

HV STG4 pro ECAT MM Series

Type BS20



Product description

HV STG4 pro BS20 is the all-round module for strain gauge-based measurements in the high voltage environment. It is an EtherCAT®-based, robust and extremely compact measurement module with four time-synchronous strain gauge inputs, which is ideally suited for distributed measurement applications under challenging conditions.

Thanks to complete galvanic isolation up to 1,000V RMS half and full bridges and standard strain gauge-based sensors, which are normally used in conventional low-voltage applications, can be used as well if they are combined with specific, high-voltage safe sensor cables.

The module is especially suitable for applications in the fields of electric mobility – electric and hybrid vehicles – for stationary and mobile use.

Shipping content

- ▶ Measurement module HV STG4 pro BS20
- ▶ Configuration software CSMconfig
- ▶ Documentation
- ▶ Device Description File (*.xml)
- ▶ Calibration certificate
- ▶ HV isolation test protocol

Key features



- ▶ **4 time-synchronous strain gauge inputs with reinforced insulation, galvanically isolated**
- ▶ **Measurement data rate up to 20 kHz per channel**
- ▶ **Supports full and half bridge strain gauges with 6- and 4-wire connection**
- ▶ **Extended range of sensor excitation from 1 up to 10V**
- ▶ **Also suitable for extremely small measuring signals/strains**
- ▶ **High resistance to interference due to ratiometric measuring principle and configurable software filter**


Maintenance


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


Accessories

- ▶ See datasheet "ECAT Accessories"

Technical Data

Type designation	HV STG4 pro BS20
	
Inputs	4 time-synchronous strain gauge inputs
Type of bridge	full and half bridges 120, 350, 700, 1,000 Ω
Bridge connection	4- and 6-wire
Measuring unit	mV/V, μm/m
Input voltage range	±11 mV, ±110 mV automatically selected on the basis of the DMS-specific configuration information
Internal resolution	eff. 21 bit
Bridge balancing	via configuration software, up to 50 % of input voltage range
Measurement data rate / sending rate per channel ¹⁾	1, 2, 5, 10, 20, 50, 100, 200, 500 Hz and 1, 2, 5, 10, 20 kHz
HW input filter	low-pass, 3rd order Bessel, 10 kHz
SW input filter	at measurement data rates 1 Hz ... 10 kHz: low-pass, 6th order Butterworth, 0.1 Hz to 2 kHz, switchable threshold frequency automatically adjusted to measurement data rate, alternatively adjustable per channel
Input protection	±20V permanent, additional ESD protection
Measurement deviation ²⁾	
Gain error ³⁾ at 25 °C	max. ±0.05 % of measured value
Offset and scaling error	depending on the measurement range
40 mV - 200 mV	max. ±0.015 %
20 mV - 40 mV	max. ±0.03 %
6 mV - 20 mV	max. ±0.07 %
3 mV - 6 mV	max. ±0.15 %
Gain drift ³⁾	±10 ppm/K
Zero drift	1.5 μV/K
Noise	at maximum excitation voltage (peak-to-peak)
$f_g \leq 10$ Hz	< 1 μV/V pp
10 Hz < $f_g \leq 100$ Hz	< 2 μV/V pp
100 Hz < $f_g \leq 1$ kHz	< 6 μV/V pp
Excitation voltage	1, 2.5, 5, 10 V adjustable per channel, optionally switchable, max. 42 mA per channel

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Fields of application ⁴⁾	for measurements in HV environments ⁵⁾ For details see co-applicable document: "Technical Information: Fields of Application for CSM HV Measurement Modules".
Nominal working voltages ⁵⁾	up to $\pm 1,000$ V
Routine test ⁴⁾	test voltage ⁵⁾ 3,100 V DC, isolation test is to be performed at least every 12 months
Reinforced insulation ^{4), 5)}	
Channel / channel	1,000 V RMS
Channel / ECAT	1,000 V RMS
Channel / power supply	1,000 V RMS
Power supply / bridge excitation voltage	1,000 V RMS
EtherCAT® interface	Ethernet 100 Base-TX, 100 Mbit/s EtherCAT® slave controller, synchronization via Distributed Clocks or Sync Manager 3
Configuration	with configuration software CSMconfig via XCP-Gateway or EtherCAT® master software via CANopen over EtherCAT® (CoE), settings and configurations stored in the device
Power supply	
Minimum	6 V DC (-10 %)
Maximum	30 V DC (+10 %)
Power consumption ⁶⁾	typ. 3 W (without sensor excitation) typ. 3.5 W (each channel with 350 Ω full bridge and 5 V sensor excitation)
LED indicators	
ECAT	Status / Link Activity IN / Link Activity OUT
Measurement channels	configuration / operation
Housing	aluminum with HV designation on the front-side (RAL 2003)
Protection class	IP67
Ground connection	M6 threaded hole
Weight	approx. 600 g
Dimensions (B × H × T)	approx. 200 × 40 × 76 mm (Slide Case)
Connectors	
EtherCAT® IN	LEMO 1B, 8-pole, code L
EtherCAT® OUT	LEMO 1B, 8-pole, code A
Signal inputs	LEMO Redel 2P, 8-pole, code E (grey/black)

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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
Pollution degree	4
Storage temperature	-40 °C to +125 °C
Conformity	CE
Device safety	EN 61010-1:2020 EN 61010-2-030:2020
Part number	ART1301020

¹ The following measurement data rates can be configured via XCP-Gateway: 10, 20, 50, 100, 200, 500 Hz and 1, 2, 5, 10, 20 kHz

² Further information can be found in the Technical Information document on the subject of "Deviation of Measurement"

³ Referring to the units mV/V or $\mu\text{m}/\text{m}$ measured by the module

⁴ Please also read the CSM document "Safety Instructions HV STG4 ECAT MM"!

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

⁶ Typ. 5W at max. load (each channel with 350 Ω full bridge and 10V sensor excitation)



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