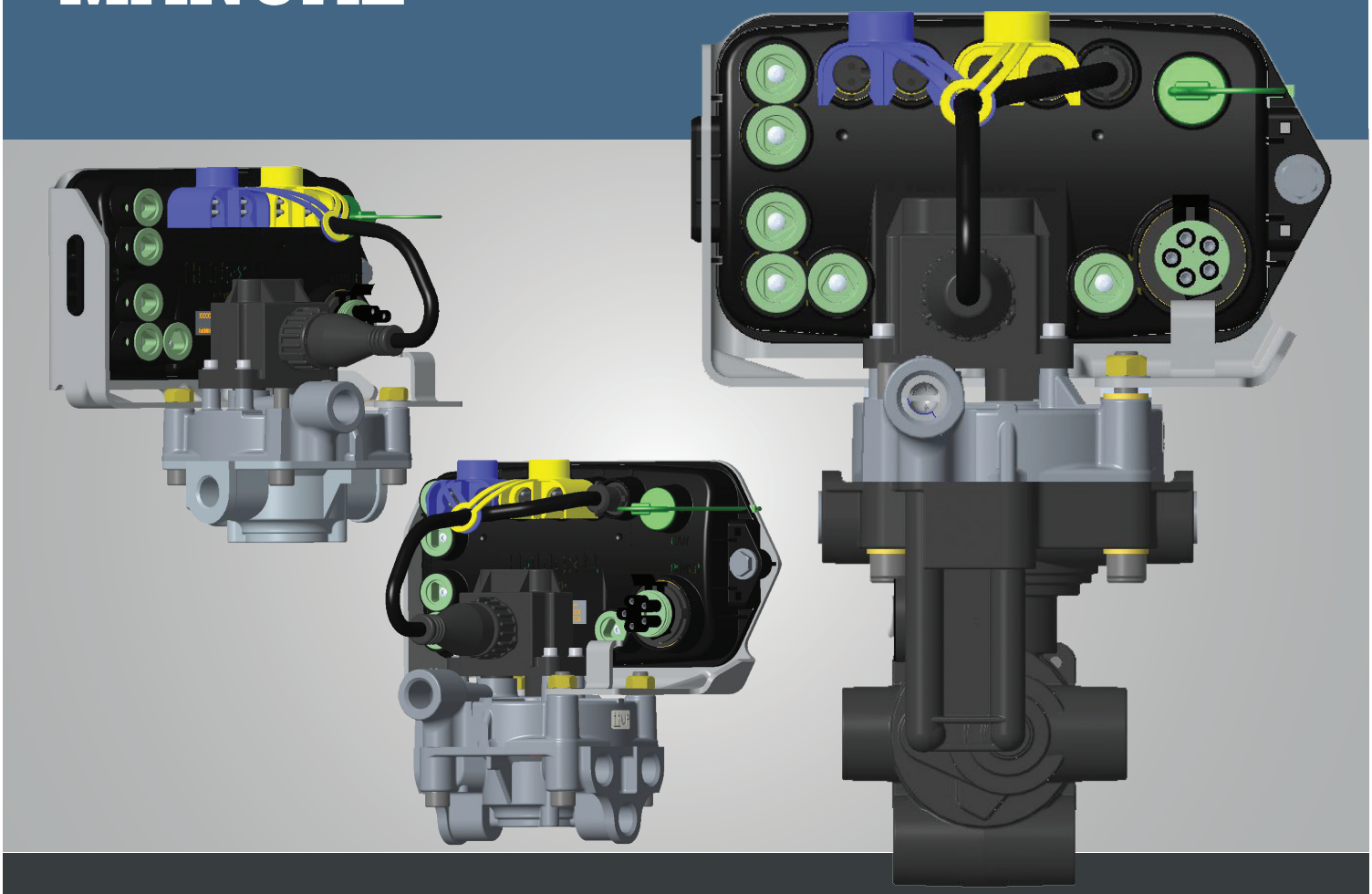
INSTALLATION/SERVICE MANUAL



ITCM™ Intelligent Trailer Control Module (L31286)

Haldex

Important Notice

The products described within this literature, including without limitation, product features, specifications, designs, availability and pricing are subject to change by Haldex and its subsidiaries at any time without notice. This document and other information from Haldex, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of your application and review the information concerning the product or system, in the current literature or catalog. Due to the variety of operating conditions and applications for these products or systems, the user, through their own analysis and testing, is solely responsible for making the final selection of the products and systems and assuring that all performance, safety and warning requirements are met.

Table of Contents

Available for Download at haldex.com

L20243 - ABS Service Components Catalog
L31154W - PC Diagnostic Instruction Manual (web only)
L31158W - PLC Info Center Instruction Manual (web only)
L31287W - DIAG+ PC Diagnostic Instruction Manual (web only)
L31292W - Info Center 2 Instruction Manual (web only)

Important Notices

Safety First

This manual describes the correct installation process for the Haldex ITCM ABS 1M, 2M and 3M for trailers/dollies. The ITCM ABS may be used with either drum or disc brakes. Care must be taken during each phase of the installation in order to ensure the system is installed and working properly.

Please follow your company's safety procedures at all times when installing this equipment. Be sure that you understand all instructions before you begin.

Remove all air pressure and electrical power from the brake system before beginning work.

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This document and other information from Haldex, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of your application and review the information concerning the product or system, in the current literature or catalog. Due to the variety of operating conditions and applications for these products or systems, the user, through their own analysis and testing, is solely responsible for making the final selection of the products and system and assuring that all performance, safety and warning requirements are met.

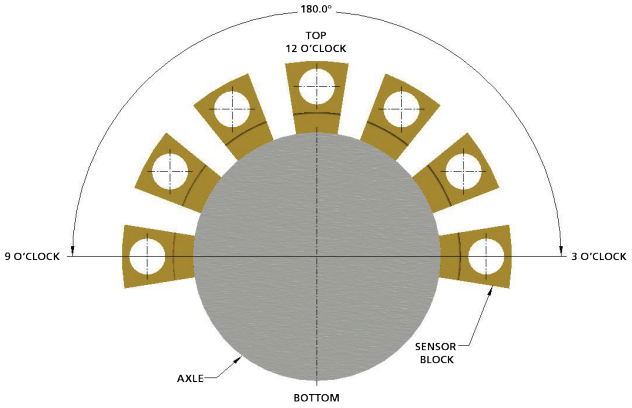
Questions?

If you have any questions on this product or any of the innovative products offered by Haldex, contact your local distributor for complete details. Technical Service or Troubleshooting help can be obtained by calling Haldex Technical Services Department at 800-643-2374, Press 2.

Wheel End Speed Sensor Installation

Sensor Block Allowable Placement

The radial clocking position should be between 9 and 3 o'clock. While the ABS performance is not affected with sensor location in the lower half of the axle, the structural integrity of the axle could be compromised. The sensor block placement should not interfere with any wheel end hardware.

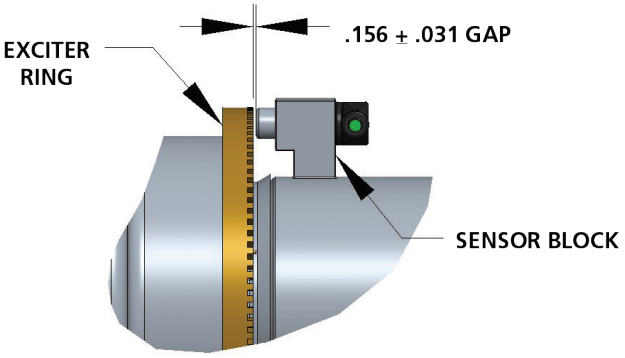


Speed Sensor Allowable Clearance

The clearance between the speed sensor and the exciter ring should be 0.156 ± .031". Any deviation will result in a reduction of the wheel speed sensor signal output.

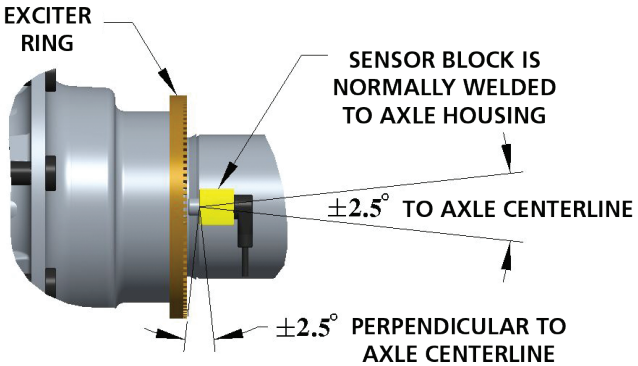
Check retention of the sensor within the sensor block - make sure the fit is tight.

Note: Sensor block type and exciter ring depth may vary between manufacturers.

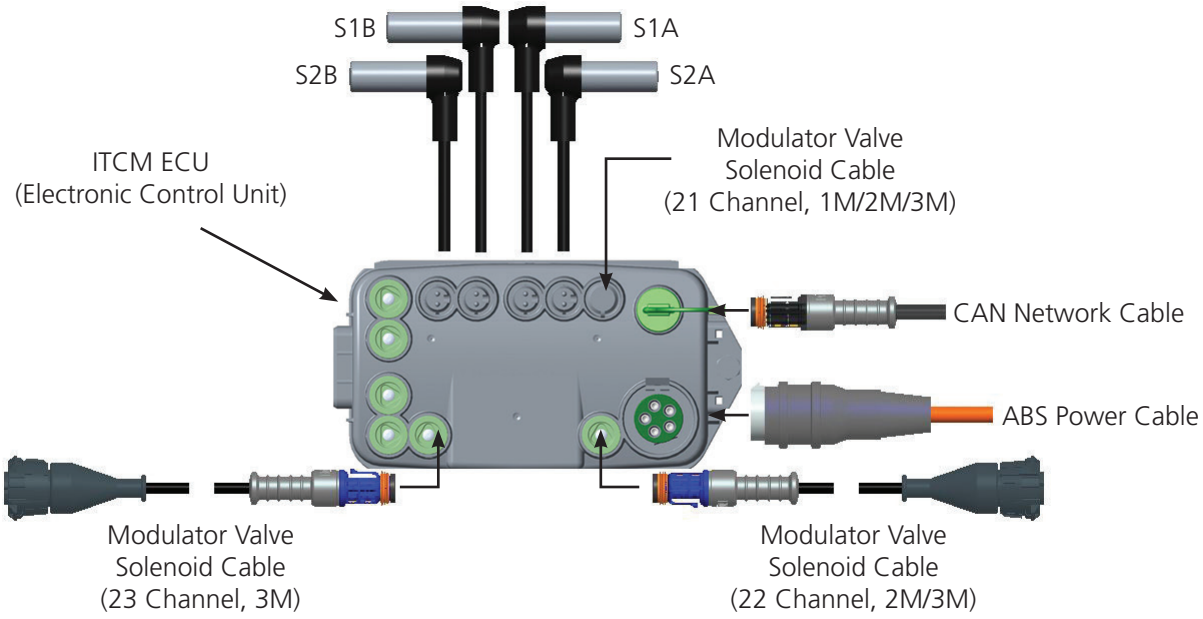


General Positioning

The position of the wheel speed sensor center axis to the exciter ring surface should be a close as possible to a 90° angle in both directions. Any deviation will result in a reduction of the wheel speed sensor signal output. The sensor block is generally welded to the axle. Refer to axle manufacturer's manual to ensure that welding won't affect structural integrity of the axle.

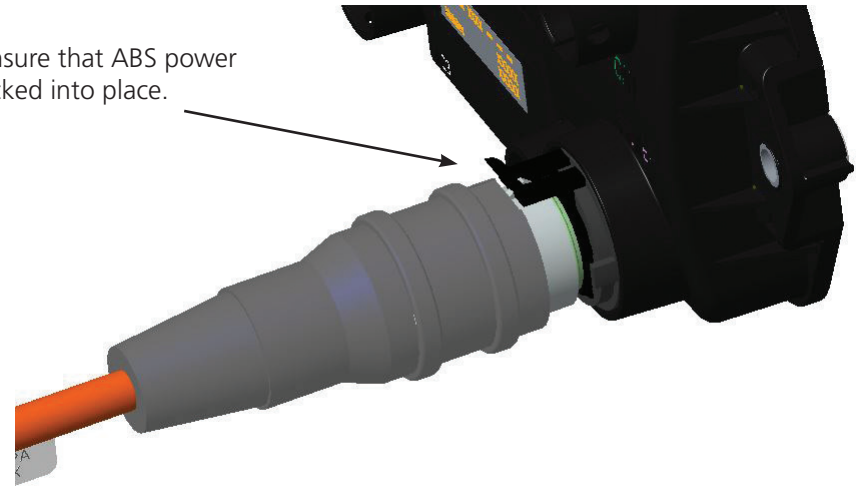


ITCM ECU Power, 2M/3M Valve and Wheel End Speed Sensor Connections



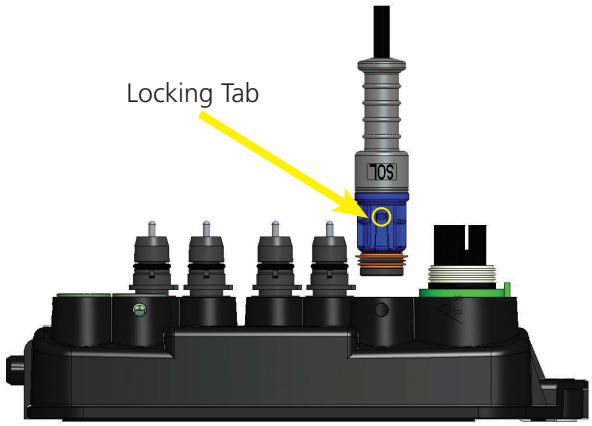
Note: If 2S/1M is desired, use Sensors (S1A and S1B). Use blanking plugs in un-used Sensor Connections.

Note: When installing and servicing always apply small amount of dielectric grease to all electrical connections.

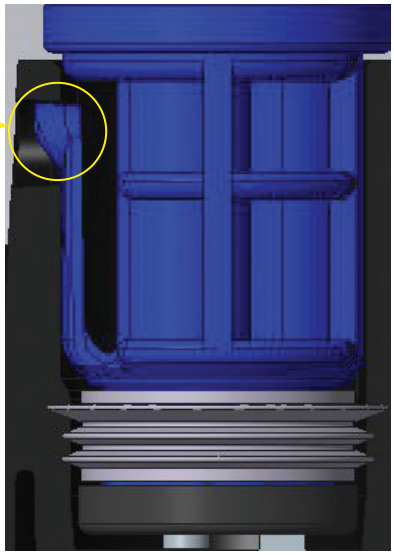


ITCM ECU Power, 2M/3M Valve and Wheel End Speed Sensor Connections (Cont'd)

Note: When installing and servicing always apply small amount of dielectric grease to all electrical connections.



