ENGINEERING
TOMORROW

Notification

PVED-CLS
Errata Information.

http://powersolutions.danfoss.com/products/steering/pved-cls-intelligent-steering-sub-system/

Terms and Abbreviations

Abbr.	Meaning
ADC	analog to digital converter
CAN	Controller Area Network
CSS	Coil Supply Switch
CRC	cyclic redundancy check
DAC	digital to analog converter
EFU	Electrical Follow-Up, here: an anti-drift correction
EH	1) electro-hydraulic 2) a type of valve used in steering applications
FMI	Failure Mode Identifier
GPS	Global Positioning System
MAIN UC	main micro-controller, the one controlling the proportional valve
MMI	Man Machine Interface
PIB	Product Information Bulletin
PVED	Proportional Valve Electronic Digital
PVED-CL	a special type of PVED developed for steering applications
PVED-CLS	a special type of PVED being developed for new steering applications
RPM	Revolution per minute
SAFETY UC	the micro-controller in the safety related channel, the one controlling the cut-off valve
SEHS	Safe EH Steering
SPN	Suspect Parameter Number
STW	steering wheel
TBD	to be defined
UC	micro-controller
VSP	vehicle speed
WA	wheel angle

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Introduction

Overview

This ERRATA Information document is auto generated from Issue tracker.

Guidelines for Severity ranking

	Cosmetic (S0)	Low (S1)	Medium (S2)	High (S3)
Severity	Cosmetic issue which has no effect to safety or performance	Existing application are not affected by this defect if functionality is not used or if it's used, a workaround can limit the impact.	Existing applications are to some degree affected. A workaround can possibly limit the impact.	High impact to existing applications. Danfoss recommends that PVED-CLS is upgraded to most recent software version or a workaround is implemented. For issues with high severity, Danfoss will issue either a PIB or a service bulletin.

Known issues and limitations

Application Software

SEHS-2250 (S2) : WAS auto-calibration may result in different maximum steering angle position and cylinder stroke volume for the main and safety controller. This inconsistency may lead to false spool monitoring faults.

JIRA ID	SEHS-2250
Severity	Medium
Introduction	The PVED-CLS has a function to auto-calibrate the maximum achievable wheel angles. As an additional feature,it is possible to also let the PVED-CLS automatically re-calculate the maximum estimated steering angles and the cylinder stroke. The re-calculation is based on the wheel angle calibration values found during auto-calibration. Further information can be found in the user manual for 1.96 or later, section wheel angle sensor calibration.
Problem	PVED-CLS has two controllers which captures their own calibration values which might slightly differ from each other due to tolerances. The two controllers use their own calibrated values to calculate the new maximum steer angle positions and the cylinder stroke volume. Their results may differ slightly as a consequence of the slightly different input data. The difference can have an impact in the maximum steering angle positions in closed-loop algorithms. Here the two controllers may come to different conclusions on where to position the EH-Main spool when the wheel angle set-point and the actual wheel angle are close to each other. The safety controller may calculate a spool-set point which is lower than the main controller spool-set point. Since the main-controller is controlling the spool, the safety controller will observe a larger spool position than it can allow. In extreme cases this may lead the PVED-CLS to enter safe state with safety controller reporting spool monitoring failure (SPN:520204 FMI: 7).
Occurrence	The condition for getting the problem arises if slightly different results from the wheel angle sensor calibration are calculated. When the condition is met, triggering of a false alarm may be provoked by analog noise and is random. According to field observations, calculating slightly different results may happen as often as 15% of the times. - The effect gets more significant the lower the maximum steering angle gets. - The issue is more likely to happen if there is a steep slope of the sensor characteristics (angle VS voltage)
Impact	This issue is only visible when auto adjustment of Maximum steering angles is enabled (ie. P3426 & P3428 > 89deg). If PVED-CLS main and safety controller uses different values for the maximum steering angles and safety controller enters safe state with spool monitoring error (SPN:520204 FMI: 7), PVED-CLS must be power-cycled by hard or soft reset. This error will only be visible in closed loop steering modes (auto-guidance and closed loop joystick)
Work around	Upon every WAS auto-calibration operation the results shall be inspected as follows. Read back the max angles found by PVED-CLS main and safety controller. In case they do not match, either take the value from main controller and download to the safety controller or try to redo the WAS calibration. Reading back the data can be done while in WAS calibration mode via the J1939 parameter read message (see communication protocol). If the values are found not to be equal, WAS calibration can be reset using the calibration reset request message where after all WAS positions (Left, Neutral, Right) need to be re-captured.
Seen on SW version	1.96, 1.97
Solved in SW version	1.98

Technical Information:

SEHS-1287 (S2) : GMS message information is not consistent if the vehicle speed is above P3250 and auto-steering engage is attempted

JIRA ID	SEHS-1287
Severity	Medium
Introduction	The GMS (Guidance machine status) message feeds back information to the auto-guidance controller about the estimated curvature and system status.
Problem	On Auto Guidance engage, when vehicle speed is too high (>P3250, see Safety Manual SSM_059) the PVED-CLS will not signal in GMS that GPS1/2 is not possible, and the PVED-CLS will remember the transition from "Not intended for steering" to "Intended for steering" (GPSX_Str_cmd_status, see Communication Protocol section "Auto-guidance related CAN messages"). The PVED-CLS will change to GPS1 or GPS2, when vehicle speed is low enough again.
Occurrence	Every time Auto Guidance is engaged at vehicle speeds higher than P3250.
Impact	This problem is limited to systems where Auto Guidance is used, P3250 is below engage speed for the Auto Guidance system. Applying the recommended vehicle speed dependent flow limitation and WA limitation, enables the operator to easily control override by the steering wheel.
Work around	Align the auto-guidance controller maximum engage speed with the PVED-CLS (P3250). Applying the recommended vehicle speed dependent flow limitation and WA limitation, enables the operator to easily control override by the steering wheel.
Seen on SW version	1.92, 1.93, 1.95, 1.96
Solved in SW version	1.97

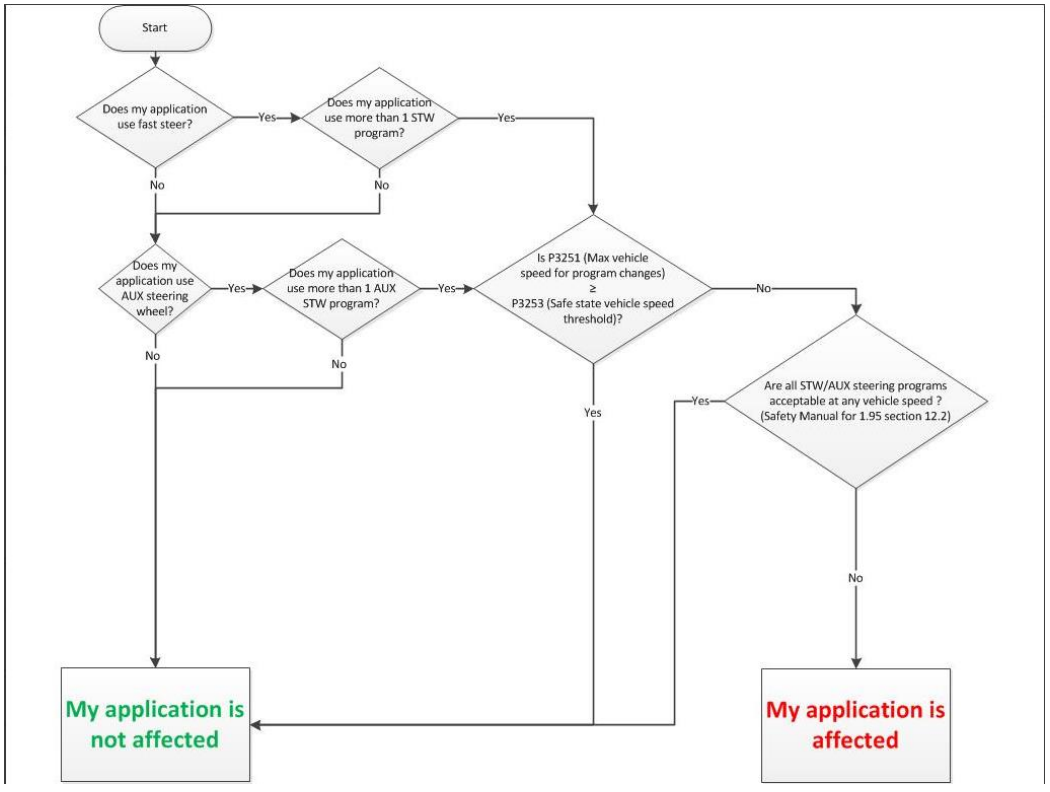
Technical Information:

SEHS-1278 (S2) : MMI STEERING PROGRAM CHANGE LOCK-OUT SSM_058 does not work as intended

JIRA ID	SEHS-1278
Severity	Medium
Introduction	MMI STEERING PROGRAM CHANGE LOCK-OUT SSM_058 prohibits steering program changes in STW or AUX mode if the vehicle speed is above P3251 (Max vehicle speed for program changes). Additional information can be found in the user manual for 1.95 section 7.1.5 or in the safety manual for 1.95 section 12.2.
Problem	If the MMI steering program change lock-out is utilized and the vehicle speed is above the threshold specified by parameter P3251 (maximum vehicle speed for program changes) and the operator tries to change the steering program (e.g. from STW program 1 to STW program 2), the PVED-CLS appears to remain in STW program 1 signaled in the operation status message. See communication protocol for 1.95, section 7.8. The problem is that the PVED-CLS will switch to the locked-out program and use the lock-to-lock configuration given by steering program 2. This program change is however evident when observing the currently applied lock-to-lock ratio displayed in the steering feedback message. See communication protocol document for 1.95 section 14.
Occurrence	The problem is systematic and not random, it is hence under specific conditions and configurations always present. The defect is isolated to Off-Road operation. Please review the flow chart given in the technical information section if an application is affected or not.
Impact	The specific safety function is designed to avoid unintended (erratic) MMI commands from the Main ECU of the machine. If this controller (sporadically and not as per design) changes the steering wheel program at vehicle speeds above the threshold set by P3251 (typically set at 20 km/h), the operator, depending on attention level and the STW program parameters, will observe a change in the lock-to-lock ratio. Upon a change in the STW program will the lock-to-lock ratio become higher or lower resulting in under- or over-steering. As the operator initiates any direction change of the vehicle through the steering wheel.Overall steering is fully controllable, only the amplification factor may change noticeable. If customers and system integrators have integrated the PVED-CLS as specified and recommended in the safety manual, will this defect have no impact at all. The flow chart in the technical information section can assist in determining if an application is potentially affected or not.
Work around	Review Safety manual for 1.95 section 12.2 for recommendations on safe steering program setup. To determine the best possible workaround requires analysis of the individual application - contact Danfoss PAE for advice.
Seen on SW version	1.92, 1.93, 1.95 & 1.96
Solved in SW version	1.97

Technical Information:

PIB ST2016-265.



