Messtechnik • Prozessinstrumentierung • Prüf- und Kalibriertechnik
Measurement • Process Instrumentation • Test and Calibration Equipment

ICS SCHNEIDER MESSTECHNIK

Operating Instructions
DPK3 Leak test case

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1 Indications for explosion proof instruments

• Application area and prescriptions

These indications and warnings must be considered absolute to guarantee an employment without danger. The devices may only be employed for the intended 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 must 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.

2 Technical data DPK3

ESS3 data logger:

Measuring range pressure:

       0… 2, 5   bar o   absolute pressure
       0…   10   bar o   absolute pressure
       0…   25   bar o   absolute pressure
       0… 100   bar o   absolute pressure

Measuring ranges temperature:

  -10… +40   °C

Other measuring ranges on request

Overpressure protection: up to1, 3-times the end of the range

Connection: G1/2" male thread with G1/8" female thread
                        „Minimess" connections Series 1215 screwed in G1/8"
                        connection

Accuracy: maximum: ± 0,1% measuring range end val (overall accuracy
                        at ambient temperature from -20°C to +40°C, linearity,
                        hysteresis)
                        typical: ± 0,05% measuring range end val

Resolution: less than ±0,004% full scale
                        (1 mbar at measuring range 25 bar according to DVGW 469
                        B3.2)

Memory: 250 000 measuring values, with pressure- and temp. ESS3
                        ca. 83 000 measuring values per channel

Power supply: 2 Lithium cells (2 x 3,6V / 7,2Ah)

Power consumption: Power save: ca. 45uA, active: ca. 20mA

Battery operating time: ca. 4 months at one measuring per second (one channel),
                        ca. 2,5 months at one measuring per second (three
                        channels)

Protection: IP 54

Ex-proof protection: ⟨Ex⟩ II 2 G   EEx ib IIC T4

Seal material: NBR70 or Viton

Dimensions: ca. 108 x 161 x 77 mm (W x H x D)

Weight: 1200 g

Operation temp.:   -20 ... +60°C

Storage temp.:   -20 ... +60°C

IrDA-interface cable serial:

Connection: 9-pin D-SUB-Bus

Ex-proof protection: none

Battery powered printer:
Power supply: 1 NiMH battery pack with 5 NiMH-Accu's (5 x 1,2V)
Power consumption   Inactive: aprox. 5 uA, active: aprox. 800 mA
Battery operation time: at least 50 ESS-prints
Protection: IP 40
Ex-proof protection: none
Operation temp.:   0 ... +60°C
Storage temp.:   -20 ... +60°C

Case:
Dimensions: 412 x 125 x 352 mm (W x H x D)
Weight: 4,2 kg

3 Introduction

The DPK3 (leak test case) is a further development of the mechanical recorders which have been used for decades for leak tests at gas- and water pipeline systems.

Electronics registers all information and stores it. Independency of the power supply and robust building makes the system universal applicable.

The DPK3 consists of an ESS3 (electronic memory recorder), a printer and accessories, all together in a stable case.

The DPK3 can have 2 instrument types.

1. ESS3 for measuring a pressure
   The instrument has a high accuracy and resolution with simultaneous temperature stability. Variations in the environmental temperature between -0°C and +40°C have only a very small effect on the measuring value.

2. ESS3 for measuring a pressure and a temperature
   These instruments measure a temperature supplementary to the pressure. This may be the temperature of the environment, the temperature of the earth's surface or the temperature of the pipeline. Out of both measuring values the ESS3 calculates a temperature compensated pressure curve.

The construction of the ESS3 is flexible. The system has a large data memory and a large program memory, which controls the operation system. It can be updated by the customer himself. Older instruments can be provided with updates.

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 have a separate ex-approval. A combination of other sensors is possible without loosing the overall ex-approval.

4 First time putting into operation

4.1 Installation of the connections

The type plate at the sensor indicates the serial number of the sensor and the measuring range. The measured pressure must be within this range. Overpressure up to1, 3-times the measuring range is allowed. The calibrated measuring range extends from 104% to -4% of the range. As a result the zero point can be clearly checked.

At measuring, the ESS3 can be kept in the case. With the provided "Minimess"-hose it can be connected to the pipe via a G½" – "Minimess" series 1215 adapter. The "Minimess"- adapter has a closing valve, that opens when the "Minimess-hose is screwed to the adapter. The ESS3 can also be employed outside the case and be connected to the pipeline with the G½"male thread. In that case the "Miminess" adapter has to be removed.

The temperature sensor can be attached directly to the pipe and at underground pipes the sensor is put in the soil. The temperature sensor should be placed in a way that the temperature of the pipe is measured as accurate as possible. Temperature differences between temperature sensor and the temperature of the pipe lead to faults in the temperature compensated measuring curve.

4.2 Switching on the ESS3

At delivery the device is in 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 device is stored.

By pushing button „**enter**"   the action bar at the lower display edge is started. When the action bar has moved to the end, the button must be released and the system switches into the measuring mode. In this mode the other 3 buttons are inactive.

Attention: At releasing the button the function is executed.

The actual adjustments are those that were active before the ESS3 was switched in power save. With new instruments these are the adjustments of the manufacturer.

Sample rate	1 sec
Resolution	0,01 %
Storage mode	standard
Upper target limit	off
Lower target limit	off
Average factor	1 The instrument is now ready to measure.

4.3 Short instruction for performing a leak test

Situation at start: The ESS3 is in position „Power-Save" („PWSV"), the battery operated printer is in position Power-Down (the led's at the printer don't light up)

1. The ESS3 is switched on by pushing button ⏎ **(„enter")** for 3 seconds. **„enter"** leads tot he first menu level. Pushing ↑ **(„up")** or ↓ **(„down")** multiple times switches tot he menu point „ LTST". The second menu level can be reached with **„enter"**. In that level, with **„up"** or **„down"**, „TYP1" can be chosen and confirmed with **„enter"**.
2. The setting „TEMP" appears only with an ESS3 with temperature measuring. **„ON"** is confirmed with **„enter"**. After that the 9 figure measurement location number LNO3, LNO2 and LNO1 is set in groups of 3 figures. The pre set figures are confirmed with **„enter"**.
3. **„enter"** starts a pressure probe. The ESS3 initialises the leak test with the indication **„WAIT"** and starts the test with a sample rate of 1 second and the maximum resolution oft he system.
4. During the measuring, alternated „RUN" and the passed time oft he leak test are indicated.
5. Terminating the leak test: By pushing **„enter"**, INFO **„down"** LTST **„enter",** in the sub menu STOP the leak test is terminated by pushing **„enter"** YES **„enter"**.
6. Printing the pressure probe: in the menu LTST, pushing **„down"** switches to the menu point PRNT. The IrDA-cable is connected to the printer, the transfer head is connected to the adapter pins of the ESS3 and the printer switched on with button ►. During initialisation the status led on the printer blinks red for 5 seconds and after that it blinks green. A yellow led means the printer battery must be charged.
7. By pushing **„enter"** the ESS3 is switched to menu point „PRNT". **„enter"** YES **„enter"** starts the printing.
8. With the menu points „LTST" and „PRNT" the printing can be repeated arbitrary.
Alternatives for pressure probe TYP1 are described in chapter 6.

The last leak test can be repeated as follows:
1. Pushing **„up"** for a longer time (3 seconds, the action bar moves to the right end) restarts the last performed leak test, respectively terminates this leak test.
2. By pushing **„down"** for a longer time the leak test is printed respectively the printing is interrupted.
3. Pushing **„enter"** for a longer time switches the ESS3 status between Power-Save and measuring mode.

4.4 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:
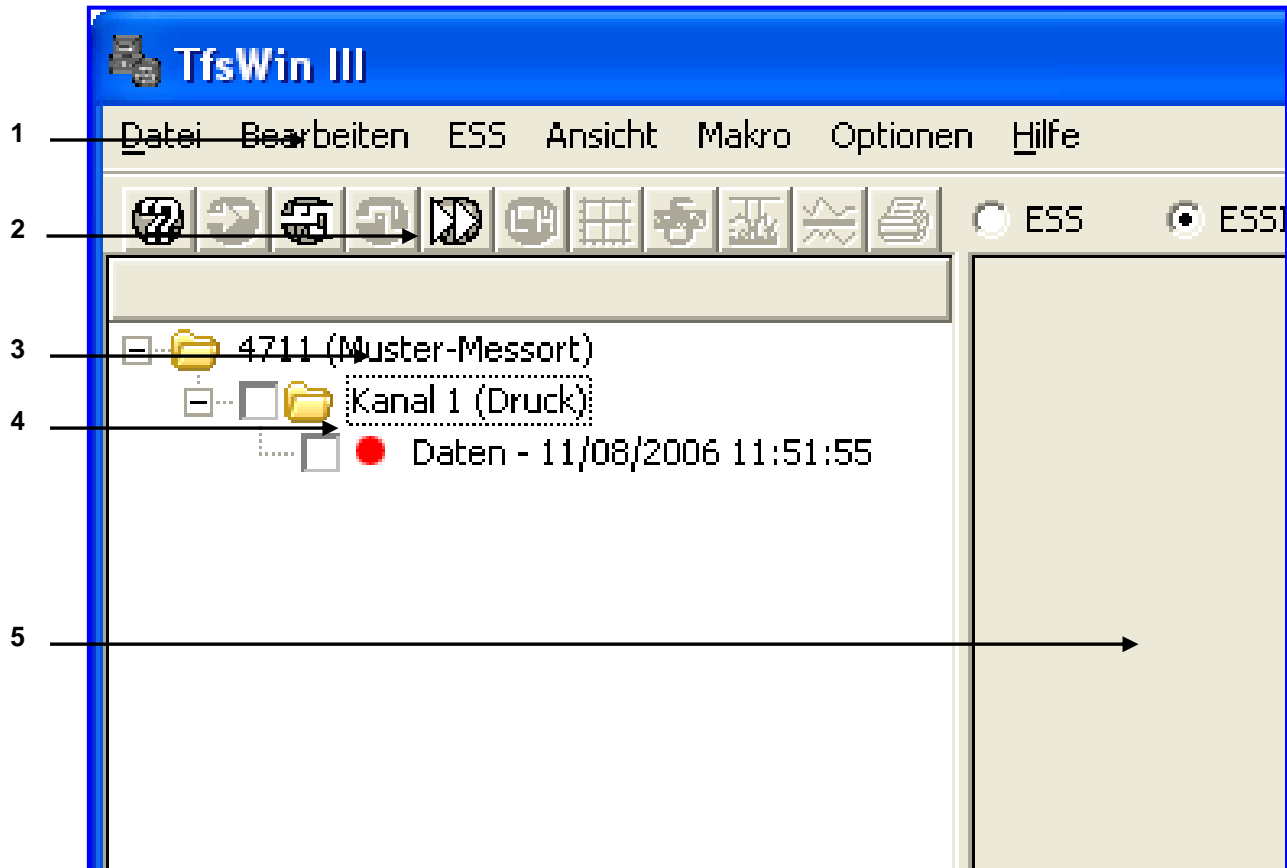
Figure 1: TfsWin III enlargement of the start display

