

Connectors for robot tool changers

Dockingline | Connectors for Automatic Systems



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Explanation of symbols



The assembly instruction MA000 is available for this product



Surface Ag



Surface Au

The concept

Stäubli FL3 plug connectors are designed for use in automatic tool changers.

Principal characteristics:

- Low profile construction
- Small dimensions
- Uniform housing standard
- Rapid changing of contact inserts
- Wide range of applications



HTC 300



FL3-High Power and FL3-BUS are extremely service friendly due to the rapid contact carrier changing system.



HIGH POWER

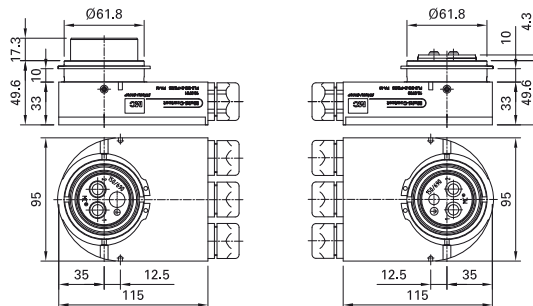
FL3...2+PE-RF-ECO

Connectors for welding current supply

Quick disconnect solution for minimized downtime and maintenance costs.

- Unequalled contact reliability thanks to the Stäubli MULTILAM contact element technology
- Fast integration and easy maintenance
- Compact design with superior performance
- First mate/last break PE-contact for additional safety
- High current-carrying capacity
- Ideal in combination with single-core conductors

FL3-BG-2+PE-RF-ECO



FL3-SG-2+PE-RF-ECO



Order No.	Type	Conductor cross section		Number of poles	Nominal-Ø contact	Surface	Cable gland
		mm ²	AWG			Ag	M20
18.0713	FL3-SG-2+PE-RF-ECO	25/35/38	4/2	2+PE	8		x
18.0712	FL3-BG-2+PE-RF-ECO	25/35/38	4/2	2+PE	8		x

Electrical data

Number of poles	2 + PE
Rated current ¹⁾	135 A (25 mm ² / 4 AWG) 150 A (35/38 mm ²)
Rated voltage	690 V AC / CAT III
Insulation coordination	6 kV/3
Pollution degree	3
Protection, in mated condition	IP65
Type of termination	Plug-in
Shielding	No

Mechanical data

For plate spacing	12,5 ^{+1/0} mm
For plate thickness	10,0 ^{0/-0,1} mm

General data

Material housing	PA
Material contact carrier	NBR
Operating temperature	+10 °C...+40 °C
Storage temperature	-40 °C...+80 °C
Mating cycles	> 500,000 (without load)
Rapid change system	Yes

¹⁾ Derating diagrams see page 13



Assembly instructions MA307

www.staubli.com/electrical

Compatible with RobiFix primary circuit connector

Step 1:

(example with existing robot dresspack)

The assembled cables are extracted from the RobiFix by hand...



Step 2:

... and inserted directly into the FL3-...-RF-ECO and automatically locked.



Contact pieces with plug termination

Order No.	Type	for conductor cross sections		Designation
		mm ²	AWG	
30.0100	BP8/25	25	–	Socket
30.0113	BP8/4AWG	–	4	Socket
30.0101	BP8/35	35	2	Socket
30.0112	BP8/38	38	–	Socket

Spare parts

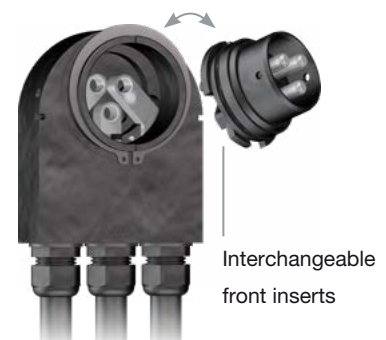
Front inserts for pin and socket housings

Order No.	Type	Designation
18.6900	FL3-VT-2+PE-SD8 PA	Male housing front part
18.6901	FL3-VT-2+PE-BS8 PA	Female housing front part

Note:

Special tools for replacement of the housing front parts see page 15.

