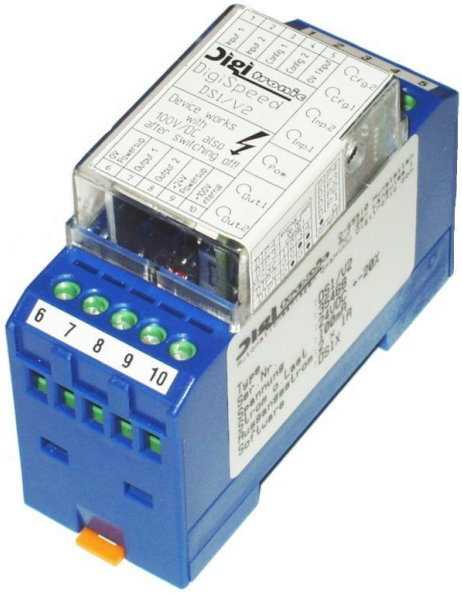
Digital Switching Accelerator

DIGI*SPEED* DS1/V2

Version 2



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Notification

This handbook corresponds with the unit version of 19.3.2004. The company Digitronic Automationsanlagen GmbH reserves the right to implement changes that result in an improvement of the quality and the functions of the device at any time and without any announcements.
This instructions manual was created with a maximum of care, but mistakes are not out of the question. We are thankful for any comments, regarding possible mistakes in the instruction manual.

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

Qualified personal only
Commissioning and operation of the device may only be carried out by qualified personal. Qualified personal are persons, authorized with commissioning, grounding and labeling devices, systems and electrical circuits according to the applicable standards of security

Liability
(1) The salesperson is liable for any damages for which he or the rightful owner is responsible up to the amount of the actual salesprice. Liability concerning missed profits, failed-to-appear savings, indirect damages and consequential damage is excluded.
(2) The liability restrictions above are not valid concerning assured characteristics and damages, which are caused by intention or coarse negligence.

Protection

Note: This device fulfills the following norms: DIN EN 61000-6-2, DIN EN 61000-4-2, DIN EN 61000-4-4, DIN EN 61000-4-5, DIN EN 61000-4-8 and DIN EN 55011 and RoHS 2 (2011/65/EU)..

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Inhaltsverzeichnis

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 invertia,
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 invertia. 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 excact 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 ±20% Power supply without aditional 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

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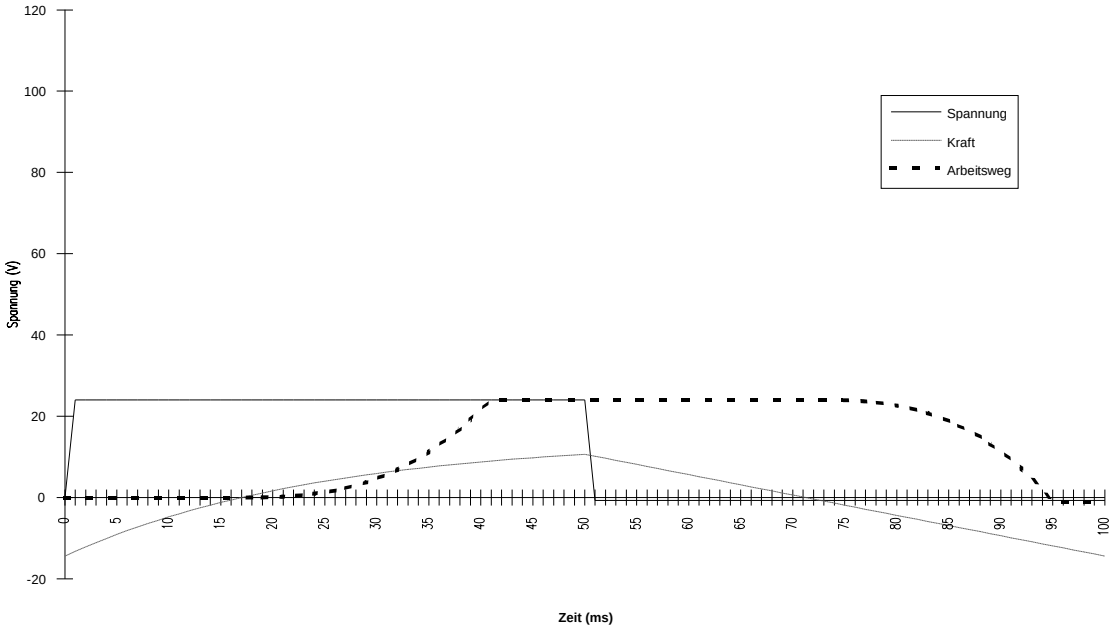
3.1. 3.1.Switching behaviour of switching links with flywheeling diods

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 movemeent 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.

