

HV AD4 XCP MM Series

Type XW4000



Product Description

The **HV AD4 XW4000** measurement module provides four galvanically isolated analog inputs and is specifically designed for the measurement of voltages in high-voltage environments. It supports high measurement data rates of up to 4 MHz per channel. This allows the precise analysis of high-frequency and fast dynamic processes, which is particularly needed for measurements in components with power semiconductors, e.g. inverters and converters.

Due to its housing design and technical specifications, the **HV AD4 XW4000** can be used in a variety of environments, both for mobile and stationary use, such as in test benches.

The **HV AD4 XW4000** transmits its measurement data directly using the standard protocol XCP-on-Ethernet. This protocol is supported by a wide range of measurement data acquisition systems in the automotive measurement technology sector. This means that the module can be connected directly to the PC and the measurement data can be analyzed and recorded via an A2L description file.

The module provides an integrated XCP-Gateway which can be optionally enabled for the direct connection of CSM EtherCAT® measurement modules. All connected measurement modules are configured using the configuration tool CSMconfig.





Key features

- ▶ 4 voltage inputs with reinforced isolation
- ▶ Gbit/s XCP-on-Ethernet interface, measurement data rate up to 4 MHz per channel
- ▶ Measurement range adjustable per channel
- ▶ Voltages up to ±1,000V (measurement range up to ±2,000V)
- ▶ Option XCP-Gateway for the direct connection of CSM EtherCAT® measurement modules
- ▶ Type approval and routine test according to safety standard EN 61010

Scope of delivery

- ▶ Measurement module HV AD4 XW4000
- ▶ Configuration software CSMconfig
- ▶ Documentation
- ▶ Calibration certificate in accordance with DIN EN ISO/IEC 17025
- ▶ HV isolation test certificate

Maintenance

- ▶ HV isolation test at least every 12 months, see EN 61010 for scope of testing
- ▶ Calibration every 12 months recommended

Accessories

- ▶ See "XCP/ECAT accessories" datasheet

Technical data

Type designation	HV AD4 XW4000
	
Technical data valid as of revision	A531
Measurement inputs	4 galvanically isolated voltage inputs
Measurement ranges	$\pm 100, \pm 200, \pm 500, \pm 1,000\text{V}^1$
Extended	$\pm 2,000\text{V}^2$
Internal resolution	16 bit
Internal sampling rate per channel	4 MS/s
Measurement data rate/ sending rate per channel	1, 2, 5, 10, 20, 50, 100, 200, 500, 1,000, 2,000, 4,000 kHz
HW input filter	<ul style="list-style-type: none"> ▶ 9th order Bessel filter ▶ 3dB cutoff frequency in the measurement ranges: <ul style="list-style-type: none"> ▶ $\pm 500\text{V}$ and $\pm 1,000\text{V}$ approx. 900 kHz ▶ $\pm 200\text{V}$ about 600 kHz ▶ $\pm 100\text{V}$ about 400 kHz
Software filter options per channel for sending rates up to 1,000 kHz	<ul style="list-style-type: none"> ▶ Off, only for sending rate of 1,000 kHz ▶ 6th order Butterworth filter, range 10 Hz to 300 kHz: <ul style="list-style-type: none"> ▶ automatically adjusted based on sending rate or ▶ user-selectable cutoff frequency
No software filters for sending rates 2,000 kHz and 4,000 kHz	
Input impedance	approx. 8 M Ω /approx. 20 pF
Channel comments	up to 100 characters of free text per channel
Error of measurement (DC)³	
Gain error at 25 °C	max. $\pm 0.05\%$ of measured value
Offset and scaling error	max. $\pm 0.02\%$ of range
Gain drift	max. $\pm 15\text{ ppm/K}$ of measured value
Zero drift	max. $\pm 8\text{ ppm/K}$ of range
Field of application⁴	for measurements in HV environments ⁵
Nominal voltages	up to 1,000V DC
Routine test	HV isolation test according to EN 61010-2-030
XCP-on-Ethernet interface	
Physical Layer	Ethernet 1000 Base-TX, 1000 Mbit/s
Protocol	XCP on UDP/IP ⁶
Configuration	via CSMconfig, settings and configuration data are stored in the device
PTP	supports synchronization using the "Precision Time Protocol" (PTP) between the HV AD4 XCP module and CSM/3rd party hardware supporting the IEEE 1588 standard
Synchronization HV AD4 XW4000/PTP-Master	100 ns

Type designation	HV AD4 XW4000
	
LED indicators	
XCP	Status, Link Activity PC, Link Activity ECAT
Measurement channels	Configuration, operation
Measurement categories ⁷	
CAT 0	1,000 V
CAT II	600 V
CAT III	300 V
Power supply	
Minimum	6 V DC (-10 %)
Maximum	30 V DC (+10 %)
Power consumption	typ. 3.4 W
Housing	aluminum with HV designation on the front-side (RAL2003)
Protection class	IP67
Ground connection	M6 threaded hole
Weight (device)	approx. 500 g
Dimensions (W × H × D)	approx. 200 × 40 × 76 mm (Slide Case)
Connectors	
PC (Ethernet)	LEMO 1B, 8-pole, code J (male)
ECAT/PWR	LEMO 1B, 8-pole, code L (male)
Signal inputs	LEMO Redel 2P, 8-pole, code D (grey/red)
Operating and storage conditions	
Operating temperature range	-40 °C to +125 °C
Relative humidity	5 % to 95 % (non-condensing)
Operating altitude	max. 5,000 m above sea level (CAT 0) max. 3,000 m above sea level (CAT II and CAT III)
Pollution degree	4
Storage temperature	-40 °C to +125 °C
Conformity	CE
Safety	EN 61010-1:2020+COR1:2022, +COR1:2023 with EN 61010-2-030:2022

¹ On request also available in other versions (sufficient quantities provided), e.g. as ECAT module with low measurement range/ measurement data rate.

² The measurement ranges of the analog inputs are set to $\pm 2,000$ V in order to be able to detect transient overvoltages.

³ For further information, please refer to the Technical Information "Deviation of Measurement".

⁴ Please also read CSM document "Safety Instructions HV AD4 XCP MM".

⁵ According to EN 61010-1:2020+COR1:2022, +COR1:2023 with EN 61010-2-030:2022

⁶ As of 10 kS/s, protocol version 1.4 or higher is required.

⁷ Further information can be found in the Technical Information "Measurement Categories for CSM HV Measurement Modules".



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