Technical Report

CiA 106

Version 1.1.0

Connector pin-assignment recommendations

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This version replaces the version 1.0.0, which was technically and editorially revised. The main changes are as follows:

- Updated normative references;
- Renamed "5-pin "mini" style connector" to "5-pin 7/8" connector";
- Renamed "5-pin "micro" style connector" to "5-pin M12 connector";
- Renamed "5-pin "pico" style connector" to "5-pin M8 connector"; and
- Added four connectors for aerospace applications.

NOTE Please double-check CiA's website for younger versions.

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Introduction

In order to achieve interchangeability of devices regarding the CAN interface, it is necessary to use compatible physical connections. In case of connectors, the plug and the socket need to match including the pin-assignment. One of the very first recommendations, CiA has released, was the pin-assignment for DSUB 9-pin connectors.

Through the years, CiA has recommended the pin-assignment for many kinds of connectors. These recommendations have been published in the CiA 303-1 document, which is part of the classic CANopen series. In order to generalize these recommendations, CiA has moved the pin-assignment recommendations to this document, which is not more related to classic CANopen only. Now, the connector pin-assignment recommendations given in this document are valid for Classical CAN, CAN FD, and CAN XL interfaces. They are also referenced by profile specification for classic CANopen and CANopen FD. They are also suitable for other CAN-based higher-layer approaches, which do not recommend or specify contradictionary pin-assignments.

Contents

1 Scope 6
2 Normative references 6
3 Terms and definitions 7
4 Symbols and abbreviated terms 7
5 Naming convention 7
6 Power-supply recommendations 8
7 Connector pin-assignments 8
7.1 D-SUB 9-pin connector 8
7.2 RJ10 connector 9
7.3 RJ45 connector 9
7.4 Multi-pole connector 10
7.5 Open-style connector 12
7.6 5-pin 7/8” connector 12
7.7 5-pin M12 connector 13
7.8 5-pin M8 connector 13
7.9 Han-Quintax connector 13
7.10 7-pin round connector 13
7.11 8-pin round connector 14
7.12 9-pin round connector 14
7.13 10-pin round connector 15
7.14 Mini-snap 10-pin round connector 15
7.15 12-pin round flange connector 15
7.16 9-pin flange round T-connector with ID-switch 16
7.17 Han-Brid CU connector 17
7.18 IEEE1394/Firewire connector with shielding 18
7.18.1 Chaining of the network on the node 18
7.18.2 No chaining of the network on the node 20
7.19 Mini-Fit Jr. connector 20
7.20 Micro-Fit 3.0 connector 21
7.21 (Automotive) 7-pin socket connector 21
7.22 (Automotive) 9-pin socket connector 21
7.23 18-pin VDA interface connector 21
7.24 2-pin power connector 22
7.25 Header 10-pin plug connector 22
7.26 D-SUB 15-pin connector 22
7.26.1 Medical contrast-media injector 22
7.26.2 With two CAN network ports 22
7.27 8-pin Ampseal connector (redundant CAN networks) 22
7.28 9-pin Deutsch HD10-9 connector 23
7.29 9-pin breakaway connector 23
7.30 4-pin Isobus connector 23
7.31 Truck/trailer connector 23
7.32 32-pin four-part connector 23
7.33 16-pin OBD-II connector 23
7.34 DroneCAN micro connector 24
7.35 CANaerospace D38999/20FA35PN connector 24
7.36 CANaerospace D38999/20FB35PN connector 24

7.37 CANaerospace MS3470L1006PN connector 25
Annex A – Connector cross-reference table (informative) 26
A.1 For application-specific connectors 26

1 Scope

This document recommends the connector pin-assignment for CAN interfaces. This includes the CAN_H and CAN_L pins, the ground pin, and the power supply pins.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

CiA 103, version 1.1.0, I*ntrinsically safe CAN device*

CiA 413-1 version 3.0.0, *CANopen device profile for truck gateways – Part 1: General definitions*

CiA 420-1 version 3.2.0, *CANopen profiles for extruder downstream devices – Part 1: General definitions*

CiA 425-1 version 2.1.0, *CANopen application profile for medical diagnostic add-on modules – Part 1: General definitions*

CiA 434-1 version 2.0.0, *CANopen profiles for laboratory automation systems – Part 1: General definitions*

CiA 447-1 version 2.1.0, *CANopen application profile for special-purpose car add-on devices – Part 1: General definitions*

DroneCAN, *DroneCAN specification (https://dronecan.github.io/)*

IEC 60130-9:2011, *Connectors for frequencies below 3 MHz – Part 9: Circular connectors for radio and associated sound equipment*

IEC 60807-2:1992/AMD1:1996, *Amendment 1 – Rectangular connectors for frequencies below 3 MHz – Part 2: Detail specification for a range of connectors, with assessed quality, with trapezoidal shaped metal shells and round contacts – Fixed solder contact types*

IEC 61076-2-101:2012, *Connectors for electronic equipment – Product requirements – Part 2-101: Circular connectors – Detail specification for M12 connectors with screw-locking*

IEC 61076-2-104:2014, *Connectors for electronic equipment – Product requirements – Part 2-104: Circular connectors – Detail specification for circular connectors with M8 screw-locking or snap-locking*

IEC 61076-2-106:2011, *Connectors for electronic equipment – Product requirements – Part 2-106: Circular connectors – Detail specification for connectors M16 x 0,75 with screw-locking and degree of protection IP40 or IP65/67*

ISO 11738-2, *Tractors and machinery for agriculture and forestry – Serial control and communications data network – Part 2: Physical layer*

ISO 12098, *Road vehicles – Connectors for the electrical connection of towing and towed vehicles – 15-pole connector for vehicles with 24 V nominal supply voltage*

ISO 15031-3, *Road vehicles – Communication between vehicle and external equipment for emissions-related diagnostics – Part 3: Diagnostic connector and related electrical circuits: Specification and use*

ISO 16844-1, *Road vehicles – Tachograph systems – Part 1: Electromechanical components*

NFPA/T3.5.29 R1-2007 (R2017), *Fluid power systems and components – Electrically-controlled industrial valves – Interface dimensions for electrical connectors (Revision and redesignation of ANSI/B93.55M-1981)*

MIL-C-26482, *Connectors, electrical, (circular, miniature, quick disconnect, environment resisting), receptacles and plugs – Military specification*

MIL-DTL-24308, *Connectors, electric, rectangular, nonenvironmental, miniature, polarized shell, rack and panel – General specification*

MIL-DTL-38999M, *Connectors, electrical, circular, miniature, high density, quick disconnect (bayonet, threaded or breech coupling), environment resistant with crimp removable contacts or hermetically sealed with fixed, solderable contacts – General specification*

SAE J1962, *Diagnostic connector*

TMC RP1210 (Technology & Maintenance Council)

3 Terms and definitions

For the purposes of this document, the terms and definitions given in the CiA terminology database (https://www.can-cia.org/groups/cia-glossary-of-terms/) and the following apply.

3.1
hybrid connector
electric connector for CAN cable with both plug-pins and socket-pin receptacles

3.2
T-connector
T-shape electric connector for CAN cable with three connection points with either plug, socket or hybrid connector

Additionally, ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp/

— IEC Electropedia: available at http://www.electropedia.org/

4 Symbols and abbreviated terms

For the purposes of this document, the following symbols and abbreviated terms apply.

