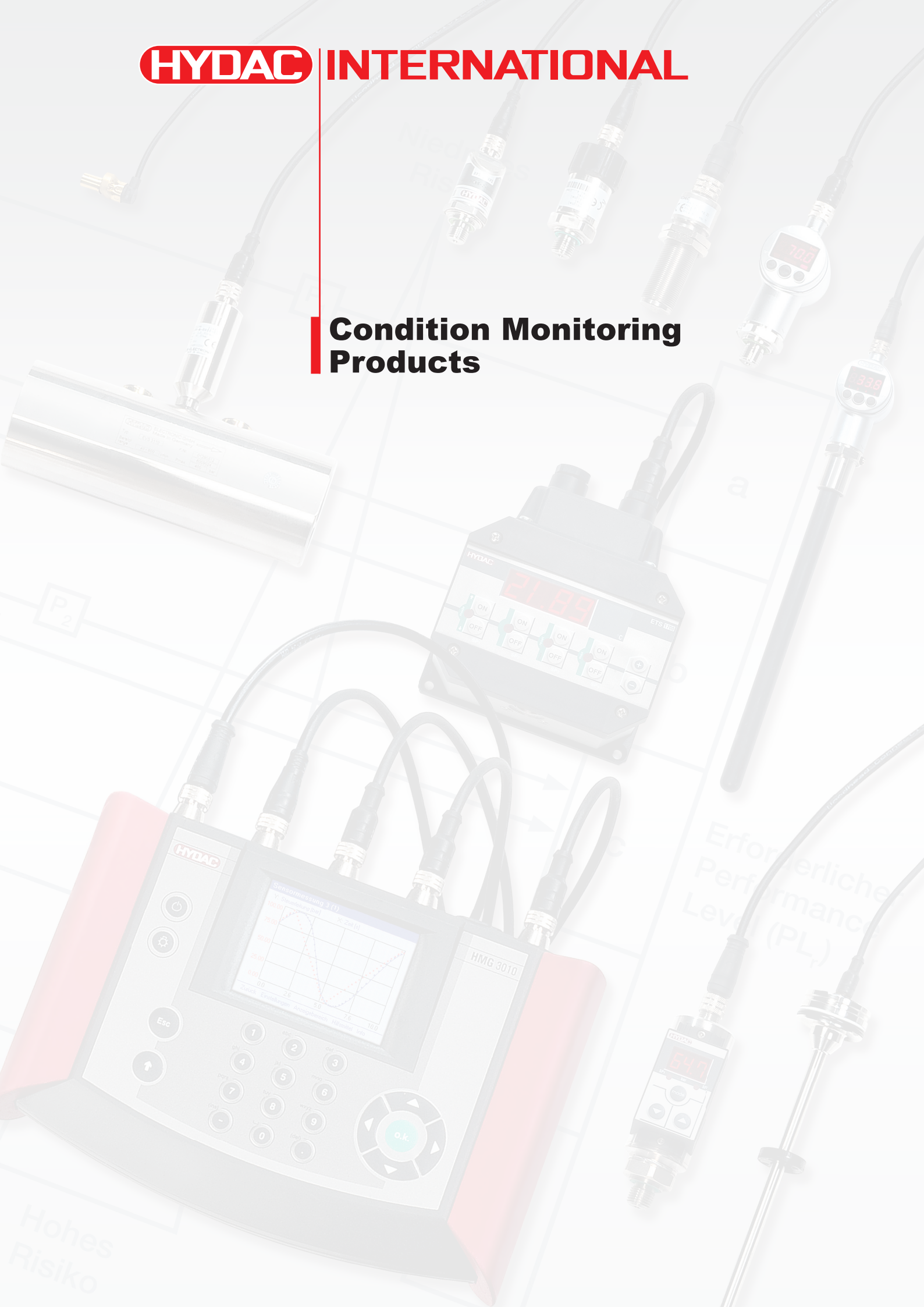


## Condition Monitoring Products



Hohes Risiko

Erforderliche Performance Level (PL)

## CONDITION MONITORING PRODUCTS

Condition monitoring is the process of logging and interpreting condition information from machines, systems and their components, with the aim of implementing predictive maintenance programs based on the condition of the system.

The operating data of the machine or system is recorded continuously using the HYDAC sensor system. The recorded data is then analyzed and interpreted. Finally this compressed condition information can be trans-mitted to the operator, enabling him to monitor and control the machine or system using a variety of communication channels.

Condition monitoring products from HYDAC ELECTRONIC GMBH:

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CMU 1000, Condition Monitoring Unit

---

CSI-B-2, Interface Module

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HPT 500 Differential Pressure Transducer

---

AS 1000, AquaSensor

---

AS 3000, AquaSensor

---

AS 3000 IO-Link , AquaSensor

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EY 1356, Contamination switch

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## Condition Monitoring Unit CMU 1000

### Description:

The CMU1000 is an electronic evaluation unit designed for permanent online condition monitoring of machines and systems.

In order to achieve this, the device must be supplied with relevant data which is recorded by the sensors connected to it. This recorded data (processed or unprocessed) can be transferred by the CMU 1000 via different ports or as an analog value to other devices and/or monitoring levels.

The CMU 1000 processes the application program stored in it continuously and cyclically like a PLC. The user creates this program simply and conveniently on a PC using the **CM Editor** developed for this purpose and then uploads it to the CMU 1000.

The **CM Editor** is part of the HYDAC PC software **CMWIN Version V03 or higher** (supplied) and it provides the various tools and functions in accordance with IEC 61131 for designing, integrating and testing the user program using "drag and drop" operations.

For status indication and for displaying messages and values on the device itself, there is a back-lit LCD display and three different colored LEDs.

The CMU 1000 is operated and data is input on site using a built-in keypad within the menu structure of the device.

The CMU 1000 is designed for use in machines in both the stationary and mobile sectors.

It is possible to connect easily to higher-level control, monitoring and bus systems using the built-in interfaces or in combination with an additional coupling module.



### Special features:

- 8 input channels for HSI or SMART sensors
- 8 input channels for analog sensors
- 4 input channels for digital signals
- 2 output channels for analog signals
- 4 relay switching outputs with change-over contacts
- USB slave port for PC connection
- USB master port for storing measured data on a standard USB memory stick
- Ethernet interface
- RS 232 interface
- 2-line LCD display (2 x 16 characters) to display measured data and status and/or error messages
- 3 user-programmable LEDs in different colours, for status indication (red, yellow, green)
- Simple operation using navigation pad
- Creation of customized application program using the PC software **CMWIN** supplied

## CM Editor:

The CM Editor is part of the HYDAC PC software **CMWIN**, Version 03 or higher, and provides a wide variety of tools and functions for designing, integrating and testing the application program. An application program consists of many individual functions which can be linked together. During subsequent operation, this user program is processed as for a PLC, cyclically. The program is created according to the IEC 61131 (the standard for PLC programming).

