

Contents

Background:	2
System Description:	2
1. E-MAAX AT3 Software.....	3
2. Field Control Module (FCM).....	4
2.1. FCM Wiring.....	4
2.2. FCM Dimensions	5
2.3. FCM Technical Specifications.....	5
2.4. FCM Status Visual Indication.....	5
2.5. FCM Settings and Status Parameters.....	6
2.5.1. FCM Settings	6
2.5.2. FCM Status Parameters.....	6
3. Battery Control Module (BCM)	7
3.1. BCM Wiring	7
3.2. BCM Dimensions	8
3.4. BCM Status Visual Indication	8
3.5. BCM Settings and Status Parameters	9
3.5.1. BCM Settings	9
3.5.2. BCM Status Parameters	10
4. System Control Module (SCM).....	12
4.1. SCM Dimensions	12
4.2. SCM Technical Specifications.....	12
4.3. SCM Buttons Functions.....	13
4.4. SCM Screens.....	13
4.5. SCM Screen Messages.....	15
4.6. SCM Settings and Status Parameters.....	15
4.6.1. SCM Settings	16
4.6.3. SCM Status Parameters.....	16
4.7. SCM USB Connection	17
4.8. SCM Bluetooth Connection.....	17

4.8.1. Regulatory Approval	18
4.9. SCM Wi-Fi Connections.....	19
4.10. SCM NMEA-2000 Connection	20
5.0. Examples of System Wiring.....	21

Background:

The E-MAAX AT3 system builds on the capability and success of the E-MAAX family of regulators and supporting peripherals. As the natural evolution of electronic processing power and the recommendations of the “wish list” from the 100’s of customers of the first 2 generations of E-MAAX regulators, the AT3 provides numerous enhanced features while significantly reducing the installation process.

The primary enhancements are;

- NMEA 2000 integration
- “Bluetooth” connectivity
- Microprocessor control increased from 8 bit to 32 bit
- Installation time / expense reduced by 75%
- Multi engine / alternator control
- Protection against installation wiring mistakes
- Integrated BMS for Lithium Battery systems.

System Description:

The AT3 system is comprised of 3 modules; **Field Control Module (FCM) / System Control Module (SCM) / Battery Control Module (BCM)**; interconnected via a 8 mm communication connection cables. The modular approach simplifies diagnostics and reliability and in the event of a component failure significantly reduces service time. The distributed functionality reduces required wire capacity and the associated risk of high-amperage electrical issues.

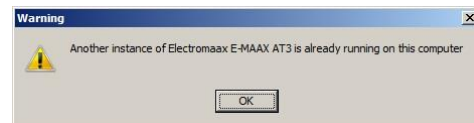
The AT3 is fully functional once the wiring and communication connections are made. The following indicators confirm the system is operational. On start-up all LED’s flash to indicate functionality and BCM detects system voltage.

1. FCM – Green LED “solid” indicates ignition signal is present, “flashing” indicates power but no ignition signal.
2. BCM – Green voltage LED (12V or 24V)
3. SCM – The LCD screen will indicate system status.

1. E-MAAX AT3 Software

The E-MAAX AT3 software is compatible with *Windows7* or higher operating systems and does not require any special drivers. All the required driver files are included in *Windows*.

Only one instance of E-MAAX AT3 is allowed to run at the same time. If you get this message, navigate to your list of running applications and select E-MAAX AT3.



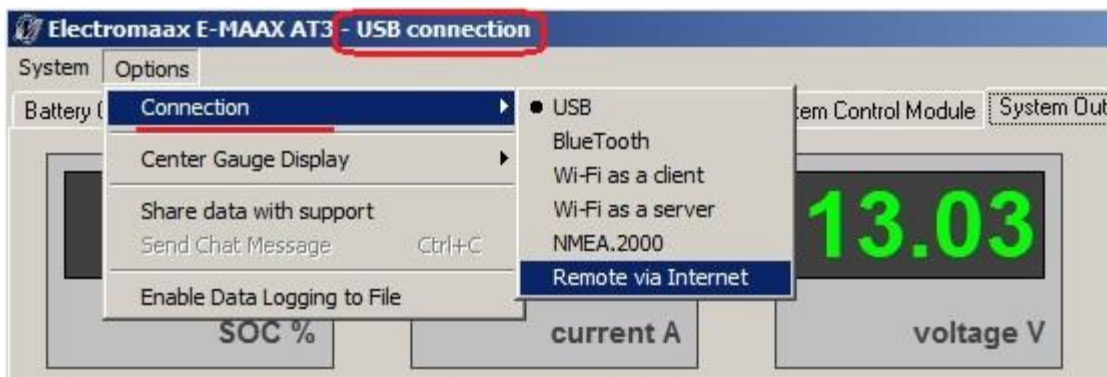
The E-MAAX AT3 software shows system data in tabular or graphical forms. Tabular data are specific to the units comprising the E-MAAX AT3 system and are described below. The graphic part of it contains gauges for ease of observation. The top portion of the screens shows the state of the house battery bank. The central magnified gauge can be any of the battery gauges as selected in the menu. System status and messages are displayed in bold text.

Left and right sides show the state of the engines.

Grayed gauges not those not present in the system

When a gauge turns yellow, the parameter displayed is in the warning territory, when red, the parameter is at fault, and immediate attention is required.

Users can connect to the E-MAAX AT3 SCM via USB (default connection type, always available). There is also a Bluetooth connection, that must be enabled in the SCM's settings to become available. The desired connection type is selected in the menu. If the selected connection is not available or fails, it defaults back to USB.



2. Field Control Module (FCM)

Mounted near the alternator, the FCM provides the following functions and features;

1. Field Control for up to two alternators on the same engine
2. Alternator's temperature sensing
3. Tachometer output using the alternator RPM
4. Ignition sensing
5. Providing a current sink output for the Warning Light (Alternator Fault) indicator
6. Status indicating LED – flashing or solid green or red (see table in section 2.3.4)



2.1. FCM Wiring

The FCM is electronically isolated from the other components of the E-MAAX AT3 system, so it can be wired independently. A sample wiring example is shown in the diagram below. The alternator harness has multiple connections points both through the "Mini" connector and wires with terminals.

At the FCM & Connector end;

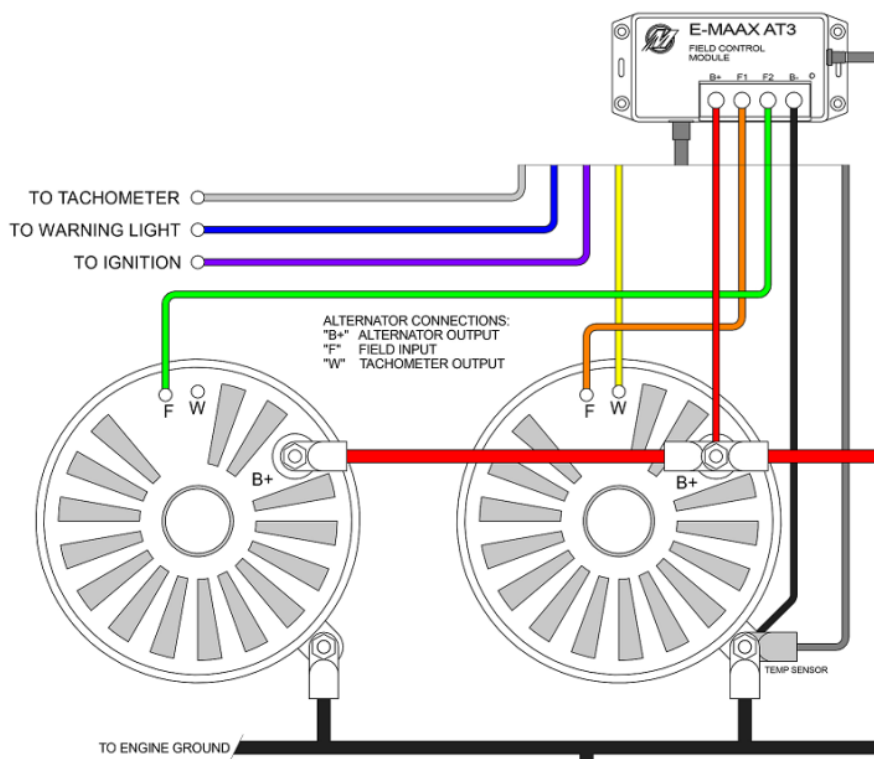
- a. Red wire connects to the FCM B+ terminal;
- b. Black wire connects to the B-
- c. Brown wire to the F1 terminal

