13.2 Connecting the Radio Cable

Warning!

The radio cable must not be connected to voltage during the connection procedure.

This section describes how to connect the radio cable to the indoor unit. The station radio cable, included in the delivery, is used for connection between the radio cable and the MMU2.

The radio cable is normally connected to the station radio cable by a mounting bracket (included in the radio unit delivery). An optional radio cable panel can be used when connecting several radio cables.

Installation Alternatives

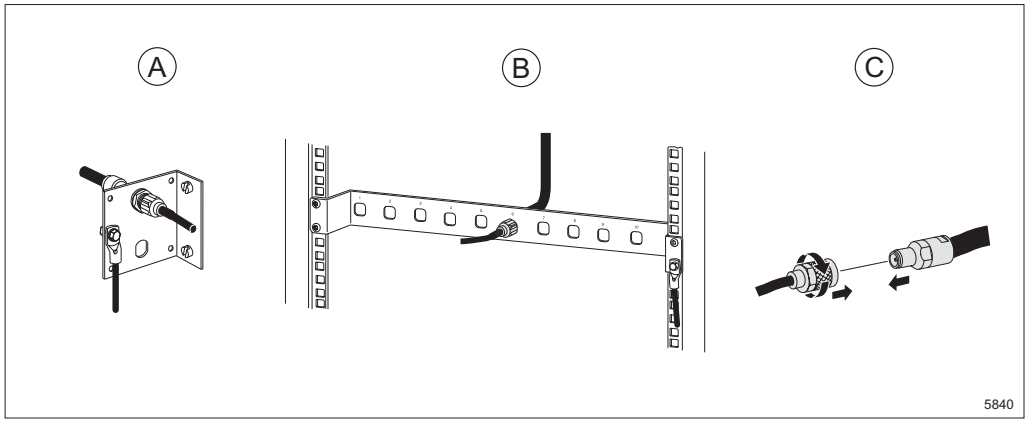


Figure 150 Installation alternatives for the radio cable

- Connecting a Ø10 mm (3/8") radio cable using a mounting bracket **A**, see Section 13.2.1 on page 146.
- Connecting a Ø10 mm (3/8") radio cable using a radio cable panel **B**, see Section 13.2.2 on page 148.
- Connecting a Ø16 mm (1/2") or Ø28 mm (7/8") radio cable **C**, see Section 13.2.3 on page 148.

13.2.1 Connecting a Ø10 mm (3/8") Radio Cable Using a Mounting Bracket

This instruction describes how to connect the radio cable to the station radio cable using a mounting bracket and an adapter, both included in the radio delivery.

Connecting the Radio Cable in a Rack

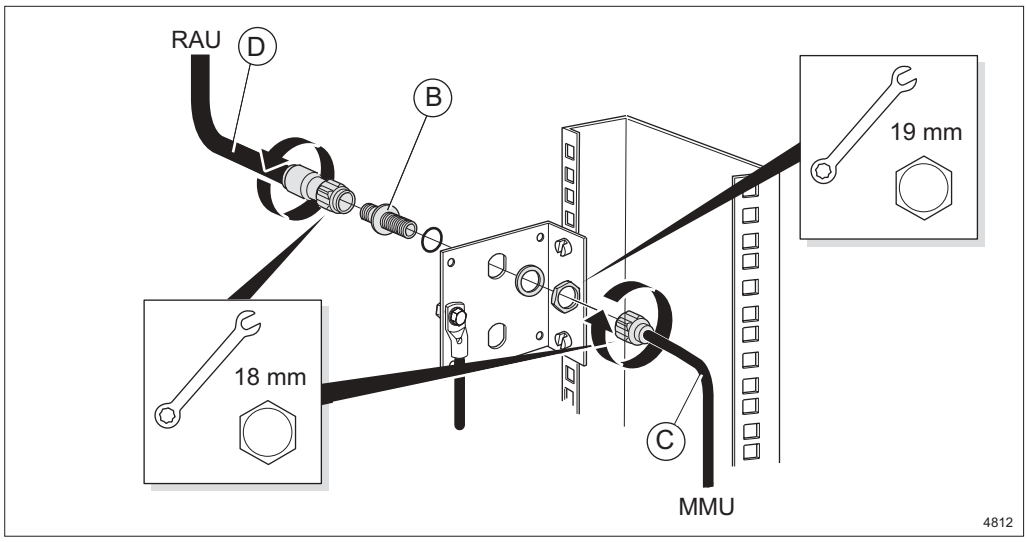


Figure 151 Fastening the station radio cable and radio cable to the adapter

1. Fasten the adapter **B** to the bracket with the nut and the washer.
2. Connect the station radio cable **C** and the radio cable **D** to the adapter.

Connecting the Radio Cable in a Cabinet (Optional)

This instruction applies to a mounting bracket that is fastened to a cabinet.

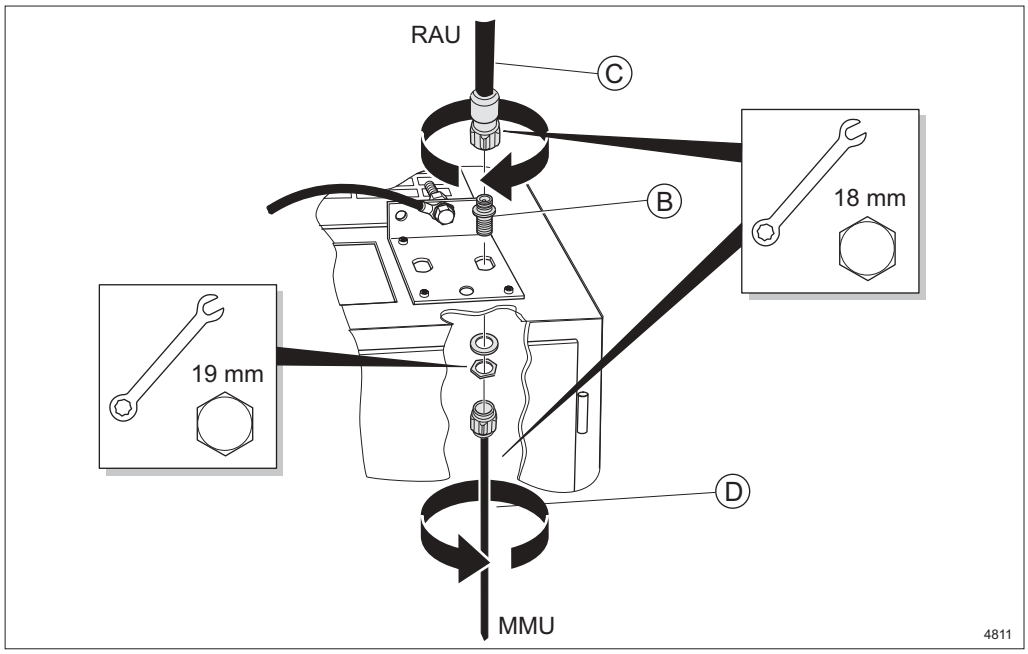


Figure 152 Fastening the station radio cable and radio cable to the adapter

3. Fasten the adapter **B** to the bracket with the nut and the washer.
4. Connect the radio cable **C** and the station radio cable **D** to the adapter.

13.2.2 Connecting a Ø10 mm (3/8") Radio Cable using a Radio Cable Panel

This instruction describes how to connect the radio cable to the station radio cable using a radio cable panel. The adapter used for the connection is included in the radio cable connector kit.

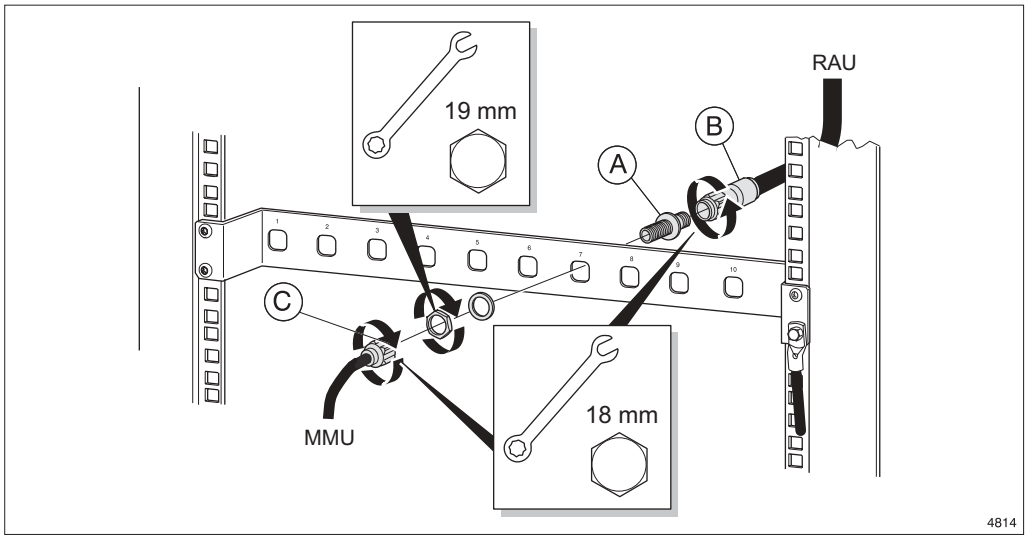


Figure 153 Connecting the radio cable

1. Fasten the adapter **A** to the radio cable panel with the nut and the washer.
2. Connect the radio cable **B** and the station radio cable **C** to the panel.

13.2.3 Connecting a Ø16 mm (1/2") or Ø28 mm (7/8") Radio Cable

The radio cable is connected directly to the station radio cable.

Connecting the Radio Cable to the Station Radio Cable

Note: If the radio cable has to be grounded indoors, use the appropriate earthing kit.

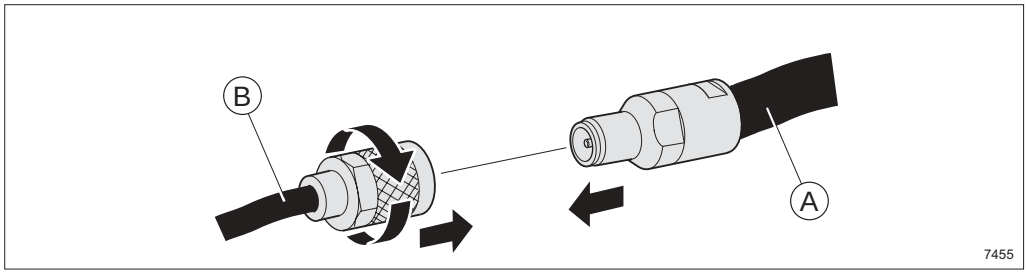


Figure 154 Connecting the radio cable to the station radio cable

1. Connect the radio cable **A** to the station radio cable **B**.

14 Software Setup

14.1 Finishing the Initial Setup

After the indoor and outdoor installations have been made and the antennas have been aligned, the initial setup must be finished by setting some basic NE parameters. This can be done either manually or automatically by downloading a configuration file. See *MINI-LINK TN ETSI Online Help* for more information.

14.2 Configuration Management

When the initial setup is completed, the remaining configurations such as configuration of plug-in units, interfaces and traffic routing have to be made. See *MINI-LINK TN ETSI Online Help* for more information on configuration management.

15 Local Supervision and Troubleshooting

This section describes local supervision and some basic troubleshooting.

15.1 Local Supervision

The unit fronts hold LEDs for fault indication and a BR button for unit replacement. Table 14 on page 152 describes the primary function of each LED. The LEDs can also be combined to indicate a fault or a state. See Section 15.1.1 on page 152 for more information.

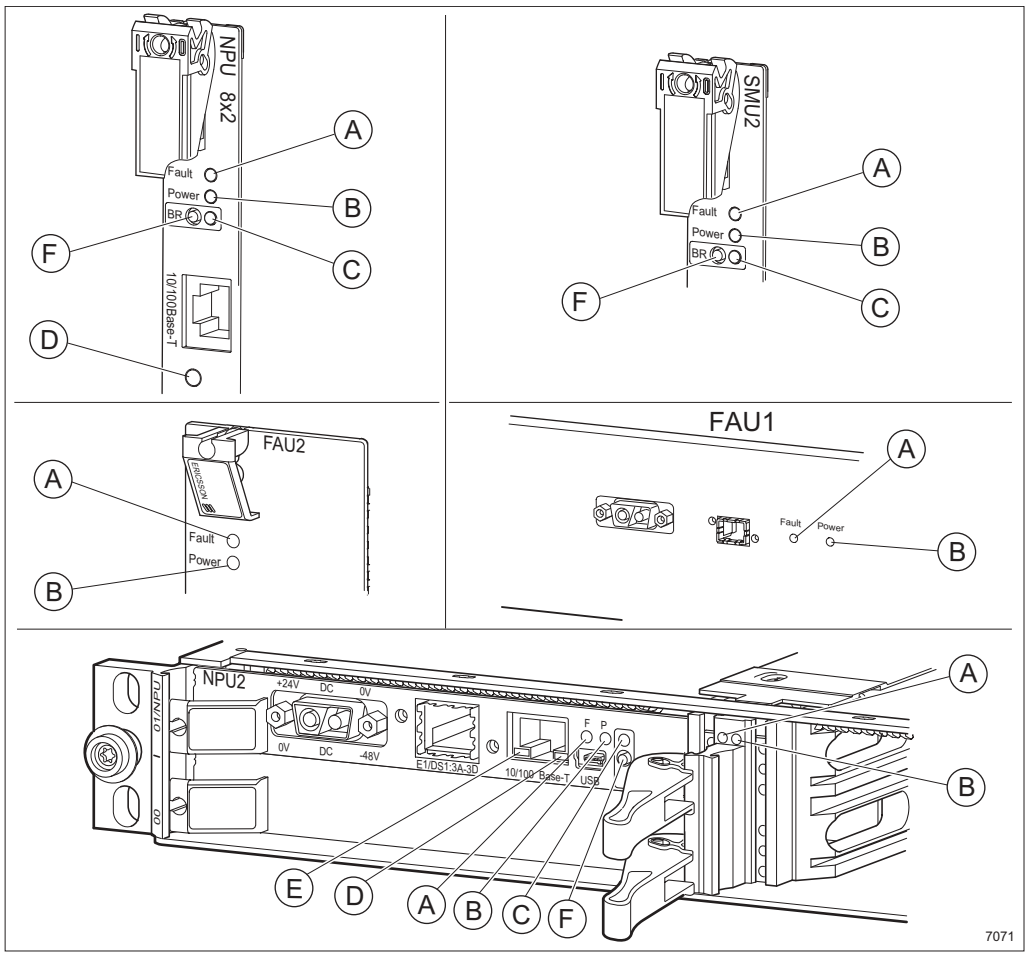


Figure 155 Unit fronts

Table 14 LED description

Item	LED	Description
A	Fault (red)	Fault indication
B	Power (green)	Power indication
C	BR (yellow)	OK to replace indication
D	Ethernet (yellow)	Carrier sense / data transmission indication
E	Ethernet capacity (green)	Indicates 100 Mbit/s Ethernet connection. The LED is OFF when connected to 10 MBit/s.

Table 15 BR button description

Item	Button	Description
F	BR	When pressed it is a request to take the plug-in unit out of service. The plug-in unit may then be removed when the BR LED **C** is ON.

15.1.1 LED Indications during Operation

Table 16 LED indications during operation

Plug-in unit	Fault (red) LED	Power (green) LED	BR (yellow) LED	Description
All	–	ON	–	Power OK
All	ON	–	–	Faulty unit
All	OFF	OFF	OFF	Non-redundant power: - Loss of incoming power - PFU failure
All – except FAU1 and FAU2	–	–	ON	Plug-in unit may be removed
PFU1	ON	OFF	–	Redundant power: - Loss of incoming signal - PFU1 failure
All – except NPU	OFF	ON	OFF	Power up

Table 16 LED indications during operation

Plug-in unit	Fault (red) LED	Power (green) LED	BR (yellow) LED	Description
NPU	ON	ON	ON	NE/NPU power up
	ON	ON	OFF	NE/NPU restart – during self test
	–	ON	FLASH-ING	Node/NPU installation mode
	FLASH-ING	–	–	NE failure (busses)

15.2 Troubleshooting

This section describes what actions to take to remedy any faults occurring during installation. For each fault, carry out the remedial actions in the sequences described until the fault is cleared.

15.2.1 Power Failure

Table 17 Remedies for power supply failure

Power (green) LED indication	Possible cause	Remedy
OFF	No power supply	All – except PFU1, PFU2, and NPU2 • Check that the power LED on the PFU/NPU2 is ON. • Remove and insert the unit(1). Check that the unit is properly inserted and secured in the AMM. • Check the equipment status using the LCT. • Replace the unit.(1)
		PFU1, PFU2 and NPU2 only: • Disconnect the power cable and check that the DC power supply is within the specified range. • Check that the units restart after the PFU/NPU2 is reconnected. • Check that the system has not been exposed to excessive ambient temperature or that there is a fan failure. • Replace the PFU/NPU2(1) . See also Section 15.2.6 on page 162 for more information on PFU. • If there still is a power failure, see Section 15.2.3 on page 156.
		FAU1: • Check that the Power LED on the PFU is ON. • Check the fuse. The fuse is found at the front of the interface connection field when using an ICF1, see Section 15.2.4 on page 157. • Replace the FAU1.

(1) see MINI-LINK TN ETSI Online Help for instructions.

15.2.2 Unit Failure

Table 18 Remedies for faulty unit

Fault (red) LED indication	Possible cause	Remedy
ON	Incorrectly inserted or faulty units	All units – except FAU1, FAU2 and FAU4. • NPU only: check that the NE is not booting by waiting approximately 2 minutes. • Check that the unit is fitted in the correct position. See Section 5.5 on page 49 for AMM 20p, Section 7.2 on page 79 for AMM 6p and Section 9.2 on page 108 for AMM 2p. • Remove and insert the plug-in unit(1). Check that the plug-in unit is properly inserted and secured in the AMM. • Check the equipment status using the LCT. • Replace the plug-in unit.(1)
		FAU (FAU1, FAU2 and FAU4): • Check that the air flows through the AMM without obstruction. • Check that the surrounding air temperature is within specified values. • Check that all fan elements are working and revolving with the same speed. • Replace the FAU.

(1) see MINI-LINK TN ETSI Online Help for instructions.

15.2.3 NE Failure

Connect the LCT and check the NE/unit status for each step.

Table 19 Remedies for NE failure

Fault (red) LED indication on the NPU	Possible cause	Remedy
Flashing	NE failure (busses)	• Switch the power supply on and off by removing the DC cable(s) from the PFU(s)/ NPU2. • Switch off the power supply and remove all units (1). • Inspect the backplane for damages such as bent pins. • Insert the PFU and NPU (NPU2 for AMM 2p), and switch on the power. • Replace the NPU if the Fault LED is still flashing • Replace the AMM, if the Fault LED is still flashing • Insert one unit at a time and check if the Fault LED starts flashing. • Remove the unit causing the failure. • Switch the power supply on and off by removing the DC cable(s) from the PFU(s)/NPU2. • Insert a new unit of the same kind and continue inserting the rest of the units. • Connect one cable at a time while checking for failure.

(1) see MINI-LINK TN ETSI Online Help for instructions.

15.2.4 Replacing a Fuse on the ICF1

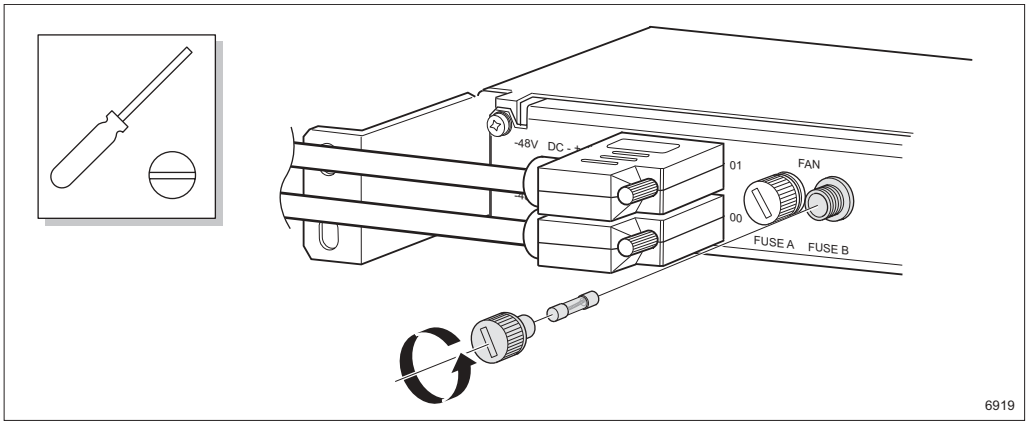


Figure 156 Replacing a fuse

1. Unscrew the fuse cartridge and replace the faulty fuse. See Section 4.1 on page 21 for information on fuses.

2. Fit the fuse cartridge.

15.2.5 Replacing the FAU4

This section describes how to replace the FAU4 without disconnecting the cables.

1. Slacken the cables, for example by cutting the straps.

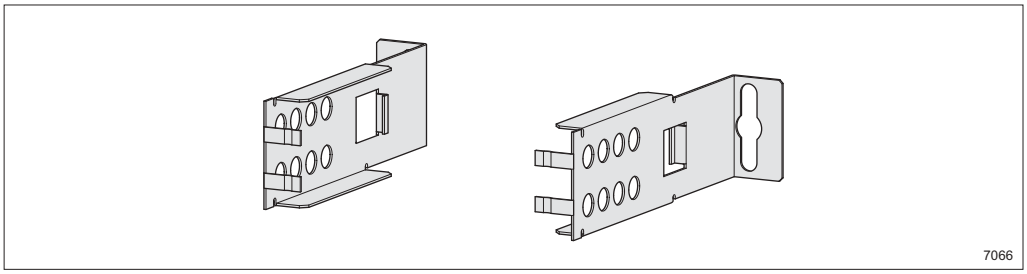


Figure 157 The service brackets

2. Make sure the service brackets, included in the FAU4 delivery, are at hand.

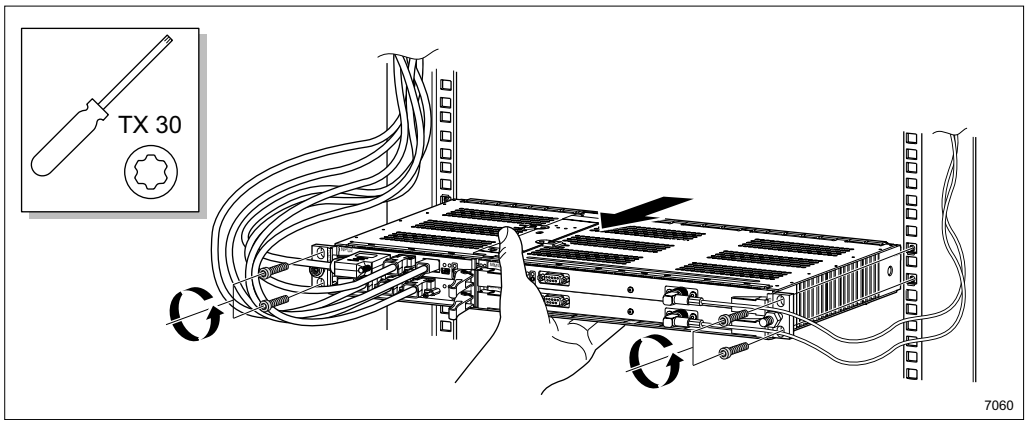


Figure 158 Pulling out the AMM

3. Undo the four screws and pull out the AMM while supporting it from underneath.

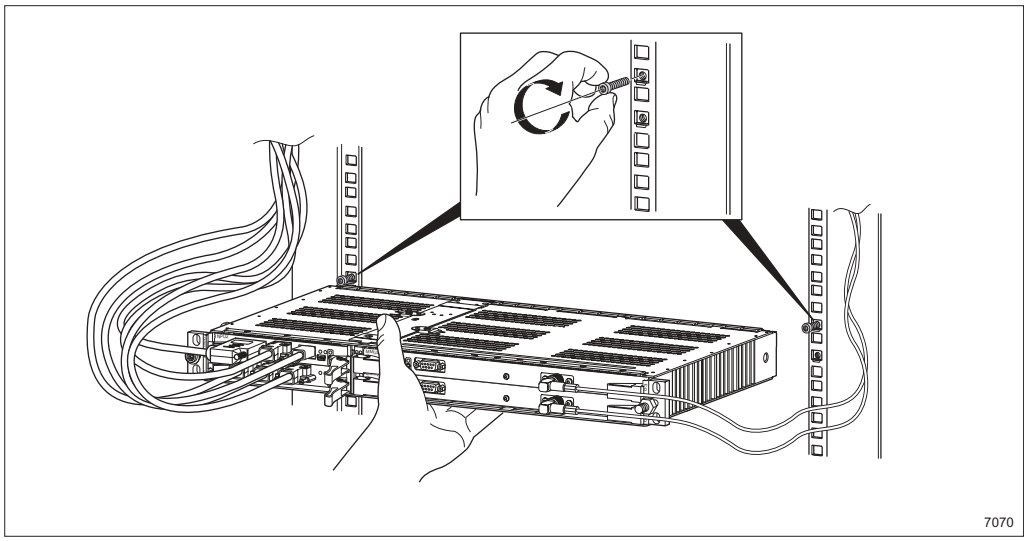


Figure 159 Fitting the screws in the upper holes

4. Fit screws in the upper holes.

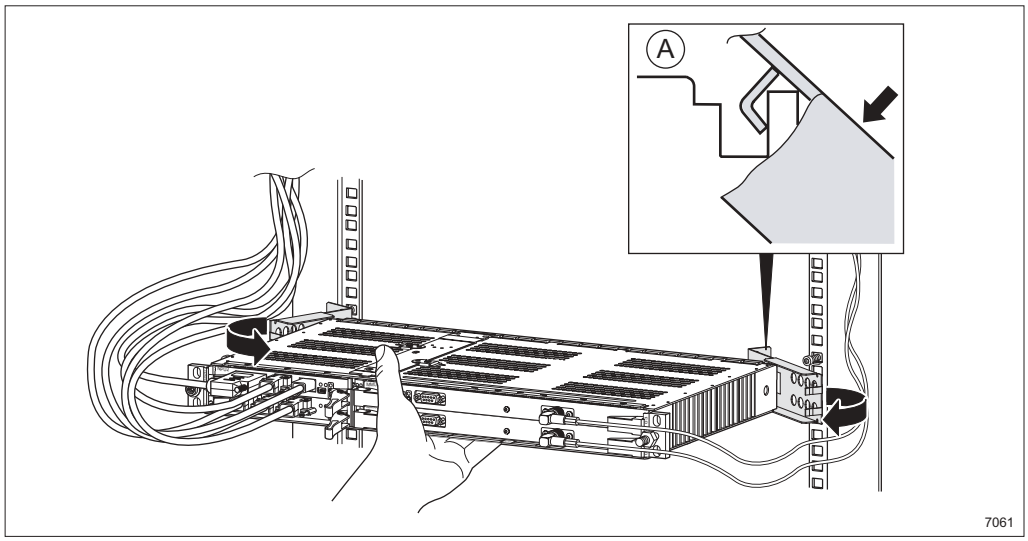


Figure 160 Fitting the service brackets

5. Attach the service brackets by fitting them to the back **A** of the AMM and then pushing them together, so that they clasp around the AMM.

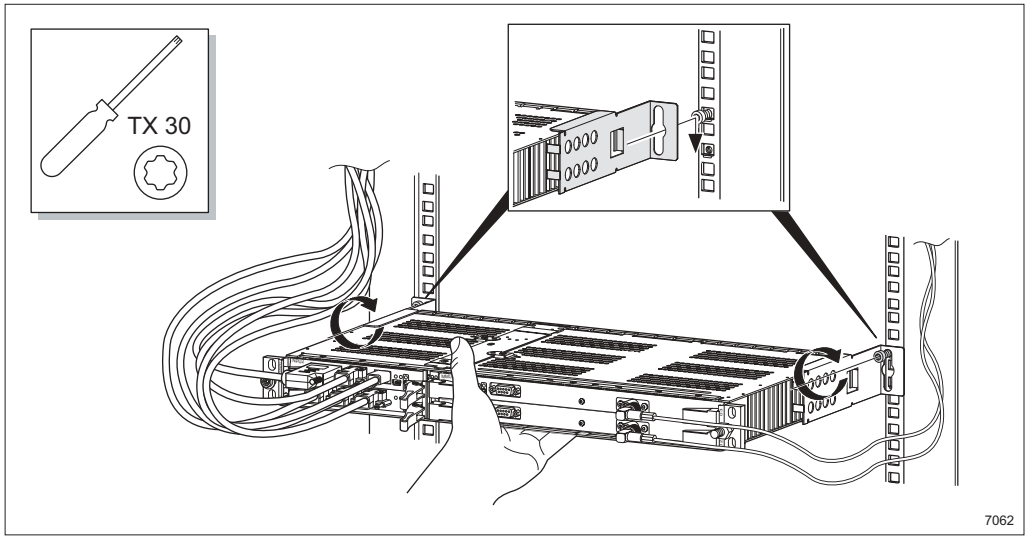


Figure 161 Tightening the AMM

6. Hook on the AMM and tighten it to the rack.

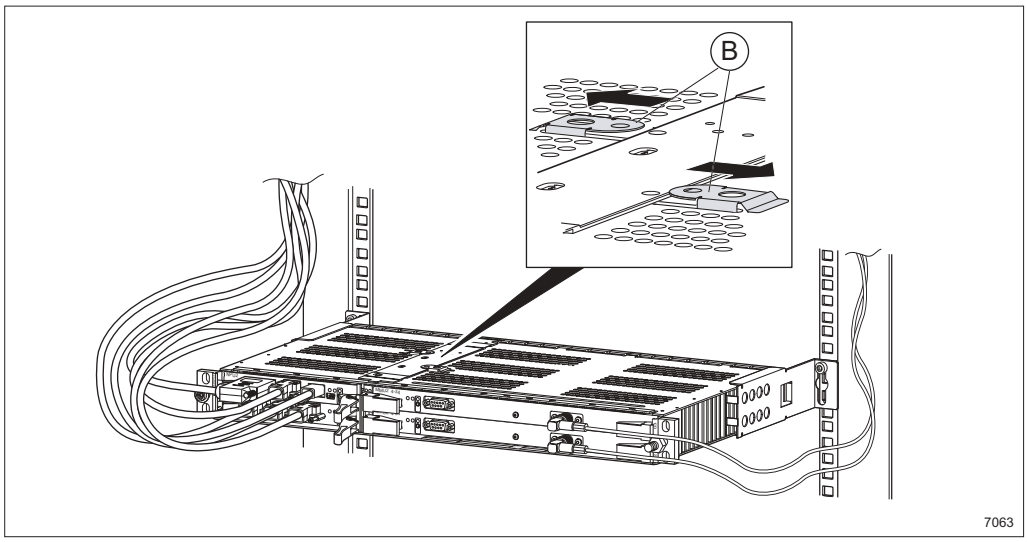


Figure 162 Unlocking the FAU4

7. Unlock the FAU4 by pressing the two locking plates **B** outwards.

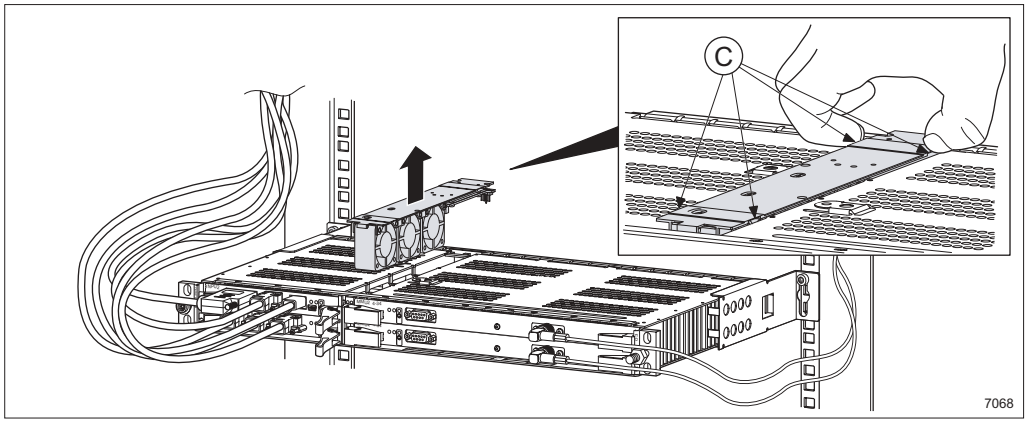


Figure 163 Lifting out the FAU4

8. Lift the FAU4 straight up. There are four indentations **C** that can be used.

   Note: The time it takes for removing the faulty FAU4 and inserting a new must not exceed 60 seconds to avoid overheating.

