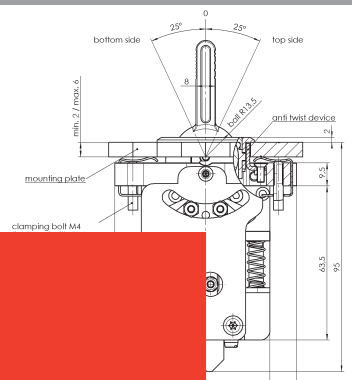


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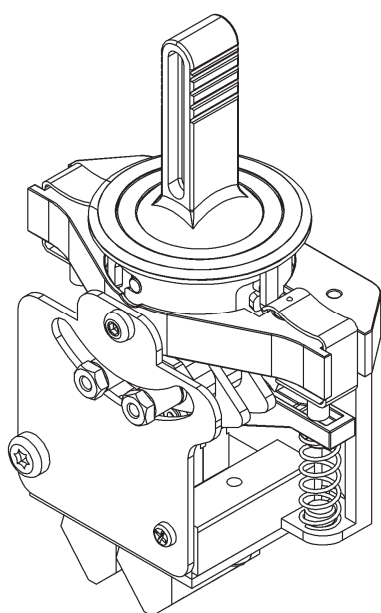
Series 04 | Lever Switches

Product Information

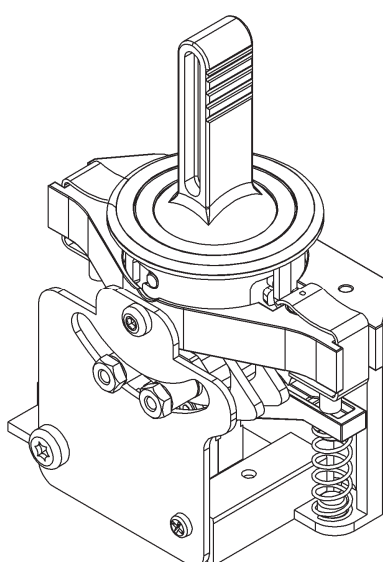
Lever switches

S41 to S45

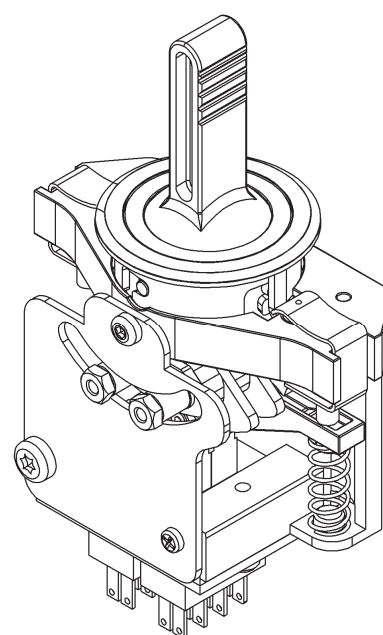
S41



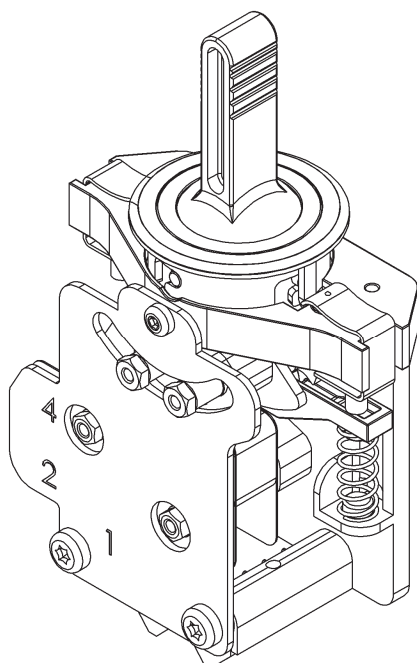
S42



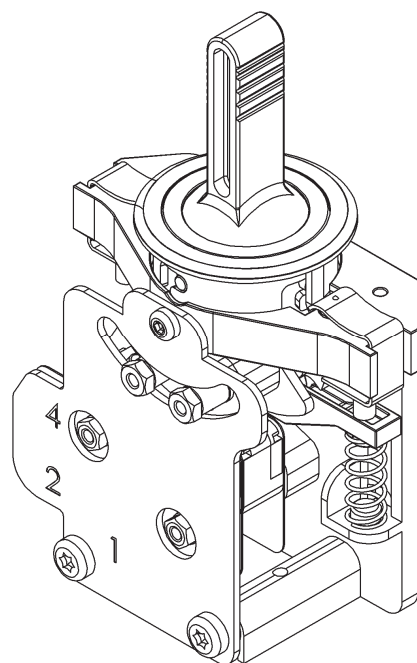
S43



S44



S45



Revision: - 11 -

Modification Report

Revision	Date	Modifications	Page(s)
1	08.03.2004	First edition	all
2	16.03.2004	Definition of dimensioned drawings and connecting diagrams in appendix checked and revised – thus automatic change of table of content.	11 and 12 2
3	06.05.2004	§ 4.4 – specification for minimal current added § 4.5 – specification for 72 VDC and 110 VDC added	8 9
4	24.06.2004	§ 4.3 – specification for minimal current and specification for 72 VDC and 110 VDC added § 4.4 – Designation AC-12, 60VAC / 1,0A changed to DC-12, 60VDC / 1,0A § 4.5 and 4.6 – specification for minimal current added	8 8 9
5	23.08.2004	§ 4.3 and § 4.5 – specification for minimal current changed from 4mA to 8mA in 0,5mA to 8mA	8 and 9
6	30.11.2005	§ 5.1 drawing added (anti-twist device) § 6 type key enhanced § 7 drawing numbers revised	10 11 12
7	01.04.2010	revised	all
8	15.09.2010	Attached documents deleted, grip shapes added	all
9	29.09.2010	Revised §7 detents and switching sequences added	13
10	05.01.2011	Document revised construction changed	all
11	10.01.2011	Document revised (T604)	all
12			
13			
14			
15			

