

# **Manual**



# **Assembly of Cables**

Cables for Synchronous Servomotors

Edition 12/2011 19301626 / EN





## Contents



## **Contents**

1	Crim	ping Too	ols	4				
	1.1	Crimpin and DF	ng tools for power and brake contacts of CMP., CMD. S motors	4				
		1.1.1	Tools required for cable assembly	4				
		1.1.2	Tools required for mounting/removing the plug connector on the motor end	4				
	1.2	Crimping tools for power and brake contacts of CFM motors						
		1.2.1	Tools required for cable assembly	5				
		1.2.2	Required tools for disassembling the plug connector on the motor end	5				
	1.3	Crimpin	ng tool for encoder system/feedback system	6				
		1.3.1	Tools required for cable assembly	6				
		1.3.2	Tools required for disassembling the plug connector on the motor end	6				
2	CMP	and CM	DV Motors	7				
	2.1	Assemb	bling the plug connectors for resolvers and Hiperface $^{\circledR}$	7				
		2.1.1	Scope of delivery for plug connectors	7				
		2.1.2	Assembly instructions for plug connectors	8				
	2.2	plug connector assembly	10					
		2.2.1	Scope of delivery of power plug connectors SM./SB	10				
		2.2.2	Assembly notes for SM1/SB1 power plug connectors	11				
		2.2.3	Assembly notes for SMB/SBB power plug connectors	13				
3	DFS/	CFM Mo	tors	15				
	3.1	Assemb	bling Plug Connectors for Resolvers and Hiperface <sup>®</sup>	15				
		3.1.1	Scope of delivery for plug connectors	15				
		3.1.2	Assembly instructions for plug connectors	16				
	3.2	Assemb	oling power plug connectors SM11/SB11 (DFS56)	18				
		3.2.1	Scope of delivery of SM11/SB11 power plug connectors	18				
		3.2.2	Assembly notes for SM11/SB11 power plug connectors	19				
	3.3	Assemb	oling power plug connectors SM5./SM6. and SB5./SB6. (CFM).	21				
		3.3.1	Scope of delivery of power plug connectors SM5./SM6./SB5./SB6	21				
		3.3.2	Assembly notes for power plug connectors SM5./SM6./SB5./SB6.	22				



#### **Crimping Tools**

Crimping tools for power and brake contacts of CMP., CMD. and DFS motors

# 1 Crimping Tools

An alternative for purchasing the prefabricated cables from SEW-EURODRIVE for motors with plug connectors is to purchase the required plug connectors and assemble the cables yourself.

In this case, the customers have to wire the plug connectors themselves. For this purpose, SEW-EURODRIVE offers the matching crimping tools to ensure correct connection of cable core and contact. Please quote the required part number in your order.

#### 1.1 Crimping tools for power and brake contacts of CMP., CMD. and DFS motors

#### 1.1.1 Tools required for cable assembly

Туре	SEW part		oss section ss section	Figure
	number	Power	Brake	
	For SM1/SB1 pe			
Crimping tool	0019 2430	_	_	
Positioner	0019 2457	Ø 2 mm 0.35 – 4 mm <sup>2</sup>	_	
Fositioner	0019 2449	_	Ø 1 mm 0.06 – 1 mm <sup>2</sup>	
	For SMB/SBB p	ower connector	•	
Crimping tool	0294 6165	_	_	
Positioner	0325 6065	Ø 1 mm 1.5 – 4 mm <sup>2</sup>	Ø 1 mm 1.5 – 4 mm <sup>2</sup>	
FOSILIONEI	0323 0003	Ø 1 mm 6 – 10 mm <sup>2</sup>	_	
Crimping tool	0019 2430	_	_	
Positioner	0019 2457	_	Ø 2 mm 0.35 – 4 mm <sup>2</sup>	

#### 1.1.2 Tools required for mounting/removing the plug connector on the motor end

Type	SEW part number	Contact cross section		
туре	SEW part number	Power	Brake	
Removal tool	0019 2473	Ø 2 mm	_	
Removal tool	0019 2465	_	Ø 1 mm	
Removal tool, insulator <sup>1)</sup>	0019 2481	-	-	

<sup>1)</sup> The removal tool is only used for removal on the motor end





#### 1.2 Crimping tools for power and brake contacts of CFM motors

#### 1.2.1 Tools required for cable assembly

For the following tool, different crimping jaws are required for assembling/disassembling different cross sections.