SEHS-1151 (S2) : Specific 11bit CAN messages force PVED-CLS to enter safe state with false alarm if AUX device is configured to be present.

JIRA ID	SEHS-1151
Severity	Medium
Introduction	PVED-CLS supports AUX devices such as mini steering wheels or joysticks.
Problem	PVED-CLS enters safe state displaying a false alarm if the AUX device is configured to be present and one of the messages which are listed in the technical details section is present on the CAN bus.
Occurrence	This issue is systematic and PVED-CLS will enter safe state each time if the AUX device is configured to be present and one of the message ID's which are listed in the technical information section is present on the CAN bus. PVED-CLS will send SPN: 520202 FMI: 9.
Impact	This issue has impact for customers using AUX device and 11 bit CAN messages on the same CAN bus.
Work around	None of the Message ID's listed in the technical information section are allowed to be on the CAN bus if the AUX device is configured to be present on the CAN bus.
Seen on SW version	1.92, 1.93, 1.95, 1.96
Solved in SW version	1.97

Technical Information:

List of 11bit CAN messages ID's which triggers safe state with false alarm:
ID: y3Fh
ID: y7Fh
ID: yBFh
ID: yFFh
Where y represents any number from 1-7.
The content of the message is not relevant for this issue, only the message ID is important.

SEHS-664 (S2) : False alarms reported during engine cranking

JIRA ID	SEHS-664
Severity	Medium
Introduction	PVED-CLS performs a power-on-self-test every time the power is cycled or soft reset is sent. This self-test includes internal monitoring functions, low level RAM and Flash tests as well the the output stage.
Problem	During test of the output stage the driver solenoids are activated and the feedback is measured. If, during cranking, the battery voltage drops while this feedback is measured, wrong feedback is indicated to the application which results in a failing test and PVED-CLS boots up in safe state.
Occurrence	It has happened in rare occasions probably 1 out of 1000 boot attempts, but is limited to systems where PVED-CLS is powered while the engine is cranking.
Impact	If this issue happens, PVED-CLS will boot up in safe state and send SPN: 299023 FMI: 12
Work around	The only way to get PVED-CLS operational is to power cycle the unit or send soft reset. A workaround for system integrators can be to power PVED-CLS only after engine cranking has finished. The issue is resolved in 1.95 by letting PVED-CLS retry the power-on-self-test 10 times before it boot up in safe state.
Seen on SW version	1.92, 1.93
Solved in SW version	1.95

Technical Information:

SEHS-3802 (S1) : PVED-CLS does not recover from CAN "bus-off".

JIRA ID	SEHS-3802
Severity	Low
Introduction	PVED-CLS can detect and react to a CAN bus-off event. The LED will become red and the error is logged in the internal error history. PVED-CLS will continuously try to recover the CAN bus communication to send diagnostic information.
Problem	PVED-CLS detects the CAN bus off event and shuts down the CAN module. The LED becomes red and an error is logged in the internal error history. The desired behavior in this case is that PVED-CLS should try to recover the CAN bus and in case this succeeds, it should send the observed error on the CAN bus to help diagnosing the issue. Due to an issue in the implementation, PVED-CLS stays in the CAN bus off mode and the only way to recover is doing a power cycle. After the power cycle, the error can at any time be read out of the internal error history.
Occurrence	The problem is systematic and will occur at every CAN bus-off event. The CAN bus-off scenario is considered very rare as it's only caused by severe electric interference (above specification) or electrical faults in the wiring harness or electrical faults in CAN transceivers on the network.
Impact	Power cycle is required as there will be many non-recoverable side effects of a bus-off event due to timeout detection of safety relevant CAN Bus messages.
Work around	PVED-CLS must be power cycled to recover from the bus off event. The system integrator must ensure proper wire harness to avoid CAN bus off scenarios.
Seen on SW version	2.00, 2.01
Solved in SW version	2.02

Technical Information:

SEHS-3597 (S1) : Unintended auto-guidance disengage can occur in cold weather conditions when PVED-CLS is configured for EHi-H valve

JIRA ID	SEHS-3597
Severity	Low
Introduction	In EHi-H valve, the operator overrides the EH-Main spool and forces it to neutral whenever the steering wheel is utilized. When EH-steering e.g. auto-guidance or joystick control is activated, PVED-CLS constantly measures its ability to control the spool. When PVED-CLS determines that spool control is not longer possible because the operator has used the steering wheel, it will disengage EH-steering and wait for the operator to release the steering wheel. More information can be found in the safety manual - SSM_067 & SSM_068.
Problem	In cold weather conditions with high oil viscosity the control of EH-Main spool is slower compared to optimal oil viscosity. The slower spool control can in some occasions lead to that PVED-CLS misinterprets the spool dynamics and determines the steering wheel to be use which results in EH-steering to be disengaged unintended.
Occurrence	Typically in cold & high oil viscosity driving conditions
Impact	The operator will not be able to engage EH-Steering modes until the oil viscosity has decreased and normal EH-Main spool control is possible.
Work around	The operator must warm up the machine to be able to engage EH-Steering modes.
Seen on SW version	2.00
Solved in SW version	2.01

Technical Information:

SEHS-2685 (S1) : Diagnostic, and appropriate action, of the cross-check of MMI lockout data is delayed until auto-guidance mode is activated

JIRA ID	SEHS-2685
Severity	Low
Introduction	The redundant MMI message data is received and cross-checked by the main and safety micro-controller. The auto-guidance mode lock-out flag (MMI_Lockout_GPS) is transmitted to the PVED-CLS to prohibit it from entering auto-guidance mode. The received lockout flags are cross-checked between the micro-controllers. If they deviate, safe state is entered and a diagnostic trouble code is send onto the CAN bus.
Problem	The received lockout flag is cross-checked between the micro-controllers. The problem is that deviating flags may exist undetected while the PVED-CLS is not in auto-guidance mode. Only on entering auto-guidance mode, the deviation is detected. The associated error code will indicate application state cross-check error (SPN: 520219 FMI: 25). A more specific error code on deviating lock-out flags will not be given.
Occurrence	The failure mode behavior is systematic.
Impact	The customer will receiver a delayed and another diagnostic trouble code, on MMI lock-out flag mismatch, as expected.
Work around	None
Seen on SW version	all
Solved in SW version	Not planned

Technical Information:

SEHS-2595 (S1) : PVED-CLS will engage AUX open loop joystick mode directly when joystick is not in neutral and MMI requests OFF-Road before PVED-CLS is powered up.

JIRA ID	SEHS-2595
Severity	Low
Introduction	When the operator wants to enter AUX joystick steering mode, PVED-CLS requires the joystick to be in neutral once before it will allow AUX joystick mode to be entered.
Problem	The AUX joystick reset functionality is described in the user manual, section "Auxiliary steering device (AUX) related conditions": The AUX joystick reset has been done, i.e. the |requested AUX joystick flow command| has been observed below the threshold value for P3647 (AUX joystick in use – Flow command threshold) AND The |Requested AUX joystick flow command| ≥ threshold value for P3647 (AUX joystick in use – Flow command threshold) This AUX joystick reset function gets wrongly initialized and will not work in following scenario: When MMI requests any OFF-Road mode while the PVED-CLS is powered up (or reset) and the |Requested AUX joystick flow command| ≥ threshold value for P3647 (AUX joystick in use – Flow command threshold). In this case PVED-CLS will enter AUX joystick mode and begin to execute the AUX joystick commands and steer out flow accordingly, without having seen a neutral joystick position. This scenario is only a problem when the joystick position is deflected while PVED-CLS is powered up.
Occurrence	The problem is systematic.
Impact	The scenario described in the problem report will lead to PVED-CLS following the AUX joystick commands without having seen the joystick being in a neutral position. Following scenarios are not affected: - When PVED-CLS is powered up in Safe ON-Road mode. - When PVED-CLS is powered up and MMI requests ON-Road. - When PVED-CLS is powered up and MMI requests AUX lockout. (When lockout is released, neutral joystick position is required before AUX steering is entered) - When the steering wheel has been used to disengage AUX steering mode and the Joystick stays in non-neutral position
Work around	Customers can work around this issue by: - External vehicle controller, sending MMI messages, shall command the PVED-CLS in Safe ON-Road mode while the PVED-CLS powers up. - If Road switch is used, make sure PVED-CLS is always powered in Safe ON-Road mode. - Set MMI AUX steering flag to "AUX steering prohibited" when PVED-CLS is powered up.
Seen on SW version	1.96, 1.97, 1.98
Solved in SW version	2.00

Technical Information:

SEHS-2519 (S1) : Elobau joystick position crosscheck threshold cannot be setup correctly as stated in the PVED-CLS safety manual, SSM_017.

JIRA ID	SEHS-2519
Severity	Low
Introduction	PVED-CLS supports the Elobau joystick as an open loop joystick variant. More information can be found in the PVED-CLS user manual, section "AUX Type - Elobau Joystick" and PVED-CLS safety manual, SSM_017.
Problem	When an Elobau joystick is used together with PVED-CLS, PVED-CLS demands specific parameter values for: P3368 Channel cross-check monitoring. Maximum auxiliary joystick position divergence time [x10ms] P3369 Channel cross-check monitoring. Maximum auxiliary joystick position difference [IR] P3291 Maximum auxiliary device message timeout [x10ms] More information about the monitoring functions for the Elobau joystick interface are found in PVED-CLS safety manual, SSM_017. When the extended joystick messages are used (EJM) PVED-CLS safety manual specifies that P3369 (Channel cross-check monitoring. Maximum auxiliary joystick position difference [IR]) shall be set to 120[IR] corresponding to 12% of the full joystick stroke. Following the PVED-CLS safety manual, PVED-CLS will enter safe state because the parameter validation in PVED-CLS only accepts a value of 125 [IR] corresponding to 12.5%. For making the EJM Elobau joystick work together with PVED-CLS, the operator will have to allow a joystick position crosscheck threshold of 12.5% instead of 12% and set P3369 to 125 [IR]
Occurrence	The problem is systematic.
Impact	The operator should validate a joystick position crosscheck tolerance of 12.5% instead of 12% as stated in the safety manual.
Work around	The operator will need to allow 12.5% and set P3369 to 125. PVED-CLS will enter safe state if a different value than 125 is programmed in EEPROM.
Seen on SW version	1.97, 1.98
Solved in SW version	2.00

Technical Information:

SEHS-2367 (S1) : PVED-CLS responds with NACK on unsupported global PGN requests

JIRA ID	SEHS-2367
Severity	Low
Introduction	PVED-CLS support J1939 PGN requests listed in the PVED-CLS communication protocol, section J1939-73 Diagnostics.
Problem	PVED-CLS responds with NACK for request of unsupported (Destination and Global) PGNs. According to SAE_J1939-21_2016_03, NACK is not desired for Global PGN request.
Occurrence	The issue is systematic.
Impact	This issue can only have impact if client requesting PGN with global request PGN is reacting to NACK from server.
Work around	Ignore NACK from server (PVED-CLS)
Seen on SW version	all
Solved in SW version	Not planned

Technical Information:

SEHS-1199 (S1) : PVED-CLS enters safe state instead of WAS/spool calibration mode when calibration sectors are corrupted

JIRA ID	SEHS-1199
Severity	Low
Introduction	PVED-CLS has implemented a function to auto-calibrate the wheel angles and the spool deadbands. In case PVED-CLS detects corrupted calibration parameters eg. parameters being out of valid range or wrong CRC values, it will enter the respective calibration service mode.
Problem	in 1.96, PVED-CLS will enter safe state and not calibration service mode if the calibration sectors are corrupted.
Occurrence	This problem is visible every time the calibration sectors gets corrupted.
Impact	PVED-CLS will enter safe state and the user will have to clear the corruption with PLUS+1 or other service tool and trigger re-calibration of the corrupted parameters.
Work around	The user will have to clear the corruption with the PLUS+1 or some other service tool and trigger re-calibration of the corrupted parameters.
Seen on SW version	1.96
Solved in SW version	1.97

Technical Information:

SEHS-1198 (S1) : PVED-CLS does not check P3426 & P3428 for consistency before use

JIRA ID	SEHS-1198
Severity	Low
Introduction	PVED-CLS has implemented a function to auto-calibrate the wheel angles. Also it is possible to let PVED-CLS re-calculate the max wheel angle positions and the cylinder stroke based on the wheel angle calibration values found during auto-calibration. For triggering the automatic recalculation of the extreme wheel angle positions the parameters P3426 Maximum steer angle left & P3428 Maximum steer angle right need to be set > 89 deg. Further information can be found in the user manual for 1.96, section Wheel angle sensor calibration.
Problem	PVED-CLS does not have a crosscheck that both of the parameters are configured consistently eg. if P3426 & P3428 > 89 deg (automatic recalculation of extreme wheel angle position during auto-calibration enabled) or P3426 & P3428 ≤ 89. If P3426 & P3428 > 89 and analog wheel angle sensors are used PVED-CLS validates that P3223 & P3225 (for CAN based sensors P3193 & P3195) are ≤ 89 before using these values as extreme wheel angle positions. If fx. P3426 is > 89 and P3428 ≤ 89 PVED-CLS will now use P3223 & P3225 as extreme wheel angle positions regardless of its value which will affect both auto-guidance and AUX joystick closed loop algorithm.
Occurrence	Safety manual for 1.95, section 18 & SSM_047, states that during system integration and parameter configuration it shall be verified that all parameters are set correctly and that the system works as specified. If this rule is followed this problem will not occur.
Impact	If the parameters are incorrectly set and PVED-CLS uses abnormal values for the extreme wheel angle position it will have influence on the closed loop algorithms eg. auto-guidance and AUX closed loop joystick. The influence will purely be on performance and not on safety.
Work around	Ensure that P3426 Maximum steer angle left and P3428 Maximum steer angle right are consistently configured eg. either P3426 & P3428 > 89 deg (automatic recalculation of extreme wheel angle position during auto-calibration enabled) or P3426 & P3428 ≤ 89.
Seen on SW version	1.96
Solved in SW version	1.97

Technical Information:

SEHS-1197 (S1) : The road switch may trigger false alarms and trip to the safe state.

JIRA ID	SEHS-1197
Severity	Low
Introduction	PVED-CLS offers a PL/AgPL e shutdown method where PVED-CLS can stay powered while driving on the road. This shutdown method includes diagnostics in form of signal validations and crosschecks. More information can be found in the safety manual, SSM_041.
Problem	Two diagnostic functions may detect false alarms under certain road switch signal conditions. The Cut-off supply on pin 6 is monitored by continuously checking that the output is driven as expected. The two-channel road switch signals are monitored by continuously comparing the signal states. Failing to switch the two channels in a synchronized manner will lead to nuisance trips and false alarms. External noise/glitches/jitter may trigger false alarms. Two scenarios have been identified in laboratory during endurance testing: 1) Switching noise/jitter/glitches on the road switch channel driving the Cut-Off supply by pin 6 may trigger the road switch interface diagnostic functions. The Cut-Off supply on pin 6 is monitored by comparing the measured switched output pulse-width with the commanded pulse-width. Any incoming glitches or jitter may in some circumstances be measured as an incorrect pulse-width. If it occurs, the PVED-CLS enters safe state and issues SPN 520198 FMI 8. The system integrator is advised to observe if noise/glitches/jitter is present when the road switch is operated and perform robustness testing as part of the integration. 2) If the road switch is not switching the two channels simultaneously and offsets the signals in the temporal domain, the signal cross-check will detect this. The PVED-CLS will enter the safe state.
Occurrence	The problem depends on the road switch, installation and/or wiring. The noise/glitch/jitter may randomly affect the diagnostic function when the road switch is operated. Not easily repeatable.
Impact	Nuisance trip to safe state. Restart is required to clear the error.
Work around	Locate the source of the noise/glitch/jitter and replace the component. No software fix is available. The problem is solved by using a mechanically linked switch.
Seen on SW version	1.92, 1.93, 1.95, 1.96
Solved in SW version	1.97

Technical Information:

SEHS-1168 (S1) : FDA not robust against wheel angle oscillations with small amplitude

JIRA ID	SEHS-1168
Severity	Low
Introduction	FDA (Fault detection algorithm) monitors the steering system for suspicious steering movements by crosschecking various sensors in the system. For additional information, refer to Safety manual section SSM_030
Problem	Field test has shown that under certain high steered axle load and operation conditions, the WAS can produce oscillating signals. This can provoke false faults in FDA. It is observed in systems where WAS is verified working correctly and exhibiting zero slack.
Occurrence	The problem has only been seen on a single test machine which is a front-loader application and has a front axle with single tyres.
Impact	In case the wheels start oscillating with small amplitude without operator input, PVED-CLS will enter safe state and send SPN: 520205 FMI: 23
Work around	Power cycling of PVED-CLS
Seen on SW version	1.92, 1.93, 1.95, 1.96
Solved in SW version	1.97

Technical Information:

SEHS-1145 (S1) : PVED-CLS looses synchronization during power-on-self-test and reports SPN: 520211 FMI: 19.

JIRA ID	SEHS-1145
Severity	Low
Introduction	PVED-CLS performs a power-on-self-test every time the power is cycled or soft reset is sent. This self-test includes internal monitoring functions, low level RAM and Flash tests as well as the output stage.
Problem	During the power-on-self-test it was observed that PVED-CLS may lose the synchronization between the 2 microcontrollers which leads to PVED-CLS booting up in safe state and reporting SPN: 520211 FMI: 19.
Occurrence	Problem was observed once during excessive power-up stress testing with battery voltage modulation (1 out of 20000 power cycles).
Impact	PVED-CLS must reboot either by power cycle or by sending soft reset.
Work around	The controller requesting the soft-reset shall check the PVED-CLS response and apply a repeat on time out policy.
Seen on SW version	1.93, 1.95
Solved in SW version	1.96

Technical Information:

SEHS-1085 (S1) : Default value for SASA steering velocity crosscheck threshold (P3358 = 50dRPM) too low for steering speeds above 100RPM

JIRA ID	SEHS-1085
Severity	Low
Introduction	PVED-CLS performs crosscheck of the incoming SASA primary and redundant steering velocity signals. Further information can be found in the safety manual, SSM_016.
Problem	It has been observed that the default value for SASA steering velocity crosscheck threshold (P3358 = 50dRPM) is aimed too low for steering speed above 100RPM. When the steering wheel RPM is kept above 100RPM for a longer duration it can happen that PVED-CLS enters safe state and reports steering wheel velocity crosscheck failure SPN: 520227 FMI:25.
Occurrence	Steering velocities above 100 RPM are not common during normal operation. The problem is seen once during 10000 hours of operation.
Impact	PVED-CLS will enter safe state and will need to be reset by power cycling or soft reset to resume operation.
Work around	If problems are experienced with the steering wheel velocity crosscheck, P3358 can be raised to 100 dRPM.
Seen on SW version	All
Solved in SW version	Not planned

Technical Information:

SEHS-1053 (S1) : PVED-CLS has no range check for the incoming steering wheel velocity

JIRA ID	SEHS-1053
Severity	Low
Introduction	PVED-CLS uses the steering wheel velocity sent by the SASA sensor to calculate the spool setpoint for the EH-spool.
Problem	Failing to respect the specified CAN data ranges may lead to fast symmetrical oscillating full flow spool set-point commands. The set-point oscillations in the 100Hz range and low-pass filtered by the solenoid valve bridge.
Occurrence	The problem has only been observed during lab tests with simulated SASA input exhibiting extreme out-of-range data.
Impact	None
Work around	Ensure that the steering wheel CAN message data is in the valid range.
Seen on SW version	1.92, 1.93, 1.94, 1.95, 1.96
Solved in SW version	1.97

Technical Information:

SEHS-919 (S1) : Service mode is not entered if ValveType is EH/OSPE and spool is not in neutral

JIRA ID	SEHS-919
Severity	Low
Introduction	PVED-CLS will enter service mode if requested by sending the service mode request or by setting calibration counters to 0 regardless of the spool position at boot-up.
Problem	Due to an issue in software 1.95 release PVED-CLS will not enter service mode upon request if the valve type is EH/OSPE and the spool is not in neutral at boot-up. If the spool is not in neutral, PVED-CLS will enter safe state and send SPN: 520204 FMI: 28
Occurrence	This issue will happen every time the spool is out of neutral and service mode is requested. If PVED-CLS is physically mounted on a valve (EH/OSPE) this issue will not be seen.
Impact	Minor, issue will only be seen if PVED-CLS is not mounted on a valve physically
Work around	None, spool must be in neutral
Seen on SW version	1.95
Solved in SW version	1.96

Technical Information:

SEHS-915 (S1) : Flow command crosscheck giving false alarms

JIRA ID	SEHS-915
Severity	Low
Introduction	Flow command crosscheck monitoring verifies that both controllers calculate the same flow command.
Problem	During excessive stress testing with simulated data not reflecting real application usage in combination with Anti-jerk or flow filter functions, PVED-CLS have shown wrongly to enter safe state and send SPN: 520214 FMI: 25.
Occurrence	This false alarm was only seen in lab conditions with extreme step response input data with the Anti-Jerk or flow filter function set to do very hard filtering on the raw calculated flow command.
Impact	This issue does only affect applications using anti-jerk or flow filter functions. As of now the issue has only been observed in lab conditions with simulated data which is considered not possible in a real world application.
Work around	This is an architectural constraint in PVED-CLS and no solution is considered possible at this point, but when the safe state is entered, soft or hard reset will re-enable EH steering. If this is a continuous problem it must be considered to either limit the maximum step sizes on the input data, modify the parameters for the flow command crosscheck function or modify the parameters of the anti-jerk or flow filter function.
Seen on SW version	all
Solved in SW version	Not planned

Technical Information:

SEHS-906 (S1) : PVED-CLS looses synchronization during power-on-self-test and reports SPN: 299023 FMI: 19

JIRA ID	SEHS-906
Severity	Low
Introduction	PVED-CLS performs a power-on-self-test every time the power is cycled or soft reset is sent. This self-test includes internal monitoring functions, low level RAM and Flash tests as well the output stage.
Problem	During the power-on-self-test it was observed that PVED-CLS has lost the synchronization between the 2 microcontrollers which leads to PVED-CLS booting up in safe state and reporting SPN: 299023 FMI: 19.
Occurrence	Problem was observed once out of 10000 operating hours.
Impact	PVED-CLS must reboot either by power cycle or sending soft reset.
Work around	No possible workaround except reboot either by power cycle or sending soft reset.
Seen on SW version	1.92, 1.93
Solved in SW version	1.95

Technical Information:

SEHS-809 (S1) : Defect in WAS auto-calibration does not allow user to re-capture the same WA value

JIRA ID	SEHS-809
Severity	Low
Introduction	PVED-CLS has implemented a function to auto-calibrate the wheel angles. Further information can be found in the user manual for 1.95, section 9.1 Wheel angle sensor calibration.
Problem	A defect in the PVED-CLS WAS auto-calibration causes that it is not possible to re-capture calibration values if the first round of values are found incorrect by the user. It is only the safety controller which is affected by this. The main controller correctly captures and downloads the subsequent calibration values. There are several functions which can be configured to capture and react to this failure: 1. PVED-CLS offers features which can limit the range of accepted calibration values. These are configured by: - P3791: Max allowable WAS signal to be captured in neutral - P3795: Min allowable WAS signal to be captured in neutral - P3793: Min Voltage needed in between the captured WAS values Additional information on how to configure these values can be found in the user manual for 1.95, Section 9.3.1.1 Auto-calibration parameter plausibility check. 2. If the first captured value violates the parameter crosschecks done at boot up (User manual for 1.95, section 16.3.5 for analog wheel angle sensors and 16.3.4. for CAN based wheel angle sensors), PVED-CLS will enter safe state at power up. The reported error code depends on if analog or CAN wheel angle sensors are used. Analog WAS: SPN:520236 FMI: 2 CAN WAS: SPN: 520235 FMI: 2 3. If the parameter validations mentioned in 1. and 2. do not capture the failure, Main and Safety controller crosschecks their wheel angle internally during normal operation. This crosscheck is configured by P3351 & P3352. If this crosscheck fails, PVED-CLS will enter safe state and report SPN: 520215 FMI: 25. Further information can be found in the safety manual, SSM_018, SSM_019 & SSM_020. 4. If the crosscheck described in 3. does not capture this either, the difference between the correctly captured value in main controller and the incorrectly captured value in safety controller is negligible. After the crosscheck is done between main and safety, both controllers use the wheel angle from main controller for further calculation which means that incorrectly captured wheel angle value will not have any effect in the system.
Occurrence	This problem will occur if a WA value is captured more than once during WAS auto-calibration.
Impact	If this is not detected by the operator itself during calibration, PVED-CLS will, if the calibrated values differ too much from each other, enter safe state because of incorrect parameter combination on the calibrated values (see problem report).
Work around	In case one of the WA values is captured wrongly, do not try to capture it again, but reset the calibration sequence and start the calibration from the beginning. Use the calibration reset message, which is described in the communication protocol for 1.95, section 5.3.4. Calibration reset request. The functions described in problem report (1. - 3.) should be fine-tuned. Always validate steering behavior after calibration.
Seen on SW version	1.92, 1.93, 1.95
Solved in SW version	1.96

Technical Information:

SEHS-677 (S1) : Cut-off valve open circuit detection

JIRA ID	SEHS-677
Severity	Low
Introduction	PVED-CLS diagnoses that the Cut-off valve has an open circuit if the current delivered to the cut-off valve drops below 0,5*P3076
Problem	This open circuit detection has specified a confidence period of 100ms, but the implementation in the software shows a confidence period of 200ms instead of the specified 100ms. In case the open circuit failure mode gets present in the system, PVED-CLS will exhibit a delayed reaction compared to the specification.
Occurrence	Every time an open circuit failure on the cut-off valve is present in the system.
Impact	EHPS: No impact as the cut-off valve is not present in the system. OSPE: No functional impact. Low safety impact as this failure only results in delayed response.
Work around	None
Seen on SW version	1.92,1.93
Solved in SW version	1.95

Technical Information:

SEHS-676 (S1) : Spool monitoring (SSM_053) not executed in service mode - Spool calibration

JIRA ID	SEHS-676
Severity	Low
Introduction	Spool monitoring checks if the spool is in a valid position
Problem	Spool monitoring is not executed in service mode – Spool calibration
Occurrence	Every time spool calibration is entered.
Impact	low safety impact as a potential hazardous situation (self-steering) is easily controllable/stoppable by activating the steering wheel)
Work around	Stop spool calibration by using STW in case odd behaviour is detected by the operator (SSM_039)
Seen on SW version	1.92, 1.93
Solved in SW version	1.95

Technical Information:

SEHS-672 (S1) : Robustness issue when changing steering device if anti-jerk functionality is enabled

JIRA ID	SEHS-672
Severity	Low
Introduction	PVED-CLS offers a feature to eliminate jerk for articulated vehicles. Find additional information in the user manual for 1.95, section 10.5 Anti-Jerk.
Problem	This problem is limited to applications using anti-jerk and the precondition for this to happen is when the operator exits fast steering while the flow command calculation is not settled to neutral before changing the steering device. The problem will be visible when the operator now changes back to fast steering because PVED-CLS continues the spool setpoint calculation from where the anti-jerk function stopped when the operator changed the steering device. The failure effect is that PVED-CLS will enter safe state and report SPN: 520204 FMI: 7, Spool monitoring failure, and the root cause for this issue is that the anti-jerk function is not correctly initialized when entering fast steer for the second time after power up.
Occurrence	Problem was only observed once during 8000h field test.
Impact	When the problem occurs, PVED-CLS will enter safe state and report SPN: 520207 FMI: 7 (Spool monitoring failure).
Work around	None, if the problem occurs and PVED-CLS enters safe state EH-steering can only be reengaged by power cycling or by sending soft reset.
Seen on SW version	1.92
Solved in SW version	1.93

Technical Information:

SEHS-667 (S1) : PVED-CLS does not succeed to auto-calibrate the EH-Main spool

JIRA ID	SEHS-667
Severity	Low
Introduction	PVED-CLS has implemented an algorithm to auto-calibrate the EH-Main spool. Find additional information in the user manual for 1.95, section 9.3 Auto-calibration.
Problem	PVED-CLS could potentially not succeed to calibrate the EH-Main spool if the Max closed loop dead band edge (P3797) is used for narrowing the allowed range for Closed loop deadbands. When PVED-CLS finishes the calibration to one of the sides it will boost the setpoint to speed up the spool calibration to the other side. If P3797 is set too tightly around the expected closed loop deadband value, PVED-CLS can potentially boost the spool setpoint above the threshold given by P3797 which will trigger a calibration error. For more information on the calibration error code see PVED-CLS communication protocol for 1.95, section 5.3.5 Calibration status.
Occurrence	This problem is application dependent which means that some applications will see it frequently and others might never see it.
Impact	PVED-CLS send a calibration error code and ends in a dead lock where it has to be power cycled or re-activated via soft reset. The auto-calibration routine must be restarted.
Work around	The tolerance given by parameter Max closed loop dead band edge (P3797) must be set wider to give PVED-CLS some more freedom for spool setpoint calculation during EH-Main spool auto-calibration.
Seen on SW version	1.92, 1.93
Solved in SW version	1.95

Technical Information:

SEHS-657 (S1) : Possibility for bypassing MMI STEERING PROGRAM CHANGE LOCK-OUT SSM_058.

JIRA ID	SEHS-657
Severity	Low
Introduction	MMI STEERING PROGRAM CHANGE LOCK-OUT SSM_058 prohibits steering program changes in STW or AUX mode if the vehicle speed is above P3251 (Max vehicle speed for program changes). Additional information can be found in the user manual for 1.95 section 7.1.5 or in the safety manual for 1.95 section 12.2.
Problem	The safety function MMI STEERING PROGRAM CHANGE LOCK-OUT prohibits program changes when the vehicle speed is above the threshold specified by P3251 while being in OFF-ROAD, but it is possible to bypass this lockout by entering ON-Road or Safe-ON-Road and then change to the desired OFF-Road steering program.
Occurrence	The problem is systematic.
Impact	The operator can potentially change to an unsafe steering program at high vehicle speed.
Work around	Follow the recommendations on safe steering program setup given by the PVED-CLS Safety manual for safety function SSM_058.
Seen on SW version	1.92
Solved in SW version	1.93

Technical Information:

SEHS-2475 (S0) : Build date encoding in J1939 SW ID response not correctly described in PVED-CLS Communication protocol

JIRA ID	SEHS-2475
Severity	Cosmetic
Introduction	The PVED-CLS can transmit information about the bootloader and FW installed on the device. Among other information, the response contains a build date of both FW and bootloader. Please refer to Communication protocol chapter "SOFTWARE ID [J1939_SW_ID_X]"
Problem	The encoding of both build dates (bootloader and FW) in the SOFTWARE ID messages are not sufficiently described in PVED-CLS communication protocol.
Occurrence	Every time the SOFTWARE ID response is transmitted
Impact	If build date information is used from the message, special conversion is needed.
Work around	Decode the separate bytes as HEX and read them as decimal. Example of how to convert dates: Hexadecimal 0x12, and then read it as 12 decimal
Seen on SW version	All
Solved in SW version	PVED-CLS communication protocol for 2.00. The application software will not be changed.

Technical Information:

SEHS-2157 (S0) : If Off-Road safety-checks is executed faster than each 500ms PVED-CLS can enter safe state with SPN: 520210 FMI: 29

JIRA ID	SEHS-2157
Severity	Cosmetic
Introduction	PVED-CLS conducts a full stroke test with the cut-off spool for OSPE & EHi-E systems. Additional details can be found in PVED-CLS safety manual, SSM_026.
Problem	When Off-Road safety-check state is entered, PVED-CLS enables the Cut-Off valve and measures the time until the cut-off valve has delivered pilot pressure so that PVED-CLS can move the EH spool. This time is used later in the test. When the operator quickly changes from OFF-Road -> ON-Road -> OFF-Road (for example by switching the Road switch back and forth) in less than 500ms for condition with high oil viscocity, the cut-off valve may not have drained the entire pilot pressure to the EH-Spool when starting Off-Road safety-checks and this has influence on the measured time. In worst case, PVED-CLS enter safe state displaying SPN: 520210 FMI: 29 meaning that PVED-CLS has detected a stuck open cut-off spool.
Occurrence	The problem is systematic.
Impact	PVED-CLS displays a false alarm. In high viscosity oil conditions this can happen when the user switches the road switch faster than 500ms. For normal viscosity the time is reduced to ~100ms.
Work around	When PVED-CLS has been forced to ON-Road by either Road switch or MMI request, make sure that PVED-CLS stays in ON-Road for at least 500ms, to cover all temperatures.
Seen on SW version	all
Solved in SW version	Not planned

Technical Information:

SEHS-2156 (S0) : PVED-CLS enters "Auto-guidance reset request" state instead of "Auto-guidance inactive" when the auto-guidance controller exits active auto-guidance steering by sending "not intended for steering" command.

JIRA ID	SEHS-2156
Severity	Cosmetic
Introduction	PVED-CLS supports auto-guidance steering by using the guidance messages specified by ISO-11873. The communication state machine between PVED-CLS and the auto-guidance controller is detailed in the PVED-CLS communication protocol - section Guidance state machine.
Problem	When the auto-guidance controller exits "auto-guidance engage" state by sending "not intended for steering" in the guidance system command message, PVED-CLS will enter "auto-guidance reset request" state instead of "auto-guidance inactive" state. When entering the "auto-guidance reset request" state PVED-CLS will in the next processing loop immediately enter "auto-guidance inactive" state because all conditions are met, but it will potentially transmit a single instance of "reset required" in the guidance machine status message before entering "auto-guidance inactive" state. When the guidance machine status transmission rate is set to 100ms (default), this will not be visible on the CAN bus in most occurrences, but if the transmission rate is increased to 10ms, this additional state transition is visible every time. This software defect in the guidance state machine in PVED-CLS will only impact the application if the auto-guidance controller decides to exit and re-engage auto-guidance within 2 guidance machine status message instances (default 200ms) because the auto-guidance controller potentially can get confused by PVED-CLS requesting reset for no reason.
Occurrence	The problem is systematic, but will on typical applications not be noticeable to the auto-guidance controller.
Impact	This software defect will for typical auto-guidance applications not require any workarounds implemented. Only in case disengage and re-engage shall happen within 2 guidance machine status message instances (default 200ms), the defect can potentially be visible.
Work around	To workaround the issue, the auto-guidance controller shall not allow re-engaging faster than 2 guidance machine status message instances (default 200ms)
Seen on SW version	all
Solved in SW version	Not Planned

Technical Information:

SEHS-1750 (S0) : PVED-CLS displays wheel angle as neutral when wheel angle sensor is not present in the system

JIRA ID	SEHS-1750
Severity	Cosmetic
Introduction	PVED-CLS has a configurable interface which allows system integrators to configure a wheel angle sensor for closed loop steering.
Problem	When the wheel angle sensor is configured not to be present in the system, PVED-CLS displays the wheel angle as neutral in status message 5 and steering feedback message (see PVED-CLS communication protocol). The correct displayed value would be: Information not available.
Occurrence	The problem is systematic
Impact	No impact as the signal is not used for anything if the wheel angle sensor is configured not to be present in the system.
Work around	None
Seen on SW version	1.97 and newer
Solved in SW version	Not planned

Technical Information:

SEHS-1519 (S0) : Wrong valid range implemented for P3568 & P3706

JIRA ID	SEHS-1519
Severity	Cosmetic
Introduction	PVED-CLS performs range check on all safety critical EEPROM parameters
Problem	The valid range implemented in PVED-CLS for P3568 STW Anti-drift - Max Steering wheel drift correction & P3706 AUX Anti-drift - Max Steering wheel drift correction is 1-180. The correct range for these 2 parameters should be 1-160.
Occurrence	The problem is systematic.
Impact	The issue is cosmetic. If a value between 160-180 is configured for P3568 & P3706, it will have negligible effects on the EFU flow contribution.
Work around	Costumers shall not configure P3568 & P3706 to be in the range 160-180.
Seen on SW version	1.92, 1.93, 1.95, 1.96, 1.97, 1.98
Solved in SW version	2.00

Technical Information:

SEHS-1202 (S0) : Wrong information shown in status message 2, Closed loop wheel angle setpoint in AUX closed loop joystick steering mode

JIRA ID	SEHS-1202
Severity	Cosmetic
Introduction	PVED-CLS supports an AUX closed loop joystick device. When operating this device, PVED-CLS send information in status message 2 about the closed loop wheel angle setpoint. See additional information in PVED-CLS communication protocol for 1.96, section 7.3 Status message 2.
Problem	If the parameters configuring the AUX closed loop vehicle speed dependent wheel angle limitation function (See safety manual for 1.96, SSM_062) specified by P3720, P3721 or P3722, are set to be higher than the physical extreme wheel angle position set by P3426 & P3428 (if the physical extreme wheel angle points are auto-calibrated, the physical extreme wheel angle positions are specified by P3223 & P3225 for analog wheel angle and P3193 & P3195 for CAN based wheel angle). If the system is configured as described and the requested wheel angle exceeds what is configured as physically possible, the wheel angle setpoint in status message 2 goes out of the valid range -1000 to 1000. In this case PVED-CLS should clamp the value to -1000 to 1000.
Occurrence	The Problem only occurs if the parameters configuring the AUX closed loop vehicle speed dependent wheel angle limitation function (See safety manual for 1.96, SSM_062), P3720, P3721 or P3722, are set to be higher than the physical extreme wheel angle position set by P3426 & P3428 (if the physical extreme wheel angle points are auto-calibrated, the physical extreme wheel angle points are specified by P3223 & P3225 for analog wheel angle and P3193 & P3195 for CAN based wheel angle) and the operator requests a wheel angle beyond the physical range.
Impact	If this information is not used by the operator this problem has no impact. The value gets clamped to the correct range before it is used in further calculations. If the value is used for any calculation externally, the value must be limited to the range -1000 to 1000 before use (raw CAN value rolls over to 0xFFFF if lower than -1000.
Work around	If the value is used for any calculation externally, the value must be limited to the range -1000 to 1000 before use (raw CAN value rolls over to 0xFFFF if lower than -1000. Note that status message (Status messages 1 - 7) information shall not be used for safety critical calculations.
Seen on SW version	1.96
Solved in SW version	1.97

Technical Information:

SEHS-1159 (S0) : When switching to off-road mode, the OFF-Road safety-check (cut-off valve self-test) may result in a short small movement of the steered wheels.

