HYDAC INTERNATIONAL

Intelligent Electronic Pressure Switch
EDS 2000

Applications:

The EDS 2000 is a four–channel pressure switch with display and microprocessor control.

The use of the microprocessor enables greater flexibility with regard to adapting the unit to individual applications and, more importantly for a pressure switch, a greater level of operating safety.

The microprocessor monitors the pressure sensor, the mains supply and all internal circuitry. The functioning of the computer itself is monitored by a so–called watchdog circuit which is independent of the computer. Errors due to transducer faults, eg due to overload, are detected internally and in the event of an error the computer ensures transition to a pre–programmed relay quiescent state.

Monitoring of the cell allows the peak pressure across the pressure switch to be displayed. Consequently the user also receives data on pressure peaks (in % of nominal pressure). The pressure switch is universally suitable for use in hydraulics and industrial process engineering.

As an option, units can be supplied with an extra sensor input and a serial interface. The RS 232 serial interface enables monitoring and programming of the unit via an external computer, or a printer can be connected to obtain print–outs. An additional pressure transducer or a temperature sensor can be connected to the 4 ... 20 mA output. If the pressure range of the external sensor corresponds to that of the internal sensor, then it is possible to evaluate the differential pressure.

Special features:

- Accuracy class 0.5
- 4–digit display
- 4 switching points with relay output (cross–over contact)
- Switch–on and switch–off point infinitely adjustable as required, apart from a small hysteresis
- Analogue output 0 ... +5 V
- Menu driven programming using only 2 keys
- Programmable switch–on and switch–off delay to suppress pressure peaks
- Relay functions individually programmable on or off
- Programme disable facility
- Two peak pressure memories, one of which can be re–set as a measuring device
- Comprehensive safety function incorporated
- IP 65 housing with separate terminal box

Options:

- RS 232 – serial interface for printer or PC
- External listing and programming option
- External sensor connection 4 ... 20 mA
- Differential pressure measurement possible
- Relay outputs can be assigned to internal/external sensors and differential pressure measurement
- Measurement range of external pressure sensor programmable, also temperature sensors –25 °C to 100 °C can be connected

Construction:

The electronic pressure switch EDS 2000 has an internal pressure sensor the signal of which changes depending on the pressure applied and is further processed electronically.
A microprocessor monitors a multitude of internal signals and thereby increases the reliability of the unit.

The EDS 2000 housing is made of ABS plastic and is to safety type IP 65.

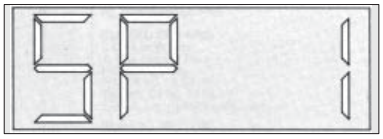
To connect the unit electrically, the lower cover plate must be unscrewed. Inside is the terminal box which also houses the sensor.

The connection cables are attached via PG 11 glands.

The unit can be operated and adjusted without opening it up, via two membrane keys “MODE” and “SET”, as described in the section on programming.

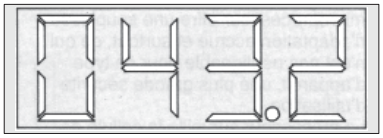
Switching point programming:

Press “MODE” and “SET” simultaneously to bring up the menu for switching point programming.
The display will be as follows:



(SP1 = switching point no. 1)

By pressing the MODE key the switching point number increases. If no key is pressed, after a short period it will display the switching point value.
The last digit shows the number of the switching point. This is separated by a decimal point.

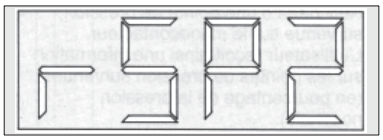


(043 bar, switching point no. 2)

The digit to be changed flashes and can be increased in steps of 1 by pressing the SET key (up to the max. pressure value only).

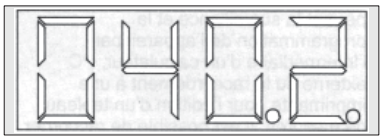
To change to the next digit, press the MODE key.

Following the input of the last figure, the display moves on to switch–back point programming. The display is as follows:



(rSP2 = switch–back point no. 2)

After a delay it will display the appropriate value.



(040 bar, switch–back point no. 2)

Programming of the value is done as described above.

Here too, the last digit indicates the switching point number.

There is a decimal point before and after the last digit to indicate that it is the switch–back point being programmed.

The maximum programmable value of the switch–back point must be lower than the value of the appropriate upper switching point by an amount equal to the hysteresis.

The hysteresis is 1% of the nominal pressure, however,

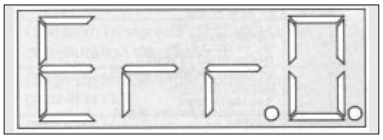
– on units > 100 bar, it is 3 bar max.

