


## DK-STM Cubicle

### Installation Manual

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		Replaces		
		Approved by Banedanmark 16.12.2017 ECP n		
	Version 1	Last version	Drawing name <b>DK-STM Cubicle</b> Installation Manual	
	Date and initials	Date and initials		
Prepared by	17-03-2015 KLP	20-11-2017 STN		
Checked by	27-03-2015 STN	20-11-2017 BDK		
Approved by	27-03-2015 STN	20-11-2017-PBO		
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	EN	3.02 20.11.2017	IN 655.00Q4432	1 (36)

## Change log

Version/date	Page(s) covered	Description	References
00.01 / 17.03.2015	All	First edition	
01.00 / 26.03.2015	All	First final publication	
01.01 / 20.04..2015	All	Update	
02.00 / 23.04.2015	All	Second final publication Reviewed	
03.00	Chapter 4	Splicing information	
03.01 / 09.06.2016	1, 2, 3.1.2, 3.2, 3.4, 8	Ref. to Application rules inserted. Application rules removed. Decommissioning is inserted	
3.02 / 10.11.2017	Chapter 1.6 Chapter 4.1.3 Chapter 5	Assuring IP54 Power supply circuit breaker Extension of antenna cable	

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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.

## 1.1 Purpose

The document is written for technical staff to get an overview of the installation of the DK-STM cubicle.

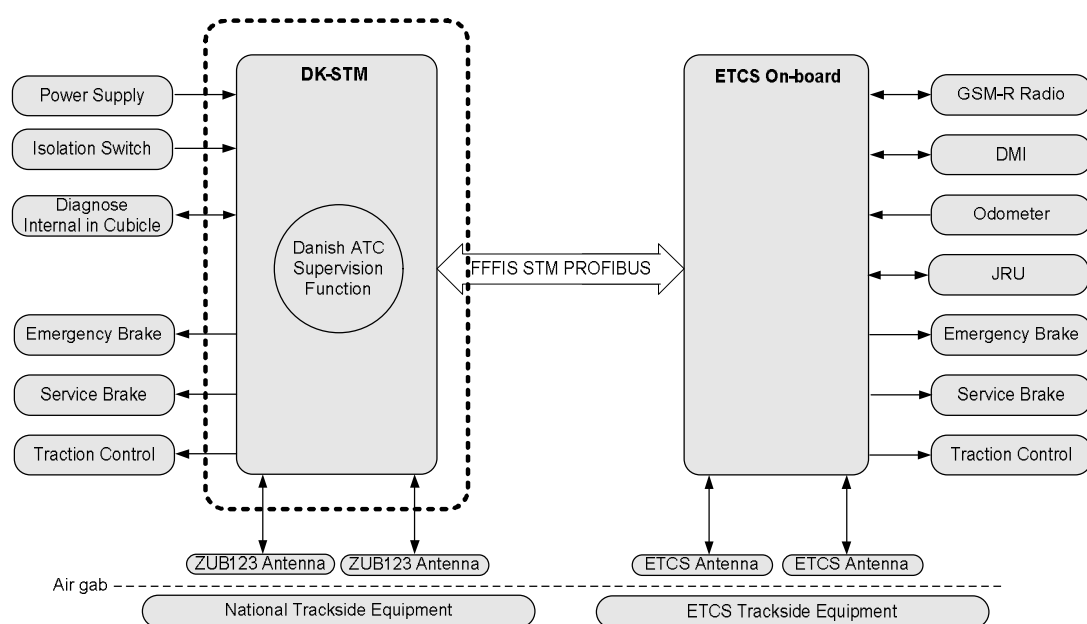
## 1.2 Scope

This document describes 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
- Equipments needed for installation in vehicles without DK-ATC

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

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



**Figure 1: Scope of DK-STM 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)
STM	Specific Transmission Module
TCC	Train Control Computer

## 1.4 References

If the identifier or version of a referenced document is not specified, the specifications in the document overview referenced here apply.

