

WHAT IS AN AMF CONTROL PANEL?

The AMF control panel features electronic devices that allow you to monitor the functions of a power backup system.



The AMF control panel is basically a processor-based electronic board with miscellaneous components: LED indicators, displays, relays, electronic components, and terminal blocks. It is usually assembled in a rugged IP62 enclosure. On the frontal side, the user interface, on the back all connections to electrical equipment.

Advanced AMF control panels feature serial interfaces committed to connecting auxiliary equipment. This will expand the connectivity when remote monitoring is required.

A USB 2.0 allows the connection to a computer. This will help programming the controller when the default settings are not compatible with the engine or generator.

When the engine or generator cannot run on the default settings, this will assist in programming the controller.

The wiring of a panel could be complex. For this reason, some AMF control panels feature a dedicated serial bus. Normally it is based on an RS485 serial interface that supports the MODBUS protocol. The AMF control panel interfaces with additional board relays and sensors. Finally, you will save time in making the AMF panel.

WHAT IS AN AMF PANEL?

An AMF panel includes all electrical power equipment able to connect the LOAD to MAINS or GENERATOR following a specific algorithm. The AMF control panel is its user interface.



You can use the AMF control panel to make AMF panels of any size, up to 100kVA. But if your backup system requires more power, you can build ATS panels of any size. Not sure about the differences between AMF and ATS panels?

[AMF VERSUS ATS TUTORIAL](#)

THE BEK2 AMF CONTROL PANEL

The BeK2 AMF control panel features a 128X64 graphic display, operating in a temperature range between -15°C and +50°C. It indicates miscellaneous parameters, alarms, and data logging functions. The AMF control panel measurements include Vac, Aac, Vdc, kVA, kVar, kW, Energy, Pf, Hz, hour count, R.p.m., Oil Pressure, Engine Temperature, Battery Vdc (Engine), and Fuel Level.



The BeK2 control panel complies with NFPA-110 / NFPA-99 specifications. This is the best choice when you have to make an AMF panel that interfaces with old or second hand generator. The BeK2 features 10 programmable inputs. You can set the input in analogue or digital mode to perform dedicated tasks.

The 7-static short-circuit-proof outputs are fully programmable. The rich set of over 150 adjustable settings makes this AMF control panel the most advanced piece of AMF controller available today in the market.

HOW TO GET THE MOST FROM AN AMF CONTROL PANEL

Follow our advice. We have made AMF panels since 1984. We have 40 years of experience in servicing AMF panels for industrial, telecom and specific applications.

STEP 1

Never install an AMF control panel on the generator. You must carry all 400V cables from the mains into the generator. This is extremely dangerous in case of lightning. Soon or later, you will get 100% trouble on your generator.



STEP 2

This is the right way to manufacture a long-term reliable AMF panel. The utility power will never affect the DC circuits of the generator. All overvoltage will be shut down inside the panel. It will act as a Faraday cage,



THE BEK2 IS A "ROCK SOLID " AMF CONTROL PANEL WITH AN ENCLOSURE MADE OF STEEL

We do not use plastic materials in our reliable AMF control panels. The enclosure of the BeK2 control panel is made of zinc double-coated steel. Zinc is a heavy element, and when alloyed with other metals, it 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 is an excellent protection against electromagnetic fields by enclosing the 32-bit processor into a Faraday cage. The BeK2 AMF control panel provides an extraordinary advantage over competitors' plastic-based enclosures.

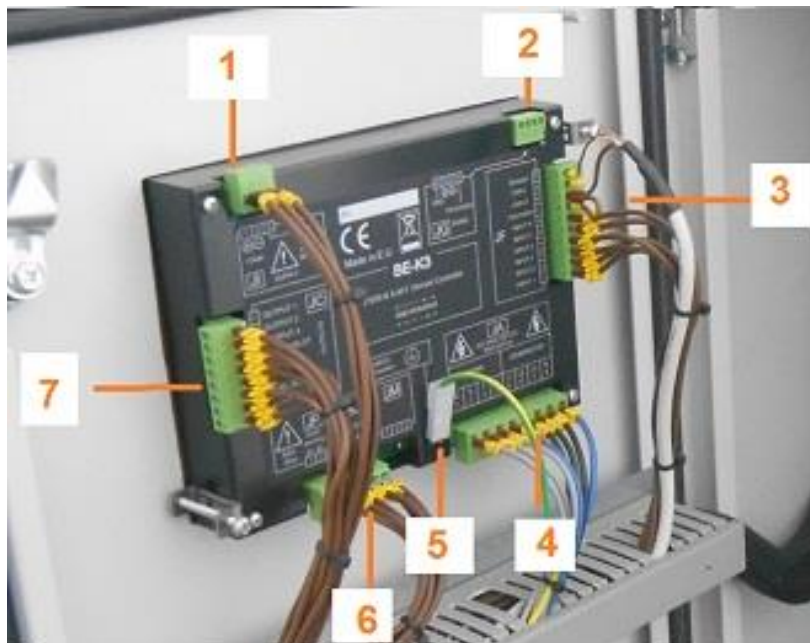
INGRESS PROTECTION IEC60529 SILICON GASKET UV-PROOF

