WEST

# Technical Documentation

## SV-300

Power amplifier for servo valves




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# 1 General Information

## 1.1 Order number

**SV-300** - power amplifier for servo valves with +/- 10 V command input
(Maximum output current from 10 mA up to 300 mA)

**Alternative products**

**SV-200** - power amplifier for servo valves (Maximum output current up to 200 mA)

## 1.2 Scope of supply

The scope of supply includes the module plus the terminal blocks which are a part of the housing. This documentation can be downloaded as a PDF file from www.w-e-st.de.

## 1.3 Symbols used



General information



Safety-related information

## 1.4 Legal notice

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The data and characteristics described herein serve only to describe the product. The user is required to evaluate this data and to check suitability for the particular application. General suitability cannot be inferred from this document. We reserve the right to make technical modifications due to further development of the product described in this manual. The technical information and dimensions are non-binding. No claims may be made based on them.

This document is protected by copyright.

## 1.5 Safety instructions

Please read this document and the safety instructions carefully. This document will help to define the product area of application and to put it into operation. Additional documents (WPC-300 for the start-up software) and knowledge of the application should be taken into account or be available.
General regulations and laws (depending on the country: e. g. accident prevention and environmental protection) must be complied with.



These modules are designed for hydraulic applications in open or closed loop control circuits. Uncontrolled movements can be caused by device defects (in the hydraulic module or the components), application errors and electrical faults. Work on the drive or the electronics must only be carried out whilst the equipment is switched off and not under pressure.



This handbook describes the functions and the electrical connections for this electronic assembly. All technical documents which pertain to the system must be complied with when commissioning.



This device may only be connected and put into operation by trained specialist staff. The instruction manual must be read with care. The installation instructions and the commissioning instructions must be followed. Guarantee and liability claims are invalid if the instructions are not complied with and/or in case of incorrect installation or inappropriate use.



**CAUTION!**
All electronic modules are manufactured to a high quality. Malfunctions due to the failure of components cannot, however, be excluded. Despite extensive testing the same also applies for the software. If these devices are deployed in safety-relevant applications, suitable external measures must be taken to guarantee the necessary safety. The same applies for faults which affect safety. No liability can be assumed for possible damage.



**Further instructions**

- The module may only be operated in compliance with the national EMC regulations. It is the user's responsibility to adhere to these regulations.
- The device is only intended for use in the commercial sector.
- When not in use the module must be protected from the effects of the weather, contamination and mechanical damage.
- The module may not be used in an explosive environment.
- To ensure adequate cooling the ventilation slots must not be covered.
- The device must be disposed of in accordance with national statutory provisions.

## 2 Characteristics

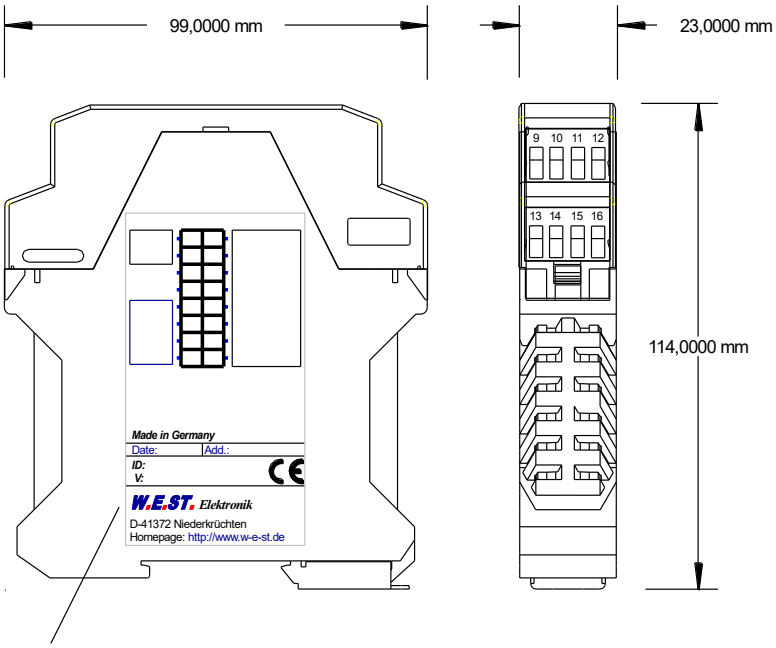
This module was developed for the control of hydraulic servo valves.
The amplifier is controlled by a ±10 V signal. The output current can be adapted via DIL switches between 10 mA and 300 mA.
This device provides a positive reference voltage as well as a negative one.
Dither and offset settings are realized with potentiometers.

