1. EDS 3000 Functions
The EDS 3000 unit offers the following functions:

- Display pressure in psi, MPa, bar or a freely scalable range.
- Display of the actual pressure, maximum measured pressure or a switching point.
- Operation of the switching outputs according to the pressure and the adjusted switch-point parameters or by using the window feature.
- Depending on the model, the choice of selecting either a 4...20mA or 0...10VDC analog output signal.
- Menus for adjustment (adapting the EDS 3000 to a particular application).
- Programming enables (lockouts).

4 different output versions are available:

- EDS 3000 with 1 switching output
- EDS 3000 with 1 switching output and analog signal output
- EDS 3000 with 2 switching outputs
- EDS 3000 with 2 switching outputs and analog signal output

2. Mounting

The EDS 3000 can be mounted onto a hydraulic block via the G¼ form A (DIN 3852) external threaded pressure connection. After mounting, the EDS can be rotated for optimal adjustment around its longitudinal axis, additionally it is possible to rotate the display for better viewing and access to the control keys. The electrical connections must be carried out by a qualified electrician according to applicable codes, laws or regulations that pertain to the location (VDE 0100 in Germany). The EDS housing must be grounded properly. When mounted to a hydraulic block, it is sufficient if the block is grounded over the hydraulic system. When mounting by means of hose, the housing must be grounded separately.

Also try to follow these installation recommendations to reduce the effect of electromagnetic interference:

- Make electrical cable connections as short as possible.
- Use shielded cable.
- The shielded cable must be fitted by qualified personal using interference suppressing techniques.
- Direct proximity to other connection lines of units generating interference or the unit itself must be avoided.
3. EDS 3000 Display and User Interface

![Diagram of EDS 3000 display and user interface]

4-digit display

Keys for adjusting menu and switch points

4. Digital Display

After switching on the supply voltage, the EDS displays "EdS" briefly followed by the measured pressure.

```
EDS 45.1
```

In the adjustment menu the display can be altered. For example, the maximum measured pressure value can be permanently displayed. This is the highest measured value since the unit was last switched on or reset. Pressing the ◀ or ▶ will reset the highest measured value. Also a switching point value can be permanently displayed or the display can be set to dark. If set to dark, the measured pressure can be displayed briefly by pressing the ◀ or ▶ key. Depending on the setting, "TOP", "S.P. 1", "S.P. 2 or off" will appear briefly in the display when the unit is switched on informing the user what the display will show.

Notes

- If the applied pressure exceeds the measuring range of the EDS, it will no longer display the pressure and the display will begin to flash.
- If applied pressure is below 1% of the measuring range, then 0 is displayed.
5. Output Functions

5.1 Switching Outputs

The EDS 3000 can have 1 or 2 switching outputs. The following settings can be made under the switch-point and adjustments menu:

5.1.1 Switch point setting (SP)

One switch point and one hysteresis can be set for each switching output. The respective output switches when the user set switch point pressure value is reached and switches back when the pressure falls below the switchback point. The switchback point is calculated by subtracting the hysteresis value from the switching point value. (switch back point = switching point – hysteresis)

Abbreviations: "SP.1" or "SP.2" = switching point 1 or 2
"HyS.1" or "HyS.2" = hysteresis 1 or 2

5.1.2 Window Function Settings (WIN)

The window function enables a range of pressure to be monitored. For each switching output, an upper and a lower switching value can be set to determine the range. The respective output switches when the pressure enters this range. When the pressure leaves the range and the switch back value has been met, the output switches back. The lower switch back value is just below the lower switching value (lower switching value minus three times the increment, see point 5.4). The upper switch back value is just above the upper switching value (upper switching value plus three times the increment, see point 5.4). The area between switching and switch back value forms a safety zone, which prevents unwanted switching operations from occurring (e.g. triggered by pulsation from a pump).

Example of switching output 1 (normally open function):

Abbreviations: "HI 1" = High level 1  "Lo 1" = Low level 1

Note: The window function only operates correctly (switching on and off) when all switching values (including the safety zone) are greater than 0 and are lower than the pressure measuring range.
5.2 Analog Output

On specified models, the EDS 3000 has a choice of 4...20mA or 0...10VDC sourcing signal output which is selectable in the adjustment menu.

5.3 Setting the Switching Points and Hysteresis

- Press "mode" key.
- In the display "S.p.1" appears or "Hi.1"
- Keep pressing the "mode" key until the desired parameter is displayed (depending on the adjustment menu setting: "S.p.1", "HyS.1", "S.p.2", "HyS.2" or with adjusted window function "Hi.1", "Lo.1", "Hi.2" or "Lo.2").
- After 2 seconds the adjustment value flashes.
- Use the ◀ or ▶ key to alter the setting.
- After 3 seconds without key activity, the display resets and the adjustments are stored.

