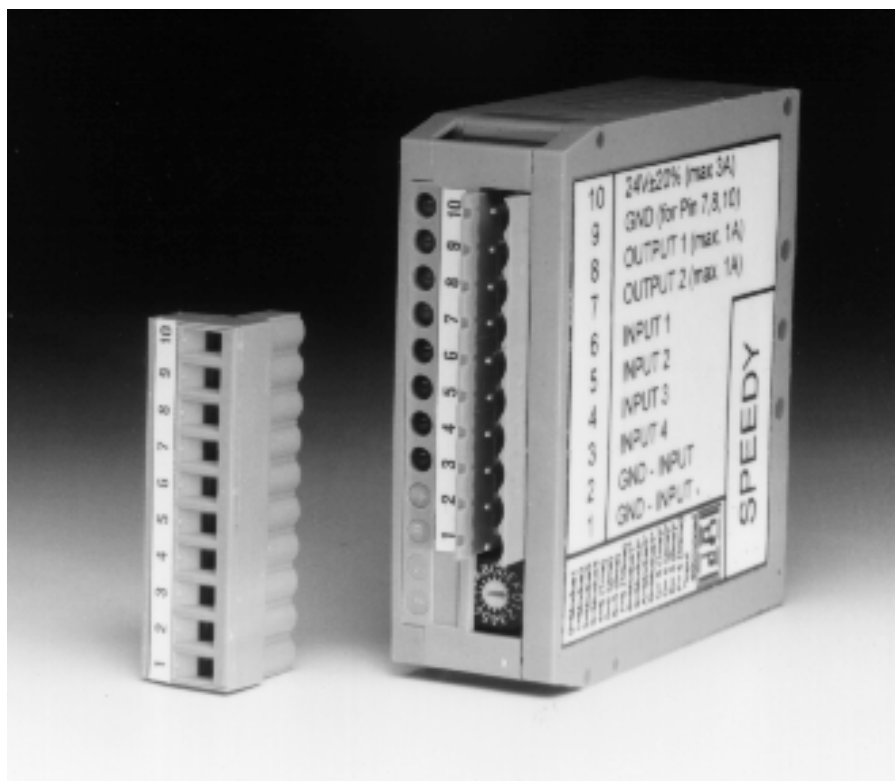


Deuschmann Automation

Cam Controls | Fieldbus Gateways | Industrial Ethernet Products

Instruction manual



Dynamic switching accelerator **SPEEDY**

V3140E

Deuschmann Automation GmbH & Co. KG

Carl-Zeiss-Str. 8 D-65520 Bad Camberg ☎ +49-(0)6434 / 9433-0 📠 +49-(0)6434 / 9433-40
eMail: info@deuschmann.de Internet: <http://www.deuschmann.de>

Foreword

This operating manual provides users and OEM customers with all the information necessary for the installation and operation of the product described in this manual.

All details contained in this manual have been checked carefully, however, they do not represent an assurance of product characteristics. No liability can be accepted for errors. DEUTSCHMANN AUTOMATION reserves the right to carry out alterations to the described products in order to improve the reliability, function or design thereof. DEUTSCHMANN AUTOMATION only accepts liability to the extent as described in the terms and conditions of sale and delivery.

All rights reserved, including translation. No part of this manual may be reproduced or processed, copied or distributed in any form whatsoever (print, copy, microfilm or any other process) without written permission from DEUTSCHMANN AUTOMATION.

Bad Camberg, November 2009

Version 3.0 dated 19.11.09, Art.-No. V3140E

Copyright by DEUTSCHMANN AUTOMATION, D-65520 Bad Camberg 1994-2009

1	Introduction	7
1.1	On this manual	7
1.1.1	Symbols	7
1.1.2	Suggestions	7
2	EMC Directives for products of Deutschmann Automation	8
3	Fields of application	9
4	Installation, connection and display	10
4.1	Dimensions and mounting	10
4.2	Terminal assignment	10
4.2.1	Option X79 - 42V holding level	10
4.3	LEDs	11
5	SPEEDY switching modes	12
5.1	Setting the switching modes	12
5.2	Switching mode 1	13
5.3	Switching mode 2	14
5.4	Switching mode 3	15
5.5	Switching mode 4	16
5.6	Switching mode 5	17
6	Commissioning and optimisation of the switching time	18
6.1	Recovery times of SPEEDY	18
7	Technical data	19
7.1	SPEEDY-100V	19
7.2	SPEEDY-50V	19
8	Servicing	20
8.1	Returning a unit	20
8.2	Internet	20

1 Introduction

1.1 On this manual

This manual documents installation, functions and operation of the Deutschmann unit specified on the cover sheet and in the header.

