

# INSTALLATION MANUAL

## **PowerMan**

230/40-1

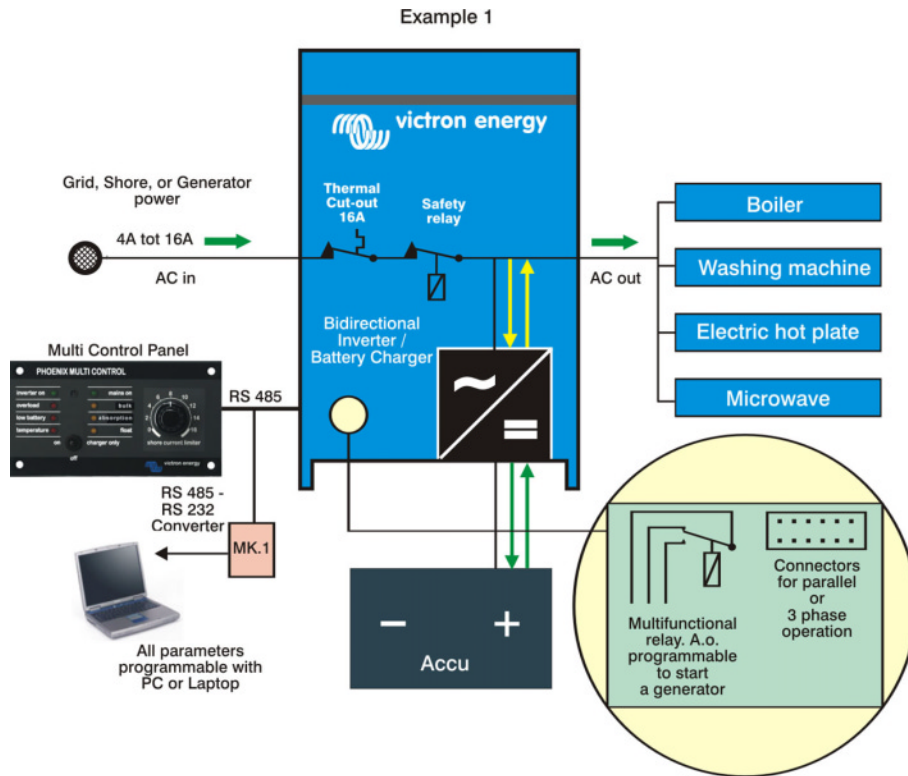
230/80-1

230/40-2

230/80-2

# 1. Introduction

The AC input of a Phoenix Multi is fitted with a 16 Amp thermal circuit breaker and a safety relay (see figure).



When no AC input is available the safety relay will open.

The safety relay is rated at 16 A. The maximum input current of 2 paralleled Multi's is therefore 32 A. Due to tolerances in relay switching time, the maximum input current of sets of 3 or more paralleled Multi's is also limited to 48 A.

Three PowerMan models:

Type 0 is a simple transfer switch for general use.

Type 1 and 2 have been developed specifically for use with the Multi/MultiPlus when more AC current is required. The PowerControl en PowerAssist functions remain functional.

For more details and examples of PowerAssist, please read "**Achieving the Impossible**", which can be found on our website under "The MultiPlus explained".

## **PowerMan type 0 (230/40-0 and 230/80-0)**

A simple "break before make" transfer switch with generator priority and a 1 minute transfer delay.

**PowerMan type 1 (230/40-1 and 230/80-1)**

Type 1 is intended to operate one or more Multi's in parallel with 1 AC power source, but without the input current limitation as mentioned above. The AC current limit (which is the current limit at which PowerControl and PowerAssist will be activated) can be set at up to 40 A, respectively up to 80 A, with a potentiometer in the PowerMan box.

**PowerMan serie 2 (bijv. 230/40-2 en 230/80-2)**

With type 2 one or more Multi's can operate in parallel with 2 alternative AC power sources. In general one of the power sources is a generator, and the other shoreside power.

The AC current limit of the generator can be set at up to 40 A, respectively up to 80 A, with a potentiometer in the PowerMan box.

