

Whitehaven Low Voltage Inverters

Whitehaven is an exceptional range of air-cooled inverters claiming one of the highest power densities of its type on the market today.

Capable of supporting all Permanent Magnet Synchronous Machines and AC Induction motors, it's a first choice for all low-voltage electrification applications below 150V in an extremely small footprint.



Turntide User Code (TUC) is an advanced feature-rich development environment for customised logical and algorithmic functions; provided by an integrated auxiliary microprocessor and fully capable API to interface to the primary motor controller.

An extensive library of validated motors is available to download to the inverter via the intuitive user interface and vehicle setup is quickly facilitated.

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
- 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. These include 2 and 3 wheel mobility, last-mile delivery, golf buggies, autonomous guided vehicles, other material handling equipment, airport ground support equipment, aerial platforms, and construction machinery.



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

TTD-MAN-006
V6.0 – 19/08/2024

Specification

Key Features

Nominal Vdc	48V Size 4 (TT-INV-48-450)	48V Size 6 (TT-INV-48-650)	80V Size 6 (TT-INV-80-550)
Working Voltage Range (V)	20 - 63	20-63	20-106
10s Boost Current (A_{rms})	600*	800*	700*
2min Peak Current (A_{rms})	450*	650*	550*
60min Current (A_{rms})	190*	250*	230*
10s Boost Motor Power (kW)	33 [†]	43 [†]	63 [†]
2min Peak Motor Power (kW)	24 [†]	35 [†]	50 [†]
60min Motor Power (kW)	10 [†]	14 [†]	21 [†]

* Subject to confirmation of validation testing

† Assuming a PF of 0.95. Mount Motor Controller with thermal paste to a 330x200 mm, 0.3 °C/W finned heatsink.

Control Interfaces	<ul style="list-style-type: none"> Remote Torque Actuator Intelligent Torque Modulator Integrated Vehicle Control User defined behaviours via TUC 	Communications Protocols	<ul style="list-style-type: none"> CAN 2.0A + CAN2.0B + FD User Definable Messages Custom Protocols via TUC UDS (ISO 14229) J1939 – proCAN J1939 – H-Protocol
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Environmental

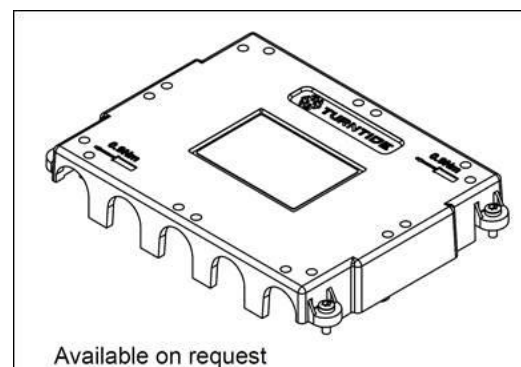
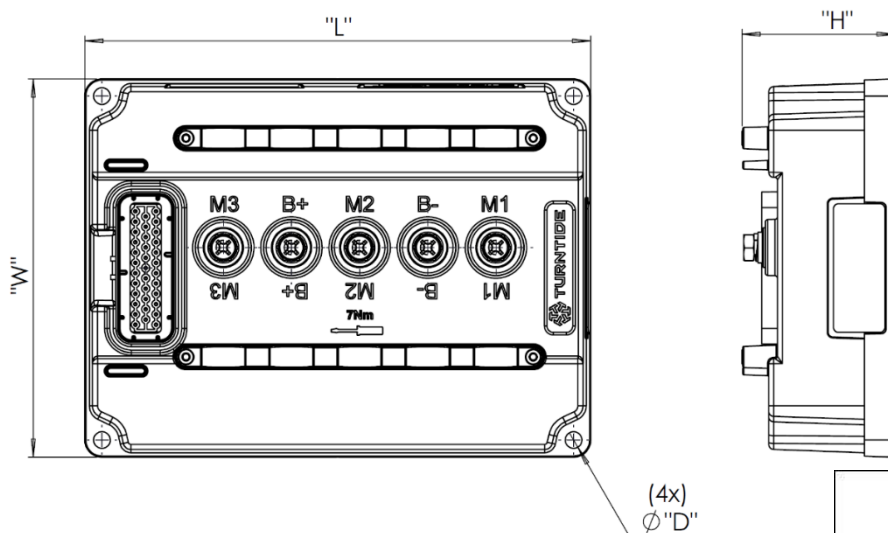
Inverter Cutback (Low) (°C)	-40 to -30	Inverter Cutback (High) (°C)	70 - 100 ^{††}
Ambient Operation (°C)	-30 to ≤ 75	IP Rating	IP6KX, IPX6 & IPX7. IPXXB capable with additional finger guard.

