SERVICE REPAIR

MANUAL

Hyster L007 (H190HD2, H210HD2, H230HD2, H230HDS2, H250HD2, H280HD2) Forklift Service Repair Manual

HYSTER

HYDRAULIC CONTROL SYSTEM (L007)

(USER INTERFACE MANUAL)

H8-12XM-6, H10XMS-6 (H190-280HD$_2$, H230HDS$_2$) [L007]

HYSTER

PART NO. 4133477

1900 SRM 1935

SAFETY PRECAUTIONS
MAINTENANCE AND REPAIR

- The Service Manuals are updated on a regular basis, but may not reflect recent design changes to the product. Updated technical service information may be available from your local authorized Hyster® dealer. Service Manuals provide general guidelines for maintenance and service and are intended for use by trained and experienced technicians. Failure to properly maintain equipment or to follow instructions contained in the Service Manual could result in damage to the products, personal injury, property damage or death.
- When lifting parts or assemblies, make sure all slings, chains, or cables are correctly fastened, and that the load being lifted is balanced. Make sure the crane, cables, and chains have the capacity to support the weight of the load.
- Do not lift heavy parts by hand, use a lifting mechanism.
- Wear safety glasses.
- DISCONNECT THE BATTERY CONNECTOR before doing any maintenance or repair on electric lift trucks. Disconnect the battery ground cable on internal combustion lift trucks.
- Always use correct blocks to prevent the unit from rolling or falling. See HOW TO PUT THE LIFT TRUCK ON BLOCKS in the **Operating Manual** or the **Periodic Maintenance** section.
- Keep the unit clean and the working area clean and orderly.
- Use the correct tools for the job.
- Keep the tools clean and in good condition.
- Always use HYSTER APPROVED parts when making repairs. Replacement parts must meet or exceed the specifications of the original equipment manufacturer.
- Make sure all nuts, bolts, snap rings, and other fastening devices are removed before using force to remove parts.
- Always fasten a DO NOT OPERATE tag to the controls of the unit when making repairs, or if the unit needs repairs.
- Be sure to follow the WARNING and CAUTION notes in the instructions.
- Gasoline, Liquid Petroleum Gas (LPG), Compressed Natural Gas (CNG), and Diesel fuel are flammable. Be sure to follow the necessary safety precautions when handling these fuels and when working on these fuel systems.
- Batteries generate flammable gas when they are being charged. Keep fire and sparks away from the area. Make sure the area is well ventilated.

NOTE: The following symbols and words indicate safety information in this manual:

WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury and property damage.

On the lift truck, the WARNING symbol and word are on orange background. The CAUTION symbol and word are on yellow background.

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

This section is for the following models:

H8-12XM-6, H10XMS-6 (H190-280HD2, H230HDS2) [L007]

General

This SRM describes the hydraulic control system, and its interaction with the Hydraulic User Interface Program.

See the following resources for additional information:

Hydraulic System1900SRM1934

Diagrams 8000SRM1938

Safety Precautions and Tips

Before connecting the Hydraulic User Interface, apply the park brake, lower the mast completely and shut down the engine. Turn the ignition key to the ON position.

Always make sure your system is properly connected (green icon, bottom of screen) and logging (blue icon, bottom of screen) before servicing the truck. See File Uploads/Downloads.

If making a connection is not working, check if the green LED on the HCU is on. This indicates the power is on.

Never disconnect the system while making changes to settings or downloading a file to the HCU.

The red LED on the HCU will switch on when there is a fault active.

After an application download always go to the Diagnostic screen and click the ‘Controller Defaults’ button when available.

After an application download always make sure the truck configuration is correct.

After an application download always recalibrate your levers/joystick.

If your trucks design deviates from the standard truck design, contact your Service representative for additional information.

List of Terms and Abbreviations

Abbreviation	Explanation
(E)CH	(Empty) Container Handler
AIN	Analog Input
Application file	The operating software program on the HCU
DIN	Digital Input
DOUT	Digital Output
ECM	Engine Control Module
FLT	Fork Lift Truck
HCU	Hydraulic Control Unit
HiP/ECO eLo	High Performance/Economic energy Low
LED	Light-Emitting Diode
OPS	Operator Present Switch
P1T-file	Parameter (settings) file
PVE	Proportional Valve Electric actuator
PWM	Pulse Width Modulation
ROP	Read Only Parameter
TCU	Transmission Control Unit

Installing the Hydraulic User Interface Program

The Hydraulic User Interface Program can be obtained through Hypass Online. Save the download from Hypass Online to a location on your computer. The download contains 2 executables that both need to be installed. Double click the HUIP_Dealer_setup.exe and follow the steps in the installation guide. Once completed double click the HUIP_Package_setup.exe and follow the steps in the installation guide.

Starting the Hydraulic User Interface Program

This section describes how to setup the Hydraulic User Interface Program for the truck that needs to be serviced. Start the program by clicking the Hydraulic User Interface Program icon on your desktop. See Figure 1, or through the Windows Start Menu. See Figure 2.

Figure 1. Desktop Icon Hydraulic User Interface

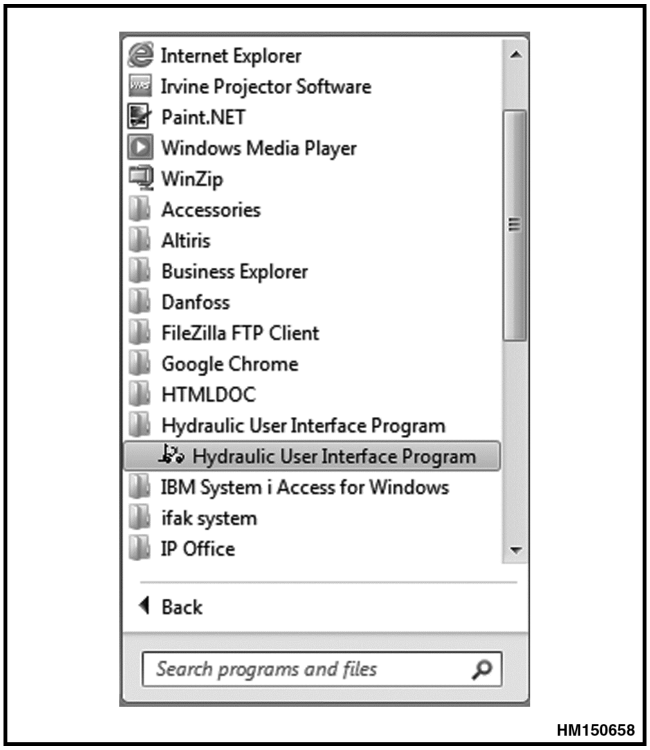


Figure 2. Windows Start Menu Access

Truck Selection Window

The Hydraulic User Interface Program will start with showing the window where the truck serial number needs to be entered. See Figure 3. This way the Hydraulic User Interface Program will make sure the file is opened that matches the truck.

For additional information about the Truck Selection window check the Help section.

After entering the truck serial number or selecting one from the drop-down box, click the 'Open' button and the Hydraulic User Interface Program will open the diagnostic file applicable for the truck.

