


DK-STM Cubicle

Installation Manual

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Change log

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This document is the Installation Manual for the DK-STM Cubicle.
 DK-STM Cubicle is the equipment that enables ETCS-equipped trains to use the ATC infrastructure. Together with ETCS Onboard DK-STM makes up the ETCS system.

This is a component manual.

1.1 Purpose

The document is written for technical staff to get an overview of the installation of the DK-STM Cubicle as a component.

1.2 Scope

This document describes the following:

- The installation of the DK-STM Cubicle in the vehicles.
- The interfaces on the DK-STM Cubicle
- The accessories for connection to the DK-STM Cubicle.
- Coding of the multi connectors
- Fulfilled application rules.

For further information of the DK-STM Cubicle, see [KN 655.00 Q4434]

For further information of the DK-STM Subrack functions, see [KN 655.00 Q2959]

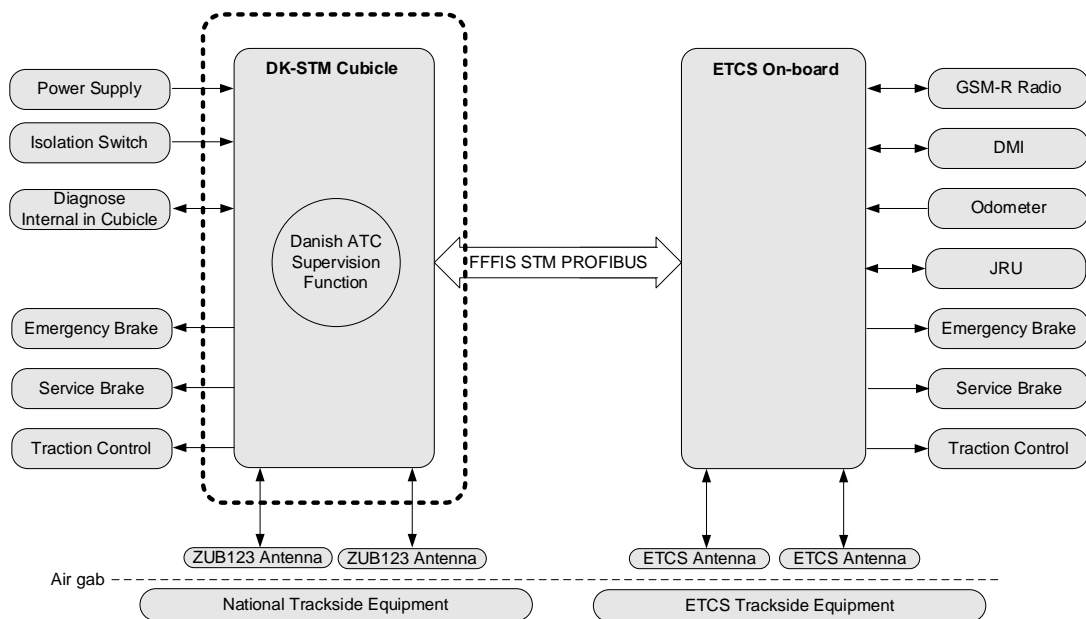


Figure 1: Scope of DK-STM Cubicle Installation manual

1.3 Definitions

ATC	Automatic Train Control
DK-STM	STM dedicated to the Danish infrastructure
ETCS	European Train Control System
EVC	European vital computer (Train onboard computer)
LRU	Least/ Lowest Replaceable Unit.
RU	Railway Undertaking Company
STM	Specific Transmission Module
TCC	Train Control Computer

1.4 References

If the version is not part of the document identification it is always the latest valid version that there are referred to.

Standards and Guidelines

Reference ID	Document identification
[EN_50121-3-2]	EN 50121-3-2 Railway applications - Electromagnetic compatibility - Part 3-2: Rolling stock – Apparatus dated 2016 + A1:2019
[EN_50124-1]	EN 50124-1 Railway applications- Insulation coordination Part 1: Basic requirements- Clearances and creepage distances for all electrical and electronic equipment, dated 2017
[EN_50155]	EN50155 Railway applications- Electronic equipment used on rolling stock, dated 2017
[EN_50343]	EN 50343 Railway applications – Rolling stock – Rules for installation of cabling
[EN_60529]	EN 60529 Degrees of protection provided by enclosures (IP Code), dated 1991+A1:2000
[EN_60721-3-2]	EN 60721-3-2 Classification of environmental conditions Part 3: Classification of groups of environmental parameters and their severities Section 2: Transportation (only Class 2M2 and 2K2), EN 60721-3-2:1997-03-01
[EN_61373]	EN 61373 Railway applications – Rolling stock equipment – Shock and vibration tests dated 2010

Other References

Reference ID	Document identification
[AppRule]	G81002-E3134-L001-C Application rules
[KN 655.00 Q2959]	DK-STM, System Description KN 655.00 Q2959 (EN), Version 3.00 25.02.2022 (or newer) Design and functional description of the DK-STM Subrack
[KN 655.00 Q4434]	STM-DK Cubicle System Description KN 655.00 Q4434 (EN), Version 2.00 23.04.2015 (or newer) Design and functional description of the DK-STM Cubicle
[IN 655.00 Q2962]	STM-DK Subrack Installation manual IN 655.00 Q2962, Issue 1.11 02.02.2022 (or newer) Generic description for installation of the STM-DK Subrack
[AN 656.00 Q4446]	DK-STM Dokumenteret Slutafprøvning AN 656.00 Q4446 V 1.14 (or newer) How to perform the function test of the DK-STM (Version "Subrack" and version "Cubicle")
[IPC/WHMA-A-620]	IPC/WHMA-A-620 Requirements and Acceptance for Cable and Wire Harness Assemblies Version D (or newer)

1.5 Reading guide:

This Installation manual is a “component manual” and describes the installation requirements, environmental requirements and connections for/to the DK-STM Cubicle.

It is based on the Installation manual for the STM-DK Subrack [IN 655.00 Q2962] where further information about additional components and installation, like antenna cables, antenna connection boxes, antennas, grounding concept, configuration can be found.

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2 Decommissioning of ATC ZUB123

Trains with ATC ZUB123 installed, shall have the ATC ZUB123 deinstalled, decommissioned, before the DK-STM Cubicle is installed.

2.1 Requirement to decommissioning

By decommissioning the following requirements shall be fulfilled:

- The decommissioning staff shall have the necessary qualifications for the (de)installation of components in trains.
- The existing emergency brake cables shall be carefully handled.
The requirement means that the isolation of the cables and the cores **MUST** not be damaged.
- For the cables to be reused it shall be taken care of, when the grounding clips at the existing grounding bar are removed, that the shielding is not damaged.
- The bending radius of cables must be obeyed during decommissioning and installation.

2.2 Before decommissioning

- It shall be controlled, that all the power to the ATC ZUB123 is disconnected.



Warning

The ATC system may be powered from both ends of the train.



Warning

It shall be assured, that the power cannot be switched on during work on the system

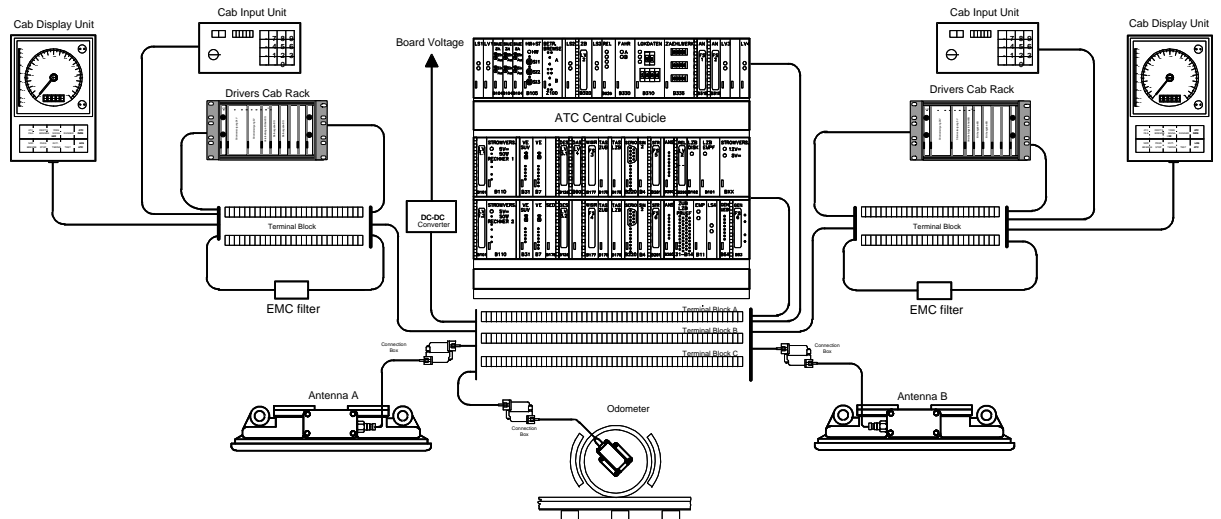
This is a general description of the decommissioning. The decommissioning shall be described in more detail for the specific trains.

2.3 ATC ZUB123 units to be removed

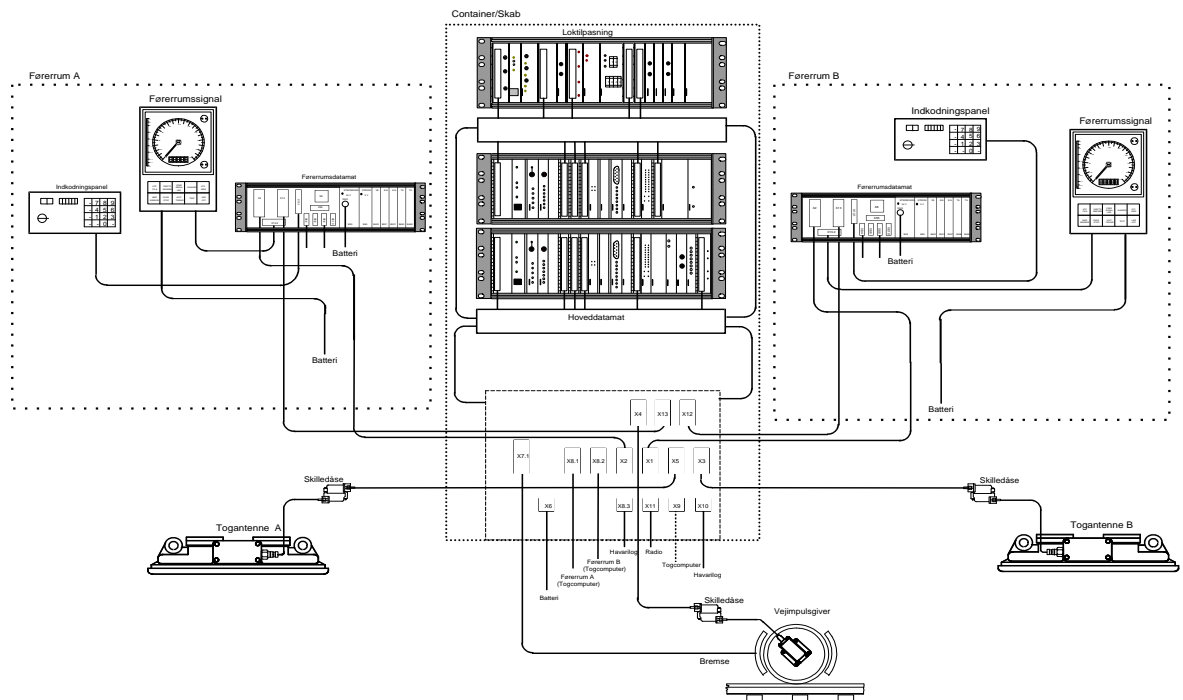
There are two different types of general DK-ATC installations:

- Older installations: Train cables are connected to terminal blocks.
- Newer installations: Train cables are connected to a cubicle, with multi connectors.

Older installation:



Newer installation:



From the above pictures only the train antennas, Antenna A, antenna B and the antenna cables shall remain.

The antenna cable shall be fitted with a connector, as described in chapter 5.

All other external cables described in chapter 5 to be used on the DK-STM Cubicle, shall be fitted with connectors, as described in chapter 5.

All internal cables between ATC ZUB123 main computer and connector blocks shall be disconnected.

It shall be agreed with the RU, if the internal cables also shall be removed.

If ATC units shall be re-used, it shall be taken care of ESD during the decommissioning.

3 Requirements for the installation

3.1 General

For installation the following are required:

- Installation and maintenance personnel shall be qualified for their work.
- The installation of the DK-STM Cubicle shall comply with the application rules for the DK-STM Cubicle [AppRule] and with the instructions described in this document.

3.2 DK-STM Cubicle Conditions of use

This chapter describes the general conditions of use for the DK-STM Cubicle. There are further requirements in the mechanical chapter (chapter 4) and the electrical chapter (chapter 5).

3.2.1 Access

The STM-DK Cubicle shall be installed in a cabinet/room, not accessible for travellers and staff.
Only maintenance staff are allowed to access the STM-DK Cubicle.

3.2.2 Storage and transport

For storage and transport (DK-STM Cubicle as a component) conditions as defined in [EN_60721-3-2] class 2M2 and 2K2 shall not be exceeded.
When being transported, the connectors on the DK-STM Cubicle shall be protected by environmental caps, protecting the interior of the DK-STM Cubicle against dust.

3.2.3 Protection class

The DK-STM Cubicle's protection class is IP 54 [EN_60529].
To retain the IP54 for the DK-STM Cubicle it shall be assured, that

- the seal in the door opening is intact.
- the door is locked with all 6 locks.
- the IP54 is retained at the electrical connections to the DK-STM Cubicle.

3.2.4 Storage life

The storage life of the LRU STM-DK Subrack is limited to 10 years because of the components used.

This shall be taken into account for the STM-DK Cubicle and for the LRU STM-DK Subrack.

3.2.5 EMC

The conditions as described in [EN_50121-3-2] shall not be exceeded for the DK-STM Cubicle.

3.2.6 Mechanical requirements

The mechanical conditions as described in [EN_50155] / class 1B -> [EN_61373] shall not be exceeded for the DK-STM Cubicle.

3.2.7 Climatic requirements

3.2.7.1 Temperature

[EN_50155] T1/Table 1. -25°C / +40°C.

