

Software module H4U.app Pressure Flow

H4U.app pQ / software version 2.0.0 (edition 1)



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English

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1 General

1.1 About this documentation

The **H4U**.app pQ is available in 3 supported target systems

Siemens TIA Portal

Software designation	Release date	Versioning
SWA-HYD-T-PQ-TIA-02-RS-NN-N	2025-03	1.0.0→ 2.0.0
SWA-HYD-T-PQ-TIA-01-RS-NN-N	2023-09	1.0.0

Beckhoff TwinCat 3

Software designation	Release date	Versioning
SWA-HYD-T-PQ-TC3-02-RS-NN-N	2025-03	1.0.0→ 2.0.0
SWA-HYD-T-PQ-TC3-01-RS-NN-N	2023-09	1.0.0

KEBA

Software designation	Release date	Versioning
SWA-HYD-T-PQ-KEBX-02-RS-NN-N	2025-03	1.0.0→ 2.0.0
SWA-HYD-T-PQ-KEBX-01-RS-NN-N	2023-09	1.0.0

1.2 Software designations

The following table shows various variants of the PLC boot application:

Table 1: Type code

Product	¹⁾	Category	Target system	Version	Export code
SWA-HYD	T	PQ	TIA	01-RS-NN	N
SWA-HYD	T	PQ	TC3	01-RS-NN	N
SWA-HYD	T	PQ	KEBX	01-RS-NN	N

SWA-HYD Software for hydraulic applications

T ¹⁾Technology library

PQ Closed-loop pressure/flow control

TIA Target system is a TIA-compatible control

TC3 Target system is a TwinCat 3-compatible control

KEBX Target system is an IECEdit-compatible control

01-RS-NN Version identifier

N Standard

1.3 Required and supplementary documentation

Title	Document number	Document type
H4U.app pQ	01936	Data sheet
Quick Start Guide H4U.app pQ	01936-x-Z	Notes on commis- sioning

These documents are available in the Media Directory at ➔ <https://www.boschrexroth.com/de/de/download-center/>



The functions of the H4U.app pQ and the handling of parameter sets are explained in the Application Manual "Software module H4U.app Pressure Flow, R.01936-FK".

2 Software version 2.0.0



IMPORTANT INFORMATION!

- If you upgrade from version 1.0.0 to version 2.0.0 you have to take note of changes with regard to the interface as well as the changed call in the case of targets that implement the call layer:
 - Changes in the interface
 - Call layer for the target "TwinCAT 3"
 - Removal of binding for know-how protection for the target "TIA Portal"
- The license acquired for version 1.0.0 may still be used for version 2.0.0 without any restrictions.

2.1 Bug fixing



The classification into the individual levels of severity is explained in ➔ Chapter 3 "Explanation of the severity level" on page 17.

2.1.1 Erroneous initialization behavior

Characteristics

SWA-HYD-T-PQ-TIA-02-RS-NN-N	✓
SWA-HYD-T-PQ-TC3-02-RS-NN-N	✓
SWA-HYD-T-PQ-KEBX-02-RS-NN-N	✓

Bug ID:

964886

Severity:

K3

Description

In version 1.0.0, the status *DoneInit* was by mistake set to static = TRUE, irrespective of the actual status of the initialization.

Bug fixing

The behavior of the app in the initialization phase was corrected. In version 2.0.0 the initialization behavior was corrected so that the status *DoneInit* = TRUE is only present, if the initialization of the app has been completed successfully.

2.2 Functional enhancements

2.2.1 Pressure/flow control in the closed circuit

Characteristics

SWA-HYD-T-PQ-TIA-02-RS-NN-N	✓
SWA-HYD-T-PQ-TC3-02-RS-NN-N	✓
SWA-HYD-T-PQ-KEBX-02-RS-NN-N	✓

Description

This function allows closed-loop pressure/flow control to be implemented at both ports of a hydraulic pump. The pump has to be a 4-quadrant-capable pump. The pressures in both ports of the pump have to be measured. A hydraulic circuit has to be present at both pump ports.

The function is described in chapters 5.2.1 "*p/Q control, variable displacement pump*" and 5.3.1 "*p/Q control, variable-speed, fixed displacement pump*" of the Application Manual 01936-FK.

2.2.2 Calibration of leakage

Characteristics

SWA-HYD-T-PQ-TIA-02-RS-NN-N	✓
SWA-HYD-T-PQ-TC3-02-RS-NN-N	✓
SWA-HYD-T-PQ-KEBX-02-RS-NN-N	✓

Description

This function can be used to improve the steady-state accuracy of open/closed-loop flow control.

