File E41791
Project 5107556.1197121

August 9, 2019

REPORT

on

Switches, Appliance and Special Use – Certified to IEC Standard

Marquardt GmbH
Rietheim-Weilheim

DESCRIPTION

PRODUCT COVERED:

USL, CNL, Appliance Switches: Mechanical push button switch

Note: comma “,” is used as decimal separator.

Model	Load	Amp	Volt	Hz	Temp °C	Pol/ Thr/ Cir	Endur	IP	Dis
1004 ww/o suff .0000 thru .9999	RM	6(2,5)	250	50/60	T125	1/1,2 /1.2, 2.3	5E4	40	µ
	RM	10(4)	250	50/60	T125	1/1,2 /1.2, 2.3	5E4	40	µ
	RM	16(4)	250	50/60	T125	1/1,2 /1.2, 2.3	25E3	40	µ
	RM	16(4)	250	50/60	T125	1/1,2 /1.2, 2.3	1E4	40	µ
	RM	16(8)	250	50/60	T125	1/1,2 /1.2, 2.3	25E3	40	µ
	RM	16(8)	250	50/60	T125	1/1,2 /1.2, 2.3	1E4	40	µ

Model	Load	Amp	Volt	Hz	Temp °C	Pol/ Thr/ Cir	Endur	IP	Dis
1005 ww/o suff .0000 thru .9999	R	22	28	DC	T100	1/1,2 /1.2, 2.3	1E4	40	Full (>3 mm)
	RM	6(2,5)	250	50/60	T125	1/1 /1.2	5E4	40	µ / Full
	RM	8(8)	250	50/60	T125	1/1 /1.2	5E4	40	µ / Full
	RM	10(4)	250	50/60	T125	1/1 /1.2	5E4	40	µ / Full
	RM	10(6)	250	50/60	T125	1/1 /1.2	5E4	40	µ / Full
	RM	10(10)	250	50/60	T100	1/1 /1.2	5E4	40	Full
	RM	12(12)	250	50/60	T85	1/1 /1.2	5E4	40	Full
	RM	16(4)	250	50/60	T125	1/1 /1.2	5E4	40	µ / Full
	RM	16(6)	250	50/60	T100	1/1 /1.2	5E4	40	µ / Full
	RM	16(16)	250	50/60	T125	1/1 /1.2	5E4	40	µ / Full
	RM	21(8)	250	50/60	T125	1/1 /1.2	25E3	40	µ / Full
	RM	6(2,5)	400	50/60	T125	1/1 /1.2	5E4	40	µ / Full
	RM	10(4)	400	50/60	T125	1/1 /1.2	1E4	40	µ / Full
	RM	16(4)	400	50/60	T125	1/1 /1.2	5E4	40	µ / Full
	RM	20(4)	400	50/60	T125	1/1 /1.2	1E4	40	µ / Full

Model	Load	Amp	Volt	Hz	Temp °C	Pol/ Thr/ Cir	Endur	IP	Dis
1006 ww/o suff .0000 thru .9999	R	22	28	DC	T100	1/1,2 /1.2, 2.3	1E4	40	Full (>3 mm)
	RM	6(2,5)	250	50/60	T125	1/1 /1.2	5E4	40	µ / Full
	RM	8(8)	250	50/60	T125	1/1 /1.2	5E4	40	µ / Full
	RM	10(4)	250	50/60	T125	1/1 /1.2	5E4	40	µ / Full
	RM	10(6)	250	50/60	T125	1/1 /1.2	5E4	40	µ / Full
	RM	10(10)	250	50/60	T100	1/1 /1.2	5E4	40	Full
	RM	12(12)	250	50/60	T85	1/1 /1.2	5E4	40	Full
	RM	16(4)	250	50/60	T125	1/1 /1.2	5E4	40	µ / Full
	RM	16(16)	250	50/60	T125	1/1 /1.2	5E4	40	µ / Full
	RM	21(8)	250	50/60	T125	1/1 /1.2	25E3	40	µ / Full
	RM	6(2,5)	400	50/60	T125	1/1 /1.2	5E4	40	µ / Full
	RM	10(4)	400	50/60	T125	1/1 /1.2	1E4	40	µ / Full
	RM	16(4)	400	50/60	T125	1/1 /1.2	5E4	40	µ / Full
	RM	20(4)	400	50/60	T125	1/1 /1.2	1E4	40	µ / Full

EXPLANATION OF COLUMN HEADINGS

Model - Cat. No. – Identifier used by the manufacturer for a specific switch Model or Catalog number.

f/b – followed by, ww/o - With or without,

Load - identify the load according the Testing. R= resistive, RM= resistive and motor, RC= resistive and capacitive, L=tungsten lamp load, Spc= specific load, mA =load below 20mA, SpcL, SpcT = specific lamp load such as US L or T, I= inductive, SpcM= specific motor rating, TV= television, GP= general purpose, GPM= general purpose and motor, GPhp= general purpose and horse power.

Amps – the steady state amp value of the switch. Per pole value may be marked "PP" and is verified by the circuit connection.

Volt – the Voltage (RMS) value.

Hz – the Frequency or range such as (50-60).

Temp – The declared operating temperature of the switch.

Pol/Thr/Cir – The number of Poles (Pol) and Throws (Thr) represented by the switch construction (where "M" indicates multiple poles (more than 2). The circuit (Cir) is identified by a code explained in the standard and appendix pages (Table 2 of 61058-1).

IP – Degree of protection against ingress of solid objects and dust, and harmful ingress of water.

DIS – Disconnect air gap across open contact, electronic is indicated by "e", micro indicated "micro", FULL indicated with a measurement in mm.

SPCA – Identifies Special Conditions of Acceptability that must be considered in the end product. A list of typical SPCOAs (represented with a number) are found in the WOYR2 guide card. Conditions other than the typical are represented with a letter and described in the specific volume and section follow-up procedure description.

Products designated USL have been investigated using requirements contained in IEC Standard for Switches for Appliance, IEC 61058-1 edition 4 and IEC 61058-1-1 edition 1.

Products designated CNL have been investigated using requirements contained in CSA Standard for Switches for Appliance, CSA C22.2 No. 61058-1:17 edition 3 and CSA C22.2 No. 61058-1-1:17 edition 1.

Products also comply with requirements contained in UL Standard for Switches for Appliance, UL 61058-1:17 edition 5 and UL 61058-1-1:17 edition 1.

Switch Declaration: Use table for general and indicate differences below.

Model	100 ww/o suff. 4,5,6 w/wo Suff. 0000-9999			
Ambient Temp. C	See table page 1		Type Reference	CT
Total Cycles	See table page 1		Glow Wire Temp. C	850
IP rating	See table page 1		PTI	250 /175
Electric shock Class	II		Over Voltage Category	II / III
Pollution degree Macro	3		Impulse withstand Volt	2500 / 4000
Pollution degree Micro	2		Disconnect	μ, or full
Actuation	Push-button (lever)		Test Circuit	1.2 or 2.2

Terminal	Type	Wire range	Flexible/ Rigid	Wire type	Prepared or Unprepared	Specific test amps
C, NO, NC	Quick connect or screw	1,5-4,0 mm²	Rigid	S+ST	Prepared	≤ 16
		1,0-2,5 mm²	Flexible	ST		
C, NO, NC	Solder	1,5-4,0 mm²	Rigid	S+ST	Unprepared	≤ 16
		1,0-2,5 mm²	Flexible	ST		
C, NO, NC	PCB solder or Quick connect	2,5-6,0 mm² 1,5-4,0 mm²	Rigid	S+ST	Prepared	≤ 22 ≤ 16
C, NO, NC	Solder,	2,5-6,0 mm² 1,5-4,0 mm²	Rigid	S+ST	Unprepared	≤ 22 ≤ 16
C, NO, NC	Screw	1,0-1,5 mm²	Rigid	S+ST	Prepared (Crimped end sleeve)	≤ 16

NOMENCLATURE:

100x.	xxxx
I	II

I	Basic switch 1004. / 1005. / 1006.
II	0000 through 9999 denote body and actuator color, and external variations not affecting the electrical or mechanical operation of the switch.

FIGURE & ILLUSTRATIONS:

The following Figures & Illustrations are included in this Report.

Figure and Illustration Index		
Fig. 1		Overall View
Fig. 2		Internal View
Fig. 3		Overall view of model 1005.
Fig. 4		Disassembly of Model 1005.
Fig. 5		Overall view of model 1005.
Fig. 6		Internal view of model 1004, also representing the whole series.
Ill. 1		Technical drawing of model 1005.3510 (SPDT)
Ill. 2		Clearances and Creepage Distances
Ill. 3		Overall view, internal view, lever types
Ill. 4		Nomenclature
Ill. 5		Declaration of Conformity on Production Methods
Ill. 6		Markings
Ill. 7		List of Materials

TECHNICAL CONSIDERATIONS (NOT FOR FIELD REPRESENTATIVE'S USE):

Use – The switches covered by this Report are for use only in complete equipment where the suitability of the combination is determined by UL.

MARKING:

General requirements on marking refer to Section General.

CONSTRUCTION DETAILS:

Corrosion Protection - All ferrous metal parts are protected against corrosion by plating, painting, galvanizing or equivalent.

Spacing - Spacing between uninsulated live-metal parts of opposite polarity and also those parts and dead-metal parts, including openings for mounting screws have been evaluated to the requirements of the standard.

Clearance and creepage distance – These spacings have been judged on the basis of the required clearances in Table 12, 13 and 14.

The following spacings requirements are based on the parameters: Pollution degree: inside 2, outside 3; material group: IIIa; Working voltage: 250 V; Rated impulse withstand voltage 2500 V:

Spacings were measured at the following locations:
A – for PD2 between moving arm and switch surface where the actuator is located; for PD3 between terminal and side (mounting) surface.
B and C – for PD2 between stationary contact carrier and moving arm; for PD3 between NC terminal and COM terminal
Details refer to Ill.2

Table 22 – 24	Creepage distance Cd and clearance Cl across:	Required Cd (mm) (measured)		Required Cl (mm) (measured)	
Locations		PD3 (outside)	PD2 (inside)	PD3 (outside)	PD2 (inside)
-	Functional	X	X	X	X
A	Basic	4,0 (1,8)+	2,5 (5,6)	1,5 (1,8)	1,5 (5,6)
-	Supplementary	X	X	X	X
-	Reinforced	X	X	X	X
B	Full disconnection	3,2 (13,5)	2,5 (3,4)	1,5 (2)	1,5 (2)
C	Micro disconnection	3,2 (13,5)	2,5 (3,4)	0,5 (2)	X

+: to fulfil the required creepage distance for basic insulation, the switch shall be installed to an insulation material with adequate size and/or thickness or to dead metal parts which is separated to live parts with minimum basic insulation or to earthed metal parts.

