



INTERNATIONAL

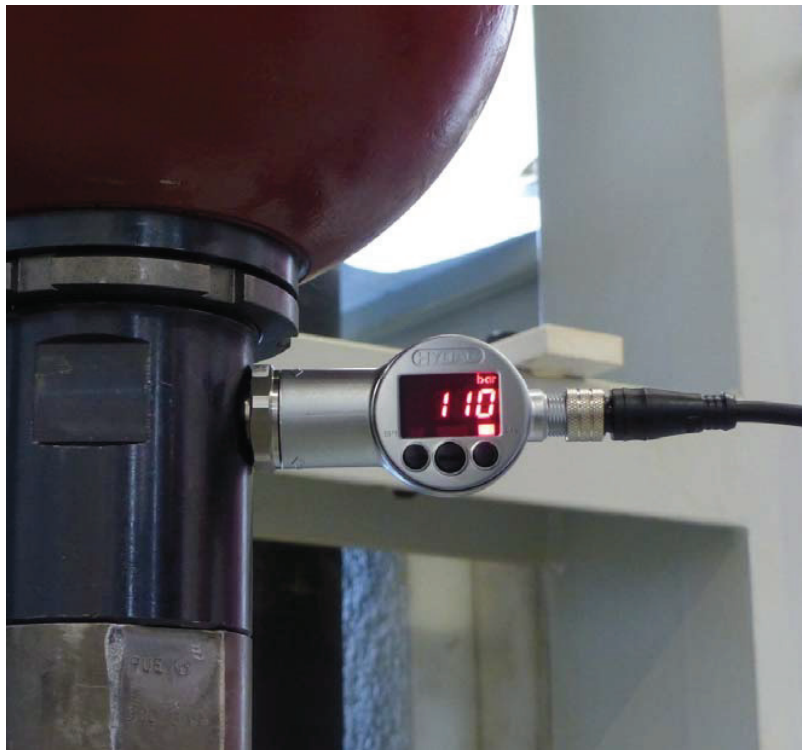
Electronic Pressure Switch

EDS 3400

p_0 -Guard for Hydraulic
Accumulators

Operating Instructions

(Translation of original
instructions)



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1 Safety Information

Before commissioning, check the instrument and any accessories supplied. Before commissioning, please read the operating instructions. Ensure that the unit is suitable for your application.

Keep the manual in the vicinity of the instrument for immediate reference. Please note that the specifications given in this documentation regarding the instrument technology were correct at the time of publishing. Modifications to technical specifications, illustrations and dimensions are therefore possible.

If the instrument is not handled correctly, or if the operating instructions and specifications are not adhered to, damage to property or personal injury can result.

2 Disclaimer

This operating manual was made to the best of our knowledge. Nevertheless and despite the greatest care, it is possible that it may contain errors. Therefore please understand that in the absence of any provisions to the contrary hereinafter our warranty and liability – for any legal reasons whatsoever – are excluded in respect of the information in this operating manual. In particular, we shall not be liable for lost profit or other financial loss. This exclusion of liability does not apply in cases of intent and gross negligence. Moreover, it does not apply to defects which have been deceitfully concealed or whose absence has been guaranteed, nor in cases of culpable harm to life, physical injury and damage to health. If we negligently breach any material contractual obligation, our liability shall be limited to foreseeable damage. Claims due to the Product Liability shall remain unaffected.

Relevant language: legal notes, please see www.hydac.com

3 Functions of the EDS 3400

3.1 MAIN FUNCTIONS

- Pressure sensor with analogue output for pressure monitoring on the fluid side of the hydro accumulator.
- Supports the control of the accumulator charging function
- Detection and signalisation of the accumulator precharge pressure drop (p_0)
→ p_0 -Guard



NOTES:

- It is essential for the functioning of the p_0 -Guard that the hydro accumulator has discharged completely before use.
- The function of the p_0 -Guard can be combined with the following HYDAC accumulator systems:
Bladder accumulators, piston accumulators, diaphragm accumulators, metal bellows accumulators as well as back-up type hydraulic accumulators and accumulator stations.
- If the hydro accumulators are arranged in parallel (e.g. in an accumulator station with multiple hydro accumulators), the p_0 -Guard recognises and signalises the critical accumulator pre-charge pressure (p_0) However, an assignment of the critical hydro accumulator (regarding p_0) is not possible.

3.2 ADDITIONAL FUNCTIONS

- 1 diagnostic/warning function and 1 switching output or 1 analogue output
- Display of the actual pressure in **PSI, MPa, bar**
- Detection and display of the max. value
- Communication via IO-Link acc. specification V1.1 and V1.0 is possible
- Flexible adaption by parameterisation of the EDS via the HYDAC programming device HPG P1-000, the HYDAC programming adapter ZBE P1-000 or the HYDAC measuring device HMG 4000
- Additional information via the LED display on the operating mode and the switching statuses.

4 Assembly

The installation of the EDS 3400 is carried out on the fluid side.



The EDS 3400 is mounted via the pressure port as close as possible to the accumulator (Example: to the left of the diaphragm accumulator via a safety and shut-off block SAF).

Please also observe the following installation recommendations.

For torque value, see Chapter 18 - Technical data.