**Typical applications**: Dynamic control of servo valves.

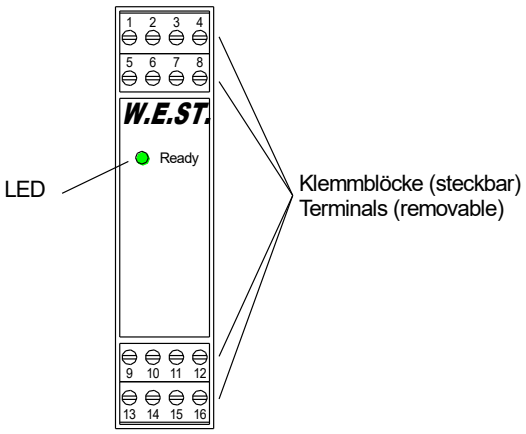
# Features

- **Power amplifier for servo valves**
- **Compact format**
- **Low cost snap in housing**
- **Positive and negative reference voltage provided**
- **Maximum output current can be set in 10 mA steps**
- **Offset adaption**
- **Stepless adjustment of the dither amplitude**

## 2.1 Device description




Typenschild und Anschlussbelegung
Type plate and terminal pin assignment



# 3 Use and application

## *3.1 Installation instructions*

- This module is designed for installation in a shielded EMC housing (control cabinet). All cables which lead outside must be screened; complete screening is required. It is also a requirement that no strong electro-magnetic interference sources are installed nearby when using our open and closed loop control modules.

- **Typical installation location:** 24 V control signal area (close to PLC)
  The devices must be arranged in the control cabinet so that the power section and the signal section are separate from each other.
  Experience shows that the installation space close to the PLC (24 V area) is most suitable. All digital and analogue inputs and outputs are fitted with filters and surge protection in the device.

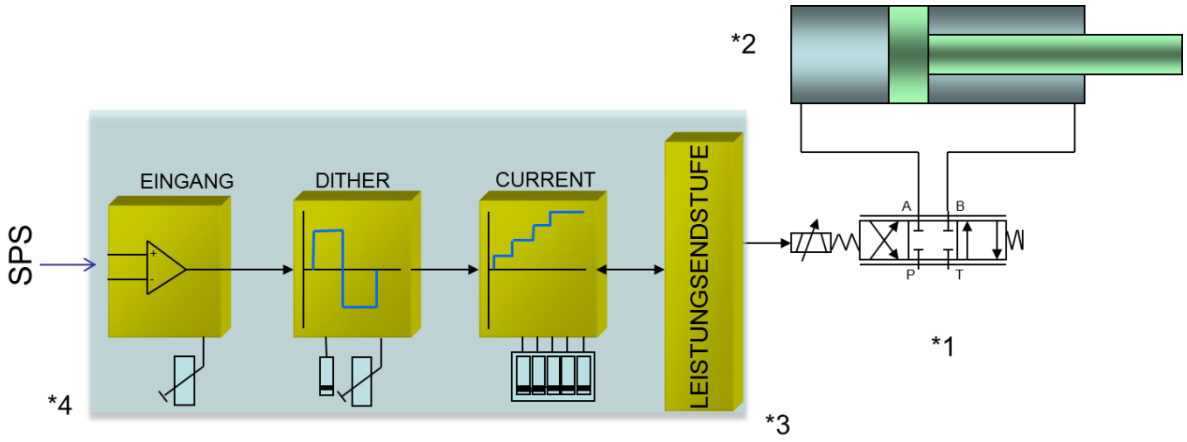
- The module should be installed and wired in accordance with the documentation bearing in mind EMC principles. If other consumers are operated with the same power supply, a star-connected ground wiring scheme is recommended. The following points must be observed when wiring:
  - The signal cables must be laid separately from power cables.
  - Analogue signal cables **must be screened**.
  - All other cables must be screened if there are powerful interference sources (frequency converters, power contactors) and cable lengths > 3 m. Inexpensive SMD ferrites can be used with high-frequency radiation.
  - The screening should be connected to PE (PE terminal) as close to the module as possible. The local requirements for screening must be taken into account in all cases. The screening should be connected to at both ends. Equipotential bonding must be provided where there are differences between the connected electrical components.
  - With longer lengths of cable (>10 m) the diameters and screening measures should be checked by specialists (e. g. for possible interference, noise sources and voltage drop). Particular care is required with cables of over 40 m in length – the manufacturer should be consulted if necessary.

