WHAT IS AN AMF CONTROLLER?

An AMF controller governs all functions of a standby generator. It automatically manages the connection assignment of the LOAD to MAINS or GENERATOR. The AMF controller is the core of AMF panels.

AMF CONTROLLER FEATURES

All parameters, alarms, and operating functions are indicated using a 128X64 graphic display capable of operating in a temperature range between -15°C and +50°C. The AMF controller measurements include Vac, Aac, Vdc, kVA, kVar, kW, Energy, Pdf, Hz, hour count, R.p.m., Oil Pressure, Engine Temperature, Battery Vdc (Engine), and Fuel Level. The AMF controller complies with NFPA-110 / NFPA-99 specifications.

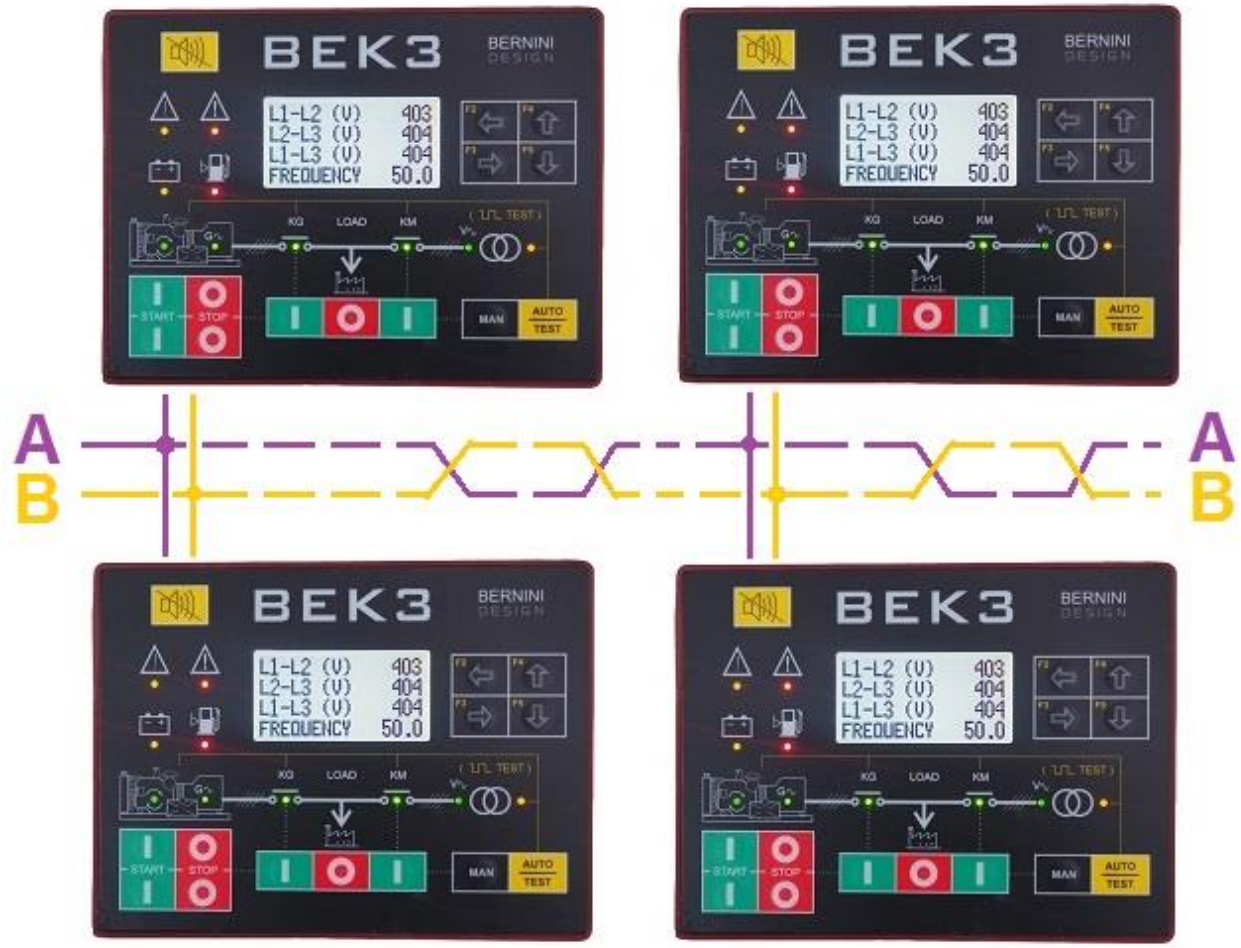
AMF CONTROLLER CANBUS

Regarding engines with ECU, this AMF controller features a fully isolated CANbus capable of supporting the J1939 protocol.

AMF CONTROLLER MODBUS-RTU

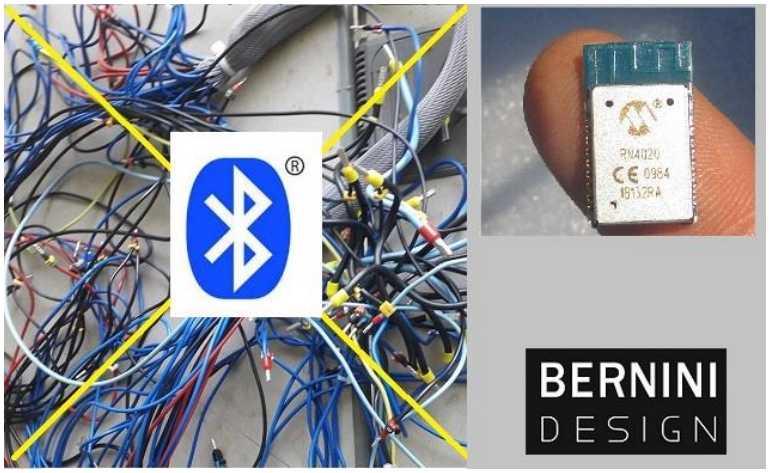
The AMF controller features an RS485 powerful serial interface capable of driving a 1000m twisted pair and 127 nodes. It completely supports the MODBUS-RTU protocol.

