CHAPTER 11 RS-485 WIRING FOR FUSION4 MSC-A / FUSION4 MSC-L

11.1 Fusion4 MSC-A / Fusion4 MSC-L Serial Connectivity

The Fusion4 MSC-A / Fusion4 MSC-L has three printed circuit boards each equipped with one more terminal connectors to connect the Fusion4 MSC-A / Fusion4 MSC-L to an external device via an RS-485 compliant connection.

- CAN-ARM-MSC-1 board, see section 11.1.1
- CAN-ARM-MSC-2 board, see section 11.1.2
- CAN-HMI-MSC board, see section 11.1.3

The following connections are supported or will be supported in the future:

- Serial connection between Fusion4 MSC-A and Fusion4 MSC-L, see section 11.1.4
- Serial connection between Fusion4 MSC-A and 1010 B-series load computer, see section 11.1.5
- Serial connection between Fusion4 MSC-A and 1010 C-series load computer, see section 11.1.6
- Serial connection between Fusion4 MSC-A / Fusion4 MSC-L and a PC running Fusion4 Portal, see section 11.1.7
- Serial connection between Fusion4 MSC-A / Fusion4 MSC-L and a PC running Experion®, see section 11.1.8
- Serial connection between Fusion4 MSC-L and a PC running Terminal Manager, see section 11.1.9

NOTE: See also the Installation & Operation Manual Fusion4 MSC-A / Fusion4 MSC-L for more information.

The terms ‘2-wire’ and ‘4-wire’ used in this chapter refer to the data signal line count. The GND connection is mandatory as illustrated in all configurations. This brings the total count of wires to 3 and 5 respectively

11.1.1 CAN-ARM-MSC-1 Board

The CAN-ARM-MSC-1 board features one terminal connector CN-146 consisting of two serial ports, namely COM-1 and COM-2. Both serial ports can be used to establish a 2-wire half-duplex RS-485 connection between the Fusion4 MSC-A / Fusion4 MSC-L and an external device. The serial ports are typically used to connect the Fusion4 MSC-A and the Fusion4 MSC-L to one another or to connect the Fusion4 MSC-A to a 1010 C-series load computer.

FIGURE 11-1 schematically shows a 2-wire half-duplex RS-485 connection between the Fusion4 MSC-A / Fusion4 MSC-L and an

external device, using one of the serial ports of terminal connector CN-146.

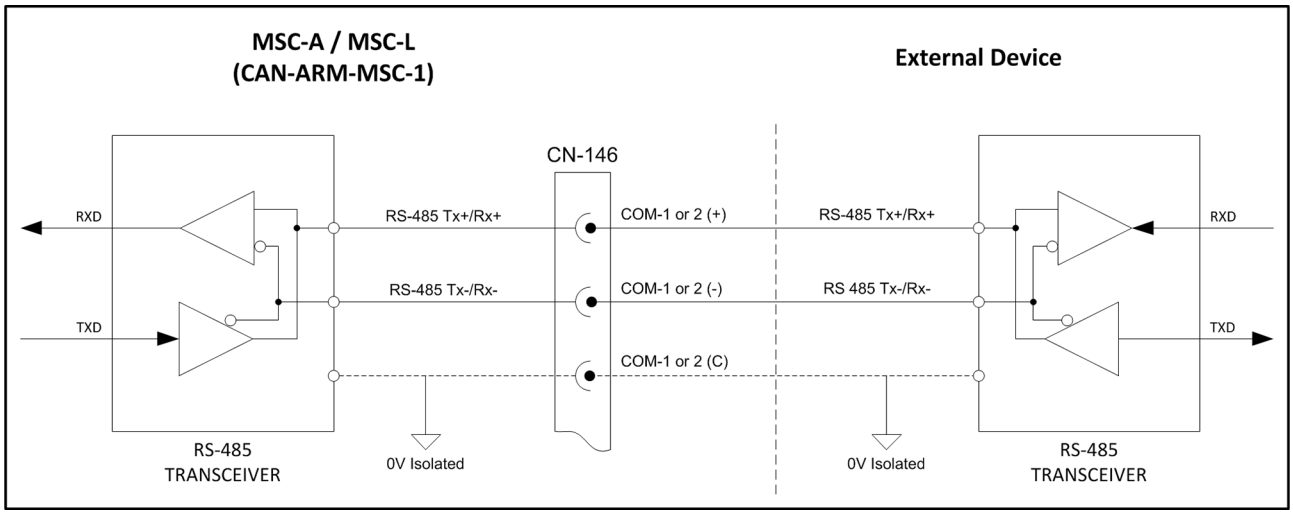

FIGURE 11-1 2-wire half-duplex RS-485 connection between Fusion4 MSC-A / Fusion4 MSC-L and external device (CAN-ARM-MSC-1 board)

TABLE 11-1 describes the layout of terminal connector CN-146.

