Guideline
for connecting

ContiPressureCheck™

with 3rd Party Components

(internal document name: "Interface_Description_CPC_for_3rd_party")

Responsible for contents: Jörg Hanna	Version 1.60 ECN 10400867		Document Number 10330556 AE	
Continental Reifen Deutschland GmbH Jädekamp 30 D-30419 Hannover	Spec_CPC-3rd-Party-Connection_v0160.docx Word 2013	Date 01. Oct. 2019	Std. Dep. -----	Op. Dep. CTT-ATS	Seen

Copyright and Scope

Modifications

Item	Changes	Ver.	Date
1	Initial Version for CCU SW 01.13	1.00	17.11.2015
2	During SAP introduction it was necessary to start with Revision AB. Internal name also changed. No changes with regard to contents.	1.10	05.01.2016
3	Cap. 4.8; PGN 65282 "CPC TTM Data": Example pressure changed to relative pressure values	1.20	01.02.2016
4	Cap. 4.7: Specifics of "Automatic Trailer Learning" added Cap. 4.8: "TTM state" added Cap. 4.9.2 "Automatic Trailer Learning (ATL)" added	1.30	10.11.2016
5	Cap. 3: New optional CAN speed added Cap. 4.5: New CAN requests added Cap. 5: "Warning Description" added	1.50	30.11.2018
6	Changes for CCU SW 01.28 added 8 axles; 32 tires; ATL with position; pressure difference twin tire warning	1.60	01.10.2019

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1 General

1.1 Aim of this technical document

This guideline describes how the tire pressure measurement system CPC can be connected to other components or systems like telematics systems, OE dashboards, data logger, etc.

1.2 Important Information (English and German)

1.2.1 Disclaimer

ATTENTION: The release of the ContiPressureCheck system is based on extensive testing. This document only applies if the Conti Pressure Check is used as a system. Omission of components is not permitted and will void the release.

However, Continental supports customer's interest in data transfer by means of telematics. The operation and necessary additional connection between the ContiPressureCheck CAN bus and the telematics unit are carried out professionally so that the ContiPressureCheck is not affected. The responsibility lies with the engaging party, e.g. the telematics provider.

WARNING: If not correctly installed, the driver might be informed late or might not be informed about a critical tire condition.

In the appendix you can find the information which helps to establish proper connection and guidelines regarding the operation. These tips are given in good knowledge but without guarantee. Please follow the future tips from Continental.

Disclaimer: Continental Reifen Deutschland GmbH is not liable if the functionality of the ContiPressureCheck is affected by any interventions.

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1.2.2 Haftungsausschluss

Zur Beachtung: Die Freigabe des ContiPressureCheck Systems basiert auf umfangreichen Versuchen. Sie gilt nur solange das ContiPressureCheck als Gesamtsystem eingesetzt wird. Weglassen von Komponenten ist nicht zulässig und führt zum Verlust der Freigabe.

Continental unterstützt aber ihr Interesse an einer Datenübertragung mittels einer Telematik. Die dazu notwendige Verbindung des ContiPressureCheck CAN Busses mit einer Telematikeinheit und der Betrieb sind fachgerecht so auszuführen, dass das ContiPressureCheck nicht beeinträchtigt wird. Die Verantwortung liegt bei der eingreifenden Partei, z.B. dem Telematikanbieter.

WARNUNG: Bei nicht sachgemäßem Einbau können dem Fahrer Informationen über einen kritischen Reifenzustand später als möglich oder gar nicht angezeigt werden.

Im Anhang finden Sie Hinweise, die eine fachgerechte Verbindung und den Betrieb unterstützen. Diese Hinweise erfolgen nach bestem Wissen, aber ohne Gewähr. Beachten Sie auch mögliche zukünftige Hinweise der Continental.

Haftungsausschluss: Continental Reifen Deutschland GmbH haftet nicht, wenn durch Eingriffe in das ContiPressureCheck die Funktionalität des ContiPressureCheck beeinträchtigt wird.

1.3 Abbreviations

CAN	Controller area network
CCU	Central Control Unit
CPC	ContiPressureCheck™
ECU	Electronic control unit
OBD	On-board diagnostics
TTM	Truck tire module (Sensor module inside the tire)
d.c.	don't care

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2 Topology

2.1 Components and harnesses on trucks and busses

Tyco Fastin-Faston
(P/N: 180923-0; 180924-0)

Length of Sub-Harness A: 750mm
Length of Sub-Harness B: 3000mm
Length of Sub-Harness C: 9000mm

Annotation:

⬭ Means wires in one cable or tube;
it does not mean shielding

Annotation:

- Color code of CAN high: White
- Color code of CAN low: Brown
- CAN termination: CCU-Truck + Display
- Please consider the maximum length of additional harness, which is given in the table in chapter 3.

Recommendation:

- CAN-Bus should be tapped between Sub-Harness B and Sub-Harness C. A Y-Cable can be made by using Tyco Fastin-Faston connectors or ordered at the Continental dealer (Sub-Harness L).

Attention:

- If any harness of the CPC system is modified or damaged, the installer has to ensure the integrity of the CPC system.