The Alternator end of the harness has the following wires;

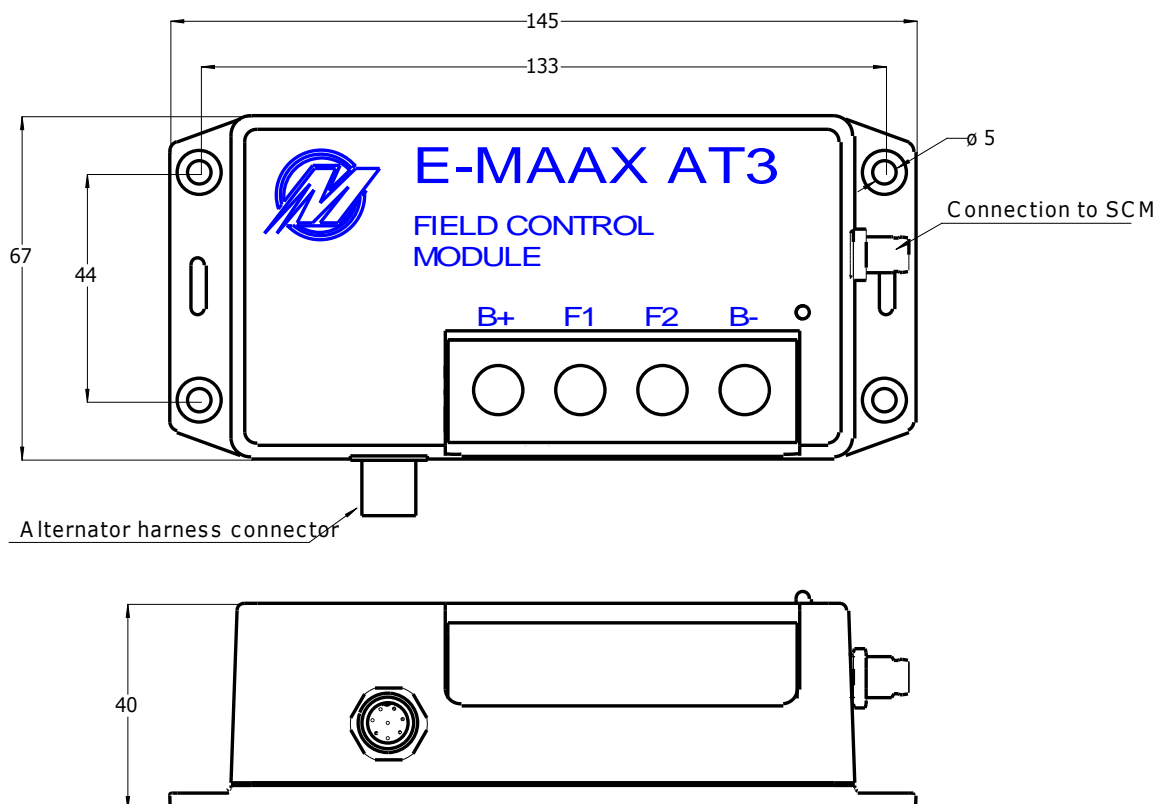
- Yellow wire to the alternator's "W" to receive the RPM output.
- Grey wire to tachometer to provide corrected engine RPM
- Purple wire to ignition power pick-up
- Blue wire to "Charge" warning light
- Black wire to alternator ground
- Red wire to alternator B+ post
- Brown wire to alternator F (Field) post
- The temperature sensor must be attached to the alternator's case in a way that provides good heat transfer.
- A Green wire is provided for use as needed a "Second Field" option. Connecting to the FCM F2 terminal at one end and the F post of a second alternator.

It is critical to make sure that the alternator has good connection to the battery's ground.

The exact wiring configuration depends on the particular install. Typical wirings are shown on the sample connection diagrams at the end of the documents.



2.2. FCM Dimensions



All units are millimeters

2.3. FCM Technical Specifications

Parameter	Value	Units
DC supply voltage	6-40	Volts
Current consumption	0.010	Amps
Max Alternator Field Current	25	Amps
Weight	0.2	kg
Housing material	PVC	-
Operating range	-20 .. +100	°C
Protection	IP 54	-
Maximum allowable shock	3	G
Maximum allowable relative humidity	95	%

2.4. FCM Status Visual Indication

Status LED	Meaning	Action
Green - Flashing	Monitoring – Ignition is OFF	System functioning – no action
Green – Solid	Ignition is ON	System functioning – no action
Red – Flashing	System Fault – Ignition is OFF	Refer to the application software or SCM display and correct
Red – Solid	System Fault – Ignition is ON	Refer to the application software or SCM display and correct

2.5. FCM Settings and Status Parameters

The state of the FCMs and its settings can be accessed via E-MAAX AT3 software under the "Field Control Module" tab.

NOTE: While any type of communication connection allows viewing the data, the settings can only be updated via USB or a WiFi connection.

2.5.1. FCM Settings

FCM Settings Table must be filled with values appropriate for the particular installation and written to the FCMs via the E-MAAX AT3 software.

Parameter	Meaning	Valid Range	Units
Amount of Alternator Poles	Actual amount of the poles in the alternator used. Refer to the alternator manufacturer's datasheet. This parameter is used to calculate the engine RPM. If the FCM provides field control for two alternators, enter the amount of poles for the alternator which provides the tachometer signal to the FCM.	6-30	-
Pulley Ratio	Actual "Crank Pulley Diameter" to "Alternator Pulley Diameter" ratio. This parameter is used to calculate the engine RPM. If the FCM provides field control for two alternators, enter the ratio for the alternator which provides the tachometer signal to the FCM.	1-10	-
Tachometer Compensator	The Coefficient to correct the tachometer output frequency of the FCM so an existing gauge does not have to be re-calibrated. Divide the engine's tachometer reading by the RPM value displayed in the E-MAAX AT3 software, and enter the calculated ratio. The two values should then be equal. For instance; the gauge shows 1000 rpm, the E-MAAX AT3 software shows 1500 rpm, so the Tachometer Compensator value must be set to 1.5.	0.01-9.99	-
Alternator Fault Temperature	Alternator temperature above which the alternator's output is cut to avoid overheating. Set to 0 if the feature is not used.	70-110	°C
Low Engine RPM Limit	Engine RPM value below which the alternator's output is limited to 50% to avoid engine stall. Set to 0 if the feature is not used.	0-1000	rpm
Use Warning Light	Set to 1 if the warning light indicator is connected to the FCM. (activates when Ignition is "on" and there is no alternator output) Set to 0 if the feature is not used.	0 or 1	-

2.5.2. FCM Status Parameters

FCM Status Parameters are shown in E-MAAX AT3 software under respective "Field Control Module #1" or "Field Control Module #2" tab.

Parameter	Meaning	Units
B+ Voltage	Measured voltage at the "B+" post of the alternator in respect to the battery's ground.	Volts
B- Voltage	Measured voltage at the "B-" post of the alternator in respect to the battery's ground.	Volts
Field #X Selector	Shows the type of output #X the FCM is set to. Can be P-TYPE, N-TYPE, or DISABLED. Refer to the alternator manufacturer's datasheet to confirm the actual field coil connections. To change the output type, set the jumpers inside the FCM enclosure.	-
Field #X Output Voltage	Measured averaged voltage at the "F1" or "F2" posts of the FCM in respect to the "B- Voltage".	Volts
Alternator Temperature	Calculated alternator temperature based on the temperature sensor signal.	°C
Engine RPM	Calculated engine RPM value based on the Alternator Tach Frequency.	rpm

3. Battery Control Module (BCM)

Mounted in or near the battery compartment, the BCM integrates numerous sensors within a single housing, significantly reducing wiring and installation time. The internal nickel plated copper bus bars (3) have 500 amp capacity providing 8 mm nickel-plated brass connection studs (14).