GND ground
SHLD shield
TMC Technology & Maintenance Council (TMC) of the American Trucking Association

5 Naming convention

Table 1 recommends the pin names for connectors not listed in this document. The names should be used in the device manual and, if feasible, on the housing of the device.

Table 1 – Pin naming

Pin description	Notation
CAN_L network line (dominant low)	CAN_L or CAN_{low} or CAN-
CAN_H network line (dominant high)	CAN_H or CAN_{high} or CAN+
CAN ground	CAN_GND or CAN_{GND} or Ground or GND
Optional CAN shield	CAN_SHLD or CAN_{SHIELD} or Shield or SHLD
Optional CAN external positive supply (NOTE)	CAN_V+ or CAN_{V+} or V+ or UC or U_{CAN}
Optional ground	OPT_GND or GND_{opt} or 0 V or V-
NOTE It is dedicated for supply of transceiver and opto-couplers, if galvanic isolation of the CAN node applies.	

6 Power-supply recommendations

If needed, the socket connector should provide the connection to the power supply. The plug connector should not be connected to the power supply. This is the reason why most devices are equipped with plug connectors. Devices can be connected to the network either directly to the T-connector or with a stub cable. The stub cable should be as short as possible. T-connectors allow to remove a device without disrupting the network operation. The transmission resistance of one connector should be in the range of 2,5 mΩ to 10 mΩ.

7 Connector pin-assignments

7.1 D-SUB 9-pin connector

Figure 1 illustrates the pin-numbering of the D-SUB 9-pin connector compliant with IEC 60807-2:1992/AMD1:1996. Table 2 recommends the pin-assignment of the D-SUB 9-pin connector. The device should provide the plug connector. Pin 3 and pin 6 should be interconnected within modules. The pins (including the reserved ones) should be connected inside of such modules, providing two network connections, and inside of T-connectors. The intention is to prevent an interruption of any of the wires in the network cable, assuming a future specification i.e. usage of the reserved pins. By using the pin V+ for supplying transceivers, in case of galvanic isolation, the necessity of extra local power isolation (e.g. DC/DC-converter) is avoided. The pin 8 should be used, in case an error line is required.

The DroneCAN applications deploying this connector use 24 V as the nominal power supply.

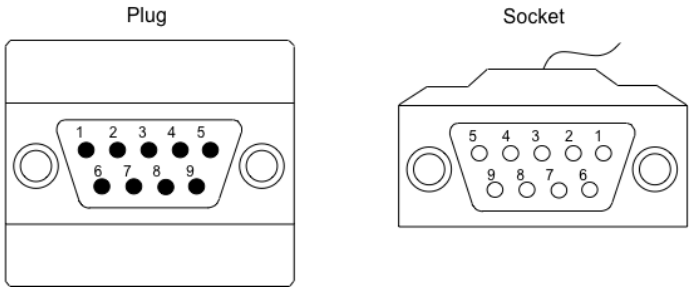


Figure 1 – D-SUB 9-pin connector pin-numbering

Table 2 – D-SUB 9-pin connector pin-assignment

Pin	Notation	Description
1	-	Reserved
2	CAN_L	CAN_L network line (dominant low)
3	CAN_GND	CAN ground
4	-	Reserved
5	(CAN_SHLD)	Optional CAN shield
6	(GND)	Optional ground
7	CAN_H	CAN_H network line (dominant high)
8	-	Reserved
9	(CAN_V+)	Optional CAN external positive supply

For CANaerospace applications, the respective D-SUB 9-pin connector MIL24308/8 is specified in MIL-DTL-24308. Table 3 recommends the pin-assignment of the MIL24308/8 connector.

Table 3 – MIL24308/8 connector pin-assignment

Pin	Notation	Description
1	V+ in	Power supply in
2	CAN_L in	CAN_L network line in (dominant low)
3	CAN_R	Termination resistor (120-Ohm, between pin 3 and CAN_L network line in)
4	CAN_L out	CAN_L network line out (dominant low)
5	V+_GND in	Power ground in
6	V+ out	Power supply out
7	CAN_H in	CAN_H network line in (dominant high)
8	CAN_H out	CAN_H network line out (dominant high)
9	V+_GND out	Power ground out

7.2 RJ10 connector

Figure 2 illustrates the RJ10 connector pin-numbering. Table 4 recommends the pin-assignment of the RJ10 connector.

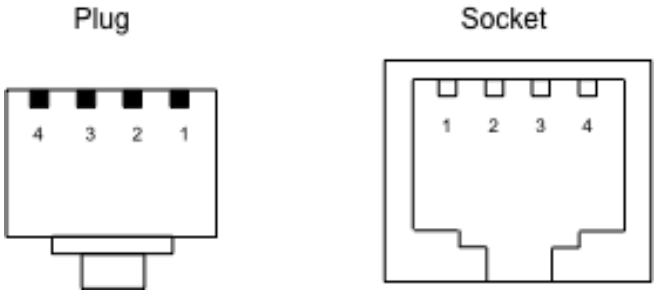


Figure 2 – RJ10 connector pin-numbering

Table 4 – RJ10 connector pin-assignment

Pin	Notation	Description
1	(CAN_V+)	Optional CAN external positive supply
2	CAN_H	CAN_H network line (dominant high)
3	CAN_L	CAN_L network line (dominant low)
4	CAN_GND	Ground or 0 V or V- (optional CAN external negative supply)

7.3 RJ45 connector

Figure 3 illustrates the RJ45 connector pin-numbering. Table 5 recommends the pin-assignment of the RJ45 connector. The device should provide the socket connector, often used with four and eight twisted-pair cabling. The pin 3 and pin 6 as well as pin 1 and pin 2 should be twisted pairs.

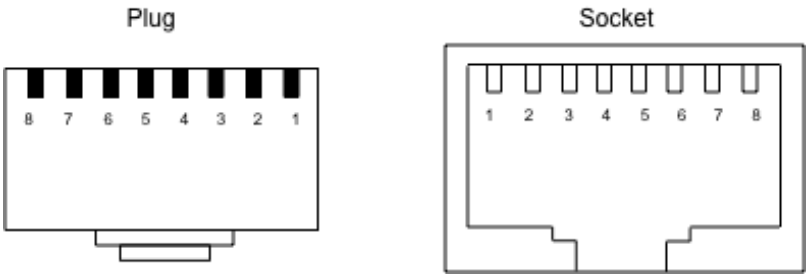


Figure 3 – RJ45 connector pin-numbering

Table 5 – RJ45 connector pin-assignment

Pin	Notation	Description
1	CAN_H	CAN_H network line (dominant high)
2	CAN_L	CAN_L network line (dominant low)
3	CAN_GND	Ground or 0 V or V- (optional CAN external negative supply)
4	-	Reserved
5	-	Reserved
6	(CAN_SHLD)	Optional CAN shield
7	(GND)	Optional ground
8	(CAN_V+)	Optional CAN external positive supply

7.4 Multi-pole connector

Figure 4 illustrates the multi-pole cable (flat band) usage with the D-SUB 9-pin connector (see IEC 60807-2:1992/AMD1:1996) and multi-pole (5 x 2) connector as well as their pin-numbering. The multi-pole connectors are used, for example, for EMI protection purposes within housings and enable a direct connection of the flat cables to D-SUB 9-pin connectors. Table 6 recommends the pin-assignment of the multi-pole connector and its compatibility to the D-SUB 9-pin connector.