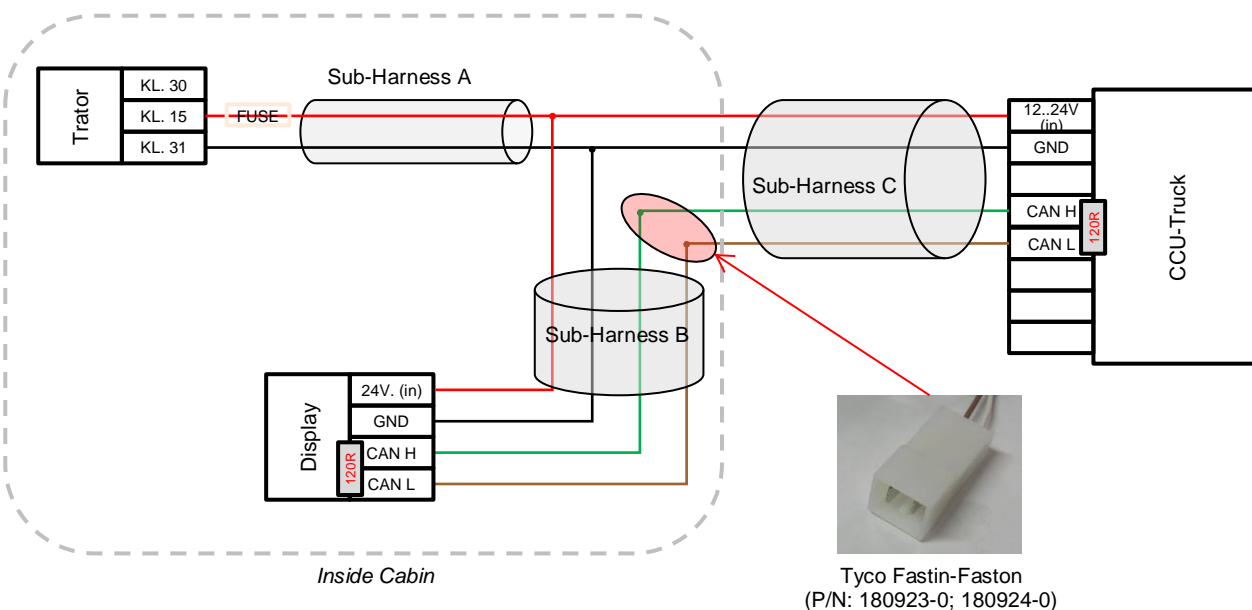| **Responsible for contents:** Jörg Hanna	Version 1.60 ECN 10400867		Document Number 10330556 AE	
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2.2 Components and harnesses on trailers

Length of Sub-Harness F: 7000mm
Length of Sub-Harness G: 7000mm

Annotation:
Means wires in one cable or tube; it does not mean shielding

Port for Diagnosis and Pressure Check Indicator

Annotation:

- Color code of CAN high: White
- Color code of CAN low: Brown
- CAN termination: CCU-Trailer + Diagnosis Port
- Please consider the maximum length of additional harness, which is given in the table in chapter 3.

Recommendation:

- CAN-Bus should be tapped on Sub-Harness G.
- Do not open or modify the connectors to ensure that they are waterproof.

Attention:

- If any harness of the CPC system is modified or damaged, the installer has to ensure the integrity of the CPC system and the water tightness of the original harnesses and components (IP69k).

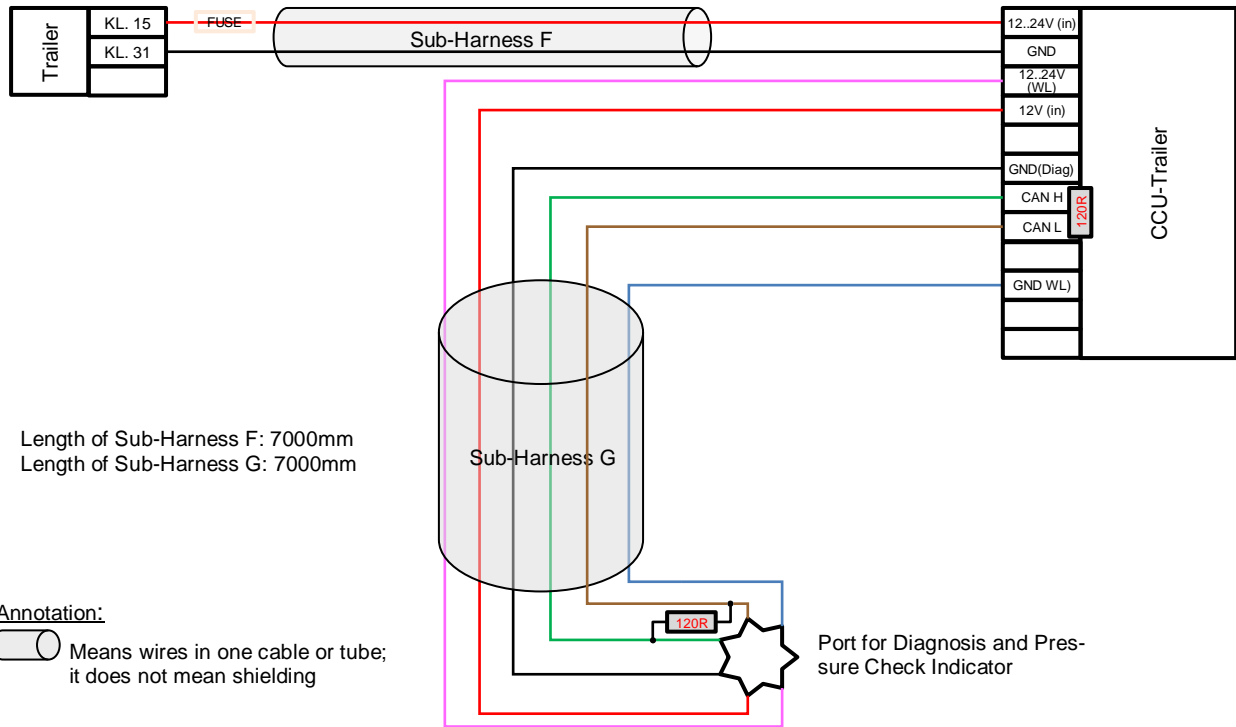| **Responsible for contents:** Jörg Hanna	Version 1.60 ECN 10400867		Document Number 10330556 AE	
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3 CAN bus details

The CAN bus of the CPC follows the standard SAE J1939.

Subject Area	J1939	Sub document
Physical Layer		
Baud rate	250 kbits/sec / 500 kbits/sec (500 kbits/sec is not available for Trailer CCU)	
Maximum nodes	10	J1939-15
Maximum bus length	40 m	
Maximum stub length	250 kbits/s: 3 m (up to 5 m for OBD) 500 kbits/s: 1.7 m	J1939-15
Termination resistor	2 required (each 120 Ω)	
Cable	UN-Shielded Twisted Pair (UTP)	J1939-15
Data Link Layer		
Protocol	CAN 2.0b (29-bit ID)	

Device	Source Address	Comment
CCU Truck	0x33 (default, but variable)	Rx, Tx
CCU Trailer	0x33, 0x55	Rx, Tx
CPC Display	0x44	Rx
CPC Diagnosis tool (HHT)	0xF1, 0xF2, 0xF3	Rx, Tx

4 Provided information on CPC CAN bus

4.1 Settings of CCU regarding CAN bus

The following CCU settings will influence the CAN messages, which are send by the CCU.

SW V01.20	CCU-Settings	1	2	3	(4)
	Selected option on HHT (CAN Bus Format)	*"J1939 standard"*	*"J1939 standard"*	*"CPC + J1939"*	*d.c.*
	Selected option on HHT (ATL)	*"ATL off"*	*"ATL on"*	*d.c.*	*d.c.*
	J1939	x	x	x	x
	CPC proprietary	-	-	x	d.c.
	ATL enabled	-	x	d.c.	d.c.
	(cannot claim address)	-	-	-	x

PGN	Message Name				
0xFEF4	Tire Condition	x	x	x	-
0xFC42	Tire Condition 2	x	x	x	-
0xFF00	CPC System Configuration	-	x	x	-
0xFF01	CPC System Status	-	x	x	-
0xFF02	CPC TTM Data	-	x	x	-
0xFF04	CPC Graphical Position Configuration	x	x	x	-

Legend		
	100ms / 10s	
	10ms / 1s	
d.c.	don't care	
All "TIS_xxx" messages are in the range of "Proprietary B" (0x00FF00 to 0x00FFFF)		
All messages are send to "global" destination (PDU Format: 0x00 to 0xEF)		

4.2 Message Transmission Type

Most messages are sent in scheduled lists. There are two types of lists with different timings as shown below:

Schedule List 1: SAE J1939   (100ms time slot; 10000ms sequence interval)

- PGN 65268 – sent for each known tire (max. 24 times)

- PGN 64578 – sent for each known tire (max. 24 times)

Example (vehicle with 4 tires):

Time	Chn	ID	Name	Dir	DLC	Data
⊞ 200.507224	CAN 1	18FC4233x	Tire_Condition_2	Rx	8	4B 00 00 7E 03 00 00 00
⊟ 205.206773	CAN 1	18FEF433x	Tire_Condition	Rx	8	00 00 E0 1B 43 00 00 40
∿ Tire_Location			0	0		
∿ Tire_Pressure			0	0		
∿ Tire_Temperature			7136	1BE0		
∿ CTI_Tire_Sensor_Enable_Status			3	3		
∿ CTI_Tire_Status			0	0		
∿ CTI_Tire_Sensor_Electrical_Fault			0	0		
∿ ExtendedTirePressureSupport			1	1		
∿ TireAirLeakageRate			0	0		
∿ Reserved_23			0	0		
∿ Tire_Pressure_Threshold_Detect			2	2		
⊞ 205.306766	CAN 1	18FEF433x	Tire_Condition	Rx	8	01 00 E0 1B 43 00 00 40
⊞ 205.406778	CAN 1	18FEF433x	Tire_Condition	Rx	8	10 00 E0 1B 43 00 00 40
⊞ 205.507218	CAN 1	18FEF433x	Tire_Condition	Rx	8	11 00 E0 1B 43 00 00 40
⊟ 210.206790	CAN 1	18FC4233x	Tire_Condition_2	Rx	8	03 00 00 7E 03 00 00 00
∿ Tire_location2			3	3		
∿ TirePressure_ExtendedRange			0 Kpa	0		
∿ RequiredTirePressure			894 kPa	37E		
∿ Reserved_22			0	0		
⊞ 210.306791	CAN 1	18FC4233x	Tire_Condition_2	Rx	8	0B 00 00 7E 03 00 00 00
⊞ 210.406779	CAN 1	18FC4233x	Tire_Condition_2	Rx	8	43 00 00 7E 03 00 00 00
⊞ 210.507251	CAN 1	18FC4233x	Tire_Condition_2	Rx	8	4B 00 00 7E 03 00 00 00
⊞ 215.206816	CAN 1	18FEF433x	Tire_Condition	Rx	8	00 00 E0 1B 43 00 00 40

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Schedule List 2: Proprietary CPC messages (10ms time slot; 1000ms sequence interval)

- PGN 65280 – sent one time

- PGN 65281 – sent one time

- PGN 65282 – sent for each known tire (max. 24 times)

- PGN 65284 – sent for each known tire (max. 24 times)

Example (vehicle with 4 tires):

Time	Chn	ID	Name	Dir	D	Data
0.246655	CAN 1	18FF0033x	TIS_System_configuration	Rx	8	FC FF 02 04 FF 4D 80 C0
0.256656	CAN 1	18FF0133x	TIS_System_status	Rx	8	FC 00 FE FF 41 C0 FF 3F
0.266640	CAN 1	18FF0433x	TIS_Graphical_position_config	Rx	8	80 03 FF 02 9D F5 28 1C
0.276636	CAN 1	18FF0433x	TIS_Graphical_position_config	Rx	8	84 0B FF 02 8C F5 28 1C
0.286633	CAN 1	18FF0433x	TIS_Graphical_position_config	Rx	8	88 53 FF 02 B3 F4 28 1C
0.296633	CAN 1	18FF0433x	TIS_Graphical_position_config	Rx	8	8C 5B FF 02 15 F4 28 1C
0.306641	CAN 1	18FF0233x	TIS_TTM_data	Rx	8	80 BC 4B FD 08 00 E0 FF
0.316641	CAN 1	18FF0233x	TIS_TTM_data	Rx	8	04 B9 4B FD 08 00 E0 FF
0.326638	CAN 1	18FF0233x	TIS_TTM_data	Rx	8	88 9E 4B FD 08 00 E0 FF
0.336642	CAN 1	18FF0233x	TIS_TTM_data	Rx	8	8C A4 4B FD 08 00 E0 FF
1.246676	CAN 1	18FF0033x	TIS_System_configuration	Rx	8	FC FF 02 04 FF 4D 80 C0
1.256676	CAN 1	18FF0133x	TIS_System_status	Rx	8	FC 00 FE FF 41 C0 FF 3F
1.266661	CAN 1	18FF0433x	TIS_Graphical_position_config	Rx	8	80 03 FF 02 9D F5 28 1C
1.276657	CAN 1	18FF0433x	TIS_Graphical_position_config	Rx	8	84 0B FF 02 8C F5 28 1C
1.286653	CAN 1	18FF0433x	TIS_Graphical_position_config	Rx	8	88 53 FF 02 B3 F4 28 1C
1.296653	CAN 1	18FF0433x	TIS_Graphical_position_config	Rx	8	8C 5B FF 02 15 F4 28 1C
1.306658	CAN 1	18FF0233x	TIS_TTM_data	Rx	8	80 BC 4B FD 08 00 E0 FF
1.316658	CAN 1	18FF0233x	TIS_TTM_data	Rx	8	04 B9 4B FD 08 00 E0 FF
1.326655	CAN 1	18FF0233x	TIS_TTM_data	Rx	8	88 9E 4B FD 08 00 E0 FF
1.336659	CAN 1	18FF0233x	TIS_TTM_data	Rx	8	8C A4 4B FD 08 00 E0 FF
2.246677	CAN 1	18FF0033x	TIS_System_configuration	Rx	8	FC FF 02 04 FF 4D 80 C0
2.256677	CAN 1	18FF0133x	TIS_System_status	Rx	8	FC 00 FE FF 41 C0 FF 3F
2.266661	CAN 1	18FF0433x	TIS_Graphical_position_config	Rx	8	80 03 FF 02 9D F5 28 1C
2.276658	CAN 1	18FF0433x	TIS_Graphical_position_config	Rx	8	84 0B FF 02 8C F5 28 1C
2.286654	CAN 1	18FF0433x	TIS_Graphical_position_config	Rx	8	88 53 FF 02 B3 F4 28 1C
2.296654	CAN 1	18FF0433x	TIS_Graphical_position_config	Rx	8	8C 5B FF 02 15 F4 28 1C
2.306659	CAN 1	18FF0233x	TIS_TTM_data	Rx	8	80 BC 4B FD 08 00 E0 FF
2.316659	CAN 1	18FF0233x	TIS_TTM_data	Rx	8	04 B9 4B FD 08 00 E0 FF
2.326655	CAN 1	18FF0233x	TIS_TTM_data	Rx	8	88 9E 4B FD 08 00 E0 FF
2.336660	CAN 1	18FF0233x	TIS_TTM_data	Rx	8	8C A4 4B FD 08 00 E0 FF

4.3 PGN 65268 "Tire Condition" of SAE J1939

PGN Message Name Signal Description	Length (Bits)	Start Bit	End Bit	Unit	Meaning	Resolution
0xFEF433 Tire Condition Tire Location	8	0	7	State encoded	SPN 929 See Cap. 4.9.1	256 states
0xFEF433 Tire Condition Tire Pressure	8	8	15	kPa	SPN 241 0x00...0xFA: Valid pressure range 0xFB...0xFD: Not used 0xFE: Error 0xFF: No TTM data since Power On	4kPa/bit 0 offset
0xFEF433 Tire Condition Tire Temperature	16	16	31	°C	SPN 242 0x0000...0xFAFF: Valid temperature range 0xFB00...0xFDFF: Not used 0xFE00...0xFEFF: Error 0xFF00...0xFFFF: No TTM data since Power On	0.03125 K -273 °C
0xFEF433 Tire Condition CTI Tire Sensor Enable Status	2	32	33	State encoded	SPN 1699 0b00: TTM mute 0b01: OK 0b10: No TTM data since Power On 0b11: Not supported	4 states 2 bit 0 offset
0xFEF433 Tire Condition CTI Tire Status	2	34	35	State encoded	SPN 1698 0b00: OK (no fault) 0b01: Tire leak detected 0b10: TTM loose OR turned 0b11: Not supported	4 states 2 bit 0 offset
0xFEF433 Tire Condition CTI Tire Sensor Electrical Fault	2	36	37	State encoded	SPN 1697 0b00: OK (no fault) 0b01: Not defined (fault) 0b10: Low battery 0b11: Not supported	4 states 2 bit 0 offset
0xFEF433 Tire Condition Extended Tire Pressure Support	2	38	39	State encoded	SPN 6990 0b00: Not using Extended Tire Pressure 0b01: Using Extended Tire Pressure 0b10: Error 0b11: Not available/Not supported	4 states 2 bit 0 offset
0xFEF433 Tire Condition Tire Air Leakage Rate	16	40	55	Pa/s	SPN 2586 0x0000...0xFAFF: Valid leakage rate range 0xFB00...0xFDFF: Not used 0xFE00...0xFEFF: Error 0xFF00...0xFFFF: Not available	0.1 Pa/s per bit, 0 offset
Reserved	5	56	60			
0xFEF433 Tire Condition Tire Pressure Threshold Detection	3	61	63	State encoded	SPN 2587 0b000: Not supported 0b001: Not supported 0b010: No warning pressure (OK) 0b011: Under pressure (Under-inflation warning) 0b100: Extreme under pressure (Under-inflation alarm) 0b101: Not supported 0b110: Sensor error 0b111: Not available	8 states 3 bit 0 offset

Attention: For some vehicle types, warnings and alerts might be suppressed (see cap. 7.5.8 of user manual).

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4.4 PGN 64578 "Tire Condition 2" of SAE J1939

PGN Message Name Signal Description	Length (Bits)	Start Bit	End Bit	Unit	Meaning	Resolution
0xFC4233 Tire Condition 2 Tire Location	8	0	7	State encoded	SPN 6987 See Cap. 4.9.1	256 states 8 bits 0 offsett
0xFC4233 Tire Condition 2 Tire Pressure (extended range)	16	8	23	kPa	SPN 6988 0x0000...0xFAFF: Valid pressure range 0xFB00...0xFDFF: Not used 0xFE00...0xFEFF: Error 0xFF00...0xFFFF: Not available	1kPa/bit 0 offset
0xFC4233 Tire Condition 2 Required tire pressure[1]	16	24	39	kPa	SPN 6989 0x0000...0xFAFF: Valid pressure range 0xFB00...0xFDFF: Not used 0xFE00...0xFEFF: Error 0xFF00...0xFFFF: Not available	1kPa/bit 0 offset

[1] The required tire pressure at which air is contained in cavity formed by tire and rim.

This pressure of the tire is compensated to meet the specific physical environmental conditions (temperature) of the vehicle. [Source: Documentation of SAE J1939]

The compensation is based on a reference temperature of 25°C.

Note: This is not the Cold Inflation Pressure (see 4.5.5) or nominal pressure!

4.5 Supported Messages send on Request

4.5.1 DM1 (PGN 65226, 0xFECA)

Request: CA FE 00

Answer: DTC Code, SPN, SPN Description, FMI, CM, OC, Mapped DTC, Mapped DTC Description

→ Additionally, the message DM1 is sent every second as a "heartbeat" signal.

4.5.2 DM2 (PGN 65227, 0xFECB)

Request: CB FE 00

Answer: DTC Code, SPN, SPN Description, FMI, CM, OC, Mapped DTC, Mapped DTC Description

4.5.3 DM3 (PGN 65228, 0xFECC)

Request: CC FE 00

Answer: (Previously active DTC are cleared)

4.5.4 Monitored Tire Information (MTI, PGN 64583, 0xFC47)

Request: 47 FC 00

Answer:

Name	Startbit	Length	Factor	Offset	Min.	Max.	Unit
Number_of_Axles_monitored	0	4	1	0	0	8	
Number_of_Tires_monitored	8	8	1	0	0	32	
Tires_on_Axle_1_monitored	16	4	1	0	0	4	
Tires_on_Axle_2_monitored	20	4	1	0	0	4	
Tires_on_Axle_3_monitored	24	4	1	0	0	4	
Tires_on_Axle_4_monitored	28	4	1	0	0	4	
Tires_on_Axle_5_monitored	32	4	1	0	0	4	
Tires_on_Axle_6_monitored	36	4	1	0	0	4	
Tires_on_Axle_7_monitored	40	4	1	0	0	4	
Tires_on_Axle_8_monitored	44	4	1	0	0	4	

Constant Values

Tires_on_Axle_9..12_monitored: 0xF

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4.5.5 Tire Configuration Status Information (TCSI, PGN 64579, 0xFC43)

Request: 43 FC 00

Answer:

Name	Startbit	Length	Factor	Offset	Min.	Max.	Unit
Tire_Location	0	8	1	0	0	255	
Cold_Inflation_Pressure	8	23	1	0	0		kPa
Under_Press_Percentage_Threshold	24	8	0.5	0	0		%
Extr_Under_Press_Percentage_Thd	32	8	0.5	0	0		%
Over_Pressure_Percentage_Thd	40	8	0.5	0	0		%
Over_Temperature	48	8	1	-40	0		°C

Constant Values

Over_Pressure_Percentage_Threshold: 0xFF

To align "Cold_Inflation_Pressure" best with RCP set by HHT:

RCP (bar) := TRUNCATE(Cold_Inflation_Pressure / 10) / 10

RCP (psi) := TRUNCATE(Cold_Inflation_Pressure * 0.14504)

Note: "Tire_Location" = 0xFF shows values for Automatic Trailer Learning, if activated.

4.5.6 Tire Sensor Information (TSI, PGN 64582, 0xFC46)

Request: 46 FC 00

Answer:

Name	Startbit	Length	Factor	Offset	Min.	Max.	Unit
Number_of_Tire_Sensors	0	8	1	0	0		
Tire_Sensor_Tire_Number	8	8	1	0	0		
Tire_Location	16	8	1	0	0		
Tire_Sensor_Id_Number	24	Var. ("*")	1	0	0		ASCII

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4.5.7 Tire Pressure Reference Information (TPRI, PGN 64953, 0xFDB9)

Request: B9 FD 00

Answer:

Name	Startbit	Length	Factor	Offset	Min.	Max.	Unit
Tire_Location	0	8	1	0	0		
Reference_Tire_Pressure	8	8	8	0	0	2000	kPa

Available but not recommended, use "Cold_Inflation_Pressure" of message TCSI instead.

4.5.8 Component Identification (CI, PGN 65259, 0xFEEB)

Request: EB FE 00

Answer:

Name	Startbit	Length	Factor	Offset	Min.	Max.	Unit
CI_Make	0	Var. ("*")	1	0	0		ASCII
CI_Model	8	Var. ("*")	1	0	0		ASCII
CI_Serial_Number	16	Var. ("*")	1	0	0		ASCII
CI_Unit_Number_Power_Unit	24	Var. ("*")	1	0	0		ASCII

Constant Values

CI_Make: "CONAG"

CI_Model: "Truck CCU"

CI_Serial_Number: First 7 digits until ";"

CI_Unit_Number_Power_Unit: ""

4.5.9 ECU Identification Information (ECUID, PGN 64965, 0xFDC5)

Request: C5 FD 00

Answer:

Name	Startbit	Length	Factor	Offset	Min.	Max.	Unit
ECU_PartNumber	0	Var. ("*")	1	0	0		ASCII
ECU_Serial_Number	8	Var. ("*")	1	0	0		ASCII
ECU_Hardware_ID	16	Var. ("*")	1	0	0		ASCII
ECU_Location	24	Var. ("*")	1	0	0		ASCII
ECU_Manufacturer_Name	32	Var. ("*")	1	0	0		ASCII
ECU_Type	40	Var. ("*")	1	0	0		ASCII

Constant Values

ECU_Part_Number: "17340140000"

ECU_Serial_Number: : First 7 digits until ";"

ECU_Type: ""

ECU_Manufacturer_Name: "Continental AG"

4.5.10 Example of CAN request

Time	ID	PGN	Name	Send Node	Src	Dest	Prio	Dir	DLC	Data	J1939 Interpretation
3179.234267	18EAFF77x	EA00p	CPC_Request	CPCTesterTool	77	FF	6	Rx	3	43 FC 00	[RQST] Request PGN: FC43p
[-] 3179.256655	18FC4333x	FC43p	TireConfigurationStatusInfo	CPC	33	FF	6	Rx	8	00 53 03 B4 A0 FF 93 00	
	Tire_Location		0	0				SPN 929			
	Cold_Inflation_Pressure		851	kPa				353			
	Under_Press_Percentage_Threshold		90.0000	%				B4			
	Extr_Under_Press_Percentage_Thd		80.0000	%				A0			
	Over_Pressure_Percentage_Thd		127.5000	%				FF			
	Over_Temperature		107	°C				93			
[+] 3179.356646	18FC4333x	FC43p	TireConfigurationStatusInfo	CPC	33	FF	6	Rx	8	01 53 03 B4 A0 FF 93 00	
[+] 3179.456646	18FC4333x	FC43p	TireConfigurationStatusInfo	CPC	33	FF	6	Rx	8	10 BD 02 B4 A0 FF 93 00	
[+] 3179.556645	18FC4333x	FC43p	TireConfigurationStatusInfo	CPC	33	FF	6	Rx	8	11 BD 02 B4 A0 FF 93 00	
[+] 3179.656645	18FC4333x	FC43p	TireConfigurationStatusInfo	CPC	33	FF	6	Rx	8	12 BD 02 B4 A0 FF 93 00	
[+] 3179.756640	18FC4333x	FC43p	TireConfigurationStatusInfo	CPC	33	FF	6	Rx	8	13 BD 02 B4 A0 FF 93 00	

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4.6 Special message: PGN 65280 "CPC System Configuration"

PGN Message Name Signal Description	Length (Bits)	Start Bit	End Bit	Unit	Meaning	Resolution
0xFF0033 CPC System Config- uration System ID	2	0	1	State encoded	0x0: System of the truck 0x1: System of the trailer 0x2: Not supported 0x3: Not supported	4 states 2 bit 0 offset
0xFF0033 CPC System Config- uration Number of axles	8	16	23	Count	Operational range: 0 to 8	1 count/bit 0 offset
0xFF0033 CPC System Config- uration Number of TTMs	8	24	31	Count	Operational range: 0 to 32	1 count/bit 0 offset

4.7 Special message: PGN 65281 "CPC System Status"

PGN Message Name Signal Description	Length (Bits)	Start Bit	End Bit	Unit	Meaning	Resolution
0xFF0133 CPC System Status System ID	2	0	1	State encoded	0x0: System of the truck 0x1: System of the trailer 0x2: Not supported 0x3: Not supported	4 states 2 bit 0 offset
0xFF0133 CPC System Status System State	8	8	15	State encoded	0x0: OK 0x1: System malfunction 0x2: System deactivated	256 states 8 bit 0 offset
0xFF0133 CPC System Status No TTM mounted	1	33	33	Binary	0b0: OK; "No TTM mounted" NOT detected 0b1: "No TTM mounted" detected	2 states 1 bit 0 offset
0xFF0133 CPC System Status Single wheel ex- change	1	35	35	Binary	0b0: "Single wheel exchanged" not detected 0b1: "Single wheel exchanged" detected	2 states 1 bit 0 offset
0xFF0133 CPC System Status Automatic trailer learning	3	36	38	State encoded	0x0: Automatic trailer learning ongoing 0x1: Automatic trailer learning finished, known trailer found 0x2: Automatic trailer learning finished, new trailer found 0x3: Automatic trailer learning finished, no trailer found 0x4: Feature not active 0x5: Automatic trailer learning finished, known trailer found AND position available 0x6: Automatic trailer learning finished, new trailer found AND position available	8 states 3 bit 0 offset

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4.8 Special message: PGN 65282 "CPC TTM Data"

PGN Message Name Signal Description	Length (Bits)	Start Bit	End Bit	Unit	Meaning	Resolution
0xFF0233 CPC TTM Data System ID	2	0	1	State encoded	0x0: System of the truck 0x1: System of the trailer 0x2: Not supported 0x3: Not supported	4 states 2 bit 0 offset
0xFF0233 CPC TTM Data Tire ID	5	2	6	Count	Operational range: 0 to 31	1 count/bit 0 offset
0xFF0233 CPC TTM Data TTM Pressure	8	8	15	kPa	0x00: Sensor defective or data not available 0x01: [0 ... 4.7[0x02: [4.7 ... 9.4[0x03: [9.4 ... 14.1[... 0xFD: [1185.88 ... 1190.59[0xFE: [1190.59 ... 1195.29[0xFF: Overflow Example value on CAN: 0xAA Calculated pressure: (0xAA -1) * 4.706 kPa/bit = 800 kPa	4.706 kPa/bit -4.706 kPa offset
0xFF0233 CPC TTM Data TTM temperature	8	16	23	°C	0x00: Sensor defective or data not available 0x01:]-50 ... -48[0x02: [-48 ... -47[0x03: [-47 ... -46[... 0xFD: [203 ... 204[0xFE: [204 ... 205[0xFF: Overflow Example value on CAN: 0x5F Calculated temperature: 0x5F – 50 K = 45 °C	1 °C/bit -50 K offset
0xFF0233 CPC TTM Data TTM State	8	32	39	State encoded	0x00: d.c. … 0xFE: d.c. 0xFF: No TTM data since Power On	256 states 8 bits 0 offset
0xFF0233 CPC TTM Data Alarm+Warning	8	40	47	State encoded	0x00: OK 0x01: Under-inflation warning 0x02: Under-inflation alarm 0x03: Tire leak alarm = fast pressure loss 0x04: TTM mute 0x05: Temperature warning 0x08: TTM over temperature warning 0x09: Pressure difference warning	256 states 8 bits 0 offset
0xFF0233 CPC TTM Data Battery flag	1	49	49	Binary	0b0: OK; Battery flag is not set 0b1: Battery flag is set	2 states 1 bit 0 offset
0xFF0233 CPC TTM Data TTM defective	1	50	50	Binary	0b0: OK; "TTM defective" NOT detected 0b1: "TTM defective" detected	2 states 1 bit 0 offset
0xFF0233 CPC TTM Data Loose TTM detection	2	51	52	State encoded	0x00: OK 0x01: TTM loose 0x02: TTM turned 0x03: Not supported	4 states 2 bit 0 offset

Attention: For some vehicle types, warnings and alerts might be suppressed (see cap. 7.5.8 of user manual).

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4.9 Special message: PGN 65284 "CPC Graphical Position Configuration"

PGN Message Name Signal Description	Length (Bits)	Start Bit	End Bit	Unit	Meaning	Resolution
0xFF0433 CPC Graphical Position Configuration System ID	2	0	1	State encoded	0x0: System of the truck 0x1: System of the trailer 0x2: Not supported 0x3: Not supported	4 states 2 bit 0 offset
0xFF0433 CPC Graphical Position Configuration Tire ID	5	2	6	Count	Operational range: 0 to 31	1 count/bit 0 offset
0xFF0433 CPC Graphical Position Configuration Graphical Position	8	8	15	State encoded	See Cap. 4.9.1	256 states 8 bit 0 offset
0xFF0433 CPC Graphical Position Configuration Tire Location	8	16	23	State encoded	SPN 929 See Cap. 4.9.1	256 states 8 bit 0 offset
0xFF0433 CPC Graphical Position Configuration TTM ID	32	32	63	count	Unique 32 bit identifier of TTM	1 count/bit 0 offset

4.9.1 PGN 65268 vs. PGN 65284 and PGN 64578

Due to the fact, that in SPN 929 and SPN 6987 of J1939 the tire positions cannot represent distances between the tires on one axle and between the axles of the vehicle, the definition for tire location on CPC is slightly different.

Details can be seen in the following example which represents a 3-axle truck and a 3-axle trailer, configured as a "married" combination with the CPC diagnosis tool (HHT):

PGN 64578 "Tire Location"

PGN 65284 "Graphical Position"

PGN 65268 and PGN 64578 "Tire Location"

(according SPN 929 and SPN 6987)

The first nibble of the byte is determined by the column of the matrix above and the second nibble by the row.

PGN 65284 "Graphical Position"	**J1939 (SPN 929 and SPN 6987)** PGN 65268 "Tire Location"
0x03	0x00
0x0B	0x01
0x43	0x10
0x45	0x11
0x49	0x12
0x4B	0x13
0x53	0x20
0x5B	0x21
0xB3	0x30
0xBB	0x31
0xC3	0x40
0xCB	0x41
0xD3	0x50
0xDB	0x51

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Advanced Tires & Systems

Technical Document:

Interface Description of ContiPressureCheck™

for 3rd Party Components

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4.9.2 Automatic Trailer Learning (ATL)

The feature ATL enables the CCU, which is normally mounted on a truck, to detect a trailer which is hooked to this truck. That means, if the trailer tires are equipped with TTM, too, the pressure, temperature and warning information is also received by the CCU on the truck and put on the CAN bus.

Data of all learned tires are available, when ATL function has finished (see PGN 65281 "CPC System Status" / "Automatic trailer learning"). Data of some trailer tires might be on the CAN even before the ATL algorithm terminates.

The TTM data of the trailer is sent in the same way on the proprietary CAN (schedule list 2) like the manually configured TTM. The only difference is the signal "Graphical Position" (PGN 65284).

a) ATL without tire position:
   For all TTM learned by ATL the value is always 0xFF.

b) ATL with tire position:
   The "Graphical Position" is according Cap. 4.9.1

On schedule List 1 there is no information about trailer tires detected by ATL, because in SAE J1939 trailers are not considered.

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4.10 DTC Description

4.10.1 System related diagnosis messages

SPN	SPN Description	FMI	Failure Mode Identification	DTC Description for CPC
639	J1939 Network #1, Primary Vehicle Network	31	Condition Exists	CAN bus failure
611	System Diagnostic Code #1	2	Data Erratic, Intermittent Or Incorrect	External Receiver 1 bus signal failures
611	System Diagnostic Code #1	14	Special Instructions	External Receivers circuit open / short
168	Battery Potential / Power Input 1	4	Voltage Below Normal, Or Shorted To Low Source	System Voltage circuit voltage below threshold
168	Battery Potential / Power Input 1	3	Voltage Above Normal, Or Shorted To High Source	System Voltage circuit voltage above threshold
612	System Diagnostic Code #1	14	Special Instructions	RF Jamming
613	System Diagnostic Code #3	12	Bad Intelligent Device Or Component	ROM / ROM / EEPROM failure
613	System Diagnostic Code #3	31	Condition Exists	µC failure
612	System Diagnostic Code #2	31	Condition Exists	No TTMs mounted
612	System Diagnostic Code #2	13	Out Of Calibration	No Configuration stored

4.10.2 Tire related diagnosis messages

SPN	SPN Description	FMI	Failure Mode Identification	DTC Description for CPC
7193…7224	Tire 1…32 Sensor Enable Status	31	Condition Exists	Mute at tire CC_TIRE_00…1F
7193…7224	Tire 1…32 Sensor Enable Status	10	Abnormal Rate Of Change	Tire Jammed at tire CC_TIRE_00…1F
7113…7144	Tire 1…32 Pressure	18	Data Valid But Below Normal Operating Range - Moderately Severe Level	Soft Warning (under inflation warning) at CC_TIRE_00…1F
7113…7144	Tire 1…32 Pressure	1	Data Valid But Below Normal Operational Range - Most Severe Level	Hard Warning (under inflation alarm) at CC_TIRE_00…1F
7233...7264	Tire 1…32 Leak Status	31	Condition Exists	Tire Leak at CC_TIRE_00…1F
7153…7184	Tire 1…32 Temperature	16	Data Valid But Above Normal Operating Range - Moderately Severe Level	Temperature Warning at CC_TIRE_00…1F
7273…7304	Tire 1…32 Sensor Electrical Fault	11	Root Cause Not Known	Sensor defective at CC_TIRE_00…1F
7153…7184	Tire 1…32 Temperature	0	Data Valid But Above Normal Operational Range - Most Severe Level	Thermal Shutdown TTM internal at CC_TIRE_00…1F
7193…7224	Tire 1…32 Sensor Enable Status	14	Special Instructions	TTM Rotation Problem at CC_TIRE_00…1F
7193…7224	Tire 1…32 Sensor Enable Status	7	Mechanical System Not Responding Or Out Of Adjustment	Loose TTM at CC_TIRE_00…1F

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5 Warnings Description

Warning	Detection	Affected messages with error values
Low Pressure	Message: Tire Condition (PGN 65268) Signal: Tire Pressure Threshold Detection = 3 (0b011)	N/A
Very Low Pressure	Message: Tire Condition (PGN 65268) Signal: Tire Pressure Threshold Detection = 4 (0b100)	N/A
Fast Pressure Loss	Message: Tire Condition (PGN 65268) Signal: CTI Tire Status = 1 (0b01)	N/A
High Temperature	Message: Tire Condition (PGN 65268) Signal: Tire Temperature > 115°C	N/A
Low Battery	Message: Tire Condition (PGN 65268) Signal: CTI Tire Sensor Electrical Fault = 2 (0b10)	N/A
Sensor Defect	Message: Tire Condition (PGN 65268) Signal: Tire Pressure Threshold Detection = 6 (0b110) AND CTI Tire Sensor Enable Status ≠ 0 (0b00)	Case 1: Acceleration sensor defect N/A Case 2: Pressure sensor defect Message: Tire Condition (PGN 65268) Signal: Tire Pressure = FE (Error) Signal: Tire Air Leakage Rate = 0xFE00.....0xFEFF (Error) Message: Tire Condition2 (PGN 64578) Signal: Tire Pressure = 0xFE00.....0xFEFF (Error) Case 3: Temperature sensor defect Message: Tire Condition (PGN 65268) Signal: Tire Temperature = 0xFE00.....0xFEFF (Error) Message: Tire Condition2 (PGN 64578) Signal: Required tire pressure= 0xFE00.....0xFEFF (Error)
Sensor Loose/Flipped	Message: Tire Condition (PGN 65268) Signal: CTI Tire Status = 2 (0b10)	Message: Tire Condition (PGN 65268) Signal: Tire Pressure = FE (Error) Signal: Tire Temperature = 0xFE00.....0xFEFF (Error) Signal: Tire Air Leakage Rate = 0xFE00.....0xFEFF (Error) Message: Tire Condition2 (PGN 64578) Signal: Tire Pressure = 0xFE00.....0xFEFF (Error)
Sensor Mute	Message: Tire Condition (PGN 65268) Signal: CTI Tire Sensor Enable Status = 0 (0b00)	Message: Tire Condition (PGN 65268) Signal: Tire Pressure = FF Signal: Tire Temperature = 0xFF00.....0xFFFF Signal: Tire Air Leakage Rate = 0xFF00.....0xFFFF Message: Tire Condition2 (PGN 64578) Signal: Tire Pressure = 0xFF00.....0xFFFF Signal: Required tire pressure= 0xFF00.....0xFFFF
No data since power ON	Message: Tire Condition (PGN 65268) Signal: CTI Tire Sensor Enable Status = 2 (0b10)	Message: Tire Condition (PGN 65268) Signal: Tire Pressure = FF Signal: Tire Temperature = 0xFF00.....0xFFFF Signal: Tire Air Leakage Rate = 0xFF00.....0xFFFF Message: Tire Condition2 (PGN 64578) Signal: Tire Pressure = 0xFF00.....0xFFFF Signal: Required tire pressure= 0xFF00.....0xFFFF

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