this time on.

Zero point setting

Here, the zero point is set. The ESS3 must be free of pressure.

Reference comparison

With this command the measurement is adjusted with a reference value. That corresponds with an Offset shift of the measuring range. The zero point is shifted equally.

Delete alarms

Violated alarm limits are being reset. A triangle upwards or downwards indicates the limit violation.

ESS clock set

The clock of the ESS3 is set to the PC-clock.

ESS on

An ESS in off-position (PWSV) is switched on with this instruction.

ESS off

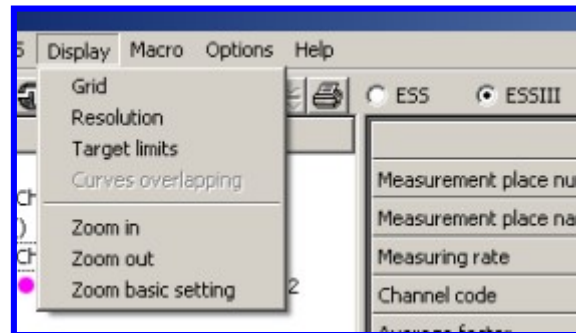
The ESS3 is switched in a power saving position. Measuring are stopped, the display indicates „PWSV“. For measuring the ESS has to be switched on.

Firmware-update

The firmware is changeable by the menu. The new Firmware file ESS3STATIONXYX.PRG is copied from the directory ...\\EsapPro III\\TfsWin III\\Firmware to the ESS3 Station. XYX indicates the version number. Only update to a higher version number is possible.

8.4.4 Display

The menu “**Display**” organises the display of the diagrams.



Grid

Here, a grid for the time- and the value-axis is switched on and off.

Resolution

The selected resolution has a blue background. The blue range indicates the measurement-noise.

Target limits

In the green range of the target limits no measurement data are stored, when the parameter „Store within limits“ is set to no. The average value between upper and lower value is displayed.

Curves overlapping

Different curves may be displayed overlapping in separated coordinate systems. Every coordinate system will be zoomed separately at the value-axis.

Zoom in

The graphic is enlarged by 10%. The selected part can be moved with the horizontal and vertical scroll bar. The enlargement can be repeated. (Zooming with the mouse gives faster results – see chapter 7.3.)

Zoom out

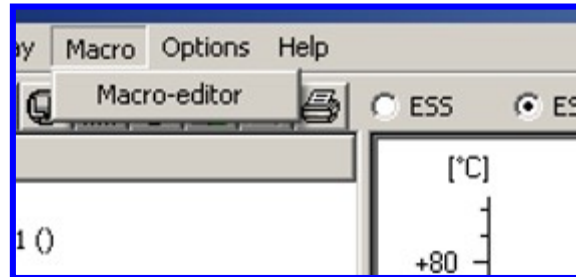
The function reduces the curve in the same pattern as with the enlargement.

Zoom basic setting

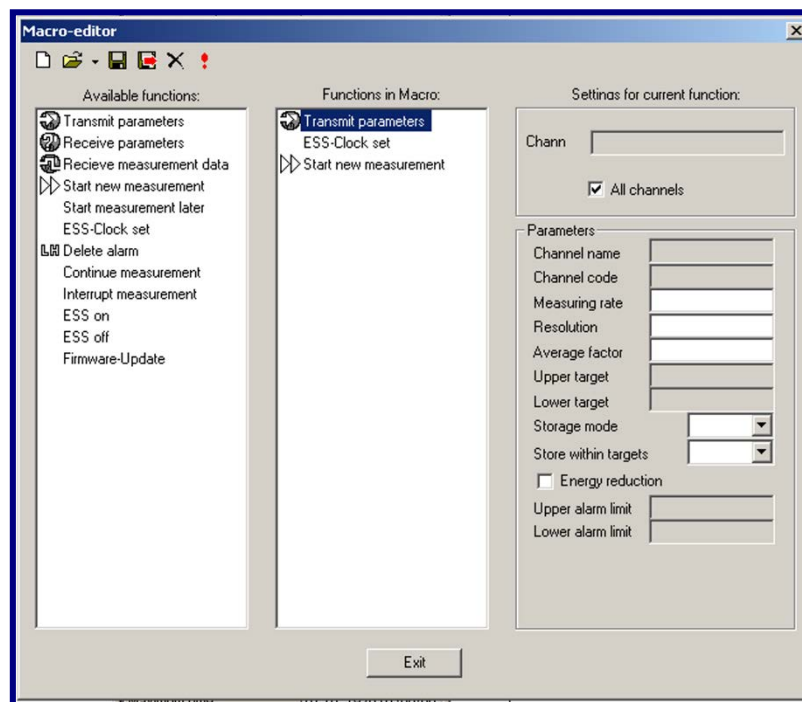
The original time- and value- range of the measurement are displayed.