The following parameters are monitored;

1. Battery Temperature x 3 (Temp #1 – House / Temp # 2 & 3 – Auxiliary or Start)
2. Battery charge / discharge current
3. Alternator output current (1 or 2 alternators)
4. Battery Voltage
5. Load Voltage
6. Battery State of Charge

The following features are provided;

1. ElectroMaax priority *Safety Switch* (SS); 2 fault controlled outputs and 1 input.
2. ElectroMaax priority *System Surge Protection* (SSP alternator protection) technology
3. Negative and Positive bus bars
4. Isolated bus for loads and other charging sources, e.g. Wind, or Solar, or Shore inputs
5. System voltage LEDs, Electrical Surge indicator LED
6. Heartbeat LED
7. 500 Amp capacity

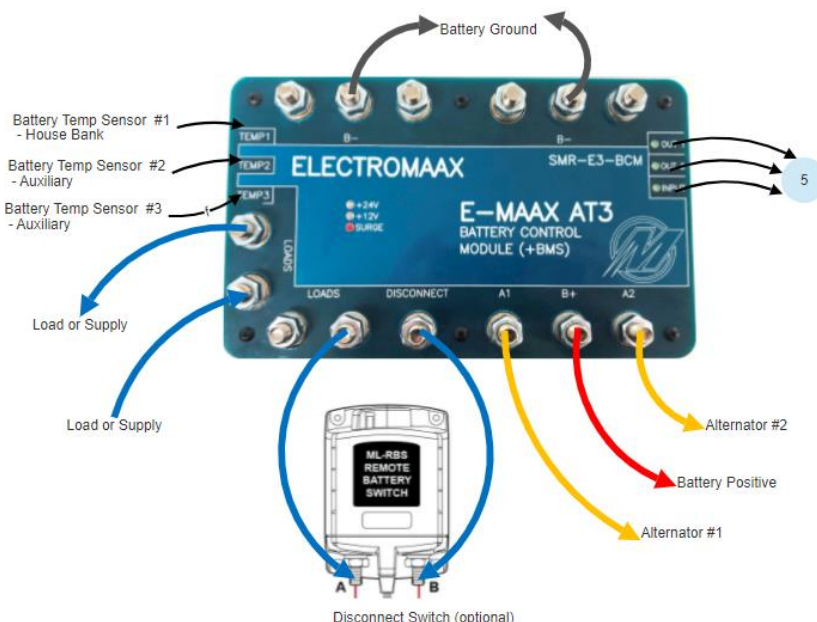


3.1. BCM Wiring

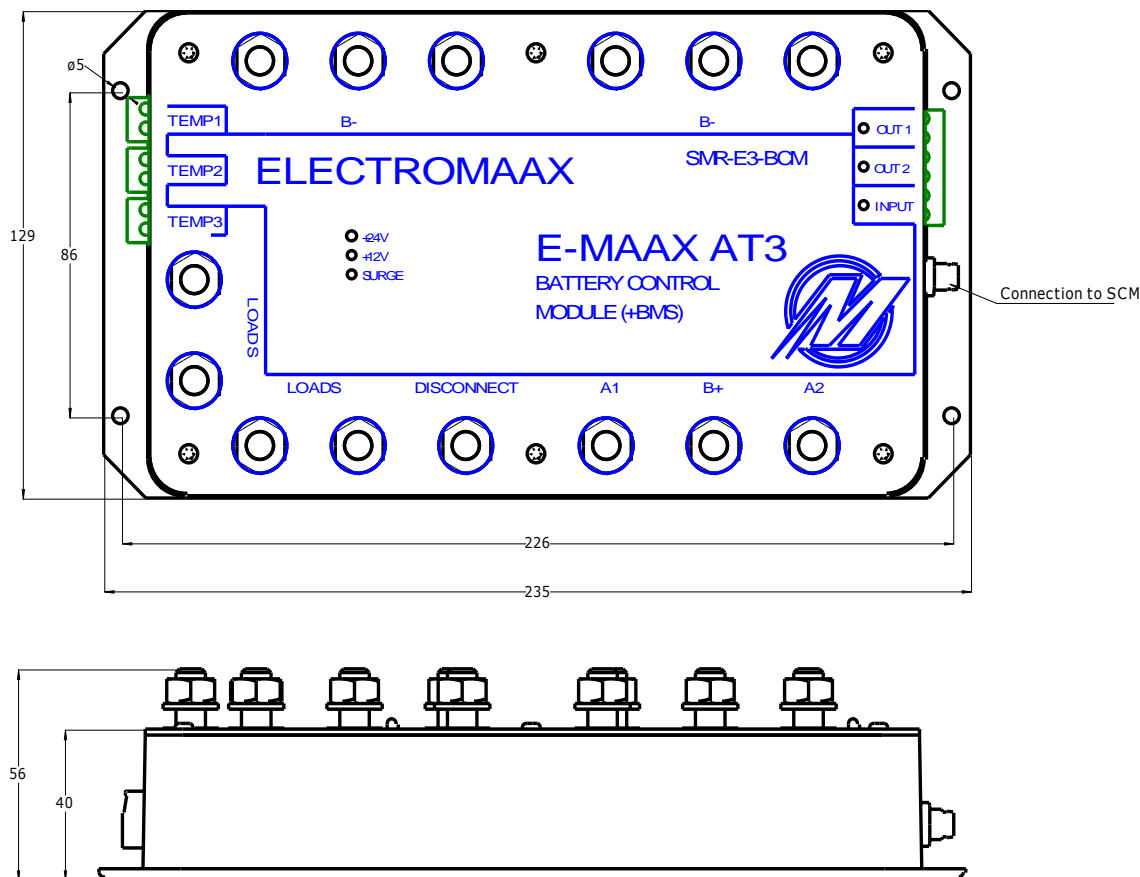
BCM must be wired to the house battery first via the "B+" and "B-" terminals. This initial connection allows the BCM to determine the system voltage, and confirm with the appropriate LED.

All other connections can be made as per schematic in the following sequence.

1. Alternator(s) ground "B-" post(s) ; positive to "A1" and ("A2" if used)
2. Safety disconnect switch (recommended) or suitable "jumper" connection must be used.
3. Loads and ancillary inputs
4. Temperature sensors as required and shown.
5. Safety Switch (SS) - input and outputs



3.2. BCM Dimensions



All units are millimeters

3.3. BCM Technical Specifications

Parameter	Value	Units
DC supply voltage	6-40	Volts
Current consumption	0.090	Amps
Current posts ratings	500A	Amps
Current measurement range	-999 to 999	Amps
Weight	1.9	kg
Housing material	PVC	-
Operating range	-20 .. +100	°C
Protection	IP 54	-
Maximum allowable shock	3	G
Maximum allowable relative humidity	95	%

3.4. BCM Status Visual Indication

Status LED	Meaning	Action
" +12V" - Flashing	The BCM has detected a 12-Volt system.	System functioning – no action
" +24V" - Flashing	The BCM has detected a 24-Volt system.	System functioning – no action
"SURGE"	System Surge Protector is active	Refer to the application software or SCM display and correct

"OUT 1"	Safety Switch Output #1 is active	Refer to the application software or SCM display and correct
"OUT 1"	Safety Switch Output #2 is active	Refer to the application software or SCM display and correct
"INPUT"	Safety Switch Input is active	Refer to the application software or SCM display and correct

3.5. BCM Settings and Status Parameters

The state of the BCM and its settings can be accessed via the E-MAAX AT3 software under the "Battery Control Module" tab.

NOTE: While any type of communication connection allows viewing the data, the settings can only be updated via USB connection.

3.5.1. BCM Settings

BCM Settings Table must be filled with values appropriate for the particular installation and written to the BCM via the E-MAAX AT3 software.

