



www.regulus.eu



PG 600 S

Installation and Operation Manual
PG 600 S BACKUP POWER SUPPLY

EN

PG 600 S

CONTENTS

SAFETY INFORMATION	3
TAKING CARE OF YOUR BATTERY	4
1 ESSENTIAL INFORMATION - USE, FEATURES, DESCRIPTION	5
1.1 GENERAL DESCRIPTION	5
1.2 FRONT PANEL	6
1.3 REAR PANEL	9
2 INSTALLATION	9
2.1 RECOMMENDED WIRING	9
2.2 TURNING PG 600 S ON WITH NO GRID POWER	15
2.3 TURNING PG 600 S OFF	15
3. OPERATION MODES	15
4. SETTINGS	16
5. POSSIBLE FAULTS, TROUBLESHOOTING	16
6. TECHNICAL DATA	19

SAFETY INFORMATION

The appliance shall be installed by a trained person. The Manual is intended for an informed person. The contents of this Manual may change over time.

THE APPLIANCE OPERATES WITH VOLTAGE DANGEROUS TO HUMAN LIFE. PLEASE STICK TO SAFETY INSTRUCTIONS GIVEN IN THIS GUIDE, PREVENTING THUS RISK OF ELECTRIC SHOCK.

IMPORTANT

Wrong wiring or handling may cause damage to the appliance itself or connected devices!

Prior to beginning with installation and start of the appliance, please read the Manual carefully and follow the instructions meticulously! These electrical appliances shall be earthed in compliance with the valid standards. The cross-sections of the power supply cables and their current ratings shall conform to the nominal current values on the label and to the specification of the appliance as required by a respective rule valid for low-voltage electric appliances. Prior to installation of this electric appliance please make sure all safety (circuit breakers and fuses) and switch-off elements are off. Batteries may only be handled by trained, informed and experienced persons sticking to all applicable safety measures. Before touching the battery clamps, all safety and switch-off elements at the appliance itself, batteries, as well as safety and switch-off elements at the electric device outlet shall be switched off!

Do not put any tools, instruments or other, esp. metal items on batteries!

Do not push any objects into the appliance through the ventilation or other openings!

Use a damp cloth to clean the casing. Take care not to let moisture or water into the appliance through the ventilation or other openings!

The appliance shall be installed in a sufficiently spacious and ventilated room enabling good access. It shall never be exposed to weather!

Whenever handling a battery and PG 600 S, the PG 600 S shall be turned off and disconnected from the power supply.

PG 600 S is not designed for use with an automotive battery.

The backup time depends on the power drawn by the device(s) connected to the PG 600 S. The higher is the connected load, the shorter is the backup time.

PLEASE RESPECT THE FOLLOWING INSTRUCTIONS

The appliance may be installed by authorized staff only!

When switching off the electric appliance fed by PG 600 S do not forget to switch off the PG 600 S itself as well. Otherwise the its inverter continues to supply electricity from its battery and does not switch off until the battery voltage drops below the set min. value.

Even if the appliance is turned off, the battery voltage is still present at the clamps.

No terminal of the unit's outlet socket shall get connected to any lead of mains or any other electric wiring. The unit is designed for a closed circuit. If the unit's outlet got connected with the mains, there would be a danger of destroying the connected appliances, the unit itself, and even causing harm to health and property. The only lead that may be connected outside TN-S network is the protective yellow-green lead.

When testing the backup function, never unplug PG 600 S from el. socket. Doing so would interrupt the PE line. De-energizing shall be done by a circuit breaker or a fuse.

PG 600 S shall always be used with the battery connected.

Do not leave the appliance turned off for more than 6 months unless its batteries had been fully charged. The appliance should be completely cleaned by a serviceperson at least twice a year. Cooling is hindered by dust inside and the appliance might suffer damage from overheating.

Check annually that the battery terminals are properly tightened.

TAKING CARE OF YOUR BATTERY

The appliance is equipped with maintenance-free lead acid batteries. The following rules shall be respected when using them:

Avoid any mechanical stress, especially by a hit.

Avoid any damage to the battery casing and do not attempt to open it. The acid inside is toxic, dangerous to skin and eyes! In no case shall the battery be exposed to high temperatures or flames. There is a risk of explosion!

When the batteries are to be replaced and new ones installed, their number, model, wiring manner and capacity set by the manufacturer shall be maintained. Only an authorized serviceperson may do that. In a room where the battery is placed the temperature shall be kept at $20\text{ °C} \pm 5\text{ °C}$. At temperatures above 20 °C the battery lifetime deteriorates, at temperatures below 20 °C the battery capacity deteriorates.

SAFETY INSTRUCTIONS REGARDING THE BATTERY

Never wire and charge very cold batteries (exposed to freezing temperatures).

A battery represents a serious threat to human health and the environment. It shall be disposed of in compliance with a valid legislation.

Be extremely careful when using metal items and tools near the battery.

When working with the appliance, refrain from smoking and using open flame! Do not use water to extinguish eventual fire, danger of explosion!

Gases develop in all lead acid batteries during charging. In traditional unsealed batteries these gases escape into the air. In batteries with pressure valves most of these gases recombine inside the battery and just a very small portion escapes into the air.

Always ensure good ventilation for battery cabinets or rooms (at least 1 l of air per hour). Hydrogen gas may explode and cause serious injuries and fire.

After a long period of operation, the capacity of lead acid batteries decreases. This is quite normal. For their proper operation in your system you should test their backup function at least once a year in order to find out whether the backup period is sufficient.

Should the battery become very hot, make sounds or inflate, leave the room immediately!

ACID BURN INJURY



Should the acid get in contact with skin, take off immediately all contaminated clothing, and wash immediately with plenty of water, use sterile gauze bandage and special medical aids.

In case of contact of acid with eyes, rinse immediately with plenty of water and call emergency and ambulance. In all emergency, life-threatening situations contact a doctor asap.

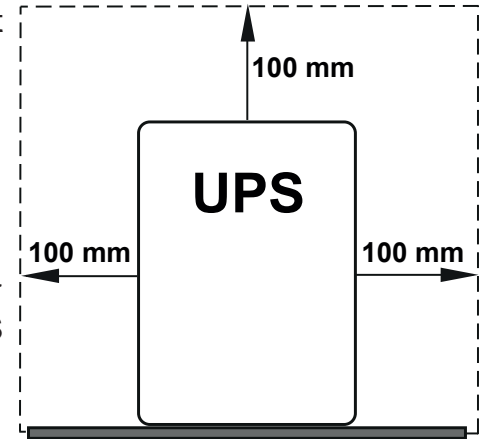
HOW TO ENSURE LONG LIFE FOR YOUR BATTERY

Never store a discharged battery. Storing a discharged battery will cause its definitive destruction. Always charge it prior to storing and disconnect all leads from the battery poles. The battery may be stored for a longer time in this manner only. At the same time, it is recommended to charge it every 3 months. Older batteries shall be checked more frequently.

