

Document: User Manual

Version: V2.0

Product: CM4 Telematics device

Model names: Communication-Module 4 MID 0101 EU/ROW
Communication-Module 4 MID 0101 NA

C400 ECU MID EU/ROW 4.5G
C400 ECU MID CN 4.5G

Date: 25. Sep. 2024

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Document History

Version ID	Document Status	Modified date	Modified by	Description
2.0	Draft	25.09.2024	Jürgen Dreyer	Released Version w/o Homologation Label

1.1 TRATON CM4 variants

CM4 Variant	Model Name	Model number
MAN MID EU + RoW	COMMUNICATION-MODULE 4 MID 0101 EU/ROW	A3C1234050100
MAN MID NA	COMMUNICATION-MODULE 4 MID 0101 NA	A3C1234060100
MAN MID CN	CM 4 MID 0101 CN	A3C1234070100
Scania MID EU + RoW	C400 ECU MID EU/ROW 4.5G	A3C1234020100
Scania MID NA	C400 ECU MID NA 4.5G	A3C1234030100
Scania MID CN	C400 ECU MID CN 4.5G	A3C1234040100

1.2 Overview

Traton CM4 is an advanced telematic and connectivity module. It is capable to perform advanced wireless communication and at the same time to interface with other ECUs or devices available on the truck.

Defined customers for Traton CM4 project are MAN and Scania. For both customers a single HW design is developed but components population on the production line will be different based on variant.

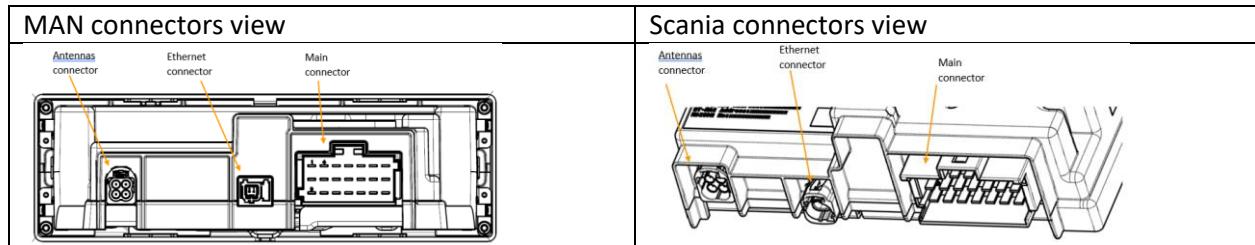
The development of the HW platform and of the basic platform SW is under Continental responsibility. The development of the application SW is under Traton responsibility.

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1.3 Vehicle mounting

CM4 device will be mounted inside the vehicle cabin in a dedicated location. For Scania vehicles the CM4 device will not be directly visible to the driver while for MAN vehicles the CM4 will be directly visible to the driver.

Initial step for mounting the de device is to plug the associated harnesses according to the connectors mapping presented below,

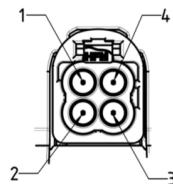


Main connector pinout

1	4	7	10	13	16	19
DIG_OUT1	DIG_OUT3	DIG_OUT4	Secondary Wake-Up	D8	Dig_In1	KL30
2	5	8	11	14	17	20
DIG_OUT2	CAN2 Shield	CAN2 Shield	Alarm Wake-Up	Activation Line	Dig_In2	KL15
3	6	9	12	15	18	21
CAN1_H	CAN1_L	CAN2_H	CAN2_L	CAN3_H	CAN3_L	KL31

After the connection of the associated harnesses, the device will have to be installed according to the specific procedure (procedure developed by customer for its specific version)

Antenna connector pinout

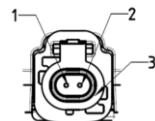


Antenna Connector MDL 208244-0200		Signal	Pin plating
Pin 1.01	GNSS antenna	GNSS [1, 2]	Au
Pin 1.02 GND		GNSS [1, 2]	Sn
Pin 2.01	BT/WLAN	Au	
Pin 2.02 GND	BT/WLAN	Sn	
Pin 3.01	Primary ext. antenna	5G 1 (Rx)	Au
Pin 3.02 GND		5G 1 (Rx)	Sn
Pin 4.01	DRXO ext. antenna	5G 2 (Rx)	Au
Pin 4.02 GND		5G 2 (Rx)	Sn