Modulator Valve Solenoid Cut-Away Section Showing Tab In Locked Position



Verify connection Locking Tab (shown above) is facing downward and secure. If the Modulator Valve Solenoid Cable can be removed without releasing the Locking Tab, verify connection orientation.

Correct location of the wheel speed sensors at wheel ends is critical for proper ABS operation and troubleshooting. The ITCM will adjust the brake pressure in response to the input from the speed sensors. Incorrect installation or location of speed sensors, sensor block clips and exciter ring will result in poor ABS performance or sensors crossed leading to incorrect diagnostic troubleshooting. See Page 3 for the correct power and speed sensor connections on the ITCM ECU. See Haldex Trailer ABS Service Components Catalog "L20243" for sensor extensions, if needed.

2S/1M Configuration
Single or Multi-Axle Trailers

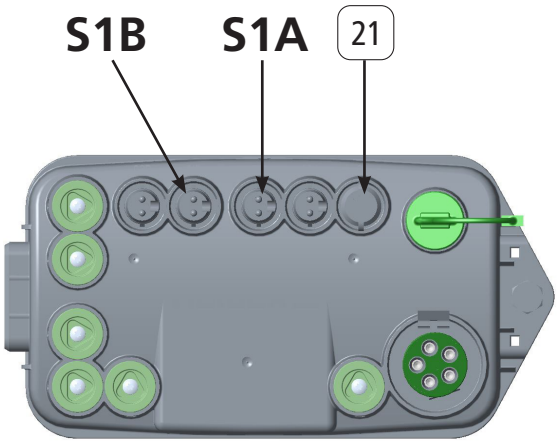
Recommended speed sensor wheel locations are shown in the figures below.

Sensor (S1A) should be installed on Road Side.
Sensor (S1B) should be installed on Curb Side.

Make sure sensors are pushed firmly against the exciter ring.

Note: For dollies and single axle trailers, Haldex recommends "A8 ECU Configuration".

Note: Any non-sensed axle can be utilized as a lift axle.



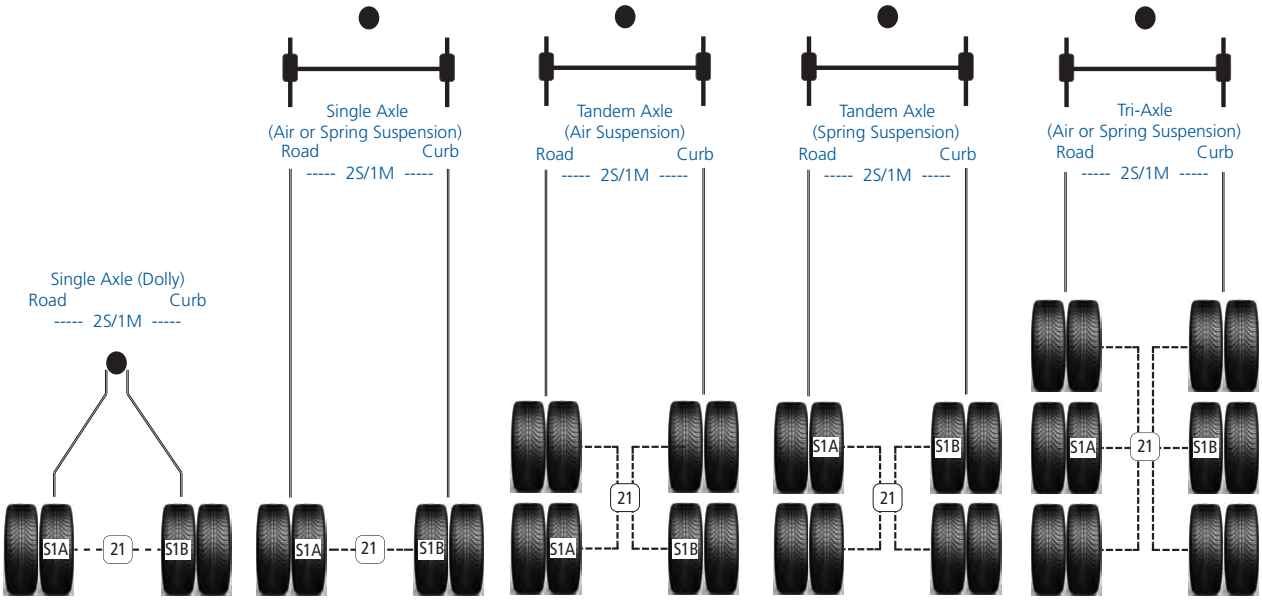
ITCM

Legend

Air Hose Line: - - - - - - - - -

Modulator Valve: 21

Speed Sensors: S1A, S1B



2S/2M Side-By-Side Configuration Multi-Axle Trailers

Recommended speed sensor wheel locations are shown in the figures below.

Sensor (S2A) should be installed on Road Side.

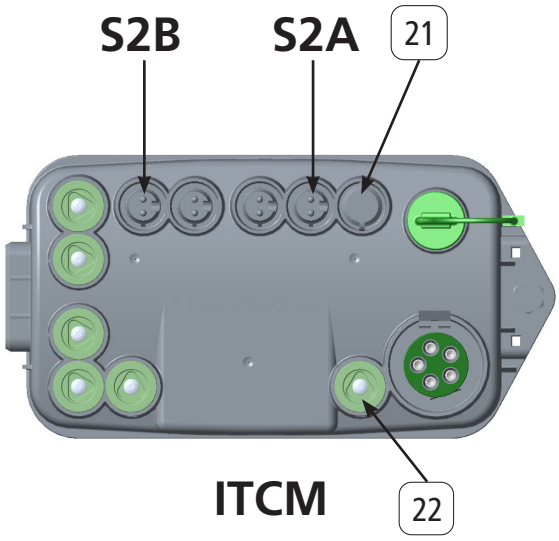
Sensor (S2B) should be installed on Curb Side.

Modulator Valve 21 is plumbed to Road Side.

Modulator Valve 22 is plumbed to Curb Side.

Make sure sensors are pushed firmly against the exciter ring.

Note: Any non-sensed axle can be utilized as a lift axle.

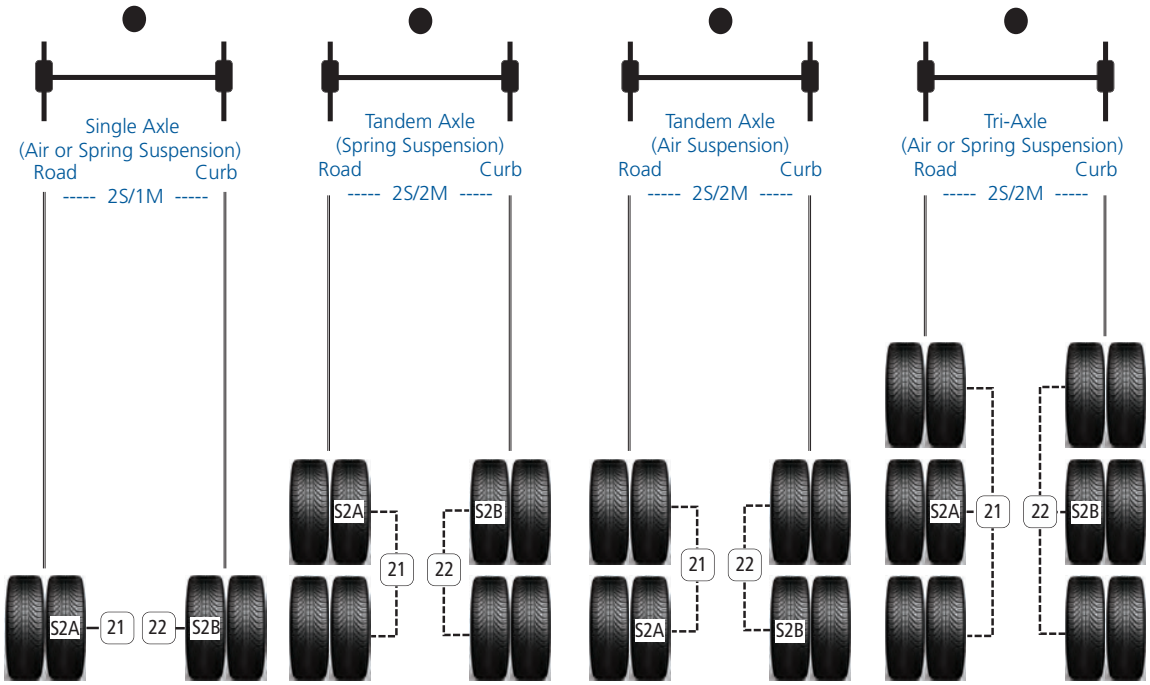


Legend

Air Hose Line: - - - - - - - - -

Modulator Valves: 21 , 22

Speed Sensors: S2A, S2B



4S/2M Side-By-Side Configuration Multi-Axle Trailers

Recommended speed sensor wheel locations are shown in the figures below.

Sensor (S1A, S2A) should be installed on Road Side.
Sensor (S1B, S2B) should be installed on Curb Side.
Modulator Valve 21 is plumbed to Road Side.
Modulator Valve 22 is plumbed to Curb Side.

Make sure sensors are pushed firmly against the exciter ring.

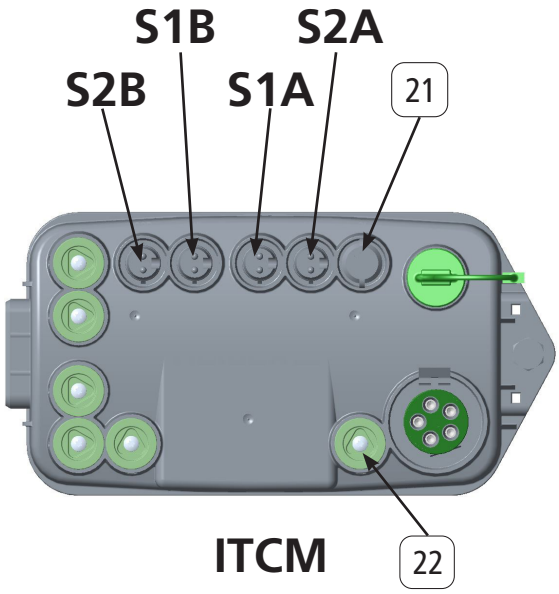
Note: Without lift axles.

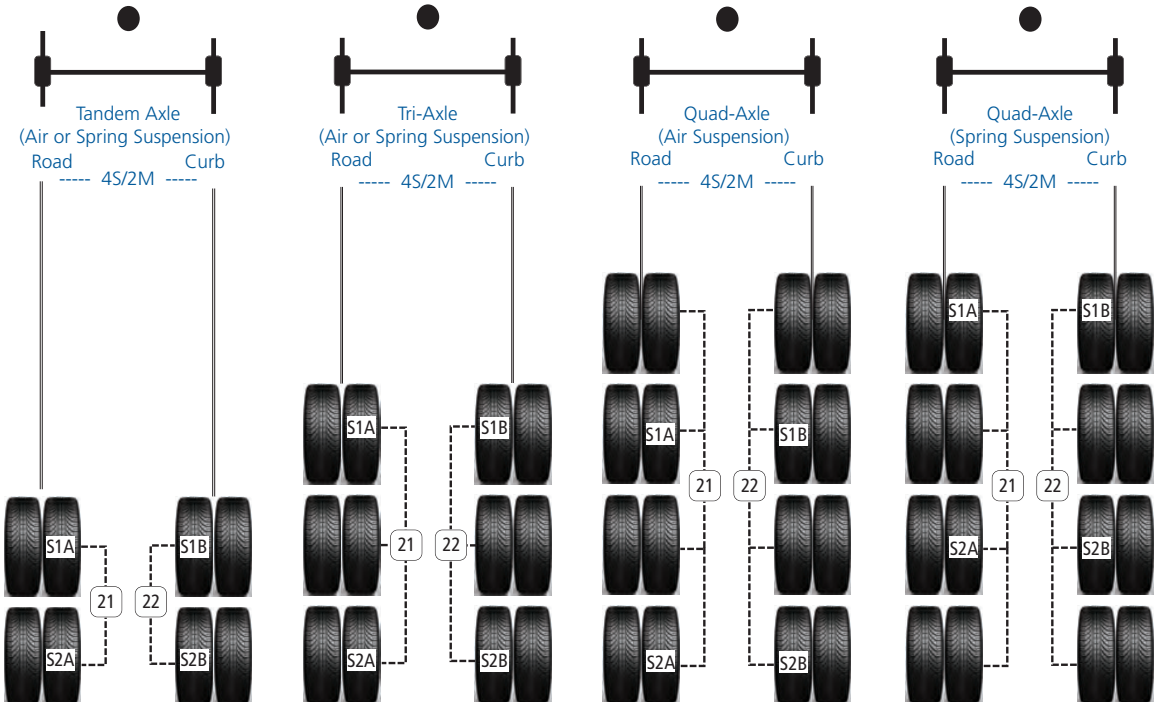
Legend

Air Hose Line: - - - - - - - - -

Modulator Valves: 21 , 22

Speed Sensors: S1A, S2A, S1B, S2B





4S/2M Side-By-Side Configuration Multi-Axle Trailers with Lift Axle(s)

Recommended speed sensor wheel locations are shown in the figures below.

Sensor (S1A, S2A) should be installed on Road Side.

Sensor (S1B, S2B) should be installed on Curb Side.

Modulator Valve 21 is plumbed to Road Side.

Modulator Valve 22 is plumbed to Curb Side.

Make sure sensors are pushed firmly against the exciter ring.

Any non-sensed axle can be lifted. One sensed axle can be used as a lift axle, but not both.

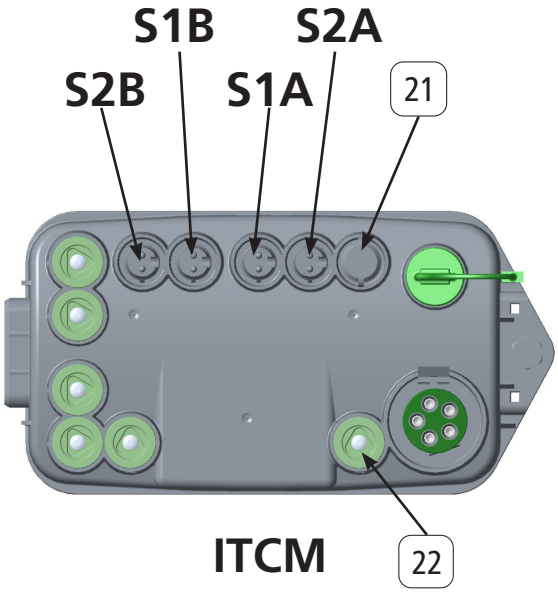
Note: At least one axle with speed sensors has to be a non-lifting axle.