Installation recommendation

Safety and shut-off block SAF	It is recommended to mount the p_0 onto a safety and shut-off block (SAF) which is usually located close to the hydro accumulator.
Bladder accumulator vent hole	If using bladder accumulators, the vent hole at the oil valve can also be used. When mounting the p_0 -Guard on the vent hole of the bladder accumulator, the function of the vent screw is no longer usable.
Control block	If using accumulator stations (parallel arrangement of the hydro accumulators), the p_0 -Guard should be mounted onto a central strip or to a central control block.

To ensure optimal positioning, the unit can be rotated by 340° about its long axis, and the display and key pad can be rotated by 270°.

The electrical connection must be carried out by a qualified electrician according to the relevant regulations of the country concerned (VDE 0100 in Germany). The pressure switch housing must be earthed correctly at the same time. When fitted into a hydraulic block, earthing the block via the hydraulic system is sufficient.

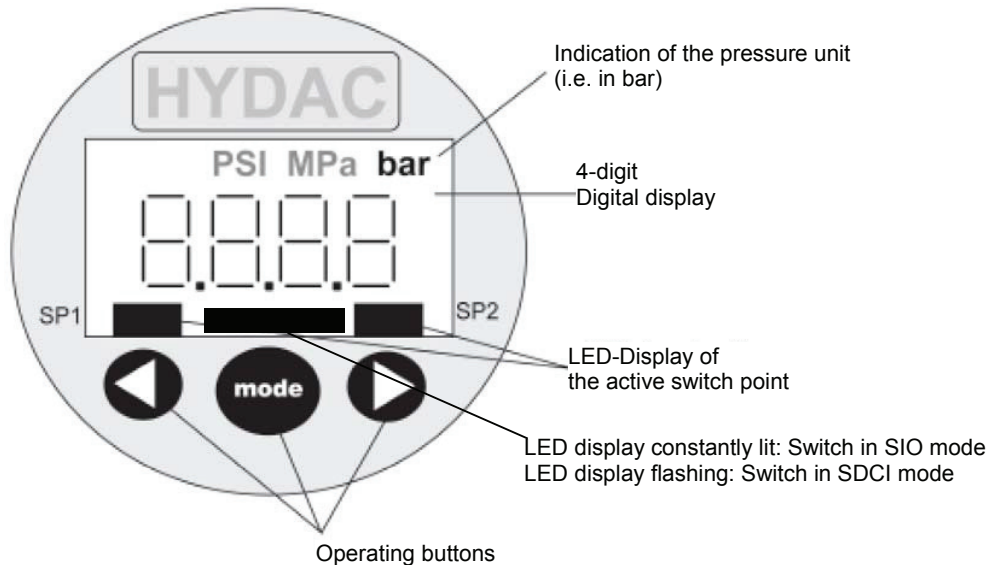
**CAUTION:**

The EDS 3400 must be fitted using a suitable open-end wrench (across flats 27) on the hexagon nut of the pressure connection. Inappropriate installation methods, such as manually fitting above the housing can damage the housing or even cause the device to fail completely, due to the rotatability of the EDS 3400.

Additional installation suggestions which, from experience, reduce the effect of electromagnetic interference:

- Make line connections as short as possible
- Use shielded lines (e.g. LIYCY 4 x 0.5 mm²)
- The cable screening must be fitted by qualified personnel subject to the ambient conditions and with the aim of suppressing interference.
- Keep the unit well away from the electrical supply lines of power equipment, as well as from any electrical or electronic equipment causing interference.

5 Control elements of the EDS 3400



- Descending in the menu
- Decrease value



- Choose menu item
- Confirm value



- Ascending in the menu
- Increase the value

6 Reading the digital display

Description	Representation on 7-segment display	ASCII representation
Accumulator precharge p ₀	<i>P0</i>	P0
Switch-of value not yet determined	<i>nR</i>	n.A.
Actual system pressure	<i>ACT</i>	ACT
Max value pre-set, output 1 (display only)	<i>FH 1</i>	FH1
Switch point, output 1	<i>FL 1</i>	FL1
Switch point, output 2	<i>SP2</i>	SP2
Switch-back point, output 2	<i>rP2</i>	RP2
Add-on functions	<i>EF</i>	EF
Reset	<i>rES</i>	RES
No	<i>no</i>	No
Yes	<i>YES</i>	Yes
set-back	<i>---</i>	---
Lower pressure value (when falling below, the monitoring is terminated)	<i>P.LoU</i>	P.LoW
Outlet 2	<i>ou2</i>	Ou2
N/O when hysteresis function is active	<i>Hno</i>	HNO
N/C when hysteresis function is active	<i>HnC</i>	HNC
Current output	<i>i</i>	I
Voltage output	<i>u</i>	U
Unit conversion	<i>un i</i>	Uni
Unit in bar	<i>bAr</i>	bar
Unit in MPa	<i>MPa</i>	MPa
Unit in psi	<i>PS i</i>	psi
Max. value	<i>H i</i>	Hi
Reset max value	<i>rSHL</i>	rS.HL
Offset calibration	<i>CAL i</i>	CALi
New	<i>nEU</i>	nEU
Error indication	<i>Err</i>	ERR
Teach	<i>TEAC</i>	TEAC
Taught p ₀ value	<i>TVAL</i>	T.VAL
Max value, pre-set (may not be changed)	<i>TdH i</i>	Td.Hi
Permissible p ₀ -loss	<i>TdLo</i>	Td.Lo

