**EPH elektronik**
Produktions- und
Handelsges. mbH

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# Technical Description

# Transistor D.C. Chopper Controller Type GS 24 S

## Table of contents

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# 1. Getting started guide: GS24S/xx-360 with 9-pole screw terminal block

1. Select operating mode on J1 (the default internal mode is Standard, which is obtained by setting J1 on I).
   Select J2 (Standard is internal RF).

2. Connect the following digital input
   (Connect terminal 7 to terminal 9; Input for enabling the regulator when J2 is set on External).

3. Connect the following analogue inputs
   Input N set point (terminal 8) voltage 0 to + 10 V or potentiometer (10kOhm) between terminal 4 and terminal 7, tap from terminal 8.

4. Connect DC motor to terminals 5 and 6.

5. Connect power supply to terminal 3 (-) and terminal 2 (+) (approx. 20 – 36 V DC).

6. Proceed to energise the power supply.

7. LED (power on) lights up on circuit board.

8. The motor turns and the rotation speed can be adjusted via the voltage on terminal 8 (n set-point).

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## 2. General information / Operation

The series GS 24 S/xx-360 transistor speed controllers are inexpensive devices with compact dimensions of 72 x 100 mm for the stepless speed control of any DC motors at low voltages and motor currents of up to 10 A. The input voltage range is 20 to 36 V DC makes a battery operation possible, e.g. from an on-board electrical supply system or through series SNT 24/xx mains adapters connected upstream. The stepless speed adjustment can take place through either an internal/external potentiometer (10kOhm) or through an external reference voltage 0....10 V DC (pre-selection via jumper set-point). An internal potentiometer acts as an overload protection by providing a continuously variable motor current limitation.

The possibility to change the rotating direction through a relay is available as an option using an additional EPH 393 type circuit board. Rotation in the left or right direction can be pre-selected **during standstill** via a 12 to 48 V DC control signal.

### 2.1. Characteristics

- The high pulse frequency of 18 kHz allows for a quiet operation.
- Form factor F < 1.05 guarantees reduced motor heating and high MD reserves.
- Adjustable rotation speed through 0..10 V interface or potentiometer (10kOhm) (external or internal).
- Enable-input for output stage activation, internal/external (pre-selection through jumper RF).
- Overload protection of motor or drive through stepless current limitation.

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## 2.2. Accessories

- Module carrier for 35 mm mounting rail installation.
- Module carrier for screw fastening.
- Suppressor diodes in motor vehicle applications with high inductive spikes.
- Potentiometer for set point adjustment 1 gang or 10 gang (10kOhm).
- Mains adapter SNT 24/ 05; NT 24/ 10 input voltage 230 V / 50 Hz.

## 3. Information and recommendations on the use of EPH motor controller cards in electrical drive systems pursuant to the current EU Machine Directives 89/392 EWG, EMC-Directive 89/338 EWG and Low Voltage Directive 73/23 EWG.

According to the Machine Directive only complete machines can bear the CE marking.

An electronic card or an electric motor are parts of a machine/electrical equipment, a system or a process, and are treated within the scope of the EU Directive as a complex component part and a CE marking requirement is therefore not given.

These components can not be operated by the user on a standalone basis and are manufactured exclusively for their further processing by industry, trade or other businesses with a specific EMC expertise.

Processing of the components is permissible only for their further adequate and correct use by trained qualified personnel, who can warrant a proper installation, start-up and maintenance.

EPH control devices in circuit board form are classified as power electronics equipment for the control of electrical power / Protection class IP 00. They are intended for the use in machines for speed control of electric motors.

To comply with the Low Voltage Directive 73/23 EWG in end user devices EPH Elektronik also offers versions with enclosures that include a protection device as an alternative to the circuit board version (at least protection class IP 20).

The user has to ensure that the devices and the corresponding components and equipment are installed and connected in accordance with the local legal and technical regulations.

