

Digital switching-speed increaser
DIGISPEED DS1/V2

Version 2

englisch



Digitronic Automationsanlagen GmbH

Steinbeisstraße 3 · D - 72636 Frickenhausen · Tel. (+49)7022/40590-0 · Fax -10
Auf der Langwies 1 · D - 65510 Hünstetten-Wallbach · Tel. (+49)6126/9453-0 · Fax -42
Internet: <http://www.digitronic.com> · E-Mail: mail@digitronic.com

For your attention

This instruction manual relates to the DIGISPEED in english. The company Digitronic Automationsanlagen GmbH reserves the right to make changes which present an improvement of the quality or functionality of the device without prior notice. The instruction manual was created with great care, although it may not be error-proof. We would be grateful for any communication relating to any errors you may have found.

UP-date

You can also obtain this instruction manual on the Internet at <http://www.digitronic.com> in the latest version as PDF file.

Qualified personnel

This device may only be started and operated by qualified staff. By qualified we mean personnel who are entitled to handle, to earth and to label devices, systems and power circuits in accordance with the technology safety standards.

Liability

(1) The supplier is liable for damages caused by himself or by the owner of the rights up to the sum of the sales price. He is not liable for loss of profits, forfeited savings, intermediate and successive damages.

(2) The above mentioned limits to liability do not apply to insurance of named characteristics and damages which were caused deliberately or through negligence.

Protection

The DIGISPEED and this instruction manual are protected by copyright. All rights are reserved. Neither the DIGISPEED, nor this document may be copied as a whole or partially, photocopied, reproduced, translated or transferred to electronic media of any kind or into machine readable format without prior written permission by the company Digitronic Automationsanlagen GmbH.

Note: We have examined the devices of the DIGISPEED series for year 2000 compatibility and have not found any adverse effects on any functions.

Note: DIGISPEED is a registered trademark of the company Firma Digitronic Automationsanlagen GmbH.(c) Copyright 1992 - 2004 / Datei: DS_V2E.DOC

Digitronic Automationsanlagen GmbH
Auf der Langwies 1
D-65510 Hünstetten - Wallbach
Tel. (+49)6126/9453-0
Fax. (+49)6126/9453-42

Internet: <http://www.Digitronic.com>
E-Mail: mail@digitronic.com

Inhaltsverzeichnis

1. Introduction:	4
2. Attributes:	4
3. Functional mode	5
3.1. 3.1.Switching behaviour of switching links with flywheeling diods	5
3.2. Behaviour of switching links with DIGISPEED during switching on or off.....	6
4. Switching modes in DIGISPEED	7
4.1. Switching mode 1 (factory preset)	7
4.2. Switching mode 2.....	8
4.3. Switching mode3.....	9
4.4. Switching mode4.....	10
4.5. Configuration of the switching-modes at DIGISPEED DS1/V2.....	11
5. Commisioning	11
5.1. The status LEDs	12
6. Recovery time for the DIGISPEED-DS2	12
7. Terminal allocartion.....	13
8. Examples for connection.....	13
9. Dimensions	14
10. Technical Data	14

1. Introduction:

All magnetically influenced switching links e.g. magnetic valves or relais undergo a certain switching delay. This delay consist of the following coefficients:

1. the time, needed to establish the magnetic field,
2. the time, needed to overcome inertia,
3. the time, needed to dismantle the magnetic field when switching off.

To accelerate the establishment of the magnetic field and thereby to shorten the switching time of a switching link during the process off switching on, DIGISPEED gives an overload impulse up to 100 Volt onto the switching link's coil. By this over-energizing the magneticfield in the coil will be increased, which causes a quicker overcoming of inertia. During the process of switching of flywheeling diods cause a dely of the decreasing magnetic field. It is not possible to renounce them for reasons of protection against malfunctions. This increases the time required for switching of essentially. DIFGISPEED accelerates the dismantleling of the magnetic fieldusing a flywheel-circle of -26V DC and causes a decreasing switching-off time.

Result: By time-interval controlled overload-impulsesin connection with the regulationof the flywheel-voltage to -56V DC the DIGISOFT causes magnetically influenced switching links to work with tenth the speed.

