

# DIAGNOSTICS

## HMG 4000 Series

### Portable Data Recorder



5.7" Color Touchscreen

Up to 38 sensors can be connected

Automatic Sensor Detection

#### Description:

The HMG 4000 is a top performance high-end portable measurement and data acquisition equipment. It was mainly developed for all measured values in relation with hydraulic systems, such as pressure, temperature, flow rate and linear position. Moreover, it provides a very high flexibility, even when it comes to evaluating other measured values. The main applications are servicing, maintenance or test rigs.

The data recorder has a very easy-to-operate user interface due to its large 5.7" touchscreen. The operator can access all of the device's functions and settings by means of clearly presented selection menus.

The HMG 4000 can record the signals of up to 38 sensors at once.

For this purpose, HYDAC ELECTRONIC offer special sensors which are automatically recognised by the HMG 4000 and whose parameters such as measured values, measuring ranges and measuring units can be set.

On the one hand, there are the HYDAC **HSI** sensors (HYDAC Sensor Interface) for the measurement of pressure, temperature and flow rate, for the connection of which there are 8 analogue input channels.

Furthermore, there is the option of connecting HYDAC SMART sensors to these inputs. SMART sensors can display several different measured values at a time.

Up to 28 special HYDAC **HCSI** sensors (HYDAC CAN Sensor Interface) can be connected additionally via the CAN bus port, also supporting automatic sensor recognition.

The HMG 4000 can optionally be connected to an existing CAN network. This enables the recording of measured data transmitted via CAN bus (e.g. motor speed, motor pressure) in combination with the measured data from the hydraulic system.

The device also offers measurement inputs for standard sensors with current and voltage signals.

The HMG 4000 rounds off the application with two additional digital inputs (e.g. for frequency or rpm measurements).

The most impressive feature of the HMG 4000 is its ability to record the dynamic processes of a machine in the form of a measurement curve and render them as a graph.

HYDAC software HMGWIN, which is specific to the HMG 4000, is supplied for convenient post-processing, rendering and evaluation of measurements on your computer.

#### Features:

- Large, full graphics colour display 5.7" touchscreen
- Capable of recording up to 38 sensors at once, 8 analogue, 2 digital sensors and 28 HCSI sensors via CAN bus.
- Up to 100 measurement channels can be depicted simultaneously
- High-speed sampling rate, up to 8 sensors at 0.1 ms at a time.
- Quick and automatic basic setting by use of automatic sensor recognition
- Analogue inputs 0 .. 20 mA, 4 .. 20 mA Voltage 0 .. 50 V, -10 .. 10 V
- PT 100/1000 input
- Connection to a CAN bus system (also J1939)
- Simple and user-friendly operation, intuitive menu
- Practical, robust design
- Very large data memory for archiving measurement curves, enables the storage of 500 measurements with up to 8 million measured values.
- Various measurement modes:
  - Normal measuring
  - Fast curve recording
  - Long-term measurements
- Recording of dynamic processes „online“ in real time
- Event-driven measurements with several triggering options
- Programming function for HYDAC switch devices
- PC interface via USB
- USB Host connection for USB memory sticks
- Convenient visualisation, archiving and data processing using the HMGWIN software supplied.

