Notes on the use of this manual

This manual has been designed to assist personnel in satisfactorily installing Haldex TPMS onto trailers. The intention has been to illustrate the various areas of installation. It is expected that this manual will be in possession of the appropriate person throughout their 'training' and 'experience' and that the manual will be used as:

a) A teaching aid following supervision of a Haldex engineer.

b) A reminder of the correct procedure of Haldex TPMS installation.

› Use appropriate spare-parts documentation when obtaining spare parts.

› Use only genuine Haldex parts in repairs.

› Due to continuous development the right is reserved to alter the specification without notice.

› No legal rights can be derived from the contents of the manual.

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For any other deviation consult
Haldex Brake Products Ltd.
Moons Moat Drive
Moons Moat North
Redditch
Worcestershire
B98 9HA
Tel: +44 1527 499 499
Fax: +44 1527 499 500
E-Mail: eng.bcbu@haldex.com
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Introduction

Haldex TPMS is a tire pressure and temperature monitoring system for any commercial vehicle trailer equipped with EB+. The EB+ shall facilitate the transmission of pressure and temperature for each wheel via ISO11992 CAN to the towing vehicle and the Info Centre 2 can be used locally to display the pressure and temperature on the trailer.

The wheel unit sensor (WUS) measures the pressure and temperature inside the tire and transmits all the measurements by radio frequency (RF) to the receiver control unit (RCU). The RCU then determines the system status and sends it to the electronic braking system (EBS) on the trailer CAN bus. The EBS then transmits this information to the dashboard which can display the required information of pressure, warning, alerts and system status for the vehicle driver.

The system is configured and diagnosed through CAN communication using DIAG+. The TPMS trigger uses low frequency (LF) to communicate to the wheel unit sensor (WUS) and is used to force the WUS to send its unique identification code (ID) to the RCU.

The components involved in the Tire pressure monitoring system (TPMS) are:
The receiver control unit (RCU) - fixed on the vehicle chassis and manages the TPMS functions
The wheel unit sensor (WUS) - buckled on the inside rim of each tire to be monitored.
The electronic braking system (EBS) - manages the information from the TPMS to the tractor unit dashboard.
The trigger - used to force the WUS to transmit its identification code (ID) to the RCU.
Diagnostic and configuration tool (DIAG+) - used to configure the TPMS system on a trailer

Specifications

**Wheel unit sensor (WUS)**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rim diameter range</td>
<td>17.5'' &lt;&gt; 22.5 ''</td>
</tr>
<tr>
<td>Screwing torque of the M5 nut:</td>
<td>2.5 Nm +0/- 0.3Nm</td>
</tr>
<tr>
<td>Maximum screwing speed for the nut :</td>
<td>20 Tr/mn (RPM)</td>
</tr>
<tr>
<td>Wheel Unit balancing with particles inside the tire OR Liquid against air leakage</td>
<td>No impact onto the sensor</td>
</tr>
<tr>
<td>Inflating Used Fluid</td>
<td>Air ; Azote (Nitrogen)</td>
</tr>
</tbody>
</table>

**TPMS system**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply:</td>
<td>12-24V</td>
</tr>
<tr>
<td>Temperature range:</td>
<td>-30°C &lt;&gt; +85°C</td>
</tr>
<tr>
<td>Pressure Range :</td>
<td>0 &lt;&gt; 14 bar</td>
</tr>
<tr>
<td>Bus network:</td>
<td>CAN (J1939 compliant)</td>
</tr>
<tr>
<td>Sensitivity:</td>
<td>-100 dBm ± 3dB</td>
</tr>
<tr>
<td>RF reception:</td>
<td>434 Mhz, 10 kbits/s</td>
</tr>
<tr>
<td>Battery life:</td>
<td>8 years</td>
</tr>
</tbody>
</table>
TPMS components

Receiver control unit (RCU)

The RCU receives sensor information, determines the system status and sends it to the EBS via the trailer CAN.