1.1.1 Symbols



Particularly **important text sections** can be seen from the adjacent pictogram.

You should **always** follow this information since, otherwise, this could result in malfunctions or operating errors.

1.1.2 Suggestions

We are always pleased to receive suggestions and wishes etc. and endeavour to allow for these. It is also helpful if you bring our attention to any errors.

2 EMC Directives for products of Deutschmann Automation

The installation of our products has to be carried out considering the relevant EMC directives as well as our internal instructions.

For more information see 'EMC Directives' on our homepage at <http://www.deutschmann.de>.

3 Fields of application

When switching on and also switching off magnetic controlled connecting devices delays appear that consist of two components:

- delay period for building up or reducing the magnetic field
- delay period time lag to overcome the mechanical inertia

To shorten the delay period SPEEDY offers the possibility to achieve an overexcitation of the magnetic field by an over-voltage impulse of 100V, adjustable from 1ms to 10ms. Therefore the mechanical inertia can be overcome faster.

When switching off the delay period for the reduction of the magnetic field is considerably decreased by a negative free wheeling voltage.

The status of the inputs and outputs, also of the supply voltages, is optionally displayed by integrated LEDs.

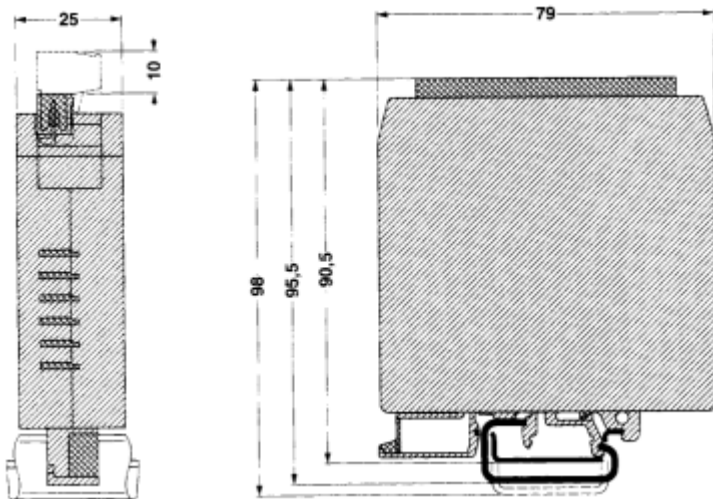
SPEEDY has different switching modes, which are externally adjustable. They are described in detail in the following chapters.

4 Installation, connection and display

4.1 Dimensions and mounting

SPEEDY is supplied in a plastic housing for snap-mounting onto a commercially available EN mounting rail.

The dimensions are shown in the drawing below:



Picture 1: Dimensional drawing SPEEDY

4.2 Terminal assignment

SPEEDY is connected via a 10-pin screw-plug connector. The following terminal assignment applies:

Terminal	Function
1	GND (reference for terminal 3-6)
2	GND (reference for terminal 3-6)
3	Input 4 (24V/max. 10mA)
4	Input 3 (24V/max. 10mA)
5	Input 2 (24V/max. 10mA)
6	Input 1 (24V/max. 10mA)
7	Output 2 (max. 1A)
8	Output 1 (max. 1A)
9	GND (reference for terminal 7, 8 and 10)
10	10... 30V (max. 3A)

4.2.1 Option X79 - 42V holding level

For devices with this option the holding level of 42V is supplied through PIN1. In other respects the device acts as a standard device SPEEDY.