In Germany the VDE regulations and the regulations of the Health and Safety Executive apply. In addition, the regulations set forth by the EMC and Low Voltage Directive need to be complied with as well.

Machines and equipment are also required to include device independent monitoring and safety provisions. The user must ensure that in the event of a device malfunction, foreign operation, outage of the control and regulation units, etc., the drive is brought to a safe operating condition. The specialized users must read and understand the operating manual before installation or start-up of the device. Please consult us in case of any doubts. Any adjustments will be performed exclusively by specialised electrical personnel under full consideration of the relevant safety regulations. Installation work is only permitted on a tension-free device. Before restarting the device the necessary security mechanisms and enclosure covers must be mounted as required.

The devices are archived at the OEM and the test data can be obtained from the respective serial numbers.

Because the products undergo a continuous improvement process we would like to ask for your understanding if we reserve the right to make any changes to the information presented in this manual.

## 3.1. Delivery

Inspect the device immediately after its reception and unpacking for any transport damage. If any damage is detected, contact the shipping company immediately and arrange for a diligent stock assessment. This is also applies if the packaging is intact.

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## 3.2. Installation, start-up and safety measures

### ESD-protection / Installation instructions

**Attention during installation of the electronic board! It must be warranted on your part that there is sufficient ESD-protection.**

An external mains adapter is required for the electrical supply of the controller EPH 360. If this mains adapter is itself supplied with a voltage >75V AC or >50 V DC the following points need to be considered:

The unit should only be installed by qualified specialist personnel. Installation and operation of the unit should comply with the local regulations for electrical installations as well as health and safety regulations.

The protection of people and property must be warranted by applying the currently applicable safety regulations (VDE, electrical safety regulations, IEC, etc.).

Safeguarding: High start-up currents can occur at the moment of turning on a controller device / mains adapter due to the charging process of the intermediate circuit. An effective safeguard is therefore required on the mains input side (e.g. a B-rated 16 A line circuit breaker).

Residual current: The use of FI circuit breakers before the control unit / mains adapter is not recommended because of the leakage currents generated by EMC interference suppressing devices.

Ground wire connection:
The regulator card / mains adapter must not be operated without an effective connection to earth! The connection to earth must comply with local regulations.

### Danger to life - Beware!

**Parts of this controller card are under intermediate circuit voltage (up to 48V DC) and remain energised for as long as 5 min. after turning main power off.**

**Coming into contact with the terminals, lines and unit parts can cause serious injuries or result in death!**

## 3.3. EMC measures

Make sure that the controllers are suitable for operating in the required EMC environment.

EPH Elektronik supplies special mains filters and enclosures that are designed for the specific controller and which are able to provide not only the best possible protection against interference, but also the best damping, low noise emissions, simple mounting and installation, as well as the necessary electrical safety.

The unit is only effectively protected against EMC when it is equipped with an EMC suitable enclosure and when the recommended mains filter has been correctly installed with shielded motor and control lines between the higher level controls, regulation and motor.

The shield needs to have a large surface and be connected to earth via the shortest possible route. In case of versions with an enclosure the shield needs to be connected to it by means of an appropriate metal screw.

- Eliminate any lacquer and insulation from the individual mounting locations.
- Use metallic connections with the largest possible surface.
- Anodised or chromated surfaces have a high HF-impedance and need to be polished.
- Use the shortest possible cables to the control unit and maintain them separate from other mains lines.
- Use only shielded cables (industry cables with shielding wire mesh sheath).
- Verify the correct connection of the circuit breaker (PE). Connect the mains filter securely to the earth potential!

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## 3.4. Low Voltage Directive 73/23 EWG

"Electrical equipment must not jeopardize the safety of people, domestic animals or property if operated at a voltage range between 50 V and 1000 V alternating current or at a voltage range between 75 V and 1500 V direct current."

