

EARTHING SWITCH FOR DC & AC TRACTION CIRCUITS

Type **BTE03.04**

RAIL VEHICLES



GENERAL INFORMATION

With the **BTE03.04**, Sécheron offers a complete range of off-load safety switches designed to earth multiple points of circuit operating with insulation voltages up to 4'800 Volts.

The BTE03.04 is a combination of twin poles that are simultaneously switched either manually or electrically. The safety position of the manually operated switch is secured through a mechanical key system, while for the electrically operated version, integrated auxiliary

switches enable the car builder to manage electrically the earthing safety interlocks with the others upstream and downstream safety devices.

The BTE03.04A is designed for vehicle's indoor installation, while the BTE03.04R is particularly dedicated to outdoor roof mounting. Its compact dimensions associated with severe testing procedures, make the BTE 03.04 the ideal solution to earth the high voltage circuits of your traction vehicles.

APPLICATIONS

Earthing of traction and auxiliary circuits on locomotives, trains and EMUs running on AC and/or DC networks.

AC/DC typical application

SAFETY FUNCTIONS

- ① Pantograph interlocking device
- ② AC surge arrester
- ③ DC surge arrester
- ④ AC circuit breaker & earthing device
- ⑫ High voltage integrated system AC
- ⑬ DC circuit breaker
- ⑭ Earthing device
- ⑮ High voltage integrated system DC
- ⑯ Key multiplier
- ⑰ Door lock

BSV, SLS

MACS

**MODFRAME
UR
BTE03.04
MODBOX®
KM
DL**

SWITCHING FUNCTIONS

- ④ Voltage selector
- ⑨ Roof line disconnecter
- ⑮ Contactors & modules
- ⑯ Permanent magnet synchronous motor isolating contactor
- ⑰ Disconnecter

**RS
RS, IS
BMS, SEC,
PCC, HS, PCM
BMS**

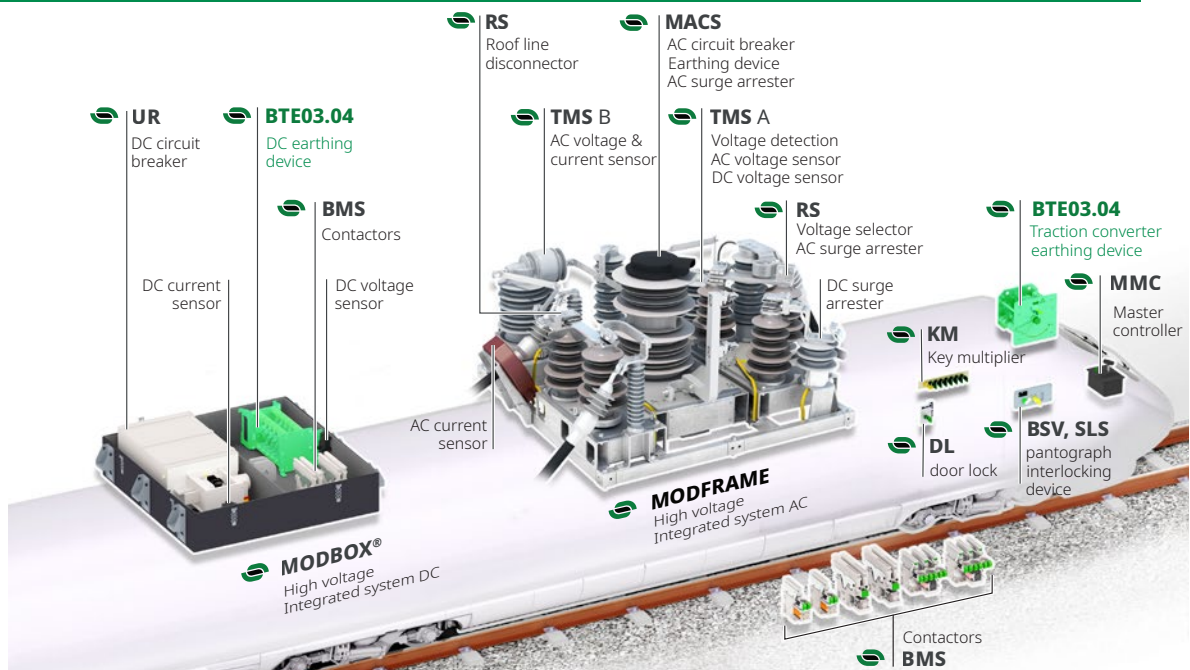
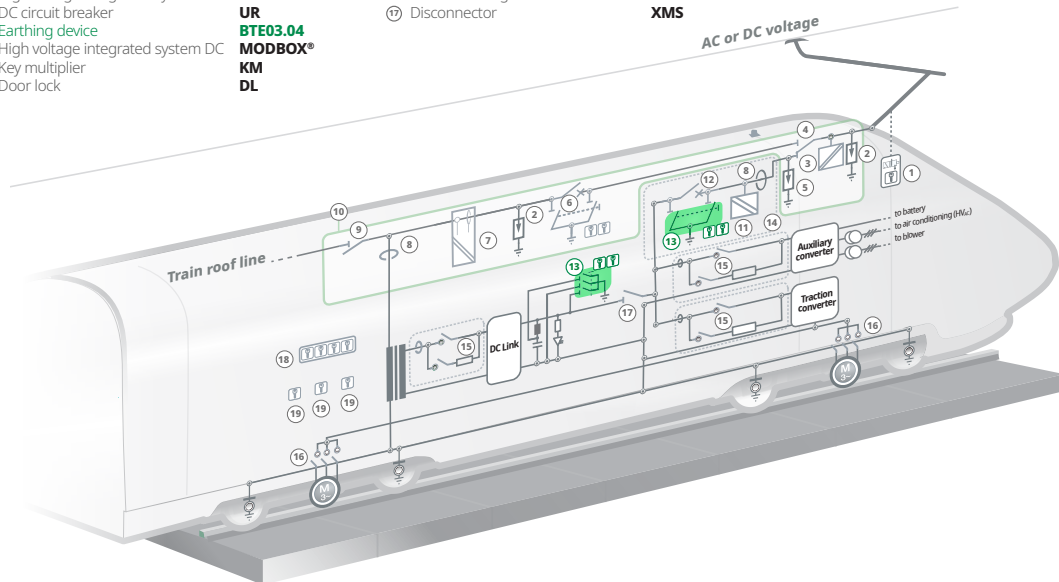
XMS