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 (Druck)" in window 2, the parameters are displayed. After marking "Data -11/08/2006 11:51:55" the diagram appears in diagram field 5.
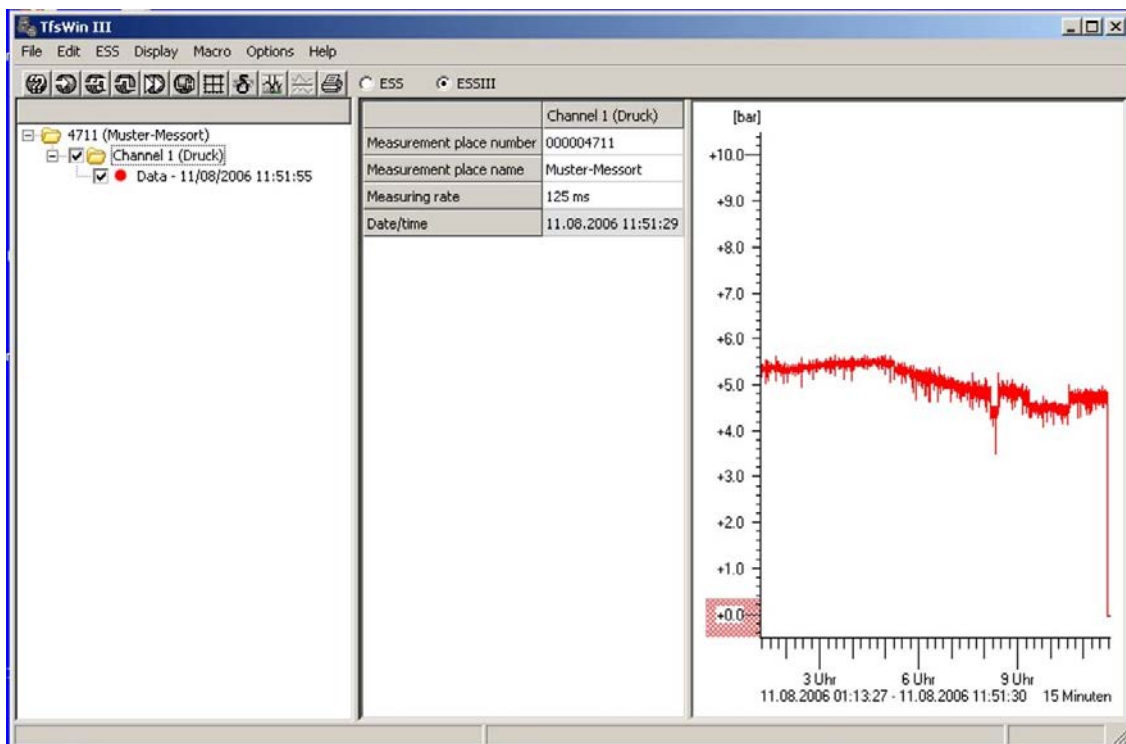
Figure 2: TfsWin III display with example curve

4.4.1 Transfer to the computer

After the ESS3 has measured for some time, the measurement data can be read. The IrDA-interface cable is connected to the serial computer interface (same cable as is used for the printer). For a PC that has no serial interface, an USB connection is available. The transfer head is connected to the adapter pins at the ESS3. With menu point `ESS / Receive measurement data (all channels)` the connection to the ESS3 is initialised and the transfer is started. The transfer can last up to 2 minutes. After the transfer the curve appears on the screen.

In following chapters all functions of the ESS3 and TfsWin III will be explained.

5 Handling the DPK3

The leak test case DPK3 contains an ESS3 for capturing data, a battery powered printer and accessories. After loosing the locking screw (8), the ESS3 (5) can be removed from the case.

5.1 Overview DPK3
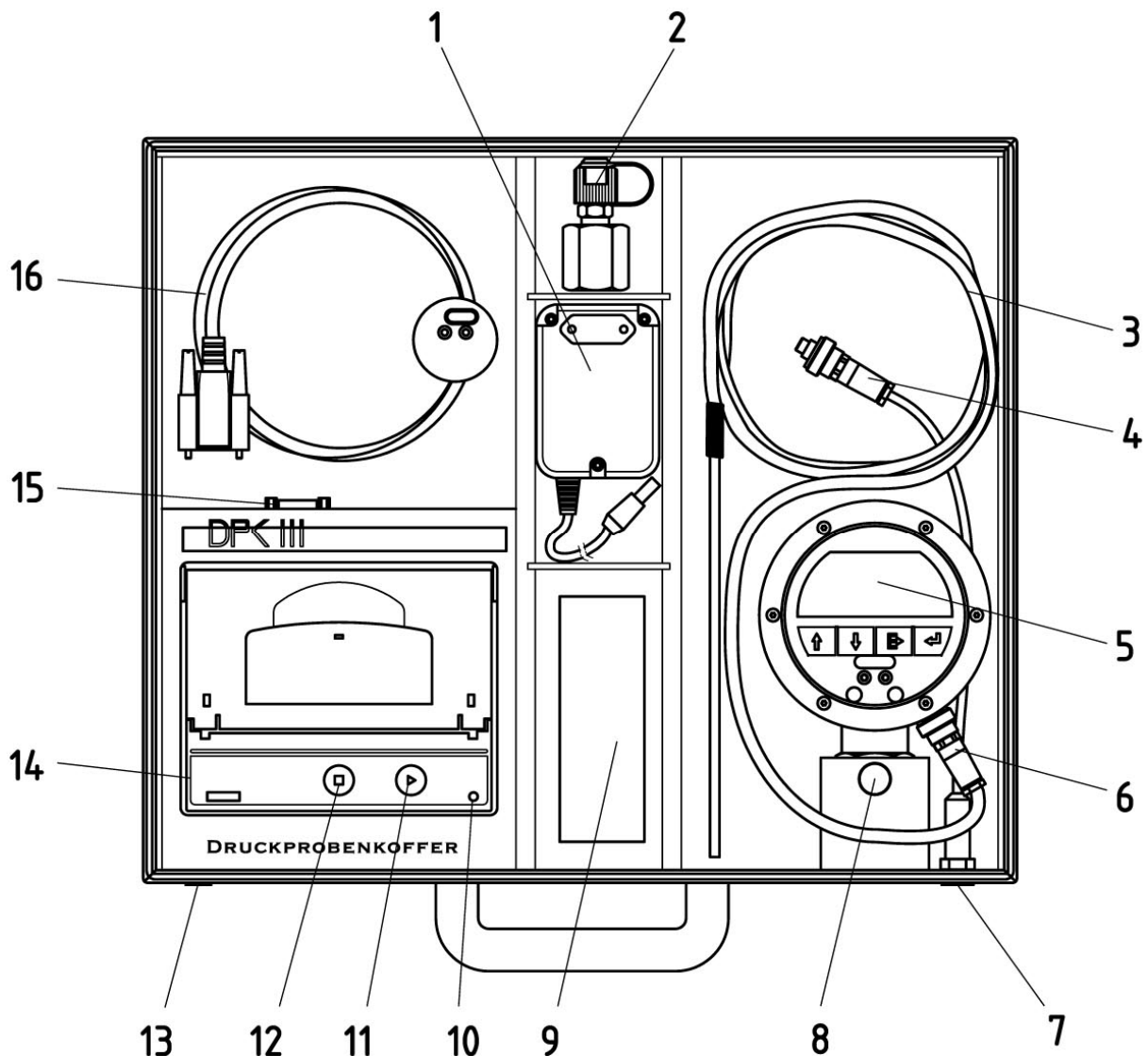
Figure 3: DPK3

1	Pluggable power supply	2	Adapter G1/2" to "Minimess" 1215
3	Temperature sensor	4	Connection cable temperature sensor
5	ESS3 pressure/temperature	6	ESS3 temp.
7	Case connection temperature sensor	8	Locking screw
9	Spare paper rolls	10	Status-LED
11	Button Paper-Feed	12	Button config

| 13 | Load jack printer | 14 | Battery powered printer |
| 15 | IrDA-cable jack | 16 | IrDA-cable |

5.2 Handling the battery powered printer

The battery powered printer (14) has a setting Power-Down. The printer is switched on with the button Paper-Feed ►(11). During initialisation the Status-LED (10) lights red. After that the led blinks for 10 seconds. The battery powered printer is operational. When there isn't any operation, the printer automatically switches in Power-Down status after a few minutes. The LED extinguishes.