The following assignment applies:

Terminal	Function
1	Input holding level 42V (max. 50V)
2	GND (reference for terminal 3-6)
3	Input 4 (24V/max. 10mA)
4	Input 3 (24V/max. 10mA)
5	Input 2 (24V/max. 10mA)
6	Input 1 (24V/max. 10mA)
7	Output 2 (max. 1A)
8	Output 1 (max. 1A)
9	GND (reference for terminal 7, 8 and 10)
10	10... 30V (max. 3A)

4.3 LEDs

SPEEDY has 8 LEDs with the following meaning:

LED over terminal	Color	Meaning
3	Red	Input 4
4	Red	Input 3
5	Red	Input 2
6	Red	Input 1
7	Green	Output 2
8	Green	Output 1
9	Green	Internal voltage supply ok
10	Green	External voltage supply ok

5 SPEEDY switching modes

5.1 Setting the switching modes

The switching modes described below are selected via a rotary coding switch. The following assignment applies:

Rotary-switch indication	Switching mode	Input interference suppression
0	1	Switched off
1	2	Switched off
2	3	Switched off
3	4	Switched off
4	5 (1ms)	Switched off
5	5 (2ms)	Switched off
6	5 (5ms)	Switched off
7	5 (10ms)	Switched off
8	1	Active
9	2	Active
A	3	Active
B	4	Active
C	5 (1ms)	Active
D	5 (2ms)	Active
E	5 (5ms)	Active
F	5 (10ms)	Active

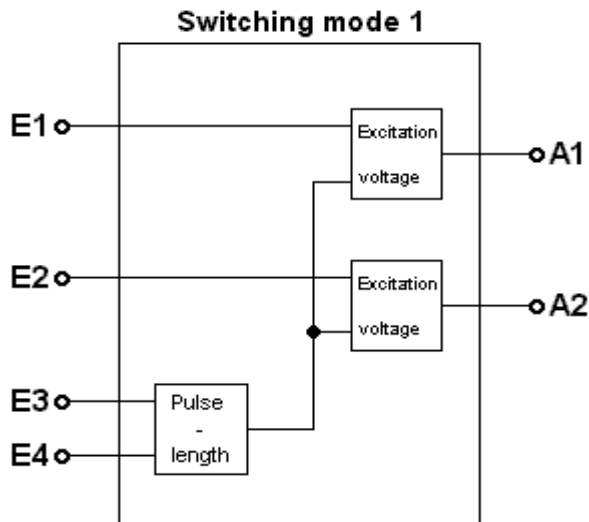
Please note that every change of the inputs is evaluated directly in the first 8 switch positions. This mode is practical if the inputs are connected to the outputs of a control and SPEEDY is required to provide an immediate response.

If interference suppression is activated, the input signals are filtered which leads to a delay (propagation time input --> output) of approx. 1 ms.

This operating mode is practical if the inputs are switched by a relay or if the input lines are subject to very strong interference.

5.2 Switching mode 1

In switching mode 1, input 1 is switched to output 1 and input 2 is switched to output 2. The duration of the overexcitation pulse is set at the inputs 3 and 4.

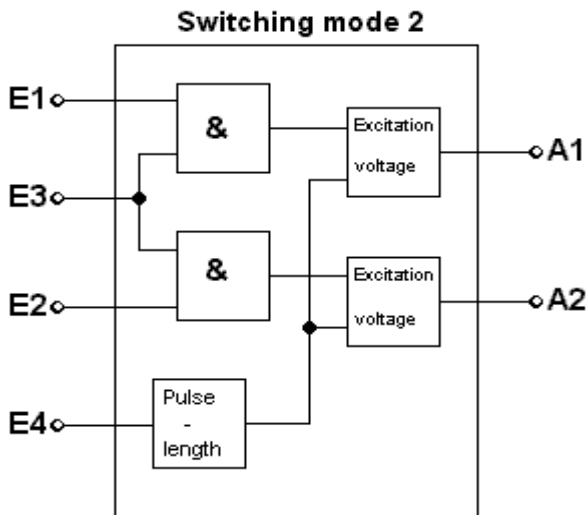


Picture 2: Switching mode 1

Input 3	Input 4	Pulse
0 VDC	0 VDC	1 ms
+24 VDC	0 VDC	2 ms
0 VDC	+24 VDC	5 ms
+24 VDC	+24 VDC	10 ms

5.3 Switching mode 2

In switching mode 2, input 1 is switched to output 1 and input 2 is switched to output 2. Input 3 is an Enable input. If there is no signal at input 3, input 1 and input 2 are inoperable. The duration of the overexcitation pulses is set at input 4.