JIRA ID	SEHS-1159
Severity	Cosmetic
Introduction	On OSPE systems PVED-CLS performs an OFF-Road safety-check where the cut-off valve is tested by an ON/OFF test. This test shall determine if the cut-off valve is capable of delivering pilot pressure to PVED-CLS and if it is able to stop supplying it again. Laboratory testing of modulating the battery supply voltage while executing the OFF-Road safety-checks (cut-off valve self-test) shows that the main spool may overshoot its set-point. If the battery supply voltage is too low for the solenoid valve bridge to stroke the spool, the integration part in the spool control algorithm will build up and result in a control overshoot when the battery supply voltage reverts to normal.
Problem	On key-on the software is designed to tolerate a fluctuating battery as a result of cranking. If the PVED-CLS is set in off-road mode during cranking or while the battery supply is too low, the main spool may overshoot the set-point during the cut-off valve test. In normal conditions the main spool is operated inside the hydraulic dead-band during testing. However, laboratory test shows that the main spool may overshoot to 1.1mm for 100ms (typical viscosity) which is in the flow range. As a result, a small finite amount of oil will be output to the steering cylinder and may be observed as a short and small steered wheel movement/jerk. At lower temperatures, the movement/jerk may be larger but is also expected to happen slower. The spool overshoot is small and fast and not of character which is detected by spool monitoring.
Occurrence	The problem may come to pass if the following conditions occur: Off-road mode is selected during cranking or if the battery supply drops below 9V during the cut-off valve self-test. Should this happen, then effect of the main spool overshoot is dependent on the piece to piece tolerance of the valve dead-band and the temperature. The problem is anticipated to be very rare.
Impact	Some users may observe a small movement/jerk. The battery voltage too low warning may be issued if the condition is present long enough. No alarms are issued and PVED-CLS will continue operation.
Work around	The MMI controller shall command PVED-CLS to stay in On-Road until battery supply is stable.
Seen on SW version	All
Solved in SW version	Not planned.

Technical Information:

SEHS-1154 (S0) : PVED-CLS uses the same SPN for all crosschecks performed on AUX closed loop joystick signals

JIRA ID	SEHS-1154
Severity	Cosmetic
Introduction	PVED-CLS performs crosscheck of the incoming AUX primary and redundant sensor signals. Further information can be found in the safety manual, SSM_064.
Problem	PVED-CLS uses the same SPN, SPN: 520231 FMI: 25, to indicate problems of the AUX sensor regardless of which signal validation failed. This is not in accordance with the SPN generation for signal crosschecks for other external sensor input.
Occurrence	The problem is systematic.
Impact	If SPN: 520231 FMI: 25 is reported by PVED-CLS, the user will have to debug all AUX sensor signals instead of being directly directed to the problematic signal which has triggered the failure.
Work around	None.
Seen on SW version	1.96
Solved in SW version	1.97

Technical Information:

SEHS-1123 (S0) : WAS auto-calibration gives different results in main and safety controller for maximum steer angle position and cylinder stroke volume calculation.

JIRA ID	SEHS-1123
Severity	Cosmetic
Introduction	PVED-CLS has implemented a function to auto-calibrate the wheel angles. Also it is possible to let PVED-CLS re-calculate the maximum steer angle positions and the cylinder stroke based on the wheel angle calibration values found during auto-calibration. Further information can be found in the user manual for 1.96, section wheel angle sensor calibration.
Problem	PVED-CLS has two controllers which captures their own calibration values which might slightly differ from each other due to tolerances. The two controllers use their own calibrated values to calculate the new maximum steer angle positions and the cylinder stroke volume which will slightly differ from each other as a consequence of the slightly different input data. The difference in the results is judged to be of cosmetic nature and will not have any influence on performance.
Occurrence	If the enhanced WAS calibration function is activated (P3426 & P3428 > 89deg or P3086 > 10000ccm) the new calculated values will always deviate slightly for main and safety controller, but only in very extreme cases this will have impact on performance. In 1.97, this issue is resolved by implementing a crosscheck for the calculated values by main and safety. After the crosscheck, the values calculated by main controller are stored in both the EEPROM for main and the safety controller.
Impact	None
Work around	None
Seen on SW version	1.96
Solved in SW version	1.97

Technical Information:

SEHS-659 (S0) : PSM error (SPN: 298966 FMI: 11) is logged in error history when soft reset is executed

JIRA ID	SEHS-659
Severity	Cosmetic
Introduction	PSM (program sequence monitoring) checks the aliveness status of the controller
Problem	When soft reset is executed PVED-CLS writes the KWP service tool ID to EEPROM and occasionally blocks the PSM task which makes it report a false alarm. PVED-CLS will recover from this internal fault and restart normally. However, it will have logged a PSM fault internally
Occurrence	1 out of 100 soft resets
Impact	This DTC will not be published on the CAN bus because the peripherals like CAN bus are shut down before this error is raised but it will be logged in the internal error buffer inside PVED-CLS. This issue has no safety impact and if the information from the error buffer is not used this issue has no functional impact.
Work around	a) Avoid using soft-reset b) Ignore the internal error buffer and read & log J1939 DM1 information only c) If internal error buffer is used, ignore PSM failure entries.
Seen on SW version	1.92,1.93
Solved in SW version	1.95

Technical Information:

SEHS-461 (S0) : LED shows wrong color during OFF-Road safety-checks

JIRA ID	SEHS-461
Severity	Cosmetic
Introduction	PVED-CLS can indicate its operating state visually via the LED. Additional information for encoding can be found in the user manual for 1.95, section 5.2 LED control.
Problem	During OFF-Road safety-checks the LED lights fully red while it should be fully green.
Occurrence	The problem is always visible.
Impact	None
Work around	None
Seen on SW version	1.92, 1.93
Solved in SW version	1.95

Technical Information:

Service Tool

SEHS-1457 (S2) : PLUS+1 ServiceTool ver. 8.0.5 is not recommended together with any PVED-CLS SW.

JIRA ID	SEHS-1457
Severity	Medium
Introduction	Memory leakage issues (on the PC side) has been observed during stress testing of ServicePages.
Problem	PLUS+1 Service Tool consumes more and more memory when parameters are downloaded continuously on service pages (with large number of parameters) and crashes sometimes.
Occurrence	Tool crashed 4 in 5 times during testing. It depends on physical memory and service tool run time. The problem was not observed for pages with few number of parameters as the service tool run time was less.
Impact	The PLUS+1 ServiceTool session may end abruptly and unintended.
Work around	Use PLUS+1 ServiceTool version 7.2.10. It can be downloaded @ http://powersolutions.danfoss.com/parts-and-service/product-archive/plus-1-guide-service-tool-history-files/
Seen on SW version	PLUS+1 ServiceTool 8.0.5
Solved in SW version	PLUS+1 ServiceTool 8.1.2

Technical Information:

SEHS-3695 (S1) : Service pages: File exported from Clone page cannot be re-imported

JIRA ID	SEHS-3695
Severity	Low
Introduction	The clone parameter interface can be used for cloning the configuration from one PVED-CLS unit to another PVED-CLS unit.
Problem	The exported clone parameter file has a formatting issue in the xml file and hence, the PLUS+1 page does not accept this file when the operator tries to re-import the same file.
Occurrence	The problem is systematic.
Impact	The customer will not be able to import clone xml file which uses the basic format. Extended format can be used without any issues.
Work around	For cloning a PVED-CLS, the extended file format can be used. For cloning a PVED-CLS with basic file format, a space shall be added after NodeNr="Safety" in the following line (line number-6) in exported file from Clone PVED-CLS page: <PARAMETERITEM NodeNr="Safety"ParameterName="BOOT_NODE_ID" Value="90"/> Corrected line shall look like: <PARAMETERITEM NodeNr="Safety" ParameterName="BOOT_NODE_ID" Value="90"/>
Seen on SW version	2.00 rev D
Solved in SW version	2.01

Technical Information:

SEHS-2036 (S1) : P3734 receives wrong value when exporting parameters using the clone PVED-CLS page.

JIRA ID	SEHS-2036
Severity	Low
Introduction	The clone parameter page can be used to copy a PVED-CLS configuration from one unit to another without overwriting calibration data.
Problem	An issue on the clone parameter page reads a wrong value for parameter P3734 when the export function on the clone page is used. When the exported file is imported in another unit, it will enter safe state sending SPN: 520244 FMI: 2 indicating sector CRC mismatch.
Occurrence	The problem is systematic and will happen everytime the export function on the clone parameter function is used.
Impact	When trying to copy the configuration data from one PVED-CLS unit to another unit using the clone PVED-CLS page, PVED-CLS will enter safe state sending SPN: 520244 FMI: 2 indicating sector CRC mismatch. The failure needs to cleared using the AUX config page.
Work around	Use service pages 1.97 rev D. Alternatively the parameter value of P3734 can be corrected manually in the exported file before importing it to another unit. The import and download function works correctly.
Seen on SW version	Service pages 1.97 rev C
Solved in SW version	Service pages 1.97 rev D

Technical Information:

SEHS-1821 (S1) : The extended linear address record (record type = 4) in the application hex file (line 3) is not correct for 3rd party flashing tools.

JIRA ID	SEHS-1821
Severity	Low
Introduction	The extended linear address record (record type = 4) in the application hex files (line 3) specifies the highest 16 bits of the physical address in flash. For PLUS+1 service tool backwards compatibility reasons, the extended linear address record is set to 7D0000h. This is however not the correct physical starting address for the micro-controllers used in PVED-CLS. The correct physical start address in flash for a PVED-CLS is 7E0000h. All other service tools than PLUS+1 must be use 7E0000h as the start address.
Problem	The extended linear address record (record type = 4) in the application hex files (line 3) specifies the highest 16 bits of the physical address in flash. For PLUS+1 service tool backwards compatibility reasons, the extended linear address record is set to 7D0000h. This is however not the correct physical starting address for the micro-controllers used in PVED-CLS. The correct physical start address in flash for a PVED-CLS is 7E0000h. If other flashing tools than the PLUS+1 service tools are used, the physical address space 7E0000h-7FBFFFh shall be used as specified in the PVED-CLS KWP2000 protocol.
Occurrence	Service tools, other than PLUS+1 service tool, retrieving the physical start address from the .hex files (7D0000h), will receive a negative response when attempting to flash new application software. This will happen every time a flashing procedure is initiated.
Impact	Flashing new application code is not possible.
Work around	Other flashing tools than the PLUS+1 service tool must ignore the extended linear address record in the .hex file and use the physical address space 7E0000h-7FBFFFh as specified in the PVED-CLS KWP2000 protocol.
Seen on SW version	All
Solved in SW version	None. The issue will not be fixed.