When the LED is blinking red continuously, the printer should be charged with the pluggable power supply (1) connected to the load jack (13). Only the original power supply should be used to avoid damaging the charge electronics. During the time the printer is charged, the LED blinks green. For an empty battery the charge time is 4 hours. After that the charging mode is switched to conservation charge; the LED lights green.

The IrDA-cable (16) is connected to the ESS3 (transfer head connected to the adapter pins). Then the cable (16) is connected to jack (15) of the printer. The IrDA-cable has to be initialised by the printer. This happens every time the printer is switched on. Therefore the IrDA-cable has to be connected before the printer is switched on. The button Config ■ (12) can eventually initialise the printer afterwards.

At paper end the LED blinks red. A new paper roll is installed. The flap of the paper compartment at the battery powered printer can be pulled up and the new paper roll is so installed, that the paper is winded from underneath, to assure that the printable side of the paper is at the printing head.

The temperature sensor can separated of the ESS3 and connected again at the case connection (7) and the connection cable (4). In this way it is possible to measure with the case closed. With the "Minimess"-hose the pressure is connected to the holding pod (8). The "Minimess"-hose is connected to the test connection with the adapter (2).

6 Handling the ESS3

Handling of the separate ESS3 for gas, water or temperature is almost identical. All instruments have identical operating software, specific configured for the appropriate instrument type.

6.1 Overview ESS3 pressure

Figure 4: ESS3 with sensor housing

1	Display	2	Arrestor ring
3	4 Operation buttons	4	IR window ESS3
5	Adapter pins	6	IR window ESS II
7	Field for sensor data	8	Sensor housing
9	G½" male thread	10	G1/8" female thread

6.2 Overview ESS3 pressure and temperature
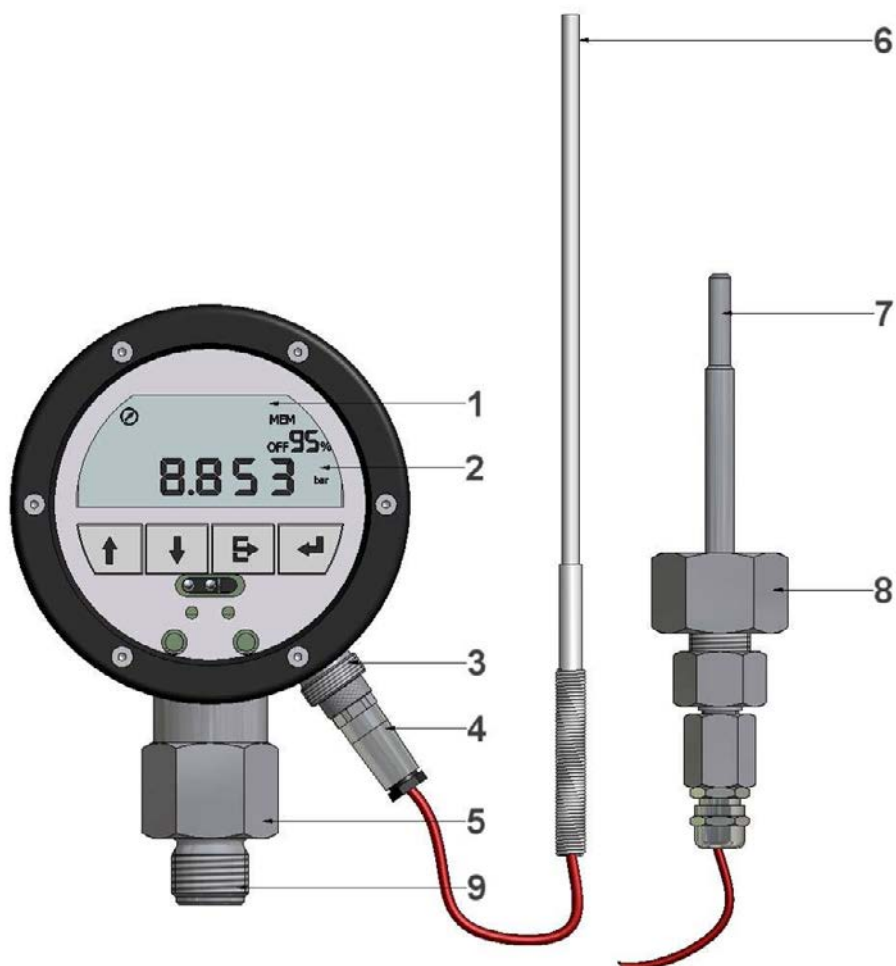
Figure 5: ESS3 with pressure and temperature sensor

1	LCD-display	2	Pressure/temp – indication
3	Connection temp. sensor	4	Connector temp. sensor
5	Sensor housing pressure	6	Temperature sensor
7	Temperature sensor	8	G3/4" internal union nut
9	G½" male thread		

ESS3 for pressure and temperature are delivered with the same sensor types as the standard ESS3. The TfsWin III Software is adapting to the pressure and temperature measuring range.

6.3 ESS3 display indications

All fields for display indications are described. Several segments show symbols and numbers in different formats and text.
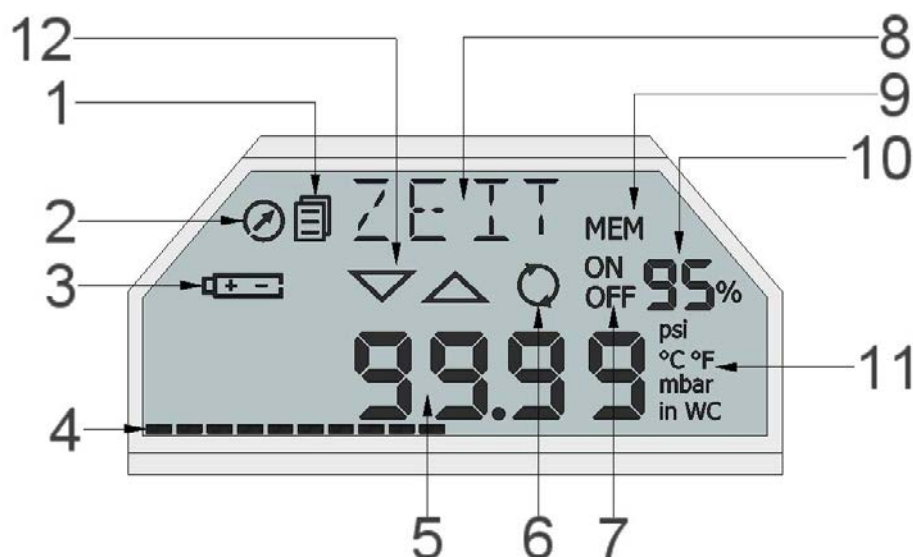
Figure 6: ESS3 display indications

1	Menu mode	2	Sample 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

6.3.1 Menu mode

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

6.3.2 Sample rate indication

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

6.3.3 Battery indication

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

6.3.4 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. Pushing a button is recognised as "short" when the button is released before the action bar has reached the right end. It is recognised as "long" when the right end is reached.

6.3.5 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.

6.3.6 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 old values are deleted.

The symbol indicates the rolling memory. It overwrites the oldest values and stores the actual values. After the new start the measurement is recorded.

6.3.7 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.

6.3.8 Menu display field

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

6.3.9 Remaining memory

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

6.3.10   Units

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

6.4 Measuring with the ESS3

In the status measuring the symbol menu does not appear on the display. At the measuring level, with the buttons **"up"** and **"down"** the 4 indications "actual measuring value" (1), "minimal measuring value" (MIN1), "maximal measuring value" (MAX1) and "difference value" (DIF1) are displayed. Pressure- and temperature-ESS have the indications in each channel (12 indications altogether). The channel number is indicated.

At the displays MIN-, MAX- or DIF-value the value can be reset to the actual value by pushing the ESC-button for a longer time (2 sec). When the action bar has moved from left to right, releasing the button the value is updated. The value is recalculated from this time.