The function is described in chapter 5.1.6 "*Calibration functions*" of Application Manual 01936-FK.

2.2.3 Calibration of the valve zero point of stroke volume adjustment valve

Characteristics

SWA-HYD-T-PQ-TIA-02-RS-NN-N	✓
SWA-HYD-T-PQ-TC3-02-RS-NN-N	✓
SWA-HYD-T-PQ-KEBX-02-RS-NN-N	✓

Description

This function can be used to improve the steady-state accuracy of closed-loop pressure control. The function is described in chapter 5.1.6 “*Calibration functions*” of Application Manual 01936-FK.

2.2.4 Automated identification of the controlled system and calculation of the controller parameters

Characteristics

SWA-HYD-T-PQ-TIA-02-RS-NN-N	✓
SWA-HYD-T-PQ-TC3-02-RS-NN-N	✓
SWA-HYD-T-PQ-KEBX-02-RS-NN-N	✓

Description

This function is used for automating the parameterization of the flow controller and the pressure controller. The function automatically determines unknown properties of the controlled system and computes a suggested parameterization for the controllers.

The function is described in chapter 5.1.5 “*Automated parameterization of pressure control*” of Application Manual 01936-FK.

2.2.5 Operating mode “direct actuator control”

Characteristics

SWA-HYD-T-PQ-TIA-02-RS-NN-N	✓
SWA-HYD-T-PQ-TC3-02-RS-NN-N	✓
SWA-HYD-T-PQ-KEBX-02-RS-NN-N	✓

Description

The new operating mode “direct actuator control” is primarily intended for the commissioning phase. In this mode, the command values (speed command value and valve command value) can be input directly for the actuators.

The function is described in chapters 5.2.1 “*p/Q control*” of variable displacement pumps in Application Manual 01936-FK.

2.2.6 Call layer

Characteristics

SWA-HYD-T-PQ-TIA-02-RS-NN-N	---
SWA-HYD-T-PQ-TC3-02-RS-NN-N	✓
SWA-HYD-T-PQ-KEBX-02-RS-NN-N	---

Description

For the target “TwinCAT 3” the software module offers two function calls for pressure/flow control:

- *alnitPressureFlowControl()*: This call is used to initialize the software module. We recommend that *alnitPressureFlowControl()* be called in a task which may be blocked (no hard real-time requirement, no cycle time monitoring). The function call has no transfer parameters.
- *aRunPressureFlowControl()*: With this call pressure/flow control is executed. *aRunPressureFlowControl()* has to be called in a cyclical task with hard real time. The function call has no transfer parameters.

The function calls offer the possibility of distributing the computing load more evenly to different tasks of the control system.

The recommended instantiation and the call of the software module are described in the Quick Start Guide 01936-01-Z “*H4U.app pQ*”.

2.3 Changes in functions

2.3.1 Removal of binding for know-how protection

Characteristics

SWA-HYD-T-PQ-TIA-02-RS-NN-N	✓
SWA-HYD-T-PQ-TC3-02-RS-NN-N	---
SWA-HYD-T-PQ-KEBX-02-RS-NN-N	---

Description

For the target “TIA”, in the past the **H4U.app pQ** used to be linked to the host ID of the control via a binding mechanism in addition to a license check. This is no longer necessary in version 2.0.0 of the **H4U.app pQ** so that the **H4U.app pQ 2.0.0** is delivered without binding.

The recommended instantiation and calling of the software module is described in the quick start guide 01936-02-Z for the “*H4U.app pQ*”.

2.3.2 Selection of the controller operating mode

Characteristics

SWA-HYD-T-PQ-TIA-02-RS-NN-N	✓
SWA-HYD-T-PQ-TC3-02-RS-NN-N	✓
SWA-HYD-T-PQ-KEBX-02-RS-NN-N	✓

Description

In this version, the controller operating mode of the H4U.app pQ is selected via the input *CyclicInput.ControlStructure.ControlMode*. In the predecessor version, the operating mode was selected via the inputs *CyclicInput.ControlStructure.EnableFlowCtrl* and *CyclicInput.ControlStructure.EnablePressureCtrl*. These inputs are no longer provided in the current version.

The function is described in chapters 5.2.1 “p/Q control, variable displacement pump” and 5.3.1 “p/Q control, variable-speed, fixed displacement pump” of the Application Manual 01936-FK.