We supply accessories and serial interface adapters with free-of-charge remote monitoring software.



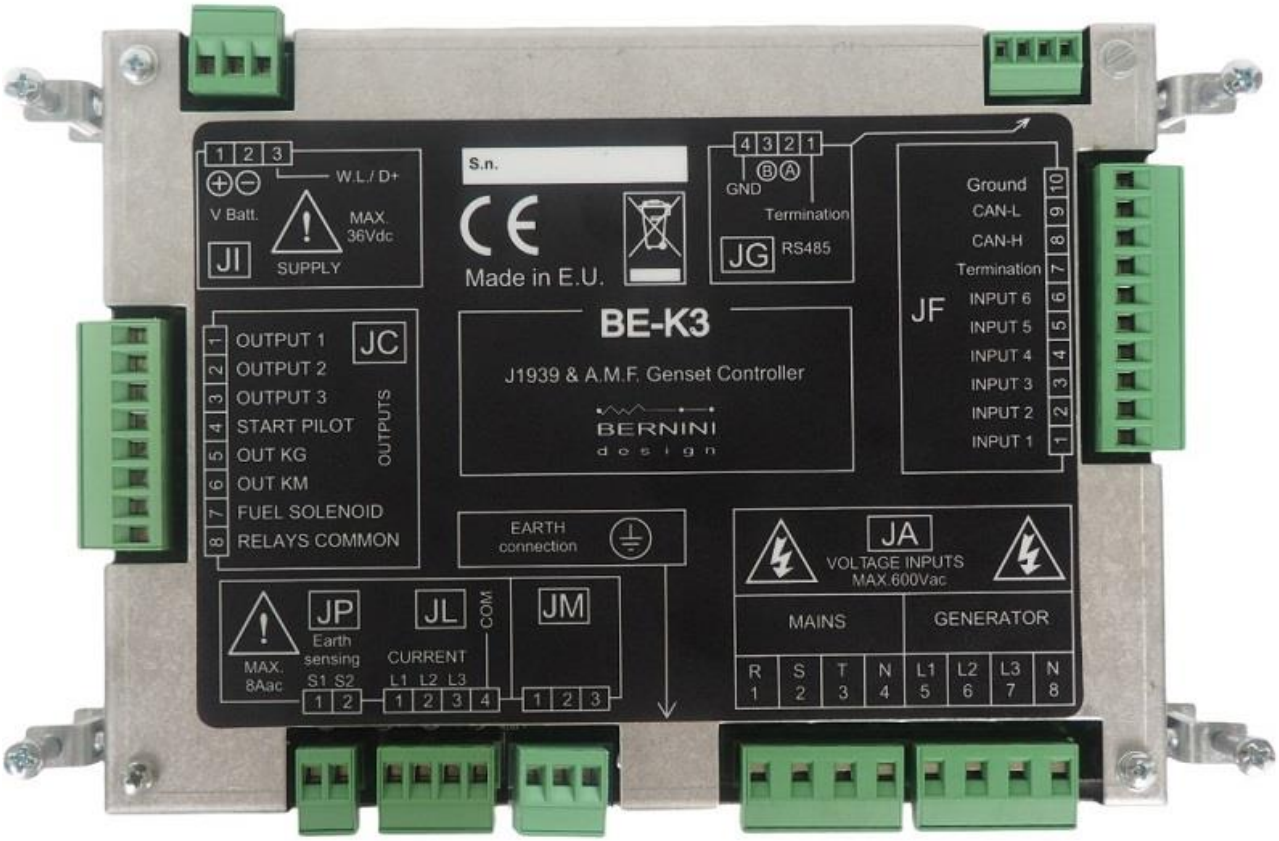
BLUETOOH-BASED I/O 16 CHANNELS INTERFACE BOARD

Save money an time. We have environmental-friendly solution. With our AMF controller you save as much as 50% of cables.



A "ROCK SOLID " AMF CONTROLLER WITH AN ENCLOSURE MADE OF STEEL

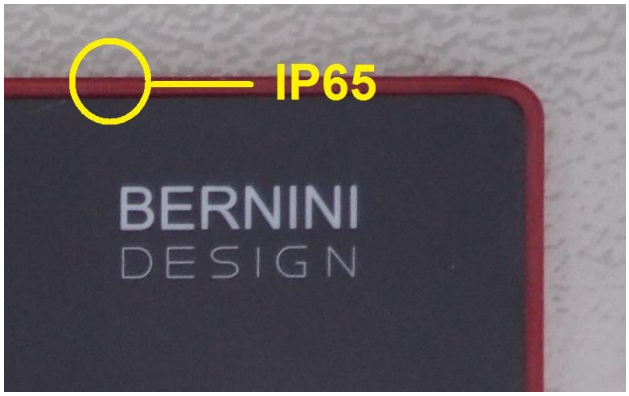
We do not use plastic materials for making RELIABLE AMF controllers. The enclosure of the AMF controller is made of zinc double-coated steel. Zinc is a heavy element, and when alloyed with other metals provides better corrosion resistance, stability, dimensional strength and impact strength.



The rear cover made of metal is the best solution for shock-proof equipment. It provides excellent protection against electromagnetic fields by enclosing the 32-bit processor into a Faraday cage. This gives an extraordinary advantage over competitors' plastic-based enclosures.