Picture 3: Switching mode 2

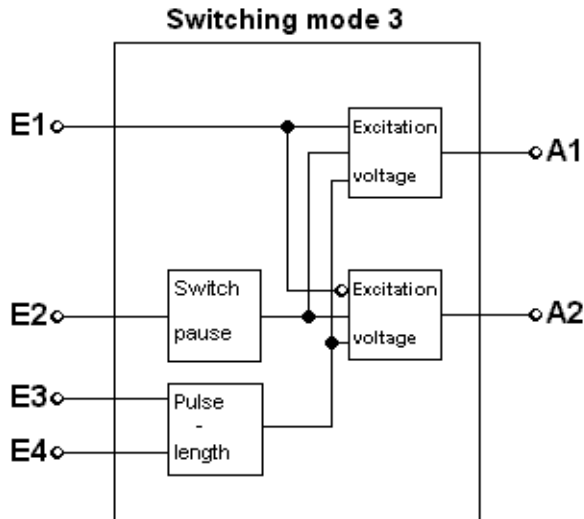
Input 1	Input 2	Input 3	Output 1	Output 2
0 VDC	0 VDC	0 VDC	0 VDC	0 VDC
+24 VDC	0 VDC	0 VDC	0 VDC	0 VDC
0 VDC	+24 VDC	0 VDC	0 VDC	0 VDC
+24 VDC	+24 VDC	0 VDC	0 VDC	0 VDC
0 VDC	0 VDC	+24 VDC	0 VDC	0 VDC
+24 VDC	0 VDC	+24 VDC	+UB	0 VDC
0 VDC	+24 VDC	+24 VDC	0V	+UB
+24 VDC	+24 VDC	+24 VDC	+UB	+UB

Input 4	Pulse
0 VDC	2 ms
+24 VDC	5 ms

5.4 Switching mode 3

Switching mode 3 was developed specifically for twin solenoids (actuating elements). If input 1 has no signal, output 2 is switched. If input 1 receives a signal, output 2 is deactivated first. After deactivation, there is a pause **. Output 1 is then activated.

The situation is different if the signal at input 1 is cancelled. Output 1 is deactivated first, followed by a pause **, after which (not before) output 2 is switched back on. Input 2 determines the duration of the pause **. The duration of the overexcitation pulse is set at inputs 3 and 4.



Picture 4: Switching mode 3

Input 1	Output 1	Output 2
0 VDC	0 VDC	+UB
+24 VDC	+UB	0 VDC

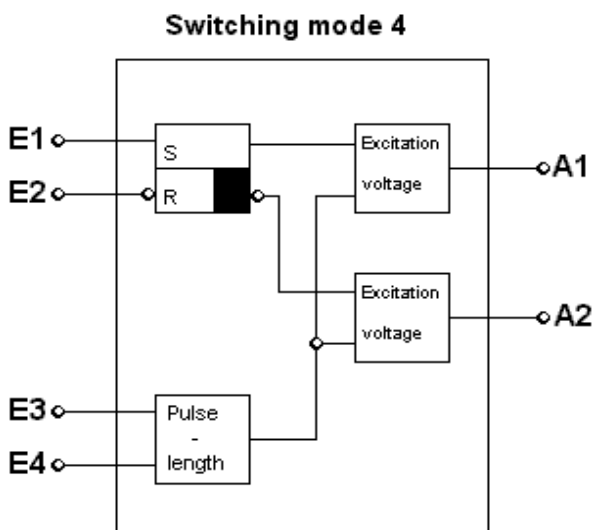
Input 3	Input 4	Pulse
0 VDC	0 VDC	1 ms
+24 VDC	0 VDC	2 ms
0 VDC	+24 VDC	5 ms
+24 VDC	+24 VDC	10 ms

Input 2	Pause **
0 VDC	Pulse x 2
+24 VDC	Pulse x 1

** Pause: Period between de-energisation of solenoid 1 and energisation of solenoid 2 or vice versa. It results from the overexcitation time (pulse) multiplied by 2 or 1.