## Model Code

HMG 4000 - 000 - X

## Operating Manual &amp; Documents

US = English

## Technical Specifications

Analogue inputs	
Input signals 8 channels M12x1 Ultra-Lock flange sockets (5-pin) channel A to channel H	HYDAC HSI analogue sensors HYDAC HSI SMART sensors Voltage signals: e.g. 0.5 to 4.5 V, 0 to 10 V etc. (input ranges for 0 to 50 V, 0 to 10 V, 0 to 4.5 V, -10 to 10 V) Current signals, e.g. 4 to 20 mA, 0 to 20 mA (input range 0 to 20 mA) 1 x PT 100 / PT 1000 (at channel H)
Accuracy dependent on the input range	≤ ± 0.1 % FS at HSI, voltage, current ≤ ± 1 % FS at PT 100 / PT 1000
Digital inputs	
Input signals 2 channels M12x1 Ultra-Lock flange socket (5-pin) channel I, J	Digital status (high/low) Frequency (0.01 to 30,000 Hz) PWM duty cycle Durations (e.g. period duration)
Level	Switching threshold/switch-back threshold: 2 V/1 V Max. input voltage: 50 V
Accuracy	≤ ± 0.1%
CAN	
Input signals 28 channels M12x1 Ultra-Lock flange socket (5-pin) channel K1 to K28	HYDAC HCSI sensors, CAN, J1939, CANopen PDO, CANopen SDO
Baud rate	10 kbit/s to 1 Mbit/s
Accuracy	≤ ± 0.1%
Calculated channels	
Quantity	4 channels via virtual port L (channel L1 to channel L4)
Programming interface	
For HYDAC I/O-Link devices	1 channel via M12x1 Ultra-Lock flange socket (5-pin)
Voltage supply	
Network operation	9 to 36 V DC via standard round plug 2.1 mm
Battery	Lithium-Nickel-Kobalt-Aluminium-Oxide 3.6 V; 9300 mAh
Battery charging time	approx. 5 hours
Battery life	w/o sensors roughly 11 hours with 2 sensors roughly 9 hours with 4 sensors roughly 7 hours with 8 sensors roughly 4 hours
Display	
Type	TFT-LCD Touchscreen
Quantity	5.7"
Resolution	VGA 640 x 480 Pixel
Backlight	10 to 100% adjustable
Interfaces	
USB Host	
Plug-in connection	USB socket, Type A, screened
USB Standard	2.0 (USB Full speed)
Transmission rate	12 Mbit/s
Voltage supply	5 V DC
Power supply	100 mA max.
Protection	Short-circuit protection to GND (0 V)
USB Slave	
Plug-in connection	USB socket, Type B, screened
USB Standard	2.0 (USB High speed)
Transmission rate	480 Mbit/s
Voltage supply	5 V DC
Power supply	100 mA max.
Protection	Short-circuit protection to GND (0 V)
Memory	
Measured value memory	16 GB for min. 500 measurements, each containing 8 million measured values
Technical standards	
EMC	IEC 61000-4-2 / -3 / -4 / -5 / -6 / -8
Safety	EN 61010
IP class	IP 40
Environmental conditions	
Operating temperature	32 to 122°F (0 to 50°C)
Storage temperature	-4 to 140°F (-20 to 60°C)
Relative humidity	0 to 70%
Max. operating altitude	2000 m
DIMENSIONS	approx. 11.2" x 7.4" x 3.4" (285 x 189 x 87 mm)
Weight	approx. 4.1 lb. (1.85 kg)
Housing material	Plastic (Elastollan® R 3000 – TPU-GF)

## Scope of delivery

- HMG 4000
- Power supply for 90 to 230 V AC
- Tether strap
- Operating Instructions
- Data carrier with USB drivers and HMGWIN software
- USB connector cable

## Accessories

- Pressure, temperature and flow rate measuring transmitter with HSI sensor detection and CAN pressure measuring transmitter with HCSI sensor detections – see separate data sheet
- Additional accessories, such as the push-pull sensor connection cables, connection accessories for the HCSI CAN sensors, mechanical connection adapters, etc. can be found in the “Accessories Service Devices” catalog section.

## Note:

The information in this brochure relates to the operating conditions and applications described.

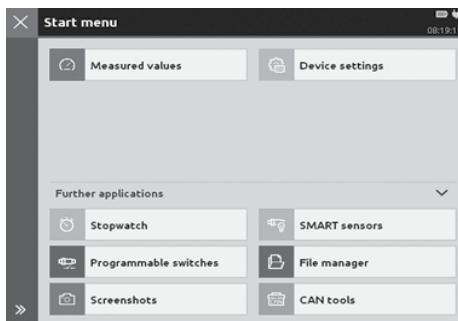
For applications or operating conditions not described, please contact the relevant technical department.

All technical details are subject to change without notice.

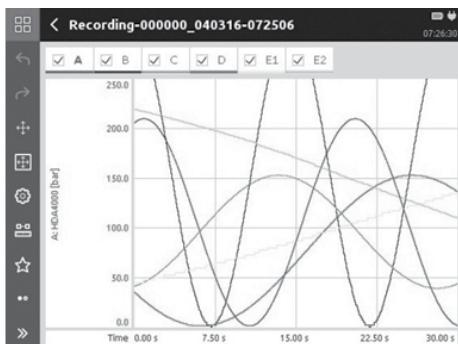
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## Function:

- Clear and graphical color selection menus intuitively guide the operator to all the device functions available and ensure fast implementation.



