HYDAC INTERNATIONAL

Hand–held Measuring Unit
HMG 4000

5.7“ Color Touchscreen

Up to 38 sensors can be connected

Automatic Sensor Detection

Description:

The HMG 4000 hand–held measuring unit is a portable measuring and data logging device. It was mainly developed for all values measured in relation with hydraulic systems, such as pressure, temperature, flow rate and position. Moreover, it provides a very high flexibility, even when it comes to evaluating other measuring values. The main applications are servicing, maintenance or test rigs.

The HMG 4000 has a very easy-to-operate user interface due to its large 5.7" touchscreen. The operator can access all of the unit’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 offer special sensors, which are automatically detected by the HMG 4000 and whose parameters such as measurement values, measuring ranges and measuring units can be set.

On the one hand, there are the HYDAC **HSI**-Sensors (**H**YDAC **S**ensor **I**nterface) for the measurement of pressure, temperature and flow rate, for the connection of which there are 8 analog input channels.
Furthermore, there is the option of connecting HYDAC SMART sensors to these inputs. SMART senors can display several different measured variables at a time.

Up to 28 special HYDAC **HCSI**-Sensors (**H**YDAC **C**AN **S**ensor **I**nterface) can be connected additionally via the CANbus port, also supporting automatic sensor detection.

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, providing two additional digital inputs (e.g. for frequency or rpm measurements).

The most impressing 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 — and, moreover, online and in real time.

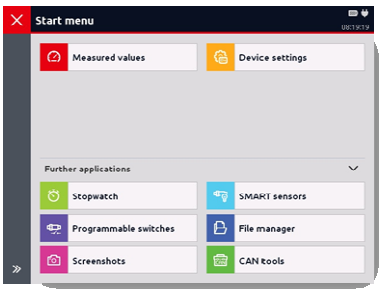
HYDAC software HMGWIN which is specific to the HMG 4000, is supplied for convenient post-processing, rendering and evaluation of measurements on your computer.

Special features:

- Large, full graphics color display 5.7" touch screen
- Capable of recording up to 38 sensors at once, 8 analog, 2 digital sensors and 28 HSCI sensors via CAN bus.
- Up to 100 measurement channels can be depicted simultaneously
- High-speed measuring rate, up to 8 sensors at 0.1 ms at a time.
- Rapid and automatic basic setting of the device by means of automatic sensor detection
- Analog inputs 0.. 20 mA, 4 .. 20 mA Voltage 0 .. 50V, -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:
  - 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 visualization, archiving and data processing using the HMGWIN software

Function:

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



- HMG 4000 can detect 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.

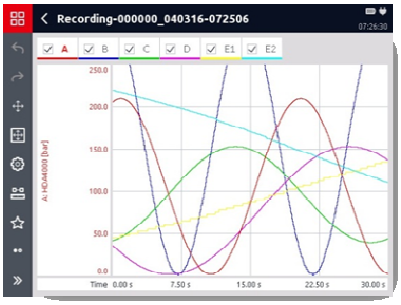
- The following sensors can be connected to 8 of these input sockets:
  - 8 Sensors (e.g. for pressure, temperature, and flow rate) with the special digital HSI interface (HYDAC Sensor Interface); this means the basic device settings (measured variable, range, and unit of measurement) are performed automatically
  - 8 standard analog sensors with current and voltage signals
  - 8 condition monitoring sensors *) (SMART sensors), the basic device settings are also performed automatically.

- The blue input socket provides 2 digital inputs, i.e. for 1 or 2 HYDAC speed sensors (2nd speed sensor connection via Y adapter). Frequency measurements, counting functions or triggers can as well 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 (**H**YDAC **C**AN **S**ensor **I**nterface) 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 HYDAC **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 impressive function of the HMG 4000 is its ability to record dynamic processes "online", i.e. in real-time, as a **measurement curve** and to render them as graphs. During the recording process of a measuring curve, you can zoom in the curve sections of interest using gestures on the touchscreen.

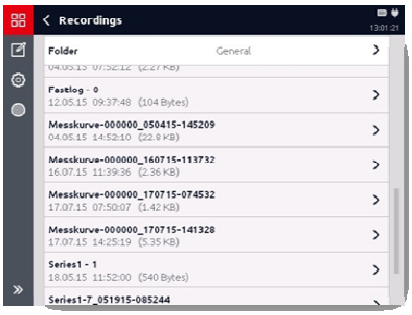


- For the purpose of recording highly dynamic processes, all 8 analog input channels can be operated simultaneously at a **measuring rate** of 0.1 ms.