Technical Information:

No deeper description will be provided. The same description is added to PVED-CLS KWP2000 protocol for software versions > 1.97

SEHS-1629 (S1) : The PLUS+1 Service tool version 8.1.2. can enter "Service tool not responding" state on some PC configurations

JIRA ID	SEHS-1629
Severity	Low
Introduction	The PLUS+1 service tool can be used for changing parameters and perform live diagnostics on PVED-CLS.
Problem	The PLUS+1 Service tool version 8.1.2. can enter "Service tool not responding" state on some PC configurations when trying to download parameters with the SEHS protocol data page using service pages 1.97 rev. C.
Occurrence	The problem is seen on 2 out of 20 tested machines.
Impact	When the problem occurs, the service tool crashes and parameters are not downloaded.
Work around	When this problem is observed, the PLUS+1 service tool needs to be downgraded to 7.2.10 which can be downloaded at: http://powersolutions.danfoss.com/parts-and-service/product-archive/plus-1-guide-service-tool-history-files/#/ The service pages 1.97 rev. C are tested to be compatible with this version also.
Seen on SW version	Service tool version 8.1.2. with service pages 1.97 rev. C
Solved in SW version	Service tool version 10.0.7 P1D file version 1.97 Rev D

Technical Information:

SEHS-637 (S1) : Wrong information displayed in the service tool during spool auto-calibration

JIRA ID	SEHS-637
Severity	Low
Introduction	PVED-CLS has implemented an auto-calibration algorithm for calibration the EH spool deadbands which can be invoked by the PLUS+1 service tool. Find additional information in the user manual for 1.95, section 9.2 Spool calibration.
Problem	The field "Time needed to complete last move" shows wrong data during execution of the spool calibration.
Occurrence	The problem is systematic hence it will always be visible.
Impact	The "Time needed to complete last move" field shows non critical information to the operator and has to be ignored.
Work around	In case the correct information of this value is required, a different tool fx CANalyzer must be used while looking at the calibration status message. Find additional information in the communication protocol for 1.95, section 5.3.5 Calibration status.
Seen on SW version	1.92, 1.93
Solved in SW version	1.95

Technical Information:

SEHS-497 (S1) : Clearing the error history with the PLUS+1 service tool only works when source addresses are default value.

JIRA ID	SEHS-497
Severity	Low
Introduction	PVED-CLS will clear its error history when a DM3 message is received. See communication protocol for 1.95, section 16.4 DM3 - Diagnostic data clear/reset of previously active diagnostic trouble codes. This functionality can be invoked by the PLUS+1 service tool.
Problem	Due to a design limitation in the PLUS+1 service tool, it can only clear the error history if PVED-CLS has CAN source addresses set to default values (P3297 = 0x13 (MainUC), 0x5A (SafetyUC)).
Occurrence	The problem is caused by a design limitation in the PLUS+1 service tool.
Impact	Customers with PVED-CLS source addresses different than default will not be able to use the PLUS+1 service tool for clearing the PVED-CLS error history.
Work around	The PVED-CLS error history can be cleared from any other tool which can send a DM3 message. See communication protocol for 1.95, section 16.4 DM3 - Diagnostic data clear/reset of previously active diagnostic trouble codes.
Seen on SW version	Service tool installations older than 7.2 with all versions of the service pages for 1.92 and 1.93.
Solved in SW version	Service tool installations from 7.2. Service pages from 1.95_rev A

Technical Information:

SEHS-1544 (S0) : Value table is wrong for P3248 in service pages for 1.95 Rev. B

JIRA ID	SEHS-1544
Severity	Cosmetic
Introduction	The PLUS+1 service tool can be used for changing parameters and perform live diagnostics on PVED-CLS.
Problem	Parameter P3248 Internal 5V on pin 11 can be set to be supplied from internal or external source. The parameter values used by the service pages 1.95 rev. B are however confusing.
Occurrence	The problem is systematic.
Impact	The impact is cosmetic if configuration rules given in the workaround field are applied.
Work around	When configuring P3248 with the PLUS+1 service tool 1.95 rev. B, use following rules: P3248 = 0 (disabled in service tool 1.95 rev B): Sensor supply is generated from PVED-CLS P3248 = 1 (enabled in service tool 1.95 rev B)): Sensor supply must be supplied from external source
Seen on SW version	Service pages 1.95 Rev. B (1.95 application software)
Solved in SW version	1.96

Technical Information:

SEHS-1501 (S0) : Plus+1 Service tool does not update reserved bytes in service mode CAN messages

JIRA ID	SEHS-1501
Severity	Cosmetic
Introduction	The Plus+1 service tool can be used to identify, configure & calibrate PVED-CLS units
Problem	The Plus+1 service tool only updates the bytes which carry valid information before sending a CAN message. This means that if a CAN message is sent which has all 8 bytes with signal information, then all 8 bytes will be updated. If the next CAN message to be sent from the Plus+1 service tool only has 2 bytes with signal information, then only these 2 bytes will be updated whereas byte 3-8 will stay with the old information. This has no influence on the functionality because PVED-CLS does not validate these bytes, but it is not according to the PVED-CLS communication protocol which may lead to confusion.
Occurrence	This problem is systematic.
Impact	This issue is cosmetic and has no influence on the functionality. If customers want to implement their own service tool functionality, they should follow the PVED-CLS communication protocol and not what is sent by the Plus+1 service tool.
Work around	In customers want to build their own service tool, they should follow PVED-CLS communication protocol and not directly implement what the Plus+1 service tool is sending.
Seen on SW version	1.92, 1.93, 1.95, 1.96
Solved in SW version	1.97

Technical Information:

SEHS-1263 (S0) : Valid parameter range incorrect in the PLUS+1 service tool for parameters P3243, P3582 & P3718.

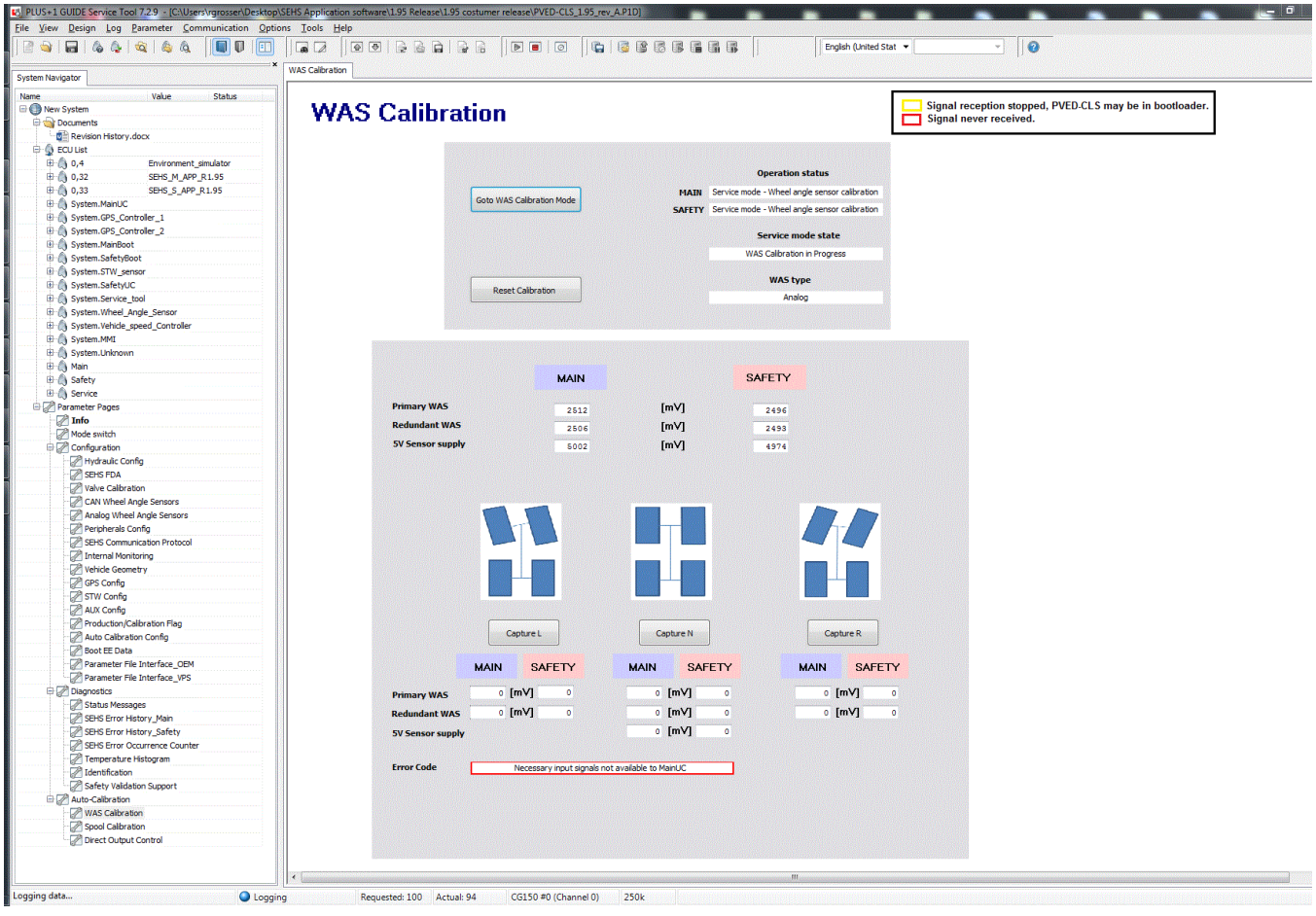
JIRA ID	SEHS-1263
Severity	Cosmetic
Introduction	By using the PLUS+1 service tool it is possible to configure the parameters for PVED-CLS.
Problem	Valid parameter range incorrect in the PLUS+1 service tool for P3243, P3582 & P3718. The correct ranges are: P3243 Max COV connection test current: 10-255 P3582 STW Anti-jerk filter Cut-off frequency: 5-200 (incorrect in the user manual too) P3718 AUX low pass Filter cut off frequency: 5-200
Occurrence	The problem is systematic
Impact	This has no impact for customers. If any parameter is configured out of the ranges implemented in the application, PVED-CLS will enter safe state.
Work around	P3243, P3582 & P3718 shall always be configured inside the valid range: P3243 Max COV connection test current: 10-255 P3582 STW Anti-jerk filter Cut-off frequency: 5-200 P3718 AUX low pass Filter cut off frequency: 5-200
Seen on SW version	1.92, 1.93, 1.95, 1.96
Solved in SW version	1.97