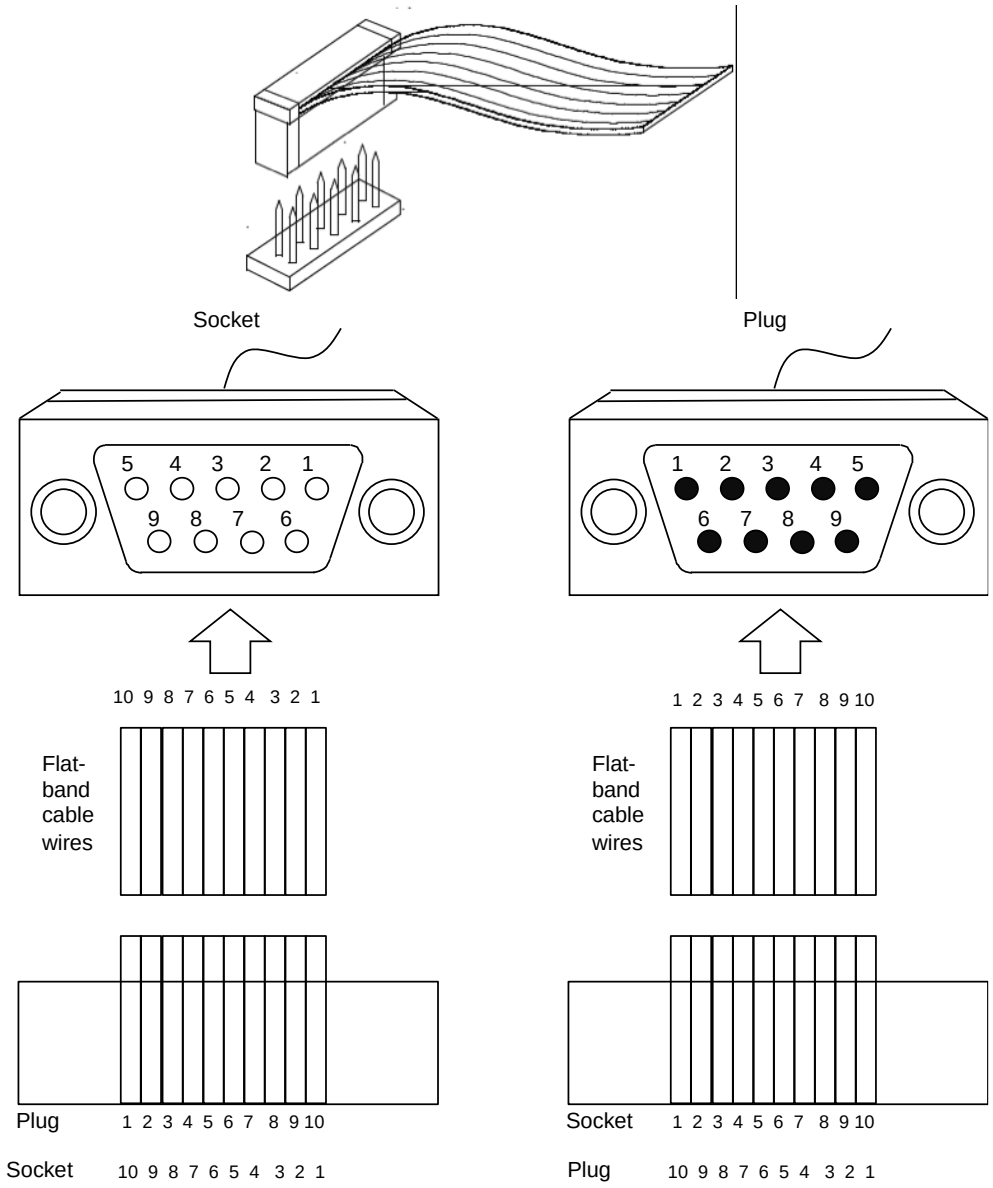


Figure 4 – Multi-pole cable (flat band) with D-SUB 9-pin and multi-pole connectors

Table 6 – Multi-pole connector pin-assignment and compatibility to D-SUB 9-pin connector

Pin		Notation	Description
Multi-pole connector	D-SUB 9-pin connector		
1	1	-	Reserved
2	6	(GND)	Optional ground
3	2	CAN_L	CAN_L network line (dominant low)
4	7	CAN_H	CAN_H network line (dominant high)
5	3	CAN_GND	CAN ground
6	8	-	Reserved
7	4	-	Reserved
8	9	(CAN_V+)	Optional CAN external positive supply
9	5	-	Reserved
10	-	-	Not used

7.5 Open-style connector

Figure 5 illustrates the open-style connector pin-numbering. Table 7 recommends the pin-assignment of the open-style connectors. The 4-pin open-style connectors should use either pin 1 to pin 4 (version A) or pin 2 to pin 5 (version B). The 3-pin open-style connectors should use pin 2 to pin 4. The device should provide an open-style plug connector.

NOTE The size of the pin pitches is not specified.

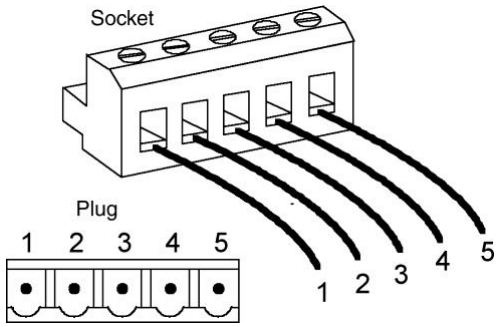


Figure 5 – Open-style connector pin-numbering

Table 7 – Open-style connector pin-assignment

Pin	Notation	Description
1	CAN_GND	Ground or 0 V or V- (optional CAN external negative supply)
2	CAN_L	CAN_L network line (dominant low)
3	(CAN_SHLD)	Optional CAN shield
4	CAN_H	CAN_H network line (dominant high)
5	(CAN_V+)	Optional CAN external positive supply

7.6 5-pin 7/8” connector

Figure 6 illustrates the pin-numbering of the 5-pin 7/8” connector (see NFPA/T3.5.29 R1-2007 (R2017)). Table 8 recommends the pin-assignment of the 5-pin 7/8” connector. The device should provide the plug connector. The plug should fit in a housing with the 7/8-16 UN 2A thread. The socket should fit in a housing with the 7/8-16 UN 2B thread.

