

DIAX04 Drive With Main Spindle Function SERCOS interface

Firmware-Version Notes: SHS-03VRS

SYSTEM200

Title	DIAX04 Drive With Main Spindle Function SERCOS interface
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Purpose of Documentation	<p>The following documentation is a complement to the description of functions DOK-DIAX04-SHS-03VRS**-FK01-EN-P</p> <p>It describes the differences between DIAX04-SHS-03VRS and DIAX04-SHS-02VRS.</p>

Record of Revisions

Description	Release Date	Notes
DOK-DIAX04-SHS-03VRS**-FVN1-EN-P	08.99	02VRS -> 03VRS

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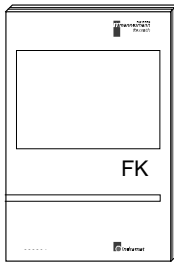
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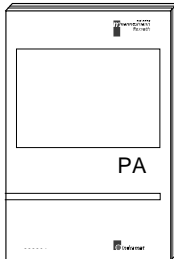
Summary of Documentation - Overview



Functional Description:

Description of all implemented Function based on SERCOS-Parameters

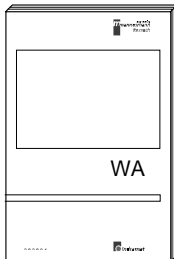
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Parameter Description:

A description of all parameters used in the firmware

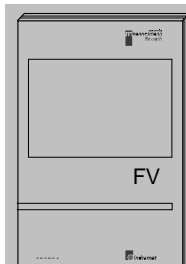
Order designation:
DOK-DIAX04-SHS-03VRS**-PA02-EN-P



Troubleshooting Guide:

- Explanation of the diagnostic states
- How to proceed when eliminating faults

Order designation:
DOK-DIAX04-SHS-03VRS**-WA01-EN-P

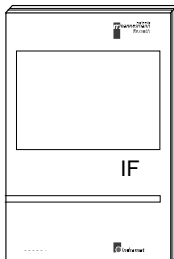


Firmware Version Notes:

Description of new and changed functions in terms of the derivatives:

- FWA-DIAX04-SHS02VRS-MS

Order designation:
DOK-DIAX04-SHS-03VRS**-FV01-EN-P



Drive Configuration:

- Determining the motor type
- Choosing the motor – motor feedback combination
- Choosing the desired function of the drive control device

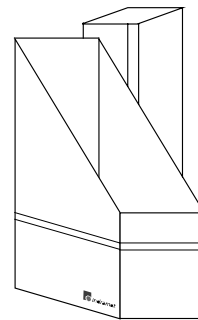
Order designation:
DOK-DIAX04-SHS-03VRS**-IF01-EN-P



CD: DRIVEHELP

Collection of Windows help systems which contain documents on firmware derivatives

Order designation:
DOK-GENEERL-DRIVEHELP**-GExx-MS-D0600



Order designation
DOK-DIAX04-SHS-03VRS**-6203-EN-P

Notes

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1 General Information

1.1 Product Family

The product release description refers to the product family:

DIAX04 Drive With Main Spindle Function, SERCOS interface FWA-DIAX04-SHS-03VRS-MS

The following drive controls can be operated with this software

The released firmware applies
to the following drive
controllers:

HDS02.1	HDS03.1	HDS04.1	HDD02.1
HDS02.2	HDS03.2	HDS04.2	HDD02.2

1.2 Documentation

The documentation for product **FWA-DIAX04-SHS-03VRS** is available as follows:

Paper form
Windows help system

The following table contains a summary of available items.

POS	Type	Document style	Part number	Symbol number
1	DOK-DIAX04-SHS-03VRS**-6201-EN-P	Box	284097	120-0800-B310-01
2	DOK-DIAX04-SHS-03VRS**-FK01-EN-P	Functional Description Paper	284101	120-0800-B311-01
3	DOK-DIAX04-SHS-03VRS**-PA01-EN-P	Parameter Description Paper	284102	120-0800-B312-01
4	DOK-DIAX04-SHS-03VRS**-IF01-EN-P	Drive Configuration Paper	284096	120-0800-B309-01
5	DOK-DIAX04-SHS-03VRS**-WA01-EN-P	Troubleshooting Guide Paper	284103	120-0800-B313-01
6	DOK-DIAX04-SHS-03VRS**-FV01-EN-P	Firmware Version Notes Paper	284095	120-0800-B308-01
7	DOK-GENEERL-DRIVEHELP**-GNxx-MS-D0600	DRIVEHELP Windows help system	282411	

Fig. 1-1: Document for FWA-DIAX04-SHS-03VRS

1.3 Notes on Replacing the Firmware

Prior to replacing the firmware, the following points must be noted:

- Read the entire documentation
- Store the current set of parameters

Note: The parameters that are to be secured are stored in parameter **S-0-0192, IDN list of backup operation data.**

- Switch drive controller off and replace software module
- Load the parameters back in
- Check the functions

2 Firmware Version Notes FWA-DIAX04-SHS-03VRS-MS

2.1 Release notes

Firmware version **FWA-DIAX04-SHS-03V13** represents the first official edition of version 03. It was released on **August 06.1999**.

The following drive controllers can be operated with the released software:

HDS02.1	HDS03.1	HDS04.1	HDD02.1
HDS02.2	HDS03.2	HDS04.2	HDD02.2

2.2 Checksums

Program-Flash: 0313 h

Data-Flash: 0313 h

Sum: 0626 h

2.3 New Basic Functions

Base Parameters and Loading Base Parameters

The drive parameters are fixed at delivery with base values set at the factory. By running command **P-0-4094, C800 Command Base-parameter load** it is possible to reproduce this state at any time. The base parameter block is built up so that

- all important monitors are activated
- all optional drive functions deactivated
- limit values for position deactivated
- limit values for torque/force are set to high values and
- limit values for velocity and acceleration set to low values.

