



Epec 2021 Hub Module

Data Sheet

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INTRODUCTION

Epec Oy is an electronics manufacturer founded in 1978 and located in Seinäjoki, Finland. Epec specializes in control systems for various types of mobile and other machinery. Epec designs and manufactures in-house the electronic, programmable basic components and modules required for these control systems. In cooperation with customers, the modules are developed for control systems which are to be installed in the customer's machines. Epec pays very close attention to quality and to the needs of the actual user environment for the product and has adopted a highly customer-oriented approach. In addition to systems deliveries, Epec provides training, produces user instructions, supplies maintenance and operating manuals and, if necessary, participates in the further development of the system. With more than twenty years' experience and excellent customer relationships, Epec has firmly established its position as an expert manufacturer of control systems.

This technical document is meant to be used in product development. This document contains necessary data concerning the module in question that system designer needs in system development work.

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EPEC 3G+ CAN MODULE FAMILY

Epec 3G+ is a third generation CAN Module Family. Epec 3G+ is designed to operate in extreme environments, where vibration, wide temperature changes and moisture are normal conditions. The requirements for the system's reliability and safety have been the key words in module family development. A small module casing keeps inside high performance microcontroller with lots of control capabilities.

HUB MODULE GENERAL DESCRIPTION

Hub Module is part of the Epec 3G+ CAN Module Family. Hub Module is used with other Epec modules to distribute and control the CAN bus and to supply the power to other modules connected to the bus. Hub module has also some digital and analog inputs and digital outputs. Digital outputs can be programmed to be used as digital inputs. Hub Module has two CAN busses.

CAN busses are configured by following way:

- Two CAN1 busses in connectors XH1, XH2 and XH3
- One CAN2 bus in connector XH4
- One CAN1 bus, and one configurable CAN1/CAN2 bus in connector XH5

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Features

- One or two ISO High Speed CAN2 interfaces
- Seven or eight High Speed CAN1 interfaces
- CANopen compatible
- Operating voltage 10 - 30 VDC
- Nominal operating voltage 24 VDC
- User application size up to 128 kilobytes
- Typical program cycle time 10 ms
- 248 16-bit parameters
- Overvoltage protection
- Overheating protection
- Short-circuit protection for outputs
- Gold plated, locked and sealed connectors:
 - 4 x 8-pin AMPSEAL for power and system CAN connections
 - 23-pin AMPSEAL for I/O
- Small outline dimensions: 147 x 113 x 35

Applications

- Forest Machines
- Road Maintenance
- Construction Machines
- Crushing Stations
- Milking Stations
- Industrial Machines
- Agricultural applications
- Automation applications
- Mining Machines

INPUTS / OUTPUTS

<i>Amount</i>	<i>Digital Input</i>	<i>Analog Input</i>	<i>Pulse Input</i>	<i>Digital Output</i>	<i>Pulse Width Modulation Output</i>
6	x		x		
2	x	x			
4	x		x	x	x

POWER CONNECTION

<i>Designation</i>	<i>Connector / pin number</i>	<i>Potential</i>
Supply voltage	XH4.1 XH4.2	+24 VDC 20A max continuous (10A/pin)
Ground (for supply voltage)	XH4.9 XH4.10	GND
Supply voltage for modules	XH1.4, XH1.5 XH2.4, XH2.5 XH3.4, XH3.5 XH5.4, XH5.5	+24 VDC
Ref+	XH4.22	+5 VDC / 47Ω
Ref-	XH4.23	GND / 0.22Ω / I _{max} = 1A
Ground	XH1.1 XH2.1 XH3.1 XH5.1	GND

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BUS CONNECTION

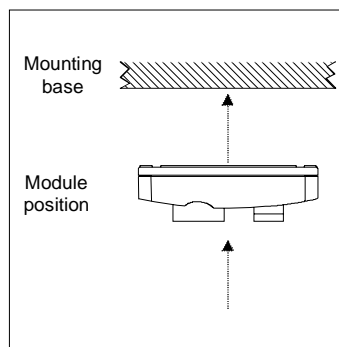
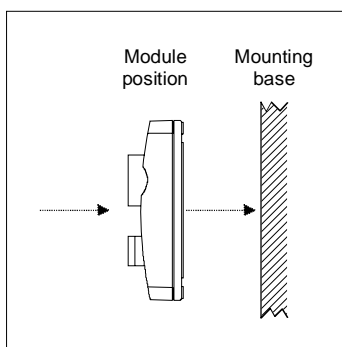
<i>Designation</i>	<i>Connector / pin number</i>
CAN1 interface, CANOpen, system interface	CAN H: XH1.2, XH1.7, XH2.2, XH2.7, XH3.2, XH3.7, XH5.2 CAN L: XH1.6, XH1.8, XH2.6, XH2.8, XH3.6, XH3.8, XH5.6 GND: XH1.3, XH2.3, XH3.3, XH5.3
CAN2 interface, user programmable communication	CAN H: XH4.16 CAN L: XH4.17
Configurable CAN1 / CAN2 interface	CAN H: XH5.7 CAN L: XH5.8
Serial interface Half Duplex	RS485H: XH4.18 RS485L: XH4.19
(this pin must be left open)	XH4.15

HOUSING

- Closed light cast aluminium housing
- Powder-painted, yellow surface passivation
- Puncture hole fastening

MOUNTING

- 2 pieces of M6 screws to DIN 912
- If a separate Epec module shock protection cover (E10801109) is mounted, it is recommended to use Epec E10701038 fastening bolts
- Recommended mounting position horizontal or vertical:



- See the mounting and cabling instructions (document P0003015-K) for more detailed information about the module mounting

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CONNECTORS

- Gold plated, locked and sealed connectors
- 4 x 8-pin AMPSEAL for power supply and system CAN connections
- 23-pin AMPSEAL for I/O

AMPSEAL CABLE DIMENSIONS

<i>Size</i>		<i>Insulation diameter range</i>	<i>Strip length ±0,4</i>	<i>Wire crimp height</i>	<i>Wire crimp width (nom)</i>	<i>Insulation crimp height max.</i>	<i>Insulation crimp width ±0,1</i>
<i>mm²</i>	<i>AWG</i>						
0.5	20	1.7	5.1	1.17 ± 0.08	2.03	3.2	3.1
0.8	18	to	5.1	1.27 ± 0.05	2.03	3.2	3.1
1.4	16	2.7	5.1	1.40 ± 0.05	2.03	3.2	3.1
<i>Typical hand crimping tools</i>			AMP Procrimper 58440-1 (408-9592) AMP Procrimper 58529-1 (408-9999)				

WEIGHT

0.7 kg

OPERATING TEMPERATURE

-40°C ... +70°C

STORAGE TEMPERATURE

-50°C ... +85°C

PROTECTION

- IP67
- Protection for plugs depends on cable processing
- All cables, connectors and tools must be of correct type and sufficiently high quality. Also the environmental suitability of equipment should be checked (protection for moisture, mechanical stability, power durability, coupling resistance, among other things)

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ENVIRONMENTAL TESTS

Following tests has been performed to Epec 3G modules. The structural design of Epec 3G+ modules is similar to Epec 3G modules.

Temperature

- Cold to IEC 60068-2-1, test Ab
- Dry heat to IEC 60068-2-2, test Bb
- Change of temperature to IEC 60068-2-14, test Nb
- Damp heat cyclic to modified IEC 60068-2-30, test Db

Mechanical resistance

- Bump to IEC 60068-2-29, test Eb
- Vibration to IEC 60068-2-64, test Fh
- Combined change of temperature and random bump/vibration test