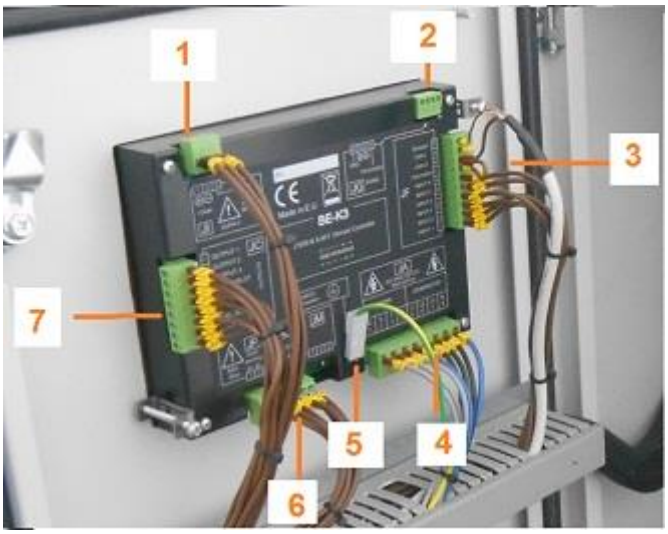
INGRESS PROTECTION IEC60529 SILICON GASKET UV-PROOF

The AMF controller is IP40-compliant. In case you need improved protection, we can separately supply a silicon gasket.



INSIDE AN AMF-BASED PANEL OVERVIEW

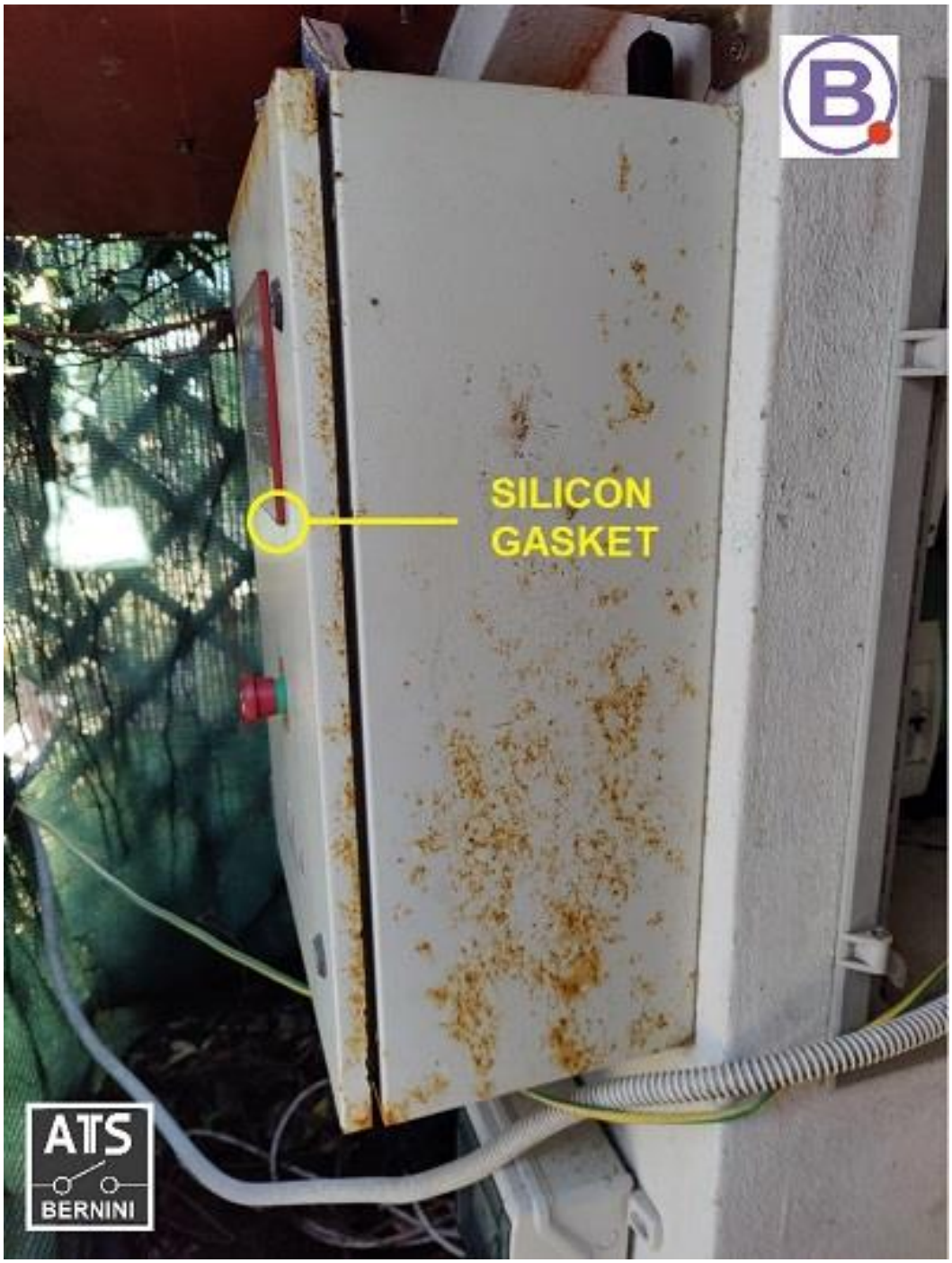
[1] Power supply [2] Modbus port [3] Digital / Analog Inputs [4] Generator & Utility power connections [5] Protection Ground [6] Current transformers