### Standards and Guidelines

Reference ID	Document incl. Title, Unequivocal identifier and version
[EN_50121-3-2]	Railway applications - Electromagnetic compatibility - Part 3-2: Rolling stock – Apparatus dated 2006-07-01
[EN_50124-1]	Railway applications- Insulation coordination Part 1: Basic requirements- Clearances and creepage distances for all electrical and electronic equipment, dated 2001-03-01
[EN_50155]	Railway applications- Electronic equipment used on rolling stock, dated 2007-07-01
[EN_50343]	Railway applications – Rolling stock – Rules for installation of cabling
[EN_60529]	Degrees of protection provided by enclosures (IP Code), dated 1991+A1:2000
[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_60950-1]	Information technology equipment - Safety - Part 1: General requirements (IEC 60950- 1:2001, modified); German version EN 60950-1:200, dated 2003-03-01
[EN_61000-6-2]	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments. dated 2005-08
[EN_61000-6-4]	Electromagnetic compatibility (EMC) – Part 6-4: Generic standards - Emission standard for industrial environments, Dated 2007-01
[EN 60947-5-1]	Low-voltage switchgear and controlgear – Part 5-1: Control circuit devices and switching elements – Electromechanical control circuit devices. Dated 2004-06
[DS/ISO_2768-1]	General tolerances - Part 1: Tolerances for linear and angular dimensions without individual tolerance indications. Dated 1993

## Input Documents

Reference ID	Document incl. Title, Unequivocal identifier and version
[AppRule]	G81002-E3134-L001-A Application rules
[ATC_G_C]	Grounding Concept for DK-ATC System General G81050-J2118-U011-C
[KN 655.00 Q2959]	DK-STM, System Description Design and funktion of the DK-STM rack
[KN 655.00 Q4434]	System Description STM-DK_Cubicle Describes the requirements of the connections to the STM-DK cubicle
[IN 655.00 Q2962]	Installation manual DK-STM Generic description for installation of the STM-DK rack
[AN 656.00 Q4446]	DK-STM Dokumenteret Slutafprøvning
[S25441-M1-A3]	Antenna (ZKS) S25441-M1-A3 For Danish ATC. Data sheet: G81050-P8308-U710-C
[S25441-M2-A4]	Antenna (NF-ZKS) S25441-M2-A4 For Danish ATC. maximum speed of 160 km/h + 10% Data sheet: G81050-P8308-U750-A
[V25132-A1-A25]	Connection Box (CBX) V25132-A1-A25 For Danish ATC. Data sheet: G81050-P8308-U720-D
[IPC/WHMA-A-620B]	Requirements and Acceptance for Cable and Wire Harness Assemblies

## 1.5 Reading guide:

This Installation manual is based on the Installation manual DK-STM [IN 655.00 Q2962] and describes the connections to the DK-STM cubicle, and necessary components for connecting to DK-STM cubicle.

## 1.6 Requirement to decommissioning and installation

By decommissioning and installation the following requirements shall be fulfilled:

- The decommissioning/installation staff must have the necessary qualifications for the installation of components in trains.
- The existing emergency brake cables shall be carefully handled.  
The requirement shall be understood in that way, 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 shielding is not damaged.
- The bending radius of cables must be obeyed during decommissioning and installation.
- After installation of the DK-STM cubicle, the function shall be tested after [AN 656.00 Q4446].
- To obtain the IP54 for the cubicle it shall be assured, that the seal in the door opening is intact and the door is locked with all 6 locks.
- After installation it shall be assured, that the IP54 is retained at the electrical connections to the DK-STM cubicle.

## 2 Decommissioning of ATC ZUB123

Trains with ATC ZUB123 installed, shall have the ATC ZUB123 de-installed, decommissioning, before the DK-STM is installed.

### 2.1 Before decommissioning

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



#### Warning

REMARK: The ATC system may be powered from both end of the train



#### Warning

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

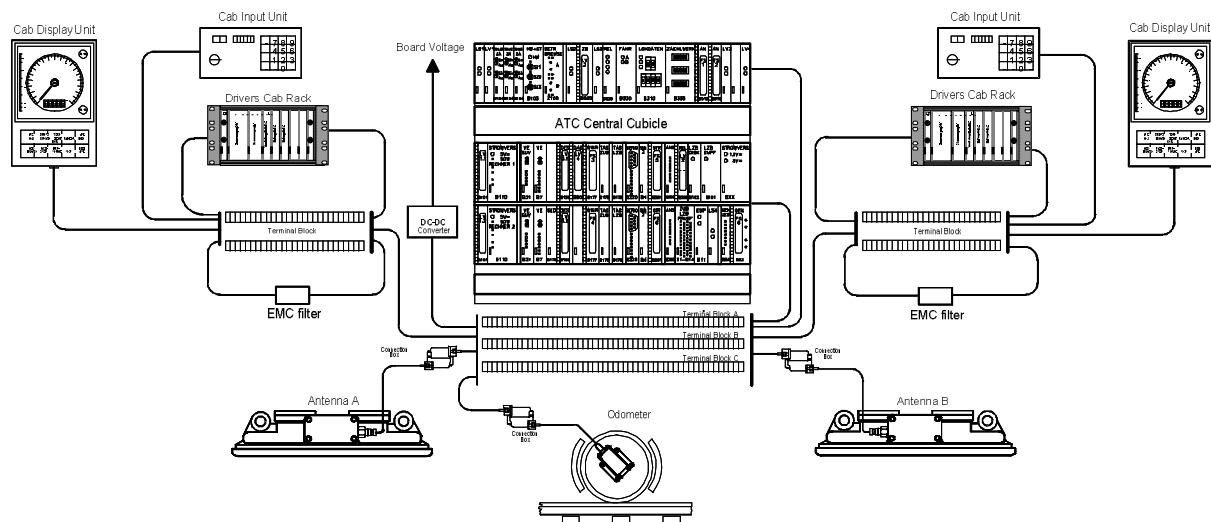
This is a general description of the decommissioning. The decommissioning shall be described in more detail for the specific trains.