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1 Illustrations

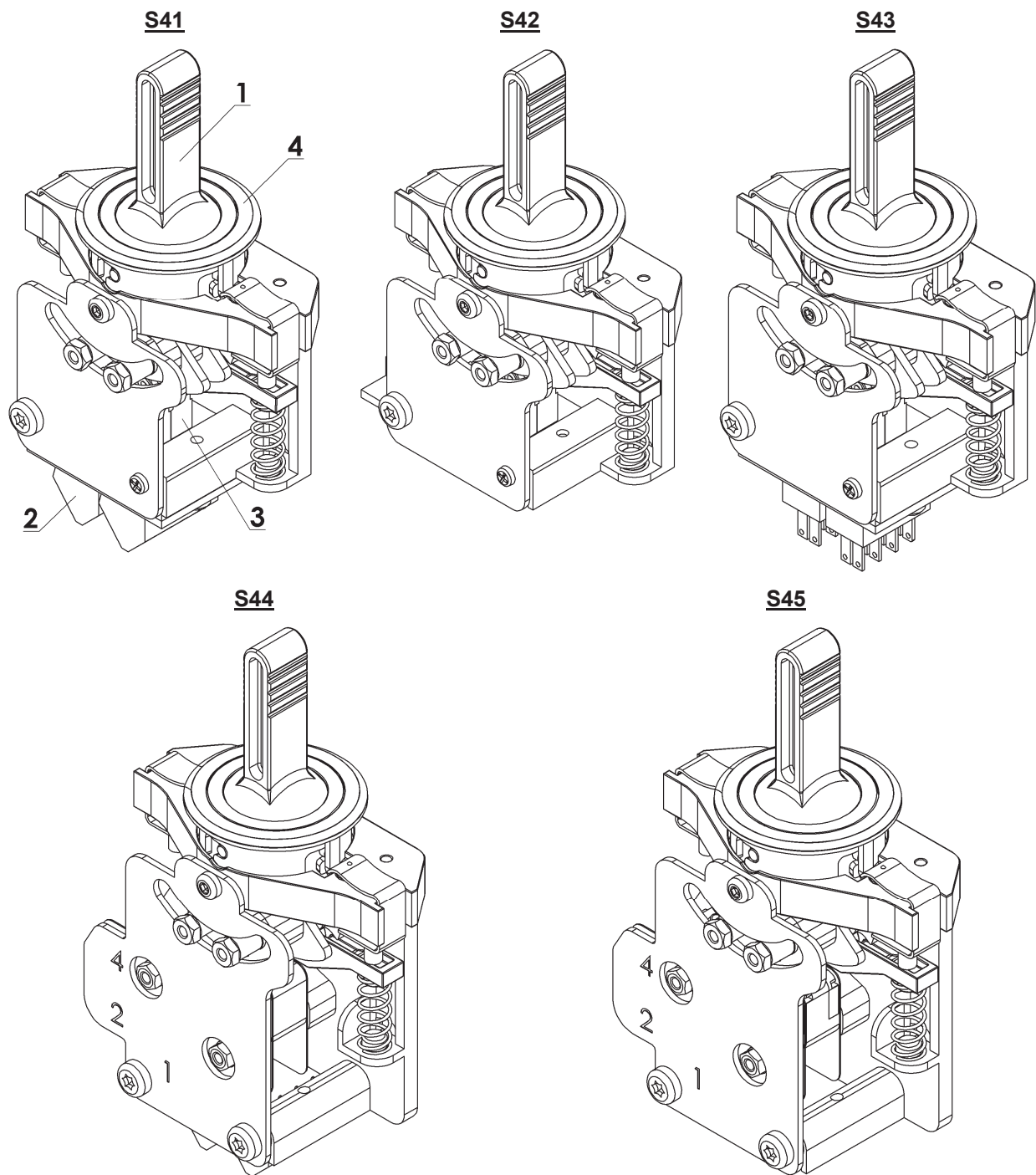


Figure 1: Lever switches S41 to S45

2 Application

The lever switches in Figure 1 – types S41 to S45 – are switches, which generate digital output signals depending on the position of the operator handle (1). For this purpose, each switch has a maximum of 5 (S41 to S43) or 4 (S44 and S45) micro-switches (2) with varying switching programs, thus providing for adaptability to the customer's demands. Besides the switching program, the micro-switch type, the electric interface, the colour of the centering rings (4), and the mechanical features (angle of deflection of the operator handle, form of the grips, and its detent and spring return functions) are variable as well.

Due to these variable features, the lever switches can be employed anywhere, where switching levers are to carry out operating functions. Since the centering rings (4) of the lever switches have formally been adjusted to the pushbuttons of the EAO type series 04, one can design operating units with pleasant looks using these components (hand-activated auxiliary switches and lever switches).

3 Design

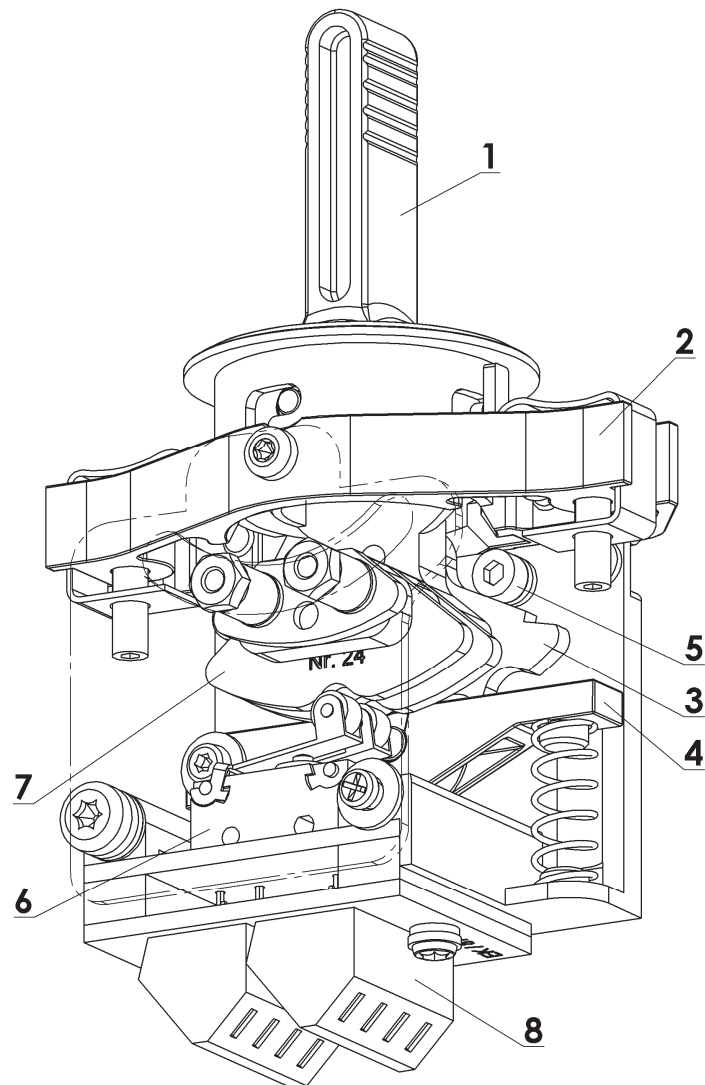


Figure 2: Design

Figure 2 provides information on the lever switch's basic design features. As one can see, it basically consists of an operator handle (1), which is supported by a flange plate (2). The form of the operator handle can vary. See the dimension drawings of the units (S41 – S45).

Below the flange plate, the operator handle is connected with a detent disk (3), which is operated by a spring loaded roller lever (4). This is the operating principle behind the mechanical detent and spring return functions. All of the default detent and spring return functions are included in the technical specification no. T 604 (also in Gessmann catalogue 5/101). Other detent and spring return functions are available on request.

Item (5) shows a stop pin, which will be employed, if the operator handles' maximum angle of deflection (25° - 0 - 25°) is to be limited. Its position and the number of stop pins is optional, which allows for a great variety of types with reduced angles of deflection (see T 604 or in Gessmann catalogue 5/101).

The micro-switches (6) are activated by cam discs (7). Basically, there are two types of micro-switches available:

1. Micro-switch without positive opening operation

These micro-switches are used in the lever switches S41, S42, and S43. Each lever switch includes a maximum of 5 micro-switches. The technical data of these micro-switches is listed in chapter 4.

2. Micro-switch with positive opening operation

These micro-switches are used in the lever switches S44 and S45. Each lever switch includes a maximum of 4 micro-switches. The technical data of these micro-switches is listed in chapter 4.

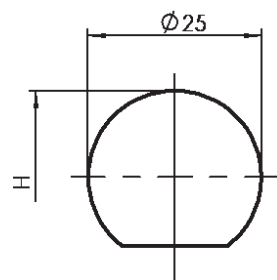
By varying the cam discs, the switching sequences may be adjusted to individual customer requirements. All the default switching sequences are listed in the technical specification no. T 604. Other switching programs are available on request.

The electric interface (8) differs from one lever switch type to the other. More detailed information on these interfaces is given in table 1. In addition, the relevant connection diagrams are listed, too, which can be found attached.

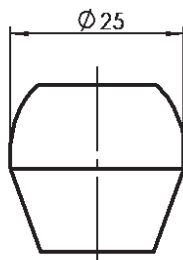
Type	S41	S42	S43	S44	S45
Electric Interface	cage clamp 1 – 1.5 mm ²	JST connector up to 0.2mm ² , counter plug is supplied. Re- quired crimping tool, JST WC 240	blade terminal 6.3 x 0.8 mm	cage clamp 1 – 1.5 mm ²	screw terminal or blade termi- nal 6.3 x 0.8 mm
Connection diagram, 1-2 contacts	EK / 87-10	EK / 90 –10	EK / 94 – 10	EK / 96 –10	EK / 106 –10
Connection diagram, 3-4 contacts	EK / 89 – 10	EK / 91 –10	EK / 95 –10	EK / 102 –10	EK / 106 –10
Connection diagram, 5 contacts	EK / 105-10	EK / 107-10	EK / 108-10	-	-

Table 1: Electric interfaces

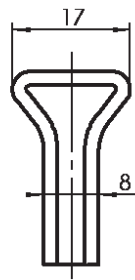
3.1 Grips for all units (S41 – S 45)



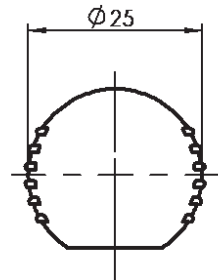
**grip 02 (black)
grip 06 (yellow)***



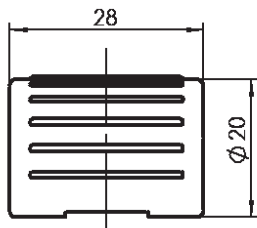
grip 03



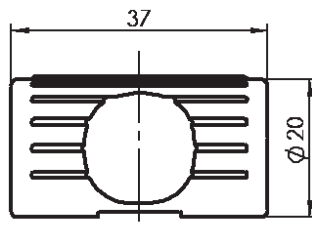
grip 04



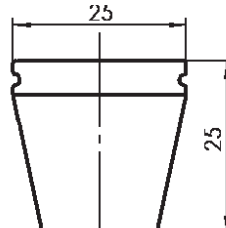
grip 05



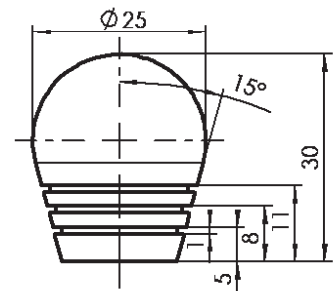
grip 13



grip 14



grip 15



grip 16*

*** grip shape according to UIC 612**

4 Technical Data

4.1 Complete device

- Mechanical product life - 5 million cycles
- Protection class (front side) - IP 54
- Standards and approbations*:
 - Fire behaviour: DIN 5510 - pending
 - NFF 16-101 - pending
 - NFF 16-102 - pending