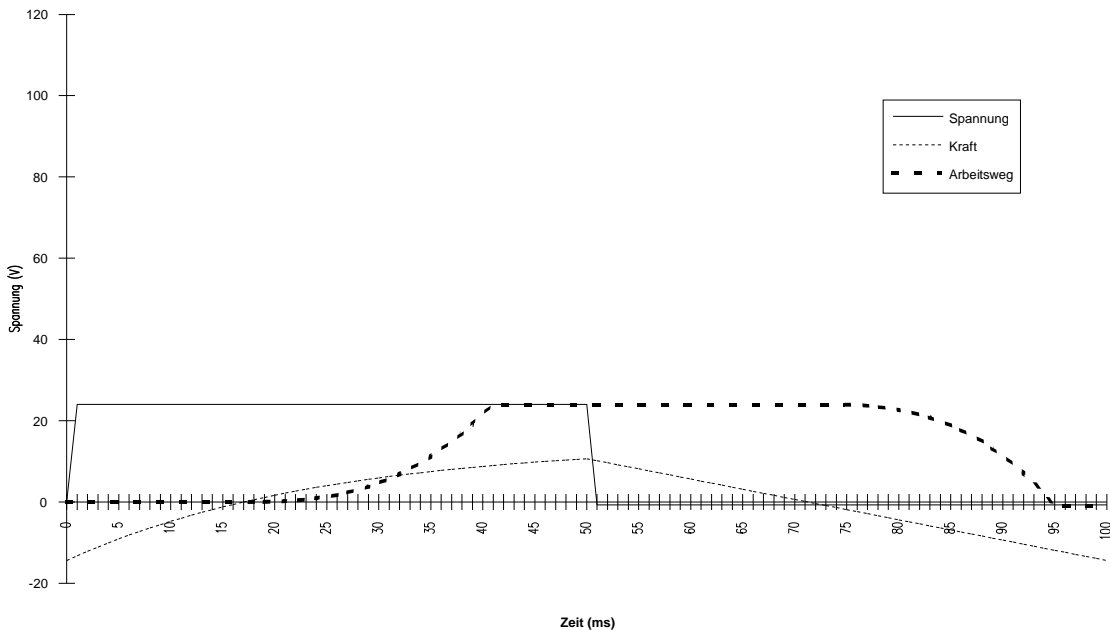
2. Attributes:

- * Microprocessor controlled perfomance-electricity for an exccat reproducible switching behaviour.
- * Version with two channels
- * short circuit resistant
- * two aditional inputs for parametering the overload impulse
- * LED Statusdisplay for in- and outputs
- * Short recovery times for the overload-impulse
- * high overenergizing voltage of up to 100V DC for a quick swiching on
- * high flywheel-voltage of -56V DC for quick switching off
- * galvanical separtion of the inputs
- * for switching devices up to 2 x 24 Watt appropriated (2 x 1 Ampere costantcurrent)
- * 24V DC $\pm 20\%$ Power supply without additional external power.
- * 30mm lank case made of Thermoplast-synthetics.
- * Case with comfortable snap-on assembling.
- * Simple adjusting of the cases in a row

3. Functional mode

3.1. 3.1. Switching behaviour of switching links with flywheeling diods

Normally magnetical switching links are switched on simply by connecting them to 24V DC. In the diagram shown here, this is done at the time of 0ms. The inductivity causes a slow establishing of the magnetic field and therefore a slow establishing of the magnetic force. At the time of 17ms the magnetic force is established as far as it is able to antagonize the spring's force. Now the switching movement is initialized. This is finished at 41ms. At the moment of 50ms the procedure of switchingboff begins. The built in flywheeling diod causes a flywheeling voltage of -0.7V DC so that the flywheeling current de-establishes the magnetic field slowly. At 71 ms, the spring's force is greater than the magnetic force, so that the switching-off movement is initiated, which finishes at 95ms.



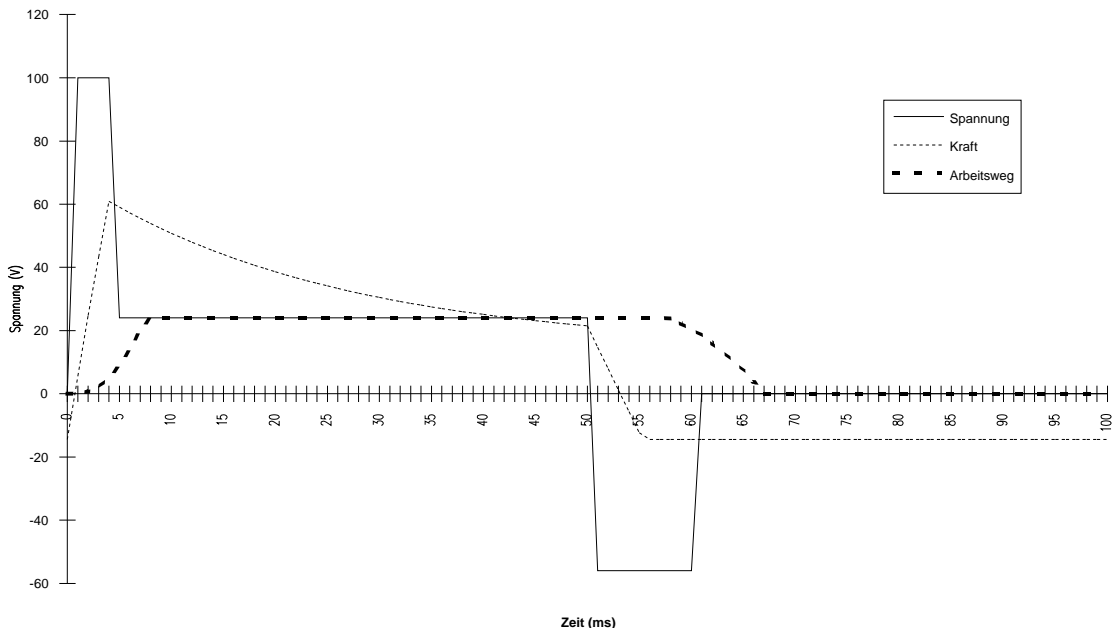
Spannung = voltage; Kraft = force; Arbeit = work