The BeK2 AMF control panel, thanks to a silicon gasket, is IP62-compliant.



INSIDE A BEK2-BASED PANEL OVERVIEW

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



AMF CONTROL PANEL WIRING DIAGRAM

The BeK2 AMF control panel governs the system and transfers the load to the generator or mains smoothly and with short downtime. This AMF control panel wiring diagram shows the basic connections of the BeK2 AMF control panel. It monitors all electrical parameters of the utility power and automatically starts the engine via relays. This happens after a mains failure programmed delay (seconds, minutes or hours).

When the engine is cold, the AMF controller waits for a warm-up. The engine will run offload. Once the generator provides the correct frequency and voltage, the controller transfers the load from the mains to the generator. This could be done via a contactor changeover or a motorized transfer switch. Once the mains has been restored, the AMF control panel will connect the load to the mains automatically. After a time delay, the engine is then stopped.

THE CHAGEOVER EXPLAINED

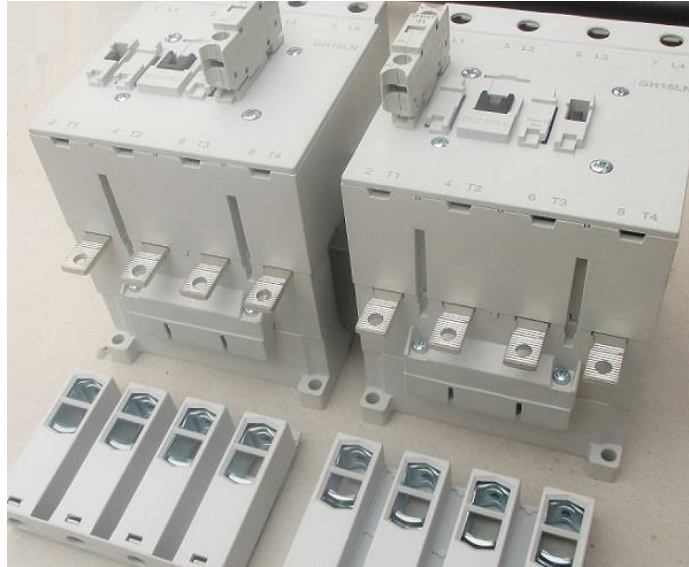
There are two basic solutions to transfer the LOAD to GENERATOR or UTILITY POWER: by contactors and by motorized transfer switches. The matter is quite complex. You can find a tutorial on this link

[CONTACTORS VERSUS MOTORIZED SWITCHES](#)

In a few words, we can say that it is preferable to use contactors changeover when the total power is up to 100kVA. Over this power, it is better to use motorized switches. In particular cases, a combination of both is required.

THIS IS A CONTACTOR-BASED CHANGEOVER

The changeover is made by two contactors capable of carrying the nominal current of the panel. This is in the range from 63 amps up to 250 amps. The contactors are activated and held in position by electric coils. On each contactor three are auxiliary contacts. The two contactors are interlocked. In this way, only one contact can be activated.