MEASUREMENT FUNCTIONS

- ① AC & DC voltage sensor, voltage detection
- ⑦ AC voltage & current sensor
- ⑧ Current sensor (AC or DC)
- ⑩ DC voltage sensor

TMS

TMS



MAIN FEATURES

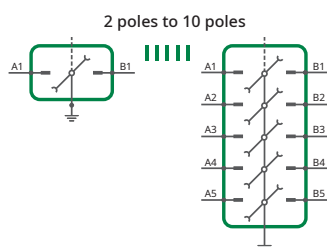
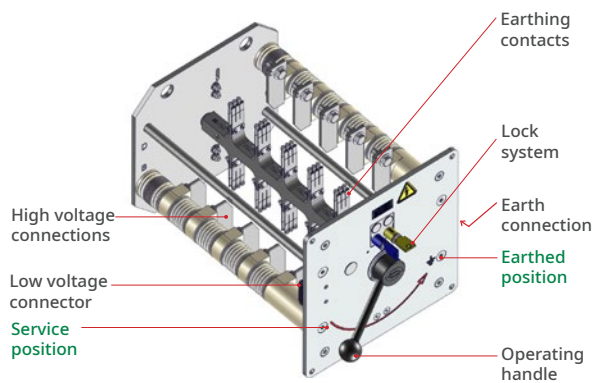
- Insulation voltage up to 4'800V_{AC}/V_{DC}.
- BTE03.04A available with up to 10 earthing poles and BTE03.04R available with 2 earthing poles.
- High rated short-time withstand current.
- Indoor (BTE03.04A) or outdoor (BTE03.04R) mounting.
- Compliant to standards: IEC60077-1/-2; IEC61373, EN45545.

MAIN BENEFITS

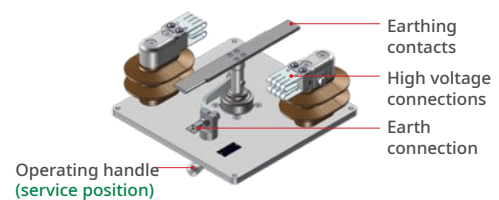
- ✓ High protection against electrical shocks (BTE03.04A).
- ✓ Safety device with key interlocking system.
- ✓ Optional integrated key multiplier, up to 8 keys (BTE03.04A).
- ✓ Optional electro-magnet interlocking.
- ✓ Sturdy structure.
- ✓ Easy to install and connect.
- ✓ Minimum maintenance requirements.
- ✓ Reliable operation in extreme temperatures.