Operating mode	Version 2.0.0	Version 1.0.0	
	Control Mode	EnableFlowCtrl	EnablePressureCtrl
Alternating control	0	FALSE/TRUE	FALSE/TRUE
Closed-loop pressure control	1	FALSE	TRUE
Flow control	2	TRUE	FALSE
Direct actuator control	3	---	---

2.3.3 Robustness of controller adaption

Characteristics

SWA-HYD-T-PQ-TIA-02-RS-NN-N	✓
SWA-HYD-T-PQ-TC3-02-RS-NN-N	✓
SWA-HYD-T-PQ-KEBX-02-RS-NN-N	✓

Description

The robustness of pressure controller adaption in the parallel controller structure was improved with regard to signal noise. This refers to the adaption of proportional gain as a function of the control deviation as well as the adaption of D-gain as a function of the actual pressure value change.

The function is described in chapter 5.2.1 “p/Q control, variable displacement pump” → “Parallel structure” → “Pressure control” in the Application Manual 01936-FK.

2.3.4 Filter cascade for the pressure command value and the actual pressure value

Characteristics

SWA-HYD-T-PQ-TIA-02-RS-NN-N	✓
SWA-HYD-T-PQ-TC3-02-RS-NN-N	✓
SWA-HYD-T-PQ-KEBX-02-RS-NN-N	✓

Description

The pressure command value and the actual pressure value are fed via a filter cascade. The filter cascade can suppress disturbances (line vibrations, resonances, pump frequencies) so that they are not excited additionally by the controller.

The function is described in chapter 5.2.1 "*p/Q control, variable displacement pump*" → "*Parallel structure*" → "*Pressure control*" in the Application Manual 01936-FK.

2.3.5 Number of data points of speed adaption was increased from 3 to 8

Characteristics

SWA-HYD-T-PQ-TIA-02-RS-NN-N	✓
SWA-HYD-T-PQ-TC3-02-RS-NN-N	✓
SWA-HYD-T-PQ-KEBX-02-RS-NN-N	✓

Description

The number of data points of the characteristic curve for speed adaption was increased from 3 to 8 data points. Speed adaption is implemented in the parallel controller structure of the pressure controller for the proportional gain and the feedback gain of the actual pressure value change. The following input parameters were changed from 3 to 8 in terms of dimension:

- *ConfigurationData.pQControl.PressureController.Parallel.SpeedAdaption_BP*
- *ConfigurationData.pQControl.PressureController.Parallel.DGainSpeedAdaption_TD*
- *ConfigurationData.pQControl.PressureController.Parallel.PGainSpeedAdaption_TD*

The function is described in chapter 5.2.1 "*p/Q control, variable displacement pump*" → "*Parallel structure*" → "*Pressure control*" in the Application Manual 01936-FK.

2.3.6 Change of the structure and the identifier of the interface

Characteristics

SWA-HYD-T-PQ-TIA-02-RS-NN-N	✓
SWA-HYD-T-PQ-TC3-02-RS-NN-N	✓
SWA-HYD-T-PQ-KEBX-02-RS-NN-N	✓

Description

The prefix “Cfg” of the structure elements was removed in the input data structure *ConfigurationData*. The parameters of the pressure controller were sorted by parallel/cascaded controller structure.

Table 2: ConfigurationData

V 1.0.0	V 2.0.0
ConfigStructure	ConfigStructure
PumpControlSystem	PumpControlSystem
EquipSwivelAngleSensor	EquipSwivelAngleSensor
EnableExternalSpeedSetting	EnableExternalSpeedSetting
EnableMultiCircuitSecPump	EnableMultiCircuitSecPump
	EnableClosedCircuit
	EnablePressureCmdGen4Tuning
pQControl	pQControl
PressureController	PressureController
CfgFactorFlowRateOffset	FactorFlowRateOffset
CfgPrsActFltTime	PrsActFltTime
CfgPrsCmdFltTimePos	PrsCmdFltTimePos
CfgPrsCmdFltTimeNeg	PrsCmdFltTimeNeg
CfgPGainRamp	PGainRamp
CfgIPartRampValue	IPartRampValue
	Parallel
CfgParIPGain_TD[..3]	PGain_TD[..3]
CfgParIPGain_BP[..1]	PGain_BP[..1]
CfgParIPGainN_TD[..3]	PGainSpeedAdaption_TD[..7]
CfgParIPGainN_BP & CfgParIDGainN_BP[..2]	SpeedAdaption_BP[..7]
	PGainAdaptionVariant
	PGainAdaptionHysteresis
	PGainAdaptionFilterTime
CfgIPartTimeParl	IPartTime
CfgParIDPartTime	DGain
CfgParIDGainN_TD[..2]	DGainSpeedAdaption_TD[..7]
CfgParIDGainFaktorIfNeg	DGainFaktorIfNeg
CfgParIDGainFaktorIfPos	DGainFaktorIfPos
CfgParIDPartFilterTime	DPartFilterTime
	DGainAdaptionVariant
	DGainAdaptionFilterTime
	DGainAdaptionHysteresis
CfgDistbcCmpFilterTime	DistbcCmpFilterTime
CfgDstCmpFltTiSwt	DstCmpFltTiSwt
	Cascade
CfgCascadePGain	PGain