The screenshot shows the CM Editor interface with a ladder logic diagram in the center. The diagram consists of a 'Start' function followed by a series of 'Setzen Text' (Set Text) functions, each connected to a corresponding 'Text' display function. The functions are arranged in a grid-like structure, with 'Setzen Text 1a' through '1g' on the left and '1h' through '1o' on the right. Below these are 'Setzen Text 2', '3', and '4'. The right-hand side of the interface features a 'Functions' panel with various tool icons for data sources, calculations, numerical operations, conditions, links, boolean operations, and result values/actions. The bottom status bar indicates 'Current platform: CMU 1000'.

This screenshot shows a context menu opened over the 'Start' function in the ladder logic diagram. The menu options are: Display, Simulate, Transfer into device, Receive from device, Deleting in the device, and Online debugging.

This screenshot shows a context menu opened over a function in the 'Linked functions' area. The menu options are: Apply from file, Apply from device, Uninstall, Saving to a file..., and Display.

The screenshot shows the 'Simulation' window in CMWIN. It contains a table with columns for 'Sources' and 'Actions'. The 'Sources' table has columns for Name, Input value, and Cycle. The 'Actions' table has columns for Name, Value, and Time. The simulation is currently at Cycle 0.

Sources		Actions	
Name	Input value	Name	Value
Eingabe2	1	Aktion1	not triggered
Input1	1	Aktion17	not triggered
		Aktion18	not triggered
		Aktion19	not triggered

The screenshot shows the main CMWIN window displaying the program name 'CM Program - Programm CMU 1000-4\_Eng.hecmp'. Below the name is a list of variables and their types:

- Eingabe2 Boolean input value(1;"Start 2";0)
- Input1 Boolean input value(1;"Start";0)
- Intervall1 Time sensor(1)
- Pulse generation1 Pulse generation(Input1)
- Flankenerkennung? Pulse generation(Eingabe2?)

## Technical data:

### Supply

Input voltage	18.0 .. 35.0 V DC
Current consumption	max. 1.5 A (3.5 A when CSI-F-10 connected)
Reverse pol. protect.:	-30 V
Isolation voltage	+40 V

### Connection of sensors

Up to 8 sensors with HSI functionality or up to 8 SMART sensors<sup>1)</sup> and in addition up to 8 analog sensors and up to 4 digital sensors  
4 x digital / 2 x digital + 2 x frequency / 3 x digital + 1 x frequency

### Analog inputs

Channel I and J (Accuracy)	4 .. 20 mA ( $\leq \pm 0.1$ % FS max.) 0 .. 20 mA ( $\leq \pm 0.1$ % FS max.) 0.5 .. 4.5 V ( $\leq \pm 0.1$ % FS max.) 0 .. 10 V ( $\leq \pm 0.1$ % FS max.)
Channel K and L (Accuracy)	4 .. 20 mA ( $\leq \pm 0.1$ % FS max.) 0 .. 20 mA ( $\leq \pm 0.1$ % FS max.) 0.5 .. 4.5 V ( $\leq \pm 0.1$ % FS max.) 0 .. 50 V ( $\leq \pm 0.1$ % FS max.) -10 .. +10 V ( $\leq \pm 0.2$ % FS max.) L only!
Channel M and N (Accuracy)	4 .. 20 mA ( $\leq \pm 0.1$ % FS max.) 0 .. 20 mA ( $\leq \pm 0.1$ % FS max.) 0.5 .. 4.5 V ( $\leq \pm 0.1$ % FS max.)
Channel O and P (Accuracy)	4 .. 20 mA ( $\leq \pm 0.1$ % FS max.) 0 .. 20 mA ( $\leq \pm 0.1$ % FS max.) 0.5 .. 4.5 V ( $\leq \pm 0.1$ % FS max.) -10 .. +10 V ( $\leq \pm 0.2$ % FS max.) P only!

### Digital inputs

Quantity	4, of which 2 are for frequency measurement (Channel Q and R)
Trigger threshold	approx. 2 V
Dynamics	30 kHz

### Measurement channels

Quantity	32 - A measurement channel can be a value of a connected sensor (also a subchannel of a SMART sensor) or a value derived (calculated) from sensor data.
----------	---

### Analog outputs

Quantity	2
Type	individually selectable, current (4 .. 20 mA) or voltage (0 .. 10 V)

### Digital outputs

Quantity	4
Type:	Relay output, change-over contact
Switching capacity	30V DC / 1 A

### Calculation unit

Analog value recording	12 bit A/D converter
------------------------	----------------------

### Interfaces

Keypad	- 4 arrow keys (up, down, right, left) - OK key - ESC key
Display (back-lit)	- Two-line LCD display (2 x 16 characters) - Additional indication of status information via 3 different colored LEDs is possible
USB Mass Storage Device <sup>2)</sup>	- USB 1.1 / USB 2.0 full speed port for connecting a mass storage device (memory stick) - Female connection type "A".
Ethernet, supported protocols	- RJ 45 8/8 Ethernet interface - HTTP Server - TCP/IP
Serial Interface 0 (UART 0)	- Implementing an RS 232 or an HSI master interface - Change-over user-programmable - Connection via plug-in terminals - No handshake lines
HSI Master	Cascading the CMU
USB Device	- USB 1.1 / USB 2.0 full speed port for connecting a PC / Notebook to configure the CMU - Female connection type "B".
CAN Bus Interface	Can be integrated as an option

### Cycle time

Independently determined at start of program  
Display of actual cycle time is possible in the CM Editor

### Operating and environmental conditions

Operating temperature	-4 .. 158°F
Storage temperature	-22 .. 176°F
Relative humidity	0 .. 70 %, non-condensing