DESIGN

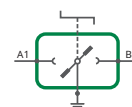
/// BTE 03.04A (Indoor mounting)



/// BTE 03.04R (outdoor mounting)



2 poles (manual)



DATA FOR PRODUCT SELECTION

	Symbol	Unit	BTE 03.04A	BTE 03.04R
MAIN HIGH VOLTAGE CIRCUIT				
Rated voltage	U_i	[kV _{AC/DC}]	4.8	4.8
Number of poles			2,4,6,8,10	2
Peak and rated short-time withstand current				.5
- AC	$[\hat{I}_{CW}/I_{CW}/t]$	[kA]/[kA]/[s]	63/25/1	63/25/1
- DC	$[\hat{I}_{CW}/I_{CW}/t]$	[kA]/[kA]/[s]	57/40/0.25	63/44/0.25
	$[\hat{I}_{CW}/I_{CW}/t]$	[kA]/[kA]/[s]	75/50/0.1	-
Overvoltage category				
- Pole-pole			OV3	OV4
- Pole-earth			OV4	OV4
Rated power frequency withstand voltage ⁽¹⁾				
- Pole-pole	U_{50}	[kV _{rms}]	11.5	18.5
- Pole-earth	U_{50}	[kV _{rms}]	18.5	18.5
Rated impulse withstand voltage (1.2 / 50 μs)				
- Pole-pole	U_{imp}	[kV]	25	40
- Pole-earth	U_{imp}	[kV]	40	40

⁽¹⁾ At 50 Hz during 1 minute.

LOW VOLTAGE CIRCUITS

Control circuit

Type of operation			Manual	Manual
Optional electromagnet electrical data				
- Nominal control voltage	U_n	[V _{DC}]	24,36,48/50,72,110	-
- Range of voltage			[0.7 - 1.25]	-
- Nominal control power ⁽²⁾	P	[W]	56	-

⁽¹⁾ At U_n and $T_{amb} = +20^\circ\text{C}$.

Auxiliary contacts

Type of contacts (refer to definition pages 5 & 7)			Potential free (PF)	Potential free (PF) ⁽³⁾ Change-over (CO) ⁽³⁾
Number of auxiliary contacts per BTE switch position				
- Per BTE switch position			1a+1b or 2a+2b	1a+1b
- Total per BTE			2a+2b or 4a+4b	2a+2b
Rated voltage		[V _{DC}]	24 to 110	24 to 110
Conventional thermal current	I_{th}	[A]	10	10
Switching categories according to EN60947 (silver contacts)				
- Potential free (PF) contacts:			- DC-13 110 V _{DC} 0.5 A - DC-13 110 V _{DC} 0.5 A	- DC-13 110 V _{DC} 0.5 A - DC-13 110 V _{DC} 0.5 A
- Change-over (CO) contacts:				- DC-13 60 V _{DC} / 0.5 A - DC-13 24 V _{DC} / 2.0 A
Minimum let-through current at 24 V _{DC} ⁽⁴⁾		[mA]	10 (silver contacts) 4 (gold contacts)	10 (silver contacts) 4 (gold contacts)

⁽³⁾ Potential free (PF) contacts for BTE 03.04R manual version. ⁽⁴⁾ For clean and dry environment.

Low voltage interface

Type of connection ⁽⁵⁾			Wago connector	Wago connector
- Manual version				

⁽⁵⁾ Refer to page 7 for mobile connector information.

Insulation

Rated power-frequency withstand voltage ⁽⁶⁾	U_{50}	[kV _{rms}]	1.5	1.5

⁽⁶⁾ At 50 Hz during 1 minute.

OPERATING CONDITIONS

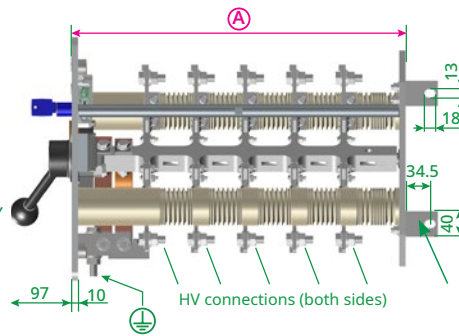
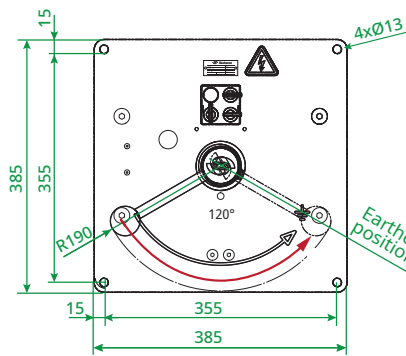
Installation			Indoor	Outdoor
Altitude		[m]		≤ 2,000
Working ambient temperature	T_{amb}	[°C]		-40 to + 70 -50 to + 70 (in option)
Humidity				Class 5K2
Pollution degree			PD3A	PD4
Minimum mechanical durability	N	[Cycles]	≥ 20'000	≥ 20'000
Protection index:				
- HV part		[IP]	IP00	IP00
- LV part		[IP]	IP00	IP00; IP3x
- Tightness between upper and lower part when installed		[IP]	-	IP65 ⁽⁷⁾