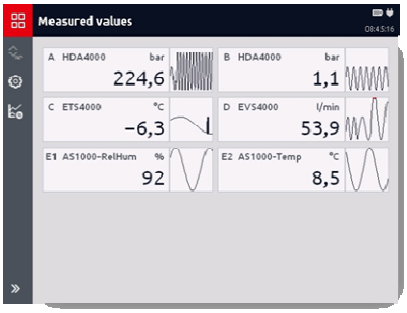
- The **data memory** for the recording of curves or logs can memorize up to 8 million measured values.
  At least 500 of such data recordings in full length can be stored in an additional archiving memory.

- For the targeted **event-driven curve or log recording**, the HMG 4000 has two 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 instrument setting s 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 a **full-graphics color display** in different selectable formats and display forms.



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

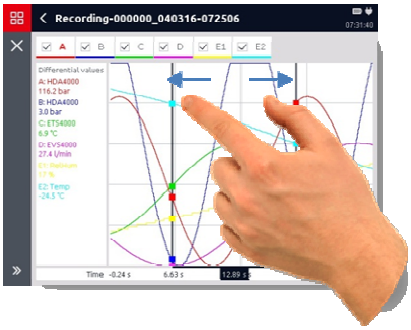


Fig.: Using the magnifying gesture with two fingers, the operation is carried out - Zooming in this case.

- 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 directory by the PC. You can conveniently move measured data to your PC.
  Optionally, data transfers can be carried out via a file manager by means of a USB memory stick.

HMGWIN:

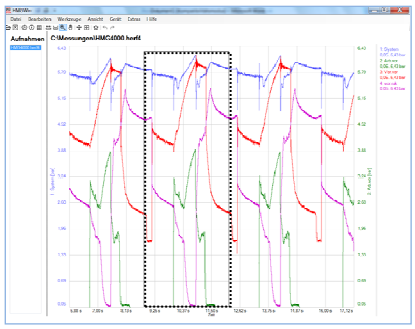
The PC software HMGWIN is also supplied with the device.
This software is a convenient and simple package for analyzing and archiving curves and logs which have been recorded using the HMG 4000, or for exporting the data for integration into other PC programs if required.
In addition it is also possible 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 as well as Windows 10
operating systems.

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

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.

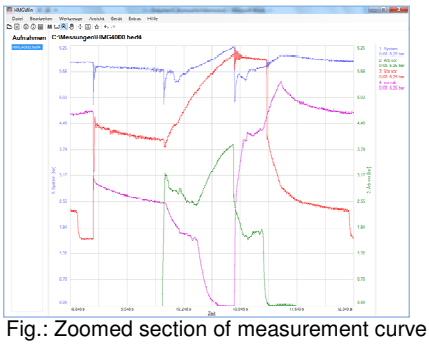
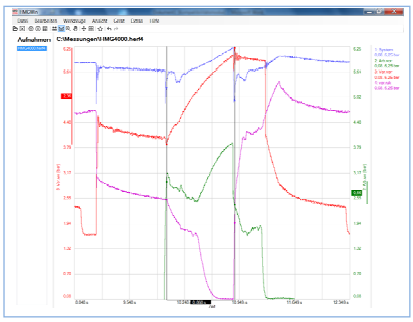
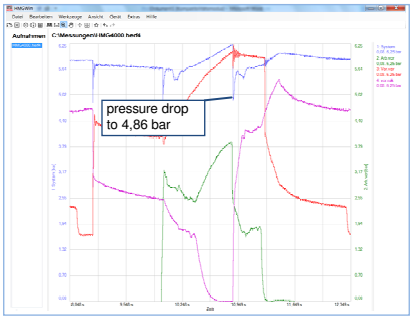


Fig.: Zoomed section of measurement curve

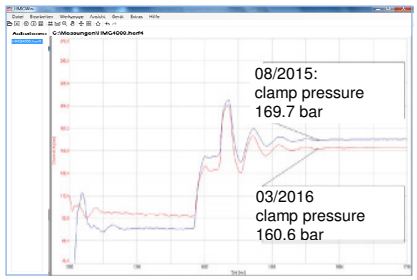
- **Accurate measurement** of the curves using the ruler tool (time values, amplitude values, and differentials)



- Individual **comments** and relating measurement information can be added into the graph. (function available from Q4/2016)



- **Overlay** of curves, for example to document the wear of a machine (new condition/current condition).
  (Function available from Q4/2016)

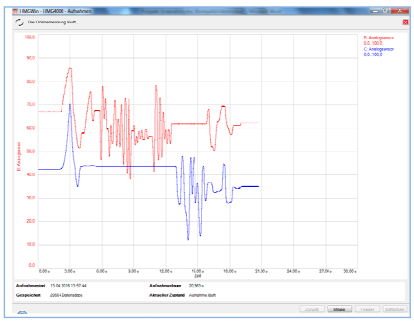


- Using mathematical operations (calculation functions, filter functions) new curves can be added.