Two external PowerMan Control panels are available to limit shore current to max. 16 A respectively 30 A. **The external PowerMan Control panels look very similar to the Phoenix Multi Control Panels but are not interchangeable!**

The 40 A model has 3 circuit breakers to connect up to 3 Multi's. The 80 A model has 5 circuit breakers to connect up to 5 Multi's.

Three phase versions are available at request.

## 2. The parameters to configure a PowerMan type 1 or 2

Three parameters are of importance to configure a PowerMan type 1 or type 2:

1. The number of Multi's that will be connected
2. The maximum output current of the generator
3. The maximum shore current (not applicable to PowerMan type 1)

The tables in the next paragraph are a help to determine the configuration parameters. Paragraph 3 describes how to perform the configuration itself.

### 2.1. PowerAssist is not required

If the PowerAssist feature is not required, the MultiPlus is not needed and one or more Phoenix Multi's can be used.

The PowerControl function (automatic reduction of charge current as soon as the AC current limit setpoint is reached) will be available.

The configuration parameters can be determined from the following tables:

Max AC current required	PowerMan	Configuration	Contactor K3	Cable to L-Out of Master	Bridge
40 A	230/40-1 230/40-2	C	Terminal 6	Terminal 3	Terminal 1-2
80 A	230/80-1 230/80-2	F	Terminal 2	Terminal 3	Terminal 1-2

The PowerMan Control Panel is applicable to the PowerMan type 2 only. The following table should be disregarded when a PowerMan type 1 is used.

Max shore current	Configuration of PowerMan Control Panel	
	C	F
16 A	49,9 kOhm	124 kOhm
32 A	12,4 kOhm	49,9 kOhm

### 2.2. PowerAssist is required

For PowerAssist at least one MultiPlus is needed. If paralleled with one or more Multi's, the MultiPlus must be the master.

The configuration parameters can be determined from the following tables:

The configuration can be determined from the first table. The second table relates the configuration to the implementation as described in paragraph 3.

Number of paralleled Multi's	PowerMan	Minimum generator current/power required	Maximum generator current/power	Configuration
1	230/40-1	10 A / 2,3 kVA	30 A / 6,9 kVA	A
2	230/40-2	20 A / 4,6 kVA	37,5 A / 8,6 kVA	B
3		30 A / 6,9 kVA	40 A / 9,2 kVA	C
4		40 A / 9,2 kVA	40 A / 9,2 kVA	D
2	230/80-1	20 A / 4,6 kVA	60 A / 13,8 kVA	D
3	230/80-2	30 A / 6,9 kVA	80 A / 18,4 kVA	E
4		40 A / 9,2 kVA	80 A / 18,4 kVA	F
5		50 A / 11,5 kVA	80 A / 18,4 kVA	F

Configuration of the PowerMan:

Configuration	Contacteur K3	Cable to L-Out of Master	Bridge
A	Terminal 6	Terminal 1	Terminal 2 - 3
B	Terminal 6	Terminal 2	n. a.
C	Terminal 6	Terminal 3	Terminal 1 - 2
D	Terminal 2	Terminal 1	Terminal 2 - 3
E	Terminal 2	Terminal 2	n. a.
F	Terminal 2	Terminal 3	Terminal 1 - 2

The PowerMan Control Panel is applicable to the PowerMan type 2 only. The following table should be disregarded when a PowerMan type 1 is used.

Max shore current	Configuration of PowerMan Control Panel					
	A	B	C	D	E	F
16 A	24,8 kOhm	37,4 kOhm	49,9 kOhm	75 kOhm	100 kOhm	124 kOhm
32 A	n. a.	6,2 kOhm	12,4 kOhm	24,8 kOhm	37,4 kOhm	49,9 kOhm