Technical Information:

SEHS-1065 (S0) : PLUS+1 Service tool shows not-existing error in WAS auto-calibration

JIRA ID	SEHS-1065
Severity	Cosmetic
Introduction	PVED-CLS has implemented a function to auto-calibrate the wheel angles which can be invoked by the service tool. Further information can be found in the user manual for 1.95, section 9.1 Wheel angle sensor calibration.
Problem	The WAS auto-calibration page in the service tool has a field "Error code" which shows the default value "Necessary input signals not available to MainUC" until a calibration status message containing this signal has been received. This may be confusing to the operator. The red square around the field indicates that a CAN message containing this signal has not been received yet. See screenshot in the technical information section. The value displayed is therefore not valid until the red square disappears.
Occurrence	This error message will be visible every time the WAS auto-calibration is started from the service tool.
Impact	The field "Error code" should be ignored a long as the red square is visible around the field.
Work around	None
Seen on SW version	1.92, 1.93, 1.95, 1.96
Solved in SW version	1.97

Technical Information:



Boot loader

SEHS-1558 (S1) : KWP2000 Bootloader Request Upload/Download block size restrictions of 56bytes

JIRA ID	SEHS-1558
Severity	Low
Introduction	KWP2000 Bootloader Block transfer (Read/write) size restrictions of 56bytes does not throw error code 0x43 in SI = 35Hex REQUEST_UPLOAD/READ and not specified in SI=34Hex REQUEST_DOWNLOAD/WRITE
Problem	Error code is not reported by services SI = 35Hex REQUEST_UPLOAD/READ when transfer memory size is more than 56bytes. Routine SI=34Hex REQUEST_DOWNLOAD/WRITE shall have block transfer memory size of less than or equal to 56bytes. No error code is reported if transfer memory size is more than 56bytes.
Occurrence	The problem is systematic.
Impact	Customer will have to make several write operations if more than 56 bytes shall be downloaded.
Work around	Block transfers(Upload/Download) using services 35Hex-REQUEST_UPLOAD/READ and 34Hex-REQUEST_DOWNLOAD/WRITE services shall be not more than 56bytes.
Seen on SW version	Boot loader 3.82 & 3.85
Solved in SW version	Not planned

Technical Information:

SEHS-1340 (S1) : KWP2000 session sequences with several master node ID's do not work

JIRA ID	SEHS-1340
Severity	Low
Introduction	PVED-CLS can be configured and flashed by using the KWP2000 protocol described in the KWP2000 manual. When starting a KWP2000 session by sending a start diagnostic session command (see KWP manual for boot loader 3.85, section 11.1), PVED-CLS locks itself to the master node sending the request. When a stop diagnostic command has been sent (see KWP manual for boot loader 3.85, section 11.3), PVED-CLS is free again to new start diagnostic requests from any master node ID.
Problem	This is only a problem if several KWP2000 master nodes are being used. When requesting a KWP2000 service which does not require starting a KWP2000 diagnostic session as e.g. ECU identification, there is a defect in the software which subsequently not allow to start a diagnostic session with another master node ID. The PVED-CLS will incorrectly remain locked to the first node ID from which the ECU identification service was requested.
Occurrence	This will only happen in applications where several KWP2000 master node ID's are used.
Impact	In a failure scenario as described under "problem report", PVED-CLS will ignore the request from the second master node.
Work around	This defect has several workarounds: 1. Power-cycle of PVED-CLS. 2. Send start diagnostic at beginning of each KWP2000 service request and stop diagnostic session when finishing the KWP2000 request. By this, PVED-CLS will clear the master node ID lock.
Seen on SW version	boot loader 3.85
Solved in SW version	Not planned

Technical Information:

SEHS-1560 (S0) : EEPROM parameter downloads to address 0 & 1 results in an unresponsive unit

JIRA ID	SEHS-1560
Severity	Cosmetic
Introduction	The PVED-CLS boot loader handles up/downloads of boot loader, application and parameters.
Problem	When downloading an application to PVED-CLS, the boot loader stores a checksum in EEPROM indexes 0 & 1. This checksum is validated at every powerup of PVED-CLS. If these addresses are changed by an external tool, PVED-CLS does not recognize a valid application and goes in to a locked safe state and does not communicate on the CAN bus anymore.
Occurrence	This problem will be visible every time an external tool downloads values to parameter index 0 & 1.
Impact	Customers will have to recover the ECU in which the parameter location were modified (parameter index 0 & 1). This can be done via the PLUS+1 Service Tool. To do that, open the service tool without opening any P1D Service page file, select communication/recover ECU, enter boot node ID of the unresponsive ECU and follow the steps on the screen. When the PLUS+1 Service Tool has found the ECU, download the boot loader and the application again. After doing that, the problem should be cleared.
Work around	The PLUS+1 Service Tool is not able to download to parameter index 0 & 1, but if customers develop their own service tool, it shall be ensured that downloads to parameter index 0 & 1 are prohibited.
Seen on SW version	Boot loader 3.82 & 3.85
Solved in SW version	Not planned

Technical Information:

Documentation

SEHS-2819 (S1) : PFHd specification per IEC61508 ed.1 and ed.2 are differing

JIRA ID	SEHS-2819
Severity	Low
Introduction	The calculation of PFHd is depending on the edition of IEC61508. The formulae are different due to a change in the underlying assumptions. To address this, both PFHd results for ed.1 and ed.2 are given. The MTTFd results per ISO13849 and ISO25119 are unchanged.
Problem	The problem is theoretic. The PFHd value given in the safety manual is updated to conform to IEC 61508 ed.1. PFHd per IEC 61508 ed. 2 is 1.67E-8. PFHd per IEC 61508 ed. 1 is 5.77E-8. Note that the PFHd calculations are based on many assumptions as e.g. the diagnostic coverage which can be claimed by a certain test method, failure rates from generic reliability handbooks, estimated failure rate for mechanical parts as well as a general application mission profile.
Occurrence	Systematic.
Impact	If safety integrity calculations are done per IEC61508, then the numerical calculation of the safety integrity level of the entire safety channel(s), including interfacing OEM components, will yield worse results than with the ed.2. There is no impact if system calculations are done per ISO13849 or SO25119.
Work around	Recalculate the overall numerical safety integrity level for the system safety functions and evaluate if the target functional safety requirements are met. Perform the calculation per ISO13849 or ISO25119. Contact Danfoss PAE for support on the calculation.
Seen on SW version	All.
Solved in SW version	Not planned.

Technical Information:

SEHS-2964 (S0) : The parameters to determine if the steering wheel is in use for auto-guidance disengage are wrongly described in the communication protocol - Auto guidance communication state machine

JIRA ID	SEHS-2964
Severity	Cosmetic
Introduction	In PVED-CLS it is configurable when the steering wheel is determined to be in use. The configuration is done by: P3583: STW in use - Velocity threshold P3584: STW in use - Angle threshold See User manual section 3.6.1 - Steering wheel related conditions.
Problem	In PVED-CLS communication protocol section 8.3 - Guidance state machine, the STW_ON condition is wrongly described in the table describing all conditions.
Occurrence	-
Impact	The described parameter, P3471, does not exist.
Work around	Follow description given in the user manual, section 3.6.1 - Steering wheel related conditions.
Seen on SW version	all
Solved in SW version	Not Planned

Technical Information:

SEHS-1626 (S0) : PVED-CLS Communication protocol misses information on how it will react if active error codes are sent via the STW or AUX mini wheel sensor messages

JIRA ID	SEHS-1626
Severity	Cosmetic
Introduction	The STW and AUX mini wheel sensor contain a field where the steering sensor can inform PVED-CLS about different error codes.
Problem	The PVED-CLS communication protocol does not document how it will react if values other than "No Error" is sent. If values other than "No Error" are sent, PVED-CLS will enter safe state and send a DTC related to the steering sensor sending the error.
Occurrence	-
Impact	-
Work around	-
Seen on SW version	1.92, 1.93, 1.95, 1.96, 1.97, 1.98
Solved in SW version	2.00

Technical Information:

SEHS-1500 (S0) : WAS position capture request is insufficiently described in PVED-CLS communication protocol

JIRA ID	SEHS-1500
Severity	Cosmetic
Introduction	PVED-CLS Communication protocol describes every byte which is sent and received by PVED-CLS.
Problem	Byte 3-5 is not described in WAS position capture request.
Occurrence	-
Impact	The problem is a typo mistake. Byte 3-5 is reserved and should have the same description as byte 6-8.
Work around	Byte 3-5 shall be handled the same way as byte 6-8.
Seen on SW version	1.92, 1.93, 1.94, 1.95, 1.96, 1.97, 1.98
Solved in SW version	2.00

Technical Information:

SEHS-1126 (S0) : Steering feedback message PGN offset parameter has wrong address in PVED-CLS communication protocol page 12.

JIRA ID	SEHS-1126
Severity	Cosmetic
Introduction	PVED-CLS communication protocol specifies the CAN message configuration on page 12.
Problem	On page 12 in the PVED-CLS communication protocol, the steering feedback has PGN offset parameter P3611 - this should be P3323.
Occurrence	NA
Impact	P3611 does not exist, so if a customer service tool implementation tries to modify P3611 the change will not have any effect to PVED-CLS.
Work around	Use P3323 instead of P3611.
Seen on SW version	1.92, 1.93, 1.95
Solved in SW version	1.96

Technical Information:

SEHS-663 (S0) : User manual error code list contains SPN 520209 but it is not used in PVED-CLS application software

JIRA ID	SEHS-663
Severity	Cosmetic
Introduction	The user manual describes all possible error codes in PVED-CLS application software. See user manual for 1.92, section 13.1 Error codes.
Problem	SPN: 520209 is documented in this list, but no functionality is implemented for it.
Occurrence	NA
Impact	SPN 520209 can be ignored if customers want to implement their own service tool.
Work around	SPN 520209 can be ignored if customers want to implement their own service tool.
Seen on SW version	1.92
Solved in SW version	1.93