

DIAX03 Drive With Servo Function

Firmware Version Notes: SSE 03VRS

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Purpose of Documentation	<p>The following documentation is a complement to the description of functions DOK-DIAX03-SSE-03VRS**-FK01-EN-P</p> <p>It describes the differences between DIAX03-SSE-03VRS and DIAX03-SSE-02VRS.</p>

Record of Revisions

Description	Release Date	Notes
DOK-DIAX03-SSE-03VRS**-FV01-EN-P	03.2000	02VRS -> 03VRS

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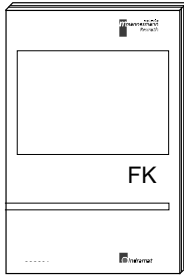
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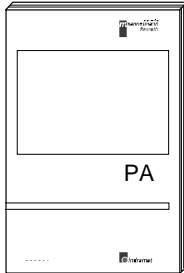
Summary of Documentation - Box



Functional Description:

Description of all implemented Function based on SERCOS-Parameters

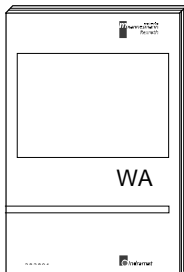
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Parameter Description:

A description of all parameters used in the firmware

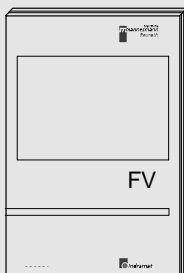
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Troubleshooting Guide:

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

Order designation:
DOK-DIAX03-SSE-03VRS**-WA01-EN-P

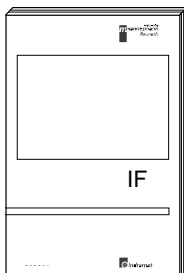


Firmware Version Notes:

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

- FWA-DIAX03-SSE02VRS-MS

Order designation:
DOK-DIAX03-SSE-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

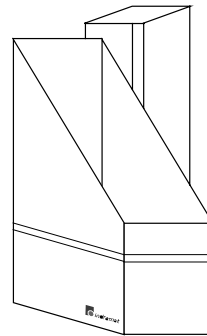
Order designation:
DOK-DIAX03-SSE-03VRS**-IF01-EN-P



CD: DRIVEHELP

Collection of Windows help systems which contain documents on firmware derivatives

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



Order designation
DOK-DIAX03-SSE-03VRS**-5101-EN-P

Notes

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1 General Information

1.1 Product Family

The product release description refers to the product family:

DIAX03
 Drive With Servo Function
 FWA-DIAX03-SSE-03VRS-MS

The following drive controls can be operated with this software:

The released firmware applies to the following drive controllers: DDS2.2 DDS3.2 DKR2.1 DKR3.1 DKR3.1 DKR4.1

1.2 Documentation

The documentation for product **FWA-DIAX03-SSE-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-DIAX03-SSE-03VRS**-5101-EN-P	Box 51-03V-EN Paper	284091	120-0700-B314-01
2	DOK-DIAX03-SSE-03VRS**-FK01-EN-P	Functional Description Paper	284083	120-0700-B309-01
3	DOK-DIAX03-SSE-03VRS**-FV01-EN-P	Firmware Version Notes Paper	284089	120-0700-B312-01
4	DOK-DIAX03-SSE-03VRS**-IF01-EN-P	Drive Configuration Paper	284090	120-0700-B313-01
5	DOK-DIAX03-SSE-03VRS**-PA01-EN-P	Parameter Description Paper	284084	120-0700-B310-01
6	DOK-DIAX03-SSE-03VRS**-WA01-EN-P	Troubleshooting Guide Paper	284084	120-0700-B311-01
7	DOK-GENERL-DRIVEHELP**-GN03-MS-D0600	DRIVEHELP	282411	120-1300-B302-**

Figure: 1-1: Documentation for FWA-DIAX03-SSE-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 Versionsnotes FWA-DIAX03-SSE-03VRS-MS

2.1 Release notes

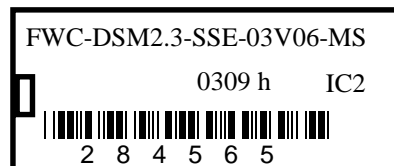
Firmware version **FWA-DIAX03-SSE-03V06** represents the first official edition of version 03. It was released on **July 02.1999**.

