



## DESCRIPTION

ACE4 inverter is suitable for controlling several types of motors (AC induction, BLDC and PMAC) in the range from 15 kW to 30 kW continuous power, adopted in battery-powered trucks for material handling.

It can be supplied in two configurations:

- **Standard version:** with a 23-poles connector
- **Premium version:** with a 35-poles connector, for enhanced I/O.

The high number of I/O accommodates a wide range of vehicle controls and sensors. ACE4 can also easily interface with a wide range of external devices via CAN bus.

## APPLICATIONS

ACE4 inverter is designed to handle all the electric functions usually present in material-handling machines.

### Typical applications are:

Counterbalanced trucks with load up to 8 tons, HLOP (VNA), GSE, tow tractors and airport ground-support vehicles, aerial-access equipment (telescopic boom and scissor lift).

Also, ACE4 may be suitable for other applications not listed here.

## FEATURES

- Nominal voltage from 36 V to 120 V.
- Microcontroller for main functions, 576+ kByte embedded flash memory.
- Microcontroller for safety functions, 320+ kByte embedded flash memory.
- Up to 8 active-high digital inputs.
- Up to 3 active-low digital input.
- Up to 4 analog inputs (range 0 V ÷ 10 V) with 10-bit resolution.
- Input for an analog motor thermal sensor.
- Compatible with several types of speed sensors:
  - Incremental encoder (default).
  - Incremental encoder + PWM + index.
  - Sin/cos sensor.
  - Set of three Hall sensors.
  - Resolver (adding an external interface).
- CAN bus interface up to 500 kbit/s.
- 11-bit and 29-bit communication supported.
- Two auxiliary supply outputs (+12V / +5V; max 100 mA for +12V, max 100 mA for +5V).
- Up to 4 PWM voltage-controlled low-side outputs.
- Up to 2 on/off low-side outputs.
- One PWM current-controlled low-side output with current feedback (up to 1.5 A continuous).
- Built-in freewheeling diodes.
- Dither injection with configurable amplitude and frequency.
- Protection from overload, short circuit, open load and ESD.
- Ambient temperature
  - Operating: -40 °C ÷ +40 °C.
  - Storage: -40 °C ÷ +85 °C.
- Sealed connector (23-pins or 35-pins Ampseal).
- Access to status and diagnostic information.

## MODEL CHART

		Available			Upcoming		
Nominal voltage		36/48V	72/80V	96V	120V		
Supply voltage [V]	Min	10	10	30	30	30	30
	Max	65	65	115	130	130	150
2-min current rating [Arms]		950	800	630	700	600	400
S2 60-min current rating [Arms]		480	460	355	350	300	200



Current ratings are based on an initial heat sink temperature of 40 °C and a maximum heat sink temperature of 85 °C. No additional external heat sink is used for the 2-minute rating test.



Inverter can continuously deliver the rated RMS current only if it is adequately cooled. When it is equipped with its own finned heat sink, a proper dissipation is obtained by applying a 100 m<sup>3</sup>/h airflow. In case the inverter is provided with the base plate, it is customer's duty to design an adequate cooling system that can dissipate the heat produced by the inverter, keeping its temperature below 85 °C.