THIS IS HOW IT LOOKS LIKE THE AMF CONTROLLER AFTER 12 YEARS OF SERVICE DAY AND NIGHT ON A BEACH RESORT

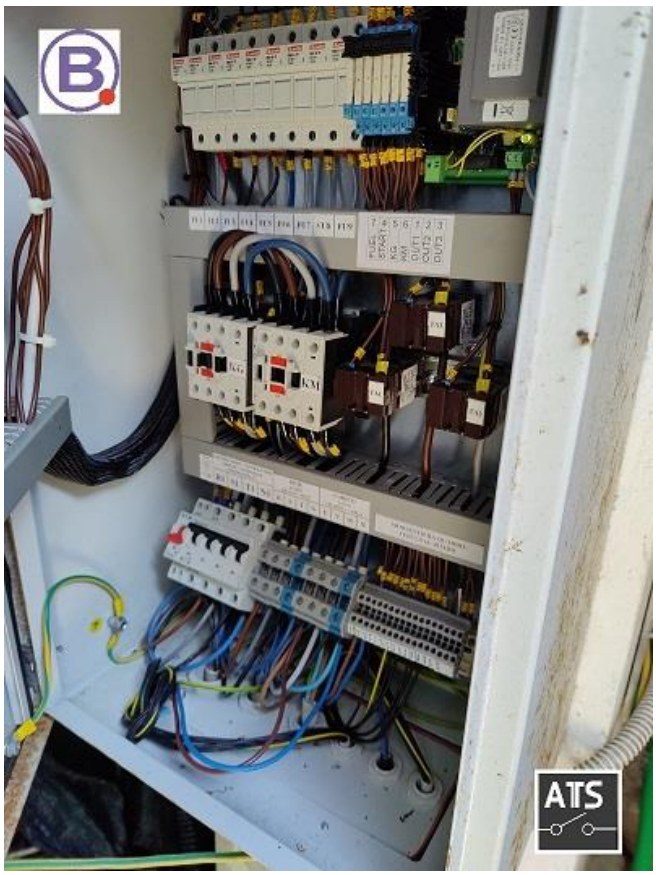
Thanks to the above-mentioned features about quality materials and silicon gasket, this is how it looks like the AMF controller after 12 years of full exposition to elements.

The customer asks us to replace the metal cabinet. We recommended to refurbish it with a special coating resin. The control panel is fully functional. A replacement of the cabinet is time-consuming.



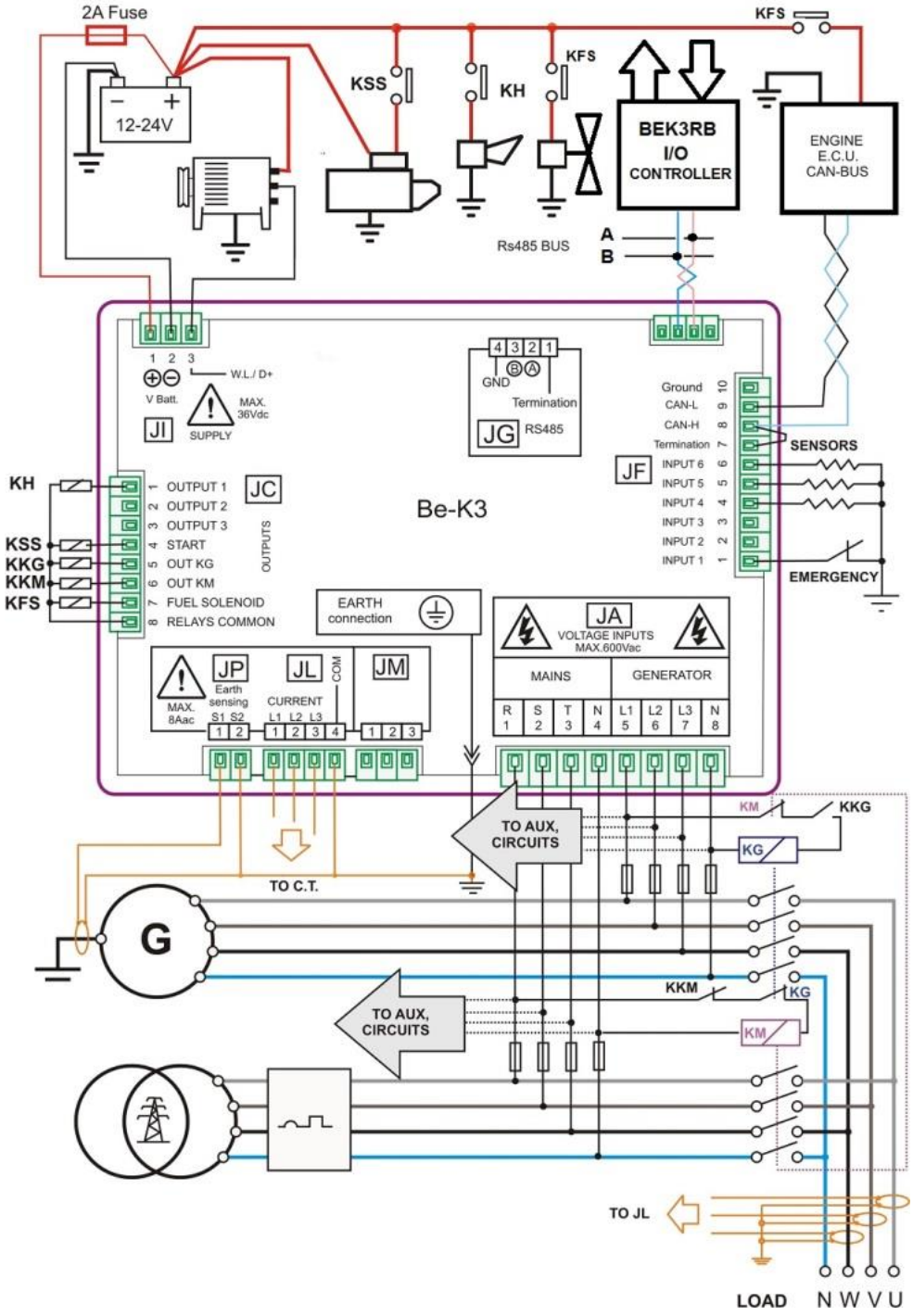
After seeing the shocking images of the panel, you are going to experience a bigger shock looking on the interior of this AMF panel.