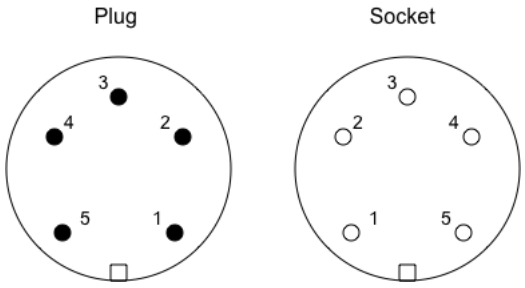


Figure 6 – 5-pin 7/8” connector pin-numbering

Table 8 – 5-pin 7/8” connector pin-assignment

Pin	Notation	Description
1	(CAN_SHLD)	Optional CAN shield
2	(CAN_V+)	Optional CAN external positive supply
3	CAN_GND	Ground or 0 V or V- (optional CAN external negative supply)
4	CAN_H	CAN_H network line (dominant high)
5	CAN_L	CAN_L network line (dominant low)

7.7 5-pin M12 connector

Figure 7 illustrates the 5-pin M12 connector pin-numbering. Table 9 recommends the pin-assignment of the 5-pin M12 connector. The device should provide the plug connector (see IEC 61076-2-101:2012). The plug connector should mate with Lumberg RST5-56/xm or a plug connector with equivalent geometric data. The socket connector should mate with Lumberg RKT5-56/xm or a socket connector with equivalent geometric data.

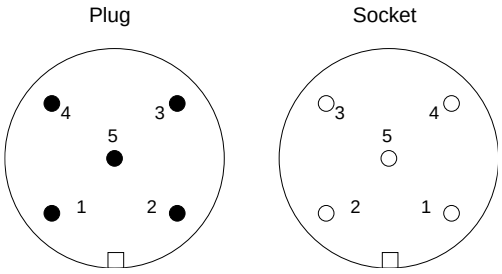


Figure 7 – 5-pin M12 connector pin-numbering

Table 9 – 5-pin M12 connector pin-assignment

Pin	Notation	Description
1	(CAN_SHLD)	Optional CAN shield
2	(CAN_V+)	Optional CAN external positive supply
3	CAN_GND	Ground or 0 V or V- (optional CAN external negative supply)
4	CAN_H	CAN_H network line (dominant high)
5	CAN_L	CAN_L network line (dominant low)

7.8 5-pin M8 connector

CiA 103 recommends the pin-assignment of the 5-pin M8 connector with coding B according to IEC 61076-2-104:2014. The connector is used by intrinsically safe devices.

The DroneCAN applications deploying this connector use 24 V as the nominal power supply.

7.9 Han-Quintax connector

CiA 420-1 specifies the pin-assignment of the Han-Quintax connector used for extruder downstream devices.

7.10 7-pin round connector

Figure 8 illustrates the 7-pin round connector pin-numbering. Table 10 recommends the pin-assignment of the 7-pin round connector. The device should provide the socket connector. This connector type is known as “DIN” connector, e.g. Binder Series 680. It is specified in IEC 61076-2-106:2011 with contact arrangement 07-a.

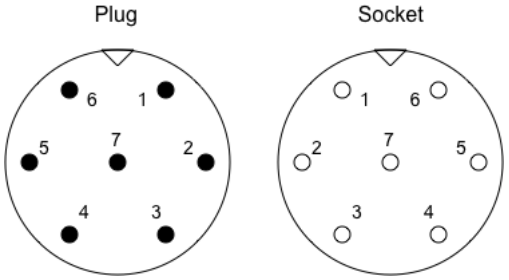


Figure 8 – 7-pin round connector pin-numbering

Table 10 – 7-pin round connector pin-assignment

Pin	Notation	Description
1	(CAN_V+)	Optional CAN external positive supply
2	CAN_GND	Ground or 0 V or V- (optional CAN external negative supply)
3	CAN_H	CAN_H network line (dominant high)
4	CAN_L	CAN_L network line (dominant low)
5	DIL-1	DIP switch 1 connected with CAN_V+
6	DIL-2	DIP switch 2 connected with CAN_V+
7	DIL-3	DIP switch 3 connected with CAN_V+

7.11 8-pin round connector

Figure 9 illustrates the pin-numbering of the 8-pin round connector as specified in IEC 60130-9. Table 11 recommends the pin-assignment of the 8-pin round connector. The device should provide the socket connector.

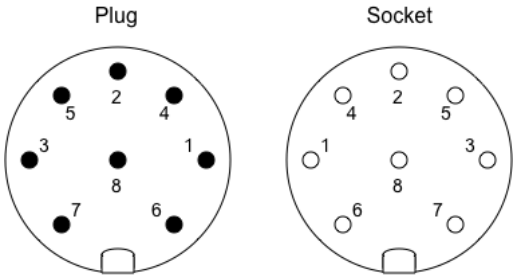


Figure 9 – 8-pin round connector pin-numbering

Table 11 – 8-pin round connector pin-assignment

Pin	Notation	Description
1	CAN_V+	CAN external positive supply
2	GND	0 V
3	CAN_H	CAN_H network line (dominant high)
4	CAN_L	CAN_L network line (dominant low)
5	CAN_GND	Ground
6	-	Reserved
7	-	Reserved
8	-	Reserved

7.12 9-pin round connector

Figure 10 illustrates the 9-pin round connector pin-numbering. Table 12 recommends the pin-assignment of the 9-pin round connector. The socket connector type is RC-09S1N and the plug connector type is RC-09P1N, manufactured by Phoenix Contact or other manufacturers.

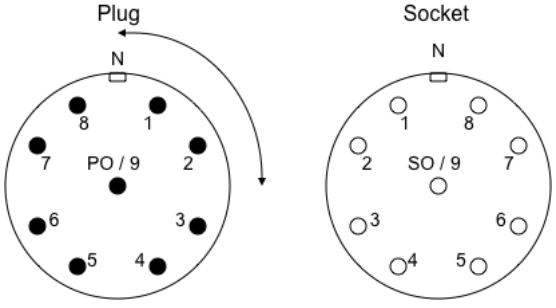


Figure 10 – 9-pin round connector pin-numbering

Table 12 – 9-pin round connector pin-assignment

Pin	Notation	Description
1	CAN_H	CAN_H network line (dominant high)
2	CAN_L	CAN_L network line (dominant low)
3	CAN_GND	Ground or 0 V or V- (optional CAN external negative supply)
4	-	Reserved
5	-	Reserved
6	-	Reserved
7	(CAN_V+)	Optional CAN external positive supply
8	(GND)	Optional ground
9	-	Reserved

7.13 10-pin round connector

CiA 425-1 specifies the pin-assignment of the 10-pin round connector to be used for contrast media injectors.

7.14 Mini-snap 10-pin round connector

CiA 425-1 specifies the pin-assignment of the mini-snap 10-pin round connector to be used for contrast media injectors.

7.15 12-pin round flange connector

Figure 11 illustrates the 12-pin round flange connector pin-numbering. Table 13 recommends the pin-assignment of the 12-pin round flange connector. The socket connector type is RC12S1N121 and the plug connector type is RC-12P1N121, manufactured by Phoenix Contact or other manufacturers.

