COMPONENTS

Earthing Switch for rolling stock

Type BTE 03.04

Sécheron

GENERAL INFORMATION

With the **BTE 03.04,** Secheron 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 **BTE 03.04** 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 **BTE 03.04A** is designed for vehicle's indoor installation, while the **BTE 03.04R** 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.

MAIN FEATURES

- Insulation voltage up to 4'800V_{AC}/$V_{DC.}$
- **BTE 03.04A** available with up to 10 earthing poles and **BTE 03.04R** available with 2 earthing poles.
- High rated short-time withstand current.
- Indoor (BTE 03.04A) or outdoor (BTE 03.04R) mounting.
- Compliant to standards: IEC60077-1/-2; IEC61373, EN45545.

MAIN BENEFITS

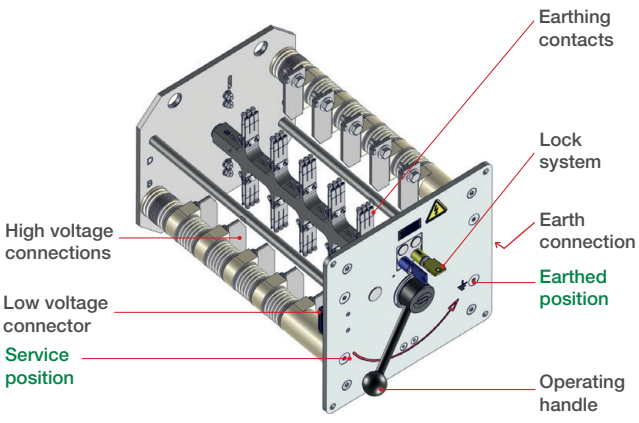
- High protection against electrical shocks **(BTE 03.04A)**
- Safety device with key interlocking system
- Optional integrated key multiplier, up to 8 keys **(BTE 03.04A)**
- Optional electro-magnet interlocking
- Sturdy structure
- Easy to install and connect
- Minimum maintenance requirements
- Reliable operation in extreme temperatures

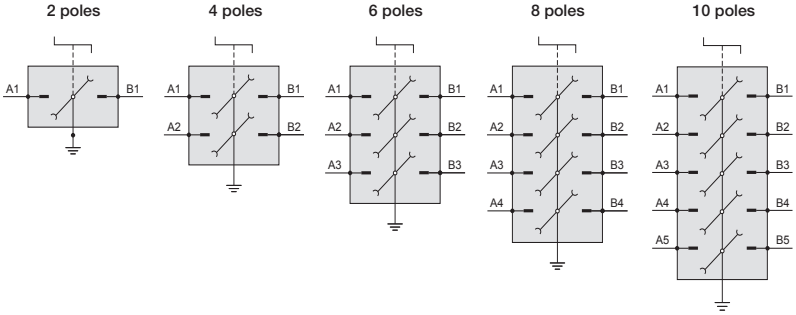
APPLICATIONS

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

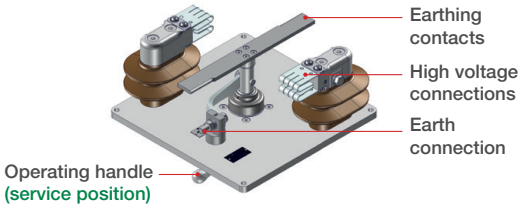
DESIGN

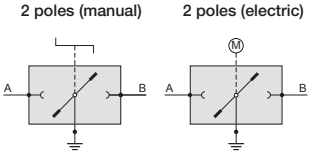
BTE 03.04A (INDOOR MOUNTING)





BTE 03.04R (OUTDOOR MOUNTING)





