

# DIAX03

## Drive With Servo Function

Drive Configuration: SSE 01VRS

DOK-DIAX03-SSE-01VRS\*\*-INF1-EN-P

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**What is the purpose of this documentation?** This documentation serves to identify the designation for a configured drive of the DIAX03 drive family, based on:

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

In addition, an overview is provided of the available basic functions and possible additional functions.

**Course of Modifications**

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# 1 Determining the Drive Configuration

## 1.1 Explanation of Terms

Digital drive controllers of the type DIAX03 by INDRAMAT can be adapted to meet numerous customer requirements by using various plug-in modules. For this reason, drive controllers are equipped with ports for plug-in modules.

### Basic devices

Drive controllers without additional plug-in modules are defined as basic devices. The basic device DDS 3.1 has two slots for plug-in modules (U1, U2). All other basic devices are equipped with 4 slots for plug-in modules (U1, U2, U3, U4). All devices are equipped with one specific slot (U5), which is used for a parameter/software module.

### Plug-in modules

The following plug-in modules are available:

- Command interface card.
- Modules for evaluating position measurement systems.
- Input/Output modules to evaluate SPS signals or to export signals to the SPS.
- Software modules
- Modules for evaluating analog inputs

### Command interface card module

The DSS plug-in module is used as a command interface card module. This module must always occupy slot U1 in the drive controller.

### Configured drive controller

A basic device with fitted with additional plug-in modules is called a configured drive controller.

### Hardware configuration

Every Hardware configuration is designated by a letter/number sequence, e.g., BE04-01-FW. Digital drive controllers are delivered as configured drive controllers which may be equipped with various components, according to the selected configuration.

The following illustration represents the components of a typical hardware configuration.