Parameter	Meaning	Valid Range	Units
Battery Bank Size	Total capacity of the house bank, used in SOC calculation. If set to 0, SOC is not calculated	0-9999	A*h
Battery Temperature Coefficient	Temperature correction factor of the battery's chemistry. Indicates how battery voltage changes with the ambient temperature. Refer to the battery's manufacturer to obtain the correct value. Used in SOC calculation. Typical values are between 0.003 and 0.050.	0.001-0.1	V/°C
Battery Voltage @ 100%	House Bank Battery voltage when the battery considered to be fully charged. Refer to the battery's manufacturer to obtain the correct value.	-	Volts
Battery Voltage @ 80%	House Bank Battery voltage when the battery considered to be 80% charged. Refer to the battery's manufacturer to obtain the correct value.	-	Volts
Battery Voltage @ 20%	House Bank Battery voltage when the battery considered to be 20% charged. Refer to the battery's manufacturer to obtain the correct value.	-	Volts
Battery Voltage @ 0%	House Bank Battery voltage when the battery considered to be completely drained. Refer to the battery's manufacturer to obtain the correct value.	-	Volts
Battery Wiring Resistance	Resistance of the power cables between the House Battery and the BCM. Typical values are between 0.001 to 0.015 Ohms. The parameter is used to recalculate the true voltage at the House Battery.	0.0-1.0	Ohms
Use System Surge Protector (SSP)	SSP is internal to the BCM; designed to suppress short powerful energy spikes (up to 3kW within 0.2 seconds) to protect sensitive boat electronics. If fault condition remains, the Safety Switch will react. Set to 1 to enable the SSP, or 0 to disable	0 or 1	-
SSP Voltage Threshold	Voltage to trigger the System Surge Protector.	-	Volts

Use Safety Switch (SS)	SS is an internal to the BCM designed to react on prolonged power surges to protect the battery. It is intended to disconnect all loads or charging sources from the battery and cut the alternator outputs of necessary. Set to 1 to enable the SS actions; Set to 0 to disable.	0 or 1	-
SS NO Output #1 usage	Output #1 is a set of dry normally open (NO) relay contacts; they close for the duration of a fault condition. Set to 1 to enable the Output #1 relay; Set to 0 to disable.	0 or 1	-
SS NC Output #2 usage	Output #2 is a set of dry normally closed (NC) relay contacts; they open for the duration of a fault condition. Set to 1 to enable the Output #2 relay; Set to 0 to disable.	0 or 1	-
SS Alarm Input usage	SS Alarm Input is an opto-coupled input to sense an external signal to activate SS. Set to 1 to make the Safety Switch react when the Alarm Input is active; Set to 0 to disable.	0 or 1	-
Battery #1 Fault Temperature	House Battery temperature above which the alternator's output is cut to avoid overheating. Set to 0 if the feature if not used.	40-60	°C
Battery #2 Fault Temperature	Start or Aux Battery temperature above which the alternator's output is cut to avoid overheating. Set to 0 if the feature if not used.	40-60	°C
Battery #3 Fault Temperature	Start or Aux Battery temperature above which the alternator's output is reduced to avoid overheating. Set to 0 is the feature if not used.	40-60	°C
Battery Fault Discharge Current	House Battery discharge current exceeds the SS reaction value. Set to 0 if the feature is not used.	0-999	Amps
Battery Fault Voltage	System voltage above which the alternator's output is cut and the SS reacts. Set to 0 if the feature is not used.	10-30	Volts
Battery Warning SOC	House Battery SOC below which a warning is developed to avoid battery damage. Set to 0 if the feature is not used. Only available while the system is in the monitoring stage.	0-99	%

3.5.2. BCM Status Parameters

BCM Status Parameters are shown in E-MAAX AT3 software under "Battery Control Module" tab.

Parameter	Meaning	Units
True Battery Voltage	House Battery voltage compensated for the voltage drop due to the wiring resistance.	Volts
Measured Loads Voltage	Voltage measured between LOADS and "B-" terminals of the BCM	Volts
Battery Current	Current measured at "B+" terminal of the BCM. If positive, the House Battery is charging. If negative, the House Battery is draining.	Amps
Alternator #1 Current	Current measured at "A1" terminal of the BCM. Can be only positive.	Amps
Alternator #2 Current	Current measured at "A2" terminal of the BCM. Can be only positive.	Amps
Load Current	Calculated difference between the Battery Current and the Alternator Currents. If positive, the House Battery is charging. If negative, the House Battery is draining.	Amps
Battery #1 Temperature	House Battery temperature calculated from the Battery #1 Temp Sensor voltage. If the voltage is not within its valid range, shows the "Sensor is not connected" message, and the battery SOC is not calculated.	°C

Battery #2 Temperature	Engine #1 Start Battery temperature calculated from the Battery #2 Temp Sensor voltage. If the voltage is not within its valid range, shows the "Sensor is not connected" message.	°C
Battery #3 Temperature	Engine #2 Start Battery temperature calculated from the Battery #3 Temp Sensor voltage. If the voltage is not within its valid range, shows the "Sensor is not connected" message.	°C
Voltage Drop	Calculated voltage drop in the wiring between the House Battery and the BCM. In general, it should never exceed 1.0 Volt.	Volts
Battery Charge	Calculated amount of charge being held in the House Battery.	Ah
Battery SOC	Calculated State-Of-Charge of the House Battery. The parameter is not calculated if Battery #1 Temp Sensor is not connected, or Battery Bank Size is not set.	%
SS Output #1	"1" indicates the active state of the output. "0" indicates the inactive state of the output.	-
SS Output #2	"1" indicates the active state of the output. "0" indicates the inactive state of the output.	-
SS Input	"1" indicates the active state of the input. "0" indicates the inactive state of the input.	-

4. System Control Module (SCM)

As the name describes, the SCM receives performance data from the FCM and the BCM and in return provides the control intelligence to optimize and protect the charging system. Since all high current functions are located at the alternator or the battery, the SCM is safeguarded utilizing “opto-isolators”; to protect against both misconnection issues and transient voltages.

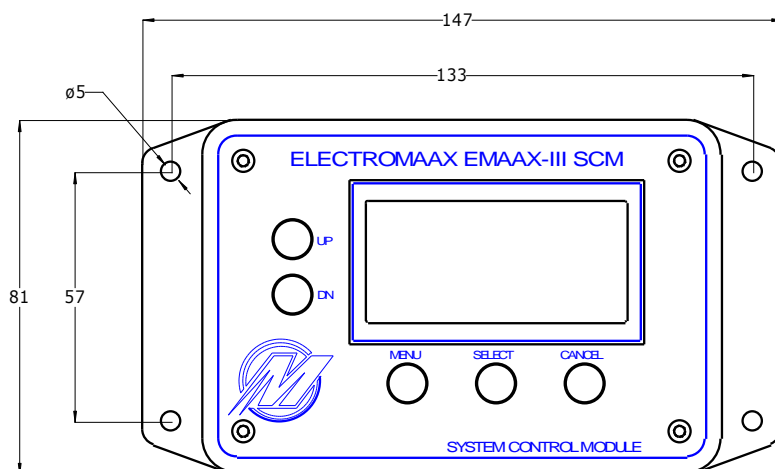
The included features are;

1. LCD screen interface
2. Secure M8 and M12 cable connections
3. Mult-format connectivity – USB/Wi-Fi/Bluetooth/NMEA
4. Dual alternator or dual engine control capability
5. On-board and remote diagnostics

The SCM can be installed in an access area with the only connections being those of the FCM(s) and BCM.



4.1. SCM Dimensions



All units are millimeters

4.2. SCM Technical Specifications

Parameter	Value	Units
DC supply voltage	6-40	Volts
Current consumption	0.090	Amps
Weight	0.2	kg
Housing material	PVC	-
Operating range	-20 .. +100	°C
Protection	IP 56	-
Maximum allowable shock	3	G
Maximum allowable relative humidity	95	%

4.3. SCM Buttons Functions

Buttons	Description
Menu	When engines are not running (Ignition signal is absent), this button enters the settings screens When engines are running button has no function.
Select	When engines are not running (Ignition signal is absent), this button has 2 functions: it (a) selects the highlighted item for editing, and (b) confirms the changed value of the item being edited. When engines are running button has no function.
Cancel	When engines are not running (Ignition signal is absent), this button has 2 functions: it (a) returns to the previous screen of the menu, or (b) cancels changes in the value of the item being edited. When engines are running button has no function.
Up	When engines are running (Ignition signal is present), this button acts as a Field Reduction Switch control, increasing allowed alternator output by 10%. When engines are not running (ignition signal is absent), this button has 2 functions: it (a) navigates between menu items, and (b) increases the item's value while a particular item is selected.
Down	When engines are running (Ignition signal is present), this button acts as a Field Reduction Switch control, decreasing allowed alternator output by 10% to a minimum of 30%. When engines are not running (ignition signal is absent), this button has 2 functions: it (a) navigates between menu items, and (b) decreases the item's value while a particular item is selected












Notes:

- The status of the buttons are refreshed every ½-second to avoid accidental touches; this may appear as a lag time in the response.
- Pressing any button causes the screen to light-up for 10 seconds.

4.4. SCM Screens

Whether the E-MAAX AT3 system is in the monitoring or in charging stages, the screen provides the basic information of its status. When the system is monitoring, users have access to the basic via the on-screen menus. To enter the menus, press the Menu button. Factory settings are sufficient for basic system operation.

