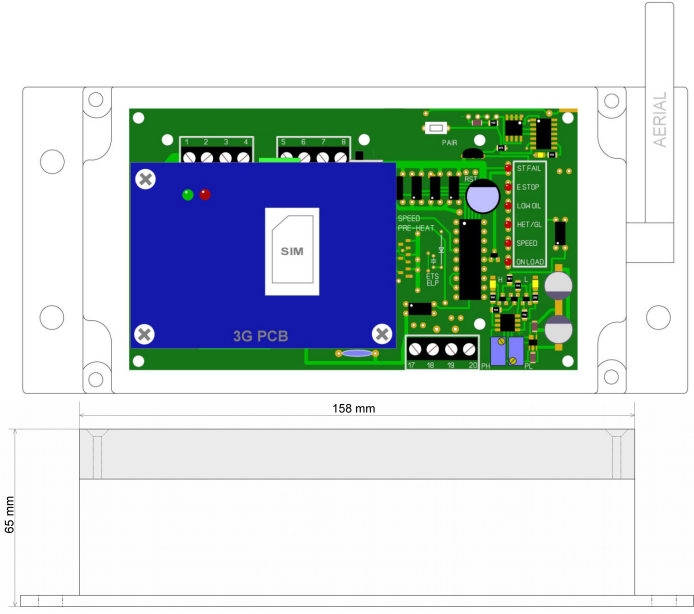




MULTI-ATTEMPT AUTOMATIC ENGINE CONTROL MODULE

Model No: **AECM105**

PREFACE	AECM105	IP67 rated
<p>The Model AECM105 is a Multi-attempt Automatic Engine Control Module designed to automatically/remotely/manually start and stop the engine. It will indicate the operational status and fault conditions, automatically shut down the engine and indicate the start engine failure with flashing “ST. FAIL” LED as well as informing operator about an issue via SMS. Other functions and possible engine fault conditions are also visually shown via a set of LEDs located on the module.</p> <p>AECM105 is designed to receive start/stop SMS commands from a CS (Control Server) phone number(s) and a start command by calling from a (CS) phone number(s). It is capable of storing up to 10 CS numbers (index 0~9) giving you and your colleagues an equal opportunity to control your engine/generator from any place on Earth where mobile network is available. You won't be charged for a call from CS phone number because the module will hang up incoming call immediately after recognizing you as a valid operator. AECM105 is fitted inside a polycarbonate IP67 rated enclosure. Wired remote control is available through terminals 5 & 13 [using maintained N/O switch]. Wireless local control via a key fob is available as an option. Programming and operation is via specially coded SMS and/or PC described in this manual.</p>		

IMPORTANT!

THIS CONTROL MODULE MUST NOT BE CONNECTED DIRECTLY TO STARTER MOTOR, FUEL SOLENOID, LOAD CONTACTOR OR A GLOW PLUG. APPROPRIATELY RATED EXTERNAL POWER RELAYS SHOULD BE USED AS IT IS SHOWN ON THE DIAGRAM PROVIDED.

The starter relay R1 can only energize for 2nd and 3rd crank cycle if “Low Oil Pressure” is sensed, to confirm that the engine is stationary. Should the engine still fail to start after the maximum number of attempts, “START FAIL” LED is displayed and the starter is latched out.

AECM105 numbered cable	Default Setting
1. Remote wired start/stop input	N/O maintained switch (RST). Sold separately if required.
2. Starter motor relay output	Batt. pos. output
3. Oil pressure switch input	N/C (normally closed when engine is not running)
4. Emergency stop button switch input	N/O type (N/C type is also available as an option)
5. Fuel solenoid relay output	Batt. pos. output
6. Engine temperature switch input	N/O type (N/C type is also available as an option)
7. Battery positive power supply (+)	12Vdc / 24Vdc (6...40Vdc)
GR/Y. Battery negative power supply (-)	Common wire (Green/Yellow)
9. Glow plug relay output (optional)	Batt. pos. output
10. Load control relay output (optional)	Gen. live output: contactor control. (R4 could be also operated via SMS (optional).
11. Generator live input (L)	100~300Vac
8. Generator neutral input (N)	100~300Vac