3.2. Behaviour of switching links with DIGISPEED during switching on or off

Being switched on DIGISPEED gives an overload impulse up to 100V DC to an adjusted time (here 5ms) upon the switching link's coil. By this over-energizing the magnetic field is established in a quarter of the time and has four times the force for a short time. The overcoming of the spring's force is done earlier (here at 1ms) and the switching-movement is finished earlier (in this case at 8ms), since the magnetic force is stronger. For not overloading the switching device, the over-energizing should be finished at at least the end of the switching movement (here at 5ms).

The switching off is done at the moment of 50ms. without flywheeling iode the flywheeling current is set to -56V DC by the DIGISPEED. This enables de-establishing the magnetic force very quickly. At 53ms the spring's power has allready overcome the magnetic force so that the switching off movement can be initialized. At 67ms it is allready finished.

Important: To use the regulated flywheeling-circle's effects every connected relais or switching link has to be used **without** flywheeling diode!! The flywheeling current is set to -56V DC constantly and can not be externally changed. A further increase of flywheeling current does not lead to better results in most cases.



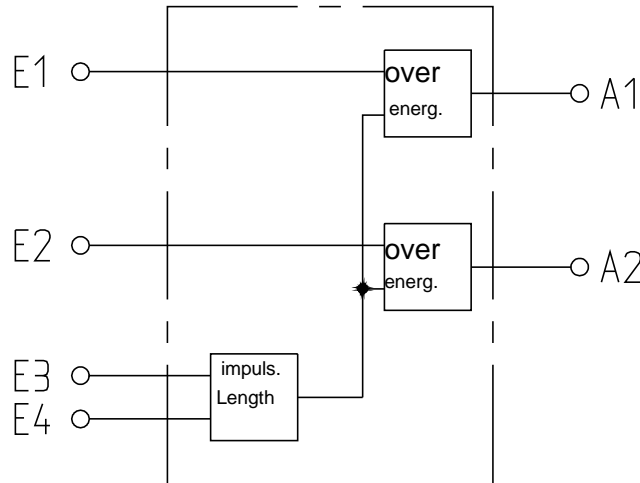
Spannung = voltage; Kraft = force; Arbeit = work

4. Switching modes in DIGISPEED

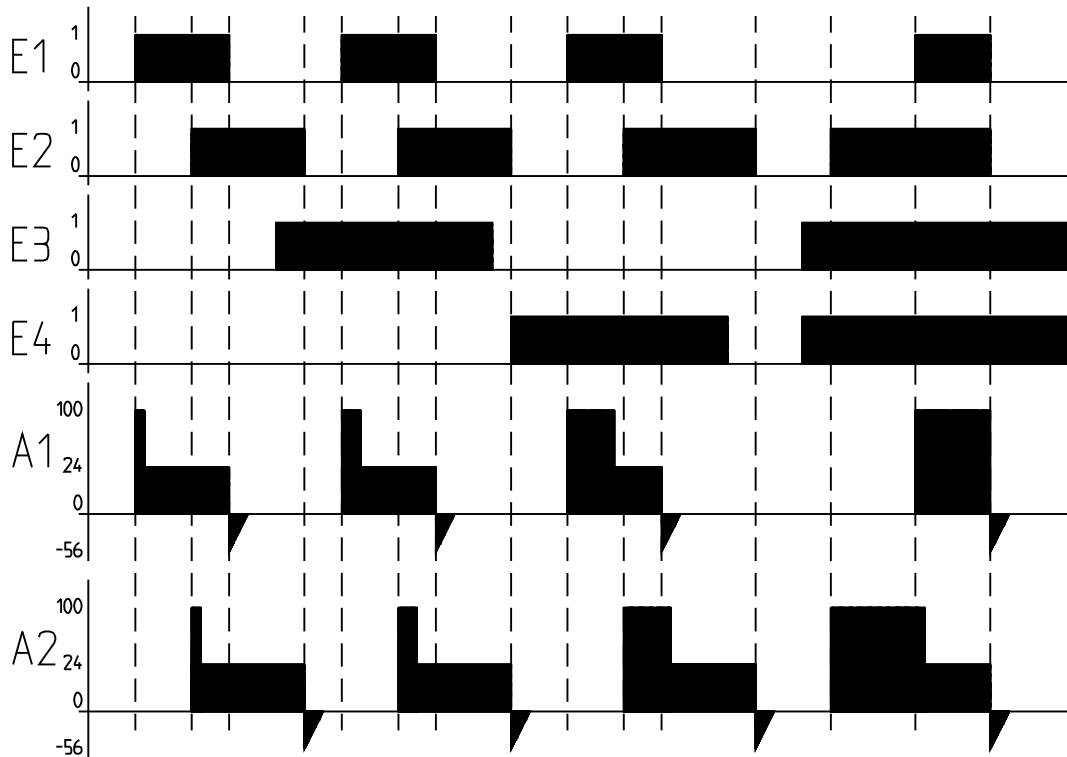
DIGISPEED can be programmed for four types of Logic-behaviour. This gives the user the possibility to process time-critical Logic-function out of an PLC-control.