### Dimensions and weight

Dimensions	approx. 212 x 106 x 36 mm
Weight	approx. 600 g

### Technical standards

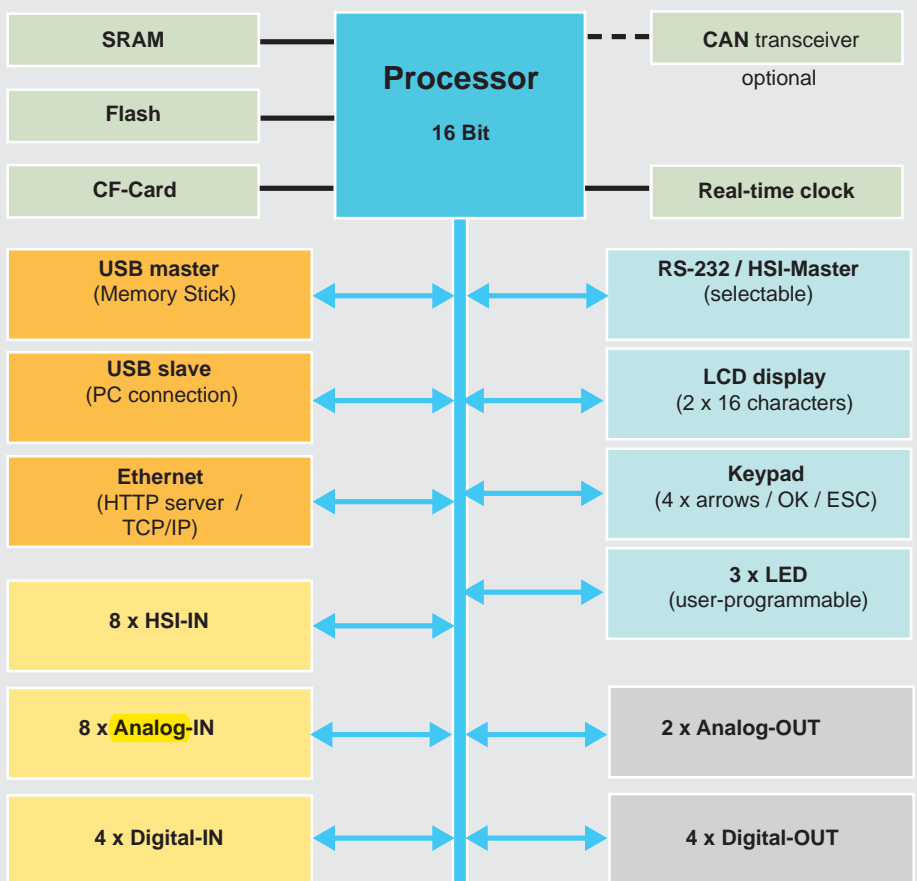
EMC	EN 61000-6-1 / 2 / 3 / 4
Safety	EN 61010
Protection class	IP 40

#### Note:

<sup>1)</sup> SMART sensors (Condition Monitoring Sensors) are a generation of sensors from HYDAC, which can provide a variety of different measured values.

<sup>2)</sup> Recorded data from the CMU can be transferred to a memory stick via this interface. The USB Host supports mass storage devices exclusively.

## Block circuit diagram:



## Note:

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

## Model code:

CMU 1000 – 000 – X

Modification number

000 = Standard

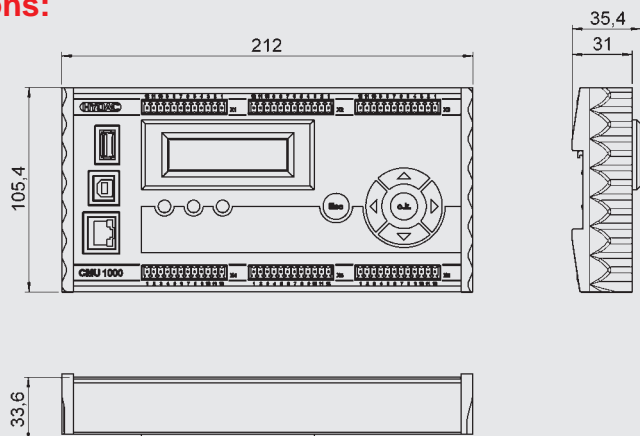
Operating manual and documentation

E = English

## Accessories:

Appropriate accessories, such as sensor lines for the electrical connection can be found in the Accessories brochure.

## Dimensions:



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## Description:

The condition monitoring interface module CSI-B-2 is another element in the HYDAC condition monitoring concept which connects the sensor level with the interpretation level. It is an all-purpose electronic instrument for converting the HSI signal from HYDAC SMART sensors into a standardized PC signal. Using the HYDAC "CMWIN" PC soft-ware, it is therefore possible to read the data and measured values of the connected SMART sensor directly.

The long-term memory can also be read as well as adjustments made and parameters set on the connected sensor (the setting options depend on the particular sensor).

The HSI signal can be converted either into an RS 232 or an RS 485 signal. The CSI-B-2 can be connected to any PC via the RS 232 interface (and possibly an additional standard RS 232/USB adapter<sup>1)</sup>). The RS 485 interface and appropriate additional coupling modules can also be used to connect to higher-level control and/or bus systems.

## Special features:

- 1 input channel for HYDAC SMART sensors
- Direct connection of the sensor via screw-type terminals
- Indication of the active interface via LED (RS 232 / RS 485)
- Very compact design
- Suitable for mounting on standard DIN rails
- Protection class IP 40

<sup>1)</sup> RS 232/USB adapter is not supplied with the device.

## Condition Monitoring Interface Module CSI-B-2

### Technical data:

Input data	
HSI interface	HYDAC Sensor Interface for digital linking of SMART sensors <sup>1)</sup> - Male X2
Output data	
Signal output	switchable: RS 485 half-duplex or RS 232 - Male X1 (RS 485) - SUB-D 9 pole female (RS 232)
Environmental Conditions	
Operating temperature range	-13 .. +185°F (-25 .. +85°C)
Storage temperature range	-22 .. +185°F (-30 .. +85°C)
Relative humidity	0 .. 70 %, non-condensing
CE mark	EN 61000-6-1 / 2 / 3 / 4
Protection class to IEC 60529	IP 40
Other data	
Supply voltage of the module	18 .. 35 V DC (male X1)
Current consumption (module + sensor)	30 mA to 300 mA max. (depending on the supply voltage and the connected sensor)
Sensor supply	15 V DC ± 5 % / 300 mA max. at (73.4°F) 23 °C (male X2)
Electrical connection	
Cross-section of connection	Max. 1.5 mm <sup>2</sup>
X1 : Module supply + RS 232 / RS 485	Male terminal block, 8 pole RM 3.5
X2 : Sensor supply + HSI	Male terminal block, 5 pole RM 3.5
SUB-D: RS 232	9 pole female with thumbscrews
Conversion mode options	Option HSI - RS 232 or HSI - RS 485 via jumper (bridge): X1.3 - X1.4 open: HSI - RS 232 X1.3 - X1.4 closed: HSI - RS 485
Indication of active conversion mode	Green LED: HSI - RS 232 Yellow LED: HSI - RS 485
Dimensions and weight	
Housing	approx. 55 x 106 x 34 mm Housing to be mounted on rails (35 mm) to DIN EN 60715 TH 35 (formerly DIN EN 50022)
Weight	~ 140 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

<sup>1)</sup> SMART sensors (Condition Monitoring Sensors) are a generation of sensors from HYDAC, which can provide a variety of different measured values.

