Regulus

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PG 500

Installation and Operation Manual

PG 500 Backup Power Supply

EN

PG 500

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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 machines!
Prior to beginning with installation and start of the appliance, please read the Manual carefully and follow the instruction meticulously!
These electrical appliances shall be grounded in compliance with the valid standards. The cross-sections of the power supply cables and their current ratings shall conform to the nominal 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 circuit breakers and fuses 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 and their outlets shall be switched off!
Do not put any tools, instruments or other, esp. metal items on batteries!
Avoid touching the terminal block or battery clamps with bare hands or conductive items held in hands!
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!

PLEASE RESPECT THE FOLLOWING INSTRUCTIONS

The appliance may be installed by authorized staff only!
When switching off the electric appliance fed by PG 500 do not forget to switch off the PG 500 itself as well. Otherwise the PG 500's inverter continues to supply electricity from its battery and does not switch off until the battery voltage drops below the set min. value.
Do not leave the appliance turned off for more than 6 months unless its batteries had been fully charged (charging shall continue for at least 2 hours after the floating voltage had been reached).
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.

TAKING CARE OF YOUR BATTERY

The appliance is equipped with maintenance-free lead acid battery. The following rules shall be respected when using it:
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!
Do not short-circuit the battery cables, it is highly risky, causing damage to the battery!
In no case shall the battery be exposed to high temperatures or flames. There is a risk of explosion!
When the battery is to be replaced and a new one installed, its 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 °C ± 5 °C. At temperatures above 20 °C the battery lifetime deteriorates, at temperatures below 20 °C the battery capacity deteriorates.

SAFETY INSTRUCTIONS REGARDING THE BATTERY

A battery represents a serious threat to human health and the environment. It shall be disposed of in compliance with a valid legislation. The appliance shall be stored in a dry, ventilated room, protected from moisture and effects of chemicals.
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.

Hydrogen gas may explode and cause serious injuries and fire.

Always ensure good ventilation for battery cabinets or rooms (at least 1 l of air per hour)**.**

ACID BURN INJURY

CALL A DOCTOR OR AMBULANCE IMMEDIATELY

This battery is sealed, valve-controlled, with acid in a gel form or soaked in microscopic-porous vitreous substance in a sealed case.
If a battery case suffers damage, the acid may leak out. In such a case internal short circuit may occur or a person may get splashed with sulphur acid!
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.

KEEP IN MIND THAT EVEN IF THE APPLIANCE IS TURNED OFF, THE BATTERY VOLTAGE IS STILL PRESENT IN THE WIRING AND AT THE CLAMPS.

HOW TO ENSURE LONG LIFE FOR YOUR BATTERY:

Always store the battery fully charged. When it is not connected to an operational charger, always disconnect also the battery poles. Even a small discharge current for a longer time will cause irreversible damage to the battery.

Never store a discharged battery. 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 recommended 3 months. Older batteries shall be checked more frequently.

DANGER **Battery poles shall never get connected to each other. That means a short circuit that can cause a battery explosion with subsequent fire.**

1 ESSENTIAL INFORMATION - USE, FEATURES, DESCRIPTION

- PG 500 line UPS is intended preferably for circulation pumps in heating systems.
- The PG 500 load shall not exceed the value shown on the label placed on its rear panel.
- In order to avoid a risk of injury, use rechargeable lead acid batteries only, preferably models designed for UPS's.
- The appliance is designed for indoor use. Do not expose it to rain, snow or any other moisture.
- Never wire and charge very cold batteries (exposed to freezing temperatures).
- In- and outgoing cables shall comply with the PG 500 output.
- Be extremely careful when using metal items and tools near the battery. Short-circuiting might cause even a battery explosion.
- The ON/OFF button does not disconnect electrically the internal circuitry. In order to de-energize the PG 500, it is necessary to disconnect the power supply at the respective terminals - by disconnecting the battery and pulling out the power cord.
- Do not open the cover of PG 500 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 on internal parts of PG 500 may be performed by a user.
- The front panel is designed for manual control; do not use sharp or pointed items..
- PG 500 is not designed for outdoor operation, nor for operation in explosive environment.
- PG 500 shall be placed in a sufficiently ventilated space. Ventilation openings shall not be covered and air intake shall not be obstructed.
- When PG 500 is in operation, its fan is running. Its switching is controlled (see Installation description, switching on and off).

1.1 GENERAL DESCRIPTION

When PG 500 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 battery.
A battery connects to PG 500 using cables fitted with cable lugs.
Max. battery capacity for UPS PG 500 is 100 Ah.
During charging, the temperature of PG 500 may rise to circa 45 °C (normal operation state).

WARNING! The battery shall be connected for standard operation, otherwise the appliance cannot be turned on.
WARNING! The battery shall be connected to the terminals marked with the same polarity (+ red / - blue or black). The poles between a battery and PG 500 must not get swapped, there is a risk of damage to PG 500.

NOTE! MORE APPLIANCES MAY BE CONNECTED BUT ONLY WITH RESPECT TO THE POWER OUTPUT OF THE PUMP AND PG 500.
OF COURSE, WITH A HIGHER LOAD CONNECTED, THE BACKUP TIME GETS SHORTER.
The appliance connects to the power supply with a standard power cord with wall plug. The load is power supplied via the 230 V socket.

WARNING! WHEN TESTING A PUMP BACKUP, NEVER UNPLUG THE PG 500 FROM ELECTRICAL SOCKET. DOING SO WOULD INTERRUPT THE PE LINE. DE-ENERGIZING SHALL BE DONE BY A CIRCUIT BREAKER OR A FUSE. MAKE SURE THE PUMP IS CONNECTED IN TN-S SYSTEM, i.e. three-wire system (L, N and PE)**.**

When running from the battery (inverter mode), yellow LED is lit. If the battery voltage falls to a low level, an acoustic alarm sounds prior to disconnecting PG 500.