### 3. Implementing the configuration

#### 3.1. Contactor K3

The black cable should be connected to terminal 6 or terminal 2 of contactor K3 (see picture)

cable connected to terminal 6

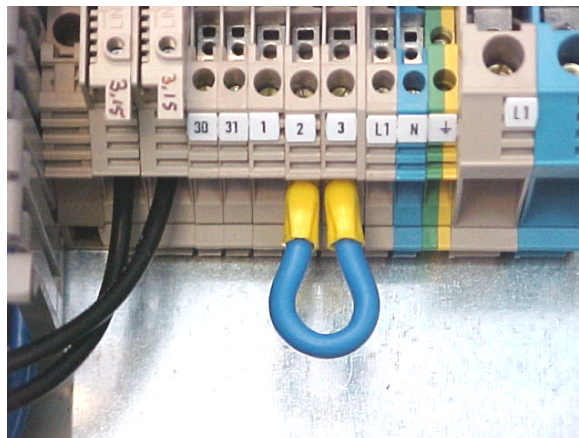


cable connected to terminal 2



#### 3.2. Bridge

Confuration A and D: interconnection between terminal 2 and 3, see picture.  
Confuration C and F: interconnection between terminal 1 and 2.  
Confuration B en E no interconnection needed.

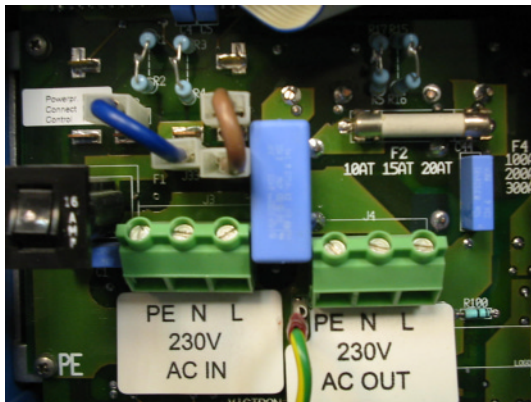


### 3.3. Cable to L-Out of Master

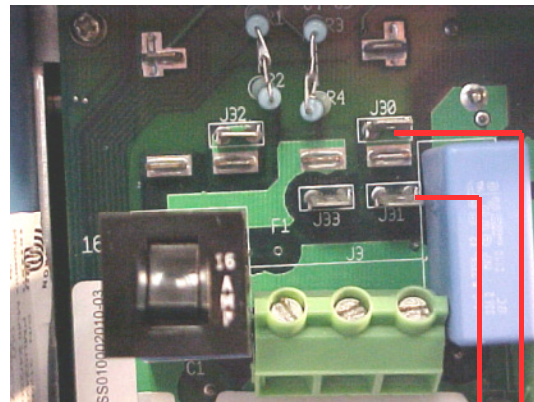
The L-out (=live out) terminal of the Multi or MultiPlus which will be the master must be connected to terminal 1, 2 or 3 of the PowerMan (see table in paragraph 2.1. or 2.2.). This cable carries the AC current signal to the Multi. The cable must have a cross section of at least  $6 \text{ mm}^2$  and it should not be longer than 10 meter. This same L-out terminal must also be connected to one of the circuit breakers in the PowerMan cubicle. The 2 cables must be crimped together to fit in that same terminal.

### 3.4. Removing 2 cable bridges from the Multi's

The 2 cable bridges with Faston terminals (see left picture) must be removed from all paralleled Multi's (from the master and from the slaves). Then a connection must be made from the the Faston blades J30 en J31 **from the master only** to terminal 30 respectively 31 in the PowerMan.  
Cable cross section:  $2,5 \text{ mm}^2$ .



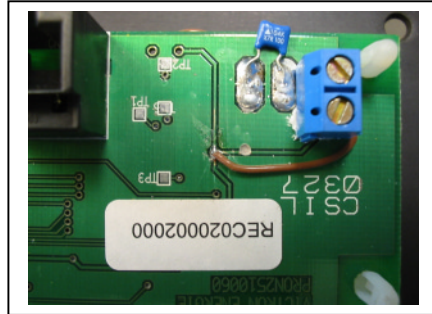
Standard Multi with the 2 bridges fitted



J30 and J31 to be connected respectively to terminal 30 and 31 in the PowerMan

### 3.5. The PowerMan Control panel

A resistor (see table in paragraph 2.1 or 2.2) must be placed in the blue connector on the back side of the PowerMan control panel.  
(In case of for example configuration E and 16 A shore current, a 100 kOhm resistor must be placed)

