



Alfa Centauri

Technical Specification



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REV	DATE	CHANGE DESCRIPTION
1.1	29/08/2017	First Release
1.2	13/12/2018	Important update on group delay
1.3	23/09/2025	Graphic review, merge with mAstro specification, input range update
1.4	20/052/2026	Power supply mating connector review



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1. Alfa Centauri Overview

1.1 Description

Alfa Centauri charge amplifier is designed for piezoelectric sensors (pressure, accelerometer, etc.).

The mASTRO system can host up to 8 Alfa Centauri modules, to optimize the space utilization based on the application. Modules can be added at any time.

Alfa Centauri is designed for a wide variety of sensors with different sensitivities. Thanks to internal active electronics, Alfa Centauri supports an input range from 100pC to 28000pC. The typical application is for monitoring in-cylinder pressure of engines, especially in those applications where compactness is required (i.e. on-board vehicle and racing use).

A dedicated software is provided to configure sensor sensitivity and output amplitude for each channel. It's also possible to configure output offset, filter, time constant and output type.

The time constant is configurable, including auto drift compensation to reduce signal error and saturation problems. The amplifier circuit is designed to minimize distortion and non-linearity while having a high signal bandwidth (filter programmable) and low noise.

The sensor connectors and signal outputs are BNC type, simplifying wiring and availability of mating connectors.

The device is CE marked, in compliance with the EC directive 2004/108/CE.



The version shown is the 4-channel model

1.2 Features

- Modular with mASTRO platform
- Galvanic isolation channel by channel
- Pre-calibrated to 0.1% accuracy
- Input range up to 28000pC
- Auto drift compensation for in-cylinder engine pressure
- 16 bit output gain resolution
- < 1mVRMS Noise (1Hz-400kHz)
- Group delay up to 8μs (fully analog conditioning line)
- -25 to 105°C operating temperature
- Programmable output offset
- Programmable cut-off frequency
- IP65, 7075-T6 aluminium
- PC mASTRO configuration tool
- 6-27V wide supply range
- Power and error LED
- 12x M4 for fixing holes with Helicoils ®
- Very compact: 82.5 x 42 x channel thickness mm

2. Standard Application

- In-cylinder engine pressure (piezoelectric sensor)
- Industrial piezoelectric sensor
- Automotive piezo accelerometer





3. Hardware Specification

3.1 Absolute Maximum Ratings

Parameter	Rating	Note
Inrush power peak (3s)	2W	Per channel
Operating temperature	-25°C to 105°C	
Storage temperature	-40°C to 125°C	
Input Signal Voltage limit	±0.6 V	
Max Signal Output Current	±10 mA	Short circuit
Max Supply Voltage	Protected to ±60 V	
Max Input Supply Current	5A	
VESD (JESD22-C101)	±1500 V	
Vibration	10g sine 50-2000Hz	

3.2 I/O Characteristics

Type	Number
Sensor input	1 ~ 8
Analog output	1 ~ 8
Power supply	1
Configuration port	1 (mini USB)

3.2.1 Sensor Input

Parameter	Min	Typical	Max	Note
Max Input range		28'000 pC		User selectable
Sensitivity	0.2 mV/pC		64 mV/pC	User selectable
Cut-off frequency filter accuracy			100 Hz	-1db@fc