WARNING – Whenever handling a battery and PG 500, the PG 500 shall be turned off and disconnected from the power supply.

FEATURES

Fast automatic line-to-battery switching
Selectable input voltage ranges
High efficient DC-to-AC conversion (12 V to 230 V)
Flexible placement - lying flat or standing
Built-in enhanced charger
Intelligent 2-stage charger control for efficient charging and preventing overcharge
Overload protection
Auto-restart while AC recovery
Multi-function LED indications and buzzer alarms

BATTERY CONNECTION

The battery terminal on PG 500 is fitted with M6 sized PLUS and MINUS contacts. A battery is to be wired using a pair of cables with lugs at the PG 500 end, and cable lugs or other terminals at the battery end (depends on the battery model). Since a battery features extra low tension (12 V), it is important that its connection to the PG 500 is as good as possible. This way contact resistance will be avoided that would compromise both the backup and battery charge time. For longer leads, a larger cross section shall be selected for the cables in order to prevent higher voltage drops.

Important:
Check annually that the battery terminals are properly tightened.

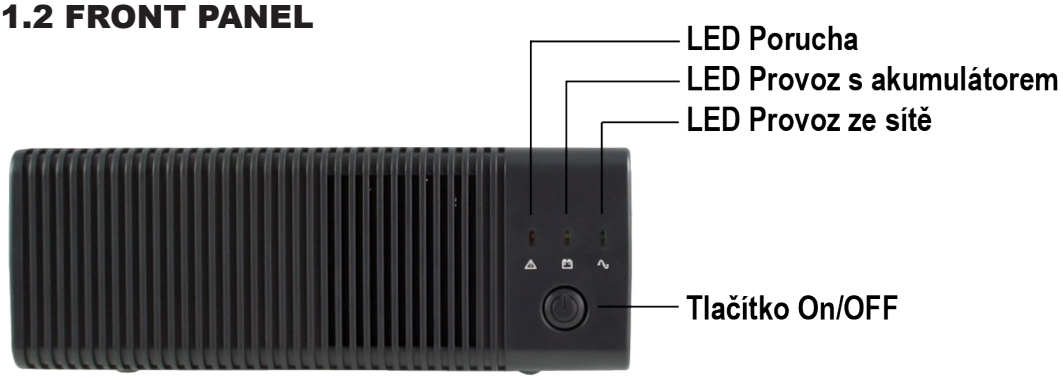
COMMENTS ON UPS PG 500 OPERATION

As new batteries are not cheap, efforts may emerge to save money by using old automotive batteries. However, these batteries are worn off internally and won't charge to their full capacity. Such batteries are unreliable and unsuitable for any backup use.

PG 500 is not designed for use with an automotive battery. Please note that an automotive battery design differs from that of a stationary battery. A starter battery is designed for a high-current, frequent and very short discharge during start-up while a stationary battery is designed to be used only from time to time during a power failure but it shall stand a long lasting discharge with a relatively low current. That is why using an automotive battery is unadvisable and such a battery, although featuring the same capacity, will not reach the same backup time as a stationary battery.

Should the UPS be disconnected from the mains for a longer time, it is unconditionally necessary to disconnect also the battery from the UPS. Despite being switched off by the mains switch, UPS keeps drawing a tiny current from the battery that might discharge it even below the critical level. Storing a discharged battery will cause its definite destruction!

1.2 FRONT PANEL



If the power supply cord is connected, press ON button and the PG 500 will work either in 230 V mode or in a battery mode, depending on whether the power supply is available. One more pressing the button will turn off the inverter control but the battery charging is maintained (supposed the incoming 230 V power is available).

LED Power line operation

Green LED will be lit or flashing if the power supply is OK. Flashing in 2 s intervals means the battery is not fully charged yet. LED is lit permanently when the voltage has reached circa 14.1 V, however controlled battery charging continues. Noise from the inner cooling fan can be heard during operation and charging.

LED Battery operation

Yellow LED will be lit if the power supply is not available or is outside the preset range. The PG 500 is fed from the battery and backups the connected appliance.

LED Fault

Red LED will be lit if there is a defect.

1.3 REAR PANEL

1. Screw terminals for wiring a battery.
2. Integrated 230 V socket to accommodate a power cord. A fuse incorporated.
3. 230 V socket (out).
4. Input voltage range selector. (Output voltage will be the same as input voltage from the el. network.) Select “Narrow” for most applications. “Wide” should be selected only when using appliances that can stand a wider voltage range.

WIRING A BATTERY

Battery cables with the right terminals (lugs) shall be connected to the battery, respecting the right polarity.
Avoid applying excess power when tightening bolts at the battery (the recommended torque is 5-7 Nm). The battery might get destroyed when the contacts tear off the lead plate inside the battery. For an improved contact, applying anti-oxidant compound may be useful.

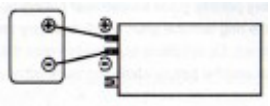
1.Šroubové svorky pro připojení akumulátoru

2.Zabudovaná zástrčka 230 V na připojení napájecí „flexošňůry“. Součástí je pojistka.

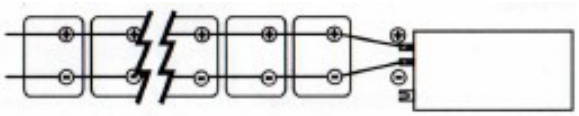
3.Zásuvka 230 V (výstup)

4.Šířka tolerance vstupního síťového napětí

Connecting one battery



Connecting batteries in parallel



Battery voltage shall be the same as in PG 500.

In case of connecting more batteries in parallel, all the batteries shall be of the same nominal capacity, principally the same model from the same manufacturer, and if possible also from the same production batch. All the batteries shall have the same tension (equally charged). The length of connecting cables should be almost identical as well as the ambient temperature. A sufficient safe distance between batteries of at least 1.5 cm shall be respected.

The batteries should be disconnected, measured separately and charged if needed at least once a year. The batteries may be discharging unevenly (due to internal influences) which may affect the overall capacity of their connection.