EPH Elektronik supplies racks with IP 20 security rating to provide protection against direct contact in accordance with the Low Voltage Directive 73/23 EWG, which also applies for the mounting of the mounting plate.

Please contact the supplier for any further suggestions and questions.

Note: In case of motors originating from the automotive sector, containing respective capacitive anti-interference parts, these need to be removed.

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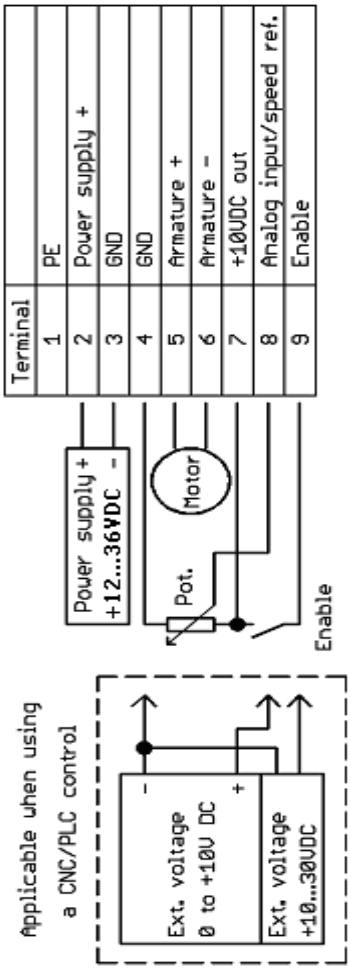
## 4. Connection options

# Type: GS 24 S 03/06/10



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## 4.1. Option change of rotating direction -Type: 393

### General information / Operation

The additional circuit board 393 provides the facility to change the rotating direction of a permanent magnet motor with a transistor chopper controller type **GS 24 S/xx-360** under low voltage of 12 to 48V DV and a nominal current of max. 6A (10A*)

Rotation in the left or right direction can be pre-selected **during standstill** via a 12 V to 48 V DC control signal.

The 393 circuit board can be utilised in combination with other controllers as well (consult with supplier if necessary).

Dimensions: Circuit board 100 x 88 (72) mm

Connection: 7-pole screw terminal block
see connection drawing

Optional: Module carrier for 35 mm standard rail or mounting plate attachment can be supplied.

*available as a special version, the 393-1 can operate with up to 10 A nominal current (additional relays K1 and K2 required).

### Terminal block layout x1: Type 393

| | | |
|---|---|---|
| Terminal 1: | Only used with special version 10A type 393-1 | |
| Terminal 2: | GND | |
| Terminal 3: | +12 to 48V DC rotation direction | switching voltagechange of |
| Terminal 4: | lead wire GS 24 S/xx (armature +) | motor outlet |
| Terminal 5: | lead wire GS 24 S/xx (armature -) | motor outlet |
| Terminal 6: | motor connection (armature) | |
| Terminal 7: | motor connection (armature) | |