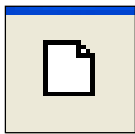
8.4.5 Macro

Command sequences may be programmed in macros. They can be combined to one function.



In the macro editor, with the mouse, commands may be dragged from the left to the right column. The macro can be saved. It can be started from outside TfsWin III. This means that commands can be executed (e.g. receive measurement data) without starting TfsWin.





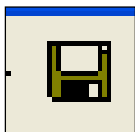
New

A new macro is opened and can be programmed.



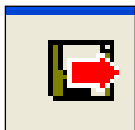
Open

An existing macro is opened.



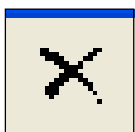
Save

a macro is saved with the existing file name.



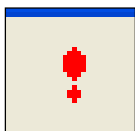
Save as

A macro is saved with a new name.



Delete

The macro is deleted.

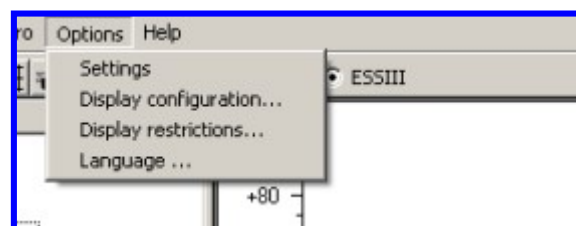


Start

A macro is executed.

8.4.6 Options

In options the basic configuration of TfsWin III is changed.



Settings

Data path: Here the path is set, where the read data will be saved.

Firmware path: Only when firmware files for ESS3 are available in this path, they may be recognised by TfsWin III.

Macro path: Macros will be saved in this path.

ESS connected to: Here the COM-interface is indicated, to which the IrDA-interface cable is connected. The USB-driver assigns a virtual COM-interface to the USB-interface, which is registered here. When a communication is realised, the program searches the correct interface and registers it here.

ESS-Type: The type of the ESS3 is pre-set. ESS3 from production year 2006. ESS from earlier production series 1995 and 2005 are indicated with type: ESS II (Fabrication number 68 000 to 86 000).

Display configuration

The display of the parameters is here specified. At start only four parameters are displayed. By double clicking a parameter it will be added or removed.

Display restrictions

The number of parameters and curves that can be displayed at the same time is here specified. Overlapping curves are from the same measurement place and channel. They are caused by repeated readings and are displayed in the same diagram.

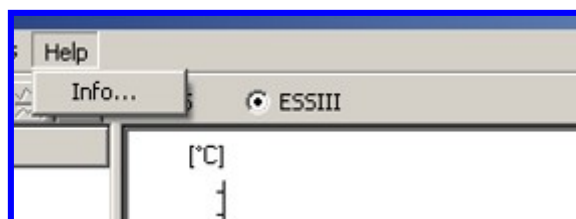
Language

Here the language is selected. Languages can be edited with the language editor Rapid-Translation. Further information about this subject can be found in the EsapPro III manual.

8.4.7 Help

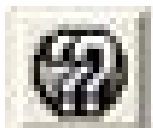
In the menu help the version number of the program is indicated. It consists of the main number and the individual components.

The menu will be extended in the future. At the moment it is inactive.



8.5 Function buttons

Important menus are assigned to function buttons. The same functions can be reached with the menu.



Receive parameters (all).

Parameters from all channels are received. This may be from 1, 2 or 3 channels.



Transmit parameters

Only parameters from the actual channel are transmitted. When parameters from different channels are displayed, this function becomes inactive and is coloured light grey.



Receive measurement data (all)

The measurement data and parameters of all channels are received and saved.



Receive measurement data

Measurement data and parameters from the actual channel are received and saved.



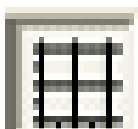
Start measurement

The measurement data are deleted. A new measurement is started.



Delete alarms (delete Low-High)

An exceeded alarm limit is indicated with a triangle upwards or downwards. The alarm is reset.



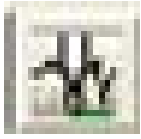
Switch grid display

The grid network can be switched on or off.



Display resolution

Here, the resolution of the measurement values is made visible. Around every measurement value there is a blue range, representing the resolution.



Display target limits

The set target limits are displayed in green.



Curves overlapping

Different readings are drawn with different value-scales. All readings are displayed overlapping, with the scales.