5.5 Switching mode 4

Switching mode 4 includes an RS flip-flop logic (RESET/SET logic). If 24 V is applied to input 2 (RESET) after power-up, output 2 is switched. If 24 V is also applied to input 1 (SET), output 1 is switched and output 2 is deactivated. When the signal input 1 (SET) is cancelled again, this state remains stable at the outputs. If the signal is now cancelled at input 2 (RESET) (0 V DC), output 1 is deactivated and output 2 is activated. This circuit state remains stable even if input 2 receives a signal again (+24 V DC). Input 2 (RESET) has priority over input 1 (SET), i. e. if input 1 has a signal (+24 V DC) and input 2 has no signal (0 V DC), output 2 is switched and output 1 is deactivated. The duration of the overexcitation pulse is set at inputs 3 and 4 (terminals 3 and 4).



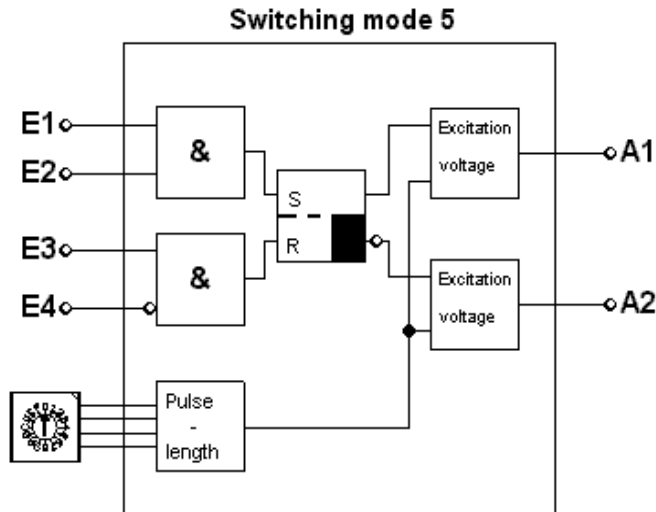
Picture 5: Switching mode 4

Input 1	Input 2	Output 1	Output 2
0 VDC	0 VDC	0 VDC	+UB
+24 VDC	0 VDC	0 VDC	+UB
0 VDC	+24 VDC	Unchanged	Unchanged
+24 VDC	+24 VDC	+UB	0 VDC

Input 3	Input 4	Pulse
0 VDC	0 VDC	1 ms
+24 VDC	0 VDC	2 ms
0 VDC	+24 VDC	5 ms
+24 VDC	+24 VDC	10 ms

5.6 Switching mode 5

Switching mode 5 also includes an RS flip-flop which is set via inputs 1 and 2 and reset via inputs 3 and 4 (cf. description in switching mode 4). The pulse length is set via the rotary coding switch, with the following assignment:



Picture 6: Switching mode 5

Rotary switch indication	Pulse
4 or C (see chapter 5.1)	1ms
5 or D (see chapter 5.1)	2ms
6 or E (see chapter 5.1)	5ms
7 or F (see chapter 5.1)	10ms

Input 1	Input 2	Input 3	Input 4	Output 1	Output 2
0 VDC	0 VDC	0 VDC	0 VDC	Unchanged	Unchanged
+24 VDC	0 VDC	0 VDC	0 VDC	Unchanged	Unchanged
0 VDC	+24 VDC	0 VDC	0 VDC	Unchanged	Unchanged
+24 VDC	+24 VDC	0 VDC	0 VDC	+UB	0 VDC
0 VDC	0 VDC	+24 VDC	0 VDC	0 VDC	+UB
+24 VDC	0 VDC	+24 VDC	0 VDC	0 VDC	+UB
0 VDC	+24 VDC	+24 VDC	0 VDC	0 VDC	+UB
+24 VDC	+24 VDC	+24 VDC	0 VDC	0 VDC	+UB
0 VDC	0 VDC	0 VDC	+24 VDC	Unchanged	Unchanged
+24 VDC	0 VDC	0 VDC	+24 VDC	Unchanged	Unchanged
0 VDC	+24 VDC	0 VDC	+24 VDC	Unchanged	Unchanged
+24 VDC	+24 VDC	0 VDC	+24 VDC	+UB	0 VDC
0 VDC	0 VDC	+24 VDC	+24 VDC	Unchanged	Unchanged
+24 VDC	0 VDC	+24 VDC	+24 VDC	Unchanged	Unchanged
0 VDC	+24 VDC	+24 VDC	+24 VDC	Unchanged	Unchanged
+24 VDC	+24 VDC	+24 VDC	+24 VDC	+UB	0 VDC