THIS IS A MOTORIZED-SWITCH-BASED CHANGEOVER

The motorized changeover switch is a complex piece of equipment. An electric motor moves the switch to a desired position. Before closing a circuit, the switch is always placed in the OFF position. The motorized transfer switch can manage an enormous amount of current. Once the switch is in position there is no current consumption because there are no coils. On the other hand, you can not pretend flexibility of use

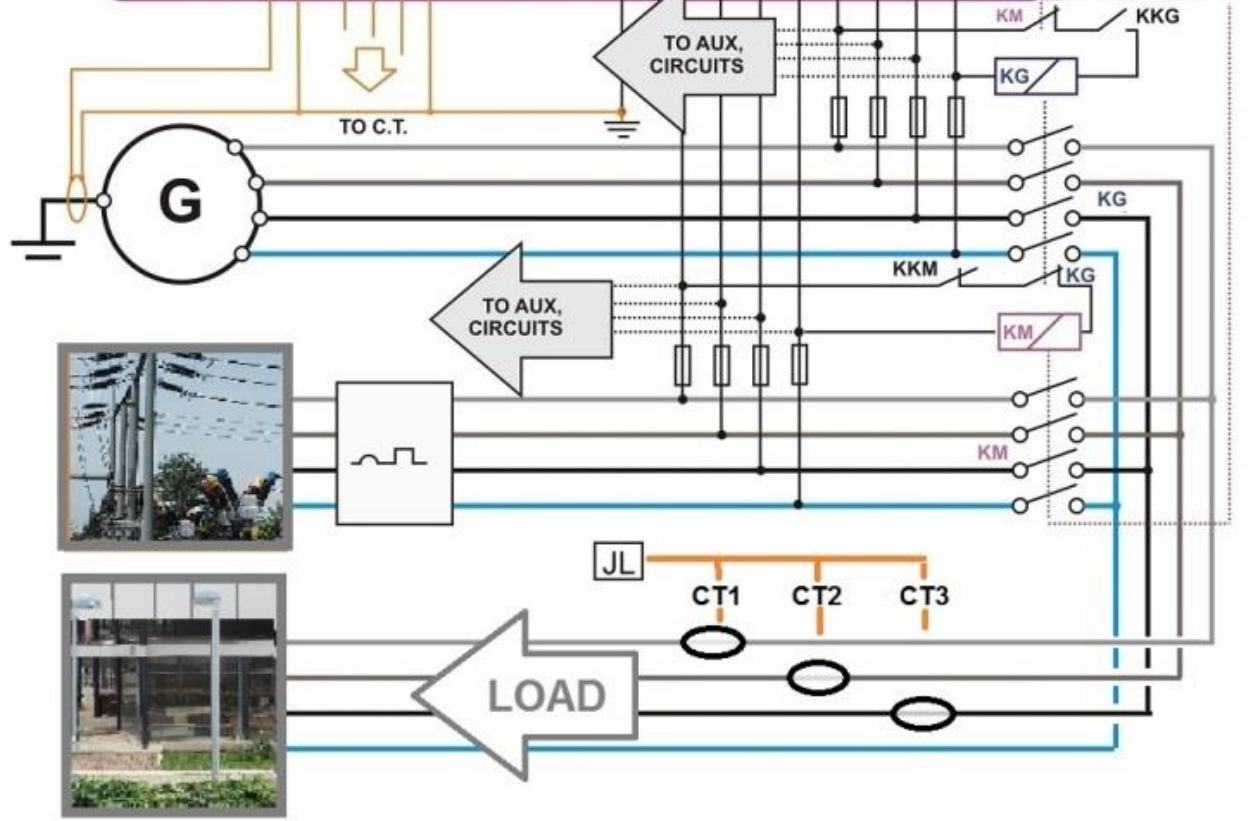
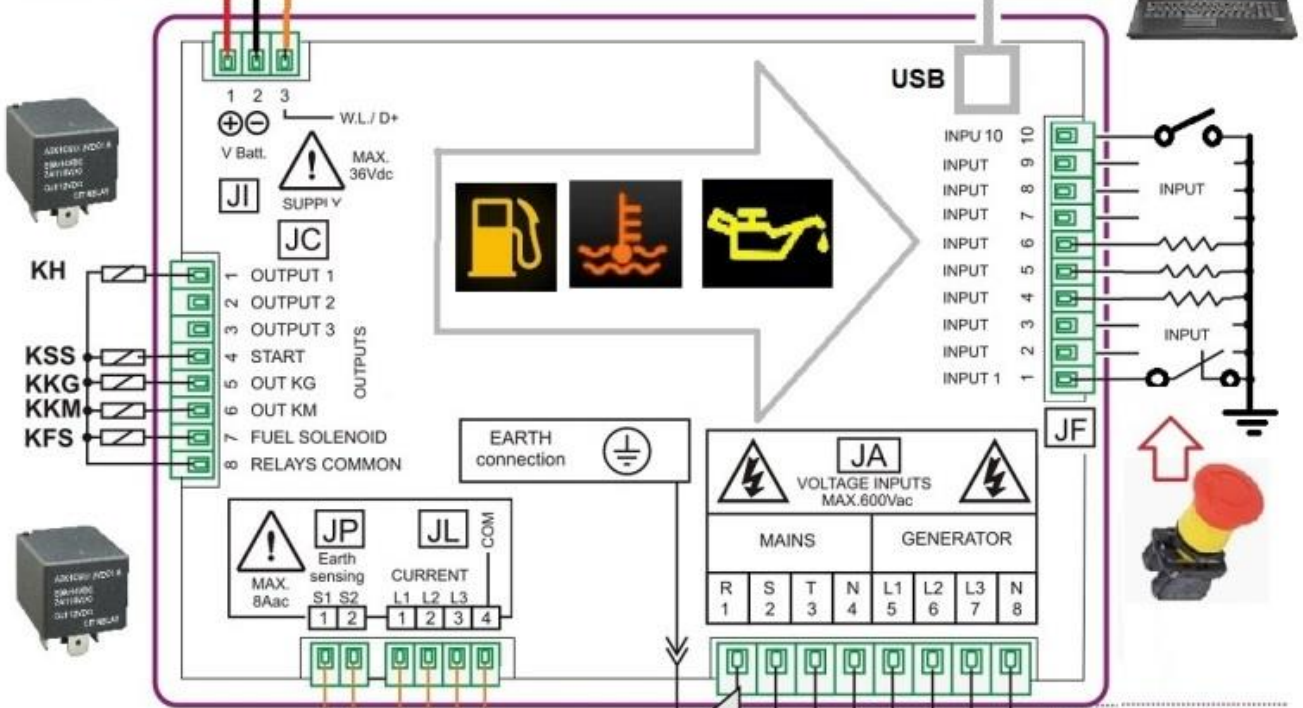
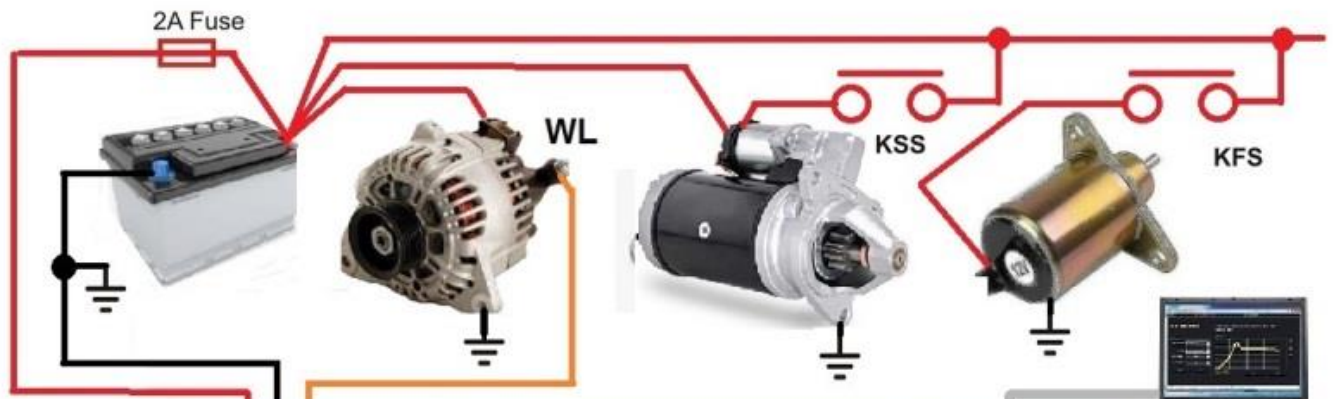


