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Operating instructions



The unit complies
with the correspond-
ing EC guidelines.

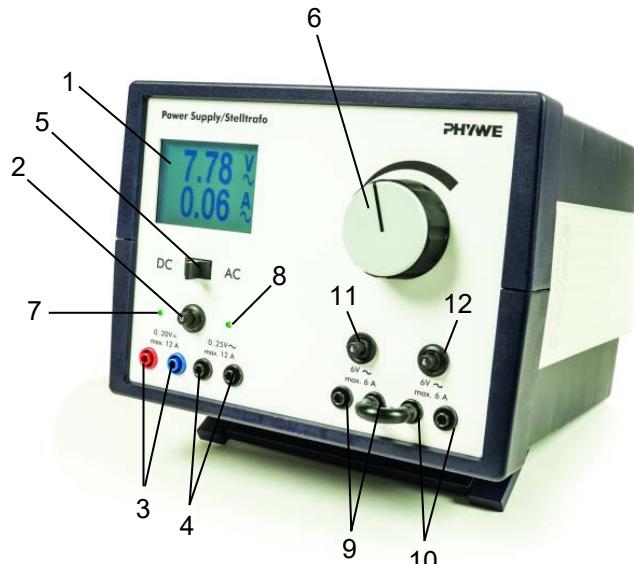


Fig. 1: PHYWE variable transformer with digital display, 13542-93

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1 SAFETY INSTRUCTIONS



Attention!

- Read the operating instructions thoroughly and completely prior to starting the unit. This is important for your own protection and for avoiding damage to the unit.
- Ensure that the mains voltage that is stated on the type plate of the unit corresponds to the voltage of your mains power network.

- When setting the unit up, ensure that the mains power switch or the device connector is freely accessible. Ensure that the ventilation slots of the unit are not blocked or covered.
- Ensure that no liquids or objects penetrate the unit through the ventilation slots.
- The unit is intended solely for use in dry rooms where there is no risk of explosion.
- Use the device solely for its intended purpose.
- Protect the device against dust, moisture and vapours. Only clean it in the voltage-free state with a slightly moistened, lint-free cloth. Do not use any aggressive cleaning agents or solvents.
- Prior to connecting the mains power, ensure that the protective earth conductor of the power supply unit is properly connected to the protective earth conductor of the mains power network. Ensure that the mains socket into which the mains power plug is plugged is equipped with a protective earth conductor. Do not eliminate the protection by using an extension cord without a protective earth conductor.
- Do not use the unit if there are visible signs of damage to the unit, the connection cord or the measuring lines.
- Do not open the unit.
- Only use the mains power cable that is supplied with the unit or an equivalent cable.

2 PURPOSE AND DESCRIPTION

This handy power supply unit delivers two low voltages that are practically continuously adjustable. A DC voltage of ca. 0.2...20 V~/12 A that pulsates at 100 Hz as well as an AC voltage of ca. 0.2...25 V~/12 A.

In addition, the unit also supplies two fixed AC voltages (2x 6 V~/6 A max.) that can be connected in series, thereby resulting in an AC voltage of 12 V~/6 A max.

All outputs are electrically isolated from the mains, earth-free and protected by overload circuit breakers.

The DC voltage at the DC output is produced by rectifying the variable AC voltage. The voltage is smoothed with the aid of a small capacitance of approx. 10 μ F. Under no-load and low load conditions, this results in minimal ripple. Under higher load of the output, the voltage value is reduced, thereby increasing the ripple.

The 1.5 m long mains lead is supplied with the unit. It serves to connect the unit to the AC mains after it has been plugged into the mains connector at the back of the unit. The rectangular fuse holder integrated below the mains connector can only be opened using a screwdriver or similar after the mains lead has been unplugged from the unit.

Both conventional 4 mm plugs and safety connecting cables (e.g. 07337-01) fit in the safety output sockets.



Attention - fire hazard!

The power supply is to be exclusively used for supplying suitable experimental set-ups and instruments. The user carries the responsibility for the operational reliability of the set-up to which the unit is connected. When it is connected to incorrect circuitry, even the relatively low power provided by the unit could cause considerable damage (fire hazard!). To avoid unnecessary risks, we recommend the setup, which it is to supply, to be carefully checked prior to switching the power supply on.