Having written that, let's go on with the presentation of this extraordinary AMF controller



AMF WIRING DIAGRAM DESCRIPTION

The AMF controller governs the system and transfers the load to the generator or mains smoothly and with short downtime. This AMF panel wiring diagram illustrates the connections of the AMF controller. It monitors the parameters of the mains and automatically starts the engine via relays or interface boards. Once the generator provides the correct frequency and voltage, the controller transfers the load from the mains to the generator.



This happens after a mains failure programmed delay (seconds, minutes or hours). When the engine is cold, the AMF controller provides a warm-up time to run the engine offload. Once the mains has been restored, the AMF controller will connect the load to the mains automatically. After a time delay, the engine is then stopped.

HOW DOES IT WORK IN DETAILS THE AMF CONTROLLER

The AMF controller closes the **KM-AUX** and **KG-PILOT** contacts to activate the KG (contactor of the generator). In this way, the LOAD is connected to the generator. The KM-AUX are the auxiliary contacts fitted on the body of the utility power contactor (so-called KM). When the KM is open, the **KM-AUX** contacts enable the KG. The AMF controller activates the KG via the **KG-PILOT relay**. The N and L3 of the generator supply the coil of the KG. When switching the generator to the mains, the user observes a short 'power outage'. Normally it is about 2 seconds. This is the typical behaviour of the automatic transfer switch: BREAK-BEFORE-MAKE.

AMF CONTROLLER MAINS-LOAD

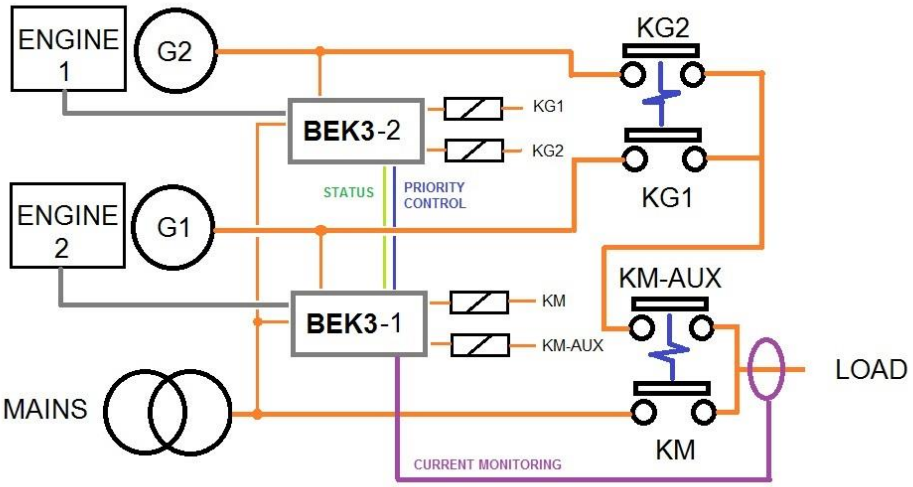
The KM contactor connects the LOAD to the MAINS. The coil of the KM energizes using the **KG-AUX** and **KM-PILOT** contacts. The **KG-AUX** auxiliary contacts have a mechanical connection with KG. The contacts close when the KG opens. T**he KM-PILOT** is the utility power control relay. This relay is OFF when the mains is within the settings. In this case, the COIL of the KM is supplied via the N and L3 of the MAINS. By using the normally closed contacts, we are sure to provide priority to the mains in case the AMF controller is damaged or without supply. In case of mains failure, the AMF controller energizes the **KM-PILOT**. The **KM-PILOT** contacts will open the KM. Once the KM is open, the auxiliary contacts **KM-AUX** will close. This is one of the mandatory conditions to close the KG (the KM must be open in the first place).

REDUNDANT MUTUAL DUAL-GENERATOR CONFIGURATION AMF PANEL

Regarding special applications, the AMF controller reveals its special character. The adjustable settings of the AMF controller can easily manage a dual-generator configuration.

AMF CONTROLLER DUAL GENERATOR SINGLE LOAD CONFIGURATION

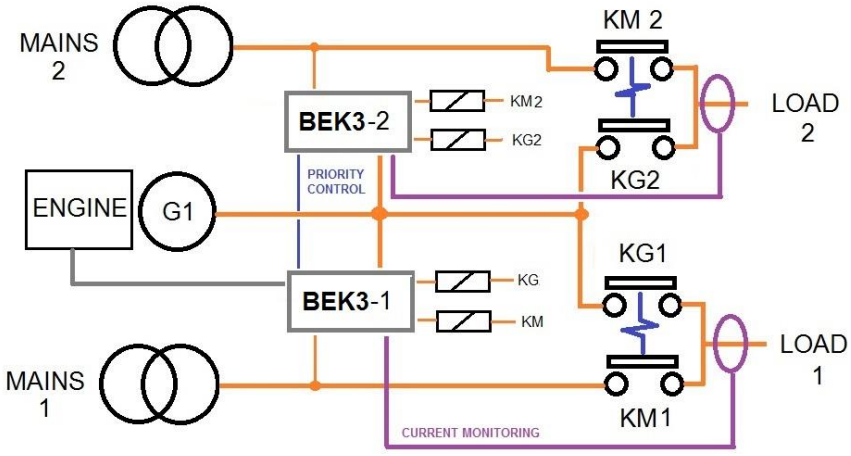
By using this AMF panel wiring diagram, you can connect two generators as an emergency standby to one load. This is not a parallel configuration. It is a basic BREAK-BEFORE-MAKE configuration. In a prolonged power outage, you can set up one generator as a master. In case of failure, the second one will supply the load.



On the same principle, you can set up a timer for supplying the load. For example, you can set up 6 hours for each generator.