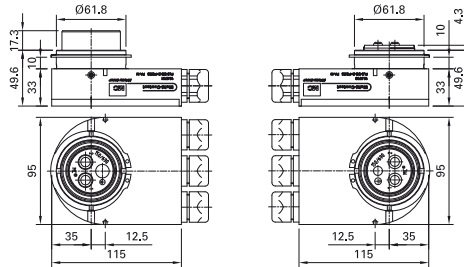
Service friendly thanks to the rapid changing system



FL3...2+PE...

Connectors for welding current transfer

FL3-BG-2+PE...



FL3-SG-2+PE...



Order No.	Type	Conductor cross section		Number of poles	Nominal-Ø contact	Surface	Cable gland	
		mm ²	AWG				M20	PG16 ¹⁾
18.0700	FL3-SG-2+PE/25 PA-M	25	4	2+PE	8		x	
18.0701	FL3-BG-2+PE/25 PA-M	25	4	2+PE	8		x	
18.0702	FL3-SG-2+PE/35 PA-M	35	~2	2+PE	8		x	
18.0703	FL3-BG-2+PE/35 PA-M	35	~2	2+PE	8		x	
18.0900	FL3-SG-2+PE/25 PA	25	4	2+PE	8			x
18.0901	FL3-BG-2+PE/25 PA	25	4	2+PE	8			x
18.0902	FL3-SG-2+PE/35 PA	35	~2	2+PE	8			x
18.0903	FL3-BG-2+PE/35 PA	35	~2	2+PE	8			x

Electrical data	
Number of poles	2 + PE
Rated current	135 A (25 mm ² / 4 AWG) 150 A (35/38 mm ²)
Rated voltage	690 V AC / CAT III
Insulation coordination	6 kV/3
Pollution degree	3
Protection, in mated condition	IP65
Type of termination	Crimping
Shielding	No

Mechanical data	
For plate spacing	12,5 ^{+1/0} mm
For plate thickness	10,0 ^{0/-0,1} mm

General data	
Material housing	PA
Material contact carrier	NBR
Material contact	CuZn
Operating temperature	+10 °C...+40 °C
Storage temperature	-40 °C...+80 °C
Mating cycles	> 500,000 (without load)
Rapid change system	Yes

¹⁾ Not supplied



Assembly instructions MA220

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Spare parts

Front parts for pin and socket housings FL3...2+PE

Order No.	Type	Designation	suitable for	Page	
18.6900	FL3-VT-2+PE-SD8 PA	Male housing front part	FL3-SG-2+PE...	6	
18.6901	FL3-VT-2+PE-BS8 PA	Female housing front part	FL3-BG-2+PE...	6	

Note:

Special tools for replacement of the housing front parts see page 15.

Contact pieces with crimp termination



Pluggable contact piece with crimp termination



Contact pieces left, straight, right (plugged)

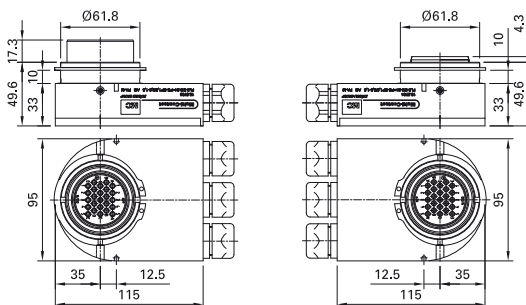
Order No.	Type	for conductor cross sections		Designation	
		mm ²	AWG		
18.8084	FL3-KP8R/25	25	~4	Contact piece right	
18.8082	FL3-KP8/25	25	~4	Contact piece straight	
18.8083	FL3-KP8L/25	25	~4	Contact piece left	
18.8087	FL3-KP8R/35	35	~2	Contact piece right	
18.8085	FL3-KP8/35	35	~2	Contact piece straight	
18.8086	FL3-KP8L/35	35	~2	Contact piece left	

SIGNAL

FL3...24+PE...

