

Guideline for connecting ContiPressureCheck™ with 3rd Party Components

responsible for contents:

Jörg Hanna

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Modifications

Item	Changes	Date
1	Initial Version	05.08.2013
2	Disclaimer added; Graphical position	28.08.2013

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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 telematic 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 attempts. It only applies as long as 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 lately 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.

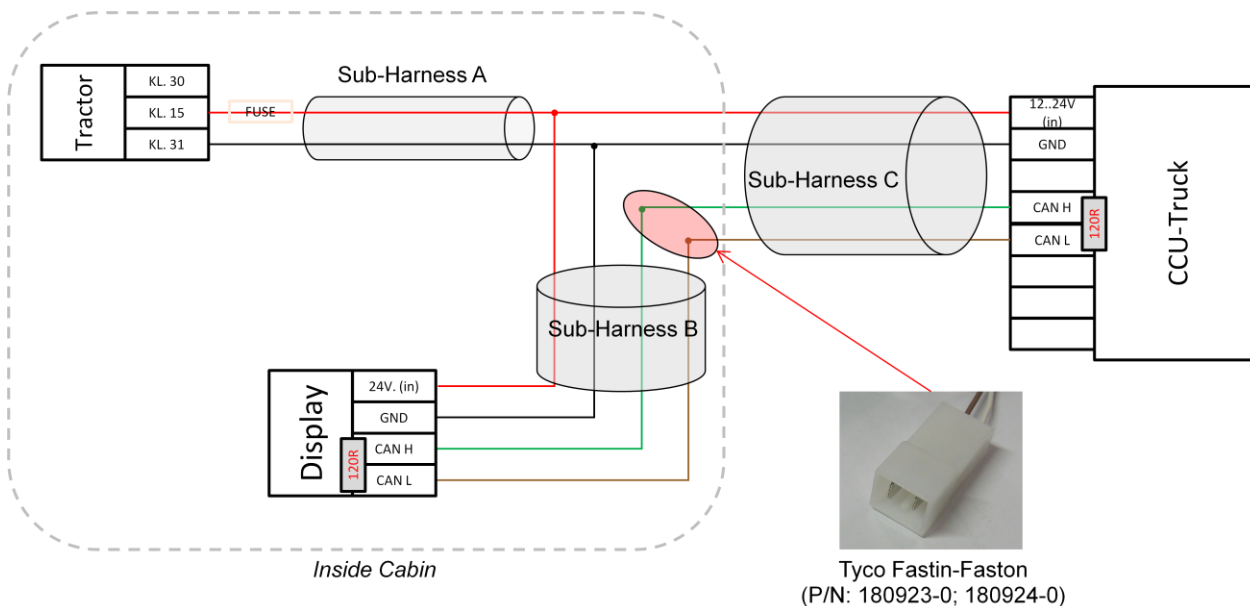
1.3 Abbreviations

CAN	Controller area network
CPC	ContiPressureCheck™
ECU	Electronic control unit
TTM	Truck tire module

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2 Topology

2.1 Components and harnesses on trucks and busses



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:

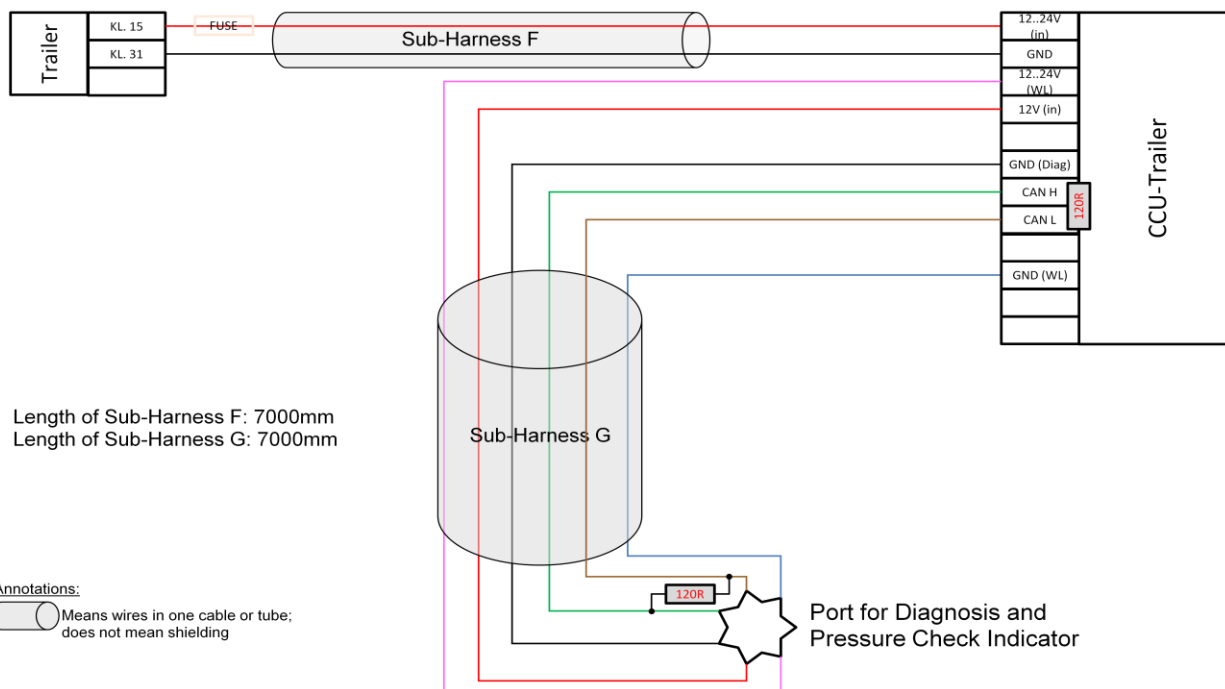
- CAN-Bus should be tapped between Sub-Harness B and Sub-Harness C. A Y-Cable can be made by using Tyco Fastin-Faston connectors.

Attention:

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

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2.2 Components and harnesses on trailers



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).

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3 CAN bus details

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

Subject Area	J1939	Sub document
<u>Physical Layer</u>		
Baud rate	250.000 bits/sec	
Maximum nodes	10	J1939-15
Maximum bus length	40 m	
Maximum stub length	3 m (up to 5 m for OBD)	J1939-15
Termination resistor	2 required	
Cable	UN-Shielded Twisted Pair (UTP)	J1939-15
<u>Data Link Layer</u>		
Protocol	CAN 2.0b (29-bit ID)	

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4 Provided information on CPC CAN bus

4.1 Message Transmission Type

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

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

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

Example (vehicle with 4 tires):

Time	Chn	ID	Name	Dir	D	Data
8.852381	CAN 1	18FEF433x	Tire_Condition	Rx	8	83 DD 40 25 33 00 00 40
8.952923	CAN 1	18FEF433x	Tire_Condition	Rx	8	8B E4 20 25 33 00 00 40
9.052914	CAN 1	18FEF433x	Tire_Condition	Rx	8	D3 B9 40 25 33 00 00 40
9.152398	CAN 1	18FEF433x	Tire_Condition	Rx	8	DB CB 20 25 33 00 00 40
18.852366	CAN 1	18FEF433x	Tire_Condition	Rx	8	83 DD 40 25 33 00 00 40
18.952927	CAN 1	18FEF433x	Tire_Condition	Rx	8	8B E4 20 25 33 00 00 40
19.052918	CAN 1	18FEF433x	Tire_Condition	Rx	8	D3 B9 40 25 33 00 00 40
19.152355	CAN 1	18FEF433x	Tire_Condition	Rx	8	DB CB 20 25 33 00 00 40
28.852389	CAN 1	18FEF433x	Tire_Condition	Rx	8	83 DD 40 25 33 00 00 40
28.952950	CAN 1	18FEF433x	Tire_Condition	Rx	8	8B E4 20 25 33 00 00 40
29.052922	CAN 1	18FEF433x	Tire_Condition	Rx	8	D3 B9 40 25 33 00 00 40
29.152358	CAN 1	18FEF433x	Tire_Condition	Rx	8	DB CB 20 25 33 00 00 40
			Tire_Location		219	DB
			Tire_Pressure		203	CB
			Tire_Temperature		9504	2520
			Reserved_2_first		3	3
			CTI_Tire_Status		0	0
			Reserved_2_second		3	3
			Reserved_8		0	0
			Reserved_15		0	0
			Tire_Pressure_Threshold_Detect		2	2