TABLE 11-1 Layout of terminal connector CN-146

Connector		Signal Name	Signal Description
ID	Pin		
CN-146	COM-1 (+)	RS485_A	2W RS-485 Tx+/Rx+
	COM-1 (-)	RS485_B	2W RS-485 Tx-/Rx-
	COM-1 (C)	RS485_0V	0 Volt
	COM-2 (+)	RS485_A	2W RS-485 Tx+/Rx+
	COM-2 (-)	RS485_B	2W RS-485 Tx-/Rx-
	COM-2 (C)	RS485_0V	0 Volt

11.1.2 CAN-ARM-MSC-2 Board

The CAN-ARM-MSC-2 board features one terminal connector CN-246 consisting of two serial ports, namely COM-6 and COM-7. Both serial ports can be used to establish a 2-wire half-duplex RS-485 connection between the Fusion4 MSC-A / Fusion4 MSC-L and an external device. The serial ports are typically used to connect the Fusion4 MSC-A and the Fusion4 MSC-L to one another or to connect the Fusion4 MSC-A to a 1010 C-series load computer.

FIGURE 11-2 schematically shows a 2-wire half-duplex RS-485 connection between the Fusion4 MSC-A / Fusion4 MSC-L and an external device, using one of the serial ports of terminal connector CN-246.

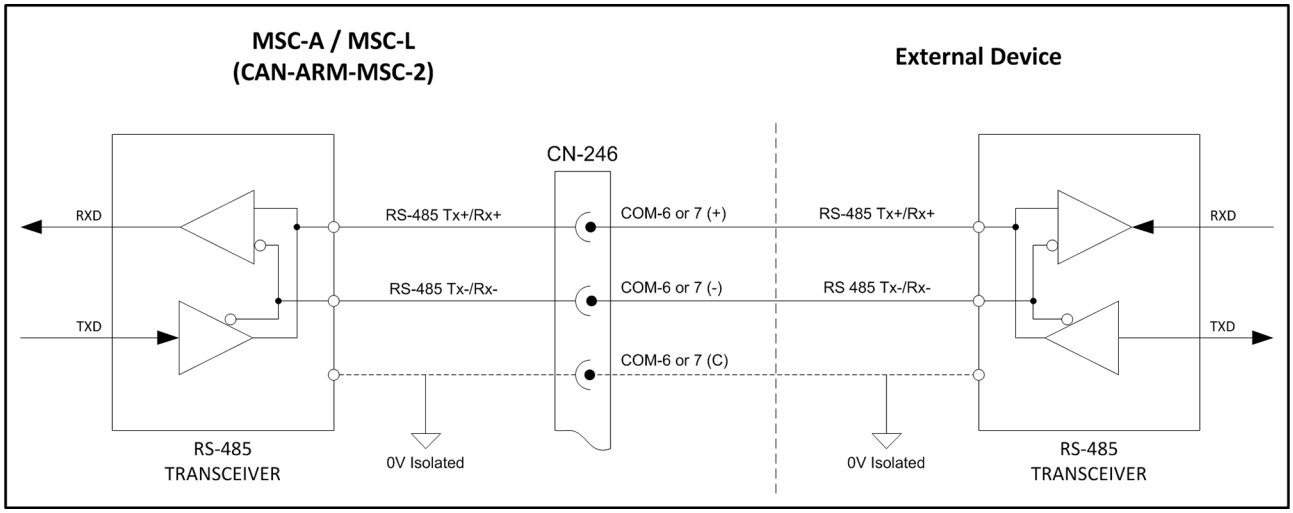

FIGURE 11-2 2-wire half-duplex RS-485 connection between Fusion4 MSC-A / Fusion4 MSC-L and external device (CAN-ARM-MSC-2 board)

TABLE 11-2 describes the layout of terminal connector CN-246.