Programming lock	PrG	PrG
free	FrEE	FrEE
Locked	LoC	LoC
Version	VEr	VEr

7 Commissioning



NOTES:

- If the current pressure exceeds the device's nominal pressure, it can no longer be displayed, and the display begins to flash.
If the actual pressure is below 0.6 % of the nominal range, 0 bar will be displayed.
- The accumulator pre-charge pressure, referred to in the following by p_0 , only approximately corresponds with the real p_0 in the hydro accumulator. Temperature dependencies and the design of the accumulator system can cause reproducible deviation.
- Please read the operating manual relevant for the used system!
- Further information on hydro accumulators can be found in the following brochure: HYDAC Accumulators No. 3000
- Check the "main menu" to see if the pre-set values of the factory settings are sufficient for the upper operating pressure (**SP2**) and the lower operating pressure (**RP2**).
The following applies:
RP2 < SP2.
- In the "main menu", please set the value for the upper operating pressure (**SP2**) applying in your system.
- In the "main menu", please set the value for the lower operating pressure (**RP2**) applying in your system.
- Set **P.Low** in the menu "expanded functions".
- Operate the system under the normal operating conditions.
- Apply the upper and lower operating pressure twice in order to check the switching behaviour of switching output 2 (accumulator charge function) for proper functioning.
- Set and hold the upper operating pressure applying for the system.
- Lower the system pressure down to **$p \leq P.Low$** .



NOTE:

The monitoring of the pressure signal according to p_0 is only performed within a range between RP2 and P.Low. The pressure must be $\leq P.Low$ when the hydro accumulator is completely emptied in order to enable the software of the EDS 3400 to complete the monitoring and to show p_0 in the display.

- Check if p_0 is displayed in the "main menu".
- Save the value for p_0 in the menu "expanded functions" by means of **TEAC**.
- Check the saved value for p_0 in the menu "expanded functions" by means of **TVal**.

- **TdLo** (intended max. permitted pre-charge pressure drop).
The following applies:
FL1 = T.VAL – Td.Lo

Commissioning completed. The switching output 1 (SP1) switches as soon as the pre-charge pressure falls below the value for FL1. The LED SP1 switches off.

8 Operation Modes

8.1 SIO MODE

After start-up, the pressure switch is in SIO mode (standard I/O mode). In this mode (pin assignment, see chap. 17), pin 4 is assigned the function "warning, pre-charge pressure not OK".

The centre LED is constantly lit.

According Chapter 11 (basic settings, main menu and extended functions) the behaviour of the EDS 3400 can be adjusted to the corresponding application.

8.2 SDCI MODE

Via a connected IO-Link master the pressure switch can be switched to the SDCI mode (Single-drop digital communication interface for small sensors and actuators) by means of a wake-up signal. In this mode, Pin 4 serves as a communication pin (pin connection, see chapter 17) The master is able to communicate with the pressure switch in order to change parameters or to read out measured values.

The centre LED flashes.

9 Parameterisation

9.1 PARAMETERISATION VIA IO-LINK MASTER

The pressure switch can be parameterised via the IO-Link interface by means of any IO-Link compatible master configuration tool (according IO-specifications V1.1). Supports IO-Link specifications V1.0

Should the read parameter sets from the device not be accepted, we recommend to carry out a plausibility check of the parameter set.

For detailed information on IO-Link device parameters, factory defaults, process and diagnostic data, supported standard system commands as well as additional HYDAC device specific system commands for the various product versions (part numbers), please refer to the corresponding IODD (IO Device Description).

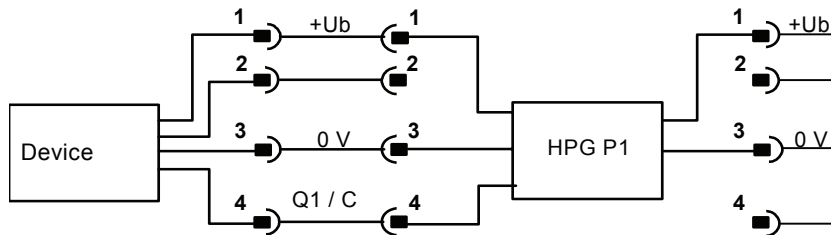
You will find the link for download of the IODD at <https://ioddfinder.io-link.com/#/>

9.2 MANUAL PARAMETERISATION ON THE DEVICE

The EDS 3400 can be parameterised via the device keys

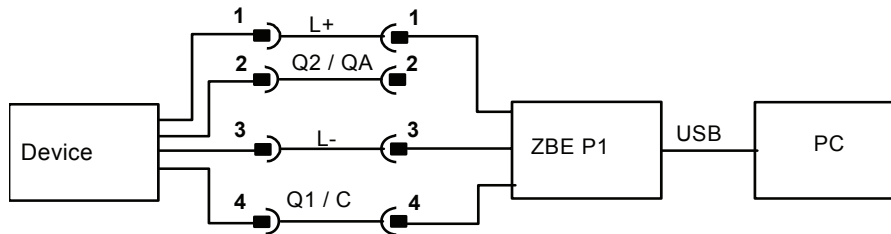
9.3 PARAMETERISATION WITH HYDAC PROGRAMMING DEVICE HPG P1-000

(Connection with standard cable)



9.4 PARAMETERISATION WITH HYDAC PROGRAMMING ADAPTER ZBE P1-000

(Connection with standard cable)



10 Output settings

10.1 SWITCHING OUTPUTS

The EDS 3400 has 2 switching outputs whose switching behaviour (setting pre-charge pressure monitoring or twopoint mode) is parameterisable.