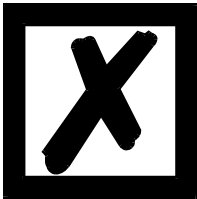
6 Commissioning and optimisation of the switching time

First, the inputs, outputs and the supply voltage for SPEEDY must be wired. When doing this, please note that the inputs feature optocouplers and a separate GND input.

Then set the required switching mode with the rotary coding switch. If optimisation has not yet been carried out, the overexcitation time should be set to the minimum value (1 ms).

When all preparations are complete, you can connect the supply voltage to SPEEDY.

For optimisation, the time of the overvoltage pulse can now be incremented step by step until no further improvement of the switching time is reached.



ATTENTION:

Increasing the pulse time further does not have any positive effect and simply unnecessarily loads the switching elements.

Note:

The switch-off delay can be reduced without affecting the switch-on delay by reducing the holding voltage (e. g. 12V instead of 24V).

6.1 Recovery times of SPEEDY

The overexcitation voltage of 100 V is generated internally by SPEEDY and buffered in a capacitor. The capacitor is partially discharged when a pulse is issued and a "recovery time" is required until the capacitor has fully recharged. This recovery time is specified in the table below:

Current (mA)	1ms-pulse	2ms-pulse	5ms-pulse	10ms-pulse
0	0 ms	0 ms	0 ms	0 ms
100	1 ms	2 ms	6 ms	13 ms
200	2 ms	4 ms	12 ms	26 ms
300	2 ms	5 ms	17 ms	39 ms
400	3 ms	7 ms	23 ms	52 ms
500	3 ms	9 ms	29 ms	65 ms
600	4 ms	11 ms	35 ms	78 ms
700	4 ms	12 ms	41 ms	91 ms
800	5 ms	14 ms	47 ms	104 ms
900	5 ms	15 ms	52 ms	117 ms
1000	6 ms	17 ms	58 ms	130 ms
1500	28 ms	60 ms	117 ms	170 ms
2000	34 ms	70 ms	130 ms	180 ms
3000	50 ms	94 ms	160 ms	200 ms

Please note that the recovery time always applies to both outputs, i. e. if both outputs are switched simultaneously, the total of the two output currents must be allowed for as the current in the table.

If both outputs are switched time-delayed, only the time between the switch-off edge of the first output's over-current impulse and the switch-on edge of the next output has to be taken into consideration as the recovery time.

7 Technical data

7.1 SPEEDY-100V

	SPEEDY-100V-1A	SPEEDY-100V-4A
Operating voltage	10... 30V, max 1 W (unloaded)	10... 30V, max 1 W (unloaded)
Current consumption	Max. 40mA (idle state) max. 3A (at switching instant)	Max. 40mA (idle state) max. 3A (at switching instant)
Inputs	4 $R_i > 3.9 \text{ k}\Omega$ $U_L = 0\text{V} - 3\text{V}$, $U_H = 12\text{V} - 30\text{V}$	4 $R_i > 3.9 \text{ k}\Omega$ $U_L = 0\text{V} - 3\text{V}$, $U_H = 12\text{V} - 3\text{V}$
Outputs	2 $I_{\text{out}} < 1\text{A}$ steady load $U_{\text{out-Stat}} > \text{operating voltage} - 1\text{V}$ $U_{\text{out-pulse}} = 88\text{V} \dots 100\text{V}$	2 $I_{\text{out}} 4\text{A}$ steady load / temporarily 5A (max. 1min.) $U_{\text{out-Stat}} > \text{operating voltage} - 1\text{V}$ $U_{\text{out-pulse}} = 88\text{V} \dots 100\text{V}$
Programs	Can be set via 5 rotary switches other customized programs on request	Can be set via 5 rotary switches other customized programs on request
Pulse length	Can be set 1 - 10ms	Can be set 1 - 10ms
Switching delay	< 300 μs (without input interference suppression)	< 300 μs (without input interference suppression)
Recovery time	Max. 150ms at 1A load and 10ms pulse	Max. 200ms at 3A load and 10ms pulse
Housing	Plastic for EN mounting rail mounting (can be lined up) W x H x D: 25 x 79 x 90.5mm	Plastic for EN mounting rail mounting (can be lined up) W x H x D: 25 x 79 x 90.5mm
Conductor connection	Via plug terminal block up to 2.5mm ²	Via plug terminal block up to 2.5mm ²
Display	Optional LED status display of the inputs, outputs and supply voltages	Optional LED status display of the inputs, outputs and supply voltages