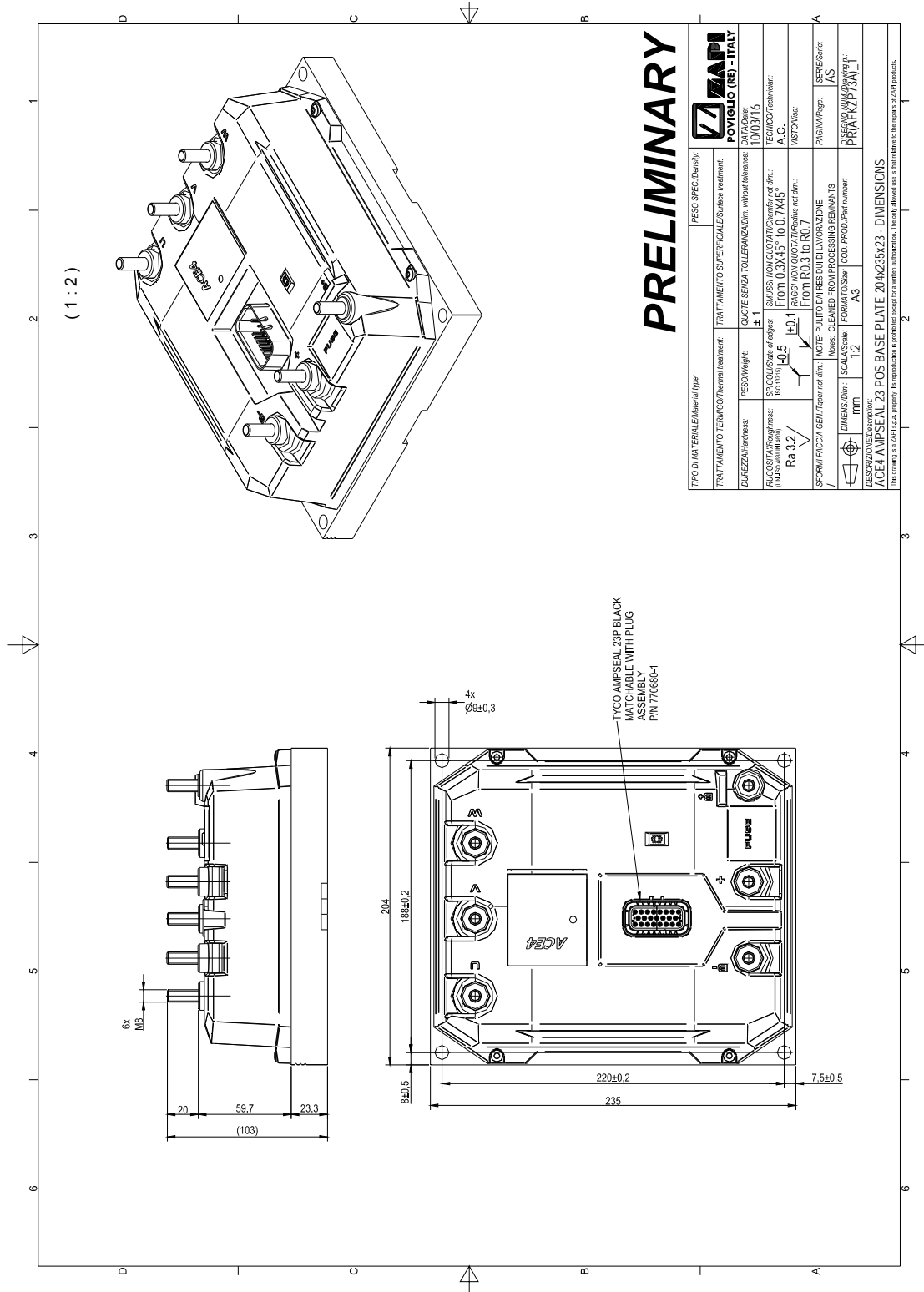
## TECHNICAL DATA

Version		STANDARD	PREMIUM
Ampseal connectors		23-pins Ampseal	35-pins Ampseal
Digital inputs	Active high	3	8
	Active low	2	3
Analog inputs		2	4
PWM voltage-controlled outputs		2	4
ON/OFF outputs		-	2
PWM current-controlled output		1	
Auxiliary supply output (+12/+5V)		2 (max 100 mA for +12V, max 100 mA for +5V)	
Encoder interface		1	
Input for motor thermal sensor		1	
CAN bus interface		1	
Memory	Main µC	576+ kB Flash, 48 kB SRAM, 64kB emulated EEPROM	
	Supervisor µC	320+ kB Flash, 32 kB SRAM, 64 kB emulated EEPROM	