Туре	SEW part		oss section ss section	Figure
	number	Power	Brake	
Crimping tool	0019 0705	Ø 3.6 mm	Ø 1.6 mm	
Chiliping tool	0019 0703	0.5 – 6	.0 mm <sup>2</sup>	
Crimping jaws	0019 0861	-	Ø 1.6 mm	
Contact receptacle	0019 087X	-	0.5 – 1.5 mm <sup>2</sup>	
Crimping jaws	0019 0128	Ø 3.6 mm		
Contact receptacle	0019 0144	1.5 – 2.5 mm <sup>2</sup>	_	•
Crimping jaws	0019 0136	Ø 3.6 mm	-	
Contact receptacle	0019 0152	4.0 – 6.0 mm <sup>2</sup>	-	
Crimping tool	0019 0691			
Positioner	0019 0713			
Test probe set	0019 0853	Ø 3.6 mm 1.5 – 10 mm <sup>2</sup>	_	

#### 1.2.2 Required tools for disassembling the plug connector on the motor end

No special tools are required for disassembly.



# **Crimping Tools**

Crimping tool for encoder system/feedback system

## 1.3 Crimping tool for encoder system/feedback system

#### 1.3.1 Tools required for cable assembly

Product	Туре	SEW part number	Contact cross section Core cross section Signal	Figure
RH1M(L) resolver	Crimping tool	0019 2430	_	
Hiperface <sup>®</sup> • AS1H multi-turn  • ES1H single-turn	Positioner	0019 2449	Ø 1 mm 0.06 – 1 mm <sup>2</sup>	
	Crimping tool	0019 2597	-	
SSI multi-turn	Positioner	0019 2600	Ø 1 mm 0.24 – 1 mm <sup>2</sup>	

#### 1.3.2 Tools required for disassembling the plug connector on the motor end

Product	Туре	SEW part number	Contact cross section Core cross section Signal
RH1M(L) resolver Hiperface <sup>®</sup> • AS1H multi-turn  • ES1H single-turn	Removal tool	0019 2481	Insulator
SSI multi-turn No special tools are required for disassembly.			



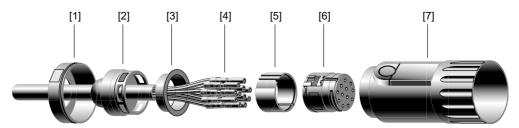


## 2.1 Assembling the plug connectors for resolvers and Hiperface®

#### 2.1.1 Scope of delivery for plug connectors

The following parts are required for assembling the plug connectors for resolvers/  $Hiperface^{\otimes}$  encoders.

SEW part number: 0198 6732.



- [1] Screw fitting
- [2] Seal with strain relief
- [3] Shield ring
- [4] Socket contacts
- [5] Insulating sleeve
- [6] Insulator
- [7] Connector housing

#### **INFORMATION**



Hold the cable firmly in place when tightening the cable and connector.



Assembling the plug connectors for resolvers and Hiperface<sup>®</sup>

#### 2.1.2 Assembly instructions for plug connectors

1	<b>4</b> 11	Pull the screw fitting and seal with strain relief 31 mm over the cable.
2	31 28	Strip 28 mm of cable insulation off the end of the cable
3		Fold back the braided shield and fan it out
4	6	<ul> <li>Strip 6 mm of cable insulation off the leads</li> <li>Push the socket contacts onto the ends of the leads</li> </ul>
5	[A] [B] 019 243 0	<ul> <li>Insert the small-diameter positioning tool (SEW part number 019 0019 2449) into the crimping pliers until the green mark appears in the view window [A].</li> <li>Set the pressing force [B] to 24 on the crimping pliers.</li> </ul>
6		<ul> <li>Insert a lead with socket contact in the crimping pliers and press the pliers fully together. The pliers then open automatically.</li> <li>Repeat this procedure for each lead.</li> </ul>
7		Pull the shield ring over the leads and press the shield against the seal
8		Turn the shield ring until the braided shield is flush with the shield ring.