EMC TESTS

<i>ISO/DIS 14982 (1996)</i>	
Electrostatic discharge (ESD) immunity test	<ul style="list-style-type: none"> • Test method EN61000-4-2 (1995) • Performance criterion B
Transient and surges in vehicular environment immunity test	<ul style="list-style-type: none"> • Test method ISO 7637-2 (1990) • Performance criterion B
<i>Commission directive 95/54/EC</i>	
Radiated disturbance emission test	<ul style="list-style-type: none"> • Test method 95/54/EC (1995)
Radiated radio-frequency electromagnetic field immunity test	<ul style="list-style-type: none"> • Test method 95/54/EC (1995) • Performance criterion A
<i>EN 50081-1 (1992) and EN 50082-2 (1995)</i>	
Radiated disturbance emission test	<ul style="list-style-type: none"> • Test method EN 55022 (1994)
Conducted disturbance at main ports emission test	<ul style="list-style-type: none"> • Test method EN 55022 (1994)
Conducted radio-frequency common mode immunity test	<ul style="list-style-type: none"> • Test method EN 61000-4-6 (1996) • Performance criterion A
Electrical fast transient (EFT/B) immunity test	<ul style="list-style-type: none"> • Test method EN 61000-4-4 (1995) • Performance criterion B

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SUPPLY VOLTAGE

- 24 VDC (10 ... 30 VDC)

NOTE! *No saving operations (program flashing or parameter storing) into permanent memory can be done under 11,5 VDC.*

OVERVOLTAGE

$\geq +36$ VDC for $t \leq 10$ s

UNDERVOLTAGE RESET

≤ 9.5 VDC

POWER CONSUMPTION

Approx. 1.7W (+24 VDC, no external load)

MONITORING FUNCTIONS AGAINST

- Undervoltage
- Firmware/application code corruption
- Overheating

CAN INTERFACE

- Physical interface ISO 11898
- Protocol CAN 2.0B
- Higher layer protocol CANopen (CAN1)
- Higher layer protocol user programmable (CAN2)
- Overvoltage protection for CAN1 and CAN2 interfaces

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DIGITAL INPUT

Input for positive sensor signals

Input pin number	Connection example	Max. input voltage	Min. logical high voltage	Max. logical low voltage	Input impedance	Max. input frequency
XH4.3 XH4.4 XH4.5 XH4.6 XH4.11 XH4.12 XH4.13 XH4.14 XH4.20 XH4.21		30 V	≥ 5 V	≤ 4 V	10 k Ω	25 Hz
XH4.7 XH4.8 (Voltage mode)		30 V	≥ 2 V	≤ 1 V	82 k Ω	25 Hz
XH4.7 XH4.8 (Current mode)		15 V	≥ 9.1 mA	$\leq 4,5$ mA	220 Ω	25 Hz

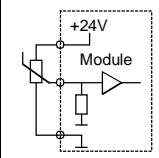
Input for frequency measurement

Input pin number	Connection example	Max. input voltage	Min. logical high voltage	Max. logical low voltage	Input impedance	Input frequency	Precision
XH4.3 XH4.4 XH4.5 XH4.6 XH4.11 XH4.12 XH4.13 XH4.14 XH4.20 XH4.21		30 V	≥ 5 V	≤ 4 V	10 k Ω	0...65 kHz	$\leq \pm 5.0\%$ FS

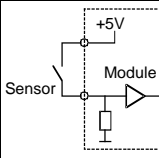
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ANALOG INPUT

Analog input for positive sensor signals; Voltage mode

<i>Input pin number</i>	<i>Connection example</i>	<i>Max. voltage</i>	<i>Zero reading voltage</i>	<i>Full reading voltage</i>	<i>Input impedance</i>	<i>Resolution</i>	<i>Precision</i>
XH4.7 XH4.8		30 V	0 V	5 V	82 k Ω	10 bits	$\leq \pm 5.0 \% \text{ FS}$