Notes:

- If "LOC" appears in the display when trying to alter settings, programming is disabled. Corrective action: set programming enable to "on". See section 7 for details.
- If the ◀ or ▶ key is held down, the value will automatically advance.
- If a setting has been altered, "PRG" will appear briefly in the display when the 3 second timer ends.
### 5.4 Ranges of Adjustment for the Switching Outputs

<table>
<thead>
<tr>
<th>Measuring range in bar</th>
<th>Switching point or upper switching value in bar</th>
<th>Hysteresis point or lower switching value in bar</th>
<th>Increment * in bar</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>0.008 .. 1</td>
<td>0.006 .. 0.99</td>
<td>0.002</td>
</tr>
<tr>
<td>2.5</td>
<td>0.02 .. 2.5</td>
<td>0.015 .. 2.47</td>
<td>0.005</td>
</tr>
<tr>
<td>4</td>
<td>0.03 .. 4</td>
<td>0.02 .. 3.96</td>
<td>0.010</td>
</tr>
<tr>
<td>10</td>
<td>0.08 .. 10</td>
<td>0.06 .. 9.90</td>
<td>0.020</td>
</tr>
<tr>
<td>16</td>
<td>0.15 .. 16</td>
<td>0.10 .. 15.85</td>
<td>0.050</td>
</tr>
<tr>
<td>25</td>
<td>0.2 .. 25</td>
<td>0.15 .. 24.75</td>
<td>0.050</td>
</tr>
<tr>
<td>40</td>
<td>0.3 .. 40</td>
<td>0.2 .. 39.60</td>
<td>0.100</td>
</tr>
<tr>
<td>60</td>
<td>0.5 .. 60</td>
<td>0.3 .. 59.40</td>
<td>0.100</td>
</tr>
<tr>
<td>100</td>
<td>0.8 .. 100</td>
<td>0.6 .. 99.00</td>
<td>0.200</td>
</tr>
<tr>
<td>250</td>
<td>2.0 .. 250</td>
<td>1.5 .. 247.50</td>
<td>0.500</td>
</tr>
<tr>
<td>400</td>
<td>3.0 .. 400</td>
<td>2.0 .. 396.00</td>
<td>1.000</td>
</tr>
<tr>
<td>600</td>
<td>5.0 .. 600</td>
<td>3.0 .. 594.00</td>
<td>1.000</td>
</tr>
</tbody>
</table>

* All areas indicated in the table are adjustable by the increments shown.
6. Menu Adjustments

In order to adapt the unit to a particular application, the EDS 3000 can be altered via several menu settings.

6.1 Altering the Menu Settings

**Important Note:** When the menu is accessed, no switching operations are performed.

To exit the menu

Select the menu point “**END**” and set to “**YES**”. The EDS will return to normal display and switching mode after 2 seconds.

**Note:**

- If no menu activity occurs after 25 seconds, the menu will automatically close and return the EDS to normal operation. Any changes that were made will not be saved.
### 6.2 Outline of the Adjustment Menu Points

<table>
<thead>
<tr>
<th>Setting Point</th>
<th>Display</th>
<th>Setting Choices</th>
<th>Factory Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Switch mode for Switch output 1 (Sm 1)</strong></td>
<td>![SP]</td>
<td>SP/ Win</td>
<td>SP</td>
</tr>
<tr>
<td>![SP]</td>
<td>Switch output 1 operates in switch point\hysteresis mode</td>
<td></td>
<td></td>
</tr>
<tr>
<td>![Win]</td>
<td>Switch output 1 operates in window mode.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Switching direction Switching output 1 (S 1)</strong></td>
<td>![ON]</td>
<td>ON/ OFF</td>
<td>ON</td>
</tr>
<tr>
<td>![ON]</td>
<td>Normally open function.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>![OFF]</td>
<td>Normally closed function</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Switch-on delay switching output 1 (Ton 1)</strong></td>
<td></td>
<td>0.00..99.99s</td>
<td>0</td>
</tr>
<tr>
<td>Length of time in seconds that must expire once the switch point has been reached before the switch output will function.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Switch-off delay switching output 1 (Toff 1)</strong></td>
<td></td>
<td>0.00..99.99s</td>
<td>0</td>
</tr>
<tr>
<td>Length of time in seconds that must expire once the switch back point has been reached before the switch output will function.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>The adjustment procedure for switch point 2 is the same as described above.</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Primary display (primary)

Display function shown:

- ![Pressure] : Currently measured pressure
- ![Max Pressure] : Maximum pressure measured (peak)
- ![SP 1] or ![SP 2] : Switch point 1 or 2 setting
- ![OFF] : Dark display (see section 4 for detail)

### Reset time (RTIM)

Only available when the display is set to “Top” in the menu. Sets how long the pressure peak value in the display achieved last will be displayed.