The following spacings requirements are based on the parameters: Pollution degree: inside 2, outside 3; material group: II; Working voltage: 400 V; Rated impulse withstand voltage 2500 V for full and micro disconnection and 4000 V for micro disconnection.

Spacings were measured at the following locations:
A – for PD2 between moving arm and switch surface where the actuator is located; for PD3 between terminal and side (mounting) surface.
B and C – for PD2 between stationary contact carrier and moving arm; for PD3 between NC terminal and COM terminal.
Details refer to Ill.2

Table 22 – 24	Creepage distance Cd and clearance Cl across:	Required Cd (mm)		Required Cl (mm)	
Locations		PD3 (outside)	PD2 (inside)	PD3 (outside)	PD2 (inside)
-	Functional	X	X	X	X
A	Basic	5,6 (1,8)+	2,8 (4,8)	1,5 (1,8)	1,5 (5,6)
-	Supplementary	X	X	X	X
-	Reinforced	X	X	X	X
B	Full disconnection	4,5 (13,5)	2,8 (3,4)	1,5 (2)	1,5 (2)
C	Micro disconnection	4,5 (13,5)	2,8 (3,4)	0,5 (2)	X

+: to fulfil the required creepage distance for basic insulation, the switch shall be installed to an insulation material with adequate size and/or thickness or to dead metal parts which is separated to live parts with minimum basic insulation or to earthed metal parts.

For model 1006 of double version, The following spacings. Requirements are based on the parameters: Pollution degree: inside 2, outside 3; material group: II; Working voltage: 400 V; Rated impulse withstand voltage 4000 V.

Spacings were measured at the following locations:
A – between NO terminals of the two stacked switches.
B – for PD2 between live part (COM) and lever where the actuator is located; for PD3 between terminal and side (mounting) surface.
C and D – for PD2 between stationary contact carrier and moving arm; for PD3 between NC terminal and COM terminal.
Details refer to Ill.2

Table 22 – 24	Creepage distance Cd and clearance Cl across:	Required Cd (mm)		Required Cl (mm)	
Locations		PD3 (outside)	PD2 (inside)	PD3 (outside)	PD2 (inside)
A	Functional	3(>3)	X	3(4,6)	X
B	Basic	5,6 (1,8)+	2,8 (4,8)	1,5 (1,8)	1,5 (4)
-	Supplementary	X	X	X	X
-	Reinforced	X	X	X	X
C	Full disconnection	4,5 (13,5)	2,8 (6,8)	3 (4)	3 (4)
D	Micro disconnection	4,5 (13,5)	2,8 (6,8)	0,5 (4)	X

Overall dimensions of the decorative parts of the housing (body / cover) and actuator (rocker) may vary.

GENERAL:

The switches covered by this report are single-pole, single-throw or double-throw push-button switches for incorporated use in Class II Appliances and dirty environment.

They are either provided with solder-, PCB solder, screw or quick-connect terminals. Switch internal parts without sealing and without potting are considered to be IP40.

Overall dimensions of the decorative parts of the housing (body / cover) and actuator (actuating member) may vary.

Switch type 1006. may consist of two switches 1006. connected with an intermediate plate. Switch type 1006. may have metal levers in different shapes and sizes. A combination with NO and NC type is also possible which is covered by a more unfavorable combination of NO + NO or NC + NC.

CAT. NO. Series 1004./1005./1006. Fig. 1 – 4; Ill. 1 - 7

General - The general design, shape and arrangement shall be as illustrated except where variations are specifically described.
The following table shows the BOM of the series 1006, which represents 1004 and 1005 as well.

Item	Part	Description	
1.	Base	R/C (QMFZ2)	
		Material Type:	A3U40G5, mfr. by BASF (E41871)
		Material Grade:	PA66
		CTI:	2
		Alternate Type:	Melopas MP 182, mfr. by Raschig GmbH (E75850)
		Material Grade:	MEL/PF
		CTI:	0
		Alternate Type:	Pocan B4225, mfr. by Lanxess AG (E245249)
		Material Grade:	PBT
		CTI:	3
		Alternate:	Materials as described under Section General, material group A6
		Dimension:	Approx.: 28 mm x 16 mm x 7,3 mm
		Other:	Materials Pocan and Rynite (Material group IIIa) are only to use for switches, which require not more than PTI 175.

CAT. NO. Series 1004./1005./1006. CONT'D

2.	Cover	R/C (QMFZ2), same as item 1	
		Material Type:	same as item 1
		Material Grade:	same as item 1
		CTI:	same as item 1
		Dimension:	Approx: 28 mm x 16 mm x 10 mm
		Other:	N/A
3.	Actuator	R/C (QMFZ2), same as item 1	
		Material Type:	Ultramid A4H
		Material Grade:	PA66
		CTI:	0
		Alternate Type:	Melopas MP 182, mfr. by Raschig GmbH (E75850)
		Material Grade:	MEL/PF
		CTI:	0
		Alternate:	Alternate: Materials as described under Section General, material group B2 and item 1
		Dimension:	Approx.: 7,1 mm x 5,1 mm x 4,5mm
		Other:	N/A
4.	Lever inside	Material Type	Copper or copper alloy, may be Ag, Au, Sn or Ni plated
		Dimension:	Approx. 15,3 mm by 7,0 mm by 6,2 mm min. thickness 0,8 mm
		Other:	N/A

CAT. NO. Series 1004./1005./1006. CONT'D

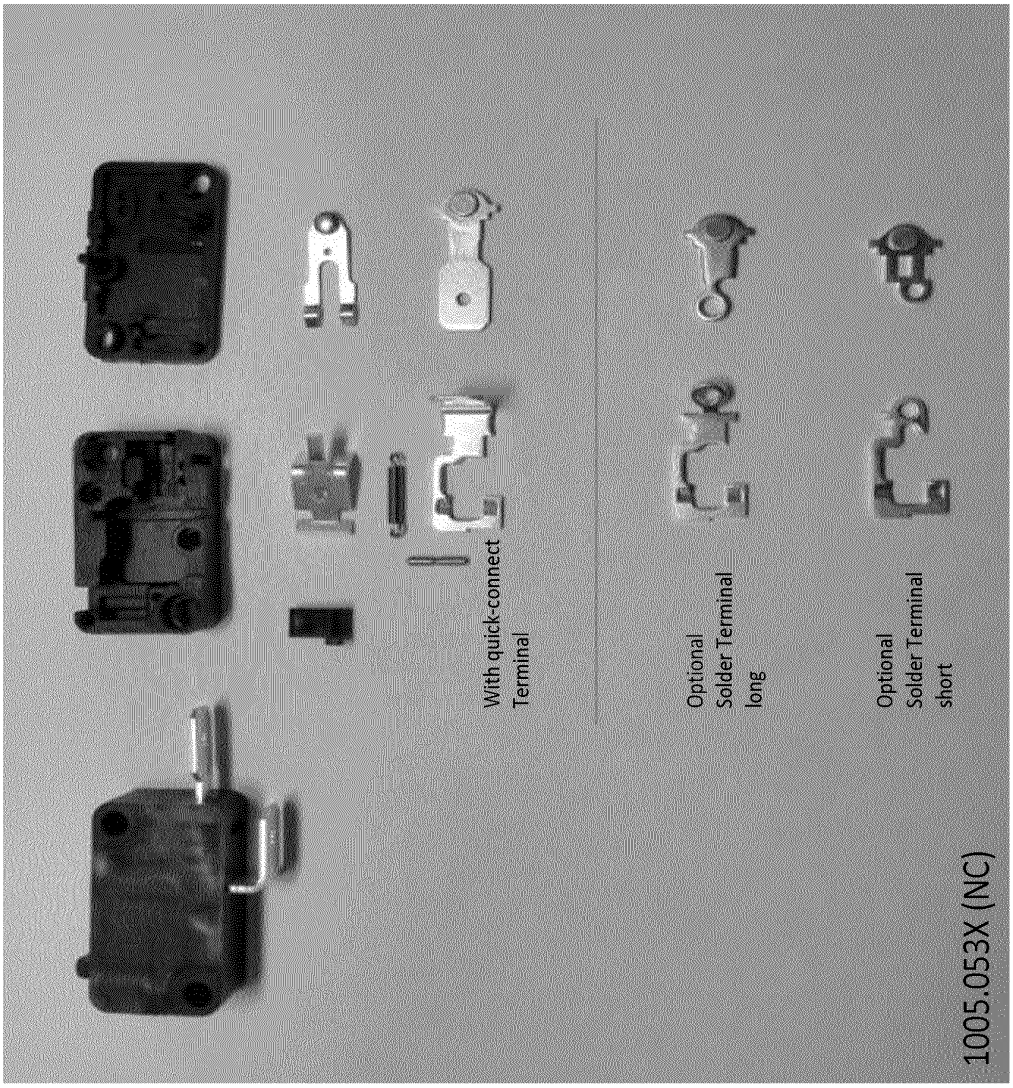
Item	Part	Description	
5.	Pin	Material Type	Copper or copper alloy
		Dimension:	Approx. dia 1,0 mm, length 7,4 mm
		Other:	N/A
6.	Movable Contact Carrier	Material Type	a) Contact - Silver alloy or copper alloy b) Contact carrier - copper alloy, may be Ag, Au, Sn or Ni plated c) Spring - Spring steel
		Dimension:	a) Contact - overall height approx. 0,5 mm, min. 3,0 mm dia b) Contact carrier - overall 16 mm by 6,4 mm by 0,4 mm thick c) Spring - dia Approx. 1,9 mm, wire dia 0,4 mm or free length approx. 12,7 mm
		Other:	Contact riveted or welded to contact carrier
7.	Stationary contact	Material Type	Silver alloy or silver alloy plated on copper alloy base, may be plated
		Dimension:	min. 3,5 mm dia, min 0,5 mm thick
		Other:	riveted to terminal
8.	Terminals	Material Type	a) Quick connect type - copper alloy, may be Ag, Au, Sn or Ni plated b) Solder terminals - copper alloy, may be Ag, Au, Sn plated c) PCB solder terminals - copper alloy, may be Ag, Au, Sn or Ni plated d) screw terminals - copper alloy, may be Ag, Au, Sn or Ni plated
		Dimension:	a) Quick connect type – 6,3 mm by 0,8 mm thick or 4,8 mm by 0,8 mm b) Solder terminals – 3,6 mm or 4,2 mm by 1,0 mm, provided with a hole c) PCB solder terminals – 1,0 mm by 1,0 mm d) screw terminal – Approx. 19 mm by 7 mm by 7 mm
		Other:	may be bend