9		Pull the insulator apart evenly by about 1 mm.
10		Insert the socket contacts into the insulator.
11	"Click"	Press the insulator together until you hear a click.
12		Fold open the insulating sleeve.     Position the side of the insulating sleeve with the recess against the groove in the insulator so that the opening of the insulating sleeve is pointing in the same direction as the double-headed arrow on the insulator.     Press the insulating sleeve together until it engages.     Insert the insulator into the connector housing in the middle position
13	[A]	<ul> <li>Use a wrench to hold the connector housing in place and use a second wrench to tighten the screw fitting</li> <li>[A] = Hold in place</li> </ul>





Power plug connector assembly

#### 2.2 Power plug connector assembly

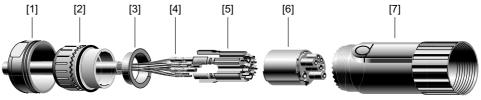
The following two chapters describe how to assemble cables with SM1/SB1 and SMB/SBB connectors.

#### 2.2.1 Scope of delivery of power plug connectors SM. / SB.

The following parts are supplied for assembling the power plug connectors. Refer to the following table for SEW part numbers.

Cable	type	Connector type	Cable cross section	Part number
			mm <sup>2</sup>	Power connector
		SM11	4 x 1.5 mm <sup>2</sup>	0198 6740
		SM12	4 x 2.5 mm <sup>2</sup>	0198 6740
	Motor cables	SM14	4 x 4 mm <sup>2</sup>	0199 1639
	MOIOI Cables	SMB6	4 x 6 mm <sup>2</sup>	1334 9856
		SMB10	4 x 10 mm <sup>2</sup>	1334 9864
Fixed		SMB16	4 x 16 mm <sup>2</sup>	1334 9872
installation		SB11	4 x 1.5 mm <sup>2</sup> + 2 x 1 mm <sup>2</sup>	0198 6740
		SB12	4 x 2.5 mm <sup>2</sup> + 2 x 1 mm <sup>2</sup>	0198 6740
	Brakemotor cable <sup>1)</sup> BP brake	SB14	4 x 4 mm <sup>2</sup> + 2 x 1 mm <sup>2</sup>	0199 1639
		SBB6	4 x 6 mm <sup>2</sup> + 2 x 1.5 mm <sup>2</sup>	1334 9856
		SBB10	4 x 10 mm <sup>2</sup> + 2 x 1.5 mm <sup>2</sup>	1334 9864
		SBB16	4 x 16 mm <sup>2</sup> + 2 x 1.5 mm <sup>2</sup>	1334 9872
		SM11	4 x 1.5 mm <sup>2</sup>	0198 6740
		SM12	4 x 2.5 mm <sup>2</sup>	0198 9197
	Motor cables	SM14	4 x 4 mm <sup>2</sup>	0199 1639
		SMB6	4 x 6 mm <sup>2</sup>	1334 9856
		SMB10	4 x 10 mm <sup>2</sup>	1334 9864
Cable carrier		SMB16	4 x 16 mm <sup>2</sup>	1334 9872
installation		SB11	4 x 1.5 mm <sup>2</sup> + 2 x 1 mm <sup>2</sup>	0198 9197
		SB12	4 x 2.5 mm <sup>2</sup> + 2 x 1 mm <sup>2</sup>	0198 9197
	Brakemotor cable <sup>1)</sup> BP	SB14	4 x 4 mm <sup>2</sup> + 2 x 1 mm <sup>2</sup>	0199 1639
	brake	SBB6	4 x 6 mm <sup>2</sup> + 2 x 1.5 mm <sup>2</sup>	1334 9856
		SBB10	4 x 10 mm <sup>2</sup> + 2 x 1.5 mm <sup>2</sup>	1334 9864
		SBB16	4 x 16 mm <sup>2</sup> + 2 x 1.5 mm <sup>2</sup>	1334 9872

1) BP brake: 3-core cable, only 2 cores are used



- [1] Screw fitting
- [2] Seal with strain relief
- [3] Shield ring
- [4] Socket contacts
- [5] Insulating sleeve
- [6] Insulator
- [7] Connector housing

#### **INFORMATION**



Hold the cable firmly in place when tightening the cable and connector.