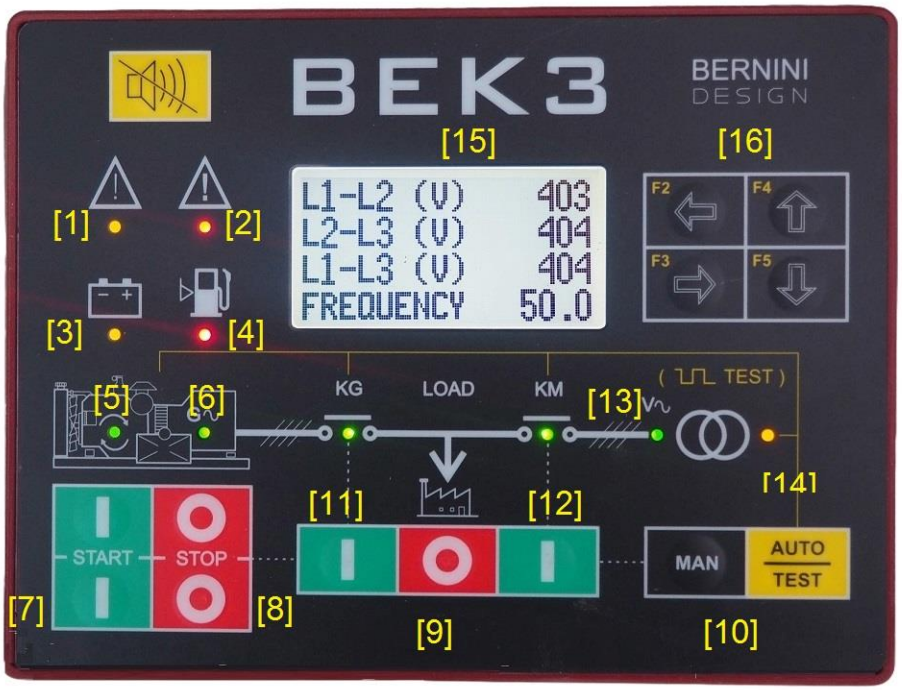
DUAL LOAD WITH A SINGLE GENERATOR

By using this AMF panel wiring diagram, you can connect one generator as an emergency standby to serve both loads. This is not a parallel configuration. The generator will supply the only load that suffers a utility power condition.



Could be only one load or both. The generator will start in case of one utility power failure and stop when the loads can be supplied by the utility power.

A USER-FRIENDLY AMF CONTROLLER



[1] Warning indicator [2] Shut down indicator [3] Battery alarm [4] Fuel Alarm [5] Engine is running [6] Generator Voltage [7] Engine start button [8] Engine stop button [9] AMF manual control buttons

AMF CONTROLLER GENERAL FEATURES

80 OPTIONS FOR EACH ADJUSTABLE OUTPUT

5-PROGRAMMABLE LE RELAY OUTPUTS

35 OPTIONS FOR EACH ADJUSTABLE INPUT

6-PROGRAMMABLE DIGITAL INPUTS

12-INPUT/12-OUTPUT EXPANSION BOARD

200 EVENTS LOG HISTORY TAGGED BY R.T.C.

600VAC 3-PHASE VAC MONITORING

EARTH FAULT MONITORING

OVER 150 ADJUSTABLE SETTINGS

14-BUTTON INDUSTRIAL CONTROL PANEL

GRAPHIC 128X64 LCD DISPLAY

SUNLIGHT READABLE DISPLAY

GENERATOR INSTRUMENTS
ENGINE INSTRUMENTS

BLUETOOTH-BASED EXTENSION BOARD

DRIVES MOTORIZED CIRCUIT BREAKERS

WIDE TEMPERATURE OPERATING RANGE

LOOKING FOR A POWER GENERATOR GSM MONITORING?

REMOTE MONITORING SOLUTIONS

The automatic mains failure controller features an RS485 serial interface capable of supporting Modbus RTU. By using appropriate options we can offer GSM remote monitoring TCP-IP remote monitoring, and Modbus remote monitoring.

AMF CONTROLLER SPECIFICATIONS

Supply voltage:

5.5Vdc to 36Vdc, 50-150mA

Protection:

internal 300mA thermal fuse

Dimensions:

192mm X 144mm X 40mm

Panel Cut-out:

187mm X 139mm, indoor operation

Operating temperature range:

-25 deg C up to +70 deg C

Humidity range:

5% up to 95% non-condensing

Weight:

710 grams

Ingress Protection:

IP40 (option IP65)

General design:

ECC 89/336, 89/392, 73/23, 93/68, IEC 68-2-6

Certification:

CE

Static output characteristics:

300mA/100Vdc short circuit proof, negative.

Supply output for relays:

Max 1A at V battery minus 1Vdc (short circuit proof)

Mains and Generator voltage input:

Nominal Voltage input: 70 Vac-600Vac

Overvoltage: 4KVac phase to neutral

Measurement precision:

+/- 2%. Input impedance: 2 Mega Ohm

Current transformer input size:

10/5Aac up to 9900/5Aac

Maximum admissible permanent current:

7Aac

Measurement precision:

+/- 2%. Internal resistance: 0.05 Ohm

Digital inputs Open circuit voltage:

Battery voltage minus 2V - Trigger level: < 2V

Charger alternator monitoring:

Operating voltage up to 36Vdc/3W, accuracy +/- 5%

THE AMF CONTROLLER OUTPUTS

On the removable connector JC you are required to wire the auxiliary relays. The controller provides a common supply rail (JC8). It is about a DC supply suitable for automotive relays that includes over-voltage protection, short circuit protection, and EMI protection. You are required to use 90-200 OHM DC coil relays (12 V or 24 according to your engine battery). The removable connectors JP and JL are provided for the connection of the **CURRENT TRANSFORMERS** suitable for the current monitoring of the **EARTH FAULT** and the current monitoring of the **3-PHASE GENERATOR**. A /5 transformers are required in the range of 50 up to 9900 Amps.

MAINS & GENERATOR CONNECTIONS

The JA removable plug is used to connect the Mains & Generator voltages. Electrical parameters must be in the range of 80-600V and 20-99HZ. The version 400Hz is normally available on request for Aircraft Ground Support Equipment. Protection fuses are highly recommended for cable protection. The connector JF is used for the **ANALOG** and **DIGITAL** sensor fitted on the engine.