2 INSTALLATION

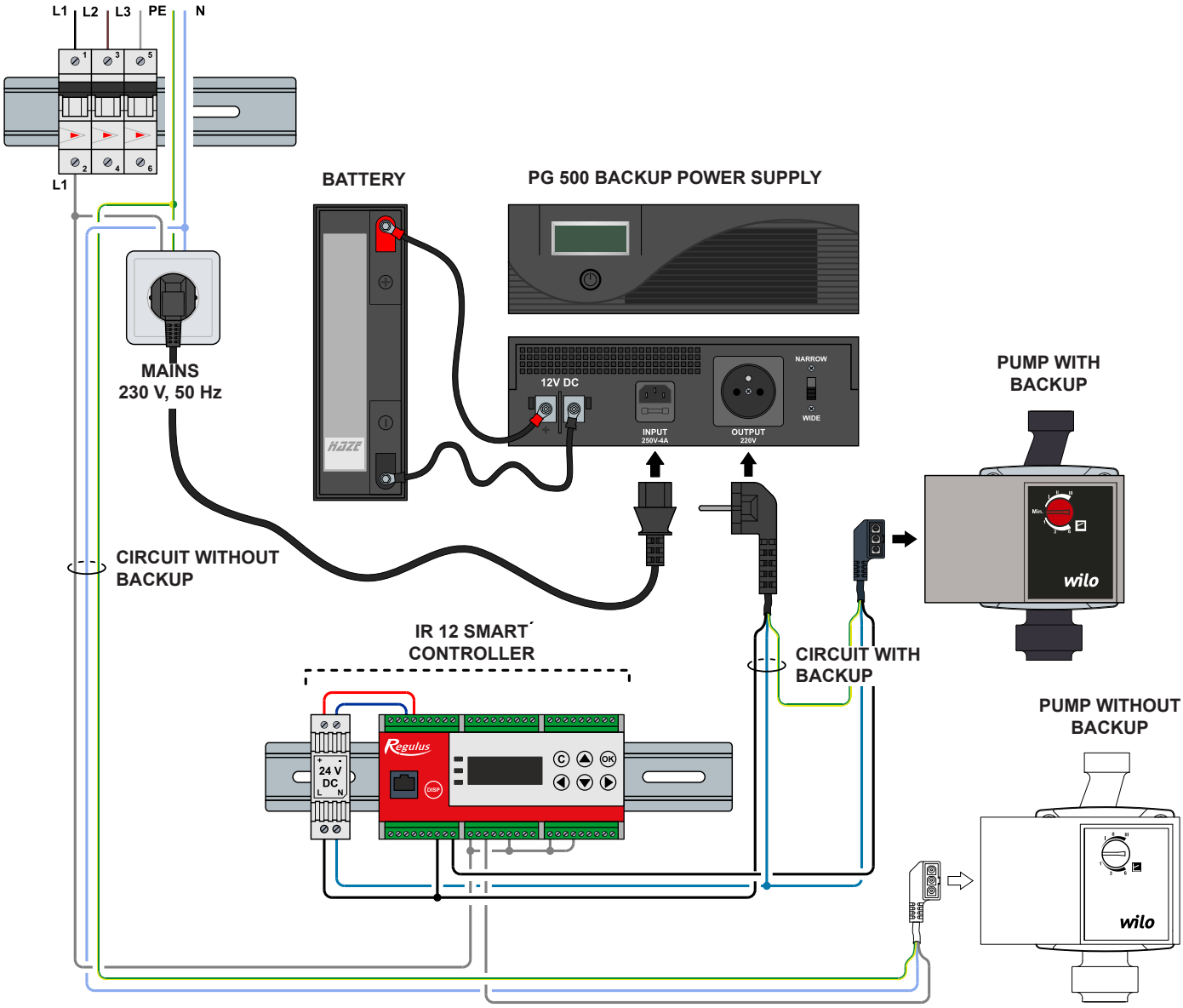
1. Make sure the power grid voltage corresponds to the voltage PG 500 is designed for.
2. Connect the battery respecting the preceding information in these Instructions (MIND THE POLARITY, + red / - blue or black).
3. Plug the power supply cord into the respective socket at the rear side of PG 500 and into a wall socket. WARNING - from the moment on the battery is being charged. At the same time, the internal cooling fan also starts running.
4. Connect your pump or another load by plugging its cable into the socket of PG 500. It is necessary to stick to a TN-S system (three-wire system, i.e. live wire is black, neutral wire is pale blue and protective earth wire is yellow-green). No contact of the UPS outlet socket shall get connected to any lead of mains or any other electric wiring. The UPS is designed for a closed circuit. If the UPS outlet got connected with the mains, there would be a danger of destroying the connected appliances, the UPS 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.
5. Press ON/OFF push button to turn PG 500 on. A signal will sound and all the LEDs will flash once. The green LED will stay lit, indicating that PG 500 is running (standard mode, ready for backup).
6. 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 is recommended to use solely an installation contactor with a 230 VAC coil, 2x NO + 2x NC
- it must be ensured that the PE lead cannot be disconnected!
- unconditional separation of the circuit fed from PG 500 from the mains shall be respected