DATA FOR PRODUCT SELECTION

	Symbol	Unit	BTE 03.04A	BTE 03.04R
MAIN HIGH VOLTAGE CIRCUIT				
Rated insulation voltage	Ui	[kVac/dc]	4.8	4.8
Number of poles			2,4,6,8,10	2
Peak and rated short-time withstand current				
- AC	Îcw/Icw/t	[kA]/[kA]/[s]	63/25/1	63/25/1
- DC	Îcw/Icw/t	[kA]/[kA]/[s]	57/40/0.25	63/44/0.25
	Îcw/Icw/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}	[kVrms]	11.5	18.5
- Pole-earth	U_{50}	[kVrms]	18.5	18.5
Rated impulse withstand voltage (1.2 / 50 µs)				
- Pole-pole	Uimp	[kV]	25	40
- Pole-earth	Uimp	[kV]	40	40

[1] At 50 Hz during 1 minute

LOW VOLTAGE AUXILIARY CIRCUIT

Control circuit

Type of operation			Manual	Manual or electric
Electric version				
- Nominal voltage	Un	[Vdc]	-	24,36,48/50,72,110
- Range of voltage			-	[0.7 - 1.25] Un
- Nominal control power [2]	P	[W]	-	125
- Commutation time [2]		[s]	-	≤3

[2] At Un and Tamb = +20°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		[Vdc]	24 to 110	24 to 110
Conventional thermal current	Ith	[A]	10	10
Switching categories according to EN60947 (silver contacts)				
- Potentiel free (PF) contacts:			- AC-15 230 V_{AC} 1.0 A - DC-13 110 V_{DC} 0.5 A	- AC-15 230 V_{AC} 1.0 A - DC-13 110 V_{DC} 0.5 A
- Change-over (CO) contacts:				- AC-15 230 V_{AC} 1.5 A - DC-13 60 V_{DC} / 0,5 A - DC-13 24 V_{DC} / 2.0 A
Minimum let-through current at 24 Vdc [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, and change-over (CO) contacts for BTE 03.04R electric version.

[4] For clean and dry environment

LOW VOLTAGE INTERFACE

Type of connection [5]				
- Manual version			Wago connector	Wago connector
- Electric version			-	Harting connector

[5] Refer to page 7 for mobile connector information

Insulation

Rated power-frequency withstand voltage [6]	U_{50}	[kVrms]	1.5	1.5

[6] At 50 Hz during 1 minute

Operating conditions

Installation			Indoors	Outdoors
Altitude		[m]	< 1'400	< 1'400
Working ambient temperature	Tamb	[°C]	-40 to +70 -50 to +70 (in option)	-40 to +70 -50 to +70 (in option)
Humidity			Class 5K2	Class 5K2
Pollution degree			PD3A	PD4
Minimum mechanical durability	N	Cycles	≥ 20'000	≥ 20'000
Protection index:				
- HV part			IP00	IP00
- LV part			IP00	IP00; IP3x [7]
- Tightness between upper and lower part when installed			-	IP65 [8]

[7] With standard LV protection cover (for motorized version only)