## REGULATIONS

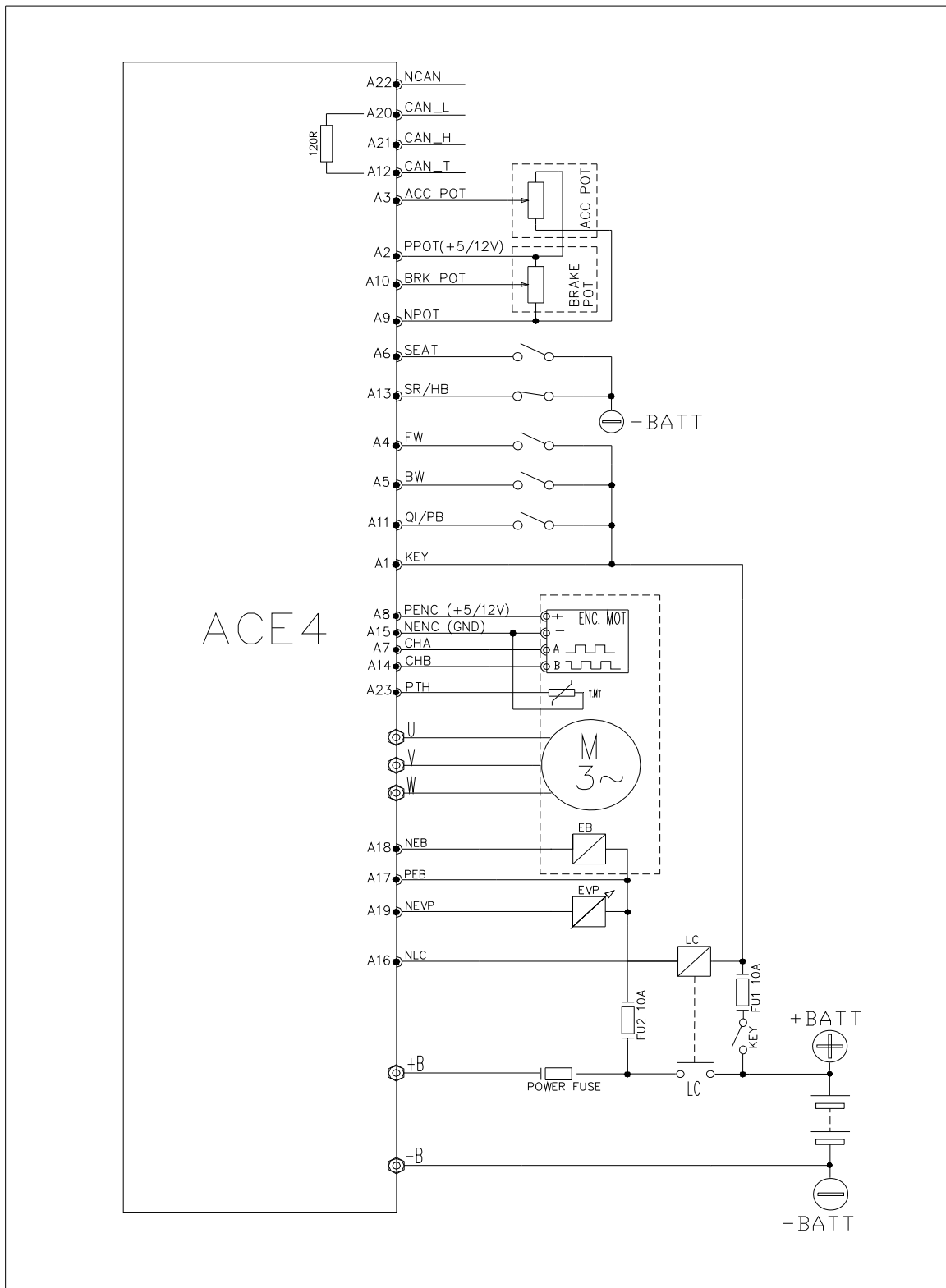
UL certificate	UL 583 compliant (AU3503).
Functional safety	Applicable requirements of EN 1175-1:2010, Compliant to upcoming revision of EN1175.
EMC	Applicable requirements of EN 12895.
IP code	IP65.

## DIMENSIONS



Other versions (without power fuse, with base-plate or with other heat sinks) exist.

