

Protection and Connection

Motorized and automatic transfer switches

IEC 61439 Technical guide

Power and productivity
for a better world™

ABB

Motorized change-over switches

Uninterrupted power supply with motorized functionality

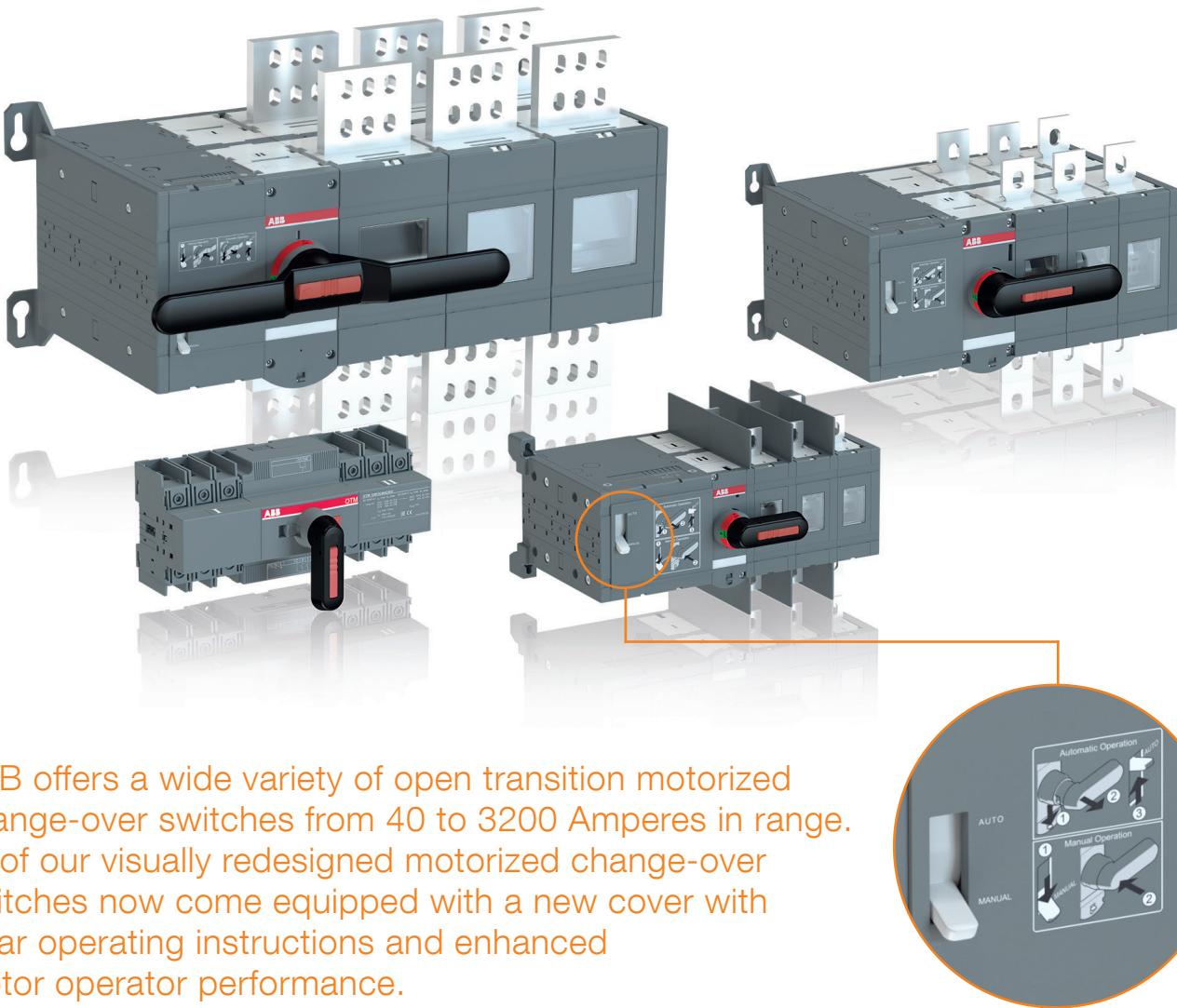


ABB offers a wide variety of open transition motorized change-over switches from 40 to 3200 Amperes in range. All of our visually redesigned motorized change-over switches now come equipped with a new cover with clear operating instructions and enhanced motor operator performance.



