

Technical Documentation

DSG-164

Demand signal module



*Electronics
Hydraulics meets
meets Hydraulics
Electronics*

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1 General Information

1.1 Order number

DSG-164 - digital demand signal module with adjustment via potentiometer. 4 values adjustable between -10V and +10V and selectable by digital inputs.

Alternative products

DSG-111-U - digital demand signal module with ± 10 V differential output or 4... 20 mA output, analogue input, bit pattern inputs for recalling 16 preset command values and linking functionality for the inputs.

DSG-111-P - digital demand signal module with 16 programmable values selectable by digital inputs, integrated power stage, ramp function and additional analogue input with mathematic functionality.

PAM-199-P - digital power amplifier for proportional directional, pressure or throttle valves with analog command signal input

1.2 Scope of supply

The scope of supply includes the module plus the terminal blocks which are a part of the housing.

The Profibus plug, interface cables and further parts which may be required should be ordered separately.

This documentation can be downloaded as a PDF file from www.w-e-st.de.

1.3 Accessories

WPC-300 - Start-Up-Tool (downloadable from our homepage – products/software)

1.4 Symbols used



General information



Safety-related information

1.5 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.

1.6 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

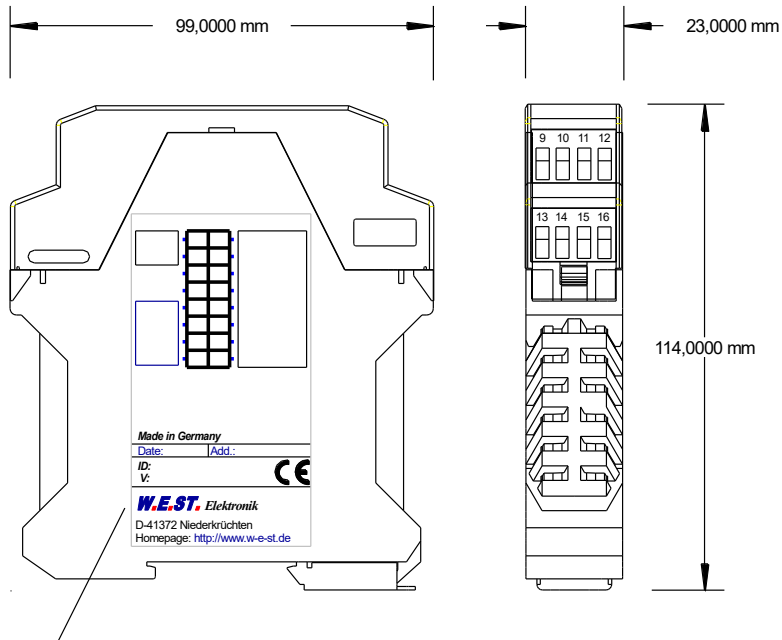
This module is a digital demand value device. Via four digital inputs the corresponding values set by each potentiometer can be given to the output. As reference voltage for the potentiometers either the generated reference voltage of the module can be used or an external supply. Another digital input allows switching the polarity of the output signal. Always only one value can be active. If more than one input is activated, the numeric highest one is active. If there is no input activated, an external signal can be connected through to the output.

Typical applications: analogue creating of demand values by digital inputs.

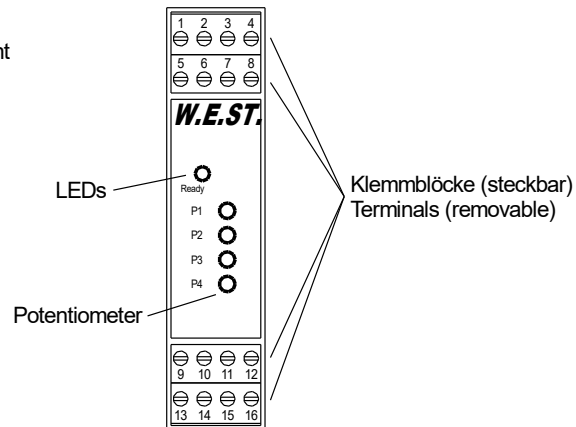
Features

- Demand values setting by potentiometers
- Digital selecting of the values
- Differential output with polarity switching
- Reference voltage output
- Cascadable
- Low cost snap in housing

