

Turtide Gen6 Low Voltage Inverters – Extended

Gen6 Extended (Gen6-X) is an exceptional air-cooled inverter, offering one of the highest power densities in its class on the market today. With additional I/O with respect to the standard version, robust isolation, and superior environmental durability, it's well-suited for demanding operating conditions of higher-power applications such as last-mile delivery and performance bikes.



Capable of supporting both Permanent Magnet Synchronous Machines and AC Induction motors, Gen6-X is the first choice for low-voltage electrification requirements below 135V, delivering an extremely compact footprint.

Turntide User Code (TUC) is a feature-rich ANSI C based development environment designed for customized logical and algorithmic functions. It leverages an integrated auxiliary microprocessor and a comprehensive API to interface seamlessly with the primary motor controller.

A comprehensive library of validated motors is readily available for download to the inverter via an intuitive user interface, facilitating quick and straightforward vehicle setup.

Features

- Accurate torque and speed control of IMPM, SPM and IM
- Maximum torque per amp algorithms for interior permanent and surface magnets
- Max motor speeds up to 20kRPM (assuming 4 Pole Pair machine)
- Variable PWM frequency up to 12kHz
- Fan PWM control and speed tacho read back (or wheel speed sensor)
- Reliable operation in Field Weakening
- Physics-based vehicle control and setup
- Hill-hold, anti-jerk, active damping
- Wake on CAN capability
- Secondary CAN bus for baud rate bridging
- Optional finger guard for protection around the terminals to IPXXB

Applications

Suitable for electric traction and ancillaries control on mobile equipment applications; such as last-mile delivery, autonomous guided vehicles, other material handling equipment, airport ground support equipment, aerial platforms, construction machinery and performance 2 wheel applications.



TURNTIDE ELECTRIFICATION

Turntide creates innovative electric motors, power electronics, and energy storage solutions to optimize performance, reliability, and efficiency for all things that move.

Turntide Transport Ltd, Eighth Avenue, Team Valley Trading Estate, Gateshead, NE11 0QA, UK

turntide.com | electrificationsales@turntide.com

Details are correct at time of publishing

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Specification

Key Features

Nominal Vdc	Size 4 X - 48V	Size 6 X- 48V	Size 6 X- 80V	Size 6 X- 96V	Size 6 X- 110V
Working Vdc Voltage Range (V)	20-63		20-106	20-120	20-135
DC Logic Supply (V)	6-16				
10s Boost Current (A_{rms})	600 [†]	800 [†]	700 [†]	550 [†]	480 [†]
2min Peak Current (A_{rms})	450 [†]	650 [†]	550 [†]	415 [†]	360 [†]
60min Current (A_{rms})	190 [†]	250 [†]	230 [†]	200 [†]	150 [†]
10s Boost Motor Power (kW)	33 [†]	43 [†]	63 [†]	60 [†]	60 [†]
2min Peak Motor Power (kW)	24 [†]	35 [†]	50 [†]	45 [†]	45 [†]
60min Motor Power (kW)	10 [†]	14 [†]	20 [†]	22 [†]	19 [†]
Max Fundamental Output Frequency	599Hz ^{††}				

[†]Assuming a PF of 0.95, and correctly mounted on a heatsink less than of 0.3 °C/W and 0.2 °C/W @ 25 °C ambient for Size 4 and Size 6 respectively.

^{††}Higher frequencies available on request, contact Turntide for details.