Mass, Dimensions and Drawings

	48V Size 4 (TT-INV-48/450)	48V Size 6 (TT-INV-48/650)	80V Size 6 (TT-INV-80/550)
Mass (g)	1590 [1670]	1890 [1970]	1890 [1970]
Length, L (mm)	197	197	197
Width, W (mm)	123	147	147
Height, H (mm)	59.5 [73]	59.5 [73]	59.5 [73]
Mounting hole Ø, D (mm)	6.5	6.5	6.5

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

†† Depending on ambient, heatsinking and duty



Available on request

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IO**IO**

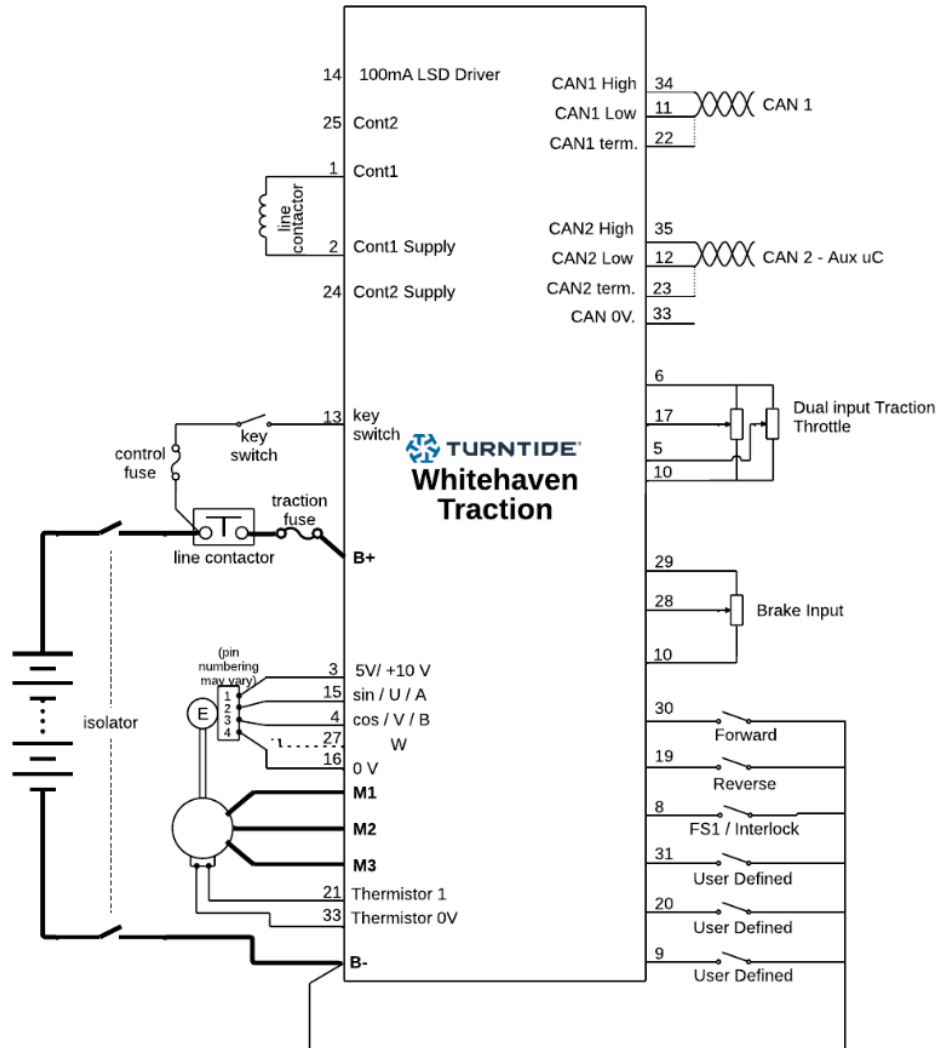
- **5x** Digital inputs^{††}
- **3x** Analogue inputs
- **1x** PWM Measure/digital input
- **2x** 2A Inductive load voltage driver
- **1x** 100mA Digital Output / Fan PWM Ctrl
- **2x** PT100/PT1000 thermistor input