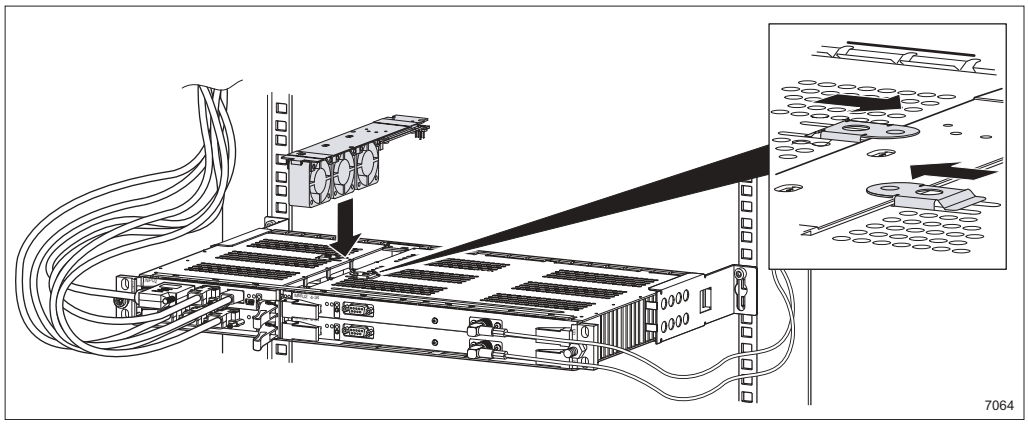


Figure 164 Fitting the FAU4

9. Fit the new FAU4 and lock it by pressing the two locking plates inwards until they lock into place.

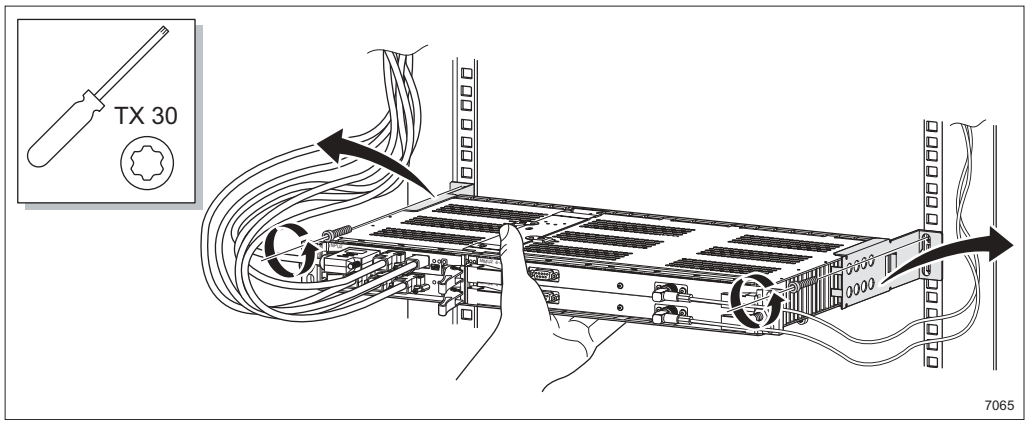


Figure 165 Removing the service brackets

10. Undo the two screws and remove the service brackets while supporting the AMM.

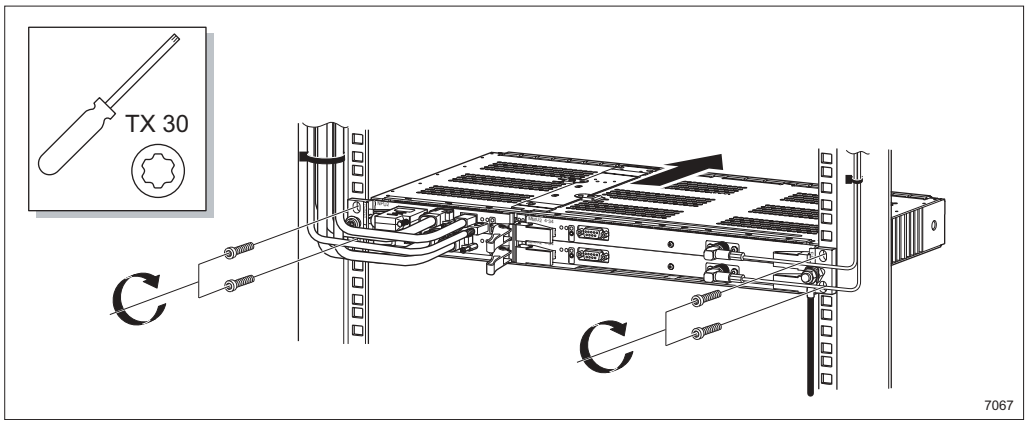


Figure 166 Fitting the AMM

11. Fit the AMM to the rack and tighten the four screws.

12. Strap the cables.

15.2.6 Additional Information on PFU1 and PFU2

PFU1 and PFU2 are equipped with ceramic fuses **A**. These fuses must ***not*** be replaced since a blown fuse indicates a severe fault on the plug-in unit.

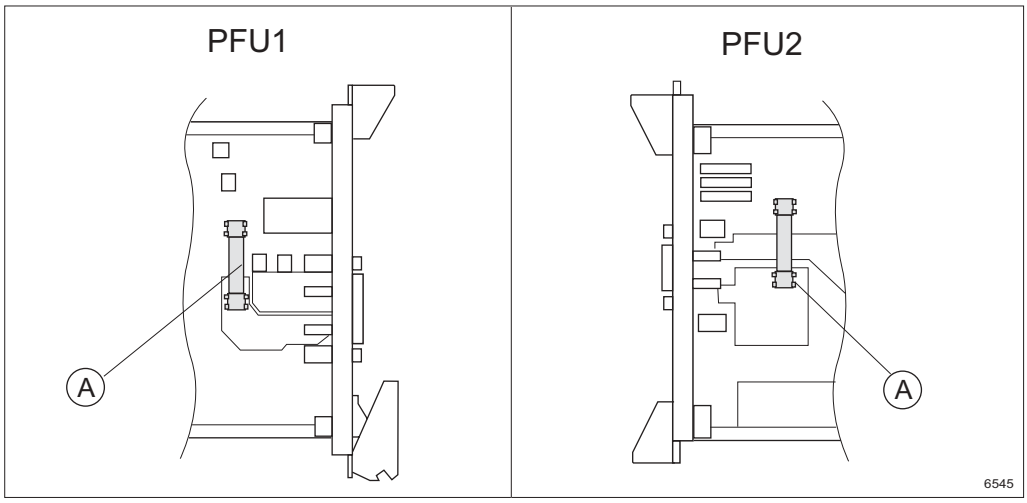


Figure 167 Position of the ceramic fuses on PFU1 and PFU2

Table 20 Positions and product numbers for the ceramic fuses

Plug-in unit	Position on board	Product number
PFU1	F202	NGH 311 02/30
PFU2	F203	NGH 257 05/10

16 Functional Test

The purpose of the functional test is to verify that the installation has been done properly. Perform the tests applicable to your configuration and record the results in the test record.

16.1 Preparations

All hardware must be installed and configured and the antennas must be aligned for maximum received level before making the tests.

16.1.1 Test Equipment

- LCT (Local Craft Terminal)
- MSM Software
- BER tester for 2 Mbit/s
- Digital voltmeter
- Optional RF power meter

16.1.2 Site Installation Documentation (SID)

Make sure the SID, filled out during the planning phase and supplied by the design department, is available.

Complete the SID and record type, serial number, hardware revision, software revision and any additional information for the equipment installed.

16.1.3 Test Record

Find the documents “MINI-LINK TN Functional Test Network Element” and “MINI-LINK TN Functional Test Radio Terminal” later in this section.

16.2 Network Element (NE) Tests

Test 1: DC Supply

Purpose: To verify that the correct DC power is fed to the PFU/NPU2 and to check redundancy functionality (AMM 20p).

- Disconnect the DC cable(s) which connect(s) to the PFU/NPU2 and measure the primary DC voltage using a digital voltmeter.
- Connect the DC cable(s) and check that all LEDs are OK (only Power LEDs should be ON) after the system has restarted.
- AMM 20p with two PFU1s: Disconnect the DC cable for one of the PFU1s. Check that the power supply is not disrupted and that the alarm is activated in the LCT. Repeat the procedure for the second PFU1.

Test 2: NE Setup Parameters

Purpose: To verify that the correct parameters are used.

- Generate a configuration and inventory report using the LCT and check that all setup parameters are set according to the SID. The following parameters must be checked:
  - Inventory data
  - NE configuration
  - Unit configuration
  - Interface configuration
  - Protection
  - Traffic Routing

Test 3: Traffic Cable Test

Purpose: To verify that the traffic cables are functioning and that the traffic is running properly without any bit error.

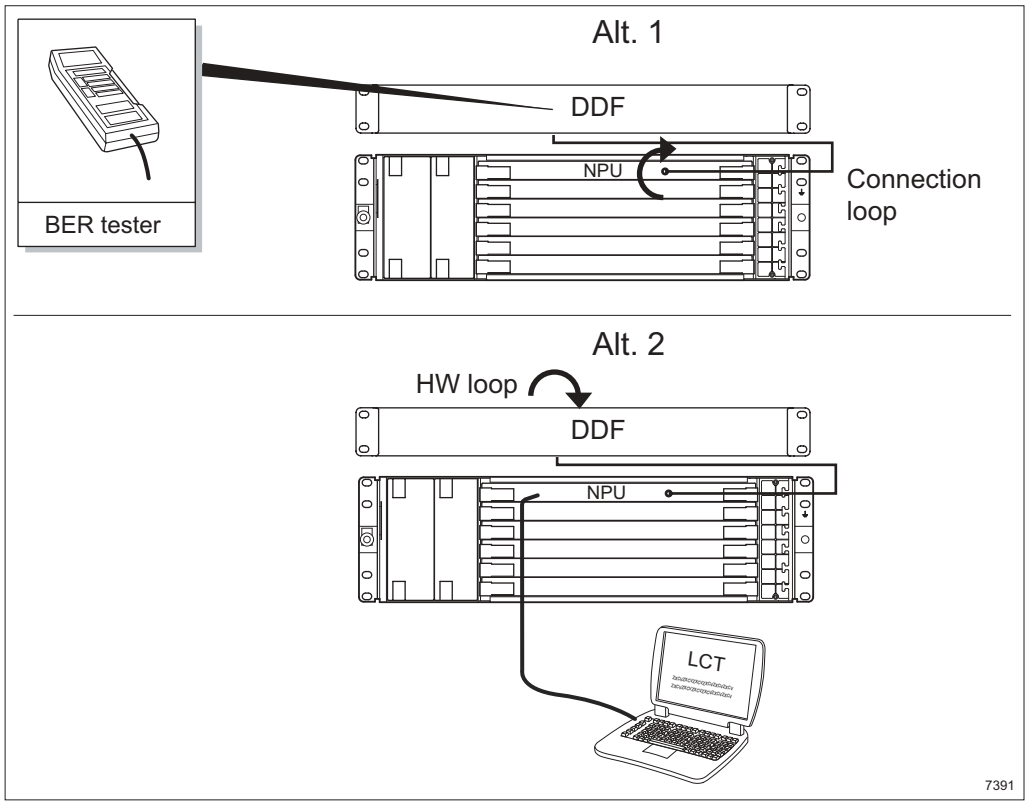


Figure 168 Example of traffic cable testing

- Set a connection loop using the LCT (Alt. 1) or make a HW loop (Alt. 2) on the interface the cable is connected to.
  - Alt. 1: Connect the BER tester to the tributary (E1) to be tested and check that the signal is looped back without any alarms.
  - Alt. 2: Start the built-in BER tester for the tributary (E1) to be tested and check that the signal is looped back without any alarms.
- Repeat the test procedure for each tributary.
- Remove the loop.

Test 4: Traffic Routing Test

Purpose: All traffic routing is checked by comparing the routing list in the configuration report with the installation data form, but all possible E1 routings should be tested as described below.

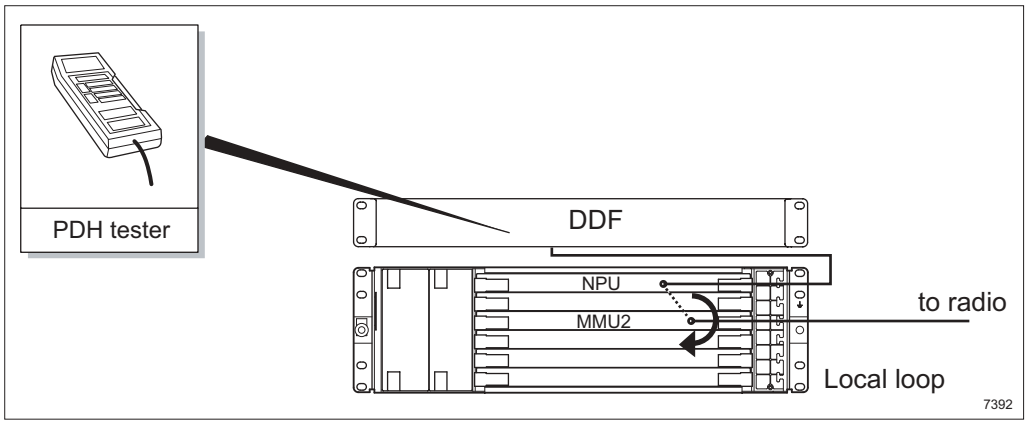


Figure 169 Example of traffic routing testing

- Follow the same procedure as described for the traffic cable test but with a local loop set on the interface the traffic is routed to.

Test 5: Fan Alarm Test

Purpose: To verify the fan alarm connection.

- AMM 20p: Disconnect the DC cable for the FAU1. Use the LCT to check that the fan alarm goes active. Repeat the procedure if redundant power supply is used.
- AMM 6p: Pull out the FAU2 until it is disconnected from the backplane of the AMM. Use the LCT to check that the fan alarm goes active.
- AMM 2p: Pull out the AMM and remove the FAU4. Use the LCT to check that the fan alarm goes active. See Section 15.2.5 on page 157 for information on how to remove the FAU4 using the service brackets.

16.3 Optional NE Tests

Test 6: User In

Purpose: To verify external User In connections.

- Open or close the circuit (depending on configuration) for one of the User In ports to be used and check that the alarm goes active in the LCT.
- Repeat the procedure for the other User In ports to be used.

Test 7: User Out

Purpose: To verify external User Out connections.

- Using the LCT, open the User Output Configuration page for one of the User Out ports and make sure Operator Controlled is selected.
- Toggle between active and inactive state while measuring the cable with an Ohmmeter.
- Reset to the original configuration.
- Repeat the procedure for the other User Out ports to be used.

Test 8: 1+1 E1 SNCP Test

Purpose: To verify the 1+1 E1 SNCP protection.

- Using the LCT, select one of the 1+1 E1 SNCP protections in the List View.
- Check that the protection switching is working by disconnecting the active line.
- Repeat the procedure for the other 1+1 E1 SNCP protections to be used.
- Reset to the original configuration.

Test 9: DCN and Site LAN Test

Purpose: To verify the DCN and site LAN connection.

- Call the Operations and Maintenance Center (OMC) and ask them to check the DCN and site LAN connection.

16.4 Radio Terminal Tests

This section describes the test procedure for radio terminals. Use one record per terminal.

Test 10: Hop Setup Parameters

Purpose: To verify that the correct parameters are used.

- Check in MSM that all AM and Hop setup parameters are set according to the SID.

Test 11: Transmitter Output Power

Purpose: To verify that the output power corresponds to the value in the SID provided by the design department.

- If the output power has not been changed during the installation, enter the value from the factory test record. (No measurement is required).
- If the output power has been changed in MSM, enter that value. (No measurement is required).
- If the output power has been changed by insertion of a fixed attenuator, check that the output power has already been measured and entered in the test record. Otherwise, measure the output power with an RF power meter and enter the value (optional).
- Compare the value with the value provided by the design department. Contact the design department if they are not equivalent.

Test 12: RF Input Level

Purpose: To verify that the input level corresponds to the value in the SID provided by the design department.

Note: In a 1+1 system, the received level in each radio should be measured twice. Once with input signal from far-end radio 1, and once with input signal from far-end radio 2.

Note: The ATPC should be switched off during the test.

- Switch off the ATPC in MSM.
- Read the received RF input level. Enter the level in the test record. The design department provides the levels for both radios in a 1+1 system. Compare the received results with these values and enter them in the test record.
- Compare the RF input level with the level calculated during path planning. Consult the design department if the difference is more than 3 dB during unfaded conditions.
- Activate the ATPC in MSM.

Test 13: Interference Test

Purpose: To verify that there are no interfering signals, which can degrade the performance.

- Access the far-end terminal in MSM and switch the far-end transmitter off.

  Note: In a 1+1 system both transmitters must be switched off.

- Read the received RF input level and record the value in the test record. If the level exceeds -90 dBm, consult the design department. After the test has been performed, activate the transmitters again and restore the communication over the hop.

Test 14: Near Alarm Check

Purpose: To verify that the indoor and outdoor units are running properly.

- Check in MSM that no near-end alarms are active.

Test 15: Switch Test 1+1 Configuration

Purpose: To verify the switching function and the functionality of the redundant MMU2 and RAU.

- Set a far-end loop using MSM.
- To perform this test, make sure the radio 1 transmitter and receiver (Ra1) are active and that switch mode is set to auto. Connect the BER tester to the traffic interface and run the traffic.
- Disconnect the power to MMU2 Ra1 and verify, using MSM, that the system switches to the radio 2 transmitter and receiver (Ra2). Check on the BER tester that traffic is recovered after switching from Ra1 to Ra2.
- Repeat the switch test for Ra2 and MMU2 Ra2.
- Remove the far-end loop.

16.4.1 Hop Test

Test 16: Performance and BER Test

Purpose: To verify that the hop performance quality after a period of time in normal operation has not degraded.

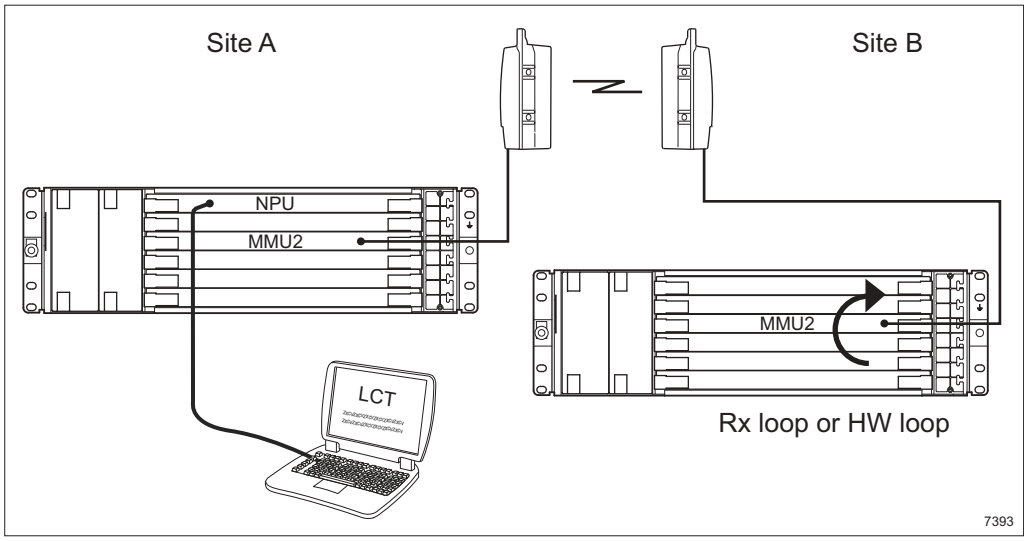


Figure 170 Example of a performance test

- At the far-end terminal, make a HW loop or set an Rx loop using MSM .
- Start the built-in BER tester using the LCT and check that the E1 signal is looped back from the remote site without any bit error.
- Reset performance data for both sides of the hop using MSM.
- Reset and restart the BER tester. Check the BER result.
- Read the performance data for both terminals after 15 minutes.
- If there is no degradation of performance, the hop is OK. If required, the hop can be tested for a 24 hour period.
- Attach the test results to the test record after the test is completed.
- If the performance has been degraded, the measurement can be extended for another 15 minutes / 24 hours. If the performance is further degraded, check the path and the installation.

16.5 Storage of Configuration File

Test 17: Configuration File

Purpose: To verify that the configuration file is stored and accessible for future use.

- Make sure the configuration file is uploaded to the PC and stored as backup. See *MINI-LINK TN ETSI Online Help* for more information.

16.6 Start the System

Use the LCT to carry out the following:

- Make sure all BER tests are stopped.

Use MSM to carry out the following on the near-end and far-end terminals:

- Restore the terminal in the Terminal Management Window (Misc. menu)
- Reset the Alarm History and Performance in the Terminal Management Window (View menu)
- Reset the switch-over alarms, if active for a 1+1 terminal.

MINI-LINK TN Functional Test Record
Network Element

NE ID	NE name
Site ID	Site name
Ethernet IP address	Subnet mask

Test	Parameter	PFU1/PFU2/ NPU2	PFU1 (Redundant DC)
1	DC Supply	V	V

Test	Parameter	OK
2	NE Setup Parameters	☐

Test	Parameter	Pass	Fail
3	Traffic Cable Test	☐	☐
4	Traffic Routing Test	☐	☐
5	Fan alarm Test	☐	☐
6	User In	☐	☐
7	User Out	☐	☐
8	1+1 E1 SNCP Test	☐	☐
9	DCN and Site LAN Test	☐	☐

Test	Parameter	OK
17	Storage of Configuration File	☐

Comments:

	Signature	Print name	Title	Date
Performed by				
Approved by				

7456

Figure 171 Network Element Functional Test Record

MINI-LINK TN Functional Test Record
Radio Terminal

Hop ID			Hop name
Site ID			Far-end site ID
Site name			Far-end site name
Terminal ID			Far-end terminal ID
Terminal name	Unit position		Far-end terminal name
Ethernet IP address			Far-end Ethernet IP address
Subnet mask			Far-end subnet mask

Test	Parameter	OK
10	Hop Setup Parameters	☐

Test	Parameter	Unit	Ra1	Ra2 (1+1config. only)
11	Transmitter output power	dBm		
12	RF input level (far-end 1/ far-end 2)	dBm	/	/
13	Interference test	dBm		

Test	Parameter	Pass	Fail
14	Near alarm check	☐	☐
15	Switch test (for 1+1 configuration only)	☐	☐
16	Performance and BER test	☐	☐

Comments:

	Signature	Print name	Title	Date
Performed by				
Approved by				

6763

Figure 172 Radio Terminal Functional Test Record

17 Repair Handling

This section describes how to handle faulty units.

For expeditious handling of repairs, please complete and enclose the Failure Report together with the other requested documents (see shipping instructions below).

The Failure Report is found in this chapter and should be as detailed as possible for us to make an efficient and quick analysis. If no fault is found, the cost for a full system test will be charged.

17.1 Shipping Instructions

Follow the instruction below when sending MINI-LINK units for repair.

1. Pack the goods thoroughly.

2. Enclose a failure report giving information about the failure. Use the failure report which is found later in this chapter.

3. Send the goods to your Regional Logistic Center (RLC) if you have signed a service contract or contact your local Ericsson representative for shipping instructions.

MINI-LINK Failure Report

Date of report: _____ Date of failure: _____

Customer

After repair return to:

Goods address	Invoice address

Failure report

Unit name	Product no	Serial no	H/W Revision state
Configuration (1+0, 1+1 etc).			S/W Revision state

MECHANICAL DAMAGE ☐
DC FAILURE ☐
TRAFFIC FAILURE ☐
RF OUTPUT FAILURE ☐
RF INPUT FAILURE ☐
INTERMITTENT FAILURE ☐
NOT WORKING AT INSTALLATION ☐
UNKNOWN ☐

Detailed fault description:

Alarms noticed:

Location of faulty unit

Site name	
Name of opposite site	
Transmit frequency (MHz)/Channel	Traffic type (Mbit/s)
Start of operation, date	Latest previous failure on the same unit, date

Name: _____ Telephone No: _____

E-mail: _____

5504

Figure 173 MINI-LINK Failure Report

18 Cable Assembly Instructions

18.1 Assembling the DIG SC Cable

Applies to cable RPMR 102 15/3 and 25-pin D-sub connector SXK 111 517/1. Item **B** is delivered inside the connector casing.

Note: Two connector kits are required, one for each digital service channel.

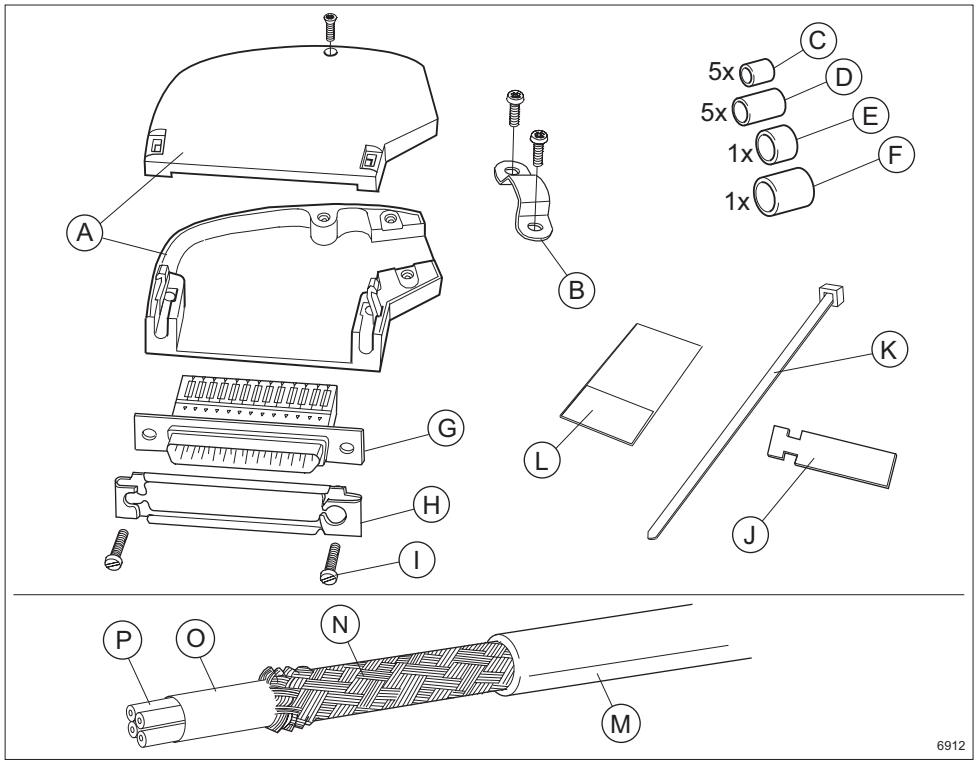


Figure 174 The 25-pin D-sub connector and 2-pair cable

Description

A	Connector casing	**G**	Contact socket	**M**	Jacket
B	Clamp	**H**	Sliding lock	**N**	Shield
C	Tube Ø5.9 mm	**I**	Screw	**O**	Aluminum sheet
D	Tube Ø7.6 mm	**J**	Marking tag	**P**	Wire
E	Tube Ø8.4 mm	**K**	Strap		
F	Tube Ø10.3 mm	**L**	Marking tape		

Trimming

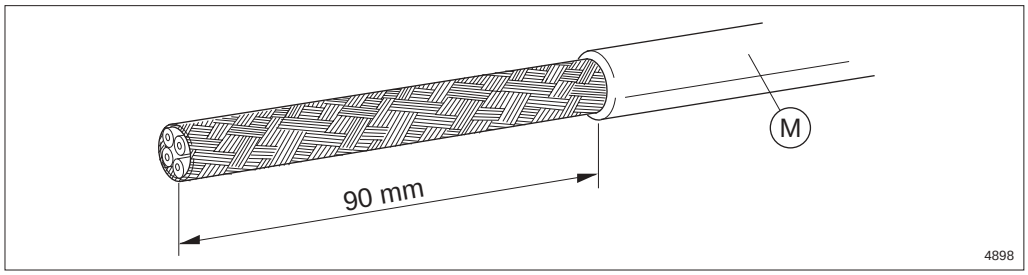


Figure 175 Stripping the cable and cutting off the drain wire

1. Strip the jacket **M** approximately 90 mm.
2. Cut off the drain wire.

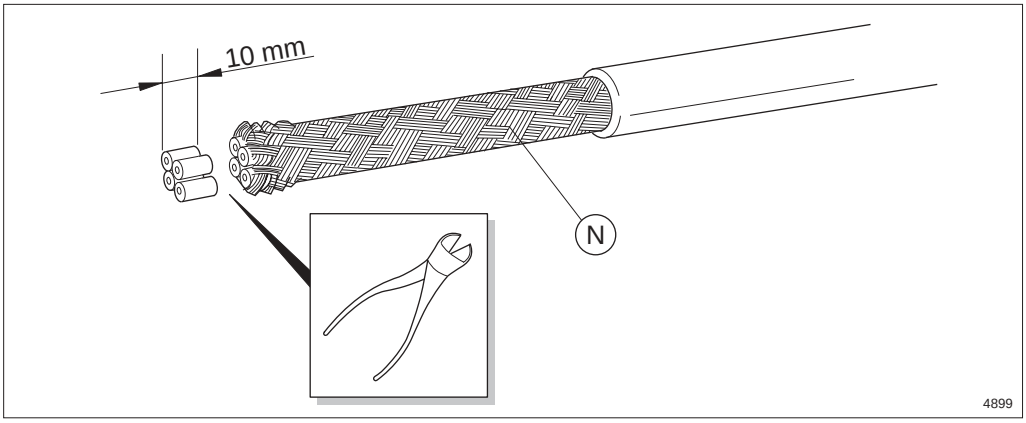


Figure 176 Cutting the wires

3. Push the shield **N** back and cut the wires 10 mm.

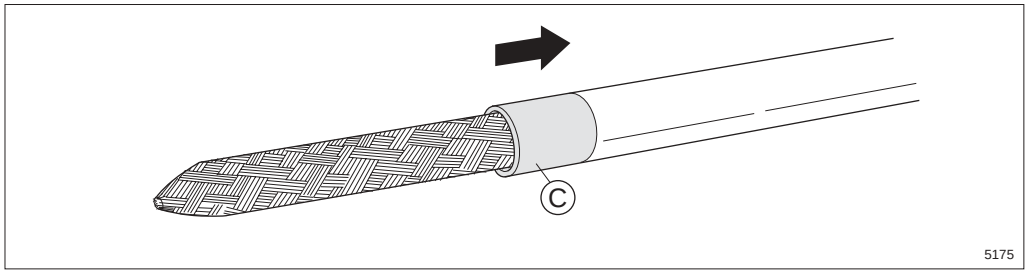


Figure 177 Fitting the tube

4. Pull the shield down towards the cable end (it makes it easier to slide on the tube) and slide the tube **C** (Ø5.9 mm) onto the cable until it butts up against the jacket.

Note: Included in the connector kit are tubes **C** – **F** to suit different cable alternatives; therefore, there will always be tubes left over when the cabling is done. Tubes **E** and **F** are not used for this application. Make sure to use the proper pair of tubes.