HOW DOES THE AMF CONTROL PANEL WORK?

The BeK2 control panel activates the **KG** (contactor of the generator) by means of the **KM-AUX** and **KG-PILOT** contacts.. The **KM-AUX** are the auxiliary contacts fitted on the body of the utility power contactor (**KM**). When the **KM** is open, the **KM-AUX** contacts enable the **KG**. The AMF control panel finally activates the **KG** via the **KG-PILOT relay**. When the AMF control panel switches the generator to the utility power, 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.

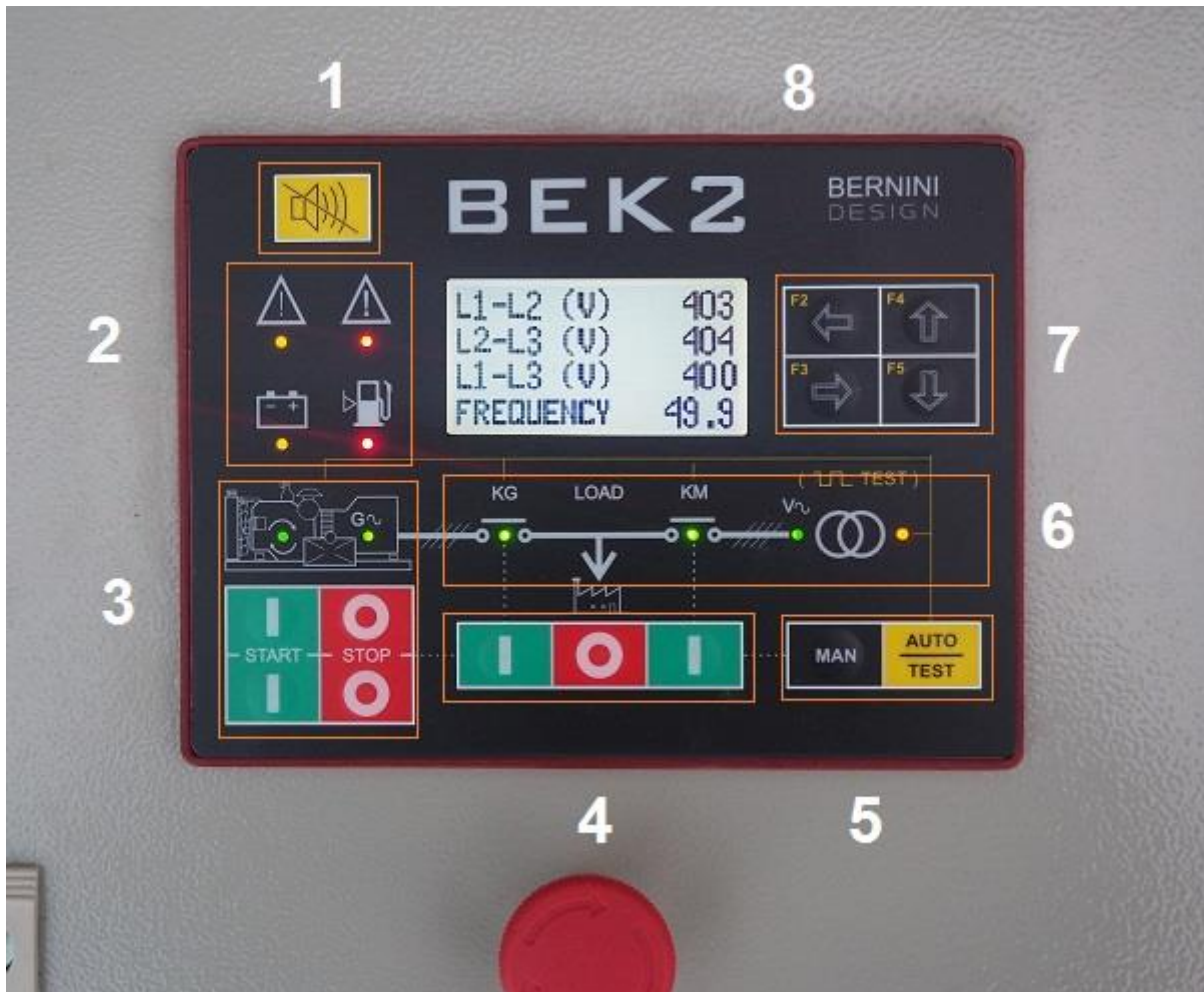
AMF CONTROL PANEL UTILITY POWER-LOAD

The **KM** contactor connects the **LOAD** to the utility power. The coil of the **KM** energizes via 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. The **KM-PILOT** is the utility power control relay. This relay is OFF when the mains is within the settings. By using the normally closed contacts, we give priority to the utility power in case the AMF controller is damaged or without supply. In case of utility power 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.



