

Circuitor

Static var generator

SVGm



INSTRUCTION MANUAL

(M248B01-03-23A)



SAFETY PRECAUTIONS

Follow the warnings described in this manual with the symbols shown below.



DANGER

Warns of a risk, which could result in personal injury or material damage.



ATTENTION

Indicates that special attention should be paid to a specific point.

If you must handle the unit for its installation, start-up or maintenance, the following should be taken into consideration:



Incorrect handling or installation of the device may result in injury to personnel as well as damage to the device. In particular, handling with voltages applied may result in electric shock, which may cause death or serious injury to personnel. Defective installation or maintenance may also lead to the risk of fire.

Read the manual carefully prior to connecting the device. Follow all installation and maintenance instructions throughout the device's working life. Pay special attention to the installation standards of the National Electrical Code.



Refer to the instruction manual before using the device

In this manual, if the instructions marked with this symbol are not respected or carried out correctly, it can result in injury or damage to the device and /or installations.

CIRCUTOR S.A.U. reserves the right to modify features or the product manual without prior notification.

DISCLAIMER

CIRCUTOR S.A.U. reserves the right to make modifications to the device or the unit specifications set out in this instruction manual without prior notice.

CIRCUTOR S.A.U. on its web site, supplies its customers with the latest versions of the device specifications and the most updated manuals.

www.circutor.com



CIRCUTOR S.A.U. recommends using the original cables and accessories that are supplied with the device.

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REVISION LOG

Table 1: Revision log.

Date	Revision	Description
03/19	M248B01-03-19A	Initial Version
11/19	M248B01-03-19B	Changes in the following sections: 4.3.2. - 6.7. - 6.9. - 7.4. - 7.5. - 7.9. - 8.2.2.4. - 11.
05/20	M248B01-03-20A	Changes in the following sections: 3.2.1. - 4.2. - 4.4. - 6.5. - 6.6. - 6.7. - 7.4. - 7.5. - 7.7.
02/21	M248B01-03-21A	Changes in the following sections: 2. - 3.2.1.3. - 3.5. - 3.6.1. - 3.6.2. - 3.6.3. - 3.6.4. - 3.8. - 3.8.2. - 7.2. - 10. - 10.3. - 10.4. - 10.5. - 10.6. - 10.7. - 10.8. - 11.
04/22	M248B01-03-22A	Changes in the following sections: 2. - 3.5. - 3.6.3. - 3.8. - 3.8.2. - 4.1. - 4.2. - 4.3. - 4.4. - 4.7.1. - 6.1.1. - 6.3. - 6.4. - 6.7. - 6.8. - 6.9. - 7.6. - 7.7. - 7.8. - 7.9. - 7.10. - 7.11. - 7.12. - 7.15. - 8.1. - 8.2.2.1. - 8.2.2.2. - 8.2.2.4. - 9.1. - 11.
05/23	M248B01-03-23A	Changes in the following sections: 2. - 3.5. - 3.6.1. - 4.7. - 4.8. - 6.7. - 6.8. - 7.2. - 7.6. - 8.2.2.4. - 10.6. - 11.

SYMBOLS

Table 2: Symbols.

Symbol	Description
	Compliant with the relevant European standards.
 1 min	After disconnecting the device from all power supplies, wait 1 minute before performing any operations.
	Torque
 2	Screwdriver for PH2 head screws
 30	Screwdriver for Torx 30 head screws

1.- VERIFICATION UPON RECEPTION

1.1.- RECEPTION PROTOCOL

Check the following points when you receive the device:

- a) The device meets the specifications described in your order.
- b) The device has not suffered any damage during transport.
- c) Perform an external visual inspection of the device prior to switching it on.
- d) Check that it has been delivered with the following:
 - Instruction manual
 - Communication cable for connecting devices in parallel.(Models **SVGm** Wall and Rac type).
- e) Perform an external and internal visual inspection of the device prior to connecting it.



If any problem is noticed upon reception, immediately contact the transport company and/or **CIRCUTOR's** after-sales service.

1.2.- TRANSPORT AND HANDLING



The transport, loading and unloading and handling of the device must be carried out with proper precautions and using the proper manual and mechanical tools so as not to damage it.

If the device is not to be immediately installed, it must be stored at a location with a firm and level floor, and the storage conditions listed in the technical features section must be observed. In this case, it is recommended that the device be stored with its original protective packaging.

To move the device a short distance, the device's floor support profiles facilitate handling with a pallet jack or forklift. (**Figure 1**)

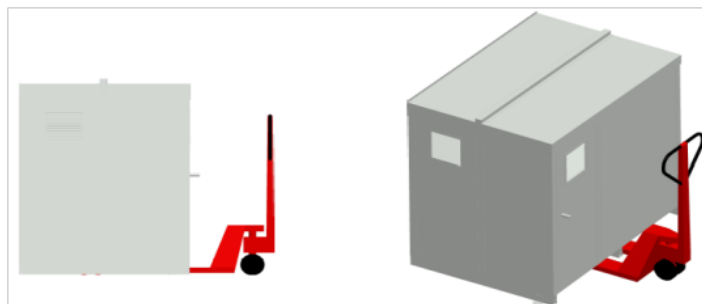


Figure 1: Transport with pallet jack.



The centre of gravity of some devices may be found at a considerable height. Therefore, when handling with a forklift, it is recommended that the device be securely fastened and that no abrupt manoeuvres made. The device should not be lifted more than 20 cm off the ground

When unloading and moving the device, use a forklift with forks long enough to support the entire length of the base. Otherwise, the forks should be long enough to support at least $\frac{3}{4}$ of said depth. The forks must be flat and supported firmly by the base. Raise the device by placing the forks underneath the profile that supports the device. (Figure 2).



There might be an offset in the centre of gravity from the centre of the cabinet, as a result of the uneven distribution of loads inside the device. The necessary precautions must be taken to prevent the device from tipping over during abrupt operations.

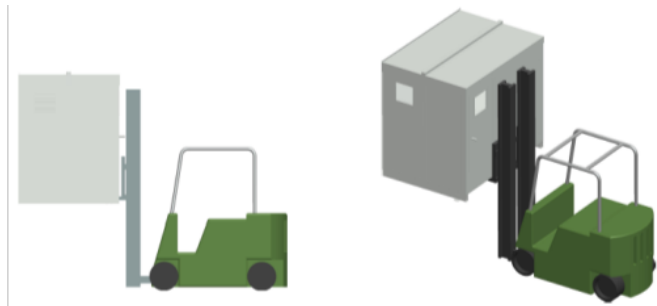


Figure 2: Unloading with a forklift.

When unpacking the device, pay attention to prevent damaging the device if you are using cutting tools, such as cutters, scissors or knives.

The **SVGm** devices cabinet type, there are also 4 rings (diameter: 28 mm) in the top panel so that they can be transported by a crane. The top panel is inverted, but the rings are mounted, to enable it to be transported without any prior set-up required. The angle of the cables must be greater than 45°

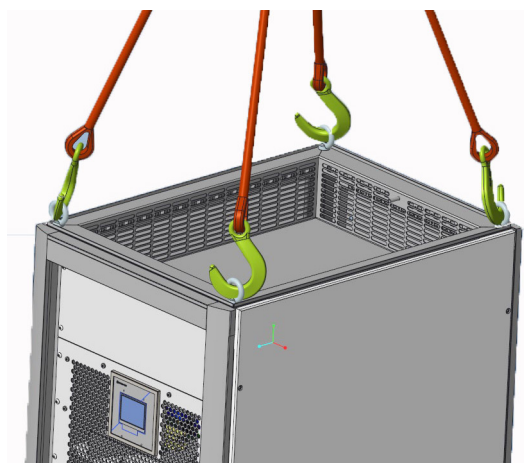


Figure 3: Transport of an cabinet SVGm by crane.

1.3.- STORAGE

The device should be stored according to the following recommendations:

- ✓ Avoid placing them on uneven surfaces.
- ✓ Do not store them in outdoor areas, humid areas or areas exposed to splashing water.
- ✓ Avoid hot spots (maximum ambient temperature: 50°C)
- ✓ Avoid salty and corrosive environments.
- ✓ Avoid storing the devices in areas where a lot of dust is generated or where the risk of chemical or other types of contamination is present.

2.- PRODUCT DESCRIPTION

The **SVG** static var generator can be used to correct the power factor. For both backward (inductive) and forward (capacitive) currents.

The device features:

- **3/4-wire multifunction** (depending on model), for installation in three-phase mains with or without neutral.
- Parallel installation of up to 100 devices, depending on model.
- **EMI filters**.
- **LCD touch display**, to view the parameters.
- **RS-485** and **Ethernet** communications.
- **Enclosure type Rack, Cabinet o Wall** (depending on model).

There are different models of the device, for different powers:

✓ SVGm 20.7 and 30 kvar,



Table 3: Relation of models SVGm of 20.7 and 30 kvar.

Model	3 Wires (L1, L2, L3)	4 Wires (L1, L2, L3, N)	Type	Power (kvar)	Mains voltage (Un)	Maximum Parallelization
SVGm-4WF-020M-400	-	✓	Wall	20.7	208 ... 400 V	100 units
SVGm-3WF-030M-480	✓	-	Wall	30	208 ... 480 V	100 units

✓ SVGm 41.4 and 60 kvar,



Table 4: Relation of models SVGm of 41.4 and 60 kvar.

Model	3 Wires (L1, L2, L3)	4 Wires (L1, L2, L3, N)	Type	Power (kvar)	Mains voltage (Un)	Maximum Parallelization
SVGm-4WF-040M-400	-	✓	Wall	41.4	208 ... 400 V	100 units
SVGm-3WF-060M-480	✓	-	Wall	60	208 ... 480 V	100 units

✓ SVGm 51.7 and 75 kvar,



Table 5: Relation of models SVGm of 51.7 and 75 kvar.

Model	3 Wires (L1, L2, L3)	4 Wires (L1, L2, L3, N)	Type	Power (kvar)	Mains voltage (Un)	Maximum Parallelization
SVGm-4WF-050M-400	-	✓	Wall	51.7	208 ... 400 V	100 units
SVGm-3WF-075M-480	✓	-	Wall	75	208 ... 480 V	100 units

✓ SVGm 67 kvar,



Table 6: Relation of models SVGm of 67 kvar.

Model	4 Wires (L1, L2, L3, N)	Type	Power (kvar)	Mains voltage (Un)	Maximum Parallelization
SVGm-4WF-067C-550	✓	Cabinet	67	230 ... 550 V	100 units

✓ SVGm 69 kvar,



Table 7: Relation of models SVGm of 69 kvar.

Model	4 Wires (L1, L2, L3, N)	Type			Power (kvar)	Mains voltage (Un)	Maximum Parallelization
		Rack	Cabinet	Wall			
SVGm-4WF-069M-400	✓	-	-	✓	69	208 ... 400 V	100 units
SVGm-4WF-069C-400	✓	-	✓	-	69	208 ... 400 V	100 units
SVGm-4WF-069R-400	✓	✓	-	-	69	208 ... 400 V	100 units

✓ SVGm 100 kvar,



Table 8: Relation of models SVGm of 100 kvar.

Model	3 Wires (L1, L2, L3)	Type			Power (kvar)	Mains voltage (Un)	Maximum Parallelization
		Rack	Cabinet	Wall			
SVGm-3WF-100M-480	✓	-	-	✓	100	208 ... 480 V	100 units
SVGm-3WF-100C-480	✓	-	✓	-	100	208 ... 480 V	100 units
SVGm-3WF-100R-480	✓	✓	-	-	100	208 ... 480 V	100 units
SVGm-3WF-100C-690	✓	-	✓	-	100	230 ... 690 V	100 units

✓ SVGm 134, 138, 200, 201, 207, 268, 276, 300 and 400 kvar,



Table 9: Relation of models SVGm of 134, 138, 200, 201, 207, 268, 276, 300 and 400 kvar.

Model	3 Wires (L1, L2, L3)	4 Wires (L1, L2, L3, N)	Type	Power (kvar)	Mains voltage (Un)	Maximum Parallelization
SVGm-4WF-134C-550	-	✓	Cabinet	134	230 ... 550 V	50 units
SVGm-4WF-138C-400	-	✓	Cabinet	138	208 ... 400 V	50 units
SVGm-3WF-200C-480	✓	-	Cabinet	200	208 ... 480 V	50 units
SVGm-3WF-200C-690	✓	-	Cabinet	200	230 ... 690 V	50 units
SVGm-4WF-201C-550	-	✓	Cabinet	201	230 ... 550 V	30 units
SVGm-4WF-207C-400	-	✓	Cabinet	207	208 ... 400 V	30 units
SVGm-4WF-268C-550	-	✓	Cabinet	268	230 ... 550 V	25 units
SVGm-4WF-276C-400	-	✓	Cabinet	276	208 ... 400 V	25 units
SVGm-3WF-300C-480	✓	-	Cabinet	300	208 ... 480 V	30 units
SVGm-3WF-300C-690	✓	-	Cabinet	300	230 ... 690 V	30 units
SVGm-3WF-400C-480	✓	-	Cabinet	400	208 ... 480 V	25 units
SVGm-3WF-400C-690	✓	-	Cabinet	400	230 ... 690 V	25 units

3.- DEVICE INSTALLATION

3.1.- PRELIMINARY RECOMMENDATIONS



The device installation and the maintenance operations must only be carried out by authorised and qualified personnel.



In order to use the device safely, it is critical that individuals who handle it follow the safety measures set out in the standards of the country where it is being used, use the personal protective equipment necessary (rubber gloves, face protection and approved flame-resistant clothing) to prevent injuries due to electric shock or electric arc due to exposure to current-carrying conductors and pay attention to the various warnings indicated in this instruction manual.



Incorrect installation or configuration of the device could cause serious damage to the device itself and to other devices of the installation.



Only suitable for assembly on concrete or other non-combustible surfaces, and in restricted access areas.



The devices are not intended for use in life support, medical safety equipment or similar applications, whereby a fault in the device could cause loss of life or physical injury. They are neither intended for military or defence applications. They should be installed in areas with restricted access.



Disconnect the main switch before starting any maintenance task on the static generators.



Make sure the device is properly **earthed** before powering up. Any fault in the earth connection might cause a risk of electrocution to the user and damage to the device itself in the case of lightning or other transients.



Before handling the **current transformers**, ensure that the secondary is short-circuited. Never open a current transformer secondary under load.

3.2.- INSTALLATION LOCATION

The device must be installed in an environment where the temperature outside the cabinet is between -10°C and 45°C, with a maximum humidity of 95% without condensation. Do not install the device close to a hot spot and keep it out of direct sunlight.



Install the **SVGm** in a place protected from water, dust, flammable liquids, gases and corrosive substances.



Make sure there are no power factor correction devices installed in the same mains as the **SVGm**.
If there are any compensation devices, these must be detuned in order to avoid interference between them and the **SVGm**.

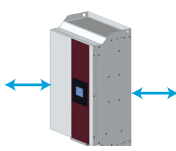
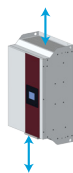
3.2.1.- VENTILATION REQUIREMENTS

Section “4.6 - *THERMAL PROTECTION*” describes all the thermal protections available in the device.

3.2.1.1.- Wall-type SVGm

The device has a power control system that controls the rotation speed of the fans and the maximum power of the device according to the internal temperature, to ensure the best performance in any condition.

Table 10: Ventilation distances: Wall-type SVGm.

Ventilation distances: Wall-type SVGm	
	
50 mm	400 mm

3.2.1.2.- Rack-type SVGm

The Rack-type **SVGm** uses a forced ventilation cooling system, with an air inlet on the front panel and an air outlet at the back of the device.

Once installed, the device's flows of inlet air and outlet air must be allowed to circulate freely. At maximum power, the Rack-type **SVGm** circulates an airflow of **375 m³/h**.

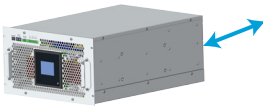
The device has a power control system that controls the rotation speed of the fans and the maximum power of the device according to the internal temperature, to ensure the best performance in any condition.

To maintain the device's performance, we recommend ensuring that the air circulates freely through the front panel of the Rack-type **SVGm**, and that the rear is free of obstacles, with a gap of at least **300 mm**.

It should be noted that, depending on the installation conditions in the cabinet and in the room where this is placed, the outflows of hot air may be sucked back in by the device's fans, causing a feedback of hot air that will lower the performance of the device.

It is also necessary to bear in mind the power dissipated by the device when choosing where to install it, to ensure proper air recirculation, to make sure that the intake air is a suitable temperature. See **"11.- TECHNICAL FEATURES"**.

Table 11: Ventilation distances: Rack-type SVGm.

Ventilation distances: Rack-type SVGm	
	
300 mm	300 mm

3.2.1.3.- Cabinet-type SVGm

The cabinet-type **SVGm** uses a forced ventilation cooling system, with an air inlet on the front panel and an air outlet at the back of the device.

The ventilation grille at the top must not be blocked, leaving enough space to the ceiling to allow the heat to dissipate. The distance depends on the characteristics of the installation site.

There is no need to leave space between the sides or at the back of the cabinet; they can be installed next to other cabinets and against a wall.

Table 12: Ventilation distances: Cabinet-type SVGm.

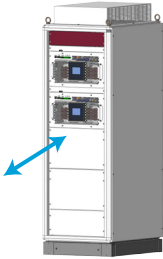
Ventilation distances: Cabinet-type SVGm

300 mm

Table 13: Air flow depending on the models.

Model	Power (kvar)	air flow
SVGm-3WF-100C-480	100	375 m ³ /h
SVGm-4WF-069C-400	69	
SVGm-3WF-100C-690	100	425 m ³ /h
SVGm-4WF-067C-550	67	

3.3.- STORAGE FOR LONG PERIODS

If the device is not installed after receipt, the following recommendations must be observed to keep the device in a good state:

- ✓Keep the device in a dry atmosphere and at a temperature of between -20°C and 50°C.
- ✓Avoid exposure to direct sunlight.
- ✓Keep the device in its original packaging.

If the static generator is stored for a long time disconnected from the mains, a specific process must be applied to restore the internal dielectric layers of the DC bus capacitors. **Table 14** shows the recommendations for starting the device, according to the length of its storage period.

Table 14: Start-up process, according to storage time.

Storage time	Process
< 1 year	No special treatment required.
> 1 year	Connect the SVGm to the mains at least one hour before starting up the device. Power the device and leave it in STOP mode

3.4.- INSTALLATION

3.4.1.- WALL-TYPE SVGm

The Wall-type **SVGm** has a number of holes on the top and bottom of the device, **Figure 4**, to facilitate transport and installation of the device.

These holes can be used as attachment points for external manipulation tools, or a bar (not included) can be passed through them to improve transport and installation of the device.

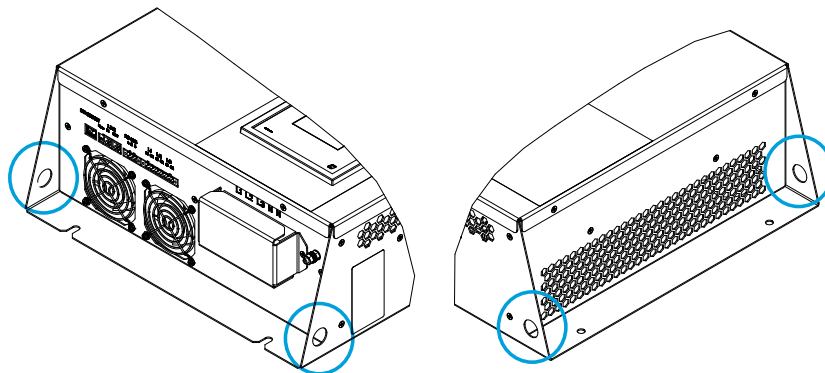


Figure 4: Holes to facilitate transport and installation.

The device must be fixed vertically to a wall or support.

Use 4 fixing screws with a diameter of **8 mm**, suitable for the chosen wall or support.

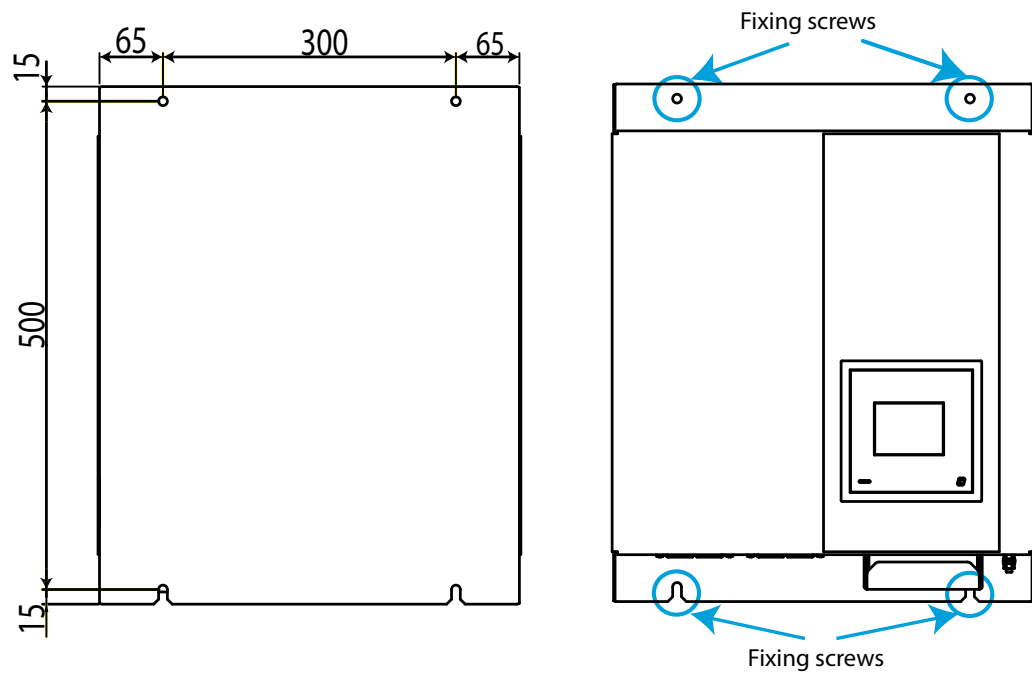


Figure 5: Installation Wall-type SVGm.

Use **4 M8** fixing screws.



The ventilation grilles must not obstructed or covered at any time.

3.4.2.- RACK-TYPE SVGm

The **Rack-type SVGm** should be installed in a 19" rack cabinet.

The height of the device is equivalent to 9U. (U is the rack unit, 1U = 4.445 cm)

You can install more than one **SVGm** in a single cabinet.

Follow these steps to install it inside the cabinet:

1.- Extend the rack cabinet's anti-tip feet.



Unless the rack cabinet is secured to the floor, the anti-tip feet have to be extended and fixed to the floor, to ensure maximum safety during the assembly process.

2.- Open or remove the door at the front of the cabinet.

3.- Place the **SVGm** on the cabinet's rails or shelves. Make sure that they are suitable for the weight of the device; use cross braces if necessary.



Do not use front handles to carry the module.



Fit the device with the help of another person.

4.- Fasten the device to the points provided for this purpose. Use **4 M6** fixing screws.

3.4.3.- CABINET-TYPE SVGm

The Cabinet-type **SVGm** models are free-standing cabinets with 4 bearing supports on the floor.



The mounting surface must be solid, support the device's weight and be level.



The cabinet must never be welded to the floor using arc welding, as this may destroy the electronic components.

The device's top panel is part of the ventilation system. The top panel is inverted to make it easier to transport.

It must be placed in the correct position to enable the device to operate properly. To do this:

- 1.- Remove the transport rings.
- 2.- Remove the top panel from the top of the cabinet.
- 3.- Rotate the top panel. The non-slotted part goes at the front of the cabinet.
- 4.- Install the transport rings with rubber washers supplied.



20 Nm

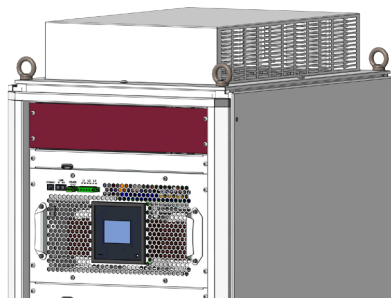


Figure 6: Top panel of an SVGm cabinet.

3.5.- CONNECTION

Wall and Rack type SVGm models:

Use cables of a cross-section suitable for the rated current of the static generator and that comply with the standards of the country in which they are being installed.

The earth conductor must have at least the same cross-section as the phase conductors. If the phase conductors exceed 16 mm^2 , the earth conductor will be at least 16 mm^2 . If the phase conductors exceed 32 mm^2 , the earth conductor can be the half of the cross-section of the phase conductors

For **69 kvar (SVGm-4WF-069M and SVGm-4WF-069R)** and **100 kvar (SVGm-3WF-100M and SVGm-3WF-100R)** models, under certain circumstances, the contact current may exceed 3.5 mA ~.

The recommended minimum cross-sections are:

SVGm-xxx-030M and SVGm-4WF-020M: 16 mm^2

SVGm-xxx-060M, SVGm-4WF-050M and SVGm-4WF-040M: 35 mm^2

SVGm-3WF-100R, SVGm-3WF-100M, SVGm-3WF-075M, SVGm-4WF-069R and SVGm-4WF-069M: 70 mm^2

Neutral conductor cross-section must suit the expected neutral current and must be selected according to the external protection devices.

**Cabinet type SVGm models:**

For the cabinet's power supply, a cable with a cross-section suitable for the maximum current that can flow through the device must be used. Although the device is composed of 100 kvar modules, to make installation easier, the modules are already wired, and the user only has to take into account the device's total capacity. The recommended minimum cross-sections are:

SVGm-4WF-067C-550: 35 mm^2

SVGm-3WF-100C-480 and SVGm-4WF-069C-400: 70 mm^2

SVGm-3WF-100C-690: 50 mm^2

SVGm-4WF-134C-550: 70 mm^2

SVGm-3WF-200C-480 and SVGm-4WF-138C-400: $70 \text{ mm}^2 (\times 2)$

SVGm-3WF-200C-690: 95 mm^2

SVGm-4WF-201C-550: 120 mm^2

SVGm-4WF-268C-550: 150 mm^2

SVGm-3WF-300C-480 and SVGm-4WF-207C-400: $150 \text{ mm}^2 (\times 2)$

SVGm-3WF-300C-690: 150 mm^2

SVGm-3WF-400C-480 and SVGm-4WF-276C-400: $240 \text{ mm}^2 (\times 2)$

SVGm-3WF-400C-690: 240 mm^2

Neutral conductor cross-section must suit the expected neutral current and must be selected according to the external protection devices.



Ensure that the **SVGm** is earthed correctly to prevent the risk of electric shock.



To measure the current, class **0.2S** transformers of the **TC** or **TCH** series are recommended.



The use of transformers with ratios close to the current to be measured is recommended.



The correct connection of the current transformers is vital for the **SVGm** static generators to operate properly. If the phases L1, L2 and L3 are switched in the secondary, the static generator will not work properly.



The **SVGm** devices have built-in fuse overcurrent protection. Install external protection according to the type of installation, the facility's maximum short-circuit current, the maximum fuse current, and the regulations in force at the place of installation.



If local regulations require the use of earth leakage protection devices, only DC sensitive RCD (RCD type B) should be used with **SVGm**. Static generators work internally with DC currents, and, in case of failure, the DC currents may produce malfunction on type A RCD devices.



Ensure that the installation of the device in your electric distribution system (TN, VT, IT) complies with current standards.

Note: In networks with a grounded phase, the permanent phase-to-ground voltage cannot exceed 300 V ~.

Check that there is a neutral in the place where three-phase static generator connections are made with neutral, **SVGm-4WF-xxxx**.



Do not install various static generators in series one after another in the same installation, configured to correct the same disturbances. This can produce an overcompensation of the disturbances, which could cause instability in the mains (**Figure 7**)

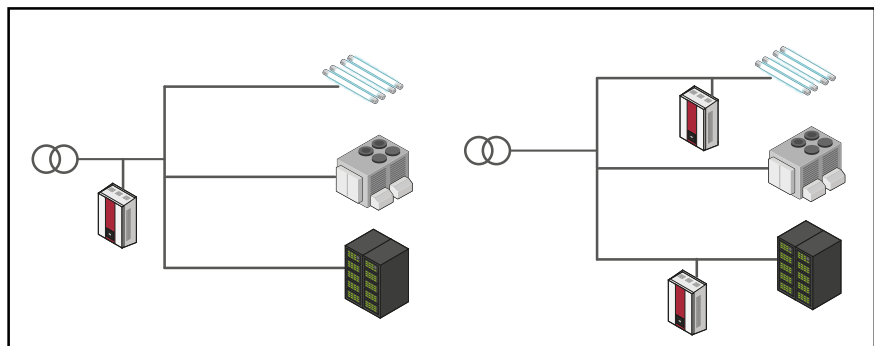
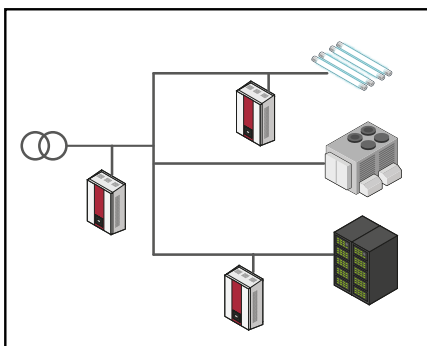


Figure 7: Do not install various static generators in series.



The presence of **notch**-type periodic disturbances in voltage with dv/dt values greater than 30% can cause deterioration and even destruction of certain components of the static var generator, even when they are not in operation and are just connected to the mains.

Thus, if the presence of these **notches** is suspected due to having loads that are prone to creating them, the network must be studied to record the voltage and current waves under full load conditions for analysis.

If these **notches** are apparent in the readings, the **CIRCUTOR** technical department should be consulted to determine the suitability of installing **SVGm** static var generator in the mains.

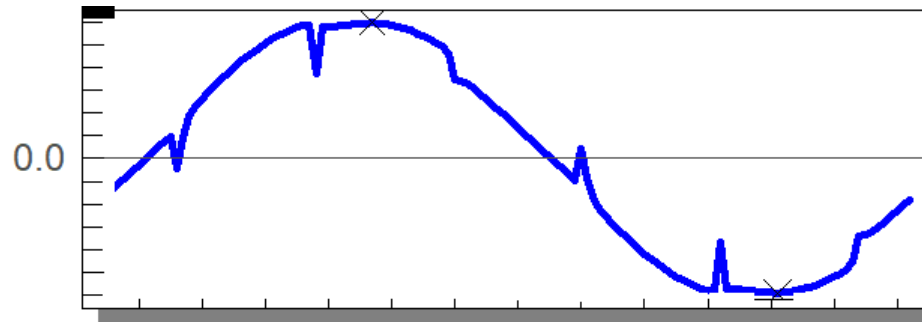


Figure 8: Example of severe notches in the mains voltage.

3.6.- DEVICE TERMINALS

3.6.1.- WALL-TYPE SVGm: SVGm-3WF-xxxM and SVGm-4WF-xxxM

The connection terminals of the Wall-type **SVGm** model are located on the lower face of the device. The device has a terminal cover on the mains connection terminals.