Connectors for signal current transfer

FL3-BG-24+PE...



FL3-SG-24+PE...



Order No.	Type	Conductor cross section		Number of poles	Nominal-Ø contact	Surface	Cable gland	
		mm ²	AWG				M20	PG16 ¹⁾
18.0704	FL3-SG-24+PE-SP1,5/0,5-1,5 AG PA-M	0.5 – 1.5	20 – 16	24+PE	1.5		x	
18.0705	FL3-BG-24+PE-BP1,5/0,5-1,5 AG PA-M	0.5 – 1.5	20 – 16	24+PE	1.5		x	
18.0706	FL3-SG-24+PE-SP1,5/0,5-1,5 AU PA-M	0.5 – 1.5	20 – 16	24+PE	1.5		x	
18.0707	FL3-BG-24+PE-BP1,5/0,5-1,5 AU PA-M	0.5 – 1.5	20 – 16	24+PE	1.5		x	
18.0904	FL3-SG-24+PE-SP1,5/0,5-1,5 AG PA	0.5 – 1.5	20 – 16	24+PE	1.5			x
18.0905	FL3-BG-24+PE-BP1,5/0,5-1,5 AG PA	0.5 – 1.5	20 – 16	24+PE	1.5			x
18.0906	FL3-SG-24+PE-SP1,5/0,5-1,5 AU PA	0.5 – 1.5	20 – 16	24+PE	1.5			x
18.0907	FL3-BG-24+PE-BP1,5/0,5-1,5 AU PA	0.5 – 1.5	20 – 16	24+PE	1.5			x

Electrical data

Rated current	16 A
Rated voltage	250 V AC / CAT III
Insulation coordination	4 kV/3
Pollution degree	3
Protection, in mated condition	IP65
Type of termination	Crimping
Shielding	No

Mechanical data

For plate spacing	12,5 ^{+1/0} mm
For plate thickness	10,0 ^{0/-0,1} mm

General data

Material housing	PA
Material contact carrier	NBR
Material contact	CuZn
Operating temperature	+10 °C...+40 °C
Storage temperature	-40 °C...+80 °C
Mating cycles	> 1,000,000 (without load)
Rapid change system	No

¹⁾ Not supplied



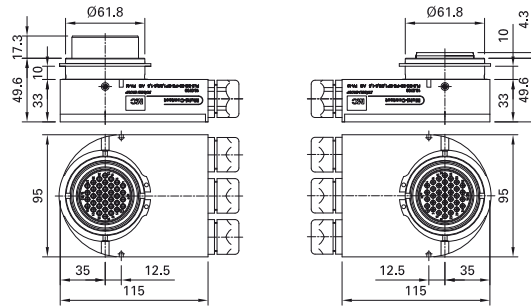
Assembly instructions MA221

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FL3...36+PE...

Connectors for signal current transfer

FL3-BG-36+PE...



FL3-SG-36+PE...



Order No.	Type	Conductor cross section		Number of poles	Nominal-Ø contact	Surface	Cable gland	
		mm ²	AWG				M20	PG16 ¹⁾
18.0708	FL3-SG-36+PE-SP1,5/0,5-1,5 AG PA-M	0.5 – 1.5	20 – 16	36+PE	1.5		x	
18.0709	FL3-BG-36+PE-BP1,5/0,5-1,5 AG PA-M	0.5 – 1.5	20 – 16	36+PE	1.5		x	
18.0710	FL3-SG-36+PE-SP1,5/0,5-1,5 AU PA-M	0.5 – 1.5	20 – 16	36+PE	1.5		x	
18.0711	FL3-BG-36+PE-BP1,5/0,5-1,5 AU PA-M	0.5 – 1.5	20 – 16	36+PE	1.5		x	
18.0908	FL3-SG-36+PE-SP1,5/0,5-1,5 AG PA	0.5 – 1.5	20 – 16	36+PE	1.5			x
18.0909	FL3-BG-36+PE-BP1,5/0,5-1,5 AG PA	0.5 – 1.5	20 – 16	36+PE	1.5			x
18.0910	FL3-SG-36+PE-SP1,5/0,5-1,5 AU PA	0.5 – 1.5	20 – 16	36+PE	1.5			x
18.0911	FL3-BG-36+PE-BP1,5/0,5-1,5 AU PA	0.5 – 1.5	20 – 16	36+PE	1.5			x