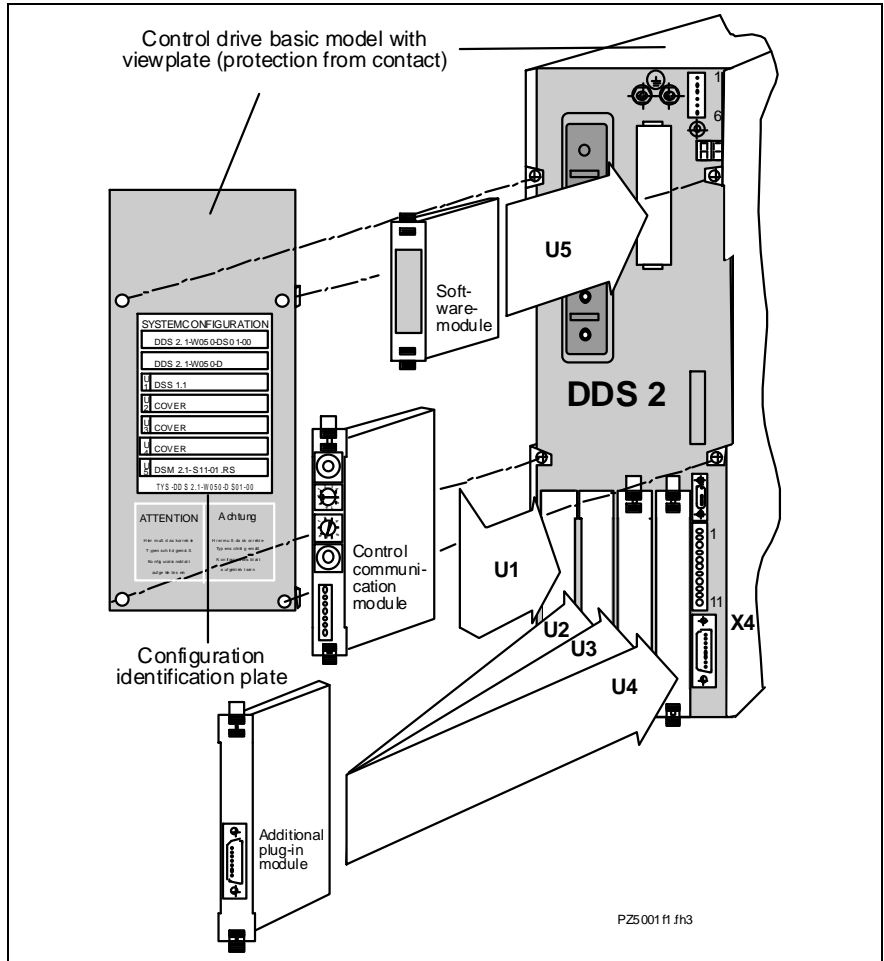


Fig. 1-1: Components of a hardware configuration

## 1.2 Procedure

To determine the drive configuration or to specify the hardware configuration labeling of a DIAX03 drive controller for the corresponding machine, we recommend the following procedure:

1. Determine the motor/controller combination:
  - Determine rpm/torque requirements for your purpose.
  - Select a motor/controller combination from the list.
2. Determine the hardware configuration labelling:
  - Motor - Select a motor feedback combination.
  - Select the desired features.
  - Determine the configuration labelling based on the plug-in modules required for the desired features.

The following two illustration will give you an idea of how to determine the configuration labelling.

## Illustration: Determining the motor/controller combination

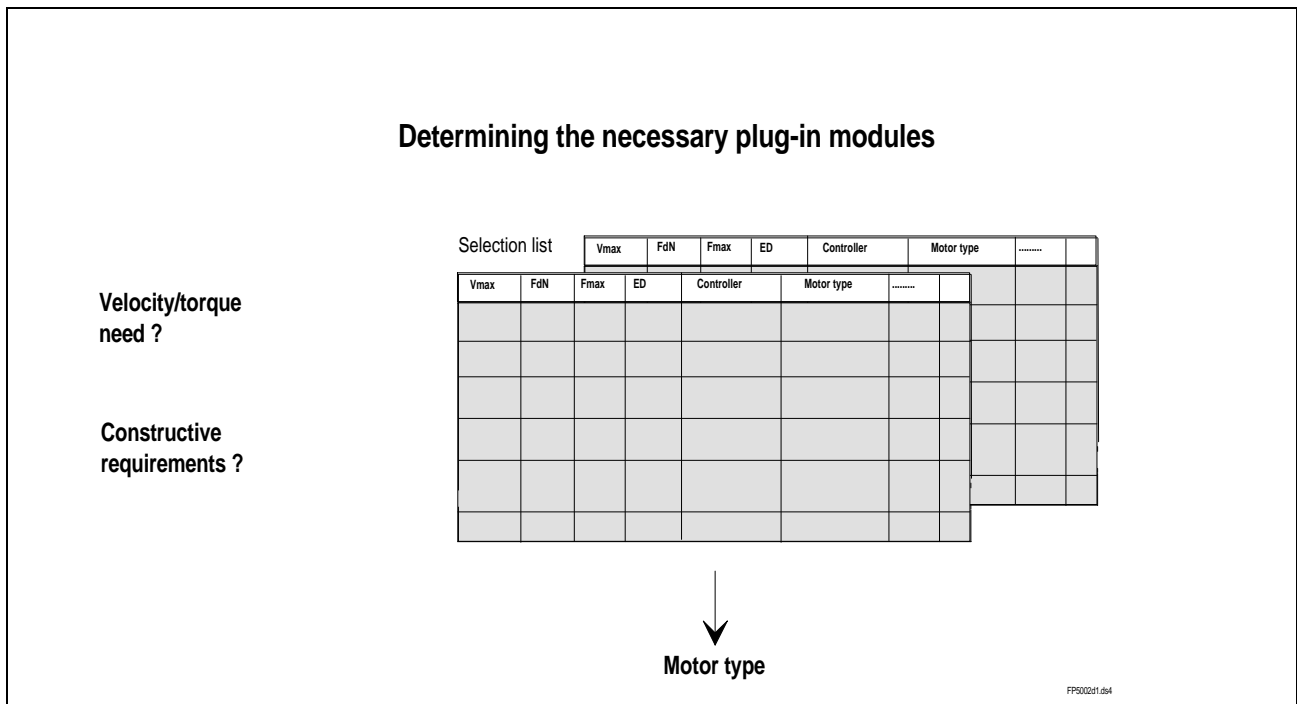


Fig. 1-2: Illustration for working with selection lists



# Illustration: Determining the hardware configuration labelling

## 1. Determining the necessary plug-in modules

### 1.1 Selection of motor-motor feedback Combinations

Example:  
MDD motor with  
DSF as motor interface

Tab.: A

Motor type	Motor feedback interface:				
	Dig. servo feedback	Resolver	Sine feedback	Sprocket feedback	EnDat feedback
MKD		X			
MDD	X				
LSF					X