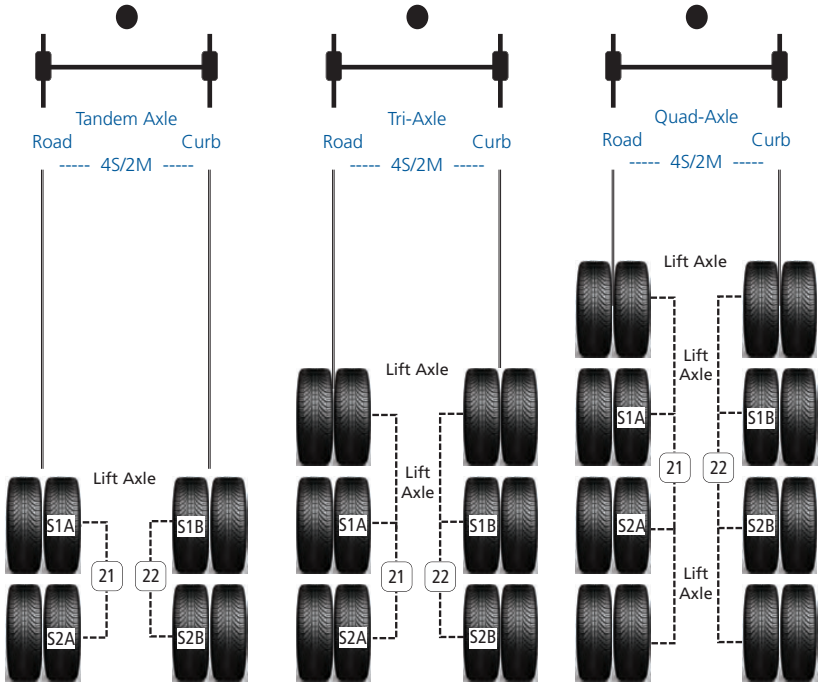
Legend

Air Hose Line: - - - - - - - - -

Modulator Valves: 21 , 22

Speed Sensors: S1A, S2A, S1B, S2B





4S/2M Axle-By-Axle Configuration Multi-Axle Trailers

This is a recommended configuration for spread axle applications.

Recommended speed sensor wheel locations are shown in the figures below.

Sensor (S1A, S1B) should be installed on Road Side.

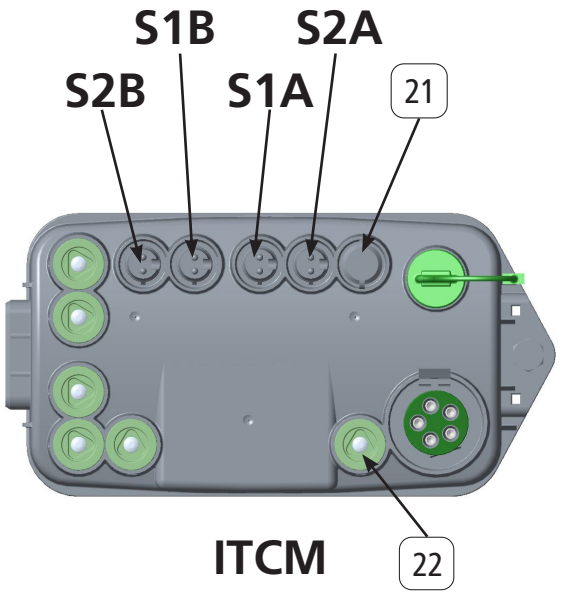
Sensor (S2A, S2B) should be installed on Curb Side.

Modulator Valve 21 is plumbed to the trailing axle(s).

Modulator Valve 22 is plumbed closest to the King Pin.

Make sure sensors are pushed firmly against the exciter ring.

Note: The A Sensors must go with the 21 Modulator Valve and the B Sensors must go with the 22 Modulator Valve.

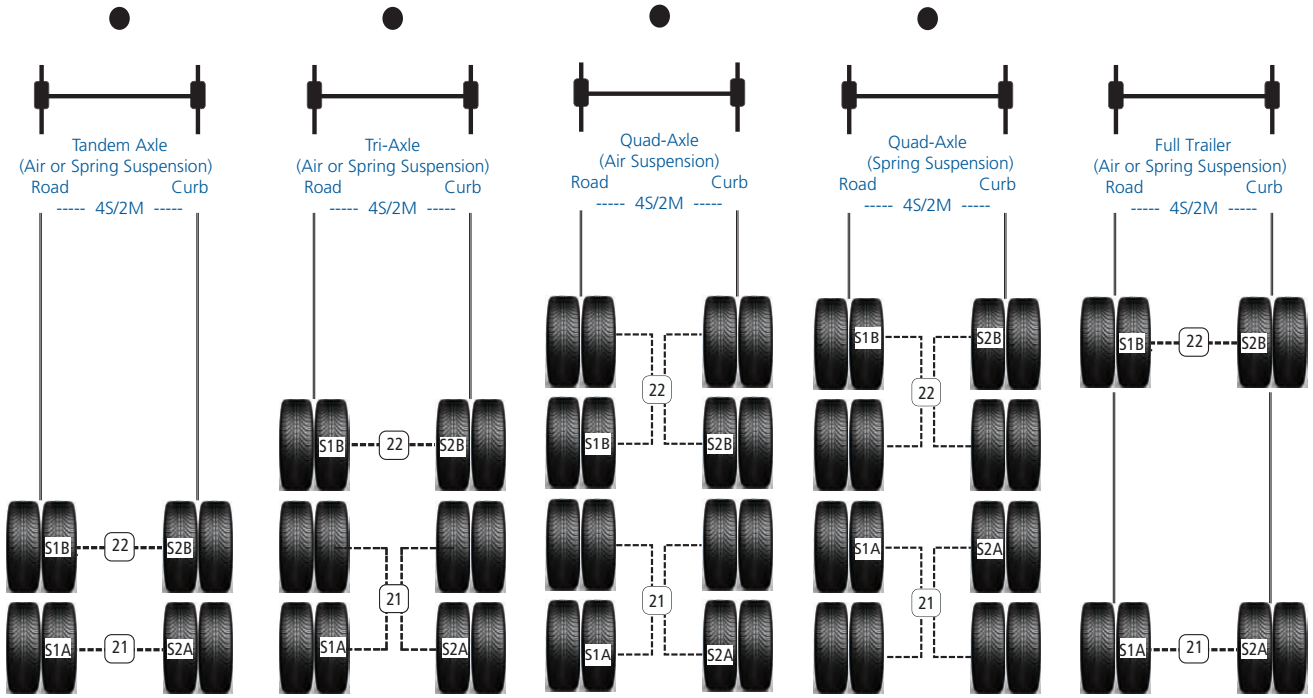


Legend

Air Hose Line: - - - - - - - - -

Modulator Valves: 21 , 22

Speed Sensors: S1A, S2A, S1B, S2B



4S/2M Axle-By-Axle Configuration Multi-Axle Trailers with Lift Axle(s)

This is a recommended configuration for spread axle applications.

Recommended speed sensor wheel locations are shown in the figures below.

Sensor (S1A, S1B) should be installed on Road Side.
Sensor (S2A, S2B) should be installed on Curb Side.
Modulator Valve 21 is plumbed to the trailing axle(s).
Modulator Valve 22 is plumbed on axles closest to the King Pin.

Make sure sensors are pushed firmly against the exciter ring.

Any non-sensed axle can be lifted. For a sensed axle lift S1B and S2B must be used.

Note: The A Sensors must go with the 21 Modulator Valve and the B Sensors must go with the 22 Modulator Valve.

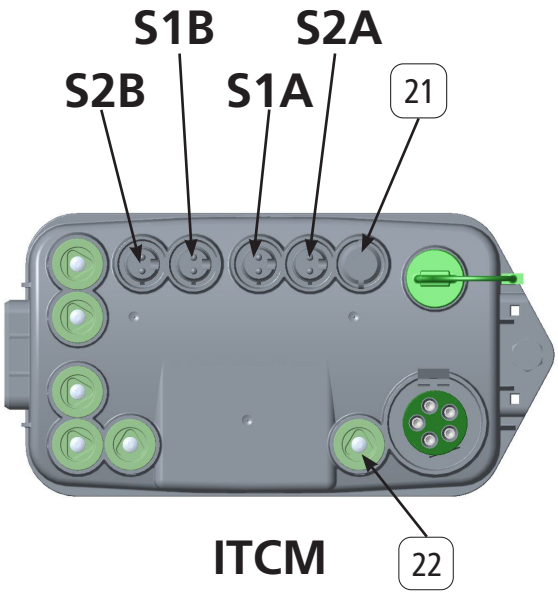
Note: At least one axle with speed sensors has to be on a non-lift axle.

Legend

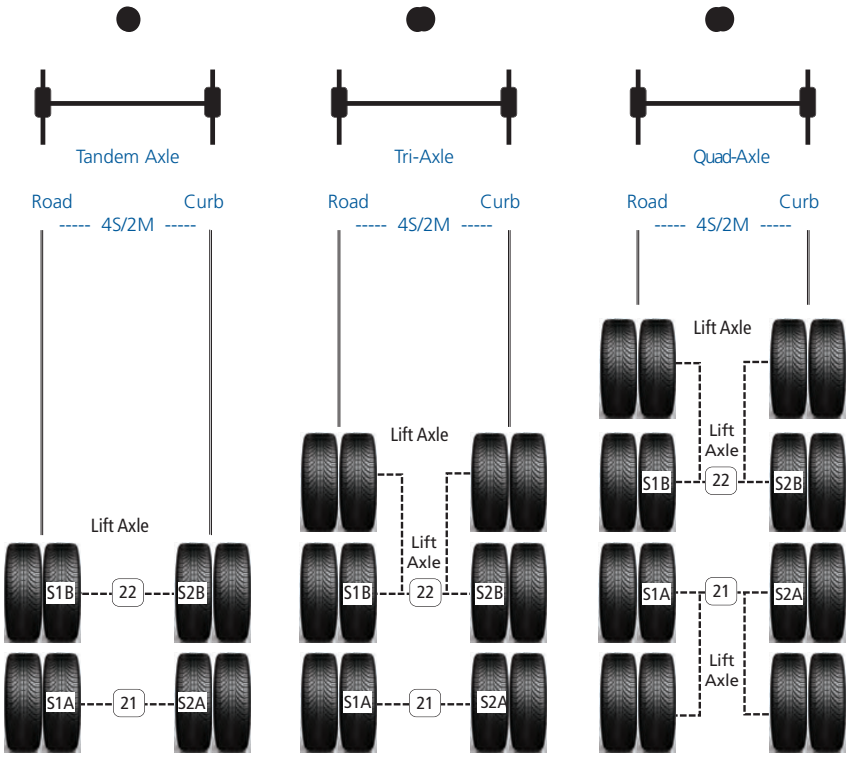
Air Hose Line: - - - - - - - -

Modulator Valves: 21 , 22

Speed Sensors: S1A, S2A, S1B, S2B



Lift Axle Control - Axle-By-Axle Configuration



4S/3M Configuration Full and Semi-Trailers

Recommended speed sensor wheel locations are shown in the figures below.

Sensor (S1A, S2A) should be installed on Road Side.

Sensor (S1B, S2B) should be installed on Curb Side.

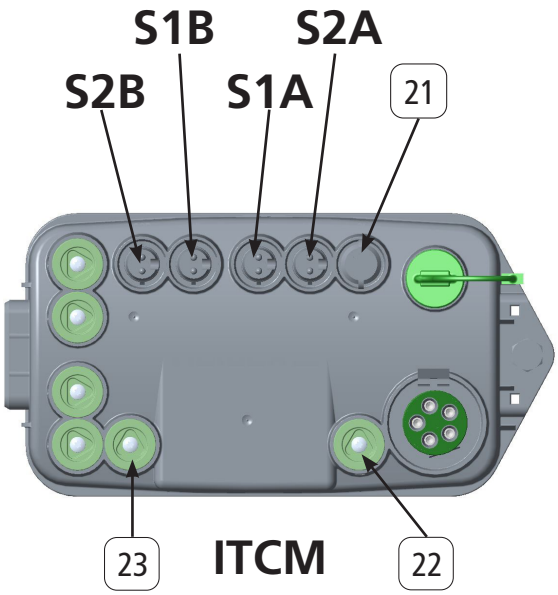
Make sure sensors are pushed firmly against the exciter ring.

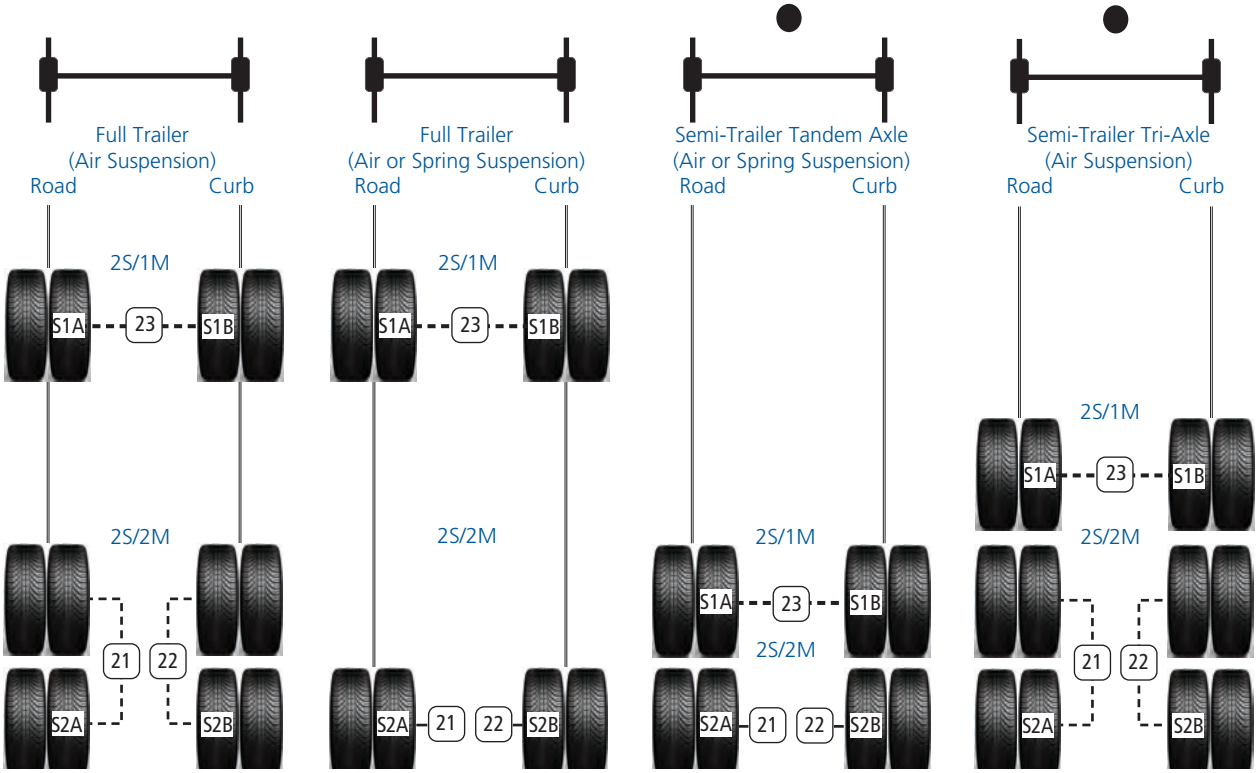
Legend

Air Hose Line: - - - - - - - - -

Modulator Valves: 21 , 22 , 23

Speed Sensors: S1A, S2A, S1B, S2B

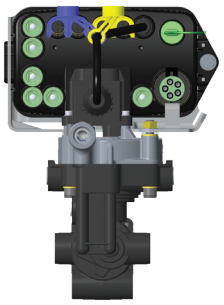




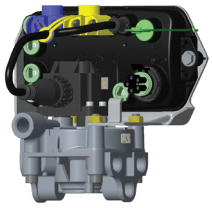
ITCM 1M System Components

"See Haldex Trailer ABS Service Components Catalog (L20243) for additional information on Haldex ABS Brake Products"