[8] Delivered with an O-ring seal

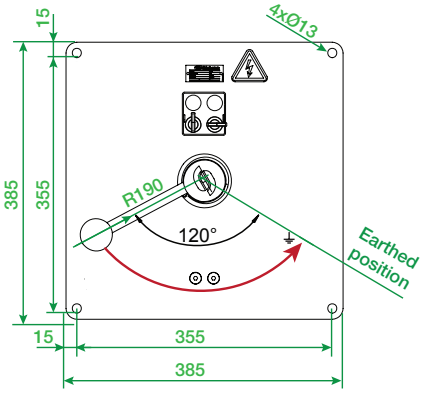
PRODUCT INTEGRATION

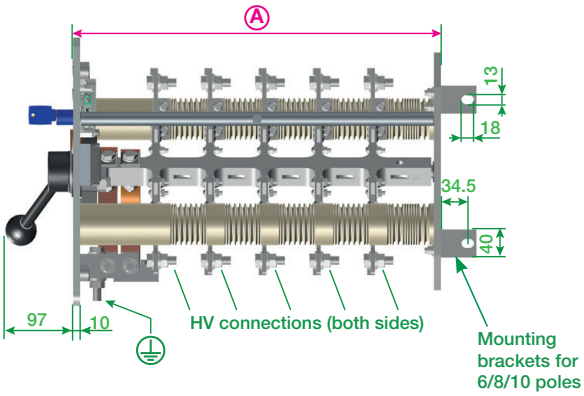
MAIN DIMENSIONS

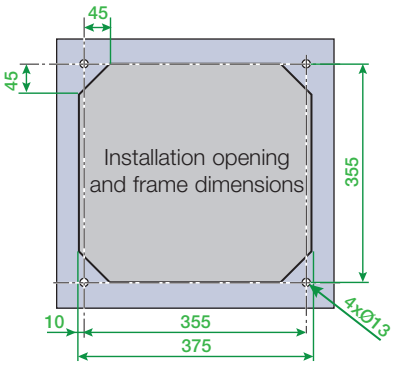
The DIN-ISO 2768-1 coarse tolerances are applied to these dimensions. All dimensions are in mm.
The maximum allowed flatness deviation of the support frame is 1 mm.
HV and earth connections: M12 screws

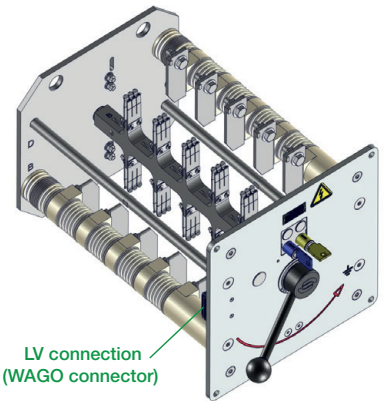
/// BTE 03.04A - MANUAL VERSION - 2 TO 10 POLES

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



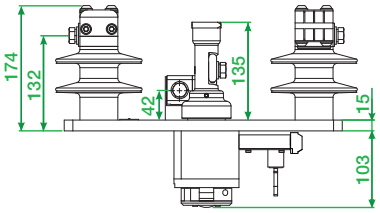


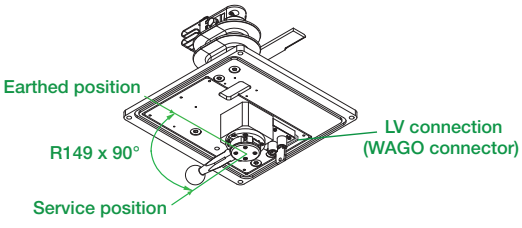


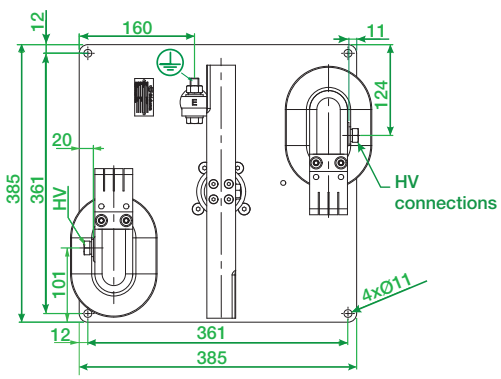


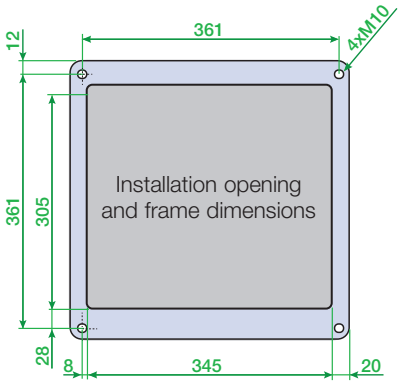
/// BTE 03.04R - MANUAL VERSION - 2 POLES