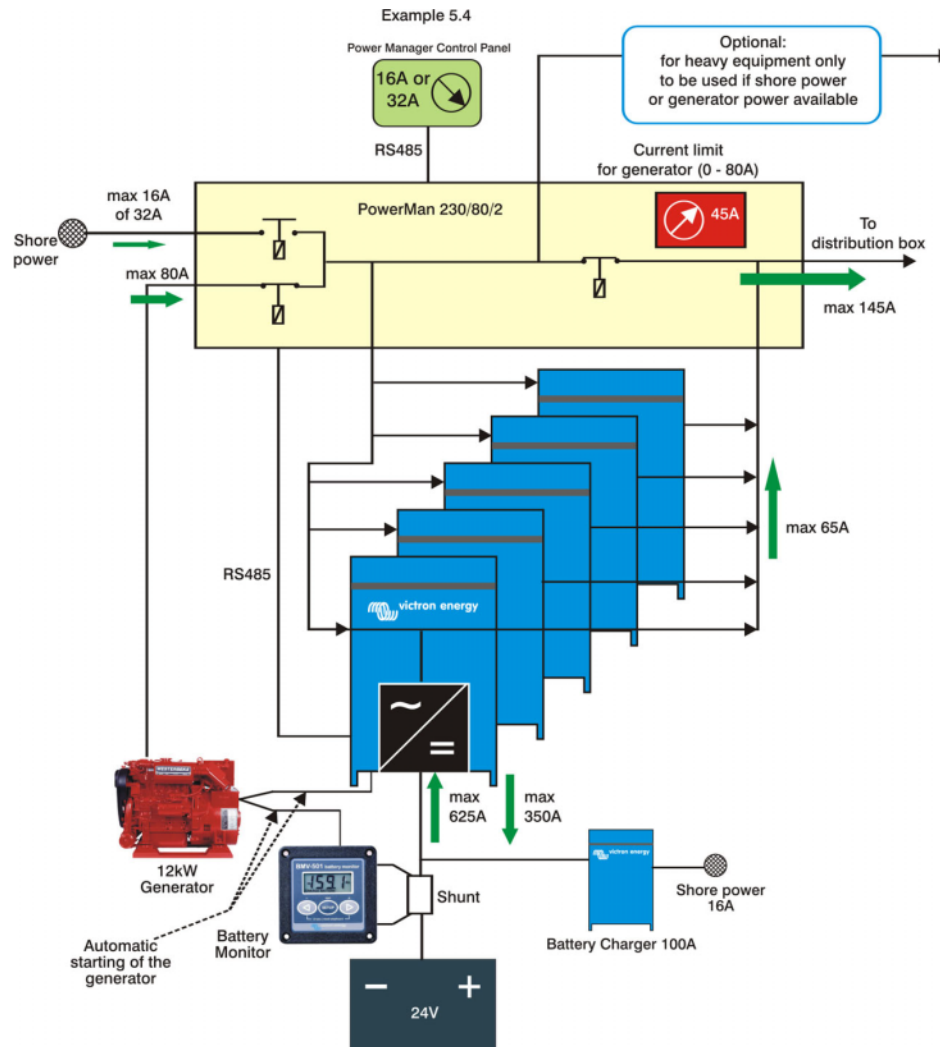




### 3.6. Commissioning the PowerMan

We recommend to use our software VE Configure to set the parameters of the Multi/Multplus which will be used as master. The slaves will automatically follow the master.

Do not forget to check and set the battery charge parameters.