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Schedule List 2 (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

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4.2 PGN 65268 “Tire Condition” of SAE J1939

PGN Message Name Signal Description	Length (Bits)	Start Bit	End Bit	Unit	Meaning	Resolution
0xFE433 Tire Condition Tire Location	8	0	7	State encoded	SPN 929 0xFF: Not supported	256 states
0xFE433 Tire Condition Tire Pressure	8	8	15	kPa	SPN 241	4kPa/bit 0 offset
0xFE433 Tire Condition Tire Temperature	16	16	31	°C	SPN 242	0.03125 K -273 °C
Reserved	2	32	33		Always set to 0b11 (SPN 1697)	
0xFE433 Tire Condition CTI Tire Status	2	34	35	State encoded	SPN 1698 0b00: OK (no fault) 0b01: Tire leak detection 0b10: Not supported 0b11: Not supported	
Reserved	2	36	37		Always set to 0b11 (SPN 1697)	
Reserved	8	38	45			
Reserved	15	46	60		Always set to 0b00 (SPN 2586)	
0xFE433 Tire Condition Tire Pressure Threshold Detection	3	61	63	State encoded	SPN 2587 0b000: Not supported 0b001: Not supported 0b010: No warning pressure 0b011: Under pressure 0b101: Not supported 0b100: Extreme under pressure 0b110: Error indicator 0b111: Not available	

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4.3 Special message: PGN 65280 “CPC System Configuration”

PGN Message Name Signal Description	Length (Bits)	Start Bit	End Bit	Unit	Meaning	Resolution
0xFF0033 CPC System Con- figuration 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 Con- figuration Number of axles	8	16	23	Count	Operational range: 0 to 6	1 count/bit 0 offset
0xFF0033 CPC System Con- figuration Number of TTMs	8	24	31	Count	Operational range: 0 to 24	1 count/bit 0 offset

4.4 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

4.5 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 24	1 count/bit 0 offset
0xFF0233 CPC TTM Data TTM Pressure	8	8	15	kPa	0x00: Sensor defective or data not available 0x01: [0 ... 104.7[0x02: [104.7 ... 109.4[0x03: [109.4 ... 114.1[... 0xFD: [1285.88 ... 1290.59[0xFE: [1290.59 ... 1295.29[0xFF: Overflow	4.706 kPa/bit 100 offset

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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	1 °C/bit -50 K 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 0x04: TTM mute 0x05: Temperature warning 0x08: TTM over temperature warning	256 states 8 bits 0 offset
0xFF0233 CPC TTM Data TTM defective	1	50	50	Binary	0b0: "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: No problem 0x01: TTM loose 0x02: TTM turned 0x03: Not supported	4 states 2 bit 0 offset

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

PGN Message Name Signal Description	Length (Bits)	Start Bit	End Bit	Unit	Meaning	Resolution
0xFF0433 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
0xFF0433 CPC TTM Data Graphical Position	8	8	15	State encoded	0xFF: Not available	256 states 8 bit 0 offset
0xFF0433 CPC TTM Data TTM ID	32	32	63	count	Unique 32 bit identifier of TTM	1 count/bit 0 offset

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4.6.1 PGN 65268 "Tire Location" vs. PGN 65284 "Graphical Position"

Due to the fact, that in SPN 929 of J1939 the tire positions cannot represent distances between the tires on one axle and between the axles of a truck, 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:

	Tractor								Trailer						
E															
D															
C															
B															
A															
9															
8															
7															
6															
5															
4															
3															
2															
1															
0															
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E

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

Data on CPC CAN PGN 65268 "Tire Location" PGN 65284 "Graphical Position"	J1939 (SPN 929) as described in SAE standard
0x00	0x00
0x0E	0x01
0x40	0x10
0x42	0x11
0x4C	0x12
0x4E	0x13
0x60	0x20
0x6E	0x21
0xA0	0x30
0xAE	0x31
0xC0	0x40
0xCE	0x41
0xE0	0x50
0xEE	0x51

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