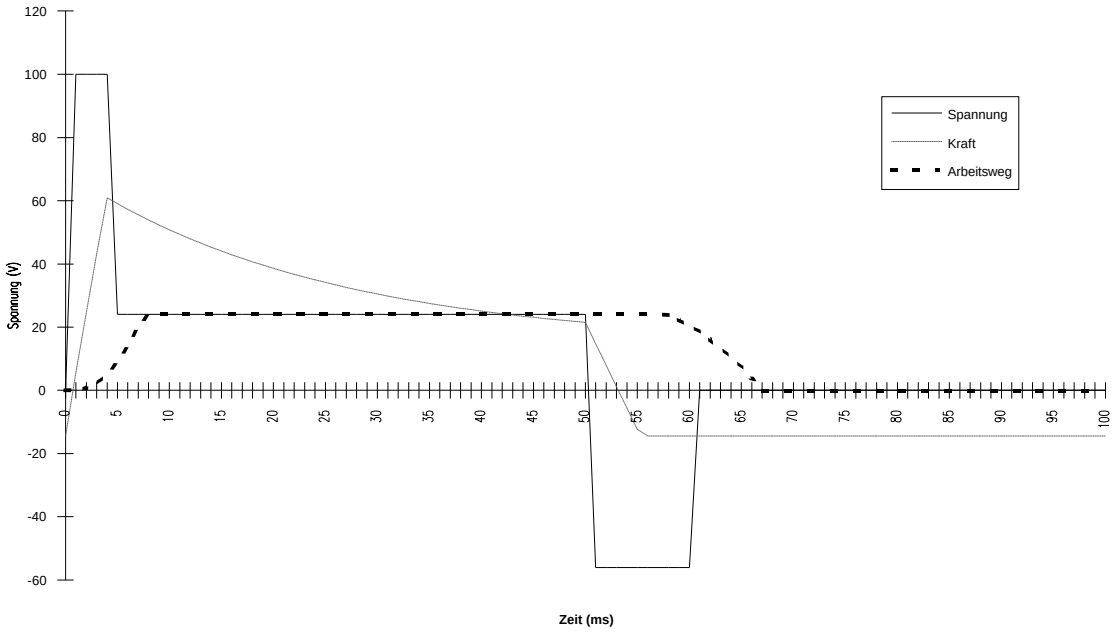


Spannung = voltage; Kraft = force; Arbeit = work

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-movemenbt is fginished earlier (in this case at 8ms), since rthe 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 flywheelingcurrent 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 reguzlated flywheeling-circle's effects every connected relais or switching link has to be used **without** flywheeling diod!! 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.



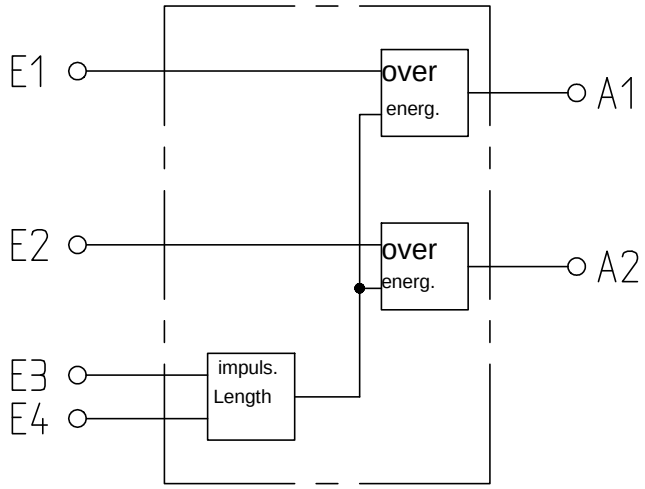
Spannung = voltage; Kraft = force; Arbeit = work

