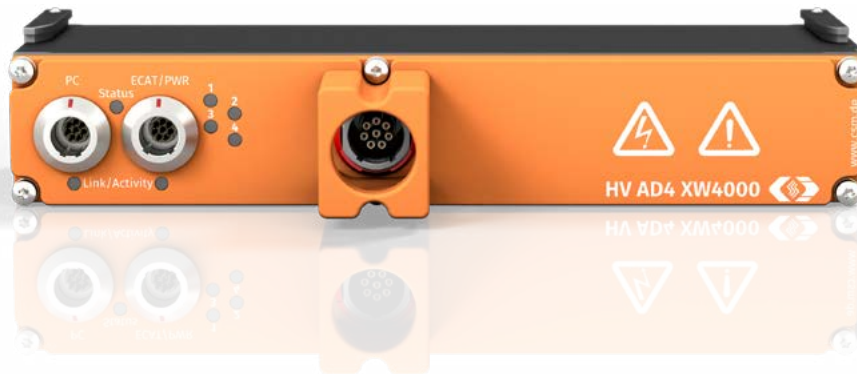# HV AD4 XCP MM Series
Type XW4000

Product Description

The HV AD4 XW4000 measurement module provides four analog inputs and is specifically designed for the measurement of analog 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 the housing design and technical specifications, the HV AD4 XW4000 can be used in a wide range of environments, both for mobile and stationary use, as for example 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 analysed 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.

Shipping content

▶ Measurement module HV AD4 XW4000
▶ Configuration software CSMconfig

Highlights

▶ **4 analog inputs with reinforced insulation, galvanically isolated**
▶ **GBit/s XCP-on-Ethernet interface, measurement data rate up to 4 MHz per channel**
▶ **Measurement range adjustable per channel**
▶ **Rated voltages up to ±1,000 V (measurement range up to ±2,000 V)**
▶ **Optional XCP-Gateway for the direct connection of CSM EtherCAT® measurement modules**
▶ **For use in vehicles and test benches as a monitor for high-speed and high-frequency time sequences (scope)**

▶ Documentation
▶ Calibration certificate (calibration certificate in accordance with DIN EN ISO/IEC 17025 in preparation)
▶ 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 "ECAT accessories" datasheet

Innovative Measurement and Data Technology

Technical data

Type designation	**HV AD4 XW4000**
Measurement inputs	4 analog inputs
Measurement ranges	±100, ±200, ±500, ±1,000 V (±5, ±10, ±20, ±45, ±90 V) [1]
Advanced	±2,000 V [2]
Internal resolution	16 bit
Internal sampling rate per channel	4 MS/s
Measurement data rate per channel	1, 2, 5, 10, 20, 50, 100, 200, 500, 1,000, 2,000, 4,000 kHz [1]
HW input filter	9th order Butterworth filter, threshold frequency approx. 1.3 MHz
SW input filter	at measurement data rates from 1 kHz to 1,000 kHz: switchable 6th order Butterworth filter, adjustable per channel threshold frequency automatically adjusted to measurement data rate
Input impedance	approx. 8 MΩ / approx. 20 pF
Channel comments	up to 100 characters of free text per channel
Error of measurement [3]	
Gain error at 25 °C	max. ±0.05 % of measured value
Offset and scaling error	max. ±0.02 % of range
Gain drift	max. ±15 ppm/K of measured value
Zero drift	max. ±8 ppm/K of range
Field of application [4]	for measurements in HV environments [5] For details, please refer to the applicable document: "Technical Information: Fields of application for CSM HV Measurement Modules"
Nominal voltages	up to 1,000 V DC
Isolation test [4]	
Routine test	Test voltage [5] 3,100 V DC, Performance of an isolation test at least every 12 months
XCP-on-Ethernet interface (ECAT)[1]	
Physical Layer	Ethernet 1000 Base-TX, 1000 MBit/s
Protocol	XCP on UDP/IP [6]
Configuration	via CSMconfig, settings and configuration date are stored in the device
PTP (option)	supports synchronisation using the "Precision Time Protocol" (PTP) between the HV AD4 XCP module and CSM/3rd party hardware supporting the IEEE 1588 standard
Synchronization	100 ns

Type designation	**HV AD4 XW4000**
LED indicators	
XCP	Status, Link Activity IN, Link Activity OUT
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	aluminium with HV designation on the front-side (RAL2003)
Protection class	IP67
Ground connection	M6 threaded hole
Weight	ca. 500 g
Dimensions (W × H × D)	approx. 200 × 40 × 76 mm (Slide Case)
Connectors	
PC (Ethernet)	LEMO 1B, 8-pole, code J (male)
ECAT (EtherCAT®/PWR$_{IN}$)	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 EN 61010-2-030:2010

[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 ±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 Series"!

[5] According to EN 61010-1:2020 with EN 61010-2-030:2010

[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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