

26 Connecting to drive controllers of third-party manufacturers

Table of contents

26.1 General instructions	907
26.1.1 Nominal data	907
26.1.2 Plug connector	908
26.1.3 Connection cable	910
26.2 Connecting to B&R drive controllers	911
26.2.1 Selectable encoder types	911
26.2.1.1 Possible combinations with drive controllers.	911
26.2.2 Connection assignment for plug connectors	912
26.2.2.1 Power connection	912
26.2.2.2 Encoder connection.	913
26.3 Connecting to Siemens drive controllers	914
26.3.1 Selectable encoder types	914
26.3.1.1 Possible combinations with drive controllers.	914
26.3.2 Connection assignment for plug connectors	915
26.3.2.1 Power connection	915
26.3.2.2 Encoder connection.	916
26.4 Connecting to Kollmorgen drive controllers	917
26.4.1 Selectable encoder types	917
26.4.1.1 Possible combinations with drive controllers.	917
26.4.2 Connection assignment for plug connectors	917
26.4.2.1 Power connection	917
26.4.2.2 Encoder connection.	918
26.5 Connecting to Bosch Rexroth drive controllers	919
26.5.1 Selectable encoder types	919
26.5.1.1 Possible combinations with drive controllers.	919
26.5.2 Connection assignment for plug connectors	920
26.5.2.1 Power connection	920
26.5.2.2 Encoder connection.	921
26.6 Connecting to Beckhoff drive controllers	922
26.6.1 Selectable encoder types	922
26.6.1.1 Possible combinations with drive controllers.	922
26.6.2 Connection assignment for plug connectors	922
26.6.2.1 Power connection	923
26.6.2.2 Encoder connection.	923

26.1 General instructions

STOBER synchronous servo geared motors in the standard version are designed for connecting to STOBER drive controllers. STOBER offers an extensive assortment of high-quality and proven power and Encoder connection cables for this purpose.

However, STOBER synchronous servo geared motors can also be operated on drive controllers of third-party manufacturers. Related instructions and information can be found in the following sections. You can find all the other information you need about STOBER synchronous servo geared motors in the relevant section of this catalog.

26.1.1 Nominal data

Formula symbol	Unit	Explanation
f_{2PU}	Hz	Output frequency of the drive controller power board
$f_{PWM,PU}$	Hz	Internal pulse clock frequency of the drive controller power board
n_{mot}	rpm	Speed of the motor
p		Number of pole pairs
U_{ZK}	V	DC link voltage: characteristic value of a drive controller

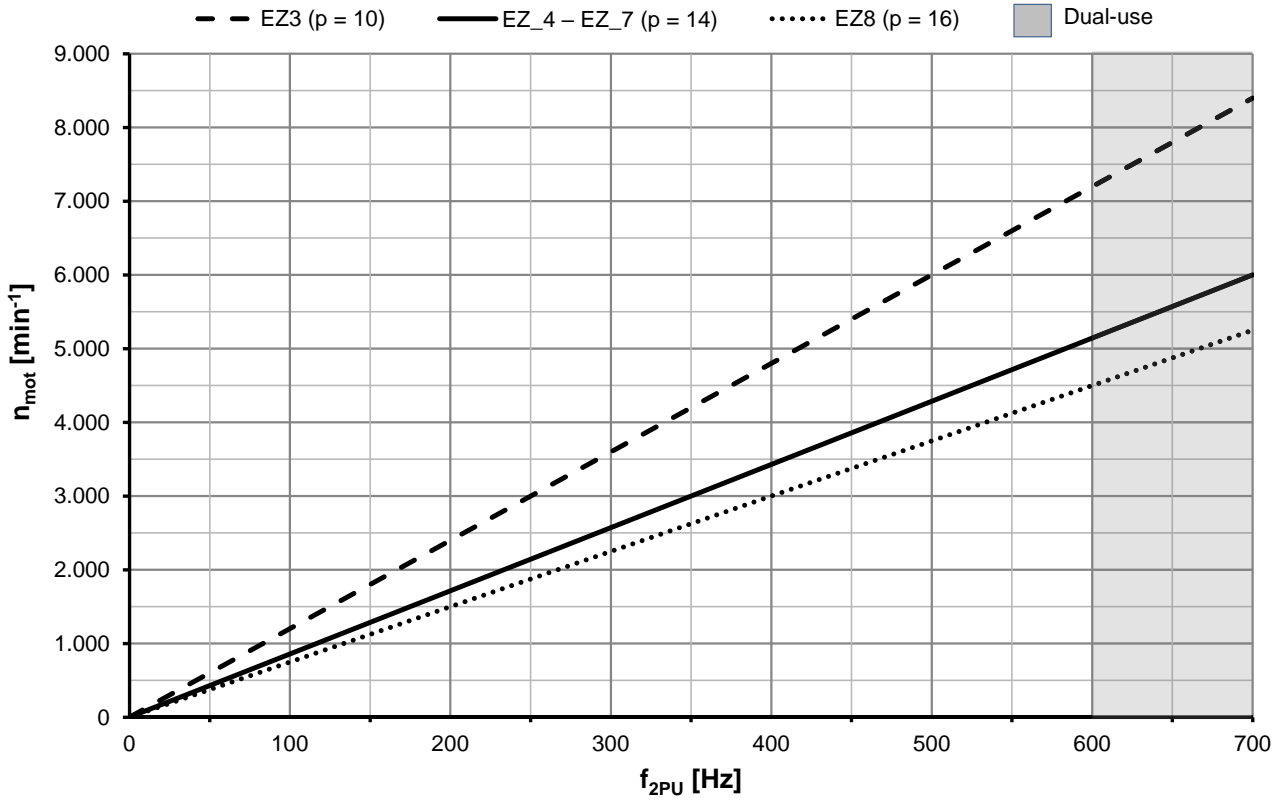
Nominal data for synchronous servo motors specified in the selection tables of this catalog were determined for connecting to STOBER drive controllers. Note that this nominal data may change when STOBER synchronous servo motors are connected to drive controllers of third-party manufacturers. The following features of the drive controller are the determining factors:

- f_{2PU}
- $f_{PWM,PU}$
- U_{ZK}
- Compensation of the field weakening range.

The maximum achievable speed of a synchronous servo motor depends on the number of pole pairs p of the synchronous servo motor and if applicable on the restriction of f_{2PU} by regulation (EC) No. 1382/2014 (EC dual-use regulation). Details can be seen in the diagram below.

Some encoders have their own internal analysis electronics with warning and off limits that may overlap with the corresponding values set in the drive controller for thermal winding protection. In some cases this may result in an encoder with internal temperature monitoring forcing the motor to shut down even before the motor has reached its nominal data.

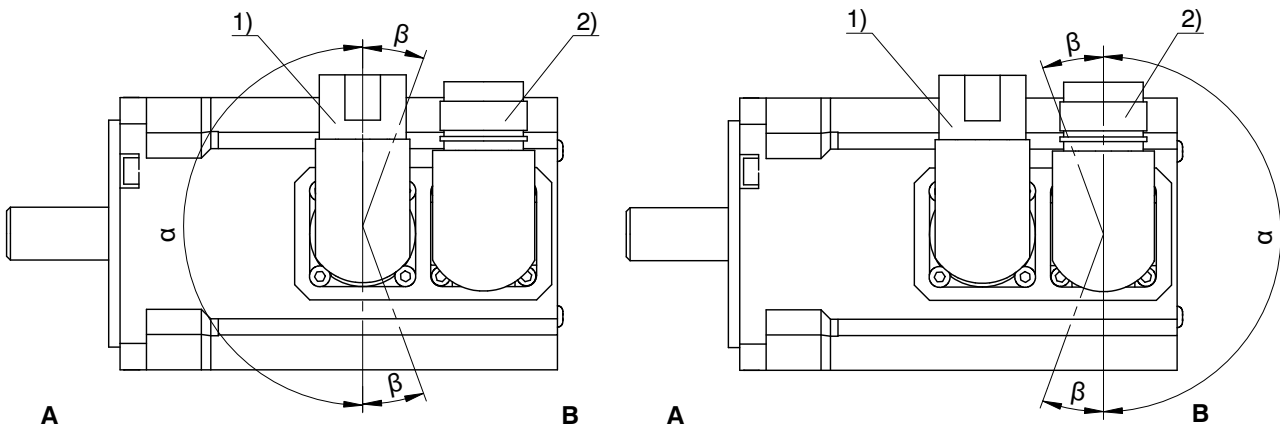
Speed/frequency diagram



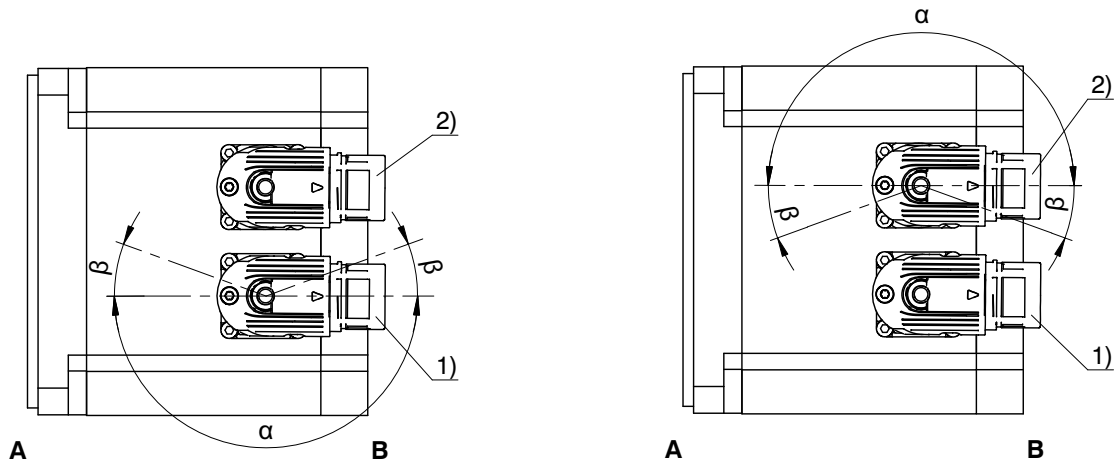
26.1.2 Plug connector

This section describes plug connectors used in the design of STOBER synchronous servo motors for connecting drive controllers of third-party manufacturers.