Automatic running of function „Load base parameter block“

The drive firmware is on the programming module. Given a firmware exchange to another compatible firmware version, then the drive controller will detect this change the next time the control voltage is switched on. In this case, "PL" appears on the display.

By pressing the "S1" key, the „Load base parameter block“ function is activated.

Error Memory and Operating Hour Counter

Error memory If occurring errors are deleted, then these are written into an error memory. This memory contains the last 18 errors and the time they occurred. Errors resulting from the shutdown of the control voltage (e.g., F870 +24 volt error) are not recorded.

Operating hour counter An operating hour counter also exists for the control and power sections of the drive controllers. The following parameters are intended for this function

- **P-0-0190, Operating hours control section**
- **P-0-0191, Operating hours power section**
- **P-0-0192, Error recorder, diagnosis number**
- **P-0-0193, Error recorder, operating hours control section**

IDN List of Parameters

There are parameters in the drive that contain ID numbers of drive parameters. These support the handling of drive parameters by means of a parametrization program (e.g., DriveTop). The following lists have been added:

- S-0-0018, IDN list of operation data for CP2
- S-0-0019, IDN list of operation data for CP3
- S-0-0025, IDN list of all procedure commands
- S-0-0026, Configuration list signal status word
- S-0-0192, IDN list of backup operation data
- S-0-0292, List of all operating modes
- S-0-0328, Assign list signal status word
- S-0-0370, Configuration list for MDT data container

- S-0-0371, Configuration list for the AT data container
- S-0-0375, List of diagnostic numbers
- P-0-0194, List of present plug-in modules
- P-0-0426, Analog outputs, IDN list of assignable parameters

List of Last Diagnoses Numbers

The last 50 diagnoses of the drive (**S-0-0390, Diagnostic message number**) are stored in parameter **S-0-0375, List of diagnostic numbers**.

Multiplex Channel

The firmware supports cyclic data transmission of various freely-configurable parameters into the data container of the transmission telegrams. To do this, lists of the parameters to be transmitted are generated for the MDT and AT. This is processed step by step via an index that is specified by the control. For each transmission cycle, the parameter specified via the index is transmitted to the relevant list via the data container of the MDT or AT.

Automatic Detection of Indramat Housing Motors

The introduction of parameter **P-7-4014, Motor type** into the feedback data memory has made it possible to automatically detected an Indramat housing motor independent of motor designation **S-7-0141, Motor type**. Parameter **P-7-4014** is used to identify the motor if it is stored in the feedback data memory and is larger than zero.

Rotary Synchronous Kit Motors

Firmware supports rotary synchronous kit motors. To do this, a 7 must be entered in parameter **P-0-4014, Motor type**.

All motor parameters such as number of pole pairs, peak and standstill currents have to be set with the help of parameter lists from the motor manufacturer. They are not automatically read out of the feedback.

The commutation settings are made when mounted.

Synchronous Motors with Incremental Measuring Systems

Synchronous motors can be operated with incremental measuring systems with this firmware. With the initial drive enable ("Ab" => "AF") the commutation angle is automatically determined and available from then on until the measuring system is re-initialized. The following encoder systems can be used:

- Incremental sine encoder, μ A level
- Incremental sine encoder, 1 Vss level
- Incremental square-wave encoder, 5V-TTL
- Indramat gearwheel encoder
- gearwheel encoder with 1 Vss level

Note: It is possible that the drive could move while determining the commutation angle.

Fieldweakening for Synchronous Motors

Fieldweakening mode has been used with synchronous motors. This means that these motors can be operated with constant power (fieldweakening range). This range begins just above the peak speed. Until now it was only possible to operate synchronous motors up to peak speed in the area of constant torque (basic velocity range).

Command „B0 Open motor holding brake“

By starting command **P-0-0542, B100 Command Open motor holding brake** it is possible to open the motor brake.

Brake as Servo or Main Spindle Brake

The behaviour of an existing motor brake can be selected as servo or main spindle brake. Use parameter **P-0-0525, Type of motor brake** to do this.

Position Control with Command Values greater than Possible with Mechanical Revolution

The modulo value parameter is no longer restricted to its input values. It is now possible to enter modulo values greater than a mechanical revolution. This means that in position control greater position command value differences can be entered to achieve a higher travel velocity with the same NC cycle time.

To run the drive-internal travel command (e.g., spindle positioning) modulo with one revolution can be set with parameter **S-0-0294, Divider for modulo value**.

Accel Pre-Control

Applications requiring the highest precision at the highest speeds now have the option of increasing the precision of an axis during the accel and decel phases by activating an accel precontrol.

Parameter **S-0-0348, Acceleration feedforward gain** is used to set this precontrol.

Choice of linear or cub position command value interpolation in position control

The firmware is outfitted with two position command value interpolators that can be alternately activated. With linear interpolation, the programmed position command values are already reached in the following cycle in the position controller. Velocity and accel precontrol work with jumps. The cubic interpolator reaches the command values two cycles later. Cubic interpolation makes the precontrol (velocity and accel precontrol) steady.

Function Selection of Encoder 2

An optional encoder mounted to the drive can be used for different purposes. The evaluation mode is set in parameter **P-0-0185, Function of encoder 2**.

Value in P-0-0185, Function of encoder 2	Definition
0	Optional encoder as additional load-side control encoder for position and/or velocity control loops
2	Optional encoder as stand-alone load-side control encoder (only with rotary asynchronous motors)
4	Optional encoder as spindle encoder. Treated like "optional encoder as auxiliary load-side control encoder for position and/or velocity control loops". If maximum possible signal frequency is exceeded, then no error is generated but rather the position status is only cleared.

Settable Drive-Internal Illustration of the Position Data

There are two different forms in the drive used to illustrate the position data. There is

- a **display format**
- and a **drive-internal format**.