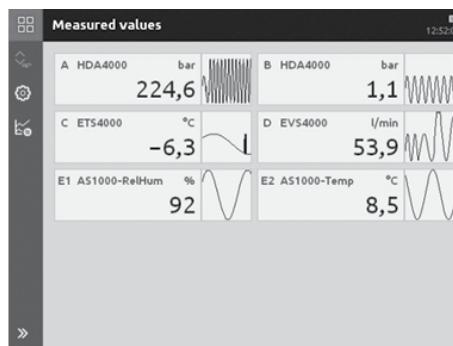
- The HMG 4000 can record the signals of up to **38 sensors simultaneously**. 11 push-pull M12x1 input sockets are available as sensor interfaces. Apart from the push-pull sensor connection cable, M12x1 standard cables can also be used.
- The following sensors can be connected to the 8 black input sockets:
  - 8 analogue sensors (e.g. for pressure, temperature, and flow rate) with the special digital HSI interface (HYDAC Sensor Interface); this means the basic device settings (measured variable, measuring range and unit of measurement) are undertaken automatically
  - 8 standard analogue sensors with current and voltage signals
  - 8 Condition Monitoring sensors\* (SMART sensors); again, the basic device settings are carried out automatically
- The blue input socket provides 2 digital inputs, e.g. for 1 or 2 HYDAC speed sensors (2nd speed sensor connection via Y adapter). Frequency measurements, counting functions or triggers can also be implemented for data recording.
- Different **CAN bus** functions can be implemented via the red input socket:
  - Connection of up to 28 HYDAC **HCSI** sensors (HYDAC CAN Sensor Interface) by setting up a CAN bus with HCSI sensors and the relevant connection accessories, also with automatic parameterization.
  - Connecting to a CAN bus, you have the option of evaluating up to 28 CAN messages.
  - Configuration of **CAN sensors**; the parameterization is performed by means of EDS files, which can be stored and administrated in the HMG 4000.
- The yellow input socket serves as the interface for HYDAC pressure, temperature or level switches with **I/O link** as well as for the programming device HPG P1. These devices can be parameterized by means of the HMG 4000.
- The most attractive function of the HMG 4000 surely is the capability of "online" recording and graphic illustration of dynamic processes, which means as a measuring curve in real time. During the recording process of a measuring curve, you can zoom in the curve sections of interest using gestures on the touchscreen.



- For the purpose of recording highly dynamic processes, all 8 analogue input channels can be operated simultaneously at a **sampling rate** of 0.1 ms.
- The **data memory** for recording curves or logs can hold up to 8 million measured values. At least 500 of such data recordings in full length can be stored in an additional archiving memory.
- For specific, **event-driven curves or logs**, the HMG 4000 has four independent triggers, which can be linked together logically. In addition, there is a "start/stop" condition, by means of which a measurement can be initiated or finished.
- User-specific device settings can be stored and re-loaded at any time as required. This means that repeat measurements can be carried out on a machine again and again using the same device settings.



- Measured values, curves or texts are visualized on the **full color graphics** display in different selectable formats and display forms.



- Numerous useful and easy-to-use **auxiliary functions** are available, e.g. zoom, tracker, differential value graph creation and individual scaling, which are particularly for use when analyzing the recorded measurement curves.

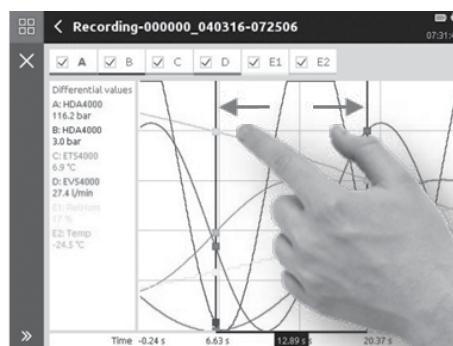


Figure: Using the magnifying gesture with two fingers, the operation is carried out – zooming in this case

- The communication between the HMG 4000 and a PC is performed via the built-in USB port. A HMG 4000 connected to your PC is recognized and depicted as a drive by the PC. You can thus move measured data to your PC conveniently. Optionally, data transfers can be carried out via a file manager by means of a USB memory stick.

## HMGWIN:

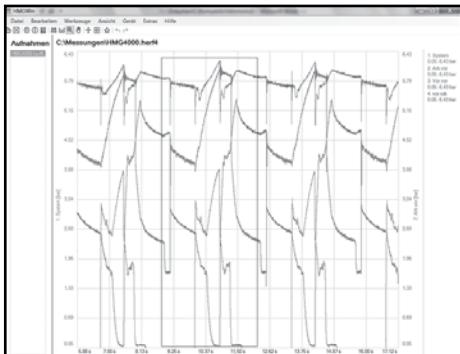
The PC software HMGWIN is also supplied with the device. This software is a convenient and simple package for analyzing and archiving curves and logs which have been recorded using the HMG 4000, or for exporting the data for integration into other PC programs if required.