The DIF-value indicates the difference between the actual measuring value and the value at the last reset.
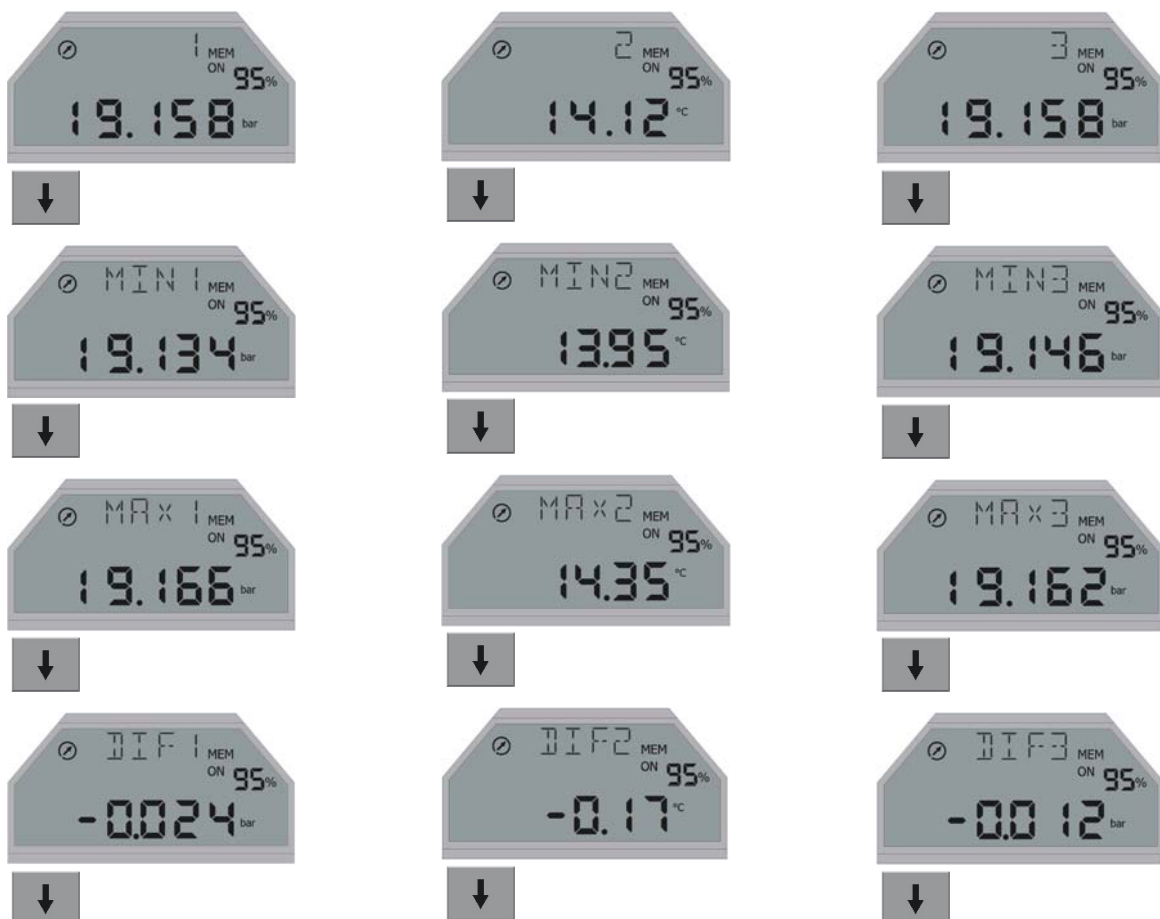
1. Channel pressure	2. Channel temperature	3. Channel temperature compensated pressure
1 MEM ON 95% 19.158 bar	2 MEM ON 95% 14.12 °C	3 MEM ON 95% 19.158 bar
MIN1 MEM ON 95% 19.134 bar	MIN2 MEM ON 95% 13.95 °C	MIN3 MEM ON 95% 19.146 bar
MAX1 MEM ON 95% 19.166 bar	MAX2 MEM ON 95% 14.35 °C	MAX3 MEM ON 95% 19.162 bar
DIF1 MEM ON 95% -0.024 bar	DIF2 MEM ON 95% -0.17 °C	DIF3 MEM ON 95% -0.012 bar

6.4.1 Main menu

From the measuring mode, by pressing the button

↵ **"enter"**

One always gets in the main menu on the position INFO. The menu symbol ▤ appears in the display
With the buttons

↑ „**up**" or ↓ „**down**"

the 4 menus of the upper menu level are attended cyclically.

⊘▤ INFO MEM
OFF **95**%
↓

⊘▤ LTST MEM
OFF **95**%
↓

⊘▤ PMTR MEM
OFF **95**%
↓

⊘▤ COMM MEM
OFF **95**%
↓

The abbreviations from the main menu have the following meaning:

INFO   Information in the system, only indications

LTST   Leak tests can be started and printed

PMTR   Parameters may be changed.

COMM   Commands may be executed.

Each of these 4 menus leads to a lower menu level with the button

↵ **"enter"**

6.4.2 Menu INFO

In the Info-menu different information is presented. Changes are only possible in the menus LTST, PMTR and in the software TfsWin III.

Some information is channel-specific. In the menu the channel can be changed. Channel specific data can be assigned and indicated. The menu CHNL is only visible when the ESS3 has more channels

1. CHNL	Channel choice
2. RANL	Measuring range begin/channel specific
3. RANH	Measuring range end/channel specific
4. MEM	Capacity of the memory (per channel)/channel specific
5. RMEM	Remaining memory/channel specific
6. SNEU / NR / TYP	Serial number and type of the evaluation unit/channel specific
7. SNOS / NR / TYP	Serial number and type of the sensor/channel specific
8. CALI	Date of the last calibration/channel specific
9. DATE	ESS3 date/global
10. TIME	ESS3 time/global
11. VERS	Firmware version/ global
12. BALT	Battery low time/global

6.4.2.1 CHNL – Changing the actual channel

The channel number is displayed with channel specific indications. It is changed with „**enter**". The channel number blinks and is changed with „**up**" or „**down**". „**enter**" confirms the setting and returns to steady indication.

6.4.2.2 RANL (Range low) – Lower range value of the channel

The lower range value of the channel is indicated. The measuring value can be 4% below this limit. The pressure indicates a negative value. Below -4% the display shows stripes at the lower edge.

6.4.2.3 RANH (Range high) – Upper range value of the channel

The upper range value of the channel is indicated. The measuring value can be 4% above this limit. If the pressure rises higher than that, the display shows stripes at the upper edge.

6.4.2.4 MEM (Memory) – Total available memory

The number of free memory places in the channel is indicated. Each memory place contains the measuring value and the time.

6.4.2.5 RMEM (Remaining memory) – Remaining memory

The remaining free memory places are indicated.

6.4.2.6 SNEU (Serial no. of evaluation unit) – Device number

The production number of the evaluation unit is indicated. In consists of a 3 figure **Type** and a 5 figure **Nr.**

6.4.2.7 SNOS (Serial no. of sensor) – Sensor number

The production number of the sensor is indicated. It consists of the 3 figure **Type** and the 5 figure **Nr.**

6.4.2.8 CALI (Calibration date) – Calibration

The date of the last calibration is indicated in the format DD.MM.YY.

6.4.2.9 DATE – Date

The actual date is indicated in the format DD.MM.YY.

(days, months, years).

6.4.2.10 TIME - Time

Here the actual time is indicated in the format HH:MM:SS.

(hours, minutes, seconds).

6.4.2.11 VERS - Version

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

6.4.2.12 BALT - Batteries Low Time

The date is indicated at which the battery will be empty at the earliest. This strongly depends of the set sample rate. When the sample rate is changed, the new date will be available at the earliest 10 minutes after the last sample rate change.

6.4.3 Menu LTST – Leak test

Here leak tests are started printed and adjustments are made.

6.4.3.1 TYP1 Start leak test Type 1

Here, a pressure test without evaluation is started. This type is suitable for the tests according to DVGW W400-2 (contraction procedure or accelerated normal procedure), at which the diagram of the pressure test is reviewed by the user himself. When a pressure test is performed according to DVGW 469 B3, the pressurizing and depressurizing must be recorded as well. In this case also this type of test should be used.

In the menu **TEMP** the question is, whether the pressure test should be performed with temperature measurement (**on**) or without temperature measurement (**off**).

After that, in three steps, with 3 figures each, the 9 figure location number is queried. At first the three highest figures are indicated with menu point **LNO3 (location number)**. Every figure can be changed with „**up**" and „**down**" and be confirmed with „**enter**". After that the figures 4 to 6 follow in the menu **LNO2** and 7 to 9 in the menu **LNO1**.

Then the pressure test is started with the automatic setting.

Sample rate: 1 Second
Average factor: 1
Resolution: 0,003%,
Target limits: switched off.

The display indicates the passed time in seconds and minutes and after an hour in minutes and hours, alternating with **RUN**. During the pressure test, the up to than stored data may be printed with menu **LTST/PRNT**. The pressure test is ended with the menu **LTST/STOP**. After that no more measuring values will be stored.

6.4.3.2 TYP2 Start leak test Type 2

This type is suitable for leak tests according to DVGW 469 B3. The ESS3 calculates the leak test with the set parameters.

At first the minimal test pressure **MNTP (Minimal test pressure)** is set. When the pressure comes below this value, the pressure test is indicated as „leaky by calculation". The test pressure can be changed with the buttons „**up**" and „**down**".

Then the test time **MNTT (Minimal test time)** is set. The time is indicated alternating with the time unit **DAYS**, **H** for hours, **MIN** for minutes and **S** for seconds.

With **MXΔP (Maximal pressure loss)** the maximal allowed pressure drop is set. If this pressure drop is exceeded, the result is also „leaky by calculation"

STRT (Start) defines a preceding calm down time. The measurement data will not be considered in the evaluation of the leak test. When 0 is set, there will be no calm down time.

With **TEMP (Temperature)** the choice is made, whether the leak test is started with temperature measurement (**on**) or without temperature measurement (**off**). Without temperature measurement the temperature compensated pressure curve is not generated.

At last the location number is set in the same way as the setting with type 1.

After that the leak test starts with the same parameters as with type 1.

Intermediate printing when the test is running is possible. The print does not indicate an evaluation.

At the end of the pre set leak test time, **END** is indicated, alternating with the result of the leak test **LPRF** for leak proof respectively **LEAK** for leaking. After that the leak test can be printed. Before that the printer is activated with button ►. Then the menu **PRNT** is confirmed with **YES**. During printing **PRNT** and **WAIT** are indicated.

The leak test can be interrupted with **LTST** / **STOP**. Printing the leak test after interrupting the indication will be „leaky by calculation", because the test time was too short.

6.4.3.3 TYP3   Start leak test Type 3

The type 3 is running like type 2 up to the additional queries of the sample rate **SMPR (Sample rate),** the resolution **RESL (Resolution)** and the average factor **AVRG (Average factor)**. That makes it possible to perform individual leak tests, at which all parameters can be set arbitrary. Should a table be printed instead of a diagram, the sample rate should be increased, to reduce the number of measuring values. Otherwise the created table will be too long.

6.4.3.4 PRNT (Print)   Print leak test

During a leak test multiple printing is possible. At the end, with **YES** the last leak test can be printed as many times as wished. Previous leak tests can't be printed any more. Only TfsWin III can recall all leak tests.

6.4.3.5 ZOOM (Zoom) Change graphic zoom

At delivery the zoom status of the diagram is set automatically. Is **ZOOM** set at „**off**", the measuring range is printed from the beginning to the end.