Poles	Weight (kg)
2	17 ± 0.5



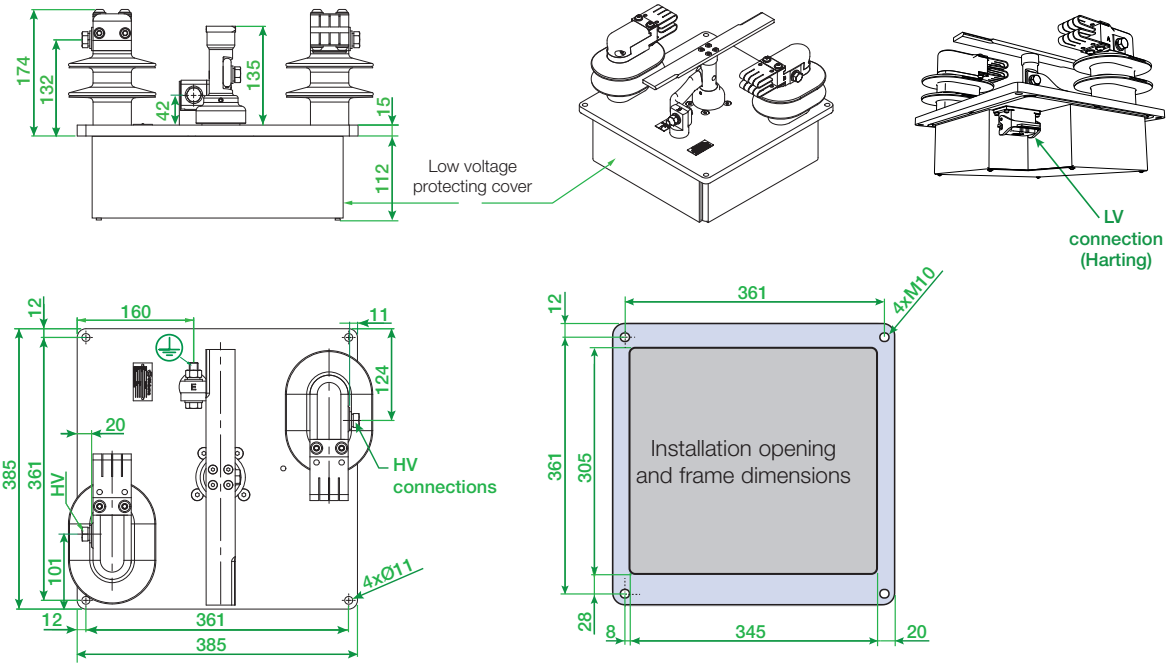






/// BTE 03.04R - ELECTRIC VERSION - 2 POLES

Poles	Weight (kg)
2	19 ± 1



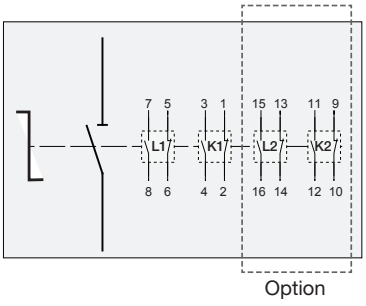
MANUAL OPERATION OF BTE 03.04A & BTE 03.04R

The BTE 03.04 is manually operated through its handle. Once set in the "earthed" or "service" position, the selected position is secured via a key-lock system. Auxiliary contacts provide information of the BTE 03.04 selected-locked position.