AECM105 specification

DC Supply: generator battery 12V or 24V (6...40Vdc)
 Max. standby current: 10mA @12Vdc
 AC voltage input max: 300Vac
 Under speed S/D @ 30Hz (45Hz for USA and Canada)
 Over speed S/D @ 57Hz (69Hz for USA and Canada)
 Number of attempts: 3 (user-configurable prior to order)
 Crank duration: 12sec (automatically regulated via sensing AC alt.)
 Pre-heat time: 10sec (user-configurable prior to order)

Load On/Off delay: 60 sec (user-configurable prior to order)
 Hold-off time*: 7sec (user-configurable prior to order)
 Starter / Fuel / Glow / Load relay output: 10A max
 Dimensions: 158x90x65mm
 Operating temperature range: -30 to +70°C
 Humidity Range Operating: 20-80%
 Enclosure IP code: IP67 (weatherproof type)

Mobile Network Communicator Working Frequencies (2G and 3G)

Quad Band: GSM/GPRS/EDGE 850/900/1800/1900Mhz, Dual Band: UMTS/HSDPA 850/1900Mhz.



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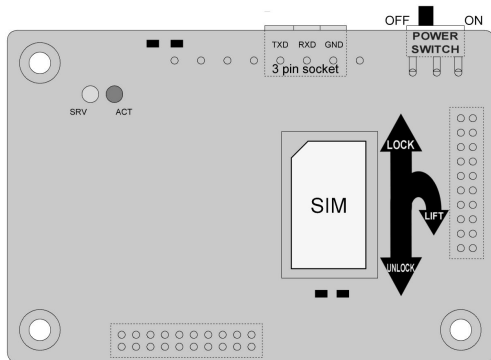
Description	
START AND RUN CYCLE	
<p>0.5 Second after the fuel relay R2 is energized [wire 5], the multi attempt start will begin its start sequence: the start relay R1 will energize, feeding battery +ve [on wire 7 to wire 2 and thence on to the start circuit]. If the engine has not fired by the end of 1st attempt, the starter is turned off for a resting period. The sequence will then repeat up to a maximum number of start attempts. Following a successful start, sensed when the generator starts producing AC power and (or) oil pressure switch changes its state, the start relay is de-energized and latched out to prevent re-engagement of the starter with the engine running.</p>	
PRE-HEAT CONTROL (optional) Make sure "pre-heat" DIP switch 1 is "ON"	
<p>When pre-heating cycle is timed out (provided via internal relay R3, wire 9) and flashing LED (HET/GL) on the panel is turned off, the fuel relay R2 is energized and the multi attempt start will begin its start sequence: the start relay R1 will energize, feeding battery +ve on terminal #14 (wire 7) to terminal #1 (wire 2) and thence on to the start circuit. If the engine has not fired by the end of 1st attempt, the starter is turned off for a 20 sec. period. The sequence will then repeat up to a maximum number of start attempts. Following a successful start, sensed when the generator starts producing AC power and (or) oil pressure switch changes its state, the start relay is de-energized and latched out to prevent re-engagement of the starter with the engine running.</p>	
LOAD CONTROL (optional)	WIRELESS CONTROL (optional)
<p>After a successful start, when engine's parameters are settled (when 7 sec time delay provided by hold-off timer is timed out, then warm-up time delay is timed out), the Load Control Output (relay R4) will energize (ON LOAD LED will lit) and send a signal from terminal #4 (wire 10) to an external customer's contactor which will connect the AC alternator output to the load. The warm-up time before accepting load and cool-down time after relieving load (while generator is still running and is ready to accept the load again if the remote/local start signal is switched back on) are re-programmable (by us) with a limit of 255 sec [4.25 min] max. (for each timer). Please contact us first if specific time settings are required. Otherwise the module will have 60 sec warm-up/cool-down time delays.</p>	<p><i>Toggle switch RST is Off</i></p> <p>Make sure there are no metal doors/walls/other metal shields between you and AECM105 module. Any metal or brick wall may significantly reduce the working distance between the transmitter (key fob) and AECM105 module.</p> <p>Press red button on a key fob for 1 sec and release it. The generator should try to start within a few seconds.</p> <p>Press it again to stop. If controlled generator doesn't start - try to pull out the telescopic aerial on key fob and press red button again. If unsuccessful - come closer to the module.</p> <hr/> <p><i>Wireless transmitter/receiver specification</i></p> <p>Receiver: internally fitted pcb. Transmitter/Receiver working frequency: 315/433Mhz Number of channels: 2 Encoding type: fixed code</p>
RELAY OUTPUTS ARE PROVIDED FOR:	CONFIGURABLE INPUTS ARE AVAILABLE FOR:
<ul style="list-style-type: none"> • Starter Motor Output R1 • Fuel Solenoid Output R2 • Glow Plug Output R3 (optional) • Load Control Output R4 (optional) 	<ul style="list-style-type: none"> • Wired remote start/stop • High engine temperature • Oil pressure • Emergency stop • AC alternator monitor
MULTIPLE ALARM CHANNELS ARE PROVIDED TO MONITOR THE FOLLOWING:	
<ul style="list-style-type: none"> • Under/Over speed S/D (speed fault). This alarm sensor can be enabled/disabled via SPEED DIP switch 2. • Low oil pressure S/D. "LOW OIL" led is lit when fault is identified. • High engine temperature S/D. "HET/GL" led is lit when fault is identified. • Fail to start S/D. "ST.FAIL" led is lit when fault is identified. • Emergency stop S/D. E. STOP led is lit when fault is identified. 	
<p><i>* During engine cranking and for a short time afterwards the protective hold-off timer (7 sec) is active and the relevant alarms inputs are inhibited. This enables the engine to start and achieve normal running conditions. Once the timer has expired, the inputs are enabled providing normal protection from the module.</i></p>	