Turning ranges of plug connectors (EZ3 motors)



Turning ranges of plug connectors (EZ4 – EZ8, EZHD, EZHP, EZM, EZS motors)



- 1) Power plug connector
- 2) Encoder plug connector
- A = Attachment or output side of the motor
- B = Rear of the motor

Instructions

- In motors with forced ventilation or water cooling, collisions between the cables to the motor plug connectors with the plug connector of the external fan or the connecting lines of the cooling system must be prevented. In the event of a collision, turn the motor plug connectors appropriately. For details on the position of the external fan plug connector or the connection lines of the cooling system, see the corresponding section in this catalog.
- The illustrations show the position of the plug connectors when the synchronous servo motor is delivered.

Features of plug connectors for power

Motor type	Size ¹⁾	Connection	Turning range	
			α	β ²⁾
EZ3 – EZ5, EZ701, EZ703 EZHD_4, EZHD_5, EZHD_711 – EZHD_713 EZHP_5, EZHP_711 – EZHP_713 EZM, EZS	con.23	Quick lock	180°	20°
EZ705, EZ802, EZ803, EZ805U EZHD_715, EZHP_715	con.40	Quick lock	180°	20°
EZ805B, EZ805W	con.58	Screw thread ³⁾	0°	0°

Features of plug connectors for encoders

Motor type	Size ¹⁾	Connection	Turning range	
			α	β ²⁾
EZ3 – EZ7, EZ802, EZ803, EZ805U EZHD, EZHP, EZM, EZS	con.23 ⁴⁾	Quick lock	180°	20°
EZ805B, EZ805W	con.23 ⁴⁾	Quick lock	180°	0°

1) The number after "con." indicates approximately the external diameter of the plug connector in mm (for example con.23 designates a plug connector with an external diameter of about 23 mm).

2) In turning range β the power and encoder plug connectors can only be turned if they will not collide with each other by doing so.

3) Specify the alignment to side A or B in the purchase order.

4) con.15 for connecting to B&R ACOPOSmulti with EnDat 2.2 Interface (drive controller type code GG)

26.1.3 Connection cable

General information

The plug connectors and connection assignment of STOBER synchronous servo motors are designed for connecting to drive controllers of third-party manufacturers so that you can connect the original cable of the respective third-party manufacturer. Note the following information regarding cable quality and design.

- Because the original cable from Bosch Rexroth cannot be used, STOBER offers suitable cables for this purpose. More detailed information is available from your STOBER customer consultant.
- Make certain the cable quality and design is suitable for the ambient conditions at the installation location.

Electromagnetic Compatibility (EMC)

- Ensure compliance with statutory ECM requirements for the drive system at the installation location.
- Connect the cable shields on both ends of the connection cable.
- Connect the grounding screw of the synchronous servo motor with the grounding at the installation location.

Power cable

- Operation with unsuitable power cables may lead to inadmissibly high voltage peaks, which could damage the motor. Therefore the capacitances and inductances must match the motor. For recommended values see the table below.
- The conductor cross-section of the power cable must be designed according to the standstill current of the motor. For details see the table below.

Conductor cross-section [mm ²]	1.0	1.5	2.5	4.0	6.0	10.0	16.0	25.0
Nominal current [A]	12.5	15.0	20.0	28.3	35.8	49.2	66.7	90.0
Max. capacity based on test type A ¹⁾ [nF / km]	45	55	65	60	70	75	75	³⁾
Max. capacity based on test type B ²⁾ [nF / km]	250	300	325	260	300	350	360	³⁾
Max. inductance ⁴⁾ [μH / km]	800	700	700	600	650	600	570	³⁾

1) Based on VDE 0472 part 504, test type A: conductor / conductor (details as per EN 50289-1-5:2001 in preparation)

2) Based on VDE 0472 part 504, test type B: conductor / remainder (details as per EN 50289-1-5:2001 in preparation)

3) Values on request

4) As per EN 50289-1-12:2005; conductor / conductor

Encoder cable

When operating with unsuitable encoder cables, encoder signals cannot be transferred interference-free. Note the recommended values in the following table.