3 EXPLANATION OF THE SYMBOLS



Safety isolating transformer,
short-circuit-proof due to special safety
measures

4 FUNCTIONAL AND OPERATING ELEMENTS

The variable transformer is held in an impact-resistant plastic housing. The cover plate of the housing has a carrying handle that can be swung upwards. The base plate has a similar handle, which can be swung out to enable the unit to stand in an inclined position. Four rubber feet ensure slip-resistance and stability. The unit can be stacked on other units having the same type of housing, whereby the rubber feet stand in the pan-shaped hollows of the unit below for increased security against displacement.

The following functional and operating elements can be found on the front and back plate of the unit (see Figures 1 and 2):

1. LCD display

The LCD display shows the measured values (voltage & current) depending on the activated output (DC or AC). The actual root mean square (TRMS) value, including the equal and alternating components, is recorded and corresponds to the display of a conventional moving iron movement.

The device has a graphic display of 128 x 64 pixels with a display surface of 62 x 44 mm and screen backlighting. The values are displayed over two lines with a digit height of 16 mm.

2. Overcurrent circuit breaker

with a thermal release for the protection of the outputs (3) and (4).

3. Output ca. 0.2...20 V~/12 A

Pair of 4 mm sockets for picking up the direct voltage that can be adjusted by way of the adjusting knob (5). The output can be subject to an excess load without damage to the unit until the associated circuit breaker (13 A) trips.

4. Output ca. 0.2...25 V~/12 A

Pair of 4 mm sockets for picking up the alternating voltage that can be adjusted by way of the adjusting knob (6). The output can be subject to an excess load without damage to the unit until the associated circuit breaker (13 A) trips.

5. Selector switch

for activating either output (3) or output (4).

6. Adjusting knob

for adjusting the voltage at the outputs (3) and (4).

7. "DC mode" LED

The LED lights up when output (3) is activated by way of switch (6).

8. "AC mode" LED

The LED lights up when output (4) is activated by way of switch (6).

9. Output 6 V~/6 A

Pair of 4 mm sockets for picking up a fixed AC voltage of 6 V~/6 A max.

10. Output 6 V~/6 A

Pair of 4 mm sockets for picking up a fixed AC voltage of 6 V~/6 A max.

The two output voltages (9) and (10) can be connected in series so that a total voltage of 12 V~/6 A max. results (Fig. 1).

11. Overcurrent circuit breaker

with a thermal release for the protection of the fixed voltage output (9).

12. Overcurrent circuit breaker

with a thermal release for the protection of the fixed voltage output (10).

Overcurrent circuit breaker

When the overcurrent circuit breaker trips, the associated fuse button pops out. Wait a few seconds so that the bimetallic element can cool down before you push it back in. In the meantime, eliminate the cause of the malfunction.

The voltage level at the outputs (9) and (10) depends on the load.

The nominal voltage of 6 V~ is provided at the nominal value of the mains voltage of 230 V~ and with a nominal current of approx. 1.8 A. In this case, standard halogen lamps of 6 V/10 W, which are sensitive with regard to overvoltage, are not at risk.

The nominal (total) voltage of 12 V~ is provided at the nominal value of the mains voltage of 230 V~ and with half of the nominal current rating (3 A).

The outputs (9) and (10) are both equipped with an overcurrent circuit breaker of 6 A. Regardless of a potential load of the outputs (3) and (4), the outputs can be subject to an excess load without damage to the unit until the associated circuit breaker trips. It is only the output voltage that decreases as a consequence of the increased load.

If the outputs (8) and (9) are connected in series to supply a total voltage of 12 V, bear in mind that the total current is limited to 6 A max.

The fixed voltage outputs can be used as voltage sources for lamps with a nominal voltage of 6 V or 12 V and a nominal current rating up to 6 A.

If the outputs of the unit are subject to load in excess of the limit values of the *overcurrent circuit breakers* (e.g. in the event of a short circuit), the response time of the *overcurrent circuit breakers* may be longer than the response time of the fuse of the device. As a result, the fuse may trip sooner than the overcurrent circuit breakers.