4. Switching modes in DIGISPEED

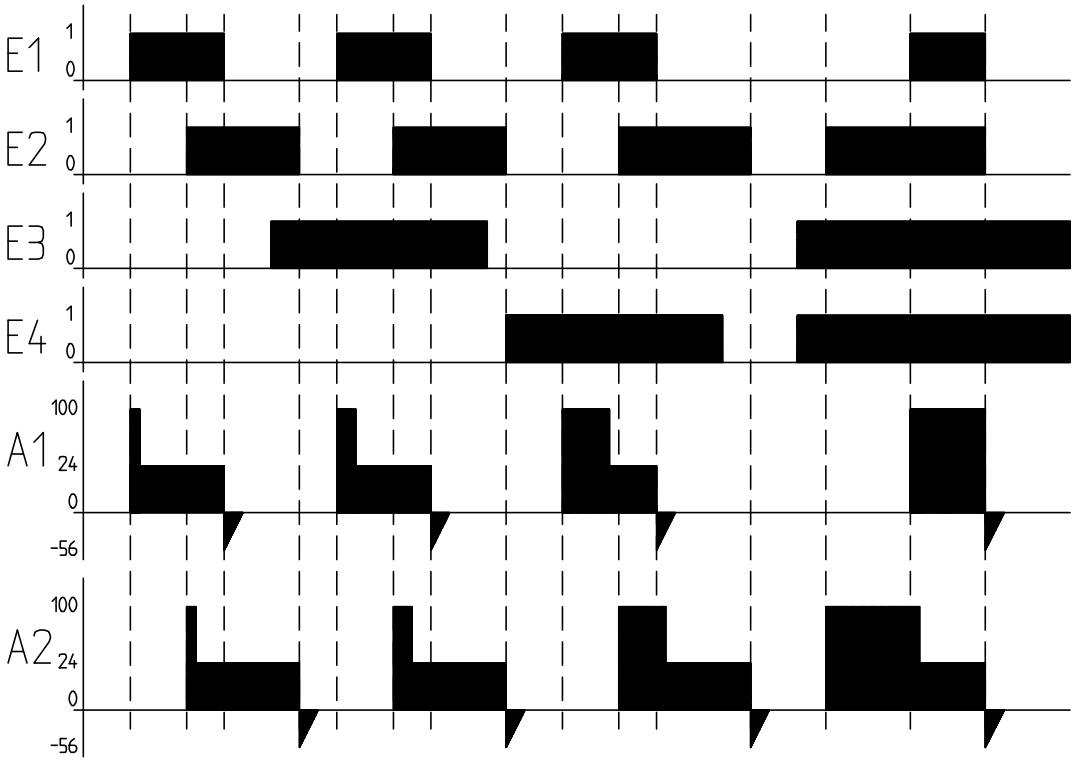
DIGISPEED can be programed for four types of Logic-behaviour. This gives the user the possibility to process time-critical Logic-function out of an PLC-controll.

4.1. Switching mode 1 (factory preset)

Switching mode 1 is the DIGISPEED's standard mode.



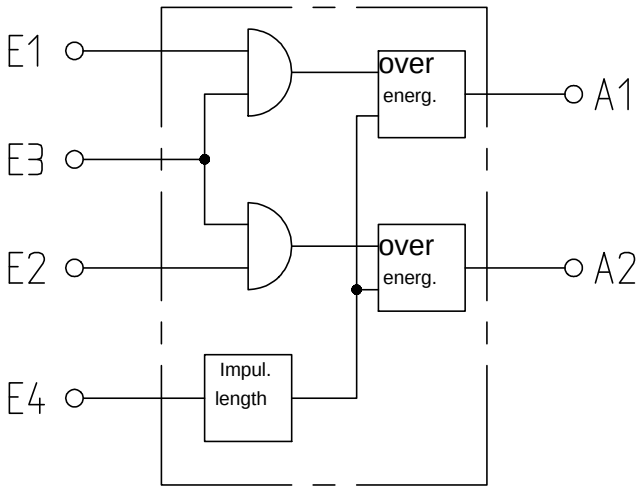
Time-Diagram:



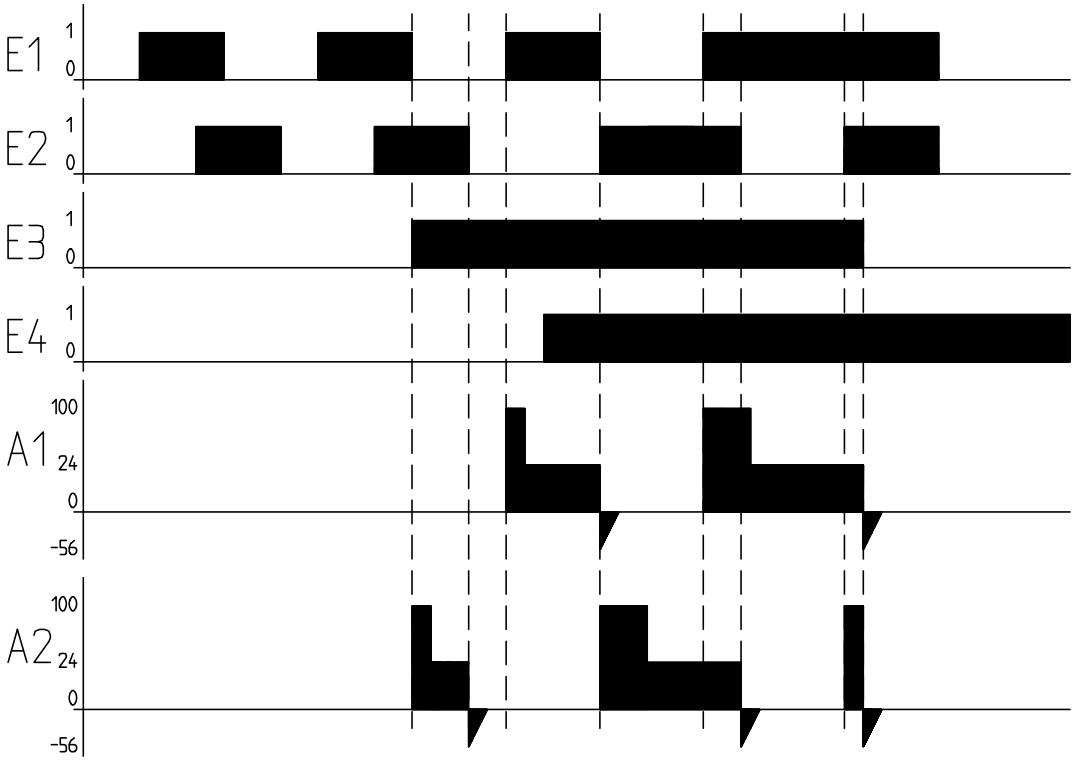
Input 3	Input 4	Duration of the overenergizing impulse
0 VDC	0 VDC	1 ms
+24 VDC	0 VDC	2 ms
0 VDC	+24 VDC	5 ms
+24 VDC	+24 VDC	10 ms

4.2. Switching mode 2

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



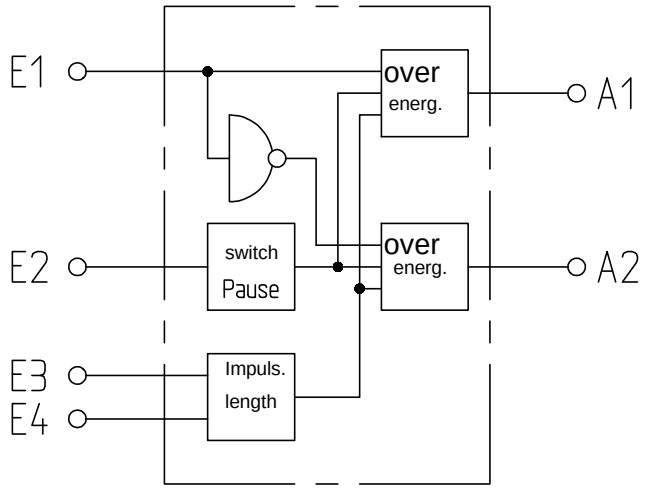
Time-Diagram:



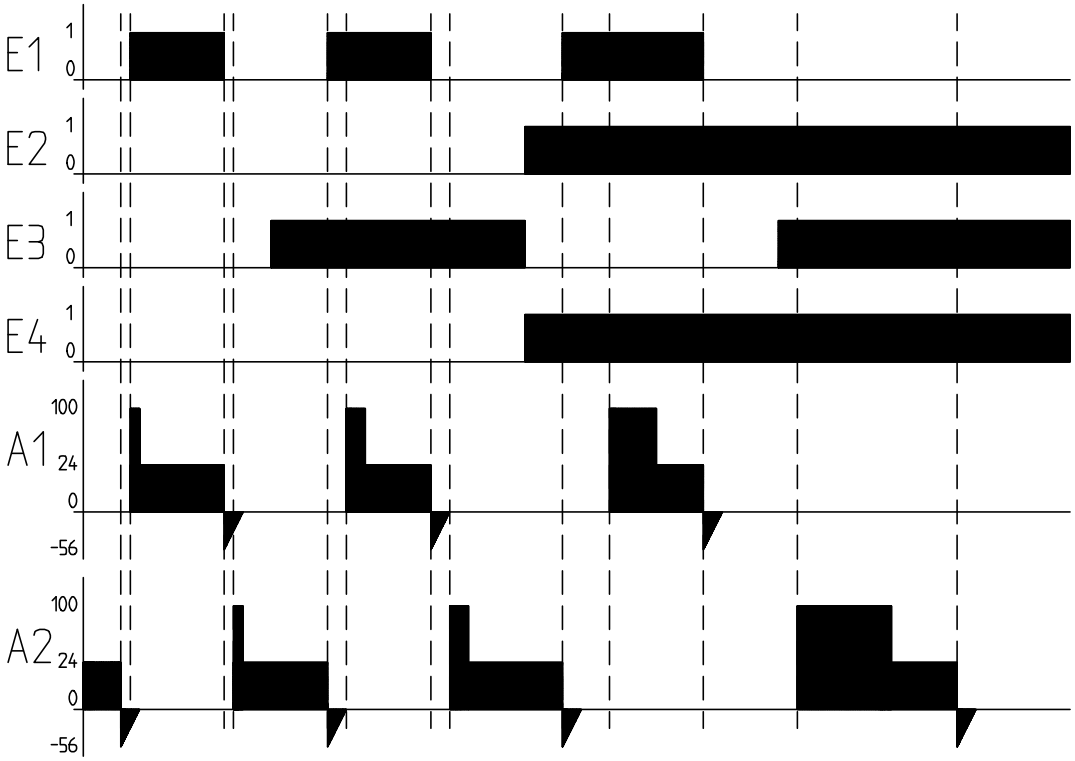
Input 4	Duration of the overenergizing impulse
0 VDC	2 ms
+24 VDC	5 ms

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

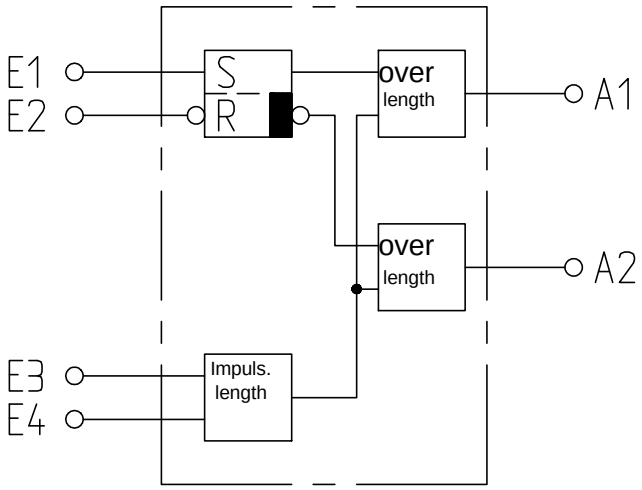
Input 2	Pause**
0 VDC	Ü-Zeit* x 2
+24 VDC	Ü-Zeit* x 1