See chapter 4 for installation restrictions regarding free space around the DK-STM Cubicle.

3.2.7.2 Altitude and air pressure

Altitude: Max 2000 m

Air pressure: Min 80 kPa and max 106 kPa.

3.2.8 Insulation and Dielectric strength

The DK-STM-DK Cubicle shall be installed in an environment, that ensures the pollution degree does not exceed PD3 [EN_50124-1] and causes no higher demand on the DK-STM Cubicle than OV2 [EN_50124-1].

3.2.9 Electrical service conditions

[EN_50155]:

- S1 apply (=no interruptions of supply voltage).
- There are three different input supply voltage versions of the DK-STM Cubicle :
 - 24 VDC
 - 72 VDC
 - 110 VDC

Before the installation, it shall be assured, that the supply voltage for DK-STM Cubicle is matching the train.

The nominal supply voltage for the DK-STM Cubicle is labelled as follows at the power supply connector -X6:



See electrical chapter (chapter 5) for further electrical related requirements/information.

3.2.10 After installation

See chapter 7.

4 Mechanical

4.1 Dimensions

Dimensions:

Height: 610 mm (inclusive grounding bar and connectors).

Width: 510 mm

Depth: 319 mm

Weight: 40 kg

Dimensions of the mounting holes:

- Thread: M8

- Depth: 18 mm.

4.2 Mechanical installation requirements

To prevent heating problems, the following requirements shall be adhered to.

For STM-DK Cubicle containing LRU STM-DK Subrack with VE5

- a) At least one vertical side shall have at least 50 mm free space to the surroundings.

For STM-DK Cubicle containing LRU STM-DK Subrack with VE6

(For LRU STM-DK Subrack with VE5: Not a requirement, but a recommendation.)

- 1) At least one vertical side shall have at least 50 mm free space to the surroundings.
- 2) The other vertical sides shall have at least 10 mm free space to the surroundings.
For the back side, a metal bracket and/or metal plate is acceptable as "surrounding" without the need for 10 mm free space.
- 3) Beneath the STM-DK Cubicle, there shall at least be 10 mm free space.
It is allowable to have a metal bracket for mounting purposes between the STM-DK Cubicle and the "10 mm free space".

General note for STM-DK Cubicle containing LRU STM-DK Subrack(VE6) or LRU STM-DK Subrack(VE5)

- a) High ambient temperature, compared to low ambient temperature, influences reliability negatively

Although possible. it is not recommended to cover all allowable surfaces and at the same time, exposing the STM-DK Cubicle for max allowable temperature, for a longer period of time. See chapter 3.2.7.1 for max ambient temperature.

It shall be prevented, that due to vibrations the DK-STM Cubicle will get in contact with other items.

For installation & maintenance the minimum height of the cabinet, in which the DK-STM Cubicle is mounted equals 650 mm. This is required to handle the cables connection to the grounding bar, see Figure 6.

610 mm < cabinet height < 650 mm: The location of the DK-STM Cubicle should either be reconsidered, or the RU should agree on the limited access, which will require the connections and grounding bar to be mounted outside the cabinet prior to the installation of the DK-STM Cubicle.

The DK-STM Cubicle shall be mounted with M8x18 bolts. See chapter 4.3.



4.3 Mounting of DK-STM Cubicle.

Mounting holes.

To fasten the DK-STM Cubicle on the vehicle the DK-STM Cubicle has totally 18 mounting holes.

- 6 holes in the left side
- 6 holes in the right side
- 6 holes in the bottom

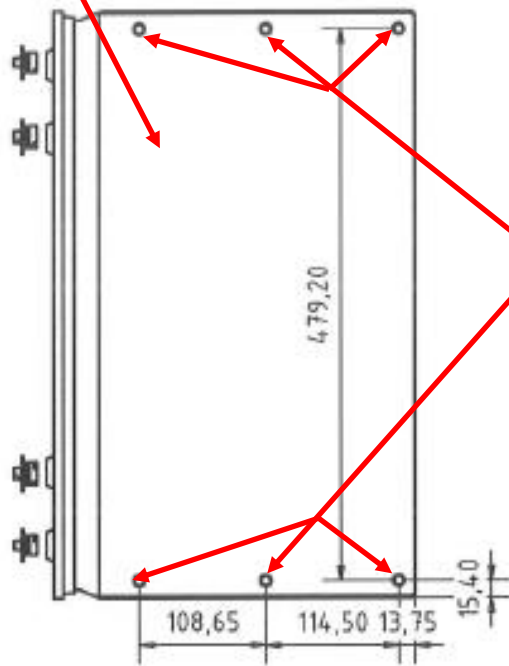
The DK-STM Cubicle shall be fastened on the vehicle using the mounting holes shown in Figure 2,

as minimum using either:

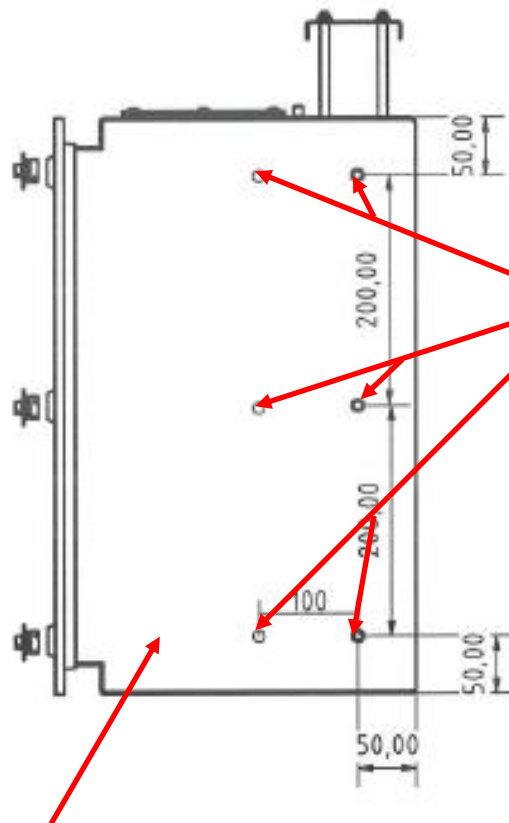
- 1) The bottom holes or
- 2) The left and right side holes.

The DK-STM Cubicle shall only be mounted in a position where the connection plate is at the topmost position.

Bottom side



Mounting holes



Mounting holes

Right side, the same for left side (mirrored).

Figure 2: Mounting holes of DK-STM Cubicle

5 Electrical interfaces

This part describes the electrical interfaces on the DK-STM Cubicle
See DK-STM Cubicle System Description [KN 655.00 Q4434] for further information.

5.1 Electrical Interfaces

The DK-STM Cubicle is designed in three different versions:

- 24 VDC (16,8 – 30 VDC)
- 72 VDC (50,4 – 90 VDC)
- 110 VDC (77 – 137,5 VDC)

The DK-STM Cubicle has the following interfaces:

- Emergency Brake
- Antenna (Antenna A and Antenna B)
- Service Brake
- Traction cut off
- Profibus (for EVC)
- Power supply (Battery)
- Isolation switch function (bypass of emergency brake relay contacts)
- Earth/Ground

As the DK-STM Cubicle gets the information about active cabin and direction from the ETCS-Onboard, it shall be assured that the A- and B-end of the train is the same for both the EVC and the DK-STM, so the right antenna is activated. The ETCS-Onboard defines the A- and B-end of the train.

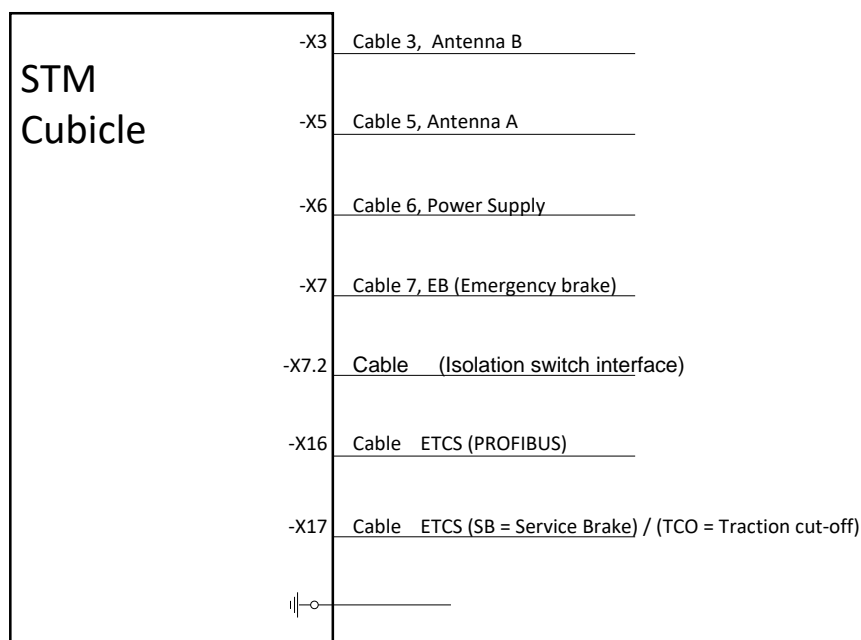


Figure 3: Interface to the DK-STM Cubicle

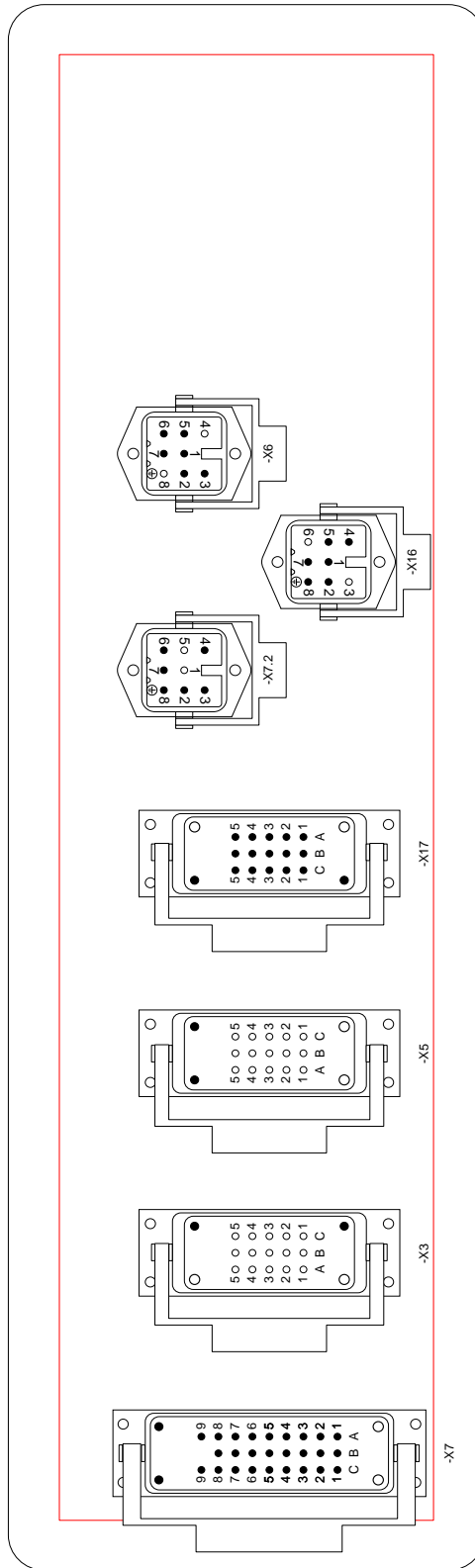


Figure 4: Connection Plate

For -X6, -X7.2 and -X16:

- Coding (no pin)
- Pin

For -X7, -X3, -X5 and -X17:

- Han Coding System Guide Pin, 09 33 000 9908
- Han Coding System Bushing 09 33 000 9909

The following describes the interface connections to DK-STM Cubicle.
 An overview of suggested components that can be used as counterparts for the connectors on the DK-STM Cubicle, can be found in chapter 6.

5.1.1 Antenna installation

For information/requirements about the installation, e.g., allowed antennas, antenna cable routing, connection boxes, etc. please see the STM-DK Subrack installation manual [IN 655.00 Q2962].

Allowed antenna cable lengths for the DK-STM Cubicle is shown in Figure 5
 Allowable antenna cable length.

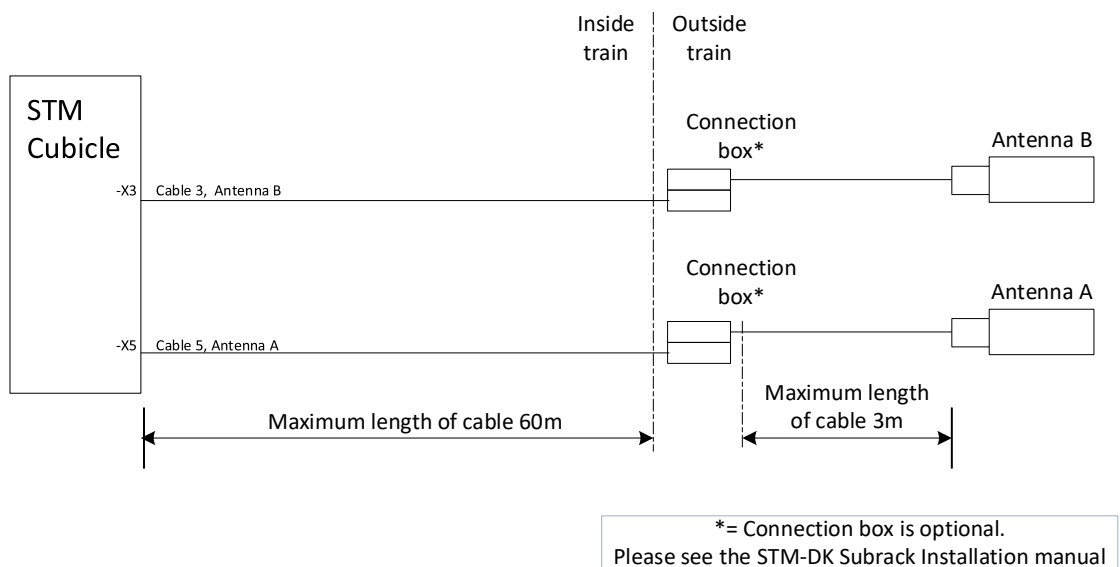


Figure 5 Allowable antenna cable length

5.1.2 Antenna B

-X3 Antenna B							
Pin No.	Signal	Descriptions	Voltage	Fuse Max	Internal fuse	Load	Comments
A1	50 B	50 kHz B					
B1	50 B	50 kHz B					
C1							
A2	RL50 B	RL50 kHz B					
B2	RL50 B	RL50 kHz B					
C2							
A3	100 B	100 kHz B					
B3							Free Core, connected to ground in DK-STM Cubicle
C3	RL100 B	RL100 kHz B					
A4	RL100 B	RL100 kHz B					
B4							Free Core, connected to ground in DK-STM Cubicle
C4	100 B	100 kHz B					
A5	850 B	850 kHz B					
B5	850 B	850 kHz B					
C5							
		Screen 850 kHz					Connected to Hood