High performance level

Ensuring a high performance level for you is of the utmost importance to us. In change-over applications where the loaded switch may need to be operated remotely, adequate durability has been ensured by testing against the IEC 60947-6-1 standard in the specification of endurance requirements.



Reduced installation time

ABB motorized change-over switches are fast and easy to install. The voltage sensing connectors have been designed to save time, as there is no need to drill holes into the busbars (see page 78 for relevant accessories). Also, the control and power cables are screw mounted, providing a safe and secure connection that stays tight even during transportation.



Safe and reliable

Our switches come equipped with a comprehensive range of inbuilt safety features such as mechanical interlock, which ensures the isolation of the two asynchronous power supplies. This eliminates risk of short-circuiting between them. The motorized change-over switches are also equipped with a handle for manual operation in case of emergency.



Space-saving design

ABB provides compact and cost-effective components for any and all installations. On average, our motorized change-over switches are 20% smaller than other similar products on the market.

Automatic transfer switches

Instantaneous automatic switching between power sources

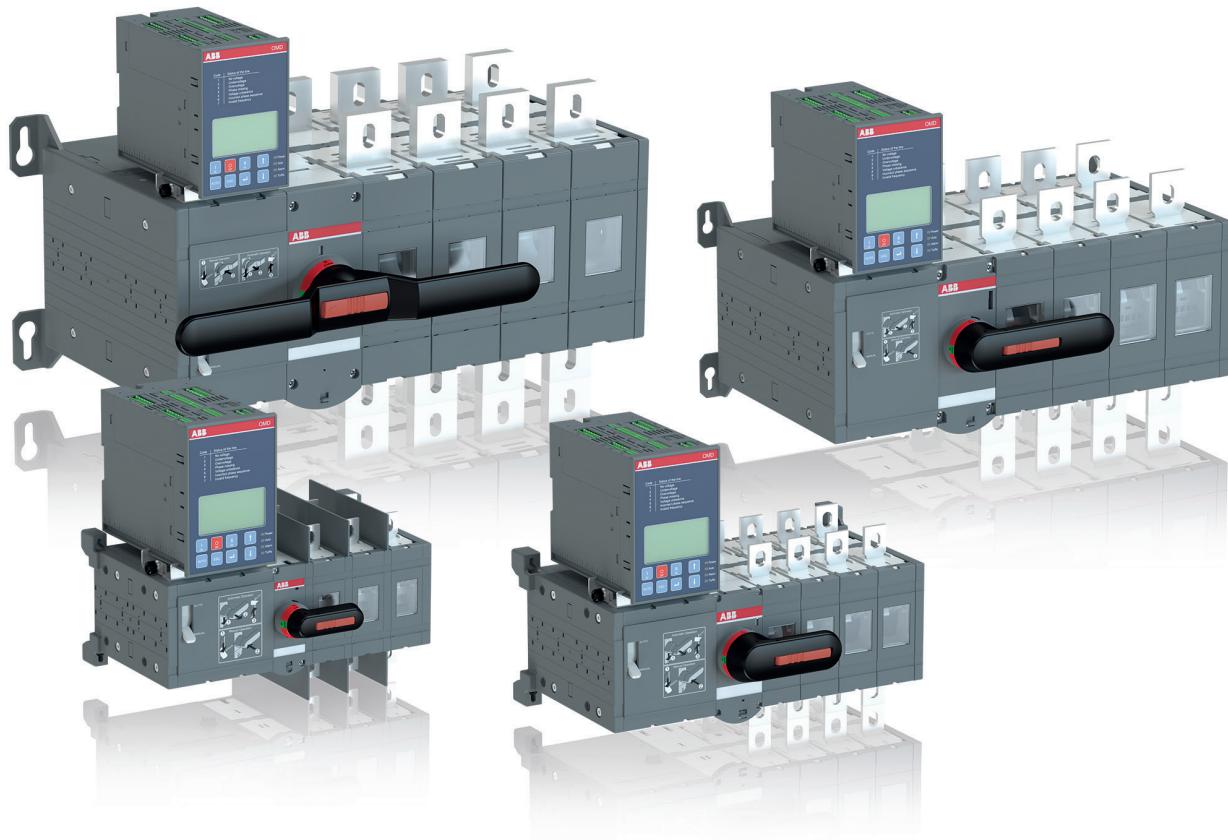


ABB offers a wide selection of automatic transfer switches (ATS), from 160 to 1600 Amperes in range. They have the features and functionality that makes them suitable for diverse applications: industrial plants, docks, airports and data centers.



Quick and easy solution

All ATS products by ABB are delivered as a ready-to-use solution in which the OMD unit is pre-mounted at the factory prior to delivery. It is also possible to purchase the control units and motorized change-over switches as separate components, allowing you to build the automatic transfer switch yourself.



Reliable functionality

You can rest assured that your automatic transfer switch solution works as expected without the need to carry out any testing. The entire solution has been tested by ABB and is guaranteed to fulfill all the requirements according to the IEC60947-6-1 standard.



Safe operations

With automatic transfer switches by ABB safe ON LOAD operations with a handle is always easy and readily available. Our switches also come equipped with numerous other safety features such as the possibility to prevent unwanted operations by padlocking the handle into O position.



Improved user experience

Ensuring a high performance level and an easy and efficient user experience for you is of the utmost importance to us. Usage has been made simpler than ever before with an LCD display with menus available in eight languages.