Design: VDE 0660

*further standards and approbations on request

4.2 Micro-switch without positive opening operation

(S = silver contacts)

- Mechanical product life - 5 million cycles
- Temperature range - -40°C to +85°C
- Switching category
 - DC-13, 24VDC / 2,0 A
 - DC-13, 60 VDC / 0,5 A
 - DC-13, 72 VDC / 0,35 A
 - DC-13, 110 VDC / 0,2 A
 - AC-13, 230 VAC / 1,5
- Minimal current - ≤ 30 VDC / 20mA

Micro-switch without positive opening operation

(G = gold plated silver contacts)

- Mechanical product life - 5 million cycles
- Temperature range - -40°C to +85°C
- Switching category - DC-12, 12 to 30 VDC / 10mA
- Minimal current - ≤ 30 VDC / 0,5mA to 8mA

4.3 Micro-switch with positive opening operation

(S = silver contacts)

- Solder-hook terminated contact - with lever switch S44
- Contact with screw terminal - with lever switch S45
- contact with blade terminal - with lever switch S45
- Mechanical product life - 10 million cycles
- Temperature range - -40°C to +85°C
- Switching category - AC-12, 250 VAC / 10A
 - DC-12, 24 VDC / 6,0 A
 - DC-12, 60 VAC / 1,0 A
 - DC-12, 72 VAC / 0,7 A
 - DC-12, 110 VAC / 0,35 A
 - DC-12, 250 VDC / 0.2 A
- Minimal current - ≤ 30 VDC / 20mA

Micro-switch with positive opening operation

(G = gold plated silver contacts)

- Solder-hook terminated contact - for lever switch S44
- Contact with screw terminal - with lever switch S45
- contact with blade terminal - with lever switch S45
- Mechanical product life - 10 million cycles
- Temperature range - -40°C to +85°C
- Switching category - DC-12, 12 to 30 VDC / 10mA
- Minimal current - ≤ 30 VDC / 0,5mA to 8mA

5 Installation

5.1 Lever switch installation

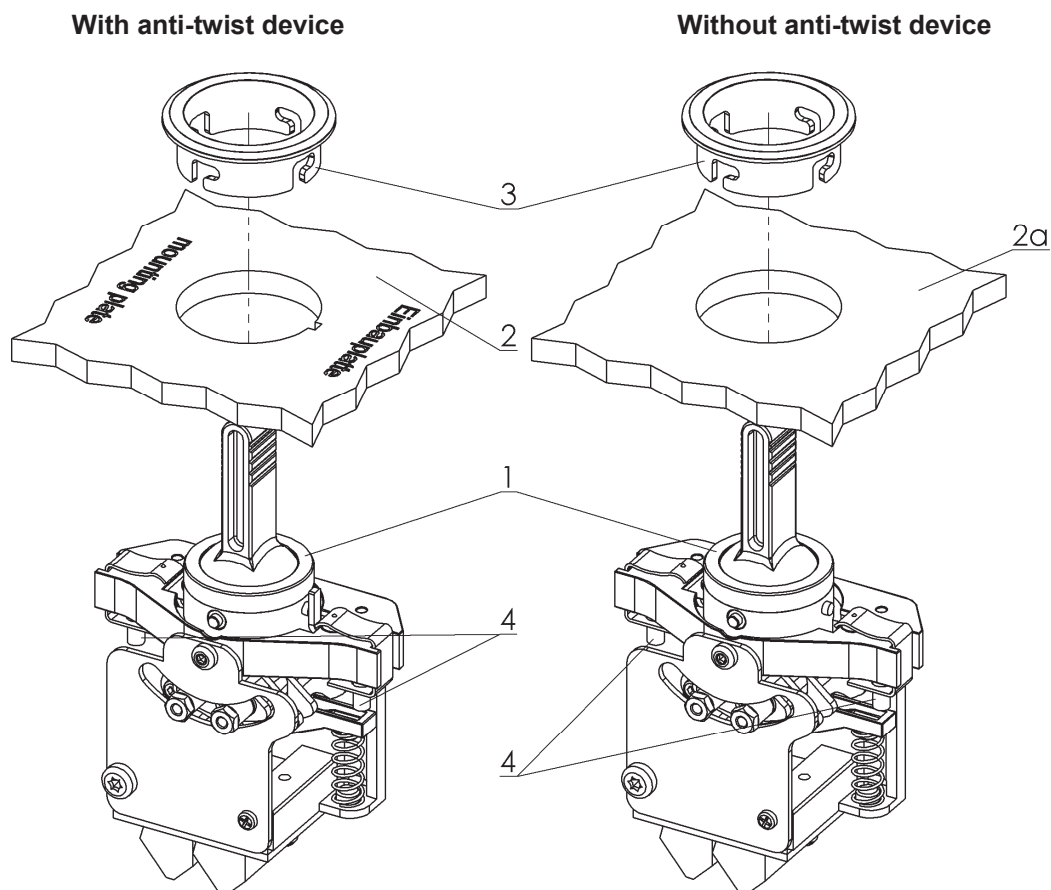


Figure 3: Installation

Figure 3 shows the installation of the lever switch. As one can see, the lever switch (1) is inserted into the port (2) from below, and the centering ring (3) is placed upon it from the top. Fix the entire unit by tightening the two attachment screws (4) evenly (NOTE: Max. Torque 50 Ncm!!). Make sure to remove the cylindrical handles (handles 13 and 14) before inserting the lever switch into the port. You will find a detailed instruction for the disassembly of the handles in chapter 5.2.

Attention !

The surface of the assembly position of the switch has to be very flat without any barrier.

The positioning of the lever switch with anti-twist device (2) is given by an arbor.

The dimensioned drawings listed in table 2 provide information on the outside dimensions of the various lever switch types and the port designs. All dimensioned drawings are attached.

Type	S41	S42	S43	S44	S45
Dimensioned drawing	M 4650	M 4651	M 4652	M 4653	M 4654

Table 2: Dimensioned drawings

5.2 Handle disassembly

The handles 02, 03, 05, 13, 14, and 15 are put over the switching lever and then fixed axially by a hex-socket set screw (M3 DIN 916). Upon the loosening of this set screw, the handles can be removed upwards. For the handles 13 and 14, a cover must be removed first (see fig. 4), before one can access the set screws.

When tightening the set screws, make sure not to exceed the max. torque of 20 Ncm.

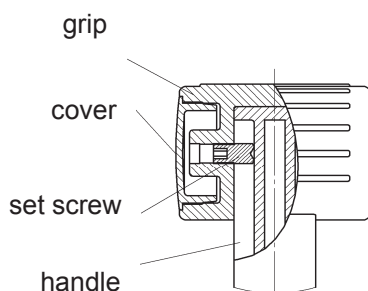


Figure 4: Handle disassembly

6 Type Key

contact 2 contact 1						
Sample:	S 4X	- 11	- 2	- MS.../xy/xy	- 4	- 8 - V
type	handle design	number of contacts	Ms = detent see T 604 x = switching sequence see T 604 y = G = goldcontact S = silvercontact	type of connection 1 = screw terminal 2 = blade terminal 6,3x0,8 3 = cage clamp 1-1,5mm ² 4 = connector JST max 0,2mm ²	colour of centering ring 0 = black anodized 8 = aluminium coloured anodized	lock against rotation not specified = without anti-twist device V = with anti-twist device

7 Appendix

This appendix includes all and any documents, to which reference was made in the previous chapters.