⁽⁷⁾ Delivered with an O-ring seal.

PRODUCT INTEGRATION

MAIN DIMENSIONS

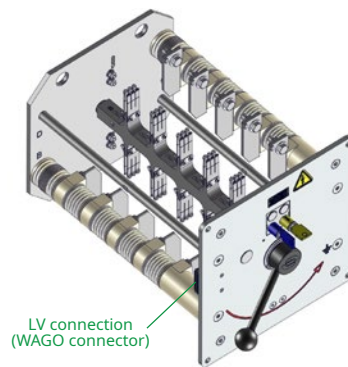
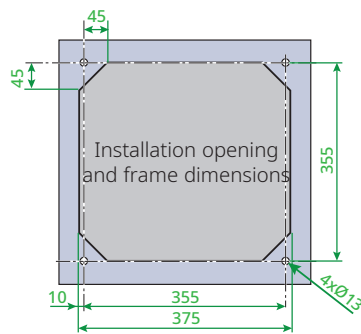
/// BTE 03.04A - MANUAL VERSION - 2 to 10 poles



The DIN-ISO 2768-1 coarse tolerances are applied to these dimensions. All dimensions are in mm.

The maximum allowed flatness deviation of the support frame is 1 mm.

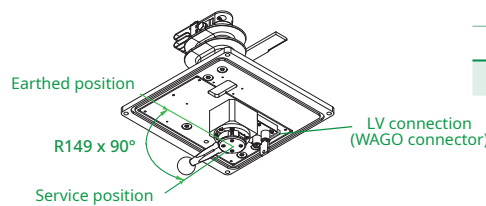
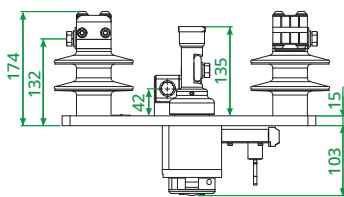
HV and earth connections: M12 screws



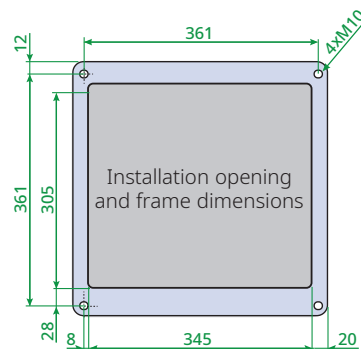
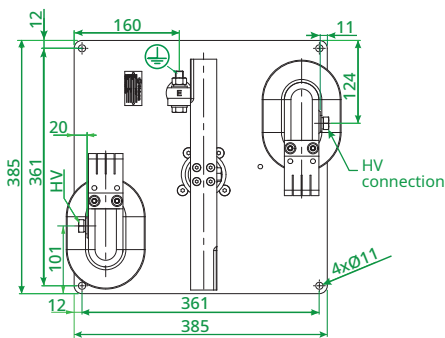
Mounting brackets for 6/8/10 poles

Poles number	Weight (±1kg)	Ⓐ [mm]
2	13	217
4	17	295
6	21	373
8	25	451
10	29	529

/// BTE 03.04R - MANUAL VERSION - 2 poles



Poles number	Weight (±1kg)
2	17 ± 0.5



MANUAL OPERATION OF BTE 03.04A & BTE 03.04R

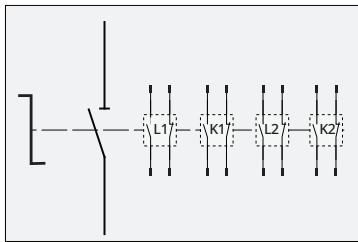
LOW VOLTAGE WIRING DIAGRAM

For the low voltage wiring scheme corresponding to your configuration, please contact Sécheron.

