



MODERSOHN[®]
Stainless Steel

With us you create lasting connections
since 1970
www.modersohn.eu

MOSO[®] precast fixings for concrete facades

Panel hanger:
FB-H



Parapet anchor:
FB-E



Restraint anchor:
FB-DS, FB-DZA



Serrated restraint anchor:
FB-ZH, FB-ZW, FB-ZK



Dowel connection:
FB-VD



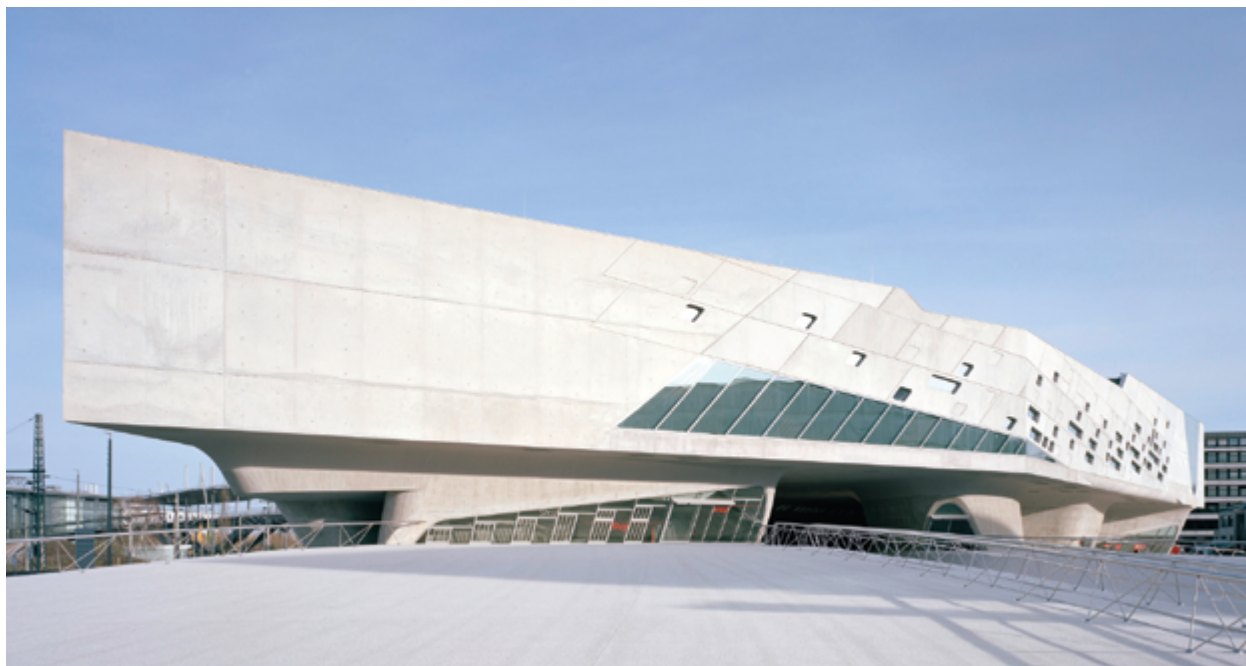
Gallow anchor:
FB-G



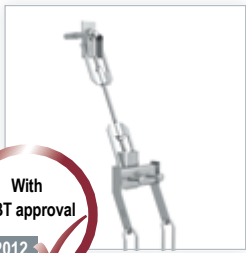


LEAN DUPLEX STAINLESS STEEL
The better alternative



Products



▲ phæno in Wolfsburg, photographer: Klemens Ortmeyer

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Delivery service for standard and special anchors for concrete

More than 50 years of experience for modern, sustainable and absolutely safe facade fixings!

The Modersohn company has been planning and supplying heavy-duty fixings for concrete components, especially for precast facades and balconies, for more than 50 years.

Practical and technically well thought-out fastening solutions are our daily business.

With the newly developed MOSO® support and anchoring systems made of standard or lean duplex steel, which also allow thermal decoupling with our approved load-bearing insulation material "MOSOTherm", you get the optimum solution for every requirement and application.

Whether inexpensive materials for larger series components or high-strength and particularly corrosion-resistant materials for special applications, Modersohn has the manufacturer's proof and general building authority approvals for most requirements.

Many of these special materials and standard articles are also kept in stock, so that short-term delivery dates can easily be realized.

Please also visit our homepage: www.modersohn.eu

Yours sincerely,



Wilhelm Modersohn

Additional concrete anchors in our product range for which our construction engineers can provide verifiable static measurements, depending on the requirements:

- **Bearing and restraining anchor for prefabricated elements**
Especially facade anchoring constructions for prefabricated wall coverings, balcony fixings (e.g. panel hangers, parapet anchors, screw-on and supporting constructions) or serrated restraint anchors, as well as pressure supports
- **Rebar reinforcing elements**
Including cut-to-size parts and special constructions made from approved high-yield steels, now also available in tool steel 1.4486 as an alternative to V4A !
- **Parapet and covering channels, e.g. FUG 6 for sealing materials and joints**
delivered with matching dowels
- **Edge protection profiles and edge protection frames**
with flat or high-yield steel or anchor bolts, e.g. our MOSO® stair tread profiles with slotted tread edge
- **Recess units and pipe penetrations**
- **Heavy-duty dowel systems**
as supporting partners of well-known dowel manufacturers
- **Elastomer compensating bearings with and without approval**
- **Lifting and transport anchor systems**
- **Centring systems for precast columns**



▲ Modersohn company building



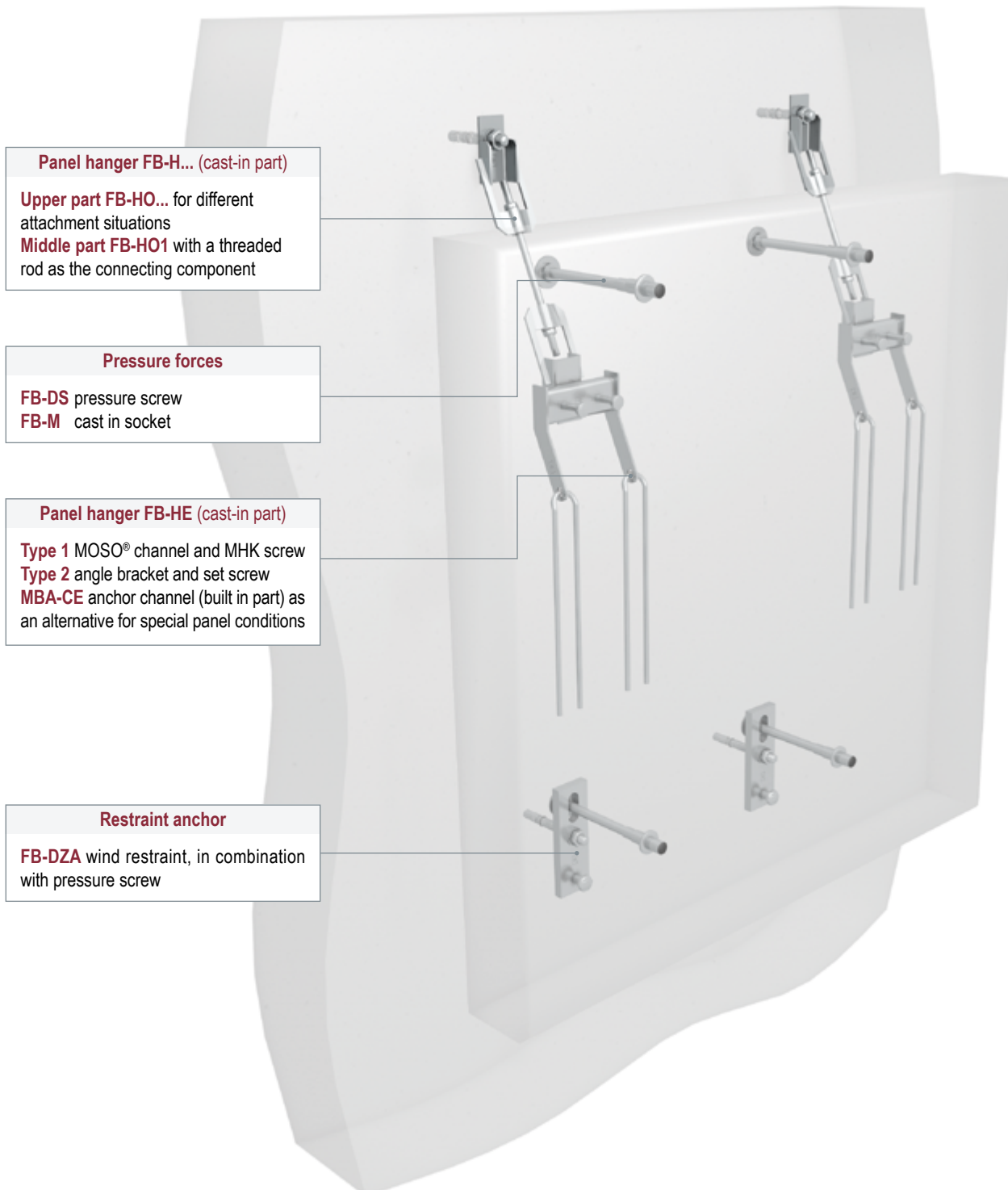
The MOSO® panel hanger is an officially approved system. It consists of an upper part, a middle part and a cast-in part.