- A low-resistance connection between PE and the mounting rail should be provided. Transient interference is transmitted from the module directly to the mounting rail and from there to the local earth.
- Power should be supplied by a regulated power supply unit (typically a PELV system complying with IEC364-4-4, secure low voltage). The low internal resistance of regulated power supplies gives better interference voltage dissipation, which improves the signal quality of high-resolution sensors in particular. Switched inductances (relays and valve coils) connected to the same power supply must always be provided with appropriate overvoltage protection directly at the coil.

## 3.2 Typical system structure

This minimal system consists of the following components:

(*1) servo valve
(*2) hydraulic cylinder
(*3) servo amplifier SV-300
(*4) interface to PLC




## 3.3 Method of operation

This power amplifier will be controlled via an analogue signal (from the SPS, from a joystick or a potentiometer).

The output current is controlled and its value is parameterized by the internal DIL switches. The polarity of the output signal depends on the polarity of the input signal.

The zero position will be set with an offset potentiometer.

An optionally necessary dither signal can be defined by another potentiometer and will be added to the output signal. Its frequency can be chosen by one of the DIL switches.

## 3.4 Commissioning

| Step | Task |
|---|---|
| Installation | Install the device in accordance with the circuit diagram. Ensure it is wired correctly and that the signals are well shielded. The device must be installed in a metal protective housing (control cabinet or similar). |
| Switching on for the first time | Ensure that no unwanted movement is possible in the drive (e. g. switch off the hydraulics). Connect an ammeter and check the current consumed by the device. If it is higher than specified, there is an error in the cabling. Switch the device off immediately and check the cabling. |
| Pre-parameterization | Now set up the following parameters (with reference to the system design and circuit diagrams):<br>The output current and the typical valve parameter such as DITHER and OFFSET.<br>Pre-parameterization is necessary to minimize the risk of uncontrolled movements. |
| Control signal | Check the control signal with an ampere meter. |
| Switching on the hydraulics | The hydraulics can now be switched on. |
| Optimize controller | Now optimize the remaining parameters according to your application and your requirements. |