6.4.3.6 POPT   (Print options) Change print options

Here is set, whether the diagram (**POPT** indicates **GrPH** (Graphic)) or the measuring value table (**POPT** indicates **TEXT** (Text)) is printed.

6.4.4 Menu PMTR (Parameters) - Parameters

In the menu parameters the sample rate and the time can be changed. With an ESS3 with more channels the sample rate is changed for each channel separately. The actual channel has to been chosen.

(1. CHNL   Channel setting)

2. SMPR   Setting oft he sample rate / channel specific

3. CLCK   Time setting / global

4. PASS   Password setting / global

5. LANG   Language setting

Further parameters can be changed with the software TfsWin III.

6.4.4.1 CHNL (Channel) - Channel

With „**enter**" an instrument with more channels can be switched from one channel to another. The menu only appears, when an ESS3 has more channels. All indications have the channel number as index.

6.4.4.2 SMPR (Sample rate) – sample rate

With „**enter**" the sample rate is adjusted. The changing of the sample rate is indicated by blinking. With „**up**", the sample rate goes up from milliseconds via seconds, minutes and hours to 6 hours maximal. With „**down**", the sample rate goes in the other direction. „**enter**" confirms the chosen value.

When an ESS3 has more channels, the individual sample rates of all channels must be a multiple of the channel with the fastest sample rate. Other values are corrected by the program automatically. The changes will be visible after leaving the menu and a new access.

6.4.4.3 CLCK (Clock) - Change date and time

„**enter**" leads to the indication **DATE**. The date can be set immediately. With „**up**", the date goes upward, with „**down**" backwards. „**enter**" confirms the chosen date. The time appears in the menu UHR. The time is set analogously and confirmed with „**enter**". After this the menu **TIME** appears.

6.4.4.4 PASS (Password) - Change password

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

6.4.4.5 LANG (Language) – Change language

The language of the ESS3 may be changed. That only relates to the hard copies made with the printer that is provided with the leak test case. From firmware version 1.10 on, the following languages are available:

DEUT = Deutsch (German), FRAN = Französisch (French), ESPN = Spanish, ENGL = English

6.4.5 Menu COMM (Commands) - commands

The menu COMM has 3 menu points.

DEL   Delete

PWSVPower save

SHRT   Shortcut

In this menu the status of the ESS3 can be changed.

6.4.5.1 DEL (Delete) - Delete

Whit delete the total memory will be deleted and a new measurement is started. The process is activated by setting „**yes**", „**no**" leads back to the COMM-menu.

6.4.5.2 PWSV (Power save) - Power save

Power save is activated, when the instrument will not be used for a longer time. It still reacts on commands and the power consumption is at minimum.

 "**enter**" leads to a blinking indication, that changes from „**on**" to „**off**" with „**up**" and „**down**".
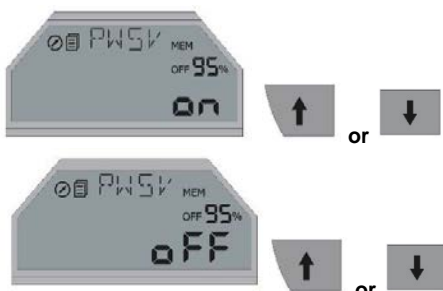
„**enter**" confirms the blinking value.

After confirmation of „**on**", at first the menu symbol , appears on the display. The symbol extinguishes after 3 minutes. Then the actual PWSV starts with the indication:

To switch from power save in the 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.

6.4.5.3 SHRT (Shortcut) – short operation leak test

When the menu point **SHRT** is set to „**on**", the short operation of a leak test is switched on. Pushing „**up**" for a longer time (the action bar moves tot he right end), the ESS3 is switched on respectively off. Pushing button „**down**" for a longer time, a new leak test is started respectively terminated. In this way the last performed leak test is repeated with the corresponding parameters. By pushing „**esc**" for a longer time, this leak test is printed respectively the printing is interrupted.

6.4.6 All abbreviations in the menus

In this chapter all abbreviations which may occur, are described.

AVRG Average
Meaning: average
Unit: number of measur.values
Description:
Number of measurement values to be averaged

BAUD Baud rate
Meaning: Baud rate
Unit: Bit/s
Description:
Display the transmission speed

BALT Battery life time
Meaning: battery life time
Unit: ---
Description:
Display the battery life time (absolute date)

CALI Calibration date
Meaning: calibration date
Unit: ---
Description:
Indication of the last calibration date oft he active channel

CHNL Channel
Meaning: channel
Unit: ---
Description:
Setting of the active channel

CLCK Clock
Meaning: time
Unit: ---
Description:
Display/set of date and time

CNCL Cancel
Meaning: cancel
Unit: ---
Description:
Interrupt printing

COMM Commands
Meaning: commands
Unit: ---
Description:
Main menu with sub menus

DATE Date
Meaning: date
Unit: ---
Description:
Indication of a date

DAYS Days
Meaning: days
Unit: ---
Description:
Unit for the duration of the leak test

DEL Delete
Meaning: delete
Unit: ---
Description:
Delete measurement memory

DIF1 Difference value
Meaning: difference value
Unit: Unit oft he active channel
Description:
Indication oft he difference value oft he active channel

END End of leak test
Meaning: end
Unit: ---
Description:
Status: leak test has ended successfully

ERR1 Error 1 leak test
Meaning: error
Unit: ---
Description:
Error in leak test (aborted /full memory)

ERR2 Error 2 leak test
Meaning: error
Unit: ---
Description:
Leak test could not be started

H Hour
Meaning: hour
Unit: ---
Description:
Unit fort the duration of a leak test/sample rat

INFO   **Information**
Meaning: information
Unit: ---
Description:
Main menu with submenus

LAL   **Lower Alarm limit**
Meaning: lower alarm limit
Unit: unit of the active channel
Description:
Setting oft he lower alarm limit

LANG   **Language**
Meaning: language
Unit: ---
Description:
Setting the language fort he leak test
printing

LEAK   **Leaking**
Meaning: leaking/untight
Unit: ---
Description:
Result of a leak test

LNO   **Location Number**
Meaning: location number
Unit: ---
Description:
Setting the location number for a leak
test

LPRF   **Leak proof**
Meaning: leak proof/tight
Unit: ---
Description:
Result of a leak test

LTL   **Lower Target limit**
Meaning: lower target limit
Unit: unit of the active channel
Description:
Setting the lower target limit value

MAX1   **Maximal value**
Meaning: maximal value
Unit: unit of the active channel
Description:
Indication of the maximal measured
value

MEM   **Memory**
Meaning: memory
Unit: number of values
Description:
Memory capacity oft he active channel

MIN   **Minutes**
Meaning: minutes
Unit: ---
Description:
Unit fort he duration of a leak test
/sample rate

MIN1   **Minimal value**
Meaning: minimal value
Unit: unit of the active channel
Description:
Indication of the minimal measured
value

MNTP   **Minimal test pressure**
Meaning: minimal test pressure
Unit: unit of the pressure
channel
Description:
Setting the test pressure for a leak test

MNTT   **Minimal test time**
Meaning: minimal test time
Unit: s, min, h
Description:
Setting the test time for a leak test

MS   **Milliseconds**
Meaning: milliseconds
Unit: ---
Description:
Unit for setting the sample rate

MXΔP   **Maximal pressure loss**
Meaning: maximal pressure drop
Unit: unit oft he pressure
channel
Description:
Setting the pressure drop for a leak
test

NO   **Number**
Meaning: serial number
Unit: ---
Description:
Indication oft he serial number of
device/sensor

OFF   **Off**
Meaning: off
Unit: ---
Description:
Switch off the ESS3 (Power save)

ON   **On**

Meaning: on
Unit: ---
Description:
Switch on the ESS3 (leave power
save mode)

PASS Password
Meaning: password
Unit: ---
Description:
Input of a password

PMTR Parameters
Meaning: parameters
Unit: ---
Description:
Main menu with sub menus

POPT Print options
Meaning: print options
Unit: ---
Description:
Setting the print options (graphic / text)

LTST Leak Test
Meaning: leak test
Unit: ---
Description:
Main menu with sub menus

PRNT Print
Meaning: print
Unit: ---
Description:
Start printing a leak test

PRNT Printing
Meaning: printing
Unit: ---
Description:
Status: printing in progress

PWSV Power save
Meaning: power save mode
Unit: ---
Description:
Status: ESS3 is set to power save
mode

PWSV Power save
Meaning: power save mode
Unit: ---
Description:
Command to switch on/off the power
save mode

RANH Range high
Meaning: upper range value
Unit: unit oft he active channel
Description:
Indication oft he upper measuring
range

RANL Range low
Meaning: lower range value
Unit: unit oft he active channel
Description:
Indication of the lower measuring
range

RESL Resolution
Meaning: resolution
Unit: percent oft he measuring
range
Description:
Setting the resolution for a
measurement

RMEM Remaining memory
Meaning: remaining memory
Unit: number of values
Description:
Free memory oft he active channel

RSET Reset
Meaning: reset
Unit:
Description:
Reset of min/max values;
terminate the printing

RUN   Running
Meaning: test is running
Unit: ---
Description:
Status: a leak test is running

S   Seconds
Meaning: seconds
Unit: ---
Description:
Unit for setting the sample rate

SHRT Shortcut
Meaning: shortcut menu
Unit: ---
Description:
Menu item for turning on/off the
shortcut option

SMOD Storage mode
Meaning: storage mode

Unit: ---
Description:
Setting the storage mode (rolling /
standard)

SMPR Sample rate
Meaning: sample rate
Unit: ms, s, min, h
Description:
Sample rate

SNEU Serial number evaluation unit
Meaning: fabrication number of the
              evaluation unit
Unit: ---
Description:
Indication oft he fabrication number
(type / number)