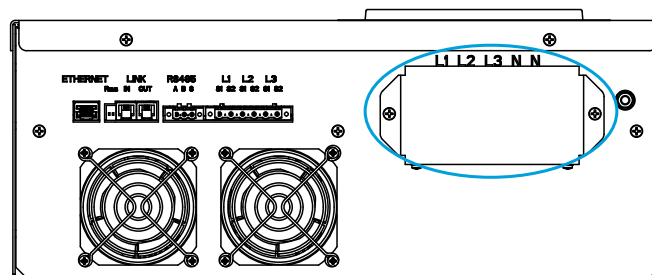


Figure 9: Terminal cover, SVGm-3WF-030M, SVGm-4WF-020M, SVGm-3WF-060M and SVGm-4WF-040M.

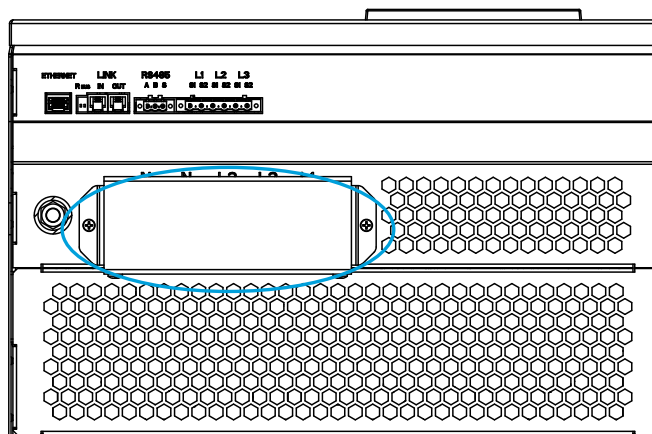


Figure 10: Terminal cover, SVGm-3WF-100M, SVGm-3WF-075M, SVGm-4WF-050M and SVGm-4WF-069M.

Remove the terminal cover before connecting the device.



Put the terminal cover back on once the device has been connected.

Table 15: List of terminals.

Device terminals	
1: ETHERNET , Ethernet Connector	11: S2 , Current input L2
2: RBUS , Terminator switch for parallel connection	12: S1 , Current input L3
3: IN , Input for parallel connection	13: S2 , Current input L3
4: OUT , Output for parallel connection	14: L1 , Mains connection L1
5: A , RS-485 communications	15: L2 , Mains connection L2
6: B , RS-485 communications	16: L3 , Mains connection L3
7: S , RS-485 communications	17: N , Mains connection N
8: S1 , Current input L1	18: N , Mains connection N
9: S2 , Current input L1	19: Earth connection
10: S1 , Current input L2	

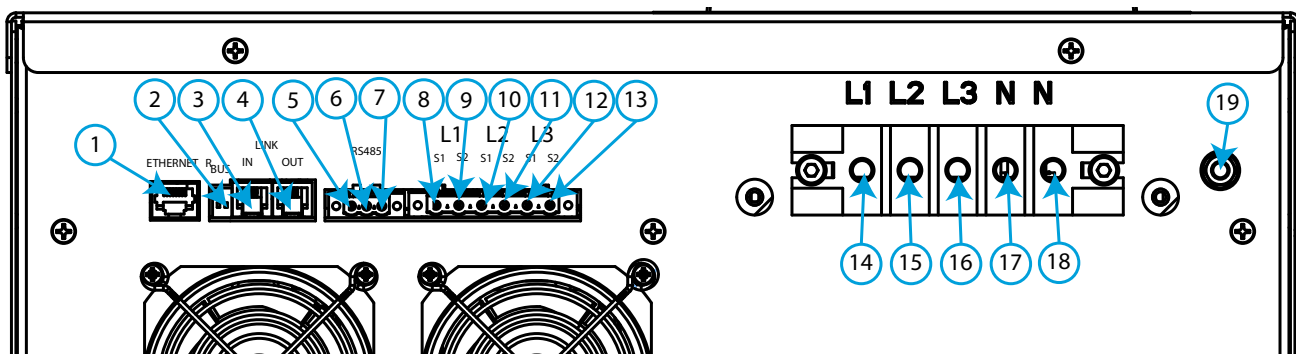


Figure 11: SVGm-3WF-030M, SVGm-4WF-020M, SVGm-3WF-060M and SVGm-4WF-040M terminals.

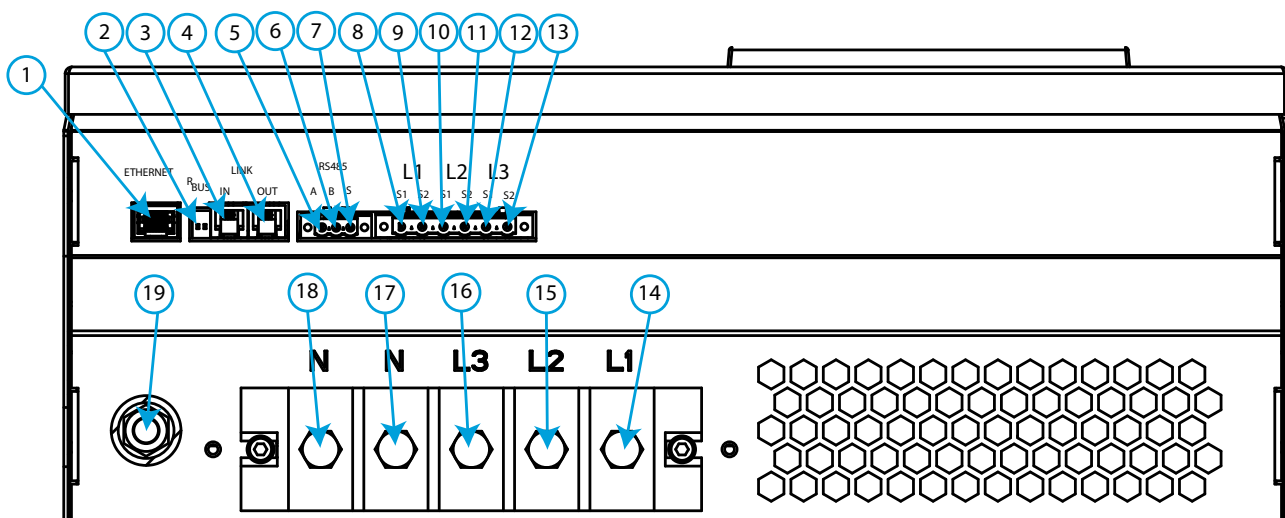


Figure 12: SVGm-3WF-100M, SVGm-3WF-075M, SVGm-4WF-050M and SVGm-4WF-069M. terminals.



It is recommended to fix the connection cables to the holes that facilitate the transport and installation of the device (**Figure 4**), so that the terminals are not subjected to any mechanical stress.

3.6.2.- RACK-TYPE SVGm: SVGm-3WF-100R and SVGm-4WF-069R

The **SVGm** type Rack connection terminals are located at the front and rear of the device.

Table 16: List of terminals.

Device terminals	
1: ETHERNET , Ethernet Connector	11: S2 , Current input L2
2: RBUS , Terminator switch for parallel connection	12: S1 , Current input L3
3: IN , Input for parallel connection	13: S2 , Current input L3
4: OUT , Output for parallel connection	14: L1 , Mains connection L1
5: A , RS-485 communications	15: L2 , Mains connection L2
6: B , RS-485 communications	16: L3 , Mains connection L3
7: S , RS-485 communications	17: N , Mains connection N
8: S1 , Current input L1	18: N , Mains connection N
9: S2 , Current input L1	19: Earth connection
10: S1 , Current input L2	

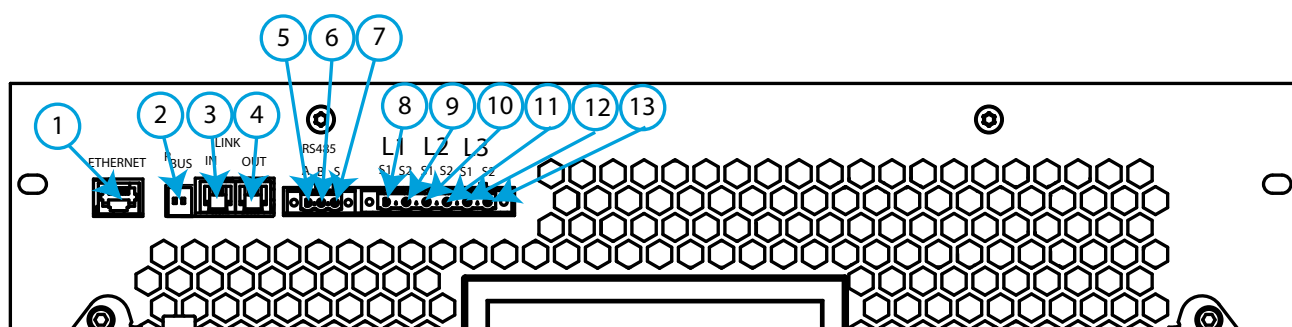


Figure 13: Rack-type SVGm terminals (terminals at the front of the device).

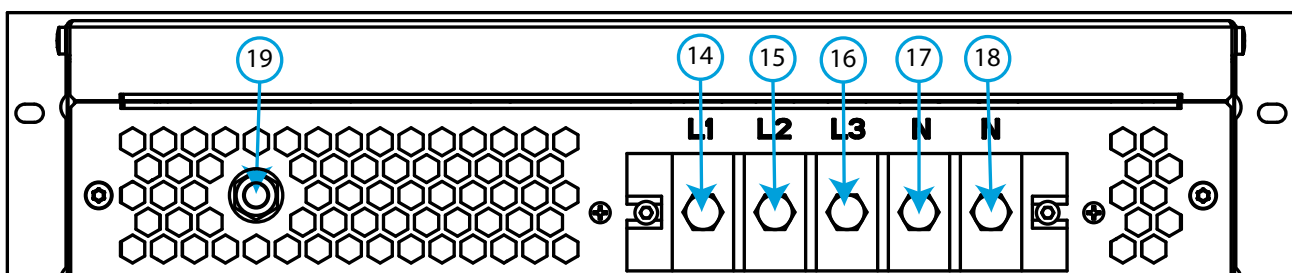


Figure 14: Rack-type SVGm terminals (terminals at the rear of the device).

3.6.3.- CABINET-TYPE SVGm

CIRCUTOR has two types of cabinets: cabinets with connections at the top and cabinets with connections at the bottom.

Note: Cabinets with connections at the top are only available in the *SVGm-3WFxxxC-480* and *SVGm-4WF-xxxC-400*.

There are sliding windows at the bottom of the cabinet so that the connection wiring can be slotted inside, **Figure 15**. These windows can be removed and machined if it is considered necessary to use a cable gland.

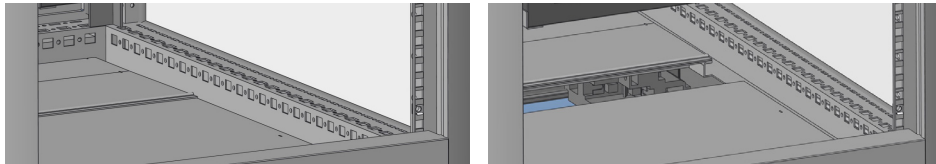
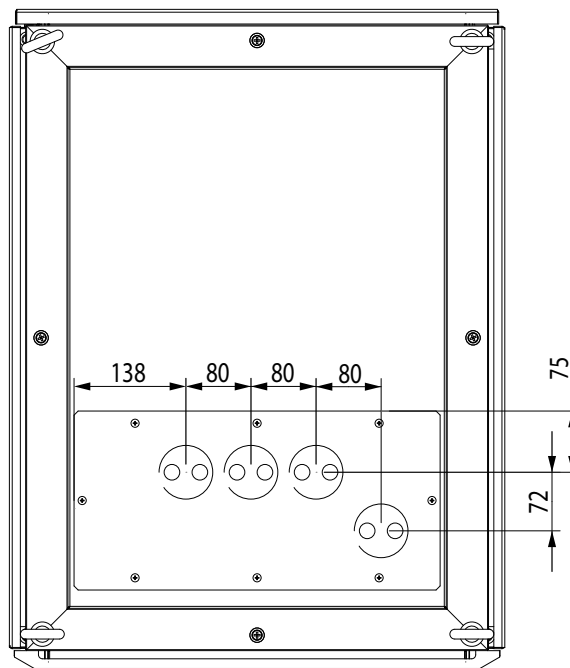


Figure 15: Sliding windows for the connection wiring.



You should never remove the cover closest to the front part.

Cabinets with connections at the top have a sheet in the upper part of the cabinet which can be machined as shown in **Figure 16**, to insert the connection wiring.



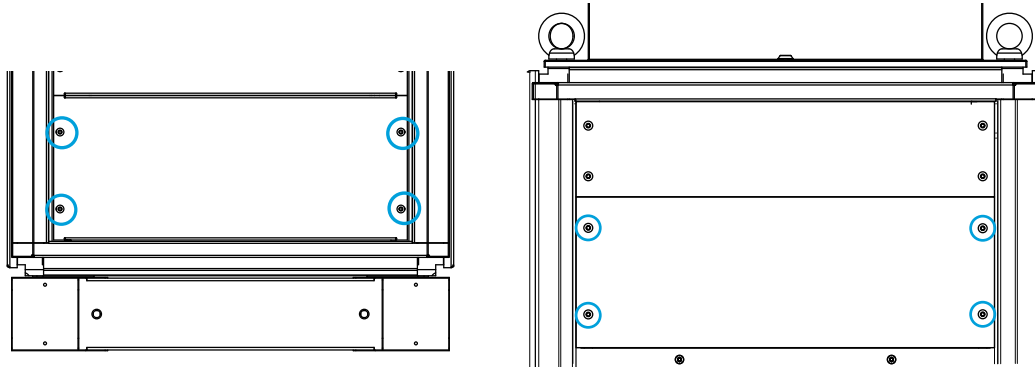
Unidades en mm. / Units in mm.

Figure 16: Machining a cabinet with connections at the top.

The current input and the communication ports must be connected to the “**master**” device, which is located at the top of the cabinet. This connection is described in “**3.6.2.- RACK-TYPE SVGm: SVGm-3WF-100R and SVGm-4WF-069R**”.

To access the current input and mains connections, loosen the screws in the lower front cover (in

cabinets with connections at the bottom) or the screws in the upper front cover (in cabinets with connections at the top) **Figure 17**.



Cabinet with connections at the bottom - Cabinet with connections at the top
Figure 17: Screws (SVGm-3WF-xxC-480 and SVGm-4WF-xxC-400 models).

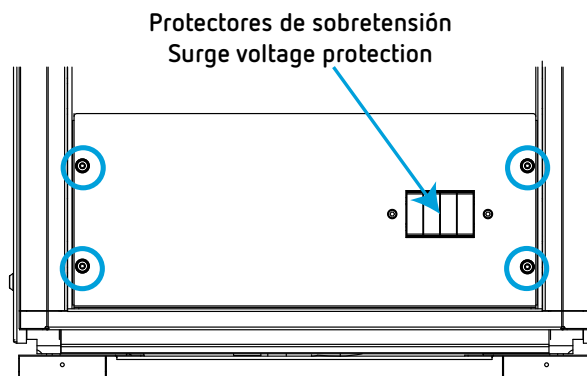


Figure 18: Screws (SVGm-3WF-xxxC-690 and SVGm-4WF-xxxC-550 models).



The green indicator voltage protection indicate that they are working correctly. Immediately replace those whose indicator is red, see **"10.8.- MAINTENANCE OF SURGE PROTECTIVE DEVICES: SVGm-3WF-xxxC-690 and SVGm-4WF-xxxC-550"**

Fold down the cover carefully once the front cover is open, the device's terminals can be accessed, Figure 19, Figure 20 and Figure 21:

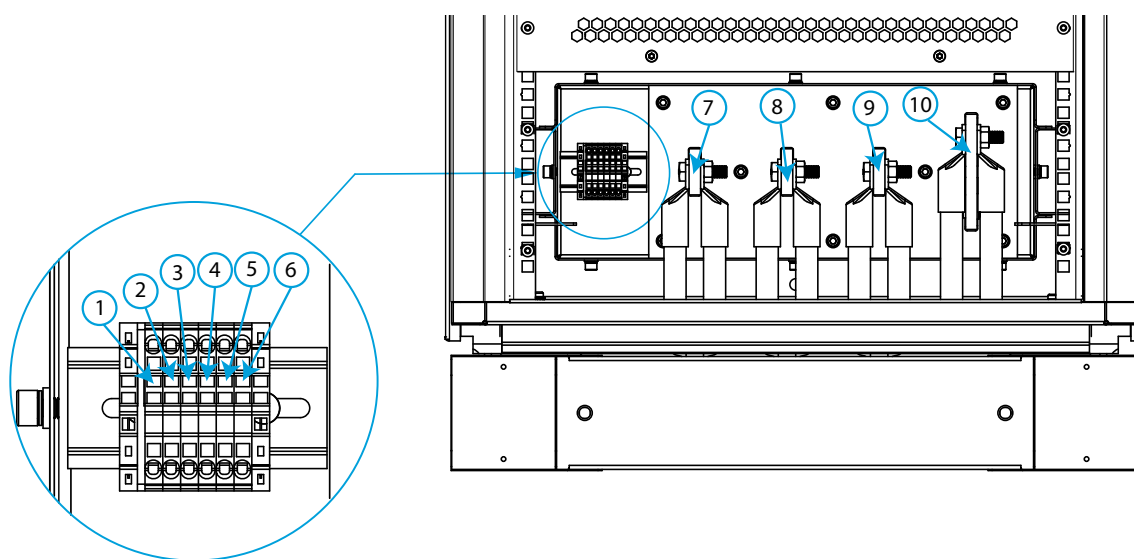


Figure 19: terminals (connections at the bottom).

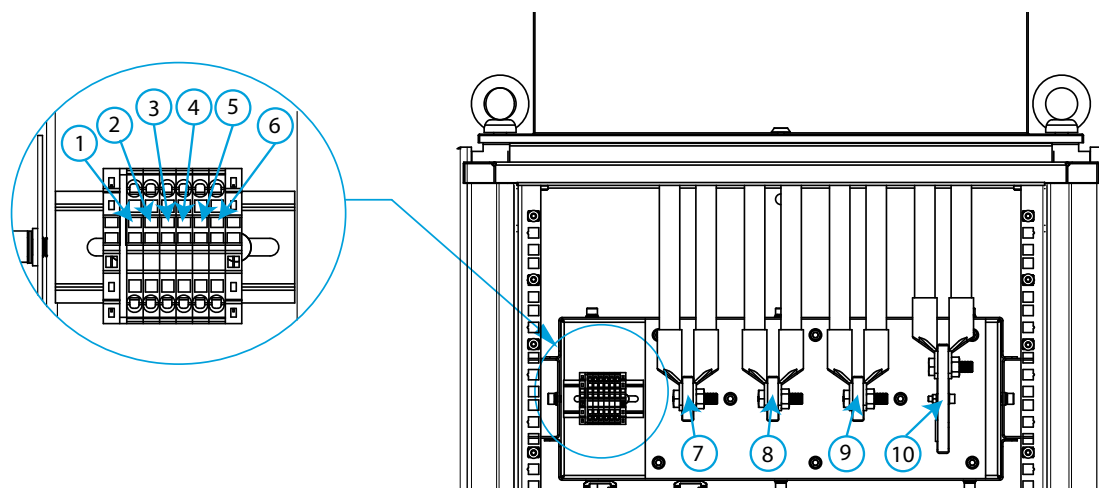


Figure 20: terminals (connections at the top).

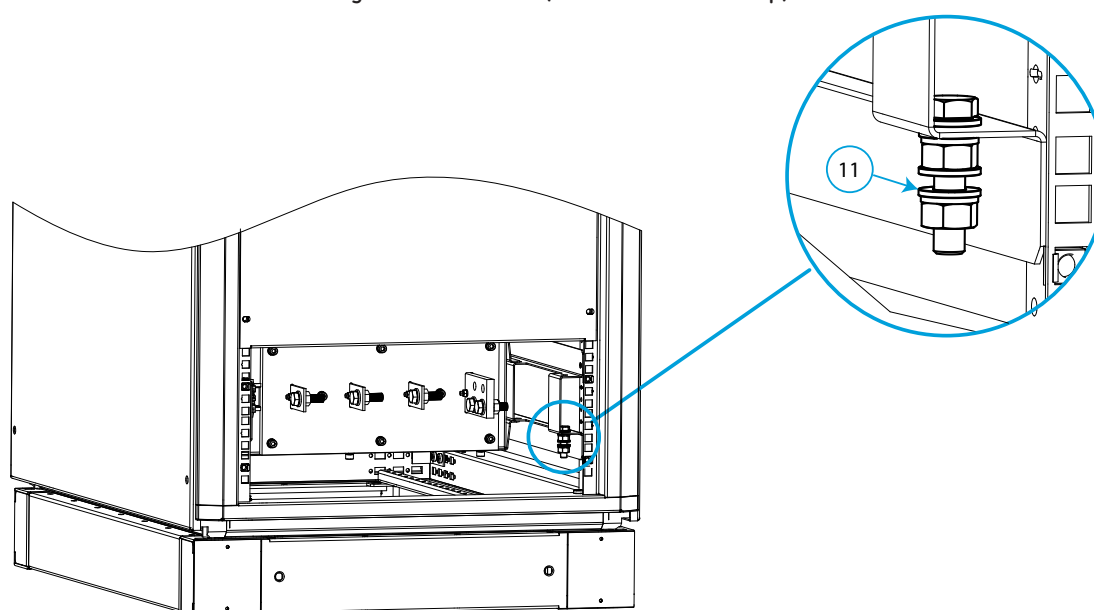


Figure 21: SVGm cabinet-type earth terminal.

Table 17: List of terminals.

Device terminals	
1: S1, Current input L1	6: S2, Current input L3
2: S2, Current input L1	7: L1, Mains connection L1
3: S1, Current input L2	8: L2, Mains connection L2
4: S2, Current input L2	9: L3, Mains connection L3
5: S1, Current input L3	10: N, Mains connection N
11: Earth connection	

3.7.- CONNECTION DIAGRAMS

3.7.1.- 4-WIRE CONNECTION AND CURRENT MEASUREMENT ON THE MAINS SIDE.

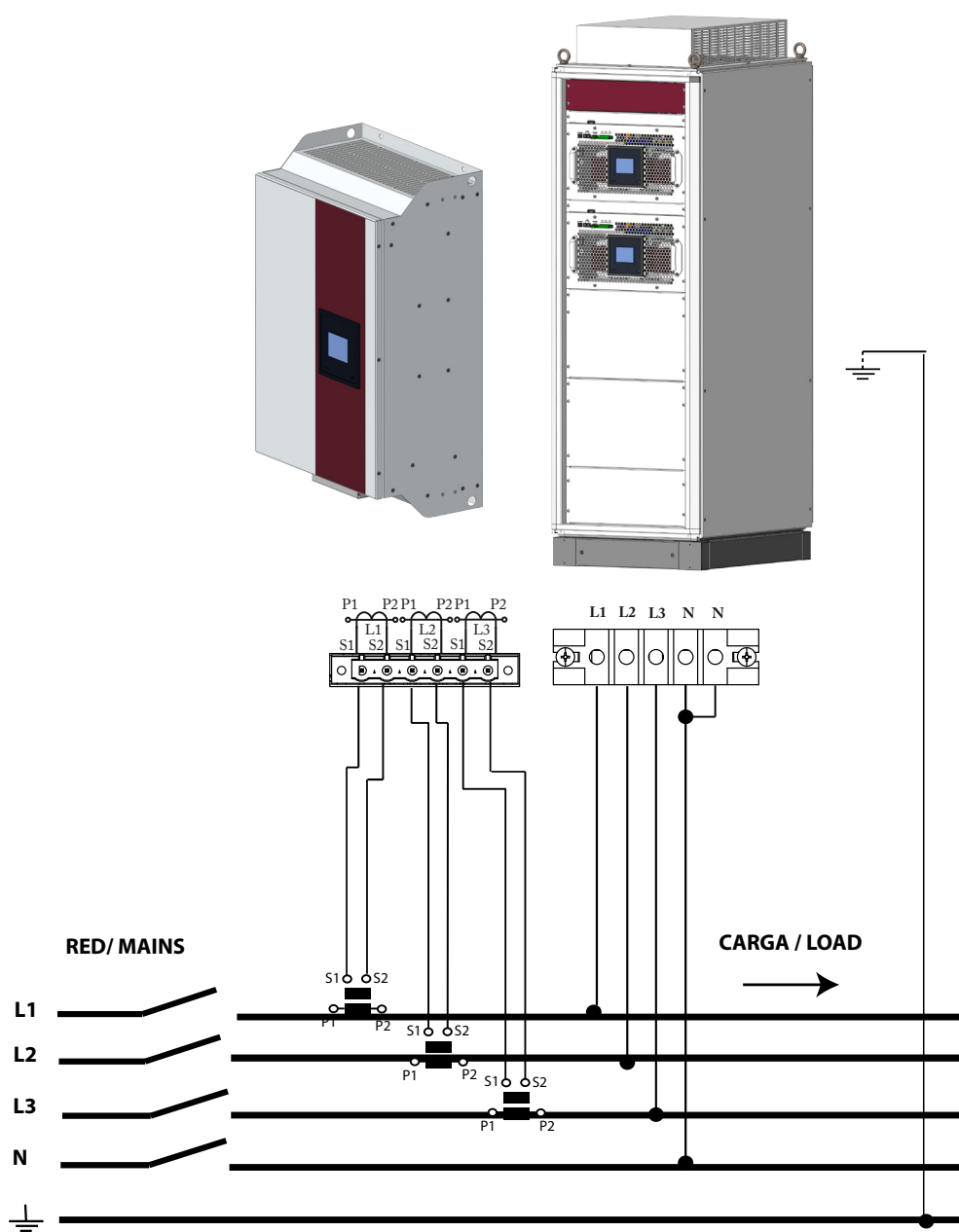


Figure 22: Three-phase measuring with 4-wire connection and current measurement on the mains side.



Use the 2 neutral current terminals, as I_n can be: $I_n \approx 3 \cdot I_{\text{PHASE}}$

3.7.2.- 4-WIRE CONNECTION AND CURRENT MEASUREMENT ON THE LOAD SIDE.

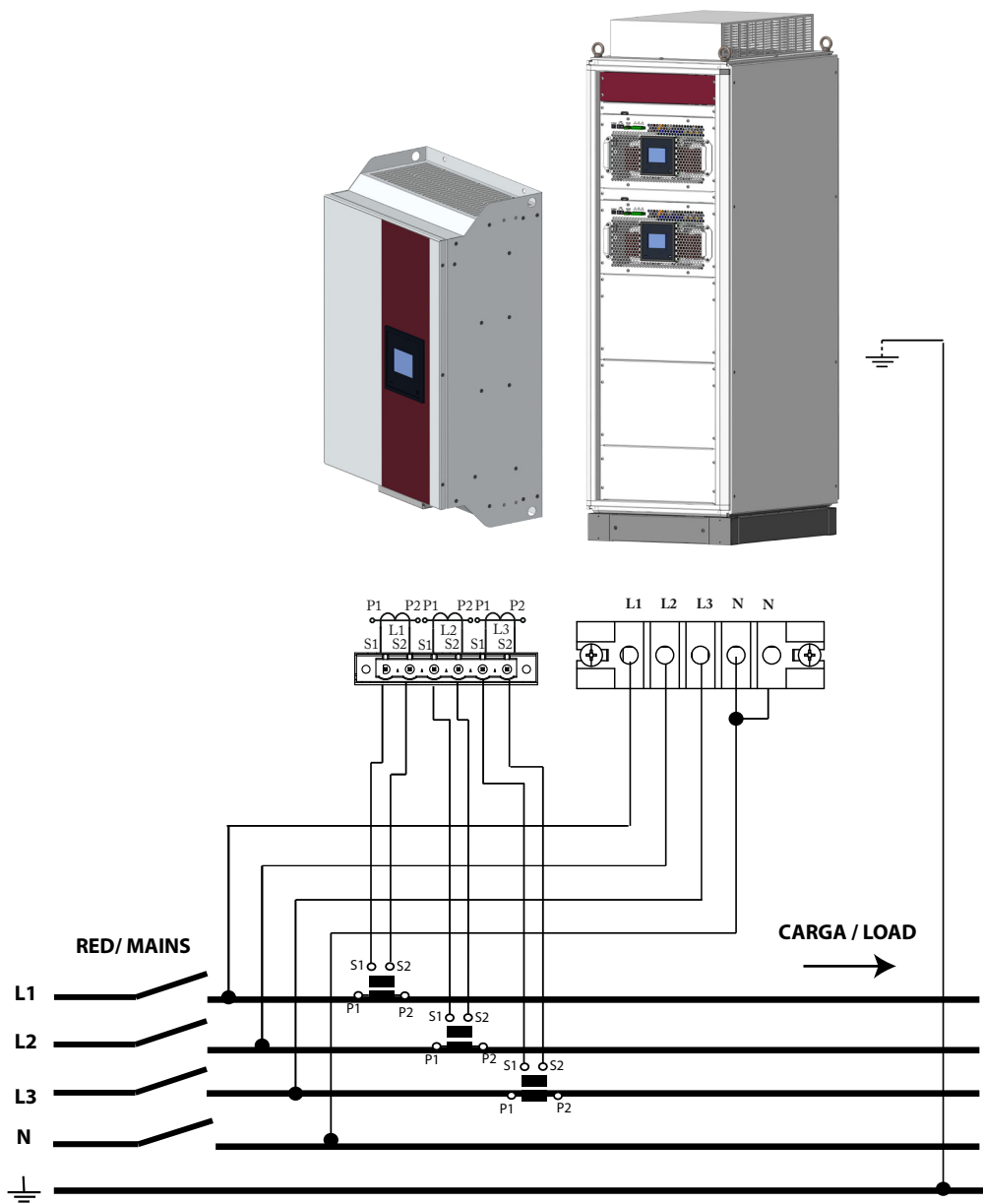


Figure 23: Three-phase measuring with 4-wire connection and current measurement on the load side.



Use the 2 neutral current terminals, as I_n can be: $I_n \approx 3 \cdot I_{\text{PHASE}}$

3.7.3.- 3-WIRE CONNECTION AND CURRENT MEASUREMENT ON THE MAINS SIDE.