If only one antenna is used, it shall be Antenna A.
 The antenna B connection (-X3) shall then be covered by an environmental cap (EMC version), protecting the interior of the STM-DK Cubicle against dust.

5.1.3 Antenna A

-X5 Antenna A							
Pin No.	Signal	Descriptions	Voltage	Fuse Max	Internal fuse	Load	Comments
A1	50 A	50 kHz A					
B1	50 A	50 kHz A					
C1							
A2	RL50 A	RL50 kHz A					
B2	RL50 A	RL50 kHz A					
C2							
A3	100 A	100 kHz A					
B3							Free Core, connected to ground in DK-STM Cubicle
C3	RL100 A	RL100 kHz A					
A4	RL100 A	RL100 kHz A					
B4							Free Core, connected to ground in DK-STM Cubicle
C4	100 A	100 kHz A					
A5	850 A	850 kHz A					
B5	850 A	850 kHz A					
C5							
		Screen 850 kHz					Connected to Hood

5.1.4 Power Supply

-X6 Power Supply							
Pin No.	Signal	Descriptions	Voltage	External fuse Max	DK-STM Cubicle		
					Internal fuse	Inrush current	Load
1	Supply +	Pin 1 – 2 – 3 Interconnected	24 V	10 A	6 A	16 A / 100 ms	App 70 W
2			72 V	6 A	6 A	8 A / 100 ms	
3			110 V	6 A	6 A	8 A / 100 ms	
4	Coding						
5	Supply 0V	Pin 5 – 6 – 7 Interconnected	24 V	*	6 A		
6			72 V	*	6 A		
7			110 V	*	6 A		
8	Coding						

The cable for the power supply (connector -X6) shall be protected by an external fuse/ circuit breaker.

The external fuse/circuit breaker shall:

- withstand the inrush current without tripping (max 8A in max 100 ms).
- protect the cable from overload.
- in case of a short circuit, not be prevented to trip due to cable resistance.
- protect the wiring and components placed in front of the internal dual pole MCB (Siemens MCB Univ. Cur. DC 440V AC /400V 10KA, 2-POLE, C, 6A for railway applications) in the DK-STM Cubicle.

Depending on a risk assessment and the trains battery grounding concept, a single pole fuse/MCB or two fuses/double pole MCB shall be used as external fuse/circuit breaker.

The power supply input(-X6) of the DK-STM Cubicle is floating, compared to the DK-STM Cubicle chassis.

Characteristic for the external fuse shall be "C" or faster. It shall be able to withstand the inrush current shown in column "Inrush current".

The cross section of the connecting cable for the power supply (connector -X6) shall be dimensioned acc. to [EN_50343].

If the power supply is not from a battery, it shall be proven that the maximum voltage is within the specified limits [EN_50155], also in case of error, it is safety relevant that the voltage stays within the maximum limits.

5.1.5 Emergency brake

X7 Emergency brake contacts							
Pin No.	Signal	Descriptions	Voltage	Fuse Max	Internal fuse	Load	Comments
A1	Not connected						
	Not connected						
A2	Not connected						
B2	EB1 (1)	Emergency brake	24 V	6 A	6,3 A	1)	Fuse for protection of cable. Potential free contact (EB)
			72 V		6,3 A		
			110 V		6,3 A		
C2	Not connected						
A3	0V SIFA	Screen 1 of EB1 (1)					
B3	0V SIFA	Screen 2 of EB1 (1)					
C3	0V SIFA	Screen 3 of EB1 (1)					
A4	Not connected						
B4	EB1 (2)	Emergency brake				1)	
C4	Not connected						
A5	0V SIFA	Screen 1 of EB1 (2)					
B5	0V SIFA	Screen 2 of EB1 (2)					
C5	0V SIFA	Screen 3 of EB1 (2)					
A6	Not connected						

Pin No.	Signal	Descriptions	Voltage	Fuse Max	Internal fuse	Load	Comments
B6	EB2 (1)	Emergency brake	24 V	6 A	6,3 A	1)	Fuse for protection of cable. Potential free contact (EB)
			72 V		6,3 A		
			110 V		6,3 A		
C6	Not connected						
A7	0V SIFA	Screen 1 of EB2 (1)					
B7	0V SIFA	Screen 2 of EB2 (1)					
C7	0V SIFA	Screen 3 of EB2 (1)					
A8	Not connected						
B8	EB2 (2)	Emergency brake				1)	
C8	0V SIFA	Screen 1 of EB2 (2)					
A9	0V SIFA	Screen 2 of EB2 (2)					
C9	0V SIFA	Screen 3 of EB2 (2)					

- 1) Specification for Potential free contacts.
See [KN 655.00 Q4434]

It shall be ruled out that any short circuit in connecting cable etc. can bypass the emergency brake contacts.

The three screen contacts concept are intended for cables with 3 three screen around each wire to exclude internal short circuits in the cable. Other ways of excluding internal shorts may apply.

The brake shall be applied if the connection between these pins (EB1 (1) and EB1 (2) respectively EB2 (1) and EB2 (2)) is open.
It shall be released if the connection is closed.

The two sets of emergency brake relay contacts (EB1 and EB2) shall be protected against overload.

The emergency brake relay contacts (connector -X7) are for short circuit protection reasons, internally fuse protected with a 6,3 A slow blow fuse.

Load:

Min:

10 mA,

Max:

6 A @ max 110 VDC

1,6 A @ max 137,5 VDC

1,6 A @ max 154 VDC in 0,1 s

Load current applies to non-inductive load

To be as versatile as possible, i.e. both supporting vehicles with one and two emergency brake circuits, two separate set of relay contacts are available. The two relay sets only differ in using different pin numbers in the connector on the DK-STM Cubicle,

- Vehicles with one emergency brake circuits, connection in serial.
- Vehicles with two emergency brake circuits, connection in parallel.