Wheel unit sensor (WUS)

The TPMS wheel unit sensor (WUS) is a pressure sensor which is clamped inside the tire using a stainless steel cable. It measures the pressure and temperature inside the tire and transmits all the measurements by radio frequency (RF) to the RCU.

Cable/clamp assembly

A stainless steel cable used to attach the WUS to the tire rim. Consists of a steel clamp which is a cable stop through an M5 screw stem and a stainless steel nut M5 to be screwed onto the cable clamp screw.

Wheel unit sensor indicator label

Used to indicate the installation of a WUS inside the tire.

TPMS trigger

The trigger is used to force the WUS to transmit its identification code (ID) to the RCU.

There are two modes of operation:

› Functional Mode
  This is the operating mode of the WUS, all WUS functions are available.

› Test Mode
  The WUS is shipped in Test Mode to save the battery capacity.

Trigger button functionality

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>On</td>
<td>Puts the WUS into park mode &amp; forces the WUS to continually transmit its ID and tire information.</td>
</tr>
<tr>
<td>Force</td>
<td>Forces the WUS to transmit its ID</td>
</tr>
<tr>
<td>Off</td>
<td>Puts the WUS into test mode &amp; forces the WUS to stop transmitting its ID and tire information.</td>
</tr>
</tbody>
</table>

Note: refer to the DIAG+ V6 document for further operating instructions (see page 17)
Standard Configurations

Semi-trailer, Gen2, typical installation

Cable:

TPMS Y-splitter  814031101

Semi-trailer, Gen2, splitter installation

Cables:

TPMS Y-splitter  814031101

EB+ diagnostic Y-splitter  814038001

EB+ to DIN telematics  814033000 series
814033001 (1m)
814033011 (12m)

Diagnostic extender  814037000 series
814037001 (6.5m)
814037011 (0.5m)
814037021 (8.0m)
Mounting the wheel unit sensor

The TPMS wheel unit sensor (WUS) can be mounted on all rims compliant to national and international tire standards from 17.5 up to 22.5 diameter inches.
Tire Standards:
European tire and rim technical organisation (ETRTO)
Tire and rim association (TRA)
Japan automobile tire manufacturers association (JATMA)

For all rims which do not respect these specifications, customer must send all rims drawings for Haldex Brake Products for approval.

TPMS label

Indicate the presence of a WUS in the wheel by sticking the TPMS label onto the wheel rim next to the valve.

Example of major mounting problem

Limitation of the mounting on small width drop centre.

Flat width available in the drop centre is below 40 mm => making it impossible to mount the WUS.

Larger than 40mm => OK
Precaution before mounting the wheel unit sensor:

- Do not use the wheel unit sensor after a drop of more than 1 meter.
- Storage temperature between 0°C and 30°C.
- It is forbidden to use a power water jet or corrosive soap on the WUS and the cable.
- Before using, always perform a visual inspection of the cable, a cable with a bending radius lower than 5mm must be scrapped.
- It is MANDATORY to replace the cable if the wheel unit sensor is disassembled from the fixing cable (i.e. re-fitting of a WUS).

Mounting of the wheel unit sensor

Install the rim onto the tire machine and locate the valve to the floor @ 6 hours, put the WUS in the drop centre onto the rim @ 12 hours, on the top of the rim, WUS is @180° from the valve.

Set the cable clamp inside the WUS cage. Press the clamp vertically on to the plastic pin protruding from the black housing of the WUS. The clamp and cable is now attached to the WUS.
Make one turn around the rim with the cable; introduce the cable end into the housing hole N°1.

Make a second turn around the rim with the cable; introduce the cable end into the housing hole N°2, pass through the clamp, screw the nut M5 to lock the cable in the clamp.

With the cable stretcher, catch the cable and press an half of the stretcher stroke, at the end, ensure that the cable is in light tension close to the rim.
Apply a torque of 2.5 Nm +0/- 0.3Nm on the M5 Nut with a torque gun on the cable under tension. Always ensure that the cable is engaged in the clamp groove at the end of the screwing.

Note:
The operator must stand on the clamp side versus the operator position to the rim.