#### 2.2.2 Assembly notes for SM1/SB1 power plug connectors

1		• Pull t	he screw fitting and	d the seal with stra	ain relief over the	cable.
2	44 mm	• Strip	44 mm of cable ins	sulation off the end	d of the cable.	
3		• Fold	back the braided s	hield and fan it ou	t.	
4	U,V,W 37mm PE 38 1,2,3, 44mm	<ul> <li>Shor</li> </ul>	ten the power lead: ten the PE lead (Gi ot shorten leads 1,	N/YE) to 38 mm.	nm.	
5	7 mm 7 mm 411 5 mm	<ul> <li>Strip</li> </ul>	he shield over the 7 mm of insulation 5 mm of insulation	off leads U, V, P a	and PÉ.	
6	BU / GN	appe	t the positioning too ars in the view win he pressing force [l	dow [A] (see table	below).	- ' '
	[A] 019 243 0	Litz wire	Litz wire cross section in mm <sup>2</sup>	Positioner part number	Marking (color)	Press force
		1, 2, 3	0.14 – 1.0	0019 2449	Green (GN)	24
	[B]	U, V, W and PE	0.35 - 4.0	0019 2457	Blue (BU)	6
7		fully	t a lead with socke together. The tool t eat this procedure f 6.	hen opens automa	atically.	



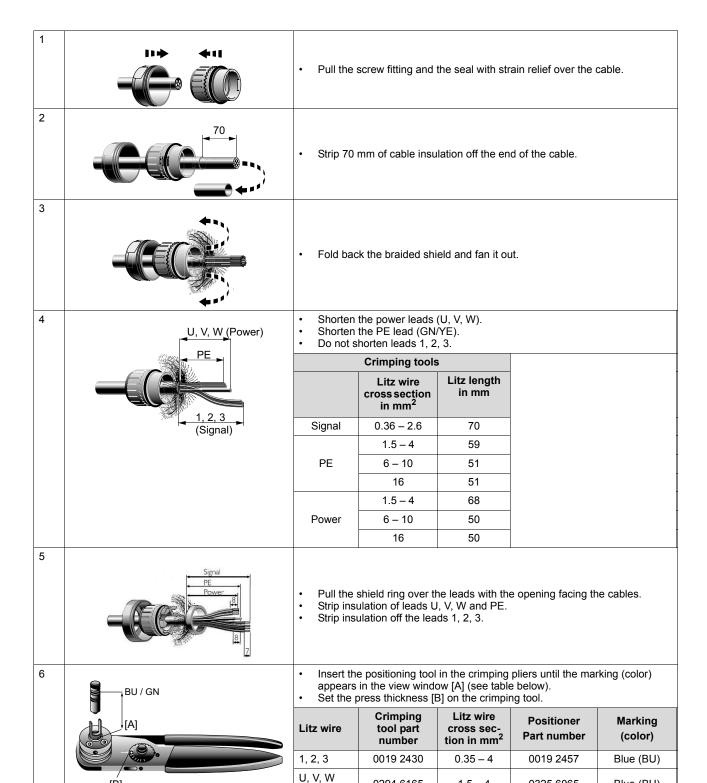
# Power plug connector assembly

8	•	Open the insulating sleeve.
9		Insert the middle socket contact into the insulator according to the wiring diagram.  Close the insulating sleeve until it clicks shut.  Insert the remaining socket contacts into the insulator according to the wiring diagram.
10	•	Shorten the braided shield as shown. Insert the shield ring into the seal so that the shield and end of the cable are flush. Make sure that the braided shield is routed cleanly between the shield ring and the seal.
11		Insert the insulator into the connector housing until the seal rests against its stop in the connector housing.
12	•	Use a wrench to hold the connector housing in place and use a second wrench to tighten the screw fitting.  [A] = Hold in place



Assembly notes for SMB/SBB power plug connectors

2.2.3



0294 6165

0294 6165

and PE

and PE

1.5 - 4

6 - 10



Blue (BU)

Green (GN)

0325 6065

0325 6065

[B]



