E-MAAX PRO-N Regulator Datasheet

1. Description

E-MAAX PRO-N Regulator optimizes alternator output based on;

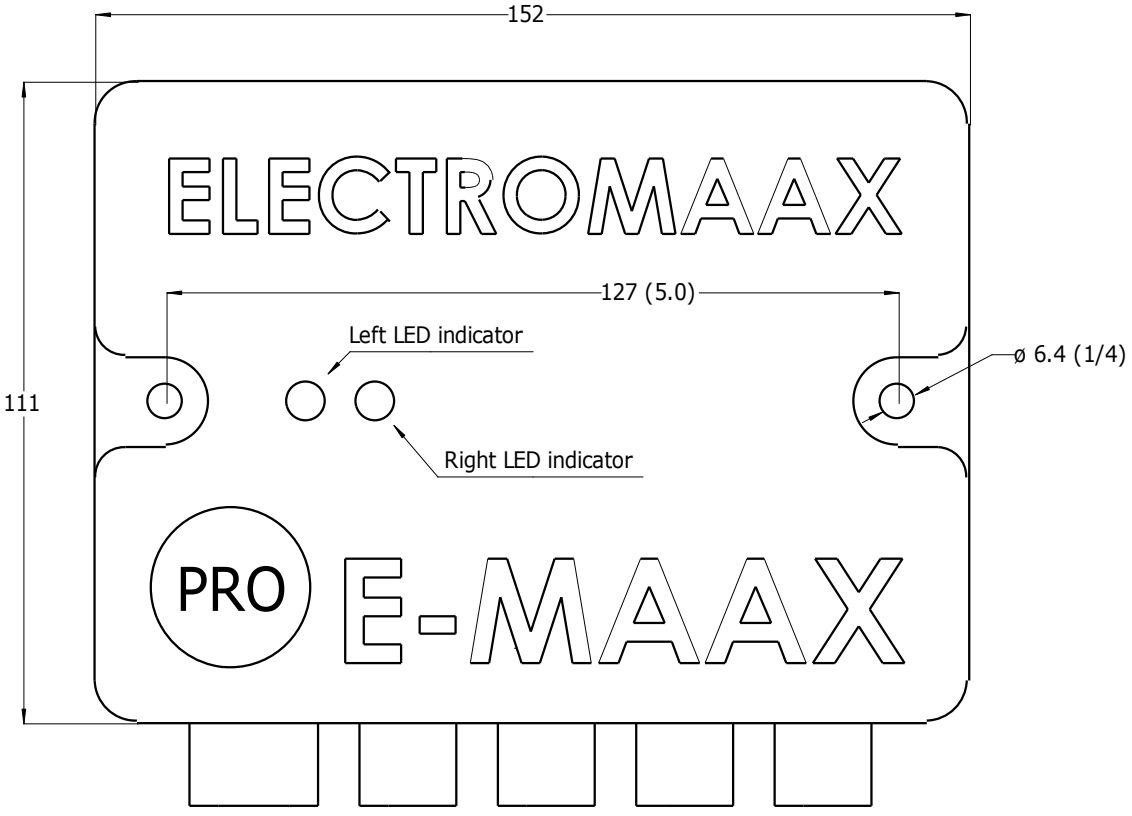
- System load
- Battery type
- Battery state of charge
- Current and voltage sensing

The battery charging profile is programmed based of battery type for the common batteries (Lead Acid / AGM / Gel / FireFly / Custom-LiFePO4 / "LiFePO4 MAAX") in both 12 and 24 Volt and "P" or "N" alternator configurations. The PRO-N has two LED's which function as visual status indicators and fault diagnostics.

2. Specifications

Parameter	Value	Units
Weight	200	grams
Housing material	PVC	-
Operating range	-20 .. +100	Celsius deg
Protection	IP 56	-
Maximum allowable shock	3	G
Maximum allowable relative humidity	95	%

3. Dimensional outline



All units are millimeters (inches)

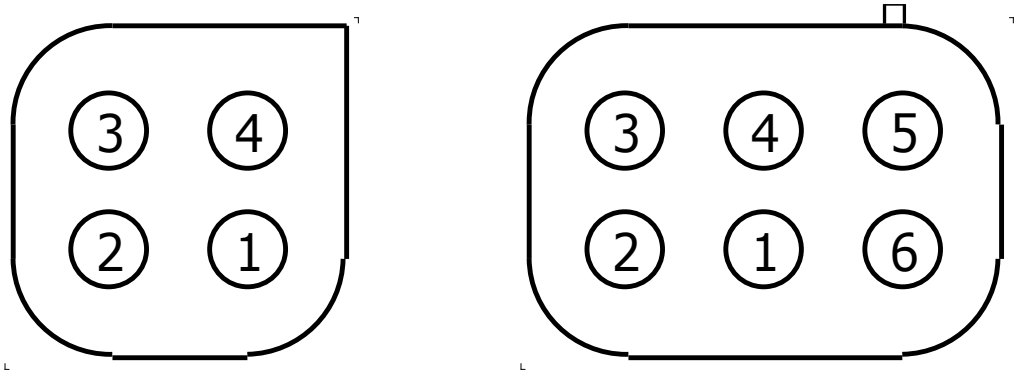
Canada:
5552 King St, Beamsville, ON L0R 1B3
Phone: 905-945-8800
Fax: 905-563-8806