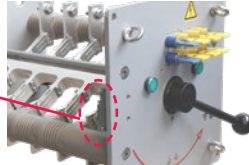
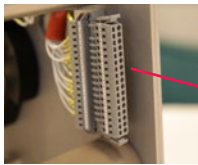
BTE 03.04A (WAGO CONNECTOR TYPE)

Auxiliary contacts

2a+2b or 4a+4b - Potential Free (PF):



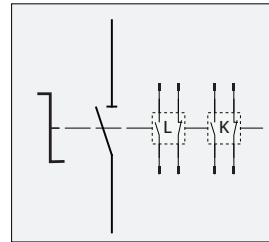
WAGO connector



BTE 03.04A (WAGO CONNECTOR TYPE)

Auxiliary contacts

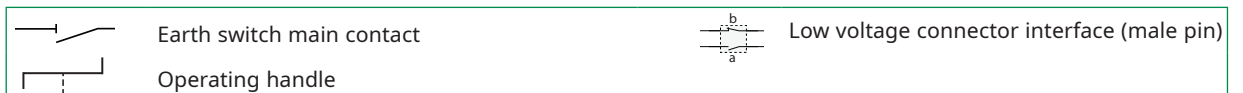
2a+2b - Potential Free (PF):



WAGO connector



Legend of the schemes:

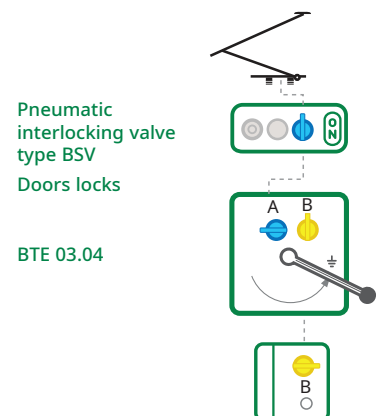


SAFETY BASED ON KEY INTERLOCKING

To guarantee the electrical earthing of the vehicle, with respect to the highest and most reliable standards for the safety of maintenance personnel, Sécheron offers a wide range of key interlocking safety components. BTE 03.04 is part of a chain of key interlocked safety components, and can be operated only once the safety conditions of the up-stream and down-stream components are fulfilled. In the shown example, the Master key «A» released from the up-stream component, is

inserted into the **BTE**, so that it can be switched to the earthed position. Then the Slave key «B» can be operated, locking the **BTE** in the earthed position, and enabling as well the «B» key to be removed and to be used on the next safety component. Different colors are available for keys and locks. A key multiplier function can be optionally integrated to the **BTE 03.04** (refer to the optional key multiplier section on page 7 for colors and ordering codes).

Example of safety key principle:



OPTIONS

(SUBJECT TO ADDITIONAL COSTS)

KEY MULTIPLIER

Additionally to the basic key lock configuration (1 Master key + 1 Slave key), the **BTE 03.04** can integrate a key multiplier function that enable to release more slave keys once operated and locked in the earth position, as well as it can accept one additional Master key.

Maximum configuration is then 2 Masters + 6 Slaves (**BTE 03.04A**) and 2 Masters + 2 Slaves (**BTE 03.04R**).

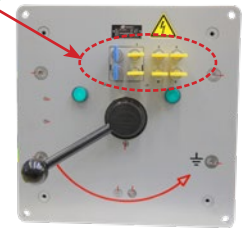
MASTER KEY ORDERING CODE

		QTY	
		1	2
Color	Blue	1A	2A
	Yellow	1B	2B
	Green	1C	2C
	Black	1D	2D
	White	1E	2E
	Red	1F	2F

SLAVE KEY ORDERING CODE

		QTY (*)					
		1	2	3	4	5	6
Color	Blue	1A	2A	3A	4A	5A	6A
	Yellow	1B	2B	3B	4B	5B	6B
	Green	1C	2C	3C	4C	5C	6C
	Black	1D	2D	3D	4D	5D	6D
	White	1E	2E	3E	4E	5E	6E
	Red	1F	2F	3F	4F	5F	6F

Example of maximum keys configuration (BTE 03.04A):
2 Master + 6 Slaves



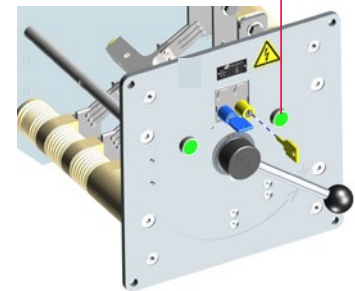
LOCKING ELECTRO-MAGNET (BTE 03.04A ONLY)

The **BTE 03.04A** can be equipped with one or two electro-magnets locking electrically the **BTE** operations with other external components involved in the vehicle safety chain.