Motorized change-over switches

Technical data for OTM16...125_C

Motorized change-over switches

Data according to IEC 60947-3				Switch size				
				OTM40	OTM63	OTM80	OTM100	OTM125
Rated insulation voltage and rated operational voltage AC20/DC20		Pollution degree 3	V	800	800	800	800	800
Dielectric strength		50 Hz 1min.	kV	6	6	6	6	6
Rated impulse withstand voltage			kV	8	8	8	8	8
Rated thermal current and rated operational current AC20/DC20	/ ambient 40°C	In open air	A	40	63	80	115	125
	/ ambient 40°C	In enclosure	A	40	63	80	115	125
	/ ambient 60°C	In enclosure	A	32	50	63	80	100
..with minimum conductor cross section	Cu	mm ²		10	16	25	35	50
Rated operational current, AC-21A		up to 500 V	A	40	63	80	100	125
		690 V	A	40	63	80	100	125
Rated operational current, AC-22A		up to 500 V	A	40	63	80	100	125
		690 V	A	40	63	80	100	125
Rated operational current, AC-23A		up to 415 V	A	40	63	80	80	90
		500 V	A	40	60	60	60	70
		690 V	A	40	40	40	40	50
Rated operational current / poles in series, DC-21A		up to 48 V	A	40/1	63/1	80/1	100/1	125/1
		110 V	A	40/2	63/2	80/2	100/2	125/2
		220 V	A	40/4	63/4	80/4	100/4	100/4
Rated operational current / poles in series, DC-22A		up to 48 V	A	40/1	63/1	80/1	100/1	125/1
		110 V	A	40/2	63/2	80/2	100/2	125/2
		220 V	A	40/4	63/4	80/4	80/4	80/4
Rated operational current / poles in series, DC-23A		up to 48 V	A	40/1	63/1	80/1	100/1	125/1
		110 V	A	40/2	63/2	80/2	100/2	125/2
		220 V	A	40/4	63/4	63/4	63/4	63/4
Rated operational power, AC-23A ¹⁾		230 V	kW	7.5	15	22	22	22
The kW-ratings are accurate for 3-phase 1500 R.P.M. standard asynchronous motors		400 V	kW	18.5	30	37	37	45
		415 V	kW	18.5	30	37	37	45
		500 V	kW	22	37	37	37	45
		690 V	kW	37	37	37	37	45
Rated breaking capacity in category AC-23		up to 415 V	A	320	504	640	640	720
		500 V	A	320	480	480	480	560
		690 V	A	320	320	320	320	400
Rated conditional short-circuit current I_{sc} (r.m.s.) and corresponding max. allowed cut-off current i_c (peak) value. The cut-off current i_c refers to values listed by fuse manufacturers (single phase test acc. to IEC60269).	I_{sc} (r.m.s.) 50 kA, 415 V Max. OFA_fuse size gG/aM	i_c (peak) gG/aM	kA/A	16.5/125	16.5/125	16.5/125	16.5/125	16.5/125
	I_{sc} (r.m.s.) 18 kA, 690 V Max. OFA_fuse size gG	i_c (peak) gG	kA/A	11/125	11/125	11/125	11/125	11/125
	I_{sc} (r.m.s.) 50 kA, 690 V Max. OFA_fuse size gG/aM	i_c (peak) gG/aM	kA/A	10/63	10/63	10/63	10/63	10/63
Rated short-time withstand current	I_{cw} (r.m.s.)	690 V 1s	kA	2.5	2.5	2.5	2.5	2.5
Rated short-time making capacity ²⁾	I_{cm} (peak)	690 V	kA	3.6	3.6	3.6	3.6	3.6
Power loss / pole	With rated current		W	1.6	2.8	3.5	4.0	6.3
Mechanical endurance	Number of oper. cycles ³⁾		Cycles	10 000	10 000	10 000	10 000	10 000
Cable size	Cu-wire size suitable for terminal clamps		mm ²	2.5- 25/2x2.5-16	10-70	10-70	10-70	10-70
			AWG	14-4/2x14-6	8-00	8-00	8-00	8-00
Terminal tightening torque	Counter torque required		Nm	6	6	6	6	6
Operating torque	3-pole switches		Nm	5	5	5	5	5
Weight without accessories	3-pole switch 4-pole switch		kg	1.37 1.60	1.37 1.60	1.37 1.60	1.37 1.60	1.37 1.60
Data according to IEC 60947-6-1								
Class of equipment			PC	PC	PC	PC	PC	PC
Rated short-time withstand current	I_{cw} (r.m.s.)	690 V 0.1s	kA	5	5	5	5	5
Conditional short-circuit current	I_{sc} (r.m.s.)	415 V	kA	50	50	50	50	50
Corresponding fuse rating	gG/aM fuse	415 V	A	125	125	125	125	125
Rated operational current, AC-31B		up to 415 V	A	40	63	80	100	125
Rated operational current, AC-32B		up to 415 V	A	40	63	80	100	125
Rated operational current, AC-33B		up to 415 V	A	40	63	80	80	80

¹⁾ These values are given for guidance and may vary according to the motor manufacturer

