

OEM pressure sensor

For mobile working machines, CANopen®/SAE J1939

Model MH-4-CAN

WIKA data sheet PE 83.02



For further approvals,
see page 9

CANopen® **SAE J1939**

Applications

Operating and control pressure measurement in:

- Construction machinery
- Agricultural and forestry equipment
- Mobile cranes and mobile elevating work platforms (MEWP)
- Material handling and municipal vehicles

Special features

- For extreme operating conditions
- Signal stability thanks to serial interface
- Reliable and accurate
- Customer-specific solutions
- High production capacities



OEM pressure sensor, model MH-4-CAN

Description

The MH-4-CAN, based on the MH-4, is a powerful, reliable and extremely resilient pressure sensor for mobile working machines. Even under demanding conditions, the sensor delivers constant, precise measured data and ensures high operational safety. The special feature of the MH-4-CAN is the CANopen® or SAE J1939 serial interface. This enables use in complex machines and offers the advantage of simple and cost-effective system expansion with the bridging of large distances while simultaneously ensuring signal stability and signal integrity.

Developed for the specific requirements in mobile working machines

The MH-4-CAN meets high demands and measures with high precision at temperatures between -40 ... +100 °C [-40 ... +212 °F]. With its up to 3 times overpressure limit, the sensor withstands hydraulic pressure spikes – and is available with a restrictor. Thanks to metal shielding, the MH-4-CAN works interference-free at field strengths up to 100 V/m. In addition, vibrations up to 40g and shocks up to 100g have no influence on the measurement quality.

Highest reliability over the entire life cycle

Whether dust, humidity, heat or mechanical stress: The MH-4-CAN pressure sensor is optimised for mobile use, particularly safe in operation and thus continuously dependable. The maintenance-free instrument design ensures a particularly low total cost of ownership. Even after more than 100 million load cycles, the long-term drift is still less than 0.1 % FS.

Think big – with WIKA as an OEM supplier

Secure supply chains, high quality standards and a comprehensive range of services worldwide make WIKA a reliable OEM supplier – especially for large volume orders. MH-4 pressure sensors are available directly, in high quantities, with commonly used electrical connections and pressure connections. Customer-specific interfaces and adaptations can be realised together – including an option for brand labelling.