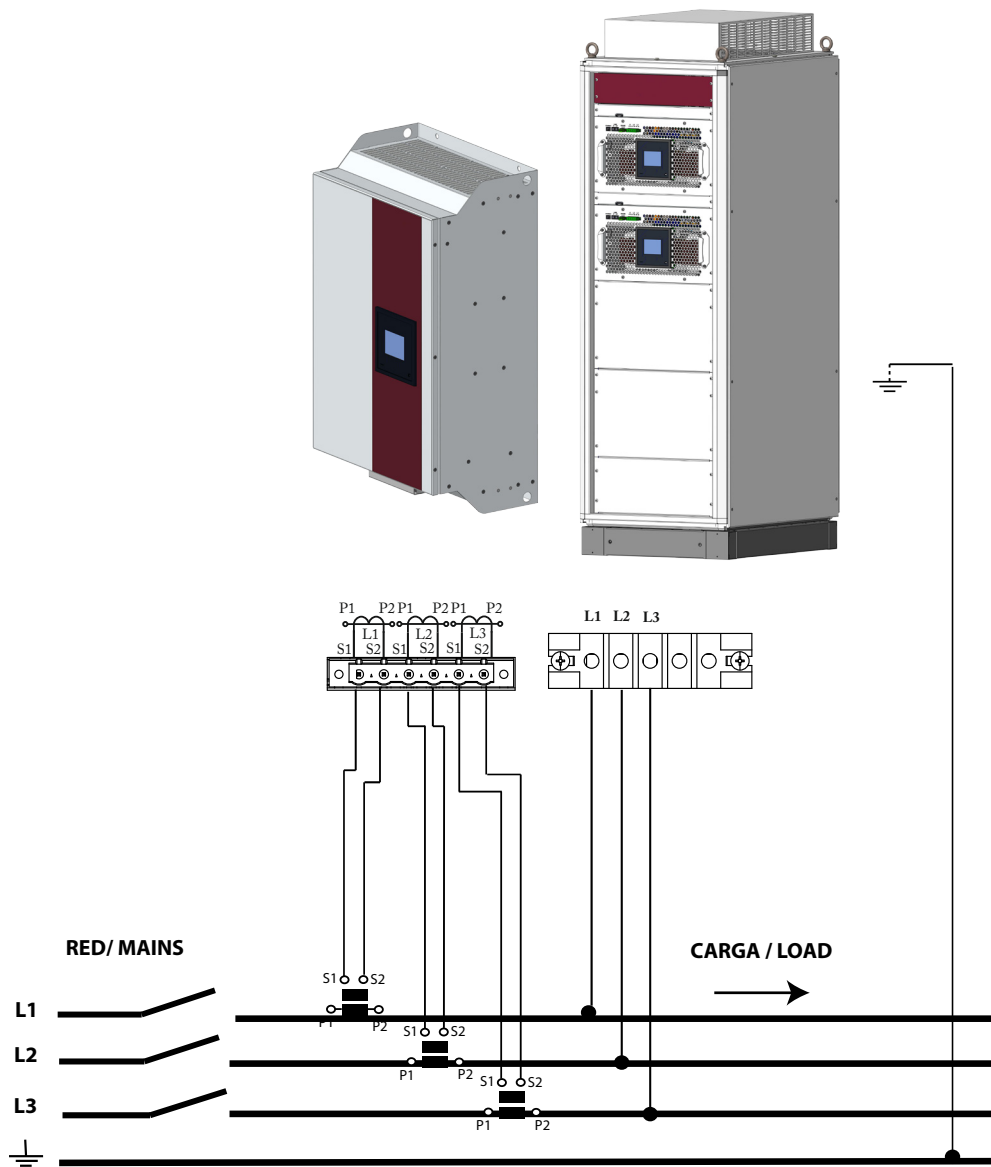


Figure 24: Three-phase measuring with 3-wire connection and current measurement on the mains side.

3.7.4.- 3-WIRE CONNECTION AND CURRENT MEASUREMENT ON THE LOAD SIDE.

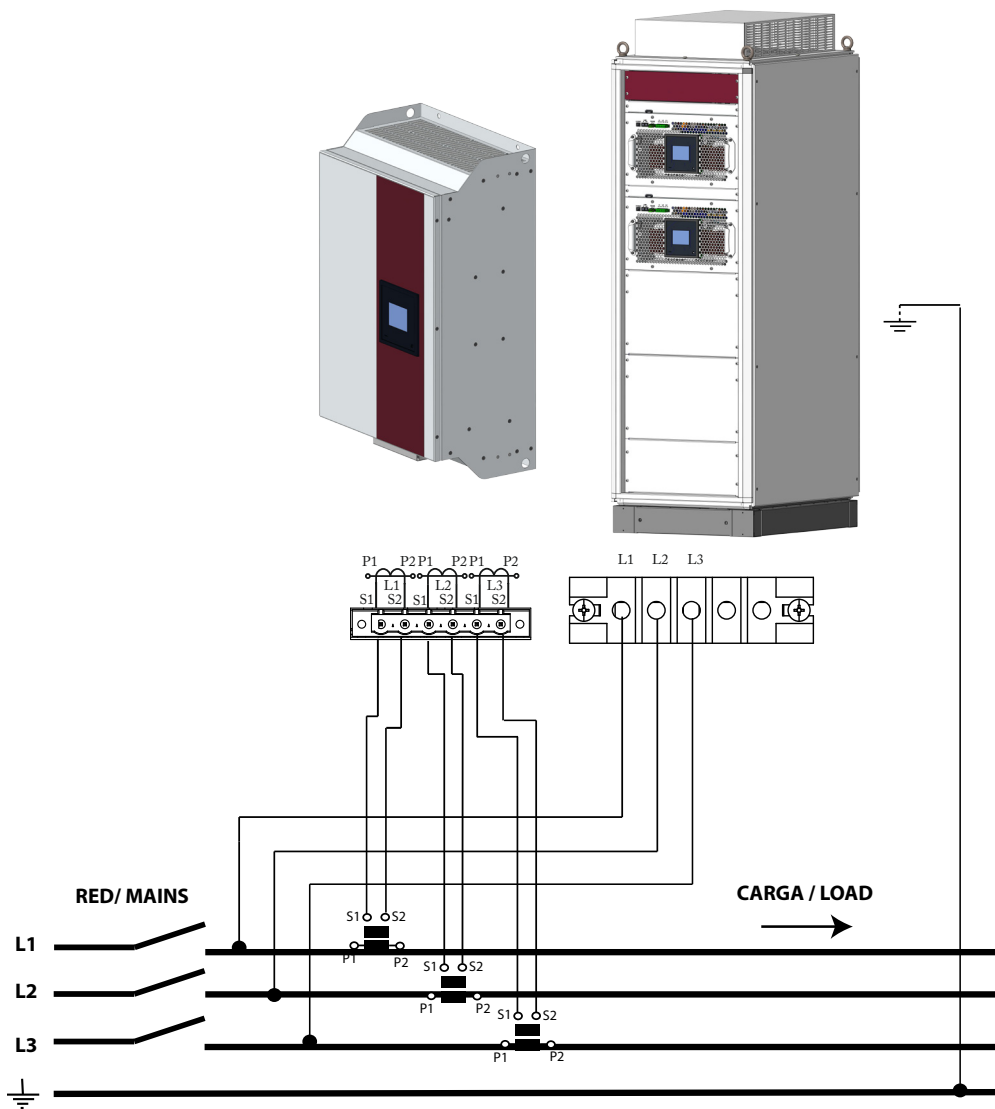


Figure 25: Three-phase measuring with 3-wire connection and current measurement on the load side.

3.7.5.- 3-WIRE CONNECTION AND 2 CURRENT TRANSFORMERS ON THE MAINS SIDE.

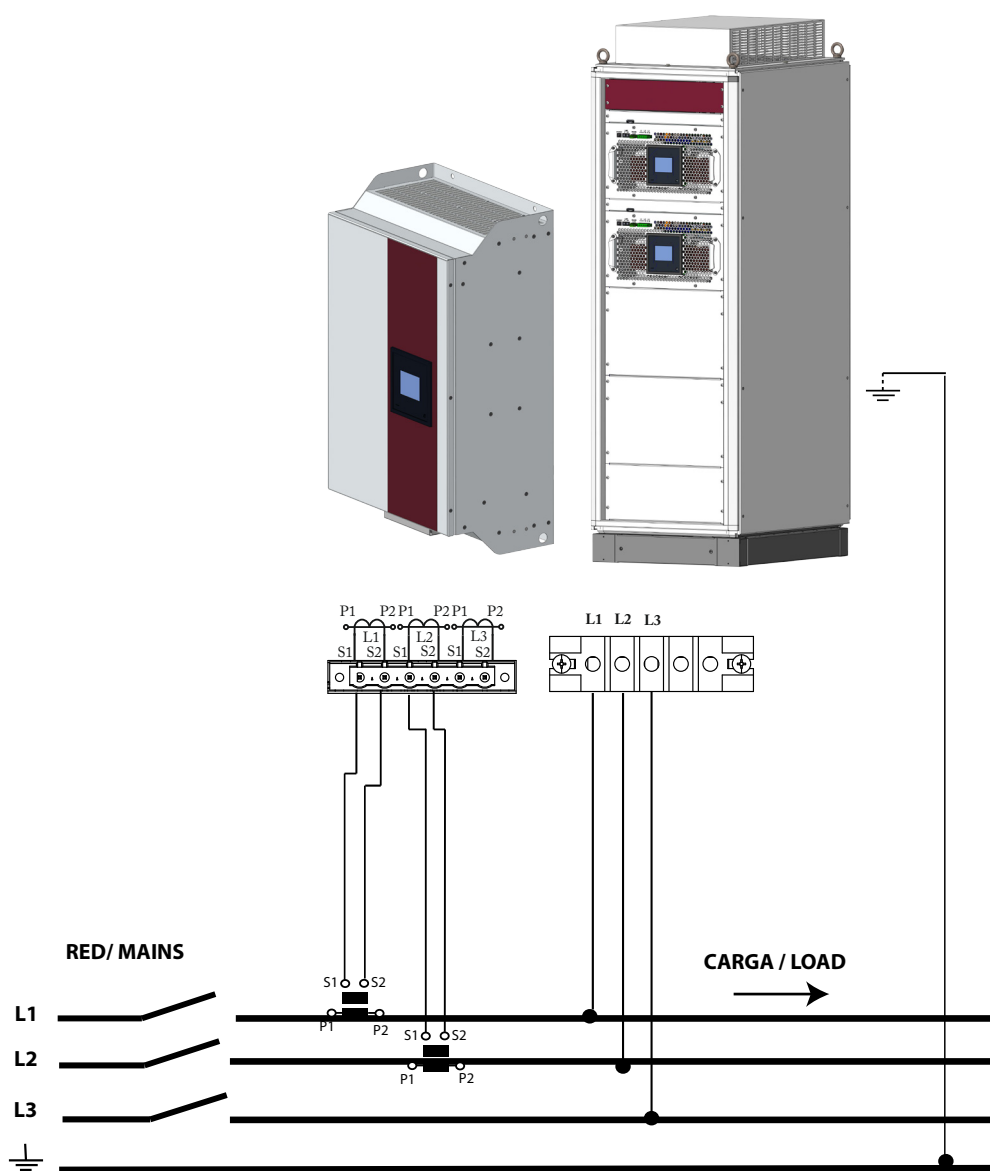


Figure 26: Three-phase measuring with a 3-wire connection and 2 current transformers on the mains side.



The connection of 2 current transformers is only possible in three-phase mains without neutral (3 wires).

3.7.6.- 3-WIRE CONNECTION AND 2 CURRENT TRANSFORMERS ON THE LOAD SIDE.

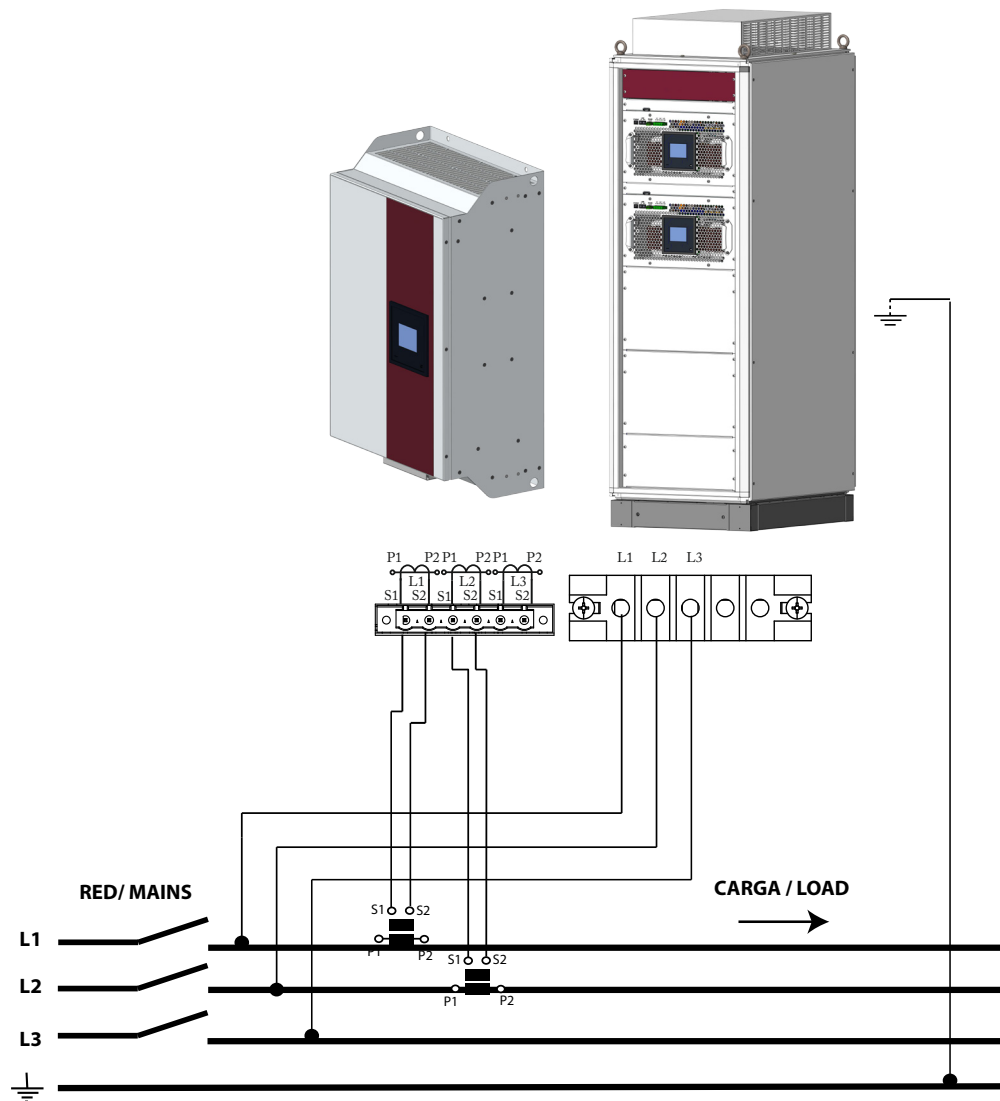


Figure 27: Three-phase measuring with a 3-wire connection and 2 current transformers on the load side.



The connection of 2 current transformers is only possible in three-phase mains without neutral (3 wires).

3.8.- PARALLEL CONNECTION OF 2 TO 100 SVGm

The **SVGm** devices can be arranged in parallel. Up to 100 devices can be arranged in parallel, depending on model.

In the case of installations with devices in parallel, a device must be defined as the **"master"**, while all others will have **"slave"** devices functions.

The **"master"** will be responsible for measuring the network parameters, so only the current transformers will be connected to it. This allows low-power transformers to be used in these installations, since an individual transformer does not have to be connected to each device.

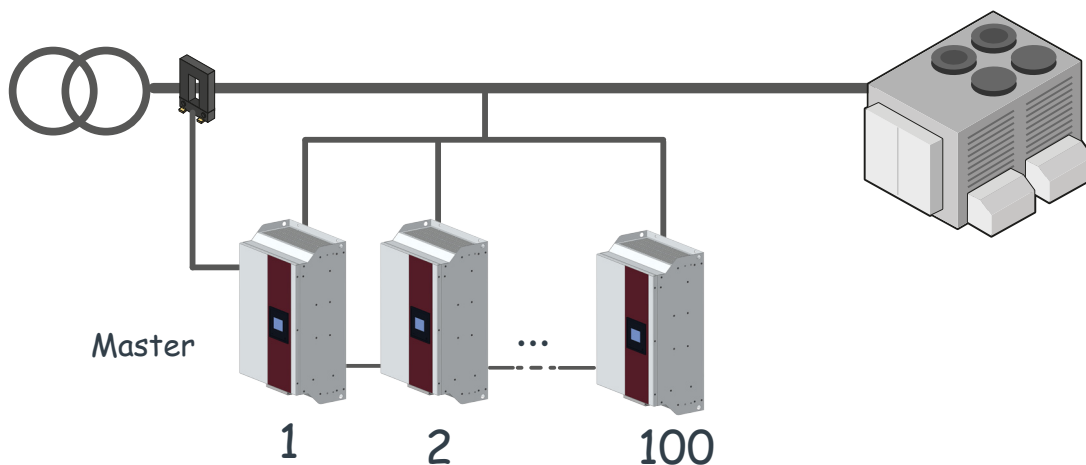


Figure 28: Connection of 2 to 100 SVGm in parallel (Transformers on the mains side).

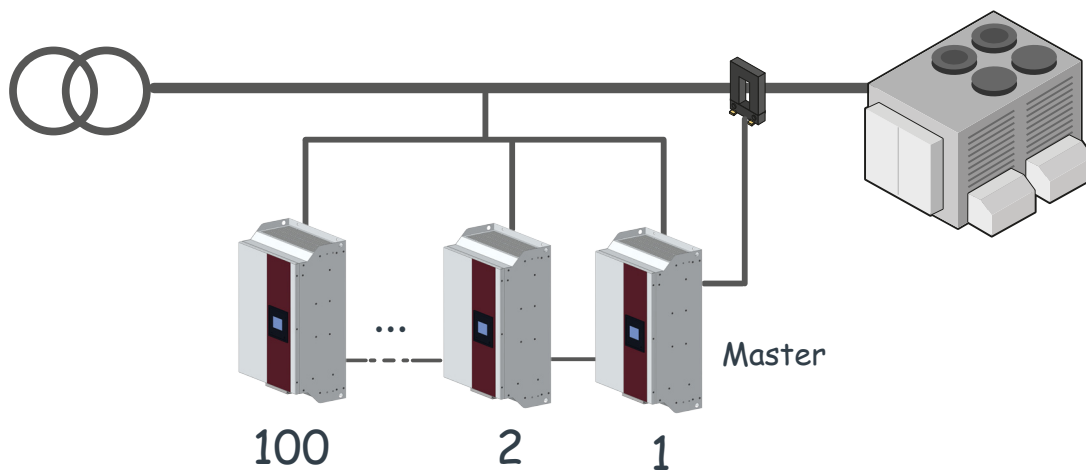


Figure 29: Connection of 2 to 100 SVGm in parallel (Transformers on the load side).

New device can be connected to existing devices without having to shut down or disconnect them. This ensures capacity can be increased or degraded device in critical installations can be replaced without affecting the installation, allowing connection without shutting down the device and also making it possible to achieve 0 **MTD** (Maximum Tolerable Downtime).

In the event of failure of the **"master"** device, the front connection of the current transformers allows connection to be changed to a **"slave"** device, reconfigured as the **"master"**, meaning the system resumes operation quickly with minimum downtime.

3.8.1.- CONNECTING INDIVIDUAL DEVICES

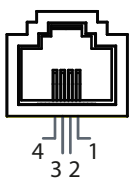
To connect multiple individual devices in parallel, follow these steps:

- 1.- Select the device that will operate as the **"master"**.
- 2.- Connect the **"master"** device. The current transformers are only connected to the **"master"** device.
- 3.- Connect all of the **"slave"** devices.

Note: Each devices must feature the protection elements indicated in section **"3.5.- CONNECTION"**.

- 4.- Connect all of the devices using the communication cables (**Table 14**).

Table 18: Communication cable, devices in parallel.

Communication cable	
RJ11 connector	Pinout
	1: Not connected. 2: CAN A 3: CAN B 4: Not connected.

Note: The communication cable must be a CAT 5 cable or higher.

Connect the **OUT** terminal from the **"master"** static generator to the **IN** terminal from the second static generator, the **OUT** terminal from the second static generator to the **IN** terminal of the third, and so on (**Table 18**).

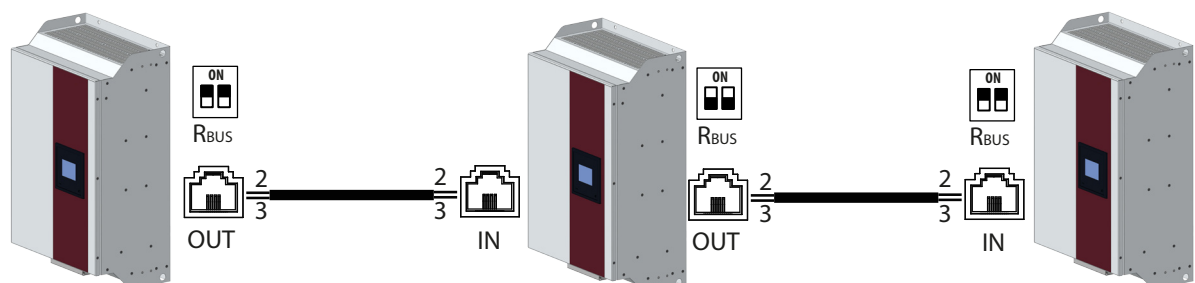


Figure 30: Connecting 3 devices in parallel, using the communication cable.

- 5.- Configure the installation in the **"master"** device (see **"7.- CONFIGURATION"**)
- 6.- Complete the configuration of the slave devices (see **"7.- CONFIGURATION"**).
- 7.- Enable the terminator switch for parallel connection, **RBus** (Terminal No 2 of **Table 15** and **Table 16**) in the bus end devices only. Then disable in the other devices.

3.8.2.- CONNECTING CABINETS

To connect multiple cabinets in parallel, follow these steps:

- 1.- Select the cabinet that is to contain the **"master"** device.
- 2.- Connect the **"master"** cabinet. The current transformers are only connected to the **"master"** cabinet.
- 3.- Connect the **"slave"** cabinets.
- 4.- Connect all of the devices using the communication cables (Table 14).

Connect the **OUT** terminal from the final slave device in the **"master"** cabinet to the **IN** terminal from the **"master"** device of the following cabinet, and the **OUT** terminal from the final **"slave"** device in this cabinet to the **IN** terminal of the **"master"** device of the following cabinet, and so on (Figure 31).

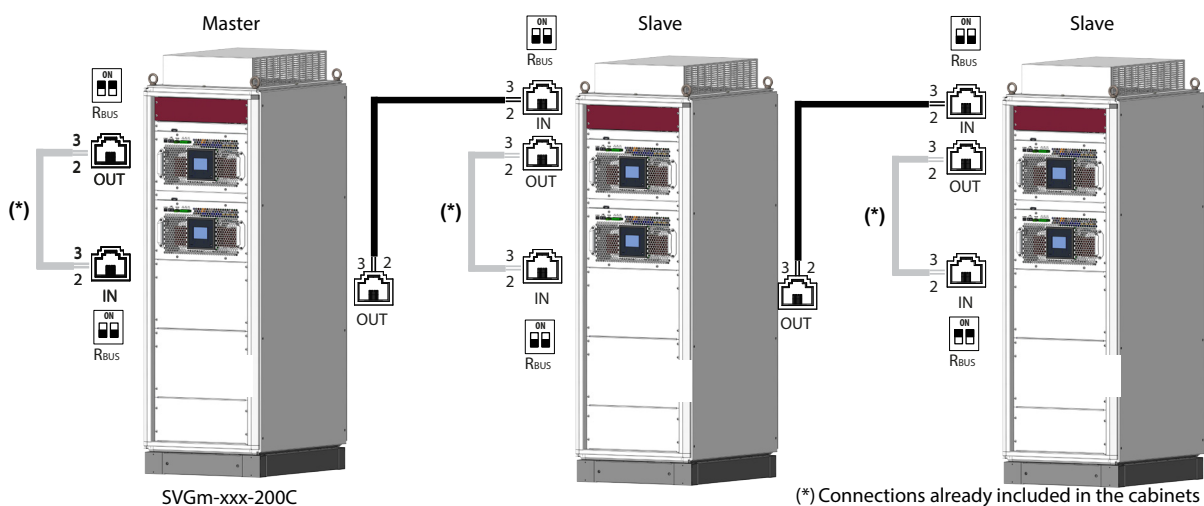


Figure 31: Connecting 3 devices in parallel, using the communication cable (200 kvar Master SVGm).

- 5.- Configure the installation in the **"master"** device (see **"7.- CONFIGURATION"**).
- 6.- Complete the configuration of the slave devices (see **"7.- CONFIGURATION"**).
- 7.- Enable the terminator switch for parallel connection, **RBUS** (Terminal No 2 of Table 16) in the bus end devices only. Then disable in the other devices.

Note: The 200 kvar (SVGm-3WF-200C), 300 kvar (SVGm-3WF-300C) and 400 kvar (SVGm-3WF-400C) cabinets are made up of 2, 3 and 4 100 kvar devices in parallel.
 The 138 kvar (SVGm-4WF-138C), 207 kvar (SVGm-4WF-207C) and 276 kvar (SVGm-4WF-276C) cabinets are made up of 2, 3 and 4 69 kvar devices in parallel.
 The 134 kvar (SVGm-4WF-134C), 201 kvar (SVGm-4WF-201C) and 268 kvar (SVGm-4WF-268C) cabinets are made up of 2, 3 and 4 67 kvar devices in parallel.
 Both the parallel configuration and connection are factory-set.

4.- OPERATION

4.1.- OPERATING PRINCIPLE

The currents consumed by the loads present in any installation have two components: an **active** component, which generates an effort, and a **reactive** component, generated by the inductive or capacitive nature of the load.

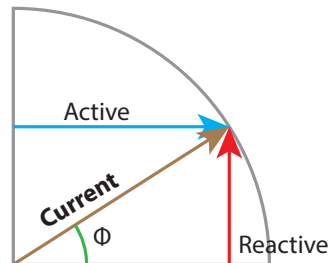


Figure 32: Current Components.

Both components are added when current flows through electrical conductors, which must be sized accordingly to transmit the resulting current. However, only part of these conductors are used to transmit current, so the capacity of the power distribution lines is underused.

Therefore, distribution companies usually impose penalties on consumers with a low **active** to **reactive** current ratio. This current ratio is known as the **power factor**, or **$\cos \Phi$** , according to whether it takes into account the content of harmonics or only the fundamental frequency component.

The effects of **reactive** currents in the conductors of distribution lines can be minimised with two methods:

- ✓ **Passively**, by adding reactive loads with the opposite sign to that of the loads of the installation. For example, adding capacitors to handle inductive loads.
- ✓ **Actively**, by generating a current with the same magnitude as the active current to compensate, in the opposite phase.

The **SVGm** is a device included in the second group. It uses the current measured with external current transformers to generate a counter-phase current, with the magnitude required to obtain the **$\cos \Phi$** programmed for the installation (target **$\cos \Phi$**).

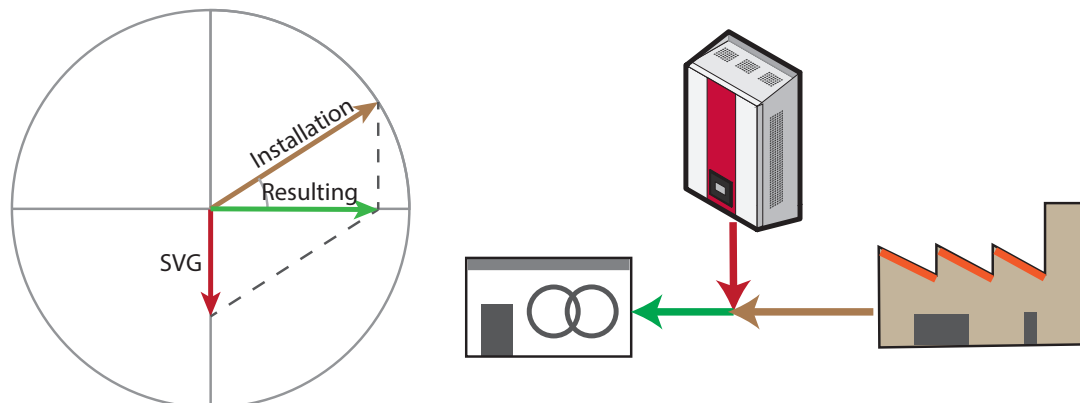


Figure 33: Operation of the SVGm.

The **SVGm** operates as a current generation source, so it can compensate capacitive and inductive currents. In addition, its operation does not depend on the content of harmonics in the network, so it can

be used in distorted networks, with no need to add filtering elements to the installation.

To adapt to the different needs of each installation, the target **cos Φ** can be defined in different ways:

✓ **Mode 1** is the basic mode of operation, in which we define a target **cos Φ** and the device will try to generate the reactive power needed to achieve that target.

✓ In **Mode 2** of operation, instead of defining a single target, a range of acceptable **cos Φ** is defined. Any value of **cos Φ** within that range will be valid. This allows acceptance ranges to be programmed based on the installation's requirements, and the device will generate the reactive power to fall within this range. If the installation is already inside this range, the device will take no action. This mode yields the most efficiency from the **SVGm**.

It is not always possible to measure all the loads present in the installation. There may be loads that cannot be measured, or we need to compensate the inductive reactive power of the power transformer, or the cable length between the measurement point and the billing point may generate reactive power that affects the target power factor. To solve these problems, a fixed reactive power to be generated (offset) can be specified. In this case, the device will calculate the reactive power to be generated based on the target **cos Φ** and adding the programmed offset value.

4.2.- MEDIUM VOLTAGE

The **SVGm** is able to compensate for the reactive current in medium voltage with the unit connected in low voltage. To do this, a current measurement transformer must be used to measure the medium voltage current.

There is a phase difference between the primary and secondary current of the medium voltage power transformer, which depends on the construction of the transformer. To compensate for this difference, the type of transformer used and its transformation ratio has to be entered in the settings screen ("**7.7 - MEDIUM VOLTAGE**"). This information is available on the transformer's rating plate.

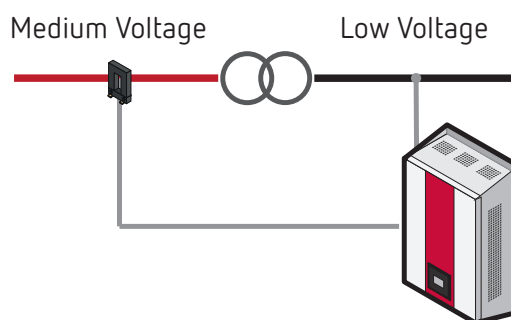


Figure 34: Operation of the SVGm in Medium Voltage.

4.3.- REMOTE CONTROL

Note: Feature available from HMI version 1.20 of the device.

The **SVGm** provides the option to measure the active and reactive power at a remote point using a power analyzer and the communication infrastructure.

In some installations, it is not possible to take a reading using current transformers at the connection point to the grid. To solve this problem, **Remote control** mode can be used in installations where a fast response is not necessary; for example, installations where the goal of reactive power compensation is to avoid a penalty on the electric bill.

The response time of the **SVGm** in this mode is approximately 15 seconds, compared to the cycle-to-cycle compensation of the **SVGm**, when measuring using current transformers.

In this mode, the **SVGm** checks the active and reactive power parameters using a **CIRCUTOR** meter or power analyzer and calculates the compensation targets based on the parameters measured.

The analyzer has to be placed at the point of common coupling (PCC) or billing point. Using any of the device's communication buses (Modbus/RTU on RS-485, or Modbus/TCP), the **SVGm** will communicate with the measuring device.

This mode overcomes the distance limitation between the measuring point and the installation point, with this distance now depending only on the communication technology used.