3.2.2 Analog output

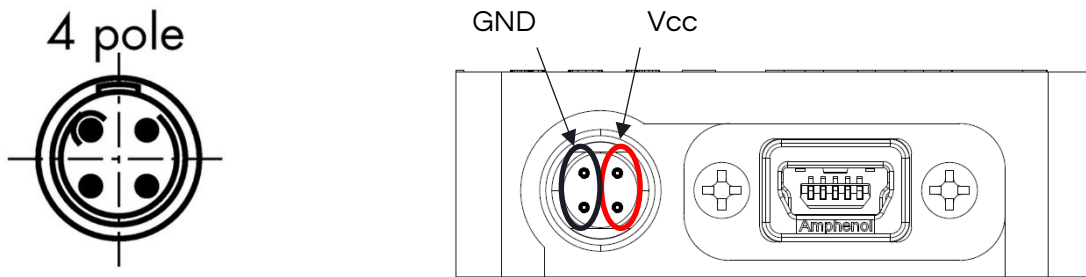
Parameter	Min	Typical	Max	Note
Output resolution		16 bit		
Time constant	0.1 s		>400 s	User selectable
Isolation	250 V			Channel by channel
Output range			±10 V	User selectable
Output impedance			6 Ω	
Output offset	-9.9 V		+9.9 V	User selectable
Output offset accuracy		0.05 V	0.1 V	
Group delay		82 μs 41 μs 28 μs 21 μs 17 μs 14 μs 12 μs 11 μs 10 μs 9 μs 8 μs 8 μs 7 μs 6 μs 6 μs		10kHz 20kHz 30kHz 40kHz 50kHz 60kHz 70kHz 80kHz 90kHz 100kHz 110kHz 120kHz 130kHz 140kHz 150kHz
Output noise			1 mVRMS	1Hz – 400kHz
Accuracy			0.1 %	After periodic calibration

3.2.3 Power supply & Configuration port

Parameter	Min	Typical	Max	Note
Operating voltage	6 V		27 V	
Power consumption (per channel)		1.7 W	2 W	
USB current consumption			50 mA	During communication
Start-up time			1 s	

3.3 Connectors

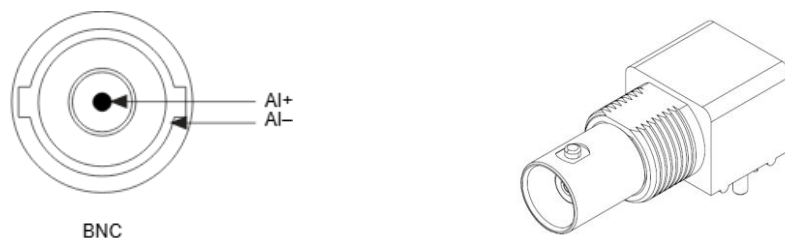
3.3.1 Power supply connector



Suggested mating connector: FGG.00.304.CLAD35Z

3.3.2 Signal connectors

Female RF / Coaxial Connectors, 50 Ohms



3.4 Led Indicators

POWER LED

Indicates a good power for mASTRO (red)

ERROR LED

Indicates error at least one channel module (yellow)

4. Configuration tool for Alfa Centauri

4.1 Characteristics

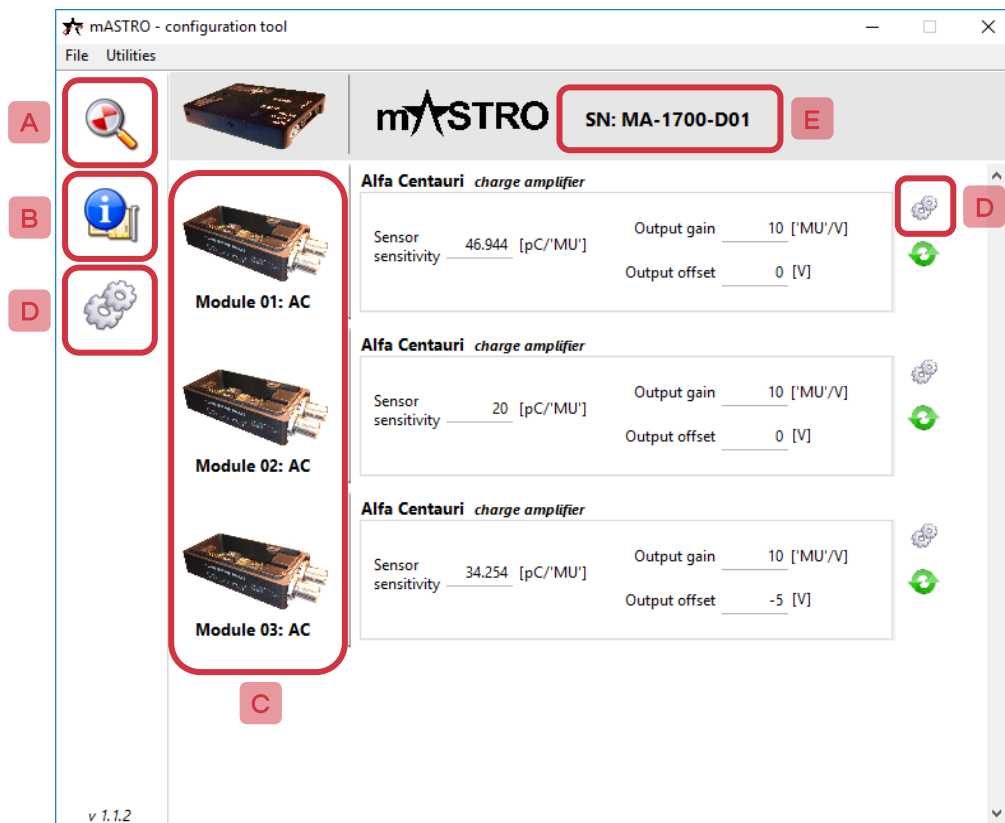
mASTRO – configuration tool allows to set Alfa Centauri relevant settings

