Application Data for All Limit Switch Types

Table 21.1: Enclosure Ratings

Type	NEMA Style											IEC Style		
	1	2	3	4	4X	6	6P	7	9	12	13	IP65	IP66	IP67
▲ Indicates NEMA or IEC Type Rating available for each product														
9007C	▲	▲		▲		▲	▲			▲	▲	▲	▲	▲
9007CR	▲	▲		▲		▲	▲	▲	▲	▲	▲			
9007FT	▲	▲		▲						▲	▲	▲	▲	▲
L100/L300	▲			▲							▲	▲	▲	
9007MS/ML *[1]*	▲	▲	▲	▲		▲	▲			▲	▲			▲
9007T	▲	▲		▲						▲	▲	▲	▲	▲
XCKJ	▲	▲	▲	▲						▲			▲	
XCKL	▲	▲	▲	▲						▲			▲	
XCKN & XCNR					▲					▲		▲		
XCKP & XCKT *[2]*	▲			▲						▲		▲		
XCKS, XCMN												▲		
XCMD, XCKD					▲		▲			▲	▲		▲	▲

Table 21.2: Ambient Temperature Ranges

Type	Low Temperature	High Temperature at Full Rated Load
9007 C		
Lever Type	-20 °F (-28.9 °C)	+185 °F (+85 °C)
Plunger & Wobble Stick Type	0 °F (-17.8 °C)	+185 °F (+85 °C)
9007 FT *[3]* **, T**	-10 °F (-23 °C)	+185 °F (+85 °C)
HL100/HL300	0 °F (-17.8 °C)	+350 °F (+177 °C)
L100/L300	0 °F (-17.8 °C)	+200 °F (+93 °C)
9007 MS/ML	-4 °F (-20 °C)	+221 °F (+105 °C)
XCKJ, XCKL, XCKP, XCKT	-13 °F (-25 °C)	+158 °F (+70 °C)
XCMN, XCKN, XCNR	-13 °F (-25 °C)	+158 °F (+70 °C)
XCKS	-13 °F (-25 °C)	+158 °F (+70 °C)
XCMD	-13 °F (-25 °C)	+158 °F (+70 °C)

Some switches are available with higher or lower temperature limits, by selecting special versions or special options. Refer to the respective product sections for further information.
(Ex.: 9007MS/ML, see page 21-9.)

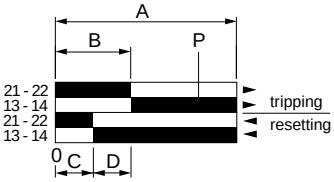
Table 21.3: Sealing

Type		Material
9007C, CR	Standard shaft seals on lever types	Fluorocarbon rubber (FKM)
	Plunger and wobble stick boots	Neoprene; Fluorocarbon optional
	All other seals	Nitrile (Buna N); Fluorocarbon optional
R.B.Denison™ L		PVC
9007T and FT	Shaft seal	Nitrile (Buna N)
	Cover gasket	Nitrile (Buna N)
	Base plate gasket	Cellulose fiber laminate
XCKJ, XCKL, XCKS		Nitrile (Buna N)
XCMD, XCKD, XCKP, XCKT, XCKN, XCNR		Nitrile (Buna N) and silicon

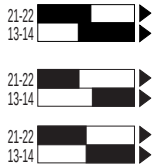
Table 21.4: Electrical Contact Ratings

AC—NEMA A600						DC			
	Max. Current—35% Power Factor						Maximum Current		
V	Make		Break		Continuous Carrying Amperes	V	Make or Break		Continuous Carrying Amperes
	A	VA	A	VA			A	VA	
120	60	7200	6	720	10	125	1.1/0.55 *[4]*	138/69 *[4]*	5/2.5 *[4]*
240	30	7200	3	720	10	—	—	—	—
480	15	7200	1.5	720	10	250	0.27	67.5	2.5
600	12	7200	1.2	720	10	600	0.10	60	2.5

Table 21.5: Contact Function Diagrams

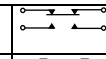


A=Maximum travel of the operator in mm or degrees.
B=Tripping travel of the contact.
C=Reset travel.
D=B-C=Differential travel.
P=Point from which positive opening is assured



Make-before-break (overlapping) SPDT
The normally open contact closes before the normally closed contact opens.
Break-before-make (offset) SPDT
The normally closed contact opens before the normally open contact closes.
Simultaneous make and break—SPDT
The normally closed contact opens at the same time as the normally open contact closes.

Table 21.6: Wiring Diagrams

												
Form A	Form B	Form C	Form AA	Form BB	Form CC	Form X	Form Y	Form Zb	Form Z	Form XX	Form YY	Form ZZ
SPST-NO	SPST-NC	SPDT	DPST-NO	DPST-NC	DPDT	SPST-NO-DB	SPST-NC-DB	SPDT-DB Isolated Contacts	SPDT-DB	DPST-NO-DB	DPST-NC-DB	DPDT-DB

[1] Enclosure ratings are NEMA 1, 2, 3, 4, 6, 6P, 12, and 13 except for option 21 (low force) which is NEMA 1 only. The 9007 MS/ML05 (omni-directional operation) enclosure ratings are NEMA 1, 2, 12, and 13
[2] For indoor use only—not UV protected.
[3] The Type FT will withstand hot falling sand up to +300°F (+149 °C); **however,** ambient temperature for the FT switch is the same as the Type T above (+185 °F, +85 °C). **Do not use in higher temperature ambients.**
[4] Type C52 compact unit ratings at 125 Vdc—same ratings as C54, CF53 and CR53 at other voltages.