2.1 Device description



Typenschild und Anschlussbelegung
Type plate and terminal pin assignment



3 Use and application

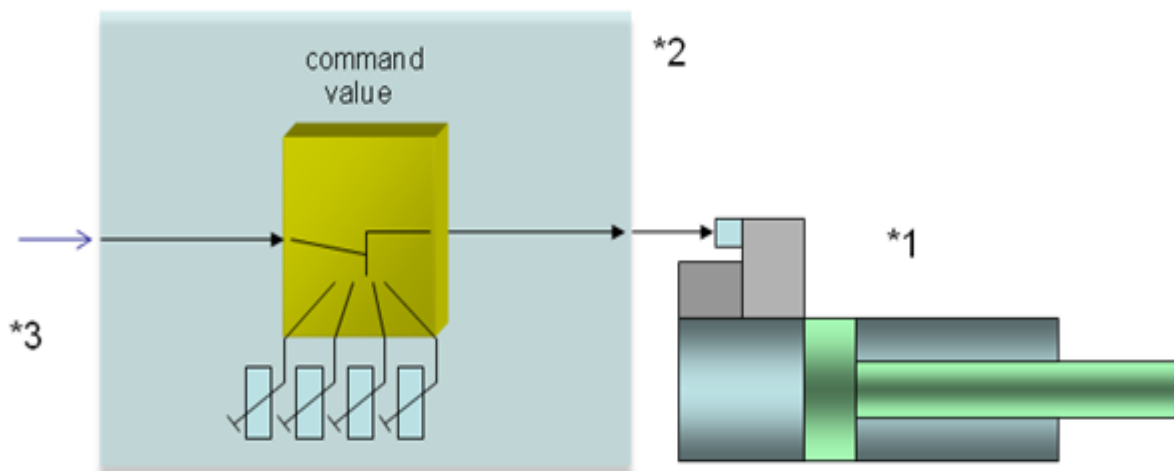
3.1 Installation instructions

- 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:** 24V 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 > 3m. 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) proportional valve
- (*2) demand value module DSG-164
- (*3) interface to PLC with analogue and digital signals



3.3 Method of operation

The demand value module is controlled by four digital inputs (typically from a plc). With those signals one of the demand values is chosen and will be given to the output. Another digital input allows the polarity switching of the output signal. That enables creating positive and negative signals. The demand values are adjusted via the potentiometers in the front of the device. The range of possible values depends on the supply voltage on PIN 11. If using the created reference voltage of PIN 12, values between 0 and 10 V can be adjusted. The value increases by turning the potentiometer clockwise. With the polarity switching input on PIN 5, the value can be switched over from PIN 15 to PIN 16. So the differential output PIN 15/16 provides a negative value in this case.

If more than one digital input gets activated, only the numeric highest one is active. If no digital input is activated, the output (PIN 15 or 16, depending on PIN 5) is connected to PIN 9. This enables a defined output signal in case of running idle.

If module is active (power supply is available) the green LED in the front will glow.

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 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 wiring. Switch the device off immediately and check the wiring.
Pre-parameterization	Now set up the needed demand values and check them with a voltmeter. After that make sure that there is no control signal generated.
Switching on the hydraulics	The hydraulics can now be switched on. The module is not yet generating a signal. Drives should be at a standstill or drift slightly (leave its position at a slow speed).
Activating digital input	CAUTION! Drives can now leave their position and move to an end position at full speed. Take safety measures to prevent personal injury and damage. The hydraulic axis can now be moved via the digital inputs.
Optimize controller	Now optimize the remaining parameters according to your application and your requirements.