– on units ≤ 100 bar, it is 0.3 bar max.

Following the input of the last figure, the display moves on to programming the next switching point.

Programming can be stopped at any time by pressing both keys simultaneously.

If the switch–back point has been programmed in as greater than its upper switching point, an error message will be displayed (acknowledge by pressing the SET key).



(ERR 0 = error no. 0)

Subsequently, the incorrectly programmed switching point is displayed and can be re–programmed.

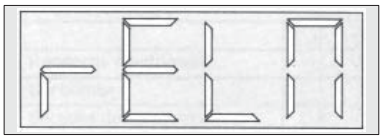
Programming with the user menu:

Hold down the MODE key to bring up the user menu, (continue to hold down MODE until required menu appears).

The next menu item can be selected by pressing MODE again. Pressing MODE and SET simultaneously takes you out of the user menu.

Programming the relay quiescent state:

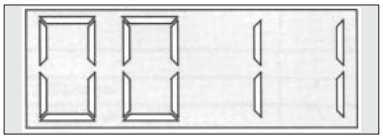
Menu:



(rELM = relay mask)

After a delay the relay quiescent position is displayed (position of the relay at zero pressure)

e.g.



(0011)

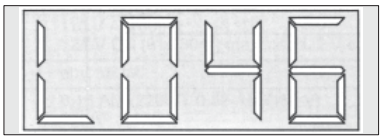
0 = relay release

1 = relay pull–in

The first digit flashes and can be switched between 0 and 1 using the SET key. Press MODE to move on to the next digit or, after the last digit, to enter the condition.

Display of maximum load:

Menu:



(L 046)

The first position is an L, followed by a three digit number which displays the highest pressure value reached as a percentage of the sensor value. The display refers to the internal sensor, regardless of the mode in which the EDS 2000 is operated.

Peak value display:

The peak value is displayed in the same way as the maximum load, except that the whole display flashes. The peak value is shown as a percentage of the internal sensor value since the EDS was last switched on or reset. The peak value can be reset to zero by pressing the SET key.

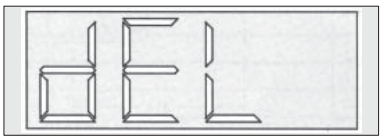
Difference between maximum load and peak value:

The maximum load is the peak pressure reached since the EDS 2000 was first used. It cannot be altered by the user and serves to identify any overload of the sensor.

Switching delays:

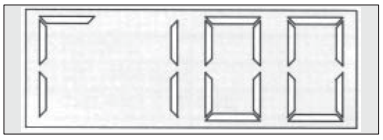
The switch–on and switch–off delay can be programmed separately for each relay. The switch–on delay starts when the switching point is exceeded and the switch–off delay begins when the value falls below the switch–back point.

Menu:



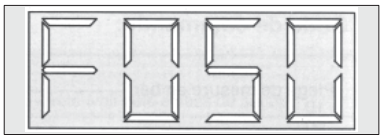
(dEL = delay)

After a delay the time value is displayed, “T 20” or “T 100” for 20 or 100 ms.



(T 100 = time value 100 ms)

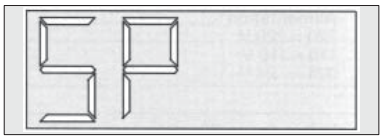
The time value can be altered using the SET key and entered by pressing MODE. The next value to be set will be the time factor.



(F 050 = factor 50)

The time factor multiplied by the time value gives the delay time. The digit to be changed flashes and can be increased by pressing the SET key.

To change to the next digit, press the MODE key and when the last figure has been input, press MODE to enter the time factor.



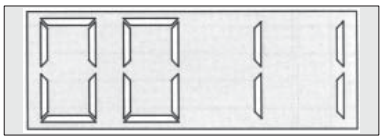
(SP = switching point)

After a short delay the mask for switch–on delay will be displayed:

0 indicates undelayed,

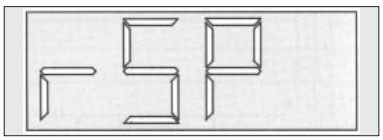
1 indicates delayed.

e.g.



(0011)

Relays 1 and 2 switch undelayed, relays 3 and 4 switch after the programmed delay time. Programming is the same as for the relay quiescent mask. Subsequently, “rSP” is displayed and the mask for the switch–off delay can be programmed.



(rSP)

The time delay function allows pressure peaks of varying durations to be filtered out. In this way it is possible to suppress pressure peaks.