- Sensor sensitivity
- Output gain
- Output offset
- Filter cut off frequency
- Time constant
- Floating output enable
- Firmware upgrade

4.2 mASTRO – configuration tool interface

Please refer to mASTRO datasheet for complete settings

- A. Search mASTRO system and connected channel
- B. View HW and FW version and serial of all channels
- C. Module type connected
- D. View advanced settings
- E. mASTRO serial number
- F. Utilities: Factory reset, Firmware upgrade, Reboot all.



4.3 Alfa Centauri Settings

1. Channel name
2. Sensor sensitivity (use sensor calibration, pC/bar or pC/g)
3. Output gain: insert desired output amplitude (bar/V or g/V)
4. Output offset: insert from -9.9 to +9.9.
Recommended to adapt signal for acquisition range
5. Reset drift (click to reset the sensor drift)
6. Select the **frequency** of filter. The correct group delay will be shown

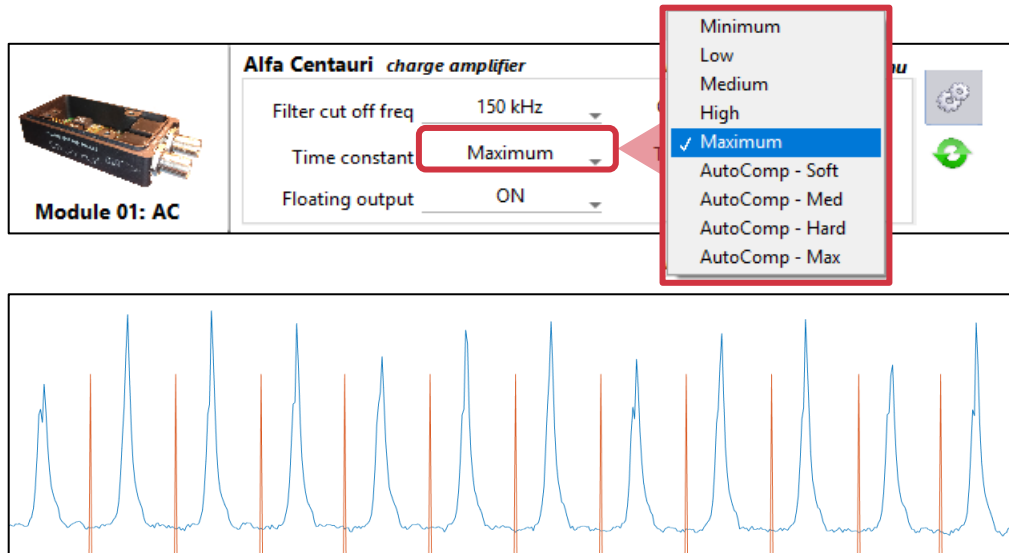
7. Select the time constant.

There are five values for fixed time constant and four values for auto-drift compensation mode.

The exact value of time constant is shown in millisecond.