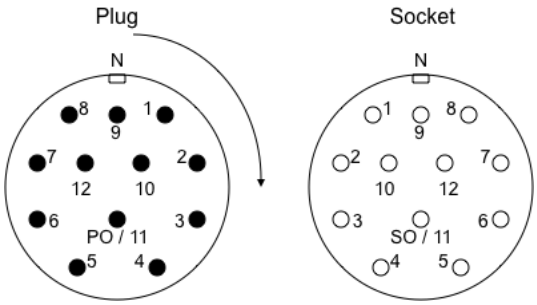


Figure 11 – 12-pin round flange connector pin-numbering

Table 13 – 12-pin round flange connector pin-assignment

Pin	Notation	Description
1	-	Reserved
2	CAN_L	CAN_L network line (dominant low)
3	CAN_GND	Ground or 0 V or V- (optional CAN external negative supply)
4	-	Reserved
5	-	Reserved
6	-	Reserved
7	CAN_H	CAN_H network line (dominant high)
8	-	Not used
9	-	Reserved
10	(GND)	Optional ground
11	-	Reserved
12	(CAN_V+)	Optional CAN external positive supply

7.16 9-pin flange round T-connector with ID-switch

Figure 12 illustrates the pin-numbering of the “Zylin series R2.5” 9-pin flange round T-connector with DIP switches by LAPP Kabel/Contact Connectors. Table 14 recommends the pin-assignment of the 9-pin flange round T-connector with DIP switches. The DIP switches are used for setting of up to 16 CANopen node-IDs. This T-connector is designed for using a 4-wire network cable. The diameter of this T-connector is about 25 mm.

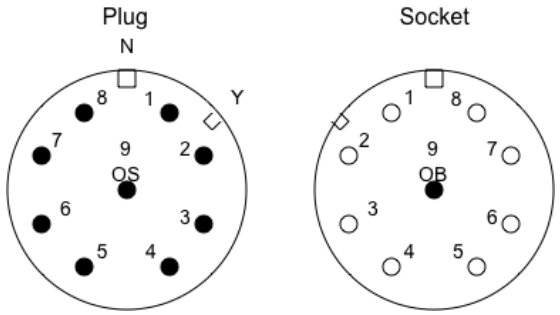


Figure 12 – 9-pin flange round T-connector with ID-switch pin-numbering

Table 14 – 9-pin flange round T-connector with ID-switch pin-assignment

Pin	Notation	Description
1	(CAN_V+)	Optional CAN external positive supply
2	CAN_H	CAN_H network line (dominant high)
3	DIL-1	DIP switch 1 connected with CAN_V+
4	DIL-2	DIP switch 2 connected with CAN_V+
5	DIL-3	DIP switch 3 connected with CAN_V+
6	DIL-4	DIP switch 4 connected with CAN_V+
7	CAN_L	CAN_L network line (dominant low)
8	CAN_GND	Ground or 0 V or V- (optional CAN external negative supply)
9	-	Reserved

7.17 Han-Brid CU connector

Figure 13 illustrates the pin-numbering of the housing-side of the Han-Brid CU connector by Harting. Table 15 recommends the pin-assignment of the housing-side.

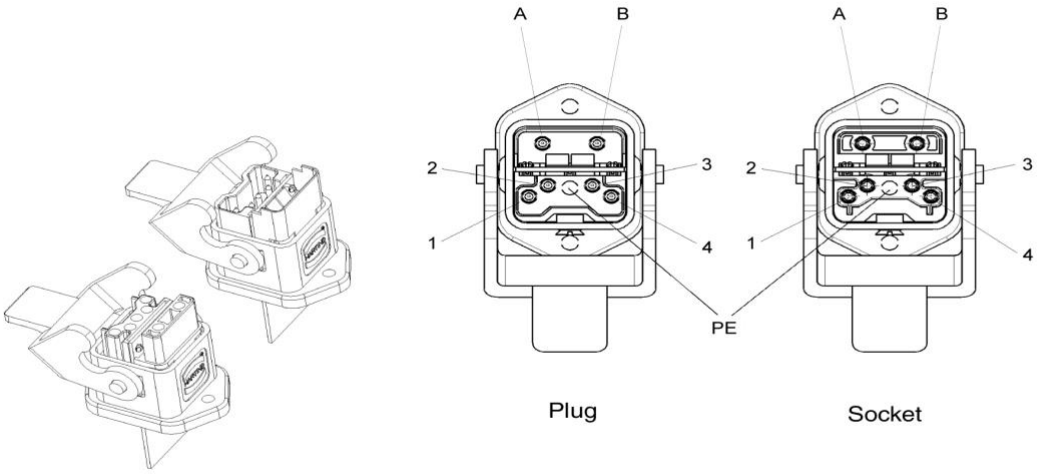


Figure 13 – Han-Brid CU connector pin-numbering (housing-side)

Table 15 – Han-Brid CU connector pin-assignment (housing-side)

Pin	Notation	Description
1	(CAN_V+)	Optional unswitched CAN external positive supply
2	(CAN_GND)	Optional unswitched CAN ground
3	(CAN_GND)	Optional switched CAN ground
4	(CAN_V+)	Optional switched CAN external positive supply
A	CAN_L	CAN_L network line (dominant low)
B	CAN_H	CAN_H network line (dominant high)
PE	(PE)	Optional PE (protective earth)

Figure 14 illustrates the pin-numbering of the cable-side of the Han-Brid CU connector. Table 16 recommends the pin-assignment of the cable-side.

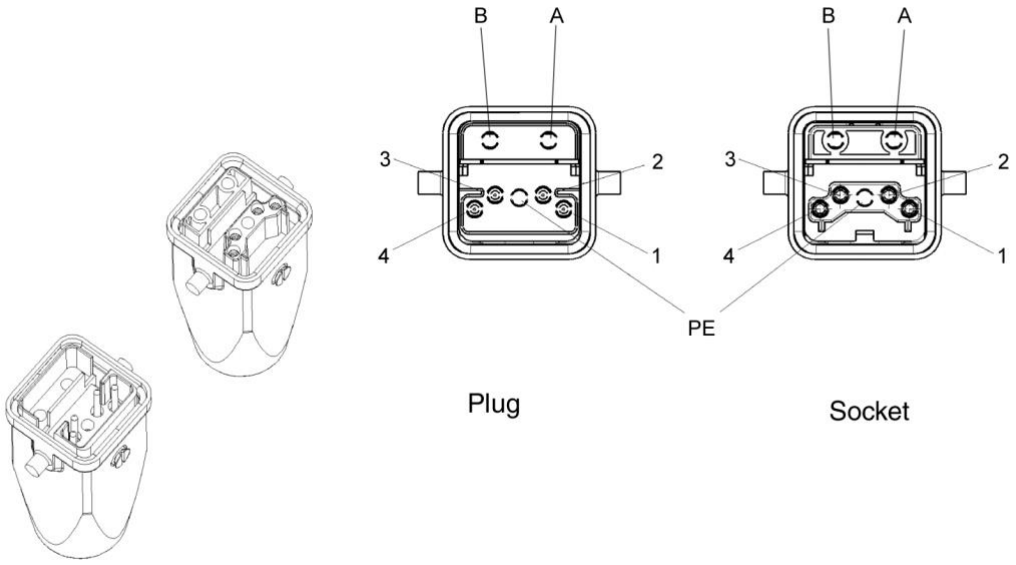


Figure 14 – Han-Brid CU connector pin-numbering (cable-side)

Table 16 – Han-Brid CU connector pin-assignment (cable-side)

Pin	Notation	Description
1	(CAN_V+)	Optional unswitched CAN external positive supply
2	(CAN_GND)	Optional unswitched CAN ground
3	(CAN_GND)	Optional switched CAN ground
4	(CAN_V+)	Optional switched CAN external positive supply
A	CAN_L	CAN_L network line (dominant low)
B	CAN_H	CAN_H network line (dominant high)
PE	(PE)	Optional PE (protective earth)

7.18 IEEE1394/Firewire connector with shielding

7.18.1 Chaining of the network on the node

Figure 15 illustrates the pin-numbering of the IEEE1394/Firewire connector with shielding. Figure 16 and Figure 17 illustrate the chaining of the network on the node for IEEE1394/Firewire connector with shielding. Table 17 recommends the pin-assignment of the IEEE1394/Firewire connector with shielding, with chaining of the network on the node. The cable should provide the socket connector and changes the terminals of the two twisted shielded pairs. The device should provide two plug connectors with pairs switching according to the IEEE1394 mechanical specification to allow usage of typical cables. A node should provide the plug corresponding to the beginning of the segment (see Figure 15).

