

Railway application Contactors

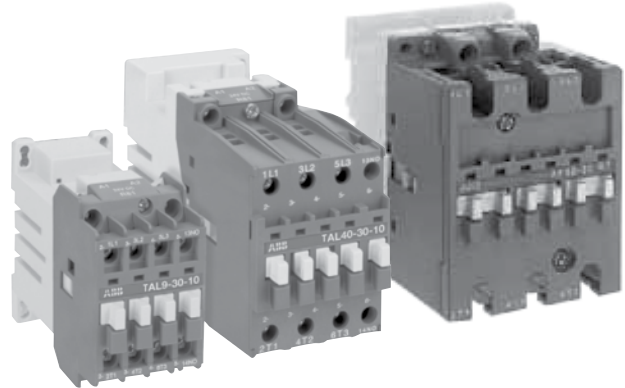


Railway application contactors

Types TBC, TAL & TAE

TNL, ring-tongue termination

1



Description

Rolling stock applications necessitate compliance to national and international standards tailored to railway environments (see "Reference Standards" on the following page). In order to improve reliability and durability, most railway applications employ specific connection methods, such as ring-tongue termination.

Coil surge suppression is also popular among rail applications. ABB's AF Series contactors are equipped with integral surge suppression in the form of a free-wheel diode, eliminating the need for additional accessories. AF Series devices are also immune to short time voltage interruption (or voltage dips) up to 20 ms.

Contactors and contactor relays are used in versatile rolling stock applications:

- Lighting
- Heating
- Braking
- Air conditioning
- Ventilation
- Door control

Requirements of railway applications

- Control networks typically utilizing DC (battery source) with wide voltage ranges:
 - 0.7 U_c ... 1.25 U_c (Operating limits included as U_c)
- Wide temperature range: -40 °C... +70 °C
- Shock & vibration withstand
- Fire-retardant / low smoke materials required

Reference standards

The contactor and control relays described in the following pages are in accordance with the following standards:

- IEC 60077-1 and IEC 60077-2 : Railway applications - Electric equipment for rolling stock.
- IEC 61373 : Railway applications - Rolling stock - Shocks and vibration tests.
- NF F 60002 : French standard - Vibration tests.
- IEC 60947-4-1 / EN 60947-4-1 : Low voltage controlgear - Contactors and motor starters.
- IEC 60947-5-1 / EN 60947-5-1 : Low voltage controlgear - Control circuit devices and switching elements.
- NF F 62000 : French standard - Functional tests for French railways (SNCF).

"Fire and Smoke" classification

According to ASTM standards:

ASTM standards, mainly used in North America, device products into two categories:

- For surfaces < 16 inch² the products are tested in accordance with:
 - ASTM E1354 : flammability and visible smoke
- For surfaces > 16 inch² the products are tested in accordance with:
 - E662 (97): density of smoke,
 - E162 (98): flammability of surface and
 - BSS 7239: toxicity of smoke (CO, HF, NO₂, HCl, HCN, SO₂).

Most of contactors, contactor relays and accessories have been tested according to the above standards. Certificates are available on request.

According to NF F standards:

French standards NF F (Normes Francaises Ferroviaires) are mainly used in Europe and Asia.

- NF F 16101: Fire behavior - Material choosing.
- NF F 16102: Fire behavior - Application to electrical equipment.

The contactors and accessories are at severity level 2 or 3 (classification level from 1 to 4) according to flammability (mark l) on the one hand, the opacity and toxicity of smoke (mark F) (CO, CO₂, HCl, HBr, HCN, HF, SO₂) in other hand.

Note: French standards are still used as references in some international railways because they were used for a long time and were alone to qualify the fire and smoke problem. There is no links between ASTM and NFF standards. A plastic material acceptable in NF F frame doesn't mean the acceptability in ASTM frame.

Technical data

Technical data for the following devices is provided in Literature no. 1SBC104032D0201. Please reference this document number at ABB Website to download or contact Technical Support at 1 (888) 385.1221, Option 4