Print

Measurements are printed. The displayed zoom range is maintained.

8.6 Parameter list

☐ ESS
 ☒ ESSIII

	Channel 0 (Pressure)
Measurement place number	011200381
Measurement place name	Water pressure
Channel code	00
Channel name	Pressure
Measuring rate	1 s
Average factor	1
Resolution[%]	0.010
Energy reduction	Off
Upper alarm limit [bar]	0.000
Lower alarm limit [bar]	0.000
Upper target limit [bar]	0.000
Lower target limit [bar]	0.000
Storage mode	Standard
Store within limits	Yes
Date/time	28.12.2006 15:46:33
ESS Firmware	1.02
Power failure	13.07.2006 11:22:56
F.Nr: Evaluation unit	AAB0038A
Measuring range	0.00...10.00 bar
Resolution	0.001 bar
Channel state	Measure
Start measurement	28.12.2006 15:05:36
Number of values	2332
Remaining memory	246975
Alarm over time	08.08.2006 12:46:32
Alarm below time	08.08.2006 12:51:35
Maximum	6.399 bar
Maximum time	28.12.2006 16:28:58
Minimum	-0.002 bar
Minimum time	28.12.2006 16:46:12
Calibration date	19.06.2006
F.Nr: Sensor	AAE0029A□

The parameter can either be programmed in TFS Win III or being read from the ESS3. Every column presents a channel. Parameter data (in white fields) may be changed, Status data (grey background) not.

Measurement place number: The measurement place number defines the measurement place and may have 9 figures.

Measurement place name: The measurement place name may consist of 30 alphanumeric characters.

From here parameters are presented, that can be assigned to every channel.

Channel code: every channel has a two figured number for clear identification.

Channel name: Every channel has a name that refers to the application.

Measuring rate: The measuring rate indicates the time between two measuring. In the example every second is measured.

Average factor: The number indicates the measuring values that will be averaged. The example is not averaged.

Resolution [%]: That is the smallest meas. value difference that must be stored.

Energy reduction: is not yet implemented.

Upper alarm limit (lower) [bar]: When the upper/lower alarm limit is exceeded, a warning is indicated – triangle upwards/downwards.

Upper target limit (lower) [bar]: Within the target limits is not stored – when the parameter „Store within limits“ is set to „No“.

Storage mode: Standard: At full memory the new data are lost. Rolling: The oldest data are deleted and the newest are stored.

Channel 0 (Pressure)	
Measurement place number	011200381
Measurement place name	Water pressure
Channel code	00
Channel name	Pressure
Measuring rate	1 s
Average factor	1
Resolution[%]	0.010
Energy reduction	Off
Upper alarm limit [bar]	0.000
Lower alarm limit [bar]	0.000
Upper target limit [bar]	0.000
Lower target limit [bar]	0.000
Storage mode	Standard
Store within limits	Yes
Date/time	28.12.2006 15:46:33
ESS Firmware	1.02
Power failure	13.07.2006 11:22:56
F.Nr: Evaluation unit	AAB0038A
Measuring range	0.00...10.00 bar
Resolution	0.001 bar
Channel state	Measure
Start measurement	28.12.2006 15:05:36
Number of values	2332
Remaining memory	246975
Alarm over time	08.08.2006 12:46:32
Alarm below time	08.08.2006 12:51:35
Maximum	6.399 bar
Maximum time	28.12.2006 16:28:58
Minimum	-0.002 bar
Minimum time	28.12.2006 16:46:12
Calibration date	19.06.2006
F.Nr: Sensor	AAE0029A□

From here status data are presented that are equal for all channels.

Date/time: Date and time are indicated.

ESS Firmware: The version number of the firmware is indicated.

Power failure: The date that the battery reached the low voltage level.

F.Nr: Evaluation unit: Indication of the production number of the evaluation unit.

From here channel dependent status data are presented, coming from the sensor:

Measuring range: Measuring range of the sensor.

Resolution: The smallest mes. value difference is indicated. It may be changed with the parameter resolution.

Channel state: Measuring: Data are measured and stored. Stop: Only measuring takes place, no storage.

Start measurement: A new measurement is started at this time. The old measuring values are finally deleted.

Number of values: Number of stored values.

Remaining memory: The remaining memory indicates the number of free memory places.

Alarm over (below) time: First time the upper/lower alarm limit was exceeded.

Maximum (minimum): Maximal (minimal) measuring value since the last reset with the buttons.

Maximum (minimum) time: Time, when the maximum (minimum) was reached.