4.4.- TIME PROGRAMMER

Note: Feature available from HMI version 1.20 of the device.

The reactive power compensation targets can vary depending on the day and time, as is the case with the reactive power penalty applied in many countries. In these situations, there may be time periods when capacitive reactive power is allowed, and other time periods in which it is penalized.

In order to work in these environments, the device offers the option of scheduling hourly compensation targets depending on the day and time.

Two working configurations are available: the main and alternative configurations (programmed using the **Time programmer** screens).

In alternative mode, you can choose between reactive power compensation in **Mode 1**, **Mode 2**, apply a fixed reactive power (**Fixed Q**), or turn the device off to reduce its consumption. For each day of the week, you can select the time period when the alternative configuration is applied.

To determine the time accurately, the device must have an Internet connection, which it will use to query an NTP time server and keep its internal clock updated.

Example:

The compensation requirements for an installation are:

- $\cos \Phi$ higher than 0.95 inductive from Monday to Friday, from 8 a.m. to midnight, with no capacitive penalty.
- Outside these hours, inductive power is permitted, but capacitive is not, meaning the target is $\cos \Phi \leq 1$ inductive.

• The main configuration will be: compensation in **Mode 2**, with an acceptable range from 0.96 inductive to 0.7 capacitive. Assume a margin of 0.01 points (from 0.96 to 0.95) to compensate for measurement errors between the billing device and the **SVGm**.

• The alternative configuration will be: The alternative time period is defined from midnight to 8 a.m., Monday to Friday, and all day Saturday and Sunday. Compensation in **Mode 2**, from 0.7 inductive to 0.99 inductive.

This configuration satisfies the specified requirements with no penalty.

4.5.- SELF-TEST

The device is fitted with a self-test system. The device checks the integrity of the hardware and software control elements when starting up. This analysis is carried out according to **IEC60730**.

This system ensures the device remains in a safe state in the event of failure. The user is alerted to the failure thanks to an on-screen message and it is also found in the Modbus register.

This type of failure indicates damage or degradation of any of the control and process elements, both hardware and software. Turning off the device and contacting **Technical Service** is recommended whenever this alarm comes about.

4.6.- THERMAL PROTECTION

The device features several levels of thermal protection:

✓ **Ventilation regulation**, the fan speed is adjusted as needed at any given time, thus minimising the noise in the device.

✓ **Static temperature limitation**, the device reduces its power if the internal temperature exceeds certain limits. This maximises the availability of the device in any situation.

✓ **Dynamic limitation of the device**, one of the factors affecting the reliability of the device is the stress caused by repeated heating and cooling cycles. The device adjusts both its ventilation and power to minimise the impact that thermal cycling has on the life of the device.

✓ **Safety shutdown**, despite the above measures, the temperature of certain components may exceed their maximum allowable level if the device is used in environmental conditions beyond the specified range. To avoid damaging the device or installation, the device will completely shut down automatically. The device must be disconnected from its power supply for 30 minutes to rearm this protection

4.7.- LOW MAINS VOLTAGE

Note: Operating mode available with software versions DSP ≥ 1.61 and HDMI ≥ 1.2006.

When the device detects an instantaneous voltage change of more than 15% with respect to the initial voltage, the **SVGm** automatically stops to check the stability of the mains and recalculate the operating parameters.

If compensating a high reactive power, the power generated by the **SVGm** may alter the mains voltage, and depending on the installation conditions, those limits may be exceeded. In environments where this can happen, a **Low Vac** mode can be programmed (see “7.6 - REACTIVE POWER OFFSET”) that keeps the device from stopping as long as the mains voltage remains at 50% of its initial value.

The losses of the device are not optimized in this mode, so we recommend that this feature be used only in the installations that require it.

The voltage drop can be estimated by assuming that the line impedance is inductive.

$$\Delta V^2 = Q * Z_L \longrightarrow \Delta V^2 = Q * 2 * \pi * f * L$$

$$L = \frac{\Delta V^2}{Q * 2 * \pi * f}$$

$$V_{ac} = V_{init} + \Delta V$$

Equation 1: Calculating the voltage drop.

Where **L** is the parasitic inductance of the line and the power transformer.

If the reactive power (**Q**) generated by the **SVGm** is capacitive, the voltage will increase with respect to the initial value, and if it is inductive, the voltage will be reduced.

4.8.- FAST REACTIVE MODE

Note: Operating mode available with software versions DSP ≥ 1.61 and HDMI ≥ 1.2006.

The device has a **Fast Reactive** mode, which reduces the response time to half a network cycle (**10 ms** in 50 Hz mains, **8.3 ms** in 60 Hz mains). This is the recommended working mode in mains with rapid load changes, such as welding machines or presses, as well as in installations where the goal is to mitigate the flashing of lights due to voltage changes caused by reactive power peaks.

By reducing the response time, this mode compensates better for disturbances, at the expense of increased energy consumption in the device. Because of this, we recommend activating it only if the disturbances and the compensation target require it.

Fast Reactive mode can be activated on configuration screen “7.6 - REACTIVE POWER OFFSET”.

4.9.- DISPLAY

The device features a 3.5" TFT display on the front part in order to be able to view and configure all of the parameters of the device.

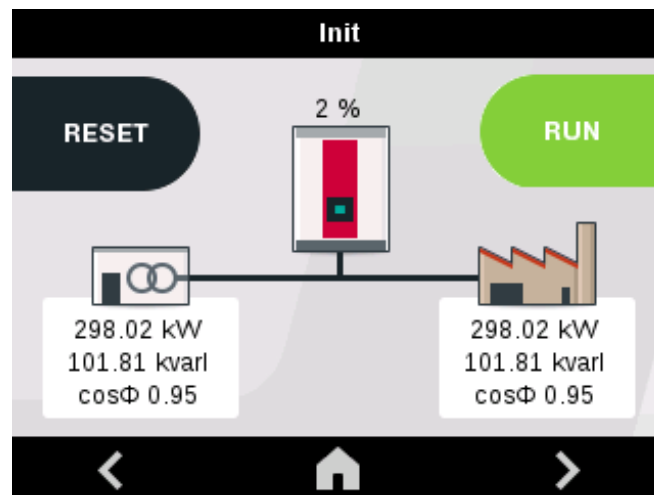


Figure 35: Display.

The display enters the energy saving mode 10 minutes after the last action. To reactivate it, just touch the display. The last screen before entering the energy saving mode will be shown.

The display is divided into three areas (Figure 36):

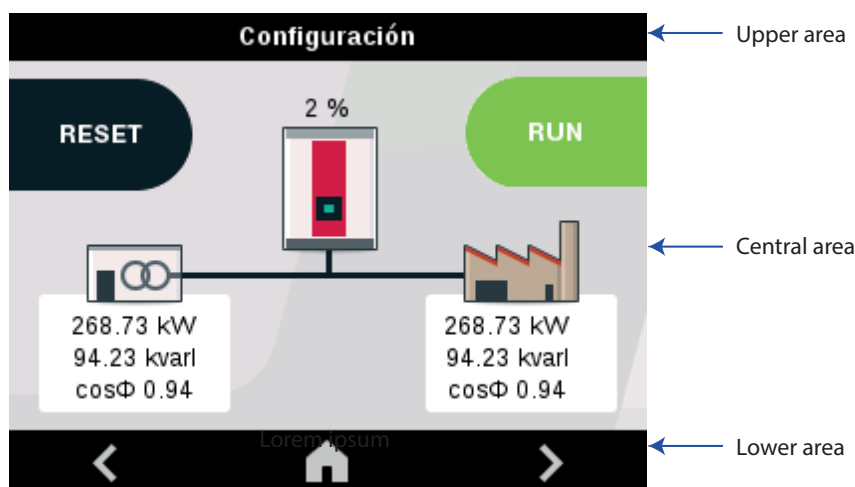


Figure 36: The display is divided into three areas.

4.9.1.- UPPER AREA

The following will be displayed on the upper area:

- ✓ A short description of the status of the device.
- ✓ The ⚙ symbol, when the device requires maintenance, see section "10.- MAINTENANCE".
- ✓ The symbol ⌚, if the device has Scheduling activated, see section "7.11 – TIME PROGRAMMER".

4.9.2.- CENTRAL AREA

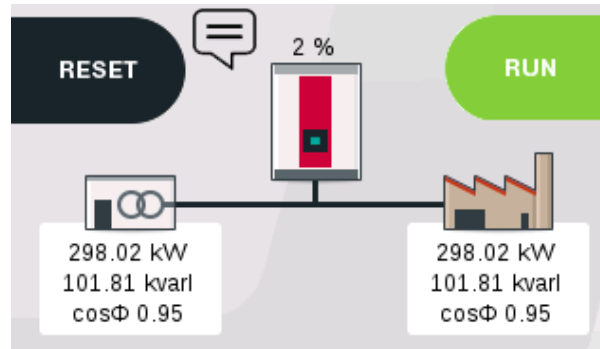


Figure 37: Central area.

This area shows:

- ✓ The condition of the installation,
- ✓ All parameters and graphs of the device.
- ✓ The  symbol, when a warning has been generated. See section "6.8.- WARNINGS"
- ✓ The  symbol means the device has advice pending that needs to be read. The device continuously analyses its behaviour and interaction with the installation. This analysis enables it to give advice on how to optimise overall system performance. Once the icon has been read, it disappears until further advice is offered.

And the necessary keys at each point, Table 19.

Table 19: Central area keys.

Key	Function
	Restarts the device after an alarm.
	Starts the device.
	Stops the device.

4.9.3.- LOWER AREA



Figure 38: Lower area.

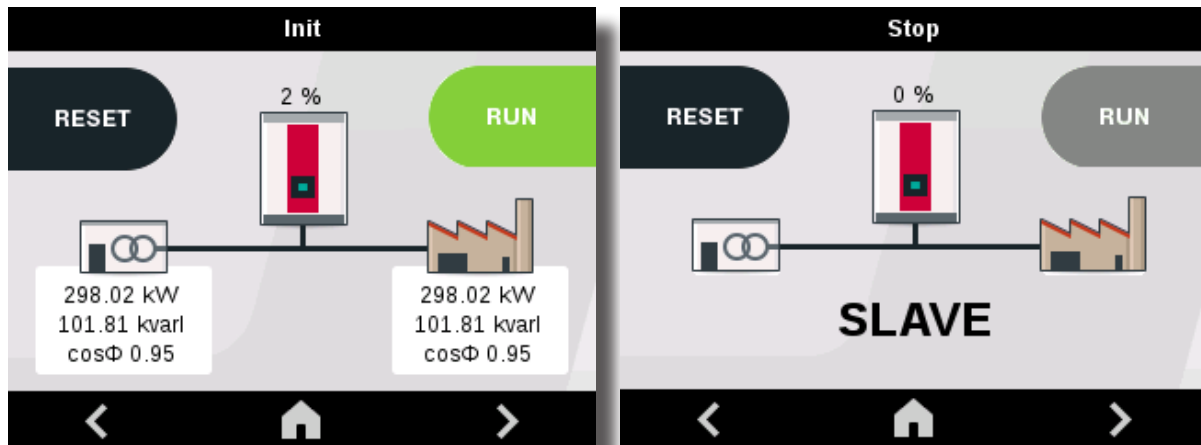
The lower area displays the navigation and configuration keys of the device.

Table 20: Lower area keys.

Key	Function
	Provides access to the main screen of the device.
	Shifting to the left.
	Shifting to the right.

5.- START-UP

When the device has been powered on, one of the screens in **Figure 39** appears on the display.



Screen of a "Single" device or "Master"

Screen of a "Slave" device

Figure 39: Home screen.

Before starting the static generator, it is necessary to follow the steps below:

1.- Use the **>** key to navigate to the configuration screen and implement the appropriate configuration according to the existing installation (see **"7.- CONFIGURATION"**).

2.- (Device **"single"** or **"master"**) Use the **>** key to navigate to the voltage and current display screen (**"6.2.- VOLTAGE, CURRENT AND FREQUENCY"**), and:

- ✓ Make sure the **voltage** measurements correspond to the real voltages of the installation.
- ✓ Make sure the load **current** measurements correspond to the current levels of the installation.

3.- (Device **"single"** or **"master"**) Use the **>** key to navigate to the display screen of the load parameters (**"6.4.- POWER AND COS ϕ OF LOAD"**) and:

- ✓ Make sure the **active power** measurement of the load corresponds to the active power levels of the installation.
- ✓ Make sure the **reactive power** measurement of the load corresponds to the reactive power levels of the installation.
- ✓ Check the **cos ϕ** in the three phases. If phases appear with very high reactive power and very low active power levels, this may indicate an error in the phase order. In this case, check the power supply and current input connections.

4.- (Device **"single"** or **"master"**) Go back to the home screen of the device, **Figure 39**, if there is no problem with the connections, the upper area should show the message **"Stop"**.

If there is a problem with the static generator connections or the configuration, the **"Waiting for conditions"** message appears.

5.- (Device **"single"** or **"master"**) Press the **RUN** key to start the static generator. If it has started correctly, the screen will show the message **"Run"**.

6.- DISPLAY

6.1.- MAIN SCREEN

6.1.1. - SINGLE OR MASTER DEVICE

Figure 40 shows the main screen of a "single" or "master" device.

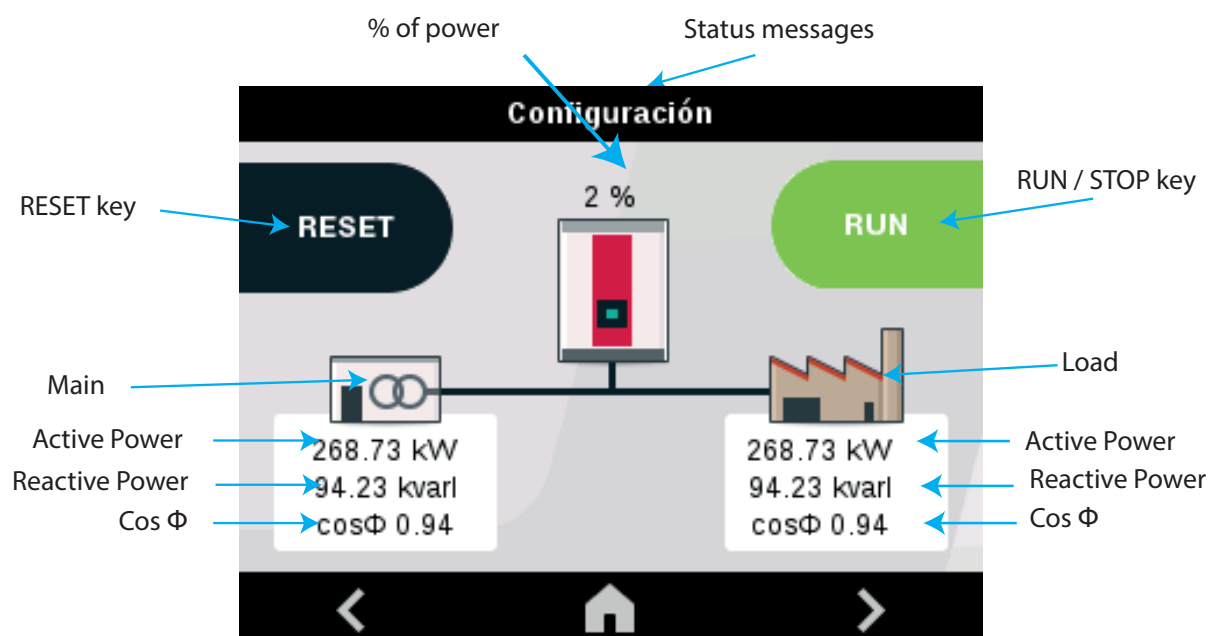


Figure 40: Main screen.

It shows the **Cos ϕ** , **Active** and **Reactive Power** values in the Main and in the Load. And the **% of SVG power** used.

Note: If the Remote Control option has been selected ("**7.9 - REMOTE CONTROL**") for the device to check the Active and Reactive Power values through an external analyzer, "**REMOTE**" is shown on the Grid side.

The **RESET** key allows you to restart the device if an alarm has been generated and this has been resolved.

The **RUN** / **STOP** key is the start and stop key of the SVGm.

Use the **<** and **>** keys to navigate through the different display screens.

In the upper part of the screen, a message with the current status of the device is shown (Table 21).

Table 21: Status messages

Status messages	
Starting	
Description	The SVGm is starting up.
Init	
Description	The device is starting the systems.

Table 21 (Cont.): Status messages

Status messages	
Waiting comms	
Description	Initiating internal communication systems
Waiting for conditions	
Description	Waiting for the conditions to be met in order to operate.
Configuration	
Description	Configuring the device.
Run	
Description	Device is operating.
Sync	
Description	The SVGm is synchronising with the mains.
Charging DC Bus	
Description	Charging process of the internal bus prior to start-up.
Stop	
Description	Device stopped.
Alarm	
Description	An alarm has been generated. Access the Alarms screen (" 6.7.ALARMS ") to obtain more information.

6.1.2. - SLAVE DEVICE

In Figure 41 the main screen of the “slave” device is shown.



Figure 41: Main screen of the slave device.

This shows the % of power used.

The  and  /  keys are disabled in the slave devices.

Use the  and  keys to navigate through the different display screens.

In the upper part of the screen, a message with the current status of the device is shown (Table 21).

6.2.- VOLTAGE, CURRENT AND FREQUENCY

Note: This screen is not visible on the "slave" devices.

Figure 42 shows the Voltage, Current and Frequency screen.

Voltage/Current/Frequency			
Voltage		Current	
		Mains	Load
L1	221.1 V	69.4 A	69.4 A
L2	221.2 V	67.9 A	67.9 A
L3	219.5 V	54.4 A	54.4 A
N		2.6 A	26.4 A
		Freq	50.0 Hz

Figure 42: Voltage, Current and Frequency display.

It shows:

- ✓ Phases L1, L2, L3 voltage.
- ✓ Phases L1, L2, L3 and Neutral mains current.
- ✓ Phases L1, L2, L3 and Neutral load current.
- ✓ The Frequency.

Use the  and  keys to navigate through the different display screens.

6.3.- MAINS POWER AND COS ϕ

Note: This screen is not visible on the "slave" devices.

Note: Screen not visible if the **Remote Control** option selected ("7.9 - REMOTE CONTROL").

Figure 43 shows the mains power and cos ϕ .

Mains power				
	P	Q	S	Cos ϕ
L1	9.9 kW	0.7 kvar	9.9 kVA	1.00
L2	9.8 kW	-1.7 kvar	9.9 kVA	0.99
L3	10.0 kW	0.0 kvar	10.5 kVA	1.00

Figure 43: Display of the mains power and cos ϕ .

It shows:

- ✓ The Active Power (P), Reactive Power (Q) and Apparent Power (S).
- ✓ The $\cos \phi$

Note: The - sign in reactive power indicates that it is capacitive and the + sign that it is inductive.

Use the  and  keys to navigate through the different display screens.

6.4.- LOAD POWER AND COS ϕ

Note: This screen is not visible on the "slave" devices.

Note: Screen not visible if the **Remote Control** option selected ("7.9 - REMOTE CONTROL").

Figure 44 shows the load power and $\cos \phi$.



	P	Q	S	Cos Φ
L1	9.8 kW	10.0 kvar	14.1 kVA	0.68
L2	9.8 kW	10.0 kvar	13.8 kVA	0.67
L3	9.9 kW	9.9 kvar	13.5 kVA	0.68

Figure 44: Display of the load power and $\cos \phi$.

It shows:

- ✓ The Active Power (P), Reactive Power (Q) and Apparent Power (S).
- ✓ The $\cos \phi$.

Note: The - sign in reactive power indicates that it is capacitive and the + sign that it is inductive.

Use the  and  keys to navigate through the different display screens.

6.5.- MAINS PHASORS

Note: This screen is not visible on the "slave" devices.

In this screen, Figure 45, the mains phasors are shown.

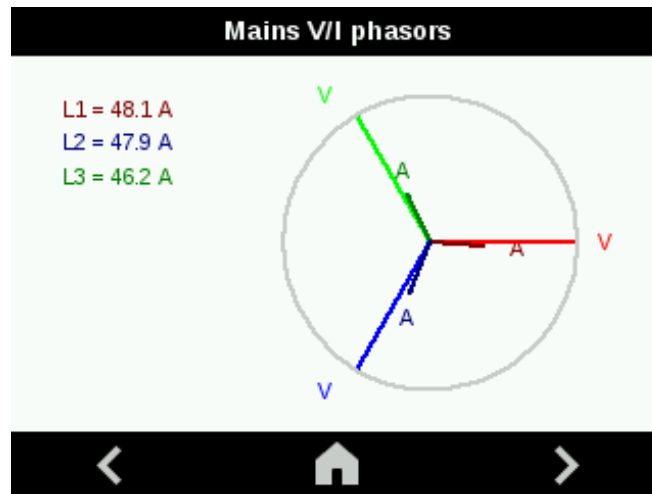


Figure 45: Mains phasors.

Use the < and > keys to navigate through the different display screens.

6.6.- LOAD PHASORS

Note: This screen is not visible on the "slave" devices.

In this screen, Figure 46, the load phasors are shown.

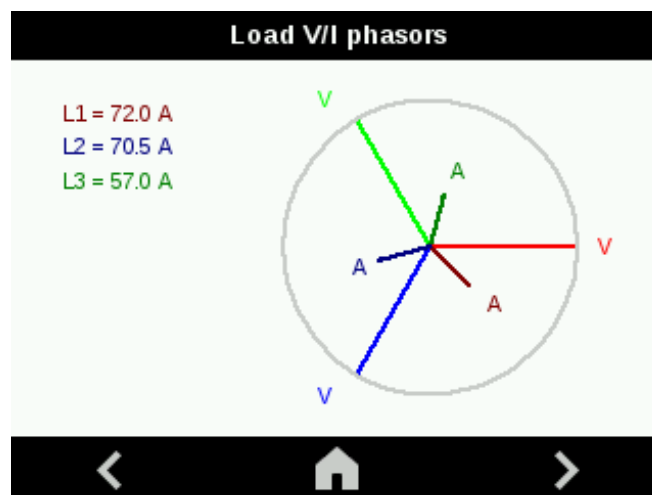


Figure 46: Load phasors.

Use the < and > keys to navigate through the different display screens.

6.7.- ALARMS

Note: This screen is not visible on the “slave” devices.
In this screen, **Figure 47**, the alarms that have occurred are shown.

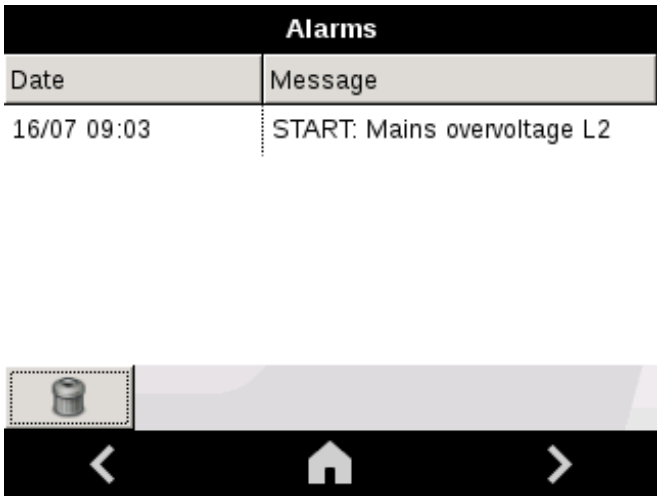


Figure 47: Alarms.

A brief description of the alarm is displayed on the screen, as well as the date and time at which it occurred.
Press the  key to delete the alarm log.

Table 22 shows the messages that could appear on the device.

If the cause of the alarm disappears, the device will be reconnected automatically.
If the same alarm is triggered 5 times during a 1-hour period, the automatic device reconnection function will be disabled.

The  key rearms the device if the cause of the alarm has disappeared or has been resolved.
If the device remains in a permanent alarm state, the screen shown in **Figure 48**, is displayed.



Figure 48: Permanent alarms.

If the display has entered energy saving mode, it is automatically disabled. The alarm screen disappears when the display is touched.

Use the ◀ and ▶ keys to navigate through the different display screens.

Table 22: Alarm messages.

Alarm messages	
DC Bus voltage error ⁽¹⁾	
Description	The voltage of the internal DC bus has exceeded the limit.
Corrective action	This is a condition that can be destructive for the device. Check that the AC voltage quality and levels meet the requirements specified in this manual and disconnect the device if they do not.
DC+ Bus overvoltage ⁽¹⁾	
Description	The voltage of the internal DC+ bus has exceeded the limit.
Corrective action	This is a condition that can be destructive for the device. Check that the AC voltage quality and levels meet the requirements specified in this manual and disconnect the device if they do not.
DC- Bus overvoltage ⁽¹⁾	
Description	The voltage of the internal DC- bus has exceeded the limit.
Corrective action	This is a condition that can be destructive for the device. Check that the AC voltage quality and levels meet the requirements specified in this manual and disconnect the device if they do not.
Overcurrent L1/L2/L3	
Description	The SVGm current is too high.
Corrective action	This alarm may be associated with transients and noise in the power supply voltage. Check the quality of the power supply voltage. If it continues, contact the Technical Service .
Mains overvoltage L1/L2/L3	
Description	The mains voltage is too high.
Corrective action	This alarm may be associated with transients and noise in the power supply voltage, or with incorrect mains voltage values. This is a condition that can be destructive for the device. Check the configuration. Check the quality of the power supply voltage and disconnect the device if the requirements in the manual are not met. If it continues, contact the TAS .
IGBT failure	
Description	IGBT overcurrent.
Corrective action	Condition that can be destructive for the device. Contact the TAS .
High temp IGBT	
Description	The temperature of the power module is very high.
Corrective action	Check that the fans are working. Clean or replace them if necessary. If it continues, contact the Technical Service .
High temp Inductor	
Description	The temperature of the inductors is very high.
Corrective action	Check that the fans are working. Clean or replace the fans if necessary. If it continues, contact the Technical Service .
DC Bus charge failure ⁽¹⁾	
Description	The DC bus has not been pre-charged.
Corrective action	Check AC connection and voltages. If it persists, contact TAS .
Initial Conditions	
Description	The start-up conditions have not been met 10 times during the past 5 minutes.
Corrective action	Check the configuration and the ambient temperature. Check the quality of the power supply voltage. If it persists, contact the Technical Service .

Table 22 (Cont.) : Alarm messages.

Alarm messages	
Hardware failure	
Description	Possible hardware failure detected.
Corrective action	Contact the Technical Service .
Self-test failed	
Description	The self-test system has detected a fault.
Corrective action	Contact the Technical Service .
Temperature	
Description	Very high ambient temperature.
Corrective action	Power limited below 50% due to temperature. Check ambient temperature, dirt at the air intake and fans.
DSP failure	
Description	Fault in the DSP
Corrective action	The DSP has suffered an unexpected fault. Appears when updating the software. In any other case, contact TAS .
5V supply failure	
Description	Power supply failure.
Corrective action	Contact Technical service.
Internal comms error	
Description	Failure in internal communications.
Corrective action	Restart. Contact the Technical Service .

⁽¹⁾ Alarm messages available with software versions DSP ≥ 1.61 and HDMI ≥ 1.2006.

6.8.- WARNINGS

Note: This screen is not visible on the “slave” devices.

When the device generates a warning, it will continue to operate, but the  symbol will be displayed on the main screen.

On pressing the  key; if there are active warnings, the screen shown in **Figure 49**, will be displayed and the user will be asked for confirmation to continue with the static generator start-up process.

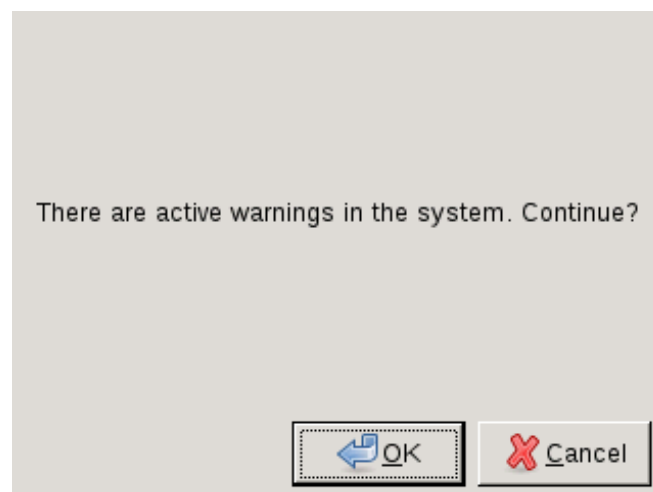


Figure 49: Confirm screen.

This screen, **Figure 50**, shows the active warnings. **Table 23** shows the warnings that can appear on the device's display.

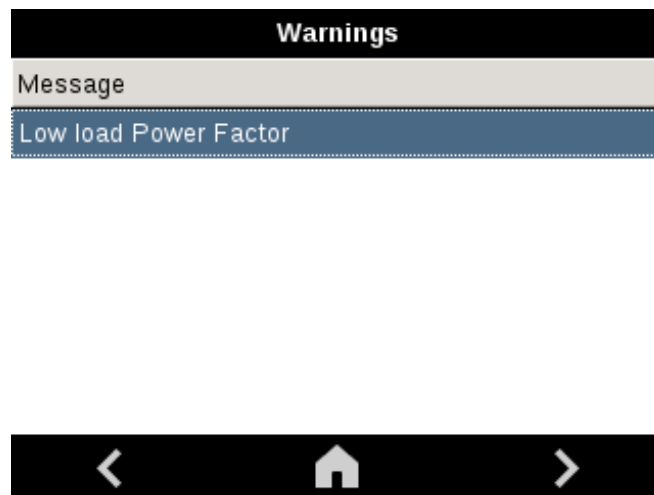


Figure 50: Warnings.

Use the  and  keys to navigate through the different display screens.

Table 23: Warnings messages.

Warnings messages	
DC Bus W0001 / W0010 / W0020 / W0040 ⁽²⁾	
Description	DC bus voltage is outside is expected limits.
Corrective action	This warning is associated with starting and stopping the power supply. If this warning appears in other situations, check the quality of the AC network.
THDv > 40% ⁽²⁾	
Description	Very high voltage distortion.
Corrective action	The voltage distortion exceeds limits. Check the quality of the power supply voltage.
Yearly maintenance	
Description	A year has passed since the last maintenance procedure was carried out and the maintenance meter was reset.
Corrective action	Perform the annual maintenance procedure and reset the maintenance meter. (see "10.- MAINTENANCE").
Fan maintenance	
Description	Fans have been operating for over 40,000 hours; they must be replaced and the maintenance meter must be reset.
Corrective action	Replace the fans and reset the maintenance meter. (see "10.- MAINTENANCE").
Fan degradation	
Description	Deterioration in the ventilation capacity of the system has been detected.
Corrective action	Check that the fans are clean. Perform the periodic maintenance tasks. Replace the fans if this does not solve the problem. (see "10.- MAINTENANCE").
Mains voltage limits: Low	
Description	Mains voltage outside limits.
Corrective action	This alert may be associated with transients and noise in the power supply voltage, or with incorrect mains frequency values. Check the configuration. Check the quality of the power supply voltage. If it continues, contact the Technical Service .
Mains voltage limits: High ⁽²⁾	
Descripción	Mains voltage outside limits.