SNOS Serial number of sensor
Meaning: fabrication number of the
              sensor
Unit: ---
Description:
Indication oft he fabrication number
(type / number)

STOP Stop
Meaning: stop
Unit: ---
Description:
Abort a running leak test

STOP Stop
Meaning: stop
Unit: ---
Description:
Status: „Measure later"-function is
running

STRT Start
Meaning: start
Unit: ---
Description:
Starting a leak test

STRT Start time
Meaning: start time
Unit: m, s, h
Description:
Setting the calm down time for a leak
test

TEMP Temperature
Meaning: temperature
Unit: ---

Description:
Turn on/off the temperature
compensation

TIME Time
Meaning: time
Unit: ---
Description:
Indication of a time

TL   Target limits
Meaning: target limits
Unit: ---
Description:
Setting the target limit mode (on/off)

TYP1 Leak test type 1
Meaning: leak test type 1
Unit: ---
Description:
Starts a leak test type 1

TYP2 Leak test type 2
Meaning: leak test type 2
Unit: ---
Description:
Starts a leak test type 2

TYP3 Leak test type 3
Meaning: leak test type 3
Unit: ---
Description:
Starts a leak test type 3

TYPE Type
Meaning: type
Unit: ---
Description:
indication oft he fabrication number

UAL   Upper Alarm limit
Meaning: upper alarm limit
Unit: Unit of the active channel
Description:
Setting the upper alarm limit

UTL   Upper Target limit
Meaning: upper target limit
Unit: Unit of the active channel
Description:
Setting the upper target limit

VERS Version
Meaning: version
Unit: ---
Description:
Indication oft he software version

WAIT Wait
Meaning: wait
Unit: ---
Description:
Status: Result of a leak test is
evaluated

WAIT Wait
Meaning: wait
Unit: ---
Description:
Status: „Measuring-later"-function is
running

WAIT Wait
Meaning: wait
Unit: ---
Description:
Status: Leak test is starting

ZOOM Zoom
Meaning: zoom
Unit: ---
Description:
Turn on/off the automatic zoom for
printing

01:15 „Time"
Meaning: time
Unit: min:s, h:min or days:h
Description:
Status: Time since/until the start of the
leak 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 (sample 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. At correct choice of the parameters the ESS3 can store measuring values for several months, without filling the memory completely. The functions can be changed at choice.
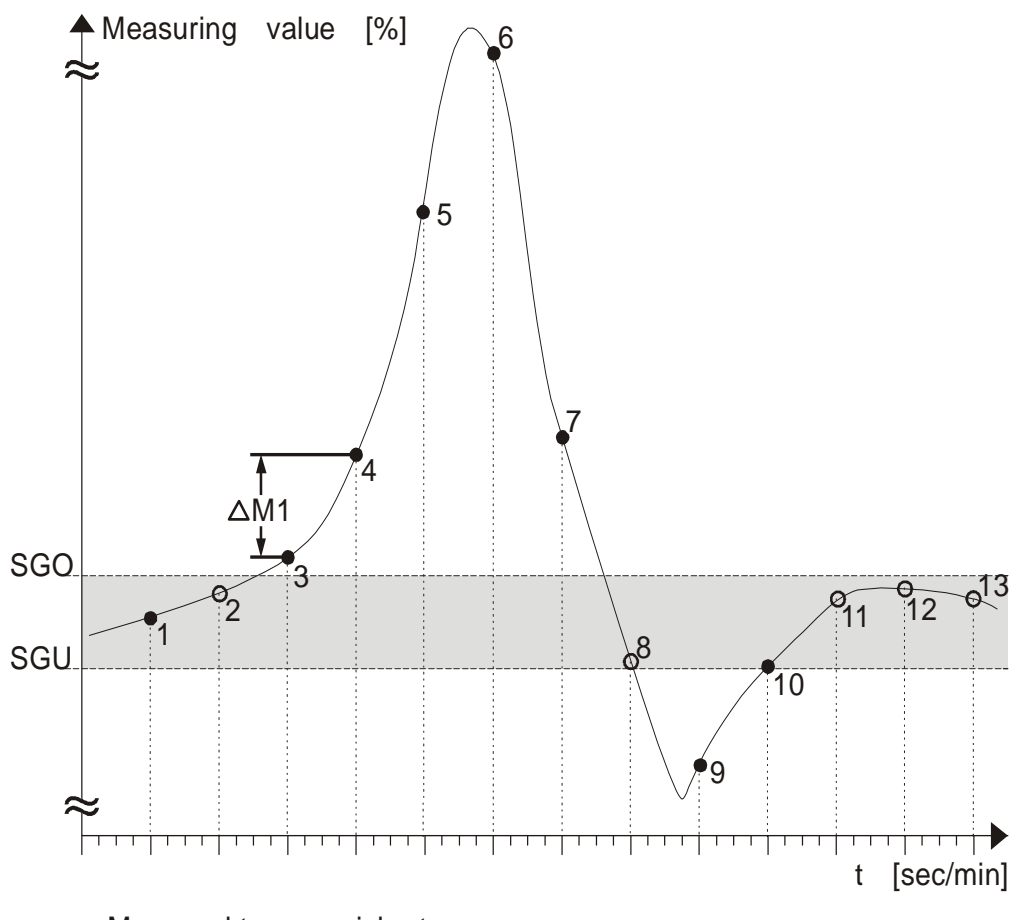

Figure 7: System of measuring point storage

1	Meas. point stored ●	2	Meas. point not stored O

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 (sample 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 (UTL) and lower target limit (LTL) 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 UTL and LTL 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 TfsWin III.

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. For leak tests, the resolution should always be set to the lowest value (0,003%) to be sure that even the smallest changes in the pressure are detected.

7.5 Sample rate and battery life time

7.5.1 Sample rate

The sample 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. Sample rates below 1 second can only be set as a multiple of 125ms.

7.5.2 Battery life time

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

the calculated battery life time. For leak tests, a sample rate of >1 sec. is necessary because otherwise the required resolution is not reached.

7.6 Measuring average factor

The measuring average factor indicates the number of measuring values to be averaged

Example

Average factor 3
 three values are averaged
3 measuring values are added and divided by 3.

The calculated new 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. , minimal and maximal values can be reset by pushing button "esc" for a longer 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.

The ESS3 is automatically switched from summer to wintertime at the corresponding time (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 TfsWin III and EsapPro III software can handle these curves

7.10 Remaining memory

The memory has a capacity of 250.000 measuring values including the relative time. 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

ESS3 has 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 %. (a resolution of 1 mbar at a measuring range of 25 bar) E.g. for leak tests according to DVGW 469 B3.2.

At ESS3 with temperature channel 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.

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

As standard installation the program is suggesting the path C:\Programme\Union\EsapPro III. This suggestion can be confirmed or changed. If there exits 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.
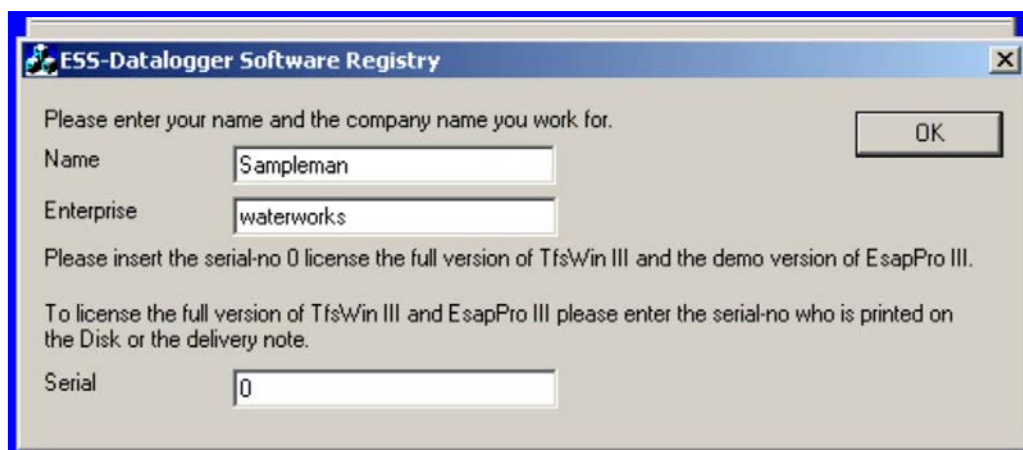
If TfsWin III is used without EsapPro III, the preset „**0**" should be confirmed. When EsapPro III was acquired, the serial number, mentioned on the delivery note, must be entered instead of the 0. Now EsapPro III is licensed.