# Power plug connector assembly

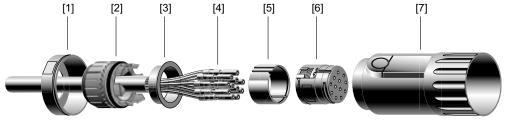
7		•	Insert a lead with socket contact in the crimping tool and press the tool fully together. The tool then opens automatically.  Repeat this procedure for each lead in accordance with the table in step 6.
8			
	position	•	Open the insulating sleeve. Insert the socket contacts into the insulator according to the wiring diagrams. Close the insulating sleeve until it clicks shut.
9		•	Place outer insulating sleeve flush on the inner insulating sleeve. Let the braided shield protrude to the outside between the cable clamping and the shield ring.
10		•	Braided shield must be turned in completely, do not shorten it. Insert the insulator into the connector housing until the seal rests against its stop in the connector housing.
11	M cable ø 9-16mm; 27Nm cable ø 16.5-25mm; 18Nm	•	Use a wrench to hold the connector housing in place and use a second wrench to tighten the screw fitting.  [A] = Hold in place

# 3.1 Assembling Plug Connectors for Resolvers and Hiperface®

#### 3.1.1 Scope of delivery for plug connectors

The following parts are supplied for assembling signal plug connectors.

SEW part number: 0198 6732.



551857419

- [1] Screw fitting
- [2] Cable clamping
- [3] Clamping ring
- [4] Socket contacts
- [5] Insulating sleeve
- [6] Insulator
- [7] Connector housing



Assembling Plug Connectors for Resolvers and Hiperface®

#### 3.1.2 Assembly instructions for plug connectors



#### **NOTICE**

The signal plug connector can be damaged if it is not assembled correctly. Possible damage to property

• Do not twist the cable during assembly.

Step	Illustration	Procedure		
1		Pull the screw fitting and cable clamping with strain relief 31 mm over the cable.		
2	31 28	Strip 28 mm of cable insulation off the end of the cable.		
3		Fold back the braided shield and fan it out.		
4	6	Strip 6 mm insulation off the leads.     Push the socket contacts onto the ends of the leads.		
5	[A] [B] 019 243 0	<ul> <li>Insert the small-diameter positioning tool (SEW part number 019 0019 2449) into the crimping pliers until the green mark appears in the view window [A].</li> <li>Set the pressing force [B] to 24 on the crimping pliers.</li> </ul>		
6		<ul> <li>Insert a lead with socket contact in the crimping tool and press the tool fully together. The tool then opens automatically.</li> <li>Repeat this procedure for each lead.</li> </ul>		
7		Pull the clamping ring over the leads and press the shield against the seal.		

# **DFS/CFM Motors**Assembling Plug Connectors for Resolvers and Hiperface<sup>®</sup>



Step	Illustration	Procedure	
8		<ul> <li>Turn the clamping ring until the braided shield is flush with t shield ring.</li> </ul>	the
9	1	Pull the insulator apart evenly by about 1 mm.	
10		<ul> <li>Insert the socket contacts into the insulator according to the wiring diagrams.</li> </ul>	е
11	"Click"  11	Press the insulator together until you hear a click.	
12		<ul> <li>Fold open the insulating sleeve.</li> <li>Position the side of the insulating sleeve with the recess against the groove in the insulator so that the opening of the insulating sleeve is pointing in the same direction as the double-headed arrow on the insulator.</li> <li>Press the insulating sleeve together until it engages.</li> <li>Insert the insulator into the connector housing in the middle position.</li> </ul>	
13	[A]	<ul> <li>Use a wrench to hold the connector housing in place and u a second wrench to tighten the screw fitting.</li> <li>[A] = Hold in place</li> </ul>	ise



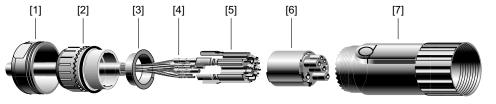
Assembling power plug connectors SM11 / SB11 (DFS56)

#### 3.2 Assembling power plug connectors SM11 / SB11 (DFS56)

#### 3.2.1 Scope of delivery of SM11/SB11 power plug connectors

The following parts are required for assembling the power connectors.

The SEW part number is 0198 6740 or 0198 9197.