In addition to the IO-Link Smart Sensor Profile Specification, a switch and switch-back delay can be set in HYDAC IO-Link sensors.



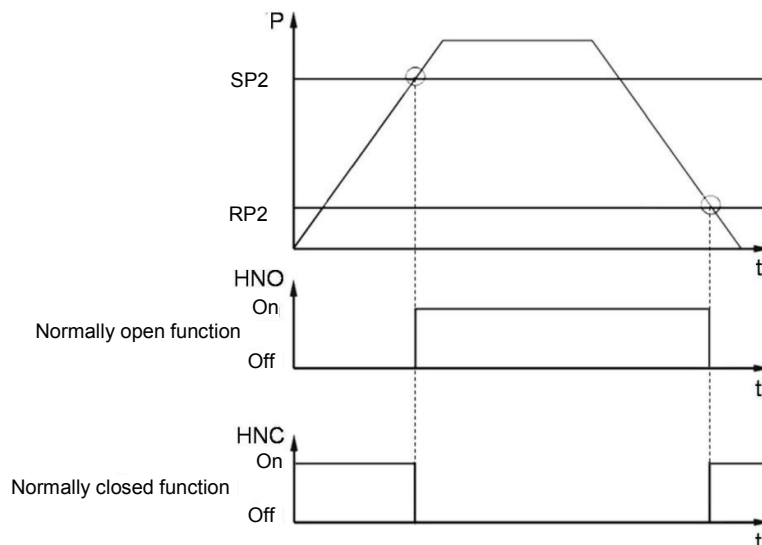
NOTE:

Exceeding or falling below the measuring range leads to a limitation to the corresponding upper or lower limit of the measuring range.

10.1.1 Setting of the switch point (SP2) - Accumulator charge, twopoint mode

One switch point and one switch-back point can be set for each switching output. The particular output will switch when the pre-set switch point is reached and then switch back when the level drops below the switch-back point.

Example for switch point 2 (N/C and N/O function):



<u>Abbreviations:</u>	"SP2"	= switch point 2
	"RP2"	= switch-back point 2
	"HNO",	= N/O when hysteresis function is active
	"HNC"	= N/C when hysteresis function is active



NOTE:

It is only possible to set the switch point (SP) if it is higher than the respective switch-back point (RP).

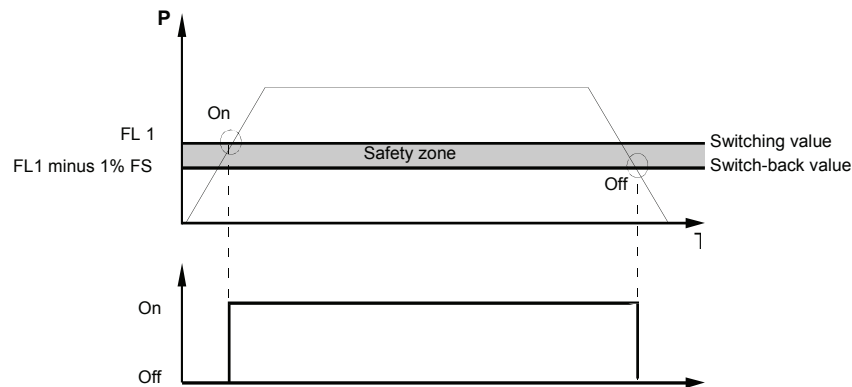
10.1.2 Setting of the pre-charge pressure monitoring

The pre-charge pressure monitoring is determined by the switching value ("FL1). This is calculated as described in the following and can be checked in the main menu.

$$FL1 = T.VAL - Td.Lo$$

The output switches as soon as p_0 leaves this range. The output will switch back when the pressure enters this range. The lower switch-back value is just below the lower switch value.

Example:



Abbreviations: "FL1" =Lower switch value 1

10.2 SETTING RANGES FOR THE SWITCHING OUTPUTS

Measuring range in bar	Lower limit of RP2 / FL1 in bar	Upper limit of SP2 in bar	Minimum difference betw. RP2 and SP2 in bar	Increment* in bar
0 ... 40	0.4	40	0.4	0.1
0 ... 100	1	100	1	0.2
0 ... 250	2.5	250	2.5	0.5
0 ... 400	4	400	4	1
0 ... 690	7	690	7	1

* All ranges shown in the table can be adjusted by the increments shown.