The **display format** defines the unit, i.e., the LSB value, with which the position data between drive and control/surface are exchanged.

The **drive-internal format** determines the LSB value with which the position command and actual values are prepared as well with which the position control loop in the drive is closed. The values of parameters

- **S-0-0278, Maximum travel range**
- **S-0-0116, Feedback 1 Resolution** and
- **S-0-0256, Multiplication 1**.

are used by the drive to compute the drive-internal format.

For drive-internal resolution it applies:

Resolution = encoder resolution x multiplication	
Resolution:	drive-internal resolution of pos. data [Incr/rev]
Multiplication:	value in S-0-0256 or S-0-0257 [Incr/TP]
Encoder resolution:	value in S-0-0116 or S-0-0117 [TP/lrev]

The format of the drive-internal position data effects the maximum limit accel that can be given to the interpolator.

The following applies :

$a \max = \frac{51.471.854.040}{enc. resolution \times multiplication} \left[in \frac{rad}{sec^2} \right]$	
amax:	maximum accel of position command value interpolator
Encoder resolution:	value in S-0-0116
Multiplication:	value in S-0-0256

Command Determine Marker Position

This command supports

- the checking for erroneous detection of the homing marker of an incremental measuring system or
- determining the position of the homing marker if the homing procedure was conducted by the control. In this case, this information is used to switch the coordinate system in the control.

A homing switch evaluation is not conducted with this command.

For this function, there are the following parameters.

- **S-0-0173, Marker position A**
- **P-0-0014, D500 Command determine marker position**

Command Clear Home Reference

The clear home reference command is built in. By starting the command, bit **S-0-0403, Position feedback value status** is cleared in the drive.

Taking Cooling Mode Into Account when Standardizing Torque/Force Data

The different ways to cool the motor effect the standstill and nominal currents of the motor. All torque/force data are scaled in percent and relate to the standstill or nominal current of the motor. To get correct torque/force data for the various cooling modes, the cooling mode is taken into account when standardizing. Parameter **P-0-0640, Cooling type** is used to define a factor to specify the increase of the standard or nominal current.

Cooling	Parameter value	Factor
not cooled	0	100 %
cooled	1	150 %
water cooled	2	190 %

This is taken into account when standardizing torque/force data.

Note: The nominal or standstill current in parameter S-0-0109 is not switched so that the cooling type factor must be considered when determining the physical torque.

New Parameters for Status Display for E-Stop Input

When diagnosing, the E-Stop input can be read out via **P-0-0223, Status Input E-Stop function**.

Filter for Actual Velocity Value

Via **P-0-0538, Motor function parameter 1** an 8 msec filter can be activated for parameter **S-0-0040, Velocity feedback value**. The filter only works for the H1 display, however.

Command Parking Axis

The command "Parking axis" supports the operational coupling of an axis. This can be needed if an axis is temporarily standing still, for example. Starting the command means that all monitors are switched off that belong to the measuring system and the control loops.

There is the following parameter for this function: **S-0-0139, D700 Command Parking axis**.

Intelligent Safety Technologies (IST)

The firmware is outfitted with a function packet that supports personnel protection. This defines the following functions:

- a safe stop
- safe operating halt
- safe reduced velocity 1 with safely limited absolute position 1
- safely reduced velocity 2 with safely limited absolute position 2
- 4 safe cams (position switching points)

Note: **Function IST cannot be switched with SHS03V10.** Only the parameters needed for IST have been installed for re-equipping in later firmware releases with certified IST functions without loss of parameters.

Monitoring Current Measurement Trim

The current measurement trim is monitored. If the zero point lies within a range where the maximum current is outside of the measuring range of the current measuring system, then error **F277 Current measurement trim wrong** is generated.

2.4 Expanded/Changed Functions

Parameter Attributes

The attributes of the parameters have been expanded. The communications phase of the parameter that can be write accessed is now displayed.

Expanding Parameter S-0-0013, Class 3 diagnostics

The following bits are now supported in parameter S-0-0013:

Bit 2 |Velocity feedback value (S-0-0040)| < Velocity threshold nx(S-0-0125)

Bit 4 | Md | ≥ Bipolar torque/force limit value (S-0-0092)|

Bit 12 *Target position*
Internal position command value = Target position (S-0-0258)

No longer supported:

Bit 5 $|n_{\text{soll}}| > n_{\text{grenz}}$,
the velocity command value (S-0-0036) is outside of the velocity limitations $\pm n_{\text{grenz}}$ (S-0-0091)

Expansion of parameter S-0-0182 Manufacturer class 3 diagnostics

The following bits are now supported in parameter S-0-018:

Bit 1 |Velocity feedback value (S-0-0040)| < S-0-0124, Standstill window

Bit 6 *IZP*
with active interpolation operating mode:
| S-0-0258, Target position - Istpos. | < S-0-0057, Position window
&&
|S-0-0189, Following error| < S-0-0057, Position window
&&
|S-0-0040, Velocity feedback value| < S-0-0124, Standstill window

Bit 10 *In_Target_Position*
with active interpolation operating mode:
|S-0-0258, Target position - S-0-0051/53, Position feedback 1/2 value| < S-0-0057, Position window

Compatibility Class B of SERCOS interface

The firmware now contains the demands made of compatibility class B of the SERCOS interface.

Percent Velocity Window

To generate the status message N=N_{soll} a percent velocity window can now be entered. Use parameter **S-0-0272, Velocity window as percentage**.

Selecting Language for Diagnoses and Parameters

The language options have been expanded with the following now available:

- German
- English
- French
- Spanish
- Italian

Torque / Force Control with Command Value Filter

The VZ1 filter for torque control smoothing of the torque command values has been altered in the firmware. The filter time constant is no longer set in parameter **P-X-1222, Velocity command filter** but rather parameter **P-X-0176, Torque/Force command smoothing time constant**.