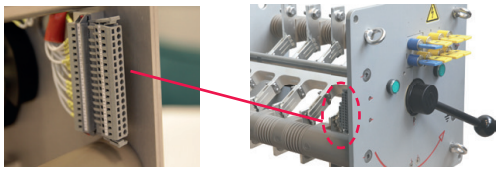
/// LOW VOLTAGE WIRING DIAGRAM

BTE 03.04A (WAGO CONNECTOR TYPE)

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

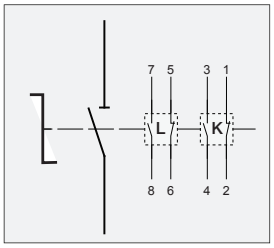


WAGO connector

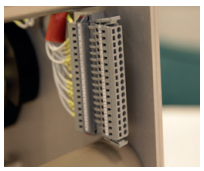


BTE 03.04R (WAGO CONNECTOR TYPE)

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



WAGO connector



Legend of the schemes :

Earth switch main contact	1a+1b - Switch PF
Operating handle	

/// SAFETY BASED ON KEY INTERLOCKING

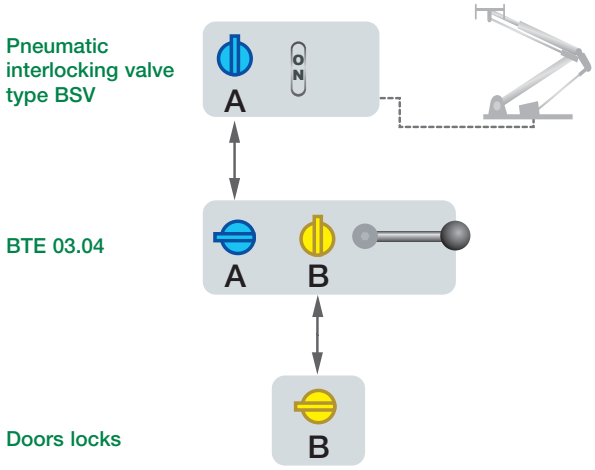
To guarantee the electrical earthing of the vehicule, with respect to the highest and most reliable standards for the safety of maintenance personnel, Sécheron offers a wide range of key interlocking safety components.

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 into 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.

Differents 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)

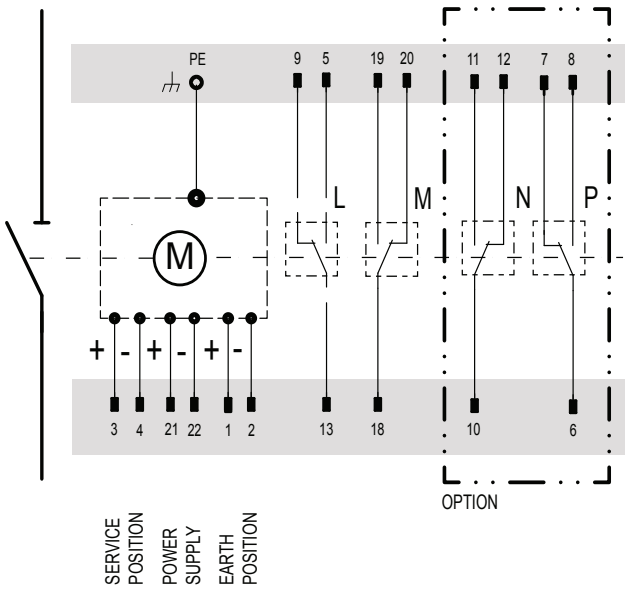
ELECTRIC CONTROL OPERATIONS (BTE 03.04R ONLY)

BTE 03.04R is also available in electric version to enable remote control operations. For electric operations, the **BTE** is delivered with integrated interlocked control relays.

/// LOW VOLTAGE WIRING DIAGRAM

BTE 03.04R (HARTING TYPE CONNECTOR)

Auxiliary contacts
2a+2b or 4a+4b - Change-Over (CO)



Legend of the scheme:

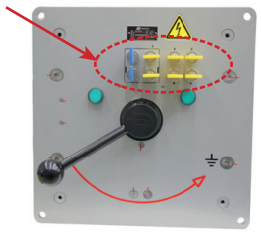
	Harting connector
	1a+1b - Switch CO
M	Electric supply (Motor)
	Earth switch main contact

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 Salves **(BTE 03.04A)** and 2 Masters + 2 Slaves **(BTE 03.04R)**.