TABLE 11-2 Layout of terminal connector CN-246

Connector		Signal Name	Signal Description
ID	Pin		
CN-246	COM-6 (+)	RS485_A	2W RS-485 Tx+/Rx+
	COM-6 (-)	RS485_B	2W RS-485 Tx-/Rx-
	COM-6 (C)	RS485_0V	0 Volt
	COM-7 (+)	RS485_A	2W RS-485 Tx+/Rx+
	COM-7 (-)	RS485_B	2W RS-485 Tx-/Rx-
	COM-7 (C)	RS485_0V	0 Volt

11.1.3 CAN-HMI-MSC Board

The CAN-HMI-MSC board features two terminal connectors that can be used to establish an RS-485 compliant connection between the Fusion4 MSC-A / Fusion4 MSC-L and an external device:

- Connector CN-150, see section 11.1.3.1
- Connector CN-151, see section 11.1.3.2

TABLE 11-4 describes the terminal layout of connector CN-151 in a 4-wire full-duplex RS-422 connection.

TABLE 11-5 Layout of terminal connector CN-151Fusion4 MSC-A

Connector		Signal Name	Signal Description
ID	Pin		
CN-151	COM-5 (Rx+)	Data In (+)	4W RS-485 Rx+
	COM-5 (Rx-)	Data In (-)	4W RS-485 Rx-
	COM-5 (Tx+)	Data Out (+)	4W RS-485 Tx+
	COM-5 (Tx-)	Data Out (-)	4W RS-485 Tx-
	COM-5 (C)	GROUND	0 Volt

11.1.4 Connecting Fusion4 MSC-A to Fusion4 MSC-L

The Fusion4 MSC-A can be connected to a Fusion4 MSC-L via 2-wire half-duplex RS-485 serial connection. The following terminal connectors/ports can be used:

- Fusion4 MSC-A: terminal connector CN-146 for COM-1 or COM-2 (CAN-ARM-MSC-1 board), or terminal connector CN-150 for COM-3 or COM-4 (CAN-HMI-MSC board), or terminal connector CN-246 for COM-6 or COM-7 (CAN-ARM-MSC-1 board)
- Fusion4 MSC-L: terminal connector CN-146, COM-1 or COM-2 (CAN-ARM-MSC-1 board) – For External Additives 1 to 12 on CAN-ARM-MSC-1 board of MSC-L
- Fusion4 MSC-L: terminal connector CN-246, COM-6 or COM-7 (CAN-ARM-MSC-2 board) – For External Additives 13 to 24 on CAN-ARM-MSC-2 board of MSC-L

FIGURE 11-6 and FIGURE 11-7 schematically show a 2-wire half-duplex RS-485 connection between the Fusion4 MSC-A and the Fusion4 MSC-L.

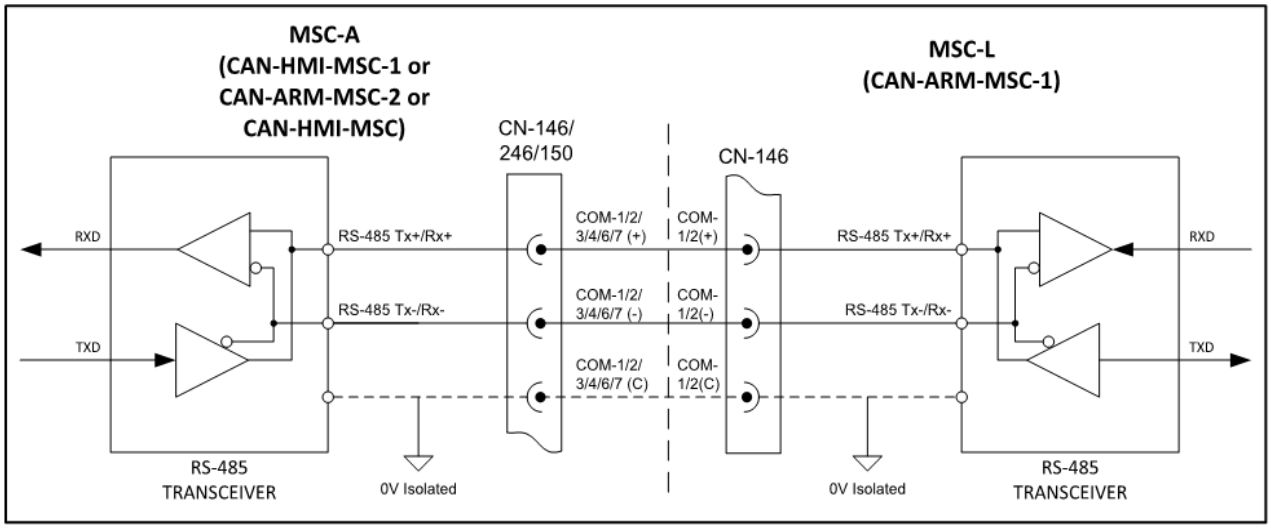

FIGURE 11-6 2-wire half-duplex RS-485 connection between Fusion4 MSC-A and CAN-ARM-MSC-1 on Fusion4 MSC-L