²⁾ Short circuit duration > 50ms, without fuse protection

³⁾ Operating cycle: O - I - O - II - O

Motorized change-over switches

Technical data for OTM160...800_C

Motorized change-over switches

Data according to IEC 60947-3				Switch size						
				OT_160	OT_200	OT_250	OT_315	OT_400	OT_630	OT_800
Rated insulation voltage and rated operational voltage AC20/DC20 ¹⁾		Pollution degree 3 ²⁾	V	1000	1000	1000	1000	1000	1000	1000
Dielectric strength	50 Hz 1min.	kV		10	10	10	10	10	10	10
Rated impulse withstand voltage ³⁾		kV		12	12	12	12	12	12	12
Rated thermal current and rated operational current AC20/DC20	/ ambient 40°C	In open air	A	160	200	250	315	400	630	800
..with minimum conductor cross section	/ ambient 40°C	In enclosure	A	160	200	250	315	400	630	800
	Cu	mm ²		70	95	120	185	240	2x185	2x240
Rated operational current, AC-21A		up to 500 V	A	160	200	250	315	400	630	800
		690 V	A	160	200	250	315	400	630	800
Rated operational current, AC-22A		up to 500 V	A	160	200	250	315	400	630	800
		690 V	A	160	200	250	315	400	630	800
Rated operational current, AC-23A		up to 415 V	A	160	200	250	315	400	630	800
		440 V	A	160	200	250	315	400	630	800
		500 V	A	160	200	250	315	400	630	800
		690 V	A	160	200	250	315	400	630	800
Rated operational current / poles in series, DC-21A ⁶⁾		≤ 110 V	A	160/2	200/2	250/2	315/1 ¹⁾	400/1 ¹⁾	630/1	800/1
		220 V	A	160/2	200/2	250/2	315/2 ¹⁾	400/2 ¹⁾	630/1	800/1
		440 V	A	160/3	200/3	230/3	315/3	360/3	630/2	720/2
		660 V	A	160/4	200/4	200/4	315/4	315/4	630/4 ¹⁾	630/4 ¹⁾
Rated operational power, AC-23A ²⁾		230 V	kW	45	60	75	100	132	200	250
The kW-ratings are accurate for 3-phase 1500 R.P.M. standard asynchronous motors		400 V	kW	90	110	140	160	220	355	450
		415 V	kW	90	110	145	180	230	355	450
		500 V	kW	110	132	170	220	280	400	560
		690 V	kW	160	200	250	315	400	630	800
Rated breaking capacity in category AC-23		up to 415 V	A	1 280	1 600	2 000	2 520	3 200	5 040	6 400
		500 V	A	1 280	1 600	2 000	2 520	3 200	5 040	6 400
		690 V	A	1 280	1 600	2 000	2 520	3 200	5 040	6 400
Rated conditional short-circuit current I_p (r.m.s.) and cut-off current i_c (peak) value. The cut-off current i_c refers to values listed by fuse manufacturers (single phase test acc. to IEC60269).	I_p (r.m.s.) 80 kA, 415 V Max. OFA_fuse size	i_c (peak) gG/AM	kA A/A	40.5 355/315	40.5 355/315	40.5 355/315	59 500/500	59 500/500	83.5 800/1 000	83.5 800/1 000
	I_p (r.m.s.) 100 kA, 500 V Max. OFA_fuse size	i_c (peak) gG/AM	kA A	40.5 315/315	40.5 315/315	40.5 315/315	61.5 500/450	61.5 500/450	90 800/800	90 800/800
	I_p (r.m.s.) 80 kA, 690 V Max. OFA_fuse size	i_c (peak) gG/AM	kA A	40.5 355/315	40.5 355/315	40.5 355/315	59 500/500	59 500/500	83.5 800/1 000	83.5 800/1 000
Rated short-time withstand current	I_{cw} (r.m.s.)	690 V 0.15s 690 V 0.25s 690 V 1s	kA kA kA	15 15 8	15 15 8	15 15 8	31 24 15	31 24 15	38 36 20	38 36 20
Rated short-time making capacity ³⁾	I_{cm} (peak) ⁴⁾ With rated current	690 V	kA W	30 2.4	30 4	30 6.5	65 6.5	65 10	80 25	80 40
Mechanical endurance	Number of oper. cycles ⁵⁾		Cycles	8 000	8 000	8 000	8 000	8 000	5 000	5 000
Terminal bolt size	Metric thread diameter x length		mm	M8x25	M8x25	M8x25	M10x30	M10x30	M12x40	M12x40
Terminal tightening torque	Counter torque required		Nm	15-22	15-22	15-22	30-44	30-44	50-75	50-75
Operating torque	3-pole change-over switches		Nm	7	7	7	16	16	27	27
Weight without accessories	3-pole switch 4-pole switch		kg	5.7 6.4	5.7 6.4	5.7 6.4	10.2 11.4	10.2 11.4	17.5 20.4	17.5 20.4
Data according to IEC 60947-6-1										
Class of equipment				PC	PC	PC	PC	PC	PC	PC
Rated short-time withstand current	I_{cw} (r.m.s.)	690 V 0.1s	kA	15	15	15	25	25	38	38
Rated operational current, AC-31B		up to 415 V	A	160	200	250	315	400	650	720
Rated operational current, AC-33B		up to 415 V	A	160	200	250	315	400	650	650