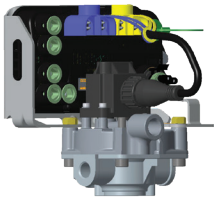
Required Items



FFABS Valve (2-port or 4-port)



ABS Relay Valve (6-port)



ABS Relay Valve (2-port)

ITCM 1M Valves

Sensor Block Clip

ABS Light

90° Sensor Cable

Trailer Brake Control Valve (TBCV) shown or (RT4 Valve)

Haldex PLC Diagnostic Tools

PLC PC Diagnostics Kit

(PC Not Included)

Software

7-Way Adapter Cable

TDA PLC Adapter

Info Center

Used With

7-Way Diagnostic Interface Cable

Haldex CAN Diagnostic Tools

DIAG+ PC Diagnostics Kit

(PC Not Included)

Software

Diagnostic Interface Cables - PC to ITCM

Info Center 2

Additional Recommended Installation Aids

Tie Straps

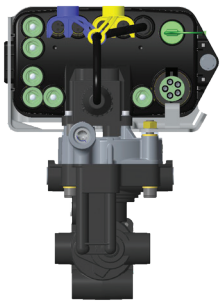
Sensor Cable Connection Clip

Sensor Cable To Hose Clip

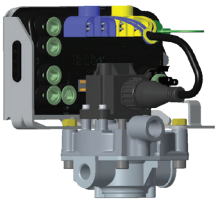
ITCM 2M/3M System Components

"See Haldex Trailer ABS Service Components Catalog (L20243) for additional information on Haldex ABS Brake Products"

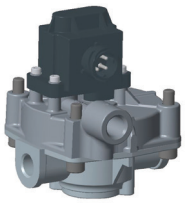
Required Items (Exact Components and Quantity Vary By Configuration. Refer to Pages 5-11.)



FFABS Valve (2-port or 4-port)



ABS Relay Valve (2-port)



ABS Relay Valve (2-port)

ITCM 2M/3M Valves

Sensor Block Clip

90° Sensor Cable

Trailer Brake Control Valve (TBCV) shown or (RT4 Valve)

ABS Light

Remote Valve Cable

Haldex PLC Diagnostic Tools

PLC PC Diagnostics Kit

(PC Not Included)

Software

7-Way Adapter Cable

TDA PLC Adapter

Info Center

Used With

7-Way Diagnostic Interface Cable

Haldex CAN Diagnostic Tools

DIAG+ PC Diagnostics Kit

(PC Not Included)

Software

Diagnostic Interface Cables - PC to ITCM

Info Center 2

Additional Recommended Installation Aids

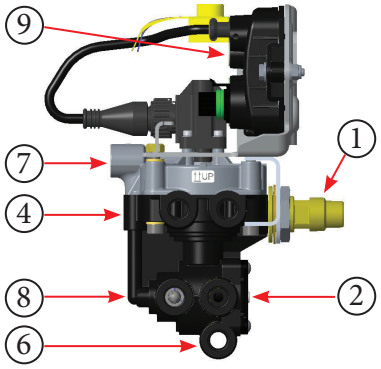
Tie Straps

Sensor Cable Connection Clip

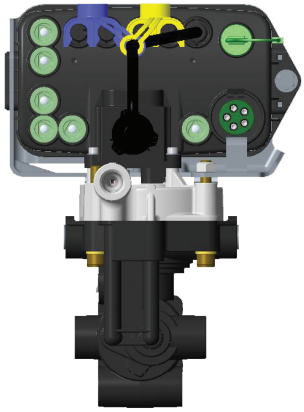
Sensor Cable To Hose Clip

ITCM FFABS Valve Overview

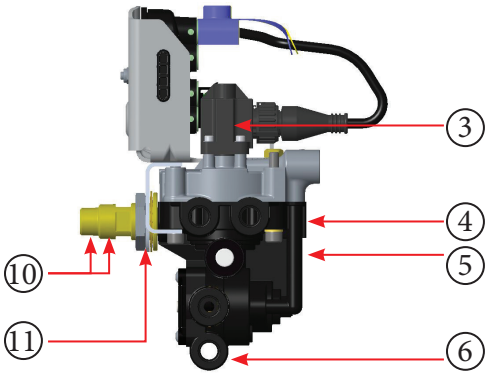
Right Side View



Front View



Left Side View



Legend:

1. Reservoir Port 1/2" and 3/4" NPT
2. Spring Brake Exhaust Port
3. Solenoid
4. Service Brake Delivery Port (4)
5. Service Brake Exhaust Port
6. Spring Brake Delivery Port (4)
7. Service/Control Port
8. Emergency/Supply Port
9. ECU (Electronic Control Unit)
10. Tighten Nipple
    Torque 1/2" NPT to 55-70 ft-lb
    Torque 3/4" NPT to 90-115 ft-lb
11. Tighten Jam Nut
    Torque to 75-80 ft-lb

To avoid loosening the nipple in the reservoir tank, orient the FFABS valve as indicated above (Left Side View) and hold the installed nipple while tightening jam nut torque to 75-80 ft-lb.

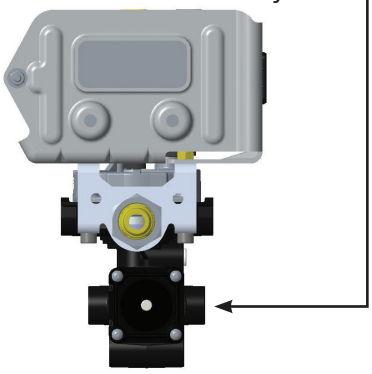
Notes:

1. A 4-Port FFABS Valve is commonly used for Multiple Axle Trailers.
2. For Single Axle Trailers use a 2-Port FFABS Valve.
3. All ports are 3/8" NPT Service and Delivery.
4. Reservoir ports are 1/2" and 3/4"NPT.
5. Service/Control Port (7) and Emergency/Supply Port (8) have a serviceable "Filter Screen" installed.
6. Attach hoses to appropriate brake chambers.
7. **Do Not** bottom out fittings as it will damage the FFABS Valve.

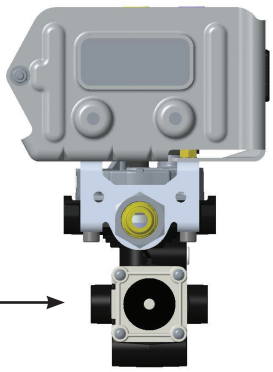
Use liquid thread sealant sparingly on all fittings. (Loctite PST565 or Equivalent)

Do Not use teflon tape on fittings.

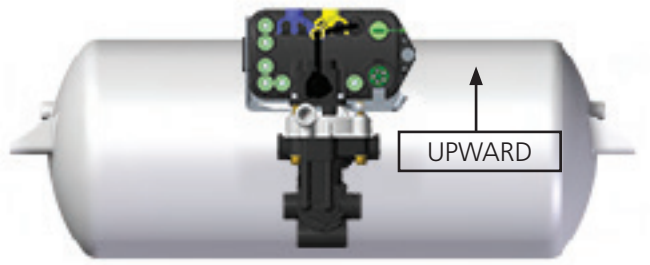
Black Exhaust Cover Indicates "Service Brake Priority"



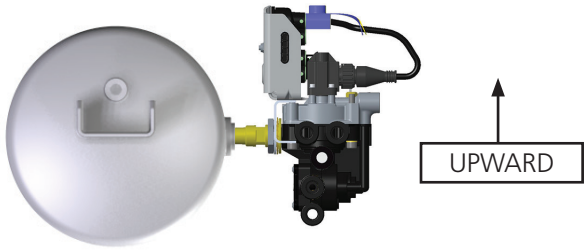
White Exhaust Cover Indicates "Spring Brake Priority"



ITCM FFABS Valve
Typical Tank Mounting Overview



ITCM FFABS Valve must face upward.



Left Side View

1. Attach hoses to appropriate brake chambers. **Do Not Use** teflon tape on fittings. Use liquid thread sealant sparingly on all fittings. (Loctite PST565 or Equivalent)
2. Install valve nipple into reservoir port. Use 7/8" wrench to tighten the nipple.
3. Using a 1-1/2" wrench tighten the jam nut to 30 ft. lb., while holding the nipple with a 7/8" wrench. See detail below (11).
4. For plastic ports, hand tighten fittings then rotate 1 to 1-1/2 additional turns. The maximum torque allowed is 210 in. lb.

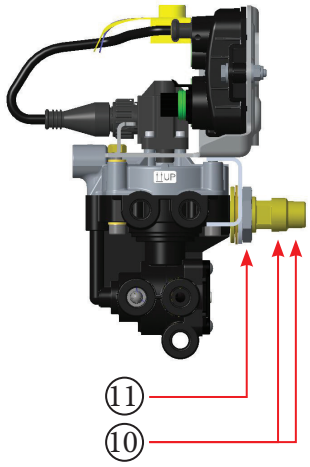
Note: If frame mounted, follow the same procedure for Valve Orientation. Valve Solenoid on a 2-Port ABS Relay Valve, 6-Port ABS Relay Valve, or FFABS Valve must be facing upward when the trailer is in normal operation or service ABS performance could be affected.

WARNING: Proper installation Valve Orientation shown above; otherwise, warranty is VOID. Installation behind the tank is recommended, facing the back of trailer.

Legend:

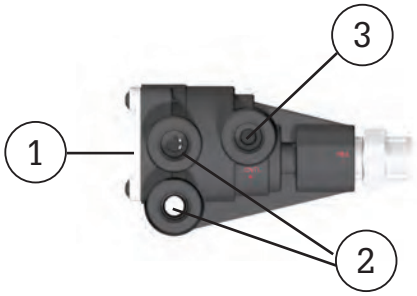
10. Tighten Nipple
    Torque 1/2" NPT to 55-70 ft-lb
    Torque 3/4" NPT to 90-115 ft-lb
11. Tighten Jam Nut
    Torque to 75-80 ft-lb

To avoid loosening the nipple in the reservoir tank, orient the FFABS valve as shown and hold the installed nipple while tightening jam nut torque to 75-80 ft-lb.



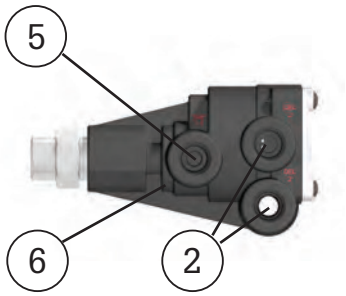
ITCM Trailer Brake Control Valve (TBCV) Overview (To be used with Standard Relay ABS).

Left Side View



Front View

Right Side View



Legend:

1. Exhaust Port
2. Spring Brake Delivery Port (4)
3. Service/Control Port
4. Reservoir Port 1/2" NPT
5. Emergency/Supply Port 3/8" NPT
6. Vent Hole

Notes:

1. Requires heavy wall steel reservoir nipple.
2. All ports are 3/8" NPT except for Reservoir Port.
3. **Do Not Use** Teflon Tape on fittings.
4. Trailer Brake Control Valve (TBCV) must face upward as shown below.
5. Service/Control Port (3) and Emergency/Supply Port (5) have a serviceable "Filter Screen" installed.
6. Attach hoses to appropriate brake chambers.
7. **Do Not** bottom out fittings as it will damage the Trailer Brake Control Valve (TBCV).

Use liquid thread sealant sparingly on all fittings. (Loctite PST565 or Equivalent)

Do Not use teflon tape on fittings.

Trailer Brake Control Valve (TBCV) must face upward.

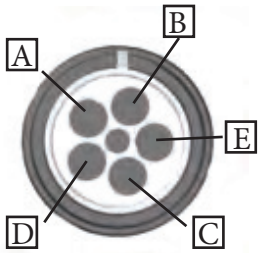
Right Side View

ABS Power Drop Pin Out

Pin #1 Ground (White)
Pin #7 Permanent (Blue)
Pin #4 Stoplight (Red)

SAE J560 (Rear View)

Pin Out for ABS Power



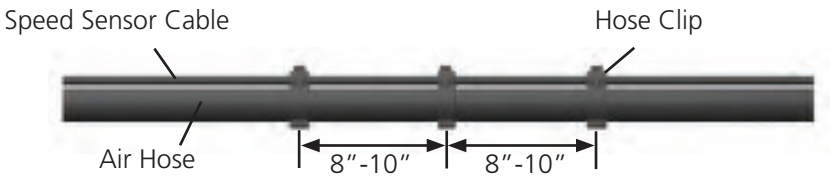
"A" Stop Light (Red)
"B" Permanent (Blue)
"C" Not Used
"D" Trailer Light (Green/White)
"E" Ground (White)

Note: Federal Regulations mandate that new trailers, built after March 1, 2001, have the capability to provide an ABS fault signal from the trailer ABS into the tractor for an In-Cab Trailer ABS Lamp.

Haldex recommends that the Red, White, and Blue wires should be a minimum of 12 AWG.