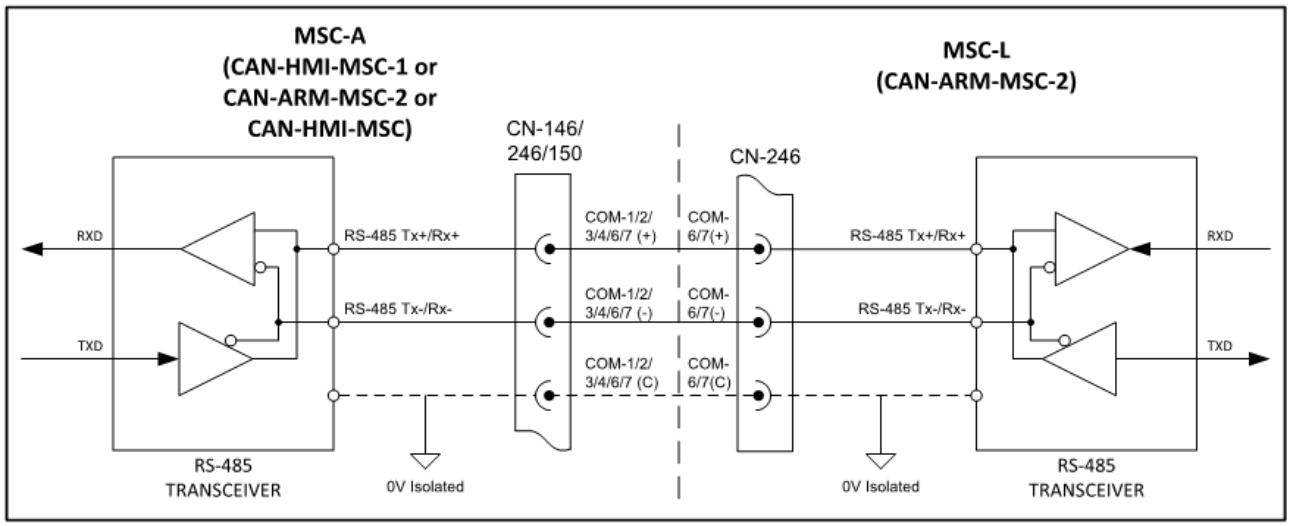

FIGURE 11-7 2-wire half-duplex RS-485 connection between Fusion4 MSC-A and CAN-ARM-MSC-1 on Fusion4 MSC-L

11.1.5 Connecting Fusion4 MSC-A to 1010 B-series load computer

The Fusion4 MSC-A can be connected to a 1010 B-series load computer via a 4-wire full-duplex RS-422 serial connection. The following terminal connectors/serial ports must be used:

- Fusion4 MSC-A: terminal connector CN-151
- 1010 B-series: AUX port

REMARKS:

1. When connecting the Fusion4 MSC-A, terminal connector CN-151 must be configured for 4-wire RS-485 communication using the RS COMM mode switch SW2 on the CAN-HMI-MSC board.
2. If the connection to the Fusion4 MSC-A represents the last link in a multi-drop bus, then the bus must be terminated by setting jumper JP8 on the CAN-HMI-MSC board to the right-hand (terminated) position. The serial bus will be terminated with a 120 Ω resistor.
3. When connecting the 1010 B-series load computer, the AUX port must be set up for 4-wire RS-422 communication through modifying parameters by using the 1010 keyboard and HMI.

FIGURE 11-8 schematically shows a 4-wire full-duplex RS-422 connection between the Fusion4 MSC-A and the 1010 B-series load computer.