4 Technical description

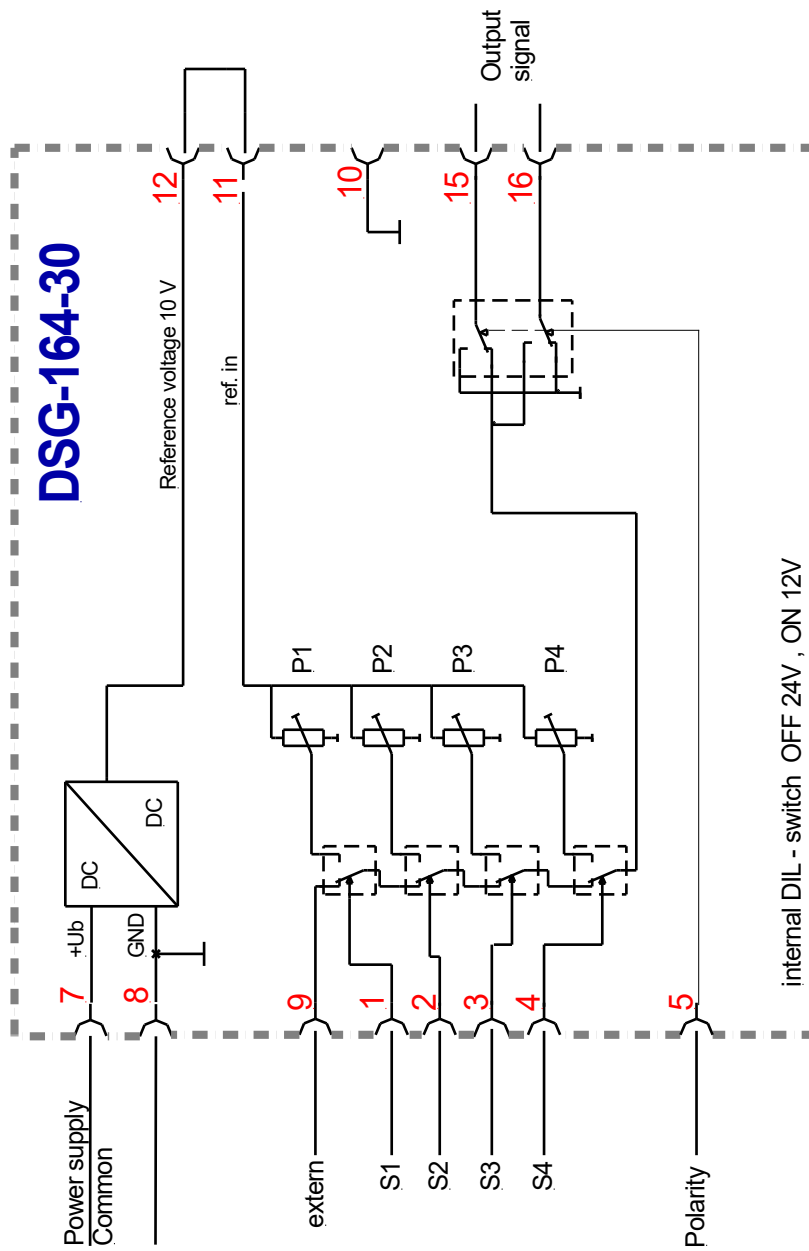
4.1 Input and output signals

Connection	Supply
PIN 7	Power supply (see technical data)
PIN 8	0 V (GND) Power supply (ground).
Connection	Analogue signals
PIN 9	Optional demand value input for idle run.
PIN 10	0 V / GND
PIN 11	Reference voltage input / supply for potentiometers
PIN 12	Reference voltage output, e.g. supply for the potentiometers.
PIN 15 / 16	Differential output (to the valve)
Connection	Digital inputs and outputs
PIN 1 - 4	Digital switching inputs: With activating one of these inputs the corresponding demand value, set by the relating potentiometer, will be given to the output.
Connection	Adapting relay voltage
DIL switches	Depending on the available voltage supply the internal DIL switches should be aligned. 24 V supply, all switches stay OFF, 12 V supply, all switches turning to ON.

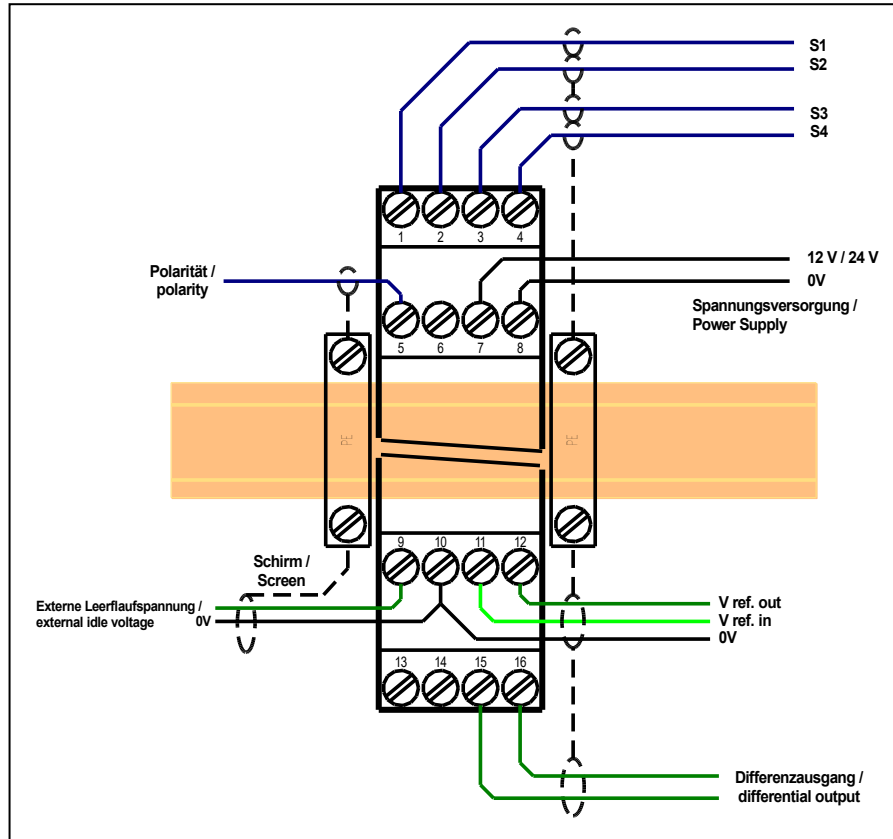
4.2 LED definitions

LEDs	Description of the LED function
GREEN	OFF: No power supply. ON: System is ready for operation.