CAT. NO. Series 1004./1005./1006. CONT'D

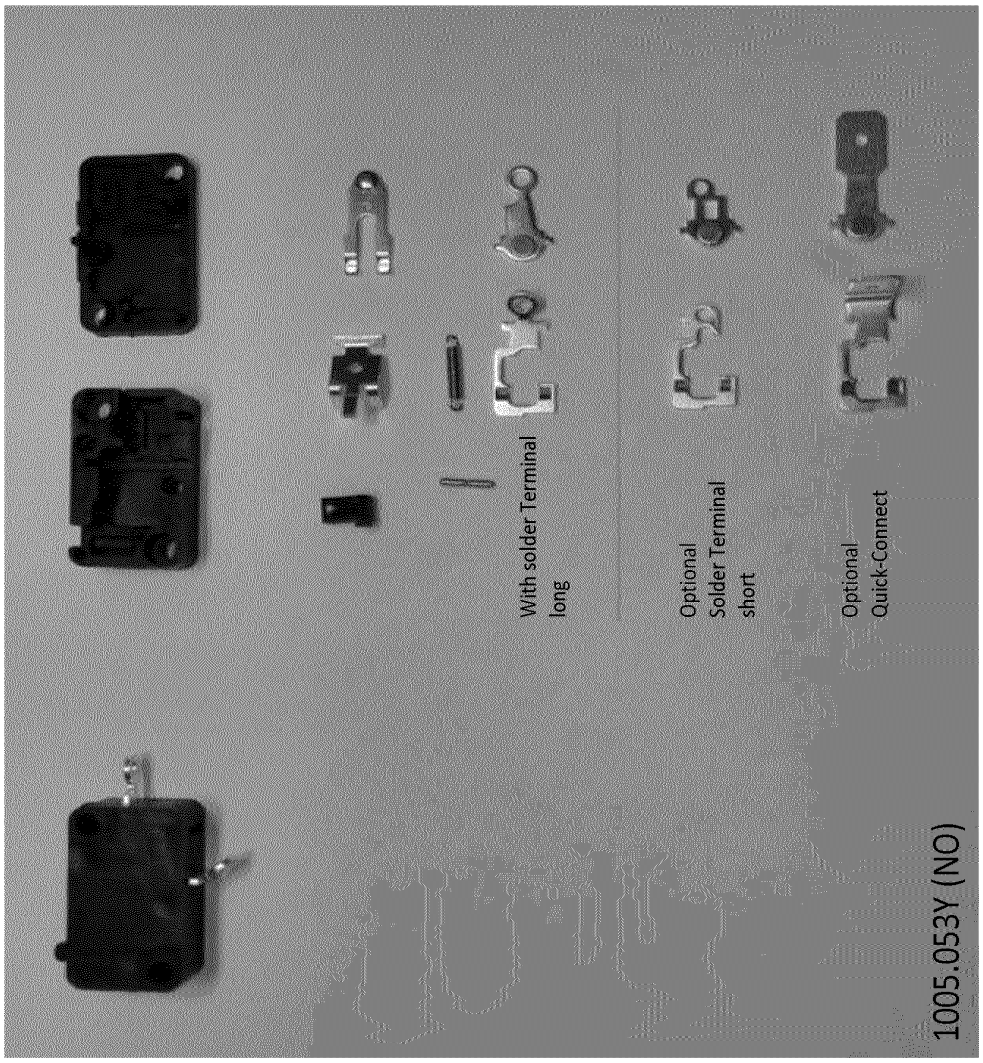
9.	Inter-mediate plate (optional)	R/C (QMFZ2), same as item 1	
		Material Type:	Ultramid A3X2G5(f2)(r),
			Alternate: Materials as described under Section General, material group A2
		Material Grade:	PA66
		CTI:	0
		Alternate Type:	Hard paper mfr. by Karl Späh GmbH
		Material Grade:	Hard paper 0,8 mm ± 0,1 mm thickness according to DIN EN 60893-3-3
		CTI:	-
		Dimension:	approx.overall 46,8 mm by 30,0 mm, height 32,0 mm
		Other:	N/A
10.	Lever outside (optional)	Material Type	Steel
		Dimension:	Approx. 50 mm by 20 mm by 8 mm min. thickness 0,6 mm
11.	Rivet (optional)	Material Type	Copper or copper alloy
		Dimension:	Approx. dia from 1,3 mm to 2,0 mm, length 9,3 mm, min. thickness 0,2 mm 1006. (double version): Approx. dia from 1,3 mm to 2,0 mm, length 21,6 mm, min. thickness 0,25 mm
12.	Wire (optional)	It is to be determined in the end use product.	


1005.053Y (NO)
1005.053X (NC)
1005.053Y (NO)
1006.9604 (NC) - double
1006.960X (NO)
1006.9702 (NO) - double

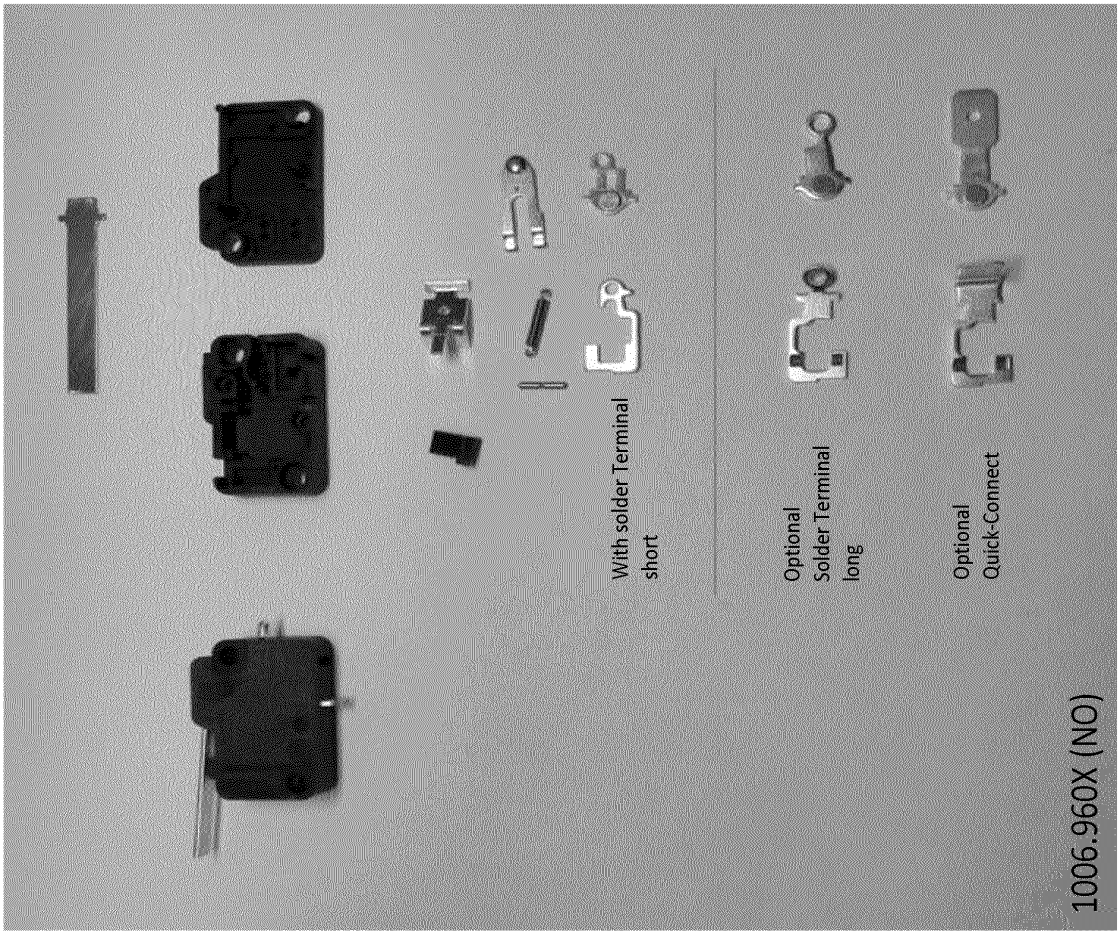
N191977558


With quick-connect
Terminal
Optional
Solder Terminal
long
Optional
Solder Terminal
short
1005.053X (NC)