CANBUS & MODBUS CONNECTIONS

CANBUS terminals are also provided on this connector (your ECU must be SAE J1939 compliant). The removable plug JG allows you the connect the **RS485** serial interface. The internal driver will allow you to use a 1000 m cable length.

AUTO MODE OF OPERATION

The AMF controller can start the engine at any time. Do not work on equipment, which is controlled by the controller. When servicing the engine, disconnect the battery and battery charger. We recommend that warning signs be placed on equipment indicating the above.

Push the **[AUTO]** push button until the yellow LED illuminates. The engine starts when the controller detects a Mains failure (see section 9.01 for settings). The circuit breaker of the Mains opens after the **[MAINS BREAKER]** timing. After the **[WARM UP]** time if the voltage and frequency are within the settings, the circuit breaker of the Generator will close. If the Mains restores, the KG will open. The KM will close following a programmed **[KM CHANGEOVER]** timing. The engine will stop after a **[COOL DOWN]** time. If the engine shuts down, because of an alarm, the KM closes independently of the Mains status if the **[NFPA-110]** is on, otherwise, the KM will close only if the parameters of the Mains are within the programmed settings. In AUTO mode, the controller will periodically test the engine if the periodic test is correctly programmed. During the test, the yellow LED of the AUTO mode will continue to blink. In AUTO mode, the controller can start and stop the engine if the remote control is activated (Table 9.07 options [25] or [26]). You can stop the engine at any time by selecting the MAN mode.

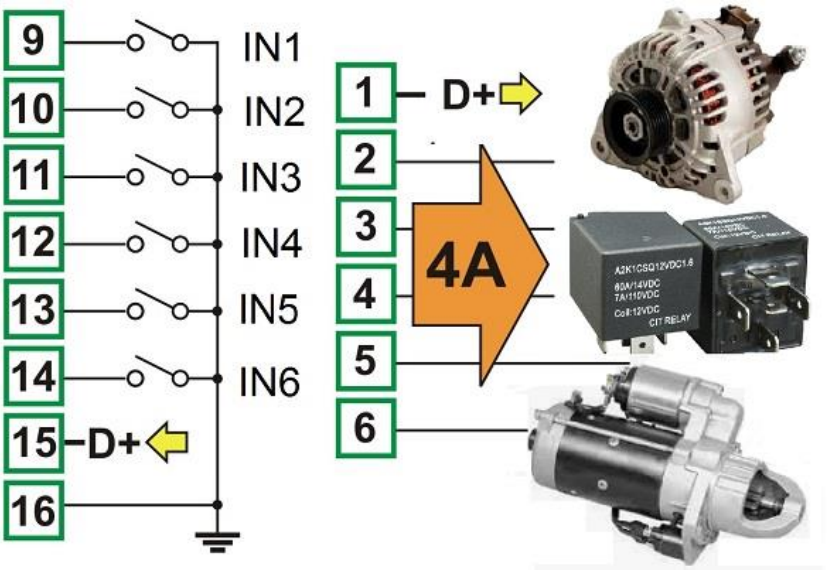
TEST MODE

Push and hold the **[AUTO]** push button until the yellow LED starts to blink. The controller will start the engine and transfer the load to the Generator only in case of Mains failure if not otherwise programmed by the parameter **[KG TEST CONTROL]** (section 8.03). To exit the TEST mode, push the **[AUTO]** push button shortly or select another mode of operation.

TYPICAL AMF CONTROL PANEL CONNECTIONS

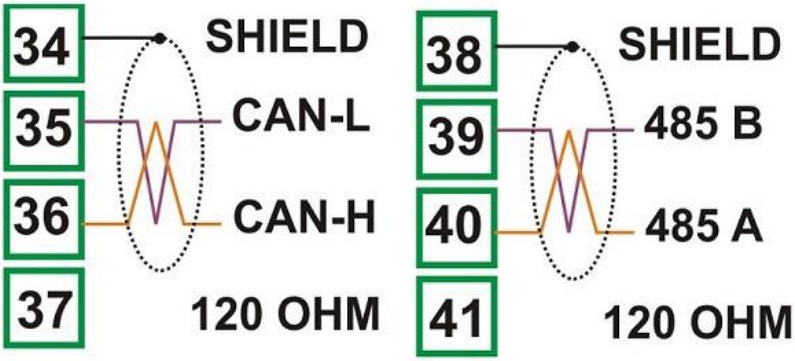
The AMF panel features short-circuit-proof relay outputs for fuel solenoid, start solenoid and stop solenoid. Two additional relays can be used for user-defined particular functions. The first step is to connect the input-output terminals to the engine. Each output is rated at 4 amps. We recommend that you use pilot relays to drive the starter motor and fuel solenoid. The input-output lines are configured by default. But you can change the configuration according to your needs.

ENGINE INPUT-OUTPUT TERMINALS

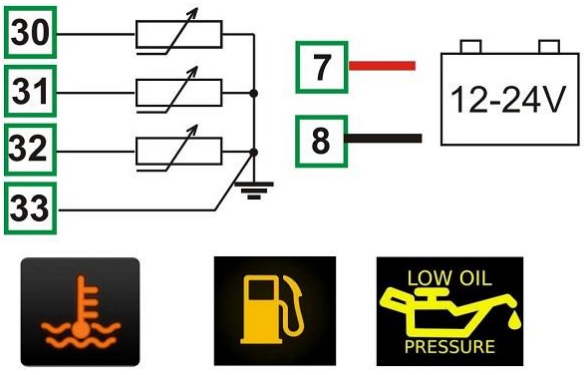


You can now connect the CANBUS to the ECU and MODBUS if a monitoring system is working on an RS485 serial interface. We offer software for control and monitoring free of charge.