There are several models of the upper part available depending on the structural situation. The standard upper part FB-HO1 is fastened to a vertical surface of the structure. The top of slab type FB-HO1A is available for top of slab. If a single point fixing is not sufficient, version FB-HO2 and FB-HO2A are available for the double bolt.

The cast-in part FB-HE was developed for slender precast concrete units. With a low load range and a simultaneously large concrete core, MOSO® CE anchor channels are an affordable alternative to the cast-in part FB-HE.

Product information

- Load range: 6.0 - 70.0 kN
- Material: stainless steel
corrosion resistance class (CRC) I-V
- Certificate: national technical approval



Panel hanger FB-H... (cast-in part)
Upper part FB-HO... for different attachment situations
Middle part FB-HO1 with a threaded rod as the connecting component

Pressure forces
FB-DS pressure screw
FB-M cast in socket

Panel hanger FB-HE (cast-in part)
Type 1 MOSO® channel and MHK screw
Type 2 angle bracket and set screw
MBA-CE anchor channel (built in part) as an alternative for special panel conditions

Restraint anchor
FB-DZA wind restraint, in combination with pressure screw



Panel hanger - Cast-in part

Together with the additional reinforcement included in the scope of supply, the cast-in parts form an officially approved system.

Type 1 covers load range from 6.0 kN to 22.0 kN inclusive.
Type 2 was designed for loads from 38.0 kN to 70.0 kN inclusive.

By default the additional reinforcement is used with B500B. With increased requirements in the concrete cover, the additional reinforcement B500A NR has to be chosen.

Please refer to the table for the dimensions



▲ Type 1

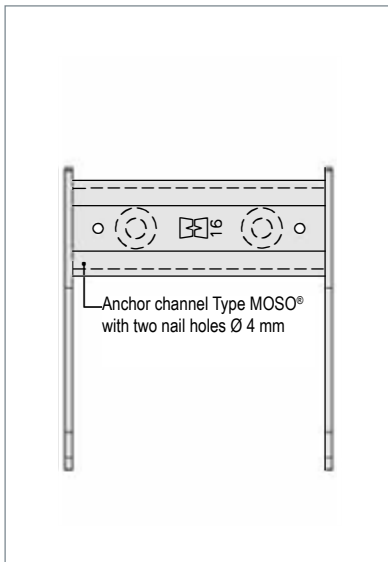


▲ Type 2

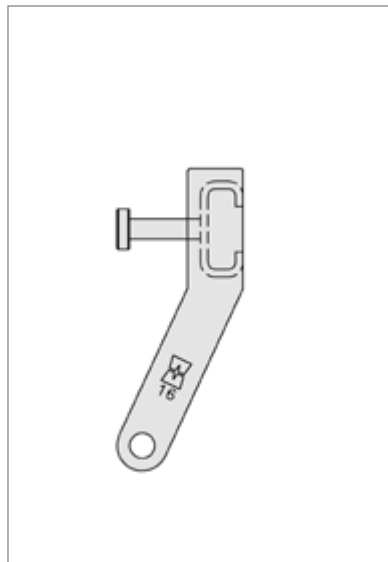
Product information

- Load range: 6.0 - 70.0 kN
- Material: stainless steel
corrosion resistance class (CRC) I-V
- Certificate: national technical approval