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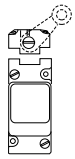
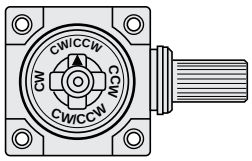
Oiltight, Watertight Switches—Standard and Compact Bodies

Table 21.65: All Type C Switches—Standard and Compact Bodies

Select Turret Head		Rotary Lever Arm						Side Plunger			
		Standard Pre-travel Spring Return	Low Differential Spring Return	Neutral Position: Standard Pre-travel Spring Return	Neutral Position: Low Differential Spring Return	Light Operating Torque Spring Return	Maintained Contact	Side Roller-Plunger Spring Return Vertical Roller Type [1]	Side Push-Rod Plunger Spring Return	Side Push-Rod Plunger Adjustable Spring Return [2]	Side Push-Rod Plunger Maintained Contact
		CW & CCW [3]	CW & CCW [3]	CW & CCW	CW & CCW	CW & CCW [3]	CW (Trip) CCW (Reset)				
											
Select Basic Switch	Contacts	Type (Class 9007)									
Standard Box Plug-in	1 N.O. 1 N.C.	C54B2	C54A2	—	—	C54N2	C54C	C54F	C54G	C54GD	C54H
	2 N.O. 2 N.C.	C62B2	C62A2	—	—	C62N2	C62C	C62F	C62G	C62GD	C62H
	2 N.O.–2 N.C. Neutral Position	—	—	C68T10	C68T5	—	—	—	—	—	—
	2 N.O.–2 N.C. Two Stage	C66B2	C66A2	—	—	C66N2	—	C66F	C66G	C66GD	—
Compact Box Plug-in	1 N.O. 1 N.C.	C52B2	C52A2	—	—	C52N2	C52C	C52F	C52G	C52GD	C52H
UL Listed for Hazardous Location Division I Class I Groups B, C, D Class II Groups E, F, G	1 N.O. 1 N.C.	CR53B2	CR53A2	—	—	CR53N2	CR53C	CR53F	CR53G	CR53GD	CR53H
	2 N.O. 2 N.C.	CR61B2	CR61A2	—	—	CR61N2	CR61C	CR61F	CR61G	CR61GD	CR61H
	2 N.O.–2 N.C. Neutral Position	—	—	CR67T10	CR67T5	—	—	—	—	—	—
	2 N.O. –2 N.C. Two Stage	CR65B2	CR65A2	—	—	—	—	—	—	—	—
Head Only (Example: 9007B)		B	A	T10	T5	N	C	F	G	GD	H
Nominal Operating Data	Pre-travel	10°	5°	10°	5°	10°	45°	0.08 in. (2 mm)			0.14 in. (3.6 mm)
	Pre-travel Two Stage: First Stage	10°	5°	—	—	10°	—	0.08 in. (2 mm)			—
	Pre-travel Two Stage: First to Second Stage	2-1/2°	1-1/2°	—	—	2-1/2°	—	0.02 in. (0.5 mm)			—
	Total Travel	90°	90°	90°	90°	90°	90°	0.25 in. (6.3 mm)			0.25 in. (6.3 mm)
	Differential	4°	2°	4°	2°	4°	—	0.03 in. (0.8 mm)			—
	Reverse Overtravel	90°	90°	90°	90°	90°	—	—			—
	Operating Torque/ Force— 1 Pole & 2 Pole	4 lb-in (0.45 N•m)	4 lb-in (0.45 N•m)	4 lb-in (0.45 N•m)	4 lb-in (0.45 N•m)	25 oz-in (0.18 N•m)	3 lb-in (0.34 N•m)	4 lb (0.45 N•m)			7 lb (0.80 N•m)
	Repeat Accuracy —Linear travel of cam (1-1/2 in. lever arm)	± 0.002 in. (0.05 mm)	± 0.001 in. (0.03 mm)	± 0.002 in. (0.05 mm)	± 0.002 in. (0.05 mm)	± 0.002 in. (0.05 mm)	± 0.002 in. (0.05 mm)	0.001 in. (0.3 mm)			—

NOTE: CW = clockwise; CCW = counter-clockwise

Acceptable Wire Sizes: 12–22 AWG.
Recommended Terminal Clamp Torque: 7 lb-in (0.80 N•m)



Mode Change—Lever Arm Type

Mode of operation is easily convertible to clockwise, counterclockwise, or both. Simply point the arrow to the letters representing the desired direction—CW, CCW, or CW/CCW. All parts are captive.

Exploded view page 21-36, Rotary Head Lever Arms, page 21-37

Lever arms page 21-9, page 21-40, page 21-41

Electrical ratings page 21-5

Special features page 21-41, page 21-42

[1] Can be converted to horizontal roller type in the field. To order horizontal roller version add the letter "H" at the end of the equivalent vertical roller version type number (Example: C54F would become C54F**H**).

[2] To lock the nut in the desired position, crimp the slot near the bottom of the nut.

[3] These devices are factory set to operate the contacts in **both** the **CW and CCW** directions. **Mode of operation** is field convertible to CW only or CCW only. **To order factory converted devices—**for CCW only operation, change the "2" at the end of the type number to "1" (Example: C54B**2** becomes C54B**1**); for CW only operation, delete the "2" at the end of the type number (Example: C54B**2** becomes C54B).

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