See Figure 6

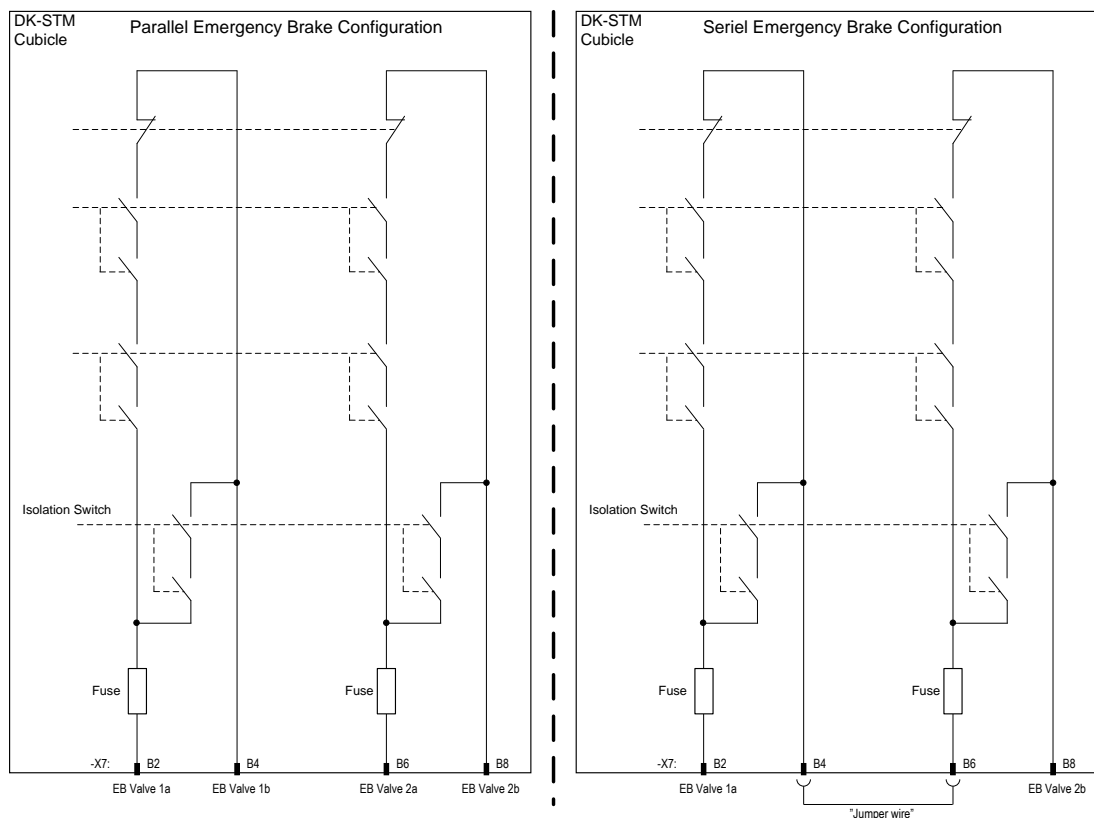


Figure 6: Configuration of Emergency Brake

5.1.6 Isolation switch

-X7.2 Isolation switch function							
Pin No.	Signal	Descriptions	Voltage	Fuse Max	Internal fuse	Load	Comments
1							Coding
2	+	I1+2a		6 A			
3							
4							
5							Coding
6	0 V	I1+2b		6 A			
7							
8							

If the voltage used as activation voltage for the isolation switch function is not from a battery, it shall be proven that the maximum voltage is within the specified limits, also in case of error, i.e. it is safety relevant that the voltage stays within the following maximum stated limits:

DK-STM Cubicle, 24 VDC version:

- Nom: 24 VDC
- Min: 16,8 VDC
- Max 30 VDC (for < 1 s: 33,6 VDC)

STM-DK Cubicle, 72 VDC version:

- Nom: 72 VDC
- Min: 50,4 VDC
- Max 90 VDC (for < 1 s: 100,8 VDC)

STM-DK Cubicle, 110 VDC version:

- Nom: 110 VDC
- Min: 77 VDC
- Max 137,5 VDC (for < 1 s: 154 VDC)

The cable for the isolation switch interface shall be protected by a circuit breaker/fuse.

If the isolation switch function is not used, the connector “-X7.2” shall be covered by an environmental cap (EMC version), protecting the interior of the DK-STM Cubicle against dust.

5.1.7 Profibus

-X16 Profibus							
Pin No.	Signal	Descriptions	Voltage	Fuse Max	Internal fuse	Load	Comments
1	Screen						
2	Not connected						
3							Coding
4	RxD/ TxD-P						
5	Not connected						
6							Coding
7	Not connected						
8	RxD/ TxD-N						

5.1.8 Service brake /Traction Cut-Off

-X17 ETCS (SB/TCO)							
Pin No.	Signal	Descriptions	Voltage	Fuse Max	Internal fuse	Load	Comments
A1	SB1	Service brake. COM		6 A	1 A	1)	Internal Fuse for short circuit protection
B1	SB1	Service brake. NC				1)	Potential free contact
C1	SB1	Service brake. NO				1)	Potential free contact
A2	SB2	Service brake. COM		6 A	1 A	1)	Internal Fuse for short circuit protection
B2	SB2	Service brake. NC				1)	Potential free contact
C2	SB2	Service brake. NO				1)	Potential free contact
A3							
B3							
C3							
A4	TCO1	Traction Cut-OFF. COM		6 A	1 A	1)	Internal Fuse for short circuit protection
B4	TCO1	Traction Cut-OFF. NC				1)	Potential free contact
C4	TCO1	Traction Cut-OFF. NO				1)	Potential free contact
A5	TCO2	Traction Cut-OFF.COM		6 A	1 A	1)	Internal Fuse for short circuit protection
B5	TCO2	Traction Cut-OFF. NC				1)	Potential free contact
C5	TCO2	Traction Cut-OFF. NO				1)	Potential free contact

- 1) Specification for Potential free contacts.
See [KN 655.00 Q4434]

5.1.9 Grounding Grounding Stud:

A grounding stud (M8) for grounding the DK-STM Cubicle is placed on top of the DK-STM Cubicle.
Length: 20 mm.

Grounding concept, see STM-DK Subrack Installation manual [IN 655.00 Q2962]

Grounding Bar:

For EMC and installation purposes, the DK-STM Cubicle is equipped with a grounding bar, where the external cables shall be fastened and the cable shield EMC properly connected.

See: Figure 7.

Brackets:

Large: Siemens C25324-A26-C162

Small: Siemens C25324-A26-C128

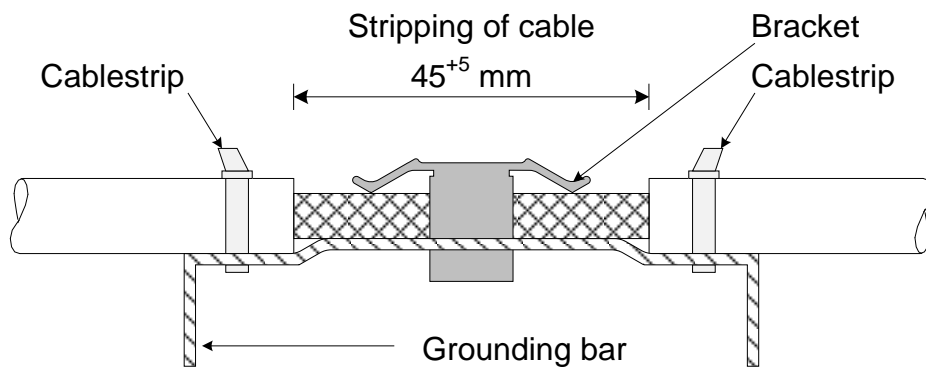


Figure 7: Connection of cables to grounding bar

6 Accessories

Suggested connector components for connecting to the DK-STM Cubicle.