Should the UPS be disconnected from the mains for a longer time, it is unconditionally necessary to disconnect also the battery from the UPS.

1 ESSENTIAL INFORMATION - USE, FEATURES, DESCRIPTION

- PG 600 line UPS is intended preferably for circulation pumps in heating systems.
- The PG 600 S load shall not exceed the value shown on the label placed on its rear panel.
- Use rechargeable lead acid batteries only, supplied by Regulus, designed for backup power supplies.
- The appliance is designed for indoor use. Do not expose it to adverse weather (direct sunshine, rain) nor to increased humidity. Protect from dust.
- The ON/OFF button does not disconnect electrically the internal circuitry. In order to de-energize the PG 600 S, it is necessary to disconnect the power supply by pulling out the power cord and disconnecting the battery.
- Do not put anything on PG 600 S.
- Do not expose PG 600 S to high temperatures.
- Do not open the cover of PG 600 S when any of its internal circuits are energized; this may apply even if the power supply at the input terminal is disconnected. In no case any repair of internal parts of PG 600 may be performed by a user.
- The front panel is designed for manual control; do not use sharp or pointed items.
- PG 600 S is not designed for operation in explosive environment.
- Both PG 600 S and the battery shall be placed in a sufficiently ventilated space. Ventilation openings shall not be covered and air intake shall not be obstructed. The minimum distance of PG 600 S is shown in the pic.
- When PG 600 S is in operation, its fan is running. Its switching is controlled (by its inner temperature).



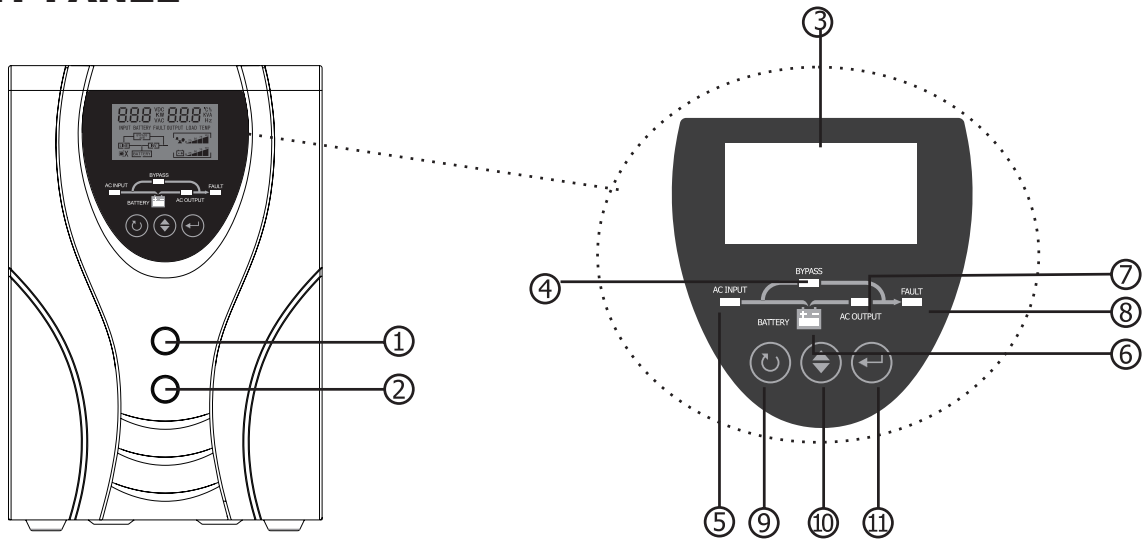
1.1 GENERAL DESCRIPTION




When the unit is power-supplied from the grid, the electricity runs via its internal bypass directly to its outlet socket. At the same time, the battery is being charged. In case of a power failure, the inverter turns on and the load is fed from the integrated batteries. During charging, the temperature of the unit may rise to circa 45 °C (normal operation state).

FEATURES

- Automatic switching from line to battery and vice versa
- High efficiency inverter
- Smart 3-stage charger control with overcharge protection
- Battery overload and deep discharge protection
- Backlit LCD display and sound signals
- Inner temperature controlled fan
- Smooth output sine-wave
- Adjustable charging current
- Protection against battery terminal reversal

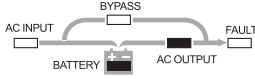
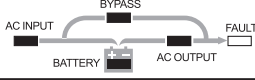




1.2 FRONT PANEL






- 1. **ON** push button
- 2. **OFF** push button
- 3. display
- 4. by-pass indicator
- 5. input AC voltage indicator
- 6. battery indicator
- 7. output AC voltage indicator
- 8. error indicator
- 9. back 
- 10. select 
- 11. confirm 

Visual indicators and sound alarms

The front panel is fitted with 5 LED indicators.

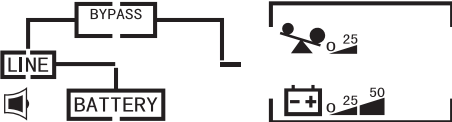
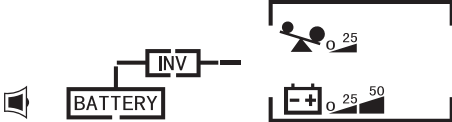
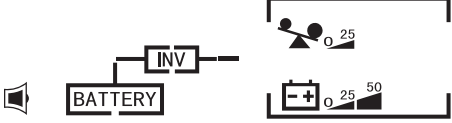



Indicator	Meaning
Battery operation	
Power grid operation	
Charging mode	 All LED indicators are off.
Discharged battery warning	The audio alarm sounds every 2 s and the red LED flashes. At the same time, the symbol  .
Overload warning	The audio alarm sounds every 2 s and the red LED flashes. At the same time, the symbol  .
Adjustment warning	The audio alarm sounds every 2 s and the red LED flashes. At the same time, the symbol  .
Fault	Zvukový alarm zní nepřetržitě a červená kontrolka svítí.

The front panel of the horizontal model is fitted with 3 LED indicators.

	The LED is lit all the time when the grid power supply is on, except for the charging mode.
	The battery LED is permanently on, except for the charging mode.
	Whenever a warning is issued, the fault LED will start flashing. In the fault mode the LED is lit continuously.

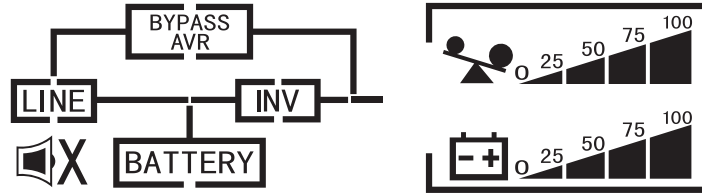
Display info

The information to be shown can be retrieved by repeated pressing the Select key. The displayed information is presented in the table below.