Example of maximum keys configuration (BTE 03.04A):

2 Master +
6 Slaves



MASTER KEY - ORDERING CODE

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

SLAVE KEY - ORDERING CODE

Colour	QTY(*) 1	2	3	4	5	6
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

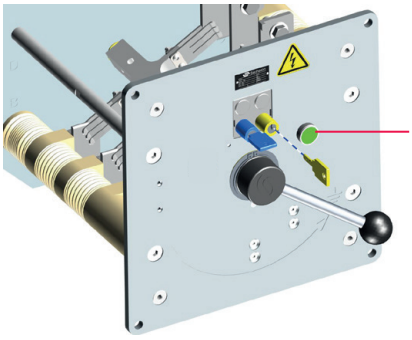
(*) BTE03.04R maximal slave key quantity is 2 keys.

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 [V_{DC}]	Nominal control power (at U_n & T_{amb}: +20°C)
24, 36, 48/50, 72, 110	56 W

PART NUMBER FOR SEPARATELY ORDERED ITEM

LOW VOLTAGE MOBILE CONNECTORS

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

Auxiliary switches		Mobile connector			
Number	Type	Type	Number of pin Size 2.5 mm²	Number of pin Size 1.5 mm²	Secheron's number
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
BTE 03.04R - Electric version					
2a + 2b	CO	Harting HAN 24 DD	7	7	SP1850005R00003
4a + 4b	CO	Harting HAN 24 DD	7	13	SP1850005R00004

The above references are given considering that all the contacts are wired, and with an external wire diameter of 3.7 mm (for 2.5mm² section) for motor supply and 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 alphanumerical 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 Secheron

Example of customer's choice:	BTE0304	A	4	M	Z	1A1B	0	Z	1	0
Line:	10	11	12	13	14	15	16	17	18	19

The bold characters of the designation code define the device type.

Line	Description	Designation	Standard	Options	Customer's choice
10	Product type	**BTE0304**	**BTE0304**		BTE0304
11	Installation	Indoors	**A**		
		Outdoors	**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	Operation	Manual	M		
	- For BTE 03.04R only	Electric		E	
14	Control voltage				
	- Manual operation & no electro-magnet	Not applicable	Z		
	- Electric operation / locking electro-magnet	24 Vdc		A	
		36 Vdc		B	
		48/50 Vdc		C	
		72 Vdc		D	
		110 Vdc		E	
15	Key and lock codification (1)				
	- Master key	(Electric operation) Not applicable	ZZ		
		1 blue key	1A		
		2 blue keys		2A	
	- Slave key	(Electric operation) 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	(Manual operation only) None	0		
	- BTE 03.04A & BTE 03.04R (manual version)	2a+2b - (switch PF) - silver type		5	
		2a+2b - (switch PF) - gold type		6	
	- BTE 03.04A	4a+4b - (switch PF) - silver type		7	
		4a+4b - (switch PF) - gold type		8	
	- BTE 03.04R (electric version)	2a+2b - (switch CO) - silver type		1	
		2a+2b - (switch CO) - gold type		2	
		4a+4b - (switch CO) - silver type		3	
		4a+4b - (switch CO) - gold type		4	
17	Low voltage protecting cover				
	- BTE 03.04A or BTE 03.04R (manual version)	Not applicable	Z		
	- BTE 03.04R (electric version)	Yes IP3x	1		
18	Ambient temperature range	-40°C to +70°C	1		
		-50°C to +70°C		2	
19	Locking Electro-magnet				
	- BTE 03.04R	NA	Z		
	- BTE 03.04A and key interlocking	No	0		
		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.

Signature:

Name:

Place and date:

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)

BTE 03.04R - electric version

☐ SP1850005R00003 (2a+2b)

☐ SP1850005R00004 (4a+4b)

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