Calibration date: Date of the last calibration of the sensor.

F.Nr: Sensor: Sequential production-number of the sensor.

9 Maintenance

Maintenance of the ESS3 is limited to monitoring the batteries, tightness of the housing and cleaning the front plate. The components that are important for the IR-transmission are situated directly behind the front plate.

9.1 Battery block

The battery block consists of lithium cells with a safety circuit. They are moulded in a silicon mass. The resistor limits the short circuit current of the batteries. The capacity of the batteries is 35 Ah. The used batteries can be disposed by the manufacturer free of charge.

9.2 Changing the batteries



Attention: Only original battery blocks with Ex-sign, certified by the manufacturer may be used..

The expl. Protected battery block is placed on a holding plate on the cover. For the change the contact plug has to be pulled. After that the battery can be removed.

The battery may be exchanged without loss of data. The clock stops. The clock is slow for the time it was without power.

The instrument is assembled again. Special attention should be paid to the situation of the O-ring between front plate and the housing. A damaged O-ring must be replaced.

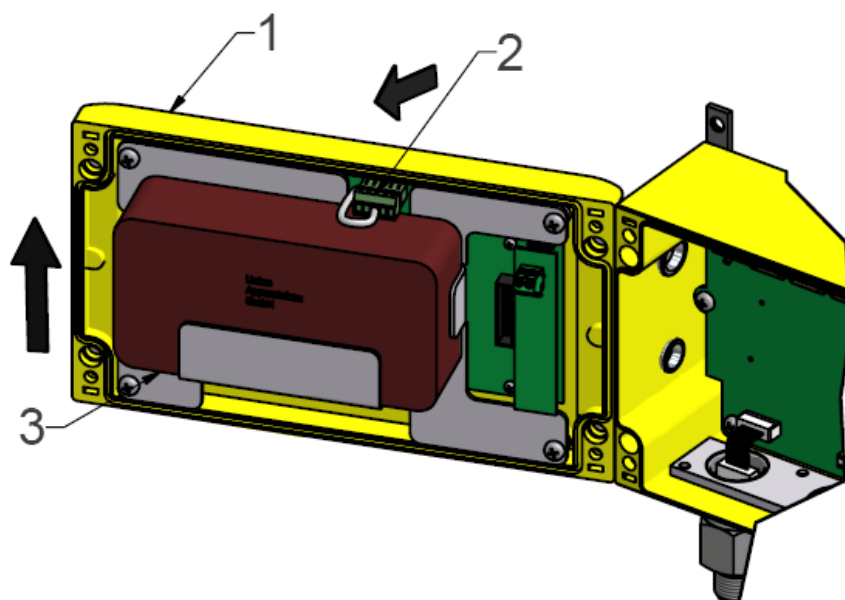


Figure 4: ESS3 Station change of battery

- 1 ESS3 Station box
- 3 battery

- 2 battery plug

The used battery should be disposed. They can be returned to the manufacturer free of charge.

The lifetime of the battery set is roughly estimated according to the table below.

measuring rate	battery life time	
	Station with 2 sensors	Station with 4 sensors
250 ms	9 months	not available
500 ms	16 months	8 months
1 second	2 years	1 year
10 seconds	7 years	4 years
1 minute	9 years	8 years
10 minutes	10 years	10 years

Table 1: ESS3 Station – battery lifetime

The lifetime of the battery is also effected by the ambient temperature, the number of communications, using the buttons for menu operation and so on.

9.3 Water proofness of the housing

The ESS3 Station is splash-proof and offers a degree of protection of IP54. It has a ventilation opening, so no internal pressure can built up at varying air pressure. At gauge pressure the air pressure will be led as reference pressure.

9.4 IR-transmission

Senden und Empfangen erfolgt durch die IR-Sensoren hinter der Frontplatte. Die Fenster zu den Dioden müssen immer sauber sein.

9.5 Change of sensors

Pressure and temperature sensors may be exchanged. Every ESS3 Station consists of an evaluation electronic unit and up to four calibrated sensors in a housing with a measuring electronic unit. The connections can be plugged in. The Sensor is only delivered together with the measuring electronic unit in the sensor housing. The unit is calibrated and is ready for measurement. Change back to the old sensor is easy.

The sensors should not constantly be exchanged. Exchange should be limited to changing measuring range or repair.

Attention:

Only sensors with ex-marks on the type plate must be used with an explosion protected ESS3 Station, otherwise the ex-protection of the ESS3 Station will get lost. The lowest

degree of protection of the single components determines the degree of protection of the total system.