Type of drawing	Drawing No.	Description
Data sheet	T 604	Order, Detents and switching sequences S4, S41 to S45
Dimensioned drawing	M 4650	Dimensioned drawing S41
Data sheet	EK / 87-10	Connection diagram 1 to 2 contacts (S41)
Data sheet	EK / 89-10	Connection diagram 3 to 4 contacts (S41)
Data sheet	EK / 105-10	Connection diagram, 5 contacts (S41)
Dimensioned drawing	M 4651	Dimensioned drawing S42
Data sheet	EK / 90-10	Connection diagram 1 to 2 contacts (S42)
Data sheet	EK / 91-10	Connection diagram 3 to 4 contacts (S42)
Data sheet	EK / 107-10	Connection diagram, 5 contacts (S42)
Dimensioned drawing	M 4652	Dimensioned drawing S43
Data sheet	EK / 94-10	Connection diagram 1 to 2 contacts (S43)
Data sheet	EK / 95-10	Connection diagram 3 to 4 contacts (S43)
Data sheet	EK / 108-10	Connection diagram, 5 contacts (S43)
Dimensioned drawing	M 4653	Dimensioned drawing S44
Data sheet	EK / 96-10	Connection diagram 1 to 2 contacts (S44)
Data sheet	EK / 102-10	Connection diagram 3 to 4 contacts (S44)
Dimensioned drawing	M 4654	Dimensioned drawing S45
Data sheet	EK / 106-10	Connection diagram 1 to 4 contacts (S45)

Table 3: Appendix

8 Order, Detents and Switching Sequences (T604)

		purchase order		offer	
<u>Purchaser:</u>		<u>Date</u>			
Company:					
Name:					
Street					
Zip code:		Location:			
Phone:					
Fax:					
E-Mail:					
<u>Delivery address</u>					
Company:					
Name:					
Street					
Zip code:		Location:			
Phone:					
Fax:					
E-Mail:					
Requested delivery date:					
Delivery / and shipping instruction:					
Remarks:					
FAX: +49(0)7131 4067-10		E-Mail: gessmann@gessmann.com			

Detents:

position of operator (direction)					switching sequence detent no.
bottom U	2	1	0	top O	
R				R	MS31
B	B			R	MS32
R			B	B	MS33
R	R		R	R	MS34
B	B		R	R	MS35
R	R		B	B	MS36
T				T	MS37
B	B			T	MS38
T			B	B	MS39
B	B		T	T	MS40
T	T		B	B	MS41
R				T	MS42
T				R	MS43
R	T		T	R	MS44
B	B		T	R	MS45
R	T		B	B	MS46
B	R		R	R	MS47

R=rest
B=blocked
T=tip

position of operator (direction)					switching sequence detent no.
bottom U	2	1	0	top O	
MS48	R	T		T	B
MS49	B	T		T	R
MS50	T	T		T	T
MS51	B	R		R	B
MS52	R			T	R
MS53	R				R
MS54	B	T		T	B
MS55	R	R		T	R
MS56	T	T		T	R
MS57	R	T			T
MS58	T	R		R	R
MS59	T			T	R
MS60	R	T		T	T
MS61	B	T		R	R
MS62	R			R	R

Ordering information: special version

Detents

position of operator (direction)					switching sequence microswitch
bottom U	2	1	0	top O	
					1
					2
					3
					4
					5

R=rest
B=blocked
T=tip

Switching program

position of operator (direction)					switching sequence microswitch
bottom U	2	1	0	top O	
					1
					2
					3
					4
					5

X = contact closed
X-X = contact
continuously closed

Switching program:

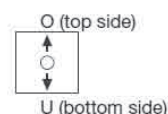
position of operator (direction)					switching sequence program no.
bottom U	2	1	0	top O	
					01
					02
					03
					04
					05
					06
					07
					08
					09
					10
					11
					12
					13
					14
					15
					16
					17
					18
					19
					20
					21
					22
					23
					24
					25
					26

the shown switching
sequences apply to
the microswitch
contacts 1/2 (NC)

X = contact closed

X-X = contact
continuously closed

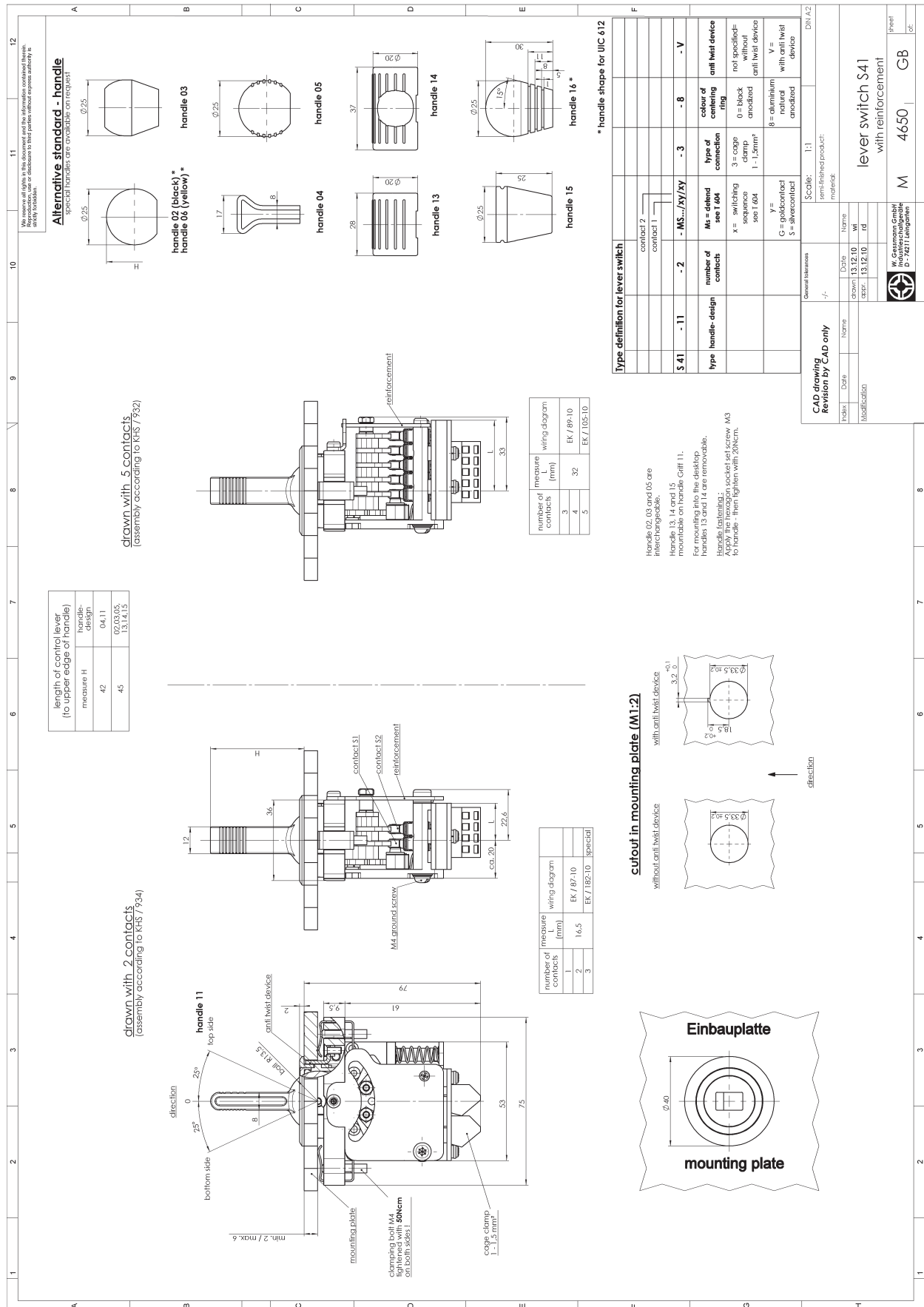
position of operator (direction)					switching sequence program no.
bottom U	2	1	0	top O	
					27
					28
					29
					30
					31
					32
					33
					34
					35
					36
					37
					38
					39
					40
					41
					42
					43
					44
					45
					46
					47
					48
					49
					50
					51