- 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 (only HMGWIN):
  Start, recording and online-display of measurements (comparable with the function of an oscilloscope) change of axis assignment of the recorded measurement variables in graph mode (e.g. to produce a p-Q graph)



Technical Data:

Analog inputs	
Input signals 8 channels M12x1 Ultra-Lock Flange sockets (5 pole) channel A, ... channel H	HYDAC HSI Analog sensors HYDAC HSI SMART sensors Voltage signals: i.e. 0.5..4.5 V, 0..10 V etc. (input ranges for 0 .. 50V, 0..10 V, 0..4.5V, -10 .. 10V) Current signals, i. e. 4..20mA, 0..20mA (input range 0..20 mA) 1 x PT 100 / PT 1000 (on channel H)
Accuracy dependence of 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 pole) channel I, J	Digital status (high / low) Frequency (0.01... 30,000 Hz) PWM duty cycle Durations (i.e. Period length)
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 pole) channel K1.. K28	HYDAC HCSI sensors, CAN, J1939, CANopen PDO, CANopen SDO
Baud rate	10 kbit/s ... 1 Mbit/s
Accuracy	≤ ± 0.1 %
Calculated channels	
Quantity	4 channels via virtual port L (channel L1 ... channel L4)
Programming interface	
For HYDAC I/O-Link devices	1 channel via M12x1 Ultra-Lock Flange socket (5 pole)
Voltage supply	
Network operation	9 ... 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
Service Life	without sensors: approx. 11 hours with 2 sensors: approx. 9 hours with 4 sensors: approx. 7 hours with 8 sensors: approx. 4 hours
Display	
Type	TFT-LCD Touchscreen
Quantity	5.7 ‘‘
Resolution	VGA 640 x 480 Pixel
Backlight	10 ... 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
Ambient conditions	
Operating temperature	32 ... 122°F
Storage temperature	-4 ... 140°F
Relative humidity	0 ... 70 %
Max. operating altitude	2000 m
DIMENSIONS	approx. 285 x 189 x 87 mm (B x H x T)
Weight	approx. 1,850 g
Housing material	Plastic (Elastollan® R 3000 – TPU-GF)

Order details:

HMG 4000 – 000 - US

Operating manual and documentation
US = English

Items Supplied

- HMG 4000
- Power supply for 90 .. 230 V AC
- Strap
- Operating Instructions
- Data storage medium containing USB drivers HMGWIN and CMWIN software
- USB connector cable

Accessories:

- Pressure, temperature, flow rate transmitters with HSI sensor detection as well as CAN pressure transmitters with HCSI sensor detection, see separate data sheet.

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.

HYDAC ELECTRONICS
90 Southland Dr. Bethlehem, PA 18017
Telephone +1 (610) 266-0100
E-mail: electronic@hydacusa.com
Website: www.hydacusa.com

Pressure Transducer with HSI

(HYDAC Sensor Interface)

Model Code	Description	Part No.
HDA 4748-H-0009-000	-14.5 to 130.5 psi (-1 to 9 bar)	00909429
HDA 4748-H-0016-000	0 to 230 psi (0 to 16 bar)	00909425
HDA 4748-H-0060-000	0 to 870 psi (0 to 60 bar)	00909554
HDA 4748-H-0100-000	0 to 1450 psi (0 to 100 bar)	00909426
HDA 4748-H-0250-000	0 to 3625 psi (0 to 250 bar)	00909337
HDA 4748-H-0400-000	0 to 5800 psi (0 to 400 bar)	00909427
HDA 4748-H-0600-000	0 to 8700 psi (0 to 600 bar)	00909428
HDA 4778-H-0135-000	-14.5 to 135.5 psi (-1 to 9.34 bar)	00920755
HDA 4778-H-0150-000	0 to 150 psi (0 to 10 bar)	00920663
HDA 4778-H-1500-000	0 to 1500 psi (0 to 103 bar)	00920757
HDA 4778-H-3000-000	0 to 3000 psi (0 to 207 bar)	00920756
HDA 4778-H-6000-000	0 to 6000 psi (0 to 144 bar)	00920664
HDA 4778-H-9000-000	0 to 9000 psi (0 to 621 bar)	00920665