Works at an open electronic have to be carried out with the utmost care. No foreign materials (especially leading metal parts) must come inside the instrument as otherwise there will be a malfunction in operating the ESS3 Station.

After pulling down the right lateral covering strip and loosening of the two screws the instrument is opened. The cover can be swayed to the left.

Attention: Pull the battery plug so that the instrument is dead.

Now new sensors can be assembled. Remove the blind screw (2) and screw in the sensor electronic onto the holding plate (1). The sensor cable (10) has to be connected with the corresponding plug.

When changing the sensors caution is necessary. The plug on the motherboard must not be damaged.

When all sensors are assembled or changed, the battery can be connected again. The new sensors are identified after rebooting.

The housing cover is screwed together again with the bottom and the board clipped on.

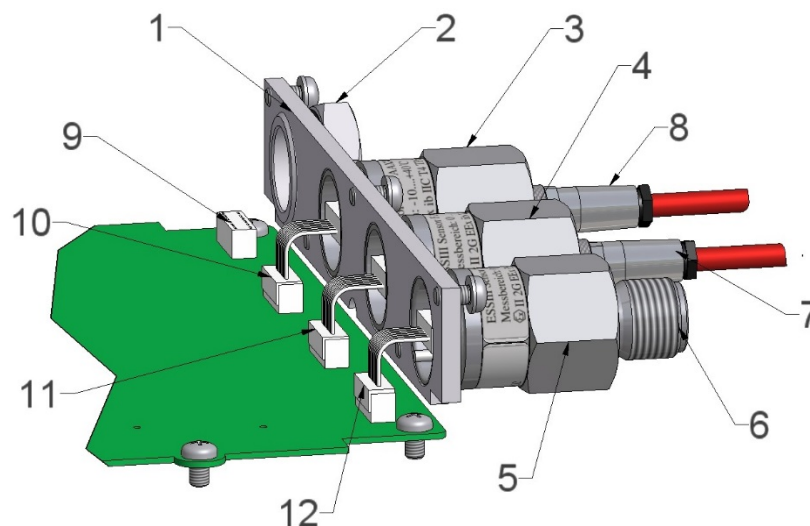


Figure 5: ESS3 Station

- | | | | |
|----|-------------------------------------|----|--------------------------------------|
| 1 | mounting plate sensor | 2 | blind cap sensor connection |
| 3 | case cable sensor | 4 | case cable sensor |
| 5 | case pressure sensor (screw sensor) | 6 | 1/2" external thread pressure sensor |
| 7 | plug sensor cable | 8 | plug sensor cable |
| 9 | connection 4. sensor | 10 | connection 3. sensor |
| 11 | connection 2. sensor | 12 | connection 1. sensor |

10 Measuring sensors

The ESS is delivered with following measuring sensors:

- Relative pressure
- Overpressure
- Barometer pressure
- Temperature
- Impulse

Every measuring sensor is selected for the desired measuring range and is adapted to the electronics. The measuring range can be changed by installing another calibrated sensor.

10.1 Overpressure protection

The pressure sensors are overpressure protected up to minimal 1,3- times the measuring range. Higher overpressure protection on request.

11 Trouble shoot

Typical mistakes are described, which may occur due to faulty operation or a defect of the device.

11.1 Display is weak or blind

Change of the battery is overdue. The display shows the battery symbol and "PWSV". The battery voltage is not strong enough to run the ESS3 Station. The old battery must be changed against a new one. After that it will be restarted automatically.

11.2 Moisture on the display

Moisture is ingressed into the instrument. This must be absolutely avoided by choosing a dry place. After ingress of moisture the instrument has necessarily to be sent in for inspection.

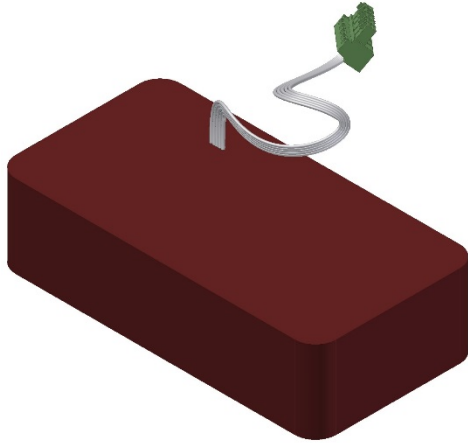
11.3 Transmission was interrupted

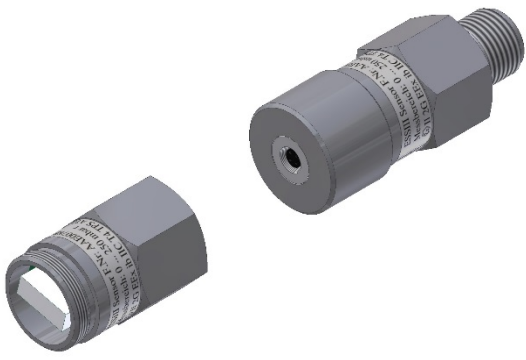
Natural light contains IR-rays that may pretend a communication of the Infrared link. During the communication with the PC, the ESS3 may not be exposed to direct sun rays.