Table 23 (Cont.): Warnings messages.

Alarm and event messages	
Acción correctora	This alert may be associated with transients and noise in the power supply voltage, or with incorrect mains frequency values. Check the configuration. Check the quality of the power supply voltage. If it continues, contact the TAS .
Min temperature	
Description	Temperature below the minimum operating value
Corrective action	Wait for the environmental conditions to meet the requirements. If the alarm continues, contact the Technical Service .
Mains frequency limits	
Description	Main frequency out of the limits
Corrective action	This alert may be associated with transients and noise in the power supply voltage, or with incorrect mains frequency values. Check the configuration. Check the quality of the power supply voltage. If it continues, contact the Technical Service .
Minimum current	
Description	Mains current below the programmed level.
Corrective action	Check the configuration.
Maximum load	
Description	Device working at full load
Corrective action	No action is necessary.
Low load Power Factor	
Description	The power factor value measured is less than 0.7, which might indicate a connection error in the measuring transformers, where the voltage phases do not correspond to the current phases.
Corrective action	Confirm that the connections are correct.
Reverse power	
Description	The power value measured is negative (generated power), which might indicate that the transformers have been connected inversely.
Corrective action	Confirm that the connections are correct.
W0080 ⁽²⁾	
Descripción	Other warnings.
Acción correctora	Contact the TAS .
NTP time server failure	
Description	Date not synchronised with NTP server.
Corrective action	Schedule mode is activated. The SVGm tries to connect to an NTP time server. Communication fails, or it is out of sync. It may take some minutes to synchronize. Check Ethernet communications and access to Internet.
Remote meter comms failure	
Description	SVGm is failing to communicate with remote meter.
Corrective action	Check SVGm configuration. Check communications and remote meter configuration.
Slave in alarm	
Description	This is a fault in one or more slaves.
Corrective action	The device does not stop and adjusts its operation to the number of available slaves. On the slave device status screen, " 6.12.- SLAVE DEVICE STATUS " you can view the status and alarms for each static generator. If there is a communications error with any of the slaves, stop the devices and check the communications wiring.

Table 23 (Cont.): Warnings messages.

Alarm and event messages	
CAN Comms loss ⁽²⁾	
Descripción	Failure in communication between devices.
Acción correctora	The master/slave configuration requires at least one master, one slave, and a termination resistor. Check that these requirements are met. Check the wiring
Modulation loss	
Description	SVGm cannot generate the expected current waveform.
Corrective action	Check connections. If it continues, contact the technical service.

⁽²⁾ Warning messages available with software versions DSP ≥ 1.61 and HDMI ≥ 1.2006.

6.9.- TEMPERATURE

Note: This screen is not visible on the “slave” devices.

In this screen, **Figure 51**, displays the device’s temperature range for inductor and IGBTs.

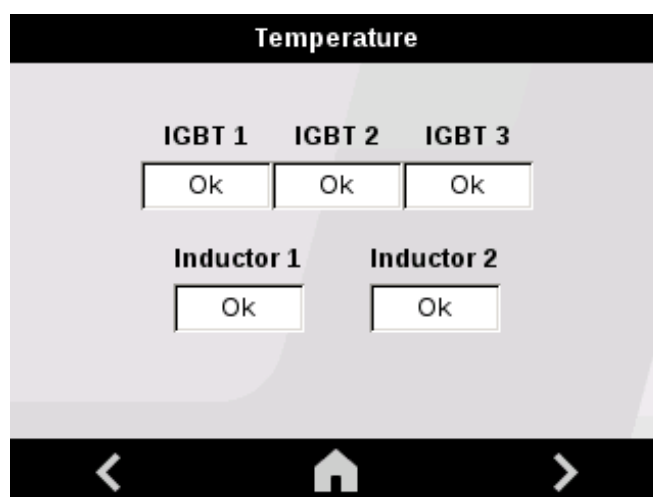


Figure 51: Temperature.

The screen displays:

- ✓ **Ok**, correct temperature.
- ✓ **High**, high temperature.
- ✓ **Low**, low temperature.

Use the  and  keys to navigate through the different display screens.

6.10.- ETHERNET COMMUNICATIONS

In this screen, **Figure 52**, the IP address of the device and the netmask are shown.



Figure 52: Communications.

Use the  and  keys to navigate through the different display screens.

6.11.- DEVICE INFORMATION

In this screen, **Figure 53**, the serial number, HMI and DSP versions of the device are shown.



Figure 53: Device information.

The touch panel of the display is calibrated from factory, but depending on the installation conditions, it may be necessary to recalibrate it.

It is recommended to use a soft tip pointer (take care not to damage the display) and press icon . The calibration screen is shown below, **Figure 54**.

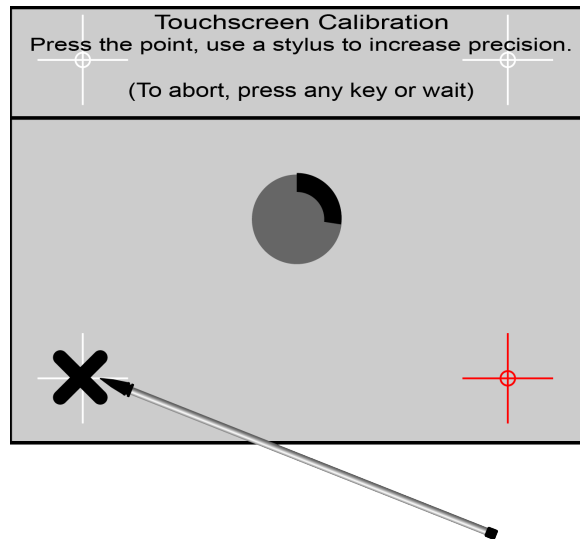


Figure 54: Calibrate touch sensor.

Note: You have accessed the calibration screen by accident, wait until the line that surrounds the central circle is complete and you will be returned automatically to the information screen of the device (Figure 53).

Use the  and  keys to navigate through the different display screens.

6.12.- SLAVE DEVICE STATUS

Note: This screen is not visible on the "slave" devices.

Note: This screen is only displayed if a system has been configured with devices in parallel.

This screen, Figure 55, shows the status of each "slave" device.

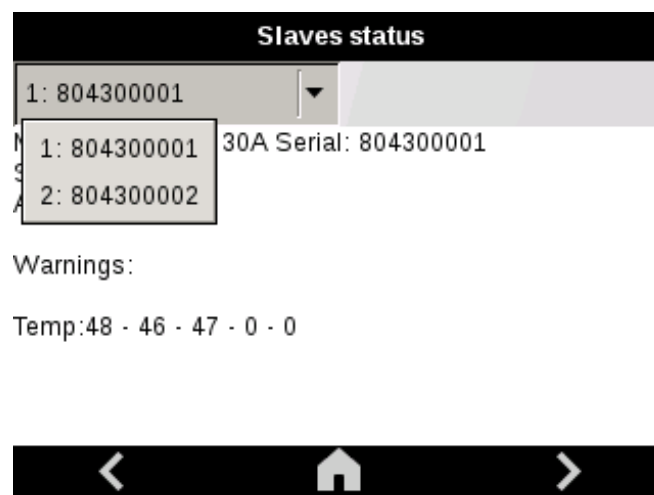


Figure 55: Slave device status screen (1).

The "slave" to be checked can be selected from the top tab, by serial number.

Select the "slave"; the screen shown in Figure 56 will be displayed. This screen shows the Model, Type and Serial number of the device, as well as its status, active alarms and the temperature of the IGBTs and inductors.



Figure 56: Slave device status screen (2).

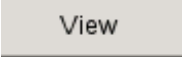
Note: If there is a communication error, the message *"Communication error"* will appear when you select the affected device.

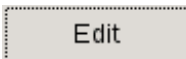
7.- CONFIGURATION

Figure 57 shows the main configuration screen.



Figure 57: Main configuration screen.

By pressing the  key, the setup menu is accessed in display mode, i.e., all parameters of the device are shown but they cannot be modified.

By pressing the  key, the setup menu is accessed in edit mode, i.e., the parameters of the device can be modified. In this case, before entering the setup menu it is necessary to enter the password, **Figure 58**

Password: 1234



Figure 58: Password to access the setup menu in edit mode.

7.1.- LANGUAGE

In this screen, **Figure 59**, the language of the display is selected.



Figure 59: Configuration screen: Language.

- **Language**, display language.

Press the  key to access the next configuration step

Press the  key to access the main screen of the device without saving the configuration values.

7.2.- DEVICE SPECIFICATIONS

Note: *This screen is informative, it can not be modified.*

In this screen, **Figure 60**, the specifications of the device are displayed.



Figure 60: Configuration screen: Device specifications.

- **Model**, device model, the options are:

Table 24: Configuration values: Model.

Model	
Possible values	3W: 3-wire model.
	4W: 4-wire model.

- **Type**, device range:

Table 25: Configuration values: Type.

Type	
Possible values	30 kvar: 20.7 and 30 kvar model.
	60 kvar: 41.4 and 60 kvar model.
	75 kvar: 51.7 and 75 kvar model.
	67 kvar: 67 kvar model.
	100 kvar: 69 and 100 kvar model.

Press the  key to access the next configuration step

Press the  key to access the main screen of the device without saving the configuration values.

7.3.- INSTALLED DEVICES

The type of device is configured in this screen, **Figure 61**.

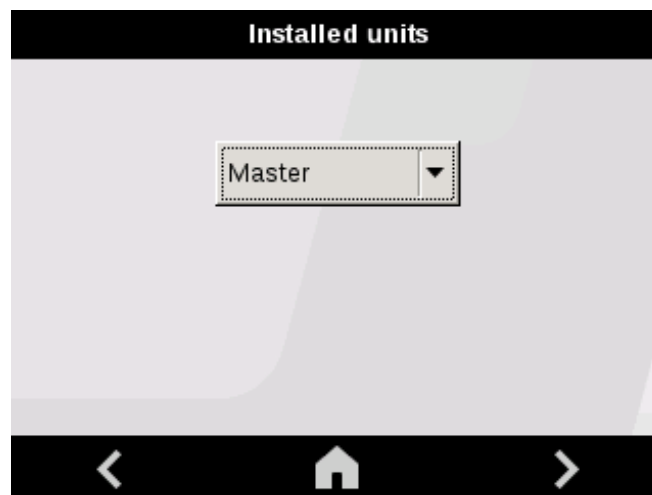


Figure 61: Configuration screen: Installed units

- **Type of device: Master / Single / Slave**

In this screen the type of device is selected, the possible options are:

- ✓ **Single:** select this option if the **SVGm** does not have static generators connected in parallel.
 - ✓ **Master:** select this option if the static generator is going to be used as the "**master**" of a group of devices in parallel.
 - ✓ **Slave:** select this option if the device is going to be used as the "**slave**" of a group of devices in parallel.
- Once the device has been configured as the "**slave**", the next configuration step is shown in section "**6.10.- ETHERNET COMMUNICATIONS**".

Note: The  and  /  keys are disabled in the slave devices.

Press the  key to access the next configuration step

Press the  key to access the main screen of the device without saving the configuration values.

7.4.- OPERATING LIMITS

Note: This screen is not visible on the “slave” devices.
In this screen, **Figure 62**, the operating limits of the device are configured:

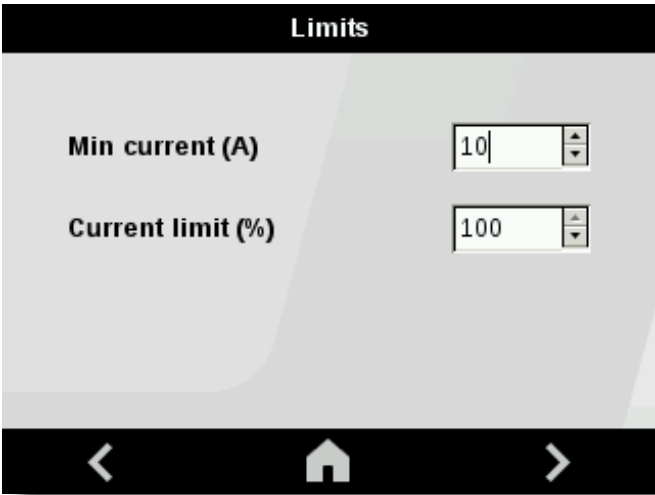


Figure 62: Configuration screen: Operating limits.

• Min current

The minimum load current to start the static generator is configured with this parameter. Minimum current feature is used to increase the system efficiency, by stopping the static generator when required. The **SVGm** will stop when the load current is below the entered value and will start when it is higher.

Table 26:Configuration values: Min current.

Min current	
Minimum value	0 A
Maximum value	5000 A

• Current limit

This parameter allows the maximum power of the static generator to be limited. The value is configured as a percentage with respect to the device’s rated power.

Table 27:Configuration values: Current limit.

Current limit	
Minimum value	20 %
Maximum value	100 %

Press the  key to access the next configuration step
Press the  key to access the main screen of the device without saving the configuration values.

7.5.- $\cos \Phi$

Note: This screen is not visible on the "slave" devices.

The device has two reactive power compensation modes (Figure 63).

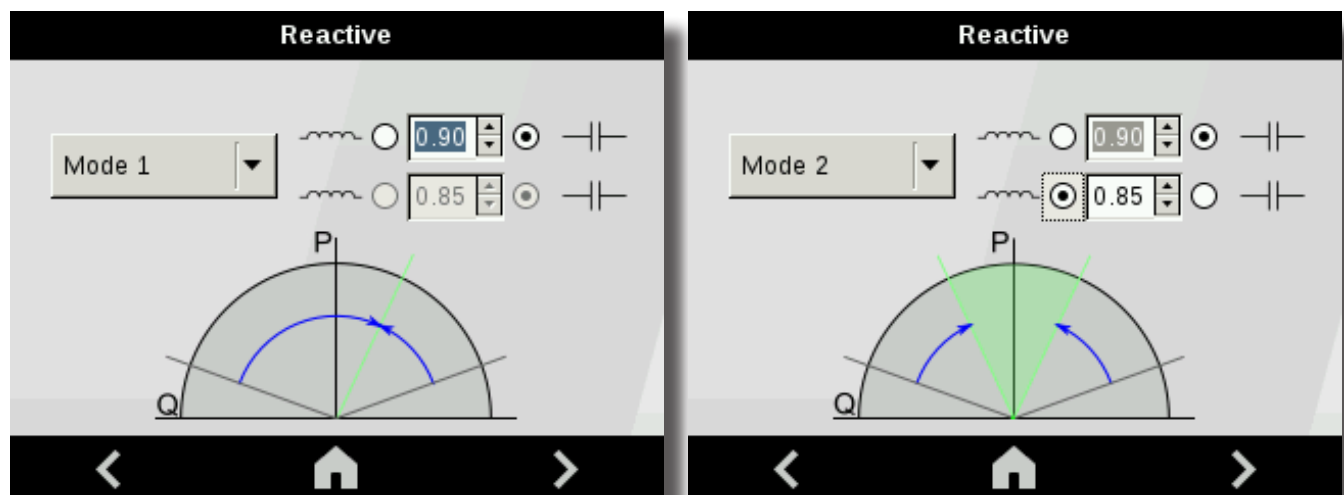


Figure 63: Configuration screen: $\cos \Phi$ (Mode 1 and Mode 2).

• Mode 1

In this mode, $\cos \Phi$ is set to a fixed value. The device will attempt to ensure that the reactive power on the mains side corresponds to the specified $\cos \Phi$.

• Mode 2

In this mode, two limits are defined to form an acceptance range. The device will adjust the reactive power on the mains side to keep $\cos \Phi$ within the specified acceptance range.

This mode minimises the amount of power used by the device to compensate for reactive power, thus reducing its energy consumption.

Table 28: Configuration values: $\cos \Phi$.

$\cos \Phi$	
Range of values	0.7 ... -0.7

Press the  key to access the next configuration step

Press the  key to access the main screen of the device without saving the configuration values.

7.6.- REACTIVE POWER OFFSET

Note: This screen is not visible on the "slave" devices.

Note: Feature available from HMI version 1.20 of the device.

On this screen, a fixed offset can be programmed that is added to the reactive power value calculated to achieve the $\cos \Phi$ programmed in section "7.5.- $\cos \Phi$ " (Figure 64).

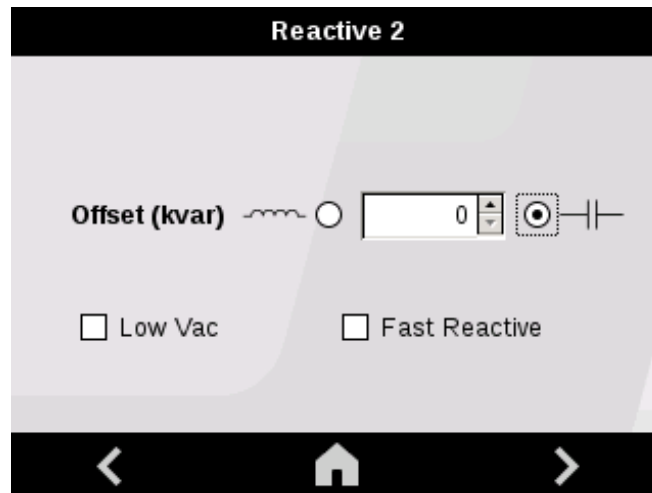


Figure 64: Configuration screen: Offset.

Example: The device calculates that to achieve a $\cos \Phi = 1$ it must generate 50 kvar capacitive. An offset of 30 kvar inductive is programmed. It will thus generate $50 - 30 = 20$ kvar capacitive.

The offset value can be capacitive or inductive.

Table 29: Configuration values: Offset.

Offset	
Minimum value	0 kvar
Maximum value	10000 kvar

• Low Vac

Note: Operating mode available with software versions $DSP \geq 1.61$ and $HDMI \geq 1.2006$.

Enable this mode to keep the device from stopping as long as the mains voltage remains at 50% of its initial value. See "4.7 - LOW MAINS VOLTAGE".

• Fast Reactive

Note: Operating mode available with software versions $DSP \geq 1.61$ and $HDMI \geq 1.2006$.

Enable this mode to reduce the response time to half a network cycle (10 ms in 50 Hz mains, 8.3 ms in 60 Hz mains). See "4.8 - FAST REACTIVE MODE".

Press the  key to access the next configuration step

Press the  key to access the main screen of the device without saving the configuration values.

7.7.- TRANSFORMER CONFIGURATION

Note: This screen is not visible on the “slave” devices.

The transformers that will be installed with the device are configured in this screen, **Figure 65**:

The screenshot shows a configuration screen titled "Current transformer". It contains four main settings:

- Num. Transformers:** A dropdown menu set to "3".
- Position:** A dropdown menu set to "LOAD".
- Ratio:** A numeric input field set to "50" followed by a unit selector set to "/5A".
- Invert:** Three checkboxes labeled "L1", "L2", and "L3", all of which are currently unchecked.

At the bottom of the screen, there is a navigation bar with three icons: a left arrow, a home icon, and a right arrow.

Figure 65: Configuration screen: Transformer configuration.

• Num transformers

The number of transformers that will be installed is configured with this parameter, the options are:

- ✓ 2. This option can only be used on the 3-wire model, **SVGm-3WF-xxxx**
- ✓ 3.



With the option of 2 transformers, you should install a transformer measuring the L1 phase and another measuring the L2 phase. The L3 phase is left without a measuring transformer.



In three-phase mains with neutral, 3 transformers are needed to ensure the correct operation of the device.

• Position

The location of the transformers is configured with this parameter, the options are:

- ✓ **LOAD:** If the transformers are installed in the load side, downstream from the **SVGm**.
- ✓ **GRID:** If the transformers are installed in the mains side, upstream from the **SVGm**.

• Ratio

The transformer ratio is configured with this parameter, i.e., the ratio between the transformer primary and secondary.

Table 30: Configuration values: Ratio.

Ratio	
Minimum value	5 A
Maximum value	20000 A

- Invert

This parameter changes the current polarity of the selected phase. It is used to correct installation errors

Press the  key to access the next configuration step

Press the  key to access the main screen of the device without saving the configuration values.

7.8.- MEDIUM VOLTAGE

The reactive current in medium voltage can be compensated with the device **connected in low voltage**. This requires using a low voltage to medium voltage step-up transformer, which can be one already present in the installation or one used solely for this purpose.

This screen, **Figure 66**, is used to set up the type of transformer and its transformation ratio.

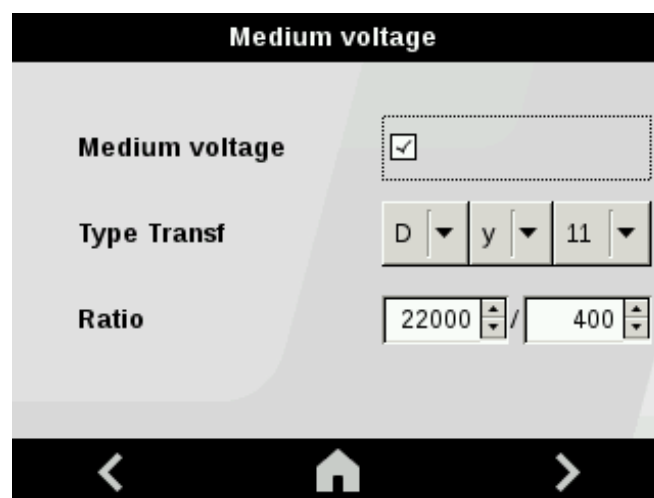


Figure 66: Configuration screen: Medium voltage.

Activate the **Medium Voltage** option ☒ so the device can compensate for reactive power.

- **Type Transf**, select the type of step-up transformer, as indicated on its rating plate.
- **Ratio**, select the transformation ratio.

Table 31: Configuration values: Ratio.

Ratio	High voltage	Low Voltage
Minimum value	690 V	100 V
Maximum value	66000 V	1000 V

Press the  key to access the next configuration step

Press the  key to access the main screen of the device without saving the configuration values.

7.9.- REMOTE CONTROL

Note: This screen is not visible on the “slave” devices.

Note: Feature available from HMI version 1.20 of the device.

The device can consult an external analyzer for the active and reactive power values to be compensated. This option allows reactive power to be compensated without using the internal measurement transformers.

The remote control option is activated and the analyzer is selected on this screen, **Figure 67**.



Figure 67: Configuration screen: Remote control.

Activate the **Remote Control** ☒ option to use an external analyzer.

Select the **CIRCUTOR** power analyzer or meter from the drop-down menu.

Note: The compensation in this mode of operation is slower. The reaction time is about 15 seconds.

Press the  key to access the next configuration step

Press the  key to access the main screen of the device without saving the configuration values.

7.10.- REMOTE CONTROL (COMMUNICATIONS)

Note: This screen is not visible on the “*slave*” devices.

Note: Feature available from HMI version 1.20 of the device.

Note: Screen visible if the **Remote Control** option selected (“7.9 - REMOTE CONTROL”).

Once the external analyzer is selected, you have to set up how the **SVGm** will communicate with it, Figure 68.

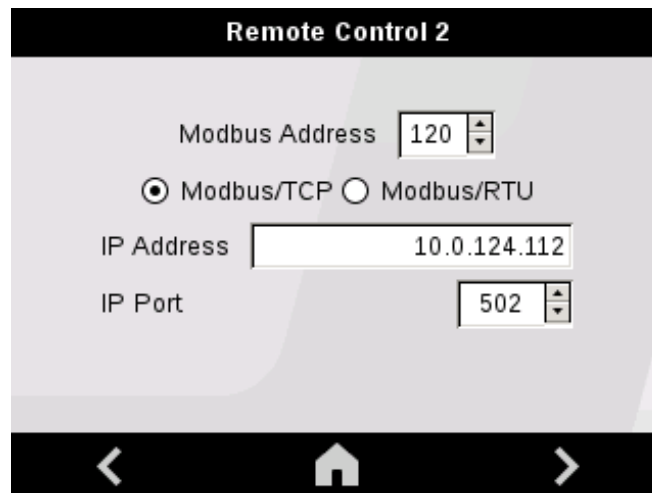


Figure 68: Configuration screen: Remote Control 2.

- **Modbus Address**, select the peripheral number of the analyzer used.

Select the type of communication ☒ **Modbus/TCP** or ☐ **Modbus /RTU** the **SVGm** will use to communicate with the analyzer.

- **IP Address**, IP address of the analyzer.
- **IP Port**, IP port of the analyzer.

Press the  key to access the next configuration step

Press the  key to access the main screen of the device without saving the configuration values.

7.11.- TIME PROGRAMMER

Note: This screen is not visible on the "slave" devices.

Note: Feature available from HMI version 1.20 of the device.

A different configuration can be set up for the compensation mode in certain time slots, **Figure 69**.

Figure 69: Configuration screen: Time Programmer.

Enable the **Enable** ☒ option to let the device change compensation modes based on a schedule. Outside the schedule programmed in this section, the device compensates as per the mode programmed in section "7.5 - $\cos \Phi$ " and "7.6 - REACTIVE POWER OFFSET".

Select the type of scheduling from the drop-down menu:

- Option **P6 Spain**, the schedule is preset as per time-of-use period P6.
- Option **Custom**, lets you set a different time band for every day of the week.

Note: If the start time is after the end time, the alternative program is activated between 00:00 and the end time, and between the start time and 24:00.

Press the key to access the next configuration step

Press the key to access the main screen of the device without saving the configuration values.

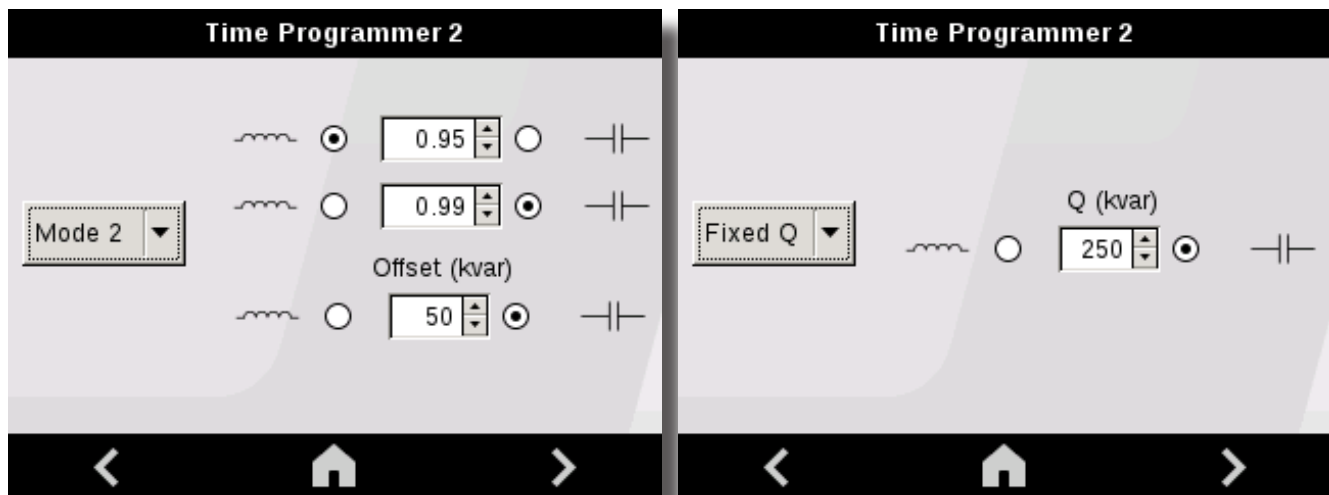
7.12.- TIME PROGRAMMER: $\cos \Phi$

Note: This screen is not visible on the "slave" devices.

Note: Feature available from HMI version 1.20 of the device.

Note: Screen visible if **Time Programmer** option selected ("7.11 – TIME PROGRAMMER").

In this section, the user selects the reactive power compensation mode that will be activated in the time bands scheduled in section "7.11 - TIME PROGRAMMER ", **Figure 70**.

Figure 70: Configuration screen: Time Programmer: $\cos \Phi$.

Select the Scheduling Mode from the drop-down menu:

• Mode 1

In this mode, $\cos \Phi$ is set to a fixed value. The device will attempt to ensure that the reactive power on the mains side corresponds to the specified $\cos \Phi$.

Table 32: Configuration values: Mode 1.

Mode 1	$\cos \Phi$	Offset
Range of values	0.7 ... -0.7	0 ... 10000 kvar.

• Mode 2

In this mode, two limits are defined to form an acceptance range. The device will adjust the reactive power on the mains side to keep $\cos \Phi$ within the specified acceptance range.

This mode minimises the amount of power used by the device to compensate for reactive power, thus reducing its energy consumption.

Table 33: Configuration values: Mode 2.

Mode 2	$\cos \Phi$	Offset
Range of values	0.7 ... -0.7	0 ... 10000 kvar.

• Fixed Q

This way, the device generates a constant reactive power.

Table 34: Configuration values: Fixed Q.

	Fixed Q
Minimum value	0 kvar
Maximum value	10000 kvar

• Off

If this mode is programmed, the device turns off during the scheduled time band.

Press the  key to access the next configuration step

Press the  key to access the main screen of the device without saving the configuration values.

7.13.- ETHERNET COMMUNICATIONS

The Ethernet communication parameters are configured in this screen, **Figure 71**:



Figure 71: Configuration screen: Ethernet communications.

By activating the ☒ **DHCP** option, the device assigns the IP automatically. If this option is not activated, the parameters must be configured manually:

- **IP Address**, IP address.
- **Netmask**, subnet mask.
- **Gateway**, gateway.

Press the  key to access the next configuration step

Press the  key to access the main screen of the device without saving the configuration values.

7.14.- RS-485 COMMUNICATIONS

The RS-485 communications configuration in **SVGm** models is set to a Baud Rate of 9600 bps, 8 Data bits, 1 Stop bit and no Parity. Only the device's Modbus address can be configured, **Figure 72**.

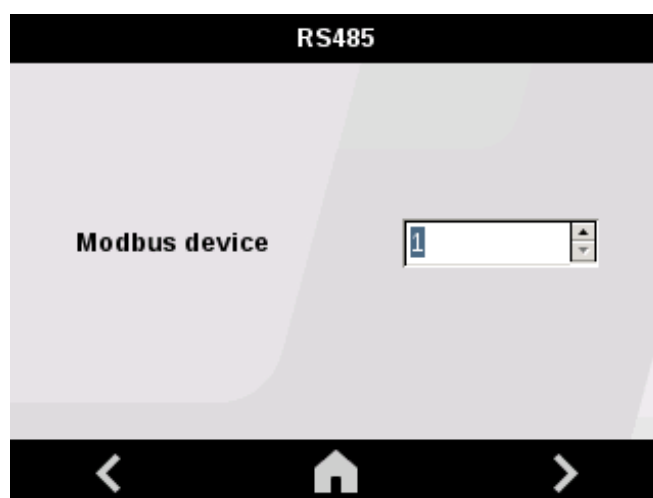


Figure 72: Configuration screen: RS-485 communications.