Control Features	• Remote Torque Actuator • Integrated Vehicle Control • Intelligent Torque Modulation • Line Contactor Control • User defined behaviours via TUC • Wake on CAN • Active Short Circuit • Programmable Fault Reactions • Customisable Data Feedback to CAN	Comms Protocols	• CAN 2.0A + CAN2.0B + FD in TUC • User Definable Messages • Custom Protocols via TUC • UDS (ISO 14229) • J1939 – proCAN • J1939 – H-Protocol
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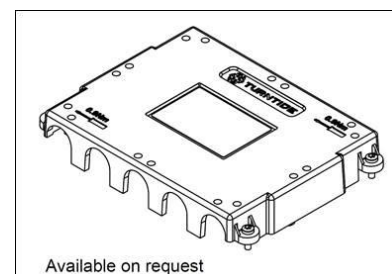
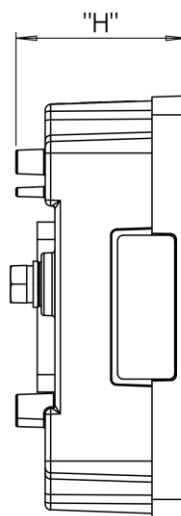
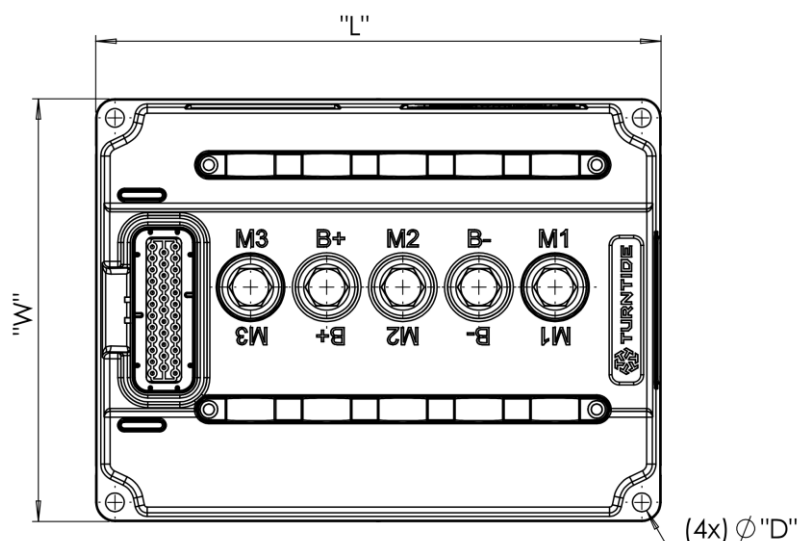
Environmental

Inverter Cutback (Low) (°C)	-40 to -20	Inverter Cutback (High) (°C)	70 to 100
Ambient Operation (°C)	-30 to 85	IP Rating	IP6KX, IPX6 & IPX7. IPXXB capable with additional finger guard.

Mass, Dimensions and Drawings

	Size 4	Size 6
Mass (g)	1970 [1670]	1890 [1970]
Length, L (mm)	197	197
Width, W (mm)	123	147
Height, H (mm)	59.5 [73]	
Mounting hole Ø, D (mm)	6.5	
Power Terminal Fixings	5 x M8	
Control Interface Header	TE AMPSEAL - 776164-1	

Values in [Square Brackets] are mass and dimensions with optional finger guard fitted



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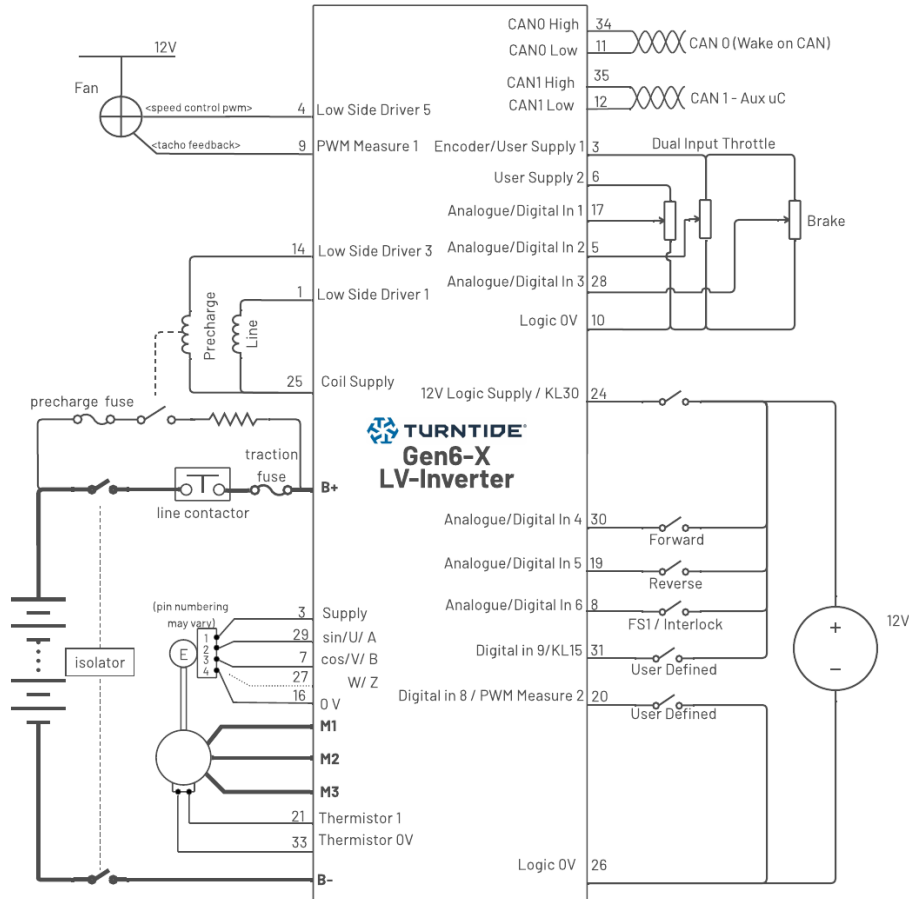
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Inputs and Outputs