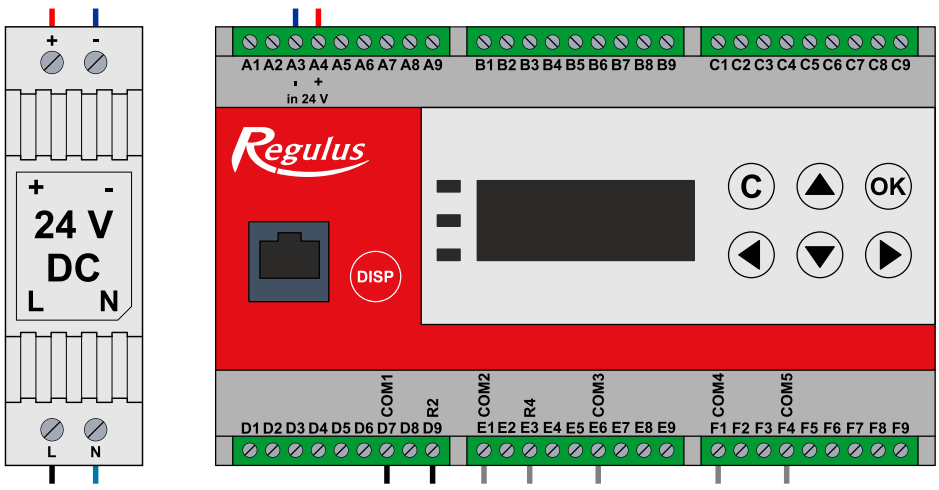
IR12 CTC controller

Backup of circulation pump of a heat pump.



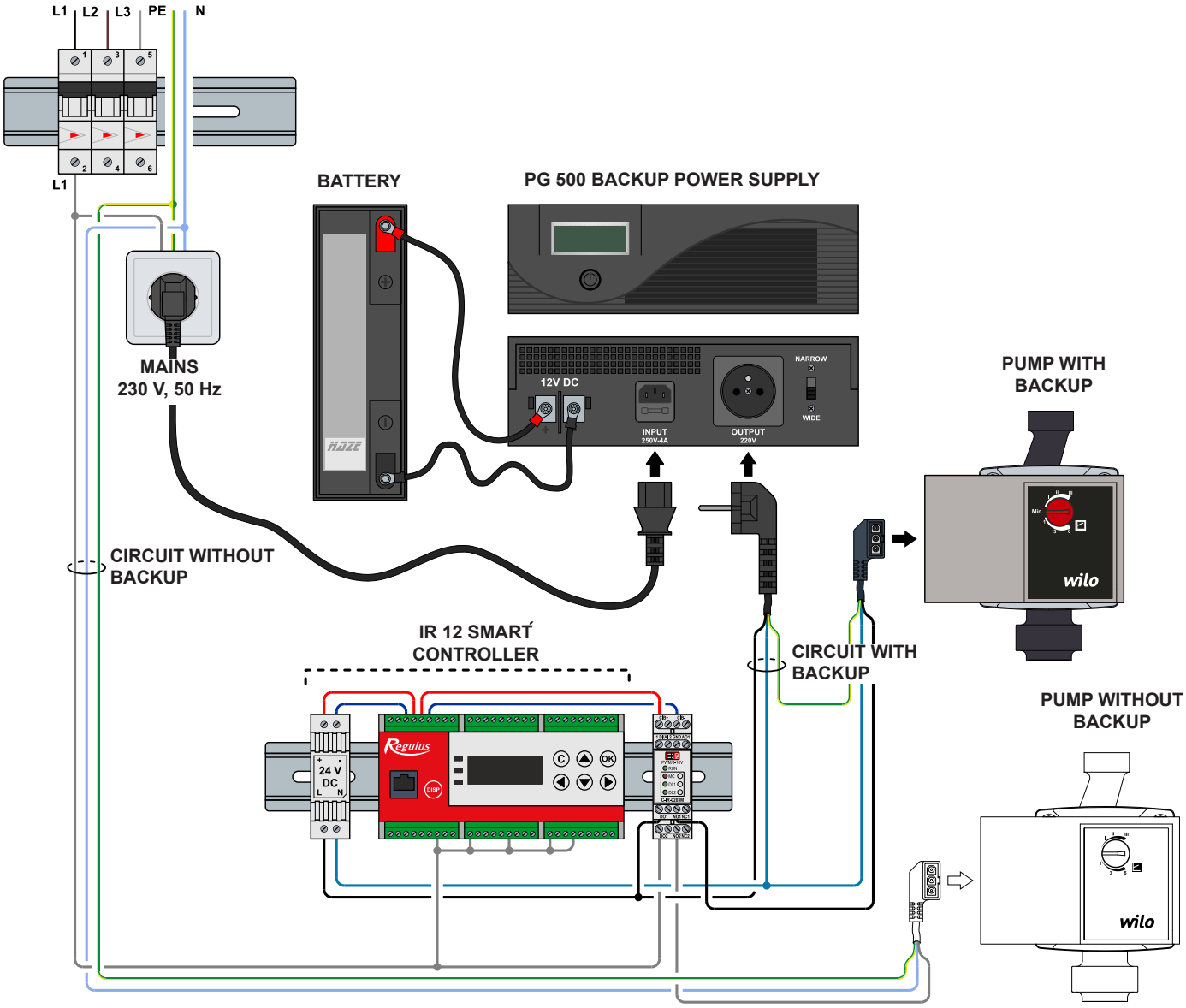
Do respect the separation between the circuits with and without backup.
Not only for the live wire but also for the neutral one!