## 2.2 ATC ZUB123 units to be removed

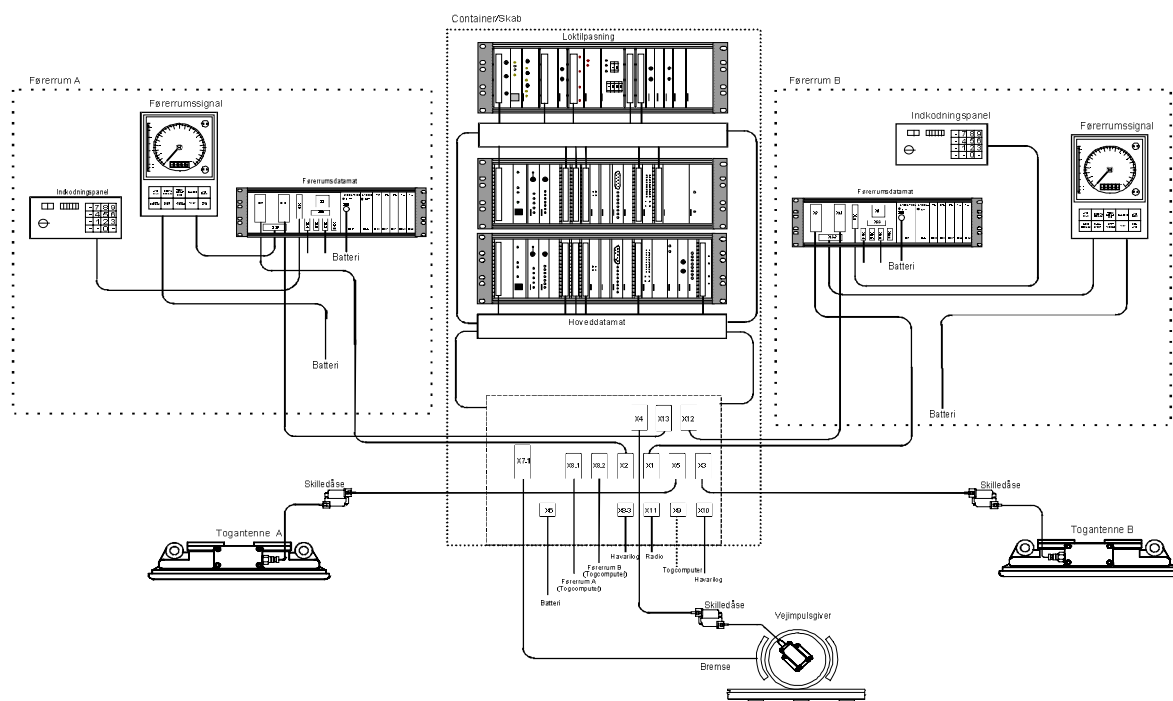
There are two different types of general DK-ATC installations:

- 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 section 5.

All other external cables described in chapter 5 to be used on the 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 Mechanical installation

This section describes the mechanical installation of the DK-STM cubicle.

#### 3.1 Requirements

The DK-STM cubicle complies with rolling stock equipment [EN\_50155]

##### 3.1.1 Environmental service conditions of operation.

[EN50\_155] Chapter 4

##### 3.1.1.1 Temperature

T1/Table 1. -25°C / +40°C.

##### 3.1.1.2 Altitude

Max 2000 m

##### 3.1.2 Electrical service conditions

[EN\_50155] Chapter 5.

- 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 voltage for DK-STM is matching the power of the train.