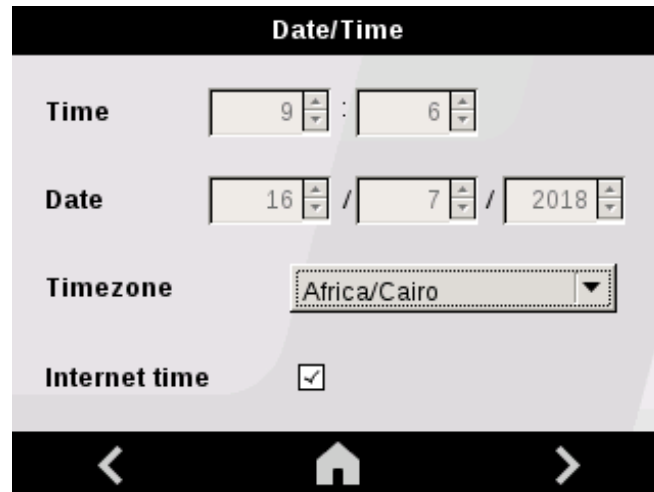
- **Modbus device**, modbus address.

Press the  key to access the next configuration step

Press the  key to access the main screen of the device without saving the configuration values.

7.15.- DATE / TIME

The time parameters are configured in this screen, **Figure 73**:



The image shows a mobile application screen titled "Date/Time". It contains four main configuration sections: "Time" with two spinners set to 9 and 6; "Date" with three spinners set to 16, 7, and 2018; "Timezone" with a dropdown menu showing "Africa/Cairo"; and "Internet time" with a checked checkbox. At the bottom, there is a navigation bar with three icons: a left arrow, a home icon, and a right arrow.

Figure 73: Configuration screen: Date / Time

- Time, Date, Time zone.

By activating the **Internet time** option, the device synchronises with an NTP server.

Press the  key to access the next configuration step

Press the  key to access the main screen of the device without saving the configuration values.

7.16.- PASSWORD

This screen, **Figure 74**, is used to configure the device's password:



The image shows a mobile application screen titled "Passwords". It has two main sections: "Setup Password" with a "Change" button, and "Stop Password" with "Enable" and "Change" buttons. At the bottom, there is a navigation bar with three icons: a left arrow, a home icon, and a right arrow.

Figure 74: Password.

- **Setup Password.**

This parameter enables the device's configuration access password to be modified.

- **Stop Password.**

The  key may be configured with a password; if enabled, the device will request the password on being pressed and will not stop unless the correct password is entered.

Press the  key to access the next configuration step

Press the  key to access the main screen of the device without saving the configuration values.

7.17.- SAVE DATA

The modified configuration values are saved in the final setup menu screen, **Figure 75**.



Figure 75: Final setup menu screen.

Press the  key to save the modified data.

Press the  key to exit the setup menu.

8.- RS-485 COMMUNICATIONS

SVGm devices have an RS-485 serial communication output with the **MODBUS RTU** ® communications protocol.

For an installation with devices in parallel, the RS-485 connection can be made on any device.

8.1.- CONNECTIONS

The RS-485 cable must be wired with shielded twisted pair cable (minimum 3 wires), with a maximum distance between the **SVGm** and the master device of 1200 metres.

A maximum of 32 **SVGm** static generators can be connected to this bus.

To establish communications with the master device, use an RS-485 converter.

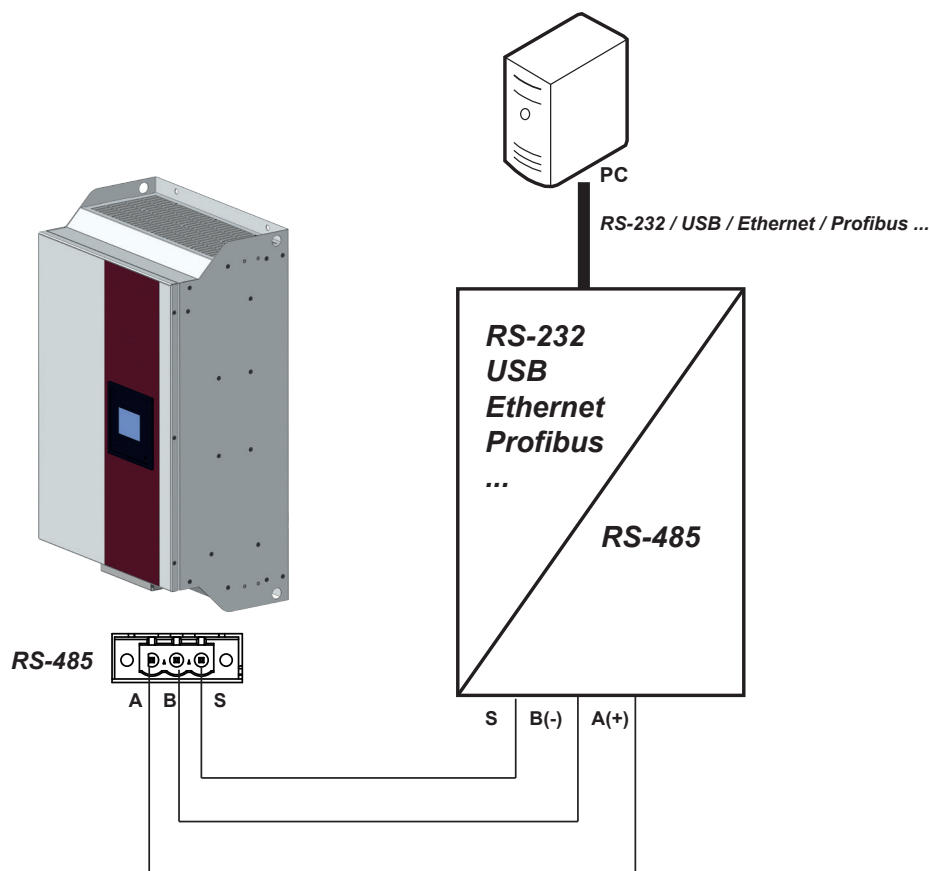


Figure 76: RS-485 Connection diagram.

The RS-485 communications configuration in **SVGm** models is set to a baud rate of 9600 bps, 8 data bits, 1 stop bit and no parity.

8.2.- PROTOCOL

In the Modbus protocol, the **SVGm** uses the RTU (Remote Terminal Unit) mode.

The Modbus functions implemented in the device are as follows:

Functions 03 and 04. Reading of n Words (2 bytes).

8.2.1.- EXAMPLE OF MODBUS QUERY

Query: Value of the Load current of L1

Address	Function	Initial register	No. of registers	CRC
0 A	03	92	0002	xxxx

Address: 0A, Peripheral number: 10 in decimal.

Function: 03, Read function.

Initial Register: 92, register from which to start reading.

No. of registers: 0002, number of registers to be read.

CRC: xxxx, CRC character.

Response:

Address	Function	No. of Bytes	Register no. 1	Register no. 2	CRC
0 A	03	04	0000	00FA	xxxx

Address: 0A, Responding peripheral number: 10 in decimal.

Function: 03, Read function.

No. of bytes: 04, No. of bytes received.

Register: 000000FA, value of load current L1, with 1 decimal: 0xFA = 25.0 A

CRC: xxxx, CRC character.

8.2.2.- MODBUS MAP

All Modbus map variables are in hexadecimal format.

For these variables, **Functions 03 and 04** are implemented.

8.2.2.1.- Load Measurements

Table 35: Modbus memory map: Measurements with Load.

Parameter	L1	L2	L3	LN	Units
Current with Load	92 - 93	94 - 95	96 - 97	98 - 99	[Low] + [Hi] A with 1 decimal
Active power with Load	AD - AE	AF - B0	B1 - B2	-	kW with 2 decimal places and sign.
Reactive power with Load	B3 - B4	B5 - B6	B7 - B8	-	kVar with 2 decimal places and sign.
Apparent power with Load	B9 - BA	BB - BC	BD - BE	-	kVA with 2 decimal places and sign.
cos ϕ with Load	D1	D2	D3	-	With 3 decimal

8.2.2.2.- Mains Measurements

Table 36: Modbus memory map: Measurements in the Mains.

Parameter	L1	L2	L3	LN	Units
Current in Mains	9A - 9B	9C - 9D	9E - 9F	A0 - A1	[Low] + [Hi] A with 1 decimal
Active power in Mains	BF - C0	C1 - C2	C3 - C4	-	kW with 2 decimal places and sign.
Reactive power in Mains	C5 - C6	C7 - C8	C9 - CA	-	kVar with 2 decimal places and sign.
Apparent power in Mains	CB - CC	CD - CE	CF - D0	-	kVA with 2 decimal places and sign.
cos ϕ in Mains	D4	D5	D6	-	With 3 decimal
Mains frequency	D7			-	Hz with 1 decimal

8.2.2.3.- Other parameters of the SVGm static generator

Table 37: Modbus memory map: Static generator parameters (Table 1).

Parameter	Address	Units
Temperature IGBT 1 ⁽³⁾	DB	°C with 1 decimal
Temperature IGBT 2 ⁽³⁾	DC	°C with 1 decimal
Temperature IGBT 3 ⁽³⁾	DD	°C with 1 decimal
Temperature Inductor 1 ⁽³⁾	E7	°C with 1 decimal
Temperature Inductor 2 ⁽³⁾	E8	°C with 1 decimal
Temperature IGBT 4 ^{(3) (4)}	F5	°C with 1 decimal
Temperature IGBT 5 ^{(3) (4)}	F6	°C with 1 decimal
Temperature IGBT 6 ^{(3) (4)}	F7	°C with 1 decimal
Temperature Inductor 3 ^{(3) (4)}	FB	°C with 1 decimal
Temperature Inductor 4 ^{(3) (4)}	FC	°C with 1 decimal
Phase L1 - L2 voltage	DE	V with 1 decimal
Phase L2 - L3 voltage	DF	V with 1 decimal
Phase L3 - L1 voltage	E0	V with 1 decimal
Positive DC bus voltage	E1	V with 1 decimal
Negative DC bus voltage	E2	V with 1 decimal

⁽³⁾ For a system with devices in parallel, the parameter value is that of the device connected with RS-485.

⁽⁴⁾ Parameters only accessible for the 60 kvar model.

Table 38: Modbus memory map: Static generator parameters (Table 2).

Parameter	L1	L2	L3	LN	Units
Current in the static generator	A3 - A2	A5 - A4	A7 - A6	A9 - A8	[Hi] + [Low] A with 1 decimal
Phase – neutral voltage	AA	AB	AC	-	V with 1 decimal
% of static generator power used	D8	D9	DA	-	%

Table 39: Modbus memory map: Static generator parameters (Table 3).

Parameter	Address	Description
SVGm serial no. ⁽⁵⁾	2710 - 2711	Hi [10] + Low [11] serial no.
DSP software version	10C	-
HMI software version	1C3	-

⁽⁵⁾ For a system with devices in parallel, the parameter value is that of the device connected with RS-485.

8.2.2.4.- SVGm messages

Table 40: Modbus memory map: Static generator messages (Table 1).

Parameter	Address	Status
Device status ⁽⁶⁾	110	1: Start 0: Stop

⁽⁶⁾ For a system with devices in parallel, the parameter value is that of the device connected with RS-485.

Table 41: Modbus memory map: Static generator messages (Table 2).

Parameter	Address
Alarm messages	105 (Hi value), 106 (Low value)
Bit	Description
0x00000000	There are no alarms
0x00000001	DC Bus voltage error
0x00000002	L1 overcurrent alarm
0x00000004	L2 overcurrent alarm
0x00000008	L3 overcurrent alarm
0x00000010	L1 overvoltage alarm
0x00000020	L2 overvoltage alarm
0x00000040	L3 overvoltage alarm
0x00000080	DC+ bus overvoltage alarm
0x00000100	DC- bus overvoltage alarm
0x00000200	IGBT failure
0x00000400	IGBT failure
0x00000800	IGBT failure
0x00001000	IGBT failure
0x00004000	High temperature IGBT
0x00008000	High temperature inductor
0x00010000	Initial Conditions Error
0x00040000	Hardware failure
0x00080000	DC Bus charge failure
0x00100000	Selt-test failed
0x00200000	Temperature alarm
0x01000000	DSP failure
0x02000000	5V supply failure

Table 42: Modbus memory map: SVGm messages (Table 3).

Parameter	Address
HMI alarm messages	44F
Bit	Description
0x0001	Internal communications alarm.

Table 43: Modbus memory map: Static generator messages (Table 3).

Parameter	Address
Initial Conditions for which the device does not start up. ⁽⁷⁾	108
Bit	Description
0x0001	Discharging DC bus
0x0002	Minimum Mains Voltage
0x0004	Minimum temperature value
0x0008	Frequency error
0x0010	Charging DC bus
0x0020	Minimum DC bus voltage
0x0040	DC Bus imbalance
0x0080	The device does not communicate
0x0200	Minimum load current
0x0400	Maximum load current
0x0800	THDv > 40% ⁽⁸⁾
0x1000	Mains voltage limits: High ⁽⁸⁾
0x4000	CAN Comms loss
0x8000	SVGm cannot generate the expected current waveform.

⁽⁷⁾ For a system with devices in parallel, the parameter value is that of the device connected with RS-485.

⁽⁸⁾ Warning messages available with software versions DSP ≥ 1.61 and HDMI ≥ 1.2006.

Table 44: Modbus memory map: Static generator messages (Table 4).

Parameter	Address
SVGm status ⁽⁹⁾	104
Status (Decimal value)	Description
0	The device is starting the systems.
50	Initiating internal communication systems
60	Configuring the device.
100	The SVGm is starting up.
200	Waiting for the conditions to be met in order to operate.
300	Device stopped.
400	The SVGm is synchronising with the mains.
500	Charging process of the internal bus prior to start-up.
600	Device is operating.
700	An alarm has been generated.

⁽⁹⁾ For a system with devices in parallel, the parameter value is that of the device connected with RS-485.

9.- ETHERNET COMMUNICATIONS

For an installation with devices in parallel, the Ethernet connection can be made on any device.

9.1.- CONNECTION

The **SVGm** has an Ethernet port to access the web server or communicate via Modbus/TCP.

Note: *The Modbus map can be consulted in section "8.2.2.- MODBUS MAP".*

9.2.- WEB SITE

The device has a web site for viewing and configuring the parameters.

Figure 77 shows the main web server screen, from where you can access all of the information of the **SVGm**.

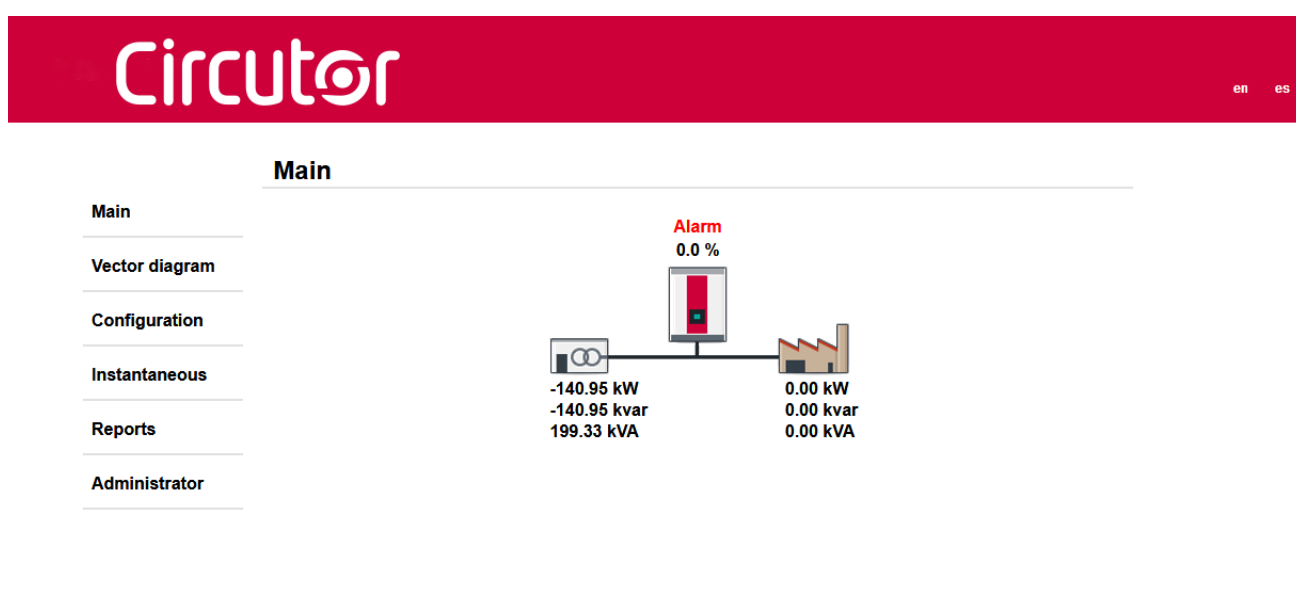


Figure 77: Main screen of the web site.

The language of the web site can be modified using the buttons that appear on the upper right part of the page.

To modify the **Configuration** parameters, it is necessary to enter the **User** and **Password** in the **Administrator** section.

There are two types of user:

- 1.- User with write access, **admin**:

Table 45: Default username and password for a user with write access.

Default User and Password	
User name	admin
Password	admin

2.- User with read access, **user**:

Table 46: Default username and password for a user with read access.

Default User and Password	
User name	user
Password	user



For security purposes, change the passwords for accessing the web site.

10.- MAINTENANCE

The SVGm static generator requires minimum preventive maintenance.



It is recommended to follow the notes described in this chapter to avoid premature damage to the device's components.

Table 47 shows the maintenance jobs with their respective time intervals.

Table 47: Static generator maintenance.

Description	Interval
Standard maintenance	12 months
Replacement of the cooling fans	40000 h
SVGm-3WF-xxxC-690 and SVGm-4WF-xxxC-550: Surge protective devices maintenance	12 months and after adverse weather events

The device controls the maintenance intervals and shows the  symbol on the main screen of the device if maintenance is required.

The warnings screen, "6.8.- WARNINGS" describes the type of maintenance procedures that must be carried out.

Note: The time intervals of the maintenance operations can vary depending on the device's operating conditions and environmental factors.



Follow the safety instructions in the "SAFETY PRECAUTIONS" section before carrying out any maintenance on the SVGm.

Failure to follow these instructions may result in injury or even death.



Certain components in the device can reach high temperatures. Allow the device to cool down before performing any maintenance operations.

10.1.- STANDARD MAINTENANCE



Perform maintenance every 6 to 12 months, depending on the level of environmental dirt and operation of the device.

The device will indicate that the maintenance procedures must be carried out every 12 months.



For an installation with devices in parallel, standard maintenance must be performed on all devices at the same time.

The points to be inspected are:

- 1.- Set the **SVGm** in STOP mode and open the main switch (**OFF** position).
- 2.- Wait 1 minute for the capacitors to discharge.
- 3.- Clean the ventilation grilles, removing the dust.
- 4.- Check the status and torque of the electrical connections, as well as the mechanical attachment to the wall.
- 5.- Reset the standard maintenance meter, to do so:

Access the main setup screen.



Figure 78: Main configuration screen.

Press the  Edit key and enter the password used to access the maintenance screen (**Maintenance password: 8888**).

The screen shown in **Figure 79** will be displayed.

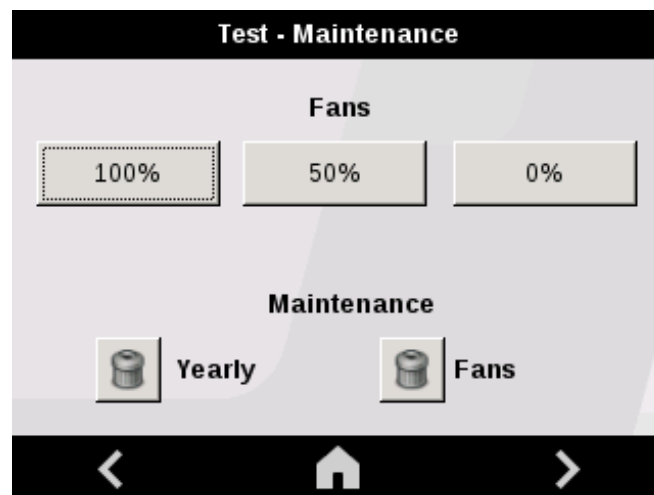
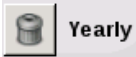


Figure 79: Maintenance screen.

Press the  Yearly key to reset the maintenance meter.

10.2.- COOLING FANS



The cooling fans must operate correctly to avoid overheating in the static generator components.

The device has high-speed cooling fans, with an estimated useful life of 40000 hours.

Nevertheless, this useful life can be shortened depending on the conditions of use (temperature, humidity, environmental pollution). In the event that the fans lose their efficiency, the device's performance will deteriorate.

The following symptoms in the static generator behaviour could indicate a deterioration of the fans:

- ✓ Increase in fan noise.
- ✓ Increase in temperature of the device under the same environmental conditions and load.
- ✓ The **SVGm** regularly indicates a temperature alarm.

The set of fans must be replaced if they have exceeded their useful life or show signs of deterioration. In such cases, **CIRCUTOR** will provide a spare part that consists of a set of fans so that the device can be repaired quickly and easily.



For an installation with devices in parallel, all of the fans must be changed at the same time.

10.3.- CHANGE OF COOLING FANS: SVGm OF 20.7 and 30 kvar

Table 48: Tools needed (SVGm-3WF-030M and SVGm-4WF-020M)

Tools needed	
Fan assembly replacement SVGm-3WF-030M and SVGm-4WF-020M , Code: 920121	
 2	Screwdriver for PH2 head screws
 3	Screwdriver for Allen 3 head screws

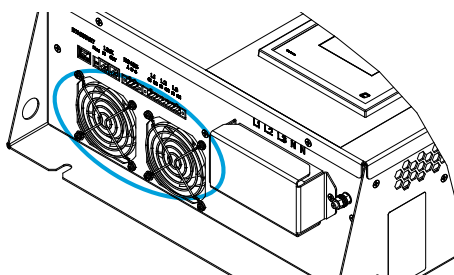


Figure 80: Location of the cooling fans.

To proceed to change the set of fans:

- ① Place the **SVGm** in **STOP** mode and disconnect the device from the power. If necessary, disconnect all the connection cables and short-circuit the current transformers.
- ② Wait for 1 minute for the capacitors to discharge before opening the device.

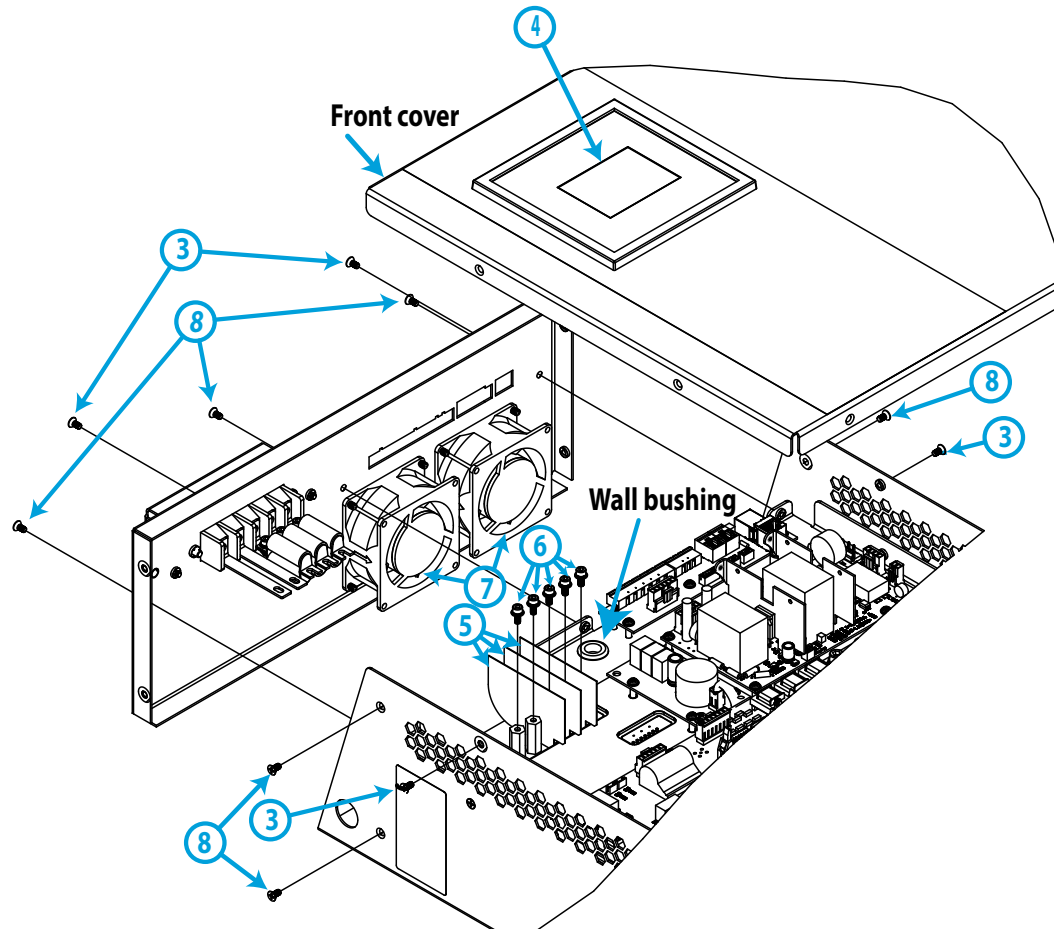


Figure 81: Steps to change fans.

- ③ Remove the 8 screws from the front cover.



- ④ Disconnect the display.

- ⑤ Remove the insulators.

- ⑥ Remove the screws from the fuses.



- ⑦ Disconnect the fans.

- ⑧ Remove the 7 screws from the fan cover.



- ⑨ Remove the fan cover. Be careful when passing the cable through the wall grommet.

- ⑩ Replace the fans.



- ⑪ Fit the fan cover, passing the fan cable through the wall grommet.



- ⑫ Connect the fans.

- ⑬ Tighten the fuse screws and the neutral connection bar.

 2.2 Nm

- ⑭ Place the insulators.

- ⑮ Connect the display.

- ⑯ Tighten front cover screws.

 1.5 Nm

- ⑰ Connect, power and start the SVGm.

- ⑱ Check the correct operation of the fans.

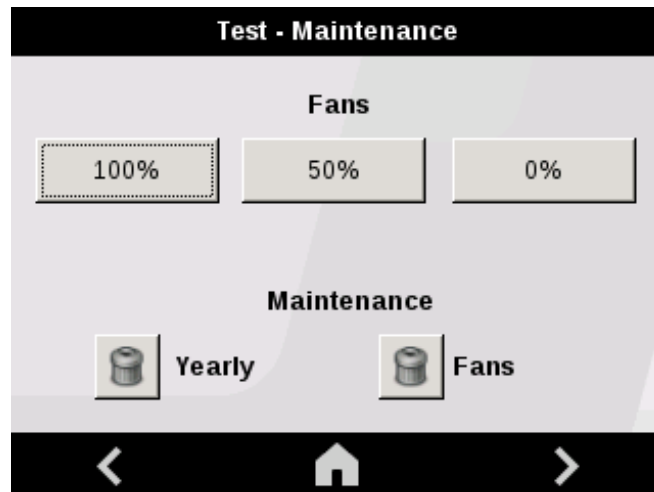
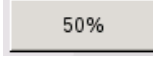


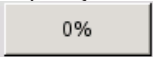
Figure 82: Maintenance screen.

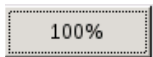
To do this, go to the maintenance screen, via the configuration screen, by pressing the  key and entering the password to log into the maintenance screen (**Maintenance password** : 8888).

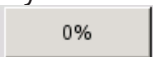
The screen in **Figure 82** is displayed.

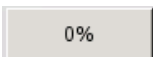
Checking the operation of the fans:

1.- Press the key , the fan starts to operate at a rotation speed of 50%; check that it is working properly.

Press the key , to stop the fan.

2.- Press the key , the fan starts to operate at a rotation speed of 100%; check that it is working properly.

Press the key , to stop the fan.

Note: The fans will stop if the key  is not pressed after 1 minute.

- ⑲ Reset the fans maintenance meter by pressing the  **Fans** key.

10.4.- CHANGE OF COOLING FANS: SVGm OF 41.4 and 60 kvar

Table 49: Tools needed (SVGm-3WF-060M and SVGm-4WF-040M)

Tools needed	
Fan assembly replacement SVGm3WF-060M and SVGm4WF-040M , Code: 920122	
 2	Screwdriver for PH2 head screws
 3	Screwdriver for Allen 3 head screws

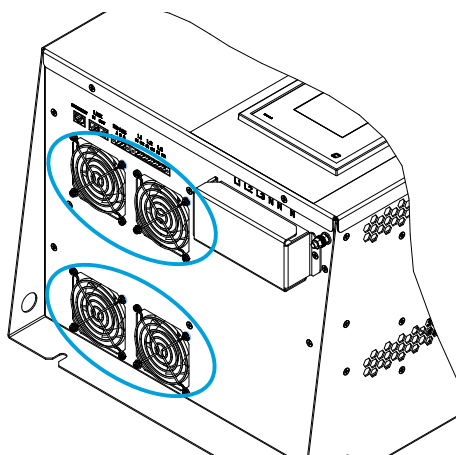


Figure 83: Location of the cooling fans.

To proceed to change the set of fans:

- ① Place the **SVGm** in **STOP** mode and disconnect the device from the power. If necessary, disconnect all the connection cables and short-circuit the current transformers.
- ② Wait for 1 minute for the capacitors to discharge before opening the device.

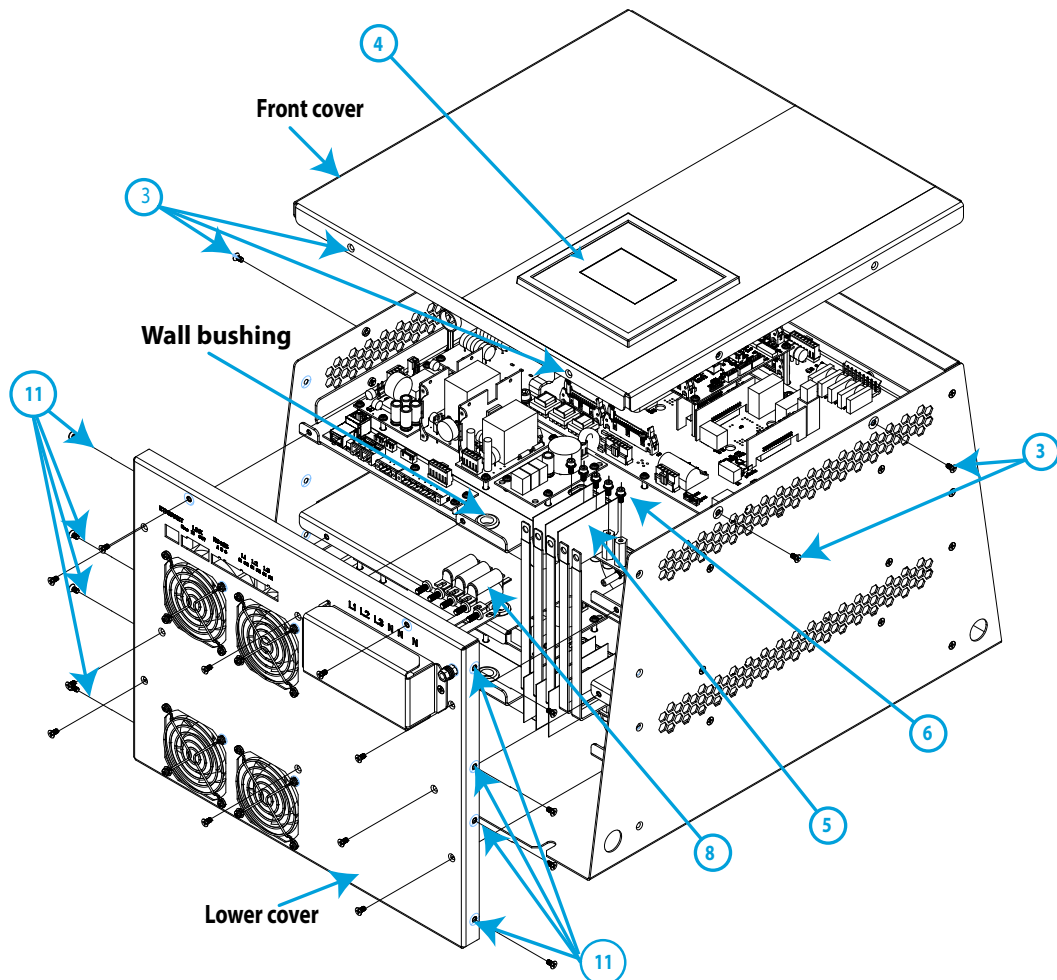


Figure 84: Steps to change fans (Part 1).