4.4.1 SCM screen when the system is in a charging stage, displays;

	Battery current
	Battery voltage
	Available engines
	Alternator current for each engine
	Alternator control output for each engine
	Master Engine Status
	Slave Engine Status
	Charging stage
	Field Reduction value if applicable
	Active Safety Switch
	Active System Surge Protector

B	A	T	T	:		-	9	9	9	A			1	2	.	3	V		
E	N	G	1	:			1	2	3	A					9	9	%		M
E	N	G	2	:			1	2	3	A					9	9	%		S
W	A	R	M	-	U	P		F	R	8	0	%		S	S		S	S	P

4.4.2. SCM screen when the system is in the monitoring state displays;

- Battery current
- Battery voltage
- Available engines
- House Battery SOC

B	A	T	T	:	-	9	9	9	A			1	2	.	3	V			
E	N	G	2	:	I	D	L	E											
M	O	N	I	T	O	R	I	N	G			S	O	C		7	2	%	

4.4.3. Main SCM menu screen, when selected enters;

- FCM #1 settings
- FCM #2 settings
- BCM settings
- Connection selection for SCM

F	I	E	L	D	B	O	X	#	1										
F	I	E	L	D	B	O	X	#	2										
H	O	U	S	E	B	A	N	K											
C	O	N	N	E	C	T	I	O	N	S									

4.4.4. FCM menu screen, when selected sets;

- Alternator Current Limit
- Alternator Fault Temperature
- Tachometer Compensator value
- Enables or disables the Warning Light Output

L	I	M	I	T	O	U	T	,	A			2	5	0					
C	U	T	T	E	M	P	,	C				1	0	0					
T	A	C	H	C	O	M	P				1	.	1	0					
E	N	A	B	L	E	D	+					Y	E	S					

4.4.5. BCM menu screen when selected sets;

- House Battery chemistry type
- House Battery Fault Temperature
- House Battery Charge Current Limit
- House Battery Discharge Current Limit

C	H	E	M	I	S	T	R	Y			L	i	F	e	P	O	4		
C	U	T	T	E	M	P	,	C							1	0	0		
L	I	M	I	T	I	N	,	A						2	2	0			
L	I	M	I	T	O	U	T	,	A					3	0	0			

4.4.6. SCM connections menu screen

- Enables Bluetooth module
- Enables Wi-Fi module as client
- Enables Wi-Fi module as server
- Enables NMEA 2000

B	L	U	E	T	O	O	T	H						Y	E	S			
W	I	-	F	I	C	L	I	E	N	T				N	O				
W	I	-	F	I	S	E	R	V	E	R				N	O				
N	M	E	A	-	2	0	0	0						N	O				

4.5. SCM Screen Messages

When there is a warning or a fault condition present in the system, the SCM shows appropriate messages to inform the users.

LCD Screen Message	Meaning	Recommended Action
W: ENG'X' ALT TEMP	Warning: Temperature of the Alternator on engine 'X' exceeds the warning limit. Alternator output on this engine is reduced to 50% to avoid overheating.	Inspect the installation of the alternator
W: ENG'X' LOW RPM	Warning: engine 'X' RPM. Alternator output on this engine is reduced to 50% to avoid engine stall.	
W: BATTERY'X' TEMP	Warning: Temperature of the battery 'X' exceeds the warning limit. Alternator output on this engine is reduced to 50% to avoid overheating.	Inspect the installation of the battery
W: BATTERY VOLTAGE	Warning: Battery voltage exceeds the warning limit. Alternator output on this engine is reduced to 50% to avoid overvoltage.	
W: BATTERY DISCHARGE	Warning: Battery discharge current exceeds the warning limit.	Inspect the installation of the battery
W: BATTERY LOW SOC	Warning: Battery SOC is below the safe usage level.	Charge battery.
W: CHECK POWER WIRES	Warning: Excessive voltage drop in power wiring between the alternator and the battery. Alternator output on this engine is reduced to 50%.	Correct voltage drop, check the power wiring quality and integrity.
SSP	Fault: System Surge Protector is active. System cannot be used.	
SS	Fault: Safety Switch is active. System cannot be used.	
F: FCM'X' FAILURE	Fault: Field Control Module 'X' hardware fault. System cannot be used.	Contact the seller for service.
F: ENG'X' ALT TEMP	Fault: Temperature of the Alternator on engine 'X' exceeds the safe limit. System cannot be used for the duration of the fault.	Inspect the installation of the alternator
F: ENG'X' ALT CONNECT	Fault: B- or B+ leads are not connected correctly on the Field Control Module "X". System cannot be used.	Check the wiring of alternator
F: BCM FAILURE	Fault: Battery Control Module hardware fault, system cannot be used.	Contact the seller for service.
F: BATTERY'X' TEMP	Fault: Temperature of the battery 'X' exceeds the safe limit. System cannot be used for the duration of the fault.	Inspect the installation of the battery
F: BATTERY VOLTAGE	Fault: System voltage exceeds the safe limit. System cannot be used for the duration of the fault.	Inspect the installation of the battery
F: BATTERY DISCHARGE	Fault: House Battery discharge current exceeds the safe limit. Safety Switch is active.	
F: SCM FAILURE	System Control Module hardware fault. Charging system cannot be used.	Contact the seller for service.
F: WRONG SETTINGS	Settings in the System Control Module are incorrect. System cannot be used.	Try to reset the SCM settings to their default values, or contact the seller for remote support.

4.6. SCM Settings and Status Parameters

The state of the SCM and its settings can be accessed via E-MAAX AT3 software under the "System Control Module" tab.

Note: All connections allow data viewing (read); whereas only a USB connection allows settings to be updated (write).

4.6.1. SCM Settings

SCM Settings Table must be filled with values appropriate for the particular installation and written to the SCM via the E-MAAX AT3 software.

Parameter	Meaning	Valid Range	Units
Access point	0-Wi-Fi radio module is disabled 1- Wi-Fi radio module presents as a device in an existing local network, and can be connected to as to a client with a local address, i.e. supports one connections at a time 2- Wi-Fi module presents as a server on an existing local network, and can be connected to as to a website with a local address, i.e. supports multiple connections	0 or 1 or 2	-
Wi-Fi User Name	String used to connect via Wi-Fi.	1-16	characters
Wi-Fi Password	String used to connect via Wi-Fi.	1-16	characters
Use Bluetooth	Set to 1 to enable the Bluetooth radio module	0 or 1	-
Use NMEA-2000	Set to 1 to enable the CAN module	0 or 1	-
Charging Profile Index	Zero-based index to identify the House Battery chemistry used. 0 – FLA, or Lead-acid 1 - AGM 2 – GEL 3 - Carbon Foam, or FireFly 4 - Lithium MAAX LiFePO4 5 – generic Lithium 6 – custom Profile 7- custom Profile	0-7	-
Bulk Target Voltage			Volts
Float Target Voltage			Volts
Alternator 'X' Current Limit	Maximum allowed current for the Alternator #X. If set to zero, the alternator current is not limited.	0-999	Amps
Battery Charge Current Limit	Maximum allowed charge current for the House Battery. If set to zero, the battery charge current is not limited.	0-999	Amps
Regulation Refresh Rate	Regulation parameter: Frequency at which the regulator refreshes the system state. Default value is 40.	10-50	Hz
Warm-up Duration	Duration of the warm-up stage of the regulation. Set according to the power of the engine/alternator arrangement.	5-250	seconds
Maximum Allowed Wiring Voltage Drop	When the wiring voltage exceeds this value, the alternators' output is limited to 50% to avoid equipment damage. Default value is 1.0.	2	Volts

4.6.3. SCM Status Parameters

Run-time parameters of the SCM are used internally in the system for regulation and diagnostic purposes only. Voltages and currents shown by the SCM may differ from the values reported by the BCM due to averaging rates. The BCM values should be taken as correct.