The power for the DK-STM is labelled at the connector X6:

24 VDC

72 VDC

110 VDC

### 3.2 Mechanical specifications

The DK-STM Cubicle has an ingress protection of IP54.

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.

To prevent heating problems it shall be assured, that at least one vertical side, has 50mm free space. See also 3.1.1.1

It shall be prevented, that due to vibrations the cubicle will get in contact with other items.

For installation & maintenance the minimum height of the cabinet, in which the 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 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 cubicle.

It shall also be noted, that the cubicle shall be mounted with M8x18 bolts. See chapter 3.3.



### 3.3 Mounting of cubicle.

Mounting holes.

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

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

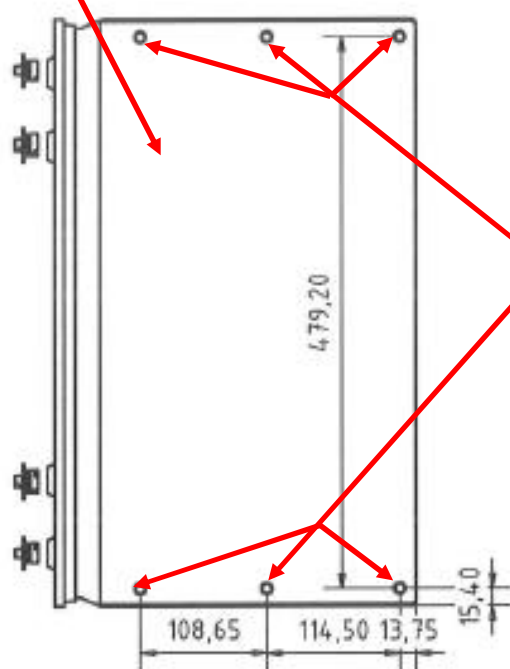
The DK-STM cubicle shall be fastened on the vehicle using the mounting holes Figure 2,

as minimum using either:

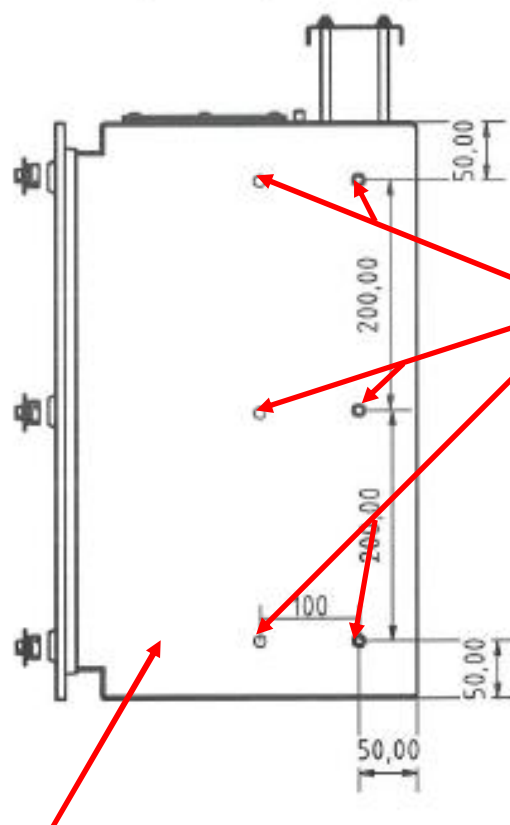
- 1) The bottom holes or
- 2) The left and right side holes.