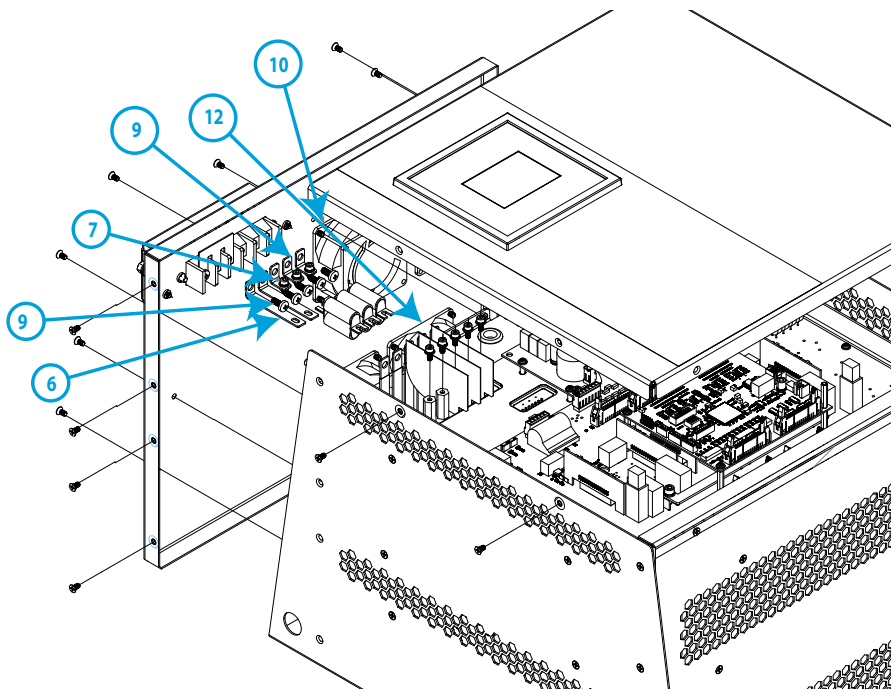


Figure 85: Steps to change fans (Part 2).

- ③ Remove the 8 screws from the front cover.



- ④ Disconnect the display.

- ⑤ Remove the insulators.
- ⑥ Remove the screws from the fuses and the neutral connection bar from the side of the board
 3
- ⑦ Loosen the fuse screws on the side of the terminal block.
 3
- ⑧ Remove the fuses.
- ⑨ Remove the 5 screws from the terminal block. Remove the bar from each of the phases.
 2
- ⑩ Disconnect the upper floor fans.
- ⑪ Remove the 16 screws from the lower fan cover and disassemble. Run the fan cables from the upper level through the wall grommet
 2
- ⑫ Disconnect the lower floor fans.
- ⑬ Remove lower cover.
- ⑭ Replace the fans.
 2  0.7 Nm
- ⑮ Place the lower cover.
- ⑯ Connect the fans on the lower level. Run the cables for the fans in the upper level through the wall grommet.
- ⑰ Assemble the lower cover.
 2  1.5 Nm
- ⑱ Connect the upper floor fans.
- ⑲ Tighten the bars to the terminal block.
 2  2.2 Nm
- ⑳ Insert the Allen screws and nuts in the bar, but do not tighten.
- ㉑ Mount the fuses. Place the screws in the column. Tighten all the fuse screws.
 2.2 Nm
- ㉒ Place the insulators.
- ㉓ Connect the display.
- ㉔ Tighten the front cover screws.
 1.5 Nm
- ㉕ Connect, power and start the SVGm.
- ㉖ Check the correct operation of the fans.

Follow **steps 18 and 19**, section **"10.3.- CHANGE OF COOLING FANS: SVGm OF 20.7 and 30 kvar"**

10.5.- CHANGE OF COOLING FANS: SVGm type RACK

Table 50: Tools needed (SVGm type Rack)

Tools needed	
Fan assembly replacement SVGm-xxx-100x , Code: 920124	
 25	Screwdriver for Torx 25 head screws
 4	Screwdriver for Allen 4 head screws
 5	Screwdriver for Allen 5 head screws
 10	Screwdriver for Hexagonal 10 mm head screws

To proceed to change the set of fans:

- ① Place the **SVGm** in **STOP** mode and disconnect the device from the power. If necessary, disconnect all the connection cables and short-circuit the current transformers.
- ② Wait for 1 minute for the capacitors to discharge before opening the device.
- ③ Remove the 8 screws of the upper cover.



25

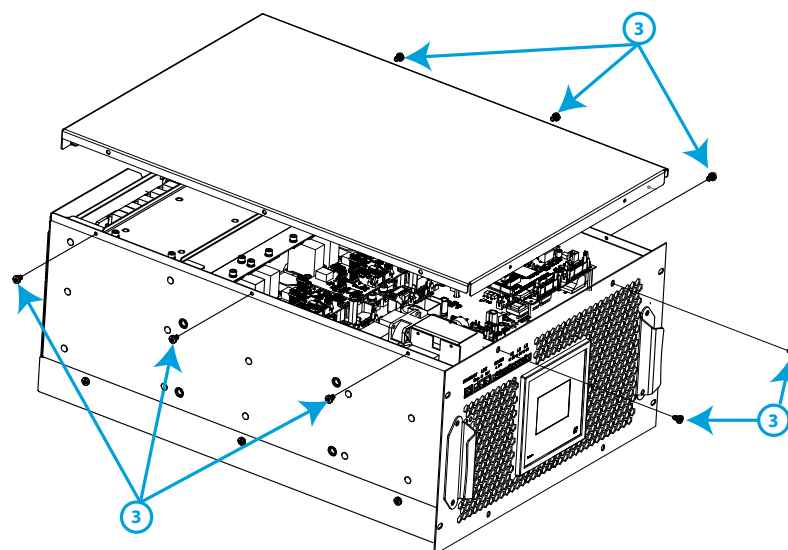


Figure 86: SVGm type Rack change of cooling fans (Step 3).

- ④ Disconnect the flat belts, Hall-effect sensors and fans.

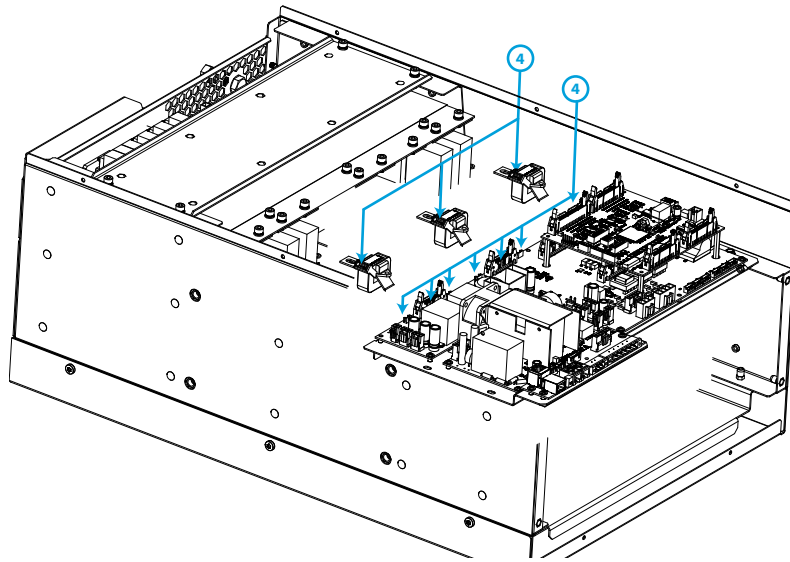


Figure 87: SVGm type Rack Change of cooling fans (Step 4).

- ⑤ Remove the 4 screws from the board bracket and carefully disassemble the boards. Remove the wall grommet from the fan cables to allow disassembly.



- ⑥ Remove the screws from the driver board.



- ⑦ Remove the driver board by gently pulling upwards.

- ⑧ Remove the screws from the bars ( 5), along with the screws in the end of the inductance. (type  5 and  10mm).

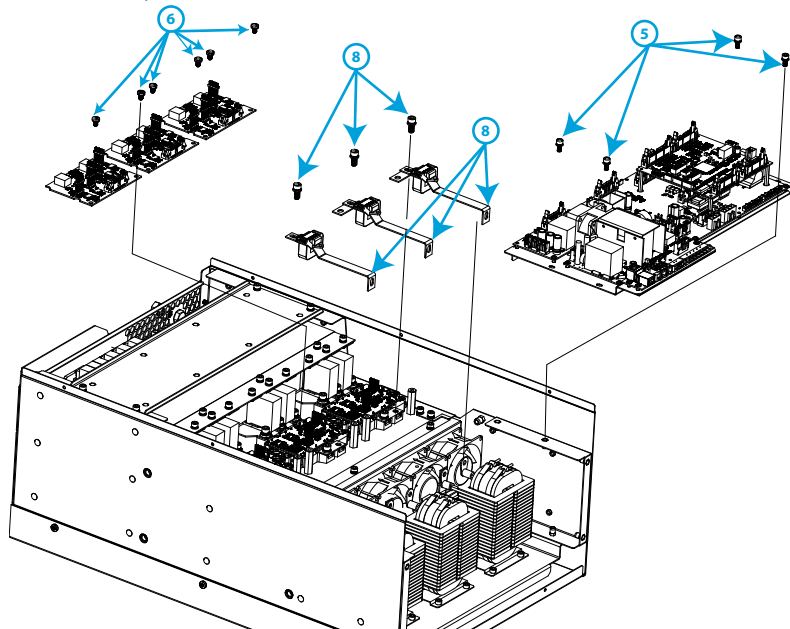


Figure 88: SVGm type Rack Change of cooling fans (Step 5, 6, 8).

- ⑨ Remove the 3 screws from the fans.



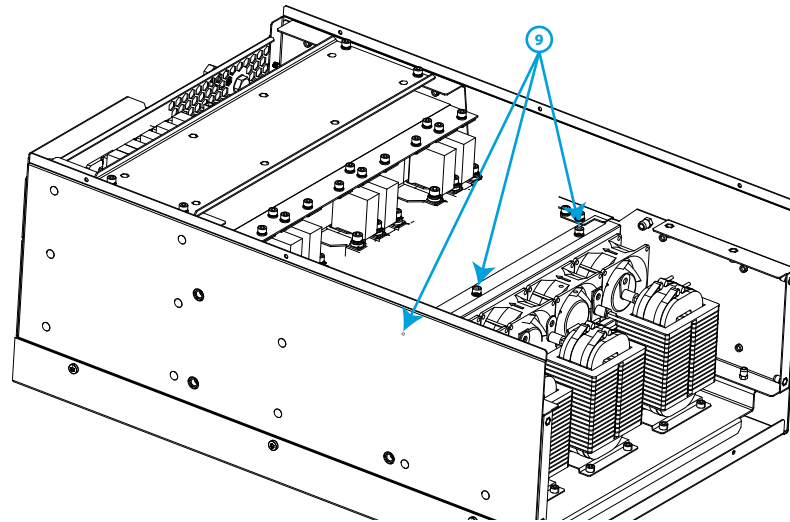


Figure 89: SVGm type Rack Change of cooling fans (Step 9).

- ⑩ Remove the fan assembly by pulling it up, and replace it with the new fans.

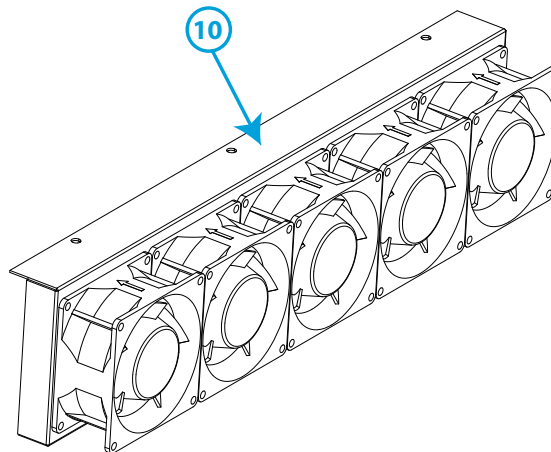


Figure 90: SVGm type Rack Change of cooling fans (Step 10).

- ⑪ Tighten the fan assembly screws.

4  5.5 Nm

- ⑫ Mount the bars. Tighten the IGBT and inductance screws.

IGBT screws :  4.5 Nm

Inductance screws :  8 Nm

- ⑬ Mount the driver board. Use the visual guides. The cross should be seen through the holes in the board.

- ⑭ Screw the driver board.

 0.7 Nm

- ⑮ Place the wall grommet on the bar brackets and reassemble the board bracket. Screw in.

 4.5 Nm

- ⑯ Connect the flat belts, Hall-effect sensors and fans.

- ⑰ Mount the top cover.

 4.5 Nm

- ⑮ Connect, power and start the **SVGm**.
- ⑯ Check the correct operation of the fans. Follow **steps 18 and 19**, section “**10.3.- CHANGE OF COOLING FANS: SVGm OF 20.7 and 30 kvar**”

10.6.- CHANGE OF COOLING FANS: SVGm OF 50, 69, 75 and 100 kvar WALL

Table 51: Tools needed (SVGm-4WF-050M, SVGm-3WF-075M, SVGm-3WF-100M and SVGm-4WF-069M)

Tools needed	
Fan assembly replacement SVGm-xxx-100x , Code: 920124	
 2	Screwdriver for PH2 head screws
 25	Screwdriver for Torx 25 head screws
 4	Screwdriver for Allen 4 head screws
 5	Screwdriver for Allen 5 head screws
 10	Screwdriver for Hexagonal 10 mm head screws

To proceed to change the set of fans:

- ① Place the **SVGm** in **STOP** mode and disconnect the device from the power. If necessary, disconnect all the connection cables and short-circuit the current transformers.
- ② Wait for 1 minute for the capacitors to discharge before opening the device.
- ③ Remove the 6 screws from the front cover.

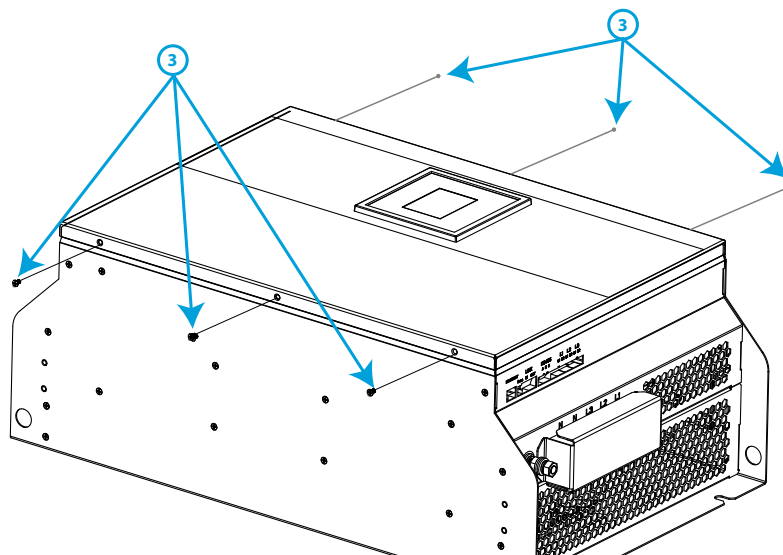


Figure 91: Change of cooling fans (Step 3).

- ④ Disconnect the display.

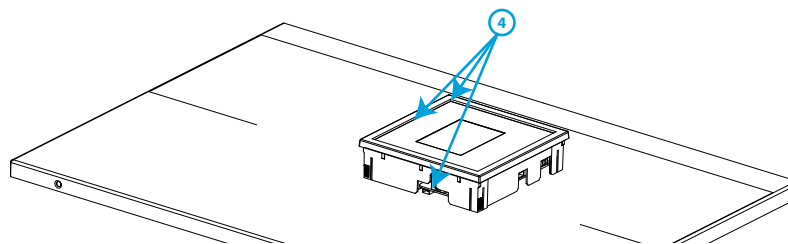


Figure 92: Change of cooling fans (Step 4).

- ⑤ Follow the steps from **step 4** in section “10.5.-CHANGE OF COOLING FANS: SVGm type RACK”

10.7.- CHANGE OF COOLING FANS: CABINET TYPE SVGm

Table 52: Tools needed (Cabinet type SVGm)

Tools needed	
SVGm-3WF-100C, SVGm-4WF-069C and SVGm-4WF-067C:	
1	Fan assembly replacement SVGm-xxx-100x, Code: 920124
SVGm-3WF-200C, SVGm-4WF-138C and SVGm-4WF-134C:	
2	Fan assembly replacement SVGm-xxx-100x, Code: 920124
SVGm-3WF-300C, SVGm-4WF-207C and SVGm-4WF-201C:	
3	Fan assembly replacement SVGm-xxx-100x, Code: 920124
SVGm-3WF-400C SVGm-4WF-276C and SVGm-4WF-268C:	
4	Fan assembly replacement SVGm-xxx-100x, Code: 920124
 25	Screwdriver for Torx 25 head screws
 30	Screwdriver for Torx 30 head screws
 4	Screwdriver for Allen 4 head screws
 5	Screwdriver for Allen 5 head screws
 10	Screwdriver for Hexagonal 10 mm head screws

To proceed to change the set of fans:

- ① Place the **SVGm** in **STOP** mode and disconnect the device from the power. If necessary, disconnect all the connection cables and short-circuit the current transformers.
- ② Wait for 1 minute for the capacitors to discharge before opening the device.
- ③ Access the 100A modules through the front panel. This is done by loosening the front screws.

 25 y 30  1.5 Nm

- ④ Proceed from point 3 of section “10.5.-CHANGE OF COOLING FANS: SVGm type RACK” with each of the device’s 100A modules.

Note: When checking the fans in the “**master**” device, the slave device fans will be activated automatically.

10.8.- MAINTENANCE OF SURGE PROTECTIVE DEVICES: SVGm-3WF-xxxC-690 AND SVGm-4WF-xxxC-550

The device has removable surge protective that are accessible from the front. They feature a green indicator to signal the correct operation of the protective.

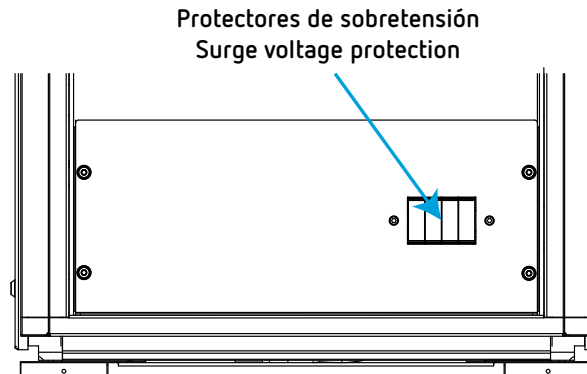


Figure 93: Surge voltage protection.

These devices are protected by **NH00** fuses.

The purpose of these devices is to protect against transient overvoltage that may appear in the power supply, mainly due to weather disturbances.

At least once a year, and after adverse weather events (storms, lightning strikes, etc.), the indicator must be verified to be green.

If it needs replacing, the indicator will change to red. In this case, the condition of the associated protective fuse must also be checked. The **NH00** fuses include a status indicator that is visible when the front cover is removed.



If any work has to be done inside the connection area, the device must be disconnected from the power supply.

It is important to always replace surge protection and fuses with devices of the same type **Table 53**.

Table 53: Description Surge protection and Fuses.

	Description
Surge voltage protection	Cirprotec PSC-12,5/400
Fuse	NH00 100A gG/gL 80kA 690V~

The surge protection are of the "plug-in cartridge" type, and can be removed by simply pulling from the outside, without using any tools. To replace the fuses, the **NH** fuse puller must be used.

11.- TECHNICAL FEATURES

Mains voltage		
Rated voltage Un	SVGm-3WF-xxxx-480	SVGm-4WF-xxxx-400
	208 ... 480 V~ Ph-Ph $\pm 10\%$	208 ... 400 V~ Ph-Ph $\pm 10\%$
	SVGm-3WF-xxxx-690	SVGm-4WF-xxxx-550
	230 ... 690 V~ Ph-Ph $\pm 10\%$	230 ... 550 V~ Ph-Ph $\pm 10\%$
Frequency Fn	50 / 60 Hz $\pm 5\%$	
Maximum THD V	25 %	
Earthing system	TN, TT	

Power					
		SVGm-3WF-030M SVGm-4WF-020M	SVGm-3WF-060M SVGm-4WF-040M	SVGm-3WF-075M SVGm-4WF-050M	SVGm-3WF-100R SVGm-3WF-100M SVGm-4WF-069R SVGm-4WF-069M
Maximum consumption		650 W	1300 W	1550 W	2070 W
Maximum current		SVGm-3WF-030M	SVGm-3WF-060M	SVGm-3WF-075M	SVGm-3WF-100R SVGm-3WF-100M
		44 A RMS	88 A RMS	108 A RMS	145 A RMS
		SVGm-4WF-020M	SVGm-4WF-040M	SVGm-4WF-050M	SVGm-4WF-069R SVGm-4WF-069M
		30 A RMS	60 A RMS	72 A RMS	100 A RMS
Maximum power	480V	SVGm-3WF-030M	SVGm-3WF-060M	SVGm-3WF-075M	SVGm-3WF-100R SVGm-3WF-100M
		30000 VA	60000 VA	75000 VA	100000 VA
	400V	SVGm-4WF-020M	SVGm-4WF-040M	SVGm-4WF-050M	SVGm-4WF-069R SVGm-4WF-069M
		20700 VA	41400 VA	51750 VA	69000 VA

		SVGm-3WF-100C-480 SVGm-4WF-069C-400	SVGm-3WF-200C-480 SVGm-4WF-138C-400
Rated insulation voltage Ui		480 V	480 V
Impulse withstand voltage Uimp		4kV, CAT III Class 1	4kV, CAT III Class 1
Rated current		SVGm-3WF-100C-480	SVGm-3WF-200C-480
		145 A	290 A
		SVGm-4WF-069C-400	SVGm-4WF-138C-400
		100 A	200 A
Short-time withstand current Icw		3.5 kA 1 second	3.5 kA 1 second
Peak current Ipk		84 kA peak	84 kA peak
Rated conditional short-circuit current Icc		40 kA	40 kA
Simultaneity RDF		1	1
Maximum consumption		2070 W	4140 W
Maximum current		SVGm-3WF-100C-480	SVGm-3WF-200C-480
		145 A RMS	290 A RMS
		SVGm-4WF-069C-400	SVGm-4WF-138C-400
		100 A RMS	200 A RMS
Maximum power	480V	SVGm-3WF-100C-480	SVGm-3WF-200C-480
		100000 VA	200000 VA
	400V	SVGm-4WF-069C-400	SVGm-4WF-138C-400
		69000 VA	138000 VA

		SVGm-3WF-300C-480 SVGm-4WF-207C-400	SVGm-3WF-400C-480 SVGm-4WF-276C-400
Rated insulation voltage Ui		480 V	480 V
Impulse withstand voltage Uimp		4kV, CAT III Class 1	4kV, CAT III Class 1
Rated current		SVGm-3WF-300C-480	SVGm-3WF-400C-480
		435 A	580 A
		SVGm-4WF-207C-400	SVGm-4WF-276C-400
		300 A	400 A
Short-time withstand current Icw		3.5 kA 1 second	3.5 kA 1 second
Peak current Ipk		84 kA peak	84 kA peak
Rated conditional short-circuit current Icc		40 kA	40 kA
Simultaneity RDF		1	1
Maximum consumption		6210 W	8280 W
Maximum current		SVGm-3WF-300C-480	SVGm-3WF-400C-480
		435 A RMS	580 A RMS
		SVGm-4WF-207C-400	SVGm-4WF-276C-400
		300 A RMS	400 A RMS
Maximum power	480V	SVGm-3WF-300C-480	SVGm-3WF-400C-480
		300000 VA	400000 VA
	400V	SVGm-4WF-207C-400	SVGm-4WF-276C-400
		207000 VA	276000 VA

		SVGm-3WF-100C-690 SVGm-4WF-067C-550	SVGm-3WF-200C-690 SVGm-4WF-134C-550
Rated insulation voltage Ui		690 V	690 V
Impulse withstand voltage Uimp		6kV, CAT III Class 1	6kV, CAT III Class 1
Rated current		SVGm-3WF-100C-690	SVGm-3WF-200C-690
		84 A	168 A
		SVGm-4WF-067C-550	SVGm-4WF-134C-550
		70 A	140 A
Short-time withstand current Icw		3.5 kA 1 second	3.5 kA 1 second
Peak current Ipk		84 kA peak	84 kA peak
Rated conditional short-circuit current Icc		40 kA	40 kA
Simultaneity RDF		1	1
Maximum consumption		SVGm-3WF-100C-690	SVGm-3WF-200C-690
		2200 W	4400 W
		SVGm-4WF-067C-550	SVGm-4WF-134C-550
		2000 W	4000 W
Maximum current		SVGm-3WF-100C-690	SVGm-3WF-200C-690
		84 A RMS	168 A RMS
		SVGm-4WF-067C-550	SVGm-4WF-134C-550
		70 A RMS	140 A RMS
Maximum power	690V	SVGm-3WF-100C-690	SVGm-3WF-200C-690
		100000 VA	200000 VA
	550V	SVGm-4WF-067C-550	SVGm-4WF-134C-550
		67000 VA	134000 VA

		SVGm-3WF-300C-690 SVGm-4WF-201C-550	SVGm-3WF-400C-690 SVGm-4WF-268C-550
Rated insulation voltage U_i		690 V	690 V
Impulse withstand voltage U_{imp}		6kV, CAT III Class 1	6kV, CAT III Class 1
Rated current		SVGm-3WF-300C-690	SVGm-3WF-400C-690
		252 A	336 A
		SVGm-4WF-201C-550	SVGm-4WF-268C-550
		210 A	280 A
Short-time withstand current I_{cw}		3.5 kA 1 second	3.5 kA 1 second
Peak current I_{pk}		84 kA peak	84 kA peak
Rated conditional short-circuit current I_{cc}		40 kA	40 kA
Simultaneity RDF		1	1
Maximum consumption		SVGm-3WF-300C-690	SVGm-3WF-400C-690
		6600 W	8800 W
		SVGm-4WF-201C-550	SVGm-4WF-268C-550
		6000 W	8000 W
Maximum current		SVGm-3WF-300C-690	SVGm-3WF-400C-690
		252 A RMS	336 A RMS
		SVGm-4WF-201C-550	SVGm-4WF-268C-550
		210 A RMS	280 A RMS
Maximum power	690V	SVGm-3WF-300C-690	SVGm-3WF-400C-690
		300000 VA	400000 VA
	550V	SVGm-4WF-201C-550	SVGm-4WF-268C-550
		201000 VA	268000 VA

Current measurement	
Type	Transformer: 5/5A ... 5000/5A
Consumption	1.5 VA per transformer

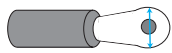
SVGm specifications	
Response time	< 100 μ s
Cos ϕ programmable	0.7 inductive ... 1 ... 0.7 capacitive
Parallel connection	Up to 100 devices of different calibres Connection of the transformers only in the Master device

Fuses	
SVGm-3WF-030M and SVGm-4WF-020M	
Quantity	2 per phase
Type	BS88A1, 25A, 500Vac gG 80kA I^2t 21kA ² s
SVGm-3WF-060M and SVGm-4WF-040M	
Quantity	4 per phase
Type	BS88A1, 25A, 500Vac gG 80kA I^2t 21kA ² s
SVGm-3WF-100M, SVGm-4WF-069M, SVGm-3WF-100R, SVGm-4WF-069R, SVGm-3WF-075M and SVGm-4WF-050M	
Quantity	2 per phase
Type	type BS88 100A, 500Vac, gG 80kA I^2t 21kA ² s
SVGm-3WF-100C-690 and SVGm-4WF-067C-550	
Quantity	2 per phase
Type	type BS88/A4 63A, 660/690Vac, gG 80kA I^2t 23kA ² s

RS-485 Communications	
Field bus	RS-485
Communications protocol	Modbus RTU
Baud rate	9600 bps
Stop bits	1
Parity	none
Ethernet communications	
Network protocol	TCP/IP, Modbus TCP
User interface	
Display	3.5" TFT colour touch screen Web server and datalogger
Environmental features	
Environmental conditions	Indoor conditioned IEC 60721-3-3
Operating temperature ⁽¹⁰⁾	-10°C ... +45°C
Storage temperature	-20°C... +50°C
Relative humidity (with no condensation)	0 ... 95%
Maximum altitude	3000 m a.s.l. (2000 m a.s.l. without performance degradation)
	SVGm-3WF-xxxC-690, SVGm-4WF-xxxC-550
	5000 m s.n.m.
Protection degree	SVGm-xxx-xxxM, SVGm-xxx-xxxR
	IP20
	SVGm-xxx-xxxC
	IP21, IP41 (optional)
Overvoltage category	OVC III 300V
	SVGm-3WF-xxxC-690, SVGm-4WF-xxxC-550
	OVC III 600V
SVGm-3WF-xxxC-480, SVGm-4WF-xxxC-400, SVGm-3WF-xxxC-690 and SVGm-4WF-xxxC-550	
Pollution degree	2
Impact resistance	IK 10
Electromagnetic compatibility	Installation in type-A environments

⁽¹⁰⁾ Consult for operating temperatures below -10°C.