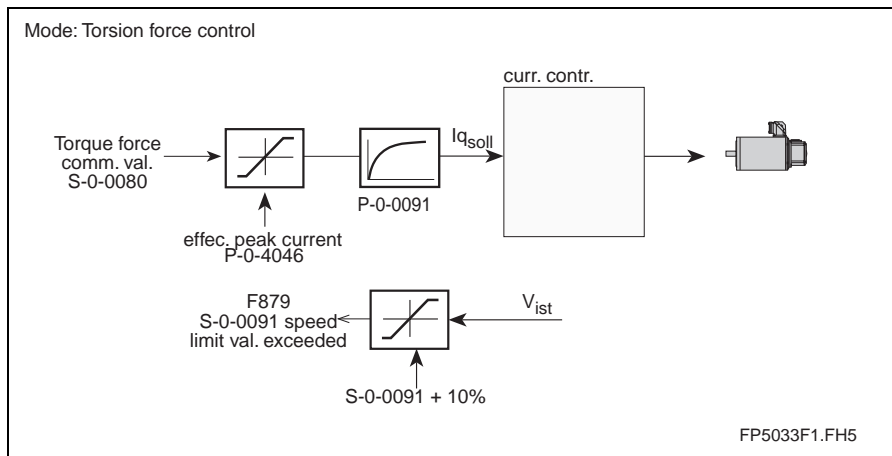


Fig. 2-2: torque / force control

Velocity Control Loop Monitor - Deactivation

The velocity control loop monitor can be deactivated with parameter **P-0-0538, Motor function parameter 1**. Only deactive in exceptional cases.

Altered and New Applications of Encoders as Motor Encoders

For firmware SHS03 new encoder systems have been introduced as motor encoders or then can now be used with other motors as well.

Motor types with parametrizable encoder interfaces can be used with the following measuring systems.

Measuring system	Encl. interface	Value in P-0-0074	for synchronous motors	for asynchronous motors
digital servo feedback (DSF,HSF) or resolver	Standard	1	yes	yes
Incremental enc. with sine signals from Heidenhain (1V – signals)	DLF 01.1M	2	no	yes
Indramat gearwheel encoder	DZF 02.1M	3	no	yes
Incremental enc. with square-wave signals from Heidenhain (not recommended)	DEF 01.1M	5	no	yes
Encl. with EnDat interface from Heidenhain	DAG 01.2M	8	yes	yes
Gearwheel encoder with 1Vss signals	DZF 03.1M	9	no	yes
Resolver without feedback memory	Standard	10	yes	no
Resolver without feedback data memory + incremental enc. with sine signals	Standard + DLF01.1	11	yes	no

Load-side Motor Encoder

With rotary asynchronous motors the motor encoder can be mounted load side.

Absolute Encoder Evaluation and Monitoring of 2 Absolute Measuring Systems

The use of a second absolute encoder buffer is now possible. Two absolute measuring systems can be operated without restrictions. A plausibility check of the absolute encoder data is also possible so that an exchange of encoders always clears the home of the encoder.

Expanded E-Stop Input Function

The reaction of the drive to a signal at the E-stop input was expanded. With bit 2 of parameter **P-0-0008, Activation E-Stop function** it can be selected, with E-stop function activated, whether the drive responds with an error reaction or the reaction should be a fatal warning.

If the definition of "Fatal warning" has been parametrized, the drive responds as with the removal of the external drive enable with the response parametrized in **P-0-0119, Best possible deceleration**. The warning diagnosis **E834 Emergency-Stop** appears.

The state of the E-stop input can be checked via parameter **P-0-0223, Status Input E-Stop function**. The state of this input is stored in bit 0.

Configuration Power Shutdown with Fault and Undervoltage

The reaction options with power shutdown with fault and with DC bus undervoltage were expanded. The following options are now available.