CANbus and MODbus CONNECTIONS

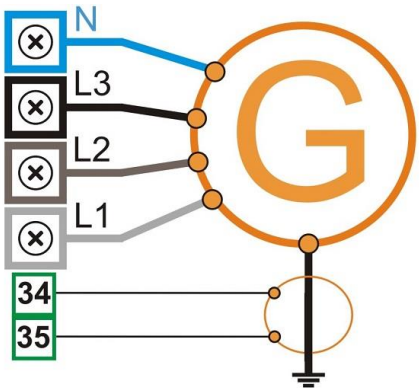


If your engine features an analog sensor you must connect the terminals 30, 31 and 32. Terminal 33 is required to improve the precision of the measurements. It must be connected to the body of the engine.



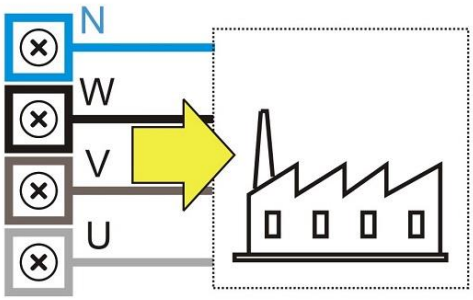
After you have carried out a complete test of the engine, you can connect the alternator. Follow the international standard for safety. Use cables of suitable size. The controller can monitor a fault current to earth, but you must connect a current transformer to terminals 34 and 35.

ALTERNATOR CONNECTION



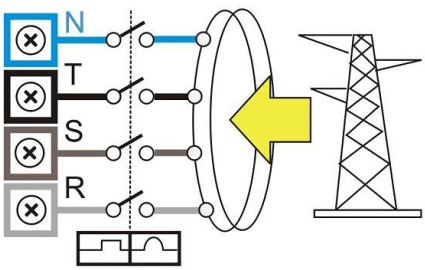
After a complete test of the generator, you can connect your load. You will test the generator on load conditions. You are required to set all protections about voltage, frequency, and overcurrent.

LOAD CONNECTION



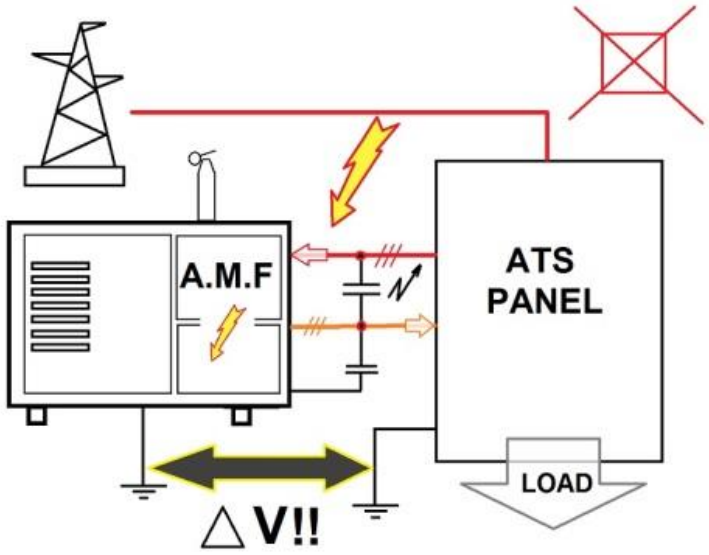
The final job consists of connecting the Mains. After that, you can carry out a complete test of your standby generator. You must set up all settings for mains failure that match the requirement of your load. Install a circuit breaker, on the transformer output, capable of opening the circuit in case of a direct short circuit.

UTILITY POWER CONNECTION

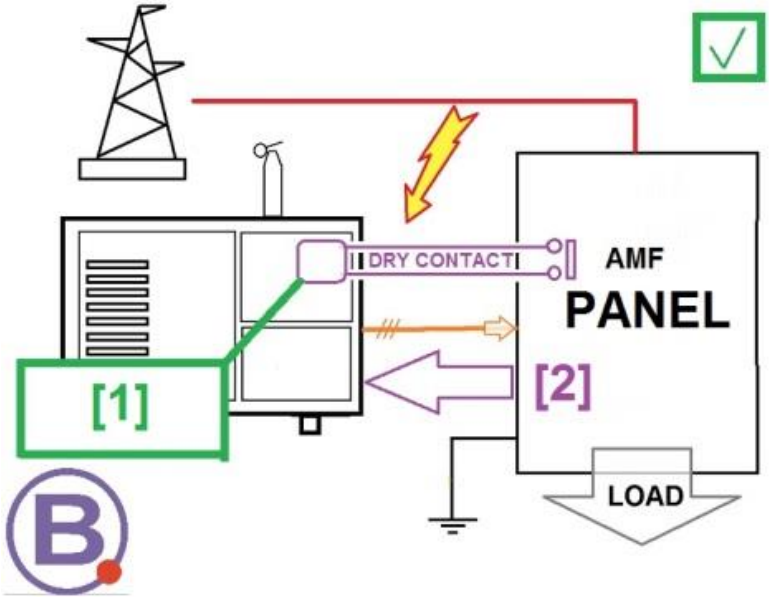


WHY USE AN AMF PANEL YOU INCREASE THE LONG-TERM RELIABILITY OF A STANDBY GENERATOR?

All, and always, is about money. To save money it is a normal practice to include an AMF controller in the body of the generator. This is a bad idea. Of course, it is a good idea for people who do business with the service. However, our the goal is different. We believe it is a serious solution. We believe that the final customer deserves safety.



From the above schematic, you see that overvoltages can easily damage the generator. No matter the insulation you can reasonably provide. The stray capacitance of the connection will win. Yes, you can find cheap ATS panels. But this is not a professional solution at all. The following picture presents one of the optimal solutions,



BERNINI DESIGN SRL

GENERATOR CONTROLLER MANUFACTURER SINCE 1984