# 4 Technical description

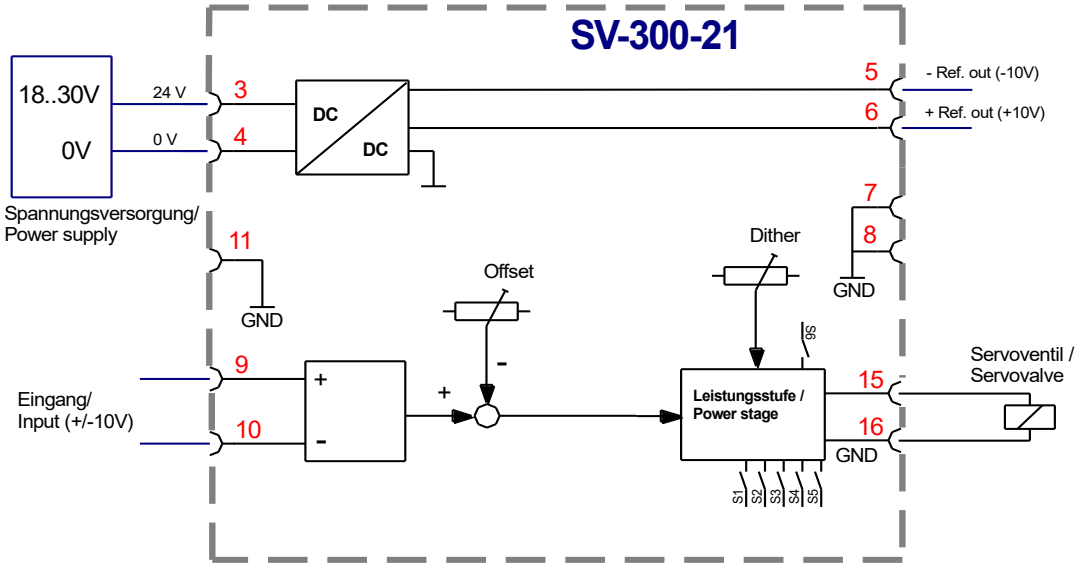
## 4.1 Input and output signals

| Connection | Supply |
|---|---|
| PIN 3 | Power supply (see technical data) |
| PIN 4 | 0 V (GND) Power supply (ground). |
| **Connection** | **Analogue signals** |
| PIN 9 / 10 | Command (input) signal (W), range +/-100 % corresponds with +/-10 V. |
| PIN 5 | Reference output voltage (-10 V). |
| PIN 6 | Reference output voltage (+10 V). |
| PIN 7 / 8 / 11 | 0 V (GND) for the signal in- and outputs |
| **Connection** | **Output signal** |
| PIN 15 / 16 | **Current output**:<br>Output for controlling valve. |

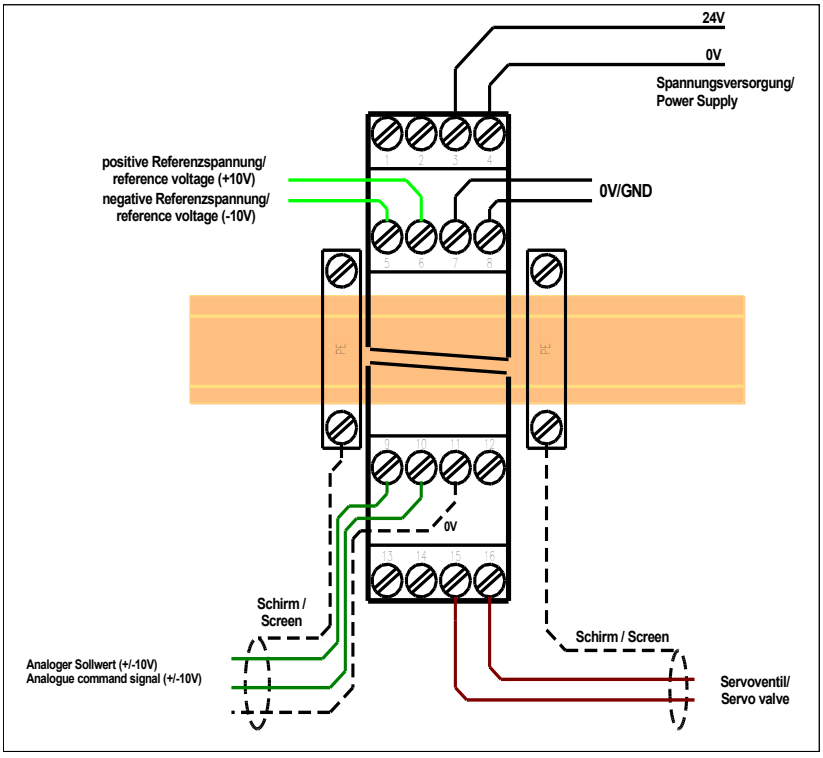
## 4.2 LED definitions

| LEDs | Description of the LED function |
|---|---|
| GREEN | **OFF:** No power supply.<br>**ON:** System is ready for operation. |

