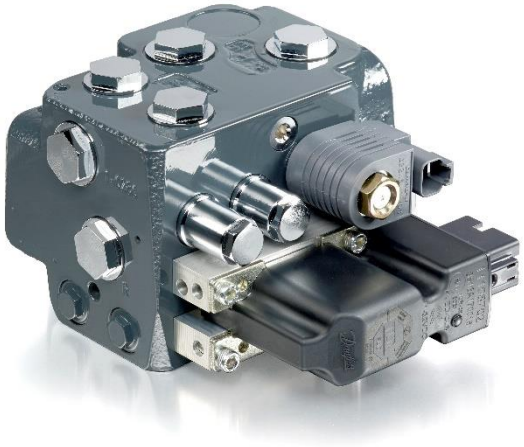
ENGINEERING
TOMORROW

MultiAxis-Steer™

EHI Electrohydraulic steering valve with PVED-CLS controller

Errata Information

FW 1.00



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
VA	Virtual Axis
VAA	Virtual Axis Angle
VAP	Virtual Axis Position
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-8736 (S2) : PVED-CLS generates alarm when pre-operation to operation state transition is triggered and exit criteria for transition is satisfied in only one controller.

JIRA ID	SEHS-8736
Severity	Medium
Introduction	PVED CLS Main and Safety controller enter in to operational state from pre-operational state if difference between wheel angle position and calculated wheel angle set point is less than NAXIS_PREOP_EXIT_WA_TOL_dDEG. Wheel angle position is sensor input to both controller,
Problem	Safety UC uses wheel angle position from Main UC shared over IPC. This alarm will come when 1. Safety UC is in pre-operation mode, while Main UC is still doing transition from off road safety check to pre-operation state 2. Difference between wheel angle position shared IPC and calculated set point is less than NAXIS_PREOP_EXIT_WA_TOL_dDEG in Safe UC which triggers transition from pre-operation to operation state 3. When Main UC completed its transition to pre-operation state , but now received wheel angle position is not enough to satisfy exit criteria.
Occurrence	The problem is systematic and will occur when exit criteria for state transition from pre-operation to operation state is fulfilled by one controller while other controller is busy in previous state transition.
Impact	Medium
Work around	None
Seen on SW version	1.00
Solved in SW version	1.10

Technical Information:

SEHS-8109 (S2) : Spool monitoring can cause false alarms in the safety controller when the system reaches a steady state condition.

JIRA ID	SEHS-8109
Severity	Medium
Introduction	Spool monitoring is executed individually in each controller and is monitoring if the spool is located in a safe position with reference to the setpoint. If the spool travels out of the safe zone for more than 150ms, PVED-CLS will enter safe state and submit DTC with SPN: 520204 FMI: 7. More information can be found in the safety and user manual, section EHi-Valve monitoring
Problem	PVED-CLS is a category 3 system where the spool setpoints are calculated individually based on the received input signals. To compensate for deviations in the calculations, the safety controller uses the input signals from the main controller, received via the internal communication bus, to ensure that equal results for the spool setpoint calculation are obtained. Intermediate crosschecks are performed, so that the category 3 architecture is maintained. The internal communication bus is asynchronous to the application task (10ms) and introduces a delay of ~20ms. This leads to that the safety controller sometimes misses a new input signal value from the main controller which can lead to small differences in the calculation. The MultiAxis VAP ramp function (see safety and user manual, section Safe vehicle speed dependent Virtual Axis Position (VAP) limit) calculates a new maximum step size based the vehicle speed every 1 second. If the vehicle speed value is changing just before the main controller is about to calculate a new maximum step size, the safety controller is still using the old vehicle speed value as it has not received the new value over the internal communication bus yet. This results in different ramping behavior in the main and safety controller for the next second. Since the vehicle speed is a slow changing signal, the calculated ramp size and the resulting wheel angle setpoint differences are of small amplitude. Once wheel angle position is close to the wheel angle setpoint, the closed-loop algorithm reaches a steady-state, it may happen at a point where the main controller calculates the spool set-point to the positive deadband and the safety controller to the negative deadband due to the small difference in the wheel angle setpoint. As no further control is happening, the difference may persist long enough for spool monitoring to detect it. If the wheel angle setpoint/position error gets larger for example due to new master axis movement, wheel angle sensor noise or wheel drift, both controllers will again agree on the spool direction. For the operator this means that PVED-CLS enter safe state and the system needs to be power-cycled to resume operation.
Occurrence	The false alarm can only occur if the VAP are configured to be active and the likelihood increases the softer the ramps are configured. The likelihood of observing this issue is rare as several conditions needs to be met before the issue - it is so far only seen once.
Impact	When the false alarm is generated, PVED-CLS needs to be power-cycled.
Work around	This false alarm can be mitigated by increasing the allowed spool position deviation threshold (P3362 Spool monitoring - Max difference between spool set-point and spool position) in the safety controller to 115 (default value 80). Overall spool monitoring performance is not affected as it is running in the main-controller with the default value of 80.
Seen on SW version	1.00
Solved in SW version	1.10

Technical Information:

SEHS-7990 (S1) : PVED-CLS will not do self-centering (Pre-Safe state) if external failure is raised during pre-operational or ON-Road locked states

JIRA ID	SEHS-7990
Severity	Low
Introduction	PVED-CLS MultiAxis slave supports a self-centering algorithm which centers the wheels when an external failure occurs. More information can be found in the user manual, section: Operation state machine – fault handling.
Problem	If an external failure happens in the states: - Pre-operational - ON-Road locked state PVED-CLS will not enter pre-safe state and center the wheels, but enter safe state directly and freeze the current wheel angle - e.g. same reaction as for internal failures.
Occurrence	The problem is systematic and will occur each time an external failure occurs in the states: - Pre-operational - ON-Road locked state For a proper integrated system this scenario will only occur very rare.
Impact	Low, the system ends up in safe state without self-centering for external failures and will thus have the same behavior as internal failures.
Work around	None.
Seen on SW version	1.00
Solved in SW version	1.10

Technical Information:

SEHS-7900 (S1) : VAP and VAA ramping parameters can be set to invalid values (0)

JIRA ID	SEHS-7900
Severity	Low
Introduction	PVED-CLS MultiAxis slave software offers VAA & VAP ramping function which smoothens the movement of VAP & VAA in case of large changes of VAP & VAA by MMI. More information can be found in the user manual, sections: Safe vehicle speed dependent Virtual Axis Position (VAP) change rate & Safe vehicle speed dependent Virtual Axis Angle (VAA) change rate.
Problem	If the maximum change rate of either VAA or VAP is set to 0, the VA will freeze at current position and not be able to move because the maximum change rate is 0mm/s.
Occurrence	The problem is systematic
Impact	None, the parameter values of the ramping functions shall not be set to 0. See user manual, sections: Safe vehicle speed dependent Virtual Axis Position (VAP) change rate & Safe vehicle speed dependent Virtual Axis Angle (VAA) change rate.
Work around	The parameter values of the ramping functions shall not be set to 0. See user manual, sections: Safe vehicle speed dependent Virtual Axis Position (VAP) change rate & Safe vehicle speed dependent Virtual Axis Angle (VAA) change rate.
Seen on SW version	1.00
Solved in SW version	1.10

Technical Information:

SEHS-10780 (S0) : MultiAxis documentation incorrectly suggests that MultiAxis SW is suitable for OSPE & EHi-H

JIRA ID	SEHS-10780
Severity	Cosmetic
Introduction	MultiAxis SW is intended to work with EHi-E or the EHPS valves.
Problem	The user documentation and the parameter list incorrectly suggests that the MultiAxis software can be used also for OSPE and EHI-H valve type. The MultiAxis SW is a stand-alone SW application which cannot coexist with an OSP operating in parallel.
Occurrence	Documentation issue.
Impact	The SW will not work properly if used on OSPE or EHI-H systems.
Work around	None, the MultiAxis SW application shall only be used with EHi-E or EHPS valves.
Seen on SW version	1.00
Solved in SW version	Not planned

Technical Information:

Service Tool

Boot loader

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 a 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 does 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:

Documentation

Other

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