Once the relevant key (released from up-stream or down-stream safety component) is inserted into the **BTE 03.04A** and operated, the push button located on the **BTE 03.04A**'s front plate starts blinking provided that the required conditions of the vehicle's safety chain are fulfilled.

Pushing on it, will activate the electro-magnet's and enable to operate the **BTE** handle for switching it to the earthed or service position, before it can be secured in the selected position with the second key.

Locking Electro-magnet activation push button



Control voltage [VDC]	Nominal control power (at Un & Tamb: +20°C)
24, 36, 48/50, 72, 110	56 W

PART NUMBER FOR SEPARATELY ORDERED ITEM

LOW VOLTAGE MOBILE CONNECTORS

Auxiliary switches			Mobile connector (without cable)		
Number	Type	Type	Number of pin		Sécheron's number
			Size 2.5 mm ²	Size 1.5 mm ²	
BTE 03.04A / BTE 03.04R - Manual version (only 2a+2b available for BTE 03.04R)					
2a + 2b	PF	WAGO connector	N.A.	N.A.	SC204675
4a + 4b	PF	WAGO connector	N.A.	N.A.	SC205090 + SC205268

For **BTE 03.04A** and **BTE 03.04R**, the mobile part of the connector has to be ordered separately..

The above references are given considering that all the contacts are wired, and with 2.9 mm (for 1.5 mm² section) for auxiliary contacts. If the conditions are different from these, the above references may change. In such case please inform Sécheron accordingly.

DESIGNATION CODE FOR ORDERING

- Be sure to establish the designation code from the latest version of our brochure by downloading it from the website: www.secheron.com.
- Be careful to write down the complete alphanumeric designation code with 17 characters when placing your order.
- For technical reasons some variants and options indicated in the designation code might not be combined.
- For other configurations not described in the brochure, please contact Sécheron.
- The bold characters of the designation code define the device type.

Example of customer's choice:	BTE0304	A	4	M	Z	1A1B	∅	Z	1	∅
Line:	10	11	12	13	14	15	16	17	18	16

Line	Description	Designation	standard	Options	Customer's choice
10	Product type	BTE0304	BTE0304		BTE0304
11	Installation	Indoor	A	-	
		Outdour	R	-	
12	Number of poles	2	2		
	- BTE 03.04A only	4	4		
	- BTE 03.04A only	6	6		
	- BTE 03.04A only	8	8		
	- BTE 03.04A only	10	10		
13	Number of poles	Manual	A	-	
14	Control voltage	Not applicable	Z		
	- Manual operation & no electro-magnet	24 V _{DC}		A	
	- Locking electro-magnet	36 V _{DC}		B	
		48/50 V _{DC}		C	
		72 V _{DC}		D	
		110 V _{DC}		E	
15	Key and lock codification ⁽¹⁾	Not applicable	ZZ		
	- Master key	1 blue key	1A		
		2 blue keys		2A	
	- Master key	Not applicable	ZZ		
		1 yellow key	1B		
		2 yellow keys		2B	
		3 yellow keys		3B	
		4 yellow keys		4B	
		Other configurations - refer to page 7		...	
16	Auxiliary contacts ⁽¹⁾	(Manual operation only) None	∅		
	- BTE 03.04A & BTE 03.04R	2a + 2b - (switch PF) - silver type		5	
	(manual version)	2a + 2b - (switch PF) - gold type		6	
	- BTE 03.04A	4a + 4b - (switch PF) - silver type		7	
		4a + 4b - (switch PF) - gold type		8	
17	Low voltage protecting cover	Not applicable	Z		
18	Ambient temperature range	-40°C to +70°C	1		
	- Manual operation & no electro-magnet	-50°C to +70°C		2	
19	Locking Electro-magnet	Not applicable	Z		
	- BTE 03.04R	No	∅		
	- BTE 03.04A and key interlocking	Yes - Locking Master key(s)		1	
		Yes - Locking slave key(s)		2	
		Yes - Locking Master & slave key(s)		3	

⁽¹⁾ Refer to page 6 for other key lock codification.

The low voltage mobile connector must be ordered separately (refer to page 7):

BTE 03.04A

- SC204675 (2a+2b)
- SC205090 + SC205268 (4a+4b)

BTE 03.04R - manual version

- SC204675 (2a+2b)



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