### 1.2 Selection of desired functionality > Determining the necessary additional plug-in modules

Example:  
additional functions selected:  
Analog inputs > DRF 1.1  
Dig. in and outputs > DEA 4.2

Tab.: B1

Funktionalität	Necessary plug-in modules					
	DAG 1.2	DEA 4.2	DEF 1.1	DEF 2.1	DRF 1.1	DZF 2.1
Analog inputs					X	
Dig. in and outputs		X				
Needed plug-in module	X		X			

## 2. Determining the configuration designation based on the selected plug-in modules

Example:  
DRF 1.1 + DEA 4.2  
> BE06-01-FW

Tab.: C1

Configuration designation:	Module combinations:					
	DAG 1.2	DEA 4.2	DEF 1.1	DEF 2.1	DRF 1.1	DZF 2.1
BE12-01-FW						
BE37-01-FW						X
BE06-01-FW		X			X	
BE28-01-FW			X			

Fig. 1-3: Illustration for determining configuration labelling

## Notes

## 2 Determining the motor/controller combination

### 2.1 Selection lists

Selection lists can be used to select the required motor controller combination.

You should consider the necessary requirements for torque and velocity just as carefully as the physical requirements.

The **Motor type** which you choose for use from the selection list is the most decisive factor in determining hardware configuration labelling.

## Notes

### 3 Choosing the motor - motor feedback combination

#### 3.1 Possible motor - motor feedback combinations

The following table contains types of motors which correspond to the permissible motor encoder interfaces.

Here you must select the motor encoder interface according to the motor type in use.

Table A: Motor feedback interface					
Motor type	Digital Servo feedback (1)	Resolver (2)	Sine encoder (3)	Gear tooth encoder	EnDat encoder (4)
MKD		X			
MDD	X				
2AD	X			X	
ADF	X			X	
1MB	X		X	X	X
MBW	X		X		X
LAR			X		X
LAF			X		X
LSF					X

Tab. 3-1: Permissible motor type - motor feedback combinations

- (1) : Single turn or multiturn DSF
- (2) : Resolver or multiturn resolver
- (3) : Incremental scale with sine signals or incremental sine encoder
- (4) : Absolute scale with EnDat interface or Singleturn or Multiturn rotation encoder with EnDat

### 3.2 Connection examples

#### DSF/RSF

The encoder is connected to the standard interface. Therefore, no other plug-in card is required.

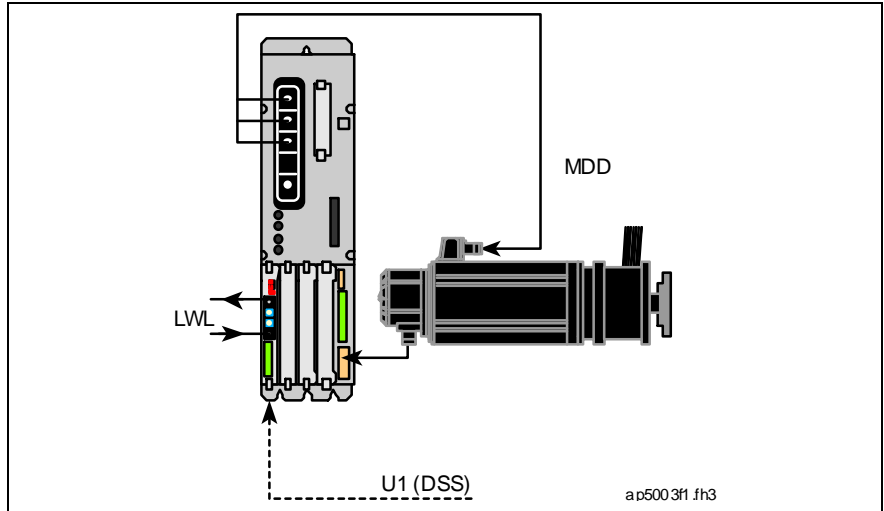


Fig. 3-4: MDD motor with DSF motor encoder to standard interface

#### Sine encoder

The DLF plug-in module is required to connect the motor encoder.