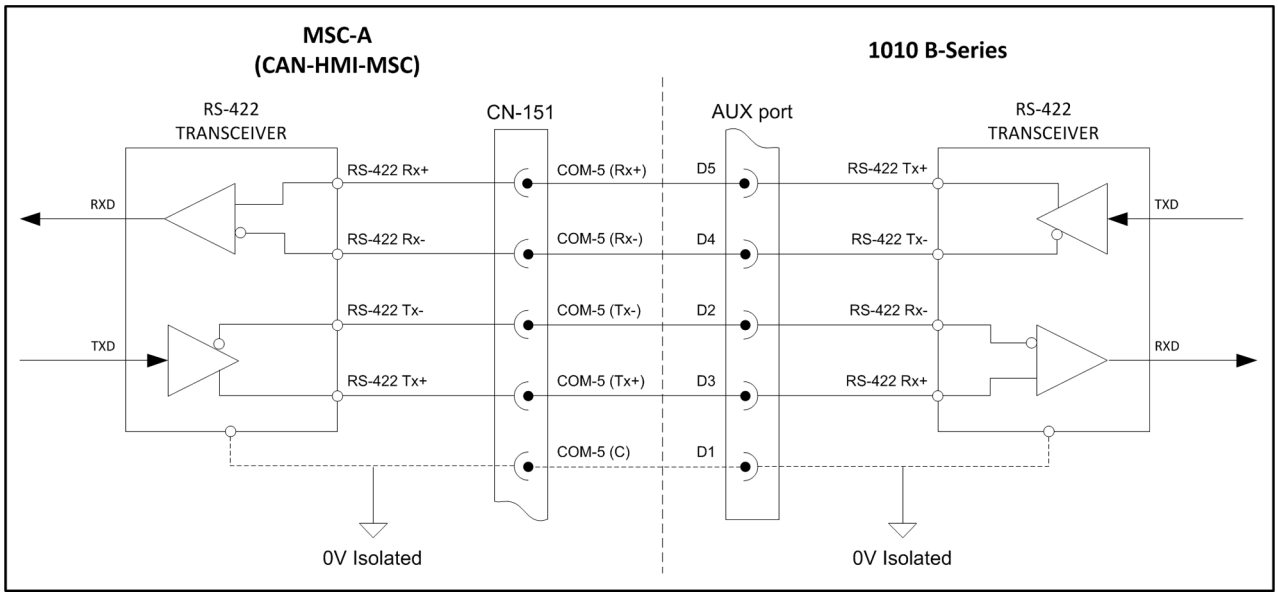

FIGURE 11-8 4-wire full-duplex RS-422 connection between Fusion4 MSC-A and 1010 B-series

TABLE 11-6 describes the layout of the 1010 B-series AUX port.

TABLE 11-6 Layout of 1010 B-series AUX port

Connector		Signal Name	Signal Description
ID	Pin		
AUX port	D1	GROUND	0 Volt
	D2	Data In (-)	4W RS-422 Rx-
	D3	Data In (+)	4W RS-422 Rx+
	D4	Data Out (-)	4W RS-422 Tx-
	D5	Data Out (+)	4W RS-422 Tx+

NOTE: See also Model 1010A Application Pack BJ Wiring Diagrams and Programming Manual for more information.

11.1.6 Connecting Fusion4 MSC-A to 1010 C-series load computer

The Fusion4 MSC-A can be connected to a 1010 C-series load computer via 2-wire half-duplex RS-485 serial connection. The following terminal connectors/ports can be used:

- Fusion4 MSC-A: terminal connector CN-146, COM-1 or COM-2 (CAN-ARM-MSC-1 board), or terminal connector CN-246, COM-6 or COM-7 (CAN-ARM-MSC-1 board)
- 1010 C-series load computer: Port 2 or Port 3

REMARKS:

1. If the connection to the Fusion4 MSC-A represents the last link in a multi-drop bus, then the bus must be terminated by setting jumper JP8 on the CAN-ARM-MSC-1/CAN-ARM-MSC-2 board to the right-hand (terminated) position. The serial bus will be terminated with a 120 Ω resistor.
2. When connecting the 1010 C-series load computer, Port 2/Port 3 port must be set up for 2-wire RS-485 communication through modifying parameters by using the 1010 keyboard and HMI.

12.1.1.3 Modbus Functions Codes Description

See section 7.3 for more information.