## Model code:

CSI - B - 2 - 000

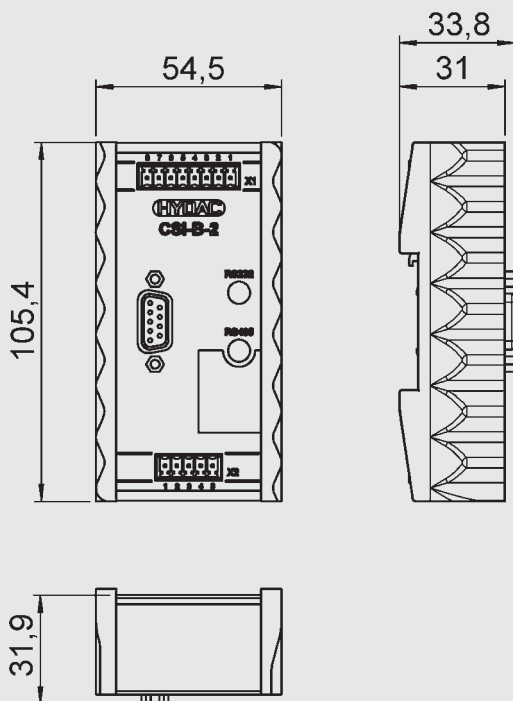
### Modification number

000 = Standard

### Accessories:

Appropriate accessories, such as sensor lines for the electrical connection can be found in the Accessories brochure.

## Dimensions:



## Terminal assignment:

### Terminal strip -X1

Pin	Signal
1	RS 485 (-)
2	RS 485 (+)
3	3 - 4 open: HSI to RS 232
4	3 - 4 closed: HSI to RS 485
5	RxD RS 232 (connected to Pin 3 SUB-D 9 pole)
6	TxD RS 232 (connected to Pin 2 SUB-D 9 pole)
7	0 V (connected to Pin 5 SUB-D 9 pole)
8	+U <sub>B</sub> (18 .. 35 V DC) Module supply

### Terminal strip -X2

Pin	Signal
1	+U <sub>B</sub> (15 V DC) Sensor supply
2	0 V
3	HSI signal
4	0 V
5	0 V

## Note:

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For applications and operating conditions not described, please contact the relevant technical department.

Subject to technical modifications

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## Differential Pressure Transmitter HPT 500

### Description:

The HPT differential pressure transmitter series was specially developed to offer low-cost solutions for differential pressure. Via a piston movement the generated differential pressure is detected by means of a Hall sensor.

The sensor reacts to increasing contamination degree of the element by increasing the differential pressure signal.

The media compatibility includes hydraulic oils, lubrication oils, HFA, HFB and HFD as well as all further environment-friendly fluids<sup>1)</sup>.

The differential pressure transmitter is used in systems requiring a continuous, intelligent monitoring of the differential pressure. It is used both in mobile and in stationary applications.

### Special features:

- Accuracy:  $\leq \pm 3\%$  FS typ.
- Compact and robust design
- Standardised mechanical connector, G  $\frac{1}{2}$  HN 28-22

### Technical data:

<b>Input data</b>			
Measuring ranges	Differential pressure 30, 70, 115 psi		
		Aluminium	Stainless steel
Differential pressure resistance			
A:(High Pressure Side)	A	2320 psi	6090 psi
B:(Low Pressure Side)	B	1015 psi	1450 psi
Overload pressure		2900 psi	8700 psi
Burst pressure		5075 psi	23200 psi
Mechanical connection	G $\frac{1}{2}$ HN 28-22		
Torque value		24 lb-ft(33 Nm)	105 lb-ft(100 Nm)
Part in contact with medium	Connection part:	Stainless steel or Aluminium	
	Seals:		
	O-Ring:	Standard NBR	
	Profile seals:	NBR (Aluminium version) PTFE (Stainless steel version)	
<b>Output data</b>			
Output signal	4 .. 20 mA, load max. $U_b - 3\text{ V} / 0.02\text{ A}$ 0 .. 10 V, 0.5 .. 4.5 x ratiometric		
Accuracy to DIN 16086, Max. setting	$\leq \pm 3\%$ FS typ. $\leq \pm 5\%$ FS max. (rel. to $\Delta p$ )		
Temperature drift	$\leq \pm 0.03\%$ / °F max. zero point $\leq \pm 0.03\%$ / °F max. range		
Long-term drift	$\leq \pm 0.5\%$ FS typ. / year		
<b>Environment conditions</b>			
Compensated temperature range	+68 °F .. +158 °F		
Operating temperature range	-4 °F .. +185 °F		
Storage temperature range	-40 °F .. +212 °F		
Fluid temperature range	-4 °F .. +185 °F		
CE mark	EN 61000-1 / 2 / 3 / 4		
Vibration resistance acc. to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20\text{ g}$		
Shock resistance according to DIN EN 60068-2-29 (1 ms)	50 g		
Protection class to IEC 60529	IP 67 (M12x1) IP 69K (DT 04)		
<b>Other data</b>			
Electrical connection	M12x1, 4pole Deutsch DT 04, 3pole		
Supply voltage, 3 conductor	8 .. 30 V DC		
Supply voltage ratiometric	5 V DC $\pm 5\%$		
Current consumption 3 conductor	approx. 25 mA		
Residual ripple of supply voltage	$\leq 5\%$		
Life expectancy	> 1 Million cycles (max. diff. pressure resistance)		
Weight	~ 80 g (aluminium) ~ 170 g (stainless steel)		

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to the full measuring range

<sup>1)</sup> Medium compatibility with HFC on request

<sup>2)</sup> Further seal materials on request

## Model code:

HPT 5 0 X - X - XXXX - X - 000

### Electrical connection

6 = Connector male M12x1, 4 pole  
K = Connector male DT04, 3 pole

### Signal

B = 0 .. 10 V, 3 conductor  
C = 4 .. 20 mA, 3 conductor  
R = 0.5 .. 4.5 V ratiometric, 3 conductor