Signal shape	Digital		Sin-cos			Resolver	
Conductor cross-section [mm ²]	0.14	0.25	0.14	0.25	0.37	0.14	0.25
Max. capacity based on test type A ¹⁾ [nF / km]	30	35	60	110	130	40	50
Max. capacity based on test type B ²⁾ [nF / km]	110	130	300	300	325	300	300
Max. inductance ³⁾ [μH / km]	800	800	650	700	700	800	800
Shielding type of cable	Tinned copper braiding						
Shielding type of conductor pairs	–		Tinned copper braiding			Film and braiding	
Cover	≥ 90 %		≥ 80 %			≥ 80 %	

1) Based on VDE 0472 part 504, test type A: conductor / conductor (details as per EN 50289-1-5:2001 in preparation)

2) Based on VDE 0472 part 504, test type B: conductor / remainder (details as per EN 50289-1-5:2001 in preparation)

3) As per EN 50289-1-12:2005; conductor / conductor

26.2 Connecting to B&R drive controllers

This section contains information for use when connecting STOBER synchronous servo motors to drive controllers of the third-party manufacturer mentioned above. It differs from the information for connecting to a STOBER drive controller. You can find all the other information you need about STOBER synchronous servo motors in the relevant section of this catalog.

26.2.1 Selectable encoder types

Encoder types with EnDat 2.2 interface available for selection

Encoder type	Type code ¹⁾	Measuring principle	Recordable revolutions ²⁾	Resolution	Position values per revolution
EQI 1131 FMA ³⁾	M4	Inductive	4096	19 bits	524288
EQI 1131	Q6	Inductive	4096	19 bits	524288
EQN 1135 FMA ³⁾	M3	Optical	4096	23 bits	8388608
EQN 1135	Q5	Optical	4096	23 bits	8388608
ECN 1123 FMA ³⁾	M1	Optical	–	23 bits	8388608
ECN 1123	C7	Optical	–	23 bits	8388608
ECI 1118-G2	C5	Inductive	–	18 bits	262144

Encoder types with EnDat 2.1 interface available for selection

Encoder type	Type code ¹⁾	Measuring principle	Recordable revolutions ²⁾	Resolution	Position values per revolution	Periods per revolution
ECI 119	C4	Inductive	–	19 bits	524288	Sin/cos 32
EQN 1125 FMA ⁴⁾	M2	Optical	4096	13 bits	8192	Sin/cos 512
EQN 1125	Q4	Optical	4096	13 bits	8192	Sin/cos 512
ECN 1113 FMA ⁴⁾	M0	Optical	–	13 bits	8192	Sin/cos 512
ECN 1113	C6	Optical	–	13 bits	8192	Sin/cos 512

1) The complete type designation of the synchronous servo motor can be found in the corresponding section of this catalog.

2) With multiturn version only

3) Version with fault elimination for mechanical mounting (FMA) and prepared for operation as a one-encoder solution on a safety-related position measuring system with interface EnDat 2.2.

4) Version with fault elimination for mechanical mounting (FMA)

26.2.1.1 Possible combinations with drive controllers

The following table shows the possible combinations of STOBER synchronous servo motors with drive controllers depending on the encoder type.

Drive controller		ACOPOS	ACOPOSMulti ²⁾	ACOPOSMulti ³⁾
ID motor connection dialog		442313	442444	442677
Drive controller type code ¹⁾		FG	FV	GG
Encoder	Encoder type code ¹⁾			
EQI 1131 FMA	M4	–	–	EZ, EZS
EQI 1131	Q6	–	–	EZ, EZS
EQN 1135 FMA	M3	–	–	EZ, EZS
EQN 1135	Q5	–	–	EZ, EZS
ECN 1123 FMA	M1	–	–	EZ, EZS
ECN 1123	C7	–	–	EZ, EZS
ECI 1118-G2	C5	–	–	EZ, EZS
ECI 119	C4	–	EZHD, EZHP, EZM	–
EQN 1125 FMA	M2	EZ, EZS	EZ, EZS	–
EQN 1125	Q4	EZ, EZS	EZ, EZS	–
ECN 1113 FMA	M0	–	EZ, EZS	–

Drive controller		ACOPOS	ACOPOSmulti²⁾	ACOPOSmulti³⁾
ID motor connection dialog		442313	442444	442677
Drive controller type code¹⁾		FG	FV	GG
Encoder	Encoder type code¹⁾			
ECN 1113	C6	–	EZ, EZS	–
Resolver	R0	EZ, EZS	EZ, EZS	–

1) The complete type designation of the synchronous servo motor can be found in the corresponding section of this catalog.

2) ACOPOSmulti with EnDat 2.1 interface

3) ACOPOSmulti with EnDat 2.2 interface

26.2.2 Connection assignment for plug connectors

Instructions

- The connection assignment of synchronous servo motors is designed specifically for the relevant drive controller. Details can be found in the following section and in the motor connection diagram that is delivered with every synchronous servo motor.
- The colors for connection assignments are named according to IEC 60757 and apply only to motor-internal connecting wires.