12 Accessories, equipment, spare parts

Below the spare parts and useful accessories are described and displayed.

12.1 List of spare parts

	Component Battery ex proof for ESS3 Station Order.Nr: 01202199996 Weight:
	Component Pressure sensor (screw sensor), ex-proof, for ESS3 Station, ESS3 Plus and ESS3 Gas Order.Nr: 01202199987 100 mbar relative 01202199988 250 mbar relative 01202199989 1 bar relative 01202199991 2,5 bar relative 01202199992 10 bar relative 01202199998 25 bar absolute 01202199994 100 bar absolut Weight:

	Component Pressure sensor (cable sensor), ex-proof, for ESS3 Station, ESS3 Plus and ESS3 Gas Order.Nr: 01202199977 100 mbar relative 01202199976 250 mbar relative 01202199975 1 bar relative 01202199974 2,5 bar relative 01202199973 10 bar relative 01202199972 25 bar absolute 01202199971 100 bar absolut Weight:
	Component Temperature sensor (cabel sensor), ex-proof, for ESS3 Station and ESS3 Plus. Measuring range: -10 ... +40°C Order.Nr: 01202199997 (Sensor length 90mm) 01202199970 (Sensor length 140mm) Weight:
	Component Sensor cabel for pressure sensor (cabel sensor) and temperature sensor (cabel sensor) Order.Nr: 01302099999 (length 10m) Weight:

13 EU-Declaration of conformity

EU – Konformitätserklärung EU – declaration of conformity



Der Hersteller / The manufacturer

Union Instruments GmbH
Zeppelinstrasse 42
76185 Karlsruhe

erklärt hiermit, dass folgend bezeichnete Produkte / hereby declares, that following named products:

Mess-System zum Erfassen von Druck-, Differenzdruck- und Temperatur Datenlogger ESS III STATION und Modem
Measuring system for pressure, difference pressure and temperature ESS III STATION and MODEM

konform sind mit den Anforderungen, die in EG – Richtlinien festgelegt sind / are compliant with the requirements as defined in the EC directives:

- 2014/30/EC **Elektromagnetische Verträglichkeit** (nur ESS III Station)
- 2014/30/EC **Electromagnetic compatibility** (only ESS III Station)
- 2014/34/EC **Richtlinie für Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen**
- 2014/34/EC **Directive on equipment and protective systems intended for use in potentially explosive atmospheres**

Angewandte harmonisierte Normen / Used harmonized standards:

DIN EN 61326-1:2013 Elektrische Mess-, Steuer-, Regel- und Laborgeräte - EMV-Anforderungen - Teil 1: Allgemeine Anforderungen
Electrical equipment for measurement, control and laboratory use – EMC requirements - Part 1: General requirements

EN 60079-0:2012 Explosionsgefährdete Bereiche - Teil 0: Betriebsmittel - Allgemeine Anforderungen
Explosive atmospheres - Part 0: Equipment - General requirements

EN 60079-11:2012 Explosionsgefährdete Bereiche - Teil 11: Geräteschutz durch Eigensicherheit "I"
Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "I"

EG-Baumusterprüfbescheinigung / EC-Type Certification Certificate:

EX5 07 04 31532 004, Mess-System zur Erfassung von Druck-, Differenzdruck- und Temperatur Datenlogger ESS III STATION, Sensorerweiterungseinheit ESS III PLUS vom 18.04.2007 inkl. 1. Ergänzung vom 24.04.2008, TÜV Product Service GmbH, Riedlerstraße 65, 80339 München, Germany, Nr.: 0123

Notifizierte Stelle für QS – Überwachung / notified body for QA-Assessment:

TÜV Product Service GmbH, Riedlerstraße 65, 80339 München, Germany, Nr.: 0123

Bei einer nicht autorisierten Änderung des Gerätes verliert diese Erklärung ihre Gültigkeit. / Any unauthorized modification of the device results in invalidity of this declaration.