This fault should be avoided, if possible.

13. Fuse holder

The fuse holder (Fig. 2) in the upper part of the device connector at the back can be accessed once the mains power connecting cable has been removed. It can then be pried out with the aid of a screwdriver.



Fig. 2: Fuse holder

Only mains fuses with the fuse rating stated under "Fuse" on the type plate are permissible.

Do not change the fuse unless the unit has been disconnected from the mains power supply and is absolutely voltage-free. Bypassing the fuse holder or mending the fuse is not permissible.

Prior to replacing a fuse, ensure that the cause of tripping has been eliminated.

Remove the defective fuse from the fuse holder and insert a new one with the correct rating. Then, push the holder back in. Ensure that you can hear it lock into place. If the fuse trips again after the unit has been switched on, do not use a higher fuse rating. This problem indicates a major defect and the unit must be sent to our service department for repair.

5 OPERATING INSTRUCTIONS



This high-quality unit fulfils the technical requirements that are summarised in the current EC directives. The product characteristics entitle the unit to bear the CE mark.



Due to the safe isolation and the safety isolating transformer in accordance with DIN EN 61558-2-6 (as per BG/GUV-SI 8040 "Sicher experimentieren mit elektrischer Energie in Schulen" (Safe experimentation with electrical energy at schools) and SI 8070 "Richtlinien für Sicherheit im Unterricht" (RiSU) (Regulations for safety at school)), this power supply unit is particularly suitable for student experiments and for all age levels ("compliant with the regulations for safety at schools").

The unit must be used under the supervision of an expert and in the electromagnetically controlled environment at research, teaching and training facilities (schools, universities, institutes and laboratories).

This means that, in such an environment, mobile phones etc. should not be used in the direct vicinity of the unit. The connected cables must not be longer than 2 m.

Electrostatic charges or similar electromagnetic phenomena (HF, bursts, indirect lightning discharge, etc.) may affect the unit so that it will not work within the given specifications. The following measures reduce or eliminate the potential interferences: Avoid carpets, provide equipotential bonding, perform the experiments on a conductive, earthed surface, use shields and shielded cables and do not use radiofrequency transmitters (radio sets, mobile phones, etc.) in the direct vicinity of the unit.

After the unit has been switched off, wait approx. 20 second prior to switching it on again. This is the time required by the microcontroller for the correct initialisation of the system.

6 TECHNICAL DATA

Operating temperature range 5-40°C
Relative humidity <80%

7 DISPOSAL

The packaging mainly consists of environmentally-friendly materials that should be returned to the local recycling stations.



Do not dispose of this product with normal household waste. If this unit needs to be disposed of, please return it to the address that is stated below for proper disposal.

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Mains supply

Protection class I
Connecting voltage see type plate
(+/-10%)
Mains frequency 50/60 Hz
Power consumption approx. 380 VA
Mains fuse see type plate
(5 mm x 20 mm)

Dimensions (mm) 230 x 236 x 168 (W, D, H)
Weight approx. 8.6 kg

Fixed voltage 2x 6 V~ or 1x 12 V~ (both outputs connected in series)

Nominal current 6 A max. per output
or total current with the outputs connected in series
Overload protection overcurrent circuit breakers

Adjustable voltages (selectable AC/DC)

Alternating (AC) voltage approx. 0.2...25 V~ (no-load operation)
Alternating (AC) voltage approx. 0.2...22.5 V~
(13 A)
Nominal current 13 A max.
Overload protection overcurrent circuit breakers

Direct voltage (rectified AC voltage by bridge rectifier/low capacitance 10 μ F) approx. 0.2...30 V (no-load operation)
Direct (DC) voltage approx. 0.2...20 V (13 A)
Ripple 48% (at max. current)
Nominal current 13 A max.
Overload protection overcurrent circuit breakers

Display

LCD display two-line display for current/voltage
Digit height h = 16 mm, 4 digits
Accuracy: $\pm(1.5\% \text{ of reading} + 5 \text{ digit})$
Type of measurement: TRMS incl. AC+DC component