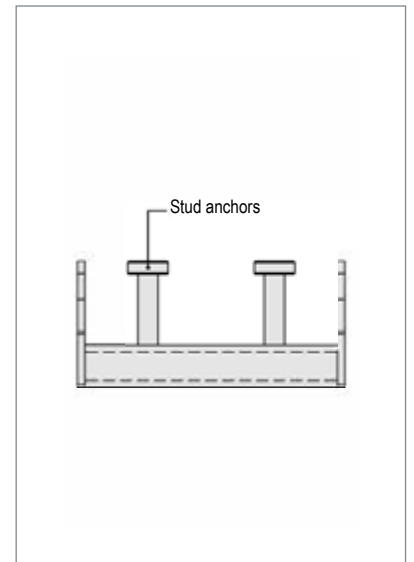
Cast-in part: load range 6.0 – 22.0 kN



▲ Front view

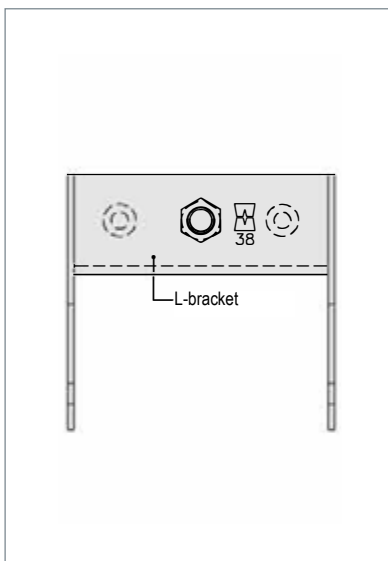


▲ Side view

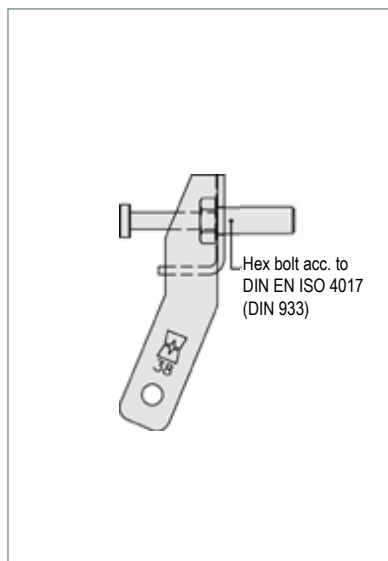


▲ Top view

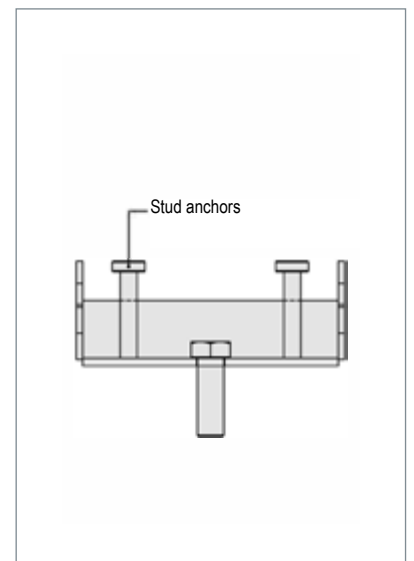
Cast-in part: load range 38.0 – 70.0 kN



▲ Front view



▲ Side view



▲ Top view

Technical data / Measurement table



Panel hanger

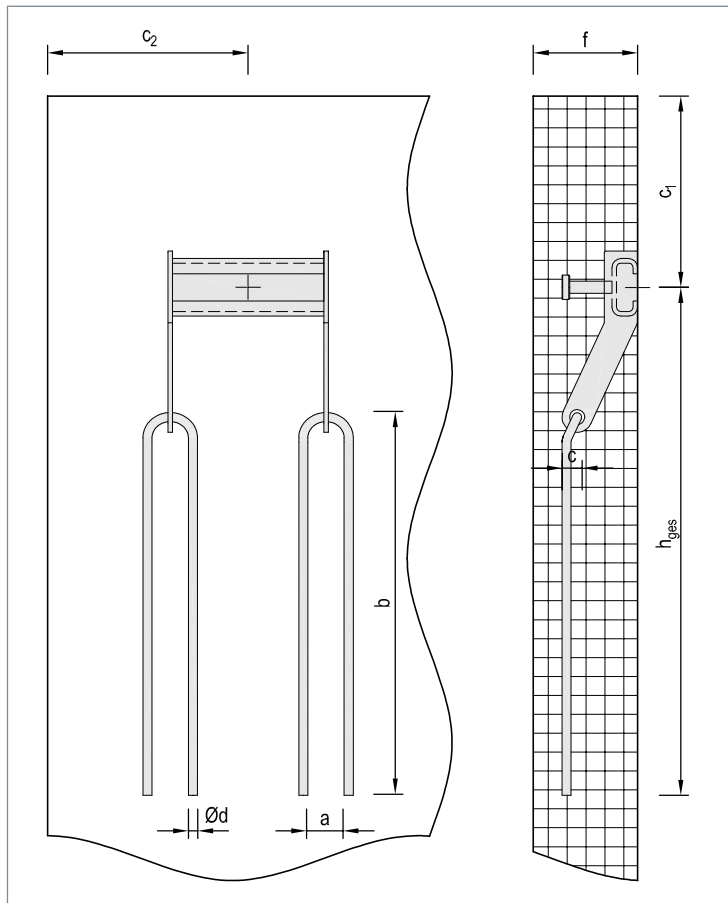
FB-HE

	Load range	Design load V_{Rd}	Boundary conditions [mm]				Required reinforcement [mm]			Min. concrete quality	Attaching bolt size	
			f_{min} ①	$c_{1, min}$	$c_{2, min}$	h_{ges}	$\emptyset d$	a	b			c
Type 1	6.0 kN	8.10 kN	70	50	110	335	6	24	250	13	C25/30	MHK 38/17 M10
	8.5 kN	11.48 kN	70	100	125	335	6	24	250	13	C25/30	MHK 40/25 M12
	13.5 kN	18.23 kN	80	125	125	340	8	32	250	22	C25/30	MHK 50/30 M16
	16.0 kN	21.60 kN	80	175	175	390	8	32	300	22	C25/30	MHK 50/30 M16
	22.0 kN	29.70 kN	90	200	200	525	8	32	400	22	C30/37	MHK 50/30 M20
Type 2	38.0 kN	51.30 kN	100	200	200	630	10	40	500	30	C30/37	SKM M20 (DIN934)
	48.0 kN	64.80 kN	115	225	225	685	12	48	500	33	C30/37	SKM M20 (DIN934)
	70.0 kN	94.50 kN	125	225	225	805	12	48	600	35	C30/37	SKM M24 (DIN934)

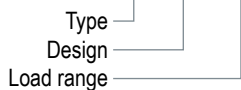
① When panel thickness f_{min} then $c_{nom,a} = 20$ mm
 When the panel thickness $f \leq f_{min} + 20$ mm, then select the reinforcement from B500A NR (Assumption XC4)

Additional reinforcement

The built in part FB-HE is designed for large and thin precast panels. To find safe solutions for narrow columns or low spandrel panels, the MOSO® CE anchor channel is a suitable alternative. The table further down shows examples for different combinations with our panel hanger. For every special case an engineer has to check if the conditions, resulting from our ETA permission, are met.



Order example: FB - HE - 13.5



Scope of supply

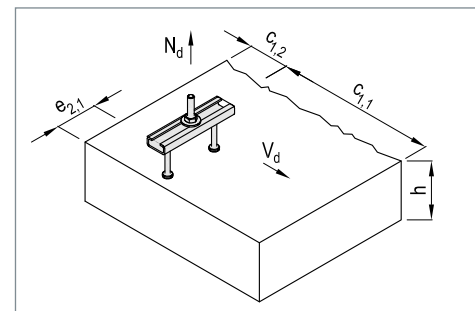
- Cast-in part
- 2x B500B additional reinforcement

Cross-references for additional information

Page	Topic
26, 28, 38	Accessories - precast concrete slabs DZA; DS and VD
14 - 17	Basic static data, assembly instruction
43	MOSO® CE anchor channel

Combination		Boundary conditions ③				
LS	MBA-CE	$c_{1,1}$	$c_{1,2}$	$e_{2,1}$	h	MHK
6.0 kN	28/15	425	75	100	80	M10
	38/17	300	50	50	107	
8.5 kN	38/17	425	75	75	107	M12
	50/31 ②	300	75	50	136	
13.5 kN	38/17 ②	450	100	150	107	M16
	50/31	400	100	125	136	
16.0 kN	50/31	500	100	150	136	M16
	52/34	400	100	100	189	
22.0 kN	50/31 ②	650	125	150	136	M20
	52/34	600	125	125	189	

② If this anchor channel is used V_{Rd} is reduced by a factor of 0.80
 ③ Assumed concrete quality C30/37; c_{nom} 30mm; 3 near edges



Text for invitation to tender

... pc. MOSO® precast fixing FB-HE-13.5 1) including additional reinforcement, delivery and proper installation.

1) Load range acc. to table



Panel hanger - Standard design

The upper mounting is fixed to the in-situ concrete with an officially approved dowel or a MOSO® CE anchor channel.

Prior to delivery, the upper mounting is pre-assembled with the accessories included in the scope of supply.

Please refer to the table for the dimensions.

Note:

Due to the new manner of construction, no offset torque must be considered when calculating the attachment point!



Product information

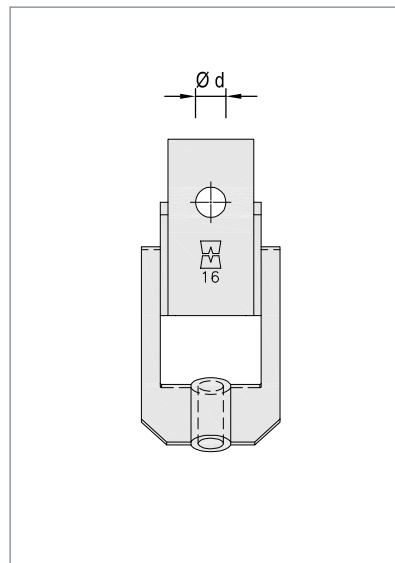
- Load range: 6.0 - 70.0 kN
- Cavity: up to 500 mm
- Material: stainless steel
- Certificate: corrosion resistance class (CRC) I-V national technical approval

Technical data / Measurement table

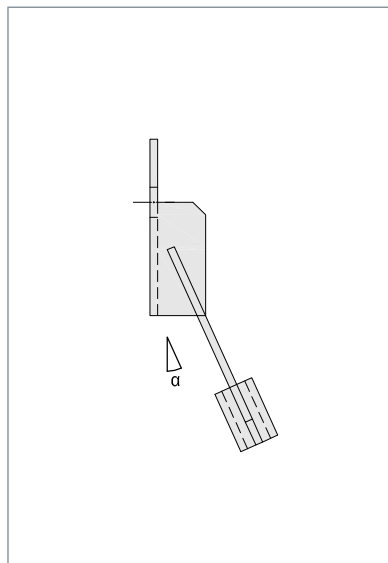
FB-HO1

Load range	Design load V_{Rd}	Connection angle α for the cavity b in mm [⊙]												Dim.		
		60	70	80	90	100	110	120	130	140	150	160	> 160	$\varnothing d$ [mm]	Dowel [-]	
6.0 kN	8.10 kN	18.0°	→		25.0°	→								25.0°	12	M10
8.5 kN	11.48 kN	18.0°	→			25.0°	→							25.0°	14	M12
13.5 kN	18.23 kN	16.0°	18.0°	→			25.0°	→						25.0°	18	M16
16.0 kN	21.60 kN	15.0°	18.0°	→					25.0°	→				25.0°	18	M16
22.0 kN	29.70 kN	13.0°	15.0°	→					22.5°	→				22.5°	22	M20
38.0 kN	51.30 kN	-	13.0°	15.0°	→						22.5°	→		22.5°	22	M20
48.0 kN	64.80 kN	-	-	-	-	15.0°	→						20,0	20.0°	22	M20
70.0 kN	94.50 kN	-	-	-	-	-	13.0°	15.0°	→					15.0° [⊗]	26	M24

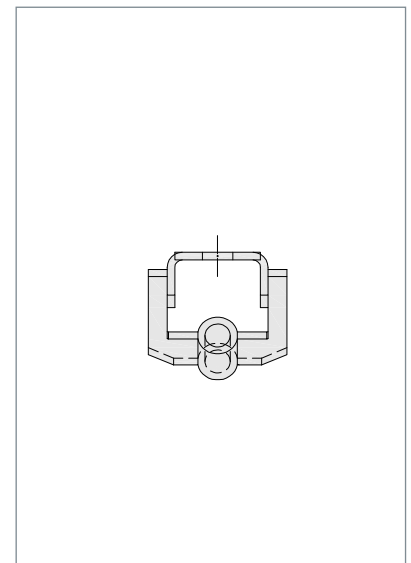
[⊙] Please refer to page 12 for more information about the installation part.
[⊗] cavity > 200 mm connection angle $\alpha = 20^\circ$



▲ Front view



▲ Side view



▲ Top view

Panel hanger - Double bolt

FB-HO2



Panel hanger

The double bolt type of the upper part is fastened to the in-situ concrete with two officially approved dowels or a MOSO® CE anchor channel.

Prior to delivery, the upper part is pre-assembled with the accessories included in the scope of supply.

Please refer to the table for the dimensions.

Note:

Due to the new manner of construction, no offset torque must be accounted for when calculating the attachment point!



Product information

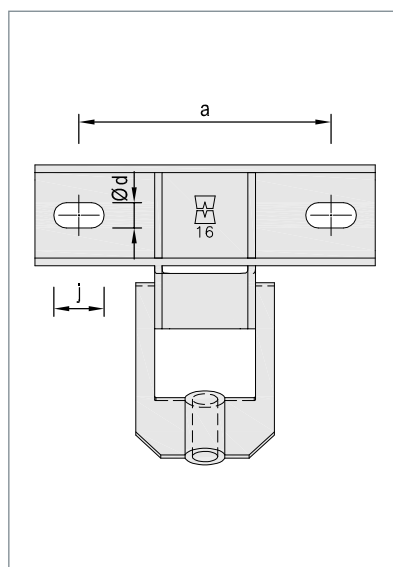
- Load range: 6.0 - 70.0 kN
- Cavity: up to 500 mm
- Material: stainless steel
- Certificate: corrosion resistance class (CRC) I-V national technical approval

Technical data / Measurement table

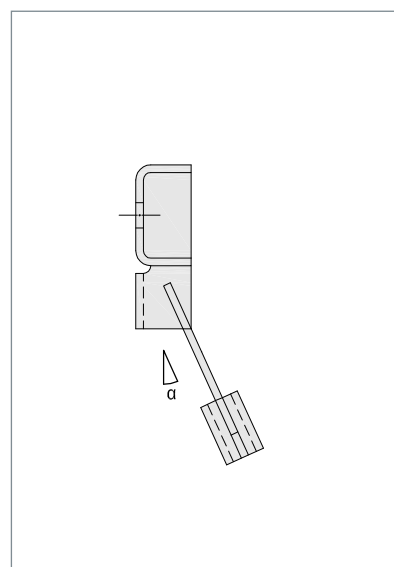
FB-HO2

Load range	Design load V_{Rd}	Connection angle α for the cavity b in mm ^①											Dimensions						
		60	70	80	90	100	110	120	130	140	150	160	>160	$\varnothing d$ [mm]	j [mm]	a [mm]	Dowel [-]		
6.0 kN	8.10 kN	18.0°	→		25.0°	→									25.0°	10	20	100	M8
8.5 kN	11.48 kN	18.0°	→		25.0°	→									25.0°	12	20	100	M10
13.5 kN	18.23 kN	16.0°	18.0°	→			25.0°	→							25.0°	14	25	115	M12
16.0 kN	21.60 kN	15.0°	18.0°	→				25.0°	→						25.0°	14	25	115	M12
22.0 kN	29.70 kN	13.0°	15.0°	→				22.5°	→						22.5°	18	30	130	M16
38.0 kN	51.30 kN	-	13.0°	15.0°	→				22.5°	→					22.5°	18	40	150	M16
48.0 kN	64.80 kN	-	-	-	-	15.0°	→							20,0	20.0°	18	40	180	M16
70.0 kN	94.50 kN	-	-	-	-	-	13.0°	15.0°	→					15.0° ^②	22	60	205	M20	

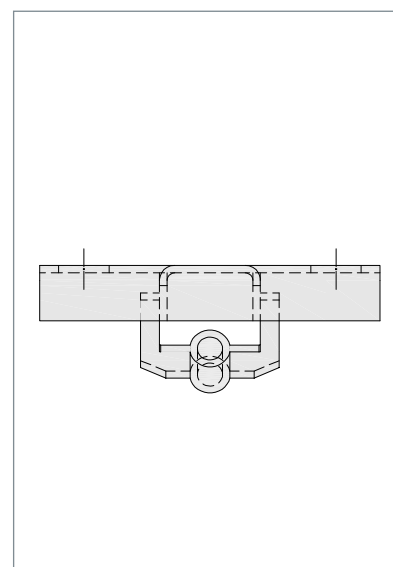
① Please refer to page 12 for more information about the installation part.
 ② cavity > 200 mm connection angle $\alpha = 20^\circ$



▲ Front view



▲ Side view



▲ Top view



Panel hanger - Top of slab

FB-H01A

The upper mounting is fixed to the top of slab with an officially approved dowel or a MOSO® CE anchor channel.

Prior to delivery, the upper mounting is pre-assembled with the accessories included in the scope of supply.

Please refer to the table for the dimensions.



Product information

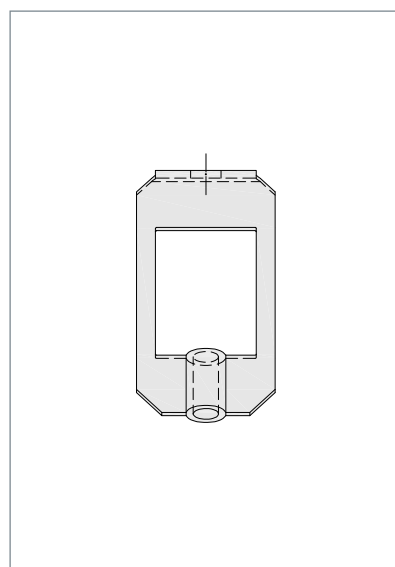
- Load range: 6.0 - 70.0 kN
- Cavity: up to 500 mm
- Material: stainless steel
corrosion resistance class (CRC) I-V
- Certificate: national technical approval

Technical data / Measurement table

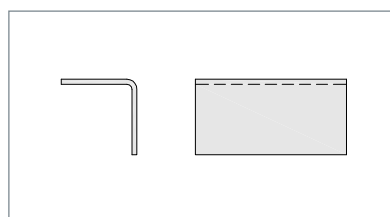
FB-H01A

Load range	Design load V_{Rd}	Connection angle α for the cavity b in mm ①											Dimensions				
		60	70	80	90	100	110	120	130	140	150	160	>160	$\varnothing d$ [mm]	c_{min} ② [mm]	Dowel [-]	
6.0 kN	8.10 kN	14.0°	18.0°	→		25.0°		→					25.0°	12	45	M10	
8.5 kN	11.48 kN	14.0°	18.0°	→		25.0°		→					25.0°	12	60	M10	
13.5 kN	18.23 kN	14.0°	18.0°	→		25.0°		→					25.0°	14	60	M12	
16.0 kN	21.60 kN	12.0°	12.0°	18.0°	→		25.0°		→				25.0°	14	65	M12	
22.0 kN	29.70 kN	12.0°	12.0°	15.0°	→		22.5°		→				22.5°	14	65	M12	
38.0 kN	51.30 kN	-	12.0°	15.0°	→		22.5°		→				22.5°	18	80	M16	
48.0 kN	64.80 kN	-	-	-	-	12.0°	15.0°	→						20.0°	18	90	M16
70.0 kN	94.50 kN	-	-	-	-	-	12.0°	→		15.0°	→		15.0° ③	22	120	M20	

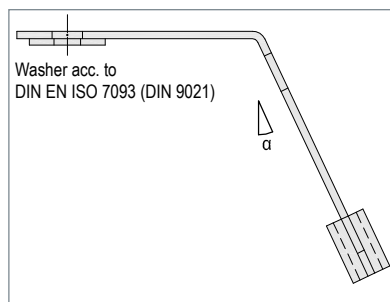
① Please refer to page 13 for more information about the installation part.
 ② $c \geq c_{min}$; can be adapted to requirements of the shell and fixing material
 ③ cavity > 210 mm connection angle $\alpha = 20^\circ$



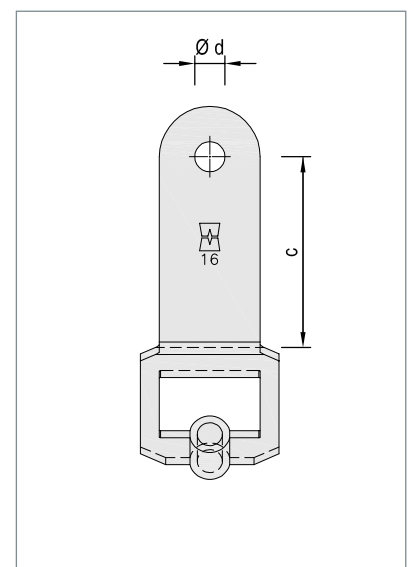
▲ Front view



▲ Edge protection profile



▲ Side view



▲ Top view

Panel hanger - Top of slab double bolt

FB-HO2A



Panel hanger

The double bolt of the upper part is fastened to the top of slab with two officially approved dowels or a MOSO® CE anchor channel.