Parameter	Meaning	Units
Battery voltage	Dynamically measured by the SCM battery voltage.	Volts
Battery Current	Dynamically measured by the SCM battery current.	Amps
Charging Stage	Can be Warm-Up, BULK, FLOAT or Monitoring.	-
Field Reduction Switch value	Immediate % of nominal alternator output.	%
System Slave Field Control	Control input to the Slave alternator (if applicable).	%
System Field Control Limit	Upper limit for the control input to all alternators. Dependent on the limitations immediately existing in the system, e.g. Field Reduction	%

	Switch, warnings, and faults.	
Alt 'X' Status	Indicates the engine's alternator behavior; can be either Master or Slave	-
Alt 'X' Current	Charging current measured by SCM	Amps
Alt 'X' SetPoint	Voltage which the regulator is trying to maintain for the current regulation stage.	Volts
Alt 'X' Digital Field Control	Immediate value of the control input to the alternator.	%
Alt 'X' Voltage Drop	Immediate voltage drop between the engine "X" alternator and the House Battery.	Volts
Alt 'X' Upper Field Control Limit	Upper limit for the control input to the engine "X" alternator(s). Dependent on the limitations set for the current regulation stage.	%
Alt 'X' Lower Field Control Limit	Lower limit for the control input to the engine "X" alternator(s). Dependent on the limitations set for the current regulation stage.	%
Reference Voltage	Measured diagnostic voltage internal to the SCM. Must be 1.023 Volts.	Volts
Internal Supply Voltage	Measured diagnostic voltage internal to the SCM. Must be approximately 7.5 Volts.	Volts

4.7. SCM USB Connection

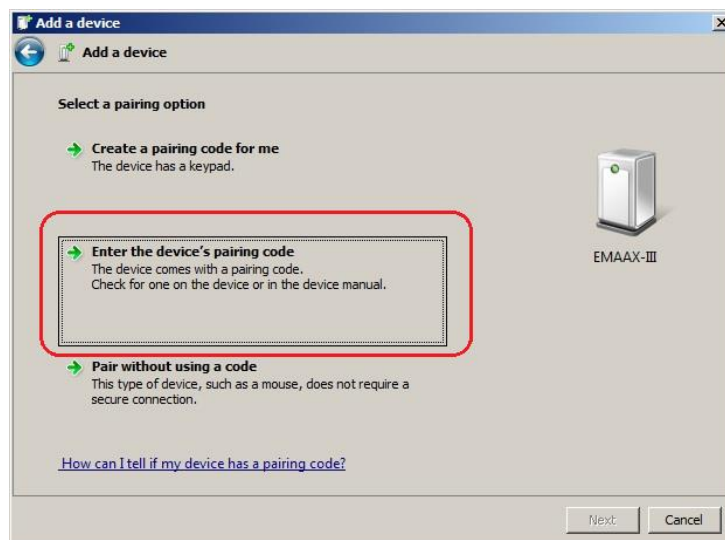
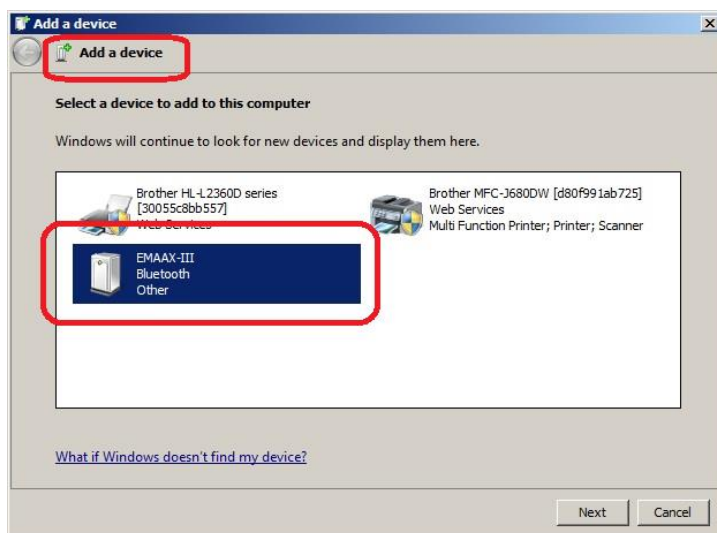
SCM USB connection provides full access to all of the settings and parameters of the E-MAAX AT3 system. FCM does not require any drivers as they are a part of the operating system. When plugged in, *Windows* identifies the FCM as a HID (Human Interface Device) class, and installs the drivers automatically. The E-MAAX AT3 should be visible in the *Windows* Hardware Manager with the following parameters: Vendor ID 0x04D8 and Product ID 0xEB28.

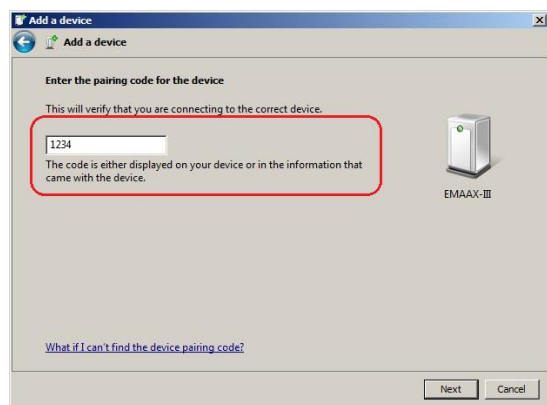
NOTE: The System has either Bluetooth or Wifi connectability which is identified by sticker on the side of the SCM.

4.8. SCM Bluetooth Connection

To use the Bluetooth connection to the E-MAAX AT3, make sure that (a) the **Use Bluetooth** parameter in the SCM settings is set to 1, and (b) your PC has its Bluetooth radio enabled. When User selects **Bluetooth** as the current connection in the software, it looks for available connections.

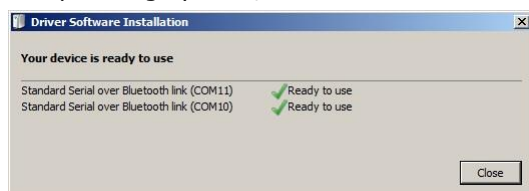
If not found, it is necessary to run Bluetooth discovery and pairing procedure. When trying to pair, device scan must show "E-MAAX-III".





Use "1234" as the pairing code. After successful scanning and pairing, the device will identify in the system as a serial port with automatically assigned number and parameters.

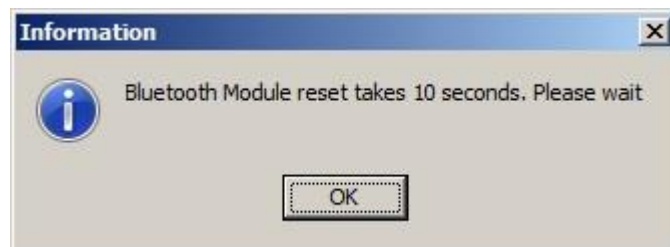
Drivers are internal to the operating system, and are installed after the pairing code has been entered.



After the driver install, the E-MAAX AT3 shows up in the list of the Bluetooth devices.

To re-initialize the Bluetooth module and erase all stored pairings; connect via a USB connection and select **Reset Bluetooth radio** from the menu. The software requires a wait time of 10 seconds.

The Bluetooth connection allows reading of the current system state and settings only, a USB connection must be used for setting changes.



4.8.1. Regulatory Approval

This section outlines the regulatory information for the AT3 for the following countries:

4.8.1.1. United States

Contains FCC ID: T9J-RN42.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

4.8.1.2. Canada

Contains transmitter module IC: 6514A-RN42

This device complies with Industry Canada license exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device. Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

4.8.1.3. European Union

Certification	Standards	Article	Laboratory	Report Number	Date
Safety	EN 609501:2006 + A11:2009 + A1:2010 + A12:2011	[3.1(a)]	Worldwide Testing Services (Taiwan) Co., Ltd	W6M21402-13966-L	2014-03-24
Health	EN 62479:2010			W6M21402-13966-62479	2014-03-13
EMC	EN 301 489-1 V1.9.2 (2011-09) EN 301 489-17 V2.2.1 (2012-09)	[3.1(b)]		W6M21402-13966-E-16	2014-03-13
Radio	EN 300 328 V1.8.1 (2012-06)	(3.2)		W6M21402-13966-T-45	2014-03-13
Notified Body Opinion	CE0681	-	Eurofins Product Service GmbH	U9M-1404-3736-C-V01	2014-04-15

4.9. SCM Wi-Fi Connections

Wi-Fi interface is the only way for a user to observe the system state and change settings.

When using an AT3 in Wi-Fi in Access Point Mode (the "Wi-Fi Mode" parameter is set to 2), the AT3 creates its own wireless network, and acts as a dynamic server on it. SSID of the network is set as the value of the "Wi-Fi SSID" parameter. Access Point Mode does not require any passwords to connect to it. The local IP address of the server is always set to "192.168.0.1". No password required.

In order to connect to it, users run an internet browser on any platform, and type the local IP address in the address bar.