In addition it is possible to operate the HMG 4000 directly from the computer. Basic settings can be made, and measurements can be started online and displayed directly on the PC screen in real-time as measurement curves progress.

HMGWIN can be run on PCs with Windows 7, Windows 8.1 and Windows 10 operating systems.

Some examples of the numerous useful additional functions:

- Display of the measurements in graph form or as a table



- Zoom function:**

Using the mouse, a frame is drawn around an interesting section of a measurement curve, which is then enlarged and displayed.

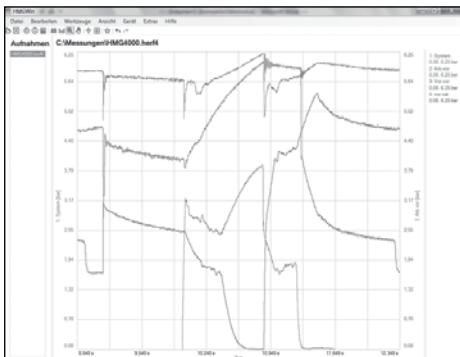
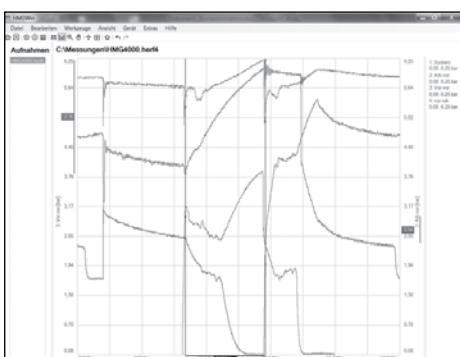
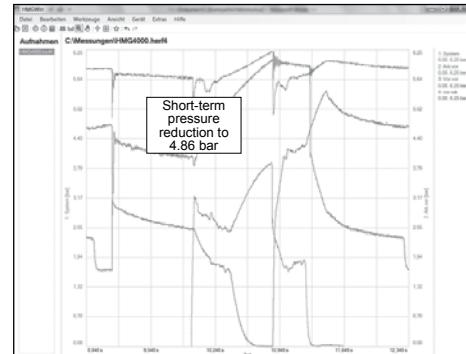


Fig.: Zoomed section of measurement curve

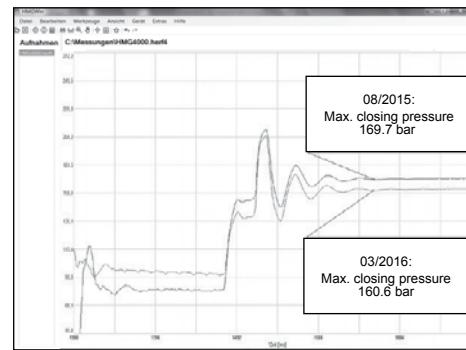
- Accurate measurement of the curves using the ruler tool (time values, amplitude values and differentials)



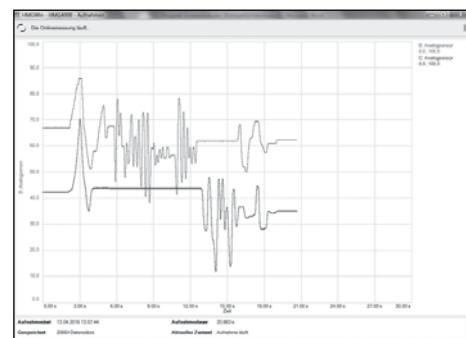
- Individual comments and measurement information can be added to the graph (function available mid-2017)



- Overlay of curves, for example to document the wear of a machine (new condition/current condition) (function available mid-2017)



- Using mathematical operations (calculation functions, filter functions), new curves can be added.
- Snap-shot function:**  
comparable to the function of a digital camera, a picture can be taken immediately of any graph and saved as a jpg file.
- A professional measurement report can be produced at the click of a mouse:  
HMGWIN has an automatic layout function. Starting with a table of contents, all recorded data, descriptions and graphics and/or tables are combined into a professional report and saved as a pdf file.
- Online function (HMGWIN only):  
Starting, recording, and online display of measurements (similar to the function of an oscilloscope) Change of axis assignment of the recorded measurement parameters in graph mode (e.g. to produce a p-Q graph)



\* SMART sensors

(Condition Monitoring 'sensors) are a generation of sensors from HYDAC which can provide a variety of different measurement variables.

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## Notes