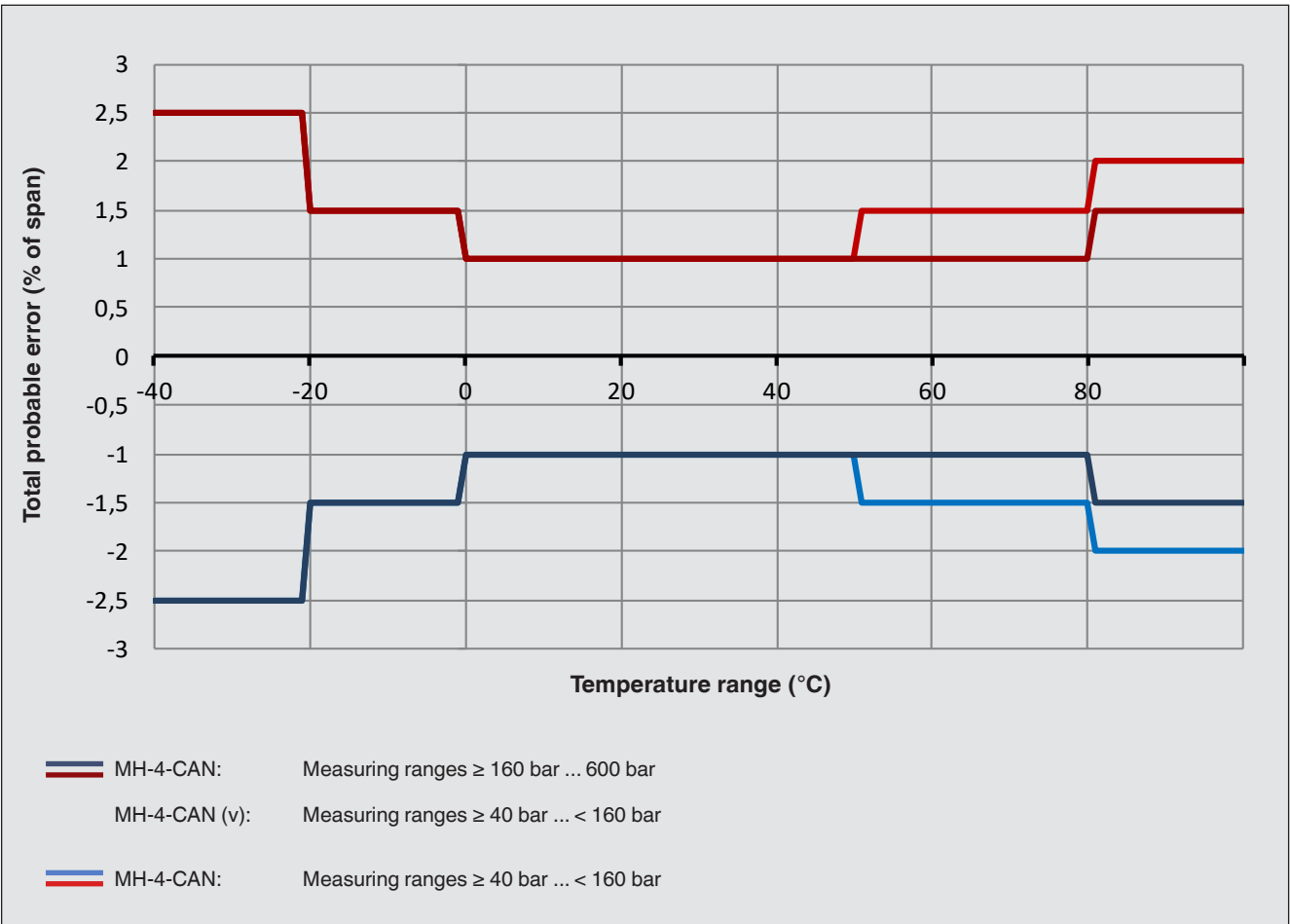
Specifications

Overview of versions	
Version	Description
MH-4-CAN	OEM pressure sensor
MH-4-CAN (v)	OEM pressure sensor with pressure compensation element (v = vented) → The pressure compensation element ensures high accuracy for measuring ranges < 160 bar [2,000 psi]. → The pressure compensation element is available for selected electrical connections. → Not suited to applications involving diesel fuels, ambient conditions involving salt mist and extreme temperature fluctuations.

Accuracy specifications	
Non-linearity per IEC 62828-1	$\leq \pm 0.25\%$ of span (BFSL) ¹⁾
Accuracy	→ See „Max. measured error per IEC 62828-1“
Max. measured error per IEC 62828-1	$\leq \pm 1.0\%$ of span → For measuring ranges < 40 bar, see „Total probable error for measuring ranges ≥ 6 bar ... < 40 bar.“
Total probable error per IEC 62828-2	→ See chart „Total probable error“
Long-term drift per IEC 62828-1	$\leq \pm 0.1\%$ of span
Reference conditions	Per IEC 62828-1

1) Applies to SAE J1939 at a zero point of +0.5 % ... full scale value of -0.5 %

Total probable error



Total probable error for measuring ranges ≥ 6 bar ... < 40 bar:			
Measuring range	Temperature limit		
	20 °C [68 °F] ¹⁾	50 °C [122 °F]	80 °C [176 °F]
MH-4-CAN			
0 ... 6 bar	$\leq \pm 1.7 \%$	$\leq \pm 3.4 \%$	$\leq \pm 5.8 \%$
0 ... 10 bar	$\leq \pm 1.3 \%$	$\leq \pm 2.3 \%$	$\leq \pm 3.8 \%$
0 ... 16 bar	$\leq \pm 1.0 \%$	$\leq \pm 1.6 \%$	$\leq \pm 2.7 \%$
0 ... 25 bar	$\leq \pm 1.0 \%$	$\leq \pm 1.3 \%$	$\leq \pm 2.1 \%$
MH-4-CAN (v)			
0 ... 6 bar	$\leq \pm 1.3 \%$	$\leq \pm 1.6 \%$	$\leq \pm 2.2 \%$
0 ... 10 bar	$\leq \pm 1.0 \%$	$\leq \pm 1.2 \%$	$\leq \pm 1.5 \%$
0 ... 16 bar	$\leq \pm 1.0 \%$	$\leq \pm 1.0 \%$	$\leq \pm 1.0 \%$
0 ... 25 bar	$\leq \pm 1.0 \%$	$\leq \pm 1.0 \%$	$\leq \pm 1.0 \%$