When using an AT3 regulator Wi-Fi in Station Mode (the "Wi-Fi Mode" parameter is set to 1), the AT3 connects to an existing wireless network as a device, and acts as a dynamic server on it. The "Wi-Fi SSID" and "Wi-Fi STA Password" parameters must be set according to the wireless network's settings.

The local IP address of the AT3's web server is set by the host network it is connected to. The "Wi-Fi AP IP Address" parameter has no meaning in the Station Mode. The network router would show the local IP address of the AT3 under the value of the "Device Name" parameter.

The AT3 tries to connect to an existing network for 10 seconds. If the connection was not successful, it defaults to the Access Point Mode with the network SSID "AT3" and no password. Local IP address is set to "192.168.0.1". This is to allow the users to revise the connection settings and try to connect again.

Remote Support is an option when users can allow the system state and settings to be viewed and modified remotely via Internet by the system supplier (ElectroMaax or sales distributor). This only works when the AT3 is connected in the Station Mode to a local wireless network with Internet access. Typical example of use would be a cell phone with a Wi-Fi HotSpot and cell data enabled at the same time.

Table below shows the parameters of the Wi-Fi transceiver of the AT3 system:

Parameter	Value	Units
Center frequency range	2412 .. 2484	MHz
Wi-Fi wireless standard	IEEE 802.11b/g	-
Data rate at 20MHz 11b	1, 2, 5.5, 11	Mbps
Data rate at 20MHz 11g	6, 9, 12, 18, 24, 36, 48, 54	Mbps
Antenna type	PCB trace antenna	-
TX Power 11b at 1 Mbps	19.5	dBm
TX Power 11b, 11 Mbps	19.5	dBm
TX Power 11g, 6 Mbps	18	dBm
TX Power 11g, 54 Mbps	14	dBm

In order to view the information on the AT3's website, users run an internet explorer on any platform, and type the local IP address in the address bar. When a gauge is grayed out, it means that there is no corresponding input. Field Reduction Switch buttons "FRS+" and "FRS-" appear when the AT3 is charging. Remote Support is enabled by clicking "Share Data with Support" button in the "About" section of the website.

4.10. SCM NMEA-2000 Connection

E-MAAX AT3 system can be connected to an existing NMEA-2000 network allowing current regulator status to be displayed on the vessel's displays.

Network credentials are as following:

- NMEA2000 VID = 1127 decimal or 0x0467 hex
- NMEA2000 PID = 25936 decimal or 0x6550 hex
- NMEA2000 Product Name = Electromaax
- NMEA2000 Function Code = 141
- NMEA2000 Class Code = 35
- NMEA2000 Software Version = 1.0
- NMEA2000 Standard = 3.101

The AT3 regulator reports the state of the "DC Sources" such as:

- a) "DC source #0" shows the following values:
 - Alternator Voltage
 - Alternator Temperature
 - Engine RPM
- b) "DC Source #1" shows the following values from another X regulator connected to the given X regulator:
 - Peer Alternator Voltage
 - Peer Alternator Temperature
 - Peer Engine RPM
- c) "DC Source #2" shows the following values:
 - Alternator Current
 - Peer Alternator Current
 - Battery Current
 - Load Current
 - Load Voltage
 - Battery Temperature
 - Battery Voltage

The following PGNs are transmitted over the network:

- PGN127506()
- PGN127508()
- PGN127751()

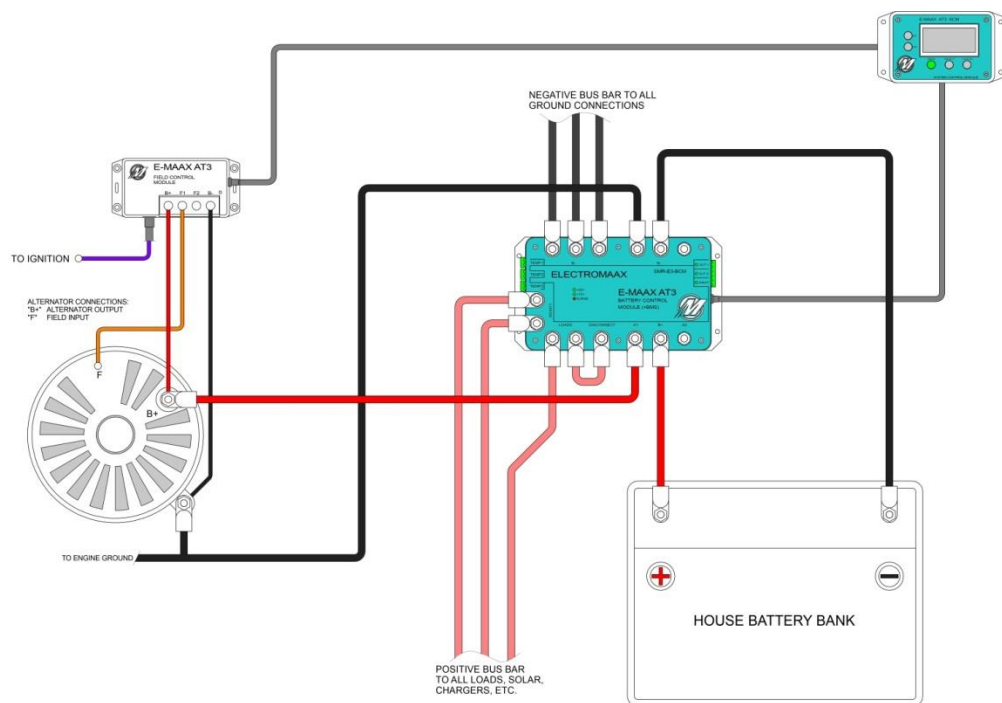
5.0. Examples of System Wiring

The following schematics illustrate the connections required for the various configurations;

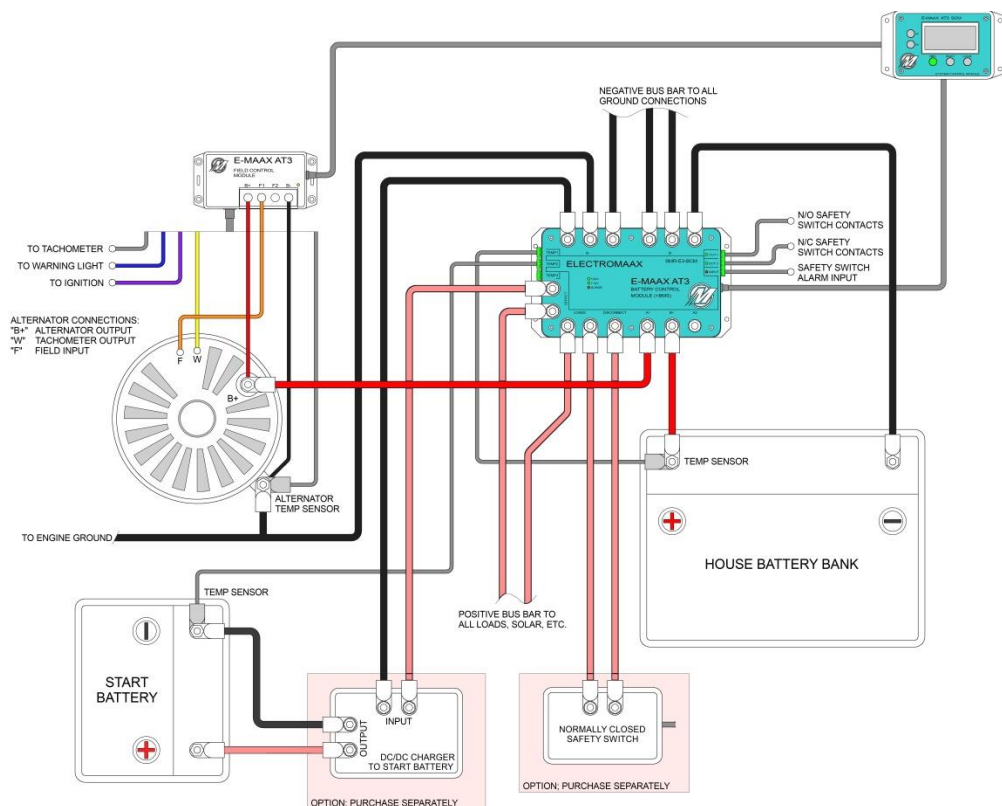
Illustration	Configuration
A	Basic System Connections
B	1 Engine / 1 Alternator
C	1 Engine / 1 Alternator/ Remote rectifier
D	1 Engine / 2 Alternators
E	2 Engines / 1 Alternator per Engine
F	Full System – 2 Engines / 3 Alternators / Remote rectifier

Disclaimer:

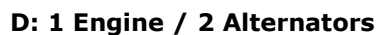
The below schematics, for clarity, have **not** shown ancillary components such as; fuses /circuit breakers / Master disconnect switches / battery isolators / charging relays, etc.
Always consult a qualified electrical technician if unsure about connections.