Cut the cable excess just behind the nut (no more than 10mm free cable).

Note:
The WUS mounting cable is for single use only. A new WUS mounting cable must be used if the wheel unit sensor is removed or replaced.

At the end of the WUS mounting process, break the plastic fuse pin on the WUS housing and push the WUS away from the clamp by approx 30 cm to reduce the risk of cable damage to the sensor.
Mounting the tire

Tire mounting precautions

Before any mounting operation of the tire, make sure that the wheel unit has been correctly mounted and tightened to the rim. If the WUS is moving more than 10mm in the drop centre under transversal stress about 6Kg, it is mandatory to change the cable.

No lubrication product or any other matter may partially or completely cover the pressure measuring hole of the wheel unit sensor. Always avoid direct lubrication onto the WUS.

Only light sliding constraints are acceptable. The tire must not stress the WUS during the mounting process.

Mounting of the tire

During this phase, avoid any constraint of the sensor by the tire.

Introduce the first side of the tire on the rim avoiding stress on the WUS, the first tire wall jumps into the rim after a wheel rotation about 90°. Be sure that the first side wall of the tire has passed over the WUS before starting to introduce the second side wall of the tire.

The second tire wall is assembled avoiding any contact between the tool and the WUS.
Removing the tire from the rim

Detaching the tire

Detachment with tools of the 2 sidewalls of the tire must be done in the zone diametrically opposite to the WUS.

Subsequently, no action of the pneumatic detachment tools is allowed in a zone of 45° on each side of the WUS and on both side walls of the tire.

Disassembling the tire

We recommend to the operator to use the rotational tool to push out the rim the tire in a single operation. With this process, the operator has to look for the Sensor in the drop centre of the rim when the first side wall is pushed enough. The major parameter of this process is the transversal speed of the rotational tool.

When the second side wall is pushed enough to give to the operator a visual access to the sensor, the transversal speed of the rotational tool must be equal to zero, and the tire and rim are still in rotation. As soon as the operator detects the WUS, he must launch the final dismounting of both side walls, using the rotation tool.
Removing the wheel unit sensor

Wheel unit sensor dismounting

Cut the cable with pliers.

Note:
The WUS mounting cable is for single use only. A new WUS mounting cable must be used if the wheel unit sensor is removed or replaced.

Twin wheels mounting

Important:
It is recommended to mount the twins wheels with an angle shift about 180°. Therefore on this couple of wheels, wheel units are set as far as possible from each other (this position offers an optimized radio frequency performance).

Super single rims

Mounting a wheel unit sensor to a super-single rim.

In the case of radial valve hole (ex: Super single rim), the cable must be located in the drop centre. Never set the cable onto the valve air flow channel.
Mounting the receiver control unit (RCU)

TPMS Receiver control unit

Top view

Bottom view
Mounting Interface

The RCU should be mounted on a plain flat surface on the vehicle frame.
The RCU has 3 mounting points equipped with silent blocks.
The RCU must be fixed on a metallic support.

Mounting Recommendations

Screws must be tightened @ 4.5 Nm +/-0.5 Nm. Speed nuts are allowed.
It’s mandatory to use a washer between the screw head and silent block with spacer.
Cable must be fastened close to the RCU starting point, without visible cable stretch or deflection of the connector.
RCU Assembly

Location recommendations

The RCU must be fixed horizontally and upside down (RCU antenna side facing the ground).

The RCU must be free from any metallic shield in the direction of the antenna side or between the antenna and each wheel position.

There must be a free space area of 5cm around the perimeter of the RCU.

The RCU must be mounted at a central point between the sensed wheels.

Standard semi-trailer RCU location
Configuring the TPMS

The TPMS is configured using DIAG+ V6 software. The software and operators guide can be downloaded from the Findex section of the Haldex website.

To download the software follow:

1. Click on http://findex.diatem.net/dynamic/findex/
2. Click on DIAG+
3. Click on Multi-language version
4. Follow installation procedure

DIAG+ V6 document reference   006300019

Monitoring the TPMS

Once installed and configured the TPMS status can also be monitored using an Info Centre 2. The Info Centre 2 operator guide can be downloaded from the Findex section of the Haldex website.