Ethernet connector pinout

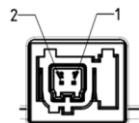
Scania ethernet connector:

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Dual H-MTD E6S220-40MT5-B	Signal	Pin plating
Pin 1	ENET2_M (Data Minus)	AE1 -
Pin 2	ENET2_P (Data Plus)	AE1 +
Pin 3	GND	Shield/GND

MAN ethernet connector:



Ethernet-Stecker/Ethernet Connector 1port MATE net L.-prof. Cod. A - 0-2320201-1/A MAN Gegenstecker/MAN Connector: 81.25475-0455	
Pin 1	ENET1_M (Data Minus)
Pin 2	ENET1_P (Data Plus)

1.4 Interfaces

1.4.1 Interfaces with other ECUs/devices in the vehicle

Interfaces with other ECUs/modules available in the vehicle are dependent of variants.

MAN specific interfaces:

- Power supply lines (TRM 30 and TRM31)
- Terminal 15 input indicating vehicle ignition signal;
- Ethernet communication interface – 1 channel with 100 ;
- 3 CAN nodes with frequency up to 500KHz;
- USB communication interface -- Used only during production of the device, will be deactivated during actual operation. this interface will not be used during the operational lifetime but only during the production test;
- 2 generic digital inputs signals;
- 2 generic digital output signals;
- 1 digital input for enabling DoIP(via SW);;
- 1 indicator LED

Scania specific interfaces:

- Power supply lines (TRM 30 and TRM 31)
- Terminal 15 input indicating vehicle ignition signal;
- Ethernet communication interface – 1 channel with 100 ;
- 2 CAN nodes with frequency up to 500KHz;

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- USB communication interface – this interface will not be used during the production lifetime but only during the production test;
- 1 wire bus communication interface for interfacing with external iButton
- 2 digital inputs signals;
- 2 digital output signals;
- 2 digital inputs/outputs signals

1.4.2 RF communication interfaces

RF communication interfaces supported by Traton CM4 are:

- Cellular communication
- WIFI communication
- BT communication
- GNSS signal acquisition

This RF communication protocols are supported on all variants.

1.5 Expected behaviour:

After supply voltage has been applied (KL30 set to 24V or 12V), the CM4 device starts booting up. The boot up process takes about 90 seconds. Some functionalities like CAN communication, ETH communication are available before the boot up process ends but the full functionality is reached only when boot up process is finished.

Main functionalities provided by CM4 device:

- GNSS positioning (starts automatically after boot up phase)
- Communication with back office via cellular network (triggered by customer application or test application)
- Communication over WIFI (triggered by customer application or test application)
- Communication over BT (triggered by customer application or test application)
- Communication via CAN based on database received from the customer;
- TCP communication via Ethernet;

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There is no functional difference between the 12V CM4 systems and 24V CM4 systems – a single HW design covers the full voltage functional range

1.6 Restrictions

Assembly or disassembly of the TRATON CM4 while operating voltage is connected is not allowed.
Assembly or disassembly of connectors while operating voltage is connected is not allowed

1.7 Label:

For label definition see specific document from dedicated folder;

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1.8 Block diagram

For the block diagram see specific document from dedicated folder; there is a specific block diagram for MAN variant and a specific block diagram for Scania