Electrical data

Rated current	16 A
Rated voltage	250 V AC / CAT III
Insulation coordination	4 kV/3
Pollution degree	3
Protection, in mated condition	IP65
Type of termination	Crimping
Shielding	No

Mechanical data

For plate spacing	12,5 ^{+1/0} mm
For plate thickness	10,0 ^{0/-0,1} mm

General data

Material housing	PA
Material contact carrier	NBR
Material contact	CuZn
Operating temperature	+10 °C...+40 °C
Storage temperature	-40 °C...+80 °C
Mating cycles	> 1,000,000 (without load)
Rapid change system	No

¹⁾ Not supplied



Assembly instructions MA221

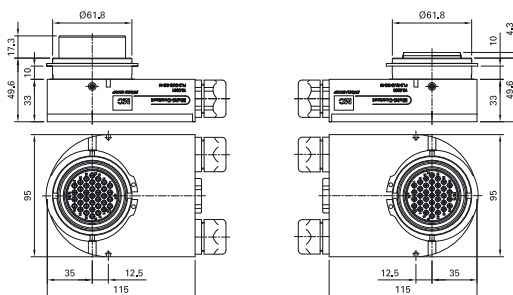
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BUS

FL3...BUS...

Connectors for data transfer in the BUS system

FL3...BUS-BG...



FL3...BUS-SG...



Order No.	Type	Conductor cross section		Number of poles	Nominal-Ø contact	Surface	Cable gland		2 x 94 cm cable + 2 connectors M23	
		mm ²	AWG				M20	PG16 ¹⁾	with	without
18.0930	FL3-BUS-SG-M	0.5 – 1.5	20 – 16	19+2PE	1.5		x			x
18.0931	FL3-BUS-BG-M	0.5 – 1.5	20 – 16	19+2PE	1.5		x			x
18.0920	FL3-BUS-SG	0.5 – 1.5	20 – 16	19+2PE	1.5			x		x
18.0921	FL3-BUS-BG	0.5 – 1.5	20 – 16	19+2PE	1.5			x		x

Electrical data

Rated voltage	33 V AC / 70 V DC
Insulation coordination	4 kV/3
Pollution degree	3
Protection, in mated condition	IP65
Type of termination	Screw connection on PCB
Shielding	Yes

Mechanical data

For plate spacing	12,5 ^{+1/0} mm
For plate thickness	10,0 ^{0/-0,1} mm

General data

Material housing	PA
Material contact carrier	NBR
Operating temperature	+10 °C...+35 °C
Storage temperature	-40 °C...+80 °C
Mating cycles	> 1,000,000 (without load)
Rapid change system	Yes