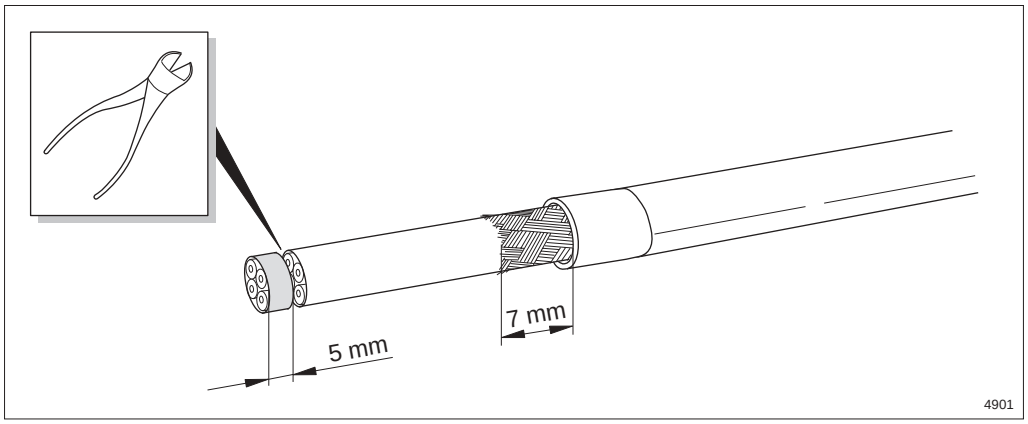


Figure 178 Cutting the wires and shield

5. Cut the shield to 7 mm.
6. Cut the wires 5 mm.

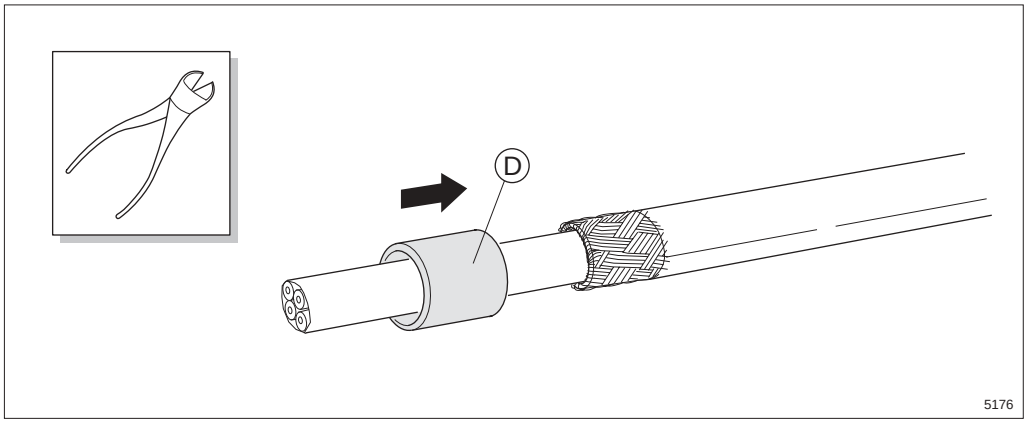


Figure 179 Folding the shield over the tube

7. Fold the shield back over the tube and trim the shield.
8. Slide the tube **D** over the folded shield.

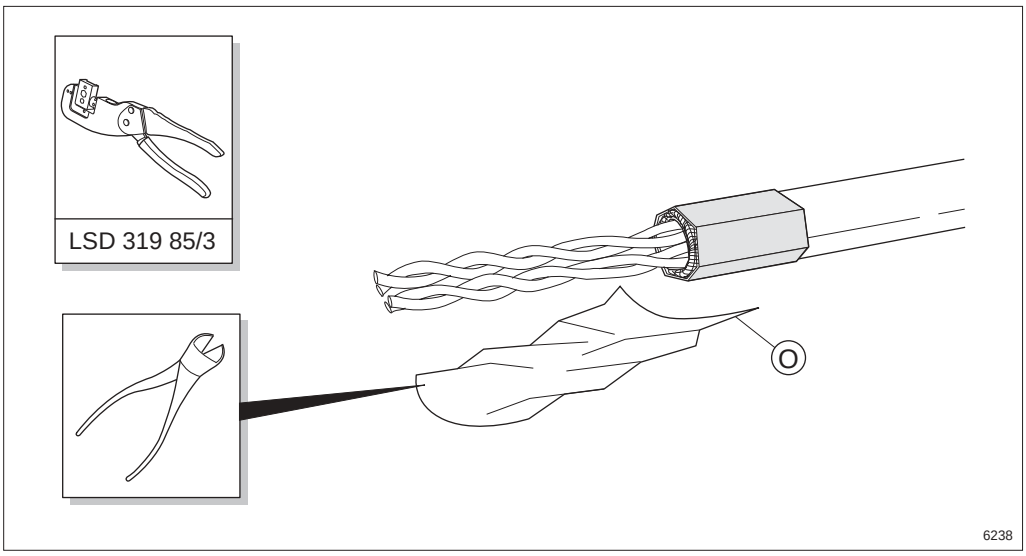


Figure 180 Crimping the tube

9. Crimp the tube with the crimping tool (cavity 9.12 mm).
10. Cut off the aluminum sheet **O**.

    Note: Keep the wires twisted in pairs.

Assembling

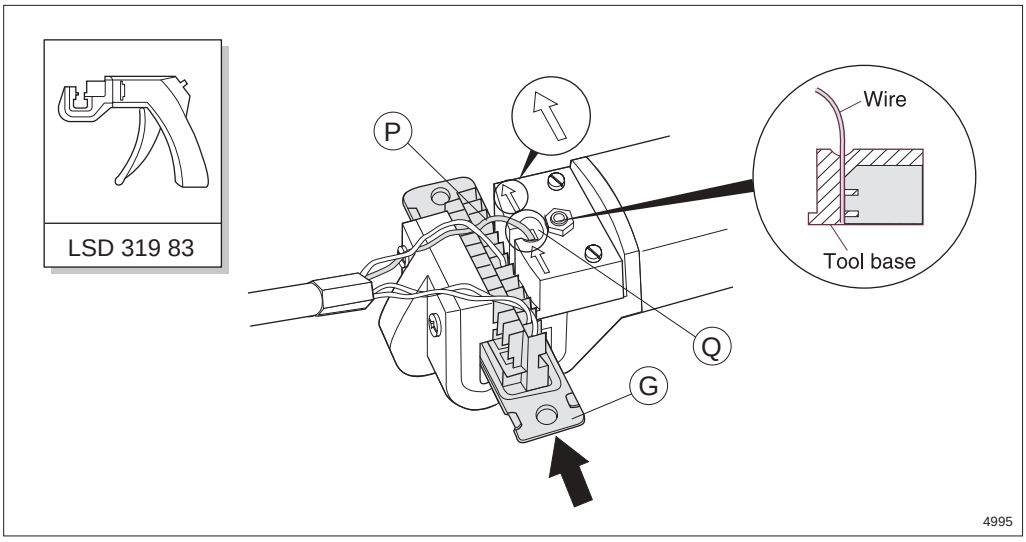


Figure 181 Crimping a wire

11. Insert the contact socket **G** from the left (arrow direction in the figure above) into the feeder channel of the terminating tool until the desired connector pin faces the wire slot **Q**.
12. Insert an unstripped wire **P** into the wire slot until the wire bottoms on the tool base. Table for pin connections is found in Section 19.6 on page 244

and information on digital service channel interconnections for MINI-LINK E is found in *MINI-LINK E ETSI Indoor Installation Manual*.

Note: Ensure the wires are connected in pairs and inserted into correct cavities.

13. Center the wire in the wire slot. Squeeze the handle until the inserter bottoms.

14. Release the handle. The inserter will retract and the connector will advance to the next connector pin. Connect all the wires to the contact socket in the same way. Remove the connector from the right side of the feeder channel.

Removing a Wire

This section only applies if a wire is connected improperly.

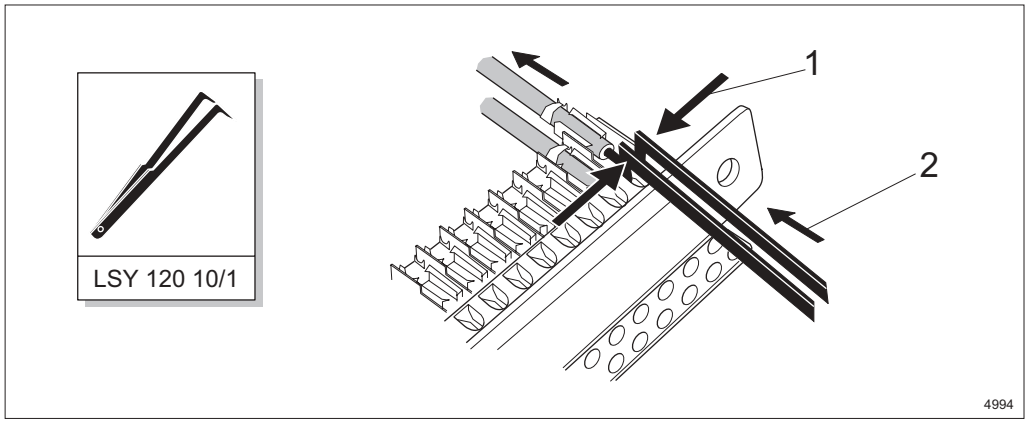


Figure 182 Removing a contact pin

15. Remove the contact pin by using the extraction tool on the contact pin. Press the extraction tool together **1** and push it upwards **2**.

16. Insert the contact pin in the correct position.

Assembling

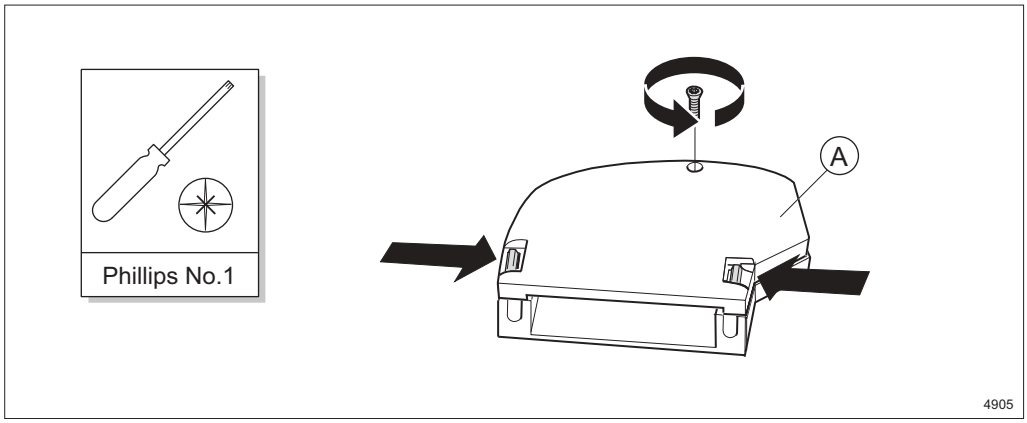


Figure 183 Opening the connector casing

17. Open the connector casing **A** by removing the screw, pushing the two plastic springs together and lifting the casing halves apart.

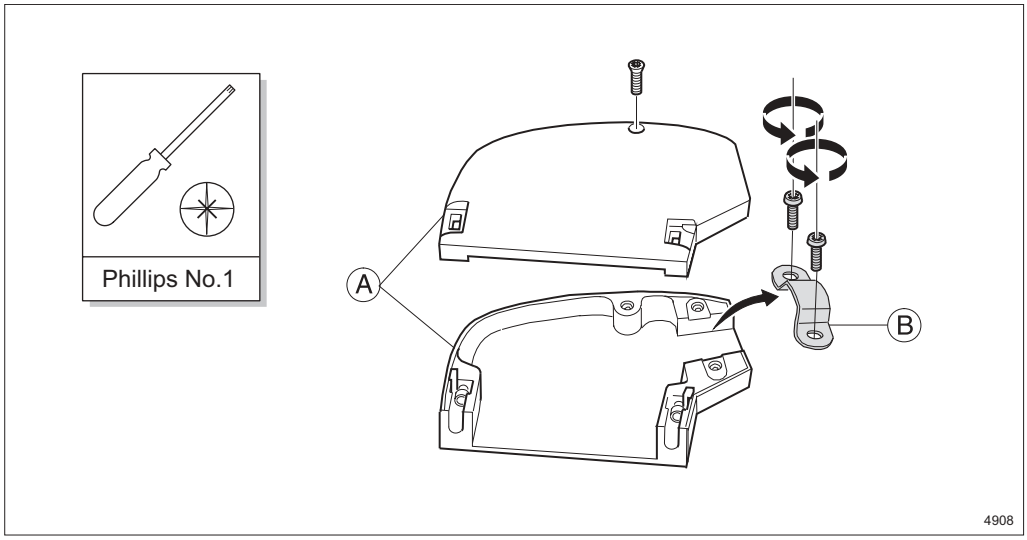


Figure 184 Removing the clamp

18. Remove the clamp **B** from the connector casing **A**.

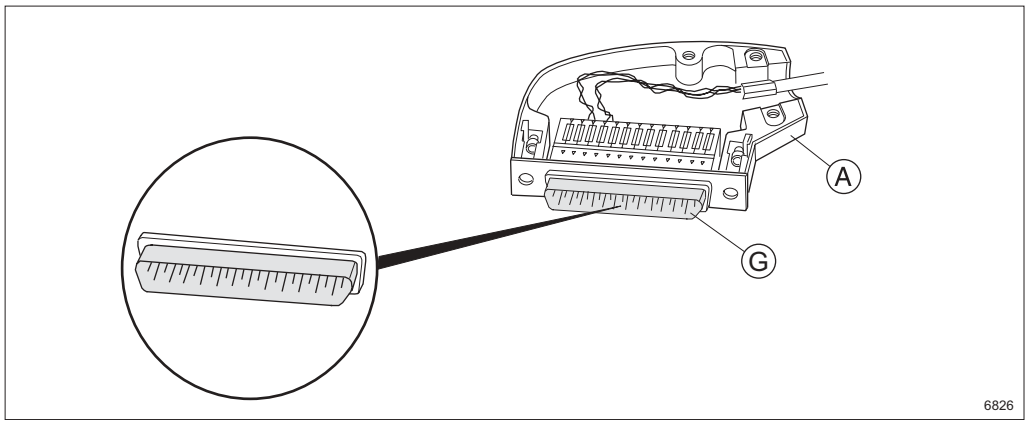


Figure 185 Fitting the contact socket in the connector casing

19. Place the contact socket **G** in the connector casing **A** as shown in the figure above.

    Note: Ensure that the contact socket is positioned as shown in the figure. Otherwise the cable outlet will point in the wrong direction when connected.

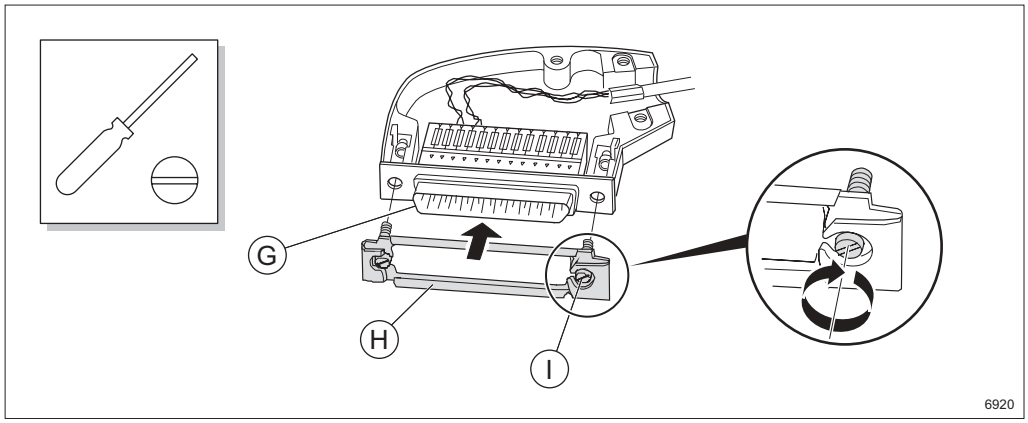


Figure 186 Fastening the contact socket in the connector casing

20. Fasten the contact socket **G** and sliding lock **H** in the connector casing with the sliding lock screws **I**.

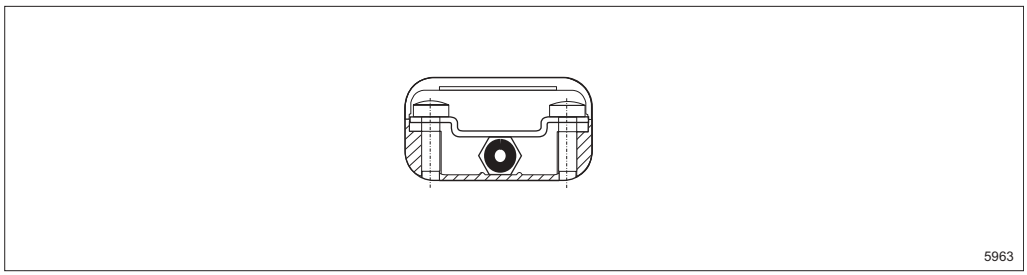


Figure 187 Positioning the cables in the connector casing

21. Position the cable in the connector casing as shown in Figure 187 on page 188.

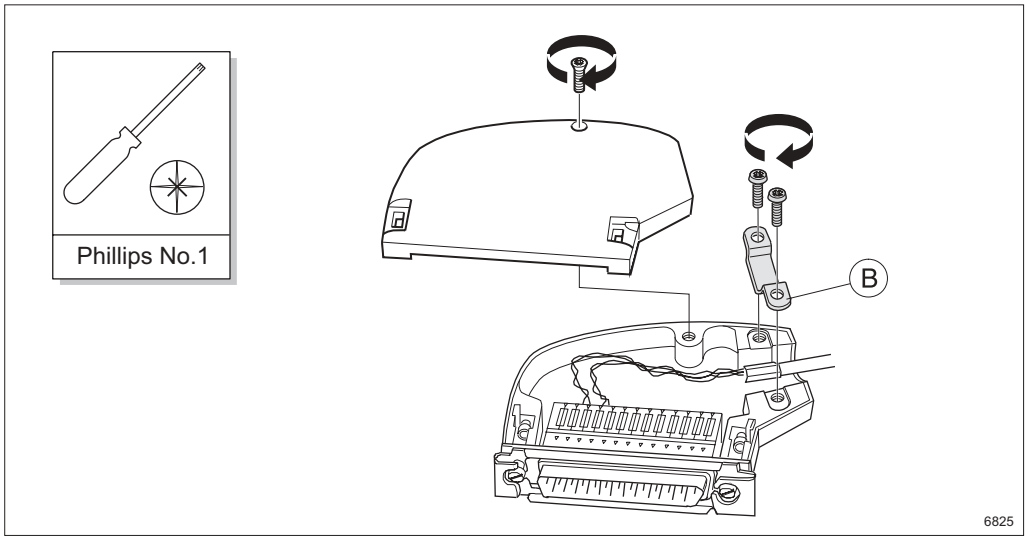


Figure 188 Fastening the clamp

22. Fasten the cable using the clamp **B**.
23. Arrange the wires in the connector casing.
24. Fasten the top of the connector with the screw.
25. Assemble the second connector.

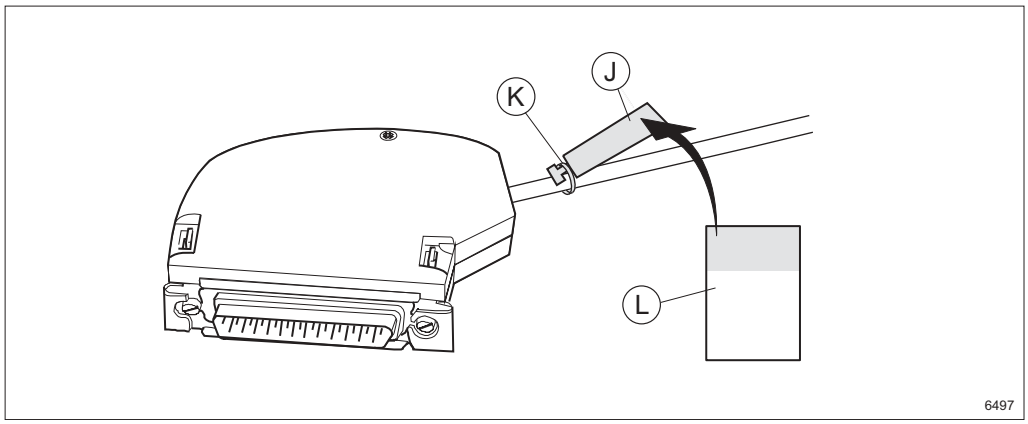


Figure 189 Marking the cable

26. Fasten a tag **J** to the cable using a strap **K**.

27. Mark the assembled connector by writing on the yellow part of the tape **L** and attach it to the tag (wrapping the transparent part round the tag).

18.2 Assembling the E1 120 Ohm Cable for an ICF

Applies to traffic cable NTM 203 83 (TFL 481 54) and 9-pin D-sub connector SXK 111 519/1.

The figure below shows the parts included in the connector and the cable. Items **B** to **E** are delivered inside the connector casing.

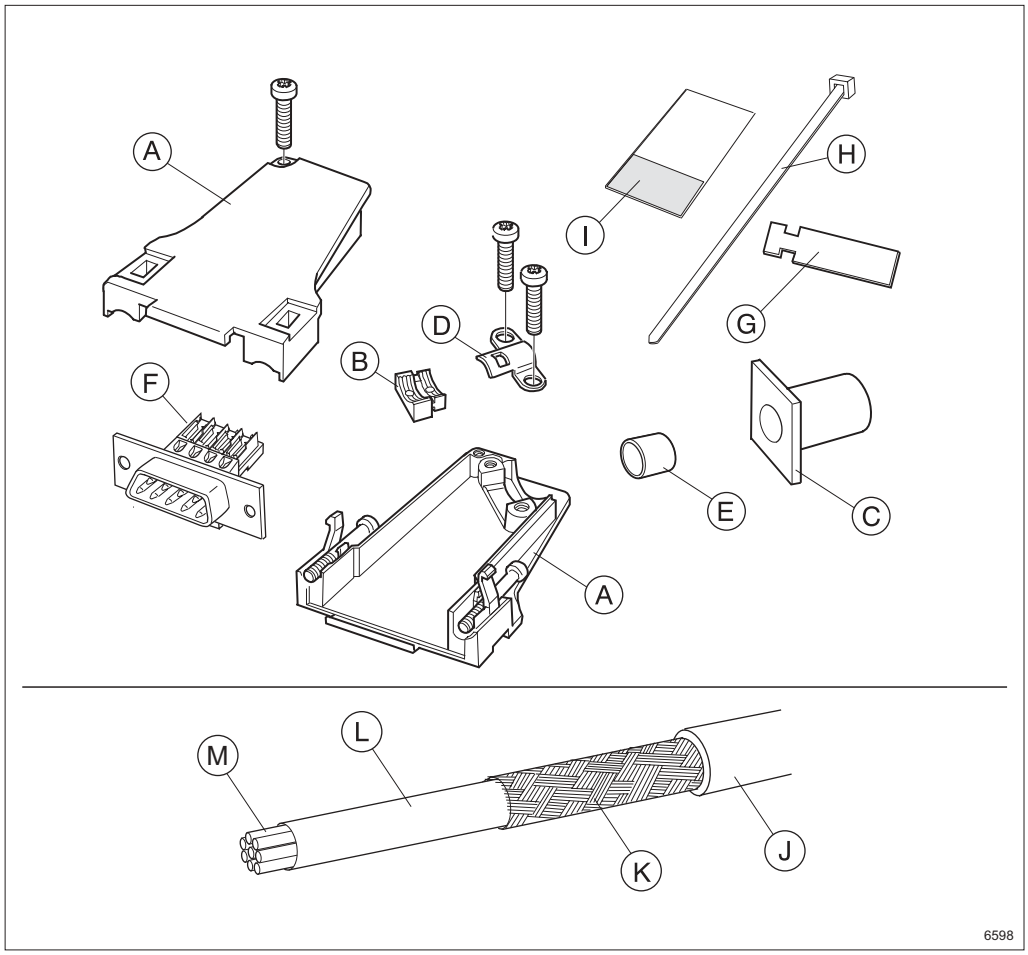


Figure 190 The 9-pin D-sub connector kit and a 4-pair cable

Description

A Connector casing
B Insert
C Rubber bushing
D Clamp
E Tube
F Contact socket
G Marking tag
H Strap
I Marking tape
J Jacket
K Shield
L Aluminum and plastic sheet
M Wire

Opening the Connector Casing

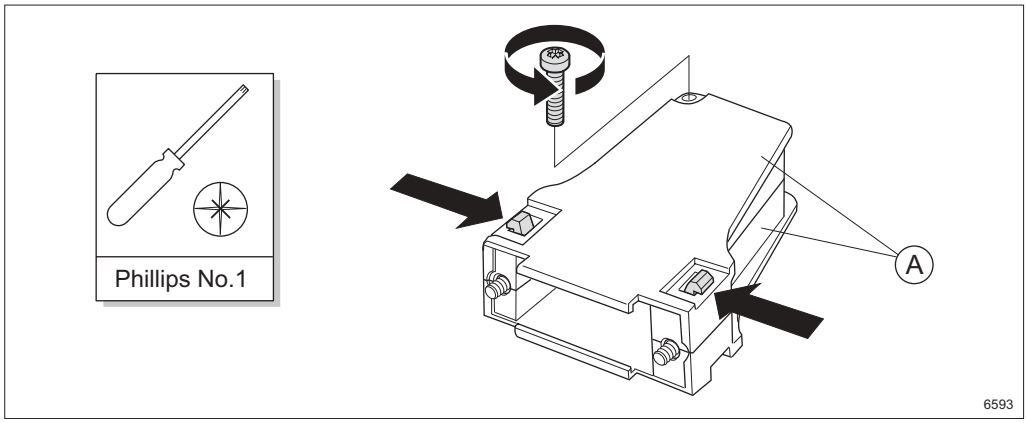


Figure 191 Opening the connector casing

1. Open the connector casing **A** by removing the screw, pushing the two plastic springs together and lifting the casing halves apart.

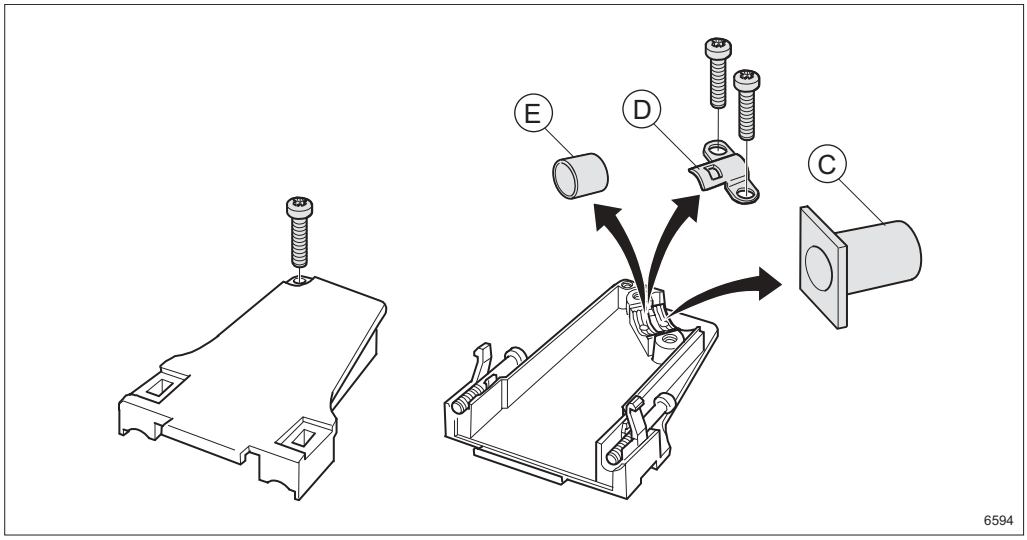


Figure 192 Removing the parts

2. Remove the rubber bushing **C**, clamp **D** and tube **E** from the connector casing but save them for later use.

Trimming

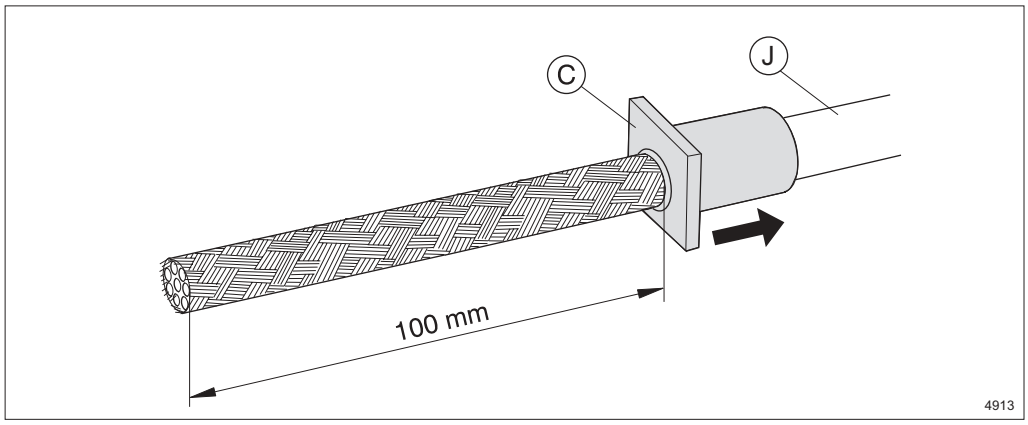


Figure 193 Stripping the cable and applying the rubber bushing

3. Slide the rubber bushing **C** over the cable.

4. Strip the jacket **J** approximately 100 mm.

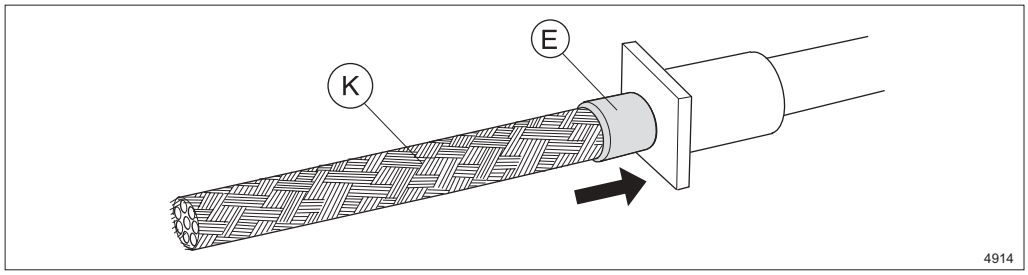


Figure 194 Sliding the tube against the jacket

5. Slide the tube **E** over the shield **K** and against the jacket.

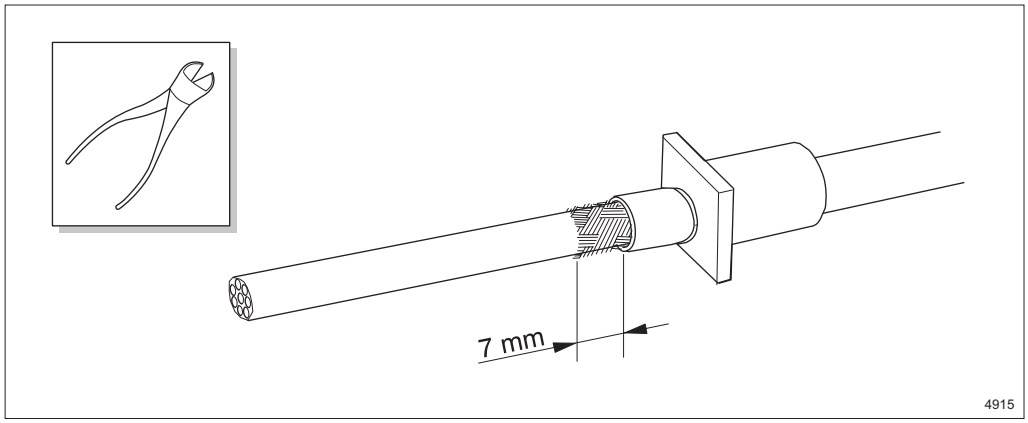


Figure 195 Cutting the shield

6. Cut the shield to 7 mm.

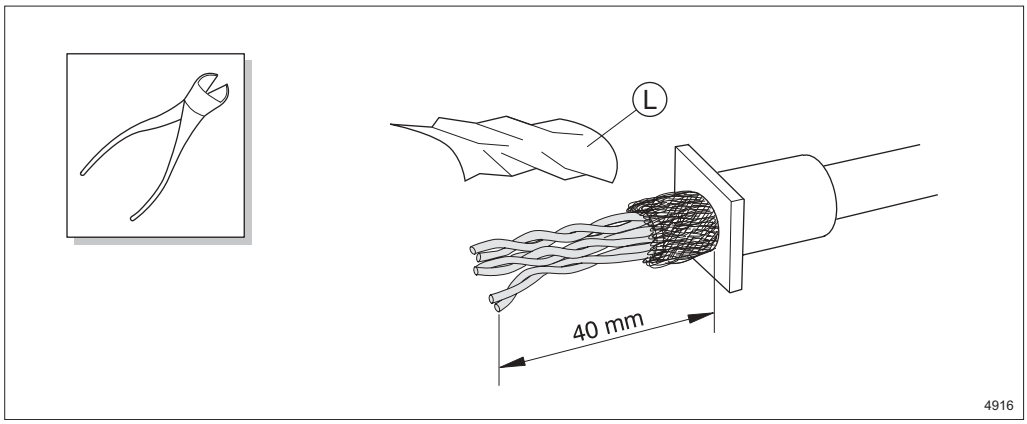


Figure 196 Folding the shield over the tube

7. Fold the shield over the tube and trim the shield.

8. Remove the aluminum and plastic sheet **L**.

9. Cut two pairs (blue/white and orange/white) of the wires to 40 mm. Cut the rest of the wires to 5-10 mm since they are not used.

   Note: Keep the wires twisted in pairs.

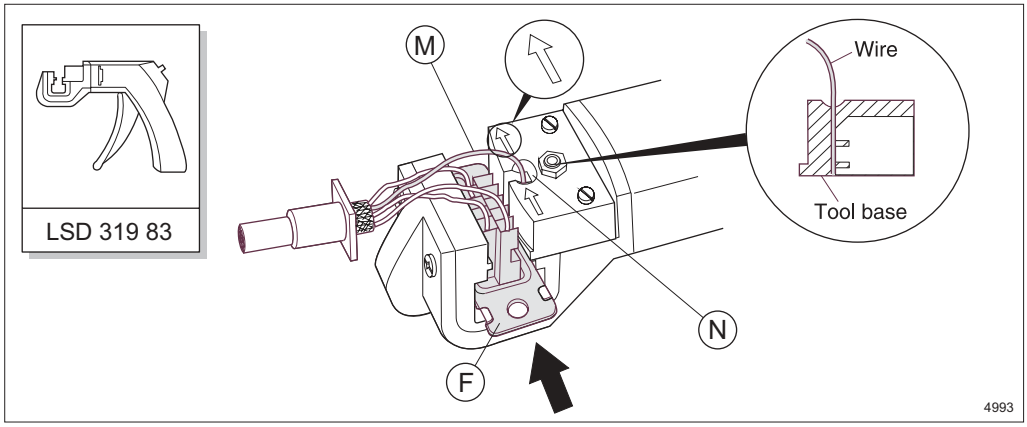


Figure 197 Crimping a wire

10. Insert the contact socket **F** from the left (arrow direction in the figure above) into the feeder channel of the terminating tool until the desired connector pin faces the wire slot **N**.

11. Insert an unstripped wire **M** into the wire slot until the wire bottoms on the tool base. Table for pin connection is found in Section 19.10 on page 249.

12. Center the wire in the wire slot. Squeeze the handle until the inserter bottoms.

13. Release the handle. The inserter will retract and the connector will advance to the next connector pin. Connect all wires to the contact socket in the same way. Remove the connector from the right side of the feeder channel.

Note: Ensure the wires are connected in pairs and inserted into correct cavities.

Removing a Wire

This section only applies if a wire is connected improperly.

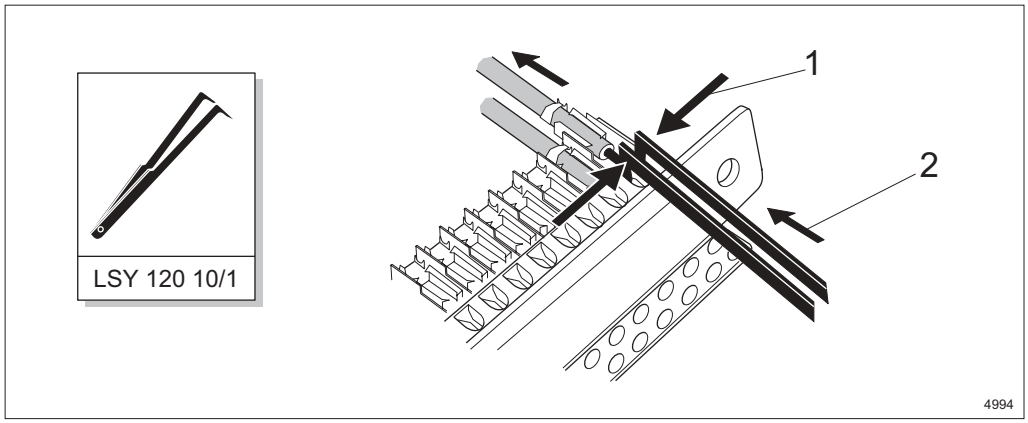


Figure 198 Removing a contact pin

14. Remove the contact pin by using the extraction tool on the contact pin. Press the extraction tool together **1** and push it upwards **2**.

15. Insert the contact pin in the correct position.

Assembling

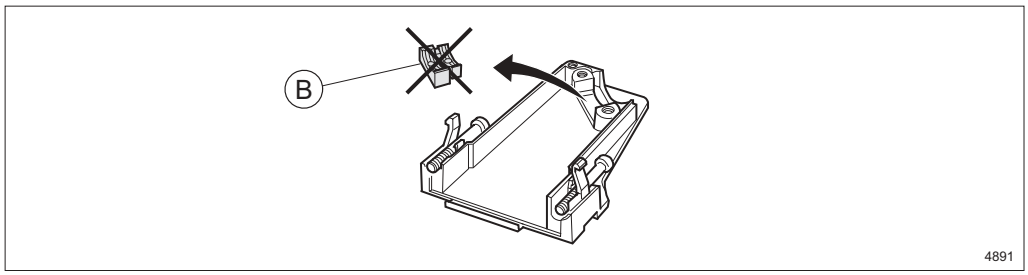


Figure 199 Removing the insert

16. Remove the insert **B** and throw it away, it is not needed later.

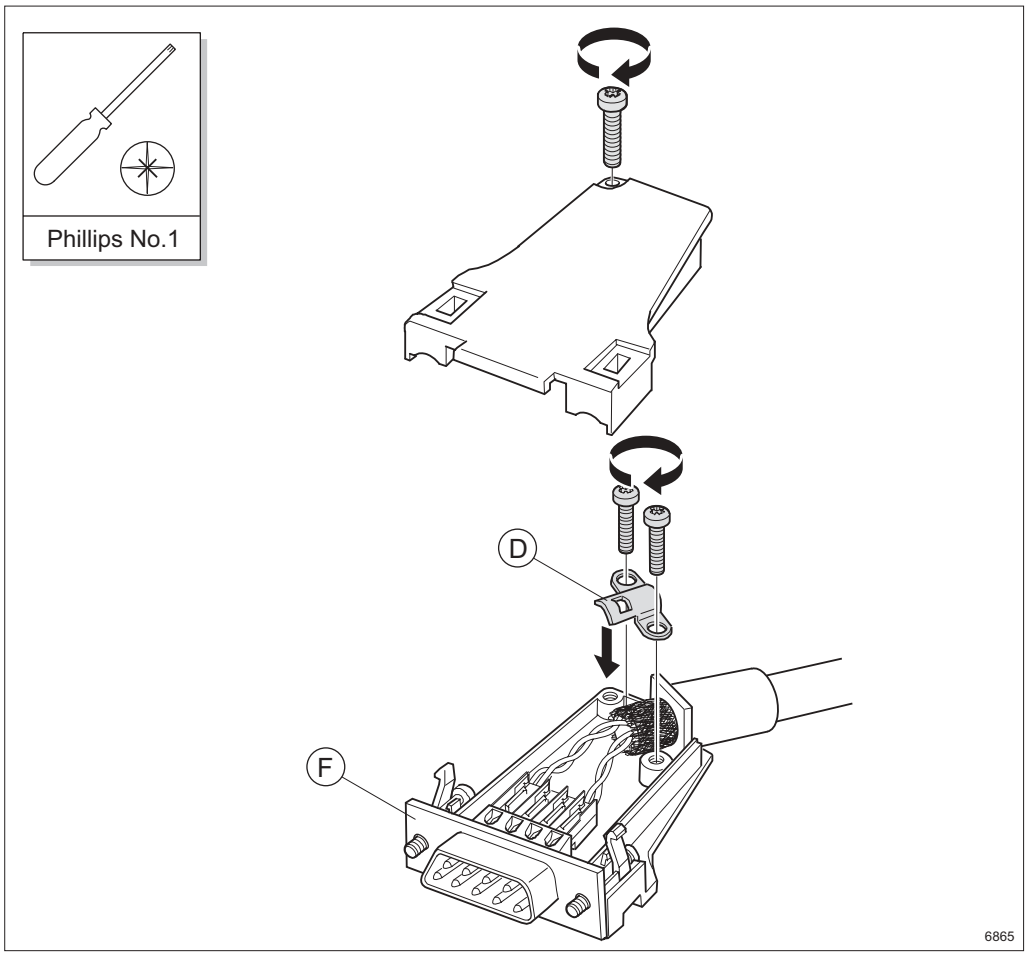


Figure 200 Assembling the connector

17. Lay down the cable in the connector casing and fasten the wires and shield with the clamp **D** included.

    Note: Ensure that the rubber bushing enters the slot in the connector casing properly.

    Note: Ensure that the contact socket **F** is positioned as shown in the figure above. Otherwise the cable outlet will point in the wrong direction when the connector is connected to the ICF.

18. Fasten the top of the connector casing with the screw.

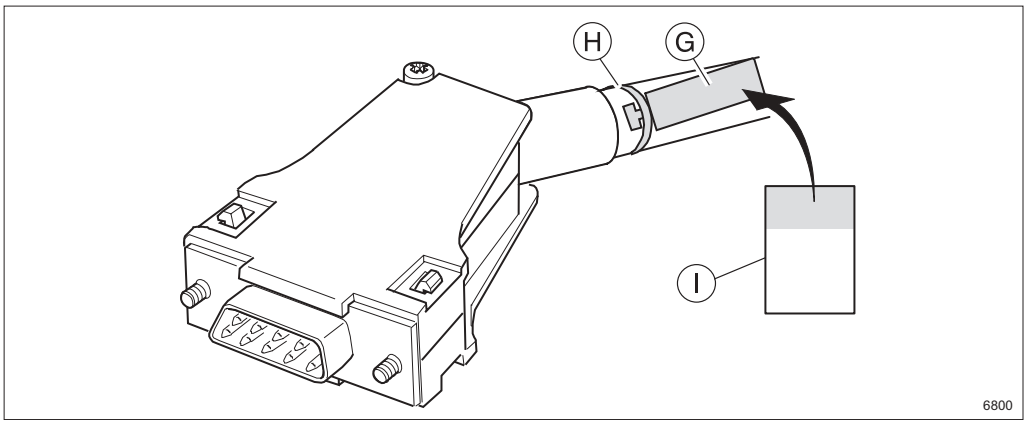


Figure 201 Marking the cable

19. Fasten a tag **G** to the cable using the strap **H**.

20. Mark the assembled connector by writing on the yellow part of the tape **I** and attaching it to the tag (wrapping the transparent part round the tag).

18.3 Assembling the E1 75 Ohm Cable (SMZ) for an ICF

Applies to traffic cable NTM 203 97 (TZC 750 24) and connector kit SXK 111 520/1.

Note: There is only one shrink sleeve included in the connector kit. Cut it in two equal parts.

The figure below shows the parts included in the connector kit and different parts of the cable.

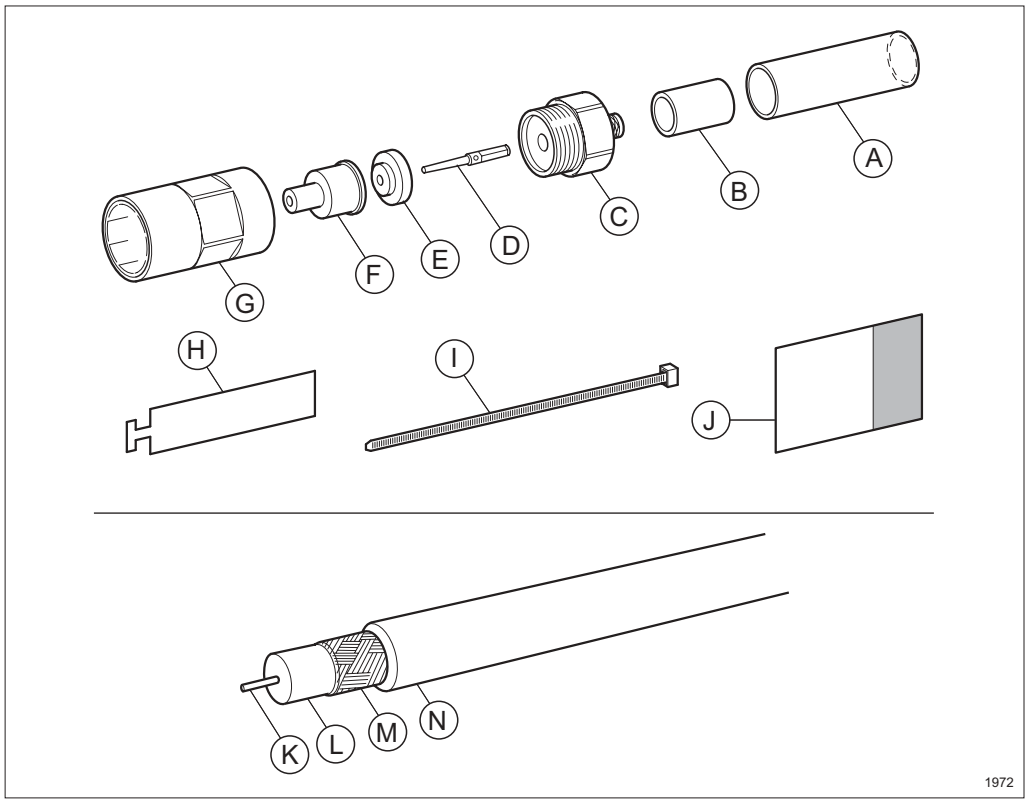


Figure 202 The SMZ connector and cable

Description

A	Shrink sleeve	**F**	Front insulator	**K**	Center conductor
B	Crimp tube	**G**	Front body	**L**	Dielectric
C	Rear part connector	**H**	Marking tag	**M**	Shield
D	Contact pin	**I**	Strap	**N**	Jacket
E	Support rest	**J**	Marking tape		

Trimming and Assembling

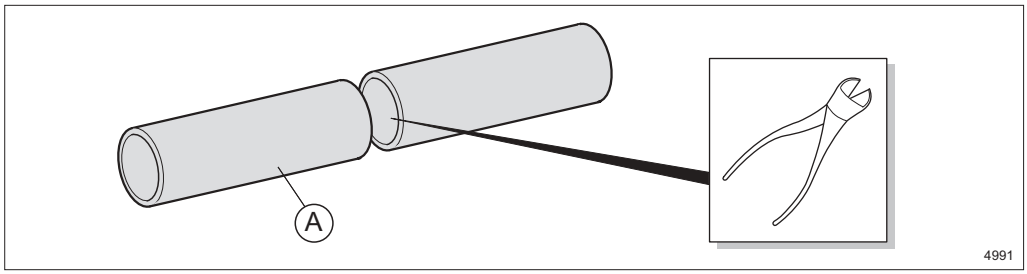


Figure 203 Cutting the shrink sleeve

1. Cut the shrink sleeve **A** in two equal parts.

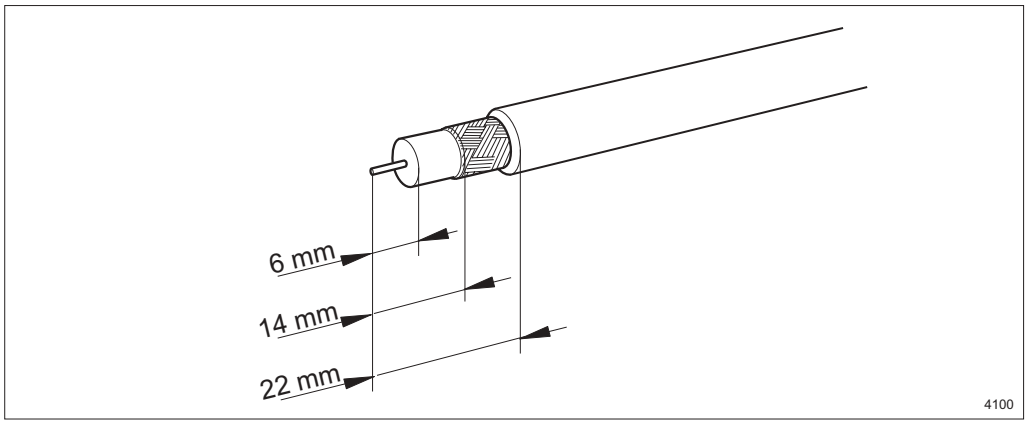


Figure 204 Stripping a cable for the SMZ connector

2. Strip the cable as shown in the figure above. Be careful not to nick the shield or center conductor.

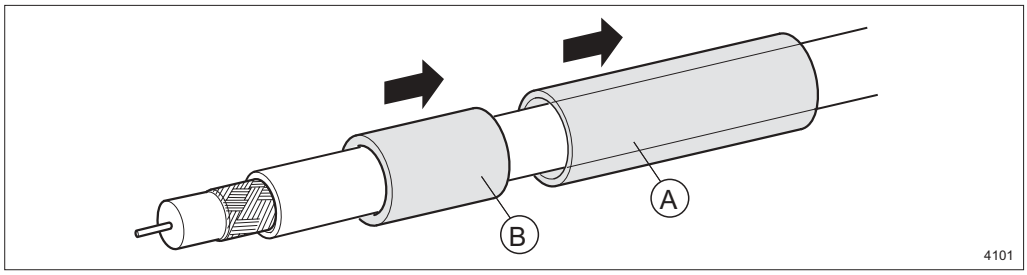


Figure 205 Attaching the shrink sleeve and crimp tube

1. Slide the shrink sleeve **A** and the crimp tube **B** over the cable.

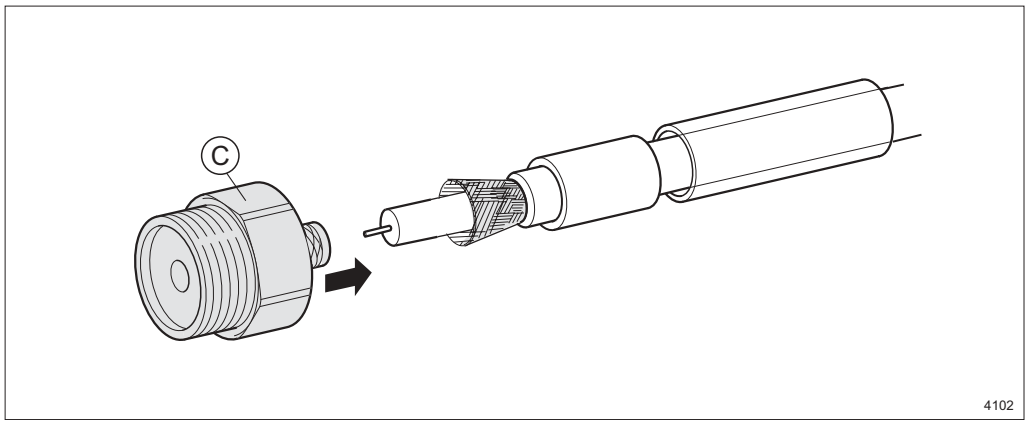


Figure 206 Inserting the rear part connector to the trimmed cable

2. Slide the rear part connector **C** over the cable so that the rear body comes between the shield and the dielectric. Gently twisting and rocking the connector body will help.

   Note: Ensure that no part of the shield is trapped under the rear part connector.

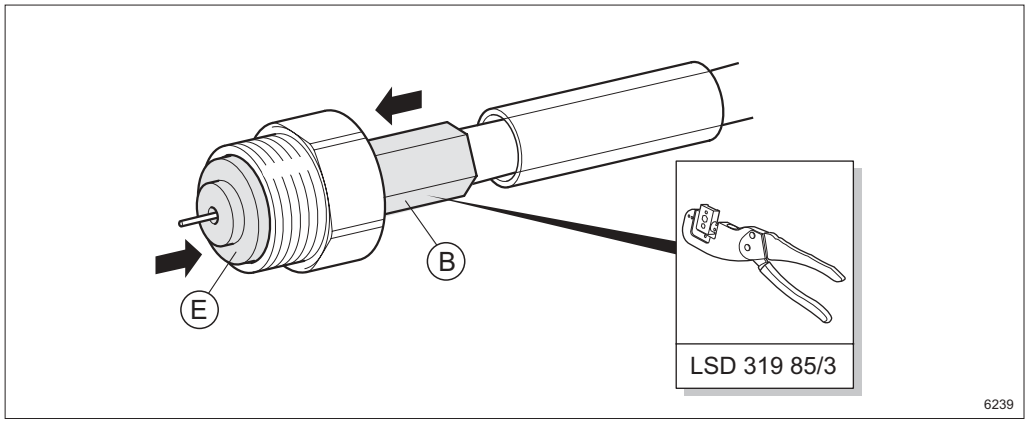


Figure 207 Crimping the tube and attaching the support rest

3. Slide the crimp tube **B** forward over the shield until it butts up against the back nut of the rear part connector, and crimp it (cavity 4.52 mm).

   Note: Slide the crimp tube tightly against the back of the nut before crimping it. The shield must not be visible.

4. Attach the support rest **E** over the center conductor.

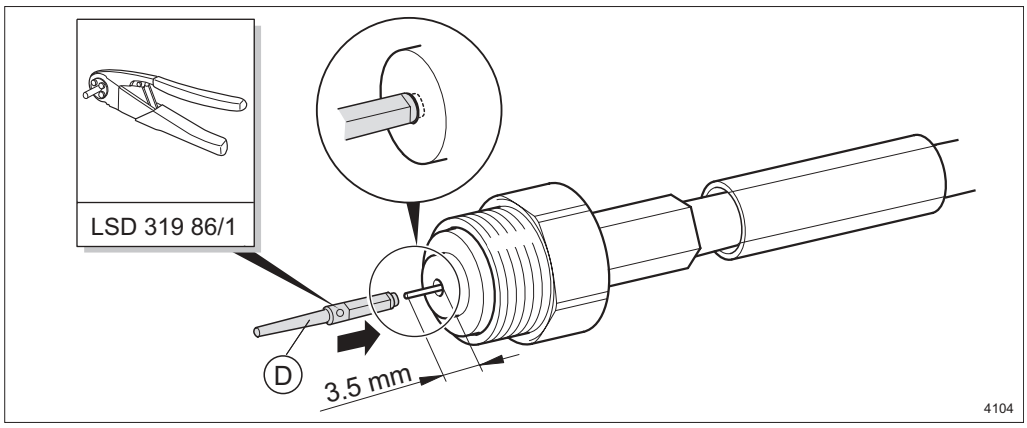


Figure 208 Attaching and crimping the contact pin over the center conductor

5. Trim the center conductor until 3.5 mm protrudes from the face of the rear insulator.

6. Assemble the contact pin **D** onto the center conductor and crimp it.

   Note: Make sure the contact pin is completely inserted in the hole on the support rest.

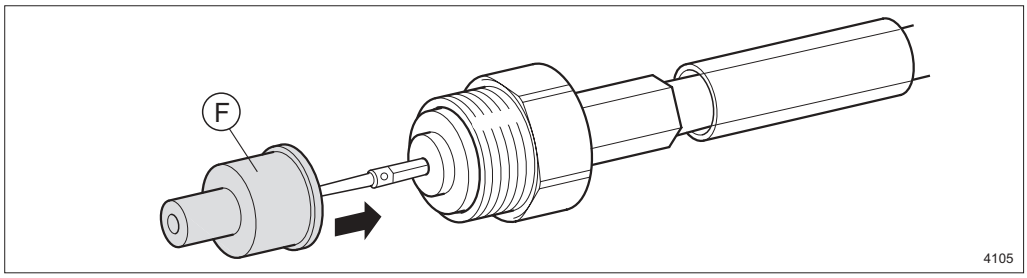


Figure 209 Assembling the front insulator

7. Assemble the front insulator **F** over the contact pin.

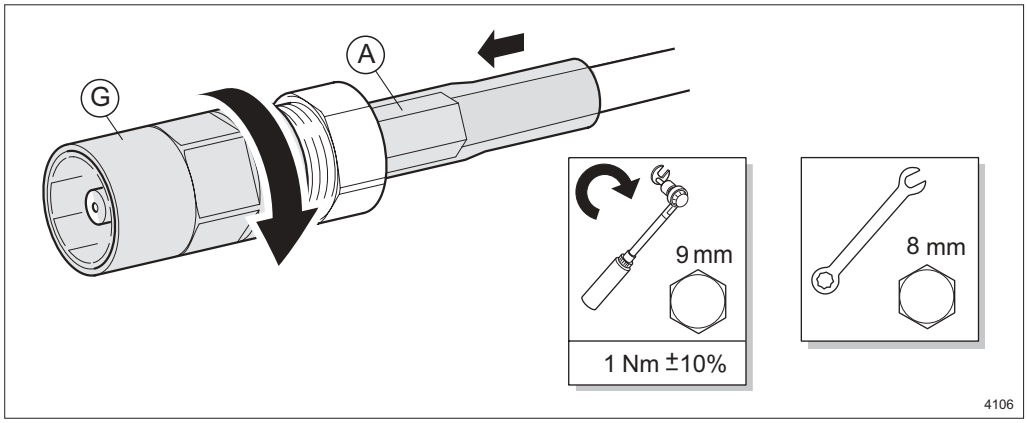


Figure 210 Assembling the front body and shrinking the shrink sleeve

8. Tighten the front body **G** to the rear body.

9. Slide the shrink sleeve **A** over the crimped tube and heat it until it shrinks.

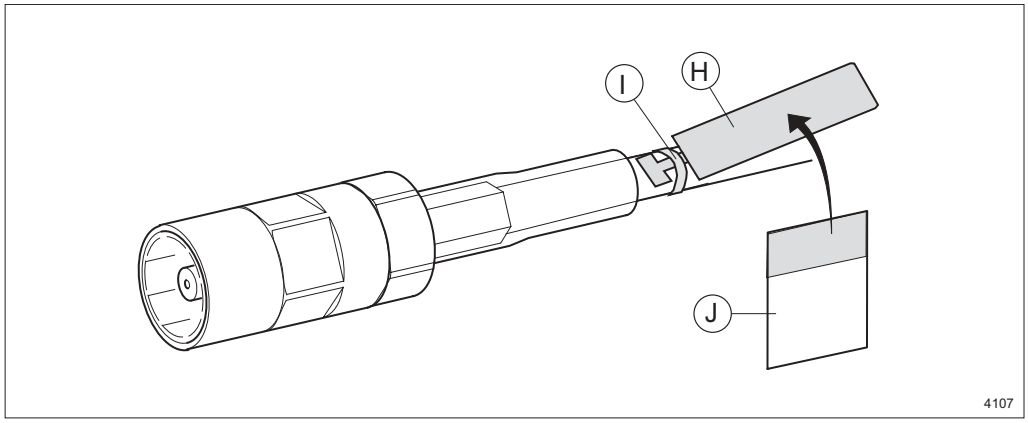


Figure 211 Marking the cable

10. Fasten a tag **H** to the cable using the strap **I**.

11. Mark the assembled connector by writing on the yellow part of the tape **J** and attaching it to the tag (wrapping the transparent part round the tag).

18.4 Assembling the User I/O Cable for ICF1 and ICF2

Applies to traffic cable NTM 203 82 (TFL 481 53) and 15-pin D-sub connector SXK 111 5028/1.

The figure below shows the parts included in the connector and the cable. Items **B** to **E** are delivered inside the connector casing.

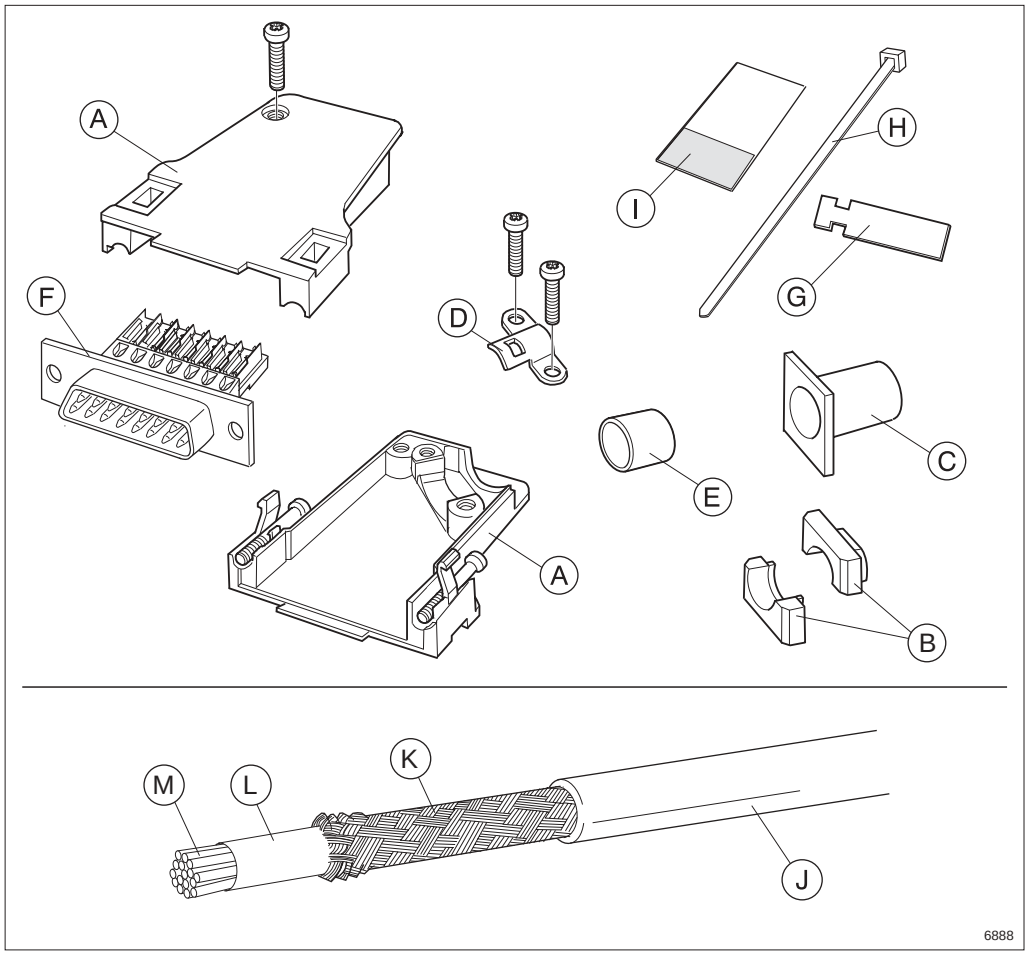


Figure 212 The 15-pin D-sub connector and 8-pair cable

Description

A Connector casing
B Insert
C Rubber bushing
D Clamp
E Tube
F Contact socket
G Marking tag
H Strap
I Marking tape
J Jacket
K Shield
L Aluminium and plastic sheet
M Wire

Opening the Connector Casing

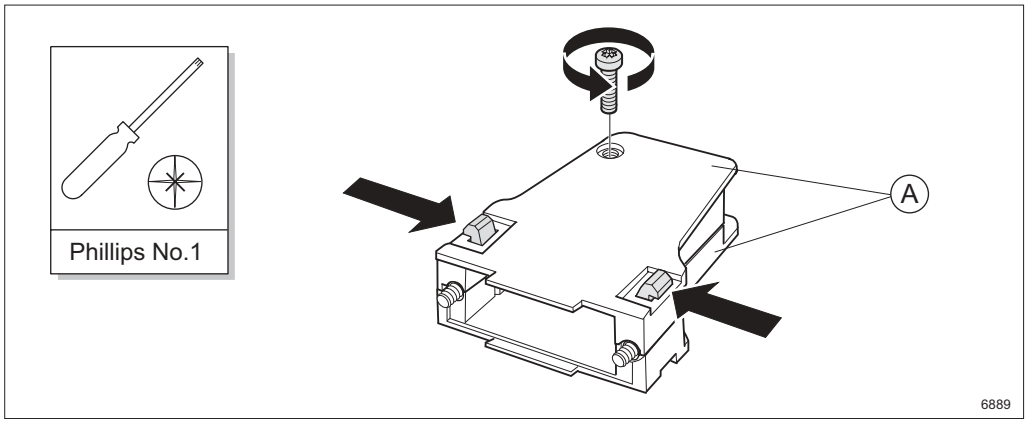


Figure 213 Opening the connector casing

1. Open the connector casing **A** by removing the screw, pushing the two plastic springs together and lifting the casing halves apart.

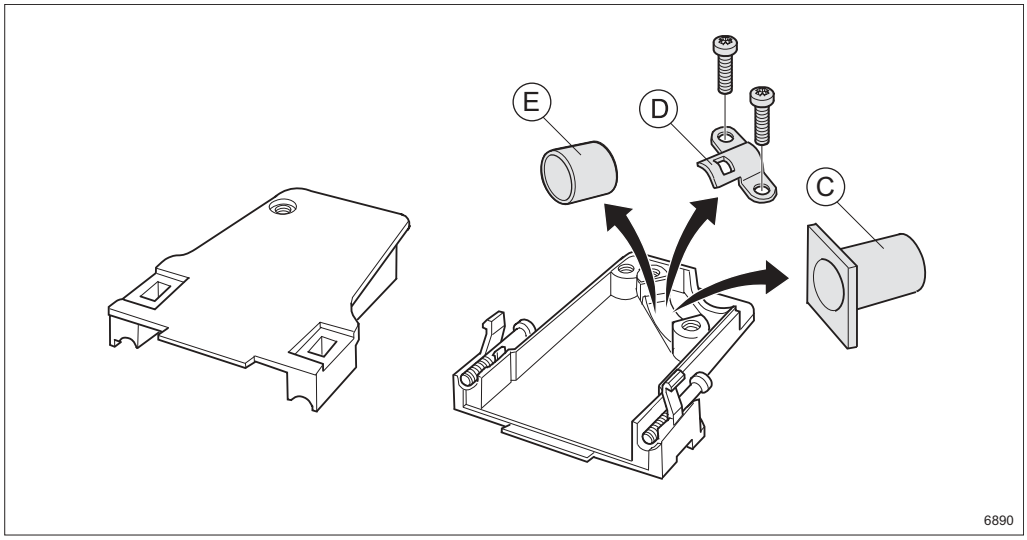


Figure 214 Removing the parts

2. Remove the rubber bushing **C**, clamp **D** and tube **E** from the connector casing but save them for later use.

Trimming

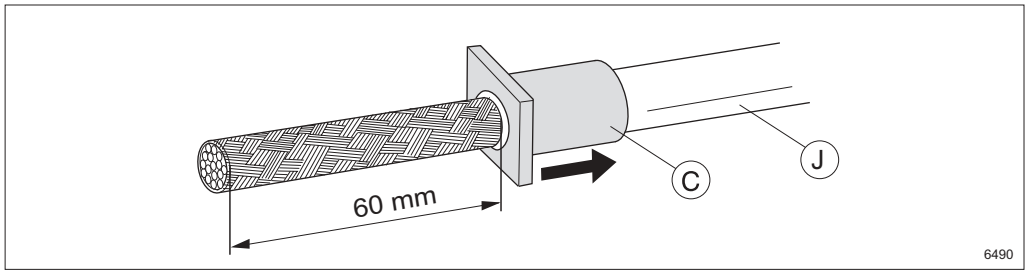


Figure 215 Stripping the cable and applying the rubber bushing

3. Slide the rubber bushing **C** over the cable.
4. Strip the jacket **J** approximately 60 mm.

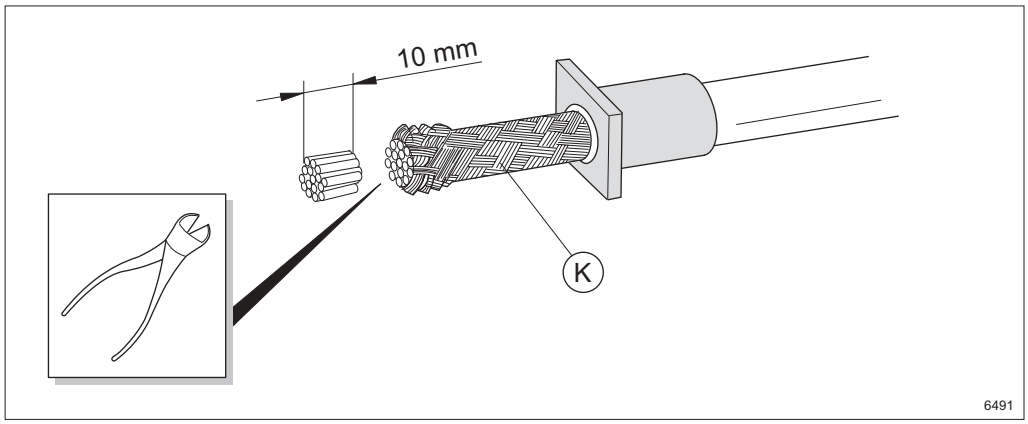


Figure 216 Cutting the wires

5. Push the shield **K** back and cut the wires 10 mm.

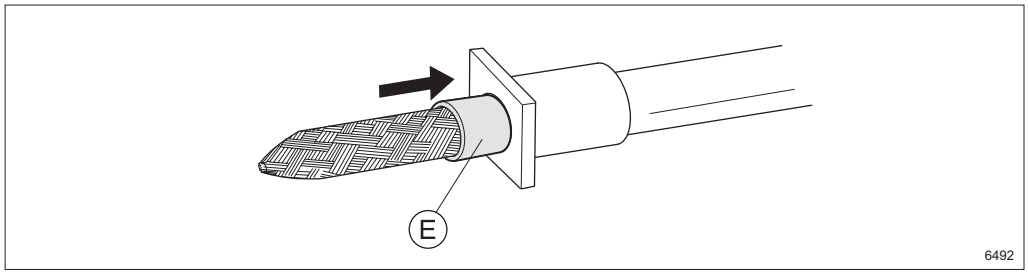


Figure 217 Applying the tube

6. Pull the shield down towards the cable end (it makes it easier to slide on the tube) and slide the tube **E** onto the cable until it butts up against the jacket.

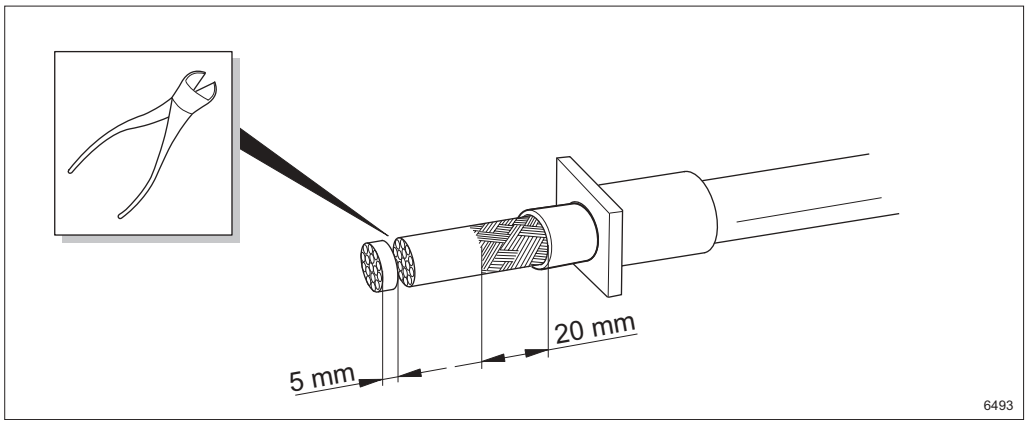


Figure 218 Cutting the wires and shield

7. Cut the shield to 20 mm
8. Cut the wires 5 mm

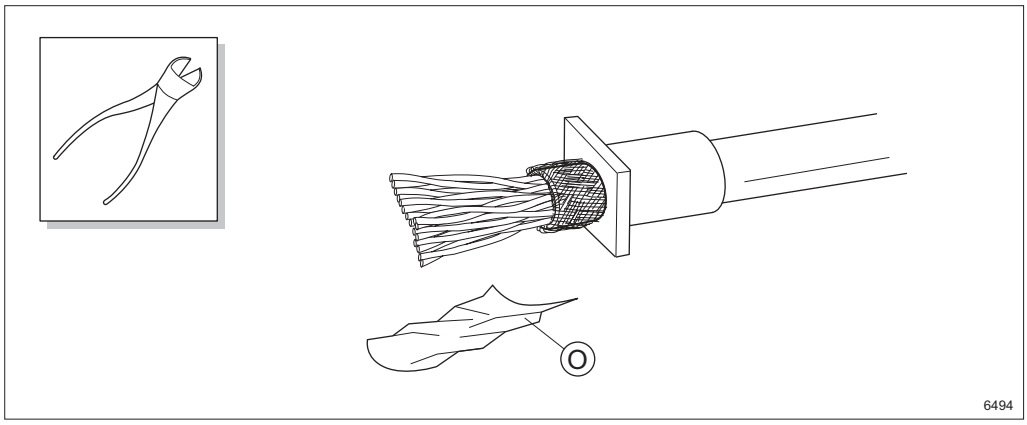


Figure 219 Folding the shield over the tube

9. Fold the shield back over the tube and trim it.
10. Cut off the aluminum and plastic sheet **O**.

    Note: Keep the wires twisted in pairs.

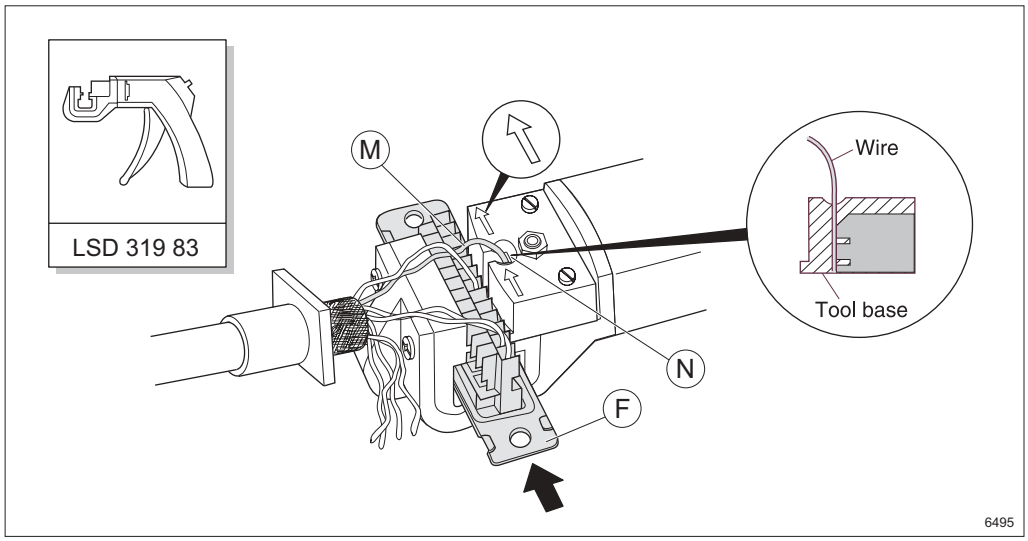


Figure 220 Crimping a wire

11. Insert the contact socket **F** from the left (arrow direction in the figure above) into the feeder channel of the terminating tool until the desired connector pin faces the wire slot **N**.

12. Insert an unstripped wire **M** into the wire slot until the wire bottoms on the tool base. Table for pin connections is found in Section 19.10 on page 249.

13. Center the wire in the wire slot. Squeeze the handle until the inserter bottoms.

14. Release the handle. The inserter will retract and the connector will advance to the next connector pin. Connect all wires to the contact socket in the same way. Remove the connector from the right side of the feeder channel.

Note: Ensure the wires are connected in pairs and inserted into correct cavities. Cut off the wires that are not used.

Removing a Wire

This section only applies if a wire is connected improperly.

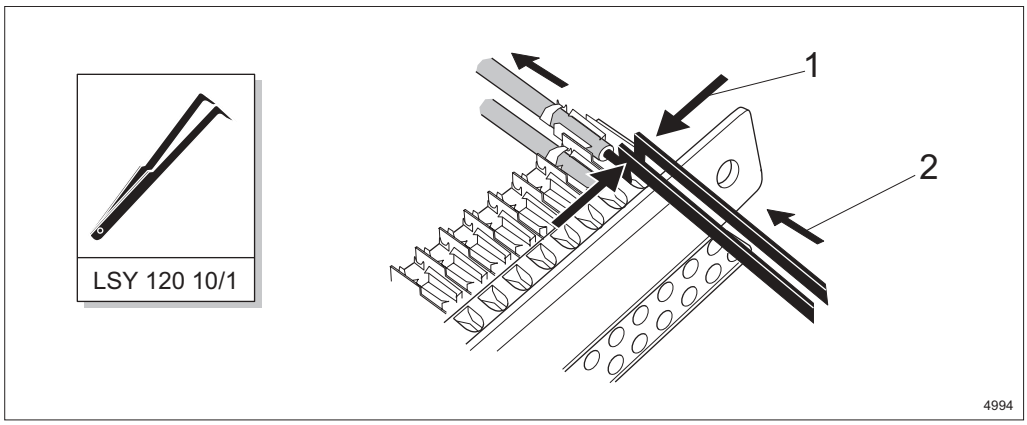


Figure 221 Removing a contact pin

15. Remove the contact pin by using the extraction tool on the contact pin. Press the extraction tool together **1** and push it upwards **2**.

16. Insert the contact pin in the correct position.

Assembling

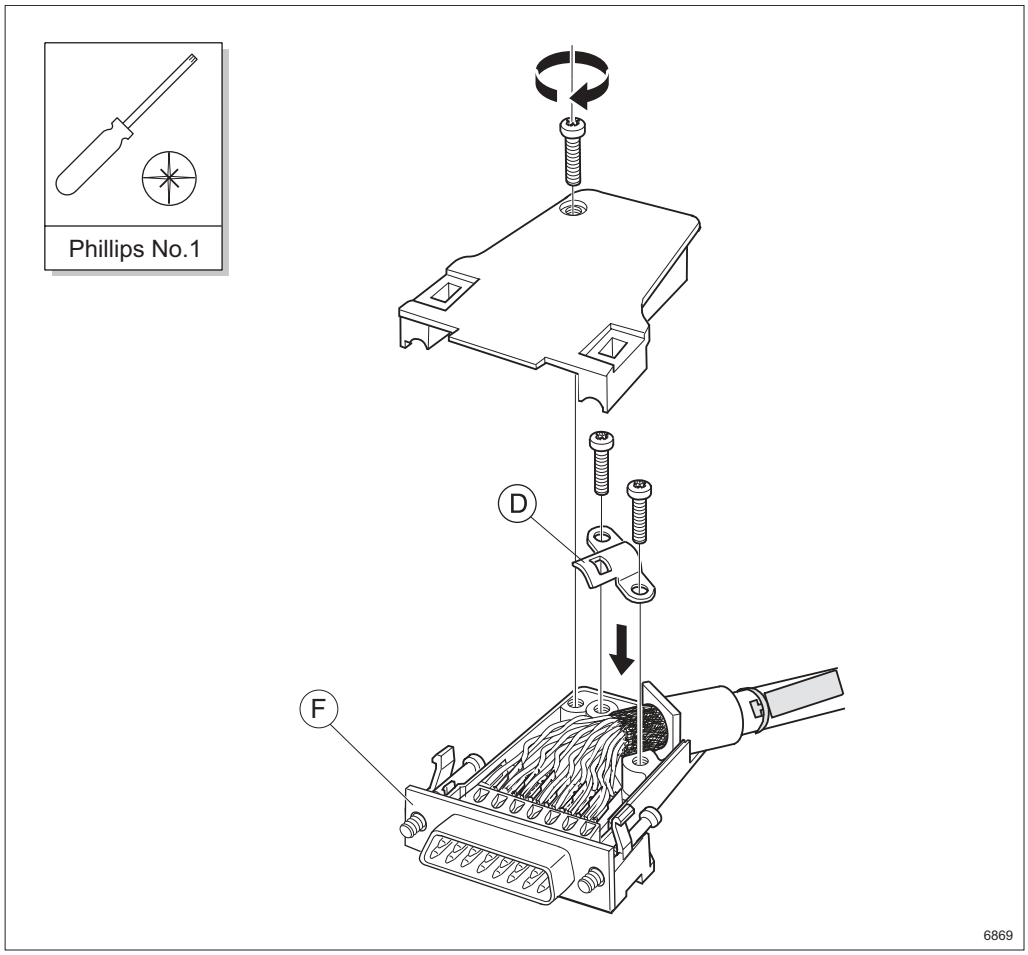


Figure 222 Assembling the connector

17. Lay down the cable in the connector casing and fasten the wires and shield with the clamp **D**.

    Note: Ensure that the rubber bushing enters the slot in the connector casing properly.

    Note: Ensure that the contact socket **F** is positioned as shown in the figure above. Otherwise the cable outlet will point in the wrong direction when the connector is connected to the ICF.

18. Fasten the top of the connector casing with the screw.

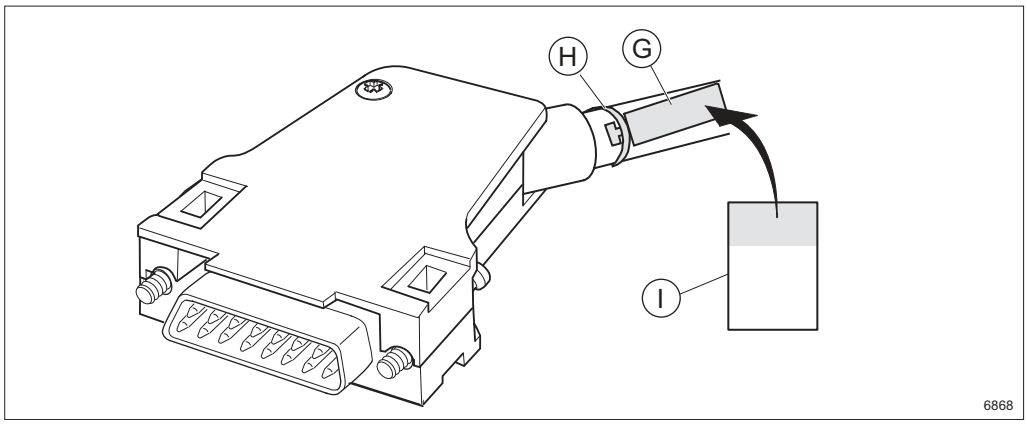


Figure 223 Marking the cable

19. Fasten a tag **G** to the cable using the strap **H**.

20. Mark the assembled connector by writing on the yellow part of the tape **I** and attaching it to the tag (wrapping the transparent part round the tag).

18.5 Assembling the DC Cable for ICF1, PFU1 and PFU2

Applies to DC cable NTM 203 80 (TFL 424 03) and connector SXK 111 516/6. The figure below shows the cable and the parts included in the connector kit.

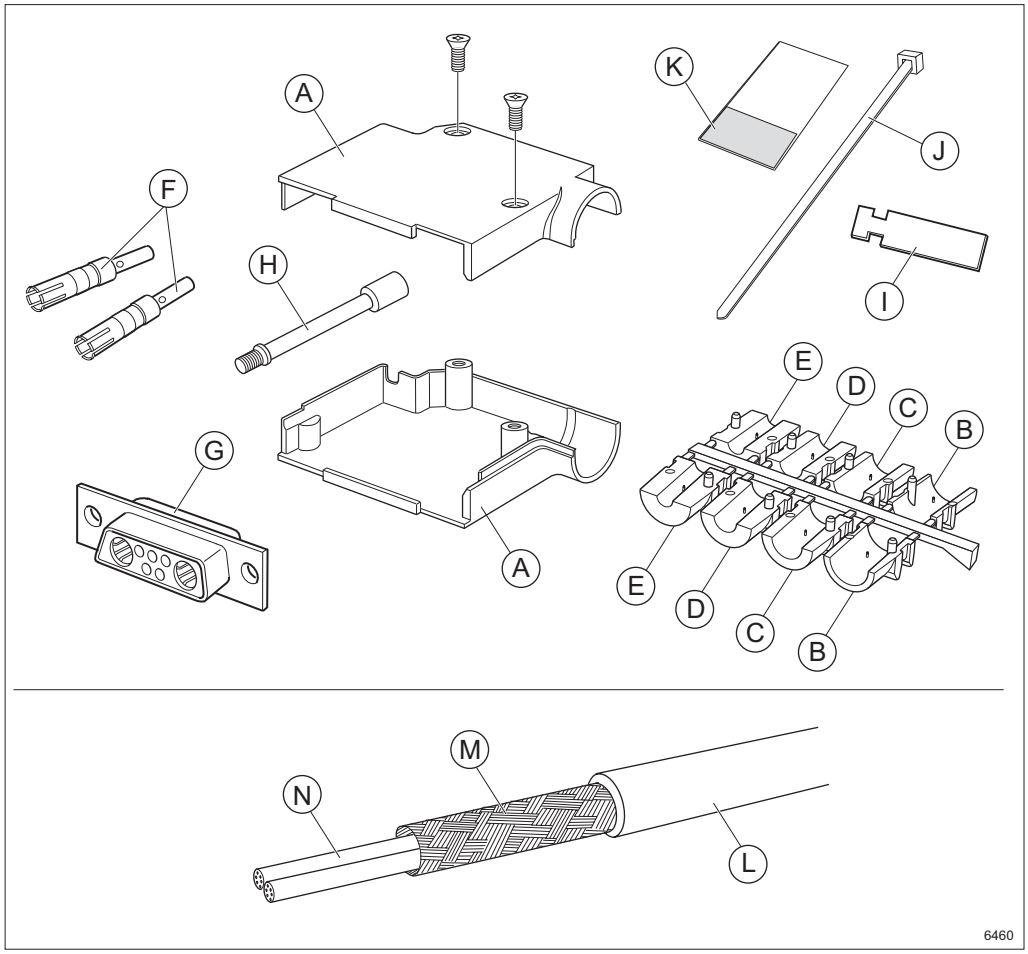


Figure 224 The DC connector kit and cable

Description

A	Connector casing	**F**	Contact sleeve	**K**	Marking tape
B	Strain relief half, size 9	**G**	Contact socket	**L**	Jacket
C	Strain relief half, size 7	**H**	Locking screw	**M**	Shield
D	Strain relief half, size 5	**I**	Marking tag	**N**	Wire
E	Strain relief half, size 4	**J**	Strap		

Trimming

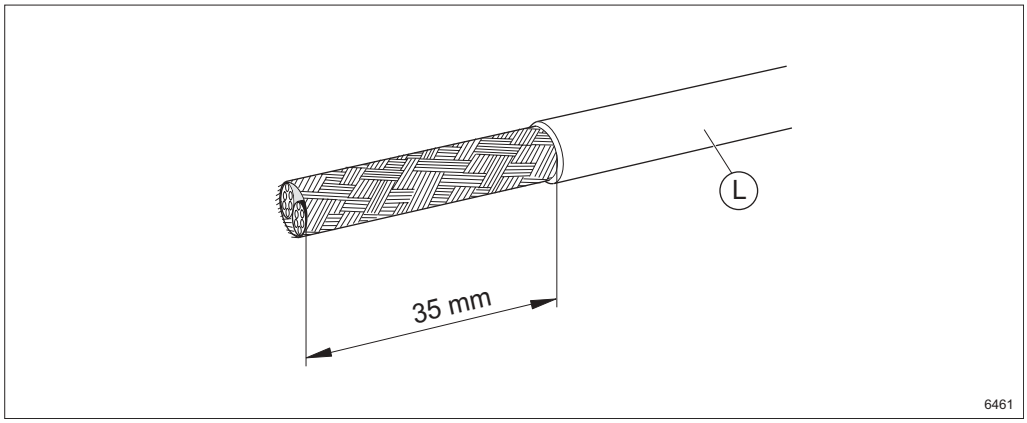


Figure 225 Stripping the cable

1. Strip the jacket **L** approximately 35 mm.

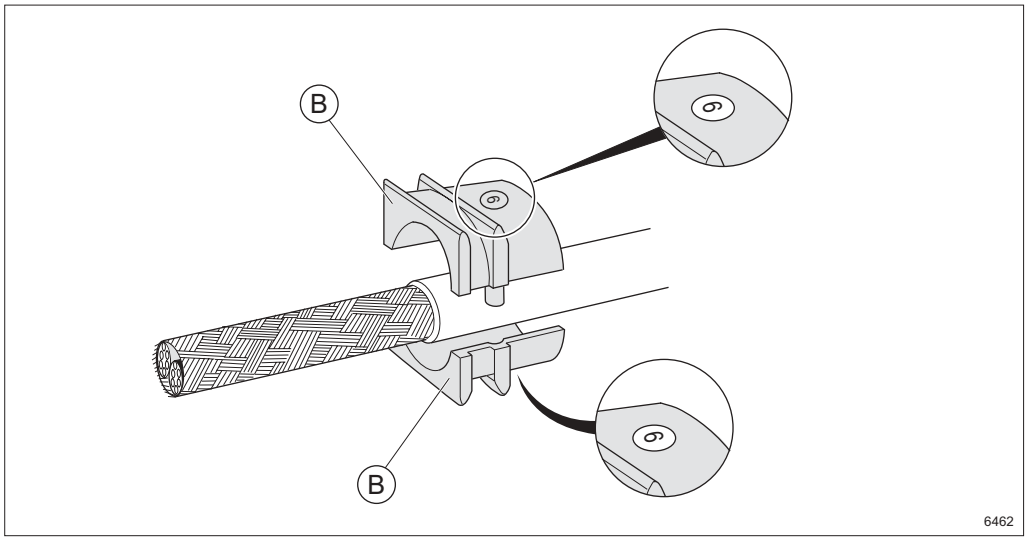


Figure 226 Fitting two strain relief halves

2. Attach the two strain relief halves around the jacket. Use two **B** (size 9).

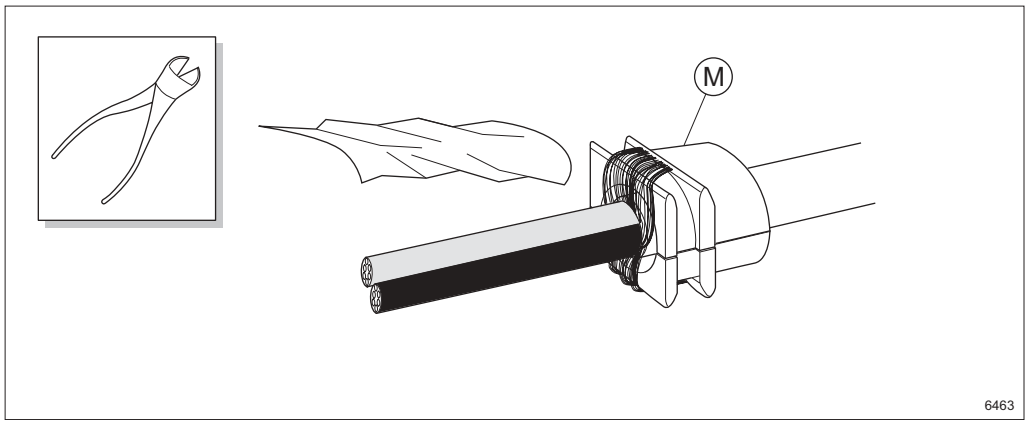


Figure 227 Folding the shield over the strain relief

3. Remove the aluminum sheet.
4. Fold the shield **M** back on the outside of the strain relief and trim it.

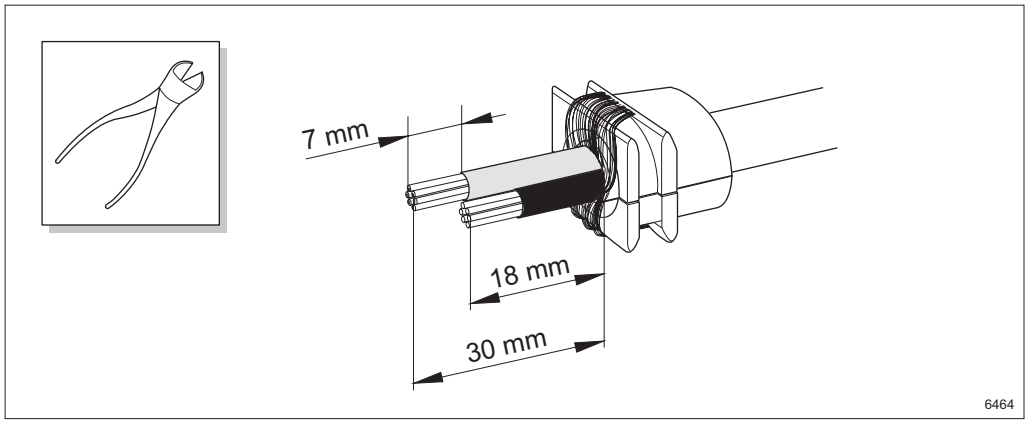


Figure 228 Cutting and stripping the wires

5. Leave 18 mm of the black wire and 30 mm of the red wire.
6. Strip the wires 7 mm.

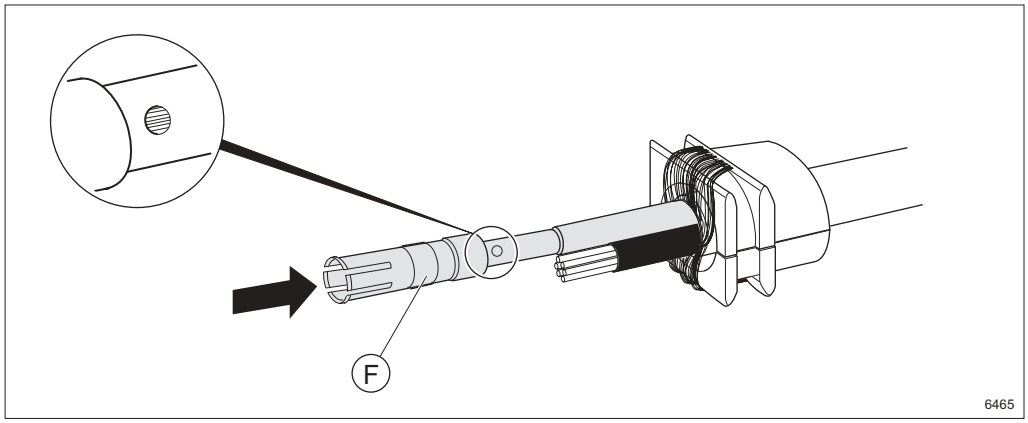


Figure 229 Fitting the contact sleeve

7. Slide the contact sleeve **F** over the wire. Make sure the wire is visible in the inspection hole.

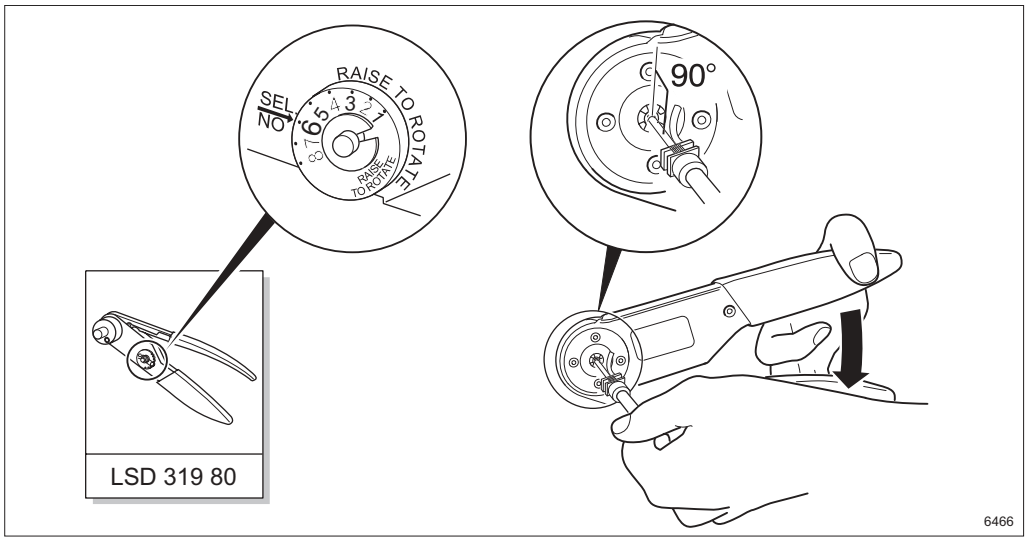


Figure 230 Using the crimping tool LSD 319 80

8. Crimp the contact sleeve. Make sure the contact sleeve is inside the crimping tool during crimping. Also make sure the contact and wire are inserted at right angles to the tool.

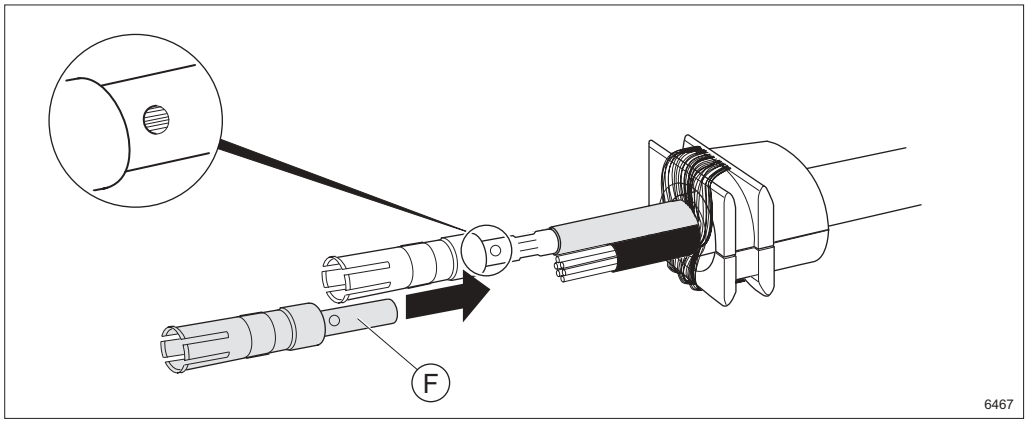


Figure 231 Checking the inspection hole and sliding on the second sleeve

9. Make sure the wires are visible in the inspection hole after crimping. Repeat the operation for the second contact sleeve **F**.

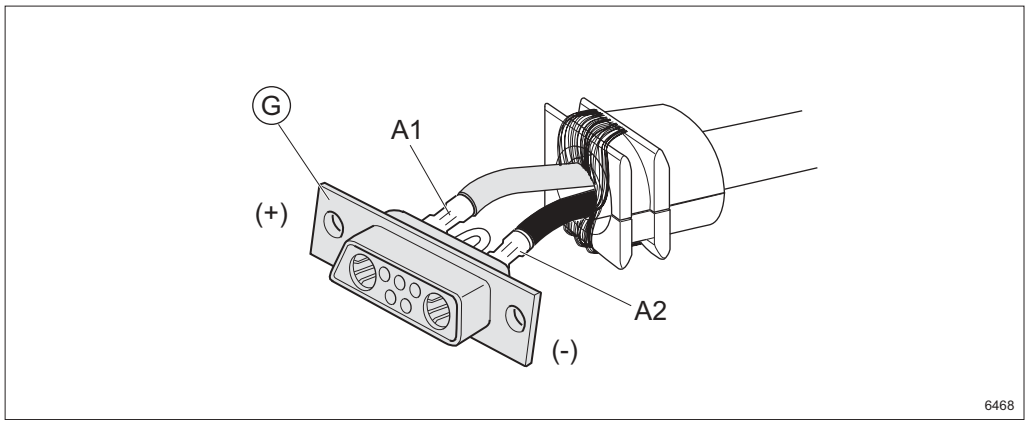


Figure 232 Inserting the contact sleeves into the contact socket

Table 21 Pin configuration for the DC connector

External connector	Pin No	Signal	TFL 424 03
DC	A1	0 V	Red
	A2	– 48 V	Black

10. Insert the contact sleeves into the contact socket **G**.

    Note: Write down color and polarity (for the connection at the other end).

Extracting the Contact Sleeves

This section only applies if a contact sleeve is inserted improperly.

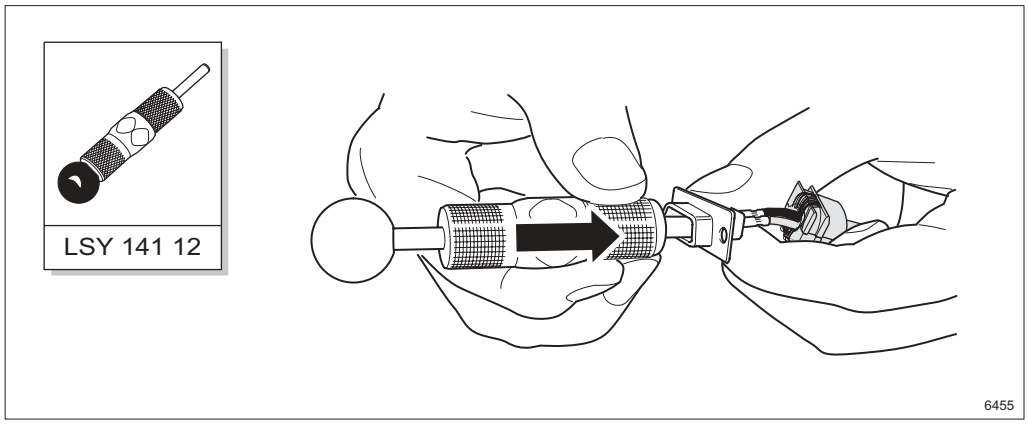


Figure 233 Applying the pin extraction tool to the contact socket

11. Pull back the handle on the pin extraction tool and apply it to the contact socket.

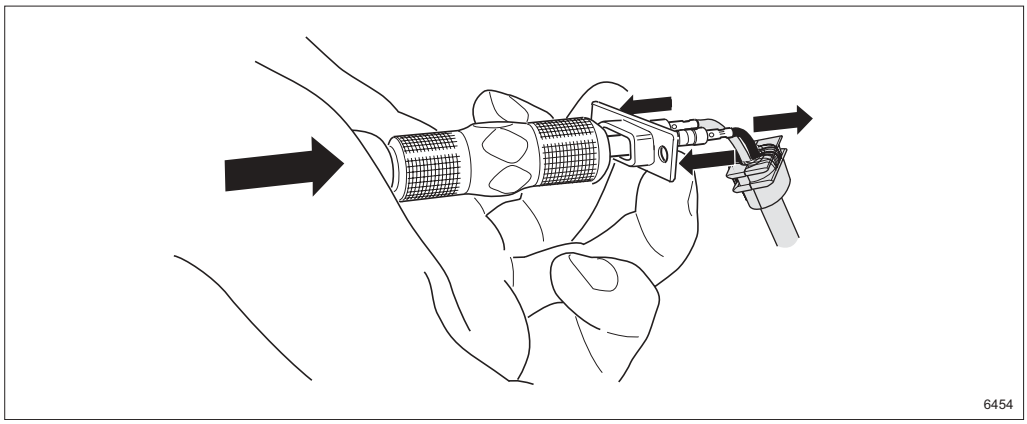


Figure 234 Extracting the contact sleeve from the contact socket

12. Extract the contact sleeve by pressing the contact socket and the tool handle together.

Assembling

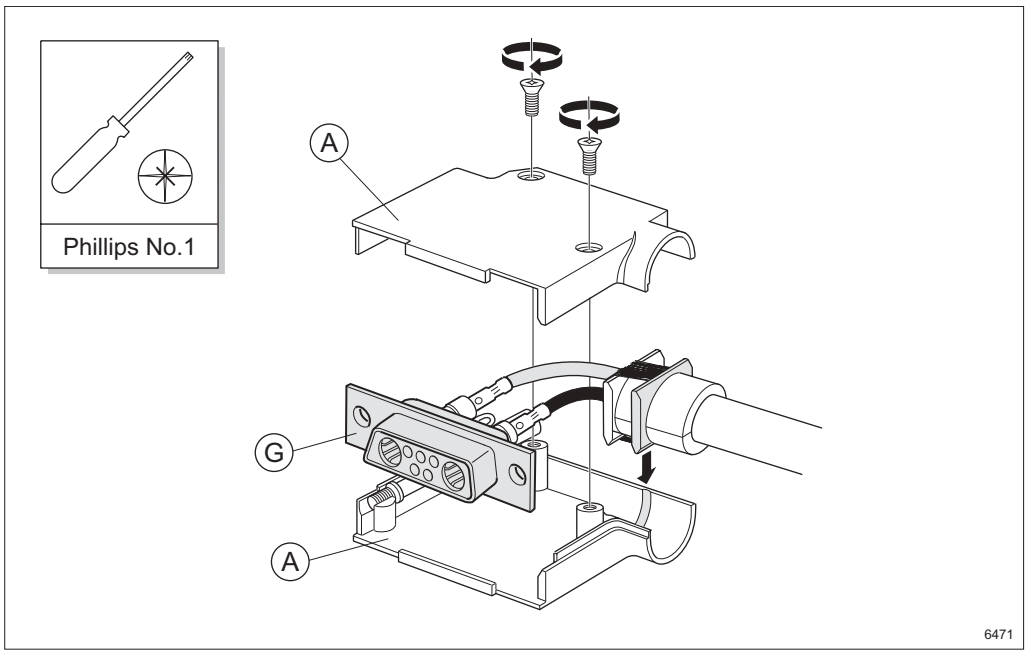


Figure 235 Assembling the connector

13. Fit the connector and cable in the connector casing **A** and adjust the contact socket **G**.

    Note: Ensure the strain relief enters the slot in the connector casing properly.

14. Fasten the top of the connector casing with the two screws.

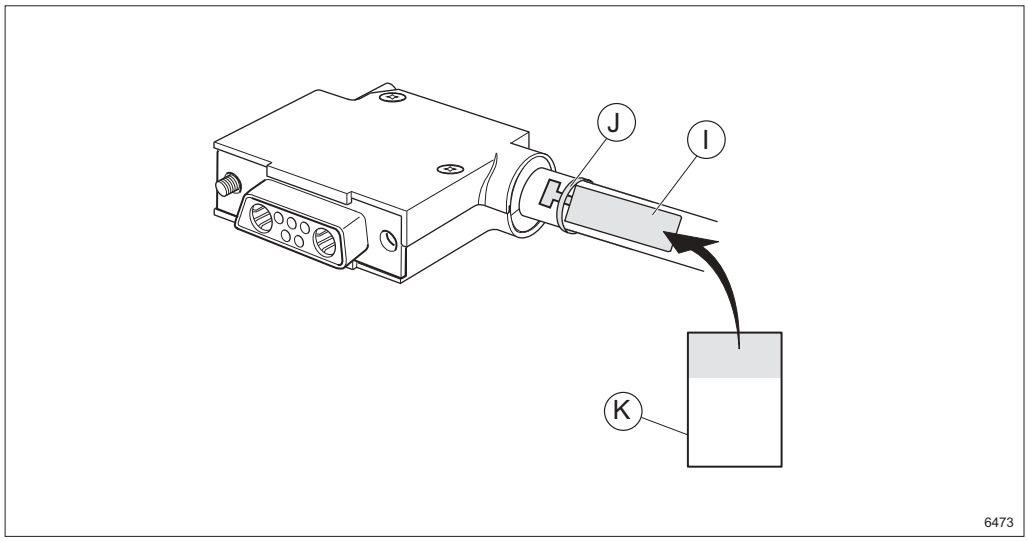


Figure 236 Fastening the tag

15. Fasten a tag **I** to the cable using a strap **J**.

16. Mark the assembled connector by writing on the yellow part of the tape **K** and attaching it to the tag (wrapping the transparent part round the tag).

    Note: There are two tags, one for each end of the cable.

18.6 Assembling the DC Cable for FAU1

Applies to DC cable NTM 203 79 (TFL 424 02) and 2-pin connector SXK 111 516/5. The figure below shows the cable and the parts included in the connector kit.

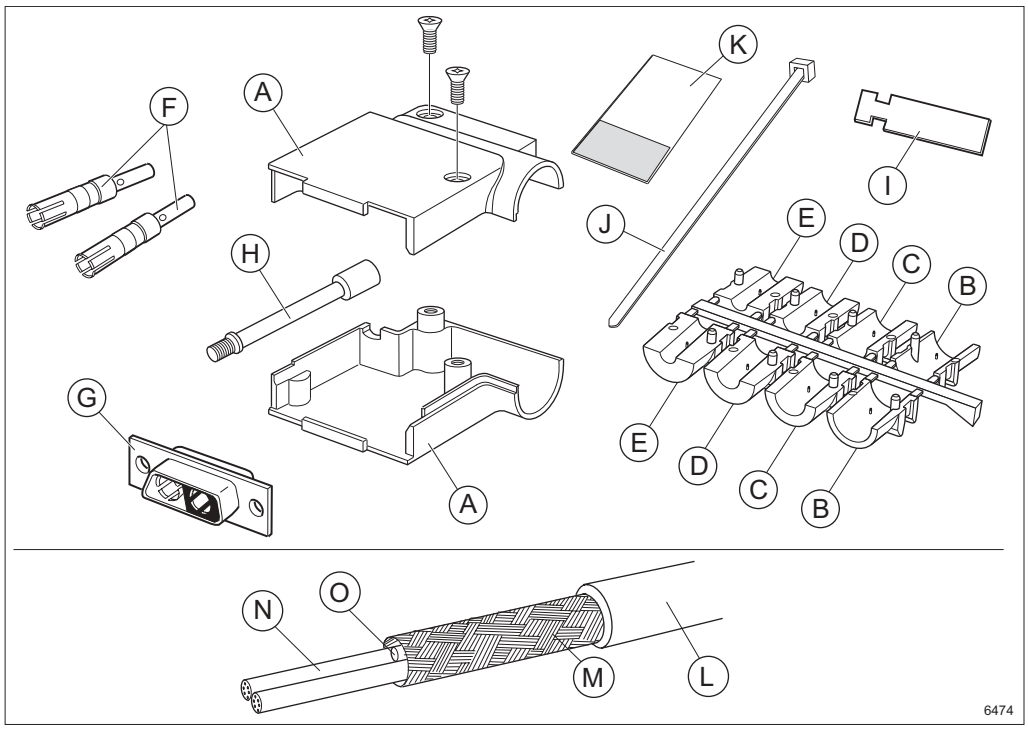


Figure 237 The DC connector kit and cable

Description

A	Connector casing	**F**	Contact sleeve	**K**	Marking tape
B	Strain relief half, size 9	**G**	Contact socket	**L**	Jacket
C	Strain relief half, size 7	**H**	Locking screw	**M**	Shield
D	Strain relief half, size 5	**I**	Marking tag	**N**	Wire
E	Strain relief half, size 4	**J**	Strap	**O**	Filler

Trimming

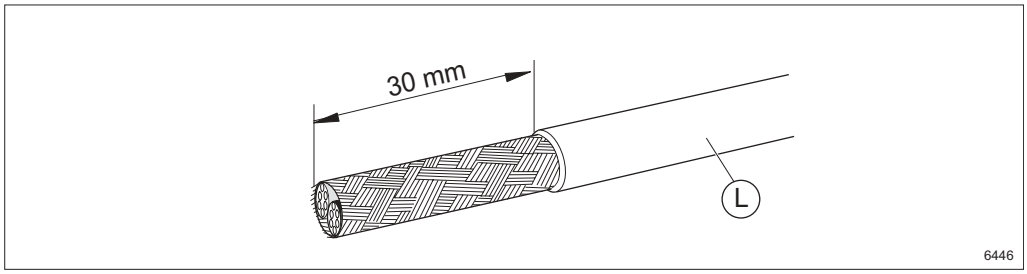


Figure 238 Stripping the cable

1. Strip the jacket **L** approximately 30 mm.

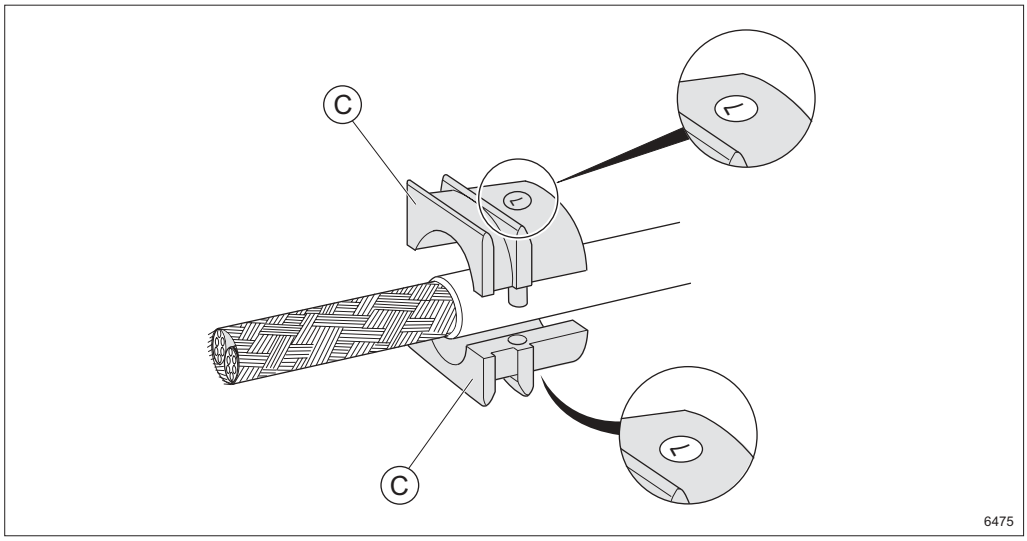


Figure 239 Fitting two strain relief halves

2. Attach the two strain relief halves around the jacket. Use **C** (size 7).

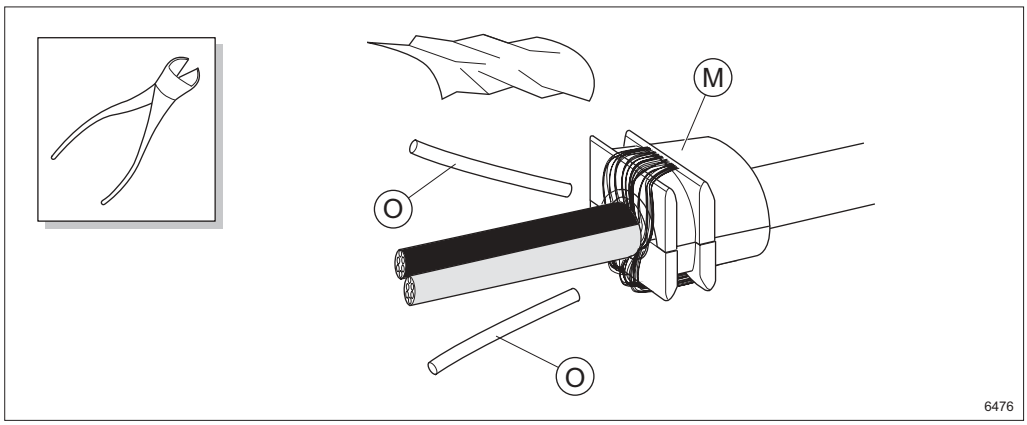


Figure 240 Folding the shield back and cutting the fillers

3. Remove the aluminum sheet and cut the fillers **O**.

4. Fold the shield **M** back on the outside of the strain relief and trim it.

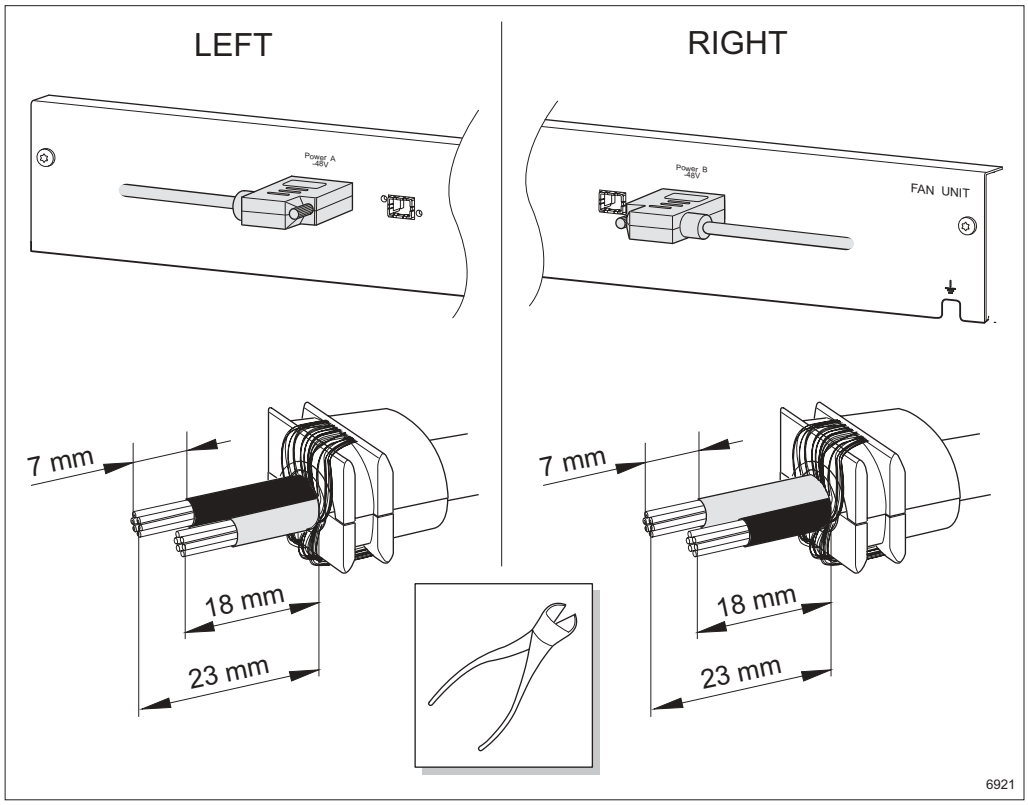


Figure 241 Cutting and stripping the wires

5. Left assembly: Leave 18 mm of the red wire and 23 mm of the black wire.

   Right assembly: Leave 18 mm of the black wire and 23 mm of the red wire.

6. Strip the wires 7 mm.

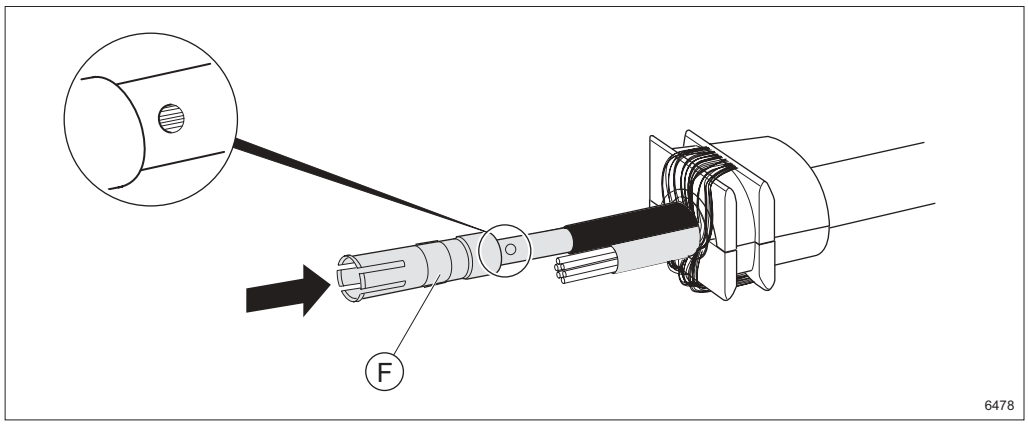


Figure 242 Fitting the contact sleeve

7. Slide the contact sleeve **F** over the wire. Make sure the wire is visible in the inspection hole.

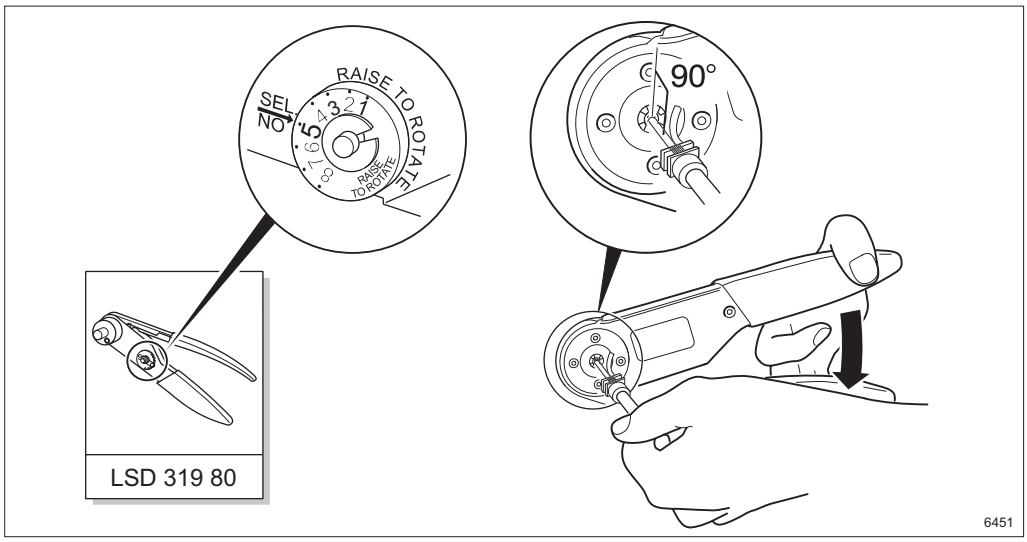


Figure 243 Using the crimping tool LSD 319 80

8. Crimp the contact sleeve. Make sure the contact sleeve is inside the crimping tool during crimping. Also make sure the contact and wire are inserted at right angles to the tool.

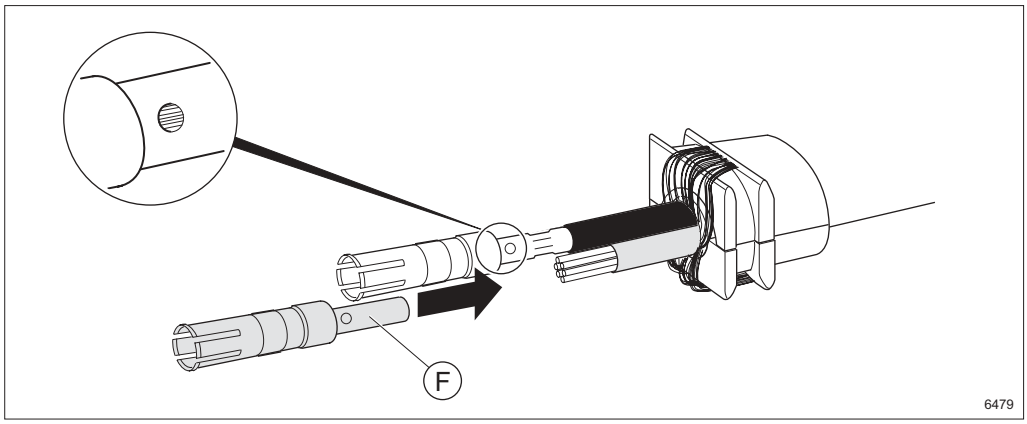


Figure 244 Checking the inspection hole and sliding on the second sleeve

9. Make sure the wires are visible in the inspection hole after crimping. Repeat the operation for the second contact sleeve **F**.

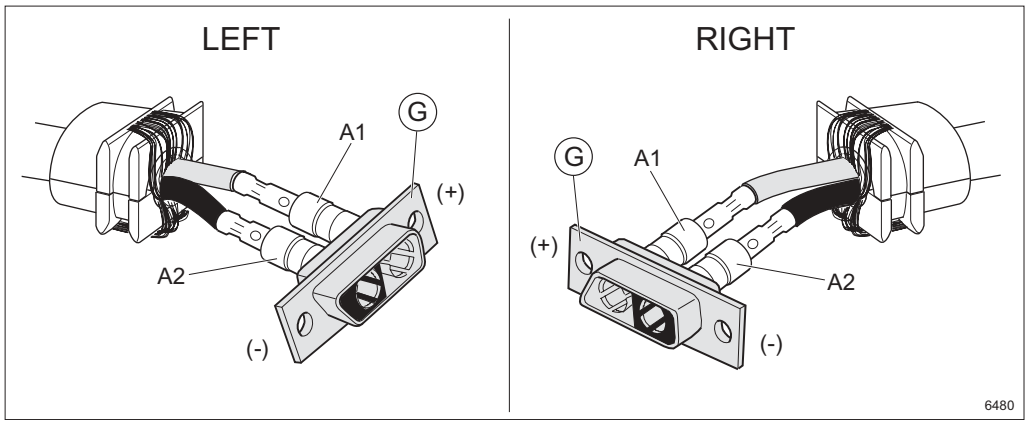


Figure 245 Inserting the contact sleeves into the contact socket

Table 22 Pin configuration for the DC connector

External connector	Pin No	Signal	TFL 424 02
DC	A1	0 V	Red
	A2	– 48 V	Black

10. Insert the contact sleeves into the contact socket **G**.

    Note: Write down color and polarity (for the connection at the other end).

Extracting the Contact Sleeves

This section only applies if a contact sleeve is inserted improperly.

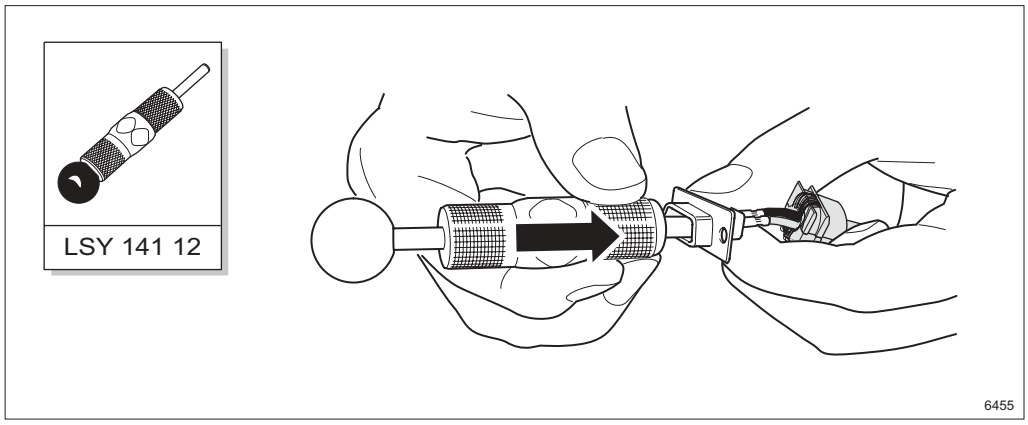


Figure 246 Applying the pin extraction tool to the contact socket

11. Pull back the handle on the pin extraction tool and apply it to the contact socket.

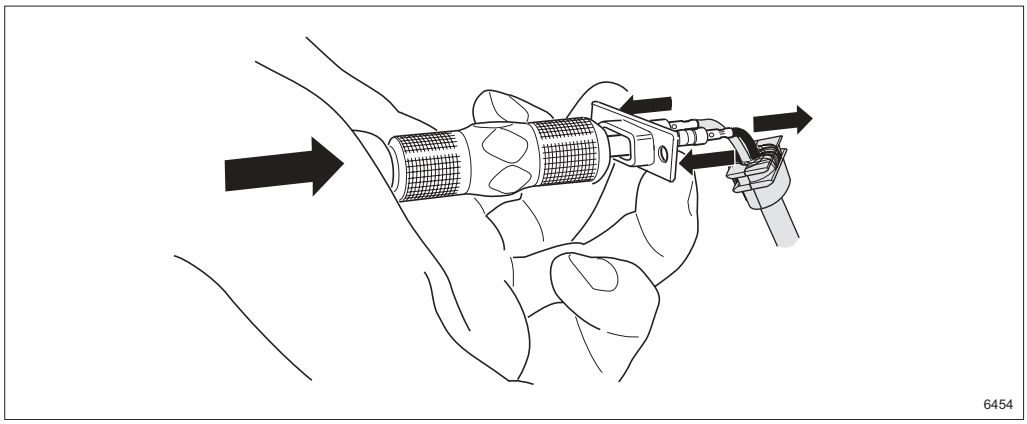


Figure 247 Extracting the contact sleeve from the contact socket

12. Extract the contact sleeve by pressing the contact socket and the tool handle together.

Assembling

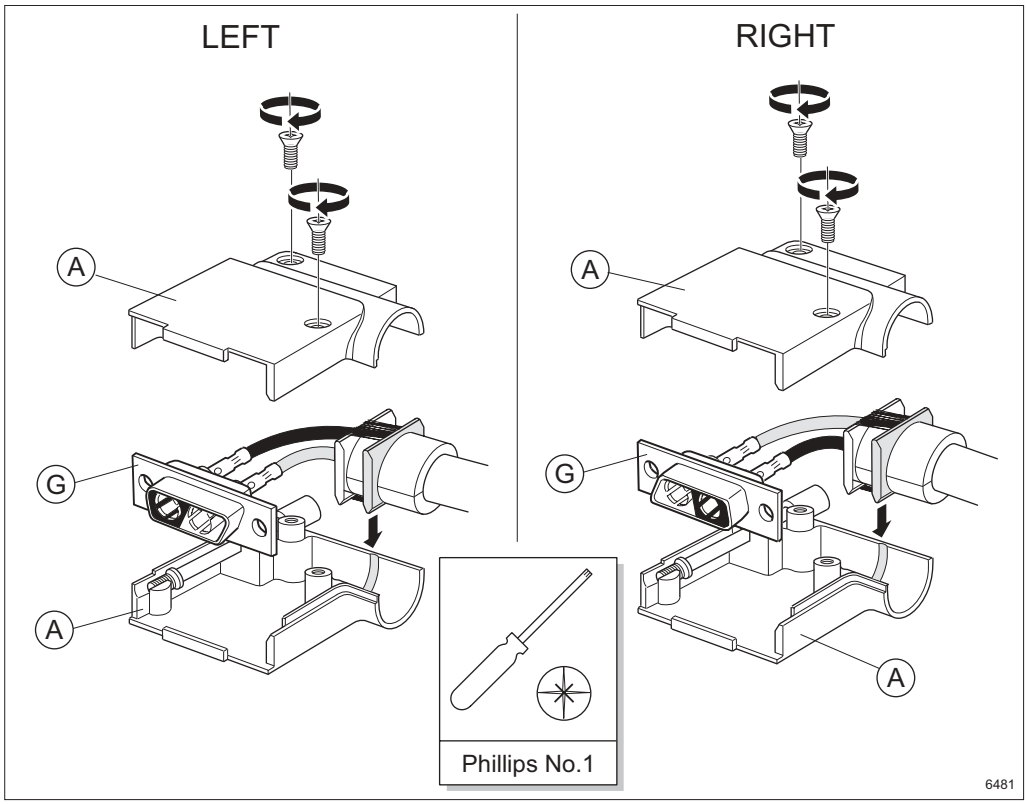


Figure 248 Assembling the connector

13. Fit the connector and cable in the connector casing **A** and adjust the contact socket **G**.

    Note: Ensure the strain relief enters the slot in the connector casing properly.

Note: Ensure the contact socket **G** is positioned as shown in the figure above.

14. Fasten the top of the connector casing with the two screws.

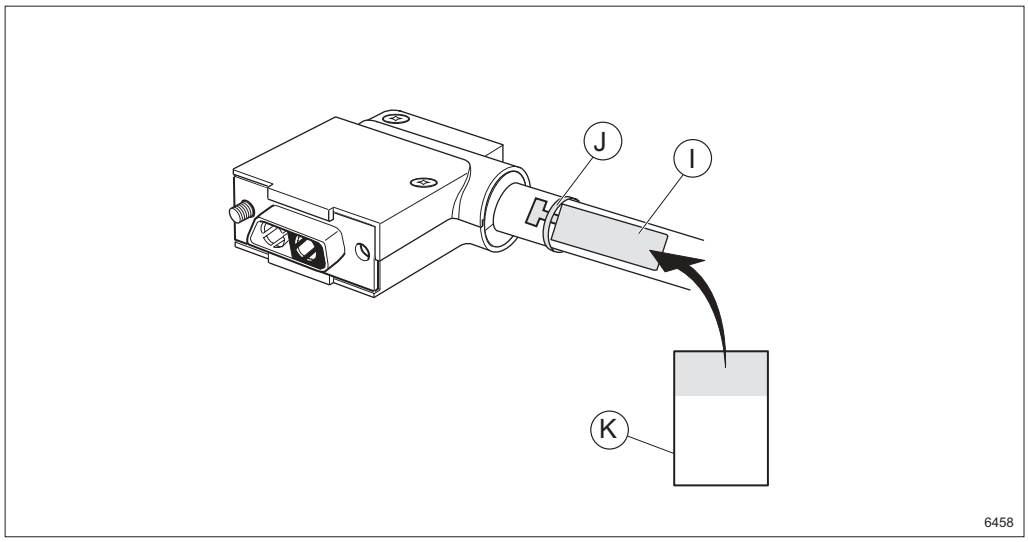


Figure 249 Marking the cable

15. Fasten a tag **I** to the cable using a strap **J**.

16. Mark the assembled connector by writing on the yellow part of the tape **K** and attaching it to the tag (wrapping the transparent part round the tag).

    Note: There are two tags, one for each end of the cable.