A USER-FRIENDLY AMF CONTROL PANEL

[1] Multi-functions button [2] Shut down indicator [3] Engine control panel [4] Changeover manual control



[5] Mode of operation selection [6] AMF panel indicators [7] Navigation buttons [8] LCD Display

HOW TO SETUP THE AMF CONTROL PANEL

Despite the possibility to setup the controller by using the navigation buttons and display, the BeK2 control panel offers an USB 2.0 connection. You can simply plug a B-TYPE male connector on the Be-K3 and an A-TYPE male connector on your computer. The software is provided free of charge.

AMF CONTROL PANEL GENERAL FEATURES

80 OPTIONS FOR EACH ADJUSTABLE OUTPUT

5-PROGRAMMABLE LE RELAY OUTPUTS

35 OPTIONS FOR EACH ADJUSTABLE INPUT

9-PROGRAMMABLE DIGITAL INPUTS

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

GENERATOR INSTRUMENTS

ENGINE INSTRUMENTS

DRIVES MOTORIZED CIRCUIT BREAKER

AMF CONTROL PANEL 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:

IP62

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:

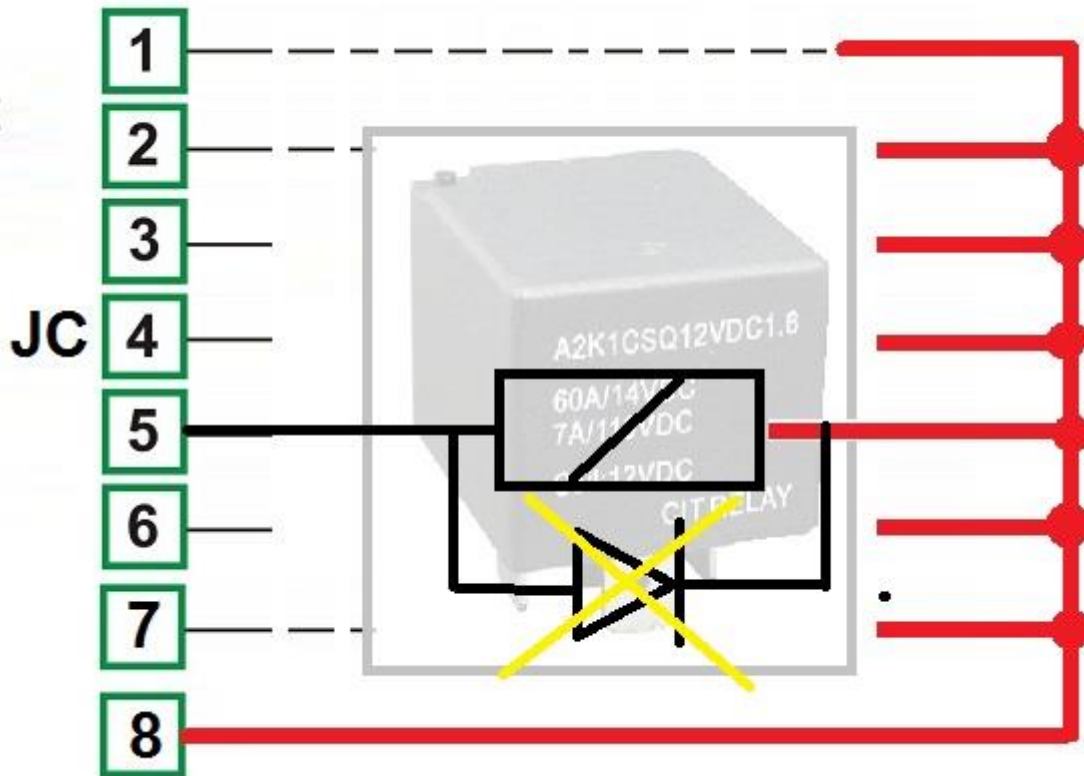
Battery voltage minus 2V - Trigger level: < 2V

Charger alternator monitoring:

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

THE BEK2 AMF CONTROL PANEL OUTPUTS

On the removable connector JC you are required to wire auxiliary relays. The BeK2 AMF control panel provides a common supply rail (JC8) suitable for automotive relays providing at the same time 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 flywheel diodes are included in the controller.