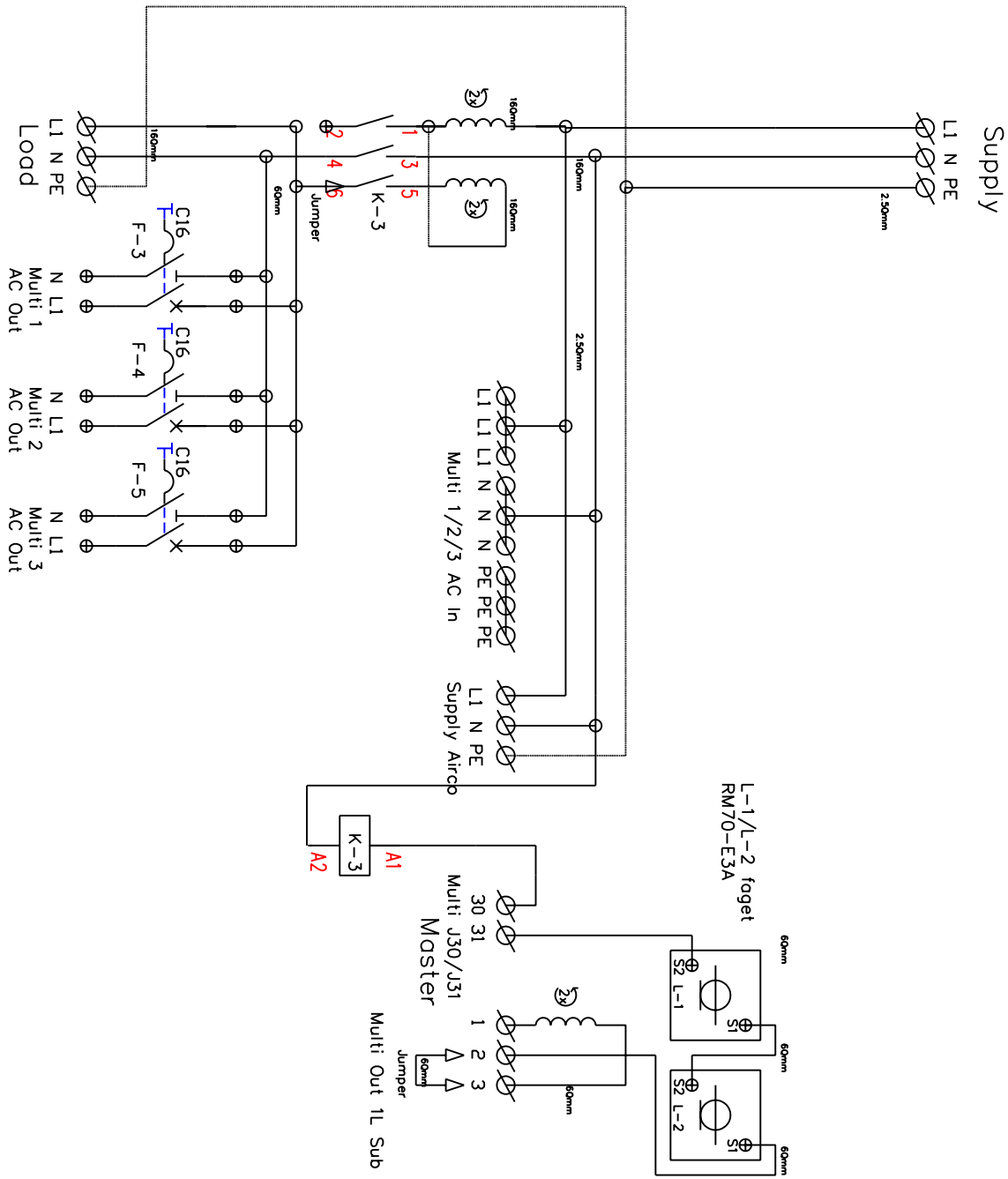
For the proper functioning of PowerMan type 1 en 2 the internal potentiometer must be set at the right current.

The purpose is to activate PowerControl and, if required, PowerAssist just before the generator is overloaded. This is achieved by running the generator, increase the load to the required maximum current and then turn the internal potentiometer counter clock wise until the Multi's start reducing the charge current or, if the charge current is negligible, start to assist the generator.

Please note that small 3000 rpm gensets of certain brands will overheat when operating for long periods at full load. In some cases the maximum current will have to set at no more than 70 % of the rated maximum current.