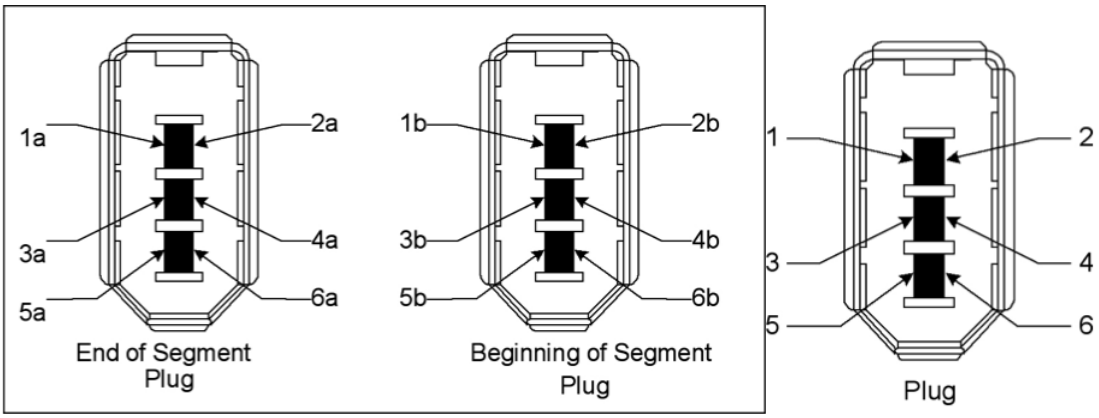


Figure 15 – IEEE1394/Firewire plug connector with shielding pin-numbering

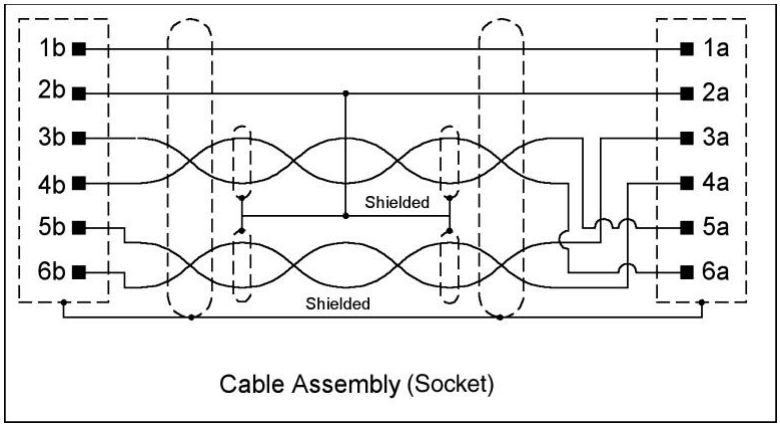
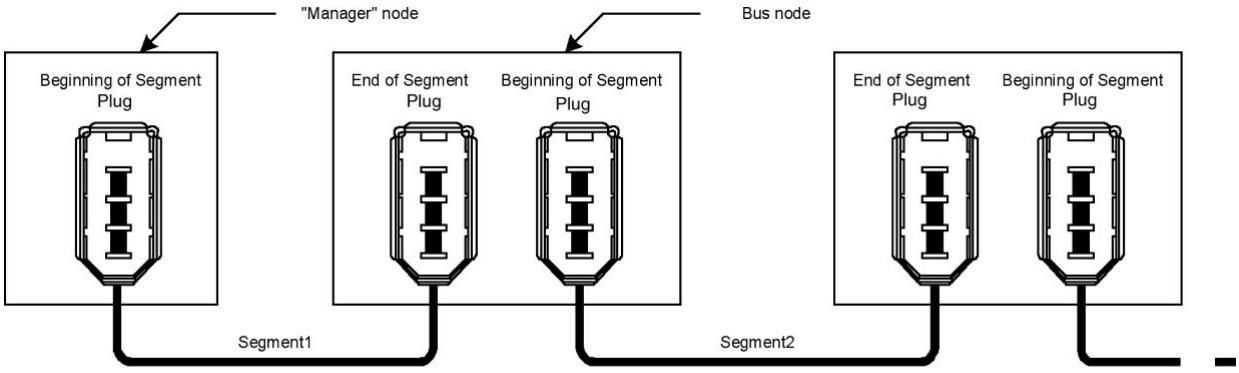


Figure 16 – Interconnection of the network segments



Global overview

Figure 17 – Global overview

Table 17 – IEEE1394/Firewire connector with shielding pin-assignment (with chaining of the network on the node)

End of segment Pin	Beginning of segment Pin	Notation	Description
1a	1b	(CAN_V+)	Optional CAN external positive supply
2a	2b	CAN_GND	0 V
3a	5b	CAN_H	CAN_H network line (dominant high)
4a	6b	CAN_L	CAN_L network line (dominant low)
5a	3b	-	Reserved
6a	4b	-	Reserved
Shield	Shield	(CAN_SHLD)	Optional CAN shield

7.18.2 No chaining of the network on the node

Figure 18 illustrates the IEEE1394/Firewire socket and plug connector pin-numbering with shielding without chaining of the network on the node. Table 18 recommends the pin-assignment of the IEEE1394/Firewire connector with shielding without chaining of the network on the node. The device should provide the plug connector. The cable should provide the socket connector. Therefore, it is possible to connect a device with one plug at the end of a segment (see Figure 18) provided by a device with two plugs according to 7.18.1.

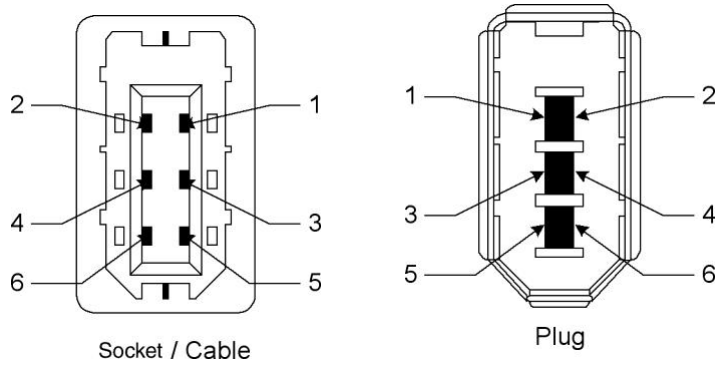


Figure 18 – IEEE1394/Firewire socket and plug connector with shielding pin-numbering (without chaining of the network on the node)

Table 18 – IEEE1394/Firewire connector with shielding pin-assignment (without chaining of the network on the node)

Pin	Notation	Description
1	(CAN_V+)	Optional CAN external positive supply
2	CAN_GND	0 V
3	CAN_H	CAN_H network line (dominant high)
4	CAN_L	CAN_L network line (dominant low)
5	-	Reserved
6	-	Reserved
Shield	(CAN_SHLD)	Optional CAN shield

7.19 Mini-Fit Jr. connector

Figure 19 illustrates the pin-numbering of the Mini-Fit Jr. connector by Molex. Table 19 recommends the pin-assignment of the Mini-Fit Jr. connector.