26.2.2.1 Power connection

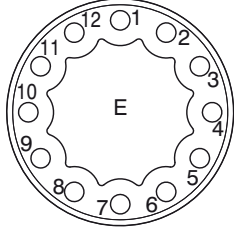
Connection diagram	Pin	Connection	Color
	1	1U1 (phase U)	BK
	3	1W1 (phase W)	RD
	4	1V1 (phase V)	BU
	A	1TP1 / 1K1 ²⁾	
	B	1TP2 / 1K2 ²⁾	
	C	1BD1 ¹⁾	
	D	1BD2 ¹⁾	
Size con.23 (1)		Protective conductor	GNYE

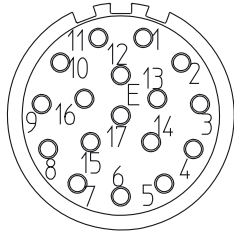
Connection diagram	Pin	Connection	Color
	U	1U1 (phase U)	BK
	V	1V1 (phase V)	BU
	W	1W1 (phase W)	RD
	+	1BD1 ¹⁾	
	-	1BD2 ¹⁾	
	1	1TP1 / 1K1 ²⁾	
	2	1TP2 / 1K2 ²⁾	
Size con.40 (1.5) Size con.58 (3)		Protective conductor	GNYE

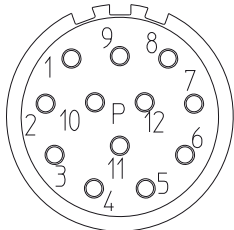
1) Motor holding brake connection (1BD1 = 24 V; 1BD2 = 0V)

2) PTC thermistor connection

26.2.2.2 Encoder connection

Absolute value encoder EnDat 2.2 digital			
Connection diagram	Pin	Signal	Color
 <p>Size con.15</p>	1	Up +	BNGN
	2	Data +	GY
	3	Data –	PK
	4	Clock +	VT
	5	Clock –	YE
	6		
	7	0 V	WHGN
	8		
	9		
	10		
	11		
	12		

Absolute value encoder EnDat 2.1 1 with Sin/Cos incremental signals			
Connection diagram	Pin	Signal	Color
 <p>Size con.23</p>	1	Up sense	BU
	2		
	3		
	4	0 V sense	WH
	5		
	6		
	7	Up +	BRGN
	8	Clock +	VT
	9	Clock –	YE
	10	0 V GND	WHGN
	11		
	12	B + (Sin +)	BUBK
	13	B – (Sin –)	RDBK
	14	Data +	GY
	15	A + (Cos +)	GNBK
	16	A – (Cos –)	YEBK
	17	Data –	PK

Resolver			
Connection diagram	Pin	Signal	Color
 <p>Size con.23</p>	1		
	2		
	3	S4 Sin +	BU
	4	S1 Cos –	RD
	5	R2 Ref +	YEWH
	6		
	7	S2 Sin –	YE
	8	S3 Cos +	BK
	9	R1 Ref –	RDWH
	10		
	11		
	12		

26.3 Connecting to Siemens drive controllers

This section contains information for use when connecting STOBER synchronous servo motors to drive controllers of the third-party manufacturer mentioned above. It differs from the information for connecting to a STOBER drive controller. You can find all the other information you need about STOBER synchronous servo motors in the relevant section of this catalog.

26.3.1 Selectable encoder types

Encoder types with EnDat 2.1 interface available for selection

Encoder type	Type code ¹⁾	Measuring principle	Recordable revolutions ²⁾	Resolution	Position values per revolution	Periods per revolution
ECI 119	C4	Inductive	–	19 bits	524288	Sin/cos 32
EQN 1125 FMA ³⁾	M2	Optical	4096	13 bits	8192	Sin/cos 512
EQN 1125	Q4	Optical	4096	13 bits	8192	Sin/cos 512
ECN 1113 FMA ³⁾	M0	Optical	–	13 bits	8192	Sin/cos 512
ECN 1113	C6	Optical	–	13 bits	8192	Sin/cos 512

1) The complete type designation of the synchronous servo motor can be found in the corresponding section of this catalog.

2) With multiturn version only

3) Version with fault elimination for mechanical mounting (FMA)

26.3.1.1 Possible combinations with drive controllers

The following table shows the possible combinations of STOBER synchronous servo motors with drive controllers depending on the encoder type.

Drive controller	SINAMICS S120	
ID motor connection dialog	442315	
Drive controller type code¹⁾	FJ	
Encoder	Encoder type code¹⁾	
ECI 119	C4	EZHD, EZHP, EZM
EQN 1125 FMA	M2	EZ, EZS
EQN 1125	Q4	EZ, EZS
ECN 1113 FMA	M0	EZ, EZS
ECN 1113	C6	EZ, EZS
Resolver	R0	EZ, EZS

1) The complete type designation of the synchronous servo motor can be found in the corresponding section of this catalog.

26.3.2 Connection assignment for plug connectors

Instructions

- The connection assignment of synchronous servo motors is designed specifically for the relevant drive controller. Details can be found in the following section and in the motor connection diagram that is delivered with every synchronous servo motor.
- The colors for connection assignments are named according to IEC 60757 and apply only to motor-internal connecting wires.