Wheel End Speed Sensor Cable Routing

Sensor Hose Clip



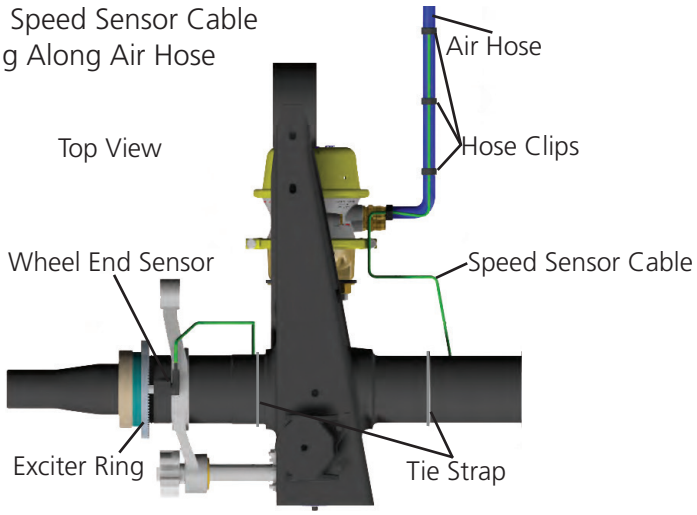
Although it is possible to route cables along the axle, the preferred method is to route the speed sensor cable along the air hoses between the ABS Valve and the Brake Actuators.

Do Not Use Tie Straps to secure the speed sensor cable to air hoses. Air hoses expand and can damage wires. For a more reliable installation use sensor hose clips to secure speed sensor cables to rubber air hoses. See Sensor Hose Clip illustration shown above.

Leave some slack in sensor cables to accommodate movement between chassis components. **Excess Cable Must Not Be Allowed To Hang Freely** and must be bundled and secured to prevent damage due to vibration and abrasion. Route speed sensor cable on the backside of axle housing to avoid damage from road debris.

Take up excess speed sensor cable in either a "Short Bone" or a "Long Bone" arrangement and secure with tie straps. **Do Not coil the speed sensor cable** into a loop smaller than 4" diameter.
Do Not over tighten the tie straps when the cable is coiled, as this could result in a cable failure.
Do Not overlap speed sensor bundles into one bundle as this arrangement could result in speed sensor signal cross talk.

Typical Speed Sensor Cable Routing Along Air Hose

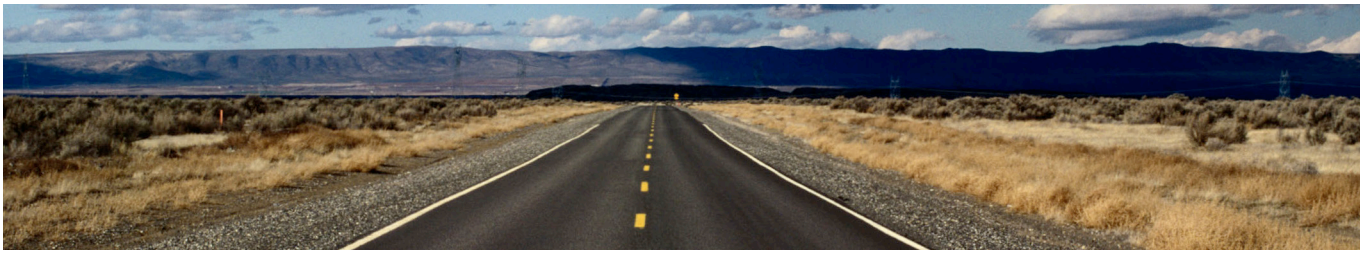


Short Cable
(Short Bone)

Push up and
attach tie strap
(Long Bone)

Long Cable
(Long Bone)

ITCM Road Testing Procedure



Road Testing Procedures:

1. Connect a tractor to the trailer and charge the trailer's air tank (100 - 120 PSI).
2. Turn on the start switch and ensure that the ABS Warning Light comes **"ON"** for about 3 seconds, then goes out.
3. Pulling the trailer at a speed greater than 6 mph, make a brake application and hold until the trailer has come to a complete stop.
4. Verify that the ABS Warning Light has remained **"OFF"**. If the ABS Warning Light remained **"OFF"**, the system is functioning properly.
5. If the ABS System detected an error during the brake application, the ABS Warning Light will be **"ON"**. If the ABS Warning Light never comes **"ON"** when the start switch is turned on, or if the ABS Warning Light stays **"ON"** with the start switch on. Refer to ABS Warning Light Troubleshooting Section on Page 29.

Notes:

1. Disconnect power from the ABS System before making any repairs.
2. Most ABS problems are related to the following items:
   a. Cut or damaged wires
   b. Corroded connector or terminals
   c. Connector terminals not attached or not seated correctly to mating assemblies
   d. Excessive sensor air gap, sensor clip retention or wheel bearing end play
   e. Insufficient power at the ABS Power Cable, 12-15 Volts DC required.
3. After making any repairs go to the ITCM Diagnostic Tools Section on Pages 20-23 to confirm that the fault has been corrected. If Dynamic Fault Codes 11 - 14 or 21 - 24 have occurred the ABS Warning Light will remain **"ON"** with a code **"07"** when re-powered until the problem has been corrected. After correcting the Stored Fault(s), each affected wheel must spin >1 mph utilizing permanent power for the ABS System to recognize the problem has been corrected. Verify the ABS Warning Light turns **"OFF"** after all affected wheels were spun >1 nph. Then the stored dynamic fault codes can be cleared.

ITCM Diagnostic Tools

Haldex Provides Five Methods for ABS Diagnostics:

1. Blink Codes
2. PLC Info Center
3. PLC PC Diagnostic Software
4. CAN Info Center 2
5. CAN DIAG+ Diagnostic Software

Blink Codes


PLC Info Center


CAN Info Center2

PLC PC Diagnostic Software or CAN DIAG+ Diagnostic Software (PC not included)

Blink Codes:
ABS Faults Codes can be accessed using the ABS Light without the use of any other tools. The Blink Code "**Simple Fault Mode**" can be activated switching ignition power "**ON**", "**OFF**", "**ON**" in 1 second intervals. See ITCM Blink Code Diagnostics Section (Pages 23-27).

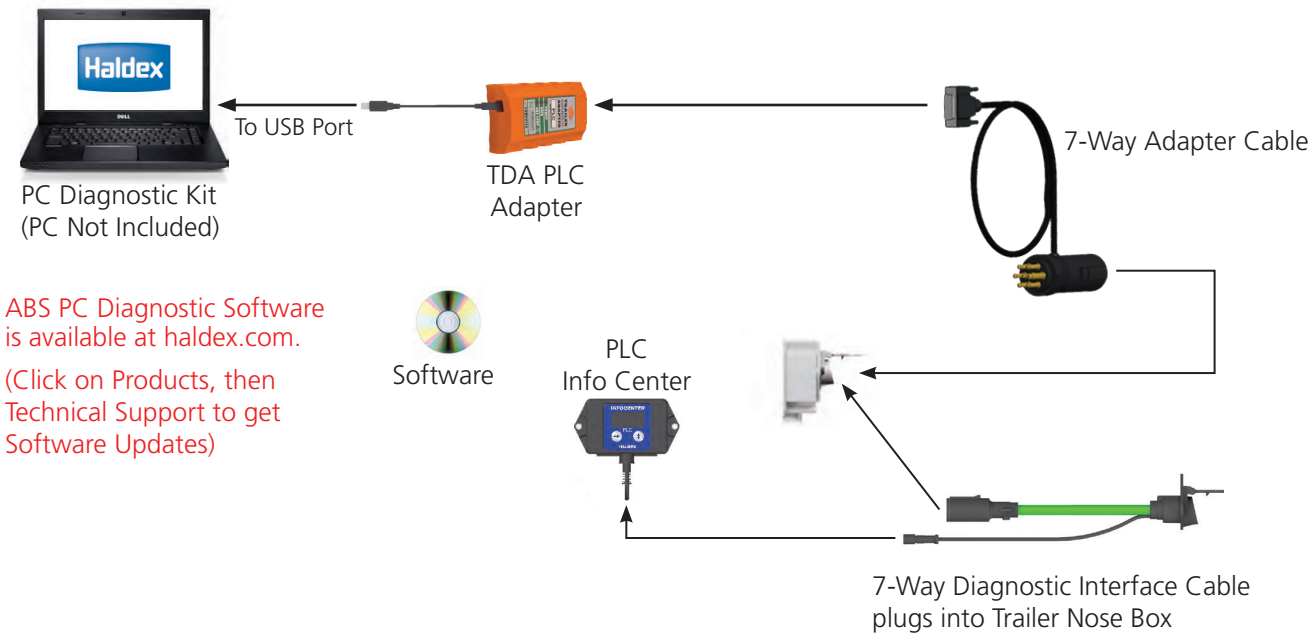
PLC Info Center
The PLC Info Center has a screen that can display ABS Fault Codes plus a number of other functions. The PLC Info Center only needs to be connected to vehicle Permanent Power and ground. An optional SAE 560 7-Way Diagnostic Interface Cable is also available.

Available Functions Include:

1. View active fault code(s) (2 digit code) and fault occurrence count (9 - Occurrences Max.).
2. View stored fault code(s) and fault occurrence count (9 - Occurrences Max.).
3. Clear stored fault code(s).
4. View wheel speed sensor identification corresponding to each individual wheel when rotated.
5. View sensor and valve configuration code.
6. View ABS ECU (Electronic Control Unit) type and Serial Number.
7. Energize valve solenoid(s).
8. Odometer
   - View Odometer, Tire Scale Factor, (Miles or Kilometer)
   - Service Interval, View and Clear Trip Distance
   - Modify Tire Scale Factor Size (Miles or Kilometer), and Modify Service Interval

Note: Refer to Manual L31158W for PLC Info Center Instructions. Refer to Manual L31292W for Info Center 2 Instructions. Both of these manuals can be found on the Haldex website at haldex.com.

ITCM Diagnostic Tools (Cont'd)



PLC PC Diagnostics:
Displays the most information. Available functions include all the functions of the Info Center as well.

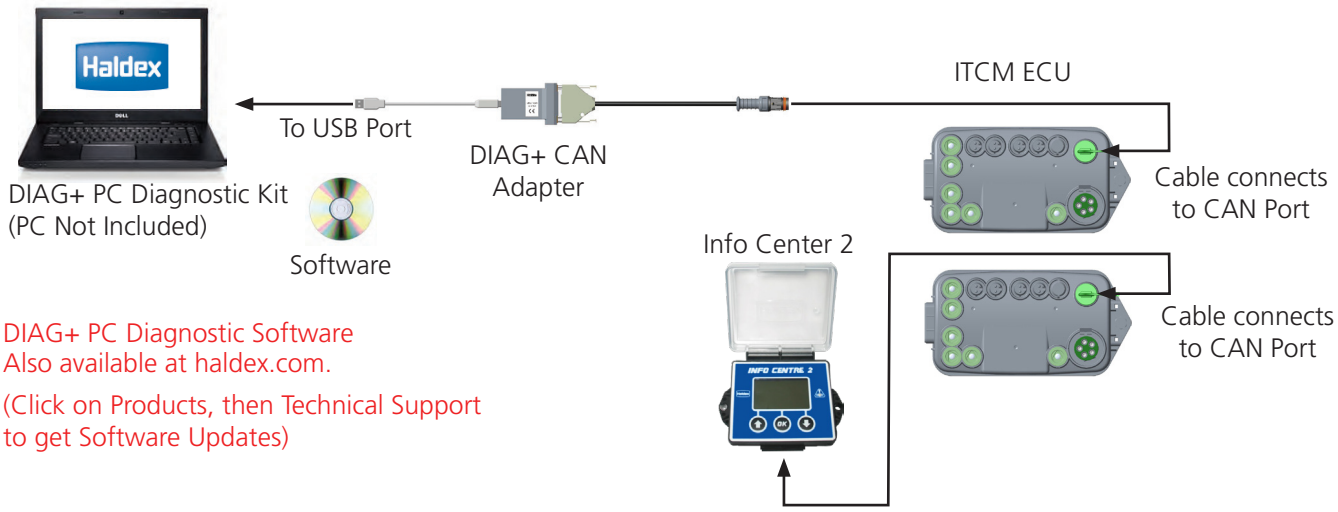
1. View ABS ECU (Electronic Control Unit) Part Number.
2. Save ABS Diagnostic results for a print out of test verification.
3. Read/Write Trailer and/or Service Data internally to ABS ECU (Electronic Control Unit).

Minimum Requirements: MS Windows 95, 98, 2000, NT, XP and Vista, Windows 7, Windows 10, 32 MB RAM

Note: PLC Info Center and PLC PC Diagnostics are not compatible with older generation of ABS manufactured prior to March 2001.

Refer to Manual L31154W for PC Diagnostic Instructions. This manual can be found on the Haldex website at haldex.com.

ITCM Diagnostic Tools (Cont'd)
CAN Based



DIAG+ PC Diagnostic Software
Also available at haldex.com.

(Click on Products, then Technical Support to get Software Updates)

Info Center 2:
The Info Center 2 is a CAN based tool that plugs into the ITCM's CAN data network. Either directly into the ITCM ECU or into the CAN network cabling.

Available functions include:

1. View active or stored Diagnostic Trouble Codes (DTC) in English rather than numbers.
2. Clear stored Diagnostic Trouble Codes.
3. Verify wheel speed sensor output and idenfitication when an individual sensed wheel is rotated.
4. Odometer
   - View Odometer, View and Clear Trip Distance
   - View and Modify Service Interval
   - View and Modify Tire Scale Factor Size (Miles or Kilometer)
5. Read Auxiliary Inputs.
6. Test Auxiliary Outputs.
7. Read TPMS Sensor Outputs.

Note: Refer to Manual L31292W for Info Center 2 Instructions. This manual can be found on the Haldex website at haldex.com.

DIAG+ PC Diagnostics:
Displays the most information.
1. View ABS ECU (Electronic Control Unit) Part Number.
2. Save ABS Diagnostic results for a print out of test verification.
3. Read/Write Trailer and/or Service Data internally to ABS ECU (Electronic Control Unit).
4. Configure auxiliary devices
5. Perform end of line test

(Continued on Following Page)

ITCM Diagnostic Tools (Cont'd) CAN Based

Minimum Requirements: MS Windows 95, 98, 2000, NT, XP and Vista, Windows 7, Windows 10, 32 MB RAM

Note: Info Center 2 and DIAG+ PC Diagnostics are not compatible with older generation of ABS.

Refer to Manual L31287 for DIAG+ PC Diagnostic Instructions. This manual can be found on the Haldex website at haldex.com.

Third Party Diagnostic Solutions:

1. NEXIQ - ProLink Ultra - PLC
2. Noregon - DLA+ - PLC
3. Noregon - TDA - PLC

These tools have been evaluated by Haldex Brake Products Corporation - Kansas City, MO. Many third party solutions may be used with reduced functions.