DETAILED PIC. SHOWING TERMINAL BOARDS MARKING AND WIRING



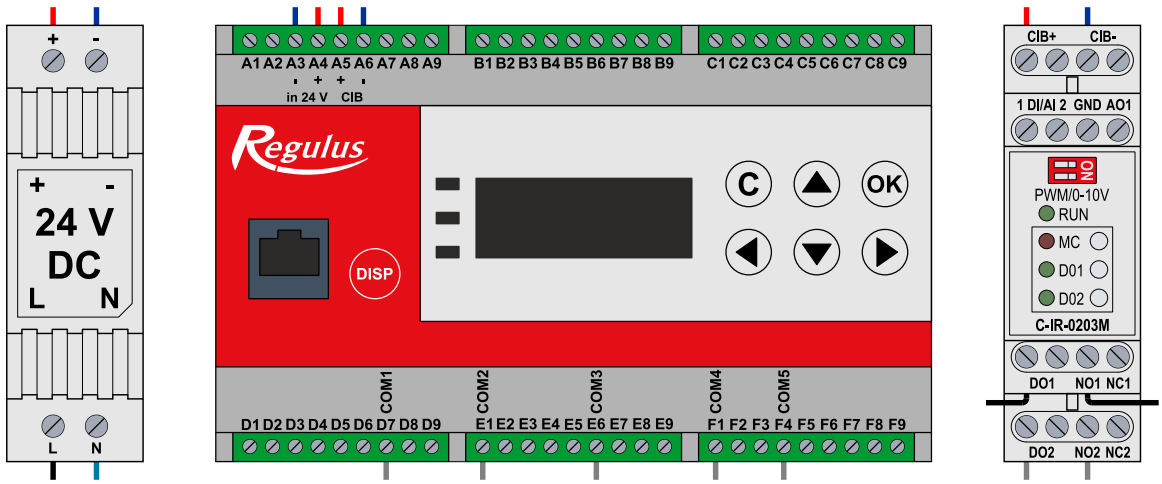
IR12 CTC controller + fireplace module

Backup of circulation pump of a fireplace.



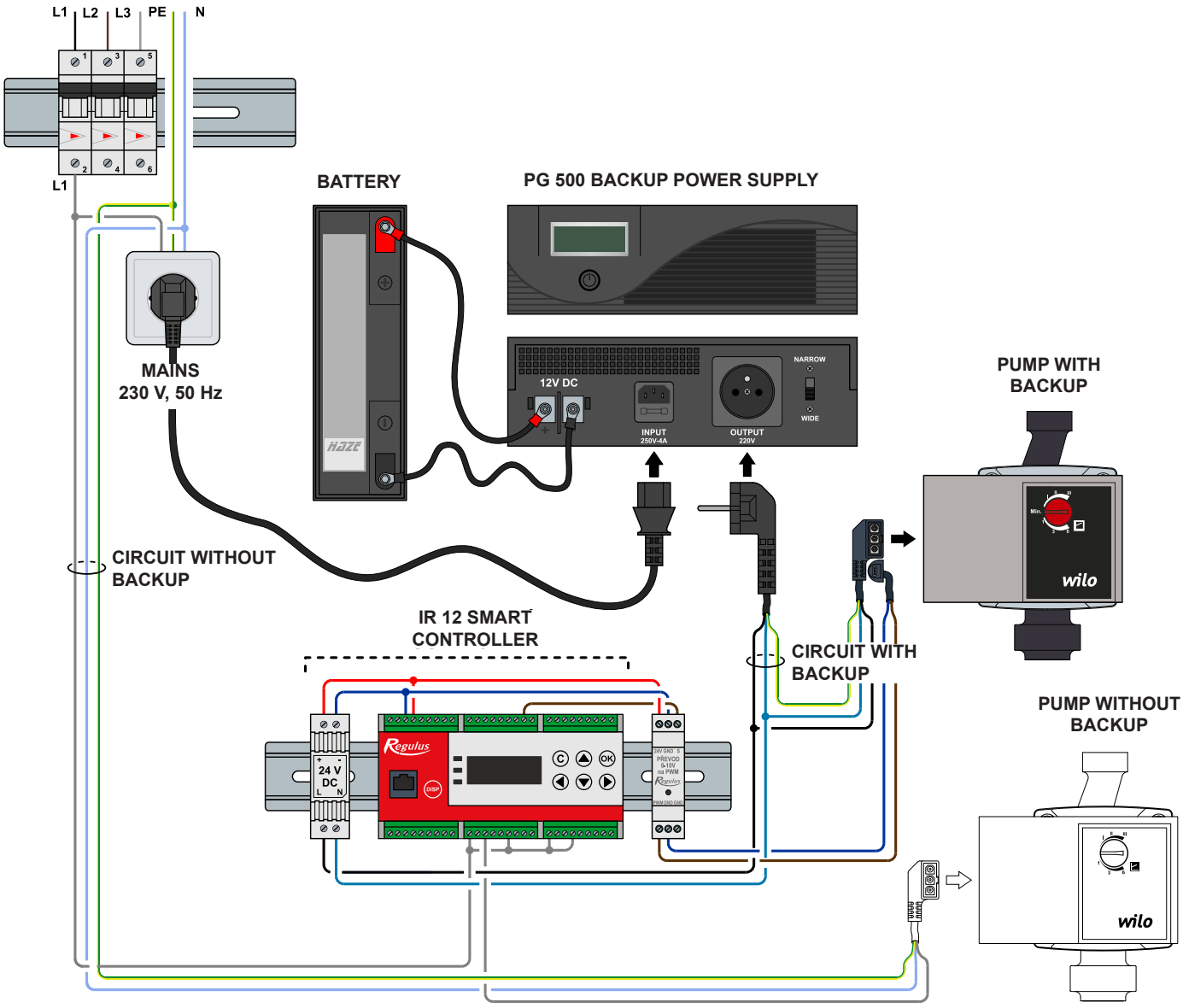
Do respect the separation between the circuits with and without backup.
Not only for the live wire but also for the neutral one!