12.2 Fusion4 MSC-A / MSC-L

12.2.1 Connecting Fusion4 MSC-A / MSC-L to Ethernet Network

The Fusion4 MSC-A (Multi-Stream Controller for Additive Injection) / MSC-L (Multi-Stream Controller for Loading) houses three boards each equipped with an Ethernet terminal connector:

- CAN-ARM-MSC-1 board, see section 12.2.2
- CAN-ARM-MSC-2 board, see section12.2.3
- CAN-HMI-MSC board, see section 12.2.4

Each terminal connector allows the Fusion4 MSC-A to communicate with external devices via an 802.3i 10BASE-T / 802.3u 100BASE-TX compliant connection. The following connections are supported or will be supported in the future:

- Ethernet connection between the Fusion4 MSC-A and a Fusion4 MSC-L (Multi-Stream Controller for Loading), see section 12.2.5
- Ethernet connection between the Fusion4 MSC-A / MSC-L and a PC running Fusion4 Portal, see section 12.2.6
- Ethernet connection between the Fusion4 MSC-A / MSC-L and a PC running Experion®, see section 12.2.7
- Ethernet connection between the Fusion4 MSC-L and a PC running Terminal Manager, see section 12.2.8

12.2.2 CAN-ARM-MSC-1 Board

The CAN-ARM-MSC-1 board features one ethernet connector CN-147 namely ETH-1.

This port can be used to establish a connection between the Fusion4 MSC-A / Fusion4 MSC-L and an external device. Ethernet port can be used to connect with external devices including Fusion4 Portal, TAS system or other remote interface. The device support only server mode for TCP/IP communication and only single socket.

FIGURE 12-3 schematically shows the ethernet connections connection between the Fusion4 MSC-A / Fusion4 MSC-L and an external device using terminal connector CN147.

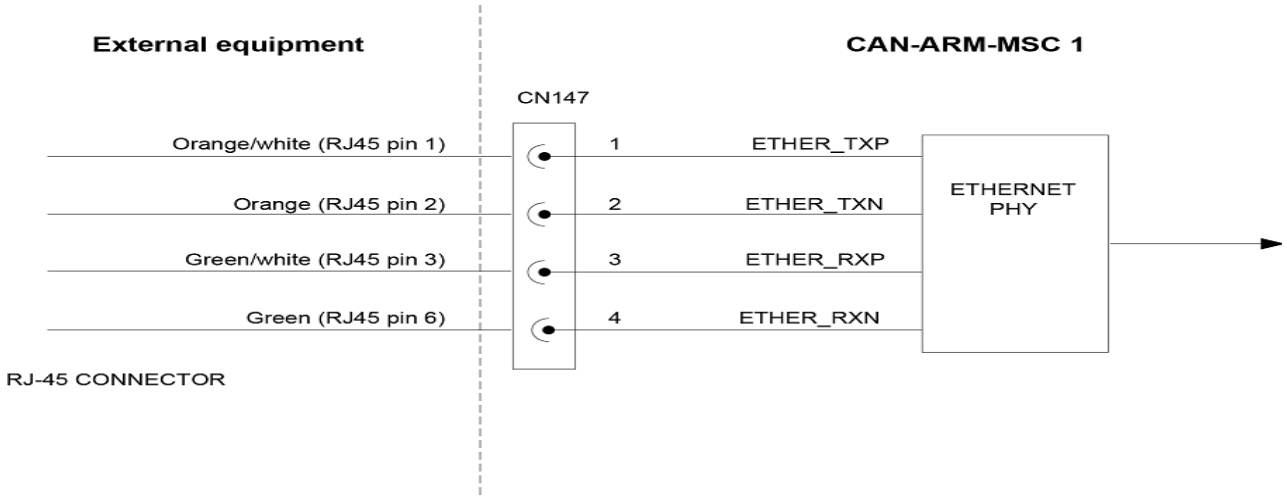

FIGURE 12-3 Ethernet connections connection between the Fusion4 MSC-A / Fusion4 MSC-L and an external device using terminal connector CN147

TABLE 12-1 Layout of terminal connector CN-147

Connector		Signal Name	Signal Description
ID	Pin		
CN-147	ETH-1-1 (Tx+)	ETHER_TXP	Transmit Positive
	ETH-1-2 (Tx-)	ETHER_TXN	Transmit Negative
	ETH-1-3 (Rx+)	ETHER_RXP	Receive Positive
	ETH-1-4 (Rx-)	ETHER_RXN	Receive Negative

12.2.3 CAN-ARM-MSC-2 Board

The CAN-ARM-MSC-2 board features one ethernet connector CN-247 namely ETH-3.

This port can be used to establish a connection between the Fusion4 MSC-A / Fusion4 MSC-L and an external device. Ethernet port can be used to connect with external devices including Fusion4 Portal, TAS system or other remote interface. The device support only server mode for TCP/IP communication and only single socket.

FIGURE 12-4 schematically shows the ethernet connections connection between the Fusion4 MSC-A / Fusion4 MSC-L and an external device using terminal connector CN247.