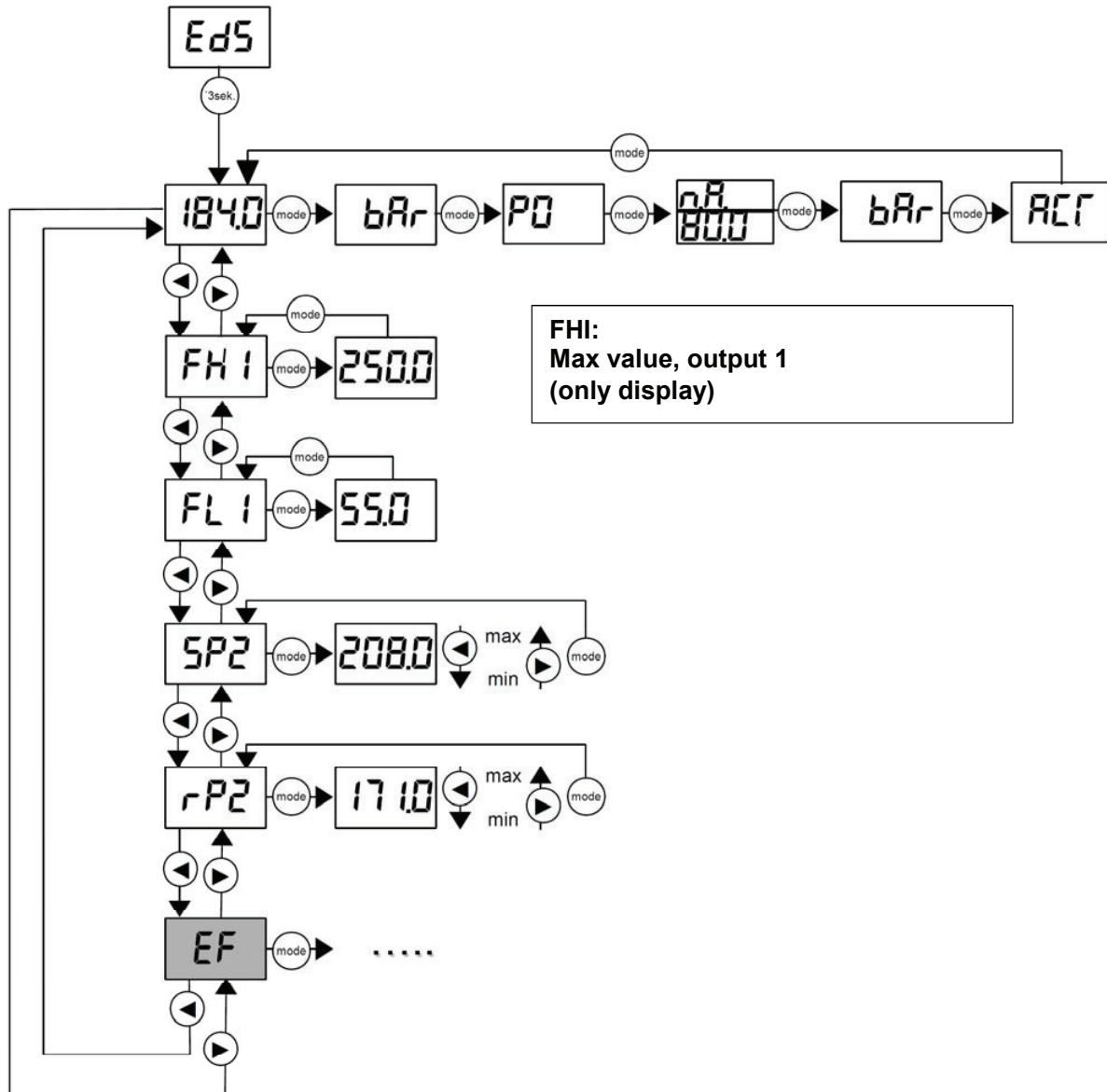
10.3 ANALOGUE OUTPUT

The universal output "ou2" can be set to 4 ... 20 mA or 0 ... 10 V (corresponding to measuring range).