¹⁾ Not supplied

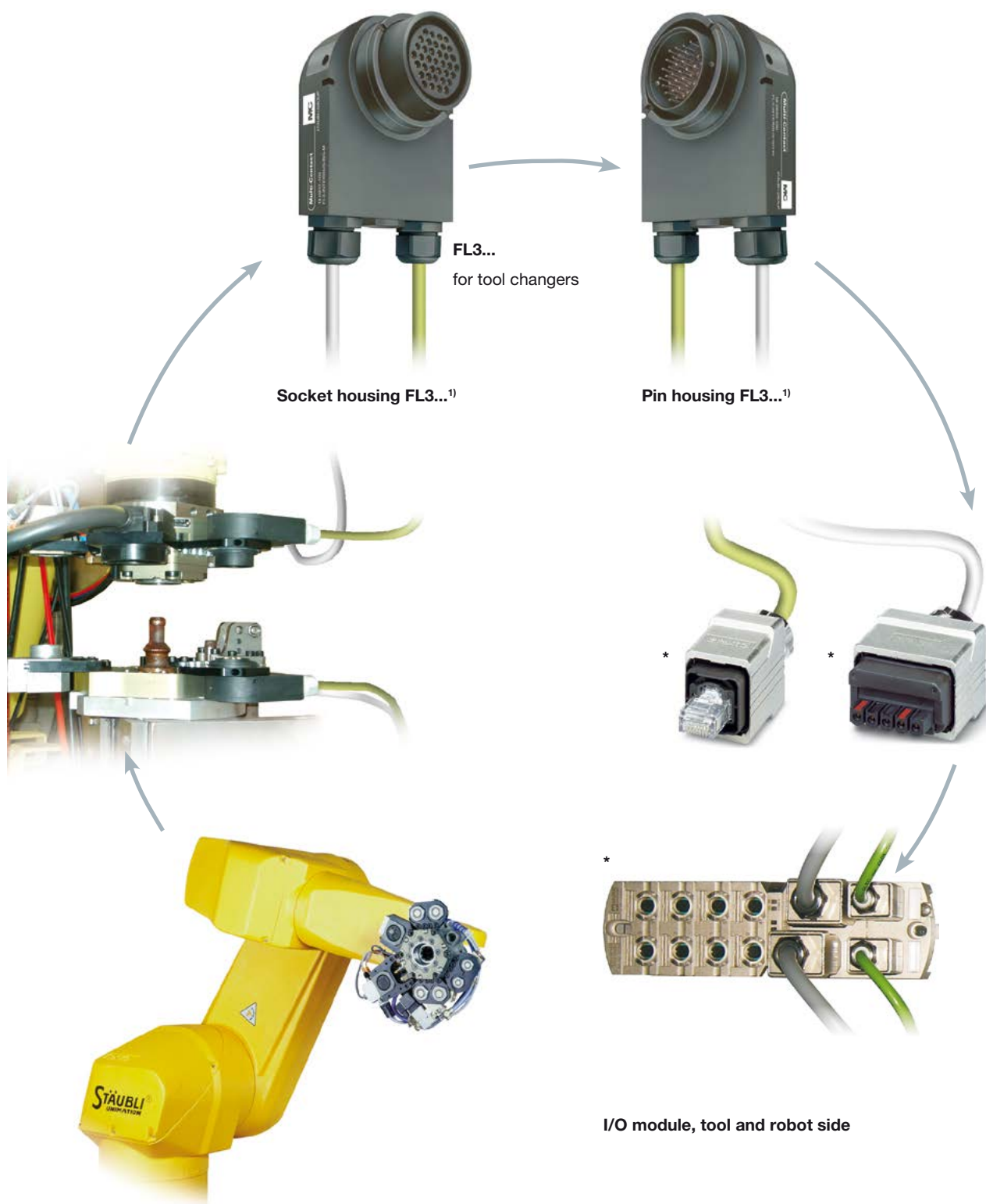


Assembly instructions MA235

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BUS signal transmission in Cu technology

Combinable with Rugged line and Profinet with RJ45 (Variosub)