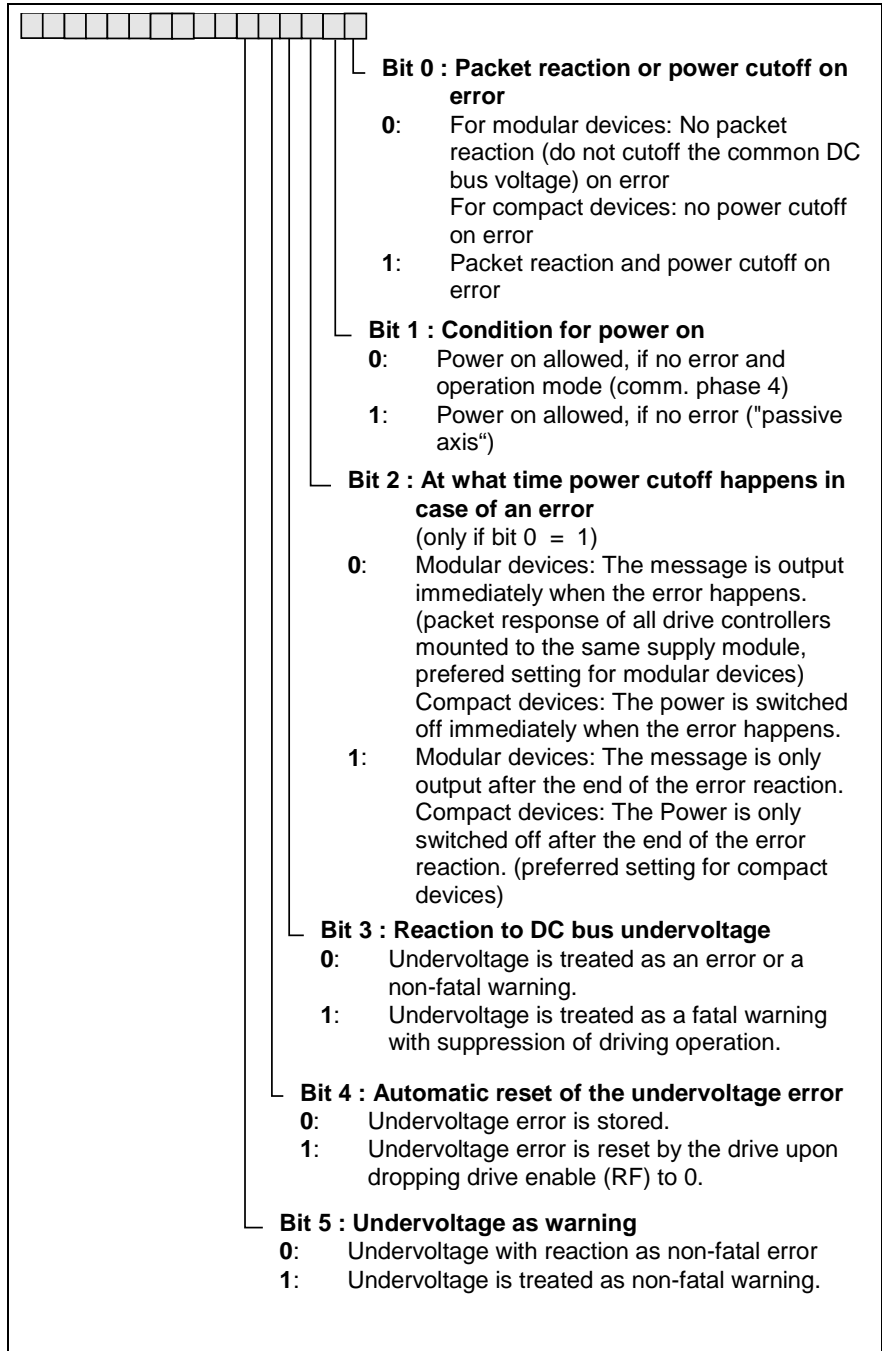


Fig. 2-3: P-0-0118, Power off on error

Controller Structure

The following controller structure has been implemented in SHS03VRS:

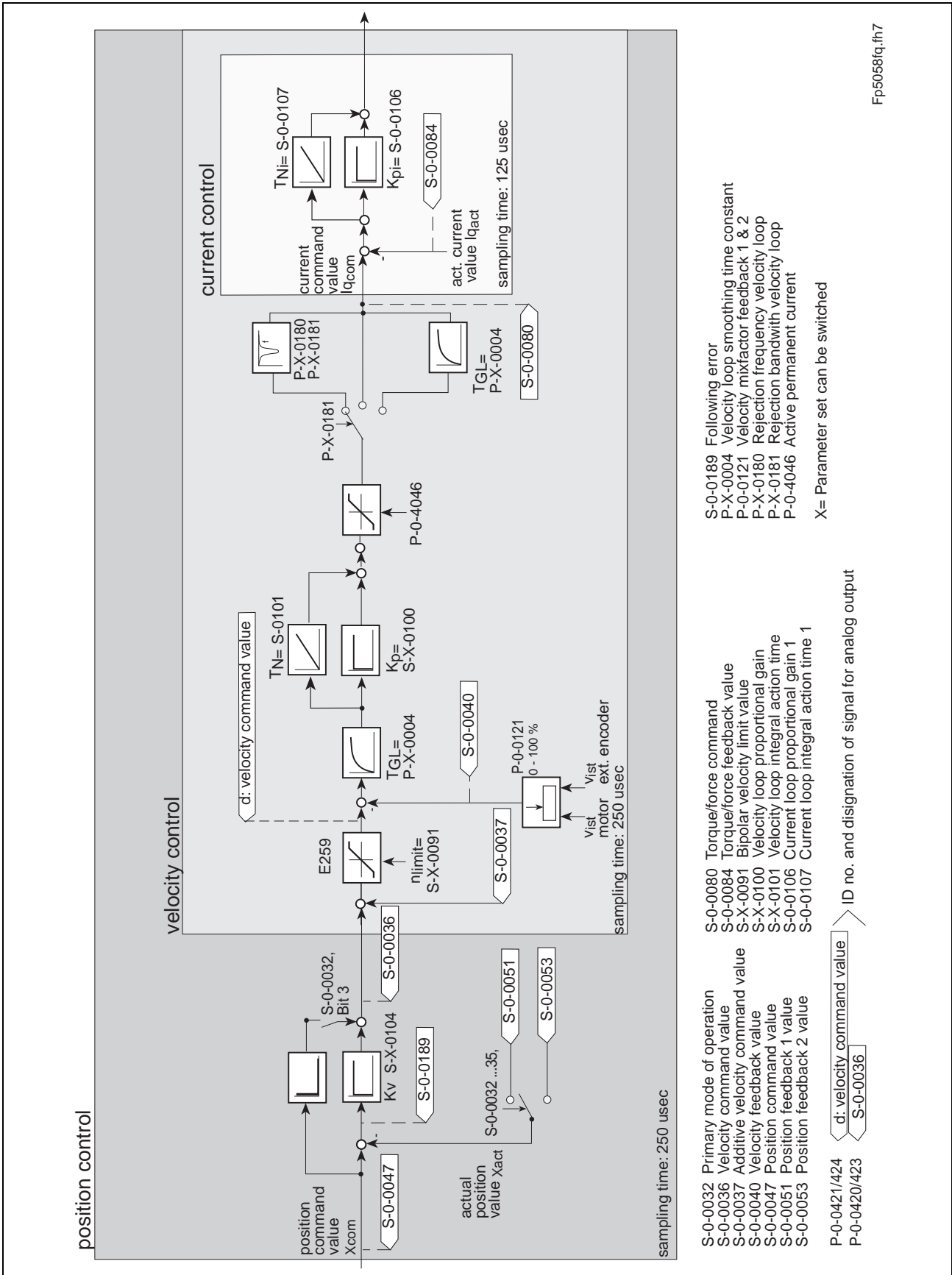


Fig. 2-4: Controller structure

Velocity Control Loop

The actual velocity filter (**S-0-0392, Velocity feedback filter**) is gone. The velocity control loop deviation can be filtered with a PT1 filter. Use parameter **P-X-0004, Velocity loop smoothing time constant** to parametrize.