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

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


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.
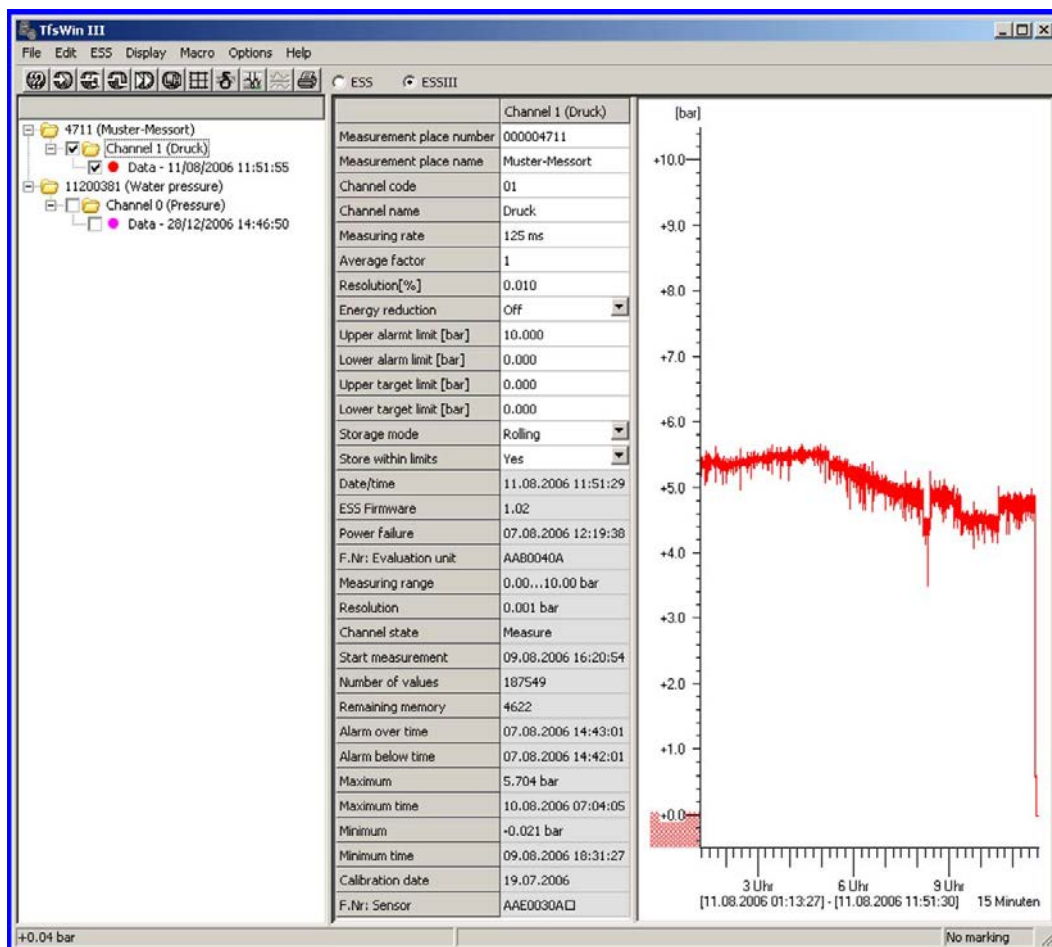
Tree: The tree is divided in three sections.

In the upper section the location number and the location name are displayed. One section down, all channels of the corresponding location 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 the location name, location number, sample 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 locations/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 follows 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.
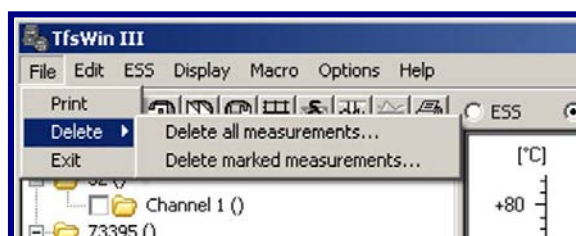
Print
The actual diagram, with all displayed information will be printed.

Delete / delete all readings
Here all measurement places with all measurements and parameters will be finally deleted.

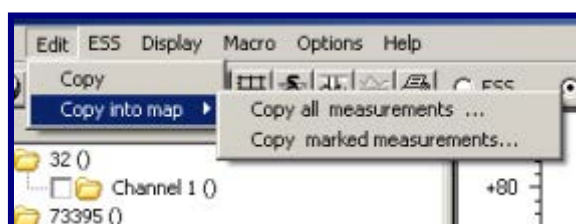**Delete / delete marked readings**
Only the marked measurements or parameters will be deleted. Different mes. data and parameters cannot be marked and deleted. For that purpose multiple deleting may be necessary.

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

8.4.2 Edit

Here, measurement 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.
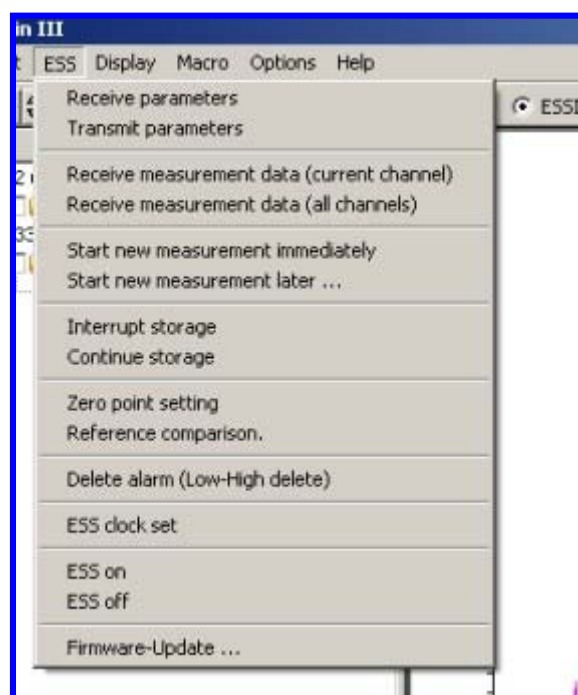
Receive parameters

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 the 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 (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 ESS3 will be finally deleted. The memory is completely free for a new measurement. It starts immediately.

Attention: the old measurement data will be finally deleted.

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.

 Attention: the old measurement data will be finally deleted.

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 ESS3 has to be switched on.

Firmware-update
The firmware is changeable by the menu. The new Firmware file ESS3XYY.PRG is copied in the directory `...\EsapPro III\TfsWin III\Firmware`. XYY 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.
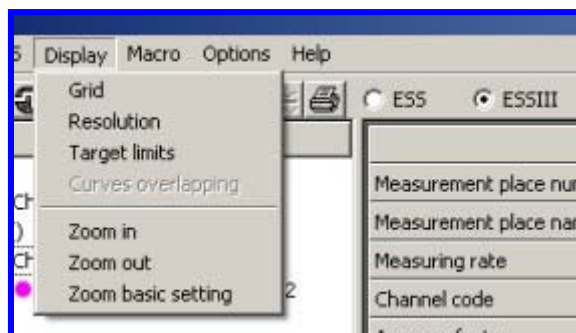
Grid
Here, a grid for the time- and the value-axis is switched on and off.

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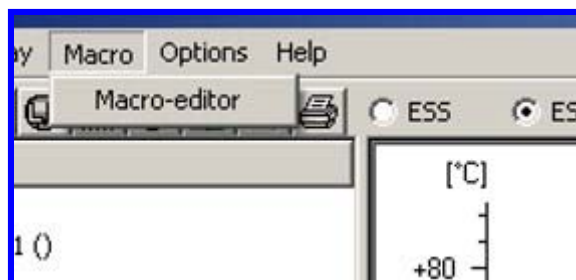
Zoom out
The function reduces the curve in the same pattern as with the enlargement.

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 III.
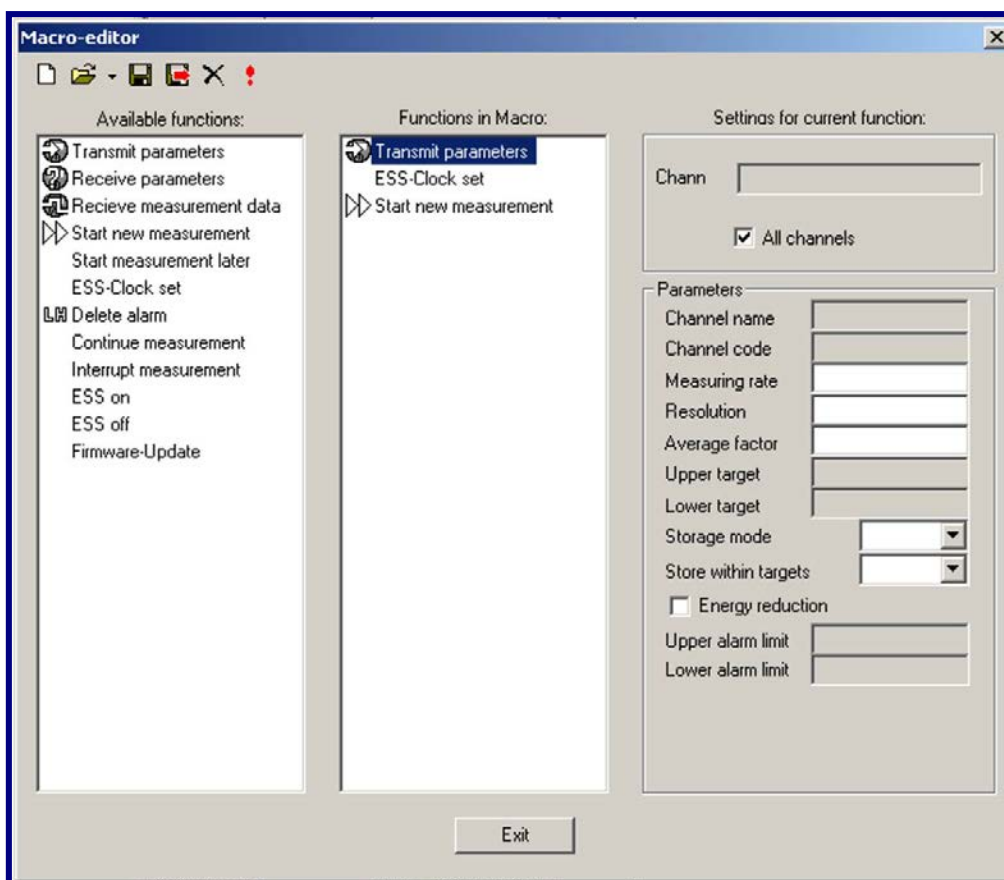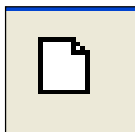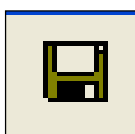
New

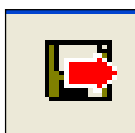A new macro is opened and can be programmed.

Open

An existing macro is opened.
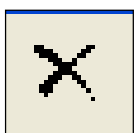
Save

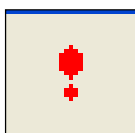a macro is saved with the existing file name.