4.3 Circuit diagram



4.4 Typical wiring



4.5 Technical data

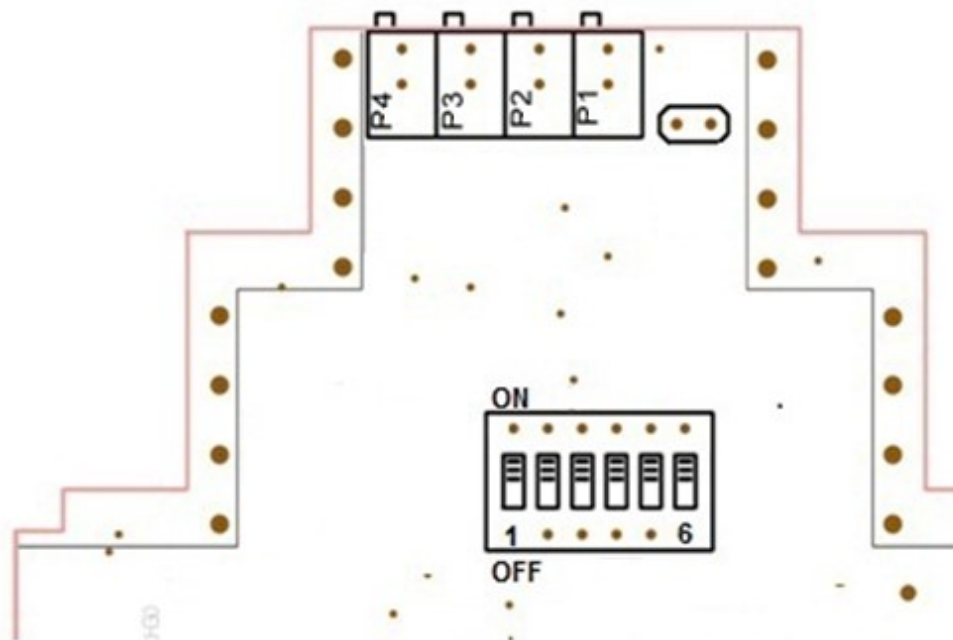
Power supply	[VDC]	12... 30 (incl. ripple)
Power consumption	[W]	Max.2,4
External protection	[A]	1 medium time lag
Reference output		
Voltage	[V]	10
Max. load	[mA]	10
Controlling digital inputs		
	[V]	12 or 24
	[mA]	25
Housing		Snap-on module acc. EN 50022
Material		PA 6.6 polyamide
Flammability class		V0 (UL94)
Weight	[kg]	0,150
Protection class	[IP]	20
Temperature range	[°C]	-20... 60
Storage temperature	[°C]	-20 ...70
Humidity	[%]	< 95 (not condensing)
Connections		
Plug connectors		4 x 4-pole terminal blocks
PE		via the DIN mounting rail
EMC		EN 50082-2 EN 50081-1

5 Parameters

5.1 Parameter list

Parameter	Default	Unit	Description
S1	20	%	Demand value 1 set by potentiometer 1
S2	40	%	Demand value 2 set by potentiometer 2
S3	60	%	Demand value 3 set by potentiometer 3
S4	80	%	Demand value 4 set by potentiometer 4
DIL	24	V	Relay voltage set via DIL switches

5.2 Positions of the potentiometers and the DIL switches



5.3 Parameter description

5.3.1 S (demand values)

Parameter	Potentiometer	Range	Unit
S1	P1	0... 100	%
S2	P2	0... 100	%
S3	P3	0... 100	%
S4	P4	0... 100	%

These parameters/potentiometers are used to adjust the different demand values, which can be controlled by the relating digital inputs. The value will be increased by turning the potentiometer clockwise. The percentage values refer to the used reference voltage for the potentiometers. If for example the internal generated reference voltage of 10V will be used, this is the reference value for 100% signal.

5.3.2 DIL (Relay voltage)

DIL 1 - 6	Value	Unit
OFF	24	V
ON	12	V

These DIL switches are used to adapt the electronics to the available control voltage. If 24V are used for controlling the inputs, all switches should stay OFF. If alternatively only 12V are provided the switches should be turned to ON.



6 Notes