¹⁾ Please observe the respective BUS-specifications

* Not supplied by Stäubli

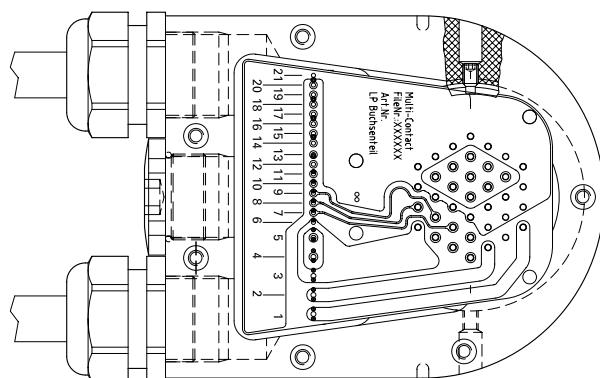
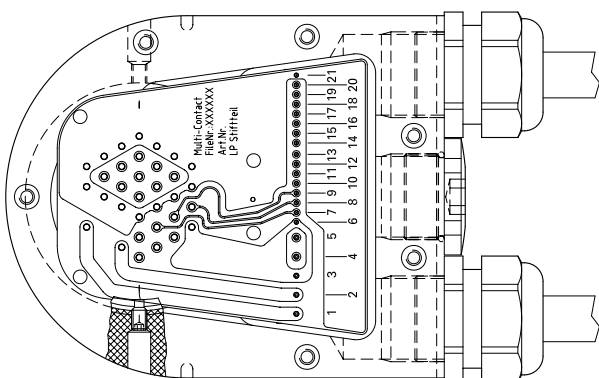
Connection assignment plan for FL3-BUS...

The contact possibilities are shown in the assignment plan. In addition to the BUS and shielding contacts, further 9 vacant

contacts are provided in the connector e.g. for secondary circuit monitoring or constant current regulation etc. Tested for immunity to

electrical noise, according to EN 50082-1/2 and emissions to EN 50081-1/2. Technical design according to IEC, EN 61984.

Clamp No.	Contact chamber No.	Interbus Cu	Profibus Cu	Ethernet / Profinet	Fire Wire	Rated current
						A
1	34	+24V Aktor	+24V Aktor	+24V US2	L ¹⁾	16
2	23	GND Aktor	GND Aktor	GND US2	L ¹⁾	16
3	PE	PE	PE	PE	PE	16
4	10	+24V Sensor	+24V Sensor	+24V US1	+12V US1	10
5	5	GND Sensor	GND Sensor	GND US1	GND US1	10
6	PE	PE	PE	PE	PE	10
7	11	L ¹⁾	L ¹⁾	L ¹⁾	L ¹⁾	1
8	2	L ¹⁾	L ¹⁾	L ¹⁾	L ¹⁾	1
9	6	L ¹⁾	L ¹⁾	L ¹⁾	L ¹⁾	1
10	17	L ¹⁾	L ¹⁾	L ¹⁾	L ¹⁾	1
11	16	L ¹⁾	L ¹⁾	L ¹⁾	L ¹⁾	1
12	19	L/S ²⁾ (SKÜ 1)	L/S ²⁾	L/S ²⁾	⁴⁾	1
13	13	L/S ²⁾ (SKÜ 2)	L/S ²⁾	L/S ²⁾	L/S ²⁾	1
14	8	L/S ²⁾ (KSR 1)	+5V	Rx-	TPA	1
15	14	L/S ²⁾ (KSR 2)	Line A	Rx+	TPAx	1
16	20	D0	L/S ²⁾	L/S ²⁾	(Power)	1
17	21	/D0	L/S ²⁾	L/S ²⁾	(Ground)	1
18	27	DI	Line B	Tx-	TPB	1
19	26	/DI	L/S ²⁾	Tx+	TPBx	1
20	32	COM	GND	L/S ²⁾	L/S ²⁾	1
21	18/12/7/4/9/ 15/22/28/33/ 37/3/25/31/36	³⁾	³⁾	³⁾	⁵⁾	1



¹⁾ L = Vacant

²⁾ L/S = Vacant (shielded)

³⁾ Shield (if required, connect with PE contact)

⁴⁾ 2 pairs of shields

⁵⁾ Fully shielded

Spare parts

For FL3...24+PE... and FL3...36+PE...