Prior to delivery, the upper part is pre-assembled with the accessories included in the scope of supply.

Please refer to the table for the dimensions.



Product information

- Load range: 6.0 - 70.0 kN
- Cavity: up to 500 mm
- Material: stainless steel
corrosion resistance class (CRC) I-V
- Certificate: national technical approval

Technical data / Measurement table

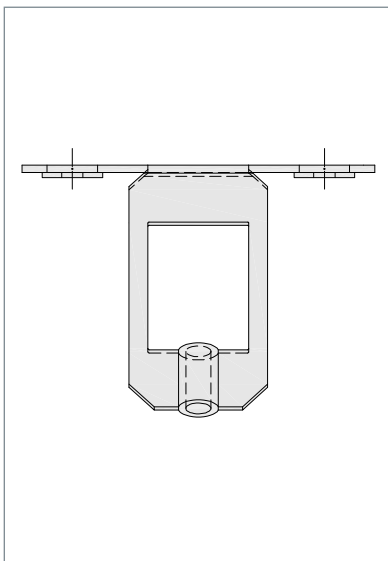
FB-HO2A

Load range	Design load V_{Rd}	Connection angle α for the cavity b in mm ①											Dimensions							
		60	70	80	90	100	110	120	130	140	150	160	> 160	$\varnothing d$ [mm]	j [mm]	a [mm]	c_{min} ② [mm]	Dowel [-]		
6.0 kN	8.10 kN	14.0°	18.0°	→		25.0°	→								25.0°	10	20	100	80	M8
8.5 kN	11.48 kN	14.0°	18.0°	→			25.0°	→							25.0°	10	20	100	85	M8
13.5 kN	18.23 kN	14.0°	18.0°	→				25.0°	→						25.0°	12	20	115	85	M10
16.0 kN	21.60 kN	12.0°	12.0°	18.0°	→				25.0°	→					25.0°	12	20	115	90	M10
22.0 kN	29.70 kN	12.0°	12.0°	15.0°	→			22.5°	→						22.5°	12	20	130	90	M10
38.0 kN	51.30 kN	-	12.0°	15.0°	→					22.5°	→				22.5°	14	40	150	125	M12
48.0 kN	64.80 kN	-	-	-	-	12.0°	15.0°	→							20.0°	18	40	180	160	M16
70.0 kN	94.50 kN	-	-	-	-	-	12.0°	→		15.0°	→				15.0° ③	18	40	205	180	M16

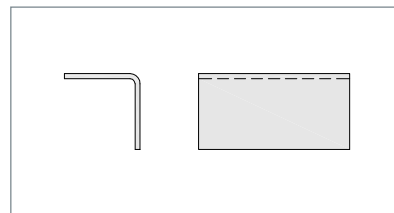
① Please refer to page 13 for more information about the installation part.

② $c \geq c_{min}$; can be adapted to requirements of the shell and fixing material

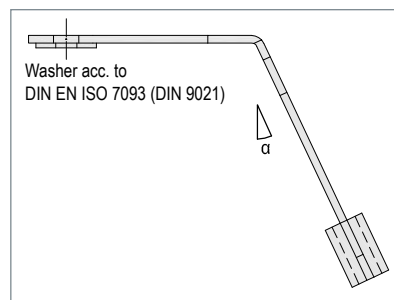
③ cavity > 210 mm connection angle $\alpha = 20^\circ$



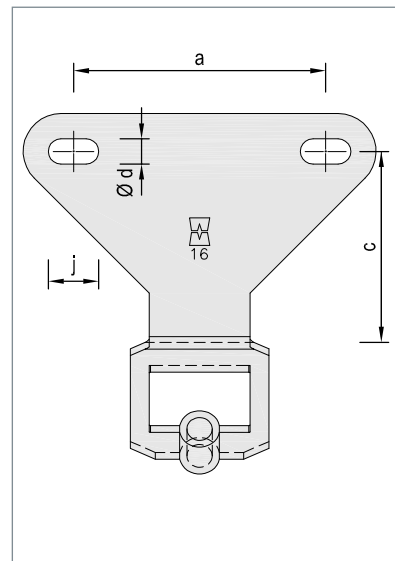
▲ Front view



▲ Edge protection profile



▲ Side view



▲ Top view



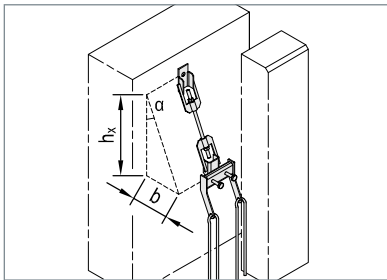
Panel hanger - Overview

Technical data / Measurement table

FB-H1 / FB-H2

Load range	6.0 kN		8.5 kN		13.5 kN		16.0 kN		22.0 kN		38.0 kN		48.0 kN		70.0 kN	
Design load V_{Rd}	8.10 kN		11.48 kN		18.23 kN		21.60 kN		29.70 kN		51.30 kN		64.80 kN		94.50 kN	
Cavity b [mm]	h_x [mm]	α	h_x [mm]	α	h_x [mm]	α	h_x [mm]	α	h_x [mm]	α	h_x [mm]	α	h_x [mm]	α	h_x [mm]	α
60	185	18.0°	185	18.0°	210	16.0°	225	15.0°	260	13.0°	-	-	-	-	-	-
70	215	↓	215	↓	215	18.0°	215	18.0°	260	15.0°	285	13.0°	-	-	-	-
80	245	↓	245	↓	245	↓	245	↓	300	↓	300	15.0°	-	-	-	-
90	195	25.0°	275	↓	275	↓	275	↓	335	↓	335	↓	-	-	-	-
100	215	↓	215	25.0°	310	↓	310	↓	375	↓	375	↓	375	15.0°	-	-
110	235	↓	235	↓	235	25.0°	340	↓	410	↓	410	↓	410	↓	475	13.0°
120	255	↓	255	↓	255	↓	370	↓	290	22.5°	450	↓	450	↓	450	15.0°
130	280	↓	280	↓	280	↓	280	25.0°	315	↓	485	↓	485	↓	485	↓
140	300	↓	300	↓	300	↓	300	↓	340	↓	340	22.5°	520	↓	520	↓
150	320	↓	320	↓	320	↓	320	↓	360	↓	360	↓	560	↓	560	↓
160	345	↓	345	↓	345	↓	345	↓	385	↓	385	↓	440	20.0°	595	↓
170	365	↓	365	↓	365	↓	365	↓	410	↓	410	↓	465	↓	635	↓
180	385	↓	385	↓	385	↓	385	↓	435	↓	435	↓	495	↓	670	↓
190	405	↓	405	↓	405	↓	405	↓	460	↓	460	↓	520	↓	710	↓
200	430	↓	430	↓	430	↓	430	↓	485	↓	485	↓	550	↓	550	20.0°
210	450	↓	450	↓	450	↓	450	↓	505	↓	505	↓	575	↓	575	↓
220	470	↓	470	↓	470	↓	470	↓	530	↓	530	↓	605	↓	605	↓
230	495	↓	495	↓	495	↓	495	↓	555	↓	555	↓	630	↓	630	↓
240	515	↓	515	↓	515	↓	515	↓	580	↓	580	↓	660	↓	660	↓
250	535	25.0°	535	25.0°	535	25.0°	535	25.0°	605	22.5°	605	22.5°	685	20.0°	685	20.0°
> 250	on request															
Cast-in part	FB-HE-6.0	FB-HE-8.5	FB-HE-13.5	FB-HE-16.0	FB-HE-22.0	FB-HE-38.0	FB-HE-48.0	FB-HE-70.0								
Threaded rod	M8	M10	M12	M16	M16	M20	M24	M27								

FB-H1



Scope of supply

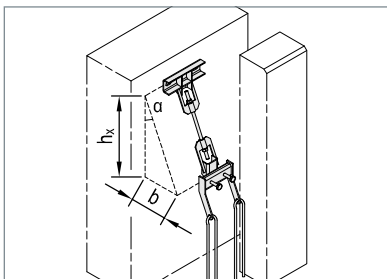
- Panel hanger (pre-assembled)
- hex nut DIN EN ISO 4032 (DIN 934)
- washer DIN EN ISO 7089 (DIN 125)
- Threaded rod A4-70
- MHK bolt up to LL 22.0 kN

Text for invitation to tender

... pc. MOSO® precast fixing FB-H1-150¹⁾-22.0²⁾ including officially approved dowel for cracked concrete³⁾, delivery and proper installation.