1) Corresponds to the max. measured error per IEC 62828-1

Measuring ranges, gauge pressure

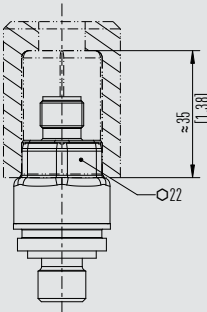
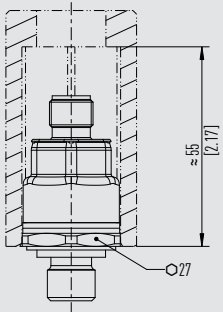
bar		psi	
MH-4-CAN	MH-4-CAN (v)	MH-4-CAN	MH-4-CAN (v)
0 ... 6	0 ... 6	0 ... 100	0 ... 100
0 ... 10	0 ... 10	0 ... 200	0 ... 200
0 ... 16	0 ... 16	0 ... 300	0 ... 300
0 ... 25	0 ... 25	0 ... 400	0 ... 400
0 ... 40	0 ... 40	0 ... 500	0 ... 500
0 ... 60	0 ... 60	0 ... 1,000	0 ... 1,000
0 ... 100	0 ... 100	0 ... 1,500	0 ... 1,500
0 ... 160	-	0 ... 2,000	-
0 ... 250	-	0 ... 3,000	-
0 ... 400	-	0 ... 5,000	-
0 ... 600	-	0 ... 8,000	-

→ Other measuring ranges on request.

Further details on: measuring range	
Units	☐ bar ☐ psi ☐ MPa
Maximum working pressure per IEC 62828-2	→ Corresponds to the upper measuring range value / end value of the measuring range → Any permanent operation above the maximum working pressure is not permissible
Overpressure limit per IEC 62828-2	The overpressure limit is based on the measuring range. Depending on the selected process connection and the seal, restrictions in overpressure limit can result.
Measuring ranges ≤ 400 bar [$\leq 5,000$ psi]	3 times
Measuring range 600 bar [8,000 psi]	2 times
Vacuum resistance	Yes

Process connection				
Standard	Thread size	Max. measuring range	Overpressure limit	Seal
DIN EN ISO 1179-2	G ¼ A	600 bar [8,000 psi]	858 bar [12,400 psi]	■ NBR ■ FPM/FKM
DIN EN ISO 9974-2	M14 x 1.5	600 bar [8,000 psi]	858 bar [12,400 psi]	
ISO 6149-2	M14 x 1.5	600 bar [8,000 psi]	858 bar [12,400 psi]	
JIS B 2351-1	G ¼ B x 10, form O with collar	600 bar [8,000 psi]	858 bar [12,400 psi]	
	G ¾ A, form O with collar	600 bar [8,000 psi]	858 bar [12,400 psi]	
SAE J514 (compatible with SAE J1926 tapped holes)	7/16-20 UNF, O-Ring Boss	600 bar [8,000 psi]	858 bar [12,400 psi]	
	9/16-18 UNF-2A, O-Ring Boss	600 bar [8,000 psi]	858 bar [12,400 psi]	
	3/4-16 UNF-2A, O-Ring Boss	600 bar [8,000 psi]	858 bar [12,400 psi]	
	7/16-20 UNF-2A, sealing cone 74°	800 bar [10,000 psi]	1,144 bar [16,500 psi]	
ANSI/ASME B1.20.1	½ NPT	400 bar [5,000 psi]	572 bar [8,200 psi]	-
	¼ NPT	1,000 bar [13,000 psi]	1,480 bar [21,400 psi]	
KS	PT ¼	1,000 bar [13,000 psi]	1,480 bar [21,400 psi]	
	PT ¾	1,000 bar [13,000 psi]	1,480 bar [21,400 psi]	
ISO 7	R ¼	1,000 bar [13,000 psi]	1,480 bar [21,400 psi]	
	R ¾	1,000 bar [13,000 psi]	1,480 bar [21,400 psi]	
EN 837	G ½ B	400 bar [5,000 psi]	572 bar [8,200 psi]	■ Copper ■ Stainless steel
	G ¼ B	1,000 bar [13,000 psi]	1,480 bar [21,400 psi]	
	G ¾ B	1,000 bar [13,000 psi]	1,480 bar [21,400 psi]	

Details must be tested separately in the respective application. The specified values for the overpressure limit serve only as a rough orientation. The values depend on the temperature, the seal used, the selected torque, the type and the material of the mating thread and the prevailing operating conditions.