On units with the options ’serial interface’ and ’external sensor’ further settings can be made using the user menu, e.g.:

– Parameters of the serial interface, baud rate, CTS signal
– Time of day for print–outs
– Definition of the operation of the external sensors

Full details of the types of operation of the EDS 2000 with integrated pressure measurement cell and the option of external sensors are given in the manual.

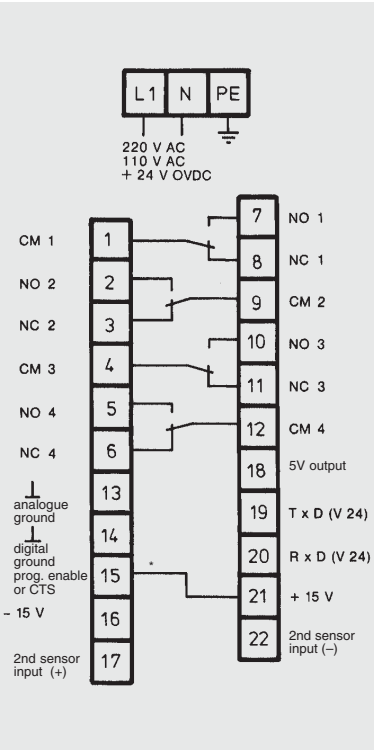
Switching response of the EDS 2000:

As described in the programming instructions for the EDS 2000, the switch–on pressure and the switch–back pressure can be set for each switching contact separately.

When the pressure is rising the delay contact remains in the programmed quiescent state until the switch–on pressure value (= switching point) of the channel is reached.

The relay switches back into the quiescent state only when the pressure drops below the programmed switch–back value. If the switching points have been programmed with delays, the reaction of the relay is delayed accordingly. This function can be used either to suppress pressure peaks or as a time delay.

Wiring diagram:

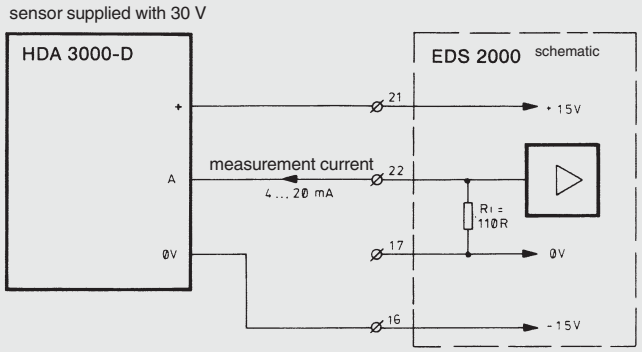


* Wire bridge for programme enable. Remove bridge for programme disable.

Connection of external sensors:

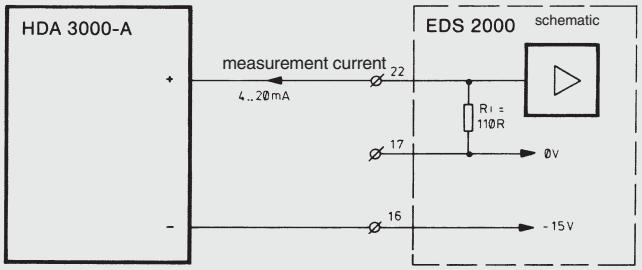
The pressure switch EDS 2000 has an auxiliary supply for external sensors of ± 15 V, which can be loaded with a maximum of ± 50 mA.

3–conductor sensor without own power supply:

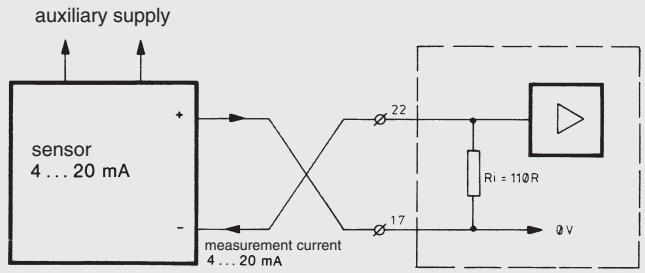


Flow of current always from connection 22.

