

## EZ motors in combination with Siemens SINAMICS S120 Information on compatibility

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# 1 Foreword

The STÖBER synchronous servo motors of the EZ series can be operated with drive controllers from a wide range of manufacturers – for example with SINAMICS S120 servo inverters from Siemens (referred to below as drive controllers).

The encoders, temperature sensors, plug connectors and terminal assignments of the STÖBER motors are compatible with the aforementioned drive controllers. We recommend using only original cables from Siemens.

## 2 Information on this documentation

This documentation contains information on the compatibility of STÖBER synchronous servo motors from the EZ series with the SINAMICS S120 drive controller from Siemens. The relevant operating manual applies to installation, connection and commissioning.

### 2.1 Timeliness

Check whether you have the latest version of this documentation. The latest document versions for our products are available for download on our website:

<http://www.stoeber.de/en/downloads/>.

### 2.2 Original language

The original language of this documentation is German; all other language versions are derived from the original language.

### 2.3 Limitation of liability

This documentation was created taking into account the applicable standards and regulations as well as the current state of technology.

No warranty or liability claims for damage shall result from failure to comply with the documentation or from use that deviates from the intended use of the product. This is especially true for damage caused by individual technical modifications to the product or the project configuration and operation of the product by unqualified personnel.

### 2.4 Formatting conventions

Orientation guides in the form of signal words, symbols and special text markups are used to emphasize specific information so that you are able identify it in this documentation quickly.

#### 2.4.1 Distinction of text elements

Certain elements of the continuous text are distinguished as follows.

<b>Important information</b>	Words or expressions with a special meaning
Interpolated position mode	Optional: File or product name or other name
<u>Detailed information</u>	Internal cross-reference
<a href="http://www.samplelink.com">http://www.samplelink.com</a>	External cross-reference

## 2.5 Trademarks

The following names used in connection with the device, its optional equipment and its accessories are trademarks or registered trademarks of other companies:

EnDat®	EnDat® and the EnDat® logo are registered trademarks of Dr. Johannes Heidenhain GmbH, Germany.
INTERCONTEC®	INTERCONTEC® is a registered trademark of TE Connectivity Industrial GmbH, Germany.
SINAMICS®	SINAMICS® is a registered trademark of Siemens AG, Germany.

All other trademarks not listed here are the property of their respective owners.

Products that are registered as trademarks are not specially indicated in this documentation. Existing property rights (patents, trademarks, protection of utility models) are to be observed.

## 3 Connection

The terminal assignment of the plug connectors of STÖBER synchronous servo motors of the EZ series – in the version for Siemens drive controllers – is identical to that of the motors from Siemens. The customer can therefore obtain and connect the corresponding Siemens original cables. STÖBER does not offer any connection cables for Siemens drive controllers, but can recommend an appropriate cable family on request.

### 3.1 Possible combinations with drive controllers

The following table shows the possible combinations of STÖBER synchronous servo motors with drive controllers from Siemens depending on the encoder model.

<b>Drive controller</b>		<b>SINAMICS S120</b> EnDat 2.1/resolver
<b>Drive controller code</b>		FJ
<b>Connection plan ID</b>		442315
<b>Encoder</b>	<b>Encoder code</b>	
EnDat 2.1 EQN 1125	Q4	EZ
Resolvers	R0	EZ

The encoder and drive controller codes are a part of the type designation of the motor.

### 3.2 Encoders

#### Encoders with EnDat 2.1 interface

Encoder model	Code	Measuring method	Recordable revolutions	Resolution	Position values per revolution	Periods per revolution	MTTF [years]	PFH [h]
EnDat 2.1 EQN 1125	Q4	Optical	4096	13 bit	8192	Sin/cos 512	> 57	$\leq 2 \times 10^{-6}$

#### Notes

- The encoder code is a part of the type designation of the motor.
- Multiple revolutions of the motor shaft can be recorded only using multi-turn encoders.

### 3.3 Resolver

In this chapter, you can find detailed technical data for the resolver that can be installed as an encoder in a STÖBER motor.

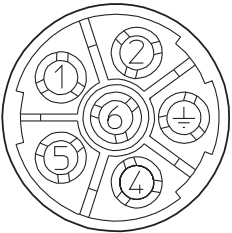

Feature	Description
Code	R0
Number of poles	2
Input voltage $U_{1\text{eff}}$	$7\text{ V} \pm 5\%$
Input frequency $f_1$	10 kHz
Output voltage $U_{2,S1-S3}$	$K_{tr} \cdot U_{R1-R2} \cdot \cos \theta$
Output voltage $U_{2,S2-S4}$	$K_{tr} \cdot U_{R1-R2} \cdot \sin \theta$
Transformation ratio $K_{tr}$	$0.5 \pm 5\%$
Electrical fault	$\pm 10$ arcmin
MTTF	> 100 years
PFH	$\leq 10^{-9}$

### 3.4 Two-cable solution

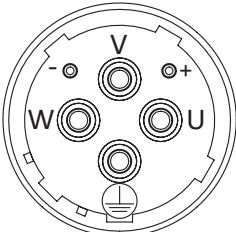

#### 3.4.1 Connection assignment of the power plug connector

The size and connection diagram of the power plug connector depend on the size of the motor.