DETAILED PIC. SHOWING TERMINAL BOARDS MARKING AND WIRING



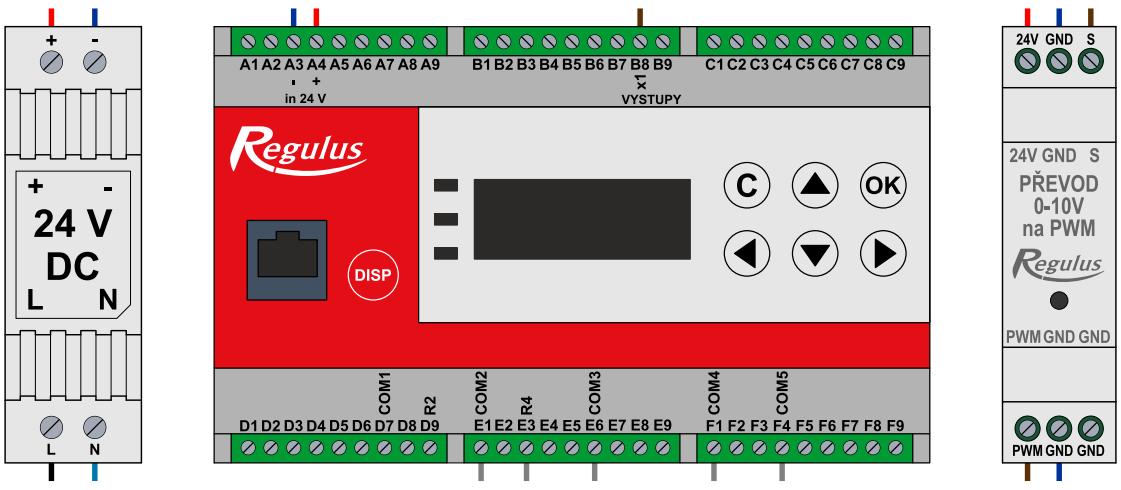
IR12 CTC controller + PWM module

Backup of a PWM-controlled solar pump.



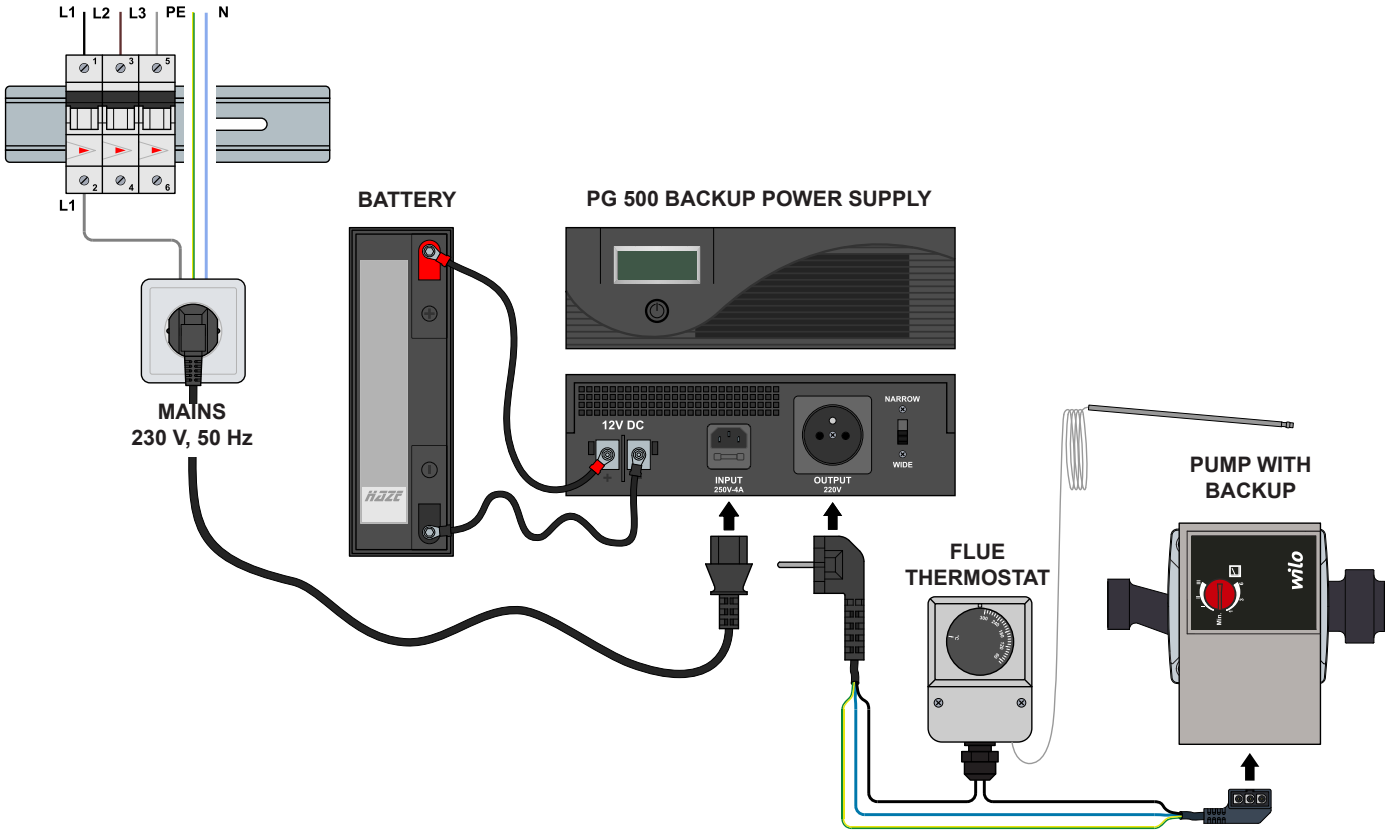
Do respect the separation between the circuits with and without backup.
Not only for the live wire but also for the neutral one!