ITCM Blink Code Diagnostics

Blink Code Modes

Cycle Permanent Power (1 second "**ON**" / 1 second "**OFF**")

1	Simple/Wheel Speed Mode	ON, OFF, ON
2	Active Faults Mode	ON, OFF, ON, OFF, ON
3	Stored Faults with Occurrence Count	ON, OFF, ON, OFF, ON, OFF, ON
4	Configuration Mode	ON, OFF, ON, OFF, ON, OFF, ON, OFF, ON
5	Odometer	ON, OFF, ON, OFF, ON, OFF, ON, OFF, ON, OFF, ON

Procedure for Blink Code Diagnostics:

1. The trailer must be stationary.
2. The trailer must be connected to a DC power supply (10 - 15 volts). Never use a battery charger.
3. Permanent Power must be cycled "**ON**" and "**OFF**" (trailer auxiliary circuit) at 1 second intervals to reach the desired mode (shown above). It is recommended that an auxiliary switched power source be used. Example: A light cart.

Note: Stop Light and Permanent Power must be independent for Blink Code Troubleshooting. If Permanent Power is required for your brake light to operate, then Blink Code Diagnostics will not function.

Procedure Notes:

1. Once Blink Mode is entered that mode can only be terminated by completely disconnecting all trailer power sources.
2. All modes repeat endlessly. Each repeat is separated by 10 seconds of continuous light "**ON**".
3. All codes are separated by 2 seconds of light "**OFF**".
4. Stored Fault Codes (Mode 3) are followed by an occurrence count which display a blink rate twice as fast as the Fault Code Blink rate.

ITCM Blink Code Diagnostic Mode 1

Simple Mode Diagnostics Faults (ON, OFF, ON)

This mode has an abbreviated list of Fault Codes that will display. Fault Codes are grouped to simplify the diagnostics. Up to 3 active codes will be displayed at one time. These faults need to be repaired before other active faults can be displayed.

See Troubleshooting Diagnostic Code Section on Pages 30-34.

Item	Flash Count	Actual Fault
System OK	Light Stay On	07 (No Active Faults)
Sensor 1A	1 Flash	01
Sensor 1B	2 Flashes	02
Sensor 2A	3 Flashes	03
Sensor 2B	4 Flashes	04
21 Valve	7 Flashes	61, 67, 71, 77, 81, and 87
22 Valve	8 Flashes	62, 68, 72, 78, 82, and 88
23 Valve	9 Flashes	63, 69, 73, 79, 83, and 89
Low Voltage	10 Flashes	90
ECU Failure	11 Flashes	93,99, and E-Codes

If the Simple Mode Code does not show a fault code, but the ABS Light remains "ON" after powering the ABS, there are no active faults present. Verify in Mode 3 (Stored Codes). If any faults 11 - 14 or 21 - 24 are present the problem needs to be resolved before the ABS Light will turn off when Permanent Powered vehicle travels greater than 6 mph.

Wheel Speed Mode

Wheel Speed Mode is accessible only in Simple Mode. This Simple Mode is not activated until ECU (Electronic Control Unit) has received a signal from the wheel speed sensor of a spinning wheel. The hold solenoid of the Modulator Valve associated with the particular sensed spinning wheel will be cycled the same number of times as the ABS Light flashes. The Blink Code for the sensed wheels are as follows:

S1A: 1 Flash S1B: 2 Flashes S2A: 3 Flashes S2B: 4 Flashes

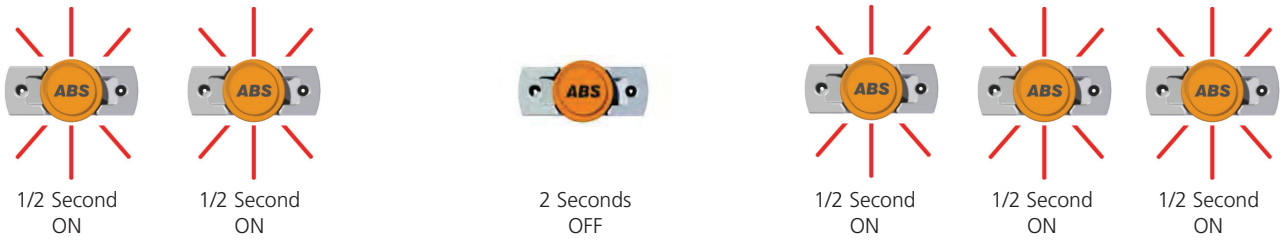
Note 1: Spin only one wheel at a time.
Note 2: Once a wheel is rotated, the ABS Light will remain "**ON**" after the wheel is stopped until the next wheel is rotated.

ITCM Blink Code Diagnostics Mode 2

Active Mode Diagnostic Faults
(ON, OFF, ON, OFF, ON)

In this mode the ABS Light displays a numerical Fault Code Sequence for each existing fault, up to nine fault codes at a time. The nine faults must be repaired before additional active faults can be displayed. See Troubleshooting Diagnostic Code Section on Pages 30-34.

Example: Fault Code "23" is indicated by the light flashing "**ON**" twice for 1/2 second each time then off for 2 seconds followed by three 1/2 second flashes.



1st Flash Sequence

2nd Flash Sequence

ITCM Blink Code Diagnostics Mode 3

Stored Diagnostic Faults
(ON, OFF, ON, OFF, ON, OFF, ON)

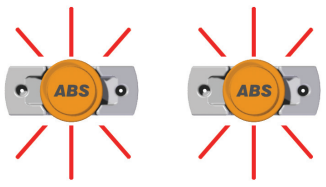
In this mode the ABS Light displays a numerical fault code sequence for each stored fault. All stored faults (not currently active) are displayed in this mode. The light will display up to nine passive stored faults at a time. The stored faults are displayed in numerical order, highest to lowest. See ITCM Diagnostic Codes Troubleshooting Section on Pages 30-34.

Stored Mode Fault Occurrences (Mode 3):
The Fault Code Blink Sequence is followed by the occurrence count for that fault in Passive Mode. The occurrence count is displayed after each pair of fault code flashes in order to differentiate between the code and its occurrence count. The occurrence count Blink Code rate is twice as fast as the Fault Code blink rate.

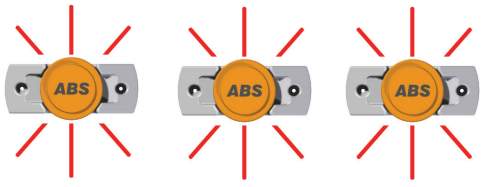
Verify if stored codes 11 - 14 or 21 - 24 are present, the problem needs to be resolved before the ABS Light will shut off when Permanent Powered vehicle travel greater than 6 mph.

Stored Fault Mode Notes (Mode 3):
1. A "**Zero**" for codes such as "**01**" is indicated by a two second light "**ON**" condition. All other digits are indicated by a half second light "**ON**" condition.

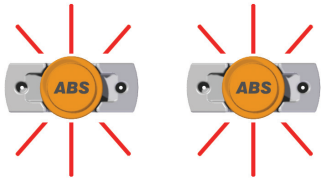
Example: Fault Code "**23**" is indicated by the light flashing "**ON**" twice for 1/2 second each time then off for 2 seconds followed by three 1/2 second flashes. The third flash is the occurrence count and as 1/4 second flashes.



1st Flash Sequence
(1st fault code digit)



2nd Flash Sequence
(2nd fault code digit)



3rd Flash Sequence
(Occurrence Count)

2. There is a two second light "**OFF**" delay between the digits in each code.
3. Code "**07**" (System OK, vehicle is parked) is displayed as a continuous light "**ON**"condition. If No Stored Faults are present, the lamp will remain "**ON**" continuously.

ITCM Blink Codes Diagnostic Mode 4

Configuration Mode Diagnostic Faults
(ON, OFF, ON, OFF, ON, OFF, ON, OFF, ON)

This Mode displays Configuration and Auxillary Codes. The Configuration Code is displayed prior to Auxiliary Codes. The Tables shown in the ITCM Diagnostic Codes Troubleshooting Section on Pages 30-34. show a list of Configuration Codes and a list of Auxiliary Codes which are supported by Blink Codes. Auxiliary Codes are displayed Low to High. Each Blink Code digit will refer back to a digit in the Haldex Configuration Codes.

CO	1	2S/1M	S1A S1B	21
C1	2	2S/2M	S2A S2B	21, 22
C2	3	4S/2M	S1A S2A S1B S2B	21, 22
C4	4	4S/3M	S1A S2A S1B S2B	21, 22, 23

Item	Blinks	Description
A7	8	SLH programming for 21 Valve Channel (2S/1M)
A8	9	MSLH programming for 21 Valve Channel (2S/1M)

ITCM Blink Code Diagnostic Mode 5

Odometer Mode Diagnostic Faults
(ON, OFF, ON, OFF, ON, OFF, ON, OFF, ON, OFF, ON)

This mode displays the Odometer Value.

Example: 4364.7 miles

4 ON/OFF, 1/2 Second Flashes
3 ON/OFF, 1/2 Second Flashes
6 ON/OFF 1/2 Second Flashes
4 ON/OFF, 1/2 Second Flashes

THEN:

2 ON/OFF, 1/4 Second Flashes (If Set For Miles)
1 ON/OFF, 1/4 Second Flash (If Set For KM)

Tire Scale Factor Chart

Trailer Tire	Scale Factor 100T (Miles)	Scale Factor 100T (km)	Scale Factor 80T (Miles)	Scale Factor 80T (km)
80T Smallest Tire			579	360
215/75R17.5			543	338
8R17.5			538	334
275/65R17.5 HC			527	328
8.5/R17.5			524	326
245/70R17.5			523	325
235/75R17.5			523	325
225/70R19.5			521	324
8.25R15			495	308
9R17.5 HC			495	308
10R17.5			490	304
265/70R19.5			483	300
285/70R19.5			470	293
100T Smallest Tire	580	360		
305/70R19.5	574	357	459	286
11R17.5 HC	568	353	454	283
10.00R15 Tire	566	352	453	282
255/70R22.5	566	352	453	282
275/70R22.5	545	339	436	271
10R22.5	520	323	416	259
9.00R20	519	323	415	258
295/75R22.5	518	322	414	258
285/75R24.5	504	313	403	251
295/80R22.5	503	313	402	250
11R22.5	(502*)	313	402	250
10.00R20	501	312	401	249
315/80R22.5	491	305	383	244
80T Largest Tire			391	243
11.00R20	488	303		
305/75R24.5	488	303		
11R24.5	478	297		
10.00R22	478	297		
12.00R20	472	294		
425/65R22.5	471	293		
11.00R22	466	290		
100T Largest Tire	391	243		

*** Haldex Factory Tire Scale Set at Default 502 Rev/Mile.**

Useful Numbers: **1 mile = 1.6093 km** **1 km = 0.6214 miles**

Scale Factor (SF) for other size:

Option 1: SF = (1000/Rc) X (T/100)
Rc = Rolling circumference in meters
T = Exciter actual tooth count

Option 2: SF = N X (T/1000)
N = Revolutions per mile
T = Exciter actual tooth count

Note: Scale factor does not affect ABS performance but does affect odometer accuracy.

ABS Warning Light Troubleshooting

ABS Warning Light Stays On Permanently:

Upon power up of the ITCM ABS System (Permanent or Stoplight Power), the ABS Warning Lights should come **"ON"** for 3 seconds and then go **"OFF"**. If the ABS Warning Light stays **"ON"**, it may be caused by improper light wiring, or by a fault in the ITCM ABS System.

1. Check for Diagnostic Fault Codes. If anything other than a "07" or "No Active DTCs" is displayed, review the ITCM Diagnostic Codes Troubleshooting Section on Pages 30-34 for possible solutions. After the problem is repaired, clear all stored faults and test again.

2. If a "07" is displayed but there was a 11 - 14 (Sensor Low), or 21 - 24 (Sensor Signal) fault stored in memory, correct the problem and drive the trailer or rotate the wheel affected >1 mph using Permanent Power to get the ABS Light to turn **"OFF"**.

3. If a "07" is displayed, there are no faults stored in memory and the ABS Light is still **"ON"**, the ABS Light is wired incorrectly. Remove the main wire harness 5 Pin Connector at the ECU (Electronic Control Unit) and verify continuity between Pin "D". Refer to ABS Power Drop Pin Out on Page 17. The remaining light wire must be grounded to the trailer chassis or connected to the SAE J560 7-Way Connector ground wire. Check for continuity between the ABS Light wire and ground. Repair as necessary and retest.

4. If the solenoid does not energize with a "CLICK, CLICK" when power is applied, or the diagnostic tool has nothing on the display, check power on the Blue or Red wire of the 7-Way Connector, as well as, the ABS Power Cord. Refer to ABS Power Drop Pin Out on Page 17. Verify power source is >10 Volts when connected to ABS.

ABS Warning Light Does Not Illuminate:

1. Check the bulb to verify that is functional. If not functional, replace it and retest.

2. Verify that there is power to the ECU (Electronic Control Unit) and the solenoid does energize with a "CLICK, CLICK" when power is applied. If not, disconnect the main wire harness 5 Pin Connector and check for positive power between either Stop Light Power with brakes applied or Permanent Power and ground. Refer to ABS Power Drop Pin Out on Page 17. The voltage drop between the SAE J560 7-Way Connector and the ECU (Electronic Control Unit) should not exceed 2 Volts. If no power exists at either Stop Light or Permanent Power in reference to ground then check continuity from these pins to the SAE J560 7-Way Connector Red and Blue circuits. Make necessary repairs and retest. Verify power source is >10 Volts when connected to ABS.

3. If the problem is still present, remove the main wire harness 5 Pin Connector at the ECU (Electronic Control Unit) and verify continuity between Pin "D". Refer to ABS Power Drop Pin Out on Page 17. The remaining light wire must be grounded to the trailer chassis or connected to the SAE J560 7-Way Connector ground wire. Check for continuity between the ABS Warning Light wire and ground. Repair as necessary and retest.