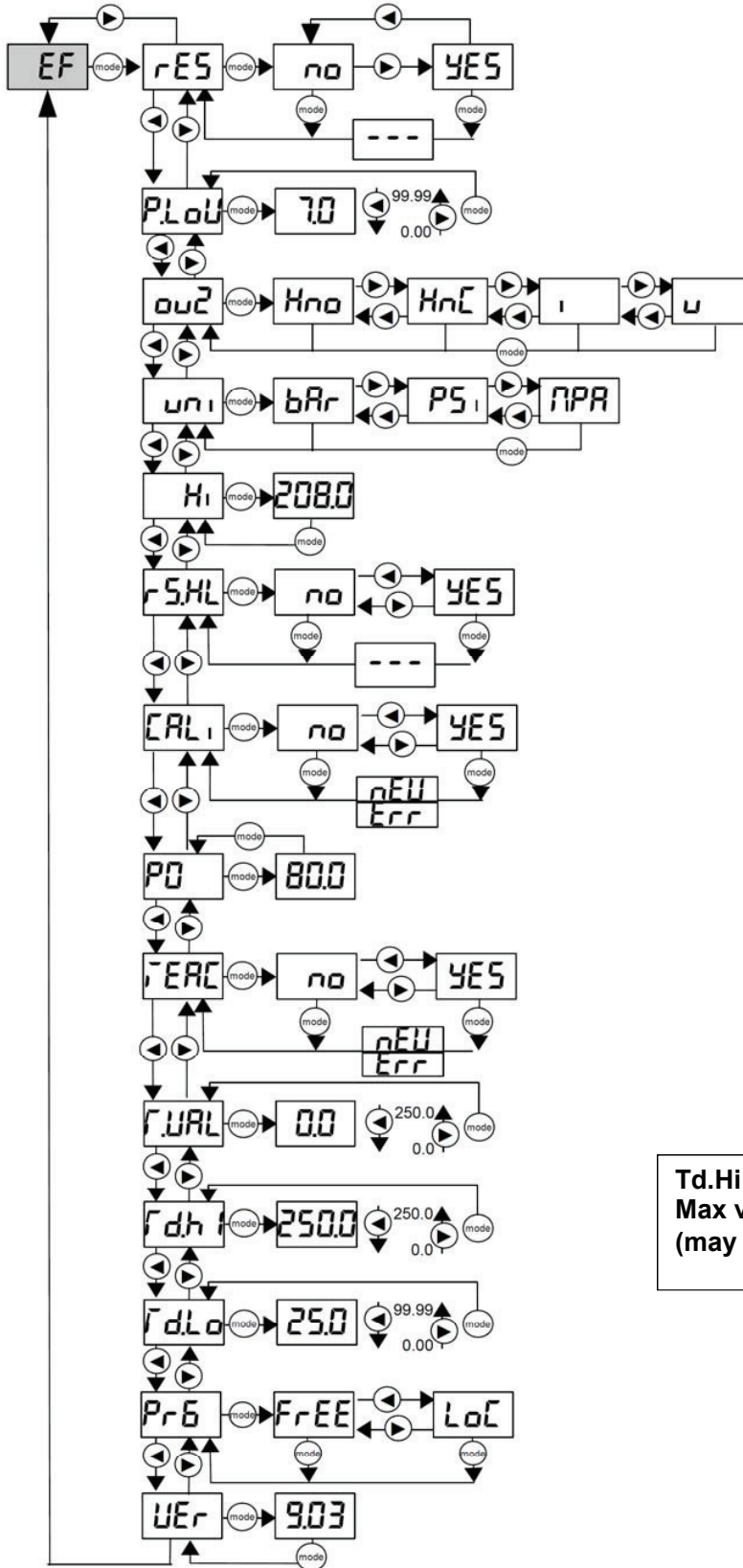
11 Basic Settings

The EDS 3400 can be adapted to suit the particular application as required by changing multiple settings. These settings are combined in a menu shown by the example of a p_0 –Guard with a measuring range of 0 .. 250 bar.

11.1 MAIN MENU



11.2 EXTENDED FUNCTIONS



Td.Hi:
Max value, pre-set
(may not be changed)

12 Changing the Basic Settings



NOTE:

When the menu is activated, no switching operations are carried out!



NOTE:

If there has been no activity in this menu for approx. 60 seconds, the menu will automatically close and any changes you have made will not be applied.

13 Resetting the peak values

The pressure peak value can be reset.

- In the extended functions menu, please press the key "◀" until „rSHL“ appears.
- Press the "mode" key.
- Press "▶" to select „YES“ and confirm by pressing the "mode" key - the max value is now set back.

14 Offset calibration

The function "Cali" enables the calibration of the sensor offset. The current pressure is saved as the new offset. This is possible in the range of +/- 3% of the instrument rated pressure.

- In the extended functions menu, please press the key "◀" until „Cali“ appears.
- Press the "mode" key.
- Press "▶" to select „YES“ and confirm by pressing the "mode" key.

"neW" appears in the display when a calibration has been carried out in the permitted range, otherwise "Err" is displayed.

This function is useful, for example, if there is always a residual pressure left in the system which should be displayed as 0 bar.



CAUTION:

Following an offset adjustment, for example on a 690 bar instrument, a pressure of up to 18 bar will be displayed as 0 bar. Before any work is carried out on the hydraulic system, ensure that the system is depressurised.

15 Program enable

The instrument has a program enable which must be set to change the settings. The program enable can be set or cancelled during operation. It provides protection against unintentional alterations of settings.

15.1 CHANGING THE PROGRAM ENABLE

- In the extended functions menu, please press the key "◀" until „PRG“ appears.
- Press the "mode" key.
- You can choose between free programming "FREE" and locked programming "LoC". By pressing "◀" or "▶" you can switch between these options.
- Confirm by pressing the "mode" key.

16 Error Messages

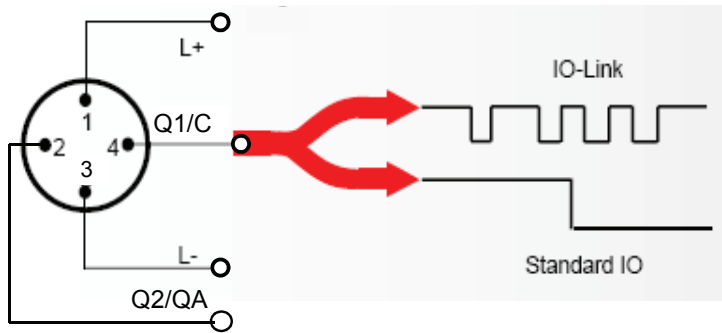
If an error is detected, a corresponding error message appears which must be acknowledged by pressing any key.