To download the Info Centre 2 operators guide follow:

1. Click on http://findex.diatem.net/dynamic/findex/
2. Click on Documentation
3. Enter ‘info Centre 2’ into the keyword box
4. Press the search button

Info Centre 2 document reference 006300001
Innovative Vehicle Solutions www.haldex.com

Haldex develops and provides reliable and innovative solutions with focus on brake and air suspension products to the global commercial vehicle industry.

Listed on the Stockholm Stock Exchange, Haldex has annual sales of approximately 4 billion SEK and employs about 2,350 people.

Austria
Haldex Wien Ges.m.b.H.
Vienna
Tel.: +43 1 8 69 27 97
Fax: +43 1 8 69 27 97 27
E-Mail: info.at@haldex.com

Belgium
Haldex N.V.
Balegem
Tel.: +32 9 363 90 00
Fax: +32 9 363 90 09
E-Mail: info.be@haldex.com

Brazil
Haldex do Brasil Ind. E Com. Ltda
São Paulo
Tel.: +55 11 213 55 000
Fax: +55 11 503 49 515
E-Mail: info.br@haldex.com

Canada
Haldex Ltd
Cambridge, Ontario
Tel.: +1 519 621 6722
Fax: +1 519 621 3924
E-Mail: info.ca@haldex.com

China
Haldex Vehicle Products Co. Ltd.
Suzhou
Tel.: +86 512 8885 5301
Fax: +86 512 8765 6066
E-Mail: info.cn@haldex.com

France
Haldex Europe SAS
Weyersheim
Tel.: +33 3 88 68 22 00
Fax: +33 3 88 68 22 09
E-Mail: info.eur@haldex.com

Germany
Haldex Brake Products GmbH
Heidelberg
Tel.: +49 6 221 7030
Fax: +49 6 221 703400
E-Mail: info.de@haldex.com

Hungary
Haldex Hungary Kft
Szentlőrinckáta
Tel.: +36 29 631 300
Fax: +36 29 631 301
E-Mail: info.hu.eu@haldex.com

India
Haldex India Limited
Nashik
Tel.: +91 253 6699501
Fax: +91 253 2380729
E-Mail: info.in@haldex.com

Italy
Haldex Italia Srl.
Biassono
Tel.: +39 039 47 17 02
Fax: +39 039 27 54 309
E-Mail: info.it@haldex.com

Korea
Haldex Korea Ltd.
Seoul
Tel.: +82 2 2636 7545
Fax: +82 2 2636 7548
E-Mail: info.hkr@haldex.com

Mexico
Haldex de Mexico S.A. De C.V.
Monterrey
Tel.: +52 81 8156 9500
Fax: +52 81 8313 7090

Poland
Haldex Sp. z.o.o.
Praszka
Tel.: +48 34 350 11 00
Fax: +48 34 350 11 11
E-Mail: info.pl@haldex.com

Russia
OOO “Haldex RUS”
Moscow
Tel.: +7 495 747 59 56
Fax: +7 495 786 39 70
E-Mail: info.ru@haldex.com

Spain
Haldex España S.A.
Granollers
Tel.: +34 93 84 07 239
Fax: +34 93 84 91 218
E-Mail: info.es@haldex.com

Sweden
Haldex Brake Products AB
Landskrona
Tel.: +46 418 47 60 00
Fax: +46 418 47 60 01
E-Mail: info.se@haldex.com

United Kingdom
Haldex Ltd.
Newton Aycliffe
Tel.: +44 1325 310 110
Fax: +44 1325 311 834
E-Mail: info.gbay@haldex.com

Haldex Brake Products Ltd.
Redditch
Tel.: +44 1527 499 499
Fax: +44 1527 499 500
E-Mail: info.gbre@haldex.com

USA
Haldex Brake Products Corp.
Kansas City
Tel.: +1 816 891 2470
Fax: +1 816 891 9447
E-Mail: info.us@haldex.com

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