Optional info	Display
Input	<p>Input voltage = 230 V, input frequency = 50 Hz</p> <p>230 VAC 50.0 Hz</p> <p>INPUT</p> 
Battery	<p>Battery voltage = 24,8 V, battery current = 1 A</p> <p>24.8 VDC 1 A</p> <p>BATTERY</p> 
Output	<p>Output voltage = 230 V, output frequency = 50 Hz</p> <p>230 VAC 50.0 Hz</p> <p>OUTPUT</p> 
Load	<p>Power output = 879 W, percentage = 88 %</p> <p>879 W 88 %</p> <p>LOAD</p> 
Load	<p>Power output = 312 W, apparent power output = 445 VA</p> <p>312 W 445 VA</p> <p>LOAD</p> 
Temperature	<p>Temperature = 30 °C</p> <p>30 °C</p> <p>TEMP</p> 

LCD Display

INPUT BATTERY FAULT OUTPUT LOAD TEMP



Display	Function			
Battery info in AC mode: Charging condition is shown.				
Condition	Battery voltage	Display		
Constant current / constant voltage mode:	0%-25%	All bars gradually blink.		
	25%-50%	The bottom bar is lit and the remaining three gradually blink.		
	25%-50%	The bottom two bars are lit and the remaining two gradually blink.		
	75%-100%	The bottom three bars are lit and the top one blinks.		
Float mode: Batteries are fully charged.		All bars are lit.		
Battery mode: Info will contain data on the battery capacity.				
Battery voltage		Display		
0%-25%				
25%-50%				
25%-50%				
75%-100%				
Load info:				
	Flashing load symbol means overload.			
	Load level shown in stages: 0%-25%, 25%-50%, 50%-75% and 75%-100%			
	0%~25%	25%~50%	50%~75%	75%~100%
Operation mode info:	see Operation mode description			
Audio alarm info: Short pressing the ON button will turn it on/off.				
	Muted			
	Normal			
Optional info:	see Display info			

1.3 REAR PANEL

The rear panel is fitted with:

1. fax/phone IN, OUT
2. fan
3. PC terminal to connect PG 600 S to power grid (INPUT)
4. two 230V sockets (OUTPUT)
5. cables to connect battery (+ -)
6. removable fuse (F10A/230V)



2 INSTALLATION

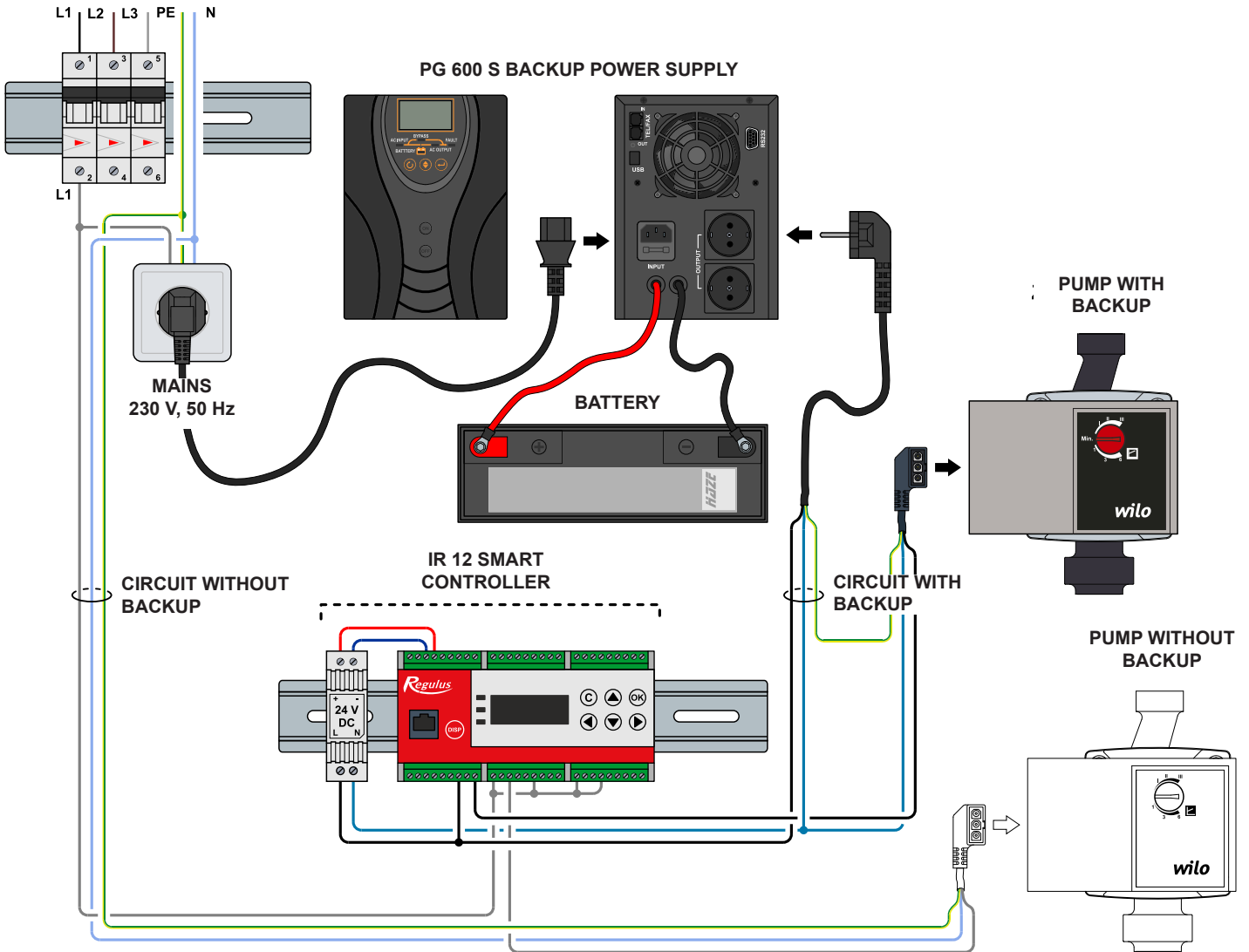
1. Read the entire Installation and Operation Manual incl. Safety information and Taking care of your battery.
2. Make sure the power grid voltage corresponds to the voltage PG 600 S is designed for.
3. Connect the battery using either M6 screws (for 44 and 100 Ah batteries) or M5 screws (for 18 Ah battery). MIND THE POLARITY, + red / - blue or black. Max. torque is shown on the batteries (mostly 5-7 Nm). Fit the battery terminals with protective covers. Avoid terminal reversal!
4. Plug the power supply cord of PG 600 S into a wall socket. WARNING – PG 600 S is now switched on and from the moment on the battery is being charged. At the same time, the internal cooling fan also starts running.
5. Connect your pump or another load by plugging its cable into the socket of PG 600 S. It is inevitable to stick to a TN-S wiring system.
6. Press and hold ON push button for 2 sec. to turn on PG 600 S. An audio signal will sound. The green LED will stay lit, indicating that PG 600 S is running (standard mode, ready for backup).
7. Now you can turn on a pump or another load and test power grid operation without the inverter. The inverter will turn on automatically at power supply failure.