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

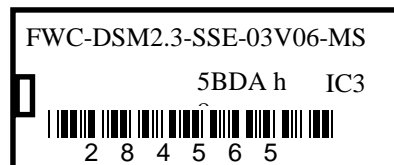
- DDS2.2
- DDS3.2
- DKR2.1
- DDS3.1
- DKR4.1

2.2 Checksums

EPROM IC2:



EPROM IC3:



2.3 New Basic Functions

Multiplex Channel

The firmware supports cyclic data transmission of various, freely-configurable parameters in the data containers of the transmission elements. Lists of the parameters to be transmitted for both MDTs and ATs are generated for this purpose. These are then processed in a step-by-step fashion via an index which the control specifies. Per transmission cycle the parameter of the relevant list specified via the index is transmitted via the data container of the MDT or AT.

Synchronous Motors with Incremental Measuring Systems

Synchronous motors can also be operated with incremental measuring systems using this firmware. This means that the initial drive enable release signal („Ab => „AF“) automatically determines the angle and is available as of this point in time until the measuring system is re-initialized. The following encoders can be used:

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

Note: When determining the commutation angle it is possible that the drive can move slightly.

Fieldweakening for Synchronous Motors

Fieldweakening mode is used for synchronous motors. This means motors can be used in the range of constant power (fieldweakening range). The range of constant power starts above maximum speed. Until recently, synchronous motors could only be operated up to maximum speed in the range of constant torque (basic speed range).

Command "B0 Cool brakes"

By starting commands **P-0-0542 B100 Command Release motor holding brake** the user can cool the motor brake.

Linear or cubic position command value interpolation in position control

The firmware has two position command value interpolators that can be activated. With linear interpolation, the specified position command values are already reached in the following cycle in the position controller. The velocity and accel pre-control, however, works abruptly. With cubic interpolation, the specified command values are reached two cycles later. The pre-controls are consistent with cubic interpolation (velocity and pre-control).

Taking Cooling Mode into Account when Standardizing Torque/Force Data

The various cooling modes of the motor change the standstill or nominal currents of the motor. All torque/force data of the drive are scaled in per cent and relate to the standstill or nominal motor current. To get correct torque/force data for the various cooling modes, the cooling mode is taken into account when standardizing. Parameter **P-0-640, Cooling type** defines a factor that specifies the standstill or nominal currents.

Cooling	Parameter value	Factor
Uncooled	0	100 %
Cooled	1	150 %
liquid-cooled	2	190 %

Note: The nominal or standard current in parameter **S-0-0109, Motor peak current** is not switched so that the cooling mode factor must be taken into account when determining the physical torque.

Automatic Detection of Indramat Housing Motors

The introduction of parameter **P-7-4014, Motor type** to the feedback memory makes it possible to automatically detect Indramat housing motors regardless of motor type set in **S-7-0141, Motor type**. Parameter **P-7-4014** is used to identify the motor if it has been validly stored and is larger than zero.

New Parameters for Status Displays for Travel Range Limit Switches and E-Stop Inputs

For diagnoses, the travel range limit switch and E-stop inputs can be read via parameters **P-0-0222, State of Travel range limit inputs** and **P-0-0223, Status Input E-Stop function**.

List of Last Diagnosis Numbers

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

Filter for Actual Velocity Value

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

Probe with Quick-Halt Function

If in **S-0-0169, Probe control parameter** in bit 7 „1“ for quick halt with positive flank of probe 1 has been set, then the drive automatically upon detection of the positive flank goes to „Velocity command value to zero“. The drive thus decels at maximum possible torque. The drive remains in this state until the probe release for probe 1 in parameter **S-0-0405, Probe 1 enable** is cleared. Then the drive follows the command value of the control.

2.4 Expanded/Altered Functions

Absolute Encoder Evaluation and Monitoring of Two Absolute Measuring Systems

The implementation of a second absolute encoder back up is now possible and two absolute measuring systems can be operated without restriction. A plausibility check of the absolute encoder data is now also possible so that an encoder change clearly deletes the reference of the encoder.