Encoders**Supply**

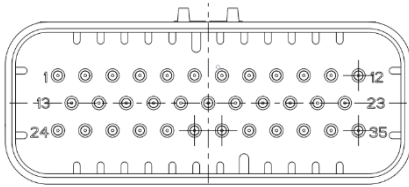
Configurable for one of the following:

- **1x** Absolute position SinCos
- **1x** Absolute position UVW
- **1x** Incremental AB
- **2x** Selectable 5V or 10 V / 200mA

^{††} - Digital Inputs; 3x Active High, Low or Analogue Inputs: 2x Active Low Only

**Application Example**

PIN	Description	PIN	Description	PIN	Description
1	Low Side Driver 1	13	Key switch	24	Low Side Driver 2
2	Protected Key switch	14	Low Side Driver 3	25	Protected Key switch
3	Encoder Supply	15	Encoder A/U/Sin Input	26	Encoder Supply
4	Encoder B/V/Cos Input	16	Encoder 0V	27	Encoder Z/W Input
5	Analogue Input 2	17	Analogue Input 1	28	Analogue Input 3
6	User Supply 1	18	User Supply 1	29	User Supply 1
7	User Supply 1	19	Digital Input 2	30	Digital Input 1
8	Digital Input 3	20	Digital Input 5	31	Digital Input 4
9	PWM Input 1	21	Thermistor Input 1	32	Thermistor Input 2
10	Logic 0V	22	CAN Termination 1	33	Thermistor 0V
11	CAN Low 1	23	CAN Termination 2	34	CAN High 1
12	CAN Low 2			35	CAN High 2

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Safety and Compliance

Electrical Safety*	<ul style="list-style-type: none"> • EN 60664-1 (2020) • ISO 6469-3 (2021) • AIS-156 (08/2022) + Amendment 3 (09/2022) • AIS-038 (12/2017) + Amendment 3 (09/2022) 	EMC*	<ul style="list-style-type: none"> • AIS-004 (07/2009) + Amendment No. 2 (09/2022) • Reg10:R6 • EN 61000-4-8:2010
Electrical Isolation	• 1.5kVdc to heatsink	Functional Safety	• Quality Managed
Product Safety	• CE Marking		

* Designed to meet the requirements of

Additional Information

Pre-Paired Motors

Dana TM4	<ul style="list-style-type: none"> • IPM-200-66 • IPM-200-33 	Motenergy	<ul style="list-style-type: none"> • ME1905 • ME1616 • ME0904
Electrified Automation	<ul style="list-style-type: none"> • EA-193-40 • EA-193-80 	SEG	• EM 1.9 E1M1 410 028-01

Turntide User Code (TUC)

- A dedicated powerful 80Mhz 16bit (32kB RAM, 128kB Flash) micro for C-based development of custom features.
- Powerful API to interface to motor controller.
- FreeRTOS based environment.
- Extensive examples provided.

General

- Optional finger guard for IPXXB compliance and general protection.
- Interfacing to 3rd party systems such as BMS and displays and HMIs becomes a trivial coding task via TUC.
- An intelligent torque modulator is included which uses physics-based modelling to control the DC link voltages and currents, maximum motor speed, torque, and 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:

- Online library of validated motor configs
- Auto characterization of motors including IPM, SPM, IM
- 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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