4.1. Switching mode 1 (factory preset)

Switching mode 1 is the DIGISPEED's standard mode.



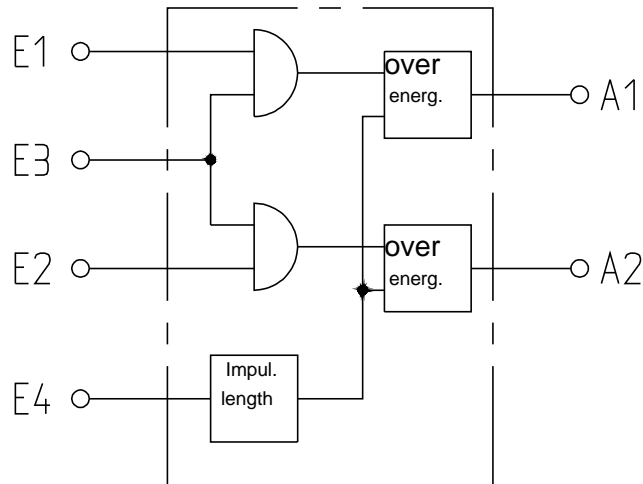
Time-Diagram:



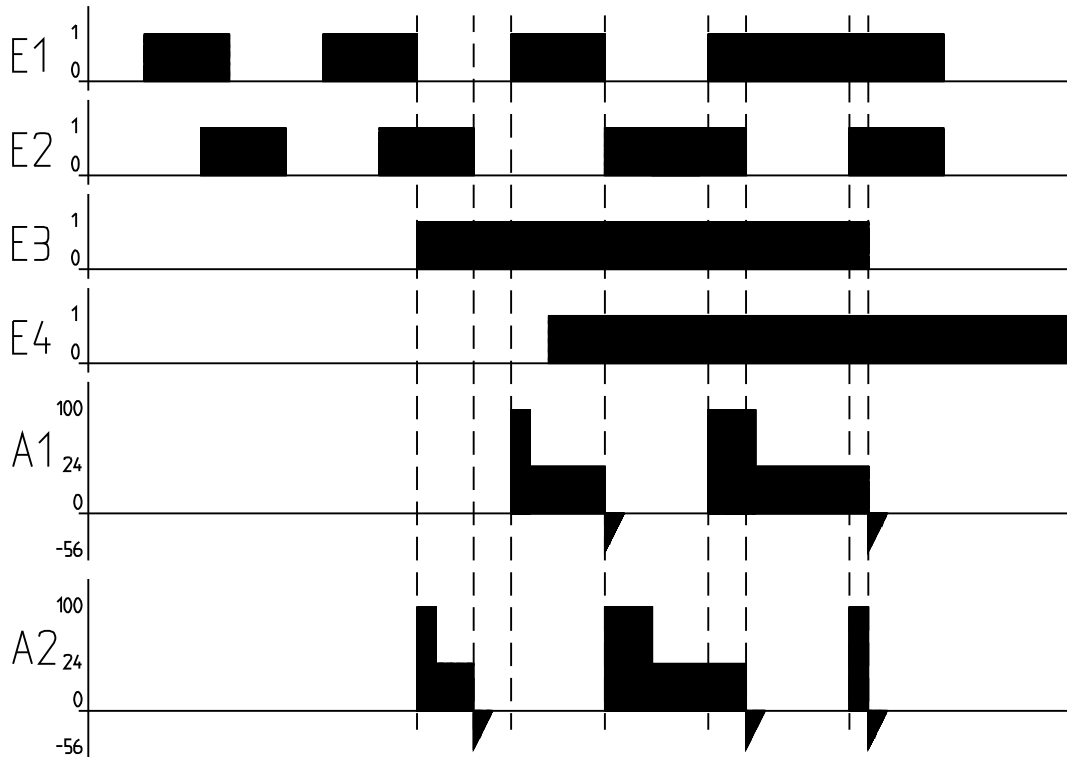
Input 3	Input 4	Duration of the overenergizing impulse
0 VDC	0 VDC	1 ms
+24 VDC	0 VDC	2 ms
0 VDC	+24 VDC	5 ms
+24 VDC	+24 VDC	10 ms

4.2. Switching mode 2

Switching mode 2 includes an enabling - input E3 (AND - Linkage).