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MOBILE NETWORK COMMUNICATION AND MANAGEMENT



This image represents the upper blue PCB fitted into your AECM. This PCB is a mobile network communicator which is able to translate your SMS commands and phone calls into specially formed signals. These signals go to a lower green PCB which is designed to read and execute all signals coming from the upper blue PCB and act accordingly. The lower green PCB translates all incoming signals into engine control commands, switching on and off all required relays and activating sensors.

AECM105 usually comes with all required settings already uploaded and able to start working. If it has been correctly wired into your generator/engine system according to a wiring diagram provided. Depends on customer's requirements the wiring diagram and some other parameters and functions may be modified by us. The customer is notified about these changes. In some cases the customer needs to upload a "CS" phone number(s). After that the customer can text or call from that CS number to AECM105 unit and the unit should recognize his commands.

How to upload CS numbers from PC:

1. Connect AECM105 unit to power supply 12Vdc or 24Vdc (wires GR/Y and 7)
2. Connect RS232 cable to your PC and plug in the other green end to the 3 pin socket located on the blue PCB (shown above).
3. Run the "5005 en" software (supplied over email) or downloaded via [this link](#). This is a "virus free" program.
4. Click "Set up Mode" tab (see the image below). The program will ask to turn the power switch from off to on. Then move the power switch from "OFF" to "ON" position.
5. Wait for approx. 1 min (waiting time depends on actual speed of your PC) until the program finished reading all current settings from AECM105 unit.
6. Select "CS Phone number" tab. Enter your 1st "CS0" number as shown below. Repeat this step if more CS numbers are required to set up.
7. Click OK and close the program then unplug the programming cable.
8. Move the power switch to "OFF" then "ON" again. Wait for SMS coming in a few min/sec to your CS number.