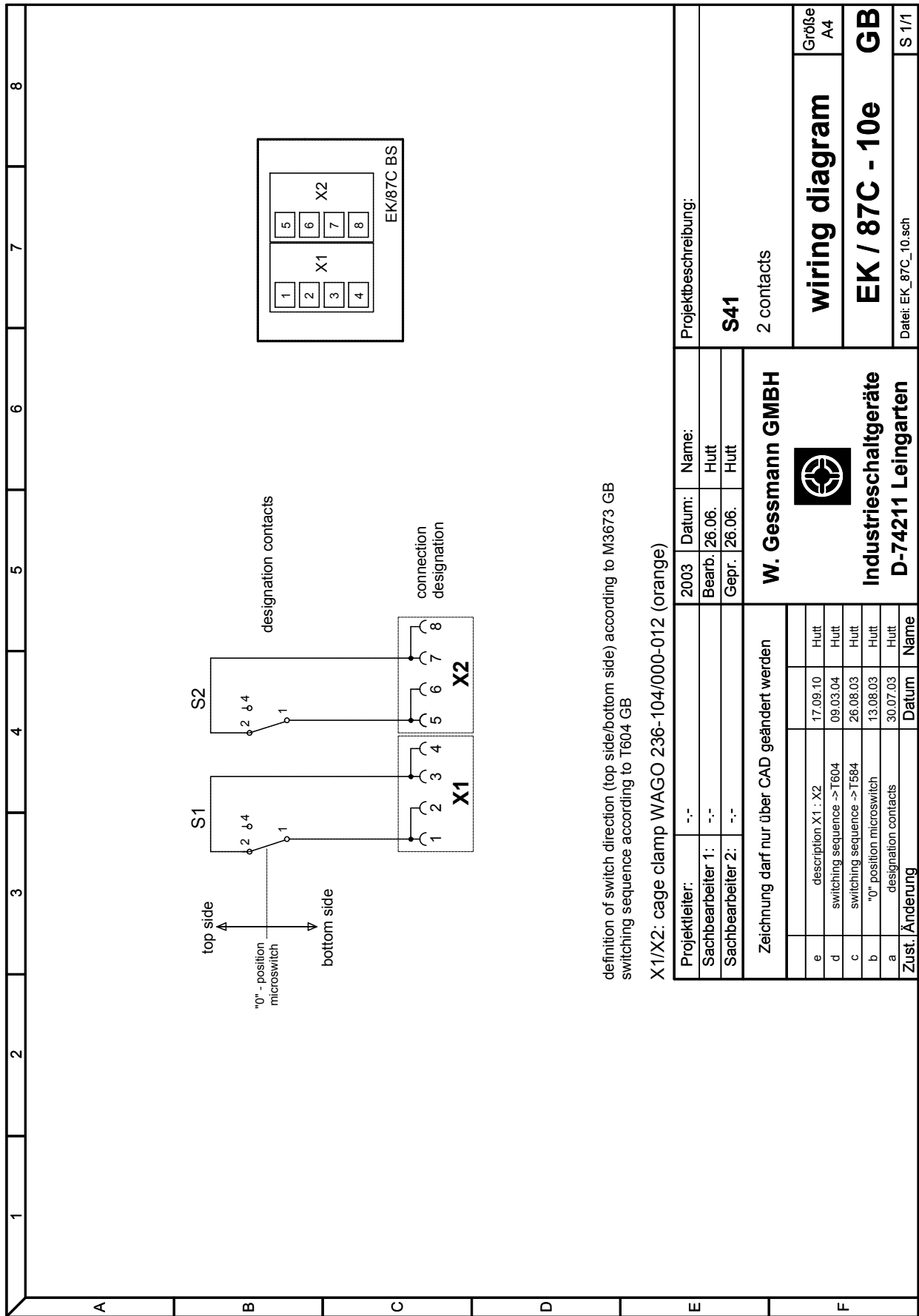


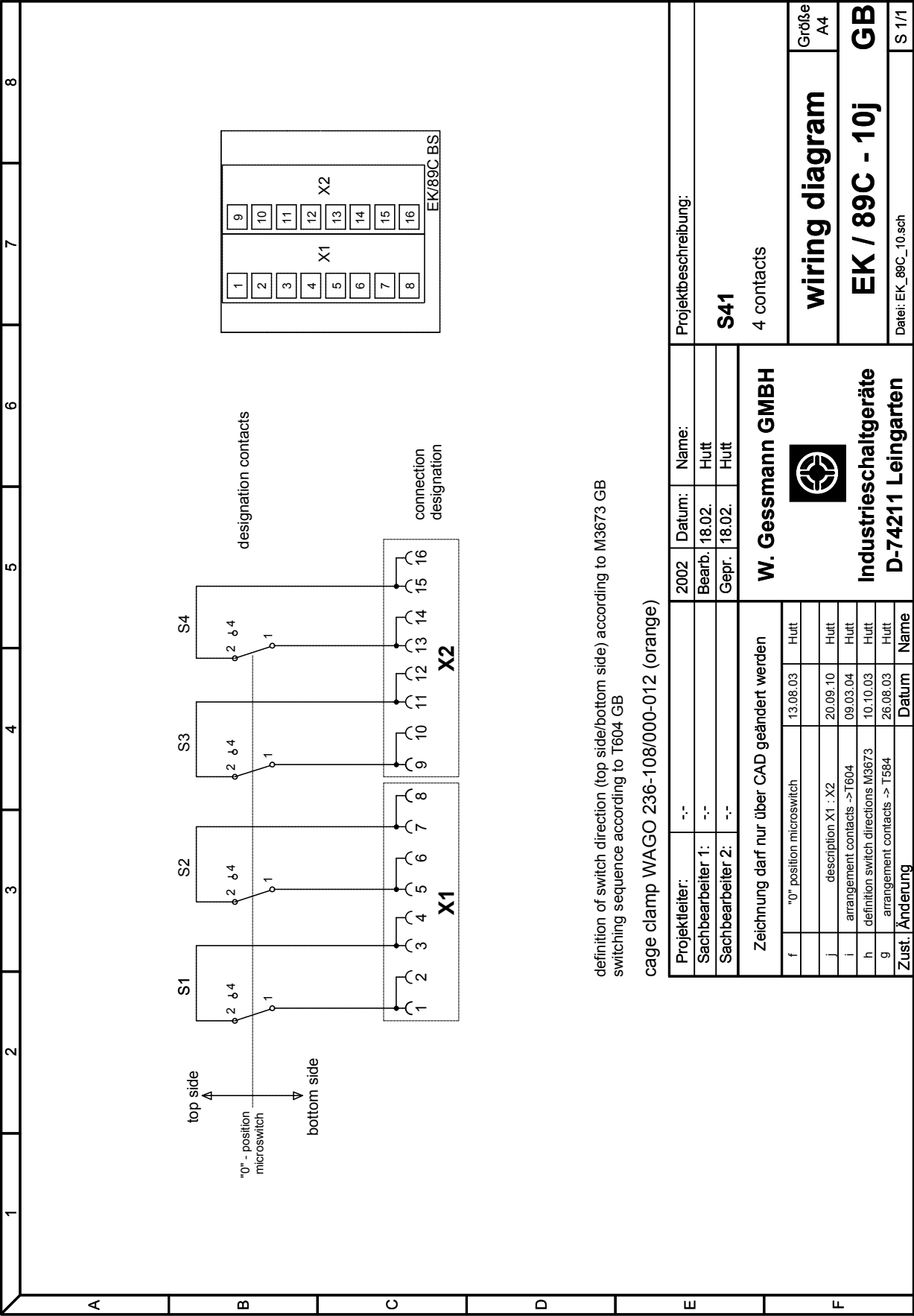
Required ordering information for S4, S41-43, S44-45 catalog 1/214...1/218

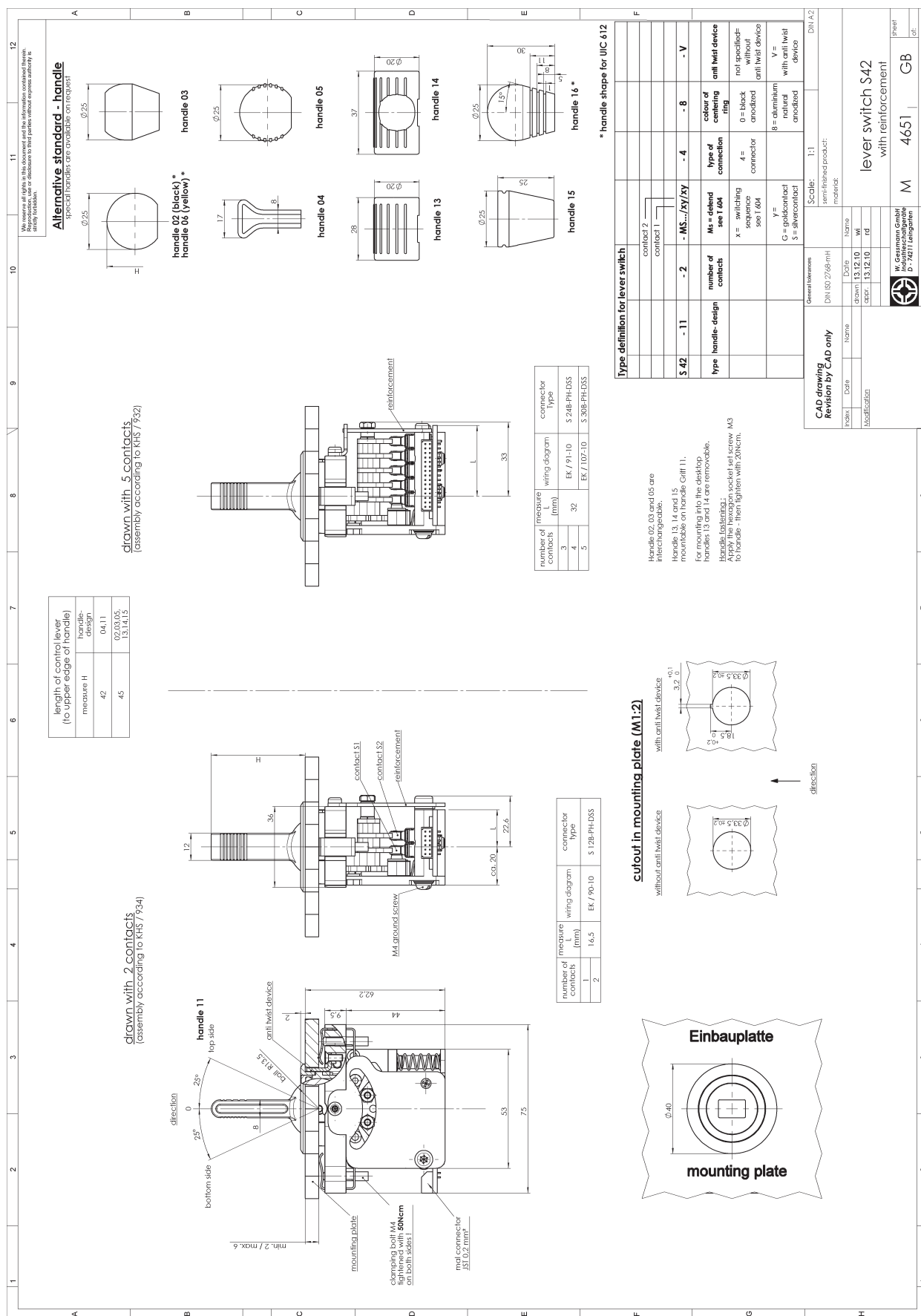
handle design no.	
contact material	standard silver (Ag) S
	Special gold plated (Au) G
contact:	snap action switch
	... with positive opening operation
terminals:	screwed contact no. 1
	fast-on terminal 6,3x0,8mm no. 2
	cage clamp connection no. 3
	connector no. 4
color of centering ring:	black anodized 0
	alu coloured anodized 8
anti twist device:	V