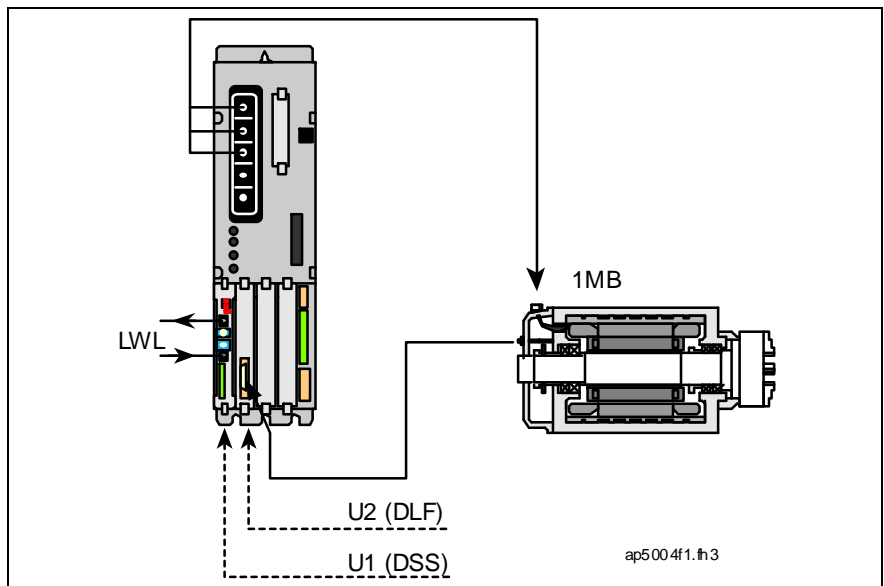


Fig. 3-5: : 1MB motor with incremental sine encoder from Heidenhain, connected to a DLF module

### Gear tooth encoder

The DZF module is required to connect the motor encoder.

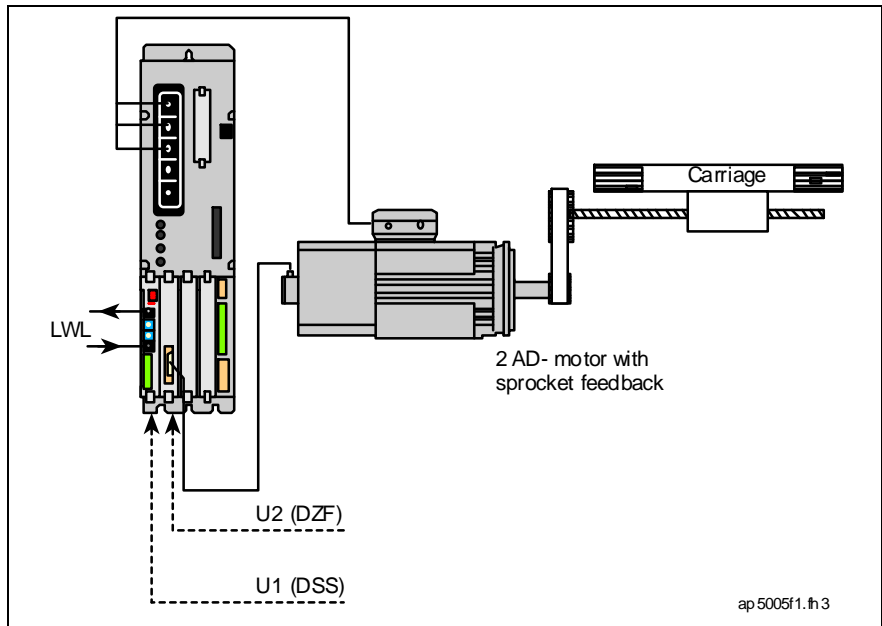


Fig. 3-6: ZAD motor with gear tooth encoder, connected to a DZF module

### EnDat Encoder

A DAG 1.2 module is required to connect the motor encoder.