When all programming finished and the AECM105 unit sent all confirmations about the engine state and asked to reply "999" to set up the current time (please reply "999" so the unit could have the current time set up) the customer can start using AECM105 unit.

Text "start" to start the engine or,

Call from CS number to start the engine. (You cannot stop the engine by another CS call! Please text "stop" to stop it)

Text "stop" to stop the engine

Text "status?" to request the current state of the engine.

Text "on" to switch on the extra relay 4 (optional).

Text "off" to switch off the extra relay 4 (optional).

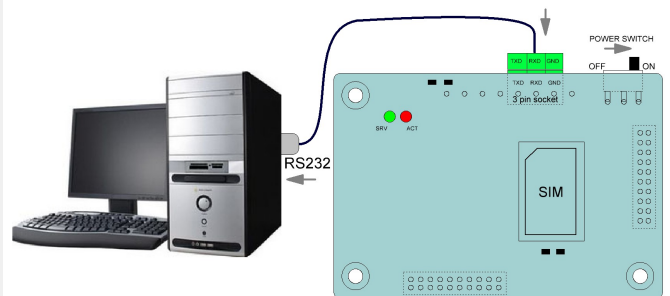
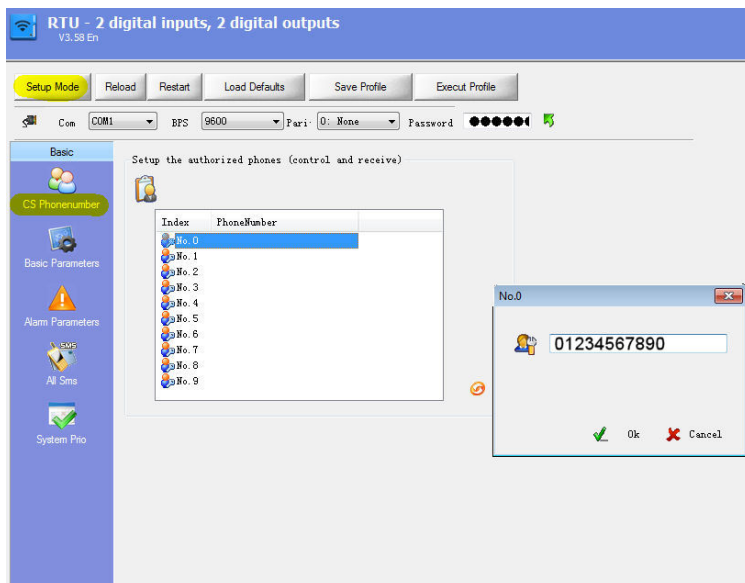
Add new CS number via SMS command (from a CS number entered earlier):

text "CS1=XXXXXXXXXX" where "XXXXXXXXXX" is your new CS phone number and "<1>" is the phone index (0...9).

Query all available CS numbers: text "CS?"