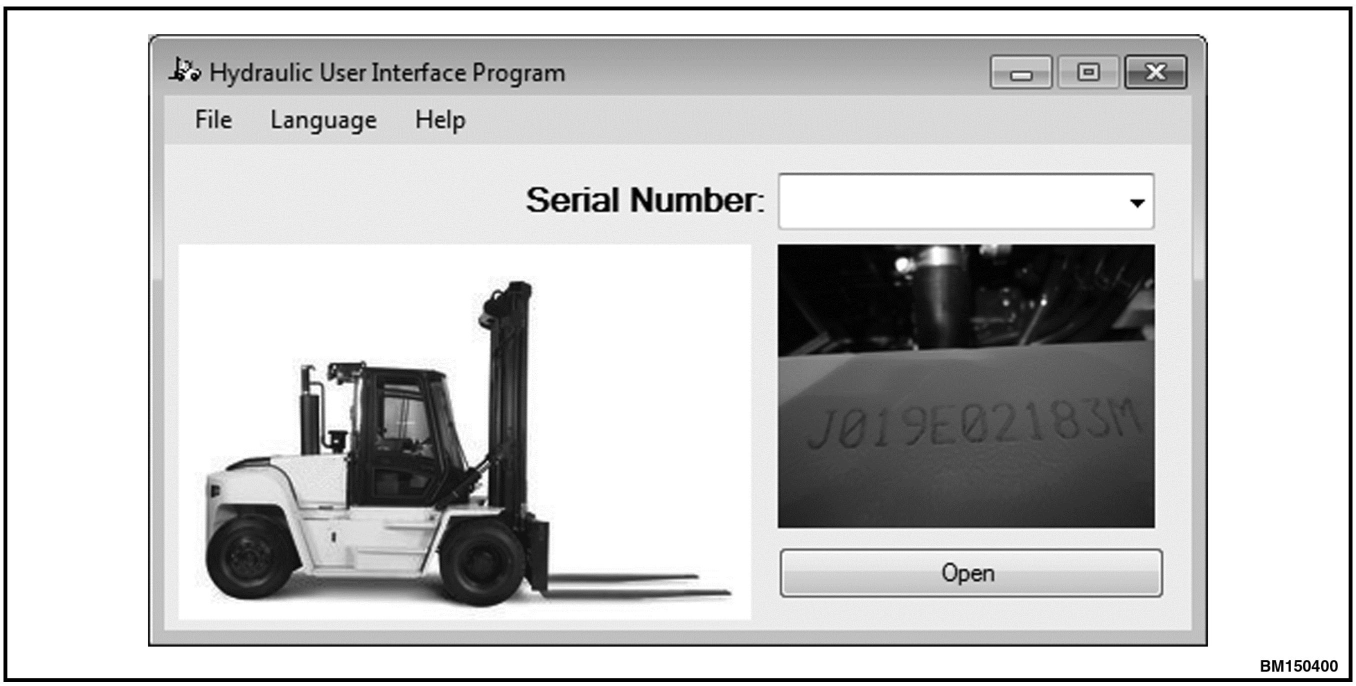


Figure 3. Truck Selection Window

Start Screen/Language Selection

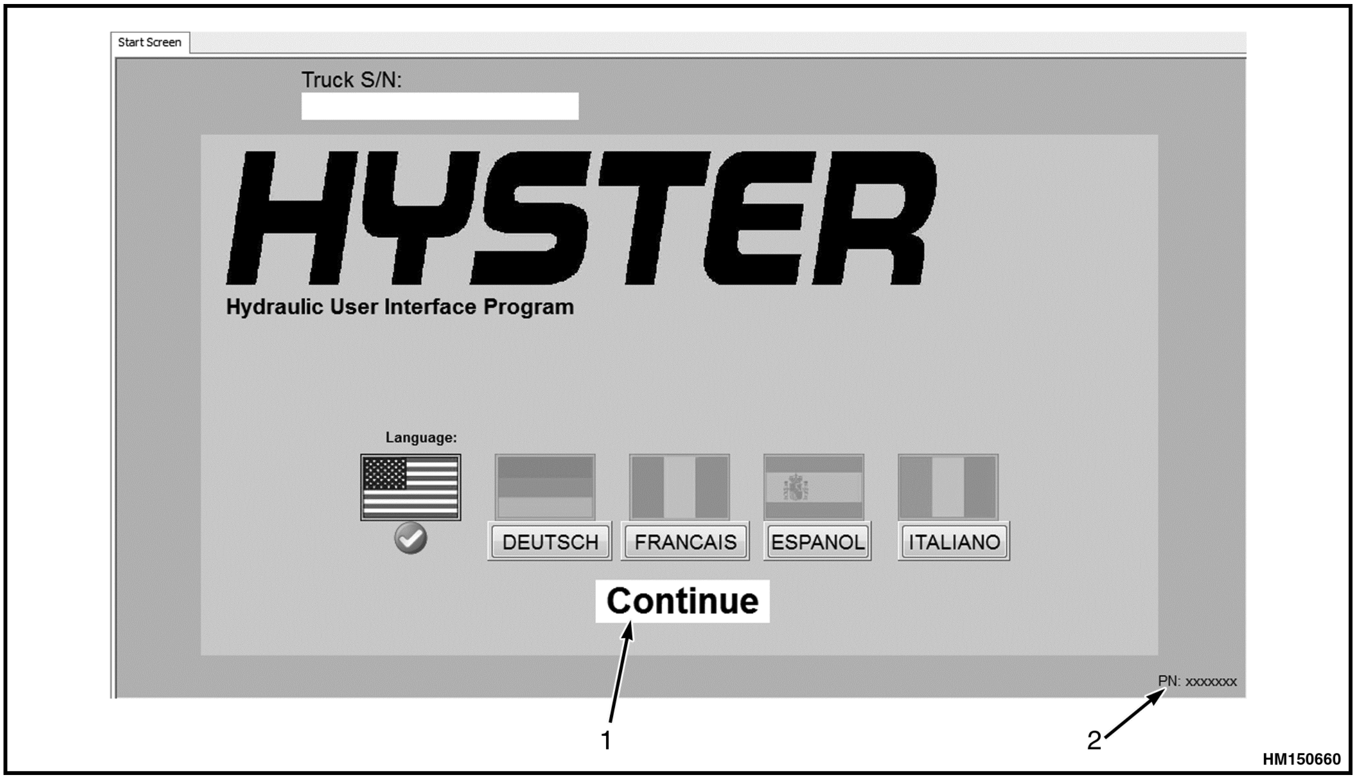
The start screen is the first screen shown when starting the Hydraulic User Interface Program. In this screen the user can select the desired language. See Figure 4.

Once the language is selected, click on the Continue button (1) to proceed to the next screen.

The start screen also contains the part number (2) of the diagnostic file.

From anywhere in the Hydraulic User Interface Program the user can return to the start screen by moving the pointer over the left margin of the screen. This will open the Diagnostic Navigator. See Figure 5.

Any screen can be accessed through the Diagnostic Navigator. Under Parameter Functions select the 'Start Screen' to return to the Start screen.



1. CONTINUE BUTTON

2. PART NUMBER

Figure 4. Start Screen

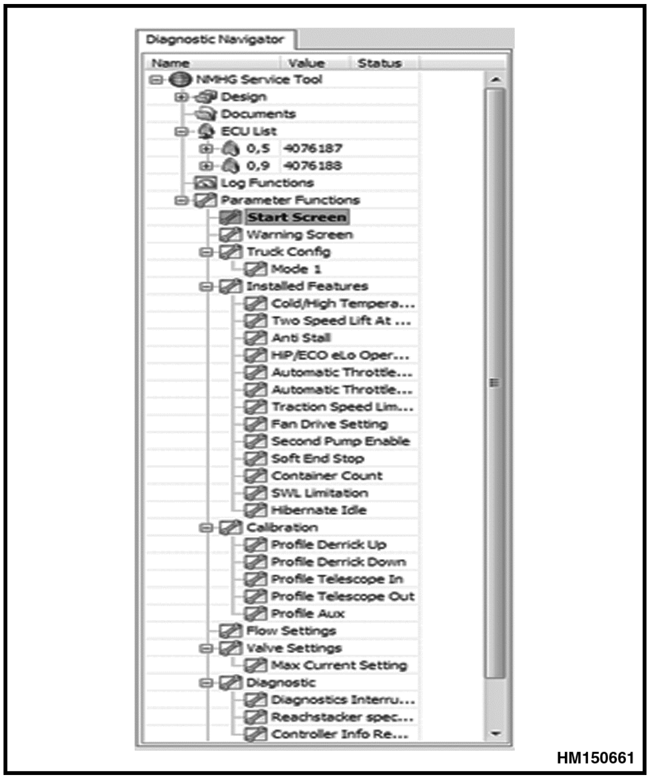


Figure 5. Diagnostic Navigator

Warning Screen

After clicking ‘Continue’ on the Start screen, the Warning screen is opened. The warning screen is a reminder to always confirm any changes made to parameters. See Figure 6.

After changing a setting in any screen of the Hydraulic User Interface Program, the setting must be downloaded to the HCU. To download an altered setting, click the download button, or press [F4] on your keyboard. If you did not make changes, there is no need to click the button. See Figure 7.

To continue to the next screen, click on the ‘Click here to Continue’ button (1).

The download button can only be found on screens that have the possibility to make changes to settings. Only the settings in the active screen will be downloaded to the HCU. The button can be found in the bottom-right of the screens. See Figure 7.

In addition an upload button can be found in the bottom-left of the screens. Clicking this button or pressing [F2] will refresh the parameters in the active screen with the values in the HCU. See Figure 8.