2.1 RECOMMENDED WIRING

- It must be ensured that the PE lead cannot be disconnected (e.g. by pulling the coiled power supply cable from PG 600 S)!
- Unconditional separation of the circuit fed from PG 600 S from the mains shall be respected. This concerns not only the live but also the neutral conductors. Only the PE lead remains uninterrupted.
- In specific cases a contactor with two NO + two NC contacts configuration can be used in order to separate the PG 600 S circuit from the mains. However it is recommended to avoid this solution.

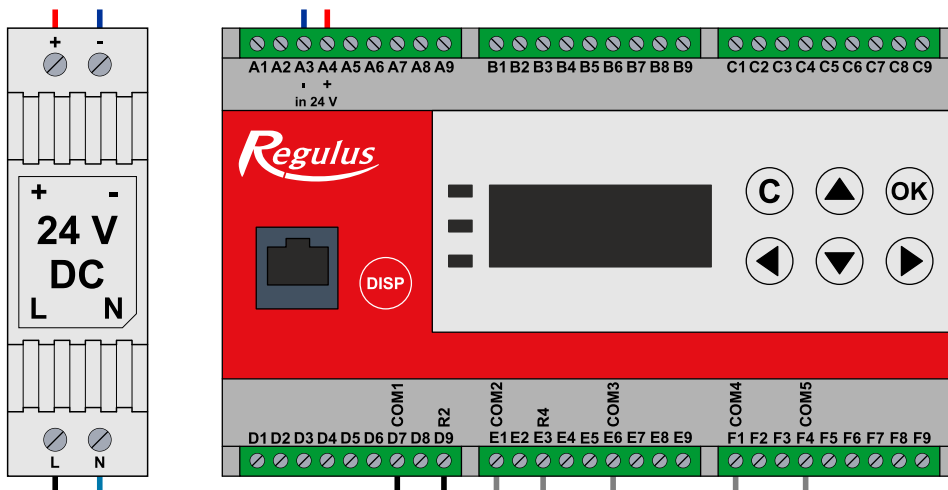
IR12 CTC controller

Backup of circulation pump of a heat pump.



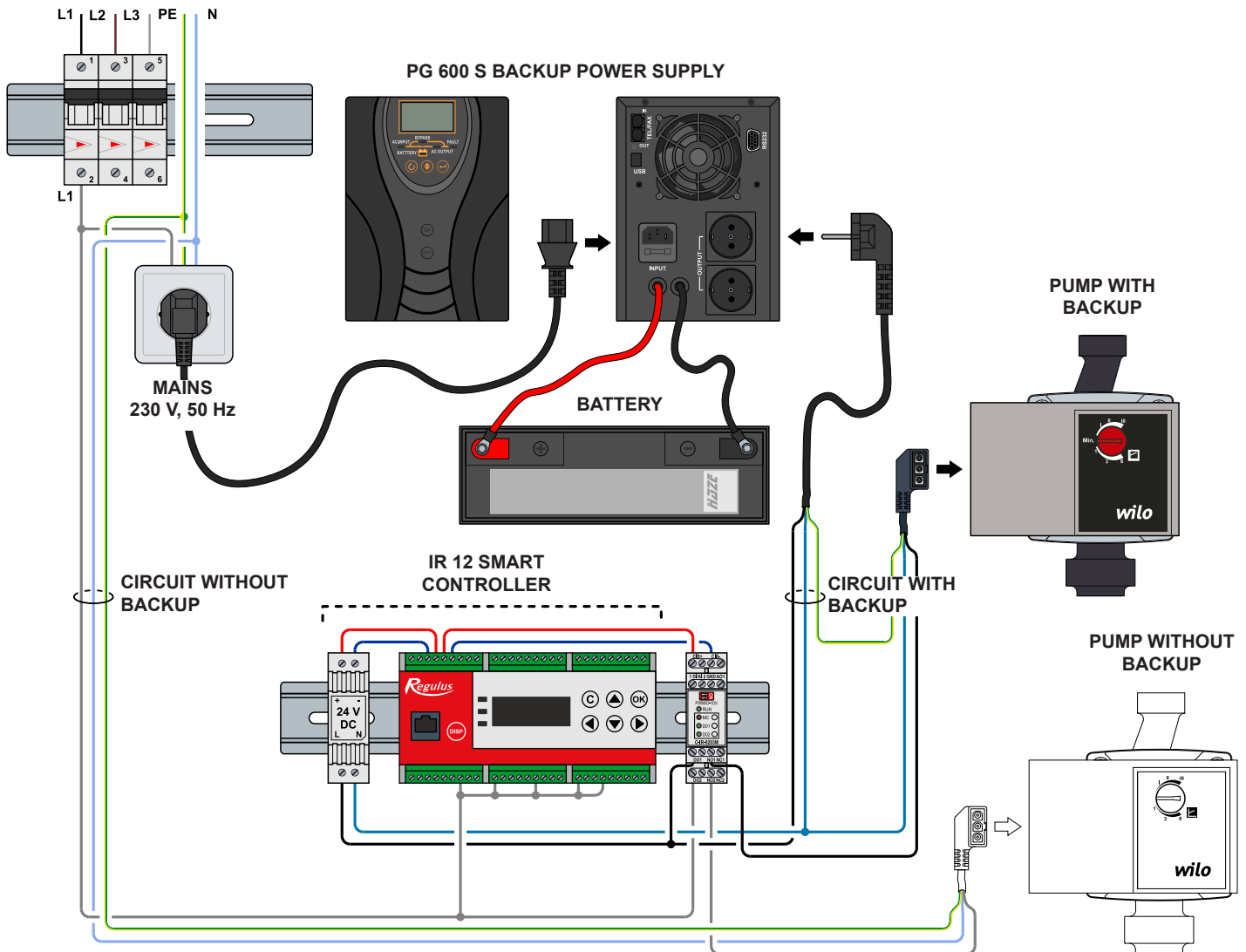
Do respect the separation between the circuits with and without backup. Not only for the live wire but also for the neutral one!