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**

## 4 Electrical interfaces

This part describes the electrical interfaces on the DK-STM cubicle

### 4.1 Electrical Interfaces

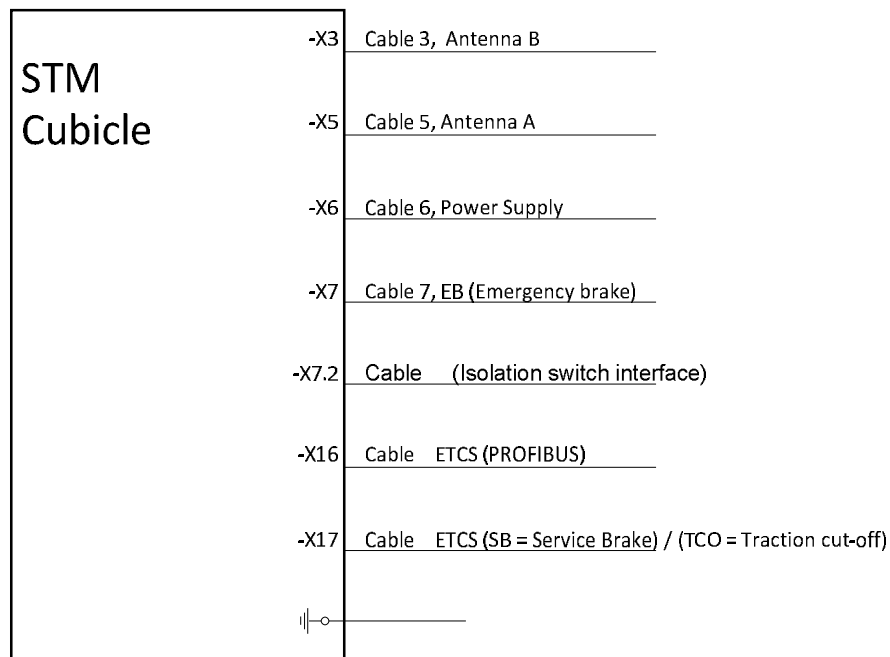
The DK-STM cubicle is designed in three different versions:

- 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

As the DK-STM 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**

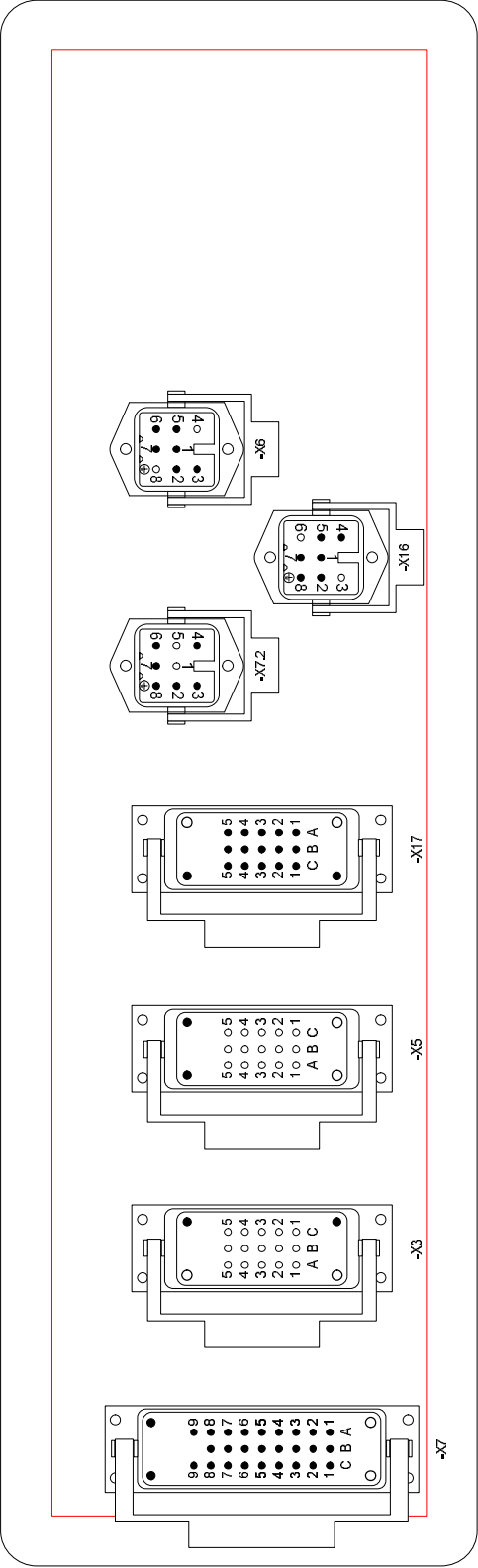


Figure 4: Connection Plate

- For -X7, -X3, -X5 and -X17:
- Han Coding System Guide Pin, 09 33 000 9908
  - Han Coding System Bushing 09 33 000 9909
- For -X6, -X7.2 and -X16:
- Coding (no pin)
  - Pin

The following describes the interface connections to DK-STM cubicle.  
An overview of the components that must be used for connection, can be found in section 5 Accessories

#### 4.1.1 Antenna B

<b>-X3 Antenna B</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 cubicle
C3	RL100 B	RL100 kHz B					
A4	RL100 B	RL100 kHz B					
B4							Free Core, connected to ground in 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

#### 4.1.2 Antenna A

<b>-X5 Antenna A</b>							
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 cubicle
C3	RL100 A	RL100 kHz A					
A4	RL100 A	RL100 kHz A					
B4							Free Core, connected to ground in 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

### 4.1.3 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 stated external fuse value shall 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. 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".