Further details on: process connection		
Max. measuring range	→ See table „Process connection“	
Overpressure limit	→ See table „Process connection“	
Seal	→ See table „Process connection“	
Pressure port diameter	For applications that can lead to pressure spikes, a restrictor with a pressure port of 0.3 mm is available. ■ 2.5 mm ■ 0.3 mm with mounted restrictor	
Socket wrench suitability	Hexagon (SW 22) integrated in the case 	Additional hexagon (SW 27) above the process connection Suitable for mounting with socket wrench 
Possible restrictions, seal	Depending on the choice of seal on the process connection, there may be restrictions in the permissible temperature limit.	

Further details on: process connection

Permissible temperature range

NBR	-40 ... +100 °C [-40 ... +212 °F]
FPM/FKM	-20 ... +125 °C [-4 ... +257 °F]
Copper	-40 ... +125 °C [-40 ... +257 °F]
Stainless steel	-40 ... +125 °C [-40 ... +257 °F]

→ Other process connections and seals on request.

→ For further information on process connections, see technical information IN 00.14.

Output signal

Signal type

CANopen®	Communication profile	CiA 301
	Device profile	CiA 404
	Layer setting services and protocol	CiA 305
	Automatic bit-rate detection	CiA 801
	→ See "Special documentation for CANopen®"	

Communication

Configuration of the CANopen® interface	It is possible to order the model MH-4-CAN already preconfigured. → See "Special documentation for CANopen®"	
Baud rate	0	1000 kbit/s
	1	800 kbit/s
	2	500 kbit/s
	3	250 kbit/s (standard)
	4	125 kbit/s
	6	50 kbit/s
	7	20 kbit/s
Node ID	001 ... 127	001 (standard) ¹⁾
PDO mapping	A	Object 0x9130.01 (pressure value int32) and 0x6150.01 (status)
	B	Object 0x6130.01 (pressure value float) and 0x6150.01 (status) (standard)
	C	Object 0x7130.01 (pressure value int16) and 0x6150.01 (status)
PDO cycle	00001 ... 65535	Period in milliseconds (default: 100)
Decimal points	A	Optimum (standard)
	0 ... 5	Number of decimal points ¹⁾
Transmission type	001 ... 240	Synchronous transmission 001 (standard) ¹⁾
	254	Asynchronous cyclic transmission (event timer driven)
	255	Asynchronous transmission (event timer driven and/or PV change, PV limit exceeding)
Event timer	0	Automatic (standard)
	00001 ... 65535	Event timer in milliseconds ¹⁾
Auto-operational	Z	Off via object 1F80 (standard)
	A	On via object 1F80
Heartbeat	0	Without (standard)
	00001 ... 65535	Heartbeat in milliseconds ¹⁾

Output signal		
Signal type		
J1939	SAE J1939	
Communication		
Baud rate	2	500 kbit/s
	3	250 kbit/s (standard)
TR-JPRIO	0	0
	1	1
	2	2
	3	3
	4	4
	5	5
	6	6 (standard)
	7	7
Parameter Group Number (PGN)	→ See „Special Documentation SAE J1939“	
Suspect Parameter Number (SPN)	→ See „Special Documentation SAE J1939“	
Source address (SA)	128	128 (standard)
	000 ... 253	Source address
Arbitrary-address-capable	0	0
	1	1 (standard)
Industry Group	0	Global (standard)
	1	On-highway equipment
	2	Agricultural and forestry equipment
	3	Construction equipment
	4	Marine
	5	Stationary industrial process control
	6	Reserved
	7	Reserved
Vehicle system instance	0 ... 15	00 (standard)
Vehicle system	0 ... 127	000 (standard)
Function	0 ... 255	000 (standard)
Function instance	0 ... 31	0 (standard)
ECU Instance	0	0 (standard)
	1	1
	2	2
	3	3
	4	4
	5	5
	6	6
	7	7
TRR rate var.	0 ... 65535	TRR rate var.
	100	100 ms (standard)
Voltage supply		
Auxiliary power	■ CANopen: DC 9 ... 35 V ■ SAE J1939: DC 9 ... 35 V	
Current supply	■ CANopen: < 50 mA ■ SAE J1939: < 50 mA	
Overvoltage resistance	DC 36 V	

Output signal	
Dynamic behaviour	
Settling time per IEC 62828-1	≤ 3 ms
Switch-on time	< 500 ms

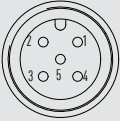
1) Select a numerical value

→ Other output signals on request

Electrical connection	
Connection type	Circular connector M12 x 1 (5-pin)
Permissible temperature range	-40 ... +125 °C [-40 ... +257 °F]
Ingress protection (IP code) per IEC 60529 ¹⁾	IP67 per IEC 60529
Pin assignment	→ See table „Pin assignment“
Short-circuit resistance	CAN-High/CAN-Low vs. U+/U- (U+: ≤ DC 24 V)
Reverse polarity protection	U+ vs. U-
Insulation voltage	DC 500 V
CAN bus impedance	A CAN bus impedance of 120 ohm is strictly required to reach a wide range and high number of involved persons with all transmission rates. In order to avoid drops in potential, the shield must be connected along the entire bus with the lowest possible impedance.