1. CONTINUE BUTTON

Figure 6. Warning Screen

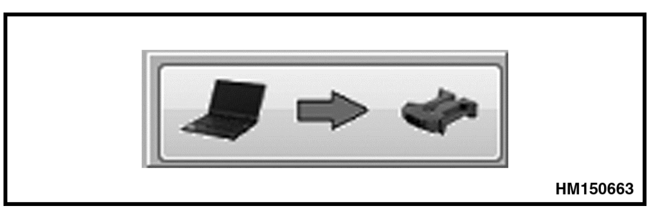


Figure 7. Download Button

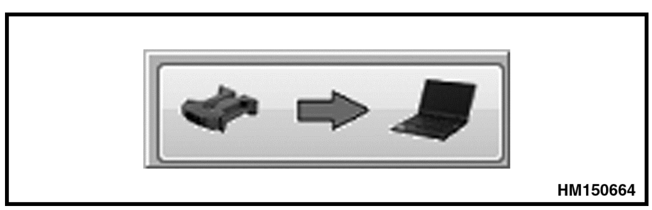


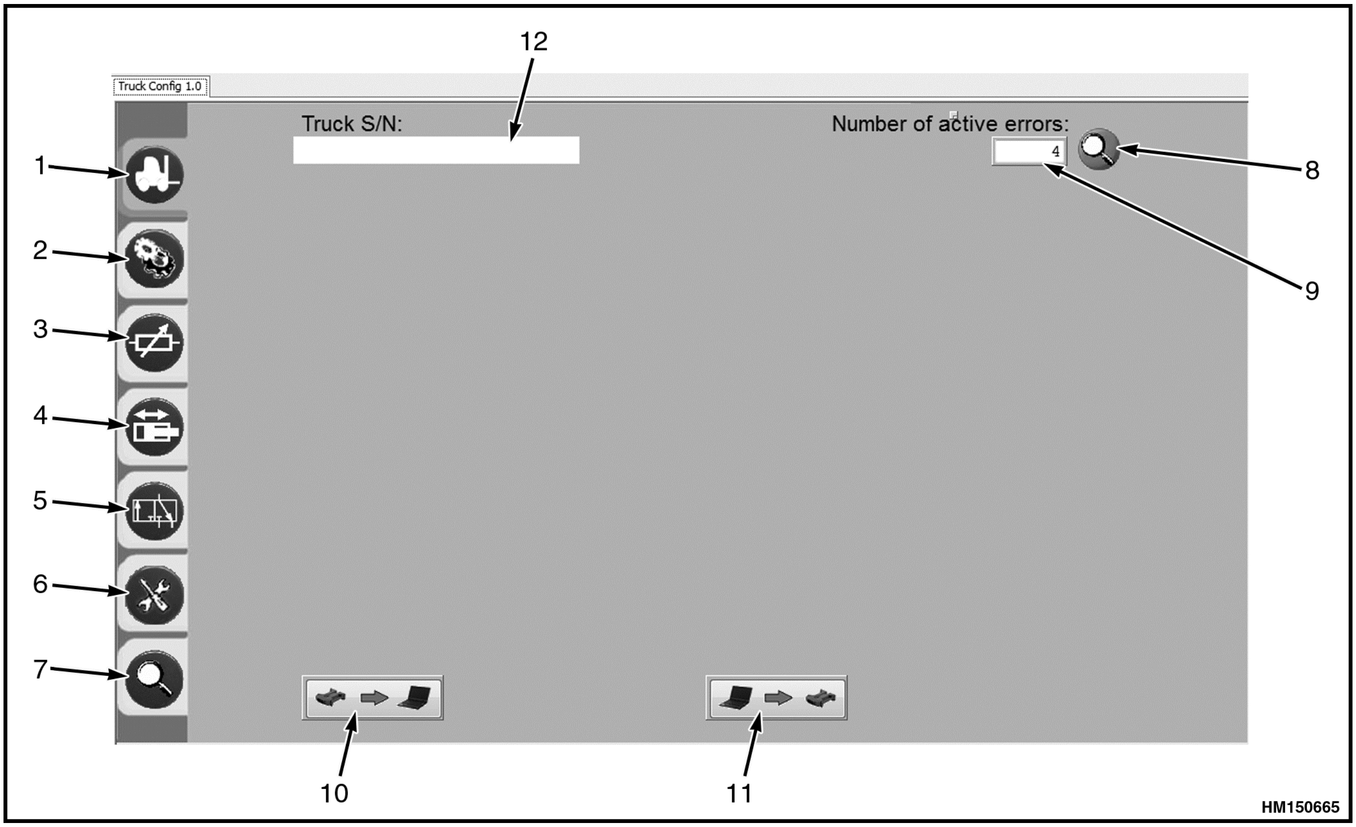
Figure 8. Upload Button

Basic Screen Explanation

This section explains the basic navigation of the Hydraulic User Interface Program.

The user can use the various buttons to navigate to the desired functionality. The functions of the buttons are explained and appear in almost every page of the Hydraulic User Interface Program. See Figure 9.

For screens not accessible through the tabs on the left of the screen, use the Diagnostic Navigator. See Start Screen/Language Selection.

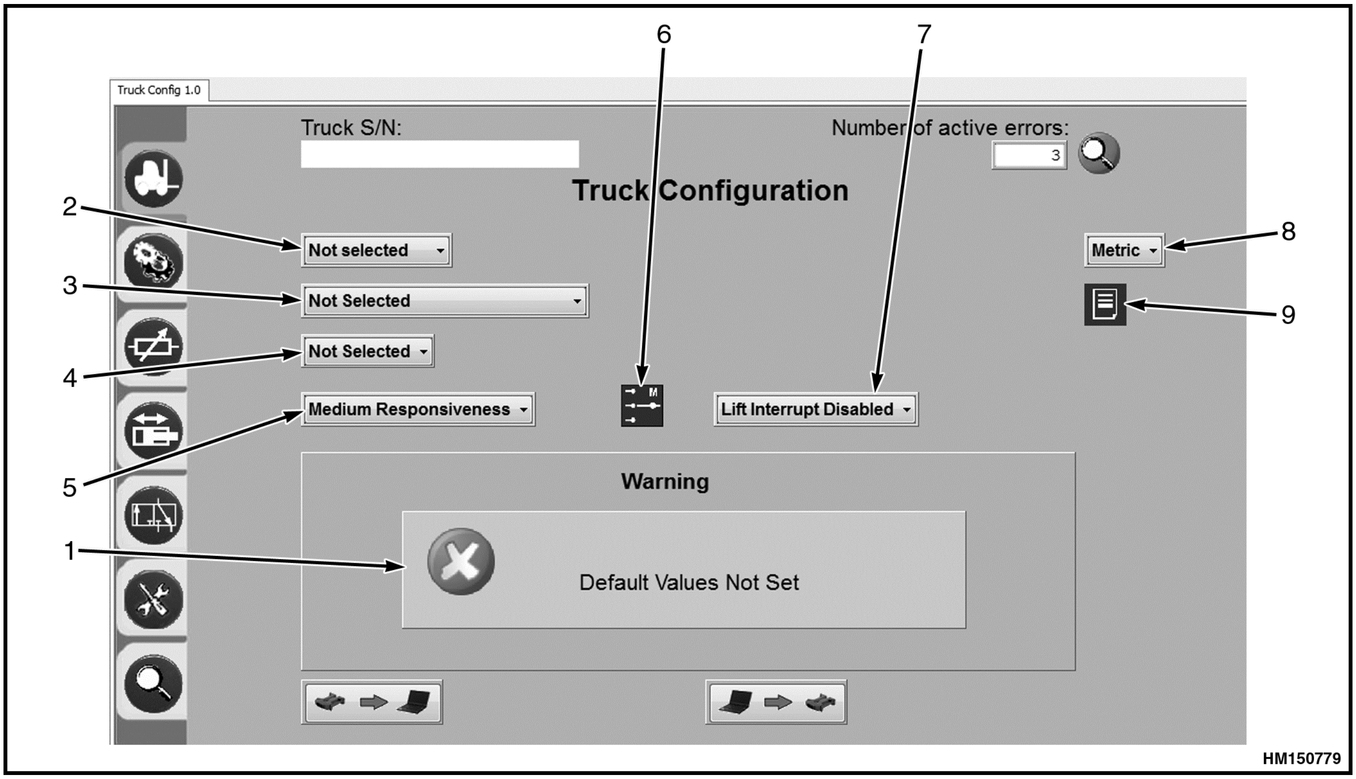


1. TRUCK CONFIGURATION. SEE TRUCK CONFIGURATION
2. INSTALLED FEATURES. SEE INSTALLED FEATURES
3. CALIBRATION. SEE CALIBRATION SCREEN
4. FLOW SETTINGS. SEE FLOW SETTINGS
5. VALVE SETTINGS. SEE VALVE SETTINGS
6. DIAGNOSTICS. SEE DIAGNOSTICS
7. ACTIVE ERRORS. SEE ACTIVE ERRORS
8. LINK TO ACTIVE ERRORS SCREEN. ONLY VISIBLE WHEN AN ERROR IS ACTIVE. SEE ACTIVE ERRORS
9. NUMBER OF ACTIVE ERRORS
10. UPLOAD SETTINGS: UPDATES THE ACTIVE SCREEN WITH THE APPLICABLE SETTINGS IN THE HCU. SEE WARNING SCREEN
11. DOWNLOAD SETTINGS: DOWNLOADS SETTINGS ON THE ACTIVE SCREEN INTO THE HCU. SEE WARNING SCREEN
12. TRUCK SERIAL NUMBER (EG L007E01501M). SEE INSTALLED FEATURES

Figure 9. Basic Screen Layout

Truck Configuration

The Truck Configuration screen is used to setup the truck's controls and front-end. Figure 10 shows the screen when the configuration of the HCU has not yet been completed. This may occur when a new HCU is installed. As long as the warning (1) is displayed, the truck's hydraulic system will not be operational.