## 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)					

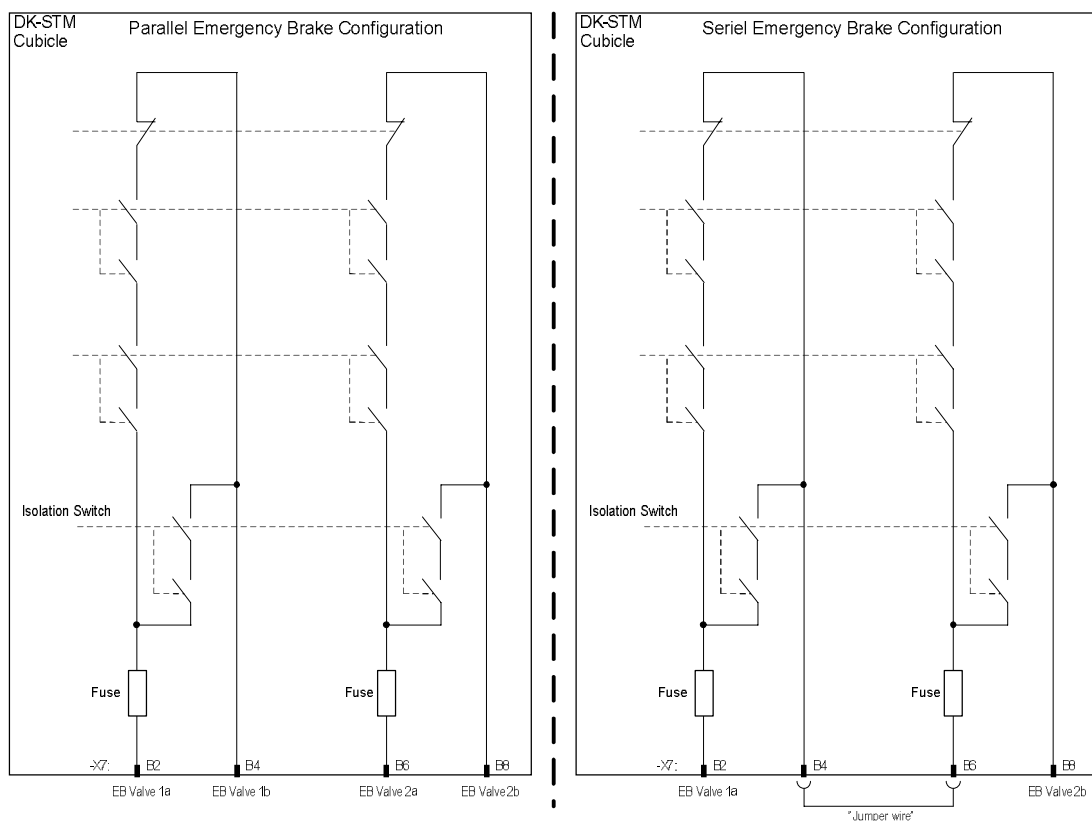
- 1) Specification for Potential free contacts.  
See [KN 655.00 Q4434]

The three screen contacts 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.

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 5



**Figure 5: Configuration of Emergency Brake**

#### 4.1.4 Isolation

<b>-X7.2 Isolation switch function</b>							
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							

#### 4.1.5 Profibus

<b>-X16 Profibus</b>							
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						

#### 4.1.6 Service brake /Traction Cut-Off

<b>-X17 ETCS (SB/TCO)</b>							
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

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

#### 4.1.7 Grounding

An grounding stud (M8) for grounding the DK-STM cubicle are placed on top of the DK-STM cubicle.  
Length: 20 mm.

Grounding concept see [IN 655.00 Q2962]

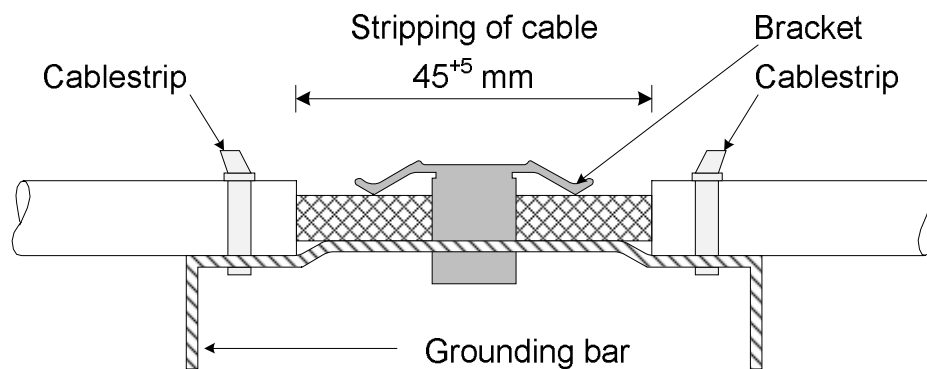
### Grounding Bar:

For EMC and installation purposes, the DK-STM cubicle is equipped with an grounding bar, where the external cables shall be fastened.  
See: Figure 6.

Brackets:

Large: C25324-A26-C162

Small: C25324-A26-C128



**Figure 6: Connection of cables to grounding bar**

## 5 Accessories

Suggested components for connecting to DK-STM cubicle.

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

When DK-STM replace an ZUB123 in a ATC-cubicle, the multiconnectors, -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 screening effect.

Conditions for splicing and use of multi connectors: see [IPC/WHMA-A-620B] 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 STM-DK
- 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.

## 5.1 Antenna B

<b>X3, Antenna B</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 <sup>2</sup>	1	RS	842-113	For 850kHz Screen
Recommended cable type		Habia	43739-010-09	Or equivalent cable type

## 5.2 Antenna A

<b>X5, Antenna A</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 <sup>2</sup>	1	RS	842-113	For 850kHz Screen
Recommended cable type		Habia	43739-010-09	Or equivalent cable type

### 5.3 Power Supply

<b>X6, Power Supply</b>				
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		RS	14.537.188	

### 5.4 Emergency Brake

<b>X7, Emergency brake</b>				
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		CGPT- 4,8/2,4-0	
AMP Gummitülle, TYCO	2	TYCO	172746 -1	Place in B2 and B8
AMP Gummitülle, TYCO	2	TYCO	172888-2	Place in B4 and B6
Recommended cable type		Habia	43739-031-02	Or equivalent cable type

## 5.5 Isolation

<b>X7.2, Isolation</b>				
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 outhur diameter Ø8mm
PG11/PG9 RS-Ms	1	Hummel	1.077.1109.01	
Loctite 243		RS	14.537.188	

## 5.6 Profibus

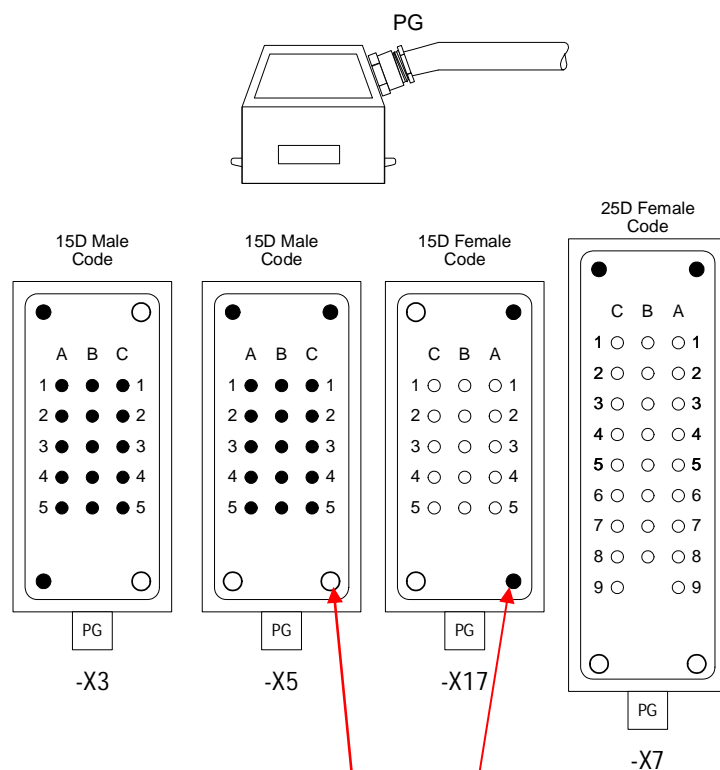
<b>X16, ETCS (Profibus)</b>				
Component	Number of pieces	Supplier	Order number	Comments
Han D F Crimp Contact Au AWG 16	6	Harting	09 15 000 6221	
HAN 8D FEMALE INSERT CRIMP	1	Harting	09 36 008 3101	
Han 3 EMC Hood Angled Entry 2 Pegs PG 11	1	Harting	09 62 003 1640	
Screw M3x6 with Nylite for Han 3A 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 outhur diameter Ø8mm
PG11/PG9 RS-Ms	1	Hummel	1.077.1109.01	
Loctite 243		RS	14.537.188	