1) The stated IP codes (per IEC 60529) only apply when plugged in using mating connectors that have the appropriate IP code.

Pin assignment

Circular connector M12 x 1 (5-pin)		
	1	Shield
	2	U+
	3	U-
	4	CAN-High
	5	CAN-Low

Material	
Material (wetted)	Stainless steel 304L (1.4307), PH grade steel
Material (in contact with the environment)	Stainless steel 304L (1.4307), electrical connection made of highly resistant glass-fibre reinforced plastic (PBT)

Operating conditions	
Medium temperature limit ¹⁾	-40 ... +100 °C [-40 ... +212 °F]
Ambient temperature limit ¹⁾	-40 ... +85 °C [-40 ... +185 °F]
Storage temperature limit	-40 ... +70 °C [-40 ... +158 °F]
Humidity per EN 60068-2-78	93 % at 55 °C [131 °F] relative humidity
Condensation	Non-condensing
Pollution degree	2
Vibration resistance per IEC 60068-2-6	40g, 10 ... 2,000 Hz
Permanent vibration resistance per IEC 60068-2-6	10g, 10 ... 2,000 Hz
Shock resistance per IEC 60068-2-27	100g, 11 ms

Operating conditions	
Free fall in line with IEC 60068-2-31	
Single instrument	1 m [3.28 ft]
Multiple packaging	0.5 m [1.64 ft]
Ingress protection (IP code) per IEC 60529	→ See „ Electrical connection “
Service life	100 million load cycles
EMC ²⁾	
ESD per ISO 10605	±8 kV contact discharge, ±15 kV air discharge
HF field per ISO 11452-2	100 V/m
BCI per ISO 11452-4	200 mA
Pulse 1 per ISO 7637-2	Level III
Pulse 2a per ISO 7637-2	Level III
Pulse 2b per ISO 7637-2	Level III
Pulse 3a per ISO 7637-2	Level III
Pulse 3b per ISO 7637-2	Level III
Fast transient pulses per ISO 7637-3	Level IV
Radio disturbance per CISPR 25	30 ... 1,000 MHz

1) Depending on the choice of seal on the process connection, the electrical connection and the UL approval, there may be restrictions in the medium and ambient temperatures.
→ For restrictions, see "Process connection" and "Electrical connection".

2) The specifications listed are the manufacturer's information and have been verified by internal tests.

Packaging and instrument labelling	
Packaging	Multiple packaging (up to 25 pieces)
Instrument labelling	■ WIKA product label, lasered ■ Customised product label on request

Approvals

Logo	Description	Region
	EU declaration of conformity	European Union
	EMC Directive EN 61326 emission (group 1, class B) and immunity (industrial environment)	
	Pressure Equipment Directive	
	RoHS directive	

Optional approvals

Logo	Description	Region
	UL Component approval	USA and Canada

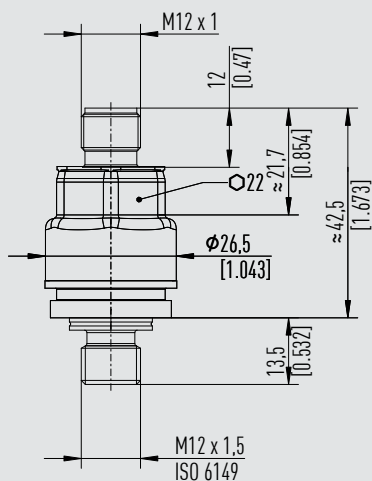
Manufacturer's declaration

Logo	Description
-	China RoHS directive
MTTF	> 100 years

→ For approvals and certificates, see website

Dimensions in mm [in]

Circular connector M12 x 1, 5-pin



Weight: 80 g [0.18 lb]

Ordering information

Model / Version / Output signal / Measuring range / Process connection / Seal

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