26.3.2.1 Power connection

Connection diagram	Pin	Designation	Color
<p>Size con.23 (1)</p>	1	1U1 (phase U)	BK
	2	1V1 (phase V)	BU
	4	1BD1 ¹⁾	
	5	1BD2 ¹⁾	
	6	1W1 (phase W)	RD
		Protective conductor	GNYE

Connection diagram	Pin	Designation	Color
<p>Size con.40 (1.5)</p>	U	1U1 (phase U)	BK
	V	1V1 (phase V)	BU
	W	1W1 (phase W)	RD
	+	1BD1 ¹⁾	
	-	1BD2 ¹⁾	
		Protective conductor	GNYE

1) Motor holding brake connection (1BD1 = 24 V; 1BD2 = 0V)

26.3.2.2 Encoder connection

Absolute value encoder EnDat 2.1 with Sin/Cos incremental signals

Connection diagram	Pin	Signal	Color
<p>Size con.23</p>	1	A + (Cos +)	GNBK
	2	A - (Cos -)	YEBK
	3	Data +	GY
	4		
	5	Clock +	VT
	6		
	7	0V GND	WHGN
	8	1TP1 / 1K1 ²⁾	BK/BN
	9	1TP2 / 1K2 ²⁾	WH
	10	Up +	BNGN
	11	B + (Sin +)	BUBK
	12	B - (Sin -)	RDBK
	13	Data -	PK
	14	Clock -	YE
	15	0 V sense	WH
	16	Up sense	BU
	17		

Resolver	Pin	Signal	Color
<p>Size con.23</p>	1	S4 Sin +	BU
	2	S2 Sin -	YE
	3		
	4		
	5		
	6		
	7	R1 Ref -	RDWH
	8	1TP1 / 1K1 ²⁾	BK/BN
	9	1TP2 / 1K2 ²⁾	WH
	10	R2 Ref +	YEWH
	11	S3 Cos +	BK
	12	S1 Cos -	RD

2) PTC thermistor connection

26.4 Connecting to Kollmorgen drive controllers

This section contains information for use when connecting STOBER synchronous servo motors to drive controllers of the third-party manufacturer mentioned above. It differs from the information for connecting to a STOBER drive controller. You can find all the other information you need about STOBER synchronous servo motors in the relevant section of this catalog.

26.4.1 Selectable encoder types

Encoder types with EnDat 2.1 interface available for selection

Encoder type	Type code ¹⁾	Measuring principle	Recordable revolutions ²⁾	interface	Signal shape	Periods per revolution
ECI 119	C4	Inductive	–	19 bits	524288	Sin/cos 32
EQN 1125 FMA ³⁾	M2	Optical	4096	13 bits	8192	Sin/cos 512
EQN 1125	Q4	Optical	4096	13 bits	8192	Sin/cos 512

1) The complete type designation of the synchronous servo motor can be found in the corresponding section of this catalog.

2) With multiturn version only

3) Version with fault elimination for mechanical mounting (FMA)

26.4.1.1 Possible combinations with drive controllers

The following table shows the possible combinations of STOBER synchronous servo motors with drive controllers depending on the encoder type.

Drive controller	Servostar S300/400/600/700	
ID motor connection dialog	442311	
Drive controller type code¹⁾	FE	
Encoder	Encoder type code¹⁾	
ECI 119	C4	EZHD, EZHP, EZM
EQN 1125 FMA	M2	EZ, EZS
EQN 1125	Q4	EZ, EZS
Resolver	R0	EZ, EZS

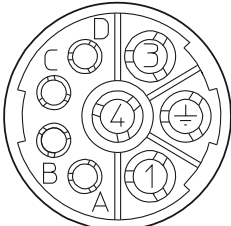
1) The complete type designation of the synchronous servo motor can be found in the corresponding section of this catalog.

26.4.2 Connection assignment for plug connectors

Instructions

- The connection assignment of synchronous servo motors is designed specifically for the relevant drive controller. Details can be found in the following section and in the motor connection diagram that is delivered with every synchronous servo motor.
- The colors for connection assignments are named according to IEC 60757 and apply only to motor-internal connecting wires.

26.4.2.1 Power connection

Connection diagram	Pin	Designation	Color
	1	1U1 (phase U)	BK
	3	1W1 (phase W)	RD
	4	1V1 (phase V)	BU
	A	1BD1 ¹⁾	
	B	1BD2 ¹⁾	
	C		
	D		
Con. size 23 (1)		Protective ground (PE)	GNYE

1) Motor holding brake connection (1BD1 = 24 V; 1BD2 = 0V)

Connection diagram	Pin	Connection	Color
	R	1U1 (phase U)	BK
	V	1V1 (phase V)	BU
	W	1W1 (phase W)	RD
	+	1BD1 ¹⁾	
	-	1BD2 ¹⁾	
	1		
	2		
		Protective ground (PE)	GNYE

Con. size 40 (1.5)
Con. size 58 (3)

1) Motor holding brake connection (1BD1 = 24 V; 1BD2 = 0V)