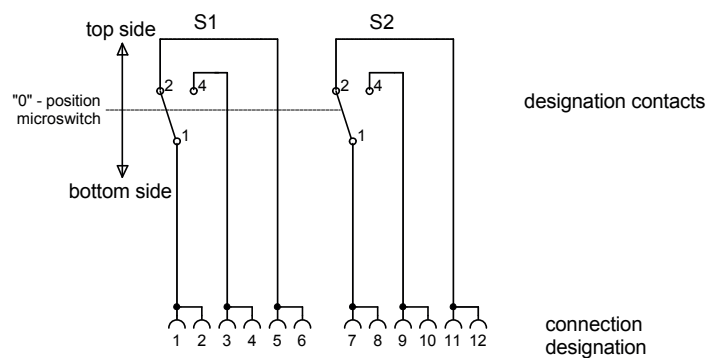
Figure 5: Detents and switching sequences (T 604)











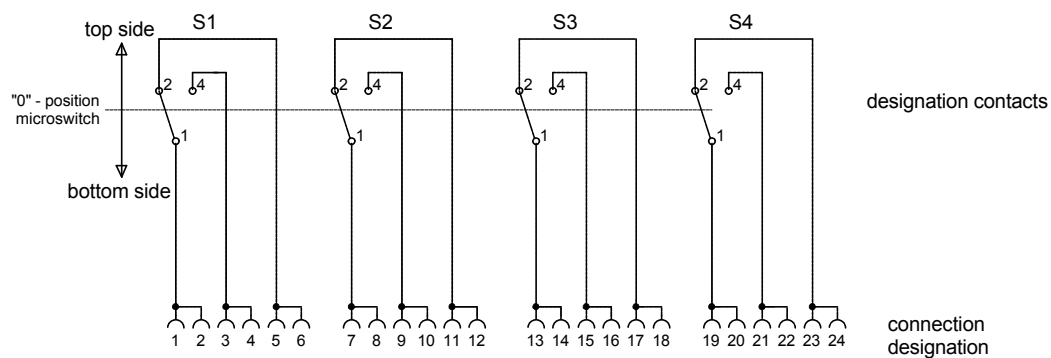
X1=12pol.

1	00	...	00	6
7	00	...	00	12

definition of switch direction (top side/bottom side) according to M3721 GB
switching sequence according to T604 GB

X1: pin contact strip 12 pol. Type: S12B-PHDSS JST

Zeichnung darf nur über CAD geändert werden				2004	Datum:	Name:	lever - switch S42 mit 2 contacts	
				Bearb.	09.03.	Hutt		
				Gepr.	09.03.	Hutt		
				W. Gessmann GMBH Industrieschaltgeräte D-74211 Leingarten			connection diagram	Größe A4
							EK / 90B - 10 GB	Seite 1v.1
							Datei: EK_90B_10GB.sch	
Zust.	Änderung	Datum	Name					



X1=24pol.

1	00	00	00	12
13	00	00	00	24

definition of switch direction (top side/bottom side) according to M3721 GB
switch sequence according to T604 GB

X1: pin contact strip 24 pol. Type: S24B-PHDSS JST

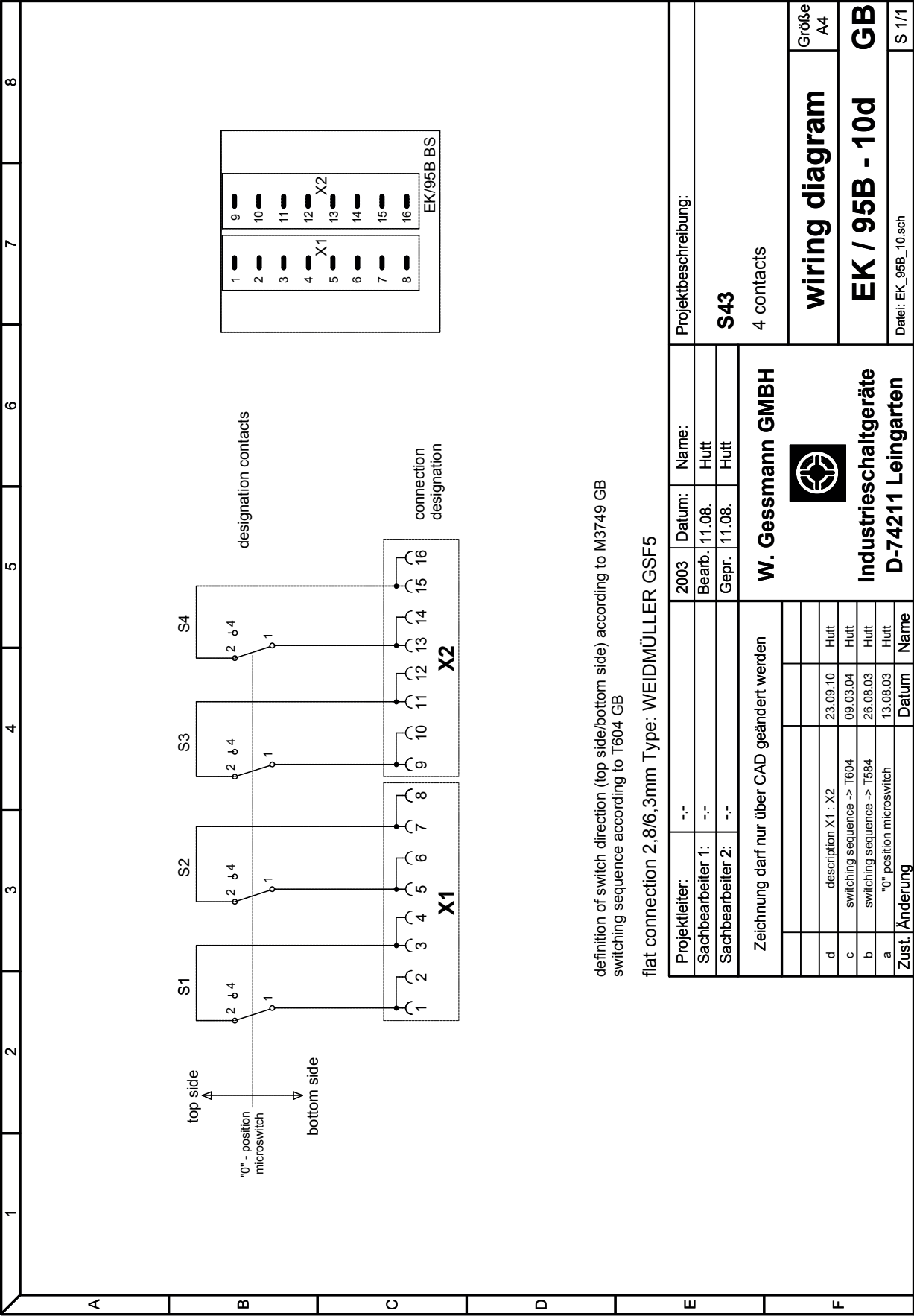
Zeichnung darf nur über CAD geändert werden				2004	Datum:	Name:	lever - switch S42 with 4 contacts	
				Bearb.	09.03.	Hutt		
				Gepr.	09.03.	Hutt		
				W. Gessmann GMBH Industrieschaltgeräte D-74211 Leingarten				Größe A4
								Seite 1v.1
Zust.	Änderung	Datum	Name					Datei: EK_91B_10GB.sch