¹⁾ Utilization category B

²⁾ These values are given for guidance and may vary acc. to the motor manufacturer

³⁾ Short circuit duration > 50ms, without fuse protection

⁴⁾ Max. distance from switch frame to nearest busbar / cable support 150 mm

⁵⁾ Operating cycle: O - I - O II - O

⁶⁾ Further ratings on request

Motorized change-over switches

Technical data for OTM1000...3200_C

Motorized change-over switches

Data according to IEC 60947-3			Switch size					
			OT_1000	OT_1250	OT_1600	OT_2000	OT_2500	OT_3200
Rated insulation voltage and rated operational voltage AC20/DC20 ¹⁾		Pollution degree 3 ²⁾	V	1 000	1 000	1 000	1 000	1 000
Dielectric strength		50 Hz 1min.	kV	10	10	10	10	10
Rated impulse withstand voltage ³⁾			kV	12	12	12	12	12
Rated thermal current and rated operational current AC20/DC20 ..with minimum conductor cross section	/ ambient 40°C	In open air	A	1 000	1 250	1 600	2 000	2 500
	/ ambient 40°C	In enclosure	A		2x400	2x500	3x500	4x500
		Cu	mm ²	2x300				4x1 000
Rated operational current, AC-21A		up to 500 V	A	1 000	1 250	1 600	2 000 ⁵⁾	2 500 ⁵⁾
		690 V	A	1 000	1 250	1 600		
Rated operational current, AC-22A		up to 500 V	A	1 000	1 250	1 600		
		690 V	A	1 000	1 250	1 600		
Rated operational current, AC-23A		up to 415 V	A	1 000	1 250	1 250		
		440 V	A	1 000	1 250	1 250		
		500 V	A	1 000	1 250	1 250		
		690 V	A	1 000	1 250	1 250		
Rated operational power, AC-23A ⁴⁾		230 V	kW	315	400	400		
The kW-ratings are accurate for 3-phase 1500 R.P.M. standard asynchronous motors		400 V	kW	560	710	710		
		415 V	kW	560	710	710		
		500 V	kW	710	900	900		
		690 V	kW	1 000	1 200	1 200		
Rated breaking capacity in category AC-23		up to 415 V	A	10 000	10 000	10 000		
		500 V	A	10 000	10 000	10 000		
		690 V	A	10 000	10 000	10 000		
Rated conditional short-circuit current I_p (r.m.s.) and cut-off current i_c (peak) value. The cut-off current i_c refers to values listed by fuse manufacturers (single phase test acc. to IEC60269).	I_p (r.m.s.) 80 kA, 415 V Max. OFA_fuse size	i_c (peak) gG/aM	KA A/A	100 1 250/1 250	100 1 250/1 250	100 1 250/1 250		
	I_p (r.m.s.) 100 kA, 500 V Max. OFA_fuse size	i_c (peak) gG/aM	KA A	106 1 250/1 250	106 1 250/1 250	106 1 250/1 250		
	I_p (r.m.s.) 80 kA, 690 V Max. OFA_fuse size	i_c (peak) gG/aM	KA A					
Rated short-time withstand current	I_{cw} (r.m.s.)	690 V 0.15s 690 V 0.25s 690 V 1s	KA KA KA	50 50 50	50 50 50	50 50 50	50 50 55	50 50 65
Rated short-time making capacity ²⁾	I_{cm} (peak) ³⁾	690 V	KA	92	92	92	110	110
Power loss / pole	With rated current		W	19	29	48	55	85
Mechanical endurance	Number of oper. cycles ⁴⁾		Cycles	3 000	3 000	3 000	2 000	2 000
Terminal bolt size	Metric thread diameter x length		mm	M12x60	M12x60	M12x60	M12x60	M12x100
Terminal tightening torque	Counter torque required		Nm	50-75	50-75	50-75	50-75	50-75
Operating torque	3-pole change-over switches		Nm	78	78	78	78	80
Weight without accessories	3-pole switch 4-pole switch		kg	42	42	44	56	56
			kg	50	50	52	70	83
							70	101
Data according to IEC 60947-6-1								
Class of equipment				PC	PC	PC		
Rated short-time withstand current	I_{cw} (r.m.s.)	690 V 0.1s	KA	50	50	50		
Rated operational current, AC-31B		up to 415 V	A	1 000	1 250	1 600		
Rated operational current, AC-33B		up to 415 V	A	1 000	1 000	1 000		

¹⁾ These values are given for guidance and may vary acc. to the motor manufacturer

²⁾ Short circuit duration > 50ms, without fuse protection

³⁾ Max. distance from switch frame to nearest busbar / cable support 150 mm

⁴⁾ Operating cycle: O - I - O - II - O

⁵⁾ Category AC-21B, up to 415V

Motorized change-over switches

Motor operator performance data for OTM40...125_C

Motor operator

Data according to IEC 60947				Switch size 40...125
Rated operational voltage U_e	Pollution degree 3 50/60 Hz	V AC/DC V DC		110 - 240 24
Operating voltage range				0.85 - 1.1 x U_e
Operating time ¹⁾	90° I-0, 0-I, 0-II, II-0	110...240 V AC/DC 24 V DC	s s	0.5-1.0 0.6-1.3
Operating transfer time ¹⁾	180° I-II, II-I	110...240 V AC/DC 24 V DC	s s	1.2-1.5 1.4-2.1
OFF-time when operating I-II or II-I ¹⁾	180° I-II, II-I	110...240 V AC/DC 24 V DC	s s	0.4-0.8 0.6-1.0
Nominal current I_n ¹⁾		110...240 V AC/DC 24 V DC	A A	0.2-0.5 0.6
Current inrush ¹⁾		110...240 V AC/DC 24 V DC	A A	1.5-3.0 3.6
Operating rate	Cycle 0-I-0-II-0	Max. continuous Max. short-time ≤ 10 cycles	cycles/min cycles/min	1 10
Overvoltage category				III
Rated impulse withstand voltage U_{imp}			kV	4
Dielectric strength		50 Hz 1 min.	kV	1.5
Impulse command		Min. impulse duration	ms	100
Terminals				
Voltage supply wiring for U_e				
Cross section		Solid/stranded	mm ²	PE - N - L 1.5 - 2.5
Short-circuit protection device		Max. MCB	A	C16
Control terminal				C - II - I - 0
Cross section		Solid/stranded	mm ²	1.5 - 2.5
Maximum cable length			m	100
Terminal for state information				
Terminal for state information		Solid/stranded Rating	mm ² A	1.5 3 AC-1/250V
Also used with the OMD automatic control unit				
Common, voltage supply	1			
Position of switch I	2			
Position of switch II	3			
Handle attached or motor operator locked	4			
Short-circuit protection device		Max. MCB	A	C2
Control terminal for OMD automatic control unit				
Control terminal for OMD automatic control unit		Solid/stranded	mm ²	1.5 - 2.5
Common, voltage supply from motor operator	1		V DC	24
Close switch I or open switch II	2		V DC mW	24 500
Close switch II or open switch I	3		V DC mW	24 500
Operating temperature			°C	-25...+55
Transportation and storage temperature			°C	-40...+70
Max. altitude			m	2 000
Protection degree (front panel)				IP20

¹⁾ Under nominal conditions

Motorized change-over switches

Motor operator performance data for OTM160...3200_C

Motor operator

				Switch size				
				160...250	315...400	630...800	1000...1600	2000...3200
Rated operational voltage U_e	Pollution degree 3	50/60 Hz	V AC V AC/DC V DC V DC		220 - 240 110 - 125 48 24			
Operating voltage range					0,85 - 1,1 x U_e			
Operating time ¹⁾	90° I-0, 0-I, 0-II, II-0	220-240VAC 110-125VAC/DC 48VDC 24VDC	s s s s	0.4-1.0 0.5-1.5 0.5-1.5 0.4-1.0	0.4-1.0 0.5-1.5 0.4-1.0 0.4-1.0	0.4-1.0 0.6-1.2 0.6-1.6 0.5-1.5	0.5-1.5 0.5-1.5 0.5-1.5 1.0-2.0	0.5-1.5 0.5-1.5 0.5-1.5 1.0-2.0
Operating transfer time ¹⁾	180° I-0-II, II-0-I	220-240VAC 110-125VAC/DC 48VDC 24VDC	s s s s	1.0-2.0 1.1-2.5 1.4-2.5 1.0-2.0	0.9-2.0 1.2-2.6 1.0-2.0 1.0-2.0	0.9-2.0 1.2-3.0 1.3-3.0 1.1-2.5	1.5-3.0 1.5-3.0 1.5-3.0 2.0-3.5	1.5-3.0 1.5-3.0 1.5-3.0 2.0-3.5
OFF -time when operating I-II or II-I ¹⁾	180° I-II, II-I	220-240VAC 110-125VAC/DC 48VDC 24VDC	s s s s	0.4-1.0 0.4-1.1 0.5-1.1 0.4-1.0	0.4-1.0 0.5-1.5 0.4-1.0 0.4-1.0	0.4-1.0 0.6-1.5 0.7-1.6 0.5-1.5	0.5-1.5 0.5-1.5 0.5-1.5 0.8-1.7	0.5-1.5 0.5-1.5 0.5-1.5 0.8-1.7
Nominal current I_n ¹⁾		220-240VAC 110-125VAC/DC 48VDC 24VDC	A A A A	0.2 0.5 1.1 3.3	0.5 0.6 2.1 4.2	0.7 0.8 2.6 4	1.8 3.0 5.3 8.0	1.8 3.0 5.3 8.0
Current inrush ¹⁾		220-240VAC 110-125VAC/DC 48VDC 24VDC	A A A A	1.3 2.1 4.4 16.8	2.1 2.5 8.3 17.5	2.8 4.6 8.4 22.4	7.7 13.3 22.4 26.6	7.7 13.3 22.4 26.6
Overload fuse	Type / I_n / Capacity	220-240VAC 110-125VAC/DC 48VDC 24VDC	mA mA A A	T/315/H T/500/H T/630/H T/1,25/H	T/500/H T/630/H T/1,000/H T/2,5/H	T/1,000/H T/1,000/H T/4,000/H T/2,5/H	T/2,000/H T/4,000/H T/5/H T/10/H	T/2,000/H T/4,000/H T/5/H T/10/H
	Size			mm 5x20	5x20	5x20	5x20	5x20
Operating rate	Cycle 0-I-0-II-0, max. continuous	220-240VAC 110-125VAC/DC 48VDC 24VDC	cycles/min cycles/min cycles/min cycles/min	1 1 1 1	1 1 1 1	1 1 1 1	0.5 0.5 0.5 0.5	0.5 0.5 0.5 0.5
	Max. short-time, ≤ 10 cycles	220-240VAC 110-125VAC/DC 48VDC 24VDC	cycles/min cycles/min cycles/min cycles/min	10 10 10 10	10 10 10 10	10 10 10 10	5 5 5 5	5 5 5 5
Overvoltage category							III	
Rated impulse withstand voltage U_{imp}			kV				4	
Dielectric strength		50 Hz 1 min.	kV				1.5	
Impulse command		Min. impulse duration	ms				100	
Terminals								
Voltage supply wiring for U_e							PE - N - L	
Cross section		solid/stranded	mm ²				1.5 - 2.5	
Short-circuit protection device		max. MCB	A				C16	
Control terminal (no SELV)							C - II - I - O	
Cross section		solid/stranded	mm ²				1.5 - 2.5	
Maximum cable length			m				100	
State information of locking (no SELV)								
Handle attached or motor operator locked		11-12-14 (C/O) 23-24 (NO)					5A/250V/cos =1	
Locking motor operator							5A/250V/cos =1	
Short-circuit protection device		Max. MCB	A				C2	
Protection degree							IP20	
Operating temperature			°C				-25...+55	
Transportation and storage temperature			°C				-40...+70	
Max. altitude			m				2 000	

¹⁾ Under nominal conditions