- ¹⁾ Cavity acc. to table
- ²⁾ Load range acc. to table
- ³⁾ Attachment in-situ concrete acc. to documentation

FB-H2



Scope of supply

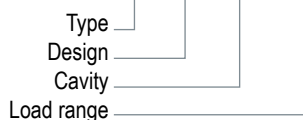
- Panel hanger (pre-assembled)
- hex nut DIN EN ISO 4032 (DIN 934)
- washer DIN EN ISO 7089 (DIN 125)
- 2x washer DIN EN ISO 7093 (DIN 9021)
- MHK bolt up to LL 22.0 kN

Text for invitation to tender

... pc. MOSO® precast fixing FB-H2-150¹⁾-22.0²⁾ including officially approved dowels for cracked concrete³⁾, delivery and proper installation.

- ¹⁾ Cavity acc. to table
- ²⁾ Load range acc. to table
- ³⁾ Attachment in-situ concrete acc. to documentation

Order example: **FB - H1 - 150 - 22.0**



Panel hanger - Overview

Technical data / Measurement table

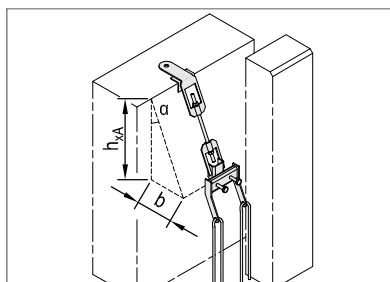


Panel hanger

FB-H1A / FB-H2A

Load range	6.0 kN		8.5 kN		13.5 kN		16.0 kN		22.0 kN		38.0 kN		48.0 kN		70.0 kN	
Design load V_{Rd}	8.10 kN		11.48 kN		18.23 kN		21.60 kN		29.70 kN		51.30 kN		64.80 kN		94.50 kN	
Cavity b [mm]	h_{VA} [mm]	α	h_{VA} [mm]	α	h_{VA} [mm]	α	h_{VA} [mm]	α	h_{VA} [mm]	α	h_{VA} [mm]	α	h_{VA} [mm]	α	h_{VA} [mm]	α
60	225	14.0°	225	14.0°	225	14.0°	260	12.0°	260	12.0°	-	-	-	-	-	-
70	205	18.0°	205	18.0°	205	18.0°	310	12.0°	310	12.0°	300	12.0°	-	-	-	-
80	235	↓	235	↓	235	↓	230	18.0°	280	15.0°	275	15.0°	-	-	-	-
90	265	↓	265	↓	265	↓	265	↓	320	↓	315	↓	-	-	-	-
100	205	25.0°	295	↓	295	↓	295	↓	355	↓	350	↓	435	12.0°	-	-
110	230	↓	225	25.0°	225	25.0°	325	↓	395	↓	390	↓	380	15.0°	475	12.0°
120	250	↓	250	↓	250	↓	355	↓	280	22.5°	425	↓	420	↓	520	↓
130	270	↓	270	↓	270	↓	270	25.0°	305	↓	465	↓	455	↓	570	↓
140	295	↓	290	↓	290	↓	290	↓	325	↓	500	↓	495	↓	490	15.0°
150	315	↓	315	↓	315	↓	310	↓	350	↓	350	22.5°	530	↓	525	↓
160	335	↓	335	↓	335	↓	335	↓	375	↓	370	↓	565	↓	565	↓
170	355	↓	355	↓	355	↓	355	↓	400	↓	395	↓	445	20.0°	600	↓
180	380	↓	375	↓	375	↓	375	↓	425	↓	420	↓	475	↓	640	↓
190	400	↓	400	↓	400	↓	400	↓	450	↓	445	↓	500	↓	675	↓
200	420	↓	420	↓	420	↓	420	↓	470	↓	470	↓	530	↓	715	↓
210	445	↓	440	↓	440	↓	440	↓	495	↓	490	↓	555	↓	550	20.0°
220	465	↓	465	↓	465	↓	460	↓	520	↓	515	↓	580	↓	580	↓
230	485	↓	485	↓	485	↓	485	↓	545	↓	540	↓	610	↓	605	↓
240	505	↓	505	↓	505	↓	505	↓	570	↓	565	↓	635	↓	635	↓
250	530	25.0°	530	25.0°	530	25.0°	525	25.0°	595	22.5°	590	22.5°	665	20.0°	660	20.0°
> 250	on request															
Cast-in part	FB-HE-6.0	FB-HE-8.5	FB-HE-13.5	FB-HE-16.0	FB-HE-22.0	FB-HE-38.0	FB-HE-48.0	FB-HE-70.0								
Threaded rod	M8	M10	M12	M16	M16	M20	M24	M27								

FB-H1A



Scope of supply

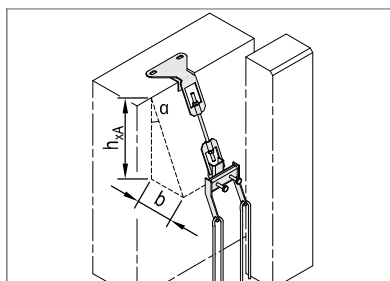
- Panel hanger (pre-assembled)
- hex nut DIN EN ISO 4032 (DIN 934)
- washer DIN EN ISO 7089 (DIN 125)
- washer DIN EN ISO 7093 (DIN 9021)
- Threaded rod A4-70
- MHK bolt up to LL 22.0 kN
- Edge protection profile

Text for invitation to tender

... pc. MOSO® precast fixing FB-H1A-150¹⁾-22.0²⁾ including officially approved dowel for cracked concrete³⁾, delivery and proper installation.

- ¹⁾ Cavity acc. to table
²⁾ Load range acc. to table
³⁾ Fixing in-situ concrete acc. to documentation

FB-H2A



Scope of supply

- Panel hanger (pre-assembled)
- hex nut DIN EN ISO 4032 (DIN 934)
- washer DIN EN ISO 7089 (DIN 125)
- 2x washer DIN EN ISO 7093 (DIN 9021)
- MHK bolt up to LL 22.0 kN
- Edge protection profile

Text for invitation to tender

... pc. MOSO® precast fixing FB-H2A-150¹⁾-22.0²⁾ including officially approved dowels for cracked concrete³⁾, delivery and proper installation.

- ¹⁾ Cavity acc. to table
²⁾ Load range acc. to table
³⁾ Fixing in-situ concrete acc. to documentation

Cross-references for additional information

Page	Topic
26, 28, 38	Accessories - precast concrete slabs DZA; DS and VD
14 - 15	Basic static data
16 - 17	Assembly and mounting instructions



Basic static data

Determination of anchoring forces and the selection of the required fixing material for anchoring a facade panel:

For fastening a suspended facade panel, not more than two panel hangers are required for vertical loads due to self-weight and four horizontal anchors (generally pressure screws) to secure the cavity.

Actions (DIN EN 1991-1):

G_k	=	vertical load from proportionate self-load of panel ($\frac{1}{2}$ weight of panel when suspended symmetrically)
W_k	=	wind load per horizontal anchor ($\frac{1}{4}$ wind load on panel; with differing projections of supports or with peak suction, the horizontal loads must be determined more precisely)
$W_{D,k}$	=	$c_{pe,1} * q_{ref}$ * proportionate surface (wind pressure)
$W_{S,k}$	=	$c_{pe,1} * q_{ref}$ * proportionate surface (wind suction)

Partial safety factors for actions:

Proof of supporting structure:

$\gamma_{G,sup}$	=	1.35	constant actions with self-weight
γ_Q	=	1.50	variable actions with wind load

Proof of position stability

$\gamma_{G,stab}$	=	0.90	constant actions (stabilising) with self-weight
γ_Q	=	1.50	variable actions with wind load

Anchoring forces:

Panel hangers

V_d	=	$\gamma_G * G_k$	vertical load in anchor
H_d	=	$V_d * \tan \alpha$	horizontal load in anchor
R_d	=	$\sqrt{V_d^2 + H_d^2}$	resulting oblique tension load in anchor

Pressure screws:

$D_{o,d}$	=	$D_{o,G,d} + D_{o,W,d}$	horizontal load top
$D_{u,d}$	=	$D_{u,G,d} + D_{u,W,d}$	horizontal load bottom
$D_{o,G,d}$	=	$\gamma_{G,sup} * G_k$	horizontal load from self-weight
max. $D_{o,W,d}$	=	$\gamma_Q * W_{D,k}$	horizontal load top (wind pressure)
min. $D_{o,W,d}$	=	$\gamma_Q * W_{S,k}$	horizontal load bottom (wind suction)
$D_{u,G,d}$	=	$\gamma_{G,sup} * G_k$	horizontal load bottom from self-weight
max. $D_{u,W,d}$	=	$\gamma_Q * W_{D,k}$	horizontal load bottom (wind pressure)
min. $D_{u,W,d}$	=	$\gamma_Q * W_{S,k}$	horizontal load bottom (wind suction)