7.2 SPEEDY-50V

	SPEEDY-50V-1A	SPEEDY-50V-4A
Operating voltage	10... 30V, max 1 W (unloaded)	10... 30V, max 1 W (unloaded)
Current consumption	Max. 40mA (idle state) max. 3A (at switching instant)	Max. 40mA (idle state) max. 3A (at switching instant)
Inputs	4 $R_i > 3.9 \text{ k}\Omega$ $U_L = 0\text{V} - 3\text{V}$, $U_H = 12\text{V} - 30\text{V}$	4 $R_i > 3.9 \text{ k}\Omega$ $U_L = 0\text{V} - 3\text{V}$, $U_H = 12\text{V} - 3\text{V}$
Outputs	2 $I_{\text{out}} < 1\text{A}$ steady load $U_{\text{out-Stat}} > \text{operating voltage} - 1\text{V}$ $U_{\text{out-pulse}} = 44\text{V} \dots 50\text{V}$	2 $I_{\text{out}} 4\text{A}$ steady load / temporarily 5A (max. 1min.) $U_{\text{out-Stat}} > \text{operating voltage} - 1\text{V}$ $U_{\text{out-pulse}} = 44\text{V} \dots 50\text{V}$
Programs	Can be set via 5 rotary switches other customized programs on request	Can be set via 5 rotary switches other customized programs on request
Pulse length	Can be set 1 - 10ms	Can be set 1 - 10ms
Switching delay	< 300 μs (without input interference suppression)	< 300 μs (without input interference suppression)
Recovery time	Max. 150ms at 1A load and 10ms pulse	Max. 200ms at 3A load and 10ms pulse
Housing	Plastic for EN mounting rail mounting (can be lined up) W x H x D: 25 x 79 x 90.5mm	Plastic for EN mounting rail mounting (can be lined up) W x H x D: 25 x 79 x 90.5mm
Conductor connection	Via plug terminal block up to 2.5mm ²	Via plug terminal block up to 2.5mm ²
Display	Optional LED status display of the inputs, outputs and supply voltages	Optional LED status display of the inputs, outputs and supply voltages

8 Servicing

Should an error message occur, please first take all measures described in chapter Error messages.

Should questions occur that are not covered by this manual, please contact the responsible sales partner (see internet: <http://www.deutschmann.de>) or contact us directly.

Please keep the following information ready at hand when you call:

Device designation
Serial number (S/N)
Item No.
Error number and error description (see also following chapter 'Returning a unit')

You can reach us on the following Hotline number. Lines are open from

Monday to Thursday from 8 am to 12 pm and from 1 pm to 4 pm, Friday from 8 am to 12 pm

Central office & sales department: +49-(0)6434-9433-0
Technical hotline: +49-(0)6434-9433-33

Fax Central office & sales department: +49-(0)6434-9433-40
Fax Technical hotline: +49-(0)6434-9433-44

8.1 Returning a unit

If you return a unit to us, we require as comprehensive a description of the error as possible. We require the following information in particular:

- How is the unit externally wired (outputs, ..)? Please state all connections of the unit.
- What is the magnitude of the supply voltage (± 0.5 V) with connected SPEEDY?
- What were you last doing on the unit (error on power-up, ...)?

The more precise your information and error description, the more precisely we can check the possible causes.

8.2 Internet

On our Internet-homepage (URL) you can find topical information on Deutschmann products, instruction manuals and a list of our distribution partners.

URL: www.deutschmann.de