1. WARNING, TRUCK CONFIGURATION NOT COMPLETED
2. PUMP SELECTION
3. CONTROLS SELECTION
4. FRONT-END SELECTION
5. RESPONSIVENESS SELECTION
6. LINK TO RESPONSIVENESS SETTINGS
7. INTERRUPT SELECTION
8. UNITS SELECTION
9. LINK TO ALL PARAMETER SCREEN

Figure 10. Truck Configuration Screen (Not Configured)

Pump Selection

In the pump selection box the installed pump configuration needs to be selected. The pump selection determines the valve settings. See Figure 11.

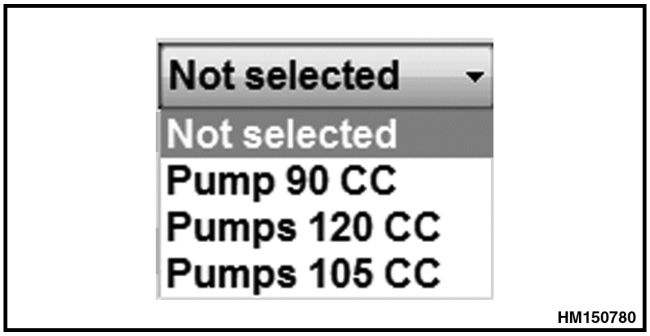


Figure 11. Pump Selection Box

Control Selection

In the control selection box (see Figure 12) the installed lever and/or switches or joystick type needs to be selected. After selecting the control option, click on the download button. After downloading the control option to the HCU, the Hydraulic User Interface Program will present the corresponding front-end options in the front-end selection box (see Figure 13) and the resulting lever-calibration options (see Calibration Screen).

If the installed controls do not match with any of the options in the Hydraulic User Interface Program, contact your Service representative.

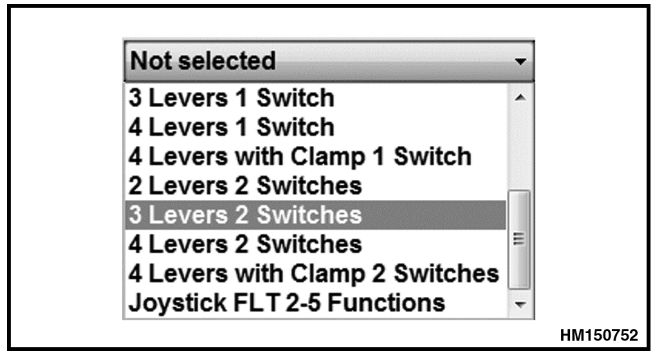


Figure 12. Controls Selection Box

Front-End Selection

In the front-end selection the user can select the installed front-end. This selection determines which auxiliary functions are enabled and corrects the flow settings to match the front-end. See Figure 13.

If the installed front-end does not match with any of the options in the Hydraulic User Interface Program, contact your Service representative.

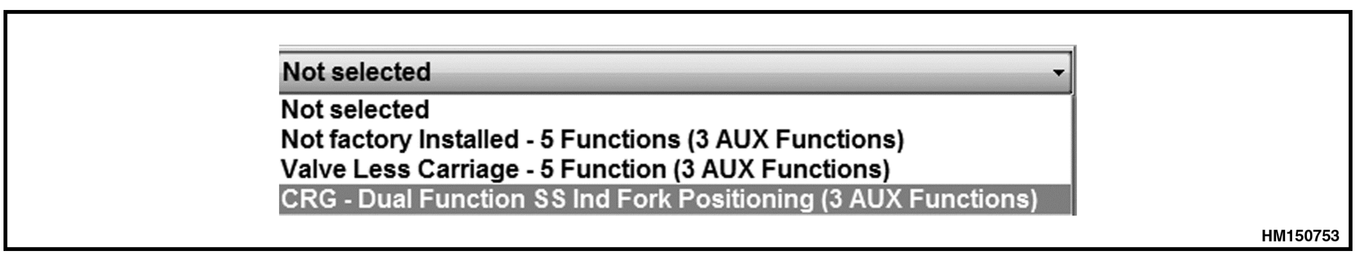
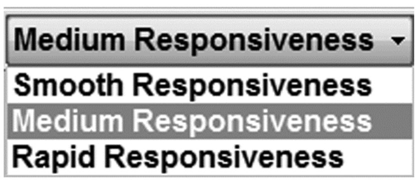


Figure 13. Front-End Selection

Responsiveness Settings

The responsiveness settings can be used to alter the control reaction of the hydraulic system. By default the responsiveness is set to 'Medium'. See Figure 14.

By clicking the link to responsiveness settings (see Figure 10, item 5), the user navigates to the sub-screen Mode definition screen linked to the chosen responsiveness.



HM150713

Figure 14. Responsiveness Selection

Interrupt Selection

In the Interrupt selection the user can enable the Lift interrupt function. For ECH models the lift interrupt is enabled by default and cannot be switched off. For ECH models, a Lift interrupt is activated when the twist-locks are neither locked nor unlocked. See Figure 15.

Contact your Service representative to establish if any additional hardware is required.

HM150714

Figure 15. Interrupt Selection Box

Units selection

In the unit selection the user can switch between Metric or Imperial units. See Figure 16.

HM150669

Figure 16. Unit Selection Box

All Parameter Screen

By clicking the link to the 'All Parameter' screen, the All Parameter screen is displayed. See Figure 17. Here the user can upload and download files from and to the HCU. See File Uploads/Downloads.

HM150670

Figure 17. Link to all Parameter Screen

Once the control- and front-end selections have been made, the warning will disappear. See Figure 18.

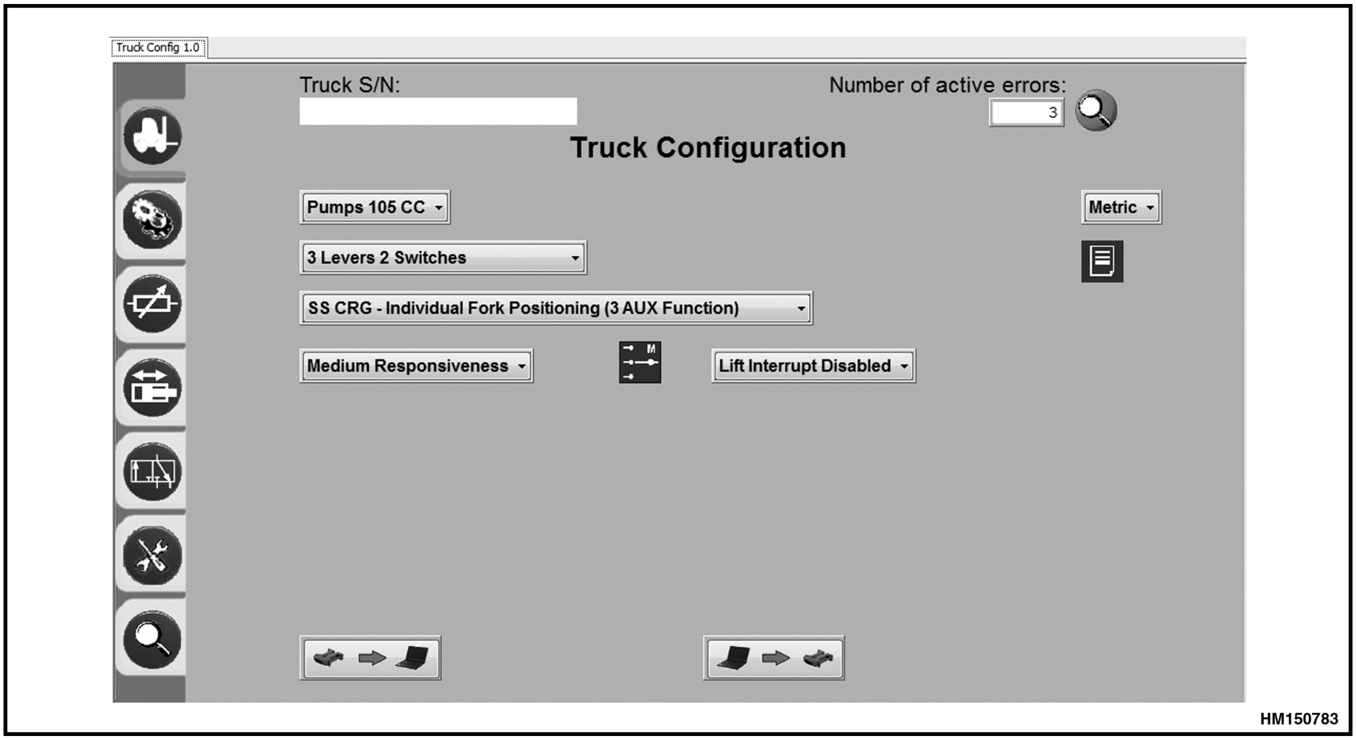


Figure 18. Truck Configuration Completed (FLT)

Installed Features

In the Installed Features screen the user can enable/disable certain features. Some features are standard and are enabled by default, depending on engine type. See Figure 19.