ITCM PLC Diagnostic Codes/ Troubleshooting

PLC Fault Code	Occurs when vehicle is Stationary	Possible Causes
00	System OK (with vehicle traveling > 6 mph)	ABS is Operational Displays "00" when traveling greater > 6 mph.
01	Wheel speed sensor wiring (S1A) has an Open or Short Circuit	Indicates a wheel speed sensor or its wiring has a short or open circuit. Disconnect the relevant sensor and measure the resistance between the two contacts in the sensor connector housing. If sensors extensions are used verify extension continuity and connections. Replace sensor and/or extension cable. The Ohm meter reading for the sensor or sensor and extension cable should be between 980 and 2350 Ohm (.98K and 2.35K Ohm). If not, replace sensor and/or extension cable.
02	Wheel speed sensor wiring (S1B) has an Open or Short Circuit	
03	Wheel speed sensor wiring (S2A) has an Open or Short Circuit	
04	Wheel speed sensor wiring (S2B) has an Open or Short Circuit	
07	System OK (No Active Faults)	Vehicle is stationary at 0 mph

PLC Fault Code	Occurs when vehicle is Moving	Possible Causes
11	Speed sensor (S1A), has low sensor output or gap too large.	Sensor or spring clip is worn or not properly adjusted, wiring open or short circuit, wheel bearings are not properly adjusted (these faults will only occur at speed > 6 mph). Measure the AC voltage at the sensor in question while rotating the wheel at a rate of about one revolution every two seconds. The output should be at least 200 millivolts (0.2 VAC). If this is not the case, push in the sensor until it touches the exciter and rotate the wheel again. If this doesn't correct the problem, then replace the sensor and sensor block clip. If sensor extensions are used, verify extension continuity and inspect exciter ring teeth for minor damage or teeth gaps filled with debris. Verify all exciters have the same number of teeth. Verify tires on the sensed axle are the same size per axle. Verify all sensor and valve wiring/plumbing is correct. Wheel end location of speed sensors must correspond with plumbing of modular valves, side-by-side or axle-by-axle configuration.
12	Speed sensor (S1B), has low sensor output or gap too large.	
13	Speed sensor (S2A), has low sensor output or gap too large.	
14	Speed sensor (S2B), has low sensor output or gap too large.	

ITCM PLC Diagnostic Codes/ Troubleshooting (Cont'd)

PLC Fault Code	Occurs when vehicle is Moving	Possible Causes
21	Wheel speed sensor (S1A) has an erratic output voltage	Loose sensor, connection, bracket or exciter, damaged exciter, sensor is not properly adjusted or has worn cable insulation, or worn sensor block clip, wheel bearing failure, wheel bearing is not properly adjusted (these faults will only occur at speed > 6 mph). Measure the AC voltage at the sensor in question while rotating the wheel at a rate of about one revolution every two seconds. The output should beat least 200 millivolts (0.2 VAC). If this is not the case, push in the sensor until it touches the exciter and rotate the wheel again. If this doesn't correct the problem, then the sensor, and sensor block clip should be replaced. If sensor faults occur at the same speed, inspect exciter ring for damage. Smaller wheels and tires require 80 tooth exciter rings. Refer to Tire Scale Factor Chart on Page 28. Verify sensor locations and valve wiring/plumbing is correct for the configuration. See Side-By-Side and Axle-By-Axle Configurations shown on Pages 5-11.
22	Wheel speed sensor (S1B) has an erratic output voltage	
23	Wheel speed sensor (S2A) has an erratic output voltage	
24	Wheel speed sensor (S2B) has an erratic output voltage	

31	Auxiliary Channel - 1 fault (Digital Channel 1) Valve 23/Dual Output	ITCM (ABS Auxiliary Codes) Note: These codes are only used with ITCM ABS that has Trailer Auxiliaries configured. Auxiliary Channel has an open circuit or the Electronic Control Unit (ECU) has auxiliary device connected and is not configured to be there. These codes do not affect ABS performance and the ABS Warning Light will not illuminate.
32	Auxiliary Channel - 2 fault (Digital Channel 2) Input/Output	
33	Auxiliary Channel - 3 fault (Digital Channel 3) Input/Output	
34	Auxiliary Channel - 4 fault (Analog Channel 1) Input only	
35	Auxiliary Channel - 5 fault (Analog Channel 2) Input only	

ITCM PLC Diagnostic Codes/ Troubleshooting (Cont'd)

PLC Fault Code	Occurs when vehicle is Stationary unless otherwise noted	Possible Causes
41	21 Valve - Slow Wheel recovery (occurs when vehicle is moving)	For a 2M System, verify sensor locations and valve wiring/ plumbing is correct for the configuration. See Side-By-Side and Axle-By-Axle Configurations shown on Pages 5-11. Slow Wheel Recovery: check for foundation brake mechanical faults, dry bushings, broken ABS Valve. Check for kinks and blockage, etc. in the piping.
42	22 Valve - Slow Wheel recovery (occurs when vehicle is moving)	
43	23 Valve - Slow Wheel recovery (occurs when vehicle is moving)	
61	23 Valve - Hold Solenoid Open Circuit	The most likely causes of Modulator valve open circuit solenoid failure include: a bad solenoid, or a loose solenoid connection. Disconnect the indicated solenoid and check the resistance at the solenoid pins. Check solenoid connection and valve cable for possible damage. Check the female terminals on the connector for excessive pin spread or corrosion. Replace defective hardware as required and retest. (Refer to Solenoid diagrams on Page 41 for pin out and resistance information.)
62	22 Valve - Hold Solenoid Open Circuit	
63	21 Valve - Hold Solenoid Open Circuit	
67	23 Valve - Dump Solenoid Open Circuit	
68	22 Valve - Dump Solenoid Open Circuit	
69	21 Valve - Dump Solenoid Open Circuit	
71	23 Valve - Hold Solenoid Short Circuit to Ground	The most likely causes of Modulator valve short to ground solenoid failure include: a damaged cable or bad solenoid. Example: A worn or chafed cable that has exposed wire contacting the trailer. Disconnect the indicated solenoid and check the resistance at the solenoid pins. (Refer to Solenoid diagrams on Page 41 for pin out and resistance information.)
72	22 Valve - Hold Solenoid Short Circuit to Ground	
73	21 Valve - Hold Solenoid Short Circuit to Ground	
77	23 Valve - Dump Solenoid Short Circuit to Ground	
78	22 Valve - Dump Solenoid Short Circuit to Ground	
79	21 Valve - Dump Solenoid Short Circuit to Ground	

ITCM PLC Diagnostic Codes/ Troubleshooting (Cont'd)

PLC Fault Code	Occurs when vehicle is Stationary or Moving	Possible Causes
80	Output leakage or poor insulation on any of the valve channels causing a shutdown relay condition.	Indicates that the Solenoid or its cable has a short circuit to positive power (12 VDC). The most likely cause is a damaged cable or solenoid. Disconnect the indicated solenoid and check the resistance at the solenoid pins. (Refer to Solenoid diagrams on Page 41 for pin out and resistance information.) If Solenoid is good and Codes 80 - 89 code still persist, replace the Electronic Control Unit (ECU).
81	23 Valve - Hold Solenoid Short Circuit to Permanent Power	
82	22 Valve - Hold Solenoid Short Circuit to Permanent Power	
83	21 Valve - Hold Solenoid Short Circuit to Permanent Power	
87	23 Valve - Dump Solenoid Short Circuit to Permanent Power	
88	22 Valve - Dump Solenoid Short Circuit to Permanent Power	
89	21 Valve - Dump Solenoid Short Circuit to Permanent Power	
90	Low Supply Voltage Fault.	Occurs when power source is < 8 Volts. Verify power source is > 10 Volts when connected to ABS.
91	No internal ABS ECU (Electronic Control Unit) solenoid voltage available	Verify Permanent Power is Present.
92	Power input over voltage fault	Verify 12 VDC power source. **Do Not Use Battery Charger as Power Supply**. Electronic Control Unit (ECU) maximum operating voltage is 16 VDC.
93	Short Circuit on ABS ECU (Electronic Control Unit) internal relay	Replace Electronic Control Unit (ECU).
99	ABS Corrupt Memory	Replace Electronic Control Unit (ECU).
9A	Configuration Error	Incorrect speed sensor and/or modulator valve connections. An auxiliary device is connected but not programmed. The ITCM is powered ON with Low Supply Voltage (<8.0V).

ITCM PLC Diagnostic Codes/ Troubleshooting (Cont'd)

PLC Configuration Code	Occurs when vehicle is Stationary	Possible Causes
Code A(x) and C(x) displayed when power is applied to the ABS Electronic Control Unit (ECU). They should not be display for more then 2 seconds; if the code remains permanently displayed, repair is necessary.		
A7	Trailer: 2S/1M - SLH on 21 Channel Trailer: 2S/2M, or 4S/2M - SLH on 21 Channel	Programmed for Tandem or Multi-Axle Trailers. Displays current configuration.
A8	Trailer: 2S/1M - MSLH on 21 Channel (Dollies, Steerable or Single Axle Only)	Programmed for Dollies, Single or Steer Axle Trailer. Displays current configuration.

PLC Configuration Code	Occurs when vehicle is Stationary	Possible Causes
Code A(x) and C(x) displayed when power is applied to the ABS Electronic Control Unit (ECU). They should not display for more then 2 seconds; if the code remains permanently displayed, repair is necessary.		
C0	2S/1M Configuration	S1A, S1B sensors, 21 Modulator. ECU is configured as a 2M and is powered up as a 1M. See "CC" possible causes below. Displays current configuration.
C1	2S/2M Configuration	S2A, S2B sensors. 21, 22 Modulators. ECU is configured as a 4S/2M and powered up as a 2S/2M. See "CC" possible causes below. Displays current configuration.
C2	4S/2M Configuration Information (Not a Fault Code)	S1A, S2A, S2B, S1B sensors. 21, 22 Modulators. Displays current configuration.
C4	4S/3M Configuration Information (Not a Fault Code)	S1A, S2A, S1B, S2B sensors. 21, 22, 23 Modulators. Displays current configuration.
CA	Clear All (Fault Codes)	Occurs when clearing fault codes with the Info Center.
CC	Clear Configuration	Only required when configured ABS System from a 4S/2M to a 2S/2M or any 2M configured to a 1M.
CF	Configuration Fault	Unrecognized ABS configuration. Verify all sensors and valve connections are correct. Verify sufficient power.
E(x)	Internal problem exists within ITCM ECU	ITCM Electronic Control Unit (ECU) is defective, replace.

SAE J1587/J1708 Fault Codes

2S/1M Only - Sensor S1A & S1B

SAE codes are structured for side-by-side only.
Use Location/Description to reference affected location.

PLC - DTC	SID	FMI	Component	DTC Description	Location/Description
01	01	05	Wheel Speed Sensor	Open Circuit	S1A Axle 1 Road Side
02	02	05	Wheel Speed Sensor	Open Circuit	S1B Axle 1 Curb Side
11	01	13	Wheel Speed Sensor	Out of Calibration	S1A Axle 1 Road Side
12	02	13	Wheel Speed Sensor	Out of Calibration	S1B Axle 1 Curb Side
21	01	02	Wheel Speed Sensor	Data Erratic, Intermittent	S1A Axle 1 Road Side
22	02	02	Wheel Speed Sensor	Data Erratic, Intermittent	S1B Axle 1 Curb Side
41	07	07	ABS Valve	Slow Wheel Recovery	21 Channel Axle 1 Both Sides
63	42	05	ABS Vallve Hold Solenoid	Open Circuit	21 Channel Axle 1 Both Sides
69	48	05	ABS Vallve Dump Solenoid	Open Circuit	21 Channel Axle 1 Both Sides
73	42	04	ABS Vallve Hold Solenoid	Voltage Shorted to B-	21 Channel Axle 1 Both Sides
79	48	04	ABS Vallve Dump Solenoid	Voltage Shorted to B-	21 Channel Axle 1 Both Sides
80	218	11	ECM Main Relay	Failure Not Definable	Failure Not Definable
83	42	03	ABS Valve Hold Solenoid	Voltage Shorted to B+	21 Channel Axle 1 Both Sides
89	48	03	ABS Valve Dump Solenoid	Voltage Shorted to B+	21 Channel Axle 1 Both Sides
90	251	01	Power Supply	Data Below Normal Range	Power < 8 Volts
91	251	04	Power Supply	Voltage Below Normal	Intermittent Low Power
92	251	00	Power Supply	Data Valid & Above Normal	Power > 17 Volts
93	13	12	Retarder Control Relay	Bad Device or Component	Defective ECU
99	253	12	Calibration Memory	Bad Device or Component	Defective ECU
9A	253	12	Calibration Memory	Bad Device or Component	Auxiliary Device Error

SAE J1587/J1708 Fault Codes

2S/2M - Sensor S2A & S2B - Side-By-Side

Fault Code	SID	FMI	Component	DTC Description	Location/Description
03	03	05	Wheel Speed Sensor	Open Circuit	S2A Axle 1 Road Side
04	04	05	Wheel Speed Sensor	Open Circuit	S2B Axle 1 Curb Side
13	03	13	Wheel Speed Sensor	Out of Calibration	S2A Axle 1 Road Side
14	04	13	Wheel Speed Sensor	Out of Calibration	S2B Axle 1 Curb Side
23	03	02	Wheel Speed Sensor	Data Erratic, Intermittent	S2A Axle 1 Road Side
24	04	02	Wheel Speed Sensor	Data Erratic, Intermittent	S2B Axle 1 Curb Side
41	09	07	Pressure Mod ABS Valve	Mechanical Failure SWR	21 Channel Road Side
42	10	07	Pressure Mod ABS Valve	Mechanical Failure SWR	22 Channel Curb Side
62	45	05	Hold Mod ABS Valve	Open Circuit	22 Channel Curb Side
63	44	05	Hold Mod ABS Valve	Open Circuit	21 Channel Road Side
68	51	05	Dump Mod ABS Valve	Open Circuit	22 Channel Curb Side
69	50	05	Dump Mod ABS Valve	Open Circuit	21 Channel Road Side
72	45	04	Hold Mod ABS Valve	Voltage Shorted to Ground	22 Channel Curb Side
73	44	04	Hold Mod ABS Valve	Voltage Shorted to Ground	21 Channel Road Side
78	51	04	Dump Mod ABS Valve	Voltage Shorted to Ground	22 Channel Curb Side
79	50	04	Dump Mod ABS Valve	Voltage Shorted to Ground	21 Channel Road Side
80	13	11	Retarder Control Relay	Failure Not Definable	Failure Not Definable
82	45	03	Hold Mod ABS Valve	Voltage Shorted to B+	22 Channel Curb Side
83	44	03	Hold Mod ABS Valve	Voltage Shorted to B+	21 Channel Road Side
88	51	03	Dump Mod ABS Valve	Voltage Shorted to B+	22 Channel Curb Side
89	50	03	Dump Mod ABS Valve	Voltage Shorted to B+	21 Channel Road Side
90	251	01	Power Supply	Data Below Normal Range	Power < 8.0 Volts
91	251	04	Power Supply	Voltage Below Normal	Intermittent Low Power
92	251	00	Power Supply	Data Valid & Above Normal	Power > 17.0 Volts
93	13	12	Retarder Control Relay	Bad Device or Component	Defective ECU
99	253	12	Calibration Memory	Bad Device or Component	Defective ECU
9A	253	12	Calibration Memory	Bad Device or Component	Auxiliary Device Error