1.9 Radio Frequency Configuration

1.9.1 EU/ROW variants

Cellular standards and frequencies	<p>2G Band:</p> <p>Band 3 (GSM1800): 1710-1785 / 1805-1880 MHz, Band 8 (GSM900): 880-915 / 925-960 MHz</p> <p>3G Band:</p> <p>Band I (B1: 2100 UMTS): 1920-1980 / 2110-2170 MHz, Band III (B3: 1800 UMTS): 1710-1785 / 1805-1880 MHz Band VIII (B8: 900 UMTS): 880-915 / 925-960 MHz</p> <p>4G Band:</p> <p>FDD Band 1 (2100 LTE): 1920-1980 / 2110-2170 MHz, FDD Band 3 (1800 LTE): 1710-1785 / 1805-1880 MHz, FDD Band 7 (2600 LTE): 2500-2570 / 2620-2690 MHz, FDD Band 8 (900 LTE): 880-915 / 925-960 MHz, FDD Band 20 (800 LTE): 832-862 / 791-821 MHz, FDD Band 28a (700 LTE): 703-718 / 758-773 MHz, FDD Band 28b (700 LTE): 718-748 / 773-803 MHz FDD Band 38 (2600 LTE): 2570-2620 MHz, FDD Band 40 (2300 LTE): 2300-2400 MHz FDD Band 41 (2500 LTE): 2496-2690 MHz</p>
WLAN standards and frequencies	IEEE 802.11 b/g/n/a/ac 2.4GHz ... 2.462GHz 5.150GHz ... 5.250 GHz
Bluetooth standards and frequencies	Bluetooth v5.0; Bluetooth LE 2.4GHz ... 2.483GHz

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1.9.2 NA variants

Cellular standards and frequencies	<p>3G Band:</p> <p>Band II (B2: 1900 UMTS): 1850-1910 / 1930-1990 MHz, Band IV (B4: 1700 UMTS): 1710-1755 / 2110-2155 MHz, Band V (B5: 850 UMTS): 824-849 / 869-894 MHz,</p> <p>4G Band:</p> <p>FDD Band 2 (1900 LTE): 1850-1910 / 1930-1990 MHz, FDD Band 4 (1700 LTE): 1710-1755 / 2110-2155 MHz, FDD Band 5 (850 LTE): 824-849 / 869-894 MHz, FDD Band 12 (700 LTE): 699-716 / 729-746 MHz, FDD Band 13 (700 LTE): 777-787 / 746-756 MHz, FDD Band 14 (700 LTE): 788-798 / 758-768 MHz, FDD Band 28a (700 LTE): 703-718 / 758-773 MHz, FDD Band 28b (700 LTE): 718-748 / 773-803 MHz FDD Band 29 (700 LTE): 717-728 FDD Band 30Rx (2300 LTE): 2305-2315 / 2350-2360 MHz FDD Band 66 (1700 LTE): 1710-1780 / 2110-2200 MHz,</p>
WLAN standards and frequencies	<p>IEEE 802.11 b/g/n/a/ac</p> <p>2.4GHz ... 2.462GHz</p> <p>5.150GHz ... 5.250 GHz</p>
Bluetooth standards and frequencies	<p>Bluetooth v5.0; Bluetooth LE</p> <p>2.4GHz ... 2.483GHz</p>

1.9.3 CN variants

Cellular standards and frequencies	<p>2G Band:</p> <p>Band 3 (GSM1800): 1710-1785 / 1805-1880 MHz, Band 8 (GSM900): 880-915 / 925-960 MHz</p> <p>4G Band:</p>
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	FDD Band 3 (1800 LTE): 1710-1785 / 1805-1880 MHz, FDD Band 8 (900 LTE): 880-915 / 925-960 MHz, FDD Band 34 (2000 LTE): 2010-2025 MHz, FDD Band 38 (2600 LTE): 2570-2620 MHz, FDD Band 39 (1900 LTE): 1880-1920 MHz, FDD Band 40 (2300 LTE): 2300-2400 MHz, FDD Band 41 (2500 LTE): 2496-2690 MHz
WLAN standards and frequencies	IEEE 802.11 b/g/n 2.4GHz ... 2.462GHz
Bluetooth standards and frequencies	Bluetooth v5.0; Bluetooth LE; 2.4GHz ... 2.483GHz

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1.10 Supply Voltage

Nominal voltage, U_{TRM30} :	$U_{TRM30}=12/24[V];$
Functional range, U_{TRM30} :	$U_{TRM30}(\min)=32[V],$ $U_{TRM30}(\max)=9[V]$
Supply current, $I_{TRM30 \text{ MAX}}$:	$I_{TRM30} = 3A$ at min. operating voltage