## 4.3 Circuit diagram




## 4.4 Typical wiring



## 4.5 Technical data

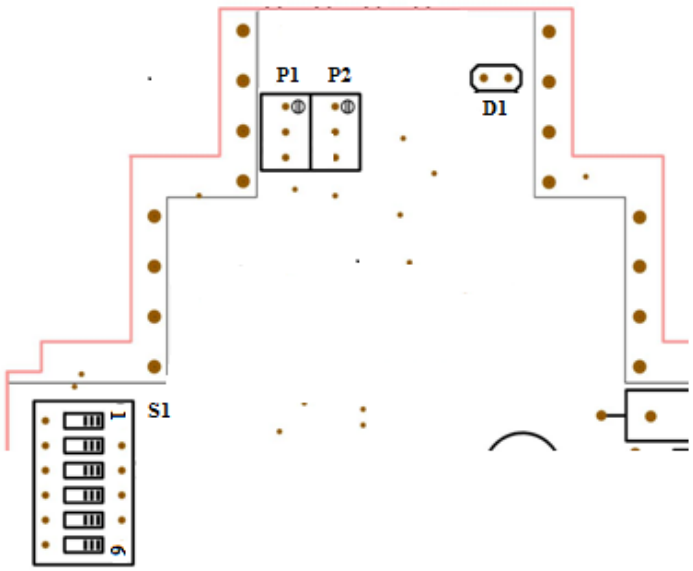
| | | |
|---|---|---|
| Power supply<br>Current consumption | **[VDC]**<br>**[mA]** | 18… 30 (incl. ripple)<br>400 |
| Reference voltage | **[V]** | 10 ( maximum 10 mA)<br>-10 ( maximum 10 mA) |
| Analogue inputs<br>Limit frequency | **[V]**<br>**[Hz]** | ±10 / 0… 10; 100 kΩ<br>140 |
| Output current to valve<br>Maximum resistance | **[mA]**<br>**[Ω]** | +/- 10 up to 300<br>25 (using maximum current) |
| Dither frequency<br>Dither amplitude | **[Hz]**<br>**[%]** | 100 / 250 (selectable)<br>0… 15 |
| Housing | | Snap-On Module EN 50022<br>Polyamide PA 6.6<br>Combustibility class V0 (UL94) |
| Protection class<br>Temperature range<br>Storage temperature<br>Humidity | <br>**[°C]**<br>**[°C]**<br>**[%]** | IP20<br>0… 50<br>-20 …70<br><95 (not condensing) |
| Connections | | 4 x 4pol. screw terminals<br>PE: direct via DIN rail |
| Weight | **[kg]** | 0.170 |
| EMC | | EN 50082-2<br>EN 50081-1 |

# 5 Parameters

## 5.1 Parameter list

| Parameter | Default | Unit | Description |
|---|---|---|---|
| CURRENT | 0 | mA | Current range/maximum current |
| DITHERFREQUENCY | 100 | Hz | Frequency of the dither signal |
| DITHERAMPLITUDE | 5 | % | Amplitude of the dither signal |
| OFFSET | 0 | % | Zero point settings |

## 5.2 Positions of the potentiometers and DIL switches



## 5.3 Parameter description

### 5.3.1 CURRENT (Current range/maximum current)

| S1.1 | S1.2 | S1.3 | S1.4 | S1.5 | Output current |
|---|---|---|---|---|---|
| ON | OFF | OFF | OFF | OFF | 10 mA |
| OFF | ON | OFF | OFF | OFF | 20 mA |
| ON | ON | OFF | OFF | OFF | 30 mA |
| OFF | OFF | ON | OFF | OFF | 40 mA |
| ON | OFF | ON | OFF | OFF | 50 mA |
| OFF | ON | ON | OFF | OFF | 60 mA |
| ON | ON | ON | OFF | OFF | 70 mA |
| OFF | OFF | OFF | ON | OFF | 80 mA |
| ON | OFF | OFF | ON | OFF | 90 mA |
| OFF | ON | OFF | ON | OFF | 100 mA |
| ON | ON | OFF | ON | OFF | 110 mA |
| OFF | OFF | ON | ON | OFF | 120 mA |
| ON | OFF | ON | ON | OFF | 130 mA |
| OFF | ON | ON | ON | OFF | 140 mA |
| ON | ON | ON | ON | OFF | 150 mA |
| OFF | OFF | OFF | OFF | ON | 160 mA |
| ON | OFF | OFF | OFF | ON | 170 mA |
| OFF | ON | OFF | OFF | ON | 180 mA |
| ON | ON | OFF | OFF | ON | 190 mA |
| OFF | OFF | ON | OFF | ON | 200 mA |
| ON | OFF | ON | OFF | ON | 210 mA |
| OFF | ON | ON | OFF | ON | 220 mA |
| ON | ON | ON | OFF | ON | 230 mA |
| OFF | OFF | OFF | ON | ON | 240 mA |
| ON | OFF | OFF | ON | ON | 250 mA |
| OFF | ON | OFF | ON | ON | 260 mA |
| ON | ON | OFF | ON | ON | 270 mA |
| OFF | OFF | ON | ON | ON | 280 mA |
| ON | OFF | ON | ON | ON | 290 mA |
| OFF | ON | ON | ON | ON | 300 mA |

With the DIL switches on S1 the nominal output current for 100% command signal is parameterized. The valence doubles up from 10 mA for S1.1 to 160 mA for S1.5. That allows setting the output current in steps of 10 mA. The table above offers an overview for easy finding the switch settings for the wanted current value.