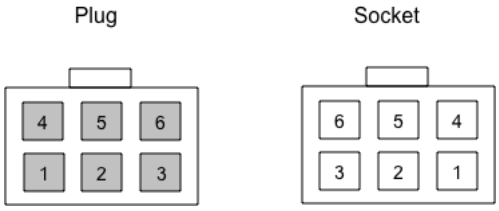


Figure 19 – Mini-Fit Jr. connector pin-numbering

Table 19 – Mini-Fit Jr. connector pin-assignment

Pin	Notation	Description
1	(CAN_SHLD)	Optional CAN shield
2	CAN_H	CAN_H network line (dominant high)
3	CAN_L	CAN_L network line (dominant low)
4	-	Reserved
5	CAN_GND	CAN ground
6	(CAN_V+)	Optional CAN external positive supply

7.20 Micro-Fit 3.0 connector

Figure 20 illustrates the pin-numbering of the Micro-Fit 3.0 connector by Molex. Table 20 recommends the pin-assignment of the Micro-Fit 3.0 connector.

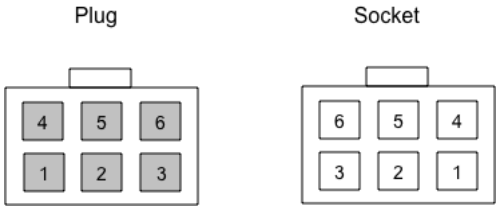


Figure 20 – Micro-Fit 3.0 connector pin-numbering

Table 20 – Micro-Fit 3.0 connector pin-assignment

Pin	Notation	Description
1	(CAN_SHLD)	Optional CAN shield
2	CAN_H	CAN_H network line (dominant high)
3	CAN_L	CAN_L network line (dominant low)
4	CAN_GND	CAN ground
5	(V-)	Optional ground
6	(CAN_V+)	Optional CAN external positive supply

7.21 (Automotive) 7-pin socket connector

CiA 413-1 specifies the pin-assignment of the 7-pin socket connector used for the in-vehicle gateway device of commercial vehicles.

7.22 (Automotive) 9-pin socket connector

CiA 413-1 specifies the pin-assignment of the 9-pin socket connector used for the in-vehicle gateway device of commercial vehicles.

7.23 18-pin VDA interface connector

CiA 447-1 specifies the pin-assignment of the 18-pin VDA interface connector (e.g. micro quadlok system 0.64 from TE Connectivity) used in special-purpose cars for add-on devices.

7.24 2-pin power connector

CiA 447-1 specifies the pin-assignment of the 2-pin power connector (e.g. AMP926474-1 from TE Connectivity) used in special-purpose cars for add-on devices.

7.25 Header 10-pin plug connector

CiA 434-1 specifies the pin-assignment of the header 10-pin plug connector used in laboratory automation equipment.

7.26 D-SUB 15-pin connector

7.26.1 Medical contrast-media injector

CiA 425-1 specifies the pin-assignment of the D-SUB 15-pin connector used in contrast media injectors.

7.26.2 With two CAN network ports

Figure 21 illustrates the D-SUB 15-pin connector pin-numbering for redundant CAN interfaces. Table 21 recommends the pin-assignment of the D-SUB 15-pin connector for redundant CAN interfaces.

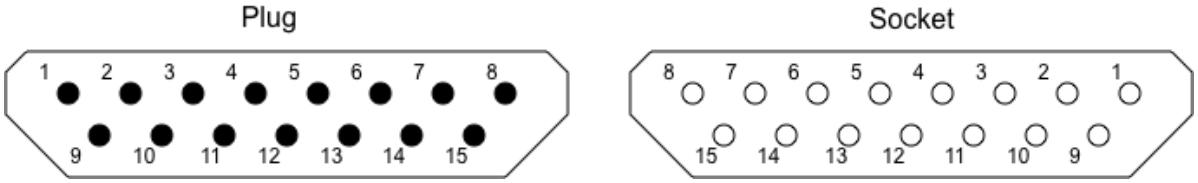


Figure 21 – D-SUB 15-pin connector pin-numbering for redundant CAN interfaces

Table 21 – D-SUB 15-pin connector pin-assignment for redundant CAN interfaces

Pin	Notation	Description
1	CAN1_L	CAN1 low
2	CAN1_GND	CAN1 ground
3	CAN2_L	CAN2 low
4	CAN2_GND	CAN2 ground
5	Parity	Adjustment “odd parity”
6	NODENO_3	See NOTE
7	NODENO_1	See NOTE
8	GND	Logic ground
9	CAN1_H	CAN1 high
10	CAN1_HR	Termination resistor
11	CAN2_H	CAN2 high
12	CAN2_HR	Termination resistor
13	NODENO_4	See NOTE
14	NODENO_2	See NOTE
15	NODENO_0	See NOTE
NOTE These pins represent the source address (in CANopen this is the node-ID) to support geographical addressing.		

7.27 8-pin Ampseal connector (redundant CAN networks)

Figure 22 illustrates the pin-numbering of the 8-pin Ampseal connector (header assembly) by TE Connectivity. Table 22 recommends the pin-assignment of the 8-pin Ampseal connector. The CAN1 line (pin 1 to pin 4) should be used if only one CAN line is used. If two CAN lines are used, then the CAN1 line should be considered as the default line and the CAN2 line (pin 5 to pin 8) as the redundant line.

Header assembly

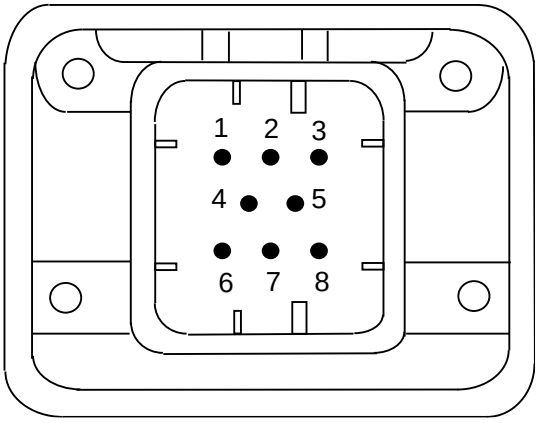


Figure 22 – 8-pin Ampseal connector pin-numbering

Table 22 – 8-pin Ampseal connector pin-assignment

Pin	Notation	Description
1	CAN1_L	CAN1_L network line (dominant low)
2	CAN1_H	CAN1_H network line (dominant high)
3	(CAN1_V+)	Optional CAN1 external positive supply
4	CAN1_GND	CAN1 ground
5	CAN2_GND	CAN2 ground
6	(CAN2_V+)	Optional CAN2 external positive supply
7	CAN2_L	CAN2_L network line (dominant low)
8	CAN2_H	CAN2_H network line (dominant high)

7.28 9-pin Deutsch HD10-9 connector

This heavy-duty diagnostic connector is specified in TMC RP1210 including the pin-assignment for the CAN interface intended to connect the test equipment.