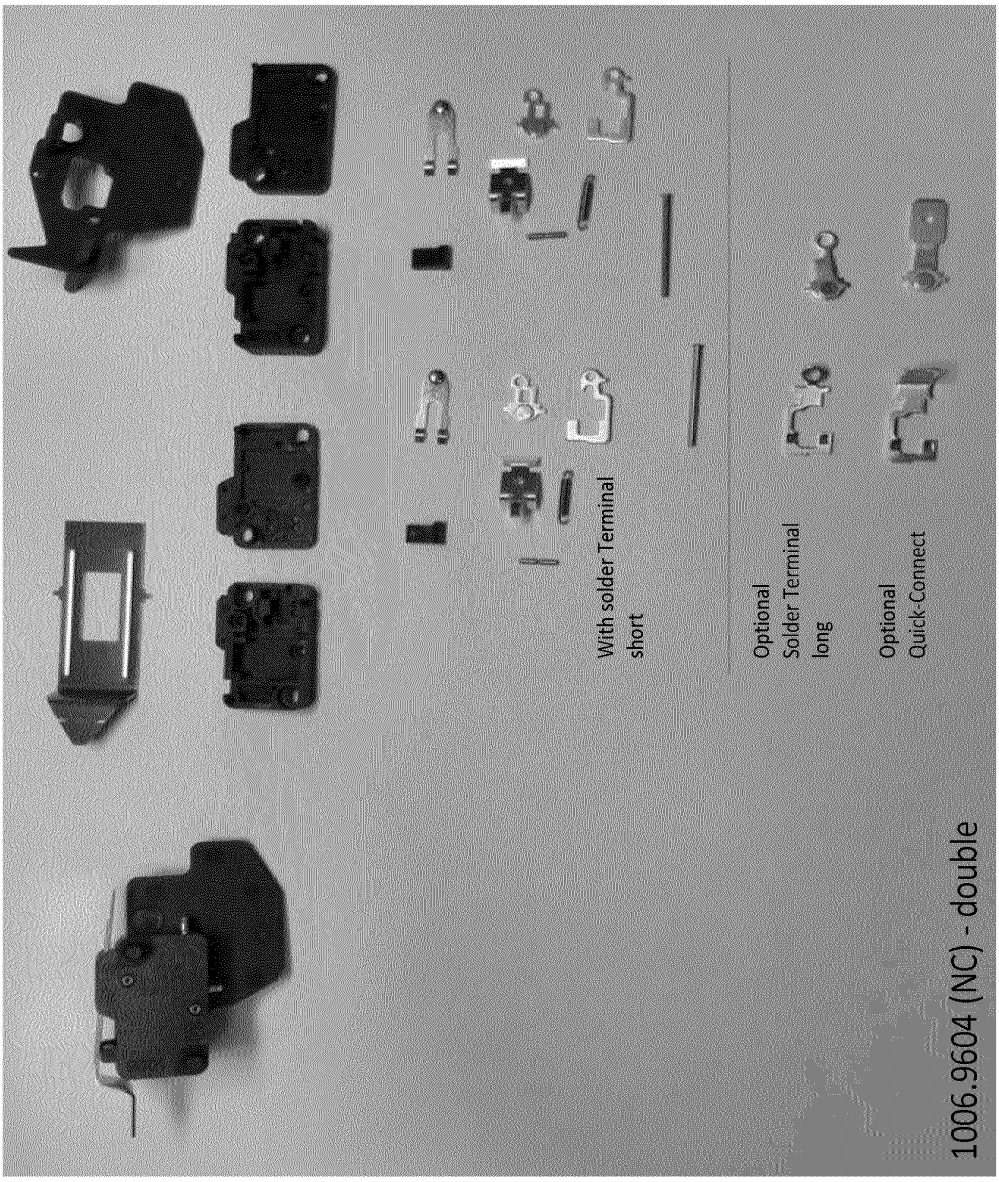
N191977559


With solder Terminal
long
Optional
Solder Terminal
short
Optional
Quick-Connect
1005.053Y (NO)

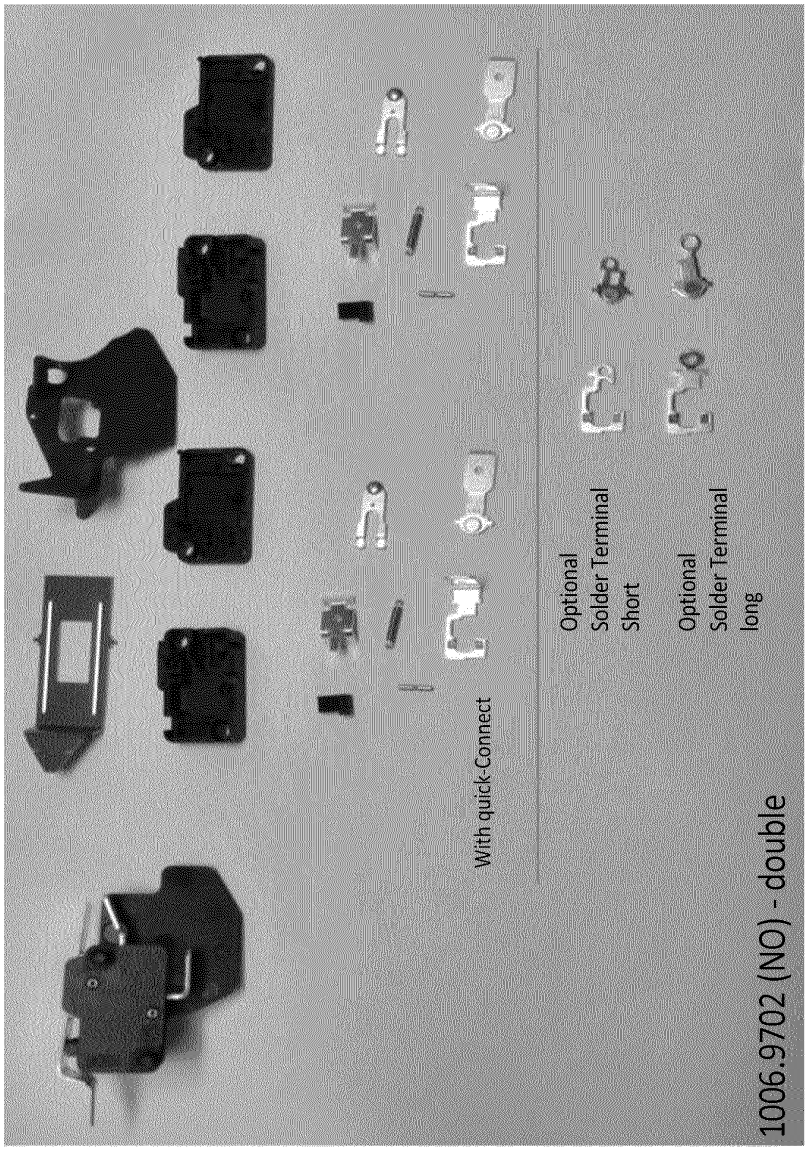
N191977559


With solder Terminal
short
Optional
Solder Terminal
long
Optional
Quick-Connect
1006.960X (NO)

N191977559

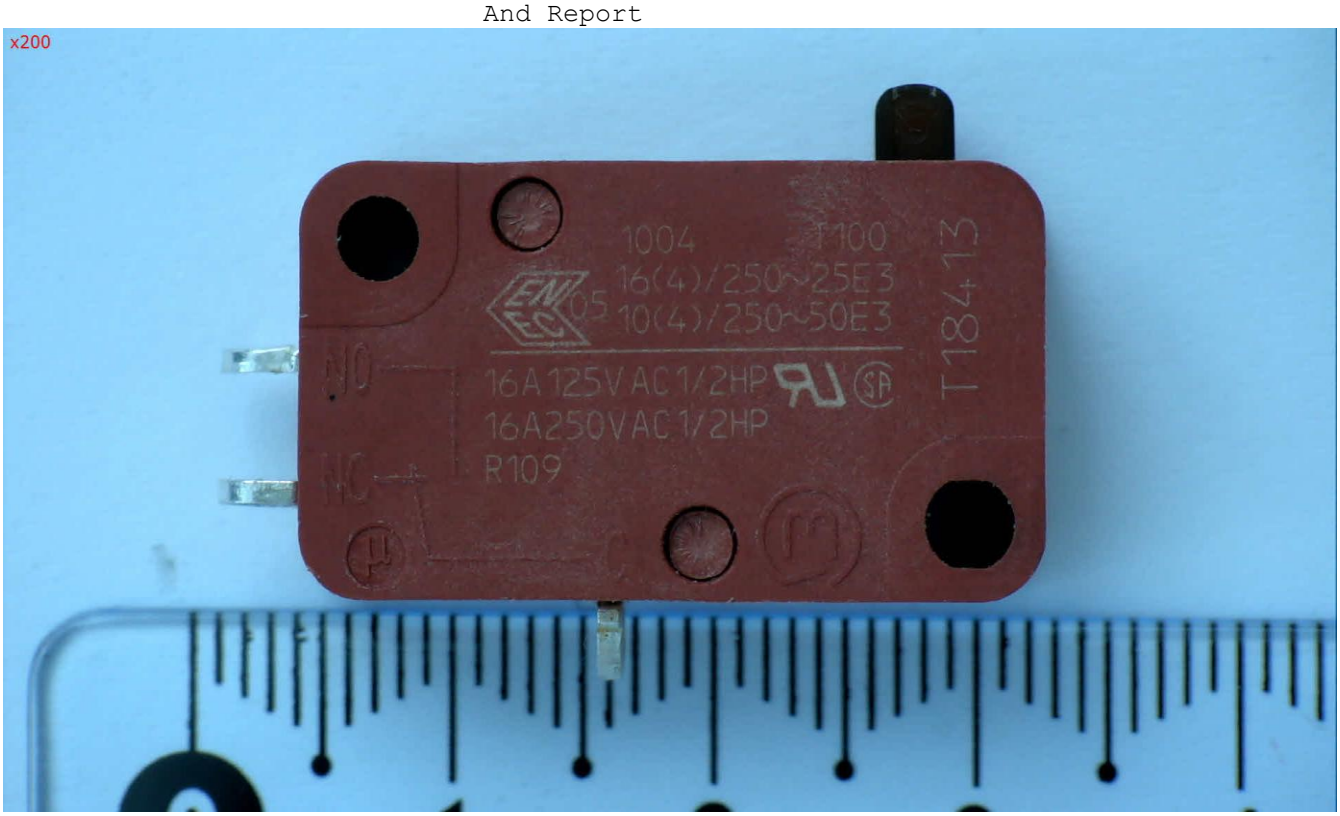

1006.9604 (NC) - double
With solder Terminal
short
Optional
Solder Terminal
long
Optional
Quick-Connect