Some features are optional and have to be enabled by downloading an ROP (Read Only Parameter)-file into the HCU.

For enabling ROP functions contact your Service representative.

Figure 19 shows how the Installed Features screen will look for a truck with a Tier4 engine.

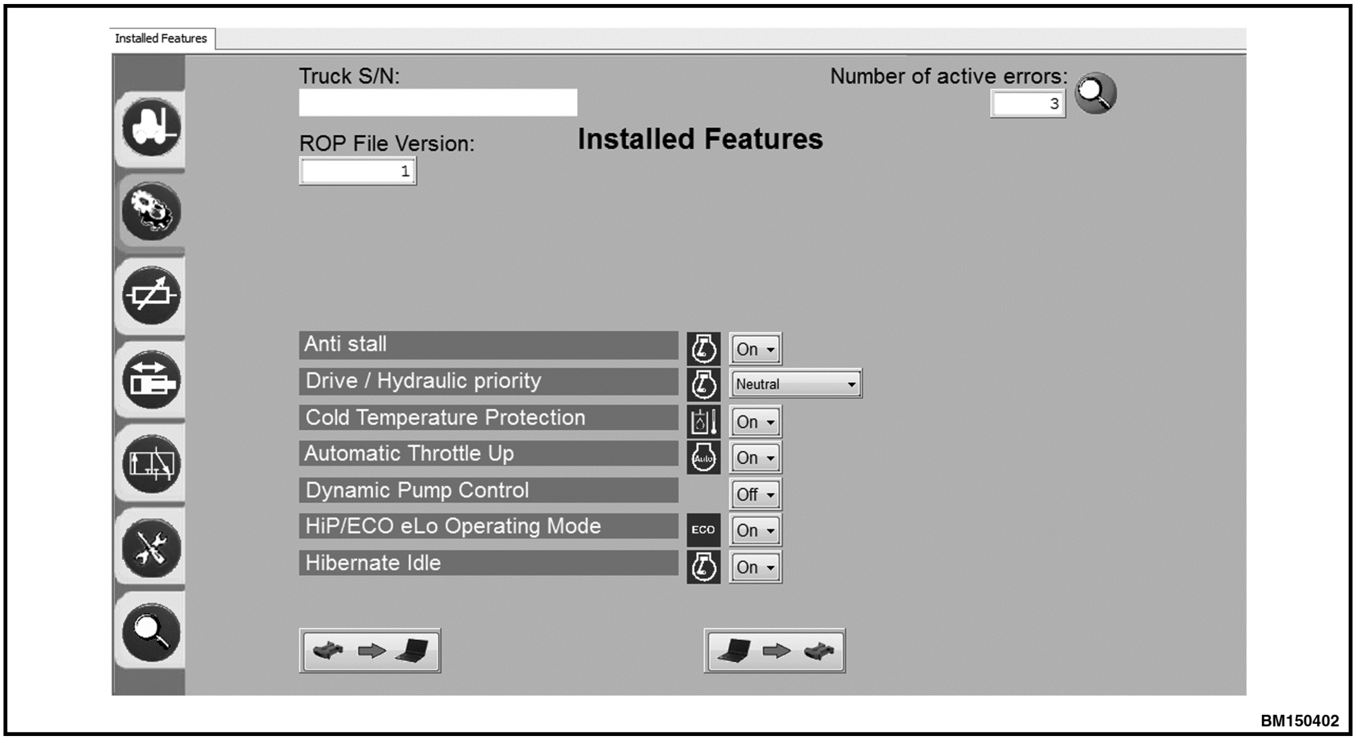


Figure 19. Installed Features Screen (Tier4)

Software Enabled Options

There are a few Installed features available which are not standard. They have to be purchased and enabled. Figure 20 shows how the Installed Features screen looks with the ROP- options enabled.

The ROP-enabled options will only be visible if they are enabled. For enabling ROP functions contact your Service representative.

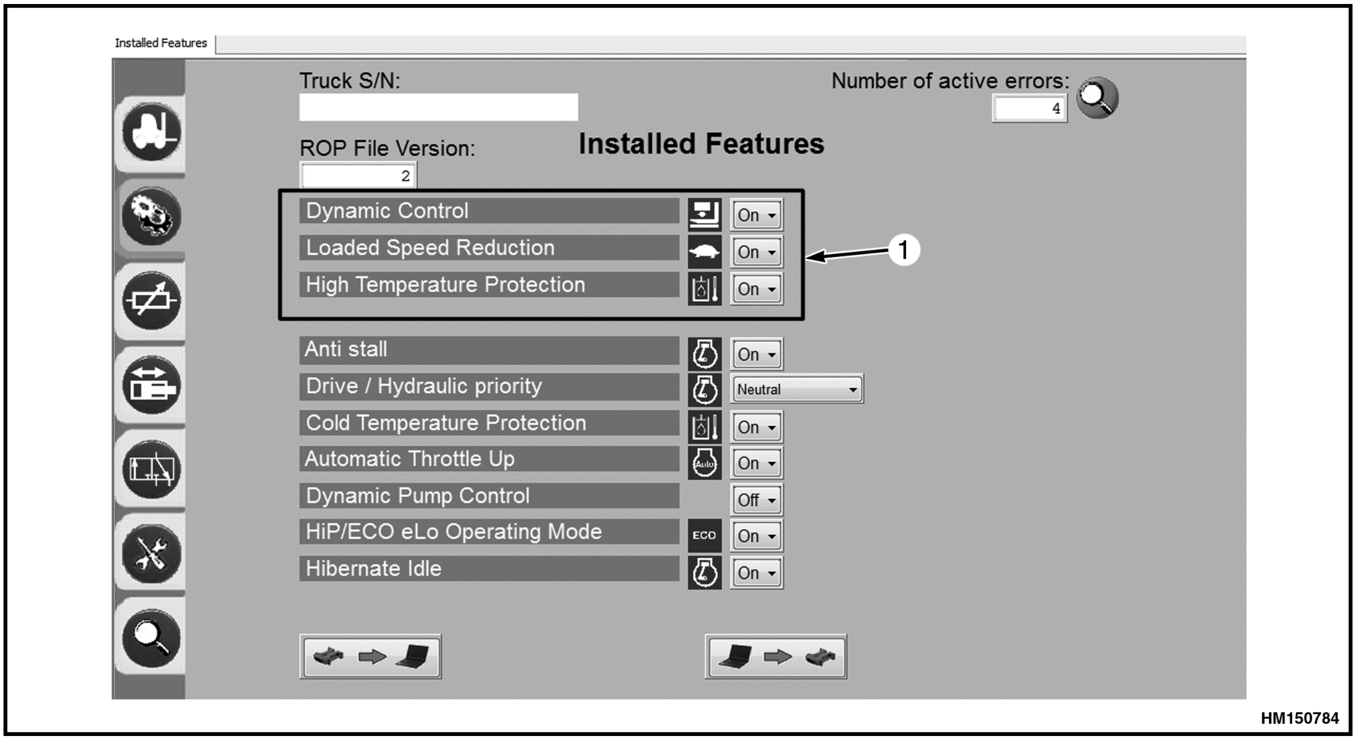
Dynamic Control

The Dynamic Control feature is used to make the trucks controllability independent of the load. The HCU uses a pressure transducer in the lift section to measure the load. Depending on this signal the HCU makes sure the lowering speed is not influenced by the load. For the lift and lower function, the responsiveness settings are load-depending to maintain controllability regardless of the load.

High Temperature Protection

The High Temperature Protection works in two stages. First it acts as a warning system to indicate the hydraulic oil temperature is getting too high. When the hydraulic oil temperature gets too high, an orange warning light is displayed on the instrument cluster and a exceed code (hHot, see Fault Code Table) is displayed. The warnings will disable when the hydraulic oil temperature is reduced.

In the second stage, the High Temperature Protection will reduce truck performance to avoid over-temperature. When the hydraulic oil temperature gets too high, a red warning light is displayed on the instrument cluster in addition to the orange warning light and the exceed code. Also the trucks vehicle speed will be reduced. The vehicle speed limitation will be disabled when the hydraulic oil temperature is reduced.