SAE J1587/J1708 Fault Codes

4S/2M - Sensor S1A, S1B, S2A & S2B - Side-By-Side

01	01	05	Wheel Speed Sensor	Open Circuit	S1A Axle 1 Road Side
02	02	05	Wheel Speed Sensor	Open Circuit	S1B Axle 1 Curb Side
03	03	05	Wheel Speed Sensor	Open Circuit	S2A Axle 2 Road Side
04	04	05	Wheel Speed Sensor	Open Circuit	S2B Axle 2 Curb Side
11	01	13	Wheel Speed Sensor	Out of Calibration	S1A Axle 1 Road Side
12	02	13	Wheel Speed Sensor	Out of Calibration	S1B Axle 1 Curb Side
13	03	13	Wheel Speed Sensor	Out of Calibration	S2A Axle 2 Road Side
14	04	13	Wheel Speed Sensor	Out of Calibration	S2B Axle 2 Curb Side
21	01	02	Wheel Speed Sensor	Data Erratic, Intermittent	S1A Axle 1 Road Side
22	02	02	Wheel Speed Sensor	Data Erratic, Intermittent	S1B Axle 1 Curb Side
23	03	02	Wheel Speed Sensor	Data Erratic, Intermittent	S2A Axle 2 Road Side
24	04	02	Wheel Speed Sensor	Data Erratic, Intermittent	S2B Axle 2 Curb Side
41	09	07	Pressure Mod ABS Valve	Mechanical Failure SWR	21 Channel Road Side
42	10	07	Pressure Mod ABS Valve	Mechanical Failure SWR	22 Channel Curb Side
62	45	05	Hold Mod ABS Valve	Open Circuit	22 Channel Curb Side
63	44	05	Hold Mod ABS Valve	Open Circuit	21 Channel Road Side
68	51	05	Dump Mod ABS Valve	Open Circuit	22 Channel Curb Side
69	50	05	Dump Mod ABS Valve	Open Circuit	21 Channel Road Side
72	45	04	Hold Mod ABS Valve	Voltage Shorted to Ground	22 Channel Curb Side
73	44	04	Hold Mod ABS Valve	Voltage Shorted to Ground	21 Channel Road Side
78	51	04	Dump Mod ABS Valve	Voltage Shorted to Ground	22 Channel Curb Side
79	50	04	Dump Mod ABS Valve	Voltage Shorted to Ground	21 Channel Road Side
80	218	11	Retarder Control Relay	Failure Not Definable	Failure Not Definable
82	45	03	Hold Mod ABS Valve	Voltage Shorted to B+	22 Channel Curb Side
83	44	03	Hold Mod ABS Valve	Voltage Shorted to B+	21 Channel Road Side
88	51	03	Dump Mod ABS Valve	Voltage Shorted to B+	22 Channel Curb Side
89	50	03	Dump Mod ABS Valve	Voltage Shorted to B+	21 Channel Road Side
90	251	01	Power Supply	Data Below Normal Range	Power < 8.0 Volts
91	251	04	Power Supply	Voltage Below Normal	Intermittent Low Power
92	251	00	Power Supply	Data Valid & Above Normal	Power > 17.0 Volts
93	13	12	Retarder Control Relay	Bad Device or Component	Defective ECU
99	253	12	Calibration Memory	Bad Device or Component	Defective ECU
9A	253	12	Calibration Memory	Bad Device or Component	Auxiliary Device Error

SAE J1587/J1708 Fault Codes

4S/2M - Sensor S1A, S1B, S2A & S2B - Axle-By-Axle

Fault Code	SID	FMI	Component	DTC Description	Location/Description
01	01	05	Wheel Speed Sensor	Open Circuit	S1A Axle 2 Road Side
02	02	05	Wheel Speed Sensor	Open Circuit	S1B Axle 1 Road Side
03	03	05	Wheel Speed Sensor	Open Circuit	S2A Axle 2 Curb Side
04	04	05	Wheel Speed Sensor	Open Circuit	S2B Axle 1 Curb Side
11	01	13	Wheel Speed Sensor	Out of Calibration	S1A Axle 2 Road Side
12	02	13	Wheel Speed Sensor	Out of Calibration	S1B Axle 1 Road Side
13	03	13	Wheel Speed Sensor	Out of Calibration	S2A Axle 2 Curb Side
14	04	13	Wheel Speed Sensor	Out of Calibration	S2B Axle 1 Curb Side
21	01	02	Wheel Speed Sensor	Data Erratic, Intermittent	S1A Axle 2 Road Side
22	02	02	Wheel Speed Sensor	Data Erratic, Intermittent	S1B Axle 1 Road Side
23	03	02	Wheel Speed Sensor	Data Erratic, Intermittent	S2A Axle 2 Curb Side
24	04	02	Wheel Speed Sensor	Data Erratic, Intermittent	S2B Axle 1 Curb Side
41	09	07	Pressure Mod ABS Valve	Mechanical Failure SWR	21 Channel Both Sides
42	10	07	Pressure Mod ABS Valve	Mechanical Failure SWR	22 Channel Both Sides
62	45	05	Hold Mod ABS Valve	Open Circuit	22 Channel Both Sides
63	44	05	Hold Mod ABS Valve	Open Circuit	21 Channel Both Sides
68	51	05	Dump Mod ABS Valve	Open Circuit	22 Channel Both Sides
69	50	05	Dump Mod ABS Valve	Open Circuit	21 Channel Both Sides
72	45	04	Hold Mod ABS Valve	Voltage Shorted to Ground	22 Channel Both Sides
73	44	04	Hold Mod ABS Valve	Voltage Shorted to Ground	21 Channel Both Sides
78	51	04	Dump Mod ABS Valve	Voltage Shorted to Ground	22 Channel Both Sides
79	50	04	Dump Mod ABS Valve	Voltage Shorted to Ground	21 Channel Both Sides
80	13	11	Retarder Control Relay	Failure Not Definable	Failure Not Definable
82	45	03	Hold Mod ABS Valve	Voltage Shorted to B+	22 Channel Both Sides
83	44	03	Hold Mod ABS Valve	Voltage Shorted to B+	21 Channel Both Sides
88	51	03	Dump Mod ABS Valve	Voltage Shorted to B+	22 Channel Both Sides
89	50	03	Dump Mod ABS Valve	Voltage Shorted to B+	21 Channel Both Sides
90	251	01	Power Supply	Data Below Normal Range	Power < 8.0 Volts
91	251	04	Power Supply	Voltage Below Normal	Intermittent Low Power
92	251	00	Power Supply	Data Valid & Above Normal	Power > 17.0 Volts
93	13	12	Retarder Control Relay	Bad Device or Component	Defective ECU
99	253	12	Calibration Memory	Bad Device or Component	Defective ECU
9A	253	12	Calibration Memory	Bad Device or Component	Auxiliary Device Error

SAE J1587/J1708 Fault Codes

4S/3M - Sensor S1A, S1B, S2A & S2B - Side-By-Side

Fault Code	SID	FMI	Component	DTC Description	Location/Description
01	01	05	Wheel Speed Sensor	Open Circuit	S1A Axle 1 Road Side
02	02	05	Wheel Speed Sensor	Open Circuit	S1B Axle 1 Curb Side
03	04	05	Wheel Speed Sensor	Open Circuit	S2A Axle 2 Road Side
04	03	05	Wheel Speed Sensor	Open Circuit	S2B Axle 2 Curb Side
11	01	13	Wheel Speed Sensor	Out of Calibration	S1A Axle 1 Road Side
12	02	13	Wheel Speed Sensor	Out of Calibration	S1B Axle 1 Curb Side
13	04	13	Wheel Speed Sensor	Out of Calibration	S2B Axle 2 Road Side
14	03	13	Wheel Speed Sensor	Out of Calibration	S2A Axle 2 Curb Side
21	01	02	Wheel Speed Sensor	Data Erratic, Intermittent	S1A Axle 1 Road Side
22	02	02	Wheel Speed Sensor	Data Erratic, Intermittent	S1B Axle 1 Curb Side
23	04	02	Wheel Speed Sensor	Data Erratic, Intermittent	S2B Axle 2 Road Side
24	03	02	Wheel Speed Sensor	Data Erratic, Intermittent	S2A Axle 2 Curb Side
41	07	07	Pressure Mod ABS Valve	Mechanical Failure SWR	21 Channel Axle 1 Both Sides
42	10	07	Pressure Mod ABS Valve	Mechanical Failure SWR	22 Channel Axle 2 Curb Side
43	09	07	Pressure Mod ABS Valve	Mechanical Failure SWR	23 Channel Axle 2 Road Side
61	42	05	Hold Mod ABS Valve	Open Circuit	23 Channel Axle 1 Both Sides
62	45	05	Hold Mod ABS Valve	Open Circuit	22 Channel Axle 2 Curb Side
63	44	05	Hold Mod ABS Valve	Open Circuit	21 Channel Axle 2 Road Side
67	48	05	Dump Mod ABS Valve	Open Circuit	23 Channel Axle 1 Both Sides
68	51	05	Dump Mod ABS Valve	Open Circuit	22 Channel Axle 2 Curb Side
69	50	05	Dump Mod ABS Valve	Open Circuit	21 Channel Axle 2 Road Side
71	42	04	Hold Mod ABS Valve	Voltage Shorted to Ground	23 Channel Axle 1 Both Sides
72	45	04	Hold Mod ABS Valve	Voltage Shorted to Ground	22 Channel Axle 2 Curb Side
73	44	04	Hold Mod ABS Valve	Voltage Shorted to Ground	21 Channel Axle 2 Road Side
77	48	04	Dump Mod ABS Valve	Voltage Shorted to Ground	23 Channel Axle 1 Both Sides
78	51	04	Dump Mod ABS Valve	Voltage Shorted to Ground	22 Channel Axle 2 Curb Side
79	50	04	Dump Mod ABS Valve	Voltage Shorted to Ground	21 Channel Axle 2 Road Side
80	13	11	Retarder Control Relay	Failure Not Definable	Failure Not Definable
81	42	03	Hold Mod ABS Valve	Voltage Shorted to B+	23 Channel Axle 1 Both Sides
82	45	03	Hold Mod ABS Valve	Voltage Shorted to B+	22 Channel Axle 2 Curb Side
83	44	03	Hold Mod ABS Valve	Voltage Shorted to B+	21 Channel Axle 2 Road Side
87	48	03	Dump Mod ABS Valve	Voltage Shorted to B+	23 Channel Axle 1 Both Sides
88	51	03	Dump Mod ABS Valve	Voltage Shorted to B+	22 Channel Axle 2 Curb Side
89	50	03	Dump Mod ABS Valve	Voltage Shorted to B+	21 Channel Axle 2 Road Side
90	251	01	Power Supply	Data Below Normal Range	Power < 8.0 Volts
91	251	04	Power Supply	Voltage Below Normal	Intermittent Low Power
92	251	00	Power Supply	Data Valid & Above Normal	Power > 17.0 Volts
93	13	12	Retarder Control Relay	Bad Device or Component	Defective ECU
99	253	12	Calibration Memory	Bad Device or Component	Defective ECU
9A	253	12	Calibration Memory	Bad Device or Component	Auxiliary Device Error

Related Parts - ITCM System Components

Individual Air Valves
FFABS 4 port — Spring brake priority
FFABS 4 port — Service brake priority
FFABS 2 port — Spring brake priority
FFABS 2 port — Service brake priority
6 port ABS
2 port ABS
ECU mounting Bracket kit
TBCV — Trailer Brake Control valve

ECUs
ITCM ECU — Multi-Axle Applications - A7
ITCM ECU — Single Axle / Dolly Applications - A8

Cables
Speed Sensor - 90° 1.5m long
Speed Sensor Extension - 2m
Speed Sensor Extension - 4m
Speed Sensor Extension - 6m
Remote Valve Cable - 2m
Remote Valve Cable - 4m
Remote Valve Cable - 6m
Power Cord Extension - 1m
Power Cord Extension - 2m
Power Cord Extension - 4m
Power Cord Extension - 6m

Miscellaneous Items
Sensor Cable Connection Clip
Speed Sensor Retention Block Clip
Trailer Mounted ABS Lamp
Sensor Cable Hose Clip

Diagnostics
PLC Info Center
CAN Info Center 2
PLC PC Diagnostics Kit
7-Way Interface Cable
7-Way Adapter Cable
DIAG+ PC Diagnostics Kit

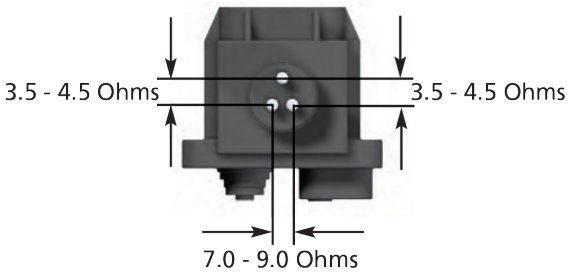
Solenoid Connections

Old Style Solenoid (Pre-DIN)

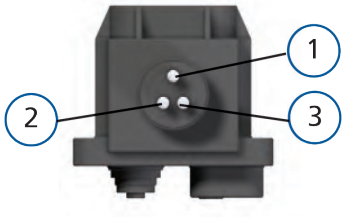
New Style Solenoid (DIN) - September 2009 - Present

Use a Volt-Ohm Meter to measure the Ohms across the Solenoid Pins as shown below.

Volt-Ohm Meter

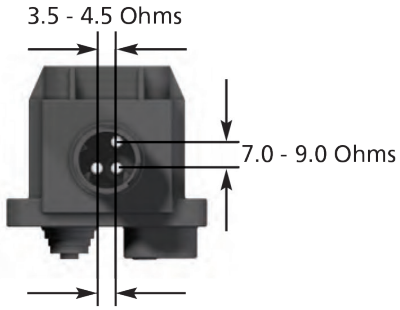


Old Style Solenoid (Pre-DIN)

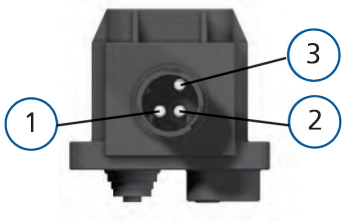


1. Common
2. Hold
3. Dump

Note: If Old Style Solenoid (Pre-DIN) is installed, it is recommended you replace the valve/solenoid assembly.



New Style Solenoid (DIN)



1. Common
2. Hold
3. Dump

Notes

Notes

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With more than 100 years of intensely focused innovation, Haldex holds unrivaled expertise in brake systems and air suspension systems for heavy trucks, trailers and buses. We live and breathe our business, delivering robust, technically superior solutions born from deep insight into our customers' reality. By concentrating on our core competencies and following our strengths and passions, we combine both the operating speed and flexibility required by the market. Collaborative innovation is not only the essence of our products - it is also our philosophy. Our employees, spread on four continents, are constantly challenging the conventional and strive to ensure that the products we deliver create unique value for our customers and all end-users.

To learn more, contact your Haldex sales professional.

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