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

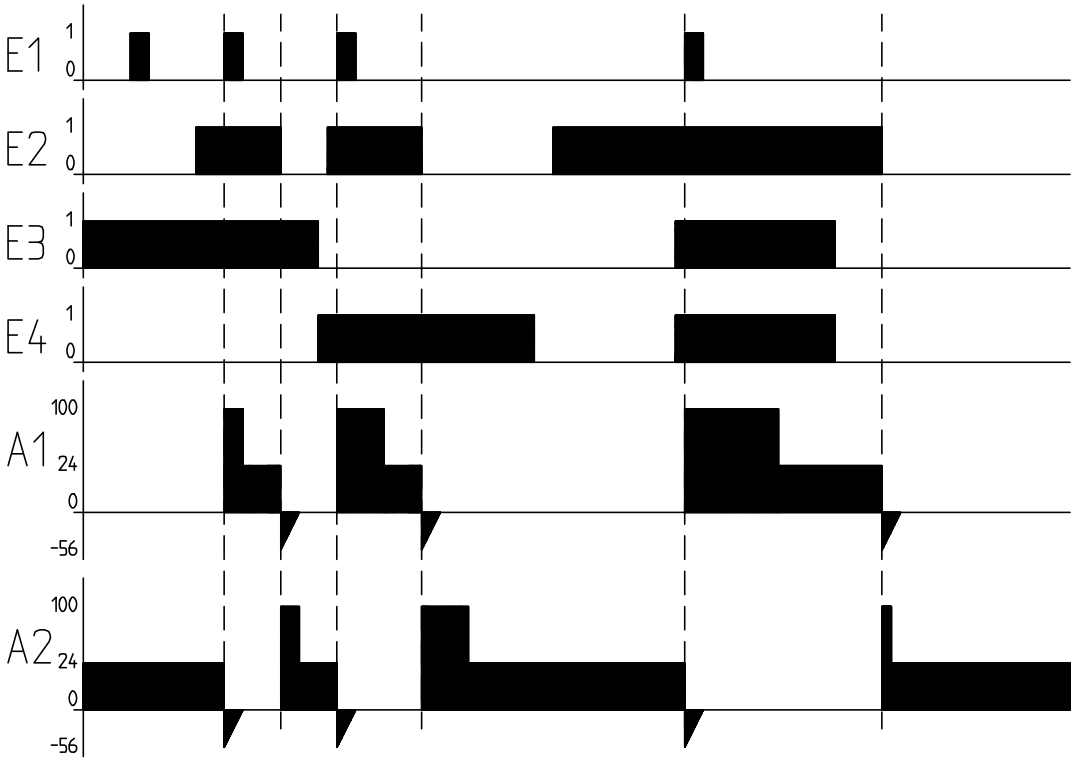
**Pause: Time between the switching off of coil 1 and the switching on off coil 2 or vice versa. It canb be calculated by multiplying the Ü-Zeit with 2 or 1.

4.4. Switching mode4

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



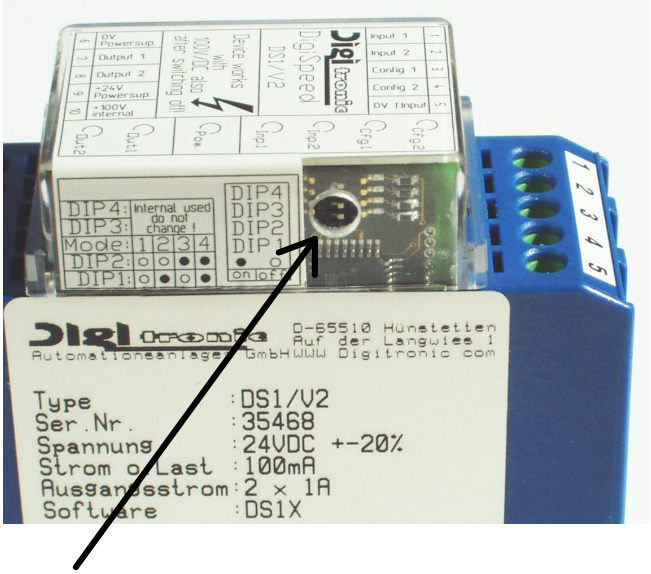
Time-diagram:



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 cion figurationof the DIP-switches 3+4 must not be changed, both have to be set to OFF.