1.11 Wired Interfaces configuration

Interface	Variant	Characteristics												
Ethernet	MAN & Scania	<ul style="list-style-type: none"> - complies with IEEE P802.3bw standard; - complies with 100BASE-T1 standard; <p>MAN ethernet connector:</p> <ul style="list-style-type: none"> - Model TE 2304372; - Impedance - 100 Ohm; <p>Scania ethernet connector:</p> <ul style="list-style-type: none"> - Model Rosenberger AMS29B-40MZ5-Y; - Impedance - 50 Ohm; 												
CAN	MAN & Scania	<p>MAN variants supports 3 CAN communication nodes</p> <p>Scania variants supports 2 CAN communication nodes</p> <ul style="list-style-type: none"> - Complies with ISO 11898 physical layer; - default baud rate on all CAN channels 500 kBaud - terminator connectors on CAN nodes <table border="1" data-bbox="816 1488 1199 1657"> <tr> <th>CAN-Interface</th> <th>MAN</th> <th>Scania</th> </tr> <tr> <td>CAN 1</td> <td>120ohms</td> <td>120ohms</td> </tr> <tr> <td>CAN 2</td> <td>120ohms</td> <td>2.6kohms</td> </tr> <tr> <td>CAN 3</td> <td>120ohms</td> <td>120ohms</td> </tr> </table>	CAN-Interface	MAN	Scania	CAN 1	120ohms	120ohms	CAN 2	120ohms	2.6kohms	CAN 3	120ohms	120ohms
CAN-Interface	MAN	Scania												
CAN 1	120ohms	120ohms												
CAN 2	120ohms	2.6kohms												
CAN 3	120ohms	120ohms												
USB	MAN & Scania	<ul style="list-style-type: none"> - Used only during production of the device, will be deactivated during actual operation. this interface will not 												

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		<p>be used during the operational lifetime but only during the production test;</p> <p>USB connector:</p> <ul style="list-style-type: none"> - Model Type-C Molex 2012670005; - Female type; - Compatible with USB 2.0; - Shielded, full shield; - Maximum voltage 30V; - No grounding to the panel;
1 Wire	Scania	<ul style="list-style-type: none"> - 1 wire bus interface is used for wired data transfer between the external device (I-button) and the TCU; - On the external 1 wire bus the CM4 module has the role of the master; - 1 wire communication interface is mapped on the main connector according to the picture available in this document.
Generic Digital Inputs	MAN & Scania	<ul style="list-style-type: none"> - 2 x Dig In signals independent of the variant - Electrical threshold for LOW level < 2V; - Electrical threshold for HIGH level > 6V;
TRM15	MAN & Scania	<ul style="list-style-type: none"> - 1 x Dig In signals independent of the variant - Electrical threshold for LOW level <=3.2V; - Electrical threshold for HIGH level >=4.0V;
ETH_ACTIVATION	MAN	<ul style="list-style-type: none"> - 1 x Dig In signals independent of the variant - Electrical threshold for LOW level < 2V (according to ISO_13400-3) ; - Electrical threshold for HIGH level >= 5V 2V (according to ISO_13400-3) ;
Digital Outputs	MAN & Scania	<ul style="list-style-type: none"> - 2 x Dig In signals independent of the variant - Electrical level for inactive level <= 2V; - Electrical threshold for active level >= 6V;
Digital Inputs/Outputs	Scania	<ul style="list-style-type: none"> - 2 x Special lines with dual role - Dig_In and Dig_Out - Electrical level for inactive level <= 3.5V; - Electrical threshold for active level >= 5.5V;

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1.12 Manufacturer

Continental Automotive Technologies GmbH
 Heinrich-Hertz-Strasse 45
 78052 Villingen-Schwenningen
 Germany

1.13 HS Code

HS Code: 8517 6200

1.14 Environmental conditions

Operating temperature range	-40° C ... +80° C
Storage temperature range	22 hours at -55° C (transition time 2h) 46 hours at +90° C
System of protection	IP54 for front of the ECU IP52 for backside (side with connectors)
Relative humidity	25 % – 75 % (Accepted tolerances ± 5 %)
Altitude	2 -3000m

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