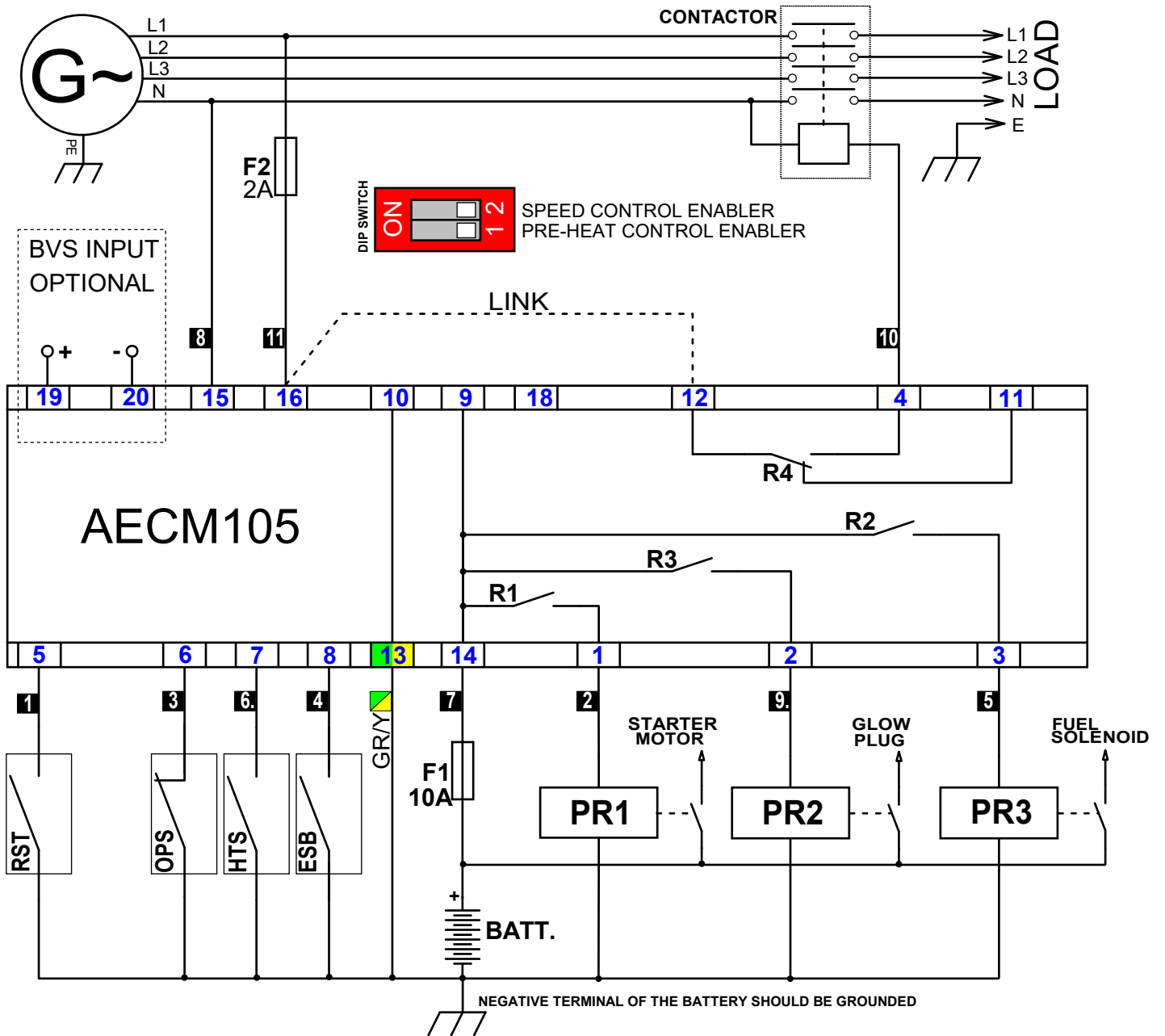
Delete CS1 number: text "CS1". This way you are able to delete any CS number (index 0...9)

DO NOT DELETE THE "CS0" number via SMS, otherwise the unit will stop responding to commands and you will need to enter it again with cable and PC.





Wiring Diagram





BVS (Optional)

The BVS (Battery Voltage Sensor) allows the AECM (Automatic Engine Control Module) to start and run the engine automatically when your engine starting battery is ready to be charged. The BVS monitors two voltage thresholds: Low Voltage Threshold (LVT) and High Voltage Threshold (HVT). When controlled voltage becomes equal to LVT the BVS tells the AECM to start and run the engine until it measures HVT.