##### Plug connector size con.23

Connection diagram	Pin	Connection
	1	1U1 (U phase)
	2	1V1 (V phase)
	4	1BD1 (brake +)
	5	1BD2 (brake -)
	6	1W1 (W phase)
		PE (grounding conductor)

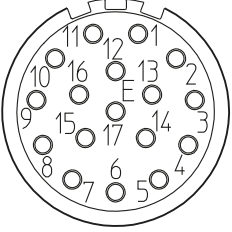
##### Plug connector size con.40

Connection diagram	Pin	Connection
	U	1U1 (U phase)
	V	1V1 (V phase)
	W	1W1 (W phase)
	+	1BD1 (brake +)
	-	1BD2 (brake -)
		PE (grounding conductor)

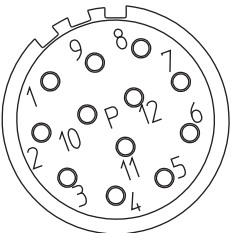
### 3.4.2 Connection assignment of the encoder plug connector

The size and terminal assignment of the encoder plug connectors depend on the model of encoder installed and the size of the motor.

#### EnDat 2.1 encoder with sin/cos incremental signals, plug connector size con.23

Connection diagram	Pin	Connection
	1	A + (Cos +)
	2	A - (Cos -)
	3	Data +
	4	
	5	Clock +
	6	
	7	0 V GND
	8	1TP1 (temperature sensor +)
	9	1TP2 (temperature sensor -)
	10	Up +
	11	B + (Sin +)
	12	B - (Sin -)
	13	Data -
	14	Clock -
	15	0 V sense
	16	Up sense
	17	

#### Resolver, plug connector size con.23

Connection diagram	Pin	Connection
	1	S4 Sin +
	2	S2 Sin -
	3	
	4	
	5	
	6	
	7	R1 Ref -
	8	1TP1 (temperature sensor +)
	9	1TP2 (temperature sensor -)
	10	R2 Ref +
	11	S3 Cos +
	12	S1 Cos -

### 3.4.3 Plug connectors

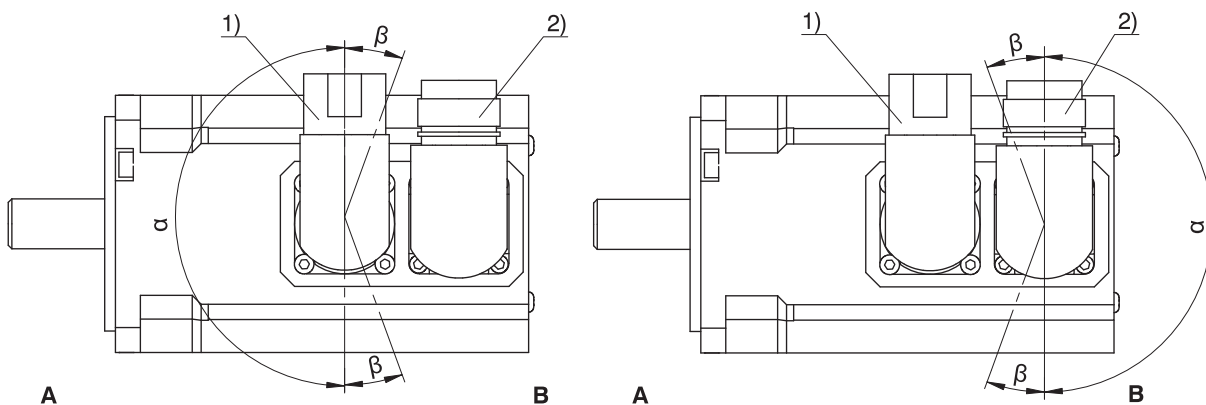
In the standard version, STÖBER synchronous servo motors are equipped with rotatable plug connectors<sup>1</sup> for power and encoder connections. You can find detailed technical information about the plug connectors at <http://www.intercontec.biz>.

For motors with forced ventilation, avoid collisions between the motor connection cables and the plug connector of the forced ventilation unit. In the event of a collision, rotate the plug connectors of the motor by the required angle.