### Differential pressure ranges in psi

0030; 0070; 0115

### Housing material

A = Aluminium  
S = Stainless steel

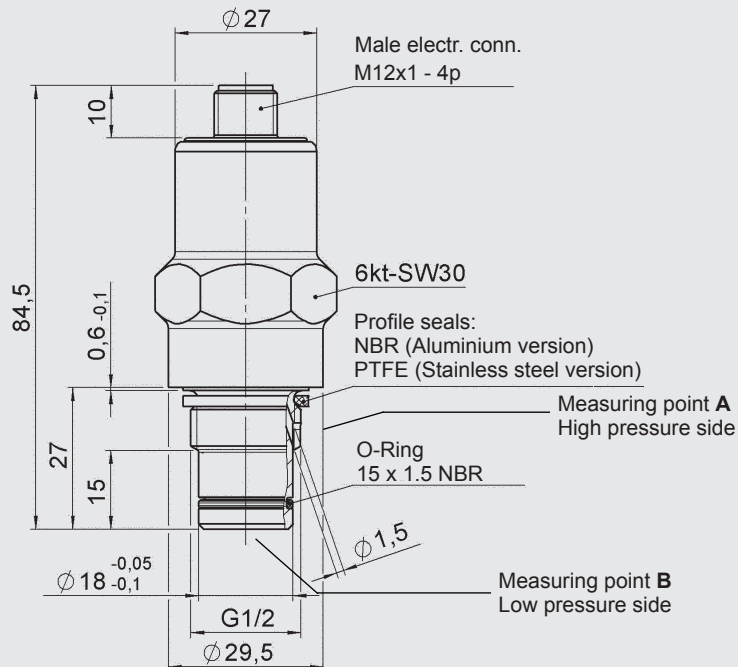
### Modification number

000 = Standard

### Accessories:

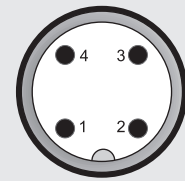
Appropriate accessories, such as connector blocks available on request.

## Dimensions:



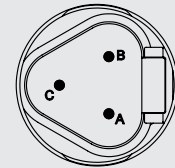
## Pin connections:

M12x1



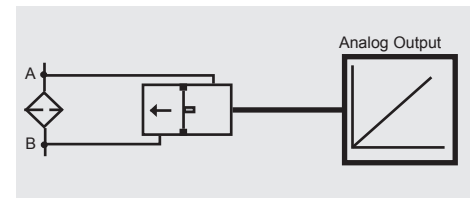
Pin	HPT 506
1	+U <sub>B</sub>
2	n.c.
3	0 V
4	Signal

DT 04 3-pol.



Pin	HPT 50K
A	+U <sub>B</sub>
B	Signal
C	0 V

## Function:



## Note:

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Subject to technical modification.

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## AquaSensor AS 1000

### Description:

The AquaSensor AS 1000 is the culmination of continued development of the successful AS 2000 series for online detection of water in oils, in particular as an OEM sensor for fluid conditioning monitoring. It measures the degree of saturation and the temperature of the fluid.

In the analog output version, the AS 1000 transmits the values for the degree of saturation and the temperature as a 4 .. 20 mA signal.

In the version with 2 switch outputs, the AS 1000 can be configured individually using the HYDAC service instrument HMG 3010, the Condition Monitoring Unit CMU 1000 and the interface module CSI-B-2.

The following parameters can be adjusted:

- Saturation level / temperature
- Switch points
- Switch mode of the switch outputs
- Switching direction
- Switch delay times

The AS 1000 therefore enables hydraulic and lubrication oils to be monitored accurately, continuously and online.

### Special features:

- Reliable due to its compact and robust design
- Cost-effective sensor, also for use in OEM applications
- Not necessary to calibrate to different types of oil
- Pressure-resistant also during pulsations
- Wide fluid temperature range
- Individual configuration
- Early detection of water problems thereby preventing breakdowns and unnecessary interruption to operations.

### Technical data:

Input data	
Saturation level	0 ... 100 %
Temperature	-13 .. 212°F
Operating pressure	-7.25 .. 725 psi
Burst pressure	≤ 9425 psi
Mechanical connection	G3/8 A DIN 3852
Torque value	25 Nm
Parts in contact with medium	Mech. connection: Stainless steel / Vacuum-metallized ceramic Seal: FPM or EPDM
Output data	
Pin 2: Saturation level	
Output signal	4 .. 20 mA (corresponds to 0 .. 100 %) $R_{Lmax} = (U_B - 10 V) / 20 \text{ mA} [k\Omega]$ or switch output (configurable)
Calibration accuracy	≤ ± 2 % FS max.
Accuracy in media measurements	≤ ± 3 % FS typ.
Pressure dependency	± 0.014% FS/psi
Pin 4: Temperature	
Output signal	4 .. 20 mA (corresponds to -25 .. 100 %) $R_{Lmax} = (U_B - 10 V) / 20 \text{ mA} [k\Omega]$ or switch output (configurable)
Accuracy	≤ ± 2 % FS max.
Pin 5:	
	<b>HSI (HYDAC Sensor Interface)</b> Automatic sensor recognition
Switch outputs	
Type	PNP transistor outputs (configurable as N/O or N/C)
Switching current	max. 1 A per switch output
Environmental conditions	
Compensated temperature range	32 .. 194°F
Operating temperature range <sup>1)</sup>	-40 .. +212°F/-13 .. +212°F
Storage temperature range	-40 .. +212°F
Fluid temperature range <sup>1)</sup>	-40 .. +212°F/-13 .. +212°F
Viscosity range	1 .. 5000 cSt
Flow velocity	< 5 m/s
Fluid compatibility	mineral oil based fluids, synthetic and natural esters
CE mark	EN 61000-6-1 / 2 / 3 / 4
Protection class to IEC 60529	IP 67
Other data	
Supply voltage	12 .. 32 V DC
Residual ripple of supply voltage	≤ 5 %
Weight	~ 145 g

Note: Reverse polarity protection, short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

<sup>1)</sup> -13 °F with FPM or EPDM seal, -40 °F on request

## Model code:

AS 1 X 0 8 - X - 000

### Medium

- 0 = Mineral oils
- 1 = Phosphate ester, e.g. Skydrol

### Mechanical connection

- 0 = G3/8 A DIN 3852

### Electrical connection

- 8 = Male M12x1, 5 pole  
(connector not supplied)

### Signal technology

- C = Output 1 Pin 2 saturation level (4 .. 20 mA)  
Output 2 Pin 4 temperature (4 .. 20 mA)
- 2 = 2 switching outputs

### Modification number

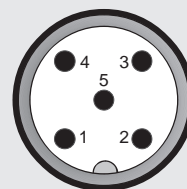
- 000 = Standard

### Accessories:

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

## Pin connections:

M12x1



Pin	AS 1X08-C	AS 1X08-2
1	+U <sub>B</sub>	+U <sub>B</sub>
2	Saturation level 4 .. 20 mA	SP 1
3	0 V	0 V
4	Temperature 4 .. 20 mA	SP 2
5	HSI*	HSI*