DETAILED PIC. SHOWING TERMINAL BOARDS MARKING AND WIRING



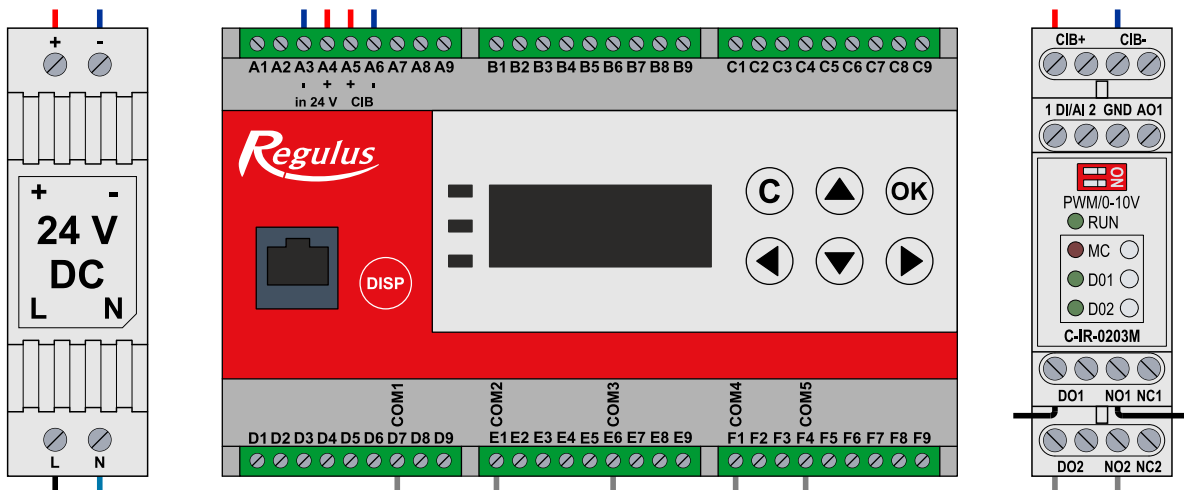
IR12 CTC controller + fireplace module

Backup of circulation pump of a fireplace.



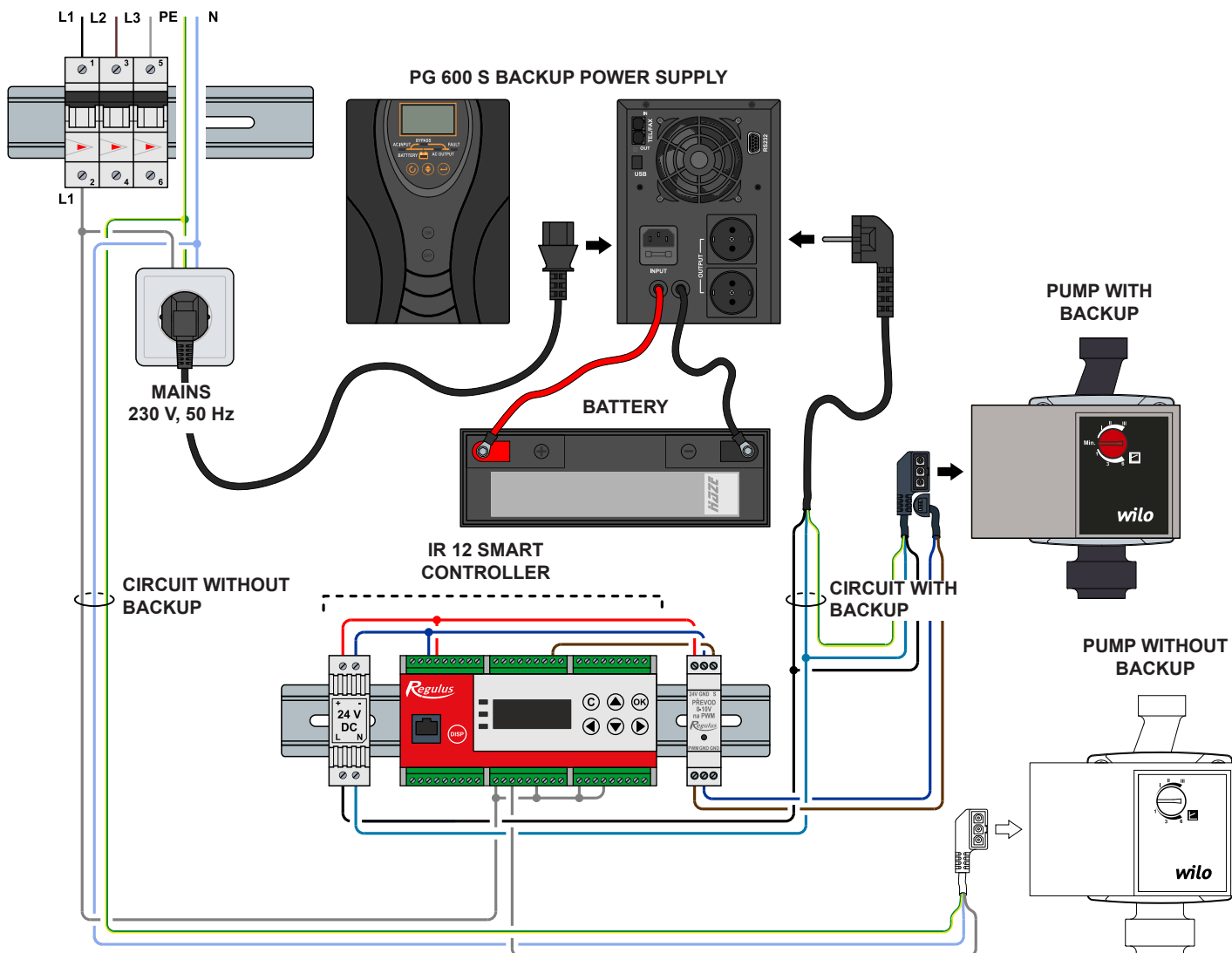
Do respect the separation between the circuits with and without backup. Not only for the live wire but also for the neutral one!

DETAILED PIC. SHOWING TERMINAL BOARDS MARKING AND WIRING



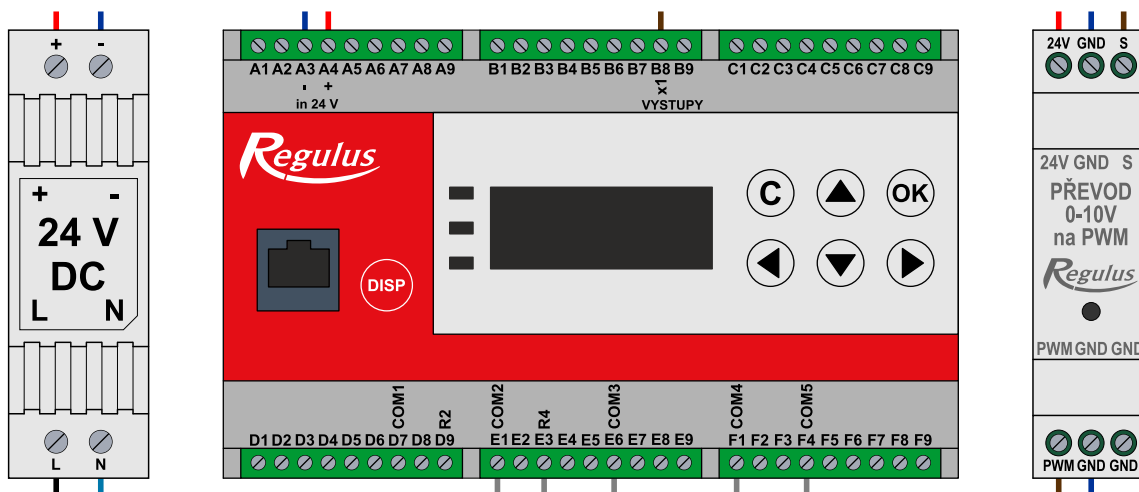
IR12 CTC controller + PWM module

Backup of a PWM-controlled solar pump.