Karlsruhe, den 29.04.2016



Peter Kienke, Geschäftsführer / general manager

14 EC-Type Examination Certificate



Product Service

EG-Baumusterprüfbescheinigung

Nr. EX5 07 04 31532 004

Zertifikatsinhaber: Union-Apparatebau GmbH
Zeppelinstr. 42
76185 Karlsruhe
DEUTSCHLAND

Produkt: Elektrische Geräte allgemein
Gerätegruppe II, Kategorie 2 G

Modell(e):  Mess-System zum Erfassen von Druck-,
Differenzdruck- und Temperatur Datenlogger
ESS III STATION, Sensorerweiterungseinheit
ESS III PLUS

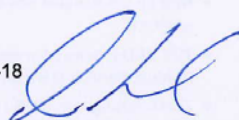
Kenndaten: Ex II 2 G, EEx ib IIB T4
Batterieversorgung XDD, 7,4 V, max. 35 Ah

Besondere Bedingungen: Das IrDA-Datenkabel darf nur für
Servicezwecke über einen externen PC angeschlossen
werden, wenn nachgewiesen ist, dass keine explosionsfähige
Atmosphäre vorliegt

Diese EG-Baumusterprüfbescheinigung bestätigt die Übereinstimmung des bezeichneten
Produktes mit den einschlägigen Vorschriften gemäß Anhang III der Richtlinie des Rates Nr.
94/9/EG für Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in
explosionsgefährdeten Bereichen (ATEX). Prüfgrundlage ist ausschließlich das zur Prüfung und
Zertifizierung vorgestellte Prüfmuster sowie dessen technische Dokumentation. Umseitige
Hinweise sind zu beachten.

Prüfbericht Nr.: 71319165

Datum, 2007-04-18




TÜV SÜD Product Service GmbH ist benannte Stelle gemäß der Richtlinie des Rates Nr.
94/9/EG für Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in
explosionsgefährdeten Bereichen mit der Kennnummer 0123.

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Product Service

1. Ergänzung zur EG - Baumusterprüfbescheinigung EX5 07 04 31532 004

1. Hersteller

Union-Apparatebaugesellschaft mbH
Zeppelinstr. 42
76185 Karlsruhe
GERMANY

2. Gerät

2.1 Datenlogger Typ: ESS III STATION / PLUS / MODEM

 II 2 G EEx ib IIB T4

Potenzialfreie Eingänge:
Klemmen A1...A6 und B1...B6
 $U_0 = 7,5 \text{ V}$
 $I_0 = 24 \text{ mA}$
 $P_0 = 180 \text{ mW}$
 L_0 vernachlässigbar
 C_0 vernachlässigbar

Serielle Schnittstelle:
Klemmen E1...E3
 $U_0 = 7,5 \text{ V}$
 $I_0 = 1 \text{ mA}$
 $P_0 = 7,5 \text{ mW}$
 L_0 vernachlässigbar
 C_0 vernachlässigbar

2.2 Impulssensor

 II 2 G EEx ib IIC T4

$U_0 = 7,5 \text{ V}$
 $I_0 = 24 \text{ mA}$
 $P_0 = 180 \text{ mW}$
 L_0 vernachlässigbar
 C_0 vernachlässigbar

TÜV SÜD Product Service GmbH
EX-Schutzzlabor
Gottlieb-Daimler-Str. 7
D-70794 Filderstadt

1. Ergänzung zu ESS III STATION; PULS; MODEM
EX5 07 04 31532 004
A.Nr.:1162216
2008-04-24
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TÜV SÜD Product Service GmbH · Zertifizierstelle · Ridlerstrasse 65 · 80339 München · Germany



Product Service

- 2.3 ESS III Modem
Serielle Schnittstelle Klemmen K1...K3

 II (2) G [EEx ib] IIB

$U_0 = 24 \text{ V}$
 $I_0 = 24 \text{ mA}$
 $P_0 = 180 \text{ mW}$
 L_0 vernachlässigbar
 C_0 vernachlässigbar

3. Prüfspezifikation

Grundlegende Anforderungen der Richtlinie 94/9/EG (ATEX 95)

EN 60079-0:2004, EN 50020:2002

4. Beschreibung der Ergänzungen

- 4.1 Das System wird mit einem „Modul MODEM“ zur Kommunikation der ESSIII-Station über Funk erweitert. Das Modem selbst wird außerhalb des Ex-Bereiches installiert und über eine serielle Schnittstelle mit der ESSIII-Station verbunden. Im Modem ist eine „Sicherheitsbarriere“ integriert, welche einen „eigensicheren Stromkreis“ zur Station sicherstellt.
- 4.2 Erweiterung um 6 passive potenzialfreie Eingänge oder 4 Namur-Eingänge. Die Speisung der externen Namur-Kontakte erfolgt durch dieselbe Platine.
- 4.3 Ergänzung der fest eingeschraubten Sensoren durch über steckbare Leitungsverbindungen anschließbare Sensoren.
- 4.4 Ergänzung um ein Sensormodul „Impuls“