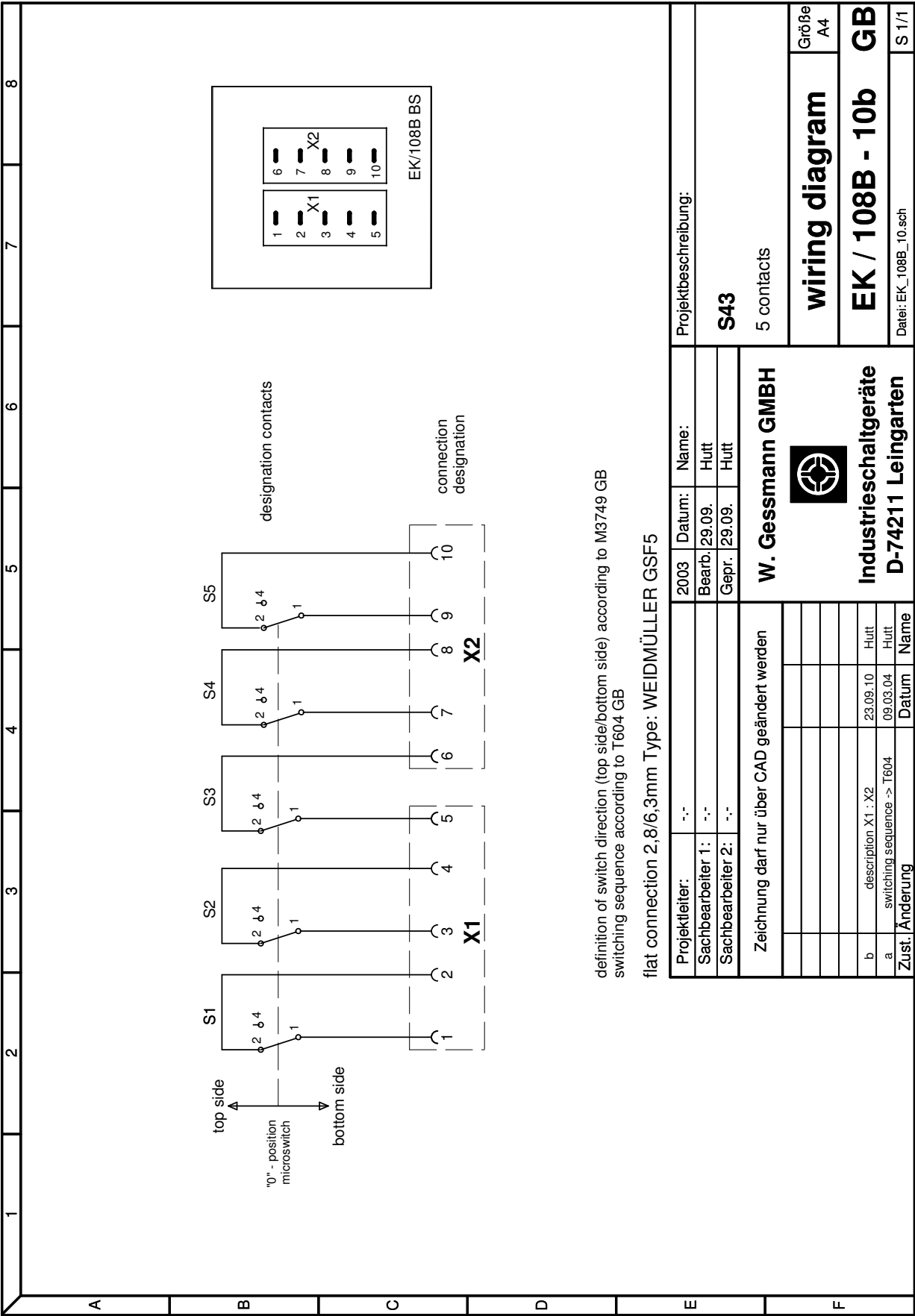


X1: pin contact strip 30 pol. Type: S30B-PHDSS JST

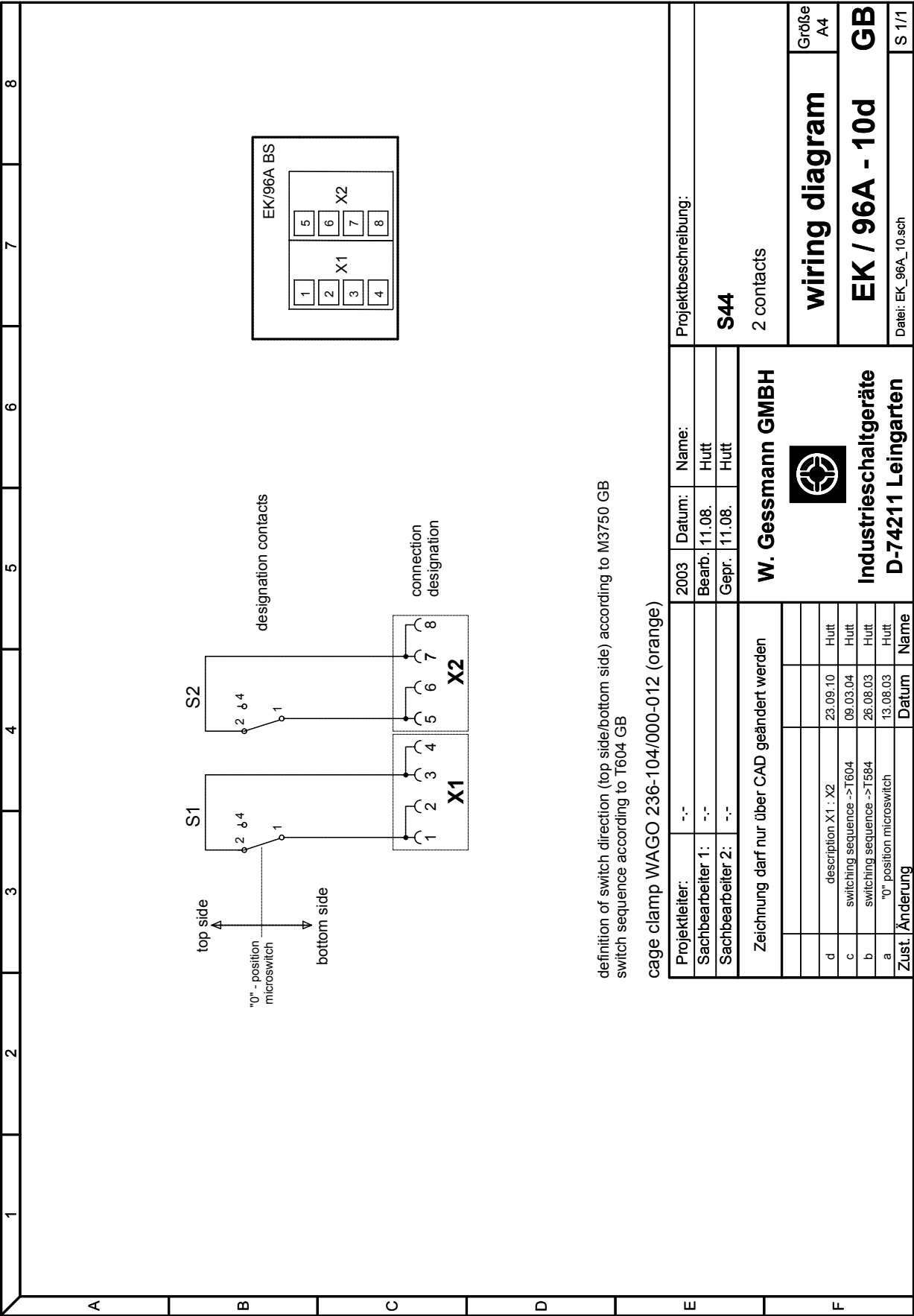
Zeichnung darf nur über CAD geändert werden				2004	Datum:	Name:	lever - switch S42 with 5 contacts				
				Bearb.	09.03.	Hutt					
				Gepr.	09.03.	Hutt			connection diagram	Größe A4	
				W. Gessmann GMBH Industrieschaltgeräte D-74211 Leingarten			EK / 107A - 10 GB	Seite 1v.1			
										Datei: EK_107A_10GB.sch	
Zust.	Änderung		Datum	Name							