THE BEK2 AMF CONTROL PANEL INPUTS

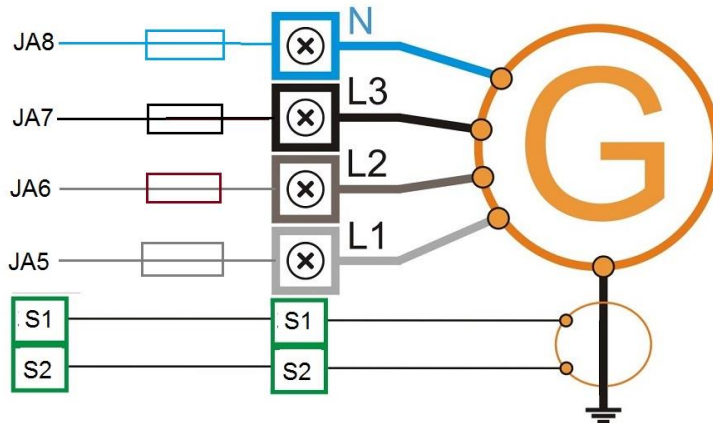
The connector JF is used for the **ANALOG** and **DIGITAL** sensor fitted on the engine. You can use any kind of sensor. Default settings allow the use of VDO-CONTINENTAL devices. You can change the setup in a range 0 up to 2000OHM.



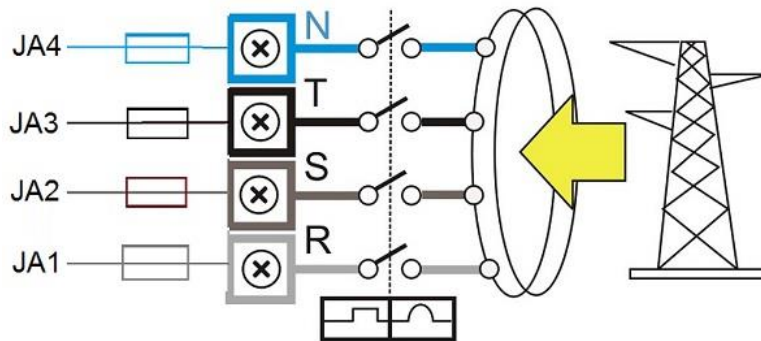
MAINS & GENERATOR CONNECTIONS

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 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**. Use suitable current transformers for your application.

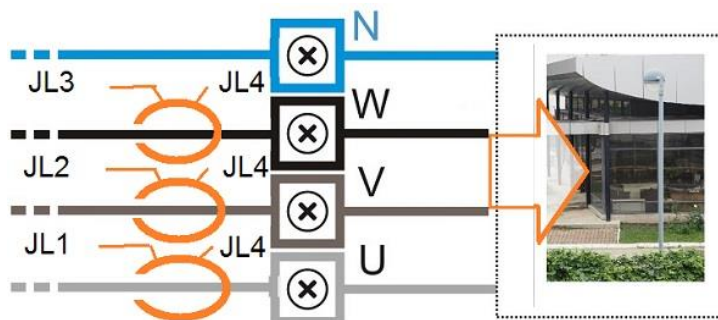
IT IS MANDATORY TO PROTECT THE CABLES INSIDE THE CABINET! INSTALL 10 AMPS MAX FUSES OR CIRCUIT BREAKERS



The JA removable plug is used to connect the Mains voltages. Electrical parameters must be in the range of 80-600V and 20-99HZ.



Connect the current transformer on LOAD side. In this way you will get current measurements all the time, When you set an overload warning or shutdown, only the measurement from the generator will cause the alarm.



AUTO MODE OF OPERATION DESCRIPTION

Push the **[AUTO]** push button until the yellow LED illuminates. The engine starts when the BeK2 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 BeK2 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 BeK2 can start and stop the engine if the remote control is activated.

TEST MODE DESCRIPTION

Push and hold the **[AUTO]** push button until the yellow LED starts blinking. The BeK2 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]**. To exit the TEST mode, push the **[AUTO]** push button shortly or select another mode of operation.

AMF CONTROL PANEL TUTORIAL VIDEOS

In this video we summarize the general instructions on how to get the best from your AMF controller.

[WHAT IS THE DIFFERENCE BETWEEN AMF AND ATS CONTROLLER?](#)

This video is a visual answer to the most asked question about AMF and ATS controllers and panels.

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