Possible error messages are as follows:

E.10	A data error has been detected in the saved settings. Possible causes are strong electromagnetic interference or a defective component.
Action:	Press "mode" and confirm "RES" by pressing "Yes". The factory settings will be restored for all adjustable parameters and all minimum and maximum values will be deleted. Enter the data again from the beginning.
E.12	An error was detected in the saved calibration data. Possible causes are strong electromagnetic interference or a defective component.
Action:	Disconnect then reconnect the supply voltage to the instrument. If the error persists, the instrument must be returned to the factory for recalibration or repair.
E.21	A communication error within the unit has been detected. Possible causes are strong electromagnetic interference or a defective component.
Action:	Press "mode". If the error persists, disconnect then reconnect the supply voltage to the instrument. If the error still persists, please contact our service department.


17 PIN connection

M 12x1, 4 pole



Pin	Signal	Description
1	L+	+U _B
2	Q2/QA	Switching output for the accumulator charging function (SP2) / Analogue output
3	L-	0 V
4	Q1/C	Switching output for the p ₀ – guarding function (SP1) / IO-Link communication

18 Technical Data

Input data						
Measuring ranges	bar	40	100	250	400	690
Overload pressures	bar	80	200	500	800	1000
Burst pressure	bar	200	500	1000	2000	2000
Mechanical connection	G1/4 A ISO 1179-2					
Tightening torque, recommended	20 Nm					
Parts in contact with fluid	Mech. connection:	Stainless steel				
	Sensor cell:	Stainless steel				
	Seal:	FPM				
Output data						
Switching outputs	PNP transistor outputs					
	Switching current:	1.2 A	PIN 2			
		250 mA	PIN 4			
Analogue output, permitted load resistance	Selectable:	4 ... 20 mA	load resistance max. 500 Ω			
		0 ... 10 V	load resistance min. 1 kΩ			
Accuracy according to DIN 16086, Limit point adjustment	≤ ± 0.5 % FS typ.					
	≤ ± 1 % FS max.					
Temperature compensation, offset	≤ ± 0.015 % FS / °C typ.					
	≤ ± 0.025 % FS / °C max.					
Temperature compensation, over range	≤ ± 0.015 % FS / °C typ.					
	≤ ± 0.025 % FS / °C max.					
Repeatability	≤ ± 0.25 % FS max.					
Reaction time	< 10 ms					
Long-term drift	≤ ± 0.3 % FS / year typ.					
Ambient Conditions						
Compensated temperature range	-10 ... +70 °C					
Operating temperature range	-25 ... +80 °C (-25 ... +60 °C for UL spec.)					
Storage temperature range	-40 ... +80 °C					
Fluid temperature range	-25 ... +80 °C					
CE mark	EN 61000-6-1 / 2 / 3 / 4					
 mark ¹⁾	Certificate-No.: E318391					
Vibration resistance according to DIN EN 60068-2-6 at 0 ... 500 Hz	≤ 10 g					
Shock resistance according to DIN EN 60068-2-27 (11 ms)	≤ 50 g					
Protection class to DIN EN 60529 ²⁾	IP 67					
Other data						
Supply voltage	9 ... 35 V DC,		if PIN 2 = SP2			
	18 ... 35 V DC,		if PIN 2 = analogue output			
when applied according to UL specifications	– limited energy – according to 9.3 UL 61010; Class 2, UL 1310/1585; LPS UL 60950					
Residual ripple of supply voltage	≤ 5 %					
Current consumption	≤ 35 mA without outputs					
Show	4-digit, LED, 7-segment, red, height of digits 7 mm					
Weight	~ 120 g					

Note: Excess voltage, override protection and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

¹⁾ Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1

²⁾ with mounted female connector having the corresponding protection class

Relevant data for IO-Link:

Download the IO Device Description (IODD) from: <https://ioddfinder.io-link.com/#/>

Features

Block Parameters	Yes
Data Storage	Yes
Profile Characteristic	0x0001 (Device Profile: Smart Sensor), 0x8000 (Function Class: Device Identification), 0x8001 (Function Class: Binary Data Channel), 0x8002 (Function Class: Process Data Variables)
Supported Access Locks	Parameters Data Storage Local Parameterisation Local User Interface

Communication

IO-Link revision	V1.1 / support V1.0
Transmission rate, baud rate ³⁾	38.4 kBaud (COM2)
Minimum cycle time	5 ms
Process data width	32 bit
SIO mode supported	Yes
M-sequence capability	PREOPERATE = TYPE_0 OPERATE = TYPE_2_2 ISDU supported

³⁾ Connection with unscreened standard sensor line possible up to a max. line length of 20 m.