N191977559

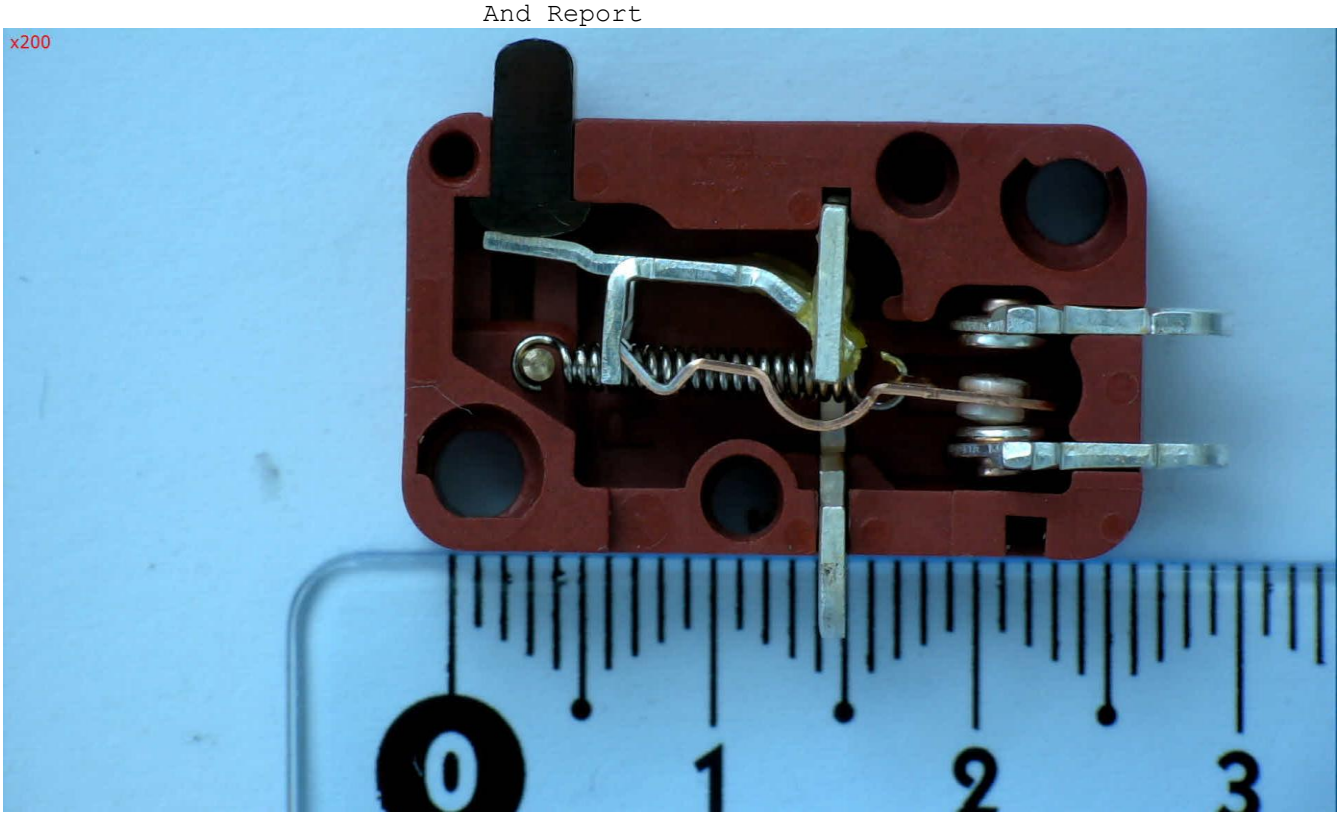

1006.9702 (NO) - double
With quick-Connect
Optional
Solder Terminal
Short
Optional
Solder Terminal
long

N191977560

N191977561


x200
1004
T100
16(4)/250~25E3
10(4)/250~50E3
05
16A 125VAC 1/2HP
16A250VAC 1/2HP
R109
NO
NC
T18413

N191977562



N191977563

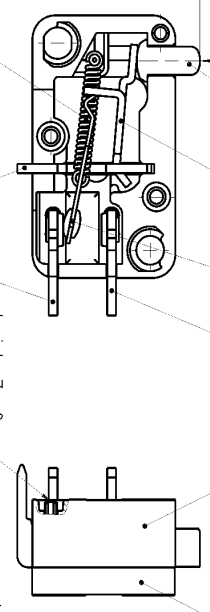
VERTRAULICH

CONFIDENTIAL

Ansicht ohne Pos.10
view without pos.10

TA 1 und 2
TD 1 and 2

TA 3 bis 7
TD 3 up to 7

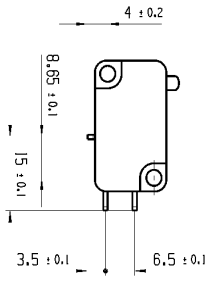


beide Zapfen warmgenietet
both pins hot-riveted

Aufschrift
marking
am Deckel vorhanden
existing on the cap

Technische Angaben (TA)
technical data (TD)

1. Schalt-Betaetigungskraft
actuating force
2.2 bis 3.6 N
2.2 up to 3.6 N
2. Rueckschaltkraft
release force
≥ 1.00 N
3. Ruhestellung
free position
≤ 16 mm
4. Schaltpunkt
operating position
14.4 ± 0.3 mm
5. Endstellung
total travel position
: Gehaeuseoberflaeche
: housing surface
6. DifferenzWeg
movement differential
0.4 bis 0.8 mm
0.4 up to 0.8 mm
7. Leerlaufweg
release travel
≥ 0.3 mm
8. Schlagartiges Schalten innerhalb
abruptly switching within
0.02 mm
9. Durchgangswiderstand
contact resistance
d ≤ 50 mΩ



Herstellort / -jahr / -woche
date code of manufacture: place / year / week

Index	Aenderung REVISION	gez. DRAWN BY	Ausg. ISSUE
c	63050	07/18/13	BRC
b	55382	11/26/07	MP
a	36668	07/26/06	RON
!	d	92840	03/11/15	JENO

Allgemeintoleranzen
UNTOLERANCED DIMENSIONS

Abmasse und Angaben in mm	Laenge LENGTH	Radien RADII
0.6	± 0.15	± 0.2
>6-15	± 0.15	± 0.2
>15-30	± 0.2	± 0.3
>30-120	± 0.3	± 0.5
>120	± 0.4	± 0.5
	± 0.8	

Normmassbereiche
PROJECTION
ALL DIMENSIONS ARE IN MILLIMETRES
± 10%

Fuer Form und Lage
FOR SHAPE AND LOC.
Fuer Winkel
FOR ANGLE

Pause COPY
Blatt SHEET 01
Original
Massstab SCALE Din A4 2:1 30mm
0 10 20

CAD: NX V8.5
gez./DRAWN BY 06/18/13 BCY
gepr./CHECKED BY
Ersatz fuer/REPLACEMENT OF
Zg.gl.Nr.v.20.01.1999

TYP Zeichn./DRAWING NO. Index
F 1005310 d

SCHNAPPSCHALTER
snap action switch

MARQUARDT

1005310-01-4-0-F-999 RELEASED/FREIGEGEBEN 2015/Oct/09

N191977568

Project no. 4786621164
File: E41791
Date: 2015-04-10
Number of pages in this document: 4

Clause 20 Clearances, Creepage Distances

	Printed Name	Signature
[x] Tests Conducted by +	Ralf Drossler	
[] UL Staff witnessing testing (WTDP only)	Martina Deschner	
[x]Authorized Signatory (CTDP, TPTDP, TCP)	Herbert Zeller	Signature, and include date for CTDP, TPTDP, TCP

Clause 20 Clearances, Creepage Distances and Solid Insulation

Switch 1005.xxxx (NC)

Clearances and creepage distances for switch 1005.xxxx (NC) with quick connect terminals

a) Min. creepage distance for basic insulation:
a1 = 8,5 mm outside, if a metal screw is used for fixation (fig. 5)
a1 = 1,8 mm outside, if the switch is mounted on a metal surface => additional insulation may be necessary (fig. 1)
a2 = 5,6 mm inside (fig. 2)
b) Min. creepage distance for functional insulation inside the switch: 4,8 mm (fig. 2)
c) Min. Clearance for functional insulation inside the switch 2 mm (fig. 3)
d) Min. creepage distance for functional insulation outside the switch: 13,5 mm (NC type). Provided with female connectors the creepage distance remains unchanged (fig. 3)
e) Min. Clearance for functional insulation outside the switch: 7,2 mm. Provided with female connectors the clearance is reduced to 3,0 mm (fig. 2 and 4).
f) Clearance between contacts: 0,7 mm (fig. 3).
g) Solid insulation 0,75 .. 1,4 mm wall thickness

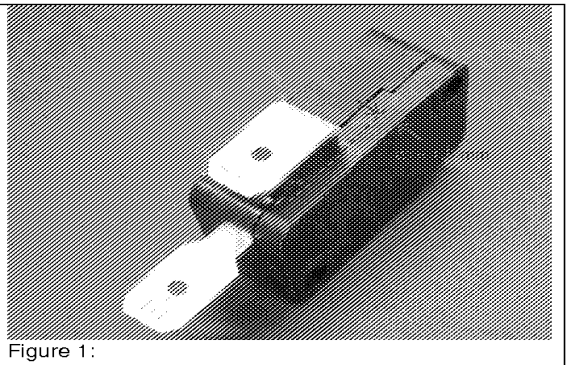


Figure 1:

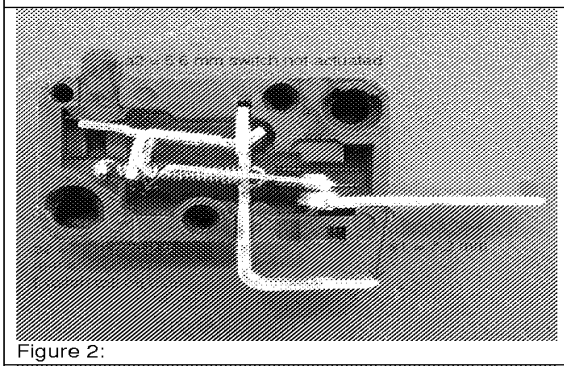


Figure 2:

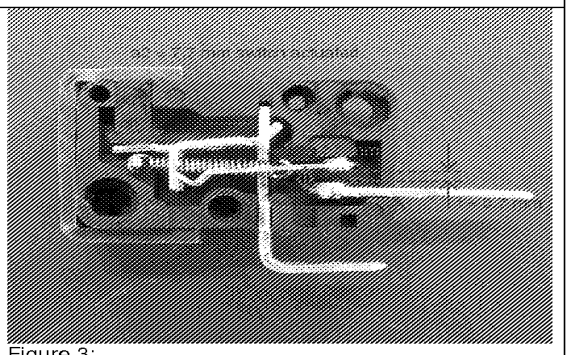


Figure 3:

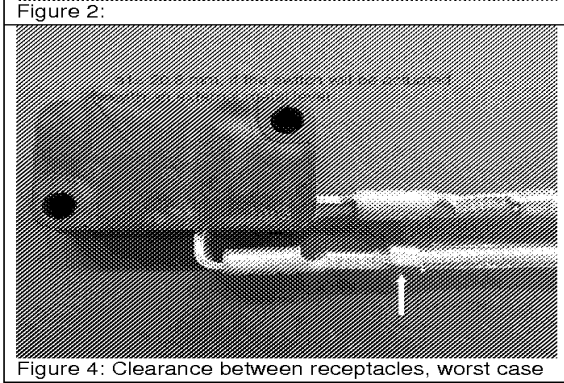


Figure 4: Clearance between receptacles, worst case

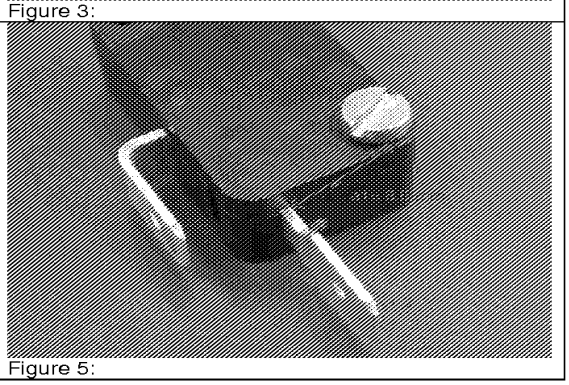


Figure 5:

Test conducted by : Ralf Drössler

Switch 1005.xxxx (NO)

Clearances and creepage distances for switch 1005.xxxx (NO) with quick connect terminals

a) Min. creepage distance for basic insulation:
a1= 3,6 mm outside, if a metal screw is used for fixation (fig. 7)
a1 = 1,8 mm outside, if the switch is mounted on a metal surface (fig. 1) => additional insulation may be necessary
a2 = 5,6 mm inside (fig. 2)
b) Min. creepage distance for functional insulation inside the switch: 3,4 mm (fig. 6)
c) Min. Clearance for functional insulation inside the switch 2 mm (fig. 6)
d) Min. creepage distance for functional insulation outside the switch: 18,1 mm (NO type). Provided with female connectors the creepage distance remains unchanged (fig. 8).
e) Min. Clearance for functional insulation outside the switch: 11,8 mm. Provided with female connectors the clearance is will be reduced, but this clearance will be larger than for the NC type (no fig.)
f) Clearance between contacts: 0,7 mm (fig. 6)
g) Solid insulation 0,75 .. 1,4 mm wall thickness (no fig.)

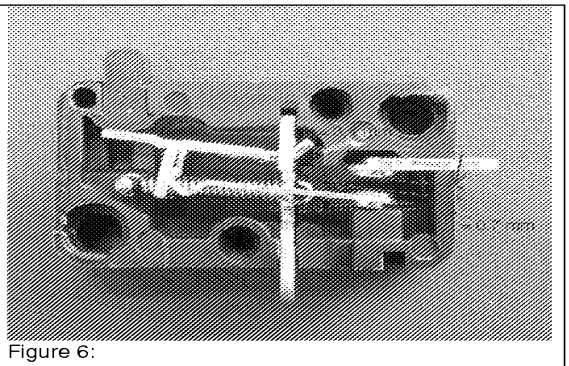


Figure 6:

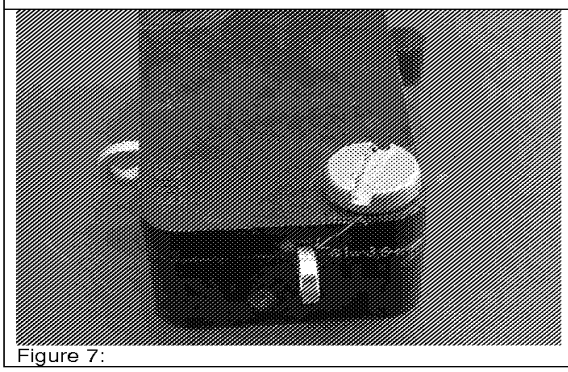


Figure 7:

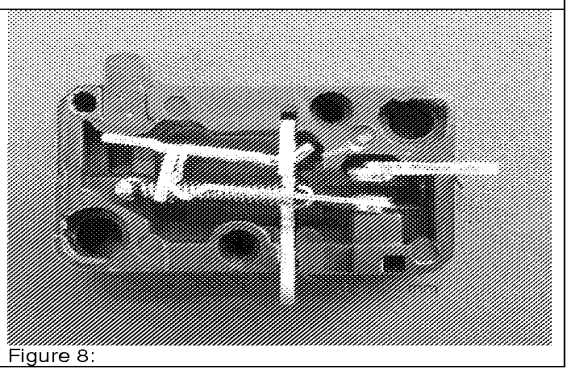


Figure 8:

INSULATION	Rated Voltage 250 V / Rated Impulse Withstand Voltage 2500 V			
	Creepage Distance (mm)		Clearance Distance (mm)	
	Inside	Outside	Inside	Outside
Operational	3,4 (1,8)	13,5 (2,8)	2,0 (1,5)	3,0 (1,5)
Basic	5,6 (1,8)	3,6 (3,6)	5,6 (1,5)	3,6 (1,5)
Reinforced	"	"	"	"
Supplementary	-	-	-	-
Full Disconnect	"	"	"	"
Micro-Disconnection	-	-	0,7	-

Table 1: Minimum values of different kinds of insulation for switch 1005.xxxx NO and NC type (no change-over type)

The value in brackets shows the required values by the standard with the following parameters:

- Rated voltage 250 VAC
- Impulse withstand voltage 2500 V
- Material group II
- Pollution degree inside 2
- Pollution degree outside 3

Test conducted by : Ralf Drössler

Clearances and creepage distances for switch 1006.xxxx with quick connect terminals

h) Min. creepage distance for basic insulation:
a1= 3,6 mm outside, if a metal screw is used for fixation (fig. 7)
a1 = 1,8 mm outside, if the switch is mounted on a metal surface (fig. 1) => additional insulation may be necessary
a2 = 5,6 mm inside (fig. 2)
k = 4,0 mm to metal lever

i) Min. creepage distance for functional insulation inside the switch: 3,4 mm (fig. 6)

j) Min. Clearance for functional insulation inside the switch 2 mm

k) Min. creepage distance for functional insulation outside the switch: 13,5 mm (NC type). Provided with female connectors the creepage distance remains unchanged (fig. 3).
Two switches 1006 together with combined outer lever the min. creepage distance for functional insulation between the two poles is 2 x 4,0 = 8,0 mm (fig. 9)

l) Min. Clearance for functional insulation outside the switch: 7,2 mm. Provided with female connectors the clearance is reduced to 3,0 mm (fig. 4)

m) Clearance between contacts: 0,7 mm (fig. 3)

n) Solid insulation 0,75 .. 1,4 mm wall thickness (no fig.)

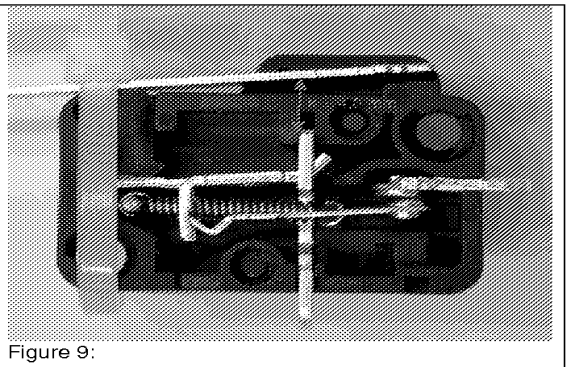


Figure 9:

INSULATION	Rated Voltage 250 V / Rated Impulse Withstand Voltage 2500 V			
	Creepage Distance (mm)		Clearance Distance (mm)	
	Inside	Outside	Inside	Outside
Operational	3,4 (1,8)	8,0 (2,8)	2,0 (1,5)	3,0 (1,5)
Basic	5,6 (1,8)	3,6 (3,6)	5,6 (1,5)	3,6 (1,5)
Reinforced	"	"	"	"
Supplementary	-	-	-	-
Full Disconnect	"	"	"	"
Micro-Disconnection	-	-	0,7	-

Table 1: Minimum values of different kinds of insulation for switch 1006.xxxx NC

The value in brackets shows the required values by the standard with the following parameters:

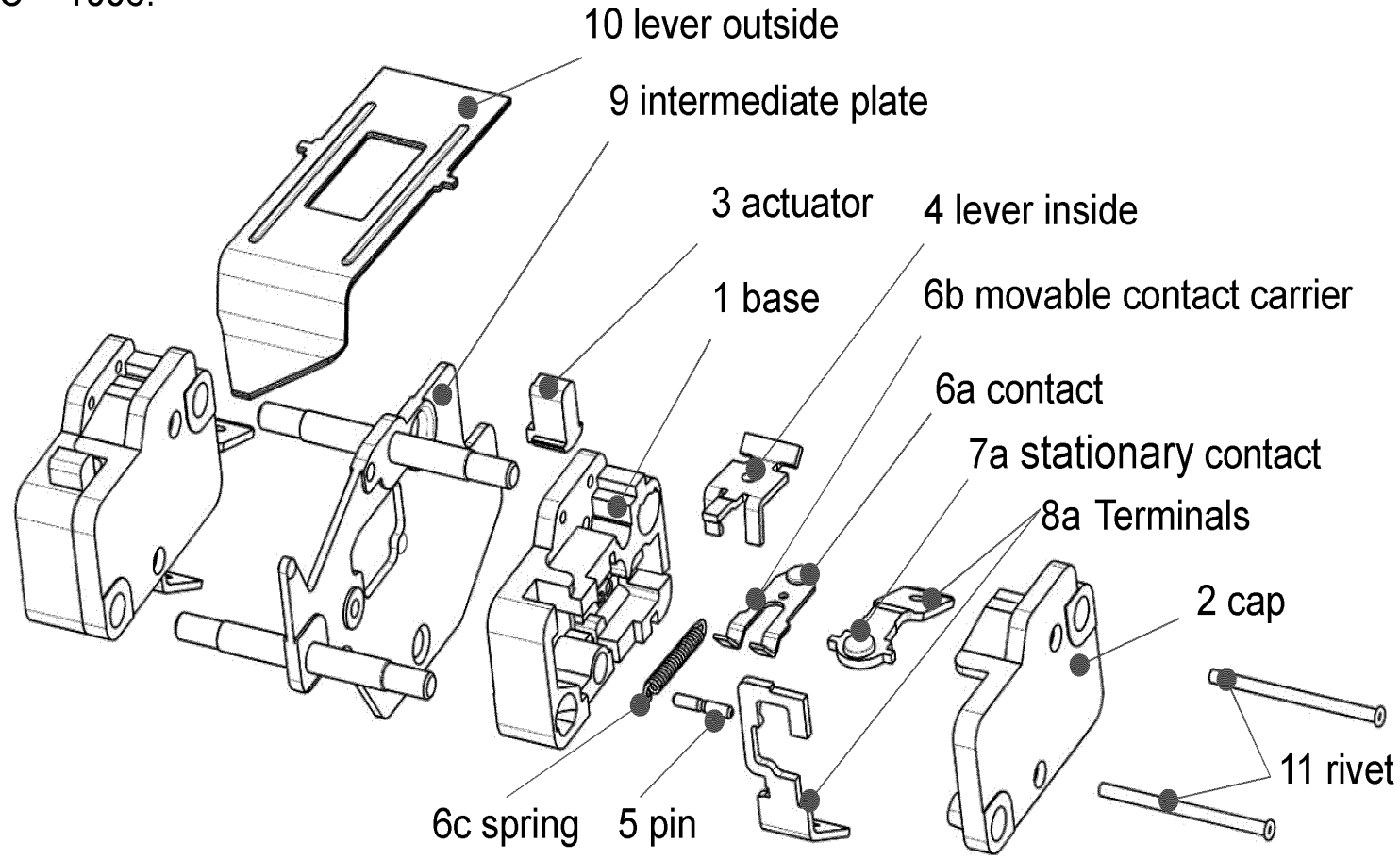
- Rated voltage 250 VAC
- Impulse withstand voltage 2500 V
- Material group II
- Pollution degree inside 2
- Pollution degree outside 3