The lock filter can also be used as a second PT1 filter. Use **P-X-0181, Rejection bandwidth velocity loop** = -1 to do this. The time constant of the filter is fixed in parameter **P-X-0004, Velocity loop smoothing time constant**. This implements a PT2 filter in the velocity control loop (see **Controller structure**).

Drive Halt

Drive halt evokes various responses depending on the operating mode:

- with interpolation it is brought to a standstill with the last active accel and jerk in position control
- with other position control modes, standstill uses **S-0-0138, Bipolar acceleration limit value** and **S-0-0349, Jerk limit bipolar** .
- with other operating modes, e.g., velocity and torque control, standstill in velocity control takes torque command value ramps and filters into account.

Drive-Controlled Homing

Drive-controlled homing is no longer functionally like spindle positioning. The travel profile can be defined independently just like the end point after homing. Use the following parameters to do this:

- **S-0-0147, Homing parameter**
- **S-0-0041, Homing velocity**
- **S-0-0042, Homing acceleration**
- **S-0-0349, Jerk limit bipolar**

In the homing parameter it is also set whether a motor encoder, spindle encoder or a switched are homed to.

Drive-controlled homing is automatically triggered if spindle positioning is started and the drive has not yet been homed. After home has been determined, the spindle angle position is immediately travelled to without going to home first or having the drive stop.

Homing Absolute Measuring Systems with Positioning to Home

By setting bit 7 in parameter **S-0-0147, Homing parameter** and starting command **S-0-0148, C600 Drive controlled homing procedure command** the drive positions at home. This is also now possible with absolute measuring systems if the relevant system has been homed.

Expanding Parameter S-0-0403, Position feedback value status

Two new bits have been defined in parameter **S-0-0403, Position feedback value status**.

Expanded structure of parameter:

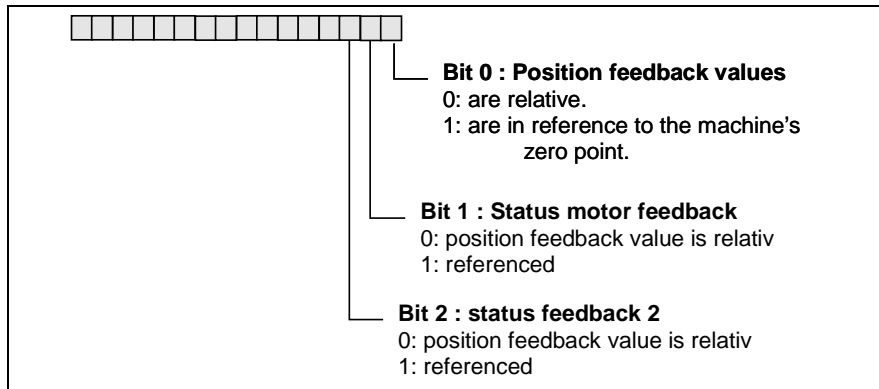


Fig. 2-5: S-0-0403, Status of actual position values

Configurable Signal Status Word

The definition of the individual bits is specified in the signal status word.

The configurable signal status word serves to accept a maximum of 16 copies of bits that are in other drive parameters. This means that the user can **compile a bit list** that contains all the **status information** of the drive that is important to the control.

The following parameters are used for this function:

- **S-0-0144, Signal status word**
configurable bit strip
- **S-0-0026, Configuration list signal status word**
ID number list with variable length to configure the bit strip
- **S-0-0328, Assign list signal status word**
bit number list with variable length to configure the bit strip

The load base parameters command sets the configuration of the signal status word so that it is compatible to SHS02VRS.

Analog Output

The present analog output was replaced with the universal analog output with parameters **P-0-0420, Analog output 1 signal selection** to **P-0-0426, Analog outputs, IDN list of assignable parameters**.

Analog Inputs

The analog inputs in this firmware are deactivated!

Digital I/Os

The plug-in modules for the digital I/O of signals have been reduced. The firmware now only supports the DEA 4 and 8 modules. The allocation of parameters to digital I/Os is no longer possible.

Command Spindle Positioning

The command to position the spindle has been altered as follows:

- The choice of positioning procedure (motor or optional encoder, cam switch) is defined in parameter **S-0-0147, Homing parameter**.
- To compute the effective modulo value for spindle positioning use **S-0-0103, Modulo value** and **S-0-0294, Divider for modulo value**.
- Positioning takes the values in **S-X-0138 bipolar accel** and **S-0-0349, Jerk limit bipolar** into account.
- To search for homing signals run with **S-0-0041, Homing velocity**.

Gear Switching

If different gear ratios have been programmed in various program blocks, then the display value of the actual position value jumps whenever a parameter block is switched.

Communication via Serial Interface Phased-Out

Communications between drive and „control“ via serial interface is no longer supported.

2.5 New Parameters

- S-0-0018, IDN list of operation data for CP2
- S-0-0019, IDN list of operation data for CP3
- S-0-0025, IDN list of all procedure commands
- S-0-0026, Configuration list signal status word
- S-0-0037, Additive velocity command value
- S-0-0041, Homing velocity
- S-0-0042, Homing acceleration
- S-0-0125, Velocity threshold nx
- S-0-0139, D700 Command Parking axis
- S-0-0165, Distance coded reference offset 1
- S-0-0166, Distance coded reference offset 2
- S-0-0173, Marker position A
- S-0-0191, D600 Cancel reference point procedure command
- S-0-0256, Multiplication 1
- S-0-0257, Multiplication 2
- S-0-0272, Velocity window as percentage
- S-0-0278, Maximum travel range
- S-0-0292, List of all operating modes
- S-0-0294, Divider for modulo value
- S-0-0328, Assign list signal status word
- S-0-0332, Message 'nactual < nx'
- S-0-0359, Drive internal interpolation mode
- S-0-0360, MDT Data container A
- S-0-0364, AT Data container A
- S-0-0368, Addressing for data container A
- S-0-0370, Configuration list for MDT data container
- S-0-0371, Configuration list for the AT data container
- S-0-0375, List of diagnostic numbers
- S-0-0378, Encoder 1, absolute range
- S-0-0379, Encoder 2, absolute range
- S-1-0272, Velocity window as percentage
- S-2-0272, Velocity window as percentage
- S-3-0272, Velocity window as percentage
- S-7-0100, Velocity loop proportional gain
- S-7-0101, Velocity loop integral action time
- S-7-0104, Position loop Kv-factor
- S-7-0106, Current loop proportional gain 1
- S-7-0107, Current loop integral action time 1
- S-7-0117, Feedback 2 Resolution
- S-7-0177, Absolute distance 1
- S-7-0178, Absolute distance 2
- P-0-0004, Velocity loop smoothing time constant

- P-1-0004, Velocity loop smoothing time constant
- P-2-0004, Velocity loop smoothing time constant
- P-3-0004, Velocity loop smoothing time constant
- P-0-0014, D500 Command determine marker position
- P-0-0139, Analog output 1
- P-0-0140, Analog output 2
- P-0-0170, Parallel I/O output 4
- P-0-0171, Parallel I/O input 4
- P-0-0176, Torque/Force command smoothing time constant
- P-1-0176, Torque/Force command smoothing time constant
- P-2-0176, Torque/Force command smoothing time constant
- P-3-0176, Torque/Force command smoothing time constant
- P-0-0177, Absolute encoder buffer 1
- P-0-0178, Absolute encoder buffer 2
- P-0-0185, Function of encoder 2
- P-0-0187, Position command processing mode
- P-0-0190, Operating hours control section
- P-0-0191, Operating hours power section
- P-0-0192, Error recorder, diagnosis number
- P-0-0193, Error recorder, operating hours control section
- P-0-0194, List of present plug-in modules
- P-0-0223, Status Input E-Stop function
- P-0-0247, Version of safety functions
- P-0-0248, Checksum over scaled data, drive
- P-0-0249, Activation of the safety functions
- P-0-0250, Safety input signals of the drive
- P-0-0251, Safety output signals of the drive
- P-0-0252, State of safety function, drive
- P-0-0253, Max. speed 1 for safety function, drive
- P-0-0254, Upper position limit 1 for safety function, drive
- P-0-0255, Lower position limit 1 for safety function, drive
- P-0-0256, Max. speed 2 for safety function, drive
- P-0-0257, Upper position limit 2 for safety function, drive
- P-0-0258, Lower position limit 2 for safety function, drive
- P-0-0259, Upper position limit for position switch 1, drive
- P-0-0260, Lower position limit for position switch 1, drive
- P-0-0261, Upper position limit for position switch 2, drive
- P-0-0262, Lower position limit for position switch 2, drive
- P-0-0263, Upper position limit for position switch 3, drive
- P-0-0264, Lower position limit for position switch 3, drive
- P-0-0265, Upper position limit for position switch 4, drive
- P-0-0266, Lower position limit for position switch 4, drive
- P-0-0267, Pos. monitoring window for safe stop operation, drive
- P-0-0268, Reference position for safe homing, drive

- P-0-0269, Mask of unused safety inputs, drive
- P-0-0270, Changeover time for safety function, drive
- P-0-0271, Time interval for forced dynamization, drive
- P-0-0272, C000 Command Check reference
- P-0-0273, Monitored actual position, drive
- P-0-0274, Preset forced dynamization
- P-0-0275, Acknowledge forced dynamization
- P-0-0276, State of safety function, control
- P-0-0277, Max. speed 1 for safety function, control
- P-0-0278, Upper position limit 1 for safety function, control
- P-0-0279, Lower position limit 1 for safety function, control
- P-0-0280, Max. speed 2 for safety function, control
- P-0-0281, Upper position limit 2 for safety function, control
- P-0-0282, Lower position limit 2 for safety function, control
- P-0-0283, Upper position limit for position switch 1, control
- P-0-0284, Lower position limit for position switch 1, control
- P-0-0285, Upper position limit for position switch 2, control
- P-0-0286, Lower position limit for position switch 2, control
- P-0-0287, Upper position limit for position switch 3, control
- P-0-0288, Lower position limit for position switch 3, control
- P-0-0289, Upper position limit for position switch 4, control
- P-0-0290, Lower position limit for position switch 4, control
- P-0-0291, Pos. monitoring window for safe stop operation, control
- P-0-0292, Reference position for safe homing, control
- P-0-0293, Mask of unused safety inputs, control
- P-0-0294, Changeover time for safety function, control
- P-0-0295, Time interval for forced dynamization, control
- P-0-0296, Monitored actual position, control
- P-0-0297, Checksum over scaled data, control
- P-0-0420, Analog output 1 signal selection
- P-0-0421, Analog output 1, expanded signal selection
- P-0-0422, Analog output 1, scaling per 10V full scale
- P-0-0423, Analog output 2, signal selection
- P-0-0424, Analog output 2, expanded signal selection
- P-0-0425, Analog output 2, scaling per 10V full scale
- P-0-0426, Analog outputs, IDN list of assignable parameters
- P-0-0542, B100 Command Open motor holding brake
- P-0-0560, Commutation adjustment current
- P-0-0562, Commutation adjustment periodic time
- P-0-0563, Reluctance value
- P-0-0640, Cooling type
- P-0-4047, Motor inductance
- P-0-4094, C800 Command Base-parameter load
- P-7-0004, Velocity loop smoothing time constant