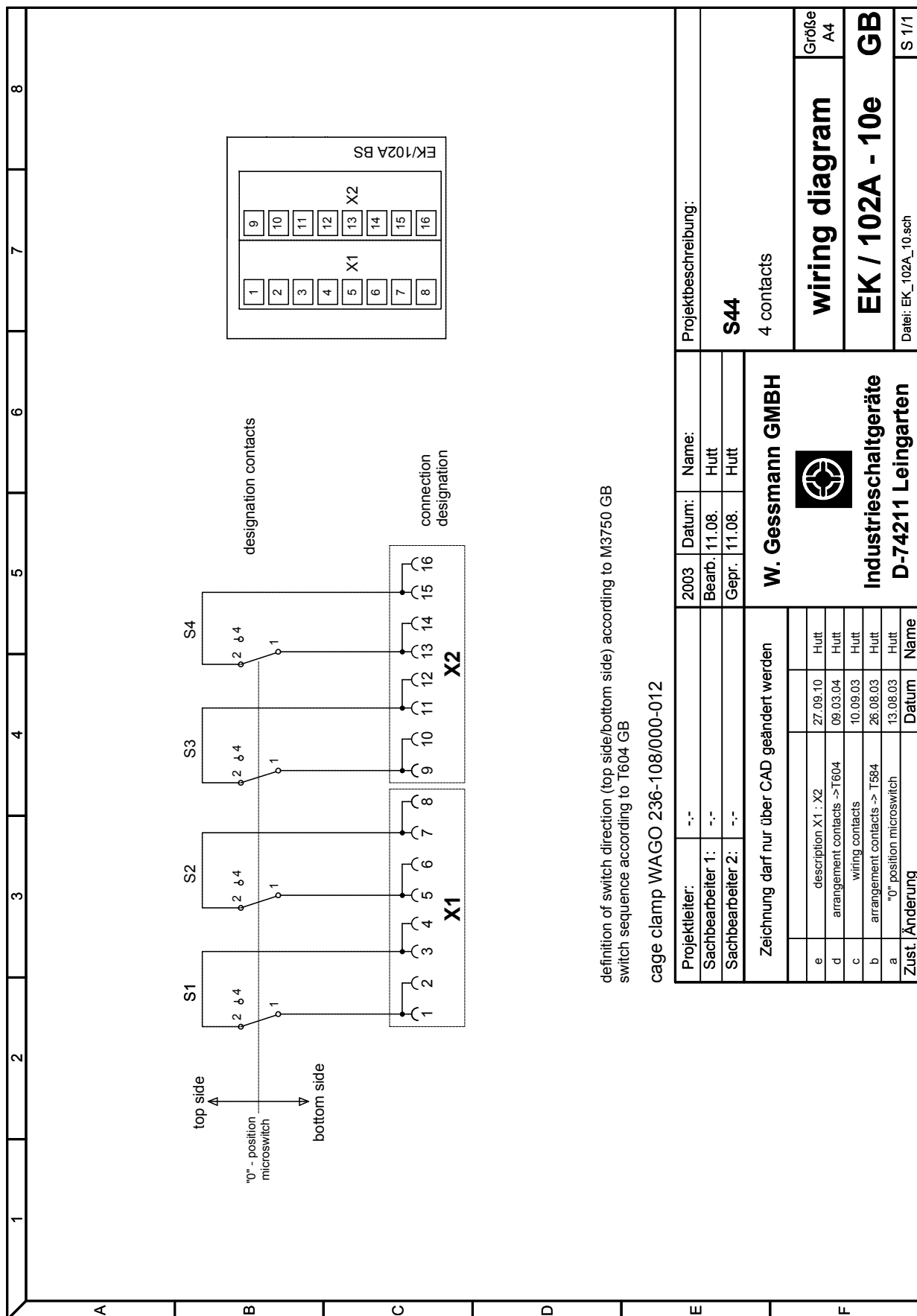
cutout in mounting plate (M1:2)

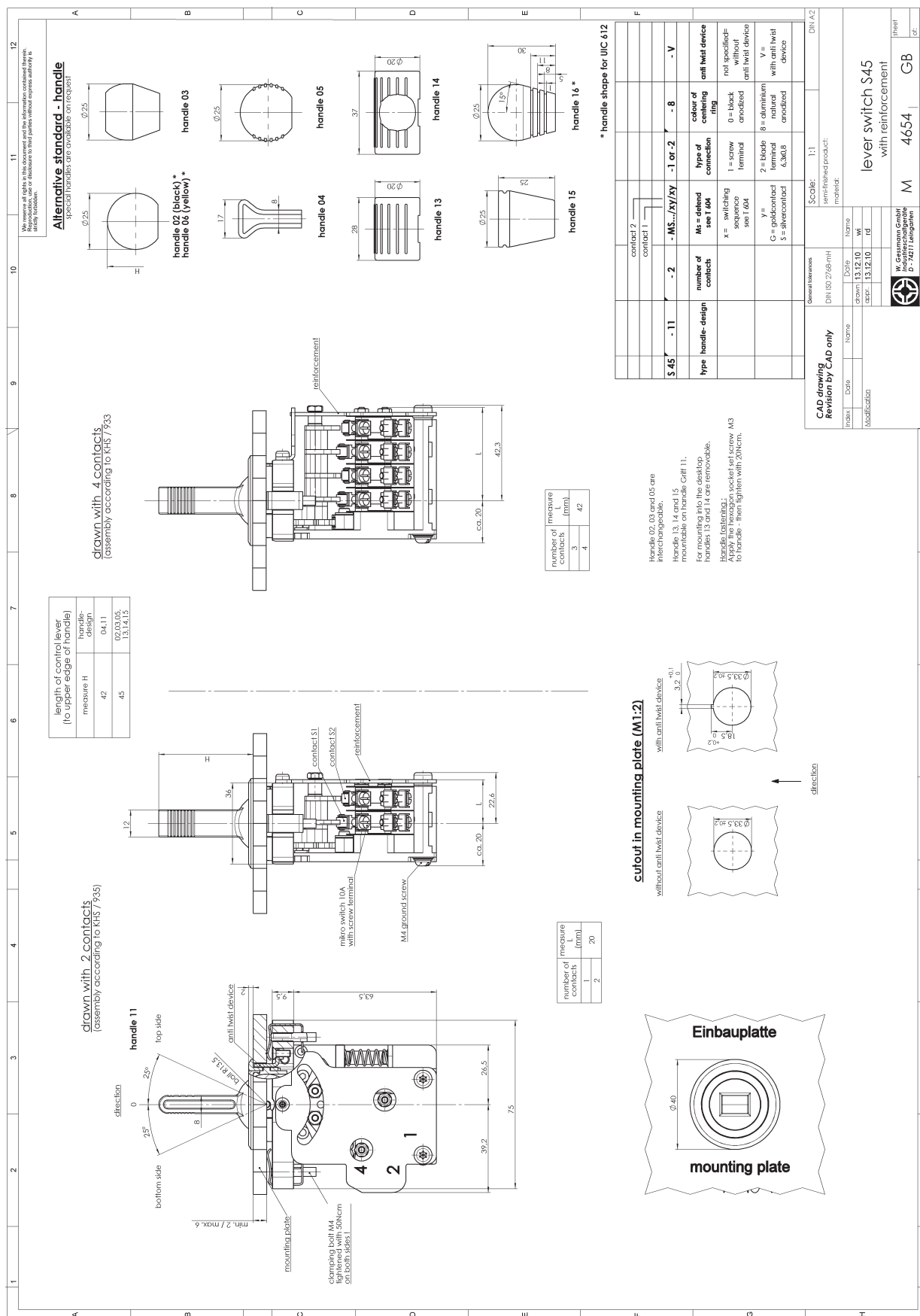


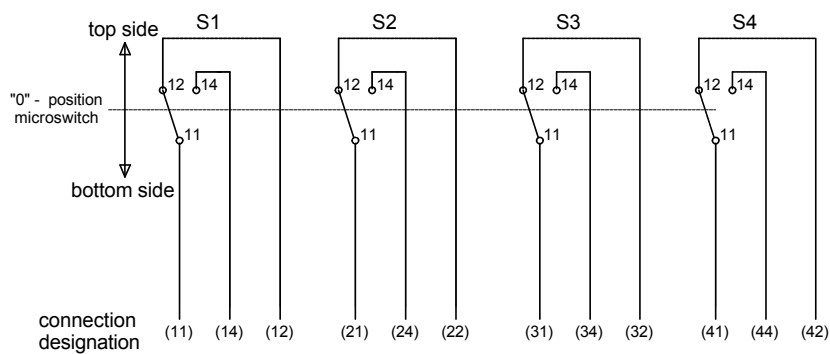


e a o 

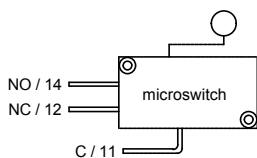








definition of switch direction (top side/bottom side) according to M3770 GB
switch sequence according to T604 GB



microswitch 10A with flat connection 6,3mm*0,8mm

Zeichnung darf nur über CAD geändert werden				2004	Datum:	Name:	lever - switch S45 with 4 contacts	
				Bearb.	09.03.	Hutt		
				Gepr.	09.03.	Hutt		
				W. Gessmann GMBH Industrieschaltgeräte D-74211 Leingarten			connection diagram	Größe A4
							EK / 106 - 10 GB	Seite 1v.1
							Datei: EK_106_10GB.sch	
Zust.	Änderung	Datum	Name					

Notes

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