5. Prüfungsunterlagen

- 5.1 Übersicht über die Ergänzungen, 18.01.2008
5.2 Übersicht über das Gesamtsystem, 18.01.2008
5.3 Beschreibung der Module, Schnittstellen und Eingänge, 18.01.2008
5.4 Zeichnung 8.13.040-ex, ESS III Modem, 08.02.2008
5.5 Zeichnung ESS-GSM_v05r02.sch, Schaltplan, 14.01.2008
5.6 Zeichnung ESS-GSM_v05r02 RS232PCB.brd Top, Bestückungsseite, 14.01.2008
5.7 Zeichnung ESS-GSM_v05r02 RS232PCB.brd Bottom, Lötseite, 14.01.2008
5.8 Zeichnung ESS-Namur v02r17.sch, Schaltplan, 15.02.2008
5.9 Zeichnung ESS-Namur v02r17.brd Top, Bestückungsseite, 15.02.2008

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1. Ergänzung zu ESS III STATION; PULS; MODEM
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2008-04-24
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Product Service

- 5.10 Zeichnung ESS-Namur v02r17.brd Bottom, Lötseite, 15.02.2008
- 5.11 Zeichnung ESS-Puls v01r00.sch, Schaltplan, 22.01.2008
- 5.12 Zeichnung ESS-Puls v01r00.brd Top, Bestückungsseite, 22.01.2008
- 5.13 Zeichnung ESS-Puls v01r00.brd Bottom, Lötseite, 22.01.2008
- 5.14 Zeichnung 8.15.032-ex, Sensoroptionen ESS III, 29.01.2008
- 5.15 Betriebsanleitung ESS III Station/Modem, Auszug S. 1-14, 15.02.2008

6. Ergebnis / Result

Die Prüfung ergab, dass durch die vorgenommenen Ergänzungen / Änderungen die Anforderungen an die „Eigensicherheit“, welche sich aus der Kennzeichnung der Module/Geräte ergeben, weiterhin erfüllt sind.

TÜV SÜD Product Service GmbH

TÜV SÜD Industrie Service GmbH

Fachzertifizierer

Prüfer




Dipl.-Ing. Andreas Pfeil
Branchenkompetenzzentrum Maschinen und
Industrieprodukte

i.A. Dipl.-Ing. Klaus Gohlke
IS-EG1-STG

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1. Ergänzung zu ESS III STATION; PULS; MODEM
EX5 07 04 31532 004
A.Nr.:1162216
2008-04-24
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TÜV SÜD Product Service GmbH · Zertifizierstelle · Ridlerstrasse 65 · 80339 München · Germany

EINGEGANGEN

- 2. Juni 2008

Erl.

TÜV SÜD Product Service GmbH • Gottlieb-Daimler-Straße 7 • 70794 Filderstadt • Deutschland

Union Instruments GmbH
Herrn Bernhard Benz
Zeppelinstr. 42
76185 Karlsruhe



Product Service

Mehr Sicherheit.
Mehr Wert.

Ihre Zeichen/Nachricht vom	Unsere Zeichen/Name	Tel.-Durchwahl/E-Mail	Fax-Durchwahl	Datum	Seite
	MMY-pf Andreas Pfeil	0711 7005-421 andreas.pfeil@tuvv-sued.de	089 5155-1688	01.07.2008	1 von 1

Änderung Ihrer Firmenbezeichnung

Sehr geehrter Herr Benz,

durch die Änderung Ihrer Firmenbezeichnung von

Union Apparatebau GmbH zu Union Instruments GmbH

wird die Gültigkeit der bei uns geführten Zertifikate **nicht** beeinträchtigt.

Dies bezieht sich auf folgende bei uns z.Z. gelisteten Zertifikate:

EX3 08 05 31532 005 ; EX5 07 04 31532 004 ; EX5 06 03 51532 002 und
EX5 03 05 31532 003

Für Rückfragen stehen wir Ihnen gerne zur Verfügung.

Mit freundlichen Grüßen

TÜV SÜD Product Service GmbH

i.A. Dipl.-Phys. Andreas Pfeil

Branchenkompetenzzentrum Maschinen und Industrieprodukte



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