V 1.0.0	V 2.0.0
CfgIPartTimeNormal	IPartTimeNormal
CfgIPartTimeOvershoot	IPartTimeOvershoot
CfgCtrlDevThr_IAdapt	CtrlDevThr_IAdapt
CfgCtrlDevHys_IAdapt	CtrlDevHys_IAdapt
CfgDPartActValueEval_TD [...1]	DPartActValueEval_TD [...1]
CfgDPartActValueEval_BP [...1]	DPartActValueEval_BP [...1]
CfgCtrlValueFilterTime	CtrlValueFilterTime
CfgCascDPartTime	DGain
CfgCascDPartFilterTime	DPartFilterTime
	LoopShapingFilter
	EnableFilter
	EnableLowPassFilter:
	EnableNotchFilter1:
	EnableNotchFilter2:
	LowPassFilterType
	Order
	FrequencyCutOff
	FrequencyNotch1
	BandwidthNotch1
	FrequencyNotch2
	BandwidthNotch2
FlowCmdValueProc	FlowCmdValueProc
CfgLeakageFlow_TD [...3]	LeakageFlow_TD [...3]
CfgLeakagePressure_BP [...3]	LeakagePressure_BP [...3]
CfgFlowCmdIntDisabled	FlowCmdIntDisabled
CfgSpeedLeakCal	SpeedLeakCal
CfgActivDampingFactor	ActivDampingFactor
CfgActivDampingFilterTime	ActivDampingFilterTime
CfgPressureActFilterTime	PressureActFilterTime
ActuatorSystem	ActuatorSystem
ValveAdaption	ValveAdaption
CfgValveCmdFilterTime	ValveCmdFilterTime
CfgInvertValveLiftCmd	InvertValveLiftCmd
CfgCharCurveType	CharCurveType
CfgCharCurveFlow [...49]	CharCurveFlow [...49]
CfgCharCurveValveCmd [...49]	CharCurveValveCmd [...49]
CfgValveLiftCmdOffset	ValveLiftCmdOffset
CfgInitCharCurve	InitCharCurve
CfgValveCorrection_BP [...3]	ValveCorrection_BP [...3]
CfgValveCorrection_TD [...3]	ValveCorrection_TD [...3]
pQCoordinator	pQCoordinator

V 1.0.0	V 2.0.0
	ThresholdPressureA
CfgThresholdPrs	ThresholdPressureB
CfgQCtrlFilterTime	QCtrlFilterTime
CfgRampFader	RampFader
CfgPrsActGradFiltTime	PrsActGradFiltTime
CfgGainBulkThrsInit	GainBulkThrsInit
FlowController	FlowController
CfgEnforceFFExternal	EnforceFFExternal
CfgIPartRampValue	IPartRampValue
CfgIPartTime	IPartTime
CfgDPartFilterTime	DPartFilterTime
CfgDPartTime	DPartTime
CfgPGainRamp	PGainRamp
CfgPGain	PGain
CfgFFGainSlave	FFGainSlave
OperationStrategy	OperationStrategy
SpeedVarOperation	SpeedVarOperation
CfgPrefSwivelAngleCmd	PrefSwivelAngleCmd
CfgMaxSpeedTorque	MaxSpeedTorque
CfgSpeedSync	SpeedSync
CfgSpeedNom	SpeedNom
CfgNomPowerMotor	NomPowerMotor
CfgFilterTimeTorqueLoad	FilterTimeTorqueLoad
CfgTorqueFactor	TorqueFactor
CfgFilterTimeSlipModel	FilterTimeSlipModel
CfgFactorSlip	FactorSlip
CfgFilterTimeMotorModel	FilterTimeMotorModel
CfgDeratingSpdLim	DeratingSpdLim
CfgDeratingStdStillTrq	DeratingStdStillTrq
CfgSpeedMinStandby	SpeedMinStandby
CfgStandbyLimit	StandbyLimit
CfgPrsDiffBoostThrs	PrsDiffBoostThrs
CfgGainBoostPrsDiff	GainBoostPrsDiff
CfgSwvAngDiffBoostThrs	SwvAngDiffBoostThrs
CfgGainBoostSwvAngDiff	GainBoostSwvAngDiff
CfgSpeedDecouplingZone	SpeedDecouplingZone
CfgDecelerationDelay	DecelerationDelay
CfgSpeedMaskCentrSpd	SpeedMaskCentrSpd
CfgSpeedMaskWindow	SpeedMaskWindow
CfgFilterTimeSpdCmdPosGrad	FilterTimeSpdCmdPosGrad
CfgFilterTimeSpdCmdNegGrad	FilterTimeSpdCmdNegGrad