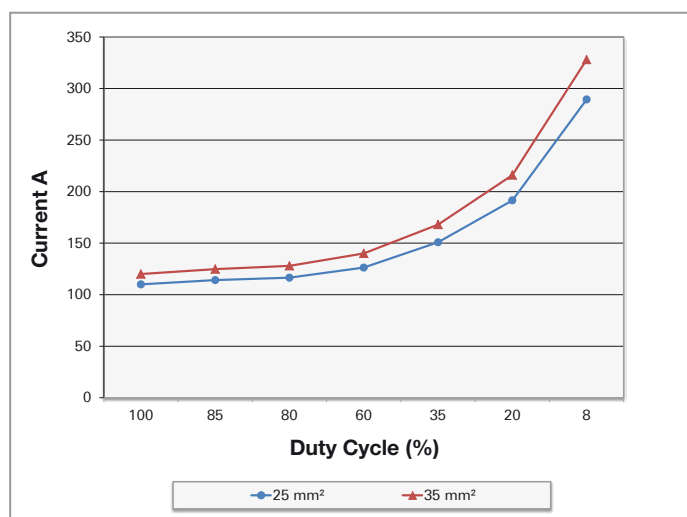
Order No.	Type	Designation	Contact material	suitable for	
18.9004	SP1,5/0,5-1,5	Pin	CuZn, Ag	FL3-SG-24+PE...	
18.8004	BP1,5/0,5-1,5	Sockets	CuZn, Ag	FL3-BG-24+PE...	
18.9005	SP1,5/0,5-1,5 AU	Pin	CuZn, Au	FL3-SG-24+PE... FL3-SG-36+PE...	
18.8005	BP1,5/0,5-1,5 AU	Sockets	CuZn, Au	FL3-BG-24+PE... FL3-BG-36+PE...	

For FL3-BUS

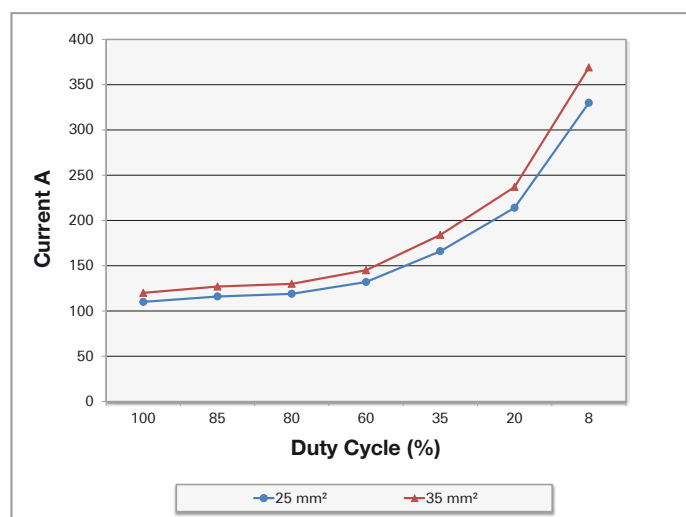
Order No.	Type	Designation	suitable for	Page	
18.6920	FL3-BUS-VT-36+PE-S	Pin housing front part	FL3-BUS	10 – 12	
18.6921	FL3-BUS-VT-36+PE-B	Socket housing front part	FL3-BUS	10 – 12	

Derating diagrams

Current at duty cycle, time cycle basis 10 Min
FL3...2+PE..., FL3-...2+PE-RF-ECO



Current at duty cycle, time cycle basis 5 Min
FL3...2+PE..., FL3-...2+PE-RF-ECO



ASSEMBLY TOOLS

Crimping pliers

For assembly of leads between 0.5 mm² to 2.5 mm² Stäubli recommends crimping pliers M-CZ. For leads of 25 mm² and 35 mm² we recommend either crimping pliers

M-PZ13 (small volumes) or our assembly case (CZK2-...) for series assembly.