DETAILED PIC. SHOWING TERMINAL BOARDS MARKING AND WIRING



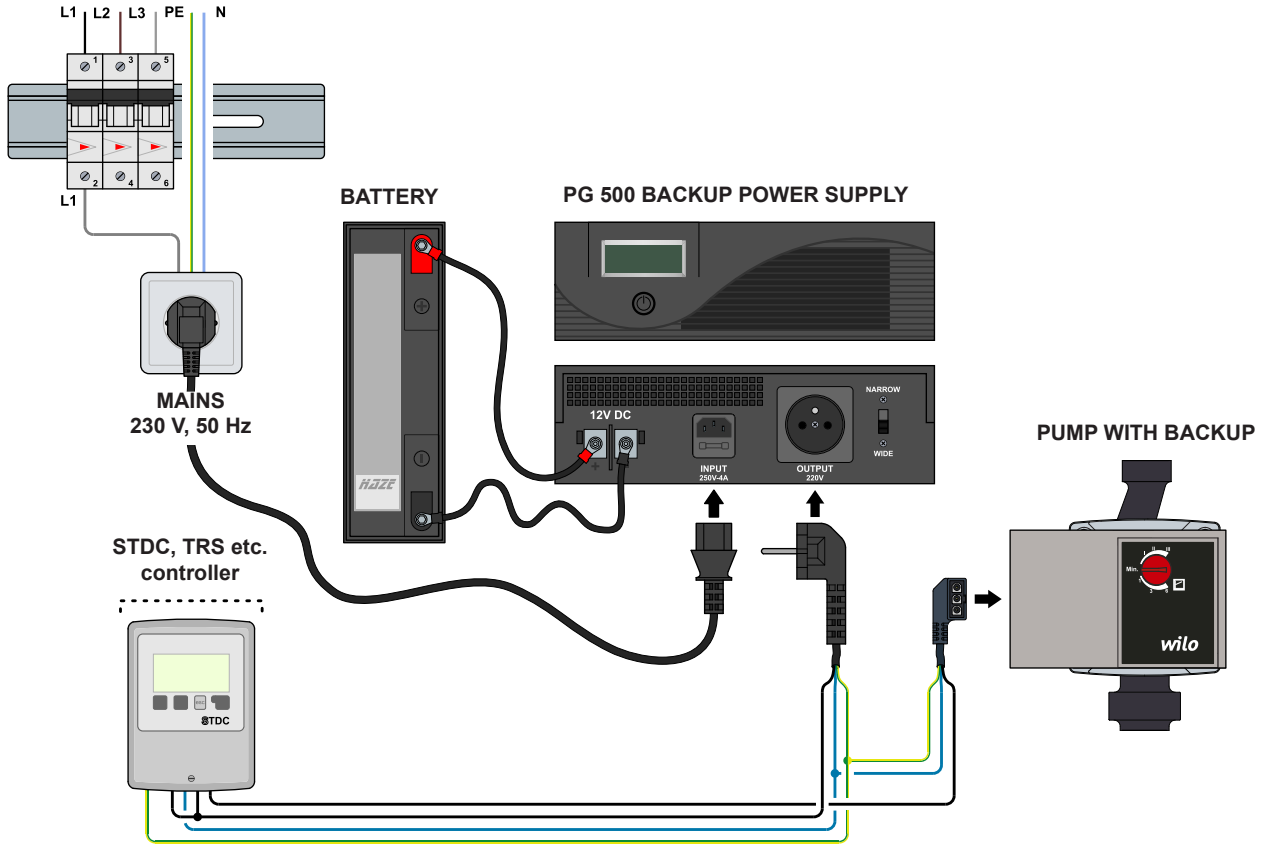
Fireplace

Backup of a fireplace circulation pump with flue thermostat.



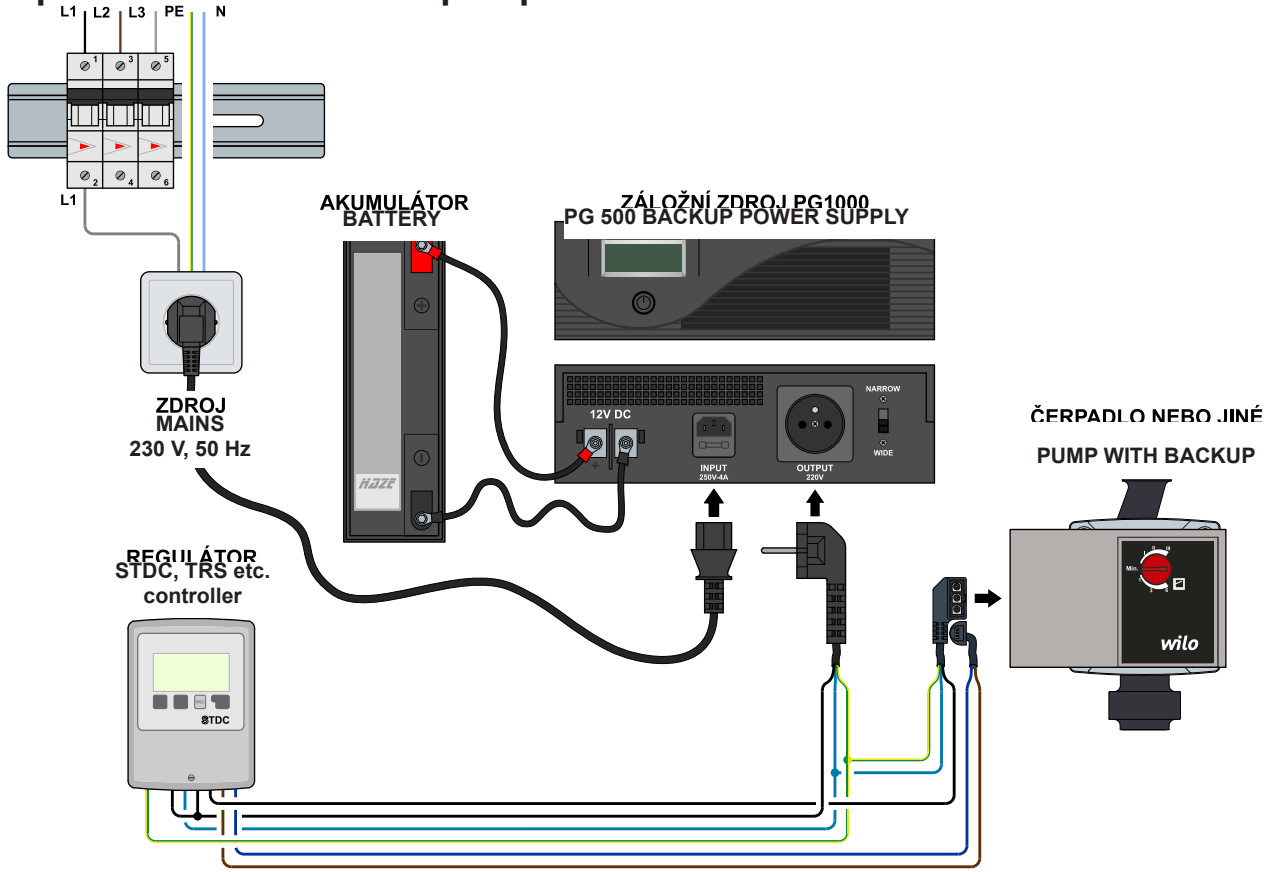
STDC, TRS etc. controller

Pump backup



STDC, TRS etc. controller

Backup of a PWM-controlled pump.