V 1.0.0	V 2.0.0
CfgRampStandBy	RampStandBy
CfgSpeedCmdExternal	SpeedCmdExternal
PumpTwoPointControl	PumpTwoPointControl
CfgCtrlDevThr_VgMin	CtrlDevThr_VgMin
CfgPrsThr_SwvIO	PrsThr_SwvIO
CfgDbcTime_A_VgMin	DbcTime_A_VgMin
CfgCtrlDevThr_VgMax	CtrlDevThr_VgMax
CfgPrsThr_SwvNIO	PrsThr_SwvNIO
CfgSpdActWeight	SpdActWeight
CfgDbcTime_A_VgMax	DbcTime_A_VgMax
CfgPrsActThr_HighLoad	PrsActThr_HighLoad
CfgPrsCmdThr_HighLoad	PrsCmdThr_HighLoad
CfgDbcTime_B_VgMin	DbcTime_B_VgMin
CfgDbcTime_B_VgMax	DbcTime_B_VgMax
CfgDelayTimeSwvIn	DelayTimeSwvIn
CfgTimeSwvIn	TimeSwvIn
CfgDelayTimeSwvOut	DelayTimeSwvOut
CfgTimeSwvOut	TimeSwvOut
CfgPmpDisplacementVolumeMin	PmpDisplacementVolumeMin
OperatingModeCtrl	OperatingModeCtrl
CfgGeneral	General
CfgSampleTime	SampleTime
CfgDeadVolume	DeadVolume
CfgBulkModulus	BulkModulus
CfgVGeoSlavePumps	VGeoSlavePumps
CalcSysOpLimit	CalcSysOpLimit
CfgSwvAngUpperLimit	SwvAngUpperLimit
CfgSwvAngLowerLimit	SwvAngLowerLimit
CfgSpeedLimitMaxMotor	SpeedLimitMaxMotor
CfgSpeedLimitMinMotor	SpeedLimitMinMotor
CfgSpeedLimitMaxUser	SpeedLimitMaxUser
CfgSpeedLimitMinUser	SpeedLimitMinUser
CfgSwivelAngleRateMax	SwivelAngleRateMax
CfgMaxAngularAccPosUser	MaxAngularAccPosUser
CfgMinAngularAccNegUser	MinAngularAccNegUser
CfgdQLimitFactor	dQLimitFactor
CfgIPartUpperLimit_In	IPartUpperLimit_In
CfgIPartLowerLimit_In	IPartLowerLimit_In
CfgValveLiftLimitMaxUser	ValveLiftLimitMaxUser
CfgValveLiftLimitMinUser	ValveLiftLimitMinUser
CfgTorqueLimitMaxMotor	TorqueLimitMaxMotor

V 1.0.0	V 2.0.0
CfgTorqueLimitMaxUser	TorqueLimitMaxUser
CfgJMotorAndCoupling	JMotorAndCoupling
OpStatusMonPGH	OpStatusMonPGH
CfgManualMode	ManualMode
CfgSpeedThresManual	SpeedThresManual
CfgPressureThresManual	PressureThresManual
CfgTimeHeatingManual	TimeHeatingManual
CfgDbcTimeLowSpeed	DbcTimeLowSpeed
CfgCoolingFactor	CoolingFactor
CfgPressureFilterTime	PressureFilterTime
CfgSpeedFilterTime	SpeedFilterTime
	PressureControllerTuning
	AsymmetricSwivelDynamics
	EquivalentTimeConstant
	CostValueLimit
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	TimeWindowCalValueAverage
	StabilizationTimePressureCtrl
	PressureWindow
	SpeedWindow
	PressureCmd4LeakageRatio
	SpeedCmd4LeakageRatio