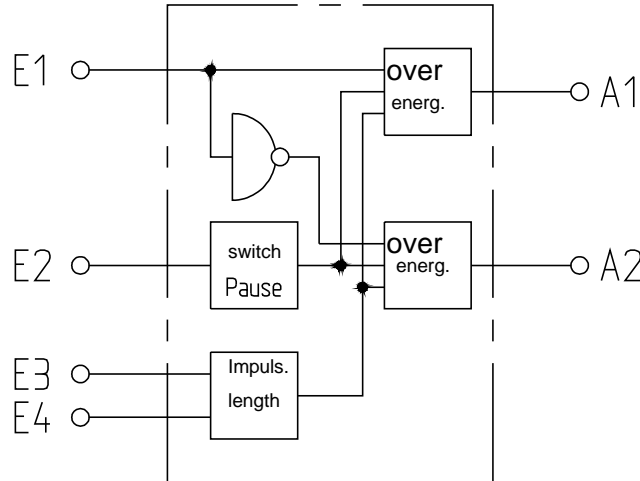
Time-Diagram:



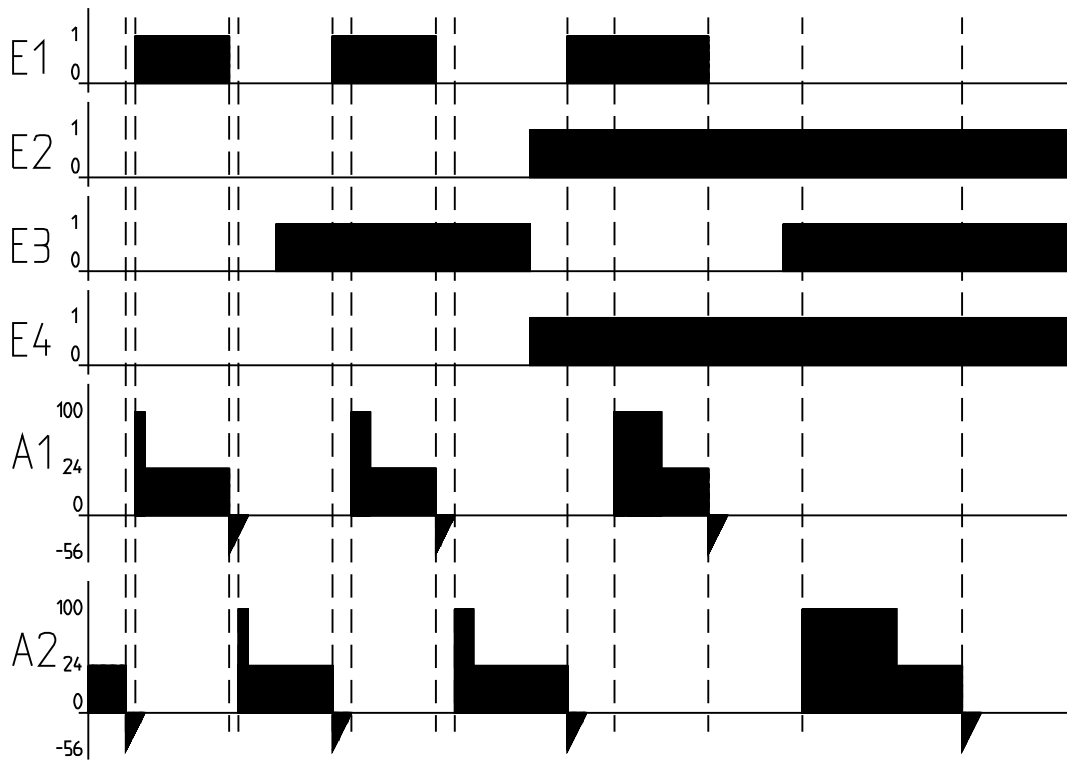
Input 4	Duration of the overenergizing impulse
0 VDC	2 ms
+24 VDC	5 ms

4.3. Switching mode3

Switching mode 3 was designed specially for magnetic double-coils (drive elements).



Time-Diagram:



Input 3	Input 4	Ü-Zeit *
0 VDC	0 VDC	1 ms
+24 VDC	0 VDC	2 ms
0 VDC	+24 VDC	5 ms
+24 VDC	+24 VDC	10 ms

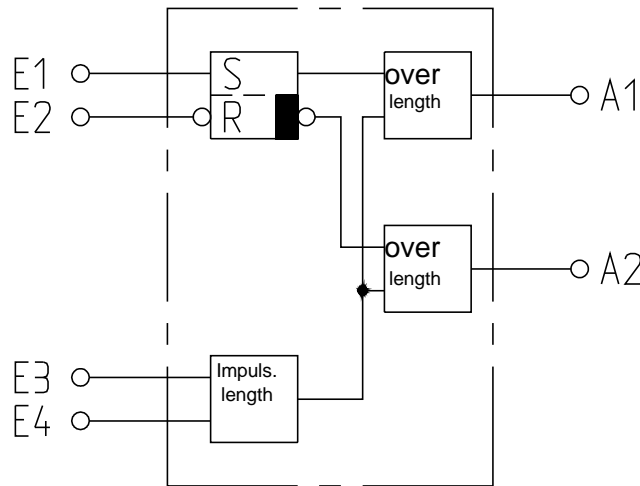
Input 2	Pause**
0 VDC	Ü-Zeit* x 2
+24 VDC	Ü-Zeit* x 1