26.4.2.2 Encoder connection

Absolute value encoder EnDat 2.1 with sin/cos incremental signals			
Connection diagram	Pin	Signal	Color
	1	B – (sin –)	RDBK
	2	0V GND	WHGN
	3	A – (cos –)	YEBK
	4	Up +	BNGN
	5	Data +	GY
	6		
	7	1TP1 ²⁾	BK
	8	Clock +	VT
	9	B + (sin +)	BUBK
	10	0 V sense	WH
	11	A + (cos +)	GNBK
	12	Up sense	BU
	13	Data –	PK
	14	1TP2 ²⁾	WH
	15	Clock –	YE
	16		
	17		

Con. size 23

2) PTC thermistor connection

Resolver			
Connection diagram	Pin	Signal	Color
	1		
	2	1TP1 ²⁾	BK
	3	S4 sin +	BU
	4	S3 cos +	BK
	5	R2 Ref +	YEWH
	6	1TP2 ²⁾	WH
	7	S2 sin –	YE
	8	S1 cos –	RD
	9	R1 Ref –	RDWH
	10		
	11		
	12		

Con. size 23

2) PTC thermistor connection

26.5 Connecting to Bosch Rexroth drive controllers

This section contains information for use when connecting STOBER synchronous servo motors to drive controllers of the third-party manufacturer mentioned above. It differs from the information for connecting to a STOBER drive controller. You can find all the other information you need about STOBER synchronous servo motors in the relevant section of this catalog.

26.5.1 Selectable encoder types

Encoder types with EnDat 2.1 interface available for selection

Encoder type	Type code ¹⁾	Measuring principle	Recordable revolutions ²⁾	Resolution	Position values per revolution	Periods per revolution
ECI 119	C4	inductive	–	19 bits	524288	Sin/cos 32
EQN 1125 FMA ³⁾	M2	Optical	4096	13 bits	8192	Sin/cos 512
EQN 1125	Q4	Optical	4096	13 bits	8192	Sin/cos 512
ECN 1113 FMA ³⁾	M0	Optical	–	13 bits	8192	Sin/cos 512
ECN 1113	C6	Optical	–	13 bits	8192	Sin/cos 512

Encoder types with HYPERFACE interface available for selection

Encoder type	Type code ¹⁾	Measuring principle	Recordable revolutions ²⁾	Resolution	Position values per revolution	Periods per revolution
SKM36	H1	Optical	4096	–	–	Sin/cos 128

1) The complete type designation of the synchronous servo motor can be found in the corresponding section of this catalog.

2) With multiturn version only

3) Version with fault elimination for mechanical mounting (FMA)

26.5.1.1 Possible combinations with drive controllers

The following table shows the possible combinations of STOBER synchronous servo motors with drive controllers depending on the encoder type.

Drive controller	IndraDrive C/Cs/Mi ¹⁾	IndraDrive C/Cs
ID motor connection dialog	442445	442678
Drive controller type code ²⁾	FW ³⁾	GH ⁴⁾
Encoder	Encoder type code ²⁾	
ECI 119	C4	EZHD, EZHP, EZM
EQN 1125 FMA ³⁾	M2	EZ, EZS
EQN 1125	Q4	EZ, EZS
ECN 1113 FMA ³⁾	M0	EZ, EZS
ECN 1113	C6	EZ, EZS
SKM36	H1	–

1) The Indradrive Mi drive controller can only be combined with a synchronous servo motor with encoder SKM 36.

2) The complete type designation of the synchronous servo motor can be found in the corresponding section of this catalog.

3) This drive controller type code applies for connecting to a drive controller with DC link voltage $U_{ZK} = 540$ V.

4) This drive controller type code applies for connecting to a drive controller with DC link voltage $U_{ZK} = 310$ V.

26.5.2 Connection assignment for plug connectors

Instructions

- The connection assignment of synchronous servo motors is designed specifically for the relevant drive controller. Details can be found in the following section and in the motor connection diagram that is delivered with every synchronous servo motor.
- The colors for connection assignments are named according to IEC 60757 and apply only to motor-internal connecting wires.

26.5.2.1 Power connection

Connection diagram	Pin	Connection	Color
<p>Size con.23 (1)</p>	1	1U1 (phase U)	BK
	3	1V1 (phase V)	BU
	4	1W1 (phase W)	RD
	A	1BD1 ¹⁾	
	B	1BD2 ¹⁾	
	C	1TP1 / 1K1 ²⁾	
	D	1TP2 / 1K2 ²⁾	
		Protective conductor	GNYE

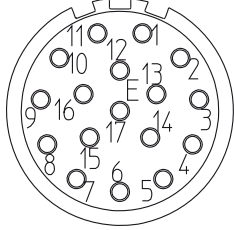
Connection diagram	Pin	Connection	Color
<p>Size con.40 (1.5) Size con.58 (3)</p>	U	1U1 (phase U)	BK
	V	1V1 (phase V)	BU
	W	1W1 (phase W)	RD
	+	1BD1 ¹⁾	
	-	1BD2 ¹⁾	
	1	1TP1 / 1K1 ²⁾	
	2	1TP2 / 1K2 ²⁾	
		Protective conductor	GNYE

1) Motor holding brake connection (1BD1 = 24 V; 1BD2 = 0V)

2) PTC thermistor connection

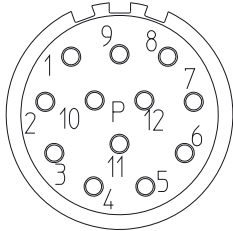
26.5.2.2 Encoder connection

Absolute value encoder EnDat 2.1 with sin/cos incremental signals (only for IndraDrive C/Cs)

Connection diagram	Pin	Signal	Color
	1	Up sense	BU
	2		
	3		
	4	0 V sense	WH
	5		
	6		
	7	Up +	BNGN
	8	Clock +	VT
	9	Clock –	YE
	10	0 V GND	WHGN
	11		
	12	B + (sin +)	BUBK
	13	B – (sin –)	RDBK
	14	Data +	GY
	15	A + (cos +)	GNBK
	16	A – (cos –)	YEBK
	17	Data –	PK

Con. size 23

Absolute value encoder Hiperface

Connection diagram	Pin	Signal	Color
	1	Up 7-12 V	RD
	2	0 V GND	BU
	3	RefSin	BN
	4	RefCos	BK
	5	Data +	GY
	6	Data –	GN
	7	Sin +	WH
	8	Cos +	PK
	9		
	10		
	11		
	12		

Size con.23

26.6 Connecting to Beckhoff drive controllers

This section contains information for use when connecting STOBER synchronous servo motors to drive controllers of the third-party manufacturer mentioned above. It differs from the information for connecting to a STOBER drive controller. You can find all the other information you need about STOBER synchronous servo motors in the relevant section of this catalog.

26.6.1 Selectable encoder types

Encoder types with EnDat 2.1 interface available for selection

Encoder type	Type code ¹⁾	Measuring principle	Recordable revolutions ²⁾	Resolution	Position values per revolution	Periods per revolution
ECI 119	C4	inductive	–	19 bits	524288	Sin/cos 32
EQN 1125 FMA ³⁾	M2	Optical	4096	13 bits	8192	Sin/cos 512
EQN 1125	Q4	Optical	4096	13 bits	8192	Sin/cos 512
ECN 1113 FMA ³⁾	M0	Optical	–	13 bits	8192	Sin/cos 512
ECN 1113	C6	Optical	–	13 bits	8192	Sin/cos 512

1) The complete type designation of the synchronous servo motor can be found in the corresponding section of this catalog.

2) With multiturn version only

3) Version with fault elimination for mechanical mounting (FMA)

26.6.1.1 Possible combinations with drive controllers

The following table shows the possible combinations of STOBER synchronous servo motors with drive controllers depending on the encoder type.

Drive controller	AX5000
ID motor connection dialog	442318
Drive controller type code¹⁾	FM
Encoder	Encoder type code¹⁾
ECI 119	C4
EQN 1125 FMA	M2
EQN 1125	Q4
ECN 1113 FMA	M0
ECN 1113	C6
	EZHD, EZHP, EZM
	EZ, EZS
	EZ, EZS
	EZ, EZS
	EZ, EZS

1) The complete type designation of the synchronous servo motor can be found in the corresponding section of this catalog.

26.6.2 Connection assignment for plug connectors

Instructions

- The connection assignment of synchronous servo motors is designed specifically for the relevant drive controller. Details can be found in the following section and in the motor connection diagram that is delivered with every synchronous servo motor.
- The colors for connection assignments are named according to IEC 60757 and apply only to motor-internal connecting wires.

26.6.2.1 Power connection

Connection diagram	Pin	Designation	Color
<p>Con. size 23 (1)</p>	1	1U1 (phase U)	BK
	3	1W1 (phase W)	RD
	4	1V1 (phase V)	BU
	A	1BD1 ¹⁾	
	B	1BD2 ¹⁾	
	C	1TP1 / 1K1 ²⁾	
	D	1TP2 / 1K2 ²⁾	
	⊕	Protective ground (PE)	GNYE

Connection diagram	Pin	Designation	Color
<p>Con. size 40 (1.5)</p>	R	1U1 (phase U)	BK
	V	1V1 (phase V)	BU
	W	1W1 (phase W)	RD
	+	1BD1 ¹⁾	
	-	1BD2 ¹⁾	
	1	1TP1 / 1K1 ²⁾	
	2	1TP2 / 1K2 ²⁾	
	⊕	Protective ground (PE)	GNYE

- 1) Motor holding brake connection (1BD1 = 24 V; 1BD2 = 0V)
- 2) PTC thermistor connection

26.6.2.2 Encoder connection

Absolute value encoder EnDat 2.1 with sin/cos incremental signals			
Connection diagram	Pin	Signal	Color
<p>Con. size 23</p>	1	B – (sin –)	RDBK
	2	0V GND	WHGN
	3	A – (cos –)	YEBK
	4	Up +	BNGN
	5	Data +	GY
	6		
	7		
	8	Clock +	VT
	9	B + (sin +)	BUBK
	10	0 V sense	WH
	11	A + (cos +)	GNBK
	12	Up sense	BU
	13	Data –	PK
	14		
	15	Clock –	YE
	16		
	17		