HCSI Pressure Measuring Transducer

Model Code	Description	Part No.
HDA 4748-HC-0009-000 (-1...+9bar)	-1 ... 9 bar	925287
HDA 4748-HC-0016-000	0 ... 16 bar	925298
HDA 4748-HC-0060-000	0 ... 60 bar	925305
HDA 4748-HC-0100-000	0 ... 100 bar	925299
HDA 4748-HC-0160-000	0 ... 160 bar	925286
HDA 4748-HC-0250-000	0 ... 250 bar	925304
HDA 4748-HC-0400-000	0 ... 400 bar	925303
HDA 4748-HC-0600-000	0 ... 600 bar	925301
HDA 4748-HC-1000-000	0...1000 bar	925300

HCSI Temperature Measuring Transducer

Model Code	Description	Part No.
ETS 4148-HC-006-000	-25 to +100 °C	925302

Speed Sensors

Model Code	Description	Part No.
HDS 1000-002	RPM Sensor (plug M12x1) 2M Includes HDA 1000 Reflector Set (part no. 904812)	909436
HDS 1000 Reflector Set	Reflective foil set 25 pieces	904812
HSS 210-3-050-000	RPM Sensor (in connection with ZBE 46)	923193
HSS 220-3-046-000	RPM Sensor (in connection with ZBE 46)	923195

Sensor Cables

Model Code	Description	Part No.
Push-pull connection on plug-side		
ZBE 40-02	(CABLE M12X1/5P, PUSH-PULL) 2M length	6177158
ZBE 40-05	(CABLE M12X1/5P, PUSH-PULL) 5M length	6177159
ZBE 40-10	(CABLE M12X1/5P, PUSH-PULL)10M length	6177160
Screw connection		
ZBE 30-02	(Sensor cable M12x1, 5-pin) 2M length	6040851
ZBE 30-05	(Sensor cable M12x1, 5-pin) 5M length	6040852

Flow Sensor with HSI *(HYDAC Sensor Interface)*

Model Code	Description - g/min (l/min)	Part No.
Aluminum		
EVS 3108-H-0020-000	0.26 to 5.28 (1.2 to 20)	00909405
EVS 3108-H-0060-000	1.59 to 15.9 (6 to 60)	00909293
EVS 3108-H-0300-000	3.96 to 79.3 (15 to 300)	00909404
EVS 3108-H-0600-000	10.6 to 159 (40 to 600)	00909403
Stainless Steel		
EVS 3118-H-0020-000	0.26 to 5.28 (1.2 to 20)	00909409
EVS 3118-H-0060-000	1.59 to 15.9 (6 to 60)	00909406
EVS 3118-H-0300-000	3.96 to 79.3 (15 to 300)	00909408
EVS 3118-H-0600-000	10.6 to 159 (40 to 600)	00909407

Temperature Transducer with HSI

(HYDAC Sensor Interface)

Model Code	Description	Part No.
ETS 4548-H-000	-13° to 212°F (-25° to 100°C)	00909298
ETS 4578-H-000	-13° to 212°F (-25° to 100°C)	00920662

Other Accessories

Model Code	Description	Part No.
Case for HMG 4000	Case for HMG 4000 and accessories	6179836
ZBE 31	Car charger for HMG 4000	909739
HCSI Y splitter	Y splitter for HCSI sensors	6178196
HCSI bus termination	Termination connector for HCSI Sensors	6178198
ZBE 46	Pin adapter HMG (for three-wire signals, AS, ...)	925725
ZBE 100	Adapter for TFP 100	925726
ZBE 38	Y adapter, black for jack I/J	3224436
ZBE 26	Y adapter, blue for HLB 1000	3304374
ZBE 41	Y adapter, yellow for CS 1000	910000
UVM 3000	Universal connection module for HMG 4000	909752
Hydraulic Adapter set	Adapter hose DN 2 / 1620/ 1620, 400 mm and 1000 mm, pressure gauge connection 1620/ G1/4, adapter 1615/ 1620, bulkhead couplings 1620/ 1620	903083
SSH 1000	Sensor simulator for HMG 4000 (ideal for training and learning purposes)	909414

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Website: www.hydacusa.com