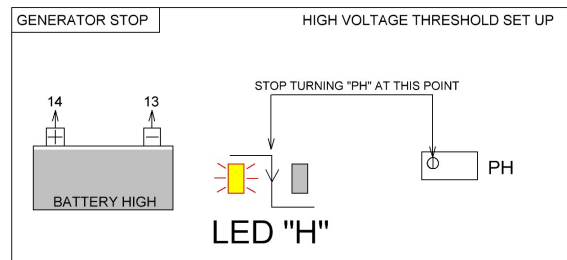
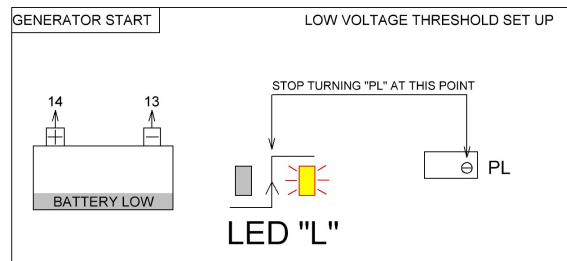
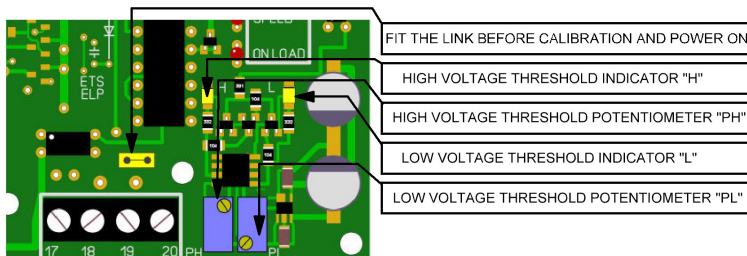
Please note that BVS usually controls the engine starting battery voltage which is also a power supply to the AECM105. Should you wish to control an independent battery (not an engine starting battery!) please contact us prior to order. In this case terminals #19 and #20 become available for you. The BVS input is designed to control DC voltage from 6Vdc to 30Vdc max. and we can pre-set desired voltage HVT and LVT for you.

This BVS enabled control module comes with following BVS default thresholds:

Start the engine @ 11.8 Vdc (or 23.6Vdc for 24V battery)
Stop the engine @ 13.8 Vdc (or 27.6Vdc for 24V battery)

Please note: you can always re-calibrate these thresholds on-site.

How To Calibrate BVS



NOTE

It is advisable to use an adjustable DC power supply unit (0V to 30V adjustable voltage output), instead of real battery to speed up the process of calibration.

HOW TO SET UP THE BVS LOW THRESHOLD

Disable AECM105 by applying Emergency Stop Button "ESB". This prevents the engine from accidental start up during calibration process of BVS. Connect your discharged (ready to be charged) engine starting battery to terminals #13 (wire GR/Y) and #14 (wire 7). Start turning "PL" (very slowly) clockwise/anticlockwise* until LED "L" changes its state from OFF to ON. Stop turning immediately when you notice this change.

HOW TO SET UP THE BVS HIGH THRESHOLD

Connect your fully charged engine starting battery to terminals #13 (wire GR/Y) and #14 (wire 7). Start turning "PH" (very slowly) clockwise/anticlockwise* until LED "H" changes its state from ON to OFF. Stop turning immediately when you notice this change. Enable AECM105 by switching off Emergency Stop Button.

The accuracy of these adjustments could be as good as ± 0.1 V
*Note: the direction of turning depends on previous threshold settings and is usually clockwise, however sometimes it needs to turn anti-clockwise.

Q1: Which way do I need to turn the pot?

A: To increase your high voltage threshold- turn the pot "PH" anticlockwise.
To increase your low voltage threshold- turn the pot "PL" clockwise.

For instance: your current low voltage threshold is 11.8Vdc. You would like to change it to 12.5Vdc. Discharge your battery down to 12.5Vdc, disable AECM via Emergency Stop Button, connect your battery to terminals 13 and 14 (wires #GR/Y and #7), start turning "PL" clockwise until you see the LED "L" switched On, stop turning "PL" immediately when you notice this change. Enable AECM via Emergency Stop Button.

Q2: How many turns these potentiometers have?
A: Up to 30 turns.