19 Order details

EDS 3 4 4 6 - F31 - XXXX - P00

Mechanical connection

4 = G1/4 A ISO 1179-2

Electrical connection

6 = Male M12x1, 4 pole (connector not supplied)

Output

F31 = IO Link interface

Pressure range

0040; 0100; 0250; 0400; 0690

Modification Number

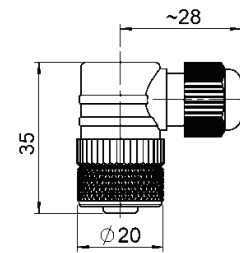
P00 = p₀-Guard

20 Accessories

20.1 FOR ELECTRICAL CONNECTION

ZBE 06 (4 pole)

Female connector, right-angle
Part No.: 6006788

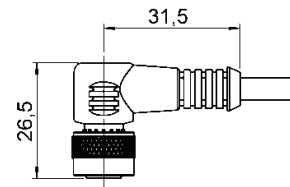


ZBE 06-02 (4 pole)

Female connector, right-angle with
2 m cable,
Part No.: 6006790

ZBE 06-05 (4 pole)

Female connector, right-angle with
5 m cable
Part No.: 6006789



Colour code:

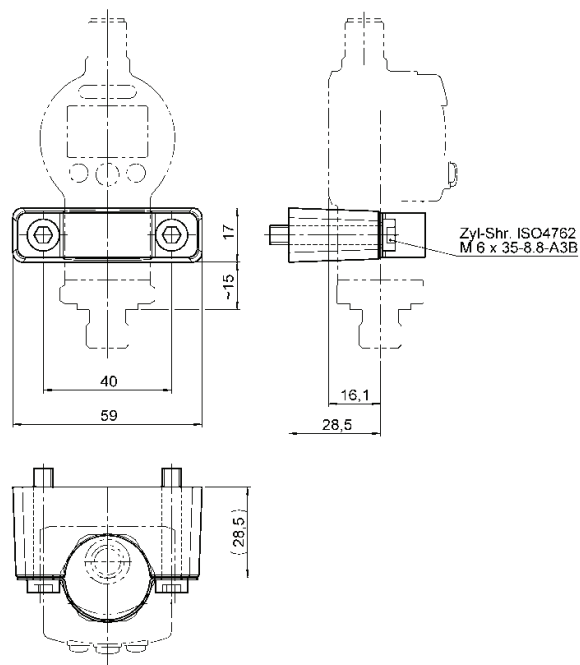
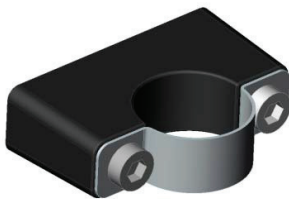
Pin 1: brown
Pin 2: white
Pin 3: blue
Pin 4: black

20.2 FOR MECHANICAL CONNECTION

ZBM 3000

Clamp for wall-mounting - screw-type fitting -
(Material of lower section: TPE Santoprene 10187;
Material of top section: Steel strip DIN 95381-1.4571)

Part No.: 3184630



ZBM 3100

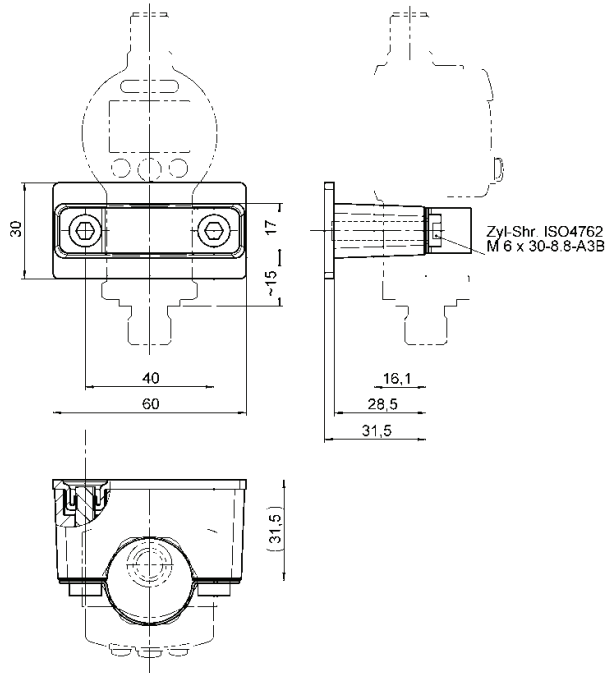
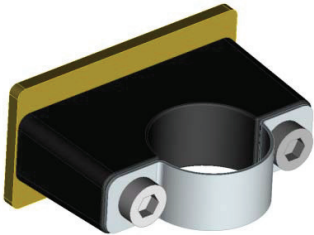
Clamp for wall-mounting - weld-type fitting -

(Material of welding bridge: QSTE340TM, zinc coating EN 12329 FE/ZN8/B;

Material of lower section: TPE Santoprene 10187;

Material of top section: Steel strip DIN 95381-1.4571)

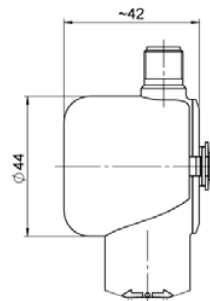
Part No.: 3184632

**ZBM 3200**

Splash guard

(Material: Elastollan S60 A15 SPF 000)

Part No.: 3201919



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Email: speichertechnik@hydac.com
Web: www.hydac.com

HYDAC Service

For enquiries regarding repairs, please contact HYDAC HYDAC SYSTEMS & SERVICES.

HYDAC SYSTEMS & SERVICES GMBH

Hauptstr. 27
D-66128 Saarbruecken
Germany

Phone: +49 (0)6897 509-1936
Fax: +49 (0)6897 509-1933

NOTE

The information in this manual relates to the operating conditions and applications described.
For applications or operating conditions not described, please contact the relevant technical department.

If you have any questions, suggestions, or encounter any problems of a technical nature, please contact your HYDAC representative.