It is the train integrator that is responsible for the safety, and it is up to the train integrator to comply to the required safety level, incl choice and use of cable, coding of connectors and accessories.

When the DK-STM Cubicle replaces a ZUB123 in a ATC-cubicle, the multi connectors, -X3, -X5, -X6 and -X7, will normally fit directly into the sockets of the DK-STM Cubicle

If, by any means, an extension of the antenna cables -X3 and X5 should be necessary, the extension shall be done by splicing the cable with an identical cable. All shielding shall remain unbroken in order to keep the shielding effect.

Conditions for splicing and use of multi connectors: see [IPC/WHMA-A-620] Class 3.

The extended cable must have the same properties as the original cable and can be tested with the same testing voltage as the original cable.

- All wires in the cable must be assembled in a safe way and isolated from other wires and the screen.
- The screen must be assembled correctly so that the function of the shield is retained.

The screen must be isolated from the wires.

Alternatively, the extension may be done by multi connectors:

- If not already provided, the existing antenna cable shall be provided with a multi connector as specified for connection to DK-STM Cubicle
- The extension cable is provided with a matching counter part

This solution requires:

- The new connection is proved to meet all relevant EMC requirements
- The new connection is proved to meet relevant environmental requirements
- The total number of connectors from antenna to STM-DK shall not exceed 7 including the antenna connector, the connection box and the STM-DK connector (this limit is based on the existing installations)
- The total cable length shall not exceed the specified limit
- The new "flying" connection shall be properly secured to avoid damage etc

After the cable has been extended it must be tested for connection of wires and that there is no short circuit between the wires themselves and between wires and screen.

6.1 Antenna B

X3, Antenna B				
Component	Number of pieces	Supplier	Order number	Comments
Han D M Crimp Contact Au AWG 18	12	Harting	09 15 000 6125	
Han EMC 15 Hood Side Entry PG 21	1	Harting	09 62 015 0541	
Han Coding System Guide Pin	2	Harting	09 33 000 9908	
Han Coding System Bushing	2	Harting	09 33 000 9909	
Han D 15 Pos. M Insert Crimp	1	Harting	09 21 015 3001	
PG21 HSK-MZ-EMV	1	Hummel	1.692.2100.01	
FERRULE, INSULATED, AWG 14; 2,5mm ²	1	RS Components	842-113	For 850 kHz Screen
Recommended cable type		Habia	43739-010-09	Or equivalent cable type

6.2 Antenna A

X5, Antenna A				
Component	Number of pieces	Supplier	Order number	Comments
Han D M Crimp Contact Au AWG 18	12	Harting	09 15 000 6125	
Han EMC 15 Hood Side Entry PG 21	1	Harting	09 62 015 0541	
Han Coding System Guide Pin	2	Harting	09 33 000 9908	
Han Coding System Bushing	2	Harting	09 33 000 9909	
Han D 15 Pos. M Insert Crimp	1	Harting	09 21 015 3001	
PG21 HSK-MZ-EMV	1	Hummel	1.692.2100.01	
FERRULE, INSULATED, AWG 14; 2,5mm ²	1	RS Components	842-113	For 850 kHz Screen
Recommended cable type		Habia	43739-010-09	Or equivalent cable type

6.3 Power Supply

X6, Power Supply				
Component	Number of pieces	Supplier	Order number	Comments
Han D F Crimp Contact Au AWG 16	6	Harting	09 15 000 6221	
HAN 8D FEMALE INSERT CRIMP	1	Harting	09 36 008 3101	
Han 3 EMC Hood Angled Entry 2 Pegs PG 11	1	Harting	09 62 003 1640	
Screw M3x6 with Nylite for Han 3A housing	1	Harting	09 20 000 9918	
Hex socket set screws	2	Bossard	BN621M3x20	Used for coding
PG9 HSK-MZ-EMV	1	Hummel	1.692.0900.01	For cable of outer diameter Ø8mm
PG11/PG9 RS-Ms	1	Hummel	1.077.1109.01	
Loctite 243		Loctite		

6.4 Emergency Brake

X7, Emergency brake				
Component	Number of pieces	Supplier	Order number	Comments
Han D F Crimp Contact Au AWG 18	4	Harting	09 15 000 6222	
Han D F Crimp Contact Au AWG 16	12	Harting	09 15 000 6221	
Han EMC 25 Hood Side Entry PG 21	1	Harting	09 62 025 0541	
Han Coding System Guide Pin	2	Harting	09 33 000 9908	
Han Coding System Bushing	2	Harting	09 33 000 9909	
Han D 25 Pos. F Insert Crimp	1	Harting	09 21 025 3101	
PG21 HSK-MZ-EMV	1	Hummel	1.692.2100.01	
Heat Shrink Sleeving	1,32 m			
AMP Rubber Plug, TE	2	TE	172746 -1	Place in B2 and B8
AMP Rubber Plug, TE	2	TE	172888-2	Place in B4 and B6
Recommended cable type		Habia	43739-031-02	Or equivalent cable type

6.5 Isolation

X7.2, Isolation				
Component	Number of pieces	Supplier	Order number	Comments
Han D F Crimp Contact Au AWG 16	6	Harting	09 15 000 6221	
HAN 8D FEMALE INSERT CRIMP	1	Harting	09 36 008 3101	
Han 3 EMC Hood Angled Entry 2 Pegs PG 11	1	Harting	09 62 003 1640	
Screw M3x6 with Nylite for Han 3A housin	1	Harting	09 20 000 9918	
Hex socket set screws	2	Bossard	BN621M3x20	Used for coding
PG9 HSK-MZ-EMV	1	Hummel	1.692.0900.01	For cable of outer diameter Ø8mm
PG11/PG9 RS-Ms	1	Hummel	1.077.1109.01	
Loctite 243		Loctite		