1. ROP ENABLED OPTIONS

Figure 20. Installed ROP-Options

Loaded Speed Reduction

The Loaded Speed Reduction reduces the vehicle speed once the pressure in the lift section is above an adjustable threshold. By clicking the function icon (see Figure 21) the Loaded Speed Reduction settings screen is opened. See Figure 22.

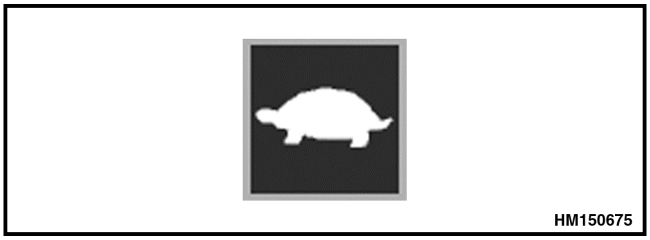
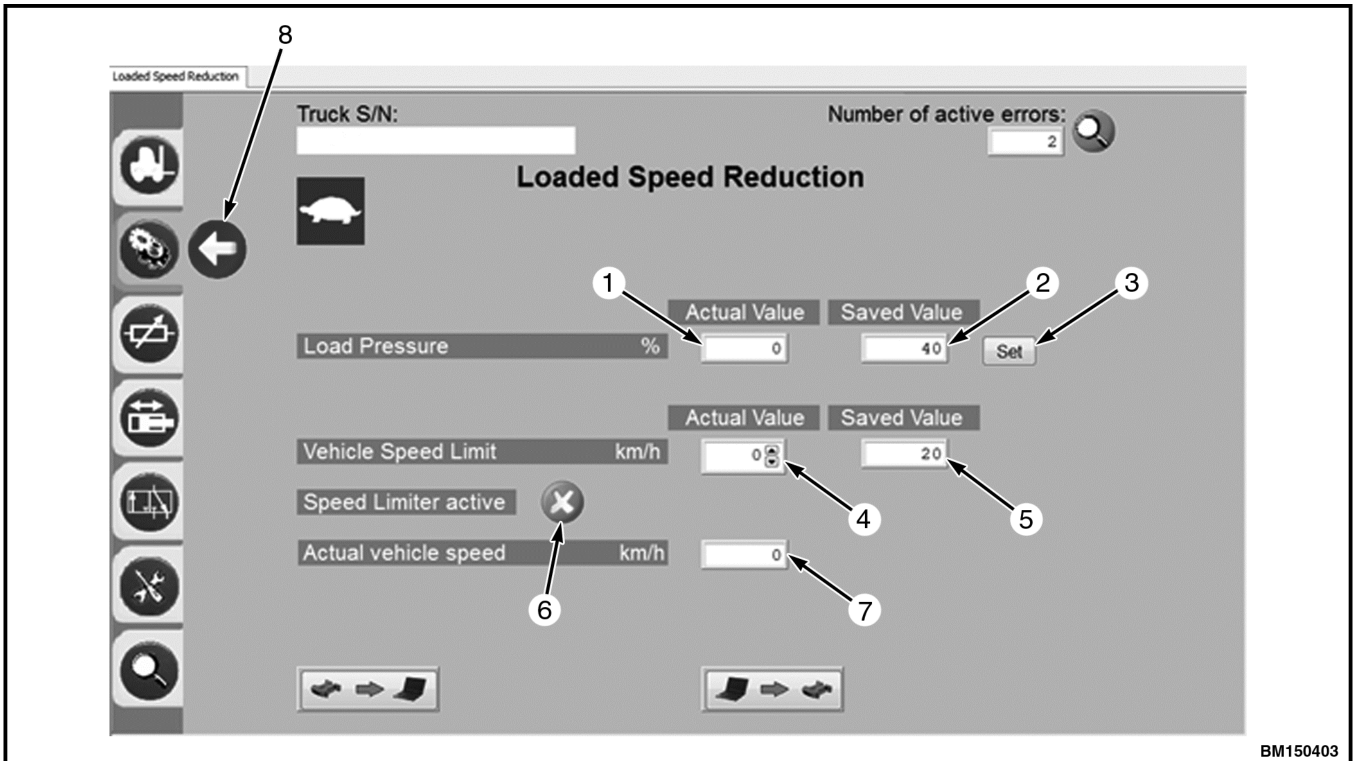


Figure 21. Link to Loaded Speed Reduction Settings

The Loaded Speed Reduction has the possibility to set a speed limiter when more than a preset load is picked up. To set up a speed limiter like this, proceed as described below:

- Pick up the maximum load which should not set a speed limiter.*
- Click the 'Set' button (3). The lift pressure is now stored as a threshold.

*The Loaded speed Reduction keeps a margin over the threshold. This way the vehicle speed will only be activated when more than the preset load is picked up.



1. ACTUAL MEASURED VALUE (% OF PRESSURE RANGE 0-250 BAR)
2. PRESSURE THRESHOLD STORED IN MEMORY (% OF PRESSURE RANGE 0-250 BAR)
3. 'SET' BUTTON. CLICKING THIS BUTTON STORES THE 'ACTUAL VALUE' (1) INTO 'SAVED VALUE' (2)
4. VEHICLE SPEED LIMIT SETTING. THIS SETTING CAN BE CHANGED TO ALTER THE LIMITED VEHICLE SPEED
5. VEHICLE SPEED LIMIT SETTING STORED IN MEMORY
6. LOADED SPEED REDUCTION ACTIVE INDICATOR
7. ACTUAL VEHICLE SPEED
8. 'BACK' BUTTON. RETURNS TO INSTALLED FEATURES

Figure 22. Loaded Speed Reduction Settings

Standard Installed Features

For a truck with a Tier3 engine the Installed Features screen will look as shown in Figure 23. In this example there are no ROP-options enabled.

Anti-stall

Anti-stall is used to prevent engine stall. If engine speed or available engine torque is too low, hydraulic take-off will be reduced. Anti-stall is enabled by default for all engine types and can only be disabled by your Service representative.

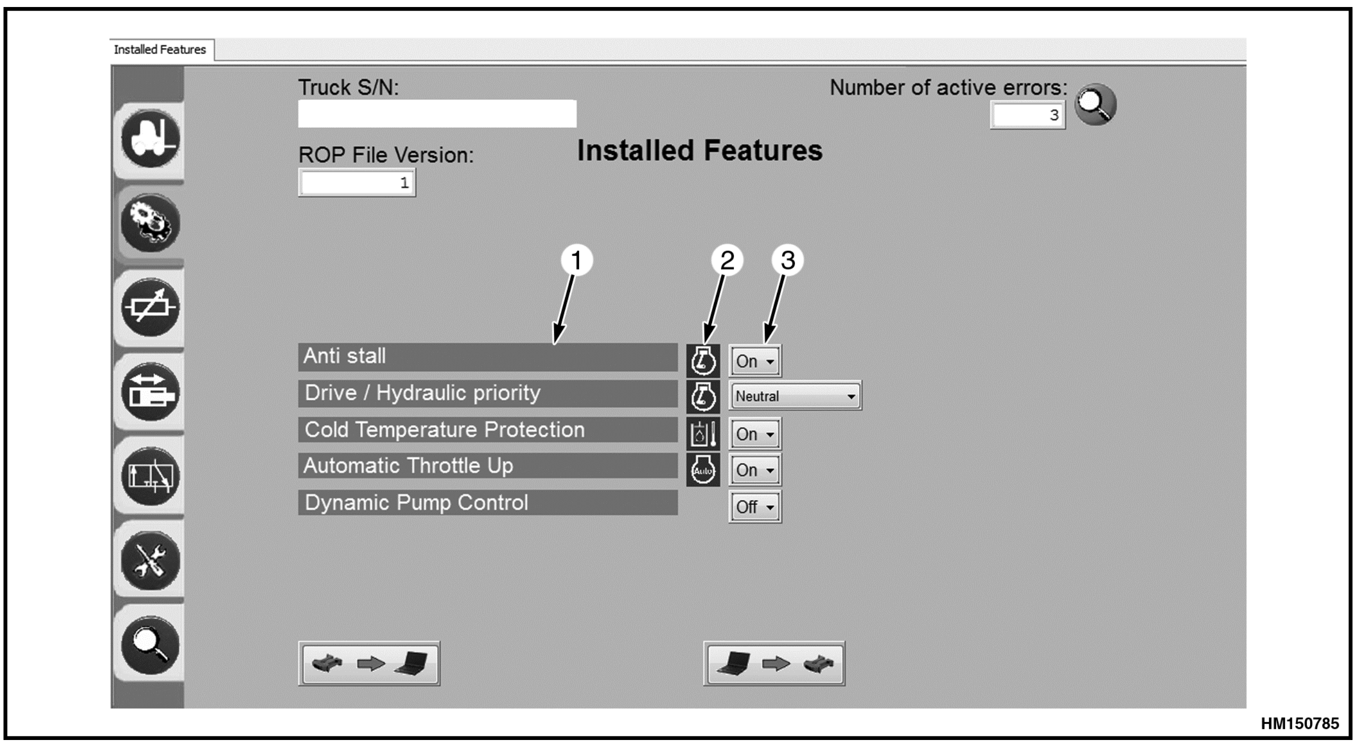
Cold Temperature Protection

The Cold Temperature Protection feature is used to prevent damage to the hydraulic system in cold conditions. If the hydraulic oil temperature is too low, the engine speed is reduced according to Table 1.