*Ü-Zeit: Duration of the over-energizing impulse

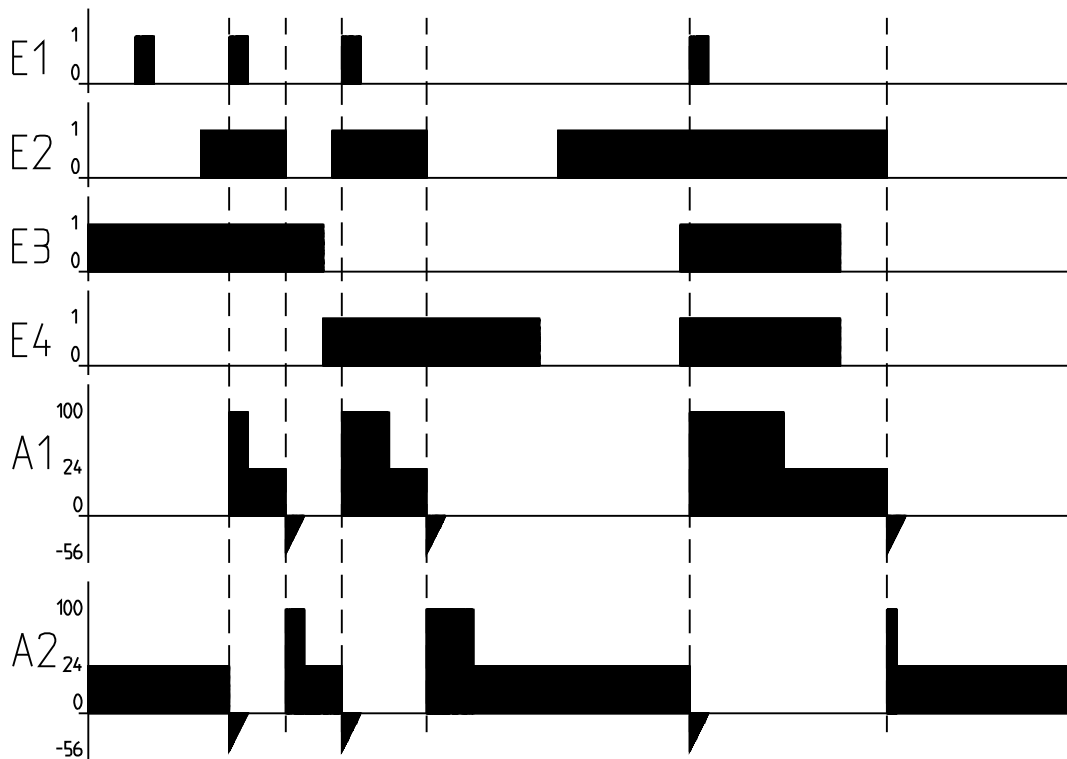
**Pause: Time between the switching off of coil 1 and the switching on off coil 2 or vice versa. It can be calculated by multiplying the Ü-Zeit with 2 or 1.

4.4. Switching mode4

Switching mode 4 includes an SR - Flipflop - Logic (SET-RESET-Logic) with broken-wire security for the reset input.



Time-diagram:



Input 3	Input 4	Duration of the over-energizing impulse
0 VDC	0 VDC	1 ms
+24 VDC	0 VDC	2 ms
0 VDC	+24 VDC	5 ms
+24 VDC	+24 VDC	10 ms

4.5. Configuration of the switching-modes at DIGISPEED DS1/V2

To set a switching-mode of the DIGISPEED use the switches DIP1 and DIP2 of the fourfold DIP - Switch. It is located behind the drilling in the transparent sheet on the device's right side.



To adjust the dip-switch use a small screwdriver or an bent paper clip.

switching-mode	DIP 1	DIP 2	DIP 3	DIP 4
1	off	off	off	off
2	on	off	off	off
3	off	on	off	off
4	on	on	off	off

Note: The configuration of the DIP-switches 3+4 must not be changed, both have to be set to OFF.

5. Commissioning

The device is snapped onto the "EN carrier rail" in the switchboard (see chapter "9. Dimensions" on page 14). Through the grounded assembly board and its electrical connection to the EN carrier rail, the disturbances are optimally grounded onto the cover. All cable connections have to be realized in a cold state. Connect the DIGISPEED at first with the shortest possible over-energizing-time (run relays or switching devices **without** flywheeling diode) and switch on the device. Increase the overenergizing time in small steps (regarding the recovery time) until no further improvement of switching behaviour can be detected. Then switch back to the last overenergizing time with a detectable improvement of the switching behaviour. To run the unit with a higher load does not make any sense since it only causes a quicker using up. An optimal adjusted over-energizing time on the contrary will cause no using up above average.

Attention: The connection to a lightbulb, an ohmic consumer, a valveplug with built in LED or Zener-Diode at the output of the DIGISPEED is not allowed and can cause the destruction of the device.



Interrupting the connection between the DIGISPEED and a switching-link while being under load can also cause the device's destruction. Try to avoid absolutely a contact-switching or a connection that could be interrupted while being under load.

If this is not possible, a protection-switch has to be created at the switching-link.

For its very high switching performance, the DIGISPEED is not resistant against short circuits. Therefore take care to do the complete commissioning in cold state.