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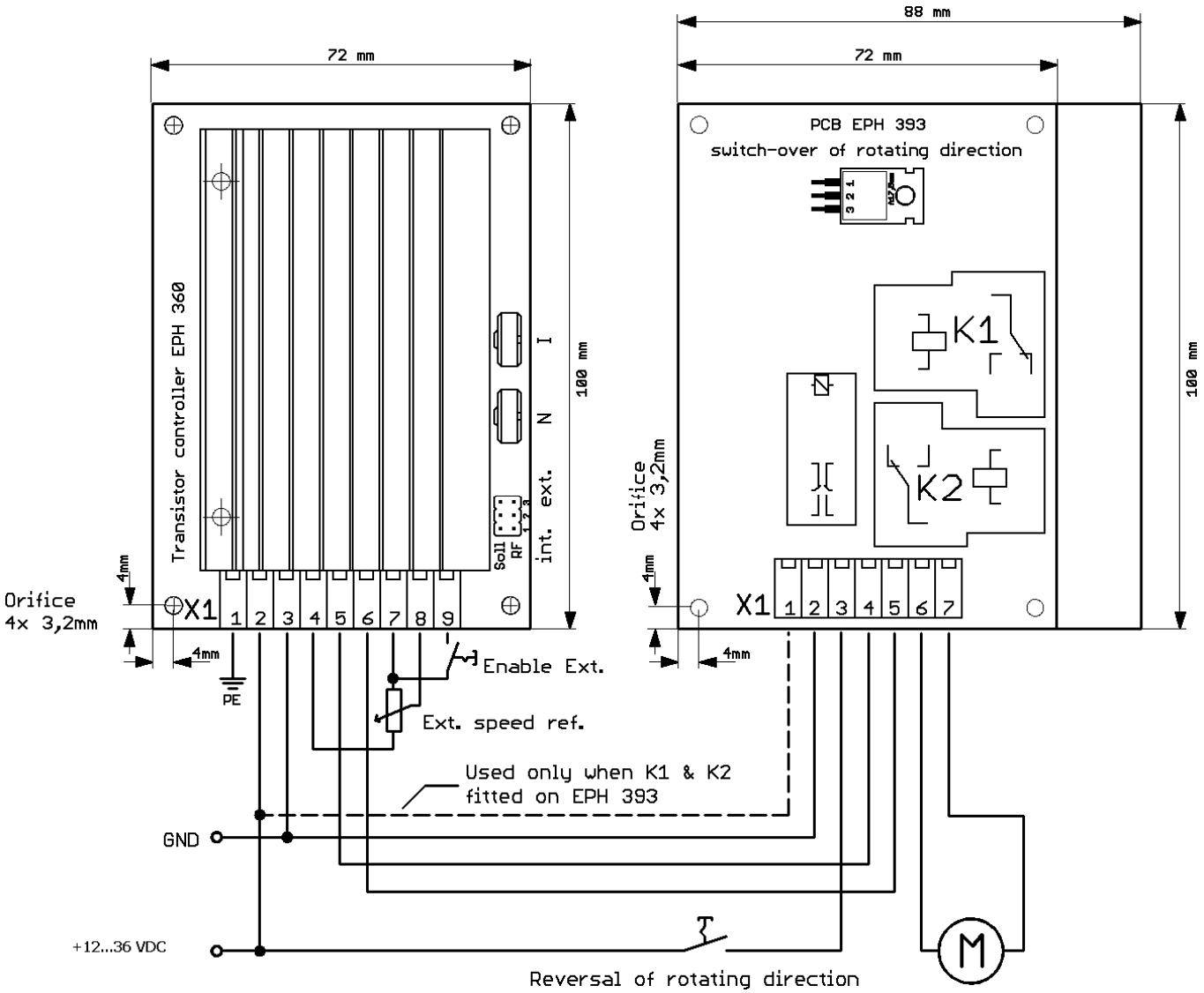
## 4.2. Connection for change of rotating direction option



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## 5. Manufacturer's declaration

The company EPH Elektronik Produktions- und Handelsgesellschaft mbH, located in

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74354 Besigheim-Ottmarsheim, Germany

herewith declares that the product

**Transistor D.C. Chopper Controller Type GS 24S/xx**

to which this declaration refers to is intended exclusively for installation in a machine / electrical equipment and its use is prohibited until such time when the machine / electrical equipment into which this product will be installed is found to fully comply with the regulations stated in the EU Directive in its currently applicable version.

The Transistor D.C. Chopper Controller complies with the EMC Directive 89/336 EWG upon correct installation and application with the use of a separate mains filter and enclosure.

To assess the electromagnetic compatibility of the product the following test specifications were conducted:

| | |
|---|---|
| Emitted interference: | EN 55011/1998+A1+A2 (limit class B) |
| Interference resistance: | EN 61000-6-2/2001 |

Effective: February 2011

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## Notes: