Switches

Snap-action Microswitches

Ultraminiature

	X5	F1	F1N
Type			
Characteristics	■ small size ■ low current ■ PCB mounting	■ small size ■ high current ■ long mechanical life ■ PCB mounting from side	■ small size ■ low current ■ long mechanical life ■ PCB mounting from side ■ sealed IP54 (optional)
Rating	250 VAC, 1.5 A	250 VAC, 5 A	up to 250 VAC, 1 A
Dimensions (mm)	13 × 6.5 × 6	16 × 6 × 6.5	16 × 6.5 × 6
Actuator	■ plunger ■ plain levers	■ plunger ■ plain levers ■ simulated roller levers	■ plunger ■ plain lever ■ simulated roller levers
Approvals	UL, CSA	UL, CSA	none

Snap-action Microswitches

Mid off

Double break

	F4	F5	F6	M0	FK4
Type					
Characteristics	■ small size ■ long mechanical and electrical life ■ solder ■ 2.8 mm quick connect ■ PCB terminals	■ small size ■ long mechanical and electrical life ■ PCB mounting	■ small size ■ sealed construction (IP67) ■ PCB mounting	■ mid-off function ■ sealed (IP6K7) ■ spring return to centre ■ toggle action ■ long overtravel	■ double break switching ■ long mechanical and electrical life ■ solder, 2.8 mm quick connect and PCB mounting ■ snap-action
Rating	250 VAC, 5 A	250 VAC, 5 A	12–30 VDC, 5–300 mA	12 VDC, 100 mA	250 VAC, 5 A
Dimensions (mm)	12.8 × 10 × 5	12.8 × 7 × 5	14.7 × 9 × 5.4	13 × 25.5 × 5.5	18 × 8 × 5
Actuator	■ plunger ■ plain levers ■ simulated roller levers	■ plunger ■ plain levers ■ simulated roller levers	■ plunger ■ plain levers	■ toggle	■ plunger ■ plain lever ■ simulated roller levers
Approvals	UL, CSA	UL, CSA	none	none	UL, CSA

Snap-action **Microswitches**

Subminiature

	XC	X4	V4NC	V4N	V4L
					
Type	**XC**	**X4**	**V4NC**	**V4N**	**V4L**
Characteristics	▪ wide range of force and ratings ▪ long mechanical and electrical life ▪ solder and PCB terminals	▪ thermoplastic housing ▪ long mechanical and electrical life ▪ solder and quick connect terminals	▪ wide variety of levers ▪ peg mounting option ▪ pre-wired ▪ sealed (IP67) ▪ solder and quick connect terminals ▪ PCB terminals	▪ sealed (IP67) ▪ solder terminals 2.8 mm quick connect and PCB terminals	▪ long overtravel of 2.2 mm minimum ▪ sealed to (IP6K7) option ▪ pre-wired option ▪ solder terminals
Rating	250 VAC, 10 A max.	250 VAC, 12 A max.	250 VAC, 5 A	250 VAC, 5 A	250 VAC, 5 A
Dimensions (mm)	19.9 × 9.5 × 6.4	19.9 × 9.7 × 6.4	20 × 10.3 × 6.4	20 × 10.3 × 6.4	20 × 11 × 6.4
Actuator	▪ plunger ▪ plain levers ▪ roller levers ▪ mushroom plunger	▪ plunger ▪ plain levers ▪ simulated roller levers ▪ roller levers	▪ plunger ▪ plain levers ▪ roller levers ▪ simulated roller levers	▪ plunger ▪ plain levers ▪ roller levers ▪ simulated roller levers	▪ plunger ▪ plain lever ▪ ice break lever
Approvals	ENEC, UL, cUL, CSA	UL, cUL, CSA, ENEC, CQC	none	UL, CSA, ENEC	ENEC

Microswitch **Push Button**

Momentary

	QA4/PBA4
	
Type	**QA4/PBA4**
Panel cut-out (mm)	Ø 6.1
Characteristics	▪ long overtravel up to 5 mm ▪ simple clip-on attachement ▪ round or square bezels ▪ push button options
Rating	250 VAC, 5 A
Dimensions (mm)	20 × 6.45 × 38.3
Actuator	▪ stainless steel plunger ▪ polyamide (PA 6.6) plunger
Approvals	UL, CSA

Snap-action **Microswitches**

Miniature





	XG	390	X3	G3	340
Characteristics	▪ wide range of forces and ratings ▪ long mechanical and electrical life ▪ solder, quick connect and PCB terminals	▪ wiping contacts, leaf spring mechanism ▪ solder, quick connect and Rast 5 terminals	▪ 8 mm creepage and clearance distance to the actuator ▪ long mechanical and electrical life ▪ solder, quick connect and PCB terminals	▪ light force range ▪ long mechanical and electrical life ▪ quick connect and solder terminals	▪ wiping contacts, leaf spring mechanism ▪ 3 mm contact gap option
Rating	250 VAC, 26 A max.	250 VAC, 25 A max.	250 VAC, 21 A max.	250 VAC, 18 A max.	250 VAC, 16 A max.
Dimensions (mm)	27.8 × 15.9 × 10.3	28.8 × 20.4 × 10.1	27.8 × 15.9 × 10.3	28 × 16 × 10	28.8 × 20.4 × 10.1
Actuator	▪ plunger ▪ plain levers ▪ roller levers ▪ simulated roller levers	▪ plunger ▪ plain levers ▪ roller levers ▪ moulded lever	▪ plunger ▪ straight lever ▪ simulated roller levers ▪ roller levers	▪ plunger ▪ ramp plunger	▪ plain lever ▪ roller lever ▪ plain levers ▪ simulated roller lever ▪ moulded lever
Approvals	ENEC, UL, cUL, CSA	ENEC, UL, CSA	UL, cUL, CSA, ENEC, CQC	ENEC, UL, CSA	ENEC

Rotary Action **Microswitche**

Miniature

	600
Characteristics	▪ low and medium torque options ▪ horizontal or vertical actuation ▪ 6.35 x 0.8 quick connect terminals
Rating	250 VAC, 5 A
Dimensions (mm)	39.6 × 22 × 16.4
Actuator	▪ wire levers
Approvals	none

Microswitches **Push Button**

Momentary


Latching

	CO911	V3Q	ZB5
Panel cut-out (mm)	Ø 12.7	Ø 11.9	Ø 12.7
Characteristics	▪ single pole ▪ changeover ▪ momentary function	▪ long overtravel assemblies with single or double pole options ▪ IP67, pre-wired option	▪ single pole ▪ changeover ▪ latching function
Rating	250 VAC, 15 A	up to 250 VAC, 10 A	250 VAC, 15 A
Dimensions (mm)	43 × 15	36.5 × 33.6 × 17.3 single pole 36.5 × 33.6 × 26.2 double pole	43 × 15
Actuator	▪ round button ▪ rectangular button ▪ 4 colour options	▪ plunger ▪ roller plunger	▪ round button ▪ rectangular button ▪ 4 colour options
Approvals	ENEC, UL, CSA	UL, CSA	ENEC, UL, CSA

Microswitche

Standard

	PN4
Type	
Characteristics	■ precision switching ■ long mechanical life ■ screw terminals
Rating	250 VAC, 15 A
Dimensions (mm)	49 × 22 × 17.5
Actuator	■ plunger ■ plain lever ■ roller lever
Approvals	UL, CSA

Limit Switches

Miniature

Standard

	V3S	V9N	4BR	3BR	4CR
Type					
Characteristics	■ sealed (IP67) ■ flying leads ■ robust construction	■ sealed (IP67) ■ metal housed ■ screw terminals or flying leads	■ choice of IP54 or IP67 sealed versions ■ precise movements and exceptional repeat accuracy ■ robust metal housing ■ flying lead version available ■ long overtravel	■ choice of IP54 or IP67 sealed versions ■ precise movements and exceptional repeat accuracy ■ flying lead version available ■ long overtravel	■ precise movements and exceptional repeat accuracy ■ robust metal housing ■ screw terminals ■ single hole mounting ■ long overtravel
Rating	250 VAC, 5 A	250 VAC, 10 A max.	250 VAC, 15 A max.	250 VAC, 10 A max.	250 VAC, 15 A max.
Dimensions (mm)	32 × 24 × 10	42 × 24.5 × 16	53.1 × 20.6 × 29.2	53.1 × 20.6 × 30.8	53.1 × 20.6 × 30.8
Actuator	■ plunger ■ plain levers ■ roller levers	■ plunger ■ plain levers ■ reverse action levers ■ roller levers	■ plunger	■ plunger	■ spring plunger ■ spring plunger with in-line roller
Approvals	UL, CSA, ENEC	UL, CSA	UL, CSA	UL, CSA	UL, CSA

Limit Switches

Momentary

	Standard		Miniature	Miniature
				
Type	**M9 / C9**	**M2V3 / C2V3**	**V9B**	**BVM3**
Characteristics	▪ sealed (IP67) ▪ internal earth (ground) screw provided ▪ trident spring mechanism for precise movements ▪ hazardous area option (Atex)	▪ sealed (IP65) ▪ contains two electrically independent change-over switches ▪ rotary action levers can be mounted in four different positions and then adjusted through 360°	▪ positive action, forced break contacts ▪ sealed (IP67) ▪ robust metal housing ▪ screw terminals or flying leads	▪ positive action, forced break contacts ▪ internationally recognised V3 housing ▪ quick connect terminals
Rating	250 VAC, 15 A max.	250 VAC, 10 A max.	250 VAC, 10 A max.	250 VAC, 10 A
Dimensions (mm)	76.7 × 45.8 × 26	66.9 × 38.3 × 30.2	42 × 24.5 × 16	28 × 16 × 10.5
Actuator	▪ spring plunger ▪ adjustable roller lever ▪ wobble stick	▪ spring plunger ▪ roller levers ▪ rod lever ▪ wobble stick	▪ plunger ▪ plain levers ▪ roller levers	▪ plunger ▪ plain levers ▪ roller levers
Approvals	UL, CSA, ATEX	UL, CSA	UL, CSA	UL, CSA and ENEC

Momentary

	Double break			
				
Type	**K5**	**XP**	**XT**	**KB5**
Characteristics	▪ double break switching ▪ long mechanical life ▪ high electrical rating ▪ quick connect terminals	▪ double break switching ▪ long overtravel ▪ single/double pole switching ▪ quick connect terminals ▪ forced break option	▪ 8 mm contact gap, creepage and clearance distances ▪ safe mechanical separation by reset springs ▪ double break contacts	▪ positive action forced double break switching ▪ high electrical rating ▪ quick connect terminals
Rating	250 VAC, 25 A	250 VAC, 16 A	400 VAC, 16.5 A max.	250 V, 25 A
Dimensions (mm)	41 × 19 × 15.5	30 × 32 × 12	30 × 32 × 12	41 × 19 × 15.5
Actuator	▪ plunger ▪ plain levers ▪ roller levers	▪ plain plunger ▪ mushroom plunger ▪ plunger with external spring	▪ shrouded plunger ▪ plain plunger	▪ plunger ▪ plain lever ▪ roller levers
Approvals	UL, CSA	ENEC, UL, CSA	UL, cUL, CSA, ENEC	UL, CSA

Momentary

	Positiv action	Snap-action	
			
Type	KB5EQ	TPS	DS
Characteristics	▪ positive action forced double break switching ▪ enclosed design ▪ long overtravel ▪ screw terminals	▪ snap-action switching ▪ enclosed design ▪ long overtravel ▪ adjustable operating position ▪ screw terminals	▪ enclosed snap-action switching ▪ long overtravel ▪ tapped plunger for attachments ▪ screw terminals
Rating	250 VAC, 25 A	250 VAC, 15 A 380 VAC, 10 A	250 VAC, 15 A
Dimensions (mm)	54 × 50 × 17.5	54 × 50 × 18	48 × 51 × 16
Actuator	▪ plunger ▪ plunger roller	▪ plain spindle plunger	▪ plain spindle plunger
Approvals	UL, CSA	UL, CSA	UL, CSA

Momentary

	Momentary		Snap-action	
				
Type	1427	1430	1429	XKA
Characteristics	▪ single pole ▪ quick connect ▪ snap-in mounting or central-fixing	▪ single pole ▪ quick connect ▪ snap-in mounting	▪ single pole ▪ snap-action function ▪ quick connect ▪ snap-in mounting	▪ long overtravel ▪ snap action C0 ▪ snap-in mounting ▪ type of protection according to IEC 60079–15: 1987
Rating	250 VAC, 0.2 [0.2] A 1E5 250 VAC, 0,25 A	250 VAC, 0.2 [0.2] A 5E4	250 VAC, 0.2 [0.2] A 2E5	250 VAC, 1 (1) A 5E4, T85
Dimensions (mm)	various	various	various	28 × 20 × 15
Actuator	▪ plunger	▪ lever	▪ plunger	▪ plain lever ▪ round levers
Approvals	ENEC, cUL	ENEC	ENEC	UL, CSA, ENEC

Push Button Switches

Push Button

Type **3290**

- Characteristics: ■ single pole ■ on/off ■ quick connect ■ PCB terminals ■ customised mounting ■ momentary or latching ■ high temp. 125°
- Rating: 250 VAC, 8 (8) A; 5E4; up to 125 VAC, 12 A
- Dimensions (mm): 13.5 × 19
- Actuator: ■ plunger ■ square 6 mm
- Approvals: ENEC, UL, CSA

Type **3292**

- Characteristics: ■ double pole ■ on/off ■ quick connect ■ PCB terminals ■ extended life (5E4) ■ customised mounting ■ momentary or latching optional ■ high temp. 100°
- Rating: 250 VAC, 8 (8) A; 125 VAC, 10 A
- Dimensions (mm): 13.5 × 19
- Actuator: ■ plunger ■ square 6 mm
- Approvals: ENEC, UL

Type **3200**

- Characteristics: ■ illumination optional ■ single pole ■ change-over ■ customised mounting ■ momentary or latching ■ PCB terminals
- Rating: 12 VDC, 2 A
- Dimensions (mm): 12.5 × 12.5 × 19.5
- Actuator: ■ square 10.4 mm
- Approvals: none

Switches

Rotary

Type **4022**

- Characteristics: ■ single pole with step function ■ double pole with on/off-function ■ solder terminals ■ PCB terminals ■ high temp. 100°
- Rating: 250 VAC, 12 (2) A; up to 125 VAC, 10 A
- Dimensions (mm): 30 × 14 × 15.3
- Actuator: ■ cam ■ square access hole 3.25 mm²
- Approvals: ENEC, UL, CSA

Slide

Type **3585**

- Characteristics: ■ single pole ■ step function ■ PCB-terminals ■ customised mounting ■ high temp 85°
- Rating: 250 VAC, 10 (2) A
- Dimensions (mm): 39 × 20 × 15
- Actuator: ■ slider
- Approvals: ENEC

Rocker Switches

Rocker

Type **3670**

- Characteristics: ■ single pole ■ on/off ■ illuminated/non-illum. ■ snap-in mounting ■ quick connect ■ optional with momentary function ■ temp. 100/55°
- Rating: 250 VAC, 6 (2) A; 250 VAC, 12 (2) A; 125 VAC, 12 A
- Dimensions (mm): various
- Actuator: ■ rockers in different shapes/colours
- Approvals: ENEC, cUL

Type **3672**

- Characteristics: ■ single pole ■ on/off ■ illuminated/non-illum. ■ snap-in mounting ■ solder terminals ■ PCB terminals ■ quick connect ■ momentary function ■ temp. 85/55°
- Rating: 250 VAC, 6 (2) A; 125 VAC, 7.5 A
- Dimensions (mm): various
- Actuator: ■ rockers in different shapes/colours
- Approvals: ENEC, UL

Type **3673**

- Characteristics: ■ single pole ■ change-over (with or without "zero-position") ■ snap-in mounting ■ quick connect ■ µ-gap ■ temp. 100/55°
- Rating: 250 VAC, 6 (3) A; 125 VAC, 10 A (for version with "zero"-position)
- Dimensions (mm): various
- Actuator: ■ rockers in different shapes/colours
- Approvals: ENEC, cUL

Type **3680**

- Characteristics: ■ single pole ■ on/off ■ illuminated/non-illum. ■ snap-in mounting ■ quick connect ■ optional with momentary function ■ temp. 85/55°
- Rating: 250 VAC, 6 (2) A; 125 VAC, 7.5 A
- Dimensions (mm): various
- Actuator: ■ rockers in different shapes/colours
- Approvals: ENEC, UL, CSA

Tippmatic®

Auto-Shut-Off

Type **3600**

- Characteristics: ■ integral timer function ■ single pole ■ on/off ■ illuminated/non-illum. ■ snap-in mounting ■ temp. 100/55°
- Rating: 250 VAC, 12 (4) A; 125 VAC, 15 A
- Dimensions (mm): 37.2 × 17 × ~38
- Actuator: ■ standard rocker 25.4 x 10.7 mm
- Approvals: ENEC, cUL

Man-Machine Interface

Push Button





Type	TP2	TP5	TP4	TP8	TP9
Panel cut-out (mm)	Ø 16.2/22.5	Ø 16.2/22.5	Ø 16.2/22.5	Ø 22.5	Ø 16.2/22.5
Characteristics	▪ momentary or latching ▪ sealed IP40, IP65 or IP67 ▪ wide range of bezels ▪ with or without illumination ▪ NO, NC, CO ▪ gold plated single or double pole contact blocks	▪ momentary or latching ▪ sealed IP40 or IP65 ▪ wide range of bezels ▪ shallow mounting depth ▪ with or without illumination ▪ NO, NC ▪ gold plated contact blocks	▪ mushroom ▪ momentary or latching ▪ sealed IP40 or IP65 ▪ wide range of bezels ▪ NO, NC ▪ gold plated contact blocks	▪ momentary ▪ sealed IP67 ▪ round metal bezels ▪ 1NO + 1 NC, 2 NC, 2 NO ▪ gold plated contact block	▪ momentary short stroke switch ▪ sealed IP65 or IP67 ▪ round metal bezels ▪ NO ▪ snap-in mounting option Ø 22.5 mm (IP65 only)
Rating	250 VAC, 5 A	250 VAC, 5 A	250 VAC, 5 A	230 VAC, 6 A	50 VAC/VDC, 50 mA
Dimensions (mm)	18 × 24 18 × 18 Ø 18 Ø 25	18 × 24 18 × 18 Ø 18 Ø 25	18 × 24 24 × 24 Ø 24 Ø 30	Ø 25	Ø 18 Ø 25
Actuator	▪ lenses in different shapes and colours	▪ lenses in different shapes and colours	▪ mushroom cap in different shapes and colours	▪ button and housing in different colours	▪ button and housing in different colours
Approvals	UL, CSA, VDE	UL, CSA, VDE	UL, CSA, VDE	none	none

Man-Machine Interface

Push Button


Type	TP7	3300
Panel cut-out (mm)	Ø 16.2/22.5/30.3/43.3	Ø 44
Characteristics	▪ piezo technology ▪ momentary ▪ sealed IP68 ▪ with or without illumination, two colours ▪ solid state output ▪ NO	▪ momentary function ▪ short travel 0.4 mm ca. ▪ sealed IP67 ▪ vandal resistant ▪ with or without illumination, two colours
Rating	3 to 35 VAC/VDC, 200 mA	12–24 VDC 30 mA
Dimensions (mm)	Ø 18 Ø 25 Ø 36 Ø 48	Ø 82
Actuator	▪ housing in different colours	▪ anodised surface ▪ plated surface ▪ powder coated surface
Approvals	none	on request

Man-Machine Interface

Indicators

Emergency Stop

	TI2	TI5	TI9	TE8
Panel cut-out (mm)	Ø 16.2 / Ø 22.5	Ø 16.2 / Ø 22.5	Ø 22.5	Ø 16.2/22.5
Characteristics	▪ illuminated ▪ sealed IP40, IP65 or IP67 ▪ wide range of bezels ▪ midget grooved lamp/ LED	▪ illuminated ▪ sealed IP40 or IP65 ▪ wide range of bezels ▪ midget grooved lamp/ LED	▪ illuminated ▪ sealed IP67 ▪ round metal bezels ▪ red LED ▪ green LED ▪ red-green LED	▪ meets EN418 directives (Ø (27 mm only) ▪ sealed IP66 or IP67 ▪ rotary pull or key reset ▪ yellow disk bezel (optional) ▪ 1NO + 1 NC or 2 NC
Rating	max. 60 VAC/VDC	max. 60 VAC/VDC	24 VDC, 20 mA	250 VAC, 6 A
Dimensions (mm)	18 × 24 18 × 18 Ø 18 Ø 25	18 × 24 18 × 18 Ø 18 Ø 25	Ø 25	Ø 27 Ø 40
Actuator	▪ lenses in different shapes and colours	▪ lenses in different shapes and colours	▪ aluminium housing in different colours	▪ red mushroom CAP (Ø 27 mm only) ▪ reset by KABA key (Ø 40 mm only)
Approvals	UL, CSA, VDE	UL, CSA, VDE	none	IEC 947-5-1/947-5-5 (Ø 27 mm)

Man-Machine Interface

Keyswitch

Rotary

	TK2	TR2
Panel cut-out (mm)	Ø 16.2/22.5	Ø 16.2/22.5
Characteristics	▪ 2 and 3 position ▪ sealed IP40 or IP65 ▪ plastic or aluminium bezels ▪ wide range of bezels ▪ NO, NC ▪ gold plated, single or double pole, contact blocks ▪ key trapping options	▪ 2 and 3 position ▪ sealed IP40 or IP65 ▪ plastic or aluminium bezels ▪ NO, NC ▪ gold plated, single or double pole, contact blocks
Rating	250 VAC, 5 A	250 VAC, 5 A
Dimensions (mm)	18 × 24 18 × 18 Ø 18 Ø 25	18 × 24 18 × 18 Ø 18 Ø 25
Actuator	▪ key-KABA MICRO	▪ black knob with white indicating bar
Approvals	UL, CSA, VDE	UL, CSA, VDE

Man-Machine Interface

Keyswitches

Type	E1	M1	P5	K2	P2
Panel cut-out (mm)	⍁ 15.1 × 15.1	⍁ 15.1 × 15.1	Ø 20.6	Ø 19.1	Ø 19.1
Characteristics	▪ tamper proof ▪ 2 positions ▪ key trapping options ▪ gold-plated contacts ▪ PCB terminals	▪ double pole change-over or three circuit selector switching functions ▪ key trapping option ▪ two body style options ▪ gold-plated contacts ▪ PCB terminals	▪ high electrical rating ▪ key trapping option ▪ choice of off-on, change-over with spring return or change-over with separate circuits	▪ choice of off-on or change-over centre off or spring return options ▪ key trapping option ▪ solder terminals	▪ up to 12 contact pairs ▪ 2 security options with key actuation ▪ from 2 to 4 switch positions ▪ key trapping option ▪ solder terminals
Rating	250 VAC, 100 mA	250 VAC, 100 mA	up to 125 VAC, 10 A up to 250 VAC, 5 A	up to 250 VAC, 2 A	250 VAC, 2 A
Dimensions (mm)	18 × 16	18 × 16 body style A 18 × 18 body style E	Ø 38.1 × 45.7 off-on Ø 38.1 × 58.4 change-over	Ø 22	Ø 22
Actuator	▪ plastic key	▪ key (common or different)	▪ key (common or different)	▪ key (common or different)	▪ key (common or different)
Approvals	none	none	UL and CSA	UL and CSA	UL (optional)

Joystick

Microswitch

Microswitch/Potentiometer

Type	700	J8	H70	C700
Panel cut-out (mm)	Ø 22 × 20	Ø 22.5	Ø 36.8 × 22.2	Ø 12 × 40
Characteristics	▪ single or double pole ▪ choice of directional gating options ▪ miniature or subminiature microswitch types	▪ choice of directional gating options ▪ choice of microswitch functions	▪ single axis joystick controllers ▪ positive movement to full travel central dead band ▪ single or double pole versions	▪ choice of directional gating options to IP66 and IP67 ▪ choice of potentiometer, microswitch and switched knob functions
Rating	up to 15 A 250 VAC miniature microswitches up to 6 A 250 VAC subminiature microswitches	up to 16 A 250 VAC up to 5 A 250 VAC	250VAC, 6 A	up to 5 A 250 VAC up to 1 A 250 VAC
Dimensions (mm)	55 × 55 × 57.2 miniature microswitches 41.3 × 41.3 × 57.2 subminiature microswitches	up to 74.5 × 74.5 × 105 up to Ø 60 × 60 × 103.5	60 × 31.9 × 57.1	up to 58 × 58 × 93
Actuator	▪ knob	▪ knob	▪ paddle style	▪ knob
Approvals	ENEC, UL and CSA (switch only)	ENEC, UL and CSA (switch only)	ENEC, UL and CSA (switch only)	ENEC, UL and CSA (switch only)

Motors

Synchronous Motors

Rotational





Type	URT	UAT	UCM/UCR	UBR1/UBR2	UDR
Dimensions (mm)	Ø 13 × 11	Ø 20 × 17	Ø 28 × 24	Ø 36 × 21	Ø 48 × 24
Characteristics	▪ **compact size** ▪ optional planetary gearbox equal to motor diameter ▪ pin connection or flex print	▪ **long life** ▪ precision bearing ▪ standard 24 VAC motor	▪ **standard modules** ▪ customer specific interfaces	▪ **wide range** of customised versions available ▪ up to 230 VAC supply voltage	▪ **compact** reversible synchronous motor
Voltage (V)	3–24	12–48	12–48	12–230	12–230
Speed 50 Hz (rpm) 60 Hz (rpm)	600 720	600 720	250/500 300/600	250/500 300/600	500 600
Pole number	10	10	24/12	24/12	12
Running torque (cNm) 50 Hz 60 Hz	 0,1 0,7	 0,31 0,3	 0,9–1,2 0,85–1,2	 0,75–0,9 0,72–0,9	 1,5 1,4
Power output (W) 50 Hz 60 Hz	 0,06 0,07	 0,19 0,23	 0,32–0,47 0,37–0,53	 0,24–0,39 0,28–0,45	 0,77 0,87
Gear combination	–	–	–	A, D, M, B, F, V, J	A, D, M, B, F, V, J
Weight (g)	7	25	54	60	132

Synchronous Motors

Rotational





Type	UDS	UOM1/R1/U1 UOM5/R5/U5 (SM5021/SM5022)	UFM/UFR	UHM	UPM1/U1 UPU5 (SM6443/SM6444)
Dimensions (mm)	Ø 48 × 18,5	Ø 50 × 21	Ø 52 × 28 (56)	Ø 59 × 35 (70)	Ø 64 × 43
Characteristics	▪ **simple to connect,** only two wires ▪ no capacitor, ▪ unidirectional with integrated anti-return mechanism;	▪ **three speed** versions ▪ wide range of torque capacities	▪ **three-phase AC** operation possible ▪ for high power 2, 3 or 4 coils	▪ **high performance** ▪ synchronous version of the stepper motor UHD	▪ **highest performance** package with STG/ V gearboxes
Voltage (V)	6–230	6–230	12–230	12–230	12–230
Speed 50 Hz (rpm) 60 Hz (rpm)	500 600	250/375/500 300/450/600	250/500 300/600	250 300	250/375 300/450
Pole number	12	24/16/12	24/12	24	24/16
Running torque (cNm) 50 Hz 60 Hz	 0,95 0,8	 2,0–7,5 1,8–7	 2,8–5,3 2,6–4,7	 8,5–15 6,6–9,5	 10,5–35 8,5–30
Power output (W) 50 Hz 60 Hz	 0,5 0,5	 0,65–2,75 0,78–3,0	 1–2,8 1,1–3	 2,2–3,9 2,1–3	 3,5–13,8 3,9–14,2
Gear combination	A, D, M, B, F, V, J	VK4, STG60/61/200, V 250	A, D, M, B, F, V, J	J	STG60/61/200 V 250
Weight (g)	102	195	195–370	300	500

Synchronous Motors

Torque Limited

	UNU0 (SM3532RG)	UOU0 (SM5032RG)	UPU0 (SM6469RG)
Dimensions (mm)	Ø 35 × 32	Ø 50 × 32	Ø 64 × 69
Chara cteristics	▪ **torque limiting feature** ▪ abrasion-free, integrated low noise magnetic hysteresis clutch	▪ **torque limiting feature** ▪ abrasion-free, integrated low noise magnetic hysteresis clutch	▪ **torque limiting feature** ▪ abrasion-free, integrated low noise magnetic hysteresis clutch
Voltage (V)	24–230	24–230	24–230
Speed 50 Hz (rpm) 60 Hz (rpm)	375 450	375 450	375 450
Pole number	16	16	16
Limited torque (cNm) 50 Hz 60 Hz	 0,6 0,6	 2 2	 7 7
Power output (W) 50 Hz 60 Hz	 0,25 0,3	 0,8 0,95	 2,75 3
Gear combination	STG60/61/200, V 250	STG60/61/200, V 250	STG60/61/200, V 250
Weight (g)	100	190	600

Linear

	UCC/UCK
Dimensions (mm)	Ø 28 × 31
Characteristics	▪ **linear** motor using modules from the UC range ▪ integrated non-rotational spindle
Travel (mm)	10/13
Voltage (V)	12–48
Thread pitch (mm)	1,0
Speed (mm/s) 50 Hz 60 Hz	 4,16/8,33 5/10
Pole number	24/12
Max Force (N)	35
Weight (g)	67

Synchronous Motors

Linear

	UBK	UNC1/K1/W1 (LA3520SM)	UNC1/K1/W1 (SP3520SM)	UOE1/K1/W1 (LA5021SM)	UOE1/K1/W1 UOE5/K5/W5 (SP5021/5022SM)
Dimensions (mm)	Ø 36 × 36	Ø 36 × 41	Ø 36 × 25	Ø 50 × 76	Ø 50 × 27
Characteristcs	▪ **standard** linear motor ▪ for extended travel the spindle has to be retained externally	▪ linear actuator with **3 speeds** ▪ **20 mm** travel ▪ integrated non-rotational threaded spindle	▪ spindle type ▪ threaded spindle has to be retained externally for **extended travel**	▪ linear actuator with **3 speeds** ▪ **50 mm** travel integrated non-rotational threaded spindle	▪ spindle type ▪ threaded spindle has to be retained externally ▪ for **extended travel**
Travel (mm)	8/13/56	20	24–134	45–50	68–130
Voltage (V)	12–230	24–230	24–230	12–230	12–230
Thread pitch (mm)	1	0,75/0,75/0,75	0,75/0,75/0,75	1,5/1,5/1,5	1,5/1,5/1,5
Speed (mm/s) 50 Hz 60 Hz	 8,33 10	 3,125/4,69/6,25 3,75/5,62/7,5	 3,125/4,69/6,25 3,75/5,62/7,5	 6,25/9,37/12,5 7,5/11,25/15	 6,25/9,37/12,5 7,5/11,25/15
Pole number	12	24/16/12	24/16/12	24/16/12	24/16/12
Max Force (N)	35	20	20	45–50	45–70
Weight (g)	90	100	100	220	220

Stepper Motor

Rotational





Type	URG	UAG	UCD/UCB	UBD/UBB	UDB
Dimensions (mm)	Ø 13 × 11	Ø 20 × 17	Ø 28 × 24	Ø 36 × 21	Ø 48× 24
Characteristics	▪ **high dynamic** performance ▪ optional planetary gearbox equal to motor diameter ▪ pin connection or flex print	▪ **precision** bearing ▪ standard motor	▪ **standard modulers** ▪ customer specific interfaces	▪ **wide range** of customised versions available	▪ **compact** reversible 15° stepper motor
Step angle(°)	18	18	7,5/15	7,5/15	15
Holding torque (cNm)	0,25	0,7/0,5	1,6–3,1	1,0–1,9	2,2–2,7
Detent torque (cNm)	0,04	0,14	0,2	0,22–0,36	0,35
Winding	bipolar	bipolar/unipolar	bipolar/unipolar	bipolar/unipolar	bipolar/unipolar
Gear combination	–	–	–	A, D, M, B, F, V	A, D, M, B, F, V, J
Weight (g)	7	25	54	60	132

Stepper Motor

Rotational




Type	UOD1/J1 UOD5/J5 (ST5021/ST5022)	UFD/UFB	UHD	UPD1/J1 UPJ5 (ST6443/ST6444)
Dimensions (mm)	Ø 50 × 21	Ø 52 × 28 (56)	Ø 59 × 35 (70)	Ø 64 × 43
Characteristics	▪ **three step angle** motor ▪ wide range of torque capacities	▪ **two step angle** motor	▪ **high performance** standard motor ▪ 7,5° stepper motor	▪ **highest performance** package with STG/V gearboxes,
Step angle(°)	7,5/11,25	7,5/15	7,5	7,5/11,25
Holding torque (cNm)	3,7–7,5	4,3–10,4	13–45,5	30–45
Detent torque (cNm)	0,25–1	0,45–0,8	1,3–5,3	2–7
Winding	bipolar	bipolar/unipolar	bipolar/unipolar	bipolar
Gear combination	VK4, STG60/61/200 V 250	A, D, M, B, F, V, J	J	STG60/61/200, V 250
Weight (g)	195	180/350	300/580	500

Stepper Motor

Linear





Type	**UCE/UCL**	**UBL**	**UNE1/L1/V1** (LA3520ST)	**UNE1/L1/V1** (SP3520ST)	**UOE1/L1/V1** (LA5021ST)
Dimensions (mm)	Ø 28 × 31	Ø 36 × 36	Ø 36 × 41	Ø 36 × 25	Ø 50 × 76
Characteristics	▪ **linear** motor using modules from the UC range ▪ integrated non-rotational threaded spindle	▪ **general purpose** linear motor ▪ for long travel version the spindle has to be retained externally	▪ linear actuator with **3 step widths and 20 mm** travel ▪ integrated threaded spindle is prevented from rotating	▪ spindle type ▪ threaded spindle has to be retained externally for **extended travel**	▪ linear actuator with **3 step widths and 50 mm** travel, ▪ integrated non-rotating threaded spindle
Travel (mm)	10/13	8/13/56	20	24–134	45–50
Travel per step (mm)	0,021/0,041	0,033/0,041	0,016/0,023/0,031	0,016/0,023/0,031	0,031/0,047/0,063
Thread pitch (mm)	1,0	0,8/1,0	0,75/0,75/0,75	0,75/0,75/0,75	1,5/1,5/1,5
Speed (mm/s) at 200 Hz	4,16/8,33	6,67/8,33	3,125/4,69/6,25	3,125/4,69/6,25	6,25/9,37/12,5
Step angle (°)	7,5/15	15	7,5/11,25/15	7,5/11,25/15	7,5/11,25/15
Max. Force (N)	35	35	20	20	45–50
Weight (g)	67	90	100	100	220

Stepper Motor

Linear


Type	**UOE5/L5/V5** (SP5022ST)	**UKE**
Dimensions (mm)	Ø 50 × 27	Ø 57 × 45
Characteristics	▪ threaded spindle has to be retained externally for **extended travel**	▪ **high performance** 7,5° linear stepper motor ▪ integrated non-rotating threaded spindle
Travel (mm)	68–130	13/30
Travel per step (mm)	0,031/0,047/0,063	0,031
Thread pitch (mm)	1,5/1,5/1,5	1,5
Speed (mm/s) at 200 Hz	6,25/9,37/12,5	6,25
Step angle (°)	7,5/11,25/15	7,5
Max. Force (N)	50–70	50–100
Weight (g)	220	325

Electronics for Stepper Motors

Driver Boards

	Type	SAMOTRONIC101	SAMOTRONIC102	EvaluationKit
	Characteristics	▪ small **unipolar** driver **board**	▪ small **bipolar** driver **board** ▪ flash controller ▪ optional customised software	▪ tool for development, test and optimisation of stepper drive system ▪ windows based software ▪ quick parameter setup ▪ visualisation of speed and position ▪ positioning sequences capability
	Dimensions (mm)	55 × 40	84 × 54	metal case 160 × 100 × 30 (Euro-PCB)
	Driver	for unipolar motors	for bipolar motors	for unipolar and bipolar motors
	Supply voltage (VDC)	10 DC–24 DC	standard version 10 DC–24 DC enhanced version 10 DC–42 DC	3-55 VDC / 24 VAC
	Motor current	constant voltage drive	constant current drive (chopper controlled) adjustable via potentiometer	constant voltage drive and constant current drive (chopper controlled)
	Step Mode	full/half step	full/half step	full/half/micro step
	Clock source	internal or external	internal or external	internal, programmable
	Control inputs to	▪ inhibit internal clock ▪ inhibit motor current ▪ change direction of rotation	▪ inhibit internal clock ▪ inhibit motor current ▪ change direction of rotation	▪ 3 digital inputs ▪ 4 signal outputs ▪ 1 analog input 0…10VDC ▪ relay contact
	Configuration	via DIP-switch, potentiometer	via DIP-switch, potentiometer	RS 232, USB

Gearboxes





Type	VK2	UGA/UGD	VK4	UGM	UGB/UGF
Dimensions (mm)	Ø 40	55 × 62/65.6	Ø 52	51 × 65.2	58 × 81
Characteristics	▪ compact ▪ **cylindrical shape**	▪ **plastic gears** ▪ wide range of ratios ▪ gears rotate on hardened steel axles ▪ optional integrated slipping clutches	▪ **cylindrical** 52 mm diameter design	▪ **volume** metal and plastic spur gears ▪ enclosed steel shafts hardered in plastic housing and metal plate	▪ **robust** metal spur gears ▪ plastic primary gears ▪ die-cast aluminium housing
Height	19	12/13	20	15	17
Maximal torque (cNm)[1]	20	32	40	100	250/500
Ratios	6 1/4...2250	A: 4 1/6...360.000 D: 4 1/6...6.048.000	6 1/4...1875	12 1/2...4800	B: 41 2/3...345.600 F: 4 1/6...5000
Internal slipping clutch	–	optional	–	–	optional (UGB)
Standard shaft (mm)	Ø 3 × 10	Ø 4 × 10	Ø 3 × 10	Ø 4 × 10	Ø 8 × 12
Weight (g)	depends on ratio	55/35	depends on ratio	45	130

Gearboxes





Type	UGV	UGO/UGP (STG60/61)	UGJ	UGR (STG200)	UGS (V250)
Dimensions (mm)	70 × 70	Ø 65/68 × 68	65 × 107	70 × 130	70 × 100
Characteristics	▪ **solid** metal spur gears ▪ die-cast aluminium housing	▪ **high performance** hardened steel spur gears ▪ low teeth profile ▪ optional interface plates for DC motors ▪ optional additional housing for IP 65	▪ the most extensive **gear ratio range** ▪ medium torque two plate gear type with metal spur gears	▪ **high performance** metal gear type ▪ robust aluminium twin plate design ▪ can be used with DC motors	▪ **high torque** spur gears type
Height	17	30–38[2]	28	38	36
Maximal torque (cNm)[1]	500	600	1500	2000	2500
Ratios	8 1/3...2.000	6 1/4...5400	4 1/6...36 Mill. ≥ 2500 with UGD	6 1/4...375	125...1500
Internal slipping clutch	–	–	–	–	–
Standard shaft (mm)	Ø 8 × 12	Ø 8 × 22	Ø 12 × 20	Ø 12 × 35	Ø 12 × 35
Weight (g)	130	[2] depends on ratio	480	depends on ratio	depends on ratio

Solenoids

Rotary Solenoids

	Ultimag® Series			BTA® Series Brushless Torque	
					
Type	4EM	5EM	6EM	2EVM	3EVM
Dimensions (mm)	Ø 41 × 26	Ø 49 × 31	Ø 59 × 41	Ø 30 × 18	Ø 35 × 23
Duty cycle	continuous or intermittent	continuous or intermittent	continuous or intermittent	continuous or intermittent	continuous or intermittent
Characteristics	▪ quiet, shock-free operation ▪ fast energising time ▪ high speed cycle rates ▪ on/off or proportional mode operation ▪ be directional	▪ quiet, shock-free operation ▪ fast energising time ▪ high speed cycle rates ▪ on/off or proportional mode operationt ▪ be directional	▪ quiet, shock-free operation ▪ fast energising time ▪ high speed cycle rates ▪ on/off or proportional mode operation ▪ be directional	▪ quiet, shock-free operation ▪ high speed cycle rate ▪ closed loop velocity ▪ position control	▪ quiet, shock-free operation ▪ high speed cycle rate ▪ closed loop velocity ▪ position control
Life	field proven over 100 M cycles	100 M cycles	100 M cycles	100 M cycles	100 M cycles
Power (W)	14.5–145	42–210	32–320	20–100	13–130
Voltage	3.2–115 VDC	6.6–168 VDC	9.2–313 VDC	3.1–80 VDC	1.9–78.7 VDC

Rotary Solenoids

	BTA® Series Brushless Torque			Rotary Solenoids	
					
Type	4EVM	5EVM	6EVM	1E	2E
Dimensions (mm)	Ø 41 × 27	Ø 49 × 32	Ø 59 × 41	Ø 25 × 16	Ø 29 × 17
Duty cycle	continuous or intermittent	continuous or intermittent	continuous or intermittent	continuous or intermittent	continuous or intermittent
Characteristics	▪ quiet, shock-free operation ▪ high speed cycle rate ▪ closed loop velocity ▪ position control	▪ quiet, shock-free operation ▪ high speed cycle rate ▪ closed loop velocity ▪ position control	▪ quiet, shock-free operation ▪ high speed cycle rate ▪ closed loop velocity ▪ position control	▪ "Snap" acting engagement ▪ maximum versatility ▪ on/off operation	▪ "Snap" acting engagement ▪ maximum versatility ▪ on/off operation
Life	field proven over 100 M cycles	100 M cycles	100 M cycles	1 million cycles	1 million cycles
Power (W)	14.5–145	21–210	32–320	10,5–108	7–140
Voltage	3.2–115 VDC	4.7–168 VDC	9.2–313 VDC	2,9–94 VDC	2.2–128 VDC

Rotary **Solenoids**

Rotary Solenoids





Type	3B	3E	4E	5B	5S
Dimensions (mm)	Ø 33 × 22	Ø 33 × 20	Ø 40 × 24	Ø 48 × 26	Ø 48 × 27
Duty cycle	continuous or intermittent	continuous or intermittent	continuous or intermittent	continuous or intermittent	continuous or intermittent
Characteristics	■ "Snap" acting engagement ■ maximum versatility ■ on/off operation	■ "Snap" acting engagement ■ maximum versatility ■ on/off operation	■ "Snap" acting engagement ■ maximum versatility ■ on/off operation	■ "Snap" acting engagement ■ maximum versatility ■ on/off operation	■ "Snap" acting engagement ■ maximum versatility ■ on/off operation
Life	1 M cycles	1 M cycles	1 M cycles	1 M cycles	1 M cycles
Power (W)	10–200	9–180	12.5–250	21–420	21–420
Voltage	2.6–123 VDC	2.6–118 VDC	4.3–187 VDC	6,1–273 VDC	6.1–271 VDC

Rotary **Solenoids**

Rotary Solenoids


Type	6S	7S
Dimensions (mm)	Ø 57 × 34	Ø 70 × 45
Duty cycle	continuous or intermittent	continuous or intermittent
Characteristics	■ "Snap" acting engagement ■ maximum versatility ■ on/off operation	■ "Snap" acting engagement ■ maximum versatility ■ on/off operation
Life	1 M cycles	1 M cycles
Power (W)	32–640	35–700
Voltage	10.3–469 VDC	16.3–463 VDC

Linear Solenoids

Soft Shift®

Type	2EPM	3EPM	4EPM	5EPM	6EPM
Dimensions (mm)	Ø 29 × 25	Ø 33 × 31	Ø 40 × 37	Ø 48 × 49	Ø 48 ×49
Duty cycle	continuous or intermittent	continuous or intermittent	continuous or intermittent	continuous or intermittent	continuous or intermittent
Characteristics	▪ quiet operation with 3-5 time the starting force of standard solenoids ▪ slow, smooth motion ▪ snap action ▪ closed loop velocity and position control	▪ quiet operation with 3-5 time the starting force of standard solenoids ▪ slow, smooth motion ▪ snap action ▪ closed loop velocity and position control	▪ quiet operation with 3-5 time the starting force of standard solenoids ▪ slow, smooth motion ▪ snap action ▪ closed loop velocity and position control	▪ quiet operation with 3-5 time the starting force of standard solenoids ▪ slow, smooth motion ▪ snap action ▪ closed loop velocity and position control	▪ quiet operation with 3-5 time the starting force of standard solenoids ▪ slow, smooth motion ▪ snap action ▪ closed loop velocity and position control
Life	1 M cycles	1 M cycles	1 M cycles	1 M cycles	1 M cycles
Power (W)	7–70	9–90	12,5–125	21–210	32–320
Voltage	2,2–91 VDC	2,6–83 VDC	4,3–132 VDC	7,2–226 VDC	12,3–394 VDC

Linear Solenoids

Tubular

Type	STA Pull 13 × 27	STA Push 13 × 27	STA Pull 20 × 39	STA Push 20 × 39	STA Pull 26 × 52
Dimensions (mm)	Ø 13 × 27	Ø 13 × 27	Ø 20 × 39	Ø 20 × 39	Ø 26 × 52
Duty cycle	continous or intermittent	continous or intermittent	continous or intermittent	continous or intermittent	continous or intermittent
Characteristics	▪ push/pull engagement; well-suited to lock/latch operations ▪ multiple plunger designs ▪ on/off operation	▪ push/pull engagement; well-suited to lock/latch operations ▪ multiple plunger designs ▪ on/off operation	▪ push/pull engagement; well-suited to lock/latch operations ▪ multiple plunger designs ▪ on/off operation	▪ push/pull engagement; well-suited to lock/latch operations ▪ multiple plunger designs ▪ on/off operation	▪ push/pull engagement; well-suited to lock/latch operations ▪ multiple plunger designs ▪ on/off operation
Life	Exceptionally high life of 25+ million cycles	Exceptionally high life of 25+ million cycles	25 M cycles	25 M cycles	25 M cycles
Power (W)	4–40	4–40	7–70	7–70	10–100
Voltage	2,4–77 VDC	2,4–77 VDC	3,9–76 VDC	3,9–76 VDC	4,4–142 VDC

Linear Solenoids

Tubular | **Low Profile**





Type	STA Push 26 × 52	STA 125M Pull	STA 150M Pull	0ECM	1ECM
Dimensions (mm)	Ø 26 × 52	Ø 32 × 57	Ø 38 × 63	Ø 19 × 13	Ø 25 × 14
Duty cycle	continous or intermittent	continous or intermittent	continous or intermittent	continuous or intermittent	continuous or intermittent
Characteristics	■ push/pull engagement; well-suited to lock/latch operations ■ multiple plunger designs ■ on/off operation	■ push/pull engagement; well-suited to lock/latch operations ■ multiple plunger designs ■ on/off operation	■ push/pull engagement; well-suited to lock/latch operations ■ multiple plunger designs ■ on/off operation	■ push/pull engagement; well-suited to lock/latch operations ■ high force ■ short stroke applications ■ on/off operation	■ push/pull engagement; well-suited to lock/latch operations ■ high force ■ short stroke applications ■ on/off operation
Life	25 M cycles	1 M cycles	1 M cycles	5 M cycles	5 M cycles
Power (W)	10–100	13–130	17–170	4,5–45	5–50
Voltage	4,4–142 VDC	6,8–218 VDC	9,8–315 VDC	1,6–78 VDC	2,1–83 VDC

Linear Solenoids

Low Profile





Type	2EFM	2ECM	3EFM	3ECM	4EFM
Dimensions (mm)	Ø 29 × 15	Ø 29 × 15	Ø 33 × 18	Ø 33 × 18	Ø 40 × 21
Duty cycle	continuous or intermittent	continuous or intermittent	continuous or intermittent	continuous or intermittent	continuous or intermittent
Characteristics	■ push/pull engagement; well-suited to lock/latch operations ■ high force ■ short stroke applications ■ on/off operation	■ push/pull engagement; well-suited to lock/latch operations ■ high force ■ short stroke applications ■ on/off operation	■ push/pull engagement; well-suited to lock/latch operations ■ high force ■ short stroke applications ■ on/off operation	■ push/pull engagement; well-suited to lock/latch operations ■ high force ■ short stroke applications ■ on/off operation	■ push/pull engagement; well-suited to lock/latch operations ■ high force ■ short stroke applications ■ on/off operation
Life	5 M cycles	5 M cycles	5 M cycles	5 M cycles	5 M cycles
Power (W)	7–70	7–70	9–90	9–90	12,5–125
Voltage	2,2–56 VDC	2,2–56 VDC	2,6–83 VDC	2,6–83 VDC	4,3–132 VDC

Linear **Solenoids**

Low Profile





Type	4ECM	5SFM	5ECM	6SFM	6ECM
Dimensions (mm)	Ø 40 × 21	Ø 48 × 22	Ø 48 × 26	Ø 57 × 29	Ø 57 × 34
Duty cycle	continuous or intermittent	continuous or intermittent	continuous or intermittent	continuous or intermittent	continuous or intermittent
Characteristics	■ push/pull engagement; well-suited to lock/latch operations ■ high force ■ short stroke applications ■ on/off operation	■ push/pull engagement; well-suited to lock/latch operations ■ high force ■ short stroke applications ■ on/off operation	■ push/pull engagement; well-suited to lock/latch operations ■ high force ■ short stroke applications ■ on/off operation	■ push/pull engagement; well-suited to lock/latch operations ■ high force ■ short stroke applications ■ on/off operation	■ push/pull engagement; well-suited to lock/latch operations ■ high force ■ short stroke applications ■ on/off operation
Life	5 M cycles	5 M cycles	5 M cycles	5 M cycles	1 M cycles
Power (W)	12,5–125	21–210	21–210	32–320	32–320
Voltage	4,3–132 VDC	6,1–192 VDC	7,2–226 VDC	10,3–331 VDC	12,3–394 VDC

Linear Solenoids

Open Frame, DC Operation

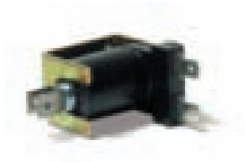




Type	B-75M	B-4HDM	B-11M	B-16M	B-17M
Dimensions (mm)	29 × 28 × 41,5	41 × 37 × 55	30 × 24 × 47	13 × 10 × 34	13 × 15 × 24
Duty cycle	continuous or intermittent	continuous or intermittent	continuous or intermittent	continuous or intermittent	continuous or intermittent
Nominal Stroke	12 mm	25,4 mm	20,3 mm	3,8 mm	4,6 mm
Characteristics	▪ pull-in engagement (push types available): well-suited to lock/latch operations ▪ DC activated ▪ continuous or intermittent ▪ on/off operation	▪ pull-in engagement (push types available): well-suited to lock/latch operations ▪ DC activated ▪ continuous or intermittent ▪ on/off operation	▪ pull-in engagement (push types available): well-suited to lock/latch operations ▪ DC activated ▪ continuous or intermittent ▪ on/off operation	▪ pull-in engagement (push types available): well-suited to lock/latch operations ▪ DC activated ▪ continuous or intermittent ▪ on/off operation	▪ pull-in engagement (push types available): well-suited to lock/latch operations ▪ DC activated ▪ continuous or intermittent ▪ on/off operation
Typical Force (N)	12 N (@5% duty cycle / 230 VAC/11 mm stroke)	15,6 N (@25% duty cycle / 100% Voltage maximum stroke)	4,4 N (@25% duty cycle / 100% Voltage maximum stroke)	4,1 N (@25% duty cycle / 100% Voltage maximum stroke)	2,1 N (@25% duty cycle / 100% Voltage maximum stroke)
Life	100 000 cycles	1 M cycles	1 M cycles	1 M cycles	1 M cycles

Linear Solenoids

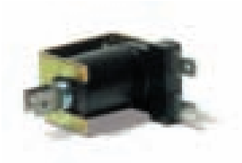
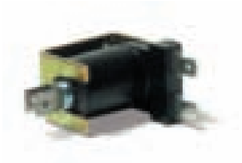
Open Frame, DC Operation

Type	B-22M	B-41M
Dimensions (mm)	37 × 33 × 41	44 × 51,5 × 77,5
Duty cycle	continuous or intermittent	continuous or intermittent
Nominal Stroke	25,4 mm	25,4 mm
Characteristics	▪ pull-in engagement (push types available): well-suited to lock/latch operations ▪ DC activated ▪ continuous or intermittent ▪ on/off operation	▪ pull-in engagement (push types available): well-suited to lock/latch operations ▪ DC activated ▪ continuous or intermittent ▪ on/off operation
Typical Force (N)	9,8 N (@25% duty cycle / 100% Voltage maximum stroke)	44,5 N (@25% duty cycle / 100% Voltage maximum stroke)
Life	1 M cycles	1 M cycles

Linear Solenoids

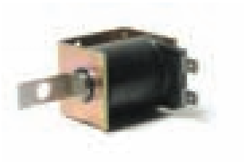
Open Frame, DC Operation

Type	C-8M	C-9M	C-15M	C-26M	C-33M
Dimensions (mm)	21 × 19 × 29	41 × 35 × 27	28 × 27 × 29	29 × 22 × 44	29 × 33 × 34
Duty cycle	continuous or intermittent	continuous or intermittent	continuous or intermittent	continuous or intermittent	continuous or intermittent
Nominal Stroke	12,7 mm	12,7 mm	12,7 mm	19 mm	12,7 mm
Characteristics	■ pull-in engagement (push types available): well-suited to lock/latch operations ■ DC activated ■ continuous or intermittent ■ on/off operation	■ pull-in engagement (push types available): well-suited to lock/latch operations ■ DC activated ■ continuous or intermittent ■ on/off operation	■ pull-in engagement (push types available): well-suited to lock/latch operations ■ DC activated ■ continuous or intermittent ■ on/off operation	■ pull-in engagement (push types available): well-suited to lock/latch operations ■ DC activated ■ continuous or intermittent ■ on/off operation	■ pull-in engagement (push types available): well-suited to lock/latch operations ■ DC activated ■ continuous or intermittent ■ on/off operation
Typical Force (N)	1,1 N (@25% duty cycle / 100% Voltage maximum stroke)	4,4 N (@25% duty cycle / 100% Voltage maximum stroke)	2,7 N (@25% duty cycle / 100% Voltage maximum stroke)	2,2 N (@25% duty cycle / 100% Voltage maximum stroke)	4,9 N (@25% duty cycle / 100% Voltage maximum stroke)
Life	1 M cycles	1 M cycles	1 M cycles	1 M cycles	1 M cycles

Linear Solenoids

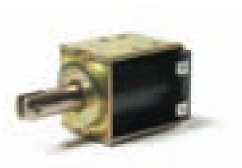
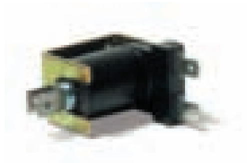
Open Frame, DC Operation



Type	C-34M
Dimensions (mm)	37 × 33 × 42
Duty cycle	continuous or intermittent
Nominal Stroke	25,4 mm
Characteristics	■ pull-in engagement (push types available): well-suited to lock/latch operations ■ DC activated ■ continuous or intermittent ■ on/off operation
Typical Force (N)	4,4 N (@25% duty cycle / 100% Voltage maximum stroke)
Life	1 M cycles

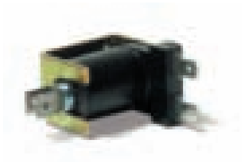
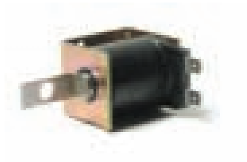
Linear Solenoids

Open Frame, AC Operation

					
Type	B-75M	B-4HDM	B-11M	B-22M	C-8M
Dimensions (mm)	28 × 29 × 41,5	41 × 37 × 55	30 × 24 × 47	37 × 33 × 41	21 × 19 × 29
Duty cycle	continuous or intermittent	continuous or intermittent	continuous or intermittent	continuous or intermittent	continuous or intermittent
Nominal Stroke	12 mm	25,4 mm	25,4 mm	25,4 mm	12,7 mm
Characteristics	▪ pull-in engagement (push types available): well-suited to lock/latch operations ▪ AC activated ▪ continuous or intermittent ▪ on/off operation	▪ pull-in engagement (push types available): well-suited to lock/latch operations ▪ AC activated ▪ continuous or intermittent ▪ on/off operation	▪ pull-in engagement (push types available): well-suited to lock/latch operations ▪ AC activated ▪ continuous or intermittent ▪ on/off operation	▪ pull-in engagement (push types available): well-suited to lock/latch operations ▪ AC activated ▪ continuous or intermittent ▪ on/off operation	▪ pull-in engagement (push types available): well-suited to lock/latch operations ▪ AC activated ▪ continuous or intermittent ▪ on/off operation
Typical Force (N)	12 N (@5% duty cycle / 230 VAC/11 mm stroke)	22,2 N (@25% duty cycle / 100% Voltage maximum stroke)	5,8 N (@25% duty cycle / 100% Voltage maximum stroke)	11,6 N (@25% duty cycle / 100% Voltage maximum stroke)	1,8 N (@25% duty cycle / 100% Voltage maximum stroke)
Life	100 000 cycles	1 M cycles	1 M cycles	1 M cycles	1 M cycles

Linear Solenoids

Open Frame, AC Operation

					
Type	C-9M	C-15M	C-26M	C-33M	C-34M
Dimensions (mm)	31 × 35 × 27	25 × 27 × 29	26 × 22 × 44	29 × 33 × 34	37 × 33 × 42
Duty cycle	continuous or intermittent	continuous or intermittent	continuous or intermittent	continuous or intermittent	continuous or intermittent
Nominal Stroke	12,7 mm	12,7 mm	19,0 mm	12,7 mm	25,4 mm
Characteristics	▪ pull-in engagement (push types available): well-suited to lock/latch operations ▪ AC activated ▪ continuous or intermittent ▪ on/off operation	▪ pull-in engagement (push types available): well-suited to lock/latch operations ▪ AC activated ▪ continuous or intermittent ▪ on/off operation	▪ pull-in engagement (push types available): well-suited to lock/latch operations ▪ AC activated ▪ continuous or intermittent ▪ on/off operation	▪ pull-in engagement (push types available): well-suited to lock/latch operations ▪ AC activated ▪ continuous or intermittent ▪ on/off operation	▪ pull-in engagement (push types available): well-suited to lock/latch operations ▪ AC activated ▪ continuous or intermittent ▪ on/off operation
Typical Force (N)	11,1 N (@25% duty cycle / 100% Voltage maximum stroke)	3,6 N (@25% duty cycle / 100% Voltage maximum stroke)	3,1N (@25% duty cycle / 100% Voltage maximum stroke)	5,3 N (@25% duty cycle / 100% Voltage maximum stroke)	9,3 N (@25% duty cycle / 100% Voltage maximum stroke)
Life	1 M cycles	1 M cycles	1 M cycles	1 M cycles	1 M cycles

Control Components

Timers

Electromechanical

	KKH	KOE
Type		
Characteristics	■ open, manual start timer ■ manual time setting ■ elapsed time indicator	■ additional functions ■ elapsed time indicator
Mounting	■ flush mounting ■ front or side mounting	■ surface mounting ■ snap on or screws ■ flush mounting with clip
Dimensions (mm)	55 × 73 × 65	surface: 45 × 70 × 99 flush: 45 × 45 × 93
Functions*	no	11, 12, 21, 22, 23 by external wiring
Time ranges	1, 5, 15, 30 min 1, 2, 3, 12, 24 h	6 time ranges, selected 0.1 s...60 h
Outputs	2 snap-action as change-over, 250 VAC, 16 A	1 timed and 1 instantaneous change-over contact, 250 VAC, 2/5 A
Supply voltage	12...230 VAC, 50/60 Hz	24, 115 and 230 VAC, 50/60 Hz

Timers

Electronic

	KOP.F	KOL	KOP.J	KOP.K
Type				
Characteristics	■ large rotary dial ■ DIN dimensions ■ multifunction ■ multi time range ■ multi voltage	■ 17.5 mm ■ multifunction ■ multi time range ■ multi voltage	■ 22.5 mm ■ mono or multifunction ■ high immunity to interference	■ 22.5 mm ■ wide range of capabilities ■ LED
Mounting	■ flush mounting ■ plug-in on 11 pin socket	■ surface mounting ■ snap-on DIN rail 35 mm	■ surface mounting ■ snap-on DIN rail 35 mm	■ surface mounting ■ snap-on DIN rail 35 mm
Dimensions (mm)	45 × 45 × 78	17.5 × 80 × 70	22.5 × 79 × 101	22.5 × 79 × 101
Functions*	211, 212, 217, 221, 223, 247 by external wiring	11, 12, 21, 42, 51, 60	11, 12, 16, 18, 19, 21, 22, 23, 24, 28, 31, 32, 33, 34, 41, 42, 51	11, 12, 16, 19, 21, 22, 23, 24, 42
Time ranges	12 time ranges, selected 0.01 s...10 h	6 time ranges, 0.05 s up to 10 h	12 time ranges, 0.05 s up to 60 h	10 time ranges, 0.05 s up to 60 h multi time 0.05 s up to 60 h
Outputs	1 relay with two contacts as change-over, 250 VAC, 5 A	1 relay NO, KOL1.. 1 relay as change-over, KOL3.. 250 VAC, 5 A	1 relay as change-over, 250 VAC, 8 A	2 relays as change-over, instantaneous and/or timer, 250 VAC, 8 A
Supply voltage	12, 24...230 VDC/VAC, 50/60 Hz	12 VDC or 24...48 VDC or 24...240 VAC, 50/60 Hz	12 VDC or 24...48 VDC or 24...240 VAC, 50/60 Hz or 346...440 VAC, 50/60 Hz	12 VDC or 24...48 VDC or 24...240 VAC, 50/60 Hz or 346...440 VAC, 50/60 Hz

* 11: delayed operation; 12: delayed release; 16: delayed operation and release; 21: fleeting-on delay timer; 22: fleeting-off delay timer; 23: impulse converter; 24: impulse generator; 42: flasher relay; 28: watchdog; 31/70: asymmetrical timer; 51: star-delta timer; 19: power off delayed release

Hour Meters

Electromechanical



	CMC	CMT	CMU
Type			
Characteristics	▪ micro counter ▪ minimal power consumption	▪ DIN dimension	▪ cut-out 46 x 46 mm or ∅ 50.5 mm
Mounting	▪ flush mounting with clip	▪ flush mounting with clip or 2 screws M3	▪ flush mounting with clip
Dimensions (mm)	30 × 13 × 33	45 × 22 × 49	48 × 48
Counting capacity	99.999.99 h	DC: 999.999.99 h AC: 99.999.99 h	99.999.99 h
Display	▪ mechanical, 4 mm high digit ▪ decimal places in red	▪ mechanical, 4 mm high digit ▪ decimal places in red	▪ mechanical, 4 mm high digit
Supply voltage	4.5...35 VDC 24, 115 or 230 VAC, 50/60 Hz	12...24 VDC 24, 115 or 230 VAC, 50/60 Hz	12...24 VDC 24 or 230 VAC 50/60 Hz

Hour Meters

Temperature Meters

Electronic




Electronic

	CXL 23, 28	CXG 23, 28	CXE	CXF	CXM
Type					
Characteristics	▪ LCD Display ▪ high accuracy ▪ screw terminals RM 5.00 ▪ ASIC design ▪ economic	▪ single, double or combined meter ▪ programmable	▪ LCD display ▪ preset value ▪ programmable resolution	▪ LED display ▪ programmable resolution (down to 0.001 s) ▪ serial interface RS232, 422 or 485	▪ LED display ▪ wide temperature range with max-min value ▪ accurate linearity ▪ small temperature drift ▪ high measuring rate
Mounting	▪ flush mounting with clip or screws	▪ flush mounting with clip	▪ flush mounting with clip	▪ flush mounting with clip or screws	▪ flush mounting with clip or screws
Dimensions (mm)	45 × 22 × 48	45 × 22 × 59	45 × 45 × 86	45 × 45 × 86	45 × 22 × 59
Counting capacity	0...999 999 99	999.999	999.999	999 999	999 999; °C or °F
Time units	CXL 23: h:min: or h CXL 28: h:min:s or s	h:min:s or s:min:h	h:min:s or s, min, h	h:min:s or s, min, h	
Display	▪ LCD backlight ▪ 8 mm high digit	▪ LED ▪ 8 mm high digit	▪ LCD backlight ▪ 9 mm high digit – counting ▪ 8 mm high digit – preset	▪ LED ▪ 8 mm high digit	▪ LED ▪ 8 mm high digit
Supply voltage	independent	10...30 VDC	11...30 VDC and 90...250 VAC	10...30 VDC and 90...250 VAC	10...30 VDC

Counters

Electromechanical, Totalising

Electromechanical, Preset





	CMB	CMA	CBG	CMM	CMM
Type					
Characteristics	■ micro size for PCB ■ machine solder ■ washable	■ small size ■ low current consumption	■ robust totalising counter	■ robust totalising counter with no, manual or electrical reset	■ up counting, manual reset ■ down counting, manual and electrical reset
Mounting	■ surface or PCB mounting ■ flush mounting with clip ■ snap-on DIN rail 35 mm	■ surface mounting with nut ■ flush mounting with clamping spring	■ flush mounting with clamping spring	■ surface mounting ■ flush mounting with clamping spring	■ flush mounting with clip
Dimensions (mm)	29 × 14 × 35 27 × 35 × 12 30 × 58 × 53	31 × 20 × 55 (50)	38 × 24 × 57	24 × 48 × 72	50 × 50 × 72
Counting capacity	9.999.999	999.999 without reset 99.999 with reset	9.999.999 without reset 99.999 with reset	99.999.999 without reset 999.999 with reset	99.999 CMM152 999.999 CMM362 CMM152 counting up with permanent display of the preset value CMM362 counting down
Display	■ mechanical, 4 mm high digit optical	■ mechanical, 4 mm high digit	■ mechanical, 4 mm high digit	■ mechanical, 4 mm high digit	■ mechanical, 4 mm high digit
Supply voltage	12 VDC, 24 VDC and 230 VAC	24 VDC and 230 VAC	6, 12, 24, 110, 220 VDC 24, 115, 230 VAC	12, 24 VDC and 24, 115, 230 VAC	24 VDC and 24, 115, 230 VAC

Counters

Electronic, Totalising

Electronic, Differential





	CXB	CXG 20, 26	CXL 20, 21, 24	CXL 26	CXG 21
Type					
Characteristics	■ battery operated (lithium)	■ single, double or combi counter ■ programmable	■ LCD display ■ screw terminal RM 5.00 ■ ASIC design ■ economic ■ multifunction	■ LCD display ■ screw terminal RM 5.00 ■ ASIC design ■ economic	■ differential counter ■ programmable
Mounting	■ flush mounting with clamping spring ■ screw mounting on front	■ flush mounting with clip	■ flush mounting with clip or screws	■ flush mounting with clip or screws	■ flush mounting with clip
Dimensions (mm)	45 × 22 × 40	45 × 22 × 59	45 × 22 × 48	45 × 22 × 48	45 × 22 × 59
Counting capacity	99.999.999	999.999	–999.999.9...999.999.99	–999.999.9...999.999.99	–199.999...999.999
Display	■ LCD ■ 7 mm high digit	■ LED ■ 8 mm high digit	■ LCD backlight ■ 8 mm high digit	■ LCD backlight ■ 8 mm high digit	■ LED ■ 8 mm high digit
Supply voltage	independent	10...30 VDC	independent	independent	10...30 VDC