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Table 3: CycleInput

V1.0.0	V2.0.0
ControlStructure	ControlStructure
	ControlMode
EnableFlowCtrl	
EnablePressureCtrl	
EnableSlaveMode	EnableSlaveMode
EnableLeakageComp	EnableLeakageComp
EnableTorqueLimit	EnableTorqueLimit
EnableActiveDamping	EnableActiveDamping
EnableSwitchingTerm	EnableSwitchingTerm
EnableExtendedPressureCtrl	EnableExtendedPressureCtrl
EnableCascadeStructure	EnableCascadeStructure
EnableLimIntPrsCtrl	EnableLimIntPrsCtrl
EnableAdaptionPressureCtrl	EnableAdaptionPressureCtrl
EnableSpeedVarMode	EnableSpeedVarMode
EnableManualSpeedSetting	EnableManualSpeedSetting
EnableBoostPressureCtrlDev	EnableBoostPressureCtrlDev
EnableBoostSwvAngCtrlDev	EnableBoostSwvAngCtrlDev
EnableSlipCompensation	EnableSlipCompensation
EnableMotorDerating	EnableMotorDerating
EnableStandbySpeedPartLoad	EnableStandbySpeedPartLoad
EnableSpdSuppression	EnableSpdSuppression
ModeCoordinatorpQ	ModeCoordinatorpQ
EnableCoordinatorFilterFlow	EnableCoordinatorFilterFlow
EnableNegLimitSetValue	EnableNegLimitSetValue
EnablePosLimitSetValue	EnablePosLimitSetValue
BypassSpeedVarMode	BypassSpeedVarMode
	SelectOpModeCtrlFunctions
	SelectPressureCtrlTuningMode
	SelectCalibrationFunctions
FlowCmd	FlowCmd
	PressureAAct
PressureAct	PressureBAct
SpeedActExternal	SpeedActExternal
SwivelAngleActExternal	SwivelAngleActExternal
PressureCmd	PressureCmd
ValveFlowCmdSlave	ValveFlowCmdSlave
SpeedCmdSlave	SpeedCmdSlave
SwivelAngleCmdSlave	SwivelAngleCmdSlave
Inputs_FlowCtrl	Inputs_FlowCtrl
ActivateIPart	ActivateIPart

V1.0.0	V2.0.0
InitIPart	InitIPart
InitValIPart	InitValIPart
ActivateIPartRamp	ActivateIPartRamp
Inputs_PressureCtrl	Inputs_PressureCtrl
ExternalSetValueOffset	ExternalSetValueOffset
Inputs_ActuatorSystem	Inputs_ActuatorSystem
ValveLiftCmdDisabledOffset	ValveCmdDirect
	SpeedCmdDirect
Inputs_SpeedVariableOpMode	Inputs_SpeedVariableOpMode
SpeedManual	SpeedManual
SpeedManMin	SpeedManMin
TorqueMotor	TorqueMotor
StatusPumps[..1]	StatusPumps[..1]
SpeedCmdPumps[..1]	SpeedCmdPumps[..1]
TorqueActPumps[..1]	TorqueActPumps[..1]
BoostStatePumps[..1]	BoostStatePumps[..1]
BoostOffsetPumps[..1]	BoostOffsetPumps[..1]

Service and support

3 Explanation of the severity level

Error classes severity level

This refers to the "severity" of an error, i.e. this is where you select how critical the effects of the error may be (e.g. risk to life and body, machine damage etc.). The following classes are distinguished:

Severity level: Criticality of a problem or error at the customer	Explanation
K1 – Safety-relevant function	Customer problem or error affects safety-relevant function
K2 – Serious malfunction	Major malfunction → Error in an important function
K3 – Malfunction, no workaround	Malfunction, no workaround available
K4 – Malfunction, with workaround	Malfunction, workaround possible
K5 – Non-critical error	Not a critical problem

4 Service and support

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Preparation of information

We can help you in a fast and efficient way if you keep the following information available:

- Details about the product concerned, particularly the type code and serial number.
- Your contact details (phone number, e-mail address)

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