Analog input for positive sensor signals; Current mode

<i>Input pin number</i>	<i>Connection example</i>	<i>Max. voltage</i>	<i>Zero reading current</i>	<i>Full reading current</i>	<i>Input impedance</i>	<i>Resolution</i>	<i>Precision</i>
XH4.7 XH4.8		15 V	0.0 mA	22.7 mA	220 Ω	10 bits	$\leq \pm 5.0 \% \text{ FS}$

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DIGITAL OUTPUT

Positive switching, protection against short-circuit and overload, diagnostic function: short-circuit

Output pin number	Connection example	Switching voltage	Switching current	Current limitation
XH4.3 XH4.4 XH4.5 XH4.6		Supply voltage	100 mA ... 3.0 A	8 A

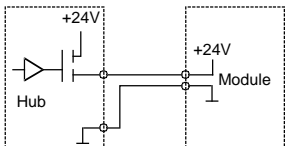
Specification for PWM output

Output pin number	Connection example	Data	
XH4.3 XH4.4 XH4.5 XH4.6		Output current	0...1 A
		Output frequency	max. 2550 Hz
		PWM pulse ratio	1 ... 99 %
		Turn-on time t_{on}	80 μ s...400 μ s, IN \square to 90% V_{out}
		Turn-off time t_{off}	80 μ s...400 μ s, IN \square to 10% V_{out}
		R_L	12 Ω
		T_j	-40°C ... +150°C
		Resolution depending on the PWM frequency	

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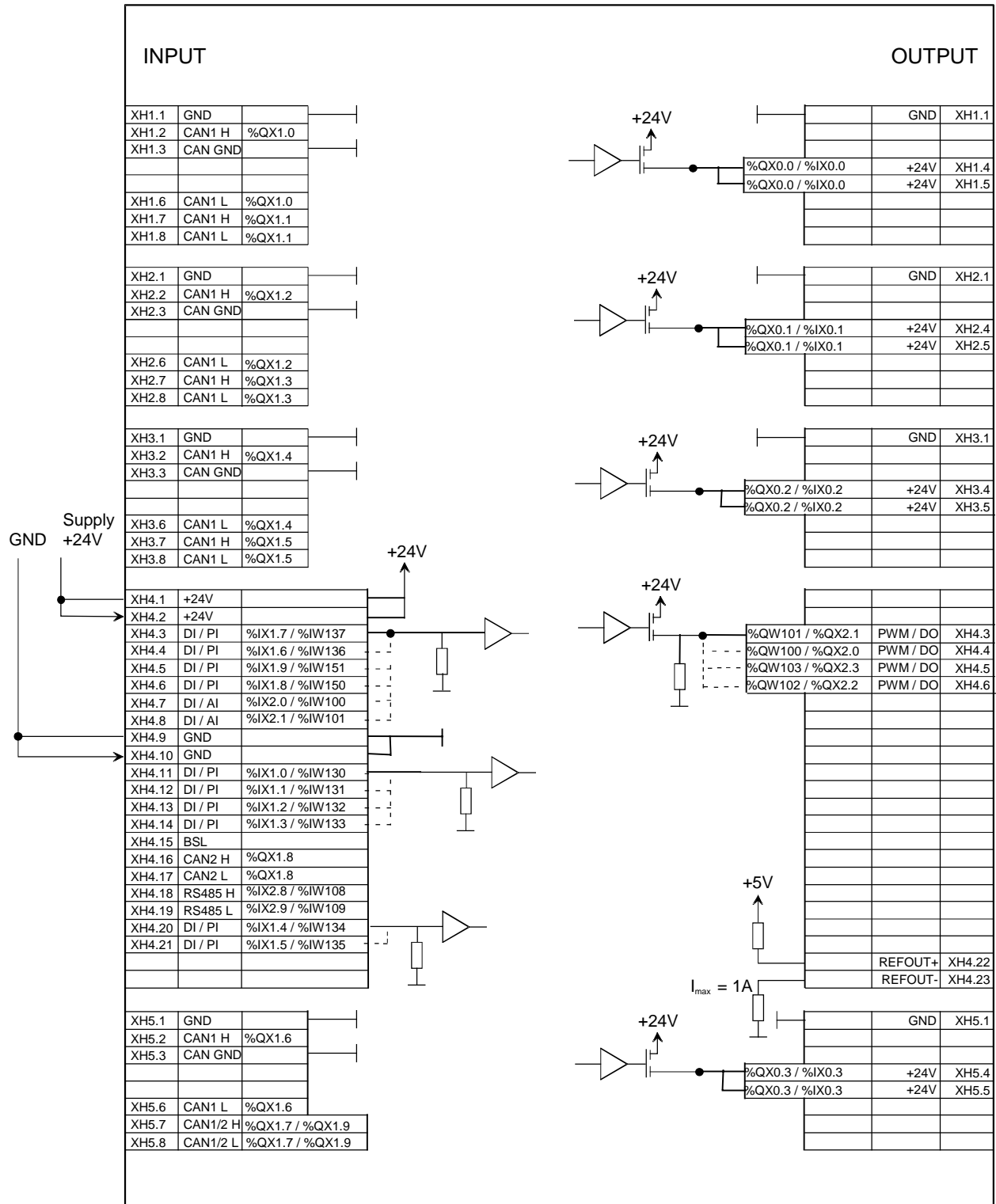
POWER OUTPUT