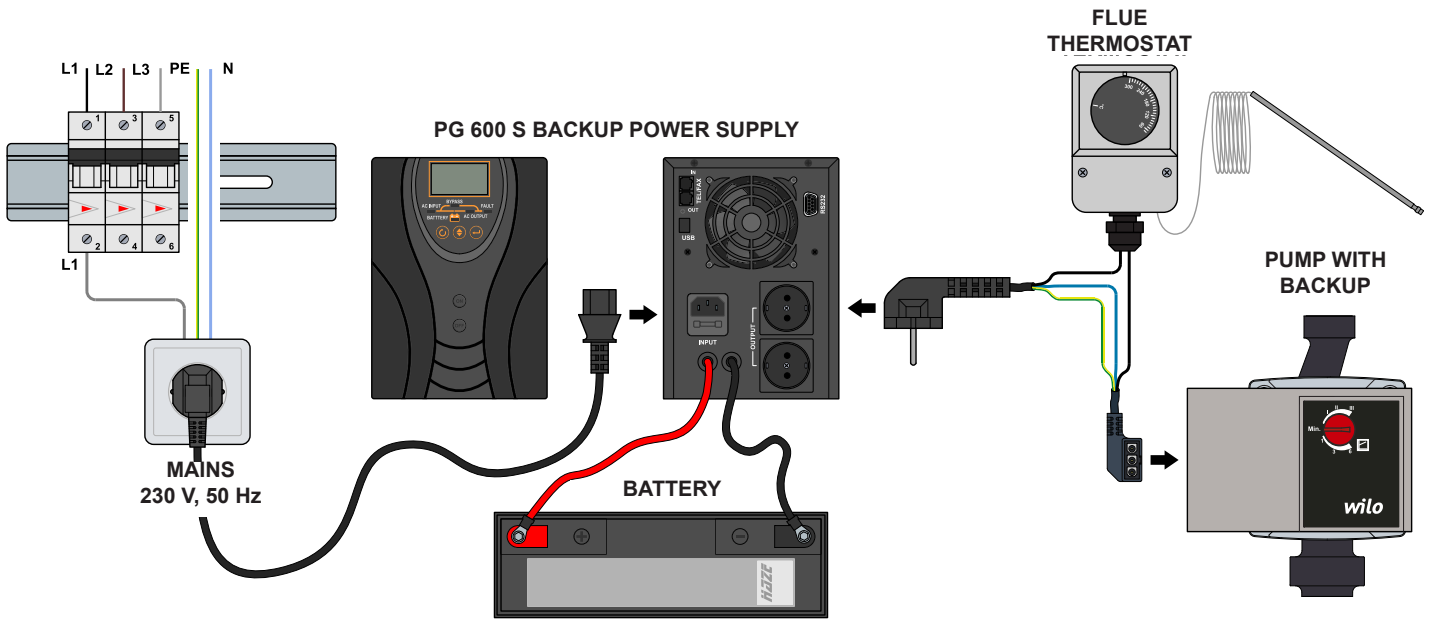
Do respect the separation between the circuits with and without backup. Not only for the live wire but also for the neutral one!