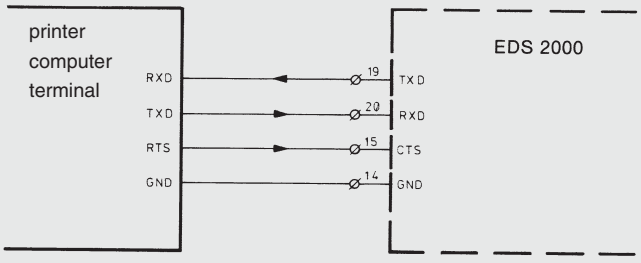
2–conductor sensor without own power supply:



Sensor with own power supply:



Connection of serial interface:



Technical specifications:

Supply voltage:	220 V AC 50 Hz ± 10 % 110 V AC 60 Hz ± 10 % 24 V DC (21...30 V) max. 2 Vpp residual ripple (see footnote)
Input power:	approx. 15 VA
Fuse:	0.16 AM (220 V), 0.32 AM (110 V) 0.8 AT (24 V)
Signal output:	0...5 V at minimum 1 kOhm
Linearity, hysteresis of the pressure evaluation circuit:	± 0.5% of the final value at 25 °C (298 K)
Temperature range of the pressure medium, compensated:	20 ... 70 °C (293...343 K)
Temperature range of the electronics:	–25 ... +50 °C
Temperature effect:	0.2% per 10 K on zero point 0.3% per 10 K on the sensitivity
Storage temperature range:	–40 ... +75 °C
Overload range:	2 x nominal pressure
Weight:	approx. 1500 g

Relay data:	
Switching output:	400 VA max. 220 V AC, 50 W max. 100 V DC cross–over contacts I_{switch} 0.025...2A
Contact resistance:	approx. 50 mOhm
Pull–in time:	approx. 6 ms
Bounce time:	approx. 2 ms
Mechanical life expectancy:	5 x 10^7
It is recommended that the relay contacts are protected with varistors (burn–up is reduced)	

Electrical connections:	
via terminal block	
Section of connection:	screw–in connections up to 2.5 mm ∅ wire
SWG:	16
Cable outlet from terminal box:	3 x PG 11
Safety type to DIN 40 050:	IP 65
CE mark	
Housing:	Plastic **Warning:** Do not use any solvent containing chlorothene on this unit!

Display:	
LED 7 segments	
Height of digits:	14 mm
Legible at:	approx. 8 m
Contrast filter:	red
Hydraulic connection:	threaded port to DIN 3852 – G 1/4

Serial interface:	
Level:	RS 232 C
Baud rate:	300...9600 baud
Signals:	TXD, RXD, CTS, GND

External sensor	
Signal:	4...20 mA (current sink)
Supply:	±15 V max. / ±50 mA from EDS 2000

The 24 V supply voltage is converted internally via a DC/DC transducer. The pulsed power supply draws max. 3.5 A peak current. The average current consumption is approx. 500 mA.

Order details:

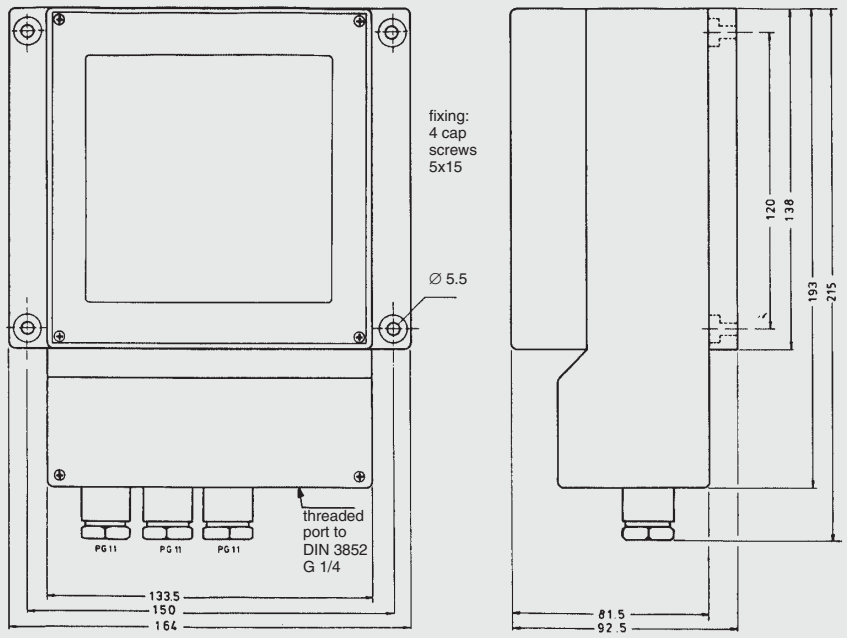
EDS 2000 – XXX – X – XXX – XXX

Pressure in bar
10
50
100
200
450

Type of connection, mechanical
1 = threaded port to DIN 3852 – G 1/4

Supply voltage
220 = 220 V
110 = 110 V
024 = 24 V

Modification number
000 = standard
100 = RS 232 – interface and connection for second sensor



Note:

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