480295819

- [1] Screw fitting
- [2] Cable clamping
- [3] Clamping ring
- [4] Socket contacts
- [5] Insulating sleeve
- [6] Insulator
- [7] Connector housing



#### 3.2.2 Assembly notes for SM11/SB11 power plug connectors



#### **NOTICE**

The power connector can be damaged if it is not assembled correctly.

Possible damage to property

· Do not twist the cable during assembly.

Step	Illustration	Procedure				
1		Pull the screw fitting and cable clamping over the cable.			9.	
2	59 mm	Strip 59 mm of cable insulation off the end of the cable.				
3		Fold back the braided shield and fan it out.				
4	1,2,3 (44 mm) PE (45 mm) 5,6 (59 mm)	<ul><li>Shorten the</li><li>Do not sho</li></ul>	e PE lead (GN rten lead pair	(1, 2 and 3) to 4 NYE) to 45 mm. 5 and 6. flush with the en		
5	7 mm 7 mm 5 mm	<ul> <li>Pull the clamping ring over the leads.</li> <li>Strip 7 mm of insulation off leads 1, 2, 3 and PE.</li> <li>Strip 5 mm of insulation of leads 5 and 6.</li> </ul>				
6	BU / GN 019 243 0	<ul> <li>Insert the positioning tool in the crimping pliers until the marking (color) appears in the view window [A] (see table below).</li> <li>Set the pressing force [B] on the crimping pliers according to the table.</li> </ul>				
	[B]	Litz wire	Ø in mm²	Positioner Part number	Marking (color)	Press force
	آما	5 and 6	0.14 – 1.0	0019 2449	Green (GN)	24
		1, 2, 3 and PE	0.35 - 4.0	0019 2457	Blue (BU)	6



Assembling power plug connectors SM11 / SB11 (DFS56)

Step	Illustration	Procedure		
7		<ul> <li>Insert a lead with socket contact in the crimping tool and press the tool fully together. The tool then opens automatically.</li> <li>Repeat this procedure for each lead in accordance with the table in step 6.</li> </ul>		
8		Open the insulating sleeve.		
9		<ul> <li>Insert the middle socket contact into the insulator according to the wiring diagram.</li> <li>Close the insulating sleeve until it clicks shut.</li> <li>Insert the remaining socket contacts into the insulator according to the wiring diagram.</li> </ul>		
10		Shorten the braided shield as shown.     Insert the shield ring into the seal so that the shield and end of the cable are flush. Make sure that the braided shield is routed cleanly between the shield ring and the seal.		
11		Insert the insulator into the connector housing until the seal rests against its stop in the connector housing.		
12		<ul> <li>Use a wrench to hold the connector housing in place and use a second wrench to tighten the screw fitting.</li> <li>[A] = Hold in place</li> </ul>		



#### 3.3 Assembling power plug connectors SM5. / SM6. and SB5. / SB6. (CFM)

#### 3.3.1 Scope of delivery of power plug connectors SM5. / SM6. / SB5. / SB6.

Туре	Cross sections	Part no.
SM51 / SM61	4 x 1.5 mm <sup>2</sup>	0199 1353
SM52 / SM62	4 x 2.5 mm <sup>2</sup>	0199 1361
SM54 / SM64	4 x 4 mm <sup>2</sup>	0199 137X
SM56 / SM66	4 x 6 mm <sup>2</sup>	0199 1388
SM59 / SM69	4 x 10 mm <sup>2</sup>	0199 1396

Туре	Cross sections	Part no.
SB51 / SB61	$4 \times 1.5 \text{ mm}^2 + 3 \times 1.0 \text{ mm}^2$	0199 1426
SB52 / SB62	$4 \times 2.5 \text{ mm}^2 + 3 \times 1.0 \text{ mm}^2$	0199 1434
SB54 / SB64	$4 \times 4 \text{ mm}^2 + 3 \times 1.0 \text{ mm}^2$	0199 1442
SB56 / SB66	$4 \times 6 \text{ mm}^2 + 3 \times 1.5 \text{ mm}^2$	0199 1450
SB59 / SB69	$4 \times 10 \text{ mm}^2 + 3 \times 1.5 \text{ mm}^2$	0199 1469