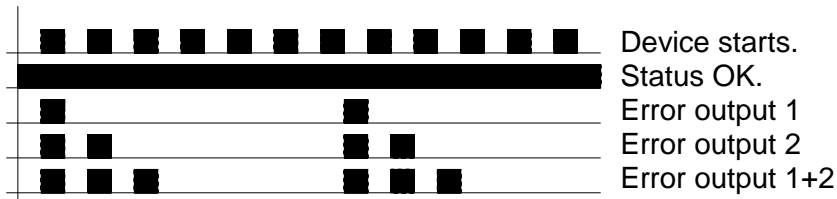
5.1. The status LEDs

The DIGISPEED is equipped with 7 status LEDs, that light the terminal allocation under the transparent sheet from behind. For every LED a specific symbol was printed on the connection allocation.

Four LEDs show the actual status of the inputs. These are: **Inp.1**, **Inp. 2**, **Cfg. 1** and **Cfg. 2**.

Two more LEDs show the actual status of the outputs. These are: **Out. 1** and **Out. 2**.

The last LED named **Pow.** displays the devices status.



6. Recovery time for the DIGISPEED-DS2

The recovery time for the DIGISPEED-DS2 is needed for the continuous recharging of the condenser to create the overload amplifier impulse, since after every initiation of such a surge impulse, the condenser has to recharge itself first. This means, that between two consecutive overload amplifier impulses, you have to wait for at least the time given in the table below.

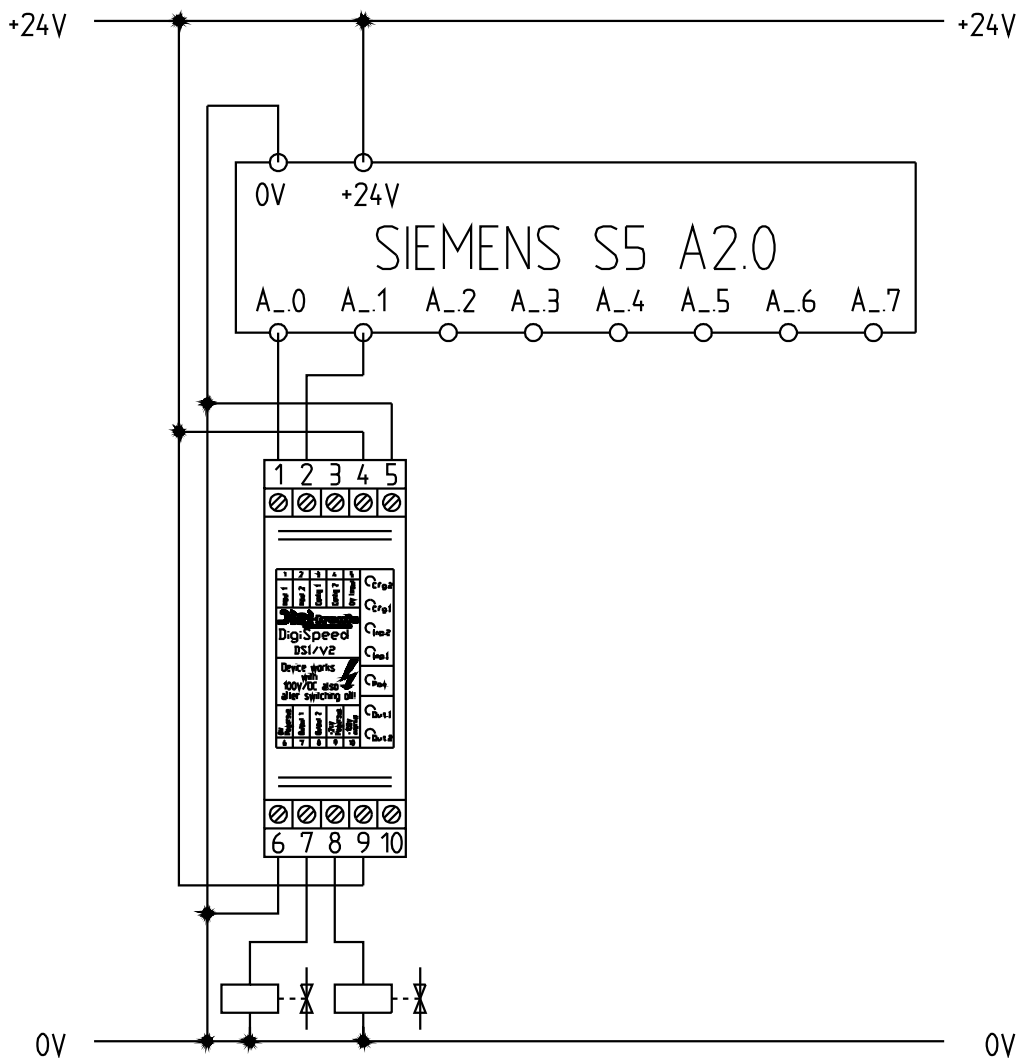
Current (mA)	Ü-Zeit* 1 ms	Ü-Zeit* 2 ms	Ü-Zeit* 5 ms	Ü-Zeit* 10 ms
100	4 ms	8 ms	20 ms	40 ms
200	8 ms	16 ms	40 ms	80 ms
300	12 ms	24 ms	60 ms	120 ms
400	16 ms	32 ms	80 ms	160 ms
500	20 ms	40 ms	100 ms	200 ms
600	24 ms	48 ms	120 ms	240 ms
700	28 ms	56 ms	140 ms	280 ms
800	32 ms	64 ms	160 ms	320 ms
900	36 ms	72 ms	180 ms	360 ms
1000	40 ms	80 ms	200 ms	400 ms