Order No.	Type	Conductor cross section		Designation	
		mm ²	AWG		

For power contacts

18.3111	CZK2-230	25 / 35	4 / 2	Crimping tool case (Battery charger 230 V AC) see Flyer „Crimping tool case CZK2“	MA306
18.3112	CZK2-110			Crimping tool case (Battery charger 110/120 V AC) see Flyer „Crimping tool case CZK2“	
18.3700	M-PZ13	–	–	Manual crimping tool	MA224
18.3704	MES-PZ-TB11/25	25	4	Crimping die for M-PZ13	–
18.3705	MES-PZ-TB13/35	35	2	Crimping die for M-PZ13	–

For signal contacts

18.3800	M-CZ	–	–	Manual crimping tool	MA085
18.3802	MES-CZ1,5/2	0.5 – 1.5	20 – 16	Locator to M-CZ	–

Insertion tool/Extraction tools

Specific insertion tools are required to insert the pins or sockets in the contact carriers.

Specific extraction tools are required for removing the pins or sockets as well.

Order No.	Type	Tool	Nominal-Ø contact	Designation	
			mm		
18.3003	ME-WZ1,5/2		1.5	Insertion tool	MA221
18.3005	MSA-WZ1,5		1.5	Extraction tool (pin)	
18.3004	MBA-WZ1,5		1.5	Extraction tool (socket)	

ACCESSORIES

Blind plugs

Vacant contact cavities must be fitted with blind plugs in order to ensure longitudinal watertightness and mechanical stability.

Order No.	Type	Nominal-Ø contact	Color
		mm	
18.5500	MVS-1,5/2	1.5	blue

SPECIAL TOOL

Special tool

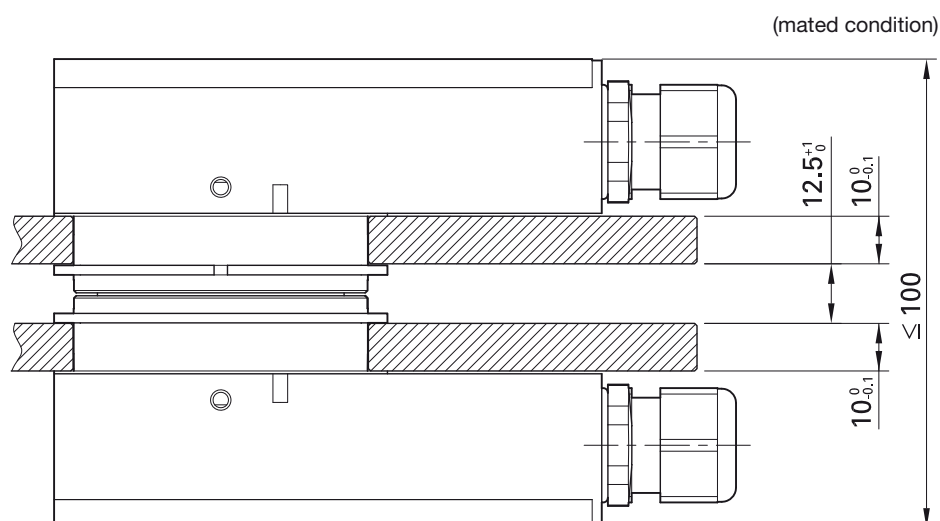
For replacement of the housing front parts

Order No.	Type	Designation	required for
18.0947	FL3-MSR BS	Support ring	FL3...2+PE..., FL3-BUS FL3...6+PE
18.0948	FL3-M-RG	Assembly ring	FL3...2+PE..., FL3...24+PE..., FL3...36+PE..., FL3-BUS FL3...6+PE
18.0946	FL3-WZ	Extracting tool	FL3...2+PE..., FL3-BUS FL3...6+PE

INSTALLATION CONDITIONS

Installation in tool-changer

For further details, please refer to the corresponding assembly instructions.





■ Stäubli Units ○ Agents

Global presence of the Stäubli Group

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