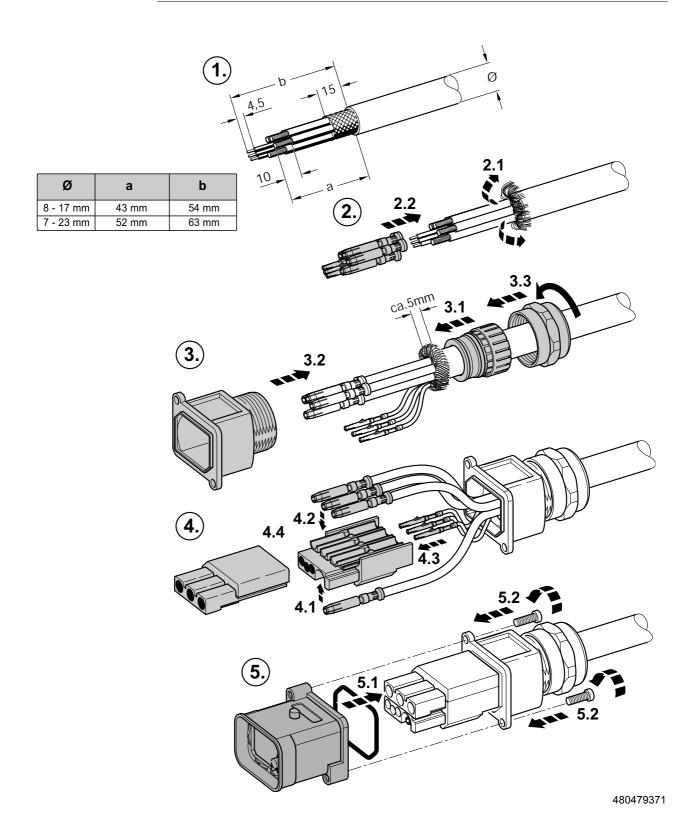
Assembling power plug connectors SM5. / SM6. and SB5. / SB6. (CFM)

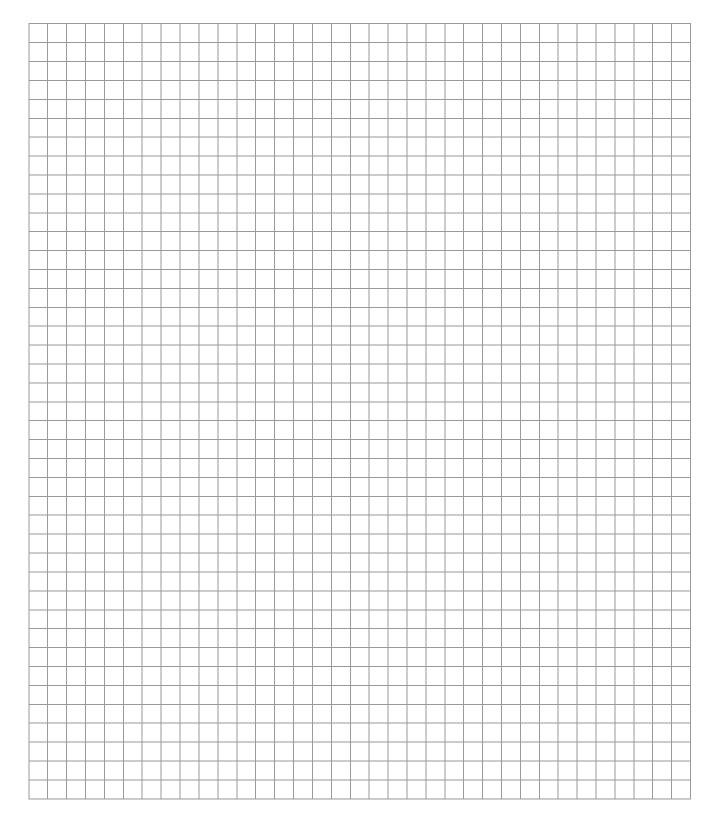
#### 3.3.2 Assembly notes for power plug connectors SM5. / SM6. / SB5. / SB6.

#### **INFORMATION**

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For SM5. / SM6., step 4.3 is not necessary









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