\* HSI = HYDAC Sensor Interface (HYDAC's own communication interface)

## Display, read-out and configuration options:

### HDA 5500-1-1-xC-000

Digital Display Unit with 2 programmable switch outputs, which have been specifically designed for use with the AS 1000

HDA 5500-1-1-AC-000

Order no.: 908869

HDA 5500-1-1-DC-000

Order no.: 908870

### HMG 510

Portable 2-channel data recorder, specially designed for displaying measured values with HSI and SMART sensors

Order no.: 909889

### HMG 3010

Portable data recorder with full graphics color display for indicating, displaying and editing measured values as well as for configuration of HSI and SMART sensors

Order no.: 920930

### CMU 1000

Electronic evaluation unit for online measured value monitoring as well as for the configuration of HSI and SMART sensors

Order no. 920716

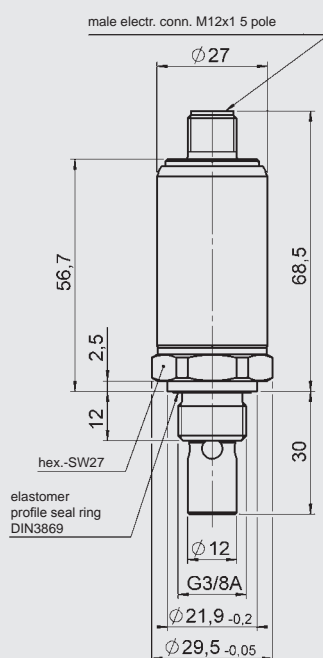
### CSI-B-2

Interface module, enables configuration of HSI and SMART sensors using HYDAC PC software CMWIN

Order no. 920134

Information on other read-out options can be found on our website at [www.hydac.com](http://www.hydac.com) or please contact your HYDAC representative.

## Dimensions:



## Note:

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Subject to technical modifications.

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Website: [www.hydacusa.com](http://www.hydacusa.com)



## AquaSensor AS 3000

### Description:

The AquaSensor AS 3000 with an integrated digital display is based on the proven AS 1000 series for the online detection of water in oils, particularly as a sensor for Condition Monitoring. The device has 2 switch outputs and one switchable analog output signal (4 .. 20 mA or 0 .. 10 V). The AS 3000 detects the water saturation level and temperature of the fluid and transmits the values in the form of an analog or switching signal. The display shows the actual measured values.

All settings offered by the AS 3000 are grouped in 2 clearly-arranged menus.

The following parameters can be adjusted:

- Saturation level / temperature
- Switch points
- Switch mode of the switch outputs
- Switching direction
- Switch delay times

The AS 3000 thus enables hydraulic and lubricating oils to be monitored accurately, continuously and online.

### Special features:

- 4-digit digital display
- Optimum alignment - can be rotated in two axes
- Reliable due to its robust design
- Not necessary to calibrate to different types of oil
- Pressure-resistant, also during pulsations
- Wide fluid temperature range
- Individual configuration
- User-friendly due to key programming
- Early detection of water problems thus preventing faults and unnecessary interruptions to operations.

### Technical data:

#### Input data

Saturation level	0 ... 100 %
Temperature	-13 .. 212°F
Operating pressure	-7.25 .. 725 psi
Burst pressure	≤ 9425 psi
Mechanical connection	G3/8 A DIN 3852
Torque value	25 Nm
Parts in contact with medium	Connector: Stainless steel / Vacuum-metallized ceramic Seal: FPM or EPDM

#### Output data

Calibration accuracy	≤ ± 2 % FS max.
Accuracy in media measurements	≤ ± 3 % FS typ.
Pressure dependency	± 0.014% FS/psi

#### Analog output

Signal	selectable: 4 .. 20 mA      ohmic resist. max. 500 Ω 0 .. 10 V        ohmic resist. min. 1 kΩ corresponds to measuring range selected
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#### Switch outputs

Type	PNP transistor outputs (programmable as N/O / N/C)
Assignment	Selectable: Saturation level or temperature
Switching current	max. 1.2 A per switch output
Switching cycles	> 100 million

#### Environmental conditions

Compensated temperature range	32 .. 176°F
Operating temperature range	-13 .. +176°F
Storage temperature range	-40 .. +176°F
Fluid temperature range <sup>1)</sup>	-40 .. +212°F/-13 .. +212°F
Viscosity range	1 .. 5000 cSt
Flow velocity	< 5 m/s
Fluid compatibility	mineral oil based fluids, synthetic and natural esters

#### CE mark

Protection class to IEC 60529	IP 67
-------------------------------	-------

#### Other data

Supply voltage	18 .. 35 V DC
Residual ripple of supply voltage	≤ 5 %
Weight	~ 145 g

Note: Reverse polarity protection, short circuit protection are provided.  
**FS (Full Scale)** = relative to the complete measuring range<sup>1)</sup> -13 °F with FPM or EPDM seal, -40 °F on request

## Model code:

AS 3 X 0 8 - 5 - 000

### Medium

0 = Mineral oils

1 = Phosphate ester, e.g. Skydrol

### Mechanical connection

0 = G3/8 A DIN 3852

### Electrical connection

8 = Male M12x1, 5 pole

(connector not supplied)

### Signal technology

5 = 2 switch outputs and 1 analog output

### Modification number

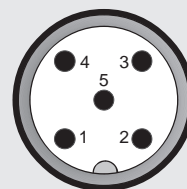
000 = Standard

### Accessories:

Appropriate accessories, such as electrical connectors, mechanical connection adaptors, etc. can be found in the Accessories brochure.