I/O	• 6x Analogue/Digital Inputs[†] • 1x Digital Input^{††} • 2x PWM Measure/Digital Input^{††} • 2x 2 Amp Low Side Driver • 4x 200mA Low Side Driver Or 250mA High Side Driver^{†††} • 2x PT100/PT1000/NTC10K/NTC5K
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Encoders	One of the Following: • 1x Absolute Position SinCos • 1x Absolute Position UVW • 1x Absolute Position ABZ • 1x Resolver/Differential SinCos^{†††} • 1x Incremental AB
Supply	• 2x Selectable 5V Or 10 V / 200mA

[†] - Selectable High or low Dig In, ^{††} - Active Low Dig In, ^{†††} - Available in alternative part number; ^{††††} - 250mA shared between 4 outputs.



Application Example

PIN	Description	PIN	Description	PIN	Description
1	Low Side Driver 1 [2A]	13	Low Side Driver 2 [2A]	24	12V Logic Supply
2	Low Side Driver 4 [250mA] High Side Driver 2 [100mA]	14	Low Side Driver 3 [250mA] High Side Driver 1 [100mA]	25	Coil Supply
3	Encoder/User Supply 1	15	Low Side Driver 6 [250mA] High Side Driver 4 [100mA]	26	Logic 0V
4	Low Side Driver 5 [250mA] High Side Driver 3 [100mA]	16	Logic 0V	27	Encoder Z/W Resolver Sin -ve ^{†††}
5	Analogue/Digital In 2	17	Analogue/Digital In 1	28	Analogue/Digital In 3
6	User Supply 2	18	Resolver Cos -ve ^{†††}	29	Encoder A/U/Sin Resolver Sin +ve ^{†††}
7	Encoder B/V/Cos Resolver Cos +ve ^{†††}	19	Analogue/Digital In 5	30	Analogue/Digital In 4
8	Analogue/Digital In 6	20	Digital in 8 PWM Measure 2	31	Digital in 9 KL15
9	Digital in 7 PWM Measure 1	21	Motor Thermistor 1	32	Motor Thermistor 2
10	Logic 0V	22	Resolver Exc +ve ^{†††}	33	Logic 0V
11	CAN Low 1	23	Resolver Exc -ve ^{†††}	34	CAN High 1
12	CAN Low 2			35	CAN High 2

^{†††} - Available in alternative part number; Pre-charge relay coil >= 50R

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Safety and Compliance

Electrical Safety*	• EN 60664-1 (2020) • ISO 6469-3 (2021) • AIS-156 (08/2022) + Amd. 3 (09/2022) • AIS-038 (12/2017) + Amd. 3 (09/2022)	EMC*	• AIS-004 (07/2009) + Amd. 2 (09/2022) • Reg10:R6 • EN 61000-4-8:2010
Electrical Isolation	• 1.4kVdc to heatsink	Functional Safety	• Quality Managed
Product Safety	• CE Marked		

* Designed to meet the requirements of

Additional Information

- A dedicated powerful 80Mhz 16bit (32kB RAM, 128kB Flash) micro for C-based development of custom features.
- Powerful API to interface to motor controller.
- Interfacing to 3rd party systems such as BMS and displays and HMIs becomes a trivial coding task via TUC.
- FreeRTOS based environment.
- Ownership and development of TUC under OEM control and development cycle
- Extensive examples provided.

General

- High reliability
- Designed for transport electrification through decades of proven experience
- Superior power density
- Optional finger guard for IPXXB compliance and general protection.
- An intelligent torque modulator is included which uses physics-based modelling to control the DC link voltages and currents, maximum motor speed, torque, and motor temperatures, based on CAN messages, TUC or programable parameters.

Configuration

Turntide offers a Windows-based PC tool for configuration of the inverter. The tool provides a simple yet powerful means of accessing the inverter for diagnostics or parameter adjustment. Communication is through CAN. IXAAT and Vector adaptors are supported, with support for others on request. Key features include:

- Library of validated motor configs
- Customizable login levels
- Powerful guided vehicle setup process
- Intuitive diagnostic processes

For more information on this product or Turntide's range of inverters, motors, batteries, pumps and fans, please visit our website or contact our team of experts at electrificationsales@turntide.com.

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