2.2 TURNING PG 500 ON WITH NO GRID POWER

Point 6. Press ON/OFF push button to turn PG 500 on. The yellow LED indicates PG 500 running but power supplied from a battery only (the battery must be connected). As soon as grid power supply is restored, the green LED will light up and PG 500 will work normally, charging the battery.

2.3 TURNING PG 500 OFF

PG 500 can be turned off by pressing and holding the ON/OFF push button until the green LED goes off. WARNING! The battery is still being charged. Complete turn off shall be done by disconnecting the mains.

Warning

- For safety reasons, it is strongly recommended not to modify the cables supplied. Further it is necessary to make sure the power supply to PG 500 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 500 when it is running - the earth protection of both PG 500 and the load connected would be interrupted.
- Check that when all loads are connected, the total earth leakage current does not exceed 2.7 mA (EN 62040-1-1).
- NOTE: When plugged to power supply, the internal cooling fan with timer starts up and keeps running constantly for up to 3 days.
- After this time that is sufficient to fully charge the battery, the fan goes off and the battery is kept under float charging.
- In case of a power supply breakdown, the fan turns on, cooling the inverter.
- When power supply is restored, the timer turns on and the cycle is repeated.

3. ALARM INDICATION

Visual indication	Power grid operation - green LED is lit
	Battery operation - yellow LED is lit
	Battery charging - green LED flashes every 2 sec.
	Overload - red LED flashes every 0.5 sec.
	Fault - red LED is lit
Audio indication	Low battery voltage - signal each 2 s
	Overload - signal each 0.5 s
	Defect - uninterrupted tone

4 TROUBLESHOOTING

Situation	Items to check	Solution
No LED is lit (outlet from PG 500 energized)	● Weak battery ● ON push button not pressed	● Charge battery ● Replace battery ● Press and hold ON push button
No LED is lit (outlet from PG 500 de-energized)	● Defect battery ● Battery not connected ● Inlet fuse ● Power source defect	● Check battery condition and connection ● Check the fuse ● Contact service staff
Power supply is present but PG 500 works in the battery mode	● Power cord is not plugged either into PG 500 or into an electrical socket. ● Electrical socket is defect	Plug the power cord into PG 500 and into a working electrical socket
	● Inlet fuse (4 A) located under the mains socket on PG 500	Replace the fuse
PG 500 has started up but the yellow LED keeps flashing	Lower voltage in the battery	If power supply is available and OK, let the battery charge for at least 8 hours
PG 500 does not serve the expected backup time	Battery capacity may be reduced: ● Too long storage time ● Overload ● Battery lifetime over ● Repeated frequent power failures when battery does not get fully charged again	● Let the battery charge for about 8 hours ● Disconnect excess load ● Replace the battery
Sound alarm (signal) sounds every 0.5 sec.	Overload	Check what is connected to PG 500 and disconnect excess load
Sound alarm (signal) sounds continuously	Fault	Hand over to an authorized service provider

5. TECHNICAL SPECIFICATIONS

MODEL		PG 500
Power output	W	200 W
Input	Line	1
	Nominal voltage	230 V, 50 Hz
	Smaller input voltage range (marked NARROW)	170 - 280 V 50 Hz
	Wider input voltage range (for less sensitive load), (marked WIDE)	90 - 280 V 50 Hz
Output	Line	1
	Nominal voltage	230 V 50 Hz
	Voltage control (backup mode)	10% - 18%
	Frequency	50 Hz
	Frequency control (backup mode)	+/- 0.1 Hz
	Waveform (backup mode)	Modified sine-wave
Power factor	cos φ	0.6
Charging	Battery nominal voltage	12 V DC
	Float charge	13.7 V
	Max. charging current *	8 A (± 1 A)
Transfer time		8 ms (typical)
Transfer time	AC/AC	>95%
	DC/AC	>80%
Visual indication	Mains operation	Green LED is lit
	Battery operation	Yellow LED is lit
	Battery charging	Green LED flashes every 2 sec.
	Overload	Red LED flashes every 0.5 sec.
	Defect	Red LED is lit
Sound alarms	Low battery voltage	Signal each 2 s
	Overload	Signal each 0.5 s
	Defect	Uninterrupted tone
Protection		Deep discharge protection, overcharge protection, overload protection
Mechanical properties	Dimensions (D x W x H) mm	224 / 255 / 80
	Weight (kg)	1.7
Ambient conditions	Operating environment	0~40 °C, 0~90% rel. humidity (non-condensing)
	Noise level	< 45 dB

** the value of charging current is controlled by electronics of the UPS depending on the battery voltage*

Recommended battery: HAZE (lead acid battery for UPS)			
Tech. data	nominal voltage	12 V	12 V
	number	1	1
	battery capacity	18 Ah	44 Ah
	max. discharge current **	4.5 A	11 A
*** in order to maintain the 12-year battery service life, the manufacturer recommends the load current (A) not to exceed one quarter of the battery capacity (Ah)*			
Backup time with a recommended battery			
Small load	output load power consumption (230 V)	20 W	65 W
	backup period	6.5 h	5.8 h
Higher load	output load power consumption (230 V)	45 W	100 W
	backup period	3.0 h	3.7 h

1 m long battery cables are included in the supply.

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