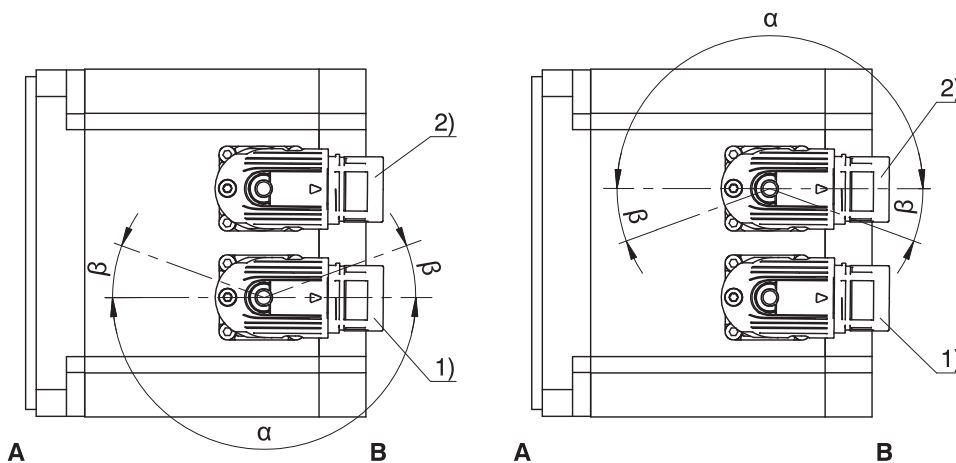
For winding protection, STÖBER uses PTC or Pt1000 temperature sensors, which are selected to match the drive. In a two-cable solution, the temperature sensor connections are routed via the encoder plug connector.

The figures represent the position of the plug connectors upon delivery.

#### Turning ranges of plug connectors (EZ2 – EZ3 motors)



#### Turning ranges of plug connectors (EZ4 – EZ8 motors)



- |   |  |   |                        |
|---|--|---|------------------------|
| 1 | Power plug connector                   | 2 | Encoder plug connector |
| A | Attachment or output side of the motor | B | Not output side        |

<sup>1</sup>The connectors can be pivoted up to 10 times at a specific angle. They cannot be rotated repeatedly.

**Power plug connector features**

Motor type	Size	Connection	Turning range	
			$\alpha$	$\beta$
EZ2, EZ3	con.23	Quick-lock	180°	120°
EZ4, EZ5, EZ701, EZ702, EZ703	con.23	Quick-lock	180°	40°
EZ705, EZ8	con.40	Quick-lock	180°	40°

**Encoder plug connector features**

Motor type	Size	Connection	Turning range	
			$\alpha$	$\beta$
EZ2, EZ3	con.23	Quick-lock	180°	120°
EZ4, EZ5, EZ7, EZ8	con.23	Quick-lock	190°	35°

**Notes**

- The number after "con." indicates the approximate external thread diameter of the plug connector in mm (for example, con.23 designates a plug connector with an external thread diameter of about 23 mm).
- In turning range  $\beta$ , the power or encoder plug connectors can be turned only if doing so does not cause them to collide.

## 4 Commissioning

Only put the motor into operation if you have reviewed its installation and connection in accordance with the associated operating manual, as well as all other necessary requirements specific to your system. In addition, follow the instructions for commissioning your drive controller in the third-party manufacturer's documentation.

### 4.1 Parameterizing the motor

After the motor has been installed and connected to the corresponding drive controller, parameterization takes place in Siemens's SINAMICS Startdrive commissioning software.

As a specific parameterization list is required for this, please contact STÖBER System Support at [systemsupport@stoerber.de](mailto:systemsupport@stoerber.de) and send either your order number or the series, size and type designation of the motor as well as the type of drive controller used. You will receive the requested list immediately by e-mail.

The electronic nameplate of STÖBER motors is not read by Siemens drive controllers. Only the commutation offset is stored in the encoder memory and can be read out by the drive controller.

#### Information

The commutation offset of the motor comes from the factor set in such a way that calibration by the customer is not necessary.

### 4.2 Converting encoder signals to Drive-CLiQ

DRIVE-CLiQ (Drive Component Link with IQ) is a communication system from Siemens that is used by SINAMICS to connect the various components (e.g. control unit, motor and encoder). DRIVE-CLiQ enables automatic recognition of the components by the control unit, provides standardized interfaces to all components and ensures service continuity and diagnostics all the way down to the individual component level.

To enable the Siemens drive controller to evaluate the encoder of the STÖBER motor, the EnDat 2.1 protocol or resolver signal must be converted to the Drive-CLiQ protocol. This conversion requires a separate module that can evaluate the signals from the encoder and send them to the SINAMICS S120 via DRIVE-CLiQ. Additional modules and associated cables can be obtained from Siemens. STÖBER does not offer any corresponding modules or cables.