DETAILED PIC. SHOWING TERMINAL BOARDS MARKING AND WIRING



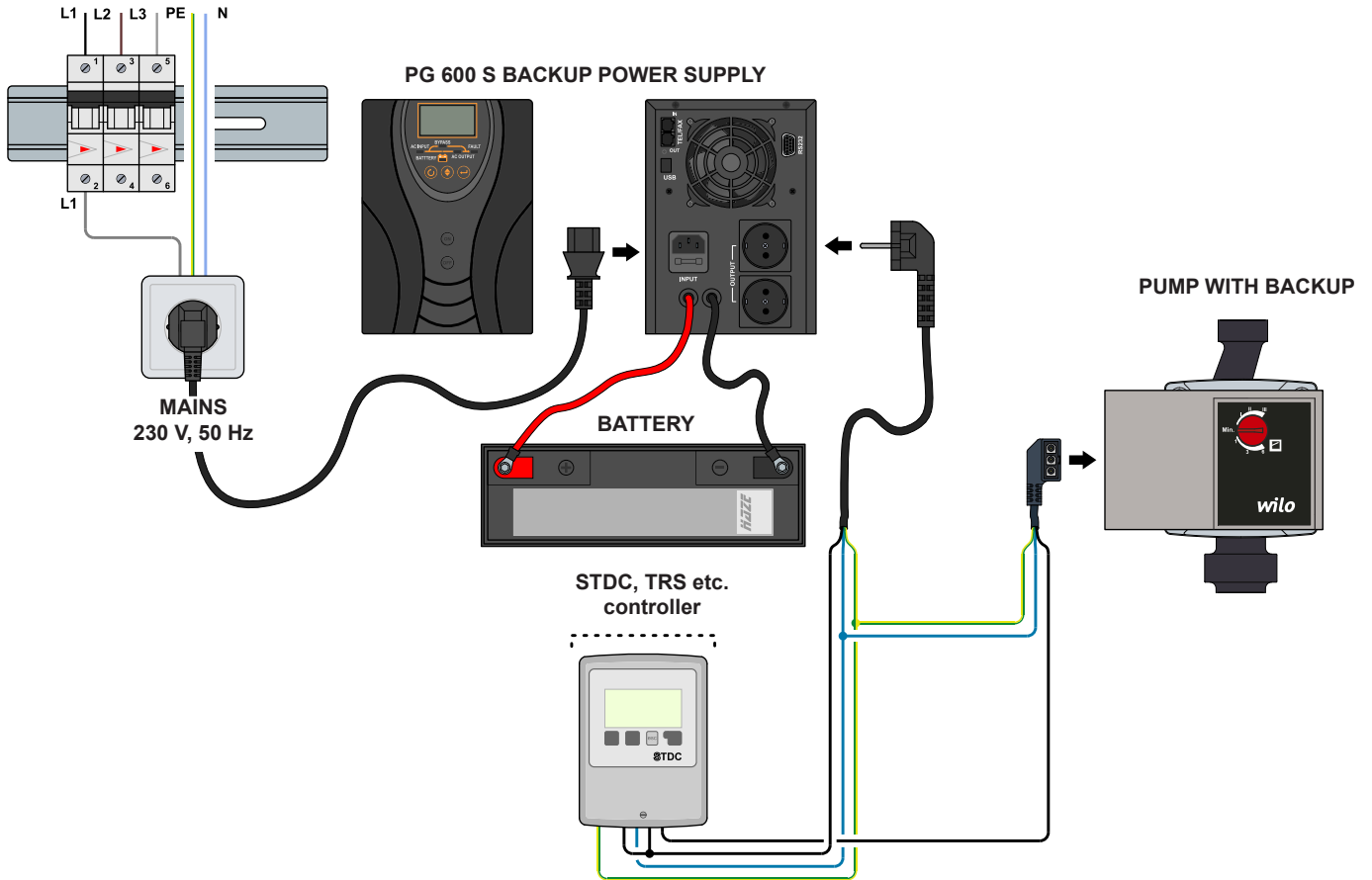
Fireplace

Backup of a fireplace circulation pump with flue thermostat.



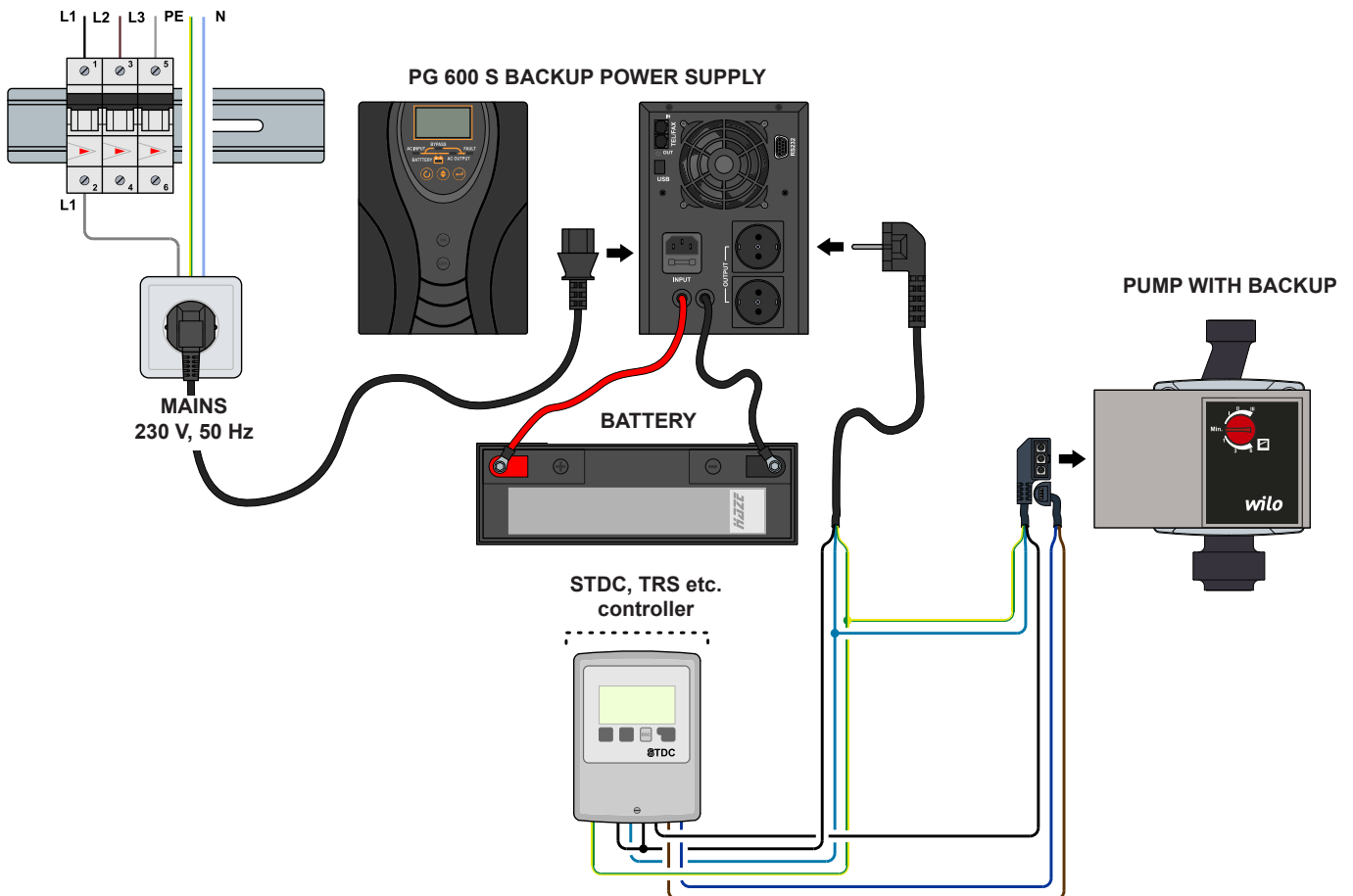
STDC, TRS etc. controller

Pump backup



STDC, TRS etc. controller

Backup of a PWM-controlled pump.



2.2 TURNING PG 600 S ON WITH NO GRID POWER

Press and hold ON push button for 2 sec. to turn on PG 600 S. The display indicates operation from a battery (the battery shall be connected). As soon as grid power supply is restored, the display will show the input voltage and PG 600 S will work normally, charging the battery.

2.3 TURNING PG 600 S OFF

PG 600 S can be turned off by pressing and holding the OFF push button for at least 3 sec. The display will go off. **WARNING!** The battery is not being charged. It will not backup anything in case of a power supply failure, however as soon as the power supply is restored, it will switch on. In order to prevent the UPS from automatic switching on, it shall be disconnected from the mains. Pay attention to the fact that the earth protection of devices connected to PG 600 S will be interrupted.

Warning

- For safety reasons, it is recommended not to modify the cables supplied.
- Make sure the power supply to PG 600 S is safely earthed.
- A mains socket or circuit breaker shall be located close to the appliance and shall be easily accessible.
- Never disconnect the 230 V power supply to PG 600 S when it is running - the earth protection of both PG 600 S and the connected load would be interrupted.
- Check that when all the loads are connected, the total earth leakage current does not exceed 2.7 mA (EN 62040-1-1).
- When PG 600 S gets plugged to power supply, the battery starts being charged. At the same time, the internal cooling fan starts up. After the battery is fully charged, the fan will remain off unless the inner temperature of PG 600 S starts rising.
- In case of a power supply breakdown, the fan turns on, cooling the inverter if needed.
- When power supply is restored, the timer turns on and the cycle is repeated.

3 OPERATION MODES

Power grid operation

The input voltage is shown on the display, the battery is being charged or is already charged.