Standards	
Electromagnetic compatibility (CEM). Part 6-4: Generic standards. Emissions standard for industrial environments. (IEC 61000-6-4:2006).	UNE-EN 61000-6-4:2007
Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement	UNE-EN 55011:2011
Electromagnetic compatibility (CEM). Part 6-2: Generic standards. Immunity for industrial environments.	UNE-EN 61000-6-2:2006
Safety requirements for power electronic converter systems and equipment - Part 1: General.	EN 62477-1:2012
Low-voltage switchgear and controlgear assemblies - Part 1: General rules	EN 61439-1:2011

Mechanical features				
SVGm-3WF-030M and SVGm-4WF-020M				
Dimensions (mm)	Figure 94			
Weight	21 kg			
Enclosure	Galvanised steel 1.5 mm			
Noise	58 dBA ⁽¹¹⁾			
Connections	Type			
Mains	M6 ring terminal	12 mm	2.2 ... 2.4 Nm	PH2
Earth	M6 ring terminal	16 mm	2.2 ... 2.4 Nm	PH2
Connections	Type			
Current	6-pole connector	max :2.5 mm ²	0.5 ... 0.6 Nm	Flat 3 mm
RS-485	3-pole connector	max :2.5 mm ²	0.5 ... 0.6 Nm	Flat 3 mm
Ethernet	RJ-45	-	-	-

⁽¹¹⁾ 1 metre from the mounting wall, ISO 11201:2010 V2

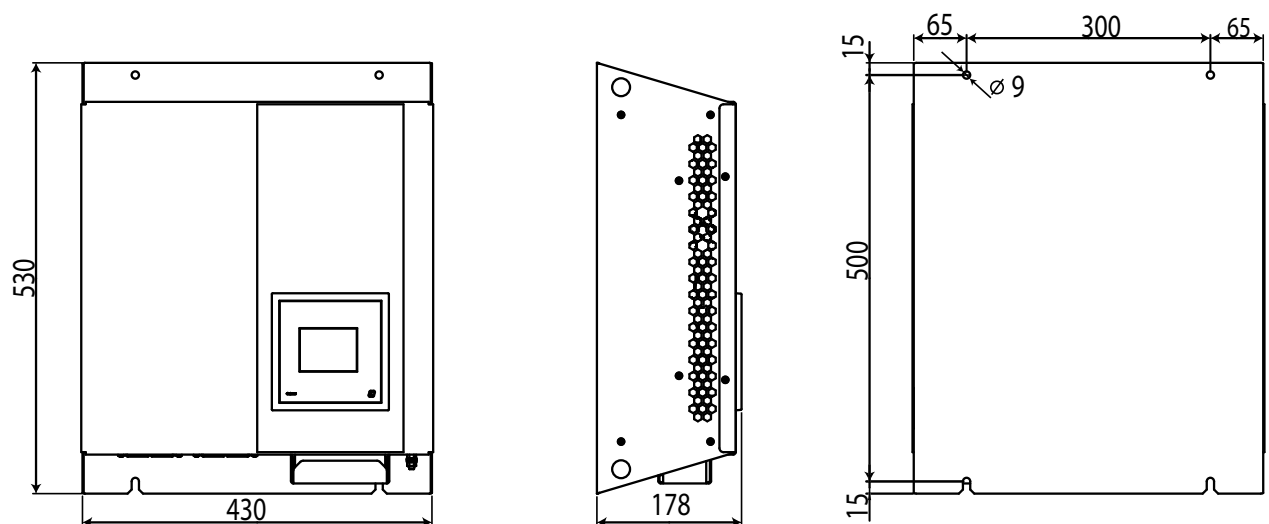
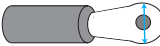


Figure 94: Dimensions SVGm-3WF-030M and SVGm-4WF-020M.

SVGm-3WF-060M and SVGm-4WF-040M				
Dimensions (mm)	Figure 95			
Weight	39 kg			
Enclosure	Galvanised steel 1.5 mm			
Noise	60 dBA ⁽¹²⁾			
Connections	Type			
Mains	M6 ring terminal	12 mm	2.2 ... 2.4 Nm	PH2
Earth	M6 ring terminal	16 mm	2.2 ... 2.4 Nm	PH2
Connections	Type			
Current	6-pole connector	max : 2.5 mm ²	0.5 ... 0.6 Nm	Flat 3 mm
RS-485	3-pole connector	max : 2.5 mm ²	0.5 ... 0.6 Nm	Flat 3 mm
Ethernet	RJ-45	-	-	-

⁽¹²⁾ 1 metre from the mounting wall, ISO 11201:2010 V2

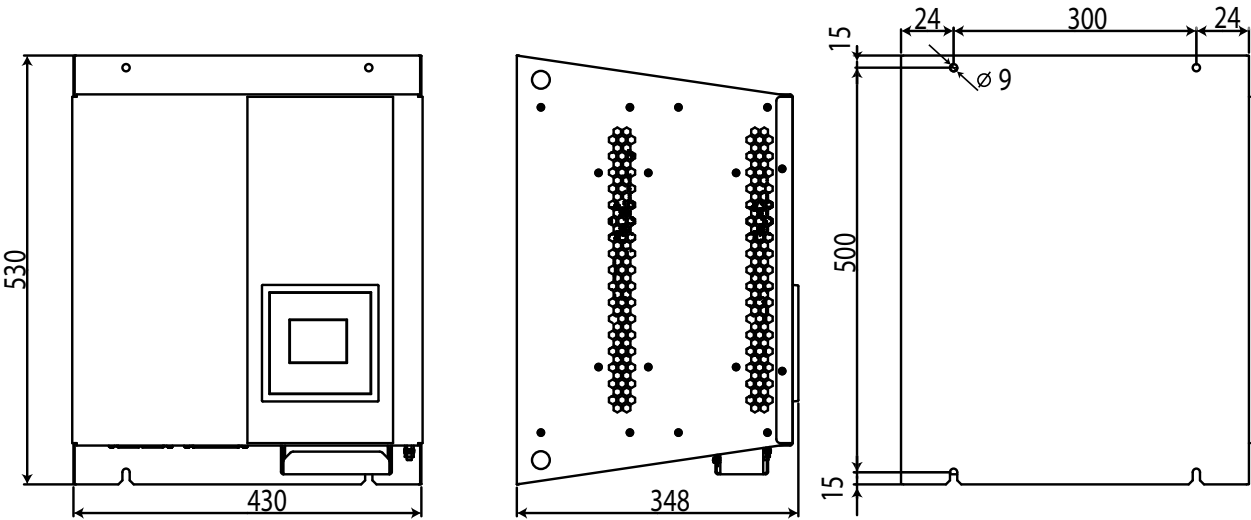
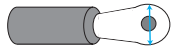
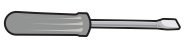
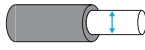


Figure 95: Dimensions SVGm-3WF-060M and SVGm-4WF-040M.

SVGm-3WF-100M, SVGm-4WF-069M, SVGm-3WF-075M and SVGm-4WF-050M				
Dimensions (mm)	Figure 96			
Weight	56 Kg			
Enclosure	Galvanised steel 1.5 mm			
Noise	< 60 dBA			
Connections	Type			
Mains	M8 ring terminal	23 mm	8 ... 10 Nm	PH2
Earth	M10 ring terminal	-	10 ... 14 Nm	Hex 17 mm
Connections	Type			
Current	6-pole connector	max :2.5 mm ²	0.5 ... 0.6 Nm	Flat 3 mm
RS-485	3-pole connector	max :2.5 mm ²	0.5 ... 0.6 Nm	Flat 3 mm
Ethernet	RJ-45	-	-	-

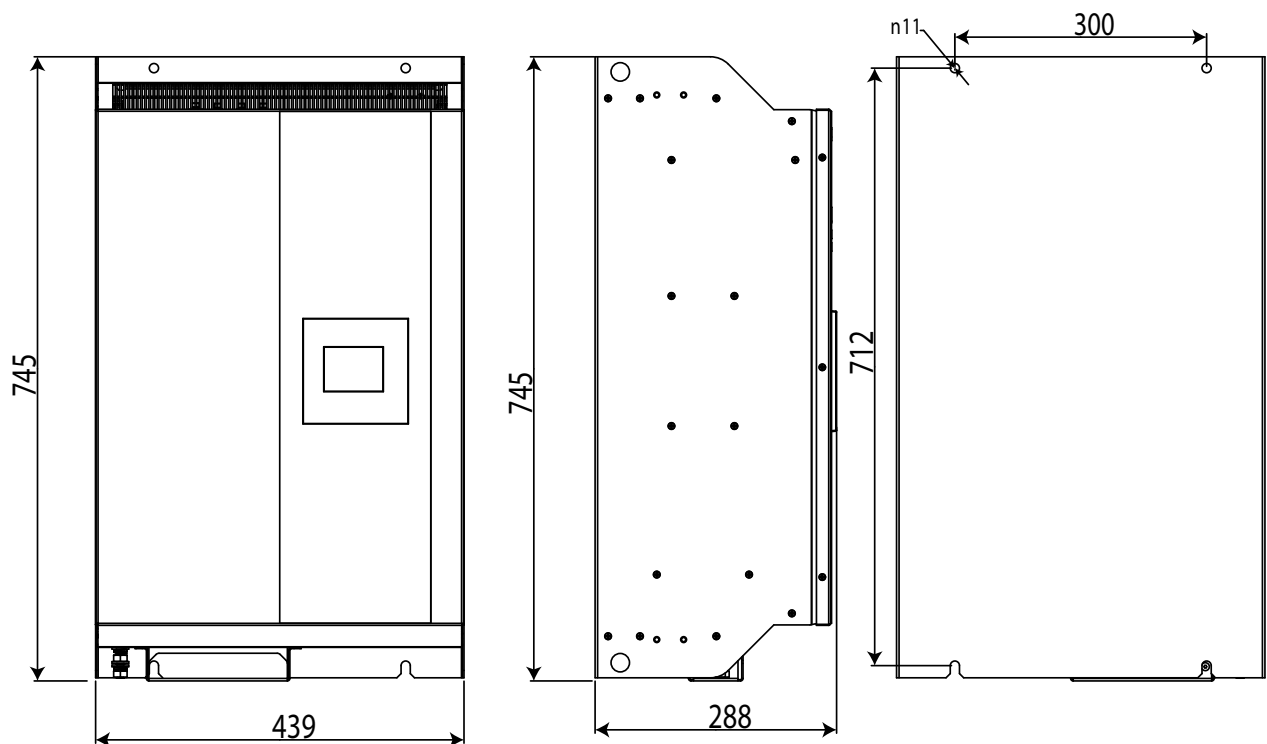
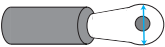
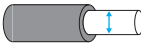


Figure 96: Dimensions SVGm-3WF-100M, SVGm-4WF-069M, SVGm-3WF-075M, SVGm-4WF-050M.

SVGm-3WF-100R and SVGm-4WF-069R				
Dimensions (mm)	Figure 97			
Weight	55 kg			
Enclosure	Galvanised steel 1.5 mm			
Noise	< 60 dBA			
Connections	Type			
Mains	Ring terminal M8	23 mm	8 ... 10 Nm	PH2
Earth	Ring terminal M10	-	10 ... 14 Nm	Hex 17 mm
Connections	Type			
Current	6-pole connector	max : 2.5 mm ²	0.5 ... 0.6 Nm	Flat 3 mm
RS-485	3-pole connector	max : 2.5 mm ²	0.5 ... 0.6 Nm	Flat 3 mm
Ethernet	RJ-45	-	-	-

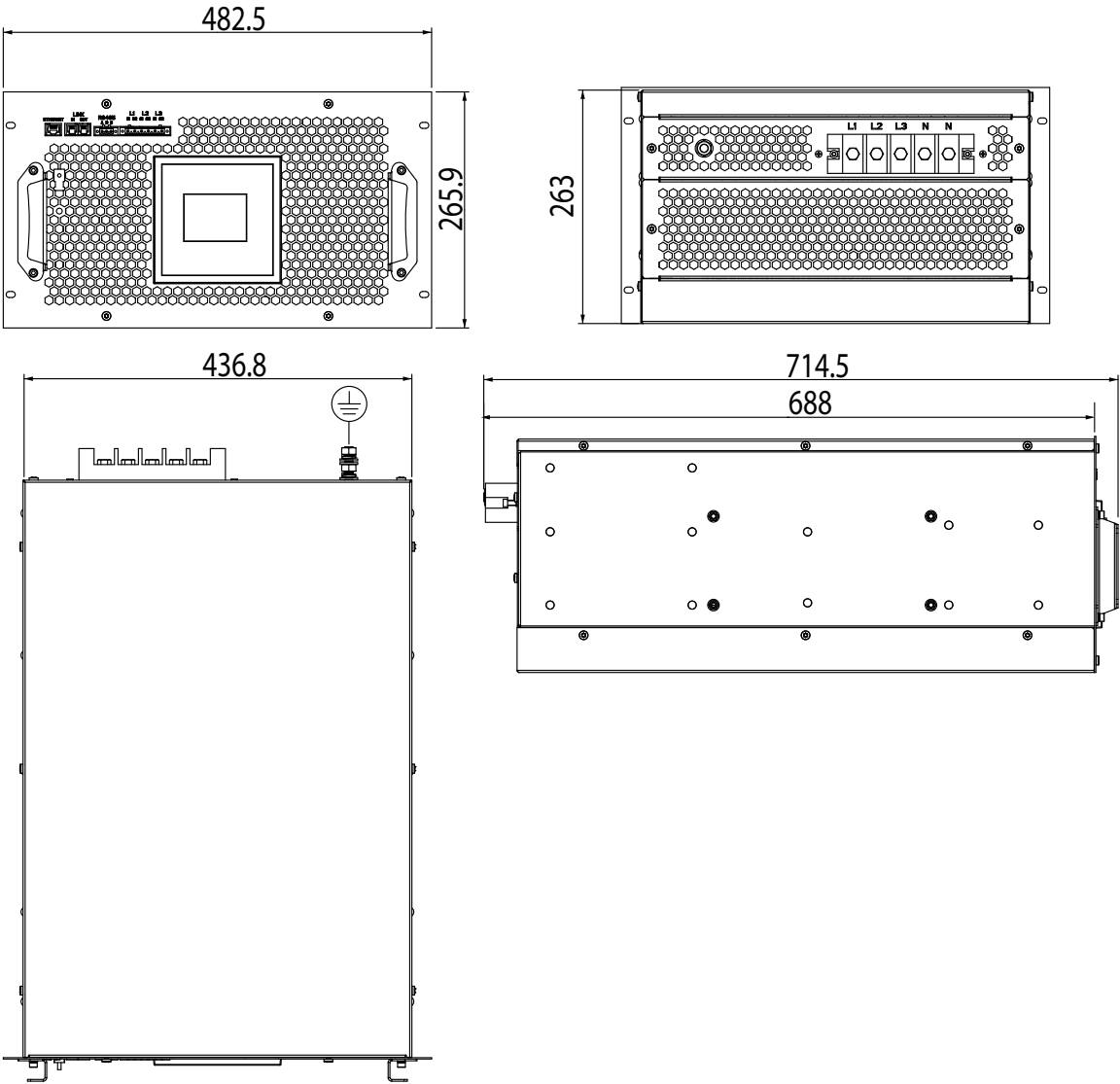


Figure 97: Dimensions SVGm-3WF-100R and SVGm-4WF-069R.

SVGm-3WF-xxxC-480, SVGm-4WF-xxxC-400, SVGm-3WF-xxxC-690 and SVGm-4WF-xxxC-550				
Dimensions (mm)	Figure 98			
Weight	SVGm-3WF-100C-690 SVGm-4WF-067C-550	SVGm-3WF-100C-480 SVGm-4WF-069C-400	SVGm-3WF-200C-690 SVGm-4WF-134C-550	SVGm-3WF-200C-480 SVGm-4WF-138C-400
	192 kg	190 kg	249 kg	245 kg
	SVGm-3WF-300C-690 SVGm-4WF-201C-550	SVGm-3WF-300C-480 SVGm-4WF-207C-400	SVGm-3WF-400C-690 SVGm-4WF-268C-550	SVGm-3WF-400C-480 SVGm-4WF-276C-400
	306 kg	300 kg	363 kg	355 kg
Enclosure	Free-standing sheet steel cabinet, for installation indoors, without removable parts.			
Noise	SVGm-3WF-100C-690 SVGm-4WF-067C-550	SVGm-3WF-100C-480 SVGm-4WF-069C-400	SVGm-3WF-200C-690 SVGm-4WF-134C-550	SVGm-3WF-200C-480 SVGm-4WF-138C-400
	< 70 dBA	< 60 dBA	< 73 dBA	< 63 dBA
	SVGm-3WF-300C-690 SVGm-4WF-201C-550	SVGm-3WF-300C-480 SVGm-4WF-207C-400	SVGm-3WF-400C-690 SVGm-4WF-268C-550	SVGm-3WF-400C-480 SVGm-4WF-276C-400
	< 76 dBA	< 66 dBA	< 79 dBA	< 69 dBA

Connections						
Current						
Type						
Spring	2.5 mm ²					
Earth ⁽¹³⁾						
Type						
Ring terminal	8 mm	10 Nm	Hex 13 mm			
Ethernet						
Type						
RJ-45						
Mains						
Static generator	Bar	Drill	Diameter of the Cable	Screw	Terminal width	
SVGm-4WF-067C-550	30x3	1xM10	35 mm ²	M10 8.8	≤ 32 mm	45 Nm
SVGm-3WF-100C-480			≥ 70 mm ²			
SVGm-4WF-069C-400			50 mm ²			
SVGm-3WF-100C-690	75 mm ²		≤ 37 mm			
SVGm-4WF-134C-550	≥ 70 mm ² (x2)					
SVGm-3WF-200C-480	90 mm ²					
SVGm-4WF-138C-400	120 mm ²					
SVGm-3WF-200C-690	150 mm ²					
SVGm-4WF-201C-550	≥ 150 mm ² (x2)					
SVGm-4WF-268C-550	150 mm ²					
SVGm-3WF-300C-480	≥ 150 mm ² (x2)					
SVGm-4WF-207C-400	150 mm ²					
SVGm-3WF-300C-690	≥ 240 mm ² (x2)					
SVGm-3WF-400C-480	240 mm ²					
SVGm-4WF-276C-400						
SVGm-3WF-400C-690						

Neutral						
Static generator	Bar	Drill	Diameter of the Cable	Screw	Terminal width	
SVGm-4WF-067C-550	50x10	2xM10	M10 8.8	≤ 32 mm		45 Nm
SVGm-4WF-069C-400						
SVGm-4WF-134C-550	≤ 37 mm					
SVGm-4WF-138C-400						
SVGm-4WF-201C-550						
SVGm-4WF-268C-550	80x10	3xM10				
SVGm-4WF-207C-400						
SVGm-4WF-276C-400	100x10					

(13) If the phase conductors exceed 32 mm², the earth conductor can be the half of the cross-section of the phase conductors.

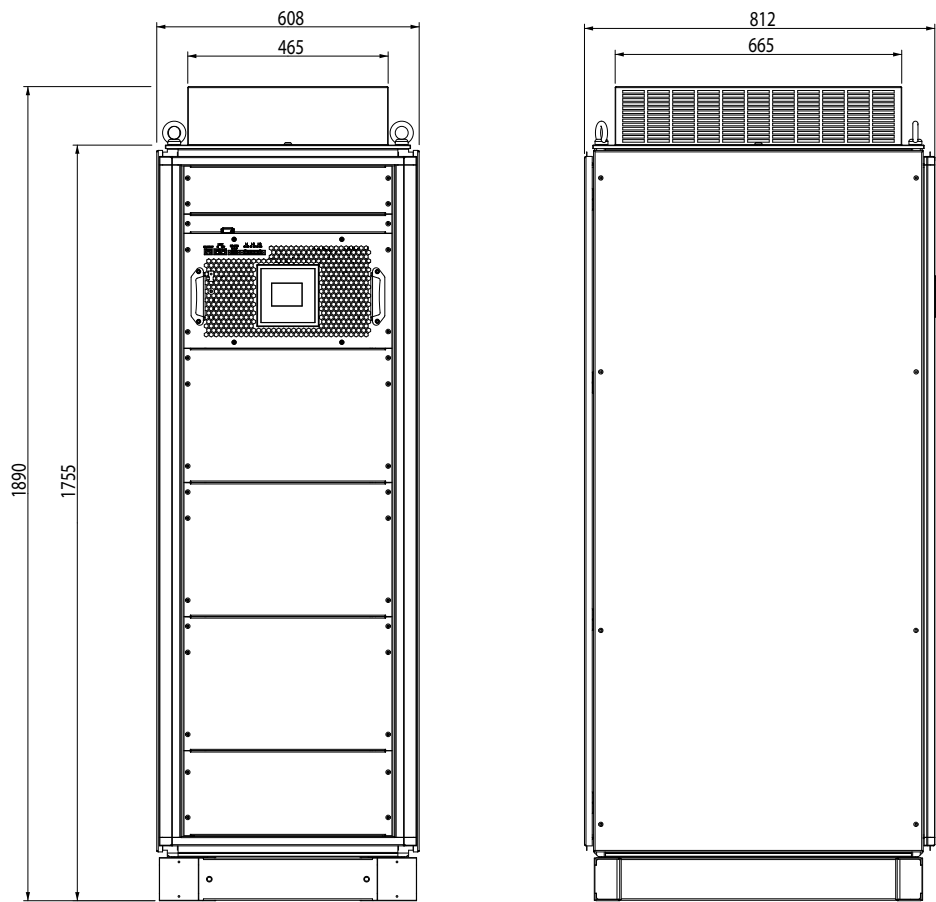


Figure 98:Dimensions Cabinet-type SVGm.

12.- TECHNICAL SERVICE

In the case of any query in relation to device operation or malfunction, please contact the **CIRCUTOR S.A.U.** Technical Support Service.

Technical Assistance Service

Vial Sant Jordi, s/n, 08232 - Viladecavalls (Barcelona)

Tel: 902 449 459 (Spain) / +34 937 452 919 (outside of Spain)

email: sat@circutor.com

13.- GUARANTEE

CIRCUTOR guarantees its products against any manufacturing defect for two years after the delivery of the units.

CIRCUTOR will repair or replace any defective factory product returned during the guarantee period.



- No returns will be accepted and no unit will be repaired or replaced if it is not accompanied by a report indicating the defect detected or the reason for the return.
- The guarantee will be void if the units has been improperly used or the storage, installation and maintenance instructions listed in this manual have not been followed. "Improper usage" is defined as any operating or storage condition contrary to the national electrical code or that surpasses the limits indicated in the technical and environmental features of this manual.
- **CIRCUTOR** accepts no liability due to the possible damage to the unit or other parts of the installation, nor will it cover any possible sanctions derived from a possible failure, improper installation or "improper usage" of the unit. Consequently, this guarantee does not apply to failures occurring in the following cases:
 - Overvoltages and/or electrical disturbances in the supply;
 - Water, if the product does not have the appropriate IP classification;
 - Poor ventilation and/or excessive temperatures;
 - Improper installation and/or lack of maintenance;
 - Buyer repairs or modifications without the manufacturer's authorisation.

14.- EU DECLARATION OF CONFORMITY

Circutor

CIRCUTOR, SA – Vial Sant Jordi, s/n
08232 Viladecavalls (Barcelona) Spain
(+34) 937 452 900 – info@circutor.com



DECLARACIÓN UE DE CONFORMIDAD

La presente declaración de conformidad se expide bajo la exclusiva responsabilidad de CIRCUTOR con dirección en Vial Sant Jordi, s/n – 08232 Viladecavalls (Barcelona) España

Producto:

Generador estático de reactiva

Serie:

SVGm

Marca:

CIRCUTOR

EL objeto de la declaración es conforme con la legislación de armonización pertinente en la UE, siempre que sea instalado, mantenido y usado en la aplicación para la que ha sido fabricado, de acuerdo con las normas de instalación aplicables y las instrucciones del fabricante

2014/35/UE: Low Voltage Directive 2014/30/UE: Electromagnetic Compatibility Directive
2011/65/UE: RoHS2 Directive

Está en conformidad con la(s) siguiente(s) norma(s) u otro(s) documento(s) normativos(s):

IEC 62477-1:2012 Ed 1.0 +AMD1:2016 CSV IEC 61439-1:2011 Ed 2.0
IEC 61000-6-2:2016 Ed 3.0 IEC 61000-6-4:2006 Ed 2.0

Año de marcado "CE":

2019



EU DECLARATION OF CONFORMITY

This declaration of conformity is issued under the sole responsibility of CIRCUTOR with registered address at Vial Sant Jordi, s/n – 08232 Viladecavalls (Barcelona) Spain

Product:

Static var generator

Series:

SVGm

Brand:

CIRCUTOR

The object of the declaration is in conformity with the relevant EU harmonisation legislation, provided that it is installed, maintained and used for the application for which it was manufactured, in accordance with the applicable installation standards and the manufacturer's instructions

2014/35/UE: Low Voltage Directive 2014/30/UE: Electromagnetic Compatibility Directive
2011/65/UE: RoHS2 Directive

It is in conformity with the following standard(s) or other regulatory document(s):

IEC 62477-1:2012 Ed 1.0 +AMD1:2016 CSV IEC 61439-1:2011 Ed 2.0
IEC 61000-6-2:2016 Ed 3.0 IEC 61000-6-4:2006 Ed 2.0

Year of CE mark:

2019



DECLARATION UE DE CONFORMITÉ

La présente déclaration de conformité est délivrée sous la responsabilité exclusive de CIRCUTOR dont l'adresse postale est Vial Sant Jordi, s/n – 08232 Viladecavalls (Barcelone) Espagne

Produit:

Générateur statique de var

Série:

SVGm

Marque:

CIRCUTOR

L'objet de la déclaration est conforme à la législation d'harmonisation pertinente dans l'UE, à condition d'avoir été installé, entretenu et utilisé dans l'application pour laquelle il a été fabriqué, conformément aux normes d'installation applicables et aux instructions du fabricant

2014/35/UE: Low Voltage Directive 2014/30/UE: Electromagnetic Compatibility Directive
2011/65/UE: RoHS2 Directive

Il est en conformité avec la(les) suivante (s) norme(s) ou autre(s) document(s) réglementaire (s):

IEC 62477-1:2012 Ed 1.0 +AMD1:2016 CSV IEC 61439-1:2011 Ed 2.0
IEC 61000-6-2:2016 Ed 3.0 IEC 61000-6-4:2006 Ed 2.0

Année de marquage « CE »:

2019



Viladecavalls (Spain), 09/04/2019
General Manager: Ferran Gil Torné



KONFORMITÄTSERKLÄRUNG UE

Vorliegende Konformitätserklärung wird unter alleiniger Verantwortung von CIRCUTOR mit der Anschrift, Vial Sant Jordi, s/n – 08232 Viladecavalls (Barcelona) Spanien, ausgestellt

Produkt:

Statischer Var-Generator

Serie:

SVGm

Marke:

CIRCUTOR

Der Gegenstand der Konformitätserklärung ist konform mit der geltenden Gesetzgebung zur Harmonisierung der EU, sofern die Installation, Wartung und Verwendung der Anwendung seinem Verwendungszweck entsprechend gemäß den geltenden Installationsstandards und der Vorgaben des Herstellers erfolgt.

2014/35/UE: Low Voltage Directive 2014/30/UE: Electromagnetic Compatibility Directive
2011/65/UE: RoHS2 Directive

Es besteht Konformität mit der/den folgender/folgenden Norm/Normen oder sonstigem/sonstiger Regelwerk/Regelwerken

IEC 62477-1:2012 Ed 1.0 +AMD1:2016 CSV IEC 61439-1:2011 Ed 2.0
IEC 61000-6-2:2016 Ed 3.0 IEC 61000-6-4:2006 Ed 2.0

Jahr der CE-Kennzeichnung:
2019



DECLARAÇÃO DA UE DE CONFORMIDADE

A presente declaração de conformidade é expedida sob a exclusiva responsabilidade da CIRCUTOR com morada em

Vial Sant Jordi, s/n – 08232 Viladecavalls (Barcelona) Espanha

Produto:

Gerador estático de var

Série:

SVGm

Marca:

CIRCUTOR

O objeto da declaração está conforme a legislação de harmonização pertinente na UE, sempre que seja instalado, mantido e utilizado na aplicação para a qual foi fabricado, de acordo com as normas de instalação aplicáveis e as instruções do fabricante.

2014/35/UE: Low Voltage Directive 2014/30/UE: Electromagnetic Compatibility Directive
2011/65/UE: RoHS2 Directive

Está em conformidade com a(s) seguinte(s) norma(s) ou outro(s) documento(s) normativo(s):

IEC 62477-1:2012 Ed 1.0 +AMD1:2016 CSV IEC 61439-1:2011 Ed 2.0
IEC 61000-6-2:2016 Ed 3.0 IEC 61000-6-4:2006 Ed 2.0

Ano de marcação "CE":
2019



DICHIARAZIONE DI CONFORMITÀ UE

La presente dichiarazione di conformità viene rilasciata sotto la responsabilità esclusiva di CIRCUTOR, con sede in

Vial Sant Jordi, s/n – 08232 Viladecavalls (Barcelona) Spagna

prodotto:

Generatore statico di var

Serie:

SVGm

MARCHIO:

CIRCUTOR

L'oggetto della dichiarazione è conforme alla pertinente normativa di armonizzazione dell'Unione Europea, a condizione che venga installato, mantenuto e utilizzato nell'ambito dell'applicazione per cui è stato prodotto, secondo le norme di installazione applicabili e le istruzioni del produttore.

2014/35/UE: Low Voltage Directive 2014/30/UE: Electromagnetic Compatibility Directive
2011/65/UE: RoHS2 Directive

È conforme alle seguenti normative o altri documenti normativi:

IEC 62477-1:2012 Ed 1.0 +AMD1:2016 CSV IEC 61439-1:2011 Ed 2.0
IEC 61000-6-2:2016 Ed 3.0 IEC 61000-6-4:2006 Ed 2.0

Anno di marcatura "CE":
2019

Viladecavalls (Spain), 09/04/2019
General Manager: Ferran Gil Torné



CIRCUTOR, SA – Vial Sant Jordi, s/n
08232 Viladecavalls (Barcelona) Spain
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Circutor



DEKLARACJA ZGODNOŚCI UE

Niniejsza deklaracja zgodności zostaje wydana na wyłączną odpowiedzialność firmy CIRCUTOR z siedzibą pod adresem: Vial Sant Jordi, s/n – 08232 Viladecavalls (Barcelona) Hiszpania

produkt:

Statyczny generator var

Seria:

SVGm

marka:

CIRCUTOR

Przedmiot deklaracji jest zgodny z odnośnymi wymaganiami prawodawstwa harmonizacyjnego w Unii Europejskiej pod warunkiem, że będzie instalowany, konserwowany i użytkowany zgodnie z przeznaczeniem, dla którego został wyprodukowany, zgodnie z mającymi zastosowanie normami dotyczącymi instalacji oraz instrukcjami producenta

2014/35/UE: Low Voltage Directive 2014/30/UE: Electromagnetic Compatibility Directive
2011/65/UE: RoHS2 Directive

Jest zgodny z następującą(y)mi normą(ami) lub innym(i) dokumentem(ami) normatywnym(i):

IEC 62477-1:2012 Ed 1.0 +AMD1:2016 CSV IEC 61439-1:2011 Ed 2.0
IEC 61000-6-2:2016 Ed 3.0 IEC 61000-6-4:2006 Ed 2.0

Rok oznakowania "CE":

2019

Viladecavalls (Spain), 09/04/2019
General Manager: Ferran Gil Torné



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Vial Sant Jordi, s/n

08232 - Viladecavalls (Barcelona)

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