- P-7-0517, Feedback type 2
- P-7-4014, Motor type

2.6 Expanded/Altered Parameters

- S-0-0013, Class 3 diagnostics
- S-0-0032, Primary mode of operation
- S-0-0033, Secondary operation mode 1
- S-0-0034, Secondary operation mode 2
- S-0-0035, Secondary operation mode 3
- S-0-0040, Velocity feedback value
- S-0-0144, Signal status word
- S-0-0154, Spindle position parameter
- S-0-0182, Manufacturer class 3 diagnostics
- S-0-0403, Position feedback value status
- P-0-0008, Activation E-Stop function
- P-0-0018, Number of pole pairs/pole pair distance
- P-0-0074, Feedback 1 type
- P-0-0075, Feedback 2 type
- P-0-0118, Power off on error
- P-0-0181, Rejection bandwidth velocity loop
- P-0-0525, Type of motor brake
- P-0-0538, Motor function parameter 1
- P-0-4014, Motor type

2.7 Deleted Parameters

- S-0-0077, Linear position data scaling factor
- S-0-0078, Linear position data scaling exponent
- S-0-0130, Probe value 1 positive edge
- S-0-0131, Probe value 1 negative edge
- S-0-0132, Probe value 2 positive edge
- S-0-0133, Probe value 2 negative edge
- S-0-0169, Probe control parameter
- S-0-0170, Probing cycle procedure command
- S-0-0392, Velocity feedback filter
- S-0-0401, Probe 1
- S-0-0402, Probe 2
- S-0-0405, Probe 1 enable
- S-0-0406, Probe 2 enable
- S-0-0409, Probe 1 positive latched
- S-0-0410, Probe 1 negative latched
- S-0-0411, Probe 2 positive latched
- S-0-0412, Probe 2 negative latched
- P-0-0038, Signal select analog output channel 1

- P-0-0038, Signal select analog output channel 1
- P-0-0040, Scaling factor for velocity data channel 1
- P-0-0041, Scaling factor for velocity data channel 2
- P-0-0042, Scaling factor for position data channel 1
- P-0-0043, Scaling factor for position data channel 2
- P-0-0044, Scaling factor for power analog outputs
- P-0-0110, Parallel I/O output 2
- P-0-0111, Parallel I/O input 2
- P-0-0112, Parallel I/O output 3
- P-0-0113, Parallel I/O input 3
- P-0-0115, Analog input 1
- P-0-0116, Analog input 2
- P-0-0123, Absolute encoder buffer
- P-0-0124, Assignment IDN -> DEA-output
- P-0-0125, Assignment DEA-input -> IDN
- P-0-0200, Signal select probe 1
- P-0-0201, Signal select probe 2
- P-0-0202, Difference probe values 1
- P-0-0203, Difference probe values 2
- P-0-0300, Spindle position parameter 2
- P-0-0310, Analog torque-command per 10V
- P-0-0311, Analog velocity-command per 10V
- P-0-0514, Absolute encoder offset
- P-0-1215, Cam search speed
- P-0-4023, C400 Communication phase 2 transition
- P-0-4036, Contacted motor type
- P-7-0512, Default value for Kv-factor of position control
- P-7-0514, Absolute encoder offset
- P-7-4037, Velocity loop prop. gain, default
- P-7-4038, Velocity loop integral action time, default
- P-7-4039, Current loop prop. gain, default
- P-7-4042, Speed control smoothing time, default
- P-7-4049, Current loop integral action time, default

2.8 New Diagnoses

- B100 Command release motor brake
- B101 Command not enabled
- C000 Command Check reference
- C001 Safe reference not possible
- C117 Timeout at command execution
- C118 Order of MDT configuration wrong
- C606 Reference mark not detected
- C800 Default parameter load
- D311 Commutation offset could not be determined.

- D312 Motion range exceeded during commutation
- D500 Command Get mark position
- D501 Incremental encoder required
- D600 Cancel reference point procedure command
- D700 Parking axis command
- E225 Motor overload
- E226 Undervoltage in power section
- E264 Target position out of num. range
- E408 Invalid addressing of MDT-data container A
- E409 Invalid addressing of AT-data container A
- E826 Undervoltage in power section
- F228 Excessive deviation
- F270 Error power supply home switch
- F271 Error power supply travel limit switch
- F272 Error power supply probe input
- F273 Error power supply E-Stop
- F277 Current measurement trim wrong
- F434 Emergency-Stop
- F501 Monitoring Safe Halt
- F502 Monitoring Safe operating halt
- F503 Monitoring safely reduced speed 1 + abs. pos. 1
- F504 Monitoring safely reduced speed 2 + abs. pos. 2
- F505 Activation of a safety function wrong
- F506 Forced dynamization necessary
- F507 Safety input signals wrong, checksum
- F508 Safety input signals wrong, counter
- F509 Data crosscheck wrong
- F510 Safe reference lost
- F511 Monitoring of safely reduced speed during switchover
- F634 Emergency-Stop
- F811 Commutation offset could not be determined.
- F812 Motion range exceeded during commutation

2.9 Diagnoses Removed

- C209 Device and software are incompatible
- C701 Basic load not possible if drive is enabled
- C901 Error during position spindle command
- C903 Error during initialization
- C904 Encoder 2 not present
- E829 Positive position limit exceeded
- E830 Negative position limit exceeded
- E843 Positive limit switch activated
- E844 Negative limit switch activated

Notes

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