Battery operation

No input voltage is shown on the display. PG 600 S shall supply backup power until the grid power supply is restored or the battery discharged. When the battery voltage becomes too low, intermittent audio alarm will sound. From that moment, PG 600 S may turn off any time depending on the load. As soon as grid power supply is restored, charging the battery will require at least 12 hours (preferably 24).

Alarm

When overloaded, PG 600 S disconnects the output and sounds an uninterrupted audio signal. It will not function as a power backup until the load gets disconnected and PG 600 S turned off and on again.

Operation mode description

Operation mode	Description	Display
Fault	If a fault occurs, the UPS will go to a Fault mode. The fault code will be shown on the display.	07
Charging	In this mode, the battery will be charged from the grid. Should the input power supply show abnormal values, the device will either turn off or go to the Fault mode.	FAULT
Power grid	The load is power supplied directly from the grid. At the same time, the battery is also being charged from the mains. If the input voltage is outside the range (200-240V), the automatic voltage regulator will intervene. Should the input power supply show abnormal values, the device will go to the Battery mode.	
Battery	The UPS will draw el. energy from the battery and supply it to the load.	

4 SETTINGS

The settings mode can be entered by pressing and holding the Confirm key for 2 sec. The settings programs can be selected by pressing the Confirm key. A parameter can be changed by pressing the Select key. By pressing and holding the Back key for 2 sec. you will leave the settings mode. All changes will be applied after the device restart.



Data settings for programs

Program	Description	
03	Output voltage	220 V 03 220 v
		230 V (default) 03 230 v
04	Output frequency	50 Hz (default) 04 50 Hz
		60 Hz 04 60 Hz
07	Auto restart during overload	Restart disabled (default) 07 Lfd
13	Constant charging current	5-30 A (default 5 A) 13 10 A
17	Absorption charging voltage	13,8-14,5 V (default 14,1 V) 17 14.1 v
18	Float voltage	13,5-13,7 V (default 13,6 V) 18 13.6 v
19	Switch-off voltage	10,0-12,0 V (default value is 10,5 V) 19 10.5 v
23	Backlight	OFF (default) 23 LOf
		ON 23 LOn
24	Sound alarm	ON (default) 24 bOn
		OFF 24 bOf
29	Charging from the mains	Charging from the mains enabled (default) 29 UCE
		Charging from the mains disabled 29 UCd
30	UPS function	ON (default) 30 On
		OFF 30 OFF

Some parameters of the UPS can be adjusted. However, it is not necessary to modify the settings. Only for the variant with a 100 Ah battery it is recommended to increase the charging current to 10 A. For lower capacities, keep the default value of 5 A.

If you wish to reset all parameters, press and hold the Select key and you will enter the reset dialog. Using the Select key, change the value "SEt" to the value "dEF". Then hold the Back key for 2 sec., you leave the settings and all parameters will be reset to default. Then restart the UPS so that the changes will be applied.

If the float voltage is higher than absorption voltage, alarm will be launched. Audio alarm will sound and the red LED and BATTERY will flash.

5 POSSIBLE FAULTS, TROUBLESHOOTING

Error code	Fault	POSSIBLE FAULTS, TROUBLESHOOTING
02	Too high temperature	02
03	Too high battery voltage	03
04	Too low battery voltage	04
05	Short-circuited output	05
06	Too high output voltage from the UPS	06
07	Overload	07
11	Main relay faulty	11
41	Too low input voltage	41
42	Too high input voltage	42
43	Too low input frequency	43
44	Too high input frequency	44
45	Automatic voltage regulator faulty	45
51	Too high current	51
58	Too low output voltage from the UPS	58

Overload	>110-125% load >125-150% load >150% load	error in 60 s error in 3 s error in 500 ms
----------	--	--

TROUBLESHOOTING

If the UPS went to Fault mode, turn off the power supply. Find the fault and its solution in the table below. If you do not understand the fault or cannot remove it, switch off the UPS and contact a service provider.

Visual/audio indication	Display	Explanation/possible cause	Solution
The audio alarm beeps and the red LED is off	Battery symbol flashes	Battery voltage too low	Charge the UPS for at least 8 hours.
	Load symbol flashes	Overload.	Reduce load.
The audio alarm sounds continuously and the red LED is lit	Fault code 02	Too high temperature of the UPS.	Ensure sufficient cooling.
	Fault code 03	Too high battery voltage.	Check battery technical data.
	Fault code 04	Too low battery voltage.	Check battery technical data.
	Fault code 05	Short-circuited output.	Disconnect the load and restart.
	Fault code 06	UPS output voltage too high.	Hand over to a service provider.
	Fault code 07	Overload	Reduce the load.
	Fault code 11	Faulty main relay.	Restart the UPS. If the fault persists, hand the device to a service provider.
	Fault code 41	Too low input voltage.	Check input values.
	Fault code 42	Too high output voltage.	
	Fault code 43	Too low input frequency.	
	Fault code 44	Too high input frequency.	
	Fault code 45	Automatic voltage regulator faulty.	Restart the UPS. If the fault persists, hand the device to a service provider.
	Fault code 51	Short-circuited output.	Check proper wiring of the device, remove abnormal load.
Fault code 58	Too low output voltage.	Reduce the load.	

6 TECHNICAL DATA

Codes	
17135	<i>PG 600 S Backup Power Supply with 18 Ah external battery</i>
17136	<i>PG 600 S Backup Power Supply with 44 Ah external battery</i>
17137	<i>PG 600 S Backup Power Supply with 100 Ah external battery</i>

Technical data				
Backup Power Supply		PG 600 S-18	PG 600 S-44	PG 600 S-100
Input	nominal voltage	230 V 50 Hz		
	voltage range	140 ~ 280 V +/- 5 %, 50 Hz +/- 5 Hz		
Output	max. inverter output	600 W		
	nominal voltage	230 V		
	voltage range (backup mode)	230 V (± 5%)		
	frequency	50 Hz		
	frequency tolerance (backup mode)	± 0,5 Hz		
Others	output waveform (backup mode)	smooth sine wave		
	dimensions (d x w x h)	420 x 280 x 225 mm		
	weight	16,4 kg	24,4 kg	39,4 kg
	ambient working temperature	0 - 40 °C		
	ambient relative humidity	0 - 90 % non-condensing		
	noise level	<= 60 dB		

Battery			
Type		lead acid battery	
Technical data	nominal voltage	12 V	
	number	1	
	capacity	18 Ah / 12 V	44 Ah / 12 V

Backup time			
output load power consump (230 V)	20 W	65 W	120 W
backup period	3 h 11 min	3 h 35 min	4 h 37 min
output load power consump (230 V)	45 W	100 W	250 W
backup period	2 h 2 min	2 h 26 min	2 h 31 min

REGULUS spol. s r.o.

E-mail: sales@regulus.eu

Web: www.regulus.eu