The following table shows which Siemens module is to be used depending on the encoder model installed:

Encoder model	Sensor Module Cabinet-Mounted (SMC)
EnDat 2.1 encoders	SMC20
Resolvers	SMC10

## 5 Appendix

### 5.1 Further information

The documentation listed below provides you with further relevant information on the motors. The current status of the documentation can be found in our download center at:

<http://www.stoeber.de/en/downloads/>.

Enter the ID of the documentation in the search.

Title	Documentation	Contents	ID
Synchronous Servo Motors EZ	Operating manual	Technical data, transport and storage, installation, connection, commissioning, service	443032_en

The documentation for the drive controller and a current version of the SINAMICS Startdrive commissioning software are available in the download area of Siemens at:

<https://www.siemens.com/en-us/support/documentation-downloads/>.

### 5.2 Abbreviations

Abbreviation	Meaning
GND	Ground
PE	Protective Earth (grounding conductor)
PTC	Positive Temperature Coefficient
SMC	Sensor Module Cabinet-Mounted

## 6 Contact

### 6.1 Consultation, service and address

We would be happy to help you!

We offer a wealth of information and services to go with our products on our website:

<http://www.stoeber.de/en/service>

For additional or personalized information, contact our consultation and support service:

<http://www.stoeber.de/en/support>

If you need our system support:

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systemsupport@stoeber.de

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Phone: +49 7231 582-1128

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### 6.2 Your opinion is important to us

We created this documentation to the best of our knowledge with the goal of helping you build and expand your expertise productively and efficiently with our products.

Your suggestions, opinions, wishes and constructive criticism help us to ensure and further develop the quality of our documentation.

If you want to contact us for a specific reason, we would be happy to receive an e-mail from you at:

documentation@stoeber.de

Thank you for your interest.

Your STÖBER editorial team

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We offer you committed, expert advice and support in over 40 countries worldwide:

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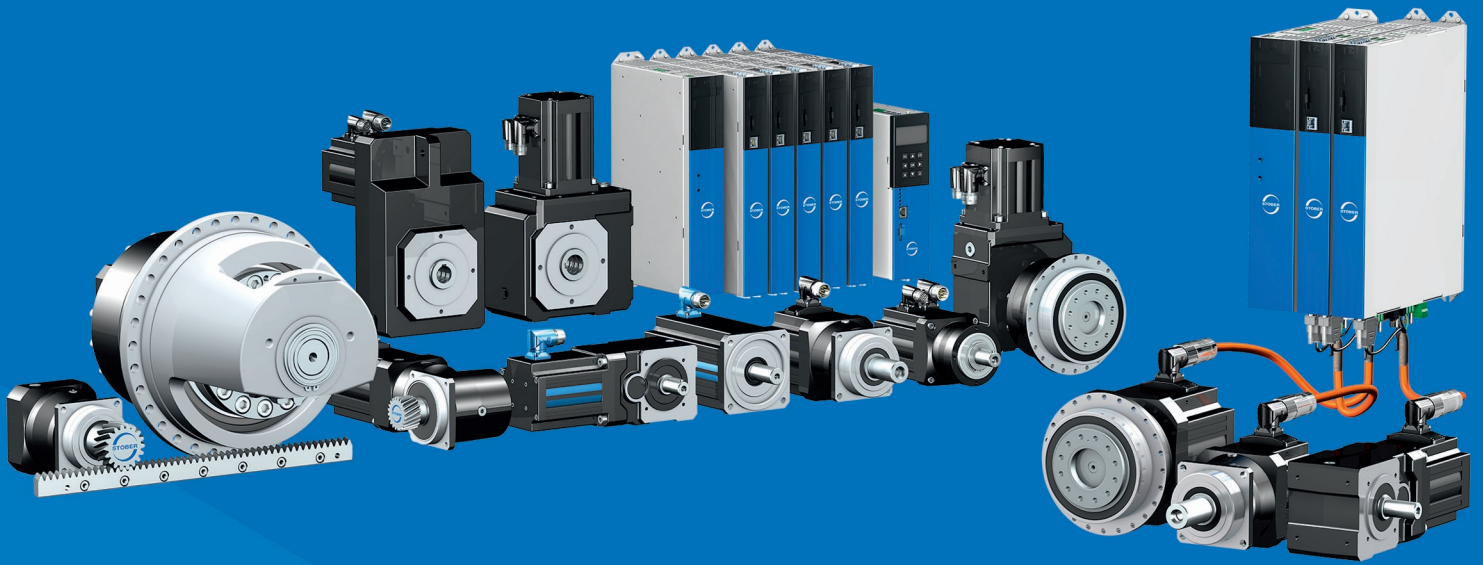
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