USA:
Unit 5, 6405 Inducon Drive West, Sanborn, NY 14132
1-866-945-8801

3. Electrical specifications

Parameter	Value	Units
DC supply voltage	6-40	Volts
Current consumption	0.030	Amps
Maximum Field current	8	Amps
Power Cable ratings	Gauge: 14 AWG Material: tinned copper strands Insulator Material: PVC Jacket Color: black Diameter: 13 mm	-
Communications format	RS-485	-
Peripherals connector pin functions	1 - black – battery negative 2 - red – DC supply 3 - white – communication lead "A" 4 - yellow – communication lead "B"	-
Power cable connector pin functions	1 - black – battery negative 2 – white – Ignition input 3 – red - battery positive 4 - brown - Field output 5 – green – do not use 6 – yellow – tachometer signal	-

4-pin and 6-pin connector pins, view from the cable side



4. Description of functions

The PRO-N regulator provides alternator output by controlling the "Field" input into the alternator. As the Field signal is increased or decreased so the alternator output follows. As the functions of the PRO-N regulator are described below the terms "Field output" and "Alternator input" are interchangeable. The term Field Output refers to Field condition from the regulator, whereas Field Input is the same value from the alternator's perspective.

5. Visual Indication

PRO-N Regulator has two LED indicators.

Left indicator works only when the ignition is inactive and there is no regulation.

Lighting sequence	Meaning
	Regulator is powered up, ignition is switched off. It flashes (ISO) green every 6 seconds.
	Regulator is busy reporting its settings to external PC
	Regulator is busy importing its settings from external PC and the settings have not been accepted
	Regulator is busy importing its settings from external PC and the settings have been updated

Right indicator works only when the ignition is active and there is regulation.

Lighting sequence	Meaning
	***Warm-up*** stage of regulation
	***Bulk+Absorb*** stage of regulation
	***Float*** stage of regulation
	Half Field condition, when regulator allows 50% of the alternator's output
	*Critical Fault condition*, when regulator allows only 10% of the alternator's output
	*Settings Fault condition*, where the regulator disables the alternator's output (0%).
	***CSR*** mode of regulation (basic regulation based on system voltage)

Supported Optional Peripherals*:*

PRO-N Regulator supports any of the following peripherals:

a) Alternator Temperature Sensor
b) Alternator Current Sensor
c) Com Module / Com Module PLUS
d) Battery Sensor Hub (connections for voltage, temperature and load current)

The peripherals can be hot-plugged at any time into any available port without restarting the regulator. The regulator detects the presence of any compatible peripheral and acquires data from it automatically.

Charging stages and supported chemistries:

PRO-N Regulator supports the following battery chemistries, in both 12 and 24 Volts:

a) Lead-acid
b) AGM
c) Gel
d) Carbon Foam
e) Lithium MAAX LiFePO4
f) Lithium

The manufacturer configures the PRO-N Regulator for use with a particular battery type.
Upon the activation of the Ignition lead, the PRO-N Regulator regulates the battery charge through the following charge profile stages:

a) Warm-up
b) Bulk + Absorb
c) Float

Depending on the charging conditions, such as immediate load requirements and engine speed, the PRO-N Regulator switches between the charge profile stages to achieve the optimal charging.

Field reduction:
The Com Module PLUS, when connected to the regulator, allows reduction of the regulator's Field Output to divert engine power from generating electricity to rotating the propellers if needed. Com Module PLUS reduces Field Output in 10% increments, down to 30% of its nominal value for the current charging conditions. Field reduction is indicated by the right LED flashing red once and is re-set automatically when the ignition is switched off.

Warning condition:
Warning condition is a special mode of regulation when the Field Outputs are reduced to 50% of their nominal value for the current charging conditions. The regulator is placed into the Warning condition due to one or more of the following conditions:

a) The battery's temperature reaches 40°C
b) The alternator's temperature reaches 90°C
c) The regulator's temperature reaches 60°C
d) Engine's RPM is below the limit (if enabled)

The Warning condition is indicated by the right LED flashing red once per second. Warning condition is re-set automatically when the ignition is switched off.

Critical Fault condition:
Critical Fault condition is an alarm mode (right LED flashing red two times quickly) when Field output is restricted to 10% in order to avoid damage to the charging system. The regulator is placed into the Critical Fault condition due to one or more of the following conditions:

a) The battery's temperature reaches 50°C
b) The alternator's temperature reaches 100°C
c) The regulator's temperature reaches 90°C
d) In-line fuse on the power supply line is blown
e) Overvoltage

Critical Fault condition does not require restart of the regulator; it is re-set automatically when the fault condition is cleared.

Settings Fault condition:
Settings Fault condition is an alarm mode (periodically flashes red three times) when no Field output is supplied to the alternator in order to avoid damage to the charging system. The regulator is placed into the Settings Fault condition due to one or more of the following conditions:

a) Alternator parameters have not been set in the regulator
b) The regulator is not configured for the correct system voltage (12 or 24)
c) Battery parameters have not been set in the regulator

To clear the Settings Field condition requires the trigger condition to be eliminated and the restart of the regulator.

CSR regulation mode:
CSR is a fail-safe mode of regulation based solely on the system voltage.

a) The alternator current sensor is not connected
b) The battery voltage sensor is not connected
c) Alternator produces current less than 3 A

This mode indicates with one short blue flash of the right LED.