18.7 Assembling the DC Cable for NPU2

Applies to DC cable NTM 203 80 (TFL 424 03) and 2-pin connector SXK 111 516/4. The figure below shows the cable and the parts included in the connector kit.

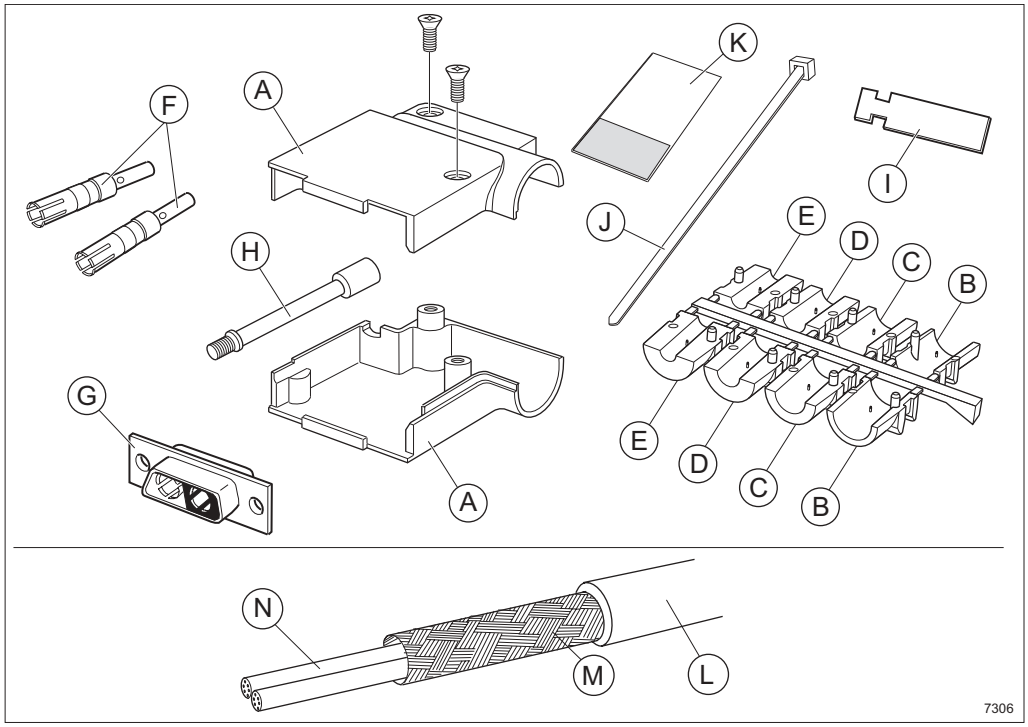


Figure 250 The DC connector kit and cable

Description

A	Connector casing	**F**	Contact sleeve	**K**	Marking tape
B	Strain relief half, size 9	**G**	Contact socket	**L**	Jacket
C	Strain relief half, size 7	**H**	Locking screw	**M**	Shield
D	Strain relief half, size 5	**I**	Marking tag	**N**	Wire
E	Strain relief half, size 4	**J**	Strap		

Trimming

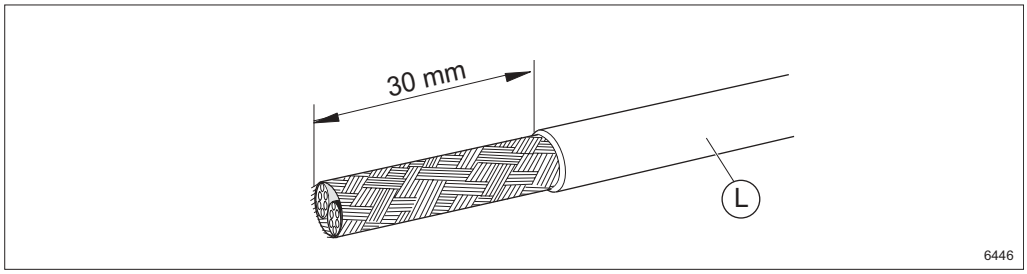


Figure 251 Stripping the cable

1. Strip the jacket **L** approximately 30 mm.

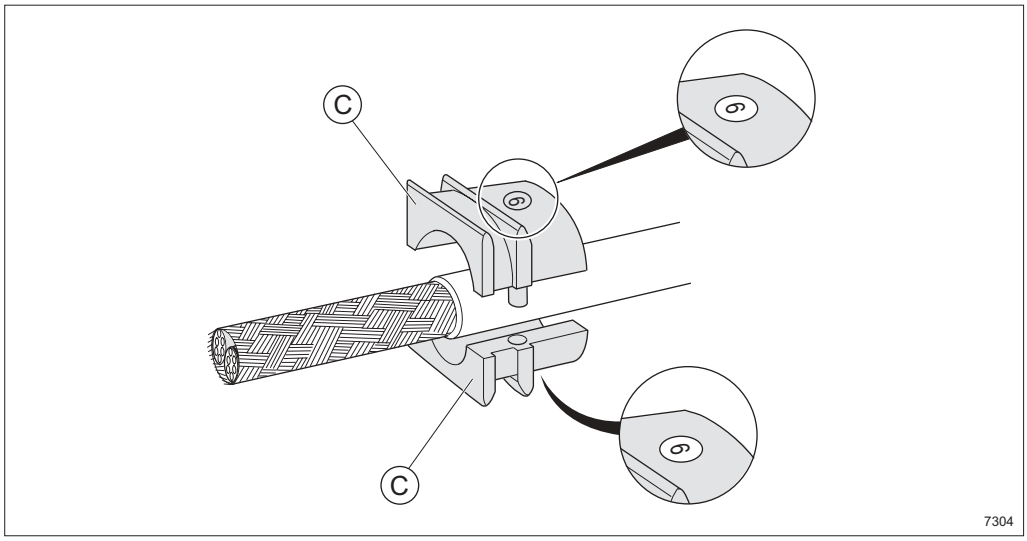


Figure 252 Fitting two strain relief halves

2. Attach the two strain relief halves around the jacket. Use **C** (size 9).

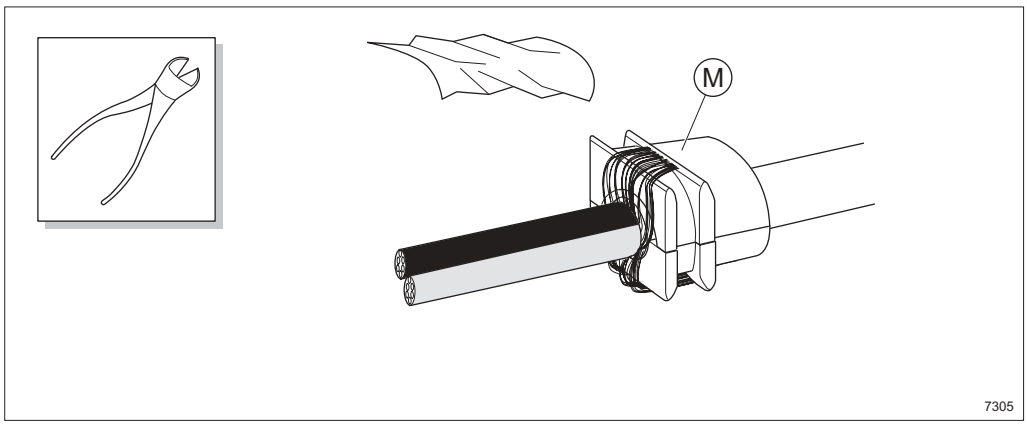


Figure 253 Folding the shield back

3. Remove the plastic sheet.

4. Fold the shield **M** back on the outside of the strain relief and trim it.

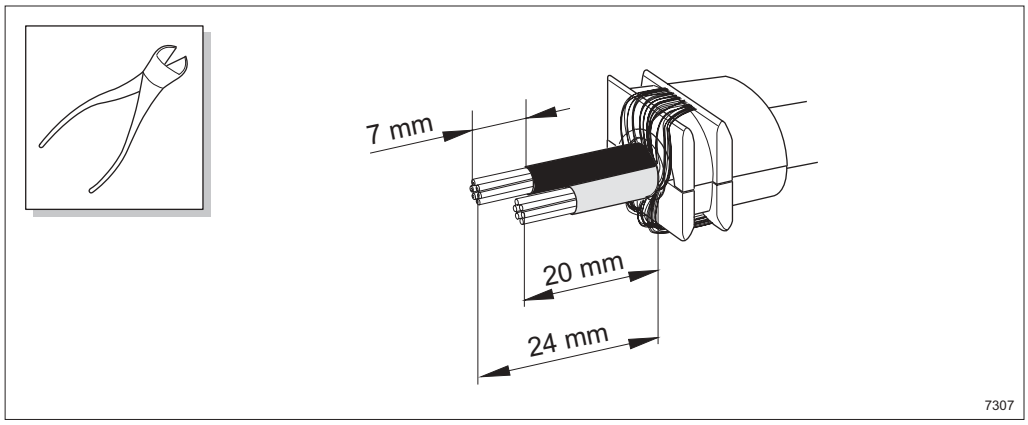


Figure 254 Cutting and stripping the wires

5. Leave 18 mm of the red wire and 23 mm of the black wire.

6. Strip the wires 7 mm.

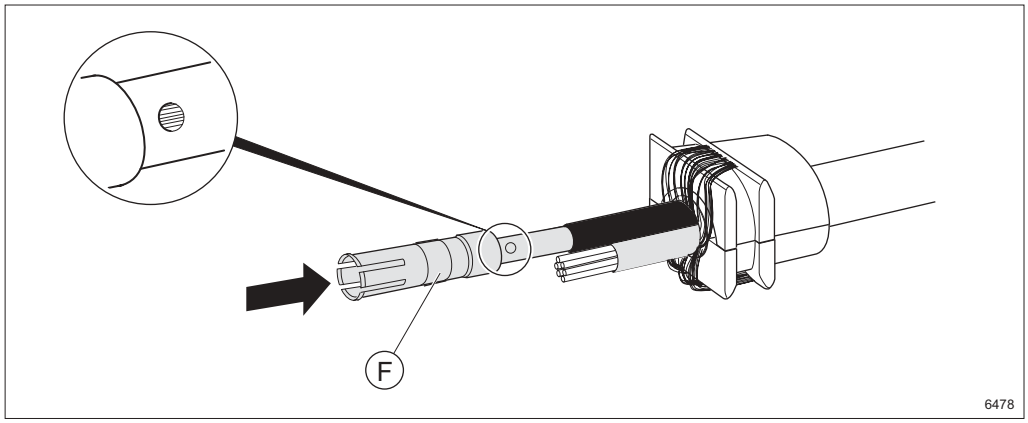


Figure 255 Fitting the contact sleeve

7. Slide the contact sleeve **F** over the wire. Make sure the wire is visible in the inspection hole.

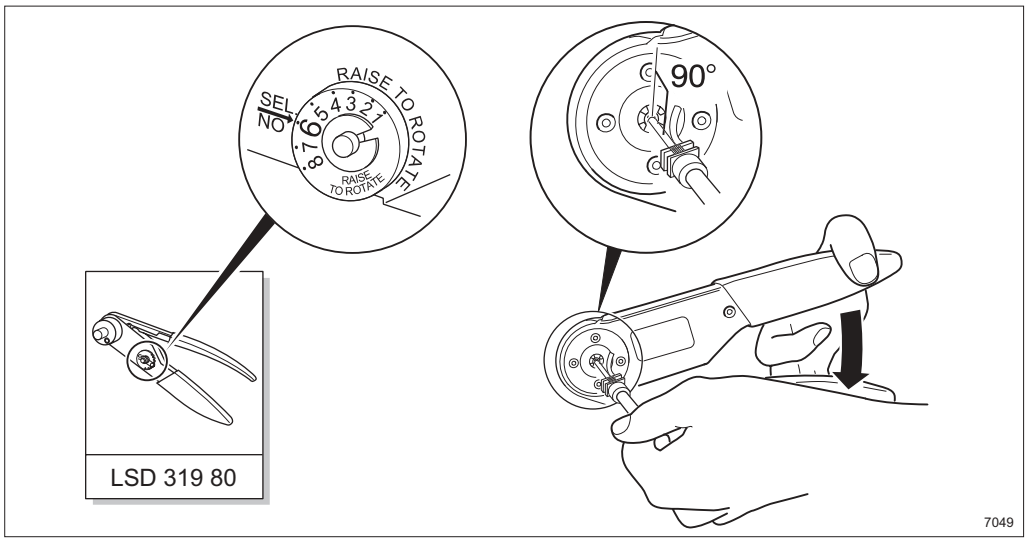


Figure 256 Using the crimping tool LSD 319 80

8. Crimp the contact sleeve. Make sure the contact sleeve is inside the crimping tool during crimping. Also make sure the contact and wire are inserted at right angles to the tool.

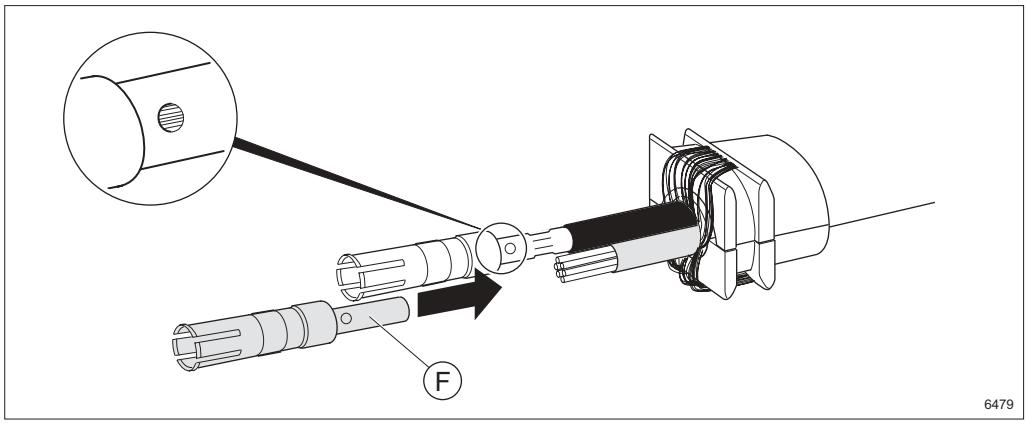


Figure 257 Checking the inspection hole and sliding on the second sleeve

9. Make sure the wires are visible in the inspection hole after crimping. Repeat the operation for the second contact sleeve **F**.

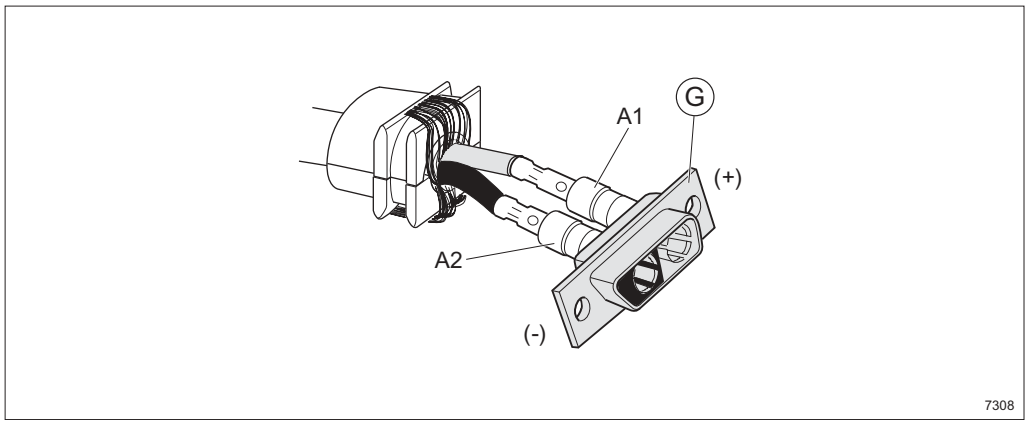


Figure 258 Inserting the contact sleeves into the contact socket

Table 23 Pin configuration for the DC connector

External connector	Pin No	Signal	TFL 424 03
DC	A1	0 V	Red
	A2	– 48 V	Black

10. Insert the contact sleeves into the contact socket **G** by pressing firmly until they click into position.

    Note: Write down color and polarity (for the connection at the other end).

Extracting the Contact Sleeves

This section only applies if a contact sleeve is inserted improperly.

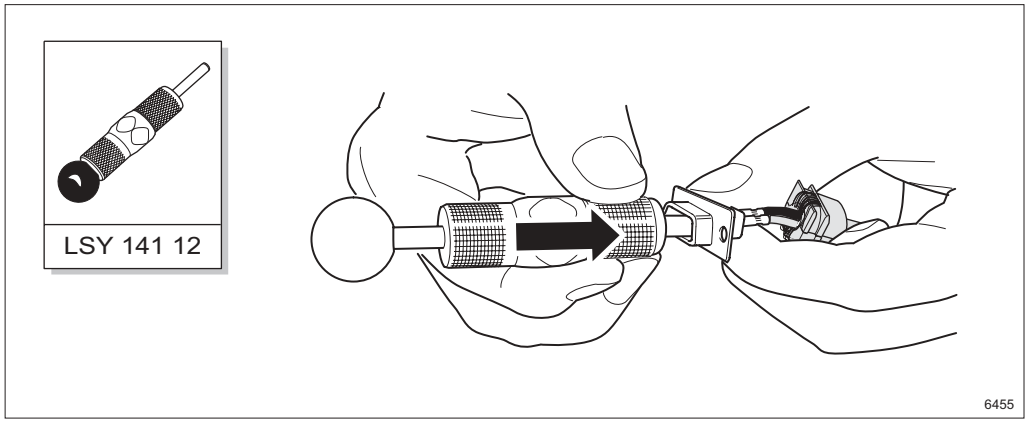


Figure 259 Applying the pin extraction tool to the contact socket

11. Pull back the handle on the pin extraction tool and apply it to the contact socket.

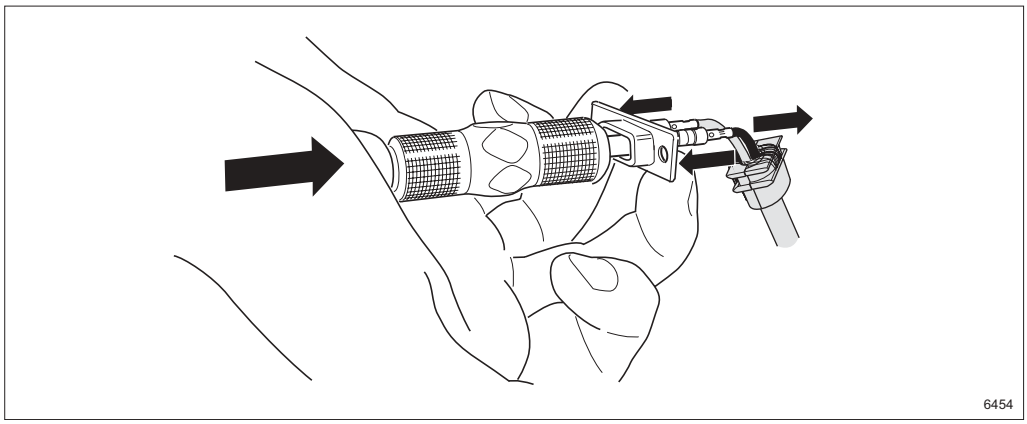


Figure 260 Extracting the contact sleeve from the contact socket

12. Extract the contact sleeve by pressing the contact socket and the tool handle together.

Assembling

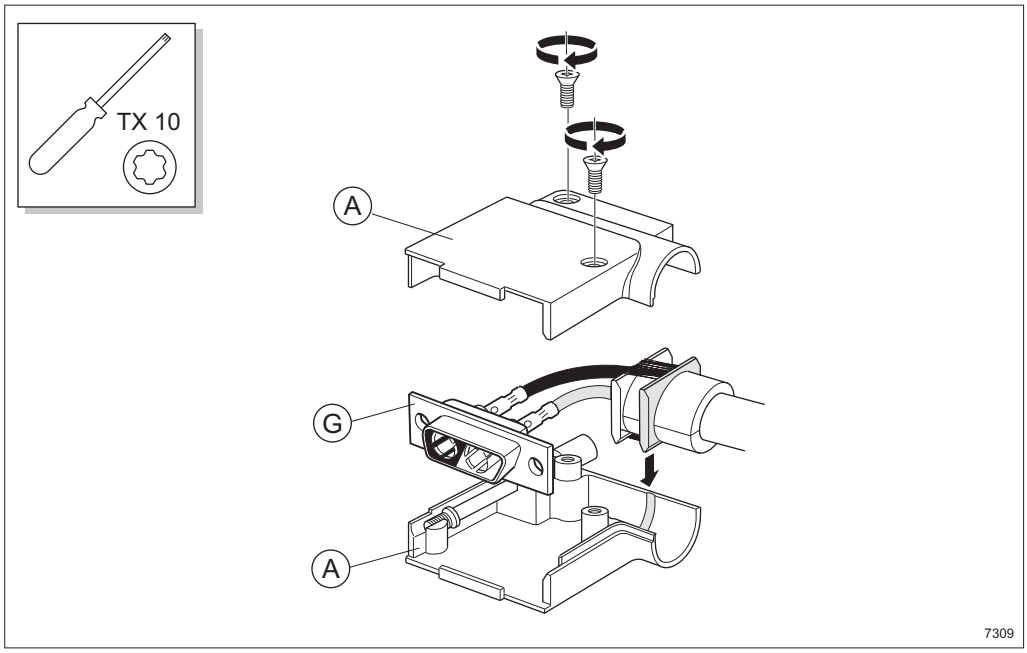


Figure 261 Assembling the connector

13. Fit the connector and cable in the connector casing **A** and adjust the contact socket **G**.

    Note: Ensure the strain relief enters the slot in the connector casing properly.

    Note: Ensure the contact socket **G** is positioned as shown in the figure above.

14. Fasten the top of the connector casing with the two screws.

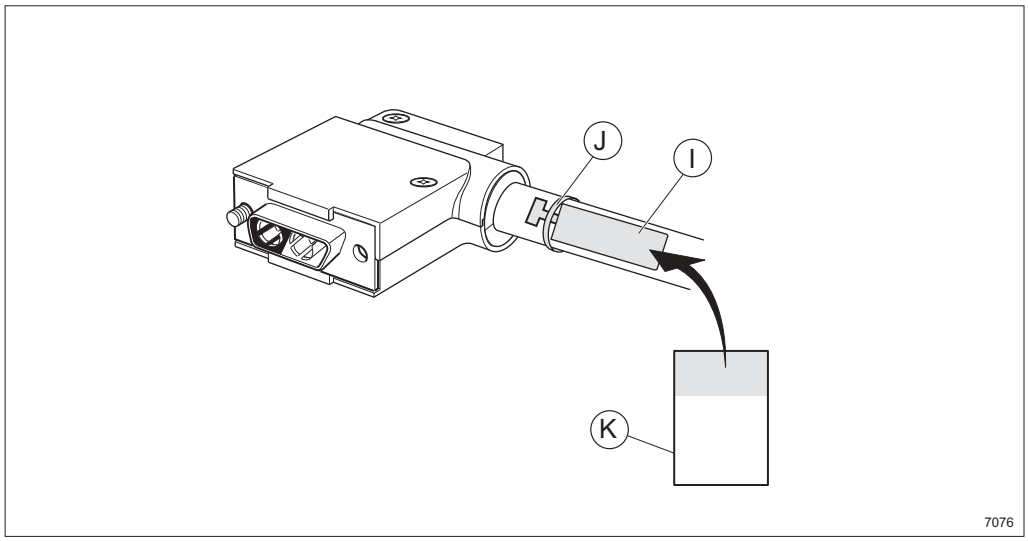


Figure 262 Marking the cable

15. Fasten a tag **I** to the cable using a strap **J**.

16. Mark the assembled connector by writing on the yellow part of the tape **K** and attaching it to the tag (wrapping the transparent part round the tag).

    Note: There are two tags, one for each end of the cable.

19 Pin Connection Overview

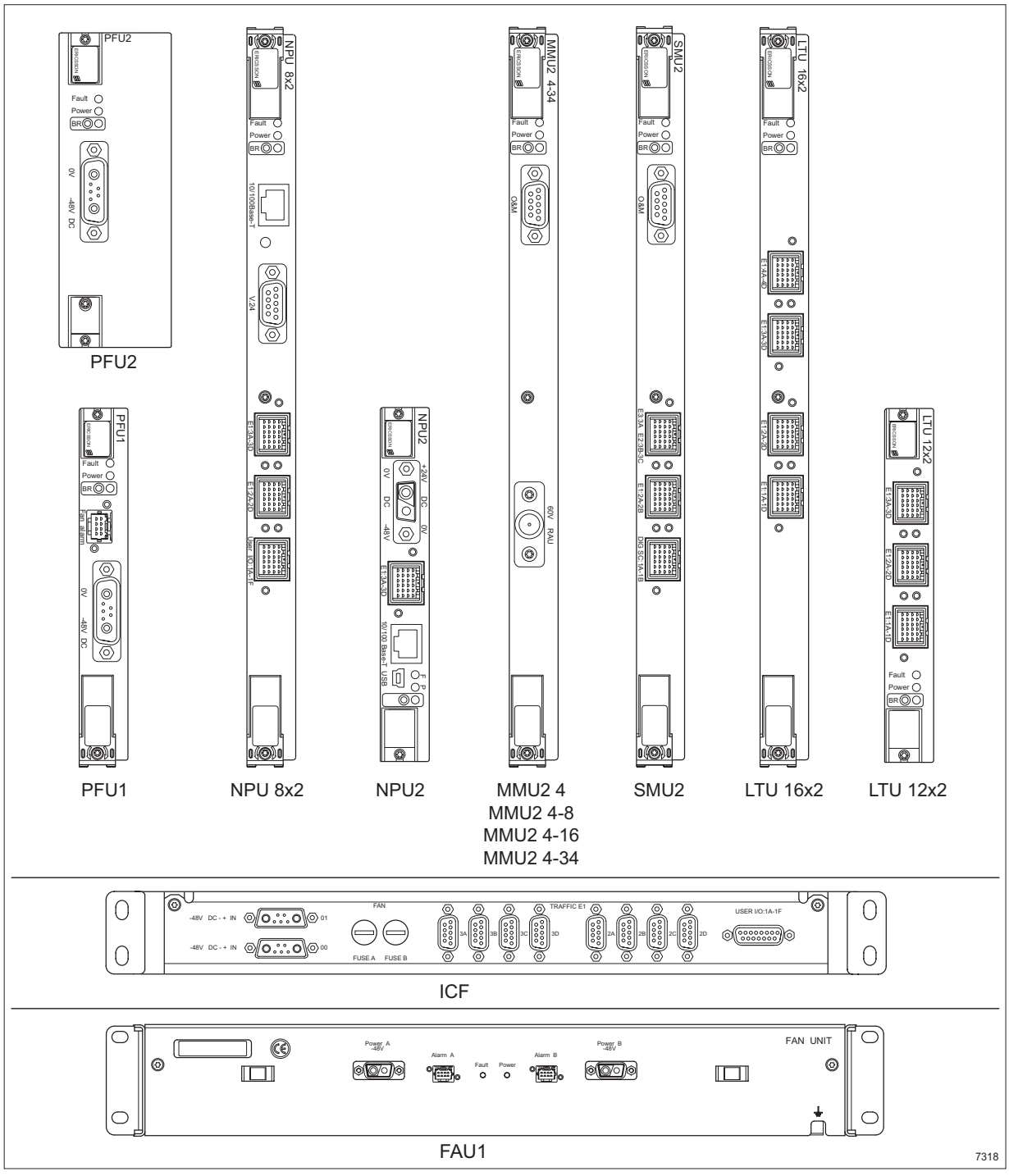
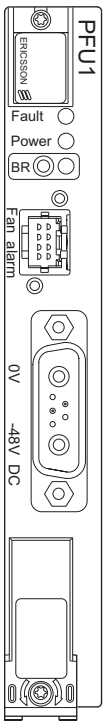
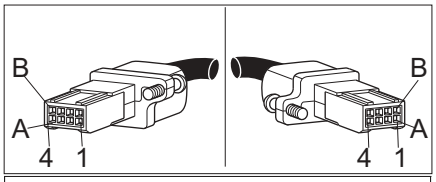


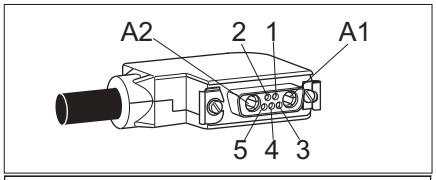
Figure 263 Pin connection overview

19.1 PFU1



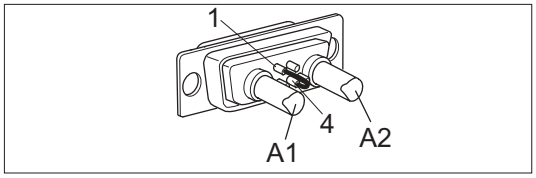


Fan alarm		
Pin No	Signal	Pin No
A1		A1
B1		B1
A2		A2
B2		B2
A3	FA OUT	A3
B3	FA IN	B3
A4		A4
B4		B4



0V -48V DC	
Pin No	Signal
A1	0 V IN
A2	-48 V IN
1	Power On Pin 1 1)
2	
3	
4	Power On Pin 2 1)
5	

1) A jumper is connected between pin 1 and pin 4



0V -48V DC		
Pin No	Signal	TFL 424 03
A1	0 V	Red
A2	-48 V	Black

Note: A jumper is connected between pin 1 and pin 4

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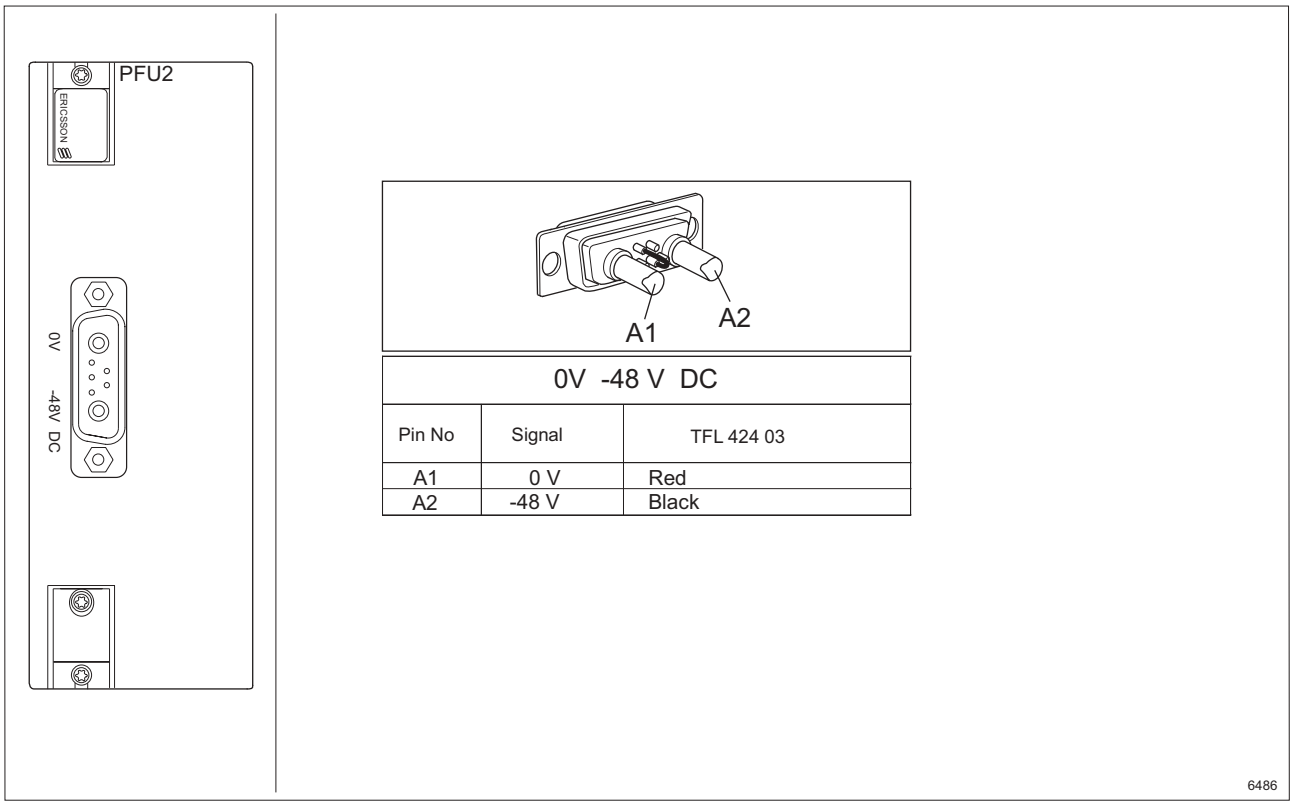
Figure 264 Pin connections for PFU1