Inspection of position stability (DIN EN 1990):

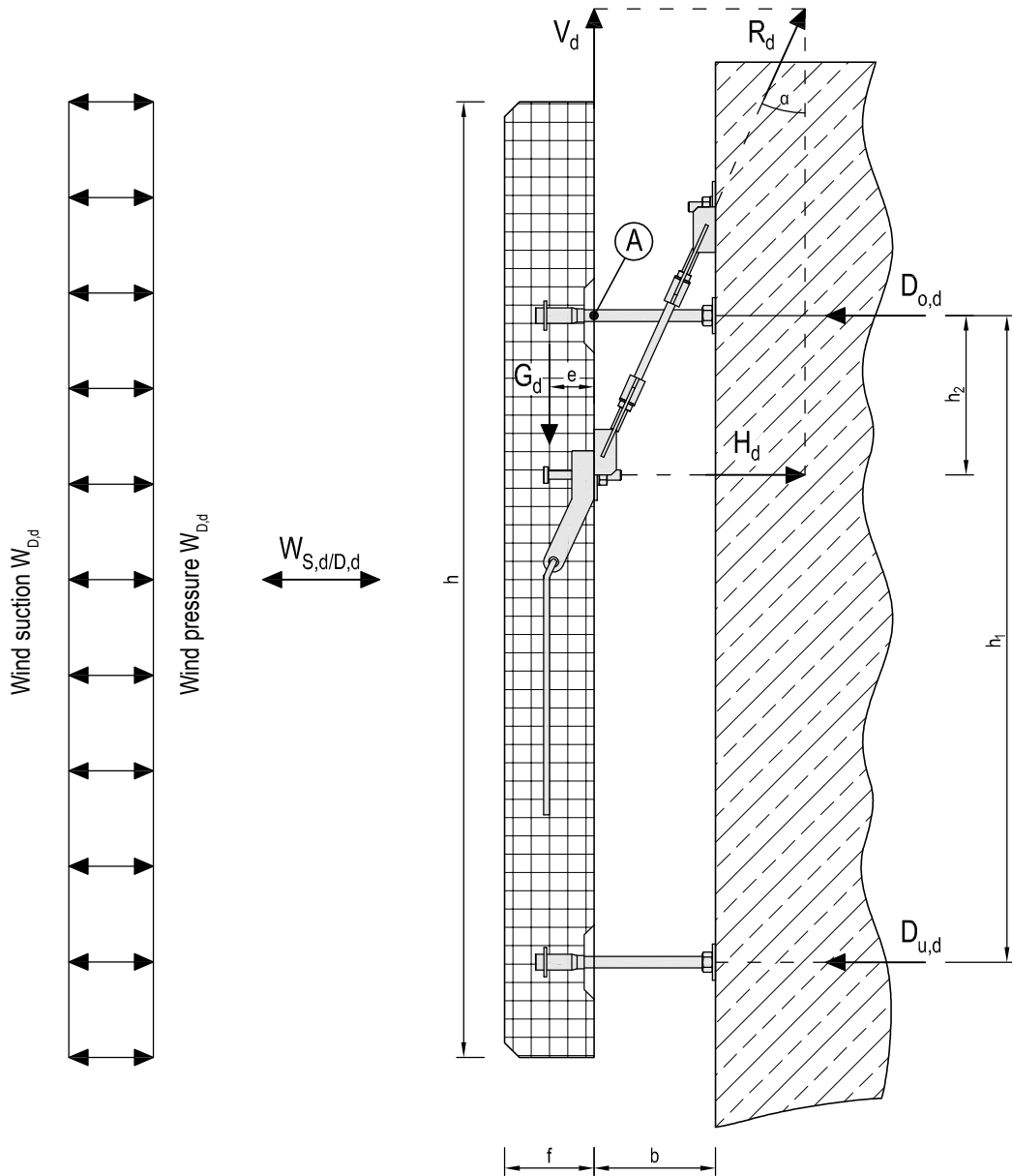
If $\gamma_{G,stab} * \min. D_{o,G,k} + \gamma_Q * \min. D_{o,W,k} < 0$	→ suction protection required for top (e.g. restraint anchor)
If $\gamma_{G,stab} * \min. D_{u,G,k} + \gamma_Q * \min. D_{u,W,k} < 0$	→ suction protection required for bottom (e.g. restraint anchor)

Calculation:

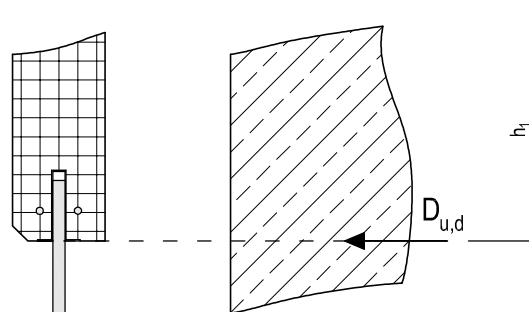
$\Sigma M_A = 0 :$	$D_{u,G,d}$	=	$(H_d * h_2 + V_d * e) / h_1$
	max. $D_{u,d}$	=	$D_{u,G,d} + \max. D_{u,W,d}$
	min. $D_{u,d}$	=	$D_{u,G,d} - \min. D_{u,W,d}$

$\Sigma H = 0 :$	$D_{o,G,d}$	=	$H_d - D_{u,G,d}$
	max. $D_{o,d}$	=	$D_{o,G,d} + \max. D_{o,W,d}$
	min. $D_{o,d}$	=	$D_{o,G,d} - \min. D_{o,W,d}$

with:	h_1	=	distance between pressure screws (see sketch)
	h_2	=	distance between panel hanger and pressure screw, top (see sketch)
	e	=	half thickness of panel ($f/2$)



alternatively:



α = Angle of inclination

Cross-references for additional information

Page	Subject
44	Software MOSOCONstructor

Please note

Due to the new manner of construction, no offset torque must be considered when calculating the attachment point!

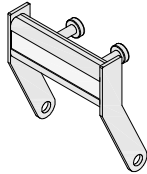


Assembly instructions FB-H

1.1 Components of cast-in part type 1

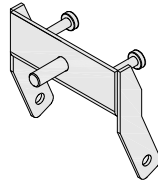
The cast-in part with load range 6.0 kN - 22.0 kN consists of an MOSO® anchor channel, two head bolts and two lateral plates for connecting the reinforcement loops.

The MOSO® anchor channel contains a recess unit made of PE foam.



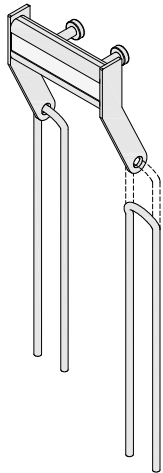
1.2 Components of cast-in part type 2

The cast-in part with load range 38.0 kN - 70.0 kN consists of a bracket, two head bolts and two lateral plates for connecting the reinforcement loops.



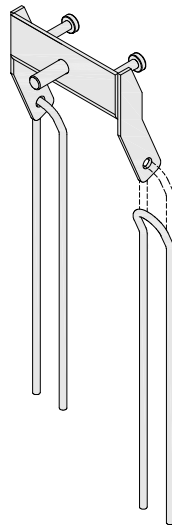
2.1 Assembly of the reinforcement

The reinforcement loops are hooked into the designated holes in the lateral plates.



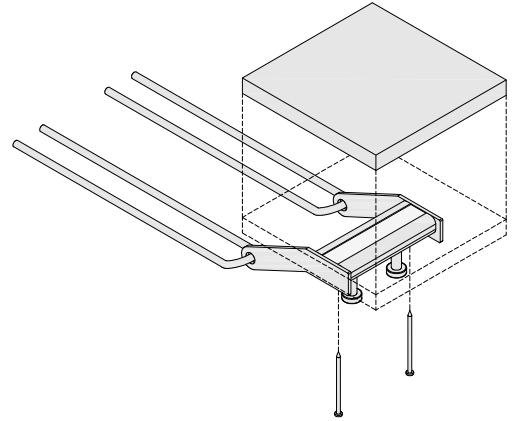
2.2 Assembly of the reinforcement

The reinforcement loops are hooked into the designated holes in the lateral plates.