*Ü-Zeit: Duration of the over-energizing impulse

7. Terminal allocation

Terminal 1	=	input 1
Terminal 2	=	input 2
Terminal 3	=	configuration 1 (input 3)
Terminal 4	=	configuration 2 (input 4)
Terminal 5	=	0V for inputs
Terminal 6	=	0V for supply voltage
Terminal 7	=	output 1
Terminal 8	=	output 2
Terminal 9	=	+24V DC $\pm 20\%$ supply voltage (a minimum of 5.0 Amp.)
Terminal 10	=	Do not connect! (for the internal condensers discharging only)

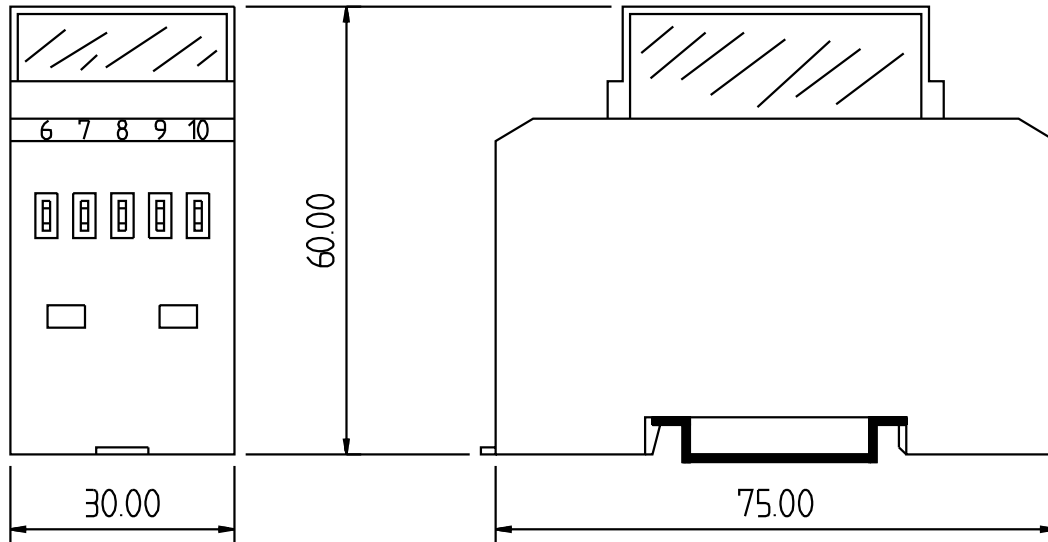
8. Examples for connection



Note:

The picture shows an DIGISPEED DS1/V2, set to 5ms over-energizing time without galvanical separation at an S5-PLC.

9. Dimensions



10. Technical Data

DisplayAnzeigen.....	7 LED for status: 4x inputs, 1x state of service 2x outputs+
Supply voltage.....	24V DC $\pm 20\%$, min. 5 Amp.
Current input.....	max. 8A top-current in the moment of switching
Number of inputs.....	4 programmable inputs, galvanically separated 4 standard-programs
.....	Example: 2 switching inputs 2 inputs which determine the time-interval of the overload-impulse.
Input voltage.....	active 16-30V DC, passive 0-3V DC
Input resistor.....	2,2k Ω -2,5k Ω
Number of outputs.....	2
Overload-impulse.....	100V DC, Note: The overload in the device is de-established during one minute after switching off the device.
Duration of the overload impulse.....	may be programed.
Flywheel voltage.....	-56V DC.
Output voltage.....	Supply voltage -1V at 1A permanent current. (bei 24V DC min. 23V DC)
Output current.....	1A permanent current per output, resistant against short circuits
Delay times.....	max. 100 μ s
Recovery times.....	see chapter recovery times
Cover.....	hardly ignitable Thermoplast plastic, continuous temperature up to 100°C
Conductor allocation.....	five solid screw clamps up to 2,5mm ² in the structural module of 5,08mm; with labeling
Assembly.....	comfortable snap-on assembly onto symmetrical carrier rail according to EN 50 022, row assembly possible.
Disemby.....	by pulling back the snap clip.
Dimensions.....	see chapter "9. Dimensions"
Cover type.....	Cover corresponds with IP20.
Operating temperature.....	0° to + 55° C.
Weight.....	about 110g.
9. DimensionsCover type.....	Cover corresponds with IP20.
Operating temperature.....	0° to + 55° C.
Weight.....	about 110g.