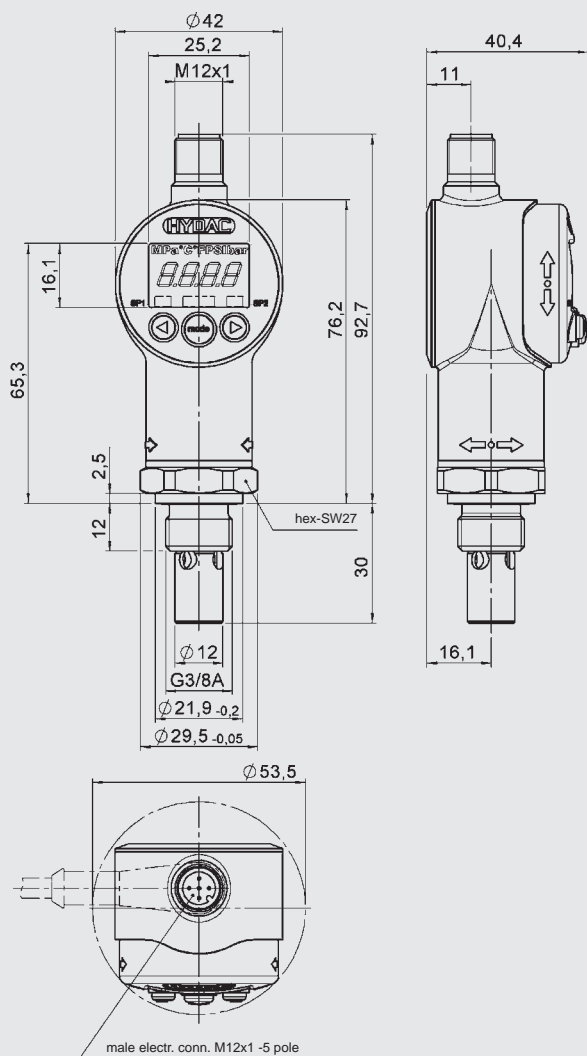
## Pin connections:

M12x1



Pin	AS 3X08-5
1	+U <sub>B</sub>
2	Analog
3	0 V
4	SP 1
5	SP 2

## Dimensions:



## Note:

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## AquaSensor AS 3000 with IO-Link Interface



### Description:

The AS 3000 with its IO Link communication interface and integrated digital display is used for the online detection of water in oils, particularly as a sensor for condition monitoring. In addition, the AS 3000 measures the temperature of the operating fluid.

The instrument has a switching output and additional output that can be configured as switching or analog (4 .. 20 mA or 0 .. 10 V).

Compared with the standard version, the IO-Link interface enables bidirectional communication between the device and the control. Parameterization and cyclical transmission of process and service data is therefore possible.

The AquaSensor AS 3000 with communication interface IO-Link according to specification V1.1 has been specially designed to connect sensors in automation systems.

Typical fields of application are machine tools, handling and assembly automation, intralogistics or packaging industry.

### Special features:

- IO Link interface
- 1 PNP transistor output
- Additional signal output, can be configured as PNP transistor switching output or analog output
- Not necessary to calibrate to different types of oil
- Wide fluid temperature range
- 4-digit display
- Display rotates in two planes for optimal alignment

### Technical data:

Input data	
Saturation level	0 ... 100 %
Temperature	-13 .. 212°F
Operating pressure	-7.25 .. 725 psi
Burst pressure	≤ 9425 psi
Mechanical connection	G3/8 A DIN 3852
Torque value	25 Nm
Parts in contact with medium	Mech. connection: Stainless steel / Vacuum-metallized ceramic Seal: FPM or EPDM
Output data	
Output signals	Output 1: PNP transistor switching output Output 2: can be configured as PNP transistor switching output or analog output
Calibration accuracy	≤ ± 2 % FS max.
Accuracy in media measurements	≤ ± 3 % FS typ.
Pressure dependence	± 0.014% FS/psi
Analog output	
Signal	selectable: 4 .. 20 mA      load resistance max. 500 Ω 0 .. 10 V      load resist. min. 1 kΩ corresponds to measuring range selected
Switch outputs	
Type	PNP transistor switching outputs
Assignment	Selectable: Saturation level or temperature
Switching current	max. 250 A per switching output
Switching cycles	> 100 million
Parameterisation	
	<b>Via IO-Link interface, with HYDAC programming device HPG 3000 or push-buttons on the AS 3000</b>
Environmental conditions	
Compensated temperature range	32 .. 176°F
Operating temperature range	-13 .. +176°F
Storage temperature range	-40 .. +176°F
Fluid temperature range <sup>1)</sup>	-40 .. +212°F/-13 .. +212°F
Viscosity range	1 .. 5000 cSt
Flow velocity	< 5 m/s
Fluid compatibility	mineral oil based fluids, synthetic and natural esters
CE mark	EN 61000-6-1 / 2 / 3 / 4
Protection class to IEC 60529	IP 67
Other data	
Supply voltage	18 .. 35 V DC
Current consumption	≤ 0.590 A with active switching outputs ≤ 90 mA with inactive switching outputs ≤ 110 mA with inactive switching output and analog output
Residual ripple of supply voltage	≤ 5 %
Weight	~ 145 g

Note: Reverse polarity protection, short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

<sup>1)</sup> -13 °F with FPM or EPDM seal, -40 °F on request

## Setting options:

All terms and symbols used for setting the AS 3000 as well as the menu structure comply with the specifications in the VDMA Standard.

## Setting ranges for the switch outputs:

Measuring range	Lower limit of RP	Upper limit of SP
0..100 %	1 %	100 %

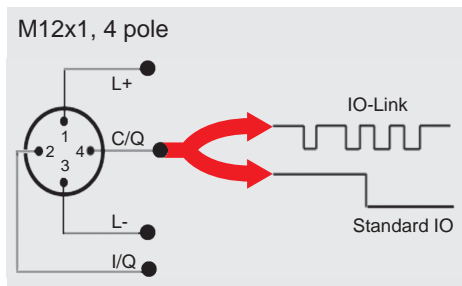
Measuring range	Minimum difference betw. RP and SP	Increment*
0 .. 100	1 %	0.2 %
-13 .. 212 °F		1 °F

\* All ranges given in the table are adjustable by the increments shown.  
SP = switching point  
RP = switch-back point

## Additional functions:

- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Analog output signal selectable 4 .. 20 mA or 0 .. 10 V

## Pin connections:



Pin	Signal	Description
1	L+	Supply voltage
2	I/Q	Switching output (SP2) / analog output
3	L-	Gnd
4	C/Q	IO-Link communication / switching output (SP1)

## IO-Link-specific data:

Baud rate	38.4 kBaud *
Cycle time	2.5 ms
Process data width	16 Bit
Frame type	2.2
Specification	V1.1

\* Connection with unshielded standard sensor line possible up to a max. line length of 20 m.