At *Maximum* the time constant is typically more than 200s

In *Auto-Drift Compensation* the system tries to keep the signal within the optimal operating conditions of the charge amplifier by modulating the time constant, while minimizing the effect on the signal. Red signal shows the position within the combustion cycle of the correction.

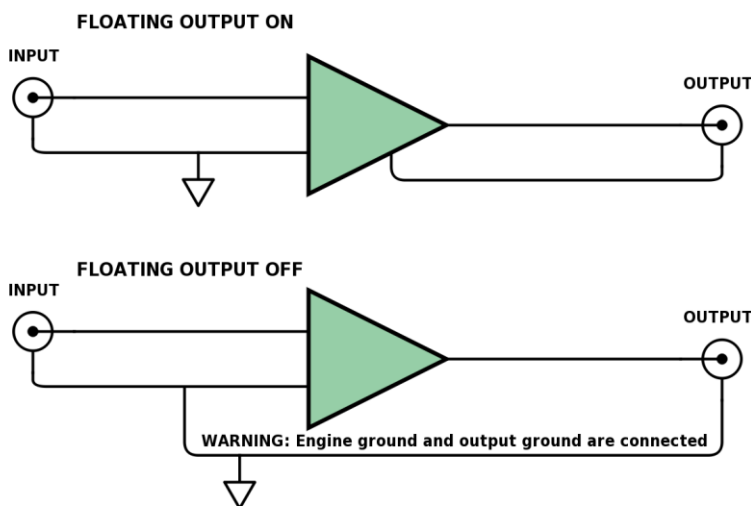


NB: Auto Drift compensation should be used only for in-cylinder pressure signals.

8. Enable or Disable floating output

Floating output ON is for ground referenced acquisition systems

Floating output OFF is for differential acquisition system: connect sensor/engine ground to Vin-



NB: if unsure, leave floating output ON

9. Serial number of Alfa Centauri Channel

10. Hardware version

11. Firmware version. You can download the last firmware from www.alma-automotive.it

Please read Alfa Centauri Upgrade Guide supplied with new firmware.

5. Safety Guidelines

Caution: Do not operate the Alfa Centauri in a manner not specified in this document.

Product misuse can result in a hazard.

You can compromise the safety protection built into the product.

If the product is damaged in any way, return it for repair.

6. EMC & Environmental Guidelines

6.1 CE Compliance

This product meets the essential requirements of applicable European Directives as follows:

- 2014/35/EU Low-Voltage Directive
- 2014/30/EU Electromagnetic Compatibility Directive



6.2 UKCA Conformity

This product complies with the essential requirements of the relevant UK legislation, as detailed below:

- The Electrical Equipment (Safety) Regulations 2016 (S.I. 2016 No. 1101)
- The Electromagnetic Compatibility Regulations 2016 (S.I. 2016 No. 1091)



6.3 Product Environmental Compliance

Alma Automotive complies with all laws and regulations regarding material declaration and the elimination of chemical and hazardous substances used in products and manufacturing. This includes:

- Lead-Free (lead free production cycle)
- RoHS (Restriction of Hazardous Substances)
- REACH (European Union on the Registration, Evaluation, Authorization and Restriction of Chemicals)