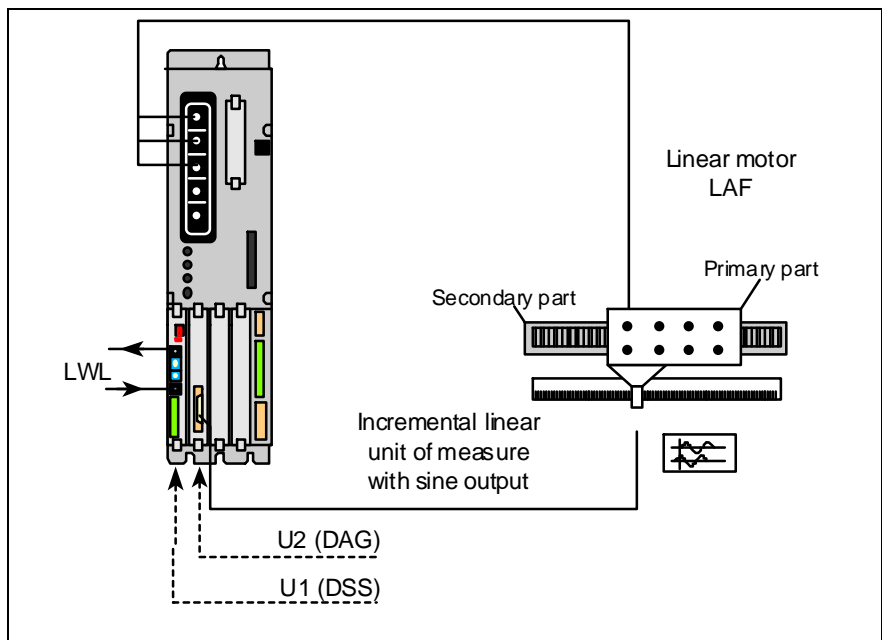


Fig. 3-7: LAF motor with EnDat encoder, connected to a DAG1.2 module

## Notes



## 4 Selecting Features - Determining Configuration Labeling

### 4.1 Basic Features

Independent of the motor type in use, a DIAX03 drive controller offers a wide range of features which are always available. To use these features, **no separate** plug-in module is needed.

The following **basic features** are available:

- Supported operating modes:
  - Torque/force control
  - Velocity control
  - Position control
  - Drive-controlled interpolation
- Numerous diagnostic possibilities
- Programmable torque/force limits
- Current limitation
- Velocity limitation
- Transversing range limitation
- Driver-side error response:
  - Best possible deceleration "velocity command value zero-switch"
  - Best possible deceleration "torque-free"
  - Best possible deceleration "velocity command value zero-switch with slope and filter"
  - NC response in error situation
  - Emergency stop feature
- Control loop setting
  - Basic load feature
  - Acceleration feedforward
  - Velocity mix factor
  - Velocity feedforward
  - Friction torque compensation
- Language selection
- Drive Interlock
- Halt drive
- Drive-controlled homing procedure
- Evaluation of absolute measurement systems
- Set absolute measuring
- Analog outputs
- Oscilloscope function
- Probe feature
  - Measurement signal actual feedback value 1/2
  - Measurement signal time
- Modulo feature
- Axis error correction
- "Travel to positive stop" command
- Password-controller write access to amplifier and feedback data

## 4.2 Selection of additional features

### Additional plug-in modules are required

Additional to the basic features DIAX03 offers a range of further features. When you select these additional features which are presented in the following chapters and tables, you should consider that additional plug-in modules will be required.

### Max number of modules

Depending on the basic device type being used, there may be differences in the number of plug-in modules used.

DDS 3.2	max. 2 additional plug-in modules
DDS 2.2	max. 4 additional plug-in modules
DKR	max. 4 additional plug-in modules

---

**Note:** One slot is already used for the DSS communication module in every basic device type.

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### Selection requirements

The following requirements must be taken into consideration when selecting an additional feature:

- Each module can only be used for one function.
- A maximum of one external measurement system may be selected.

In contrast to basic features, use of additional features depends on the type of motor or motor feedback interface being used.

For this reason, distinctions are made based on the motor feedback interface in the following chapters.

## Motor encoder interface: DSF / RSF

If a motor type with a digital servo feedback or a resolver is used, you can then select the *Additional features for motor with DSF/RSF* from the following table.

Depending on your selection, the result will be a number or a combination of required modules.

Using this module combination, you can define the corresponding configuration labelling in the table *Configuration selection for motor with DSF/RSF*, which is then used to order the correct components.

If the module combination is not listed in this table, check your selected components again (motor type, motor encoder interface, features); some changes may be required.

### Selection of features for the motor with DSF/RSF

Features	Table B1: Plug-in modules:							
	DAG 1.2	DEA 4.2	DEF 1.1	DEF 2.1	DFF 1.1	DLF 1.1	DRF 1.1	DZF 2.1
Analog input							X	
Digital input/output		X						
External measurement system with Heidenhain sine encoder						X		
External measurement system with Heidenhain rectangle encoder			X	X				
External measurement system with DSF encoder					X			
External measurement system with SSI Interface	X							
External measurement system with EnDat Encoder	X							
External measurement system with gear tooth encoder (Indramat)								X
No additional features								
<b>Plug-in modules determined:</b>								

Tab. 4-1: Additional features for motor with DSF/RSF

**Configuration Selection for Motor with DSF/RSF**

Name of configuration:	Table C1: Module combination							
	DAG 1.2	DEA 4.2	DEF 1.1	DEF 2.1	DFF 1.1	DLF 1.1	DRF 1.1	DZF 2.1
BE12-01-FW								
BE37-01-FW								X
BE31-01-FW							X	
BE32-01-FW						X		
BE09-01-FW					X			
BE23-01-FW		X						
BE45-01-FW	X							
BE27-01-FW					X			X
BE38-01-FW		X						X
BE04-02-FW	X							X
BE15-01-FW					X		X	
BE06-01-FW		X					X	
BE08-01-FW					X	X		
BE33-01-FW		X				X		
BE30-01-FW		X			X			
BE74-02-FW	X	X						
BE22-01-FW		X			X			X
BE02-02-FW	X				X			X
BE03-02-FW	X	X						X
BE13-01-FW		X			X		X	
BE28-01-FW		X			X	X		

Tab. 4-2: Configuration Selection for Motor with DSF/RSF

## Motor encoder interface: Sine encoder

If a motor type was specified, and an incremental scale with sine signals or an incremental sine encoder is used for the motor encoder interface, then the desired additional feature can be selected from the table *Additional features for motor with sine encoder as a motor encoder*.

Depending on your selection, the result will be a number or a combination of required modules.

With this module combinations you can determine the configuration labeling from the table *Configuration selection for motor with sine encoder as a motor encoder* to order the correct components.

If the module combination is not listed in this table, check your selected components again (motor type, motor encoder interface, features); some changes may be required.

### Selection of Features for Motor with Sine Encoder

Features:	Table B2: Plug-in modules:							
	DAG 1.2	DEA 4.2	DEF 1.1	DEF 2.1	DFF 1.1	DLF 1.1	DRF 1.1	DZF 2.1
Digital input/output		X				X		
External measurement system with Heidenhain rectangle encoder				X		X		
External measurement system with DSF encoder (1)					X	X		
External measurement system with SSI Interface	X					X		
External measurement system with EnDat Encoder	X					X		
No additional features						X		
<b>Plug-in modules determined:</b>								

Tab. 4-3: Additional features for motor with sine encoder as the motor encoder

(1) If the standard interface X4 is not used, there is then no need for the DFF module.