Supply voltage for modules

<i>Output pin number</i>	<i>Connection example</i>	<i>Switching voltage</i>	<i>Total output current</i>
XH1.4 and XH1.5 XH2.4 and XH2.5 XH3.4 and XH3.5 XH5.4 and XH5.5		Supply voltage	30 A

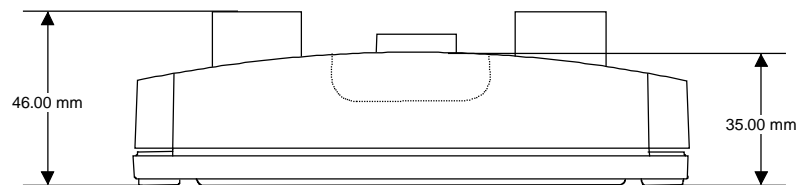
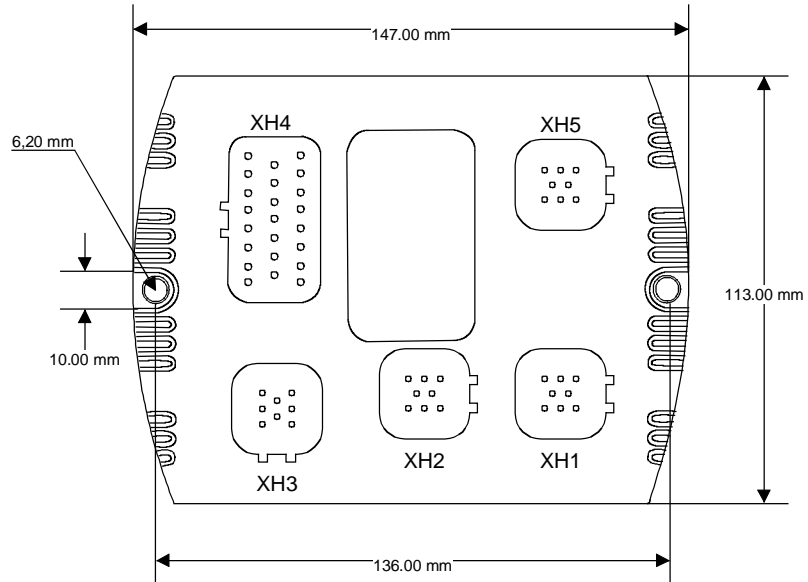
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I/O / IEC MAP



AI = ANALOG INPUT DO = DIGITAL OUTPUT
DI = DIGITAL INPUT PWM = PULSE WIDTH MODULATIVE OUTPUT
PI = PULSE INPUT

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UNIT DIMENSIONS

Scale 1:2

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