- 0..300s
- 0
## Adjustment

<table>
<thead>
<tr>
<th>Display</th>
<th>Range of adjustment</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLOW/FAST</td>
<td></td>
<td>MEDI</td>
</tr>
<tr>
<td>MEDI/</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FAST</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Display

- **SLOW/FAST**: Display reacts slowly to pressure changes.
- **MEDI**: Display reacts normal to pressure changes.
- **FAST**: Display reacts quickly to pressure changes.

## Pressure Range Scale

- **BAR**
  - Pressure in Bar.
- **PSI**
  - Pressure in PSI.
- **MPa**
  - Pressure in MPa
- **FREE**
  - The normal range can be scaled freely. If this adjustment is selected, the decimal place as well as upper and lower range limits must be adjusted.
  
  **Example**: If the range has been changed to 0...215.5, the display value 215.5 corresponds to the maximum pressure capable of being measured by the EDS.

  **Application**: Display other scales like KN, Kg, etc.

## Decimal Place

- **BAR/PSI/MPa/FREE**: Only available when range is set to “FREE”.
  - Placement of decimal point is selectable below a display value of 3000.
  - **0.000**: 0.0

## Low Range

- **BAR/PSI/MPa/FREE**: Only available when range is set to “FREE”.
  - **-999..9899**: 0.0

## High Range

- **BAR/PSI/MPa/FREE**: Only available when range is set to “FREE”.
  - **-899..9899**: Meas. range final value
Analog Output

MAMP/VOLT
The analog output supplies a 4...20mA DC sourcing output signal.

VOLT
The analog output supplies a 0...10VDC sourcing output signal.

Zero Point Calibration (Calibrate)

YES/NO
NO

CAL
The pressure at that point in time is stored as a new zero point. This is possible in the area +/- 3% of the pressure range of the EDS.

nEU
This will be displayed if your new calibration is within 3% of 0 bar pressure.

Err
This will appear if the pressure applied to the EDS is more than 3% of the measuring range and a zero point calibration is attempted.

Example:
If you have a 600 bar EDS, up to 18 bar can be applied to the switch and a zero point calibration could be performed to have the display show 0 bar.

Version
Displays the current software version.

End
YES/NO
NO

Use to exit the adjustment menu.

no
Continue adjustments.

If menu adjustments were changed then upon exiting “ProG” will be displayed. This notifies the user changes have been made and stored.
7. Programming Enables

The EDS has 2 types of programming enables which must be set to “ON” to change any of the settings in the switch point menu or the adjustment menu. These enables can be set to prohibit unintentional or unauthorized changes.

7.1 Altering the Switch-point Programming Enable

Press both arrows simultaneously and hold for 3s.

Display (release arrow keys)

With ◆ or ◆ alter setting
FrEE = programming possible
Loc = Programming locked

7.2 Altering the Adjustment Menu Enable

Remove voltage supply from EDS.

Press both arrows simultaneously and hold.
Switch on supply voltage.

Display (release both keys)

Use ◆ or ◆ to alter setting
FrEE= Programming possible
Loc = Programming disabled

Note:
- If an adjustment was performed in the menu, the display after switching back on will show "ProG" for a brief period. The new setting is then stored in the device.
8. Error Codes

If the EDS detects an error, then a corresponding error code will be displayed. Possible error codes are as follow:

E.01  The switching point and hysteresis have been set in such a way that the resulting switch-back point is no longer within the permissible setting range.

Corrective action:  Correct the settings.

E.10  A data error has been detected in the saved settings. Possible causes are strong electromagnetic interference or an internal circuit fault.

Corrective action:  Check the settings (programming enables, switch point settings, adjustment menu settings) and correct these if possible. If the errors occur frequently, please contact Hydac.

E.12  An error has been detected in the stored calibration data. Possible causes are strong electromagnetic interference or an internal circuit fault.

Corrective action:  Switch the unit off and then on. If the error message is still displayed, the unit must be returned to the manufacture for re-calibration or repair.

E.20  A short circuit has been detected on a switch output.