## TYPICAL WIRING DIAGRAM – STANDARD VERSION



ACE4 TRACTION STANDARD VERSION WITH ENCODER FUNCTIONAL DRAWING

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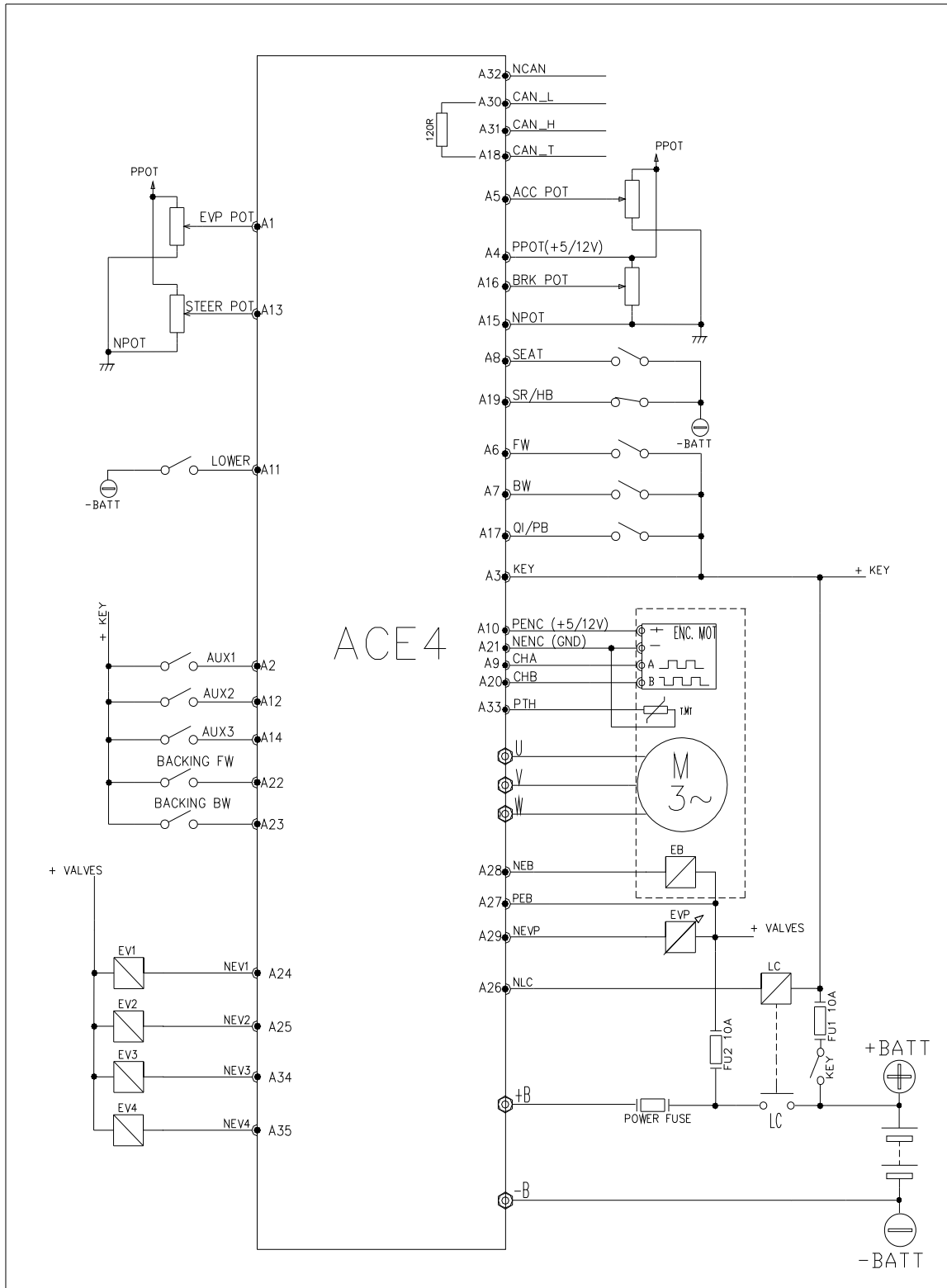
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11

## TYPICAL WIRING DIAGRAM – PREMIUM VERSION



ACE4 TRACTION PREMIUM VERSION WITH ENCODER FUNCTIONAL DRAWING

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Pag./Page 11