### 5.3.2 DITHER frequency

| Parameter | Switch | Choice | Unit |
|---|---|---|---|
| Frequency switching | DIL 1.6 | 100 or 250 | Hz |

Via this DIL switch the frequency of the optional added dither signal is set.
Default setting is OFF so that the preset frequency is 100 Hz.
Switching DIL 1.6 ON changes the dither frequency to 250 Hz.

### 5.3.3 DITHER amplitude

| Parameter | Potentiometer | Range | Unit |
|---|---|---|---|
| Setting amplitude | P2 | 0… 15 | % |

This potentiometer provides the parameterizing of the amplitude of the dither signal.
The adjusted value is in percent relating to the nominal output current. The dither signal is deactivated if the potentiometer is in leftmost position.

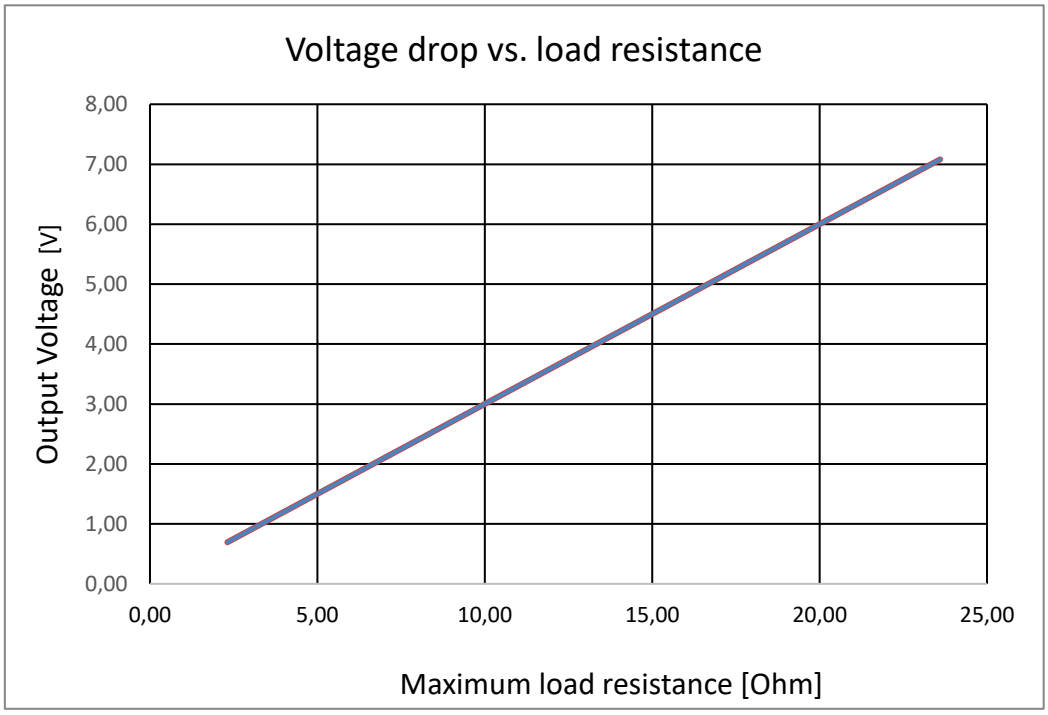
### 5.3.4 OFFSET

| Parameter | Potentiometer | Range | Unit |
|---|---|---|---|
| Zero point setting | P1 | -6,5 to 6,5 | % |

This setting allows the adjustment of the zero point of the amplifier in case of avoiding unmeant controlling or compensating dead bands.

# 6 Output characteristics

## *6.1 Working range (maximum load resistor)*




## *6.2 Working range (with maximum output current)*



# 7 Notes