6.6 Profibus

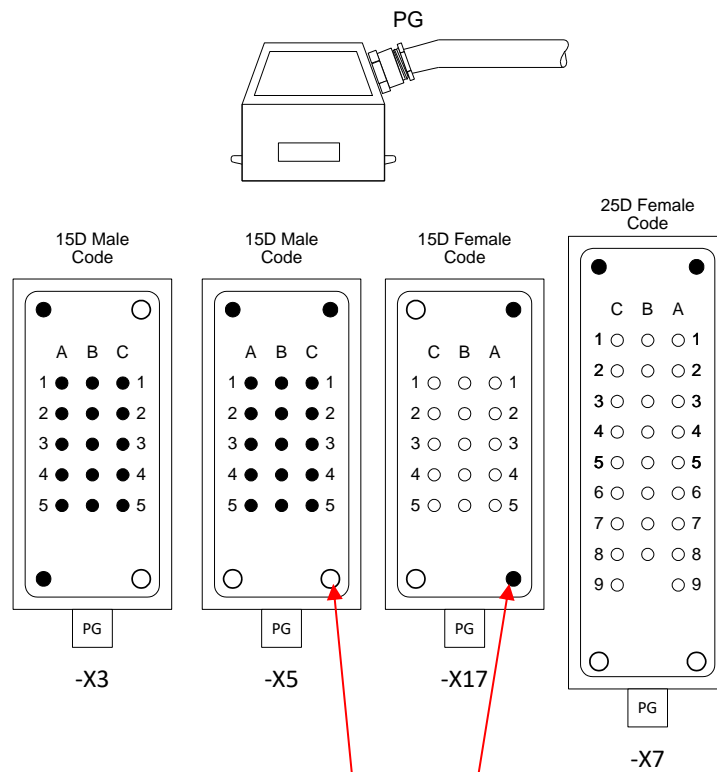
X16, ETCS (Profibus)				
Component	Number of pieces	Supplier	Order number	Comments
Han D F Crimp Contact Au AWG 16	6	Harting	09 15 000 6221	
HAN 8D FEMALE INSERT CRIMP	1	Harting	09 36 008 3101	
Han 3 EMC Hood Angled Entry 2 Pegs PG 11	1	Harting	09 62 003 1640	
Screw M3x6 with Nylite for Han 3A housing	1	Harting	09 20 000 9918	
Hex socket set screws	2	Bossard	BN621M3x20	Used for coding
PG9 HSK-MZ-EMV	1	Hummel	1.692.0900.01	For cable of outher diameter Ø8mm
PG11/PG9 RS-Ms	1	Hummel	1.077.1109.01	
Loctite 243		Loctite		

6.7 Service Brake /Traction Cut-Off

X17, ETCS (SB/TCO)				
Component	Number of pieces	Supplier	Order number	Comments
Harting: Han D F Crimp Contact Au AWG 18	12	Harting	09 15 000 6222	Depends on Cable type
Harting: Han EMC 15 Hood Side Entry PG 16	1	Harting	09 62 015 0540	
Harting: Han Coding System Guide Pin	2	Harting	09 33 000 9908	
Harting: Han Coding System Bushing	2	Harting	09 33 000 9909	
Harting: Han D 15 Pos. F Insert Crimp	1	Harting	09 21 015 3101	
Hummel: PG13,5 HSK-MZ-EMV	1	Hummel	1.692.1300.01	For cable of outer diameter Ø12mm
Hummel: PG16/PG13,5 RSD-MS	1	Hummel	1.077.1613.01	
Loctite 243		Loctite		

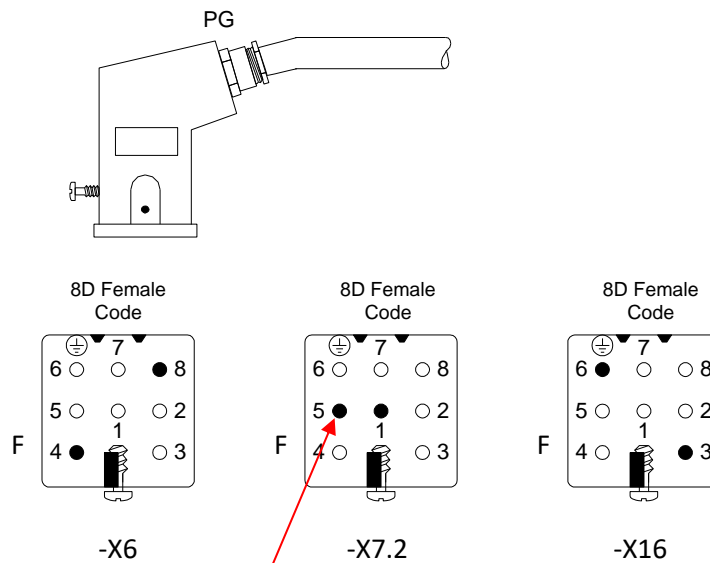
6.8 Coding of multi connectors at DK-STM Cubicle

To ensure that the cables at the DK-STM Cubicle can not be wrongly inserted/swapped, the multi connectors shall be coded.



● Han Coding System Guide Pin, 09 33 000 9908

○ Han Coding System Bushing 09 33 000 9909



● Hex socket set screws, BN621M3x20

7 After installation

7.1 Power on/off

From “outside” the DK-STM Cubicle, it can be powered on/off in several ways, depending on the train installation.

Inside the DK-STM Cubicle, it can be powered off(/on) by activating the MCB -F1. The STM-DK Subrack can be powered on/off by using the switch on the power supply SV5.

Please be aware, that even if removing the power/powering off, some parts within the DK-STM Cubicle can still be under power, due to external powering through e.g. the emergency brake circuit (connector).

7.2 Antenna tuning

An antenna tuning shall be performed.

Please see the STM-DK Subrack Installation manual [IN 655.00 Q2962].

7.3 Diagnosis/Interfaces

The installer/maintainer is allowed to access the diagnose interface on the SERIO5. Normal ESD precautions shall be observed.

It must be ensured that no higher voltages than 60V can be applied to the diagnose interfaces even in case of failure of the connected equipment.

The door shall be attached after use.

Standard EIA RS232 must be followed.

If this interface shall be used during normal service, i.e. where the STM-DK Cubicle is safety responsible, the national authorities shall give their acceptance and the exact conditions agreed upon.

No other ports are allowed to be used.

See STM-DK Subrack Installation Manual [IN 655.00 Q2962] for further information about using the diagnosis interface.

7.4 Tests

1. After the installation of the DK-STM Cubicle the integration test on the vehicle shall verify the correct function of all interfaces of the DK-STM Cubicle, incl. verify that the DK-STM Cubicle does not disturb other Profibus participants.

Hint: Noise, wrong or missing termination, address conflict, faulty connections or wrong connections etc. might be the cause of the disturbance of other Profibus participants.

2. After the first start-up and configuration it shall be verified that the DK-STM Cubicle starts up correctly.

Hint: It shall be possible to enter DA-state (Data available) for the DK-STM Cubicle
See the STM-DK Subrack Installation Manual [IN 655.00 Q2962] for further details.

3. A functional test shall be performed according to Dokumenteret Slutafprøvning [AN 656.00 Q4446].

8 Application rules

Table 1 is an overview of the installation relevant application rules, acc. to [AppRule]. It is shown in which chapter of this document the application rules are handled.

AppRule	Chapter
AppRule_26	Chapter 5 -> [IN 655.00 Q2962]
AppRule_37	Chapter 7
AppRule_43	Chapter 7 -> [IN 655.00 Q2962]
AppRule_97	Chapter 7
AppRule_174	Chapter 7 -> [AN 656.00 Q4446]
AppRule_187	Chapter 7
AppRule_188	Chapter 7
AppRule_200	Chapter 3
AppRule_201	Chapter 3
AppRule_202	Chapter 5
AppRule_203	Chapter 5
AppRule_204	Chapter 5
AppRule_205	Chapter 5
AppRule_206	Chapter 7
AppRule_207	Chapter 5
AppRule_208	Chapter 5
AppRule_209	Chapter 4
AppRule_210	Chapter 3
AppRule_211	Chapter 6
AppRule_212	Chapter 5
AppRule_213	Chapter 5
AppRule_216	Chapter 5
AppRule_217	Chapter 5
AppRule_219	Chapter 5
AppRule_221	Chapter 3
AppRule_222	Chapter 5
AppRule_223	Chapter 3
AppRule_227	Chapter 3
AppRule_228	Chapter 4

Table 1 Application rule allocation.