Test conducted by : Ralf Drössler

N191977569

MARQUARDT

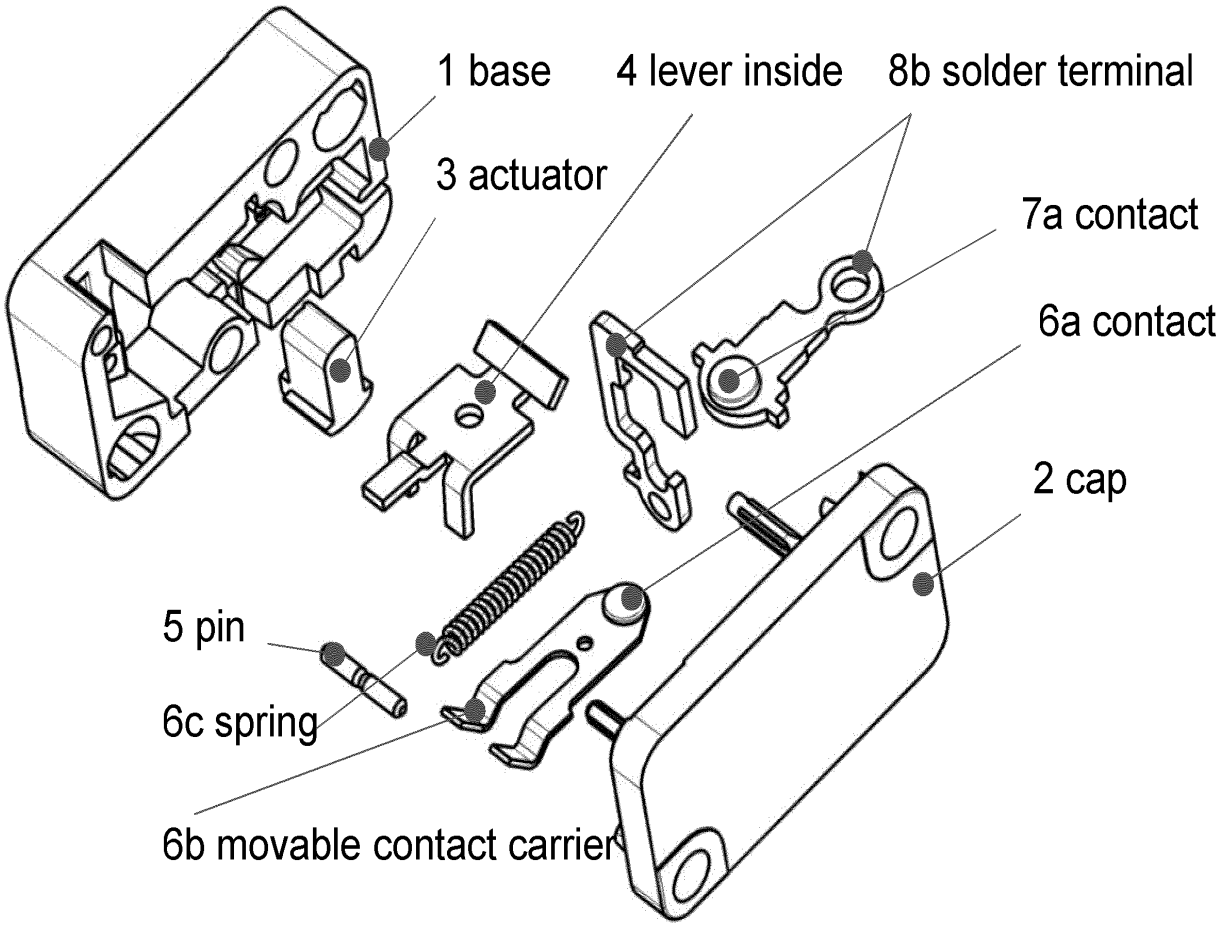
NC – 1006.



N191977624

MARQUARDT

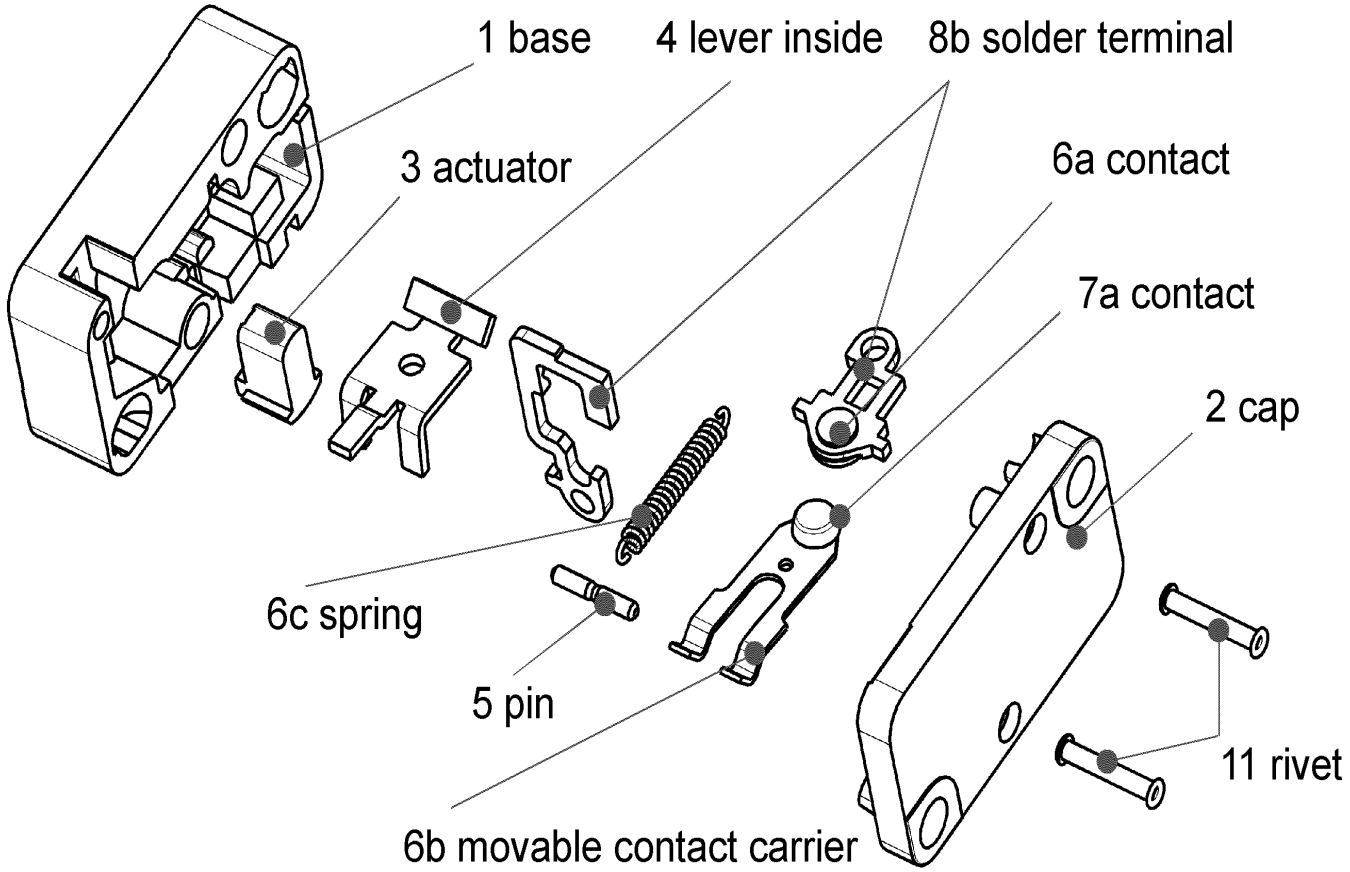
NO – 1005.



N191977624

MARQUARDT

NO – 1005.



N191977624

Nomenclature Switch Series 1005. / 1006.

We actually do have different ways to denote our switches:

The longest designation is a 4 digit - full stop - 4 digit - dash - 2 digit format,

xxxx.xxxx-xx

The last two digits are only internal and mostly indicating historic issues and are never marked on the switches.

The middle four digits denote terminals, actuators or other visible characteristics. Sometime we also use different four middle letters for identical switches, e.g. in case the rating specifications are different due to economic aspects.

xxxx.1234-xx

The first four letters mostly indicate issues in general the switch series. The first letter denotes often (about 70 %) the MQ-Business unit: 1: Switches; 2: Power Tools; 3 Automotive; there are additionally some 4s and 5s and some exemptions, too (e.g. 1298 and 2098 are quite identical).

1005.xxxx-xx

or

1006.xxxx-xx

The second letter of this quadruple originally was intended to indicate a constructional type or an actuating type e.g. 18xx, but this structure was not kept.

Sometimes the second and the third letter share this task, e.g. 100x.

MARQUARDT	Declaration of Conformity	SPD7A-RI/dm	2015-03-31

Declaration of Conformity on Production Methods

Herewith, the manufacturer

Marquardt GmbH
Schloss-Str. 16
D 78604 Rietheim-Weilheim

declares that in accordance with the requirements of the Standard for Appliance Switches IEC 61058-1, IEC 61058-2-5 all

Switch Series 1005. / 1006.

are manufactured and assembled following the identical production methods independently of the Marquardt factory location responsible:

Marquardt GmbH **Schloss-Str. 16** **78604 Rietheim-Weilheim** **Germany**	**Marquardt Mécatronique Tunisie S.a.r.l.** **Lot 23/24** **Zone Industrielle El Agba** **2087 El Agba TUNISIA**
Marquardt Switches (Shanghai) Co., Ltd. **No. 650 Qingda Road** **Pudong New Area** **Shanghai 20 12 01 / China**	**Marquardt Schaltsysteme S.C.S.** **Zona Industriala Vest** **Str. Munchen Nr. 2** **550018, Sibiu, Romania**
Marquardt Switches, Inc. **2711 Route 20 East** **Cazenovia NY 13035 / USA**	**Marquardt México S. de R.L. de C.V.** **Rio Turia 505** **Parque Tecno Industrial Castro del Rio** **Irapuato, Gto., C.P. 36810, México**

Within the unavoidable process variations the products are identical except location specific marking codes, if applied.