In the Diagnostic screen is indicated when the Cold Temperature Protection is active. See Diagnostics. Cold Temperature Protection is enabled by default for all engine types and can only be disabled by your Service representative.

Table 1. Cold Temperature Protection

Hydraulic Oil Temperature	Max engine speed
-5°C (23°F)	No limitation
-10°C (14°F)	1600 rpm
-13°C (9°F)	1200 rpm
-20°C (-4°F)	1000 rpm

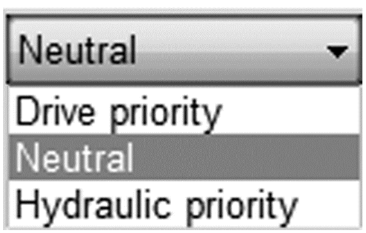


1. FEATURE NAME
2. FEATURE ICON (LINK TO SETTINGS SCREEN)
3. ON/OFF SELECTION BOX

Figure 23. Installed Features Screen (Tier3)

Drive/Hydraulic Priority

The Drive Over Hydraulics feature makes it possible to accelerate the truck while lifting a load. The feature reduces hydraulic lift, tilt and auxiliary take-off in the lower engine speed range while driving. The amount of Drive vs Hydraulics can be adjusted in the drop down box. The default setting is neutral. If the application requires more drive than hydraulic capability, select the Drive priority. If the application requires more hydraulic capability than drive, select the hydraulic priority. See Figure 24.



BM150404

Figure 24. Drive/Hydraulic Priority Selection

Automatic Throttle Up

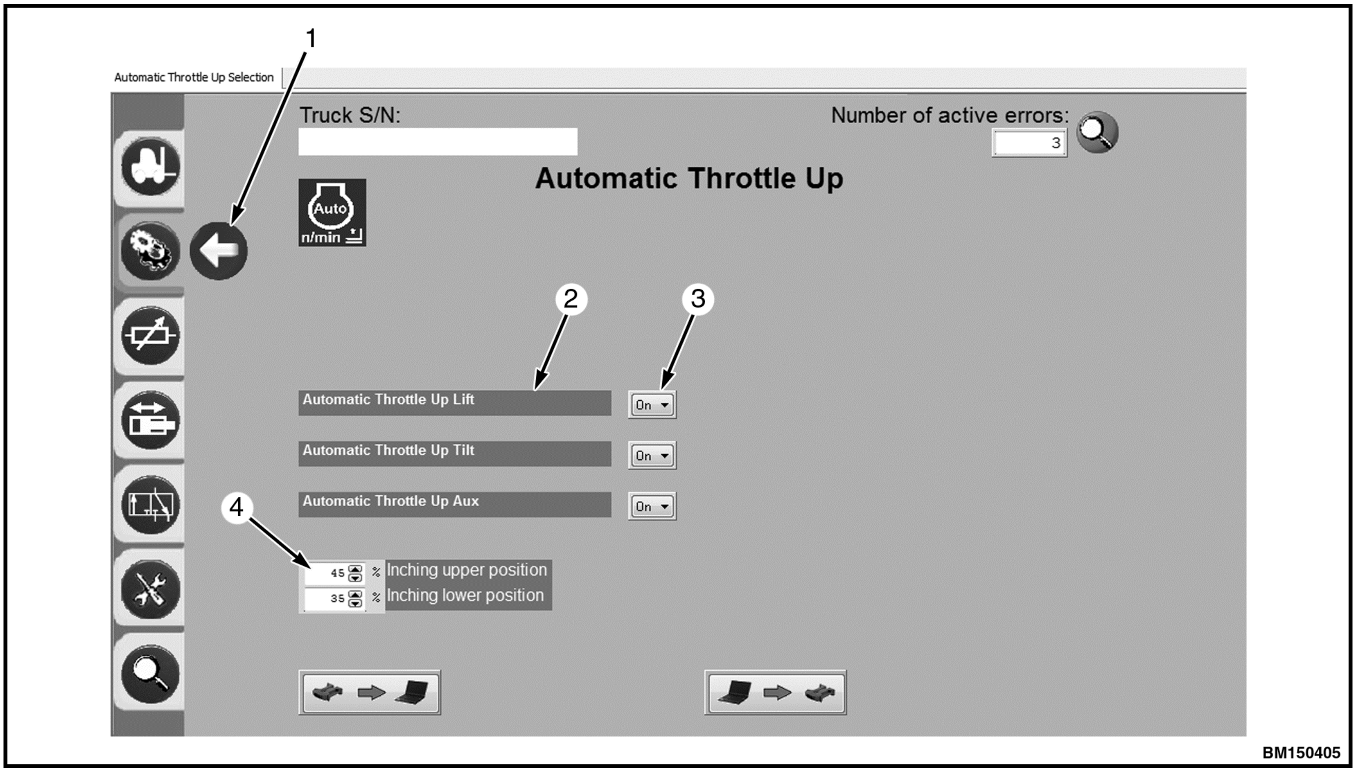
The Automatic Throttle Up feature controls engine speed depending on the lever position of a proportional hydraulic function. Automatic Throttle Up is only active if the transmission is in neutral or if the inching pedal is depressed. Automatic Throttle Up is enabled by default for all engine types. By clicking the function icon (see Figure 25) the Automatic Throttle Up selection screen is opened. See Figure 26.

HM150677

Figure 25. Link to Automatic Throttle Up Selection

In the Automatic Throttle Up selection screen the feature can be disabled per sub-function. The three sub functions are:

- Lift (Typically the 1st lever or joystick back/forth)
- Tilt (Typically the 2nd lever or joystick left/right)
- Auxiliary (Typically the 3rd and 4th lever or joystick thumbwheel and joystick rotate)



1. 'BACK' BUTTON. RETURNS TO INSTALLED FEATURES
2. SUB-FUNCTION NAME
3. ON/OFF SELECTION BOX
4. INCHING PEDAL POSITION SETTINGS

Figure 26. Automatic Throttle Up Selection Screen

HIP/ECO Operating Mode

The HIP/ECO key switch is available on Tier 4 engine types only. This key switch allows the selection of either the HIP (High Performance) Operating Mode or the ECO (Economy) Operating Mode.

The High Performance Operating Mode is the normal operating mode. In the ECO Operating Mode the maximum engine speed is reduced and engine response is more gentle, which results in an improved fuel efficiency.

The key switch is located in the side console and has a label which indicates the key positions to select one of the two operating modes.

Functionality of the key switch can be disabled in the Hydraulic User Interface program, which results in a continuous activation of the of the High Performance Operating Mode, irrespective of the key switch position.

Hibernate Idle

The Hibernate Idle function reduces fuel consumption by reducing idle engine speed when the truck has not been used for a while.

Hibernate idle is enabled by default for Tier4 engine types only and can be disabled in the Installed Features screen. See Figure 19. By clicking the function icon (see Figure 27) the Hibernate Idle settings screen is opened. See Figure 28.