5. Commisioning

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 it's 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 possiblew over-aroousing-time (run relais or switchingdevices **without** flywheeling diode) and switch on the device. Increase the overenergizing time in small steps 8regarding the recovery time) until no further improvement of switchimng behaviour can be detected. Thenb 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 aboive 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 thge 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 it's very high switchingperfomanbce, the DIGISPEED is not resistant against short circuits. Therefore take care to do the complete comissioning in cold state.

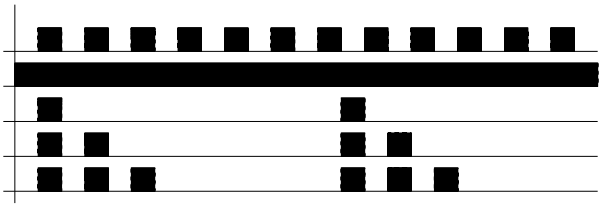
5.1. The status LEDs

The DIGISPEED is equiped 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.



Device starts.
Status OK.
Error output 1
Error output 2
Error output 1+2

6. Recovery time for the DIGISPEED-DS2

The recovery time for the DIGISPEED-DS2 is needed for the continous 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.

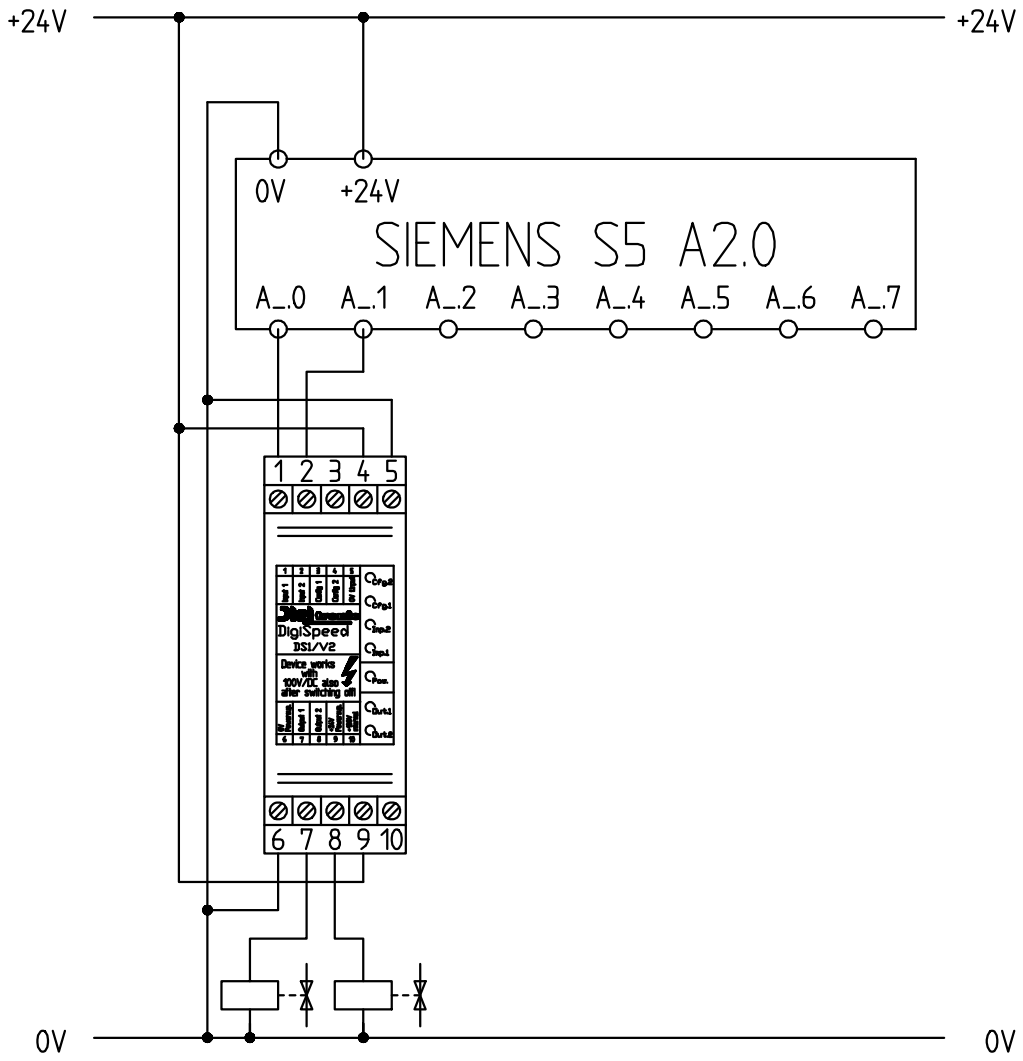
Current (mA)	Ü-Zeit* 1 ms	Ü-Zeit* 2 ms	Ü-Zeit* 5 ms	Ü-Zeit* 10 ms
100	4 ms	8 ms	20 ms	40 ms
200	8 ms	16 ms	40 ms	80 ms
300	12 ms	24 ms	60 ms	120 ms
400	16 ms	32 ms	80 ms	160 ms
500	20 ms	40 ms	100 ms	200 ms
600	24 ms	48 ms	120 ms	240 ms
700	28 ms	56 ms	140 ms	280 ms
800	32 ms	64 ms	160 ms	320 ms
900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