7.29 9-pin breakaway connector

This connector is specified in ISO 11738-2 including the pin-assignment for the CAN interface intended to connect the agriculture vehicles and implements.

7.30 4-pin Isobus connector

This connector is specified in ISO 11738-2 including the pin-assignment for the CAN interface intended to connect the agriculture vehicles and implements.

7.31 Truck/trailer connector

This connector is specified in ISO 12098 including the pin-assignment for the CAN interface intended to link the truck/trailer to ISO 11992-2 equipment.

7.32 32-pin four-part connector

This connector is specified in ISO 16844-1 including the pin-assignment for the CAN interface intended to connect the tachograph.

7.33 16-pin OBD-II connector

This on-board diagnostic 2 (OBD-II) connector is specified in SAE J1962 (referenced by ISO 15031-3) including the pin-assignment for the CAN interface intended to connect the test equipment.

7.34 DroneCAN micro connector

This connector is specified in DroneCAN including the pin-assignment for the CAN interface used in weight- and space-sensitive applications.

7.35 CANaerospace D38999/20FA35PN connector

Figure 23 illustrates the pin-numbering of the D38999/20FA35PN connector as specified in MIL-DTL-38999. Table 23 recommends the pin-assignment of the D38999/20FA35PN connector.

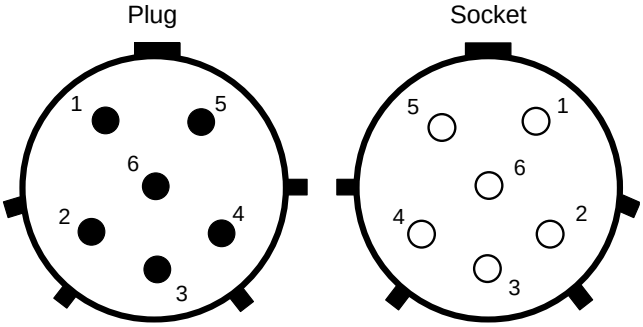


Figure 23 – D38999/20FA35PN connector pin-numbering

Table 23 – D38999/20FA35PN connector pin-assignment

Pin	Notation	Description
1	V+	Power supply
2	CAN_L	CAN_L network line (dominant low)
3	CAN_GND	CAN ground
4	CAN_H	CAN_H network line (dominant high)
5	V+_GND	Power ground
6	CAN_SHLD	CAN shield

7.36 CANaerospace D38999/20FB35PN connector

Figure 24 illustrates the pin-numbering of the D38999/20FB35PN connector as specified in MIL-DTL-38999. Table 24 recommends the pin-assignment of the D38999/20FB35PN connector.

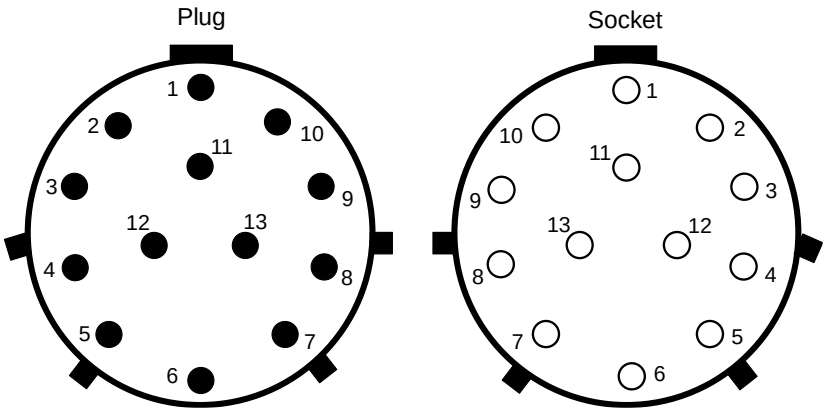


Figure 24 – D38999/20FB35PN connector pin-numbering

Table 24 – D38999/20FB35PN connector pin-assignment

Pin	Notation	Description
1	V+ in	Power supply in
2	V+_GND in	Power ground in
3	V+ out	Power supply out
4	V+_GND out	Power ground out
5	CAN_L in	CAN_L network line in (dominant low)
6	CAN_H in	CAN_H network line in (dominant high)
7	CAN_L out	CAN_L network line out (dominant low)
8	CAN_H out	CAN_H network line out (dominant high)
9	CAN_RA	Termination resistor A
10	CAN_RB	Termination resistor B
11	CAN_GND in	CAN ground in
12	CAN_GND out	CAN ground out
13	-	Not available

7.37 CANaerospace MS3470L1006PN connector

Figure 25 illustrates the pin-numbering of the MS3470L1006PN connector as specified in MIL-C-26482 Series II. Table 25 recommends the pin-assignment of the MS3470L1006PN connector.

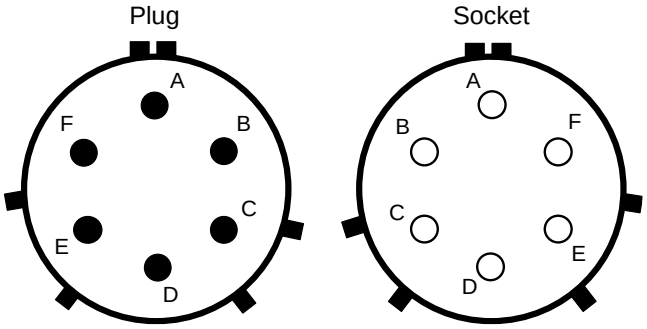


Figure 25 – MS3470L1006PN connector pin-numbering

Table 25 – MS3470L1006PN connector pin-assignment

Pin	Notation	Description
A	V+_GND	Power ground
B	V+	Power supply
C	CAN_SHLD	CAN shield
D	CAN_H	CAN_H network line (dominant high)
E	CAN_L	CAN_L network line (dominant low)
F	CAN_GND	CAN ground

Annex A – Connector cross-reference table (informative)

A.1 For application-specific connectors

Table A.1 provides the cross-references for application-specific connectors included in this document.

Table A.1 – Cross-reference table for application-specific connectors

Application	Connector	Reference
Aerospace	7.1	MIL-DTL-24308
Aerospace	7.35 and 7.36	MIL-DTL-38999
Aerospace	7.37	MIL-C-26482 Series II
Agriculture vehicles and implements	7.29 and 7.30	ISO 11738-2
Commercial vehicles in-vehicle gateway	7.21 and 7.22	CiA 413-1
Contrast media injector	7.14 and 7.26.1	CiA 425-1
Drones	7.1, 7.8, and 7.34	DroneCAN
Heavy-duty diagnostic	7.28	TMC RP1210
Laboratory automation	7.25	CiA 434-1
Redundant CAN networks	7.26.2 and 7.27	This document
Special-purpose car add-on devices	7.23 and 7.24	CiA 447-1
Tachograph	7.32	ISO 16844-1
Truck/trailer link for ISO 11992-2	7.31	ISO 12098
Vehicle on-board diagnostic	7.33	SAE J1962 (referenced by ISO 15031-3)