Figure 27. Link to Hibernate Idle Screen

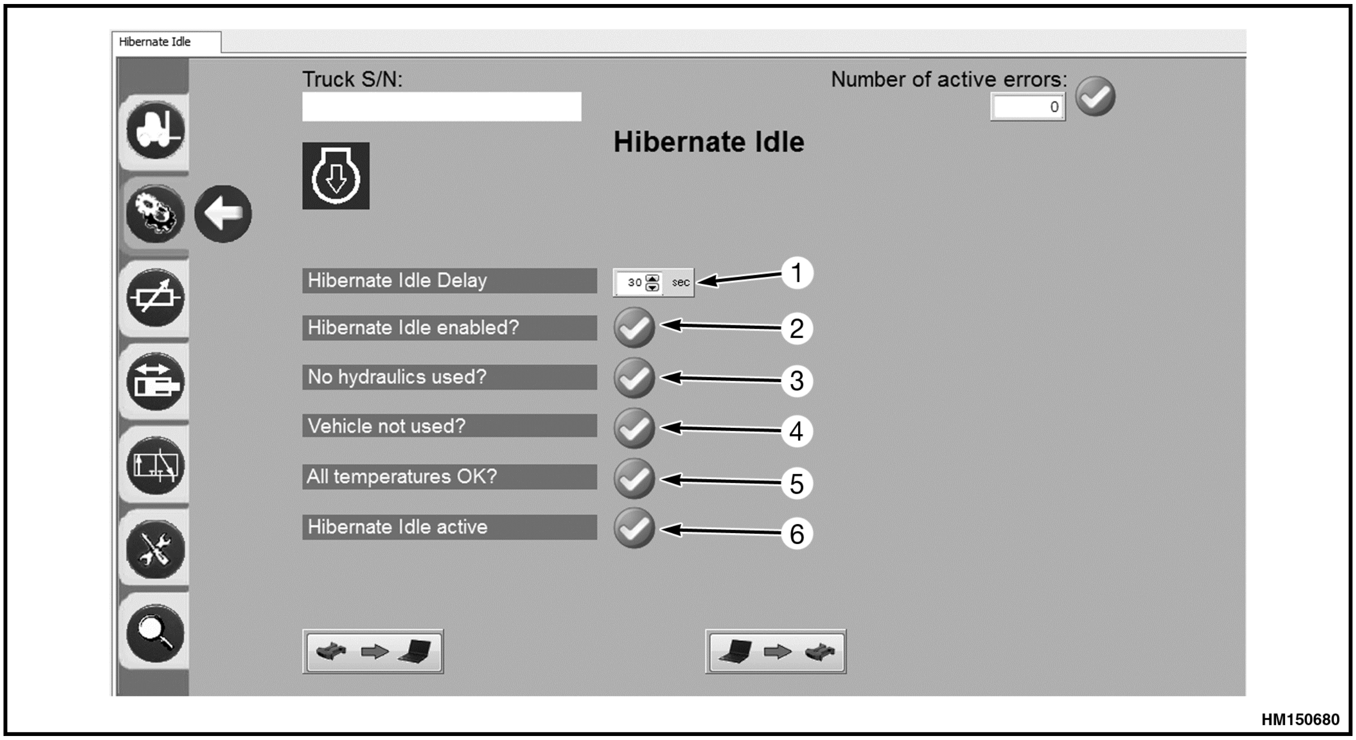


Figure 28. Hibernate Idle Screen

Table 2. Legend for Hibernate Idle Screen

Item	Hibernate Idle Button	Function
1	Hibernate Idle activation delay time	After not using the truck for this amount of time, the idle engine speed switches to Hibernate Idle.
2	Function enable indicator	Indicates if:
		a. The engine type is Tier4.
		b. The function is switched ON in the Hydraulic User Interface Program. (See Figure 19).
		c. The inputs for the function over the CAN-bus are received correctly.
3	Hydraulic usage indicator	Indicates if there is any hydraulic input active. The hydraulic inputs monitored:
		a. The (up to) 4 proportional levers or proportional joystick functions*.
		b. The (up to) 2 switches*.
		c. The flow request from a spreader (if applicable).
4	Vehicle usage indicator	Monitors the following vehicle functions:
		a. Vehicle speed.
		b. Accelerator pedal position.
		c. Inching pedal position.
		d. Gearbox neutral status.
5	Temperatures OK indicator	Monitors the following temperatures:
		a. Engine coolant temperature below 95°C (203°F).
		b. Transmission Oil temperature below 90°C (194°F).
		c. Hydraulic Oil temperature above 18°C (64.4°F) and below 85°C (185°F).
6	Hibernate Idle active indicator	Indicates if the HCU is sending the signal to the engine to go to Hibernate Idle.
NOTE: For item 3 *Levers and switches layout may differ from standard.		

If any of the conditions are not met, the Hibernate Idle function will not activate. This is indicated by a white cross instead of a tick. See Figure 29.

Figure 29. Error Indicator

Dynamic Pump Control

Dynamic Pump Control engages and disengages one of the two hydraulic pumps to avoid high engine loads. Dynamic Pump control is by default enabled for trucks with the QSB4.5 engine in combination with a 105cc or 120cc pumps setup. If required it can be enabled on other engine types as well. Enabling or disabling Dynamic Pump Control can be done in the Installed Features screen. See Figure 19.

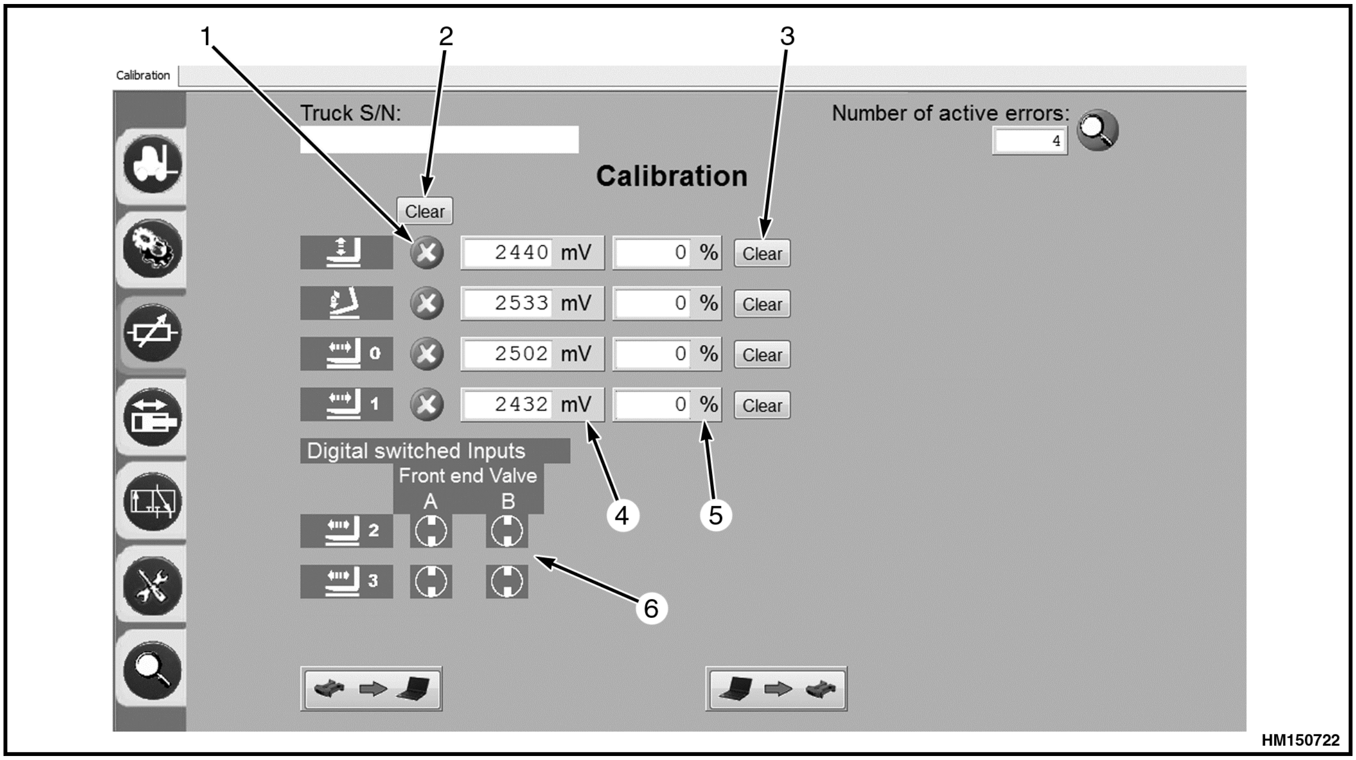
Calibration Screen

In the Calibration screen the user can check the calibration of the levers or joystick and perform calibration of the individual lever/joystick functions. The Calibration screen only shows the functions corresponding with the control option selected in the Truck Configuration screen. See Figure 30.

The Calibration status indicator (1) shows if the corresponding lever is properly calibrated. If the indicator is shown as illustrated in Figure 30 the levers are not calibrated. Figure 31 shows the Calibration screen with a properly calibrated levers. By clicking the Clear All button (2) all calibrations are cleared. With the Clear calibration button (3) calibration can be cleared per function.

To calibrate the lever/joystick:

1. Hold the lever/joystick in max end position for 3 seconds.
2. Hold the lever/joystick in other max end position for 3 seconds.
3. Leave the lever/joystick in the mid position for 3 seconds.



1. CALIBRATION STATUS INDICATOR
2. CLEAR ALL CALIBRATIONS
3. CLEAR CALIBRATION FOR THIS FUNCTION
4. LEVER/JOYSTICK INPUT IN (MV)
5. LEVER/JOYSTICK OUTPUT (%)
6. DIGITAL AUXILIARY FUNCTION INPUT STATUS

Figure 30. Calibration Screen (Not Calibrated)