Corrective action:  Eliminate the short circuit.
9. Technical Data

**Inputs:**
- Measuring Range – Ceramic - Absolute: 15, 50 psi
- Overload pressure: 2x
- Burst pressure: 3x
- Measuring Range – Ceramic - Gauge: 0...15, 30, 50, 150, 250, 500 & -14...75 psi
- Overload pressure: 2x
- Burst pressure: 3x
- Measuring Range – Thin Film DMS – Gauge: 0...1000, 3000, 6000, 9000 psi
- Overload pressure: 2x
- Burst pressure: 3x

**Accuracy data:**
- Accuracy (display, analogue output): \( \leq \pm 0.5 \% \text{ FS typ.} \)
- Repeatability: \( \leq \pm 0.25 \% \text{ FS max.} \)
- Temperature Drift:
  - \( \leq \pm 0.017\%\text{FS/°F} \text{ max. zero point} \)
  - \( \leq \pm 0.017\%\text{FS/°F} \text{ max. span} \)

**Analog signal output:**
- Selectable 0 ...10VDC or 4 ... 20 mA DC

**Switching outputs:**
- Type: PNP-Transistor output
- Switching current: Max. 1.2 A
- Cycles: > 100 Million
- Reaction time: < 10 ms

**DESINA Diagnostic signal (Pin 2):**
- Function: I/O: HIGH-Level, I/O NOT: Low-level
- Level:
  - HIGH = +Supply VDC
  - LOW = +/-0.3 VDC

**Environment conditions:**
- Normal temperature: -25.. + 80 °C (-13 ...+176°F)
- Ambient temperature: -25.. + 80 °C (-13 ...+176°F)
- Storage temperature: -40.. + 80 °C (-40 ...+185°F)
- Nominal temperature: -25.. + 85 °C (-13 ...+185°F)

**CE-Mark:**
- EN 50081-1, EN 50081-2, EN 50082-1, EN 61000-6-2

**Vibration Resistance:**
- 10 g / 0..500 Hz

**Shock Resistance:**
- 50 g / 1ms

**Other Data:**
- Supply voltage: 18.. 32 VDC
- Electrical connection: M12x1 (4-pin or 5-pin)
- Power input: 100 mA (without switching output load)
- Enclosure rating: IP 67 (w/ molded M12 cable connector)
- Mechanical Connection: ¼ NPT male or SAE-6 male (standard)
- Parts in contact with medium: Stainless steel, Viton seal; Ceramic
- Housing Material: Display: 4-digit, 7 segment LED, red
- Weight: approx. 300 g

Note: \textbf{FS (Full Scale)} = related to the full measuring range
10. Circuit Diagrams

Model with 1 switch output
Plug 4-pol. M12x1

Model with 2 switch outputs
Plug 4-pol. M12x1

Model with 1 switch output and signal output
Plug 4-pol. M12x1

Model with 2 switch outputs and signal output
Plug 5-pol. M12x1
11. Model Code

Series #

Sensor Type
2 = Ceramic absolute
3 = Ceramic Relative
4 = Thin-film relative

Mechanical Connection
6 = 1/4"-18 NPT male thread (brass types 1 and 3)
7 = SAE-6 male thread (9/16-18 UNF2A stainless steel type 4)

Electrical Connection
6 = Plug M12x1, 4-pol.
   only with the output version 1, 2 and 3
   (without quick coupling socket)
8 = Plug M12x1, 5-pol.
   only with the output version 5
   (without quick coupling socket)

Output
1 = 1 Switching Output
   (only with electrical connection 6)
2 = 2 Switch Output
   (only with electrical connection 6)
3 = 1 Switch with analog output
   (only with electrical connection 6)
5 = 2 Switch with analog output
   (only with electrical connection 8)

Pressure Ranges in bar
Type 2 (Ceramic - Absolute) 1; 2.5 bar
Type 3 (Ceramic relative) 1; 2.5; 4; 10; 16; 25; 40 bar
Type 4 (Thin-film, relative) 40; 60; 100; 250; 400; 600 bar
150; 1000; 3000; 6000; 9000 bar

Modification number
000 = Standard
12. Accessories

12.1 For Electrical Connection

**ZBE 06** (4-pol.) and **ZBE 08** (5-pol.)

- **ZBE 06-02**: Screw-type coupling socket with 2m length, 4-pol. M12x1, right-angle
- **ZBE 06-05**: Screw-type coupling socket with 5m length, 4-pol. M12x1, right-angle
- **ZBE 06-02S**: Quick coupling socket with 2m length protected, 4-pol. M12x1, right-angle
- **ZBE 06-05S**: Quick coupling socket with 5m length protected, 4-pol. M12x1, right-angle

- **ZBE 08-02**: Screw-type coupling socket with 2m length, 5-pol. M12x1, right-angle
- **ZBE 08-05**: Screw-type coupling socket with 5m length, 5-pol. M12x1, right-angle
- **ZBE 08-02S**: Quick coupling socket with 2m length protected, 5-pol. M12x1, right-angle
- **ZBE 08-05S**: Quick coupling socket with 5m length protected, 5-pol. M12x1, right-angle

**Color:**

- Pin 1: brown
- Pin 2: white
- Pin 3: blue
- Pin 4: black

- Pin 1: brown
- Pin 2: white
- Pin 3: blue
- Pin 4: black
- Pin 5: gray
13. Dimensions