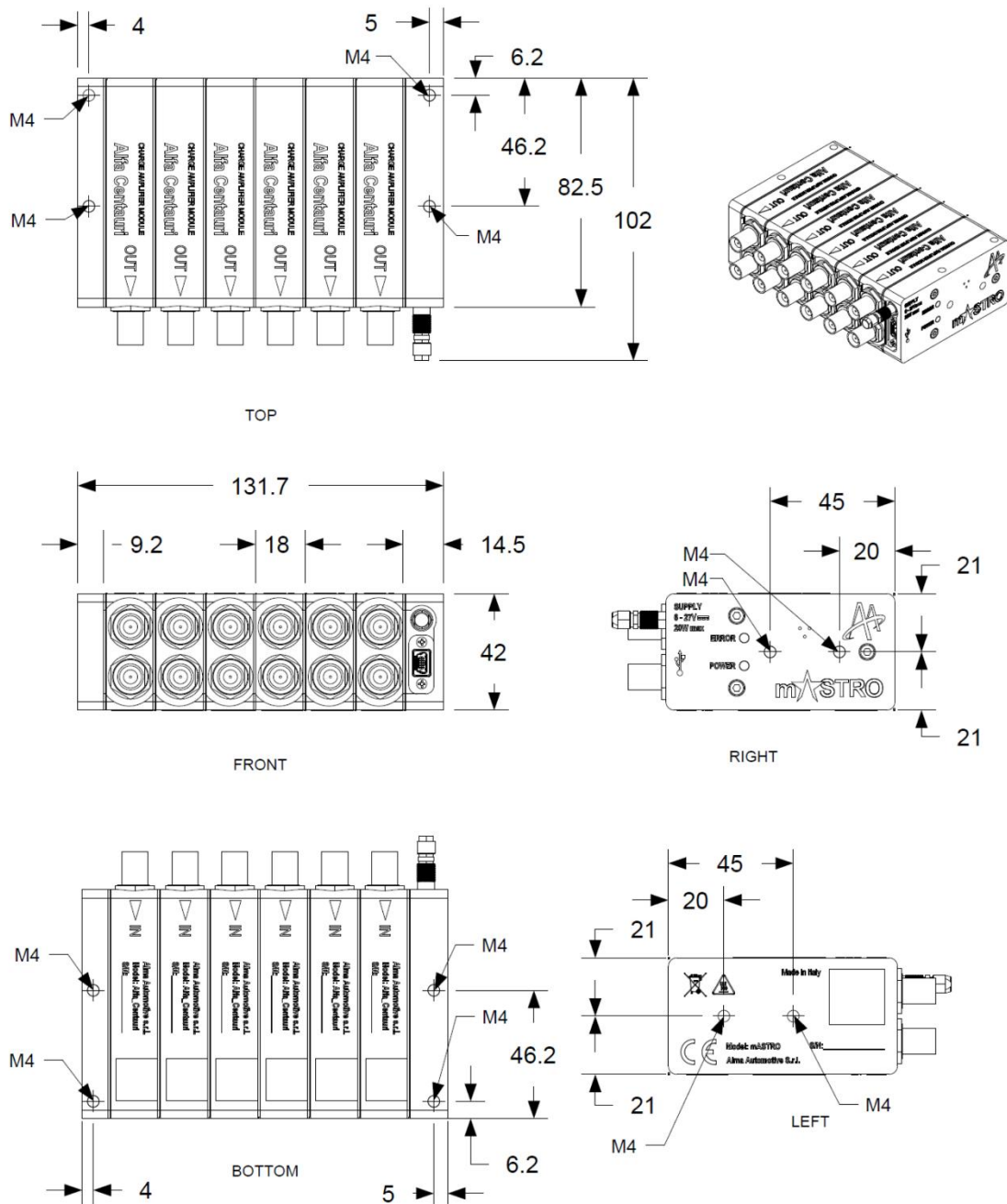
6.4 Waste Electrical and Electronic Equipment

At the end of the product life cycle, all products must be sent to a WEEE recycling center.

The recycling center must be compliant with WEEE Directive 2002/96/EC.

7. Mechanical characteristics

Parameter	Rating	Note
mASTRO supply dimension	82.5 x 42 x 23.7 mm	TOP + BOTTOM
Alfa Centauri channel dimension	82.5 x 42 x 18 mm	Without BNC
Alfa Centauri channel dimension	96.2 x 42 x 18 mm	With BNC
Alfa Centauri Channel height	18 mm	
mASTRO weight	135 g	TOP + BOTTOM
Alfa Centauri channel weight	90 g	
Protection Marking	IP65	
mASTRO slot requirements	1 unit	



Dimensions are in mm



Originally established in 2002 as a spin-off of University of Bologna, Alma Automotive represents the synergy between knowledge acquired in academic research activities and years of experience in developing applied solutions. The company has now evolved to offer both ready-to-use products and technical consulting services supported by bespoke hardware and software solutions.

Our expertise is focused on real time control and measurement electronics, simulation and custom-made test systems. We provide powertrain testing services and competitor data analysis for motorsport.



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