## 5.7 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	Depend 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 outhur diameter Ø12mm
Hummel: PG16/PG13,5 RS-Ms	1	Hummel	1.077.1613.01	
Loctite 243		RS	14.537.188	

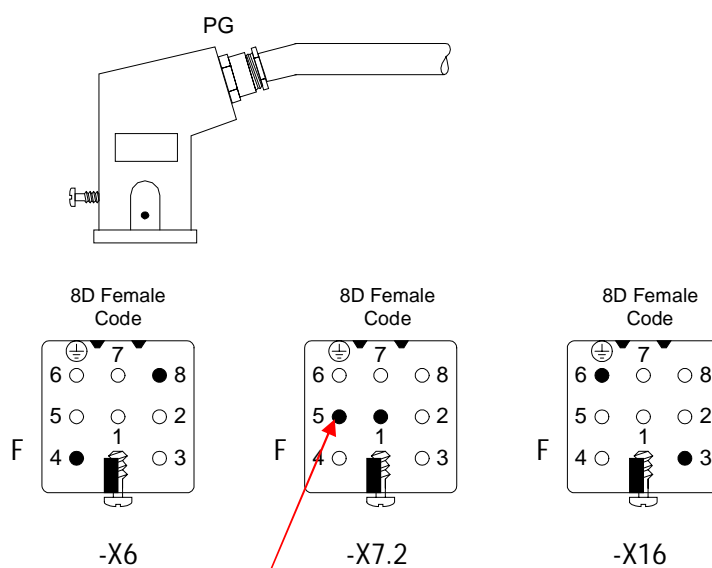
## 6 Coding of multi connectors at DK-STM cubicle

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



● Han Coding System Guide Pin, 09 33 000 9908

○ Han Coding System Bushing 09 33 000 9909

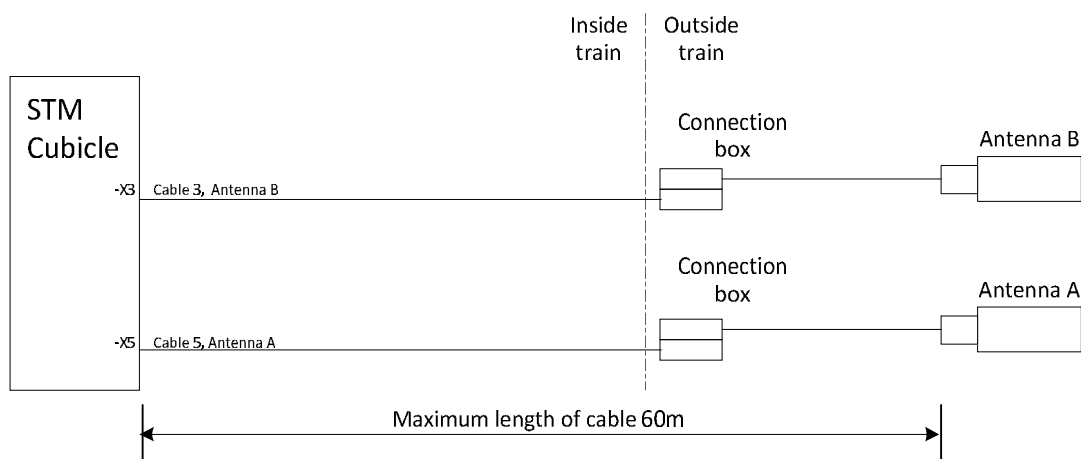


● Hex socket set screws, BN621M3x20

## 7 Installation of DK-STM in vehicles without DK-ATC

The requirements and installation of DK-STM in vehicles without DK-ATC are the same as for vehicles with DK-ATC.

When the vehicle don't have DK-ATC it is necessary to install an ATC-Antenna and an ATC Antenna Connection Box in each end of the train.



### 7.1 ATC Antenna

It is possible to use two different ATC-Antenna



Figure 7: Antenna (ZKS)

Further information see [S25441-M1-A3]



Figure 8: Antenna (NF-ZKS) Max 160km/h

Further information see [S25441-M2-A4]

## Antenna connection Box



**Figure 9: Antenna connection Box**

Further information see [V25132-A1-A25]

## 8 Functional Test

After the installation, the correct function of all interfaces of the DK-STM must be tested. The functional test is performed by performing the “Dokumenteret Slutafprøvning”, [AN 656.00 Q4446].