Furthermore the quality control methods as well as the end-of-line tests are identical in methodology.

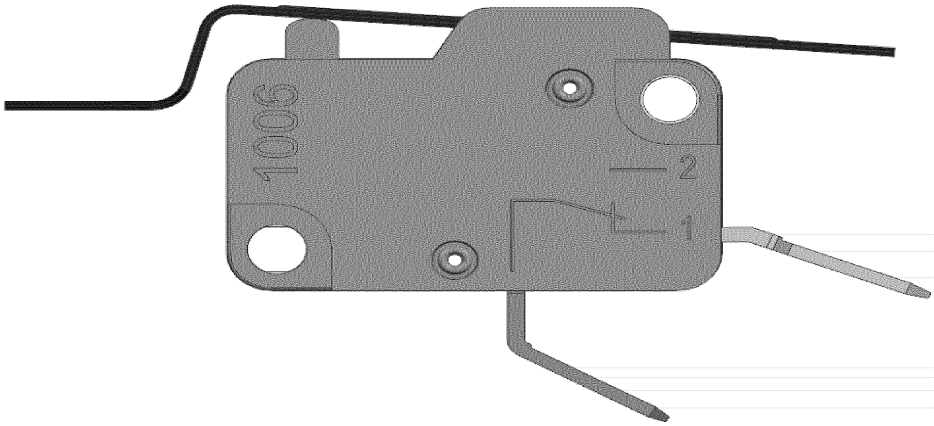
Rietheim-Weilheim,
2015-03-31
MARQUARDT GMBH
78604 RIETHEIM-WEILHEIM
i.A. Herbert Zeller
MARQUARDT Verwaltungs GmbH
Switches, Sensors and Actuators
Head of Testlab

form 103.07

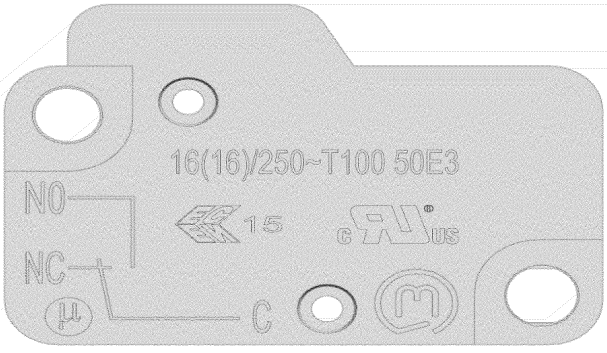
Example of label

1006....

cover side



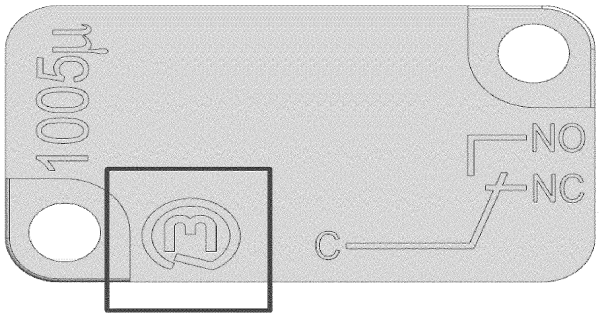
base side



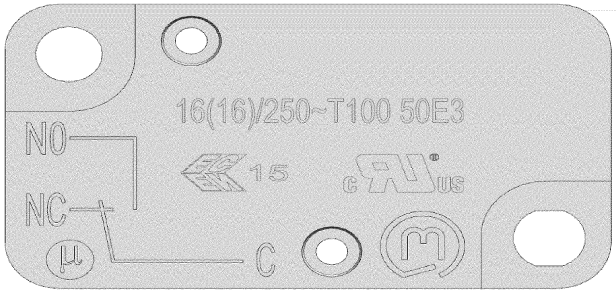
N191977591

1005....

cover side



base side



N191977591

Materials of metal parts switch series 1005.../ 1006....		
Part	**Materials Serie ...**	**Copper content**
Movable Contact carrier	CuAg2 (optional Ag, Au, Sn or Ni plated)	98%
Solder terminal	CuZn37 (optional Ag, Au, Sn or Ni plated)	63%
Quick connect terminal	CuZn37 (optional Ag, Au, Sn or Ni plated)	63%
	E-Cu (optional Ag, Au, Sn or Ni plated)	100%
Contact	Silver alloy	-
Spring	spring steel	-
Lever inside	CuZn37 (optional Ag, Au, Sn or Ni plated)	63%
Lever outside	steel	-
pin	CuZn39	61%
rivet	CuZn37	63%

Material and plating for tabs	T_{max} °C	
Bare copper	155	
Bare brass	210	
Tin plated copper and copper alloys	160	
Nickel plated copper and copper alloys	185	
Silver plated copper and copper alloys	205	
Nickel plated steel	400	
Stainless steel	400	

Materials of plastic parts switch series ...

Plastic Part name	Plastic Manufacturer/ UL file number	Generic Name	Specific Plastic Grade	PTI/CTI value	Minimum thickness used on part (mm)
Base	Lati Industria Thermoplastici S.p.A E54080	PA	Latamid 66 H2 G/25-V0CT1 / ALL	1	0.8
	BASF SE E41871	PA	Ultramid A3U40 G5 / ALL	0	
Cap	Lati Industria Thermoplastici S.p.A E54080	PA	Latamid 66 H2 G/25-V0CT1 / ALL	1	0.8
	BASF SE E41871	PA	Ultramid A3U40 G5 / ALL	0	
Actuator	BASF SE E41871	PA	Polyamid C3U / ALL	0	1.5
	Dupont E41938	PET	Rynite FR 531 / NC, BK	2	
	BASF SE E41871	PA	Ultramid A4H / ALL	0	
Intermediate plate	BASF SE E41871	PA	Ultramid A3X2G5 / NC, BK, GY	0	1

TEST RECORD NO. 1

SAMPLES:

Samples of the switch series 1004, 1005 and 1006 as indicated below and constructed as described herein, was submitted by the manufacturer for examination and test.

[x] The Model mentioned above was used for test purposes and considered representative of the entire series.

GENERAL:

In this Report the currently certified switch mentioned above are transferred from CCN WOYR2/8 to WHAC/7. The switch construction is as same as before. And added ratings which have been certified by DEKRA Certification B.V. with CBTR Ref. No. 21570821.51-DCC dated 2012-09-19.

Test results relate only to the items tested.

[x] Tests were considered covered as follows:

Test	File Reference	Report Date	Test Record No.
8.8 Marking durable	E41791	2015-05-21	1
11.8.3 TERMINAL DISPLACEMENT TEST (TT2) – FLAT QUICK- CONNECT TERMINATION	E41791	2015-05-21	1
14.3/15 Humidity Conditioning / Insulation Resistance And Dielectric (for DC rating)	E41791	2015-05-21	1
17 Endurance – mechanical switch (for DC rating)	E41791	2015-05-21	2
17.6 Evaluation Of Compliance (for DC rating)	E41791	2015-05-21	2
21.1 Ball Pressure test	E41791	2015-05-21	1, 2
21.2 Glow wire test	E41791	2015-05-21	1, 2
Annex C PTI	E41791	2015-05-21	1, 2

and

Test	Report No.	Report Date	Certificate No.	Issued by:
17 Endurance Test – Mechanical Switch:	21570821.51-DCC	2012-09-19	NL-24592	DEKRA Certification B.V.
17.6 Evaluation Of Compliance				

The following tests were conducted and recorded in DS1.

CONDUCTOR ESCAPE TEST (TT1)	11.7
TERMINAL DISPLACEMENT TEST (TT2) – SCREW-TYPE TERMINAL	11.8.2
Humidity Conditioning / Insulation Resistance And Dielectric:	14.3 / 15
Endurance Test – Mechanical Switch:	17
Evaluation Of Compliance (Te2/Te3):	17.6

The test methods and results of the above tests have been reviewed and found in accordance with the requirements in the standard list below.

Test Record Summary:

The results of this investigation, including construction review and testing, indicate that the products evaluated comply with the applicable requirements in the standards noted below and, therefore, such products are judged eligible to bear UL's Mark as described on the Conclusion Page of this Report.

Standard	Edition	Revision Date
IEC 61058-1 the standard for Switches for Appliances — Part 1: General Requirements	4	2016-07-01
IEC 61058-1-1 SWITCHES FOR APPLIANCES - PART 1-1: REQUIREMENTS FOR MECHANICAL SWITCHES	1	2016-05-25
CAN/CSA-C22.2 No. 61058-1:17 the standard for Switches for Appliances — Part 1: General Requirements	3	2017-11-03
CAN/CSA-C22.2 No. 61058-1-1:17 Switches for Appliances - Part 1-1: Requirements for Mechanical Switches	1	2017-11-03
UL 61058-1:17 the standard for Switches for Appliances — Part 1: General Requirements	5	2017-11-03
UL 61058-1-1:17 Switches for Appliances - Part 1-1: Requirements for Mechanical Switches	1	2017-11-03

CONCLUSION

Samples of the product covered by this Report have been found to comply with the requirements covering the category and the product is found to comply with UL's applicable requirements. The description and test result in this Report are only applicable to the sample(s) investigated by UL and does not signify UL certification or that the product(s) described are covered under UL's Follow-Up Service Program. When covered under UL's Follow-Up Service Program, the manufacturer is authorized to use the Certification Mark of UL on such products which comply with UL's Follow-Up Service Procedure and any other applicable requirements of UL LLC. The Certification Mark of UL on the product, or the UL symbol on the product and the Certification Mark of UL on the smallest unit container in which the product is packaged, is the only method to identify products investigated by UL to published requirements and manufactured under UL's Listing and Follow-Up Service.

Report by: Reviewed by:

Chao Zhang
Project Engineer

Nick Tu
Senior Project Engineer