Download the IO Device Description (IODD) from:

<http://www.hydac.com/de-en/service/downloads-software-on-request/>

## Model code:

AS 3 X 0 6 - L - 000

### Medium

- 0 = Mineral oils
- 1 = Phosphate ester, e.g. Skydrol

### Mechanical connection

- 0 = G3/8 A DIN 3852

### Electrical connection

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

### Output

- L = IO Link interface

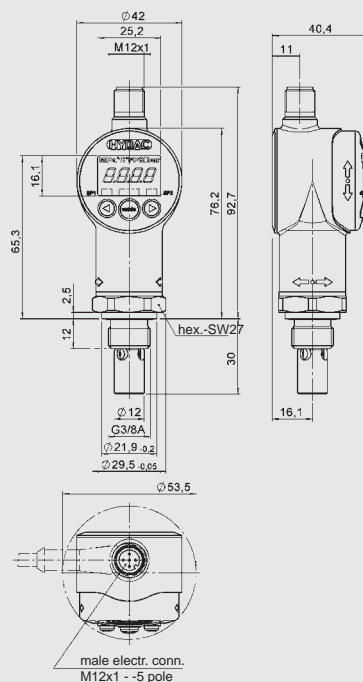
### Modification number

- 000 = Standard

## Accessories:

Appropriate accessories, such as electrical connectors, mechanical connection adapters, etc. can be found in the Accessories brochure.

## Dimensions:



## Note:

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## Electronic Contamination Switch EY-1356

### Description:

The contamination switch series EY-1356 works as a warning element in hydraulic systems and gearboxes and has been developed by HYDAC ELECTRONIC to meet the special requirements of our customers.

The sensor detects and attracts metal ferromagnetic particles in oil or in other hydraulic fluids. The accumulation of particles generates a switching signal (change in the ohmic resistance). The contamination sensor thus provides an early warning of possible wear. Substantial damage on bearings and gear wheels, for instance, can therefore be avoided.

The sensor is available with different mechanical and electrical connections and can be integrated into almost any application.

### Special features:

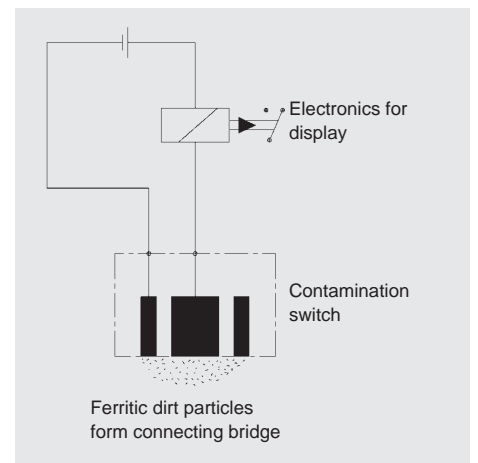
- Simple design
- Robust design
- Standard connection types

### Technical data:

<b>Maximum switching voltage</b>	30 VDC
<b>Maximum switching current</b>	200 mA
<b>Maximum oil pressure abs.</b>	8.7 psi (232 psi)
<b>Holding power of the permanent solenoid</b>	~ 1.5 N
<b>Ambient temperature</b>	-12°F .. 194°F
<b>Protection class to IEC 60529</b>	
DEUTSCH male connector DT04 2 pole	IP67
Integrated male connector according to EN175301-803/ ISO4400	IP65
<b>Mating connector supplied</b>	
DEUTSCH male connector DT04 2 pole	no
Integrated male connector according to EN175301-803/ ISO4400	yes
<b>Max. torque value</b>	
M14x1.5	11 lb-ft (15 Nm)
M18x1.5	18 lb-ft (25 Nm)
M22x1.5	44 lb-ft (60 Nm)
M26x1.5	52 lb-ft (70 Nm)
M33x2	103 lb-ft (140Nm)
<b>Installation position</b>	We recommend an "upside-down" mounting position, i.e. connector or cable outlet pointing downwards.
The contamination switch is supplied with seal ring DIN 3896 NBR.	

### Functional principle / diagram:

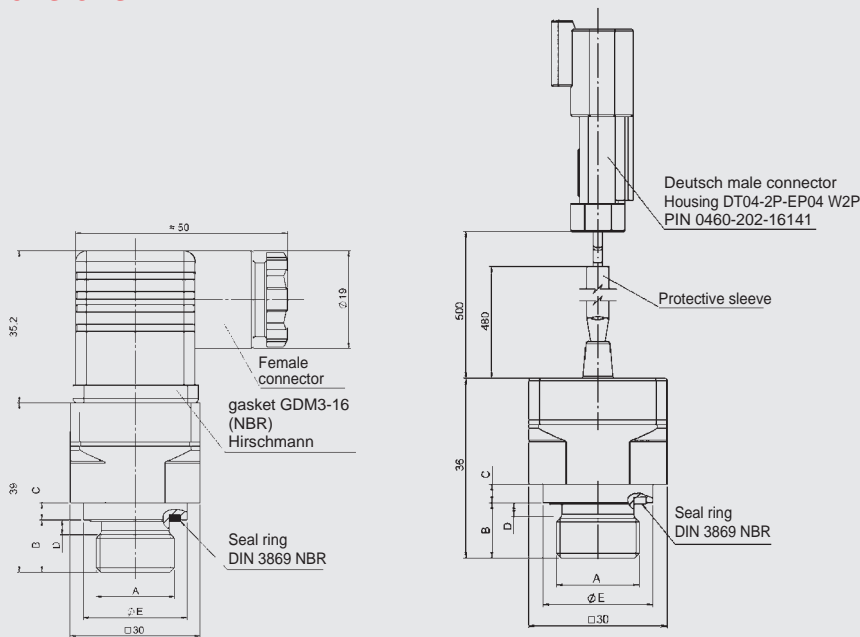
The permanent solenoid at the measuring surface of the contamination switch attracts the ferromagnetic particles from the passing oil. The increased accumulation of particles forms an electrical bridge between the permanent solenoid and the adjacent metal contact. The resulting switching signal can, for instance, activate a warning function or switch off the system.



## Order details:

Electrical connection	Mechanical connection	Part number
Integrated male connector according to EN175301-803/ ISO4400	M14x1.5	3836591
	M18x1.5	3829087
	M22x1.5	3829086
	M26x1.5	3829088
	M33x2	3829089
Strand DEUTSCH male connector DT04 2 pole	M14x1.5	3836593
	M18x1.5	3836635
	M22x1.5	3829090
	M26x1.5	3647788
	M33x2	3829092

## Dimensions:



Dim.	14	18	22	26	33	Other types of connection are available on request
A	M14x1.5	M18x1.5	M22x1.5	M26x1.5	M33x2	
B	12	12	12	12	12	
C	4	4	4	4	4.5	
D	3	3	3	3	4	
ØE	19	23.9	27	31.4	39.2	

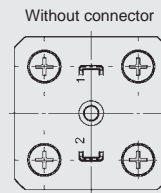
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## Pin connections:

in accordance with EN 175301-803



Pin

1	+U <sub>B</sub>
2	-U <sub>B</sub>

Reverse polarity permitted

Cable assignment for Deutsch DT04



Pin

1	+U <sub>B</sub>
2	-U <sub>B</sub>

Reverse polarity permitted

Switching example:

