

Electronics options · Board/slot preconfiguration[1])

Designation		Order No.	Supplementary order code[6])	Weight, approx. kg (lb)	Dimensions W x H x D mm x mm x mm (in x in x in)
Encoder boards (An encoder board must always be ordered. Exception: *V/f* control)					
SBP	Incremental-encoder evaluation HTL/TTL (Impuls-encoder evaluation)				
	Spare part[2])	**6SE7090–0XX84–0FA0**		0.3 (0.7)	20 x 90 x 95 (0.8 x 3.5 x 3.7)
	Retrofit kit[3])	**6SX7010–0FA00**			
	Plugged into slot A[4])		**C11**		
	Plugged into slot B[4])	**(only for Compact PLUS units!)**	**C12**		
	Plugged into slot C[4])	(motor encoder)	**C13**		
	Plugged into slot D[4])	(only for compact and chassis units)	**C14**		
	Plugged into slot E[4])		**C15**		
	Plugged into slot F[4])		**C16**		
	Plugged into slot G[4])		**C17**		
SBR1	Resolver evaluation without incremental-encoder simulation				
	Spare part[2])	**6SE7090–0XX84–0FB0**		0.3 (0.7)	20 x 90 x 95 (0.8 x 3.5 x 3.7)
	Retrofit kit[3])	**6SX7010–0FB00**			
	Plugged into slot C[4])		**C23**		
SBR2	Resolver evaluation with incremental-encoder simulation				
	Spare part[2])	**6SE7090–0XX84–0FC0**		0.3 (0.7)	20 x 90 x 95 (0.8 x 3.5 x 3.7)
	Retrofit kit[3])	**6SX7010–0FC00**			
	Plugged into slot C[4])		**C33**		
SBM	Absolute-value encoder evaluation/incremental-encoder evaluation sin/cos 1 Vpp (only as spare part for existing systems)				
	Spare part[2])	**6SE7090–0XX84–0FD0**		0.3 (0.7)	20 x 90 x 95 (0.8 x 3.5 x 3.7)
SBM2	Absolute-value encoder evaluation/incremental-encoder evaluation sin/cos 1 Vpp (MC firmware versions ≥ 1.3)				
	Spare part[2])	**6SE7090–0XX84–0FE0**		0.3 (0.7)	20 x 90 x 95 (0.8 x 3.5 x 3.7)
	Retrofit kit[3])	**6SX7010–0FE00**			
	Plugged into slot C[4]) (motor encoder)		**C43**		
	Plugged into slots A, B, D, E, F, G[4]) (machine encoder)		**C41/C42/C44 to C47**		
Expansion boards					
EB1	Expansion board				
	Spare part[2])	**6SE7090–0XX84–0KB0**		0.3 (0.7)	20 x 90 x 95 (0.8 x 3.5 x 3.7)
	Retrofit kit[3])	**6SX7010–0KB00**			
	Plugged into slots A to G[4])		**G61 to G67**		
EB2	Expansion board				
	Spare part[2])	**6SE7090–0XX84–0KC0**		0.3 (0.7)	20 x 90 x 95 (0.8 x 3.5 x 3.7)
	Retrofit kit[3])	**6SX7010–0KC00**			
	Plugged into slots A to G		**G71 to G77**		
Drive coupling (rapid data exchange via fiber-optic cable)					
SLB	for SIMOLINK				
	Spare part[2])	**6SE7090–0XX84–0FJ0**		0.3 (0.7)	20 x 90 x 95 (0.8 x 3.5 x 3.7)
	Retrofit kit[3])[5])	**6SX7010–0FJ00**			
	Plugged into slots A to G[4])[5])		**G41 to G47**		
Communication boards (for slot location, see page 6/60)					
CBP2	for PROFIBUS DP				
	Spare part[2])	**6SE7090–0XX84–0FF5**		0.3 (0.7)	20 x 90 x 95 (0.8 x 3.5 x 3.7)
	Retrofit kit[3])	**6SX7010–0FF05**			
	Plugged into slots A, B, C, E, G		**G91/G92/G93/G95/G97**		
CBC	for CAN				
	Spare part[2])	**6SE7090–0XX84–0FG0**		0.3 (0.7)	20 x 90 x 95 (0.8 x 3.5 x 3.7)
	Retrofit kit[3])	**6SX7010–0FG00**			
	Plugged into slots A, B, C, E, G		**G21/G22/G23/G25/G27**		
CBD	**C**ommunication **B**oard **D**eviceNet for DeviceNet	**6SX7010–0FK00**		0.3 (0.7)	20 x 90 x 95 (0.8 x 3.5 x 3.7)

1) The Compact PLUS units have three slots A, B and C. Compact and chassis units can be expanded to have up to 6 slots, A, C, D, E, F and G. For the various possible configurations, see Page 6/61.

2) Excluding connector, excluding documentation.

3) For retrospective mounting. The retrofit kit usually contains a board, plug-in connector and documentation but not adapter boards or LBA (see Page 3/8).

4) With appropriate connector.

5) With 2 FOC connectors, 1 connector for X470 and 5 m all-plastic FOC (fiber-optic cable).

6) When ordering the board, **"–Z"** and the corresponding code for direct mounting in the corresponding slot must be appended to the converter/inverter order no.

8 SBR1/2 – Sensor Board Resolver (only for MASTERDRIVES Motion Control)

8.1 Description

The SBR optional board (Sensor Board Resolver) enables a resolver to be connected to the converter and inverter modules.

NOTE

The SBR optional board is available in two versions:

- SBR1 Optional board for connecting up a resolver
- SBR2 Optional board for connecting up a resolver with additional pulse encoder simulation

Connectable resolvers

You can connect all standard 2-pole resolvers and resolvers with the pole pair number of the motor to the optional board. Adaptation to the different types of resolvers is effected on the optional board by automatic adjustment of the signal amplitude and the sampling time.

Temperature sensor

As well as a resolver, you can connect a temperature sensor (either a KTY or a PTC sensor) to the optional board for monitoring the motor temperature.

Pulse encoder simulation

As an option, the SBR2 optional board can be equipped with pulse encoder simulation. This provides A+, A-, B+, B-, zero+ and zero- signals according to the standard RS422 which can be picked up via an additional front socket.

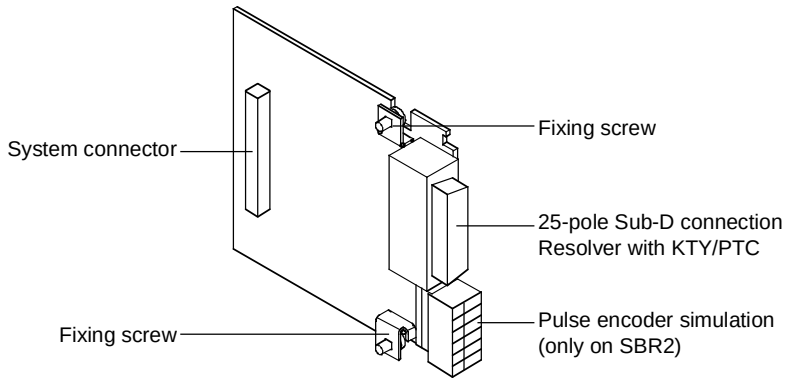


Fig. 8-1 View of the SBR2

Function principle

The position of an exciter coil in the rotor in relation to two stator coils is evaluated in the resolver.

A high-frequency carrier signal (5 to 10 kHz) is injected into the rotor winding of the resolver via a rotary transformer. The high-frequency current flowing in the rotor induces a high-frequency voltage into the two stator coils arranged at right-angles to each other. The amplitude of this voltage depends on the present position of the rotor winding or of the rotor. The envelope curve of the voltage induced into the stator coils is a sine or cosine curve.

On account of the right-angle arrangement of the stator coils, one coil will supply the sine value, and the other coil the cosine value of the present rotor position. Both signals are sensed via A/D transformers.

Subsequently, the unit software calculates the position angle α from these two signals via trigonometry functions.

The change of the position angle α between two sampling times provides the current speed of the motor.