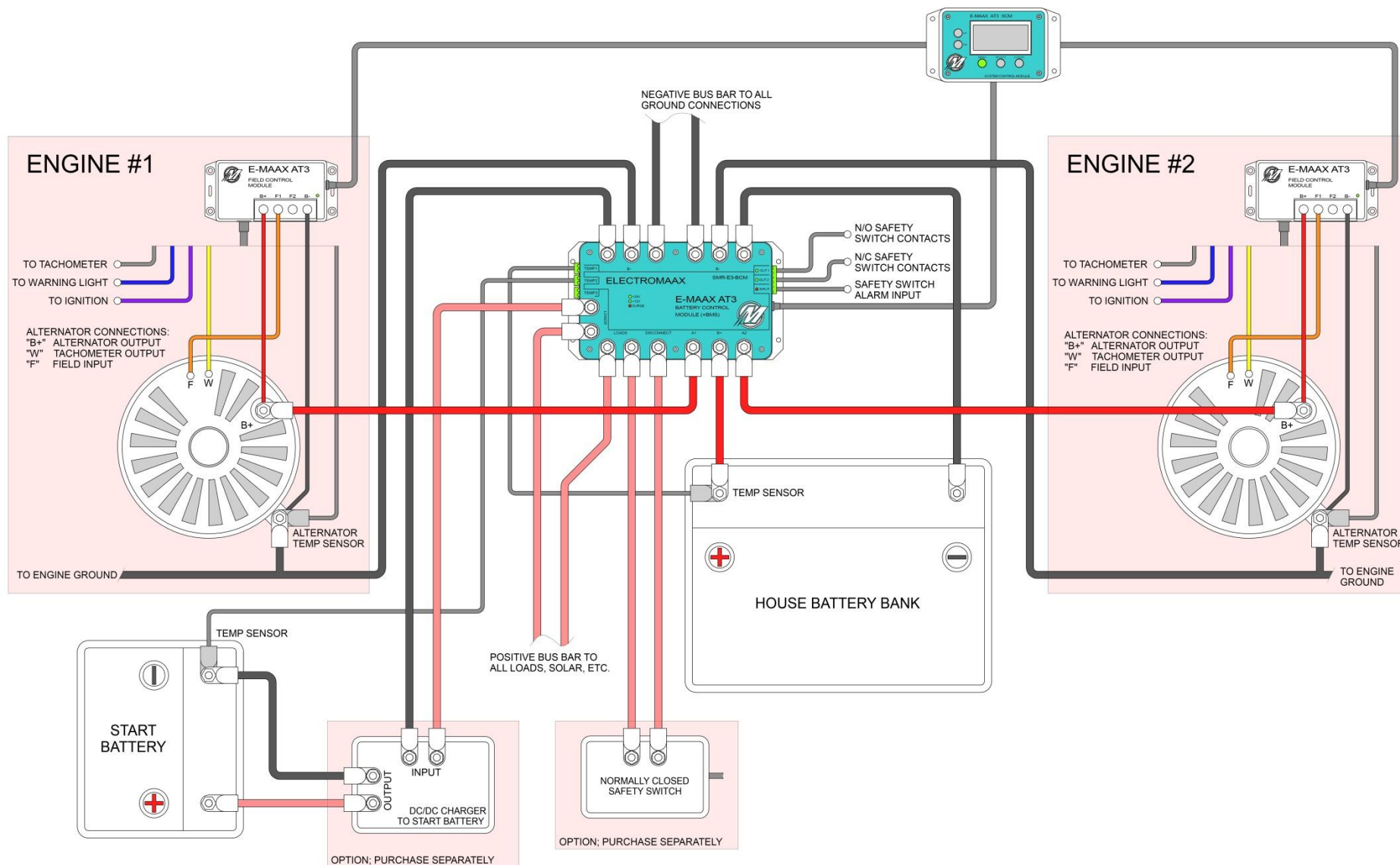


A: Basic System Connections

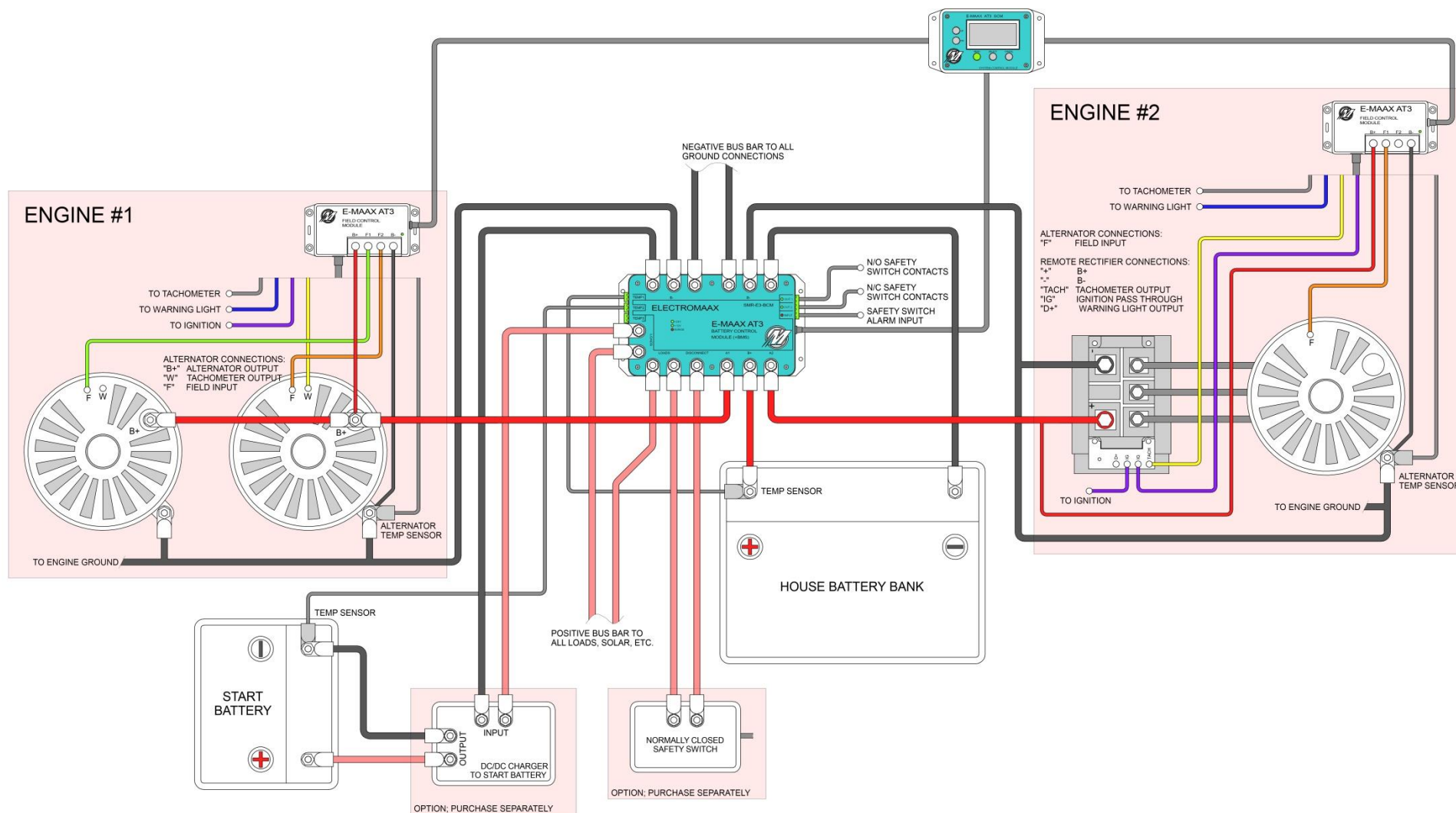


B: 1 Engine / 1 Alternator





E: 2 Engines / 1 Alternator per Engine



F: 2 Engines / 3 Alternators