Standard devices, ring-tongue, 3-pole A/L9...A/F75 AC or DC controlled



A26..RT



A50...A75..RT

Electrical ratings

AC general purpose ratings (A)	Maximum motor switching current (A)	AC motor ratings, breaking all lines, three phase, 50/60 Hz (hp)				Standard auxiliary contacts		Catalog number, AC controlled	Catalog number, DC controlled
		200... 208V	220... 240V	440... 480V	550... 600V	NO	NC		
21	9	2	2	5	7.5	1	-	A93010RT-Δ	AL93010RT-Δ
						-	1	A93001RT-Δ	AL93001RT-Δ
25	11	3	3	7.5	10	1	-	A123010RT-Δ	AL123010RT-Δ
						-	1	A123001RT-Δ	AL123001RT-Δ
30	17	5	5	10	15	1	-	A163010RT-Δ	AL163010RT-Δ
						-	1	A163001RT-Δ	AL163001RT-Δ
40	28	7.5	10	20	25	1	-	A263010RT-Δ	AL263010RT-Δ
						-	1	A263001RT-Δ	AL263001RT-Δ
50	34	10	10	25	30	1	-	A303010RT-Δ	AL303010RT-Δ
						-	1	A303001RT-Δ	AL303001RT-Δ
60	42	10	15	30	40	1	-	A403010RT-Δ	AL403010RT-Δ
						-	1	A403001RT-Δ	AL403001RT-Δ
80	54	15	20	40	50	1	1	A503011RT-Δ	AF503011RT-Δ
						1	1	A633011RT-Δ	AF633011RT-Δ
105	80	25	30	60	75	1	1	A753011RT-Δ	AF753011RT-Δ

Note: devices with ring-tongue termination UL recognized

Coil voltage selection chart (Δ)

Rated control circuit voltage U_c	A9... A75	AL9... AL40	AF50... AF75
12V DC	-	80	80
24V AC	81	-	-
24V DC	-	81	81
20...60V DC	-	-	72
110V/50, 110...120V/60	84	-	-
48...130V AC/DC	-	-	69
100...250V AC/DC	-	-	70
125V DC	-	87	87
220V DC	-	88	88
230...240V/60	80	-	-
240V DC	-	89	89
480V/60	51	-	-
600V/60	55	-	-

Example:

24V DC input voltage: AL303010RT-81

120V AC input voltage: A753011RT-84

Traction-specific, ring-tongue, 3-pole TBC7, TAL9...AF300B DC controlled, standard & ring-tongue termination



TBC7-30



TAL26..RT



TAE50...TAE75..RT



AF210B...AF300B

Electrical ratings

AC general purpose ratings (A)	Maximum motor switching current (A)	AC motor ratings, breaking all lines, three phase, 50/60 Hz (hp)				Standard auxiliary contacts		Catalog number, Standard termination	Catalog number, Ring-tongue termination
		200... 208V	220... 240V	440... 480V	550... 600V	NO	NC		
600V	9.6	2	3	5	5	1	-	TBC7-30-10-Δ	-
						-	1	TBC7-30-01-Δ	-
21	9	2	2	5	7.5	1	-	TAL9-30-10-Δ	TAL9-30-10RT-Δ
						-	1	TAL9-30-01-Δ	TAL9-30-01RT-Δ
25	11	3	3	7.5	10	1	-	TAL12-30-10-Δ	TAL12-30-10RT-Δ
						-	1	TAL12-30-01-Δ	TAL12-30-01RT-Δ
30	17	5	5	10	15	1	-	TAL16-30-10-Δ	TAL16-30-10RT-Δ
						-	1	TAL16-30-01-Δ	TAL16-30-01RT-Δ
40	28	7.5	10	20	25	1	-	TAL26-30-10-Δ	TAL26-30-10RT-Δ
						-	1	TAL26-30-01-Δ	TAL26-30-01RT-Δ
50	34	10	10	25	30	1	-	TAL30-30-10-Δ	TAL30-30-10RT-Δ
						-	1	TAL30-30-01-Δ	TAL30-30-01RT-Δ
60	42	10	15	30	40	1	-	TAL40-30-10-Δ	TAL40-30-10RT-Δ
						-	1	TAL40-30-01-Δ	TAL40-30-01RT-Δ
80	54	15	20	40	50	1	1	TAE50-30-11-Δ	TAE50-30-11RT-Δ
105	80	25	30	60	75	1	1	TAE75-30-11-Δ	TAE75-30-11RT-Δ
150	88	30	30	60	75	1	1	AF95B-30-11-Δ	AF95B-30-11RT-Δ
150	104	30	40	75	100	1	1	AF110B-30-11-Δ	AF110B-30-11RT-Δ
230	130	40	50	100	125	1	1	AF145B-30-11-Δ	AF145B-30-11RT-Δ
250	156	50	60	125	150	1	1	AF185B-30-11-Δ	AF185B-30-11RT-Δ
300	192	60	75	150	200	1	1	AF210B-30-11-Δ	AF210B-30-11RT-Δ
350	248	75	100	200	250	1	1	AF260B-30-11-Δ	AF260B-30-11RT-Δ
400	302	100	100	250	300	1	1	AF300B-30-11-Δ	AF300B-30-11RT-Δ

Note: devices with ring-tongue termination UL recognized

Coil voltage selection chart (Δ)

Rated control circuit voltage U _c	TBC7	TAL9... TAL40	TAE50... TAE75	AF95B... AF300B
17...32V DC	51	51	51	-
24...45V DC	52	52	52	-
20...60V DC	-	-	-	72
36...65V DC	54	54	54	-
42...78V DC	58	58	58	-
50...90V DC	55	55	55	-
48...130V AC/DC	-	-	-	69
77...143V DC	62	62	62	-
90...150V DC	66	66	66	-
100...250V AC/DC	-	-	-	70
152...264V DC	68	68	68	-

Example:

24V DC input voltage: TAL9-30-10-52

120V AC input voltage: AF300B-30-11RT-70

Coil operating limits

For traction-specific catalog numbers starting with "T", the coil operating limits are included in the coil voltage range (U_c min...U_c max.). For AF..B devices, the coil range is nominal with operating limits 15% below and 10% above the range specified.

Traction-specific, ring-tongue, 4-pole & relays

TBC7, TAL9...TAE75, TNL

DC controlled



TBC7-30



TAL26-40..RT



TAE50-40...TAE75-40..RT



TNL80E

4-pole contactors – Electrical ratings

AC general purpose ratings (A)	Main (power) pole Configuration		Standard auxiliary contacts		Catalog number, Standard termination	Catalog number, Ring-tongue termination
	NO	NC	NO	NC		
600V	NO	NC	NO	NC	TBC7-40-00-Δ	-
16	4	-	-	-	TBC7-22-00-Δ	-
	2	2	-	-	TAL9-40-00-Δ	TAL9-40-00RT-Δ
21	4	-	-	-	TAL9-22-00-Δ	TAL9-22-00RT-Δ
	2	2	-	-	TAL16-40-00-Δ	TAL16-40-00RT-Δ
30	4	-	-	-	TAL16-22-00-Δ	TAL16-22-00RT-Δ
	2	2	-	-	TAL26-40-00-Δ	TAL26-40-00RT-Δ
40	4	-	-	-	TAL26-22-00-Δ	TAL26-22-00RT-Δ
	2	2	-	-	TAL45-40-00-Δ	TAL40-40-00RT-Δ
65	4	-	-	-	TAE50-40-00-Δ	TAE50-40-00RT-Δ
80	4	-	-	-	TAE75-40-00-Δ	TAE75-40-00RT-Δ
105	4	-	-	-		

Note: devices with ring-tongue termination UL recognized

Control relays

Pilot duty ratings	Number of contacts				Catalog number, Standard termination	Catalog number, Ring-tongue termination
	1st stack		2nd stack			
	NO	NC	NO	NC		
A600, Q300	2	2	-	-	TNL22E-Δ	TNL22ERT-Δ
	3	1	-	-	TNL31E-Δ	TNL31ERT-Δ
	4	-	-	-	TNL40E-Δ	TNL40ERT-Δ
	4	-	-	4	TNL44E-Δ	TNL44ERT-Δ
	4	-	2	2	TNL62E-Δ	TNL62ERT-Δ
	4	-	4	-	TNL80E-Δ	TNL80ERT-Δ

Note: devices with ring-tongue termination UL recognized

Coil voltage selection chart (Δ)

Rated control circuit voltage U_c	TBC7	TAL9... TAL40	TAE50... TAE75	AF95B... AF300B
17...32V DC	51	51	51	51
24...45V DC	52	52	52	52
36...65V DC	54	54	54	54
42...78V DC	58	58	58	58
50...90V DC	55	55	55	55
77...143V DC	62	62	62	62
90...150V DC	66	66	66	66
152...264V DC	68	68	68	68

Example:

24V DC input voltage: TAL9-22-00-52

120V AC input voltage: TAE75-40-00RT-62

Coil operating limits

For traction-specific catalog numbers starting with "T", the coil operating limits are included in the coil voltage range ($U_c \text{ min.} \dots U_c \text{ max.}$).

Load / supply requirements

4-pole devices can be utilized for controlling either 2 separate loads from 2 separate supplies, or 2 separate loads from 1 supply. These devices are not suitable for controlling 1 load from 2 separate supplies. There is no mechanical overlapping (NO poles will break before NC poles make).

Accessories

Devices in this section of the catalog utilize the same accessories as ABB's standard across-the-line motor. Please see the below page references for accessories:

Accessory type	Page reference
Surge suppressors	1.52...1.53
Mechanical / electrical interlocks	1.57
Electronic timers	1.59
Replacement coils	1.73