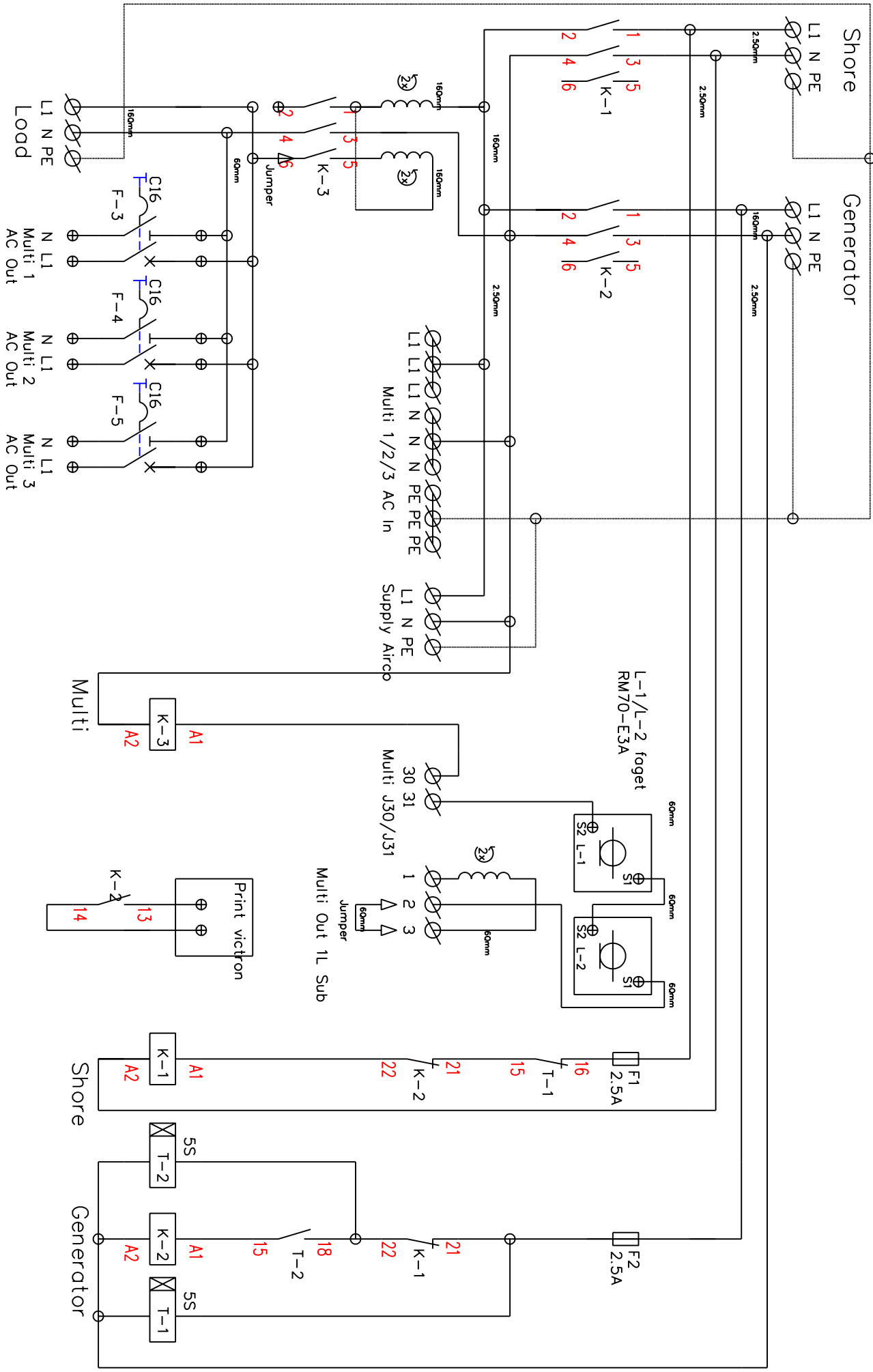
The current limit of 1500 rpm gensets can in general be set at around 90 % or more of the rated output current.

# Wiring Powermanager series 1



Maximal current	K3	wire	L-out master	Bridge
2/30	6	1	2-3	
2.5/37.5	6	2	none	
3/45	6	3	1-2	
4/60	2	1	2-3	
5/75	2	2	none	
6/90	2	3	1-2	

# Wiring Powermanager serie 2



# Wiring Powermanager 230/40/1