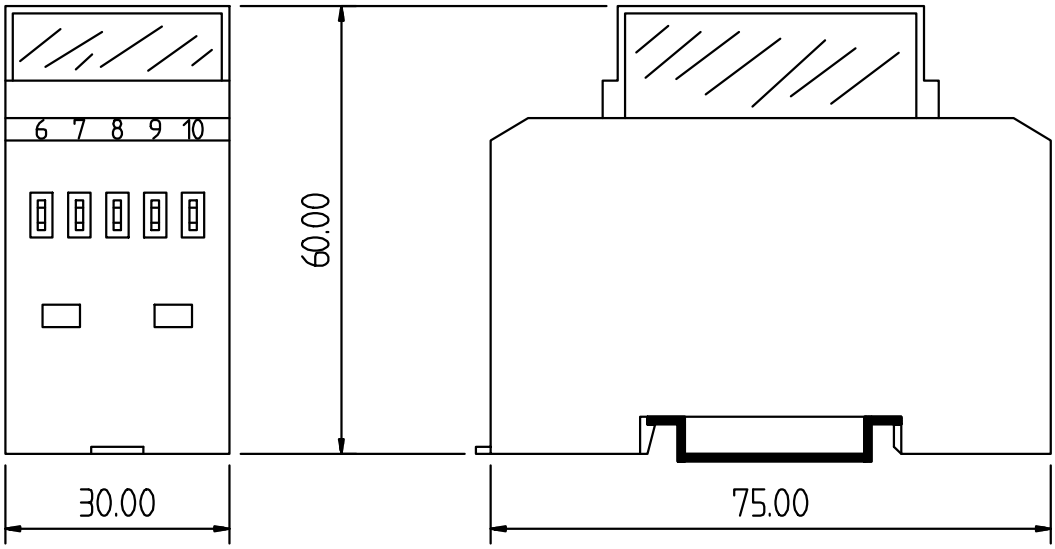
Terminal 1	=	input 1
Terminal 2	=	input 2
Terminal 3	=	configuration 1 (input 3)
Terminal 4	=	configuration 2 (input 4)
Terminal 5	=	0V for inputs
Terminal 6	=	0V for supply voltage
Terminal 7	=	output 1
Terminal 8	=	output 2
Terminal 9	=	+24V DC ±20% supply voltage(a minimum of 5.0 Amp.)
Terminal10	=	Do not connect!(for the internal condensors 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 ±20%, min. 5 Amp.
Current input	max. 8A top-current in the moment of switching
Number of inputs	4 programable inputs, galvanically separated 4 standard-programs
	Example: 2 switching inputs 2 inputs whichdetermine the time-interval of the overload-impulse.
Input voltage	active 16-30V DC, passive 0-3V DC
Input resistor	2,2kΩ-2,5kΩ
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. 100µs
Recovery times	see chapter recovery times
Cover	hardly ignitable Thermoplast plastic, continous temperature up to 100°C
Conductor allocation	five solid screw clamps up to 2,5mm² in the structural module of 5,08mm; with labeling
Assembly	comfortable snap-on assembly onto symmetrical carrierer rail according to EN 50 022, row assembly possible.
Disembly	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.
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Operating temperature	0° to + 55° C.
Weight	about 110g.