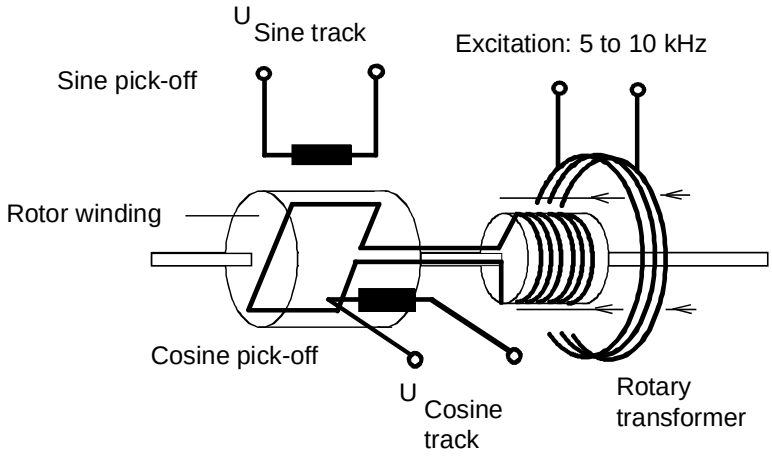


Fig. 8-2 Schematic diagram of a resolver

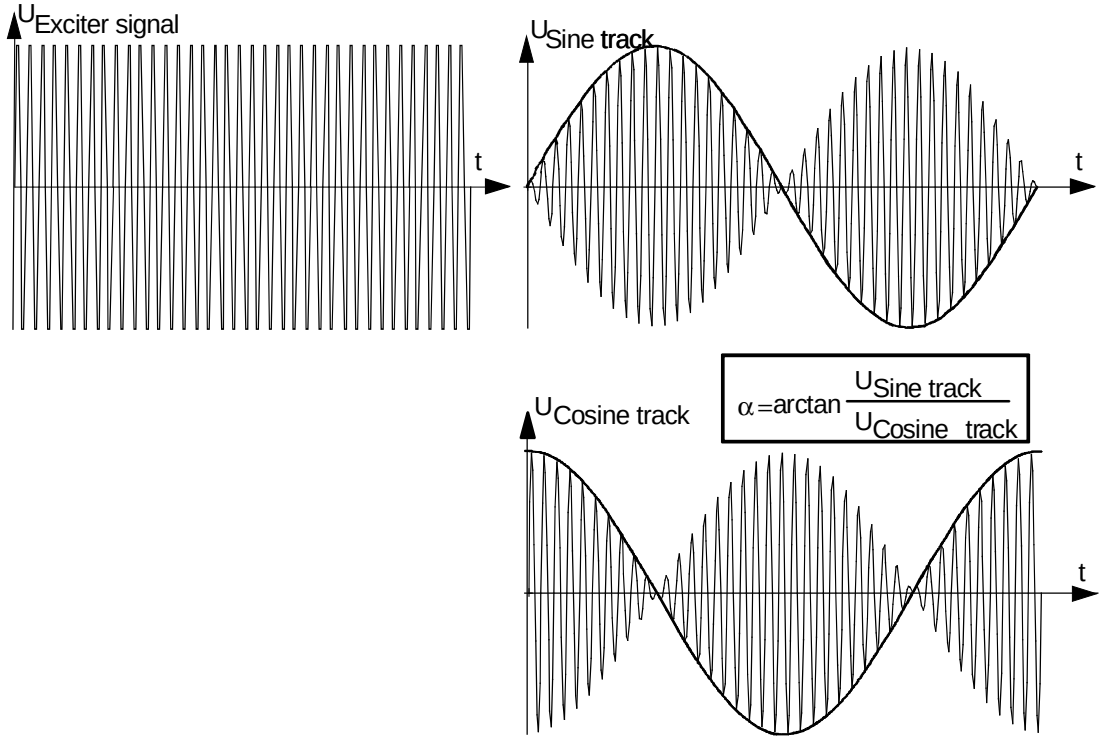


Fig. 8-3 Resolver output signals

Adjustment

Via a PLL control loop, the SBR optional board is capable of setting the phase position of the exciter signal such that the sine or cosine signal induced in the stator windings of the resolver is always sensed at maximum.

At the same time, the amplitude of the exciter signal is adjusted to the maximum resolution of the internal A/D transformer. This enables the position angle of the stator winding to be sensed with the maximum possible accuracy.

8.2 Technical Data

Order numbers	6SE7090-0XX84-0FB0 (SBR1) Resolver evaluation without pulse encoder simulation 6SE7090-0XX84-0FC0 (SBR2) Resolver evaluation with pulse encoder simulation
Size (length x width)	90 mm x 83 mm
Pollution degree	Pollution degree 2 acc. to IEC 664-1 (DIN VDE 0110/T1), moisture condensation is not permissible in operation
Mechanical strength During stationary operation - Deflection - Acceleration During transport - Deflection - Acceleration	Acc. to DIN IEC 68-2-6 (for correctly installed board) 0.15 mm in frequency range 10 Hz to 58 Hz 19.6 m/s² in frequency range > 58 Hz to 500 Hz 3.5 mm in frequency range 5 Hz to 9 Hz 9.8 m/s² in frequency range > 9 Hz to 500 Hz
Climate class	Class 3K3 to DIN IEC 721-3-3 (in operation)
Type of cooling	Natural-air cooling
Permissible ambient or coolant temperature - during operation - during storage - during transport	 0° C to +70° C (32° F to 158° F) -25° C to +70° C (-13° F to 158° F) -25° C to +70° C (-13° F to 158° F)
Permissible humidity rating	Relative air humidity ≤ 95 % during transport and storage ≤ 85 % in operation (condensation not permissible)

Table 8-1 Technical Data

8.3 Installation

If the inverters/converters are ordered with optional functions, the optional boards are already installed in the units when they are delivered.

It is possible to retrofit optional boards and this can be carried out by the user.

For this purpose, there are either three or up to six slots on the basic unit depending on the unit type of construction for mounting the optional boards.

An exact description of installation is included with the relevant basic unit. As the unit has to be removed and opened in order to install optional boards, attention must be paid to the ESD measures. Please refer to the operating instructions of the basic unit in this regard.

NOTE Install the SBRx optional board in slot C. The SBRx optional board does not operate in other slots.

8.4 Connecting-up

Connecting-up

The optional board is provided with the following connections for the signal cables:

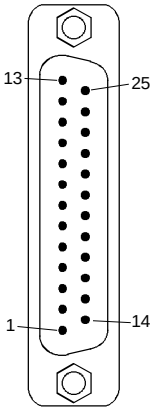
- X414 Encoder connection via a 25-pole SUB D connector
- X410 Pulse encoder simulation via a 6-pole terminal strip (only for SBR2)

Connect the shielded signal cables to the appropriate connection and place the shield on the shield plate.

Encoder connection

Connect the resolver to the optional board by means of the shielded encoder cable. Use the pre-assembled cable for this purpose.

Connection is via a 25-pole SUB D connector on the front side of the optional board.



Pin	Significance	Range
3	Resolver output voltage sin+	
4	Resolver output voltage sin-	
5	Internal shield for 3 and 4	
6	Resolver output voltage cos+	
7	Resolver output voltage cos-	
8	Internal shield for 6 and 7	
9	Resolver excitation U_{SS}	0 V to 7 V automatic adaption, 5...10 kHz sine
11	Ground for resolver excitation	
13	Motor temperature sensing PTC/KTY	
24	Internal shield for 13 and 25	
25	Motor temperature sensing PTC/KTY	
Housing	External shield	

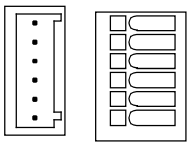
Table 8-2 Pin assignment at connection X414

Pulse encoder simulation (only for SBR2)

At connection X410 you can pick up the signals of the pulse encoder simulation generated on the optional board.

The optional board generates 512 or 1024 pulses alternatively per electrical revolution. In the case of a two-pole resolver the set pulses (512 or 1024) are generated accordingly, in the case of a four-pole resolver 1024 or 2048 pulses are generated, and in the case of a six-pole resolver, 1536 or 3072 pulses are generated per mechanical resolver revolution.

The simulation signals are available as differential signals according to standard RS 422.



Terminal	Designation	Significance	Range
90	A+	Pulse encoder simulation track A+	RS 422-
91	A-	Pulse encoder simulation track A-	standard
92	B+	Pulse encoder simulation track B+	RS 422-
93	B-	Pulse encoder simulation track B-	standard
94	N+	Pulse encoder simulation track zero+	RS 422-
95	N-	Pulse encoder simulation track zero-	standard

Connectable cross-section: 0.5 mm² (AWG 20)

Terminal 90 is at the top when installed.

Table 8-3 Terminal assignment at connection X410

8.5 Start-up

After installation of the SBR optional board has been completed, an automatic self-test is carried out when the basic unit (converter/inverter) is powered up.

NOTE

Please refer to the documentation for the respective basic unit regarding instructions for parameterization using the quick procedure.