Axis Error Correction

The correction function to compensate temperature-dependent errors are no longer supported. The following correction functions have been deactivated:

- Position-dependent temperature correction
- Position-dependent temperature correction

Digital I/Os

The supported plug-in module for digital I/Os of signals has been reduced. The firmware now only supports modules DEA 4 and 8. It is no longer possible to allocate parameters to digital I/Os.

Analog Inputs

The analog inputs of this firmware have been deactivated!

Probe Function with „Rapid Reading“

The function „Rapid reading“ makes it possible to take readings of probe signals that follow each other in rapid succession without having to clear and reset probe enable (S-0-0405). The function is activated by setting bits 5 and 6 in parameter **S-0-0169, Probe control parameter**.

Communication via Serial Interface

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

Torque/Force Control with Command Value Filter

A VZ1 filter for torque/force command value smoothing has been built into the firmware. The filter time constant can be set via parameter **P-0-0176, Torque/Force command smoothing time constant**.

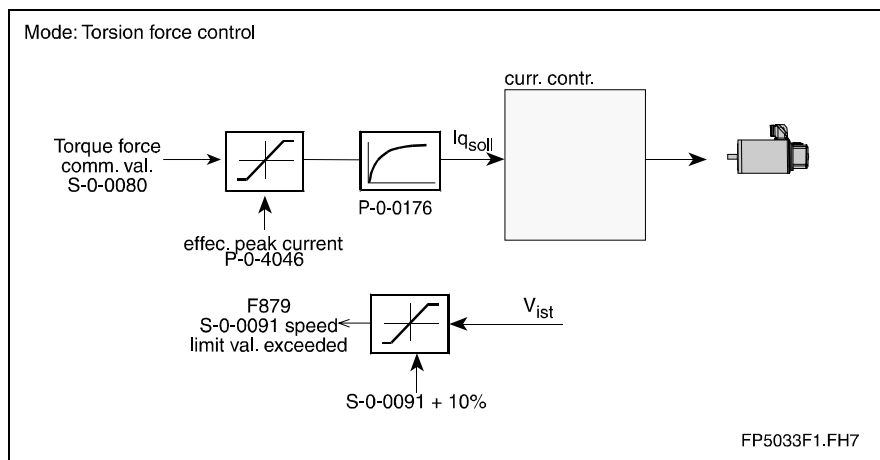


Fig. 2-2: Torque / force control

Interruptible Velocity Control Loop Monitor

The velocity control loop monitor can be activated via parameter **P-0-0538, Motor function parameter 1**. Deactivation should only be instituted, however, in exceptional cases.

Referencing Absolute Measuring System by Positioning to Reference Point

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 to home. This is also now possible with absolute measuring systems if the relevant measuring system is not reference.

Referencing with Permanently-Defined Traversing Path with Absolute-Coded Encoders

The travel path required with distance-coded encoders to ensure referencing is fixed by the distance of the reference markers. By setting bit 8 in **S-0-0147, Homing parameter** the referencing function is activated with a fixed traversing path. The drive runs over at least two reference markers and then stops regardless of whether it has detected the reference marker or not.

Expansion of Parameter S-0-0403 Status Actual Position Values

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

Expanded construction of the parameter:

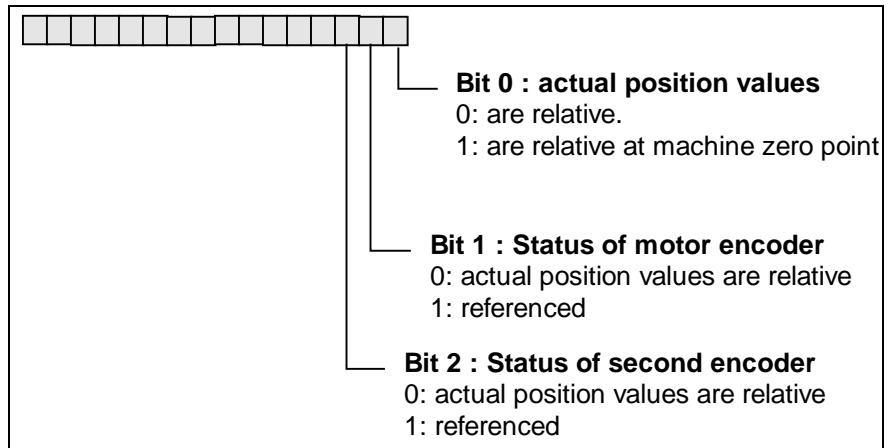


Fig. 2-3: S-0-0403, Position feedback value status

Motor Temperature Sensor Monitor in Linear Motors

The motor temperature sensor (PTC) of linear motors is checked for cable breaks and short circuits and, if necessary, the error message **F221 Motor temp. surveillance defective** is generated.

Customer Password

This function is no longer supported.

Relative Drive-internal interpolation

This function is no longer supported.

Drive Halt

The function „Drive Halt“ is now dependent from the operation mode. Depending on the operation mode from where „Drive Halt“ is activated, the stopping is done with different input parameters for acceleration and jerk. The following applies:

Coming from position control:

- **S-0-0138, Bipolar acceleration limit value**
- **S-0-0349, Jerk limit bipolar**

Coming from velocity control or torque/force control:

- **P-0-1201, Velocity control, deceleration ramp 1**
- **P-0-1222, Velocity command filter**

Position Limit Monitoring

The position limit monitoring is now no more solely done with the encoder defined in the **S-0-0147, Homing parameter**. As an additional criterion,, the reference of the encoders is taken. If the encoder chosen via **S-0-0147 Homing parameter** does not have a reference and a second encoder is present, which is already homed, this latter one is used for the monitoring.

2.5 New Parameters

- S0-0359, 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-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-0-0176, Torque/Force command smoothing time constant
- P-0-0177, Absolute encoder buffer 1
- P-0-0178, Absolute encoder buffer 2
- P-0-0187, Position command processing mode
- P-0-0194, List of present plug-in modules
- 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-0-0542, B100 Command Open motor holding brake
- P-0-0560, Commutation adjustment current
- P-0-0562, Commutation adjustment periodic time
- P-0-0640, Cooling type
- P-0-4047, Motor inductance
- P-7-0004, Velocity loop smoothing time constant
- P-7-0517, Feedback-Typ 2
- P-7-4014, Motor type

2.6 Expanded/Altered Parameters

- S-0-0032, Primary mode of operation 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-0-0147, Homing parameter
- S-0-0169, Probe control parameter
- S-0-0403, Position feedback value status
- P-0-0538, Motor function parameter 1

2.7 Deleted Parameters

- S-0-0282, Travel distance
- S-0-0346, Setup flag for relative command values
- 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-0-0123, Absolute encoder buffer
- P-0-0124, Assignment IDN -> DEA-output
- P-0-0125, Assignment DEA-input -> IDN
- P-0-0172, Parallel I/O output 5
- P-0-0173, Parallel I/O input 5
- P-0-0174, Parallel I/O output 6
- P-0-0175, Parallel I/O input 6
- P-0-0210, Analog input 1
- P-0-0211, Analog input 2
- P-0-0212, Analog inputs, IDN list of assignable parameters
- P-0-0213, Analog input 1, assignment
- P-0-0214, Analog input 1, scaling per 10V full scale
- P-0-0215, Analog input 2, assignment
- P-0-0216, Analog input 2, scaling per 10V full scale
- P-0-0217, Analog input 1, offset
- P-0-0218, Analog input 2, offset
- P-0-0402, Pos. corr., reference temperature
- P-0-0403, Pos. corr., reference position for temperature correction
- P-0-0404, Pos. corr., actual temperature, position dependent
- P-0-0405, Pos. corr., actual temperature, position independent
- P-0-0406, Pos. corr., temperature factor position dependent
- P-0-0407, Pos. corr., temperature factor position independent [0.1/K]
- P-0-4021, Baud rate RS-232/485

- P-0-4022, Drive address
- 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

3 Kundenbetreuungsstellen - Sales & Service Facilities

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from abroad: don't dial (x) after country code!

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