### Configuration Selection for Motor with Sine Encoder

Name of configuration:	Table C2: Module combination:							
	DAG 1.2	DEA 4.2	DEF 1.1	DEF 2.1	DFF 1.1	DLF 1.1	DRF 1.1	DZF 2.1
BE32-01-FW						X		
BE08-01-FW					X	X		
BE33-01-FW		X				X		
BE28-01-FW		X			X	X		

Tab. 4-4: Configuration selection for motor with sine encoder as the motor encoder

## Motor encoder interface: Gear tooth encoder

If a motor type was specified for an application where a gear tooth encoder is used for a motor encoder interface, then you can select the desired additional features from the table *Additional features for motor with gear tooth encoder*.

Depending on your selection, the result will be a number or a combination of required modules.

With this module combination from the table *Configuration selection for motors with gear tooth encoder* you can determine the configuration label and order the correct components.

If the module combination is not listed in this table, check your selected components again (motor type, motor encoder interface, features); some changes may be required.

### Selection of Features for Motor with Gear Tooth Encoder

Features:	Table B3: Plug-in modules:							
	DAG 1.2	DEA 4.2	DEF 1.1	DEF 2.1	DFF 1.1	DLF 1.1	DRF 1.1	DZF 2.1
Digital input/output		X						X
External measurement system with Heidenhain rectangle encoder				X				X
External measurement system with DSF encoder (1)					X			X
External measurement system with SSI Interface	X							X
External measurement system with EnDat Encoder	X							X
No additional features	X							
<b>additional modules determined:</b>								

Tab. 4-5: Additional features for motor with gear tooth encoder

(1) If the standard interface X4 is not used, there is then no need for the DFF module.

### Configuration Selection for Motor with Gear Tooth Encoder

Name of configuration:	Table C3: Module combination:							
	DAG 1.2	DEA 4.2	DEF 1.1	DEF 2.1	DFF 1.1	DLF 1.1	DRF 1.1	DZF 2.1
BE37-01-FW								X
BE27-01-FW					X			X
BE38-01-FW		X						X
BE04-02-FW	X							X
BE22-01-FW		X			X			X
BE02-02--FW	X				X			X
BE03-02--FW	X	X						X

Tab. 4-6: Configuration Selection for Motor with Gear Tooth Encoder

## Motor encoder interface: EnDat Encoder

If a motor type was specified for an application where an encoder with EnDat interface is used for the motor encoder interface, then you can select the desired additional features from the table *Additional features for motors with EnDat motor encoder Interface*.

Depending on your selection, the result will be a number or a combination of required modules.

With this module combinations you can define the appropriate configuration label for ordering the correct components in the table *Configuration selection for Motor with EnDat motor encoder interface*.

If the module combination is not listed in this table, check your selected components again (motor type, motor encoder interface, features); some changes may be required.

### Selection of Features for Motor with EnDat Encoder

Features	Table B3: Plug-in modules:							
	DAG 1.2	DEA 4.2	DEF 1.1	DEF 2.1	DFF 1.1	DLF 1.1	DRF 1.1	DZF 2.1
Analog input	X						X	
Digital input/output	X	X						
External measurement system with Heidenhain sine encoder	X					X		
External measurement system with Heidenhain rectangle encoder	X		X	X				
External measurement system with DSF encoder (1)	X				X			
External measurement system with gear tooth encoder (Indramat)	X							X
No additional features	X							
<b>Plug-in modules determined:</b>								

Tab. 4-7: Additional features for motors with EnDat motor encoder interface

(1) If the standard interface X4 is not used, there is then no need for the DFF module.

### Configuration selection for motors with EnDat encoder

Name of configuration:	Table C3: Module combination:							
	DAG 1.2	DEA 4.2	DEF 1.1	DEF 2.1	DFF 1.1	DLF 1.1	DRF 1.1	DZF 2.1
BE45-01--FW	X							
BE04-02--FW	X							X
BE74-02--FW	X	X						
BE02-02--FW	X				X			X
BE03-02--FW	X	X						X

Tab. 4-8: Configuration selection for motor with EnDat motor encoder interface

## Notes



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