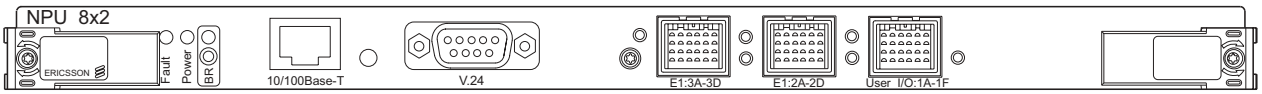
19.2 PFU2

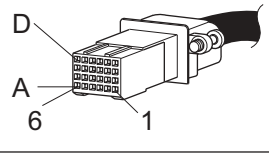


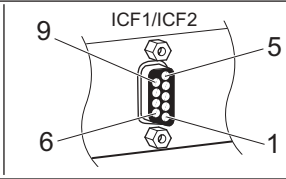
0V -48 V DC		
Pin No	Signal	TFL 424 03
A1	0 V	Red
A2	-48 V	Black

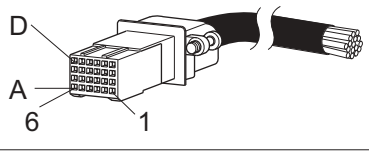
Figure 265 Pin connections for PFU2

19.3 NPU 8x2



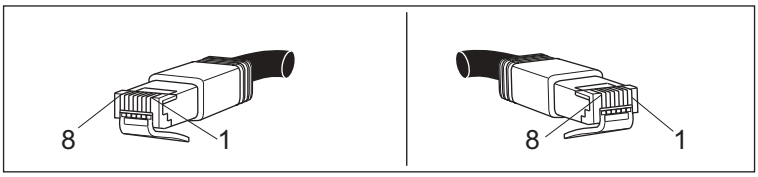






	Pin No	Signal	Direction	Pin No	
E1:2A-2D E1:3A-3D	A1	TRAFFIC 2A IN A	←	2	2A (ICF1/ICF2)
	B1	TRAFFIC 2A IN B	←	1	
	C1	TRAFFIC 2A OUT A	→	5	
	D1	TRAFFIC 2A OUT B	→	4	
	A2	TRAFFIC 2B IN A	←	2	2B (ICF1/ICF2)
	B2				
	C2	TRAFFIC 2B OUT A	→	5	
	D2				
	A3				
	B3	TRAFFIC 2B IN B	←	1	
	C3				
	D3	TRAFFIC 2B OUT B	→	4	
	A4	TRAFFIC 2C IN A	←	2	2C (ICF1/ICF2)
	B4				
	C4	TRAFFIC 2C OUT A	→	5	
	D4				
	A5				
	B5	TRAFFIC 2C IN B	←	1	
	C5				
	D5	TRAFFIC 2C OUT B	→	4	
	A6	TRAFFIC 2D IN A	←	2	2D (ICF1/ICF2)
	B6	TRAFFIC 2D IN B	←	1	
	C6	TRAFFIC 2D OUT A	→	5	
	D6	TRAFFIC 2D OUT B	→	4	

	Pin No	Signal	Direction	RPMR 102 06/2
E1:2A-2D E1:3A-3D	A1	TRAFFIC 2A IN A	←	White
	B1	TRAFFIC 2A IN B	←	Orange
	C1	TRAFFIC 2A OUT A	→	White
	D1	TRAFFIC 2A OUT B	→	Blue
	A2	TRAFFIC 2B IN A	←	White
	B2			
	C2	TRAFFIC 2B OUT A	→	White
	D2			
	A3			
	B3	TRAFFIC 2B IN B	←	Brown
	C3			
	D3	TRAFFIC 2B OUT B	→	Green
	A4	TRAFFIC 2C IN A	←	Red
	B4			
	C4	TRAFFIC 2C OUT A	→	Red
	D4			
	A5			
	B5	TRAFFIC 2C IN B	←	Orange
	C5			
	D5	TRAFFIC 2C OUT B	→	Blue
	A6	TRAFFIC 2D IN A	←	Red
	B6	TRAFFIC 2D IN B	←	Brown
	C6	TRAFFIC 2D OUT A	→	Red
	D6	TRAFFIC 2D OUT B	→	Green



	Pin No	Signal	Direction	Signal	Pin No	
10/100 Base-T	1	TX+	→	RX+	3	PC
	2	TX-	←	RX-	6	
	3	RX+	→	TX+	1	
	4					
	5					
	6	RX-	←	TX-	2	
	7					
	8					
	9					

Note: Definition of the directions in the tables:
← : Incoming signal to the NE
→ : Outgoing signal from the NE

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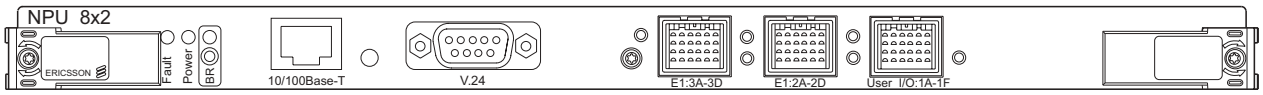
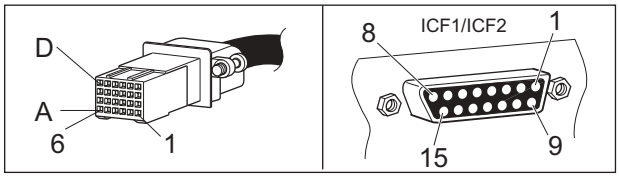
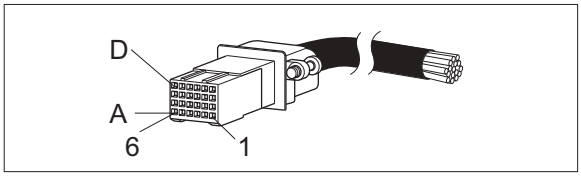
Figure 266 Pin connections for NPU 8x2 (continues)

NPU 8x2 continued





	Pin No	Signal	Direction	Pin No	
User I/O: 1A-1F	A1	USER IN 1A	→	2	User I/O ICF1/ICF2
	B1	USER IN 1A RTN	←	1	
	C1	USER IN 1B	→	4	
	D1	USER IN 1B RTN	←	3	
	A2	USER IN 1C	→	6	
	B2				
	C2	USER OUT 1D RTN	←	8	
	D2				
	A3				
	B3	USER IN 1C RTN	←	5	
	C3				
	D3	USER OUT 1D NOP	→	7	
	A4	USER OUT 1D NCL	→	15	
	B4				
	C4	USER OUT 1E NOP	→	9	
	D4				
	A5				
	B5	USER OUT 1E RTN	←	10	
	C5				
	D5	USER OUT 1E NCL	→	11	
	A6	USER OUT 1F RTN	←	13	
	B6	USER OUT 1F NOP	→	14	
	C6				
	D6	USER OUT 1F NCL	→	12	



	Pin No	Signal	Direction	RPMR 102 06/2
User I/O: 1A-1F	A1	USER IN 1A	→	White
	B1	USER IN 1A RTN	←	Orange
	C1	USER IN 1B	→	White
	D1	USER IN 1B RTN	←	Blue
	A2	TRAFFIC 1B IN A	→	White
	B2			
	C2	USER OUT 1D RTN	←	White
	D2			
	A3			
	B3	USER IN 1C RTN	←	Brown
	C3			
	D3	USER OUT 1D NOP	→	Green
	A4	USER OUT 1D NCL	→	Red
	B4			
	C4	USER OUT 1E NOP	→	Red
	D4			
	A5			
	B5	USER OUT 1E RTN	←	Orange
	C5			
	D5	USER OUT 1E NCL	→	Blue
	A6	USER OUT 1F RTN	←	Red
	B6	USER OUT 1F NOP	→	Brown
	C6			Red
	D6	USER OUT 1F NCL	→	Green

Note: Definition of abbreviations in the tables:
NCL : Normally Closed
NOP: Normally Open
RTN : Return

Note: Definition of the directions in the tables:
← : Incoming signal to the NE
→ : Outgoing signal from the NE

Note: V.24 is not used.

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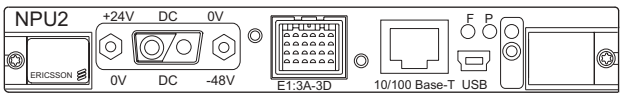
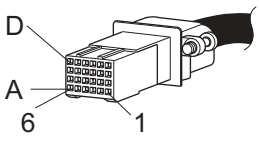
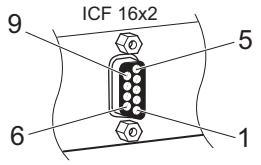
Figure 267 Pin connections for NPU 8x2

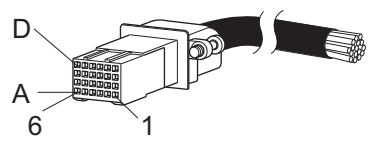
19.4 NPU2



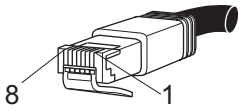


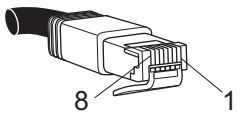


	Pin No	Signal	Direction	Pin No	
E1:3A-3D	A1	TRAFFIC 3A IN A	←	2	1A (ICF 16x2)
	B1	TRAFFIC 3A IN B	←	1	
	C1	TRAFFIC 3A OUT A	→	5	
	D1	TRAFFIC 3A OUT B	→	4	
	A2	TRAFFIC 3B IN A	←	2	1B (ICF 16x2)
	B2				
	C2	TRAFFIC 3B OUT A	→	5	
	D2				
	A3				
	B3	TRAFFIC 3B IN B	←	1	
	C3				
	D3	TRAFFIC 3B OUT B	→	4	
	A4	TRAFFIC 3C IN A	←	2	1C (ICF 16x2)
	B4				
	C4	TRAFFIC 3C OUT A	→	5	
	D4				
	A5				
	B5	TRAFFIC 3C IN B	←	1	
	C5				
	D5	TRAFFIC 3C OUT B	→	4	
	A6	TRAFFIC 3D IN A	←	2	1D (ICF 16x2)
	B6	TRAFFIC 3D IN B	←	1	
	C6	TRAFFIC 3D OUT A	→	5	
	D6	TRAFFIC 3D OUT B	→	4	



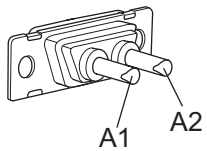
	Pin No	Signal	Direction	RPMR 102 06/2
E1:3A-3D	A1	TRAFFIC 3A IN A	←	White
	B1	TRAFFIC 3A IN B	←	Orange
	C1	TRAFFIC 3A OUT A	→	White
	D1	TRAFFIC 3A OUT B	→	Blue
	A2	TRAFFIC 3B IN A	←	White
	B2			
	C2	TRAFFIC 3B OUT A	→	White
	D2			
	A3			
	B3	TRAFFIC 3B IN B	←	Brown
	C3			
	D3	TRAFFIC 3B OUT B	→	Green
	A4	TRAFFIC 3C IN A	←	Red
	B4			
	C4	TRAFFIC 3C OUT A	→	Red
	D4			
	A5			
	B5	TRAFFIC 3C IN B	←	Orange
	C5			
	D5	TRAFFIC 3C OUT B	→	Blue
	A6	TRAFFIC 3D IN A	←	Red
	B6	TRAFFIC 3D IN B	←	Brown
	C6	TRAFFIC 3D OUT A	→	Red
	D6	TRAFFIC 3D OUT B	→	Green





Note: Definition of the directions in the tables:
← : Incoming signal to the NE
→ : Outgoing signal from the NE

	Pin No	Signal	Direction	Signal	Pin No	
10/100 Base-T	1	TX+	→	RX+	3	PC
	2	TX-	←	RX-	6	
	3	RX+	→	TX+	1	
	4					
	5					
	6	RX-	←	TX-	2	
	7					
	8					
	9					



-48 V DC 0 V		
Pin No	Signal	TFL 424 03
A1	0 V	Red
A2	-48 V	Black

Note: AMM 2p will support + 24 V DC in future releases.

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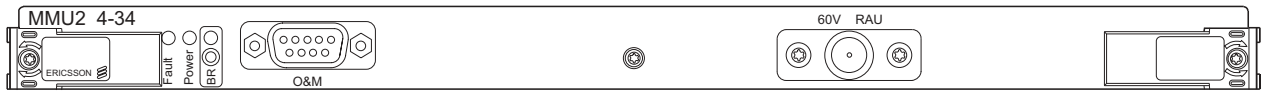
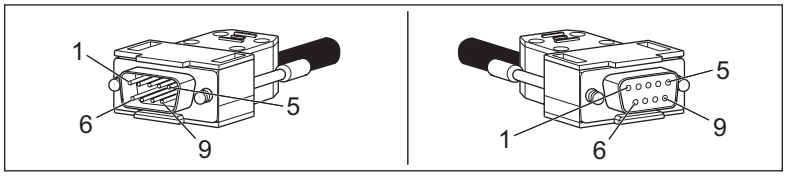
Figure 268 Pin connections for NPU2

19.5 MMU2 4, MMU2 4-8, MMU2 4-16 and MMU2 4-34





	Pin No	Signal	Direction	Signal	Pin No	
O&M	5	0 V		SG	5	PC
	4					
	3	O&M TD 103	←	TD	3	
	2	O&M RD 104	→	RD	2	
	1					
	6					
	7					
	8					
	9					

Note: The MINI-LINK O&M port is configured as Data Communication Equipment (DCE)

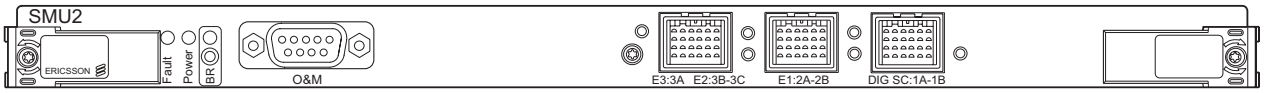
Note: Definition of the abbreviations in the table:

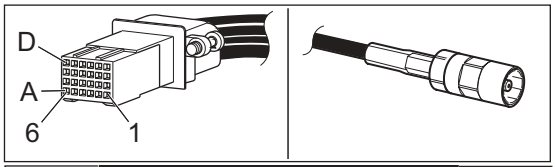
SG : Signal Ground
RD : Receive Data
TD : Transmit Data

7450

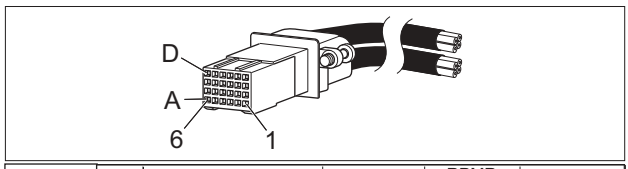
Figure 269 Pin connections for MMU2 4, MMU2 4-8, MMU2 4-16 and MMU2 4-34

19.6 SMU2



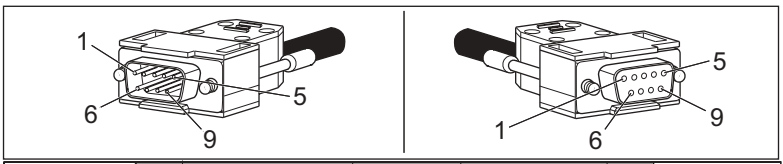


	Pin No	Signal	Direction	
E3:3A E2: 3B-3C	A1			
	B1			
	C1			
	D1			
	A2			
	B2	TRAFFIC OUT	→	E3 Tx
	C2			
	D2	TRAFFIC IN	←	E3 Rx
	A3	TRAFFIC A OUT	→	E2 A Tx
	B3			
	C3	TRAFFIC A IN	←	E2 A Rx
	D3			
	A4			
	B4	TRAFFIC B OUT	→	E2 B Tx
	C4			
	D4	TRAFFIC B IN	←	E2 B Rx
	A5			
	B5			
	C5			
	D5			
	A6			
	B6			
	C6			
	D6			



	Pin No	Signal	Direction	RPMR 102 15/3	
DIG SC: 1A-1B	A1	DIG SERV 1A IN A	←	Turquoise [1]	DIG SC 1-4
	B1	DIG SERV 1A IN B	←	Violet [2]	
	C1	DIG SERV 1A OUT A	→	White	
	D1	DIG SERV 1A OUT B	→	Blue	
	A2	DIG SERV 1B IN A	←	Turquoise [1]	DIG SC 5-8
	B2				
	C2	DIG SERV 1B OUT A	→	White	
	D2				
	A3				
	B3	DIG SERV 1B IN B	←	Violet [2]	
	C3				
	D3	DIG SERV 1B OUT B	→	Blue	
	A4				
	B4				
	C4				
	D4				
	A5				
	B5				
	C5				
	D5				
	A6				
	B6				
	C6				
	D6				

1) Turquoise= Light green/blue
2) Violet = Light purple



Note: Definition of the directions in the tables:
← : Incoming signal to the NE
→ : Outgoing signal from the NE

	Pin No	Signal	Direction	Signal	Pin No	
O&M	5	0 V		SG	5	PC
	4					
	3	O&M TD 103	←	TD	3	
	2	O&M RD 104	→	RD	2	
	1					
	6					
	7					
	8					
	9					

Note: Definition of the directions in the tables:
SG : Signal Ground
RD : Receive Data
TD : Transmit Data

Note: The MINI-LINK O&M port is configured as Data Communication Equipment (DCE)

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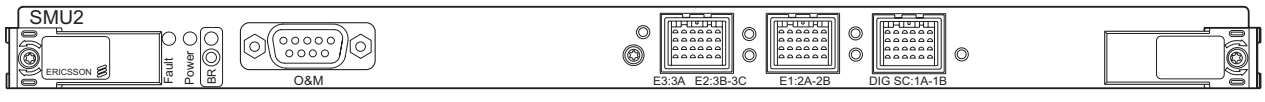
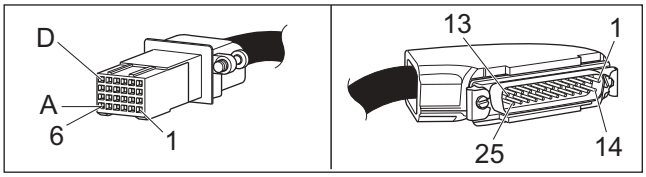
Figure 270 Pin connections for SMU2 (continues)

SMU2 continued





	Pin No	Signal	Direction	Pin No	
E1:2A-2B	A1	TRAFFIC 2A IN A	←	13	TR (MMU/ SMU)
	B1	TRAFFIC 2A IN B	←	12	
	C1	TRAFFIC 2A OUT A	→	10	
	D1	TRAFFIC 2A OUT B	→	9	
	A2	TRAFFIC 2B IN A	←	6	
	B2				
	C2	TRAFFIC 2B OUT A	→	3	
	D2				
	A3				
	B3	TRAFFIC 2B IN B	←	5	
	C3				
	D3	TRAFFIC 2B OUT B	→	2	
	A4				
	B4				
	C4				
	D4				
	A5				
	B5				
	C5				
	D5				
	A6				
	B6				
	C6				
	D6				

	Pin No	Signal	Direction	Signal	Pin No	
O&M (Access Server)	5	0 V		0 V	5	O&M
	4	O&M DCD 109	←	O&M CDSTL 108/1	6	
	3	O&M TD 103	←	O&M RD 104	2	
	2	O&M RD 104	→	O&M TD 103	3	
	1	Not used		Not used		
	6	O&M CDSTL 108/1	→	O&M DCD 109	4	
	7	Not used		Not used	8	
	8	Not used		Not used	7	
	9	Not used		Not used		

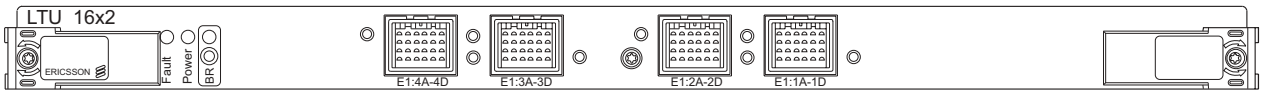
Note: Definition of the directions in the tables:
← : Incoming signal to the NE
→ : Outgoing signal from the NE

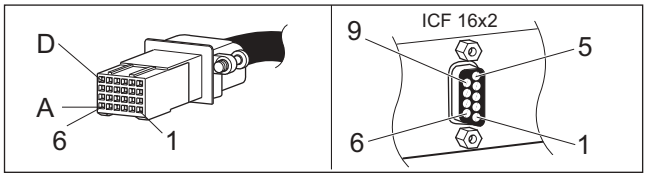
Note: The MINI-LINK O&M ports are configured as Data Communication Equipment (DCE)

6767

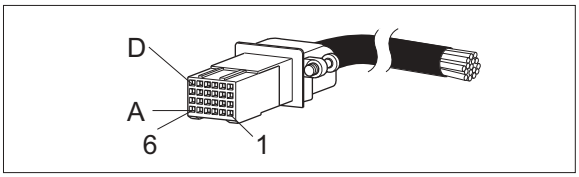
Figure 271 Pin connections for SMU2

19.7 LTU 16x2





	Pin No	Signal	Direction	Pin No	
E1:1A-1D E1:2A-2D E1:3A-3D E1:4A-4D	A1	TRAFFIC 1A IN A	←	2	1A (ICF 16x2)
	B1	TRAFFIC 1A IN B	←	1	
	C1	TRAFFIC 1A OUT A	→	5	
	D1	TRAFFIC 1A OUT B	→	4	
	A2	TRAFFIC 1B IN A	←	2	1B (ICF 16x2)
	B2				
	C2	TRAFFIC 1B OUT A	→	5	
	D2				
	A3				
	B3	TRAFFIC 1B IN B	←	1	
	C3				
	D3	TRAFFIC 1B OUT B	→	4	
	A4	TRAFFIC 1C IN A	←	2	1C (ICF 16x2)
	B4				
	C4	TRAFFIC 1C OUT A	→	5	
	D4				
	A5				
	B5	TRAFFIC 1C IN B	←	1	
	C5				
	D5	TRAFFIC 1C OUT B	→	4	
	A6	TRAFFIC 1D IN A	←	2	1D (ICF 16x2)
	B6	TRAFFIC 1D IN B	←	1	
	C6	TRAFFIC 1D OUT A	→	5	
	D6	TRAFFIC 1D OUT B	→	4	



	Pin No	Signal	Direction	RPMR 102 06/2
E1:1A-1D E1:2A-2D E1:3A-3D E1:4A-4D	A1	TRAFFIC 1A IN A	←	White
	B1	TRAFFIC 1A IN B	←	Orange
	C1	TRAFFIC 1A OUT A	→	White
	D1	TRAFFIC 1A OUT B	→	Blue
	A2	TRAFFIC 1B IN A	←	White
	B2			
	C2	TRAFFIC 1B OUT A	→	White
	D2			
	A3			
	B3	TRAFFIC 1B IN B	←	Brown
	C3			
	D3	TRAFFIC 1B OUT B	→	Green
	A4	TRAFFIC 1C IN A	←	Red
	B4			
	C4	TRAFFIC 1C OUT A	→	Red
	D4			
	A5			
	B5	TRAFFIC 1C IN B	←	Orange
	C5			
	D5	TRAFFIC 1C OUT B	→	Blue
	A6	TRAFFIC 1D IN A	←	Red
	B6	TRAFFIC 1D IN B	←	Brown
	C6	TRAFFIC 1D OUT A	→	Red
	D6	TRAFFIC 1D OUT B	→	Green

Note: Definition of the directions in the tables:
← : Incoming signal to the NE
→ : Outgoing signal from the NE

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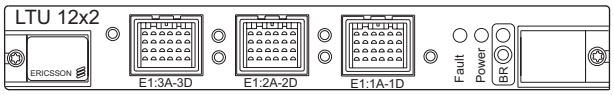
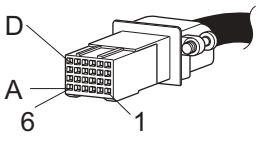
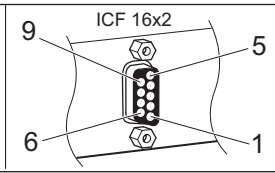
Figure 272 Pin connections for LTU 16x2

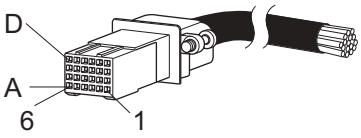
19.8 LTU 12x2







	Pin No	Signal	Direction	Pin No	
E1:1A-1D E1:2A-2D E1:3A-3D	A1	TRAFFIC 1A IN A	←	2	2A (ICF 16x2)
	B1	TRAFFIC 1A IN B	←	1	
	C1	TRAFFIC 1A OUT A	→	5	
	D1	TRAFFIC 1A OUT B	→	4	
	A2	TRAFFIC 1B IN A	←	2	2B (ICF 16x2)
	B2				
	C2	TRAFFIC 1B OUT A	→	5	
	D2				
	A3				
	B3	TRAFFIC 1B IN B	←	1	
	C3				
	D3	TRAFFIC 1B OUT B	→	4	
	A4	TRAFFIC 1C IN A	←	2	2C (ICF 16x2)
	B4				
	C4	TRAFFIC 1C OUT A	→	5	
	D4				
	A5				
	B5	TRAFFIC 1C IN B	←	1	
	C5				
	D5	TRAFFIC 1C OUT B	→	4	
	A6	TRAFFIC 1D IN A	←	2	2D (ICF 16x2)
	B6	TRAFFIC 1D IN B	←	1	
	C6	TRAFFIC 1D OUT A	→	5	
	D6	TRAFFIC 1D OUT B	→	4	



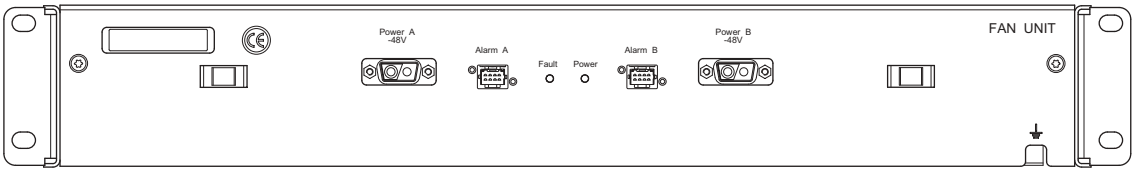
	Pin No	Signal	Direction	RPMR 102 06/2
E1:1A-1D E1:2A-2D E1:3A-3D	A1	TRAFFIC 1A IN A	←	White
	B1	TRAFFIC 1A IN B	←	Orange
	C1	TRAFFIC 1A OUT A	→	White
	D1	TRAFFIC 1A OUT B	→	Blue
	A2	TRAFFIC 1B IN A	←	White
	B2			
	C2	TRAFFIC 1B OUT A	→	White
	D2			
	A3			
	B3	TRAFFIC 1B IN B	←	Brown
	C3			
	D3	TRAFFIC 1B OUT B	→	Green
	A4	TRAFFIC 1C IN A	←	Red
	B4			
	C4	TRAFFIC 1C OUT A	→	Red
	D4			
	A5			
	B5	TRAFFIC 1C IN B	←	Orange
	C5			
	D5	TRAFFIC 1C OUT B	→	Blue
	A6	TRAFFIC 1D IN A	←	Red
	B6	TRAFFIC 1D IN B	←	Brown
	C6	TRAFFIC 1D OUT A	→	Red
	D6	TRAFFIC 1D OUT B	→	Green

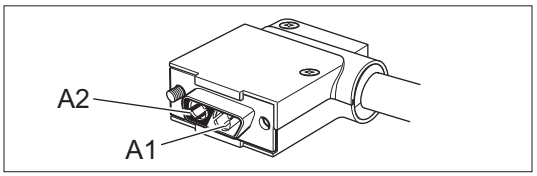
Note: Definition of the directions in the tables:
← : Incoming signal to the NE
→ : Outgoing signal from the NE

7454

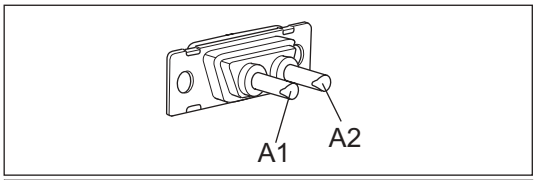
Figure 273 Pin connection for LTU 12x2

19.9 FAU1





Power A/B -48 V	
Pin No	Signal
A1	0 V
A2	-48 V

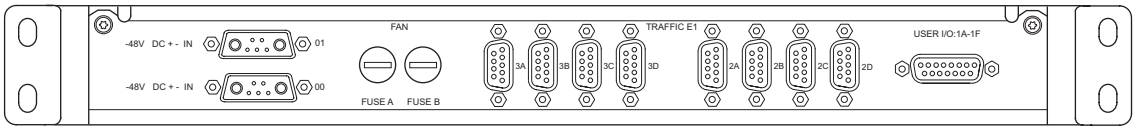


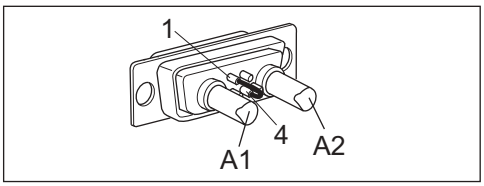
Power A/B -48 V		
Pin No	Signal	TFL 424 02
A1	0 V	Red
A2	-48 V	Black

6065

Figure 274 Pin connections for FAU1

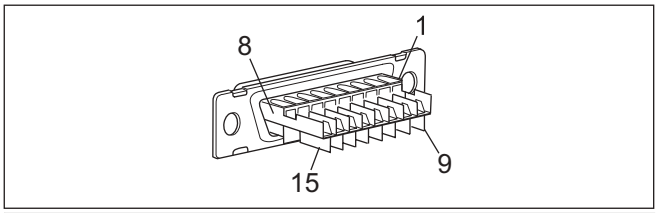
19.10 ICF





External connector	Pin No	Signal	TFL 424 03
DC	A1	DC +	Red
	A2	DC -	Black

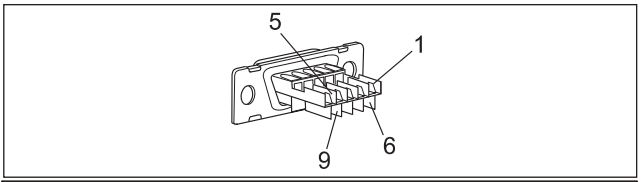
Note: A jumper is connected between pin 1 and pin 4



External connector	Pin No	Signal	Direction	TFL 481 53
USER I/O: 1A-1F	8	USER OUT 1D RTN	←	WHITE / blue
	7	USER OUT 1D NOP	→	BLUE / white
	6	USER IN 1C	→	WHITE / orange
	5	USER IN 1C RTN	←	ORANGE / white
	4	USER IN 1B	→	WHITE / green
	3	USER IN 1B RTN	←	GREEN / white
	2	USER IN 1A	→	WHITE / brown
	1	USER IN 1A RTN	←	BROWN / white
	9	USER OUT 1E NOP	→	RED / blue
	10	USER OUT 1E RTN	←	BLUE / red
	11	USER OUT 1E NCL	→	RED / orange
	12	USER OUT 1F NCL	→	ORANGE / red
	13	USER OUT 1F RTN	←	RED / green
	14	USER OUT 1F NOP	→	GREEN / red
	15	USER OUT 1D NCL	→	RED/ brown

Note: Definition of the directions in the tables:
← : Incoming signal to the NE
→ : Outgoing signal from the NE

Note: Definition of abbreviations in the tables
NCL : Normally Closed
NOP: Normally Open
RTN : Return



External connector	Pin No	Signal	Direction	TFL 481 54
E1:1A-1D to E1:4A-4D	5	TRAFFIC 2A OUT A	→	WHITE / blue
	4	TRAFFIC 2A OUT B	→	BLUE / white
	3			
	2	TRAFFIC 2A IN A	←	WHITE/ Orange
	1	TRAFFIC 2A IN B	←	ORANGE / White
	6			
	7			
	8			
	9			

7442

Figure 275 Pin connections for ICF1 120 Ohm. The applicable tables are valid for all other ICFs.

Glossary

AM
Access Module

AMM
Access Module Magazine

ATPC
Automatic Transmit Power Control

BER
Bit Error Ratio

BR
Board Removal

DCN
Data Communication Network

DDF
Digital Distribution Frame

DIG SC
Digital Service Channel

EEM
Embedded Element Manager

FAU
Fan Unit

Hop
A radio link connection with a pair of communicating terminals

ICF
Interface Connection Field

Installation Mode
A state when the Network Element allows a limited set of parameters to be set.

IP
Internet Protocol

LAN
Local Area Network

LED
Light Emitting Diode

LCT
Local Craft Terminal

LTU
Line Termination Unit

LU
Local Upgrade (Software)

MMU
Modem Unit

MSM
MINI-LINK Service Manager

NE
Network Element

Network
Several MINI-LINK sites connected via radio or cable

Node Installation Mode
A state used for initial setup of the Network Element, allowing a limited set of parameters to be set.

Normal Mode
A state of the Network Element used for normal operation, allowing complete configuration possibilities.

NPU
Node Processor Unit

NPU Installation Mode
A state of the Network Element used for NPU repair.

OMC
Operation and Maintenance Center

PFU
Power Filter Unit

PSU
Power Supply Unit

SID
Site Installation Documentation

Site
A place with one or more MINI-LINK terminals

SMU2
Switch Multiplexer Unit

SNCP
Sub-Network Connection Protection. 1+1 E1 SNCP is used to create a protected E1 interface from two unprotected E1 interfaces.

STM-1
Synchronous Transport Module level 1. SDH traffic at 155 Mbit/s.

Terminal
One side of radio-link connection with a unique identity in the network.

USB
Universal Serial Bus