Save as

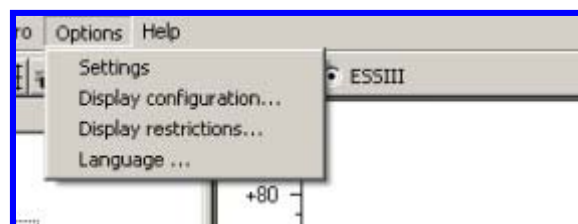A macro is saved with a new name.

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, were 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 location 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.
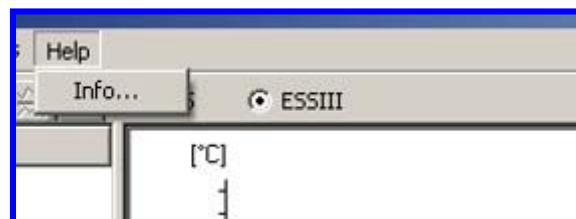
8.5 Function buttons

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. This may be 1, 2 or 3 data sets.

Receive measurement data

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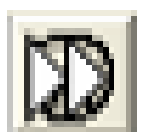
Start measurement

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.
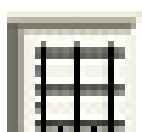
Switch grid display

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

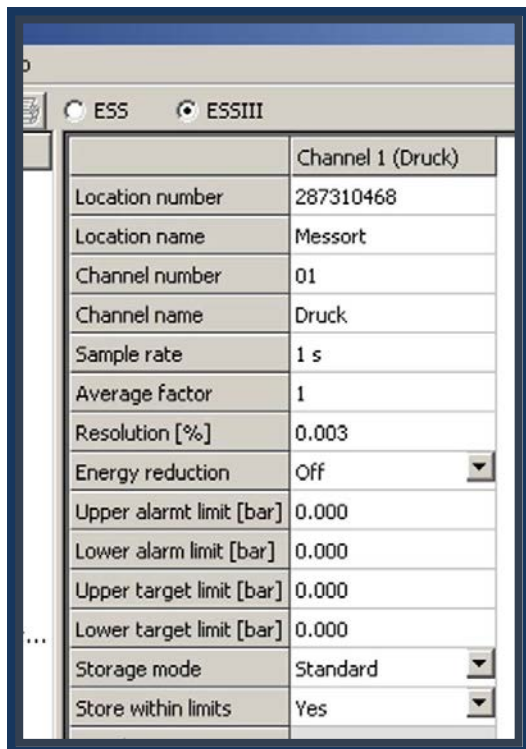|	Channel 1 (Druck)
Location number	287310468
Location name	Messort
Channel number	01
Channel name	Druck
Sample rate	1 s
Average factor	1
Resolution [%]	0.003
Energy reduction	Off
Upper alarmt limit [bar]	0.000
Lower alarm limit [bar]	0.000
Upper target limit [bar]	0.000
Lower target limit [bar]	0.000
Storage mode	Standard
Store within limits	Yes

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.

Location number: The location number defines the location and may have 9 figures.

Location name: The location name may consist of 30 alphanumeric characters.

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

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

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

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

Upper (lower) target limit [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.

Date/time	29.03.2007 14:44:26
ESS Firmware	1.06
Power failure	01.01.1970 00:00:00
Ser.Nr: Evaluation unit	AAB0028A
Measuring range	0.00...25.00 bar
Resolution	0.001 bar
Channel state	Measure
Start measurement	29.03.2007 14:44:25
Number of values	1
Remaining memory	83298
Alarm over time	15.12.2006 14:15:51
Alarm below time	15.12.2006 14:16:44
Maximum	-0.037 bar
Maximum time	29.03.2007 16:44:25
Minimum	-0.037 bar
Minimum time	29.03.2007 16:44:25
Calibration date	15.12.2006
Ser.Nr: Sensor	AAE0283A

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.
Ser. 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.
Ser. 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.

An annual re-calibration oft he ESS3 by the manufacturer is recommended. From this re-calibration a calibration-certificate is issued.

9.1 Battery block

The battery block consists of lithium cells with a safety circuit. They are moulded in silicon mass. The resistor limits the short circuit current of the batteries. The capacity of the batteries is 7,2 Ah. The used batteries can be disposed by the manufacturer free of charge.

9.2 Exchanging the batteries

Attention: Only original battery blocks with Ex-sign, certified by the manufacturer, may be built in explosion protected ESS.

The expl. protected battery block is situated behind the electronic unit. To exchange the battery block the black arrestor ring must be unscrewed. Front plate, electronic unit and battery block can be removed. After removing the black rubber tape the battery can be taken off the electronics.

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.

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.

Sample rate	Battery lifetime	
	1-Channel ESS	3-Channel ESS
125 ms	20 days	12 days
1 second	4 months	2,5 months
10 seconds	3 years	2 years
1 minute	7 years	6 years
10 minutes	8 years	8 years

Table 1: ESS3-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 Tightness of the housing

The ESS3 for gas is not completely watertight (IP54). It has a ventilation opening, so no internal pressure can built up at varying air pressure.
Gage pressure devices are additionally supplied with atmospheric pressure as reference pressure.

9.4 IR-transmission

Sending and receiving takes place via the IR-Sensors behind the front plate. The front plate must be clean at all times.

9.5 Exchanging sensors

Pressure and temperature sensors may be exchanged. Every ESS3 consists of an evaluation electronic unit and a calibrated sensor in a housing with measuring electronic unit. The connections can be plugged in. The VA –housing of the sensor is glued in the aluminium housing with special glue. This guarantees that the glued place is tight and can be loosed again.

The sensor is only delivered together with the measuring electronic unit in the sensor housing. The unit is calibrated and can measure directly after assembly. Taking back the old sensor in exchange is possible.

The sensors should not constantly be exchanged. Exchange should be limited to changing measuring range or repair.
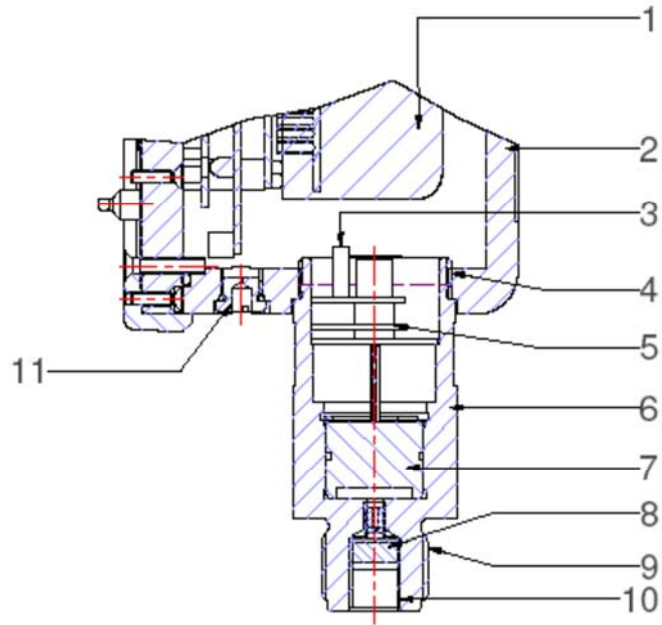
Figure 8: ESS3 Sensor unit gas

1	Li Battery	2	ESS3 housing
3	Sensor connection	4	Sensor male thread
5	Sensor seal	6	Sensor housing
7	Sensor	8	Protection filter
9	G½" male thread	10	G1/8" female thread
11	Ventilation opening		

10 Error diagnostic

A number of typical errors are described, that result either from incorrect operation or a fault in the instrument.

10.1 Display is weak or blind

Battery exchange is overdue. The display shows the battery symbol and „PS". The battery voltage is too low to operate the ESS3 .The battery should be replaced. After that the system starts independently.

10.2 Moisture on the display

The front plate seal is leaking. The O-Ring may be damaged. Once moisture has entered the unit the instrument should absolutely be sent in for inspection.

At ESS3 > 1bar the reference pressure is measured over a hole in the housing. If an ESS3 is employed in a moisturized environment (e.g. gas-hydrants), the plug with the hole should be changed for a plug with PTFE-insert. The PTFE-filter is watertight but air-permeable. Additionally there are drying agent bags (Ordering: ess-z-tm) available to absorb the condensates. These bags are placed inside the housing and exchanged every time the battery is exchanged.

10.3 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.

11 Measuring sensors

The ESS3 can be delivered with the following measuring sensors:

- Gage pressure (relative)
  Pressure difference between ambient atmospheric pressure and the pressure at the sensor. The sensors are characterized with „**r**".
- Overpressure
  Pressure difference between the atmospheric pressure at the time of the last zero point adjustment and the pressure at the sensor. The sensors are characterized with „**o**".
- Absolute pressure
  Pressure difference between vacuum and the pressure at the sensor. The sensors are characterized with „**a**".
- Barometric pressure
  atmospheric pressure. The sensors are characterized with „**a**". The measuring range is 800 mbar … 1200 mbar
- Temperature

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.

11.1 Overpressure protection

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

12 Accessories, equipment, spare parts

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

12.1   Transport cases

ESS3 for water and gas may be transported in aluminium transport cases. These cases are sturdy and can hold six gas-ESS3 or four water-ESS3 with bayonet adapter.

For a single ESS3 there is a little transport case available, which also has a compartment for the bayonet adapter.

12.2　　Spare part list

	Building group battery ex proof Order nr: ESS3-Z-BATC Weight: ca. 150 gram
Description:　　　Building group battery	

ICS Schneider Messtechnik GmbH　　　　Tel.: 03303 / 50 40 66　　　　info@ics-schneider.de
Briesestraße 59　　　　　　　　　　　Fax.: 03303 / 50 40 68　　　　www.ics-schneider.de
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