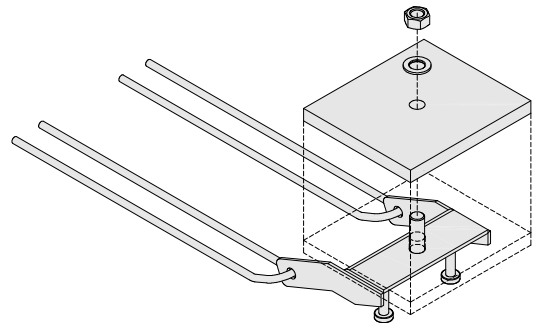
3.1 Attaching the formwork

The cast-in part can be attached to the formwork (e.g. board) with the help of two nails. There are two nail holes on the back of the MOSO® anchor channel for this purpose. The auxiliary construction and the cast-in part can subsequently be flush-mounted to the formwork.



3.2 Attaching the formwork

The cast-in part can be fixed to an auxiliary construction (e.g. board) with the help of an included hexagon nut and a washer. The formwork must have a hole to match the size of the hexagon nut. The auxiliary construction and the cast-in part can subsequently be flush-mounted to the formwork.



Load range	T_{inst} [Nm]	Connection bolt	Width across flat
6.0 kN	15	M10	17
8.5 kN	25	M12	19
13.5 kN	60	M16	24
16.0 kN	60	M16	24
22.0 kN	120	M20	30
38.0 kN	240	M20	30
48.0 kN	240	M20	30
70.0 kN	420	M24	36

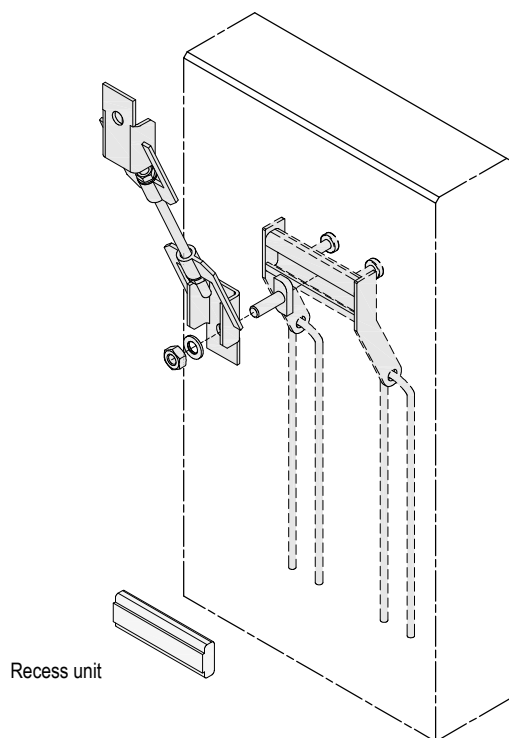
General information

- ① The precast part remains suspended on the crane over the entire assembly process.
- ② The hexagon nut on the threaded rod in the middle part of the panel hanger system may only be rotated manually to adjust the height. To do this, the precast part must be lifted to allow for a load relief.
- ③ If the horizontal distance b between the in-situ concrete and the precast part should deviate after the panel hanger system has been delivered, the vertical mounting dimension h_x or h_{xA} also changes accordingly. This may make it necessary to adjust the threaded rod in the middle part.



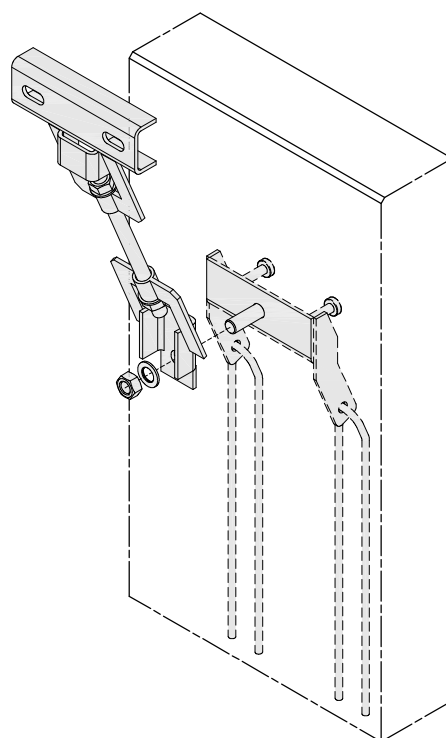
4.1 Attaching the mounting part to the cast-in part

The mounting part of the panel hanger system consists of an upper part (available in four different designs) and a middle part (available in two different designs). This mounting part is delivered completely pre-assembled. Prior to installing the panel hanger, the recess unit must be removed from the MOSO® anchor channel. Then the installation part is connected to the cast-in part with the aid of an MHK bolt, a washer and hexagon nut. The anchor channel allows a horizontal adjustment. The tightening torques indicated in the table on page 16 must be adhered to.



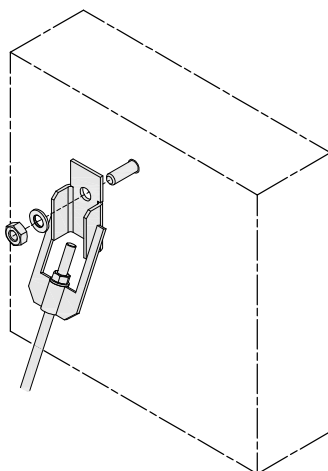
4.2 Attaching the mounting part to the cast-in part

The mounting part of the panel hanger system consists of an upper part (available in four different designs) and a middle part (available in two different designs). This mounting part is delivered completely pre-assembled. The installation part is connected to the cast-in part with the aid of a washer and a hexagon nut. The tightening torques indicated in the table on page 16 must be adhered to.



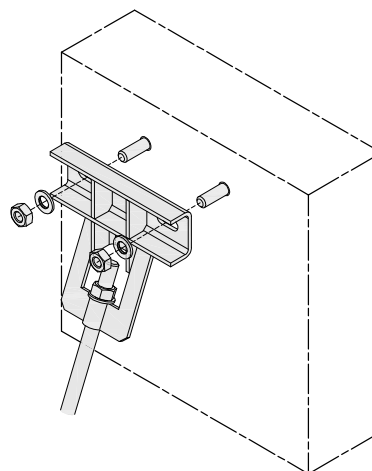
5.1 Attaching the mounting part to the in-situ concrete

The upper part of the panel hanger system is fastened to the in-situ concrete with an officially approved dowel or a MOSO® CE anchor channel. The tightening torques must be taken from the respective approvals and must be adhered to. A vertical adjustment of the precast part can be done by the continuous adjustment of the hexagon nut on the threaded rod. In order to minimise the risk of cold welding, a lubricant must be applied (e.g. Molykote® - can be ordered separately).



5.2 Attaching the mounting part to the in-situ concrete

The upper part of the panel hanger system is fastened to the in-situ concrete with an officially approved dowel or a MOSO® CE anchor channel. The tightening torques must be taken from the respective approvals and must be adhered to. The slotted holes in the upper part allow a horizontal adjustment. A vertical adjustment of the precast part can be done by the continuous adjustment of the hexagon nut on the threaded rod. In order to minimise the risk of cold welding, a lubricant must be applied (e.g. Molykote® - can be ordered separately).





Parapet anchor – Standard design

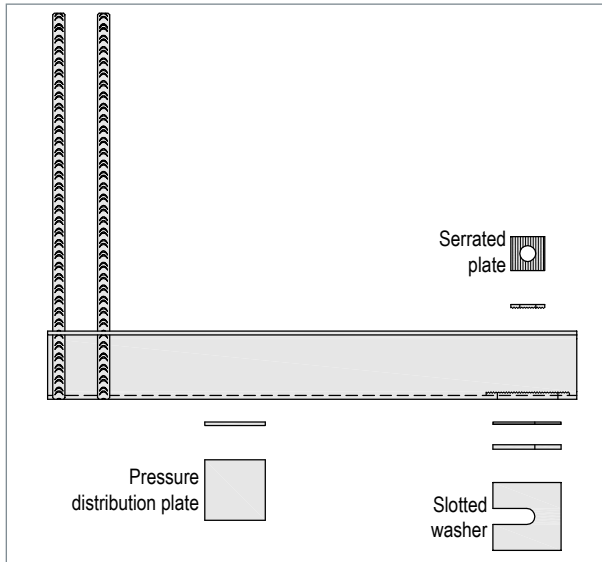
The MOSO® precast fixing FB-E is a parapet anchor for supporting parapet elements. In order to achieve a uniform distribution of load, each concrete element is braced with at least two anchors. When using more than two anchors, the design with adjusting screw must be used (see FB-EJ on page 20).

By default the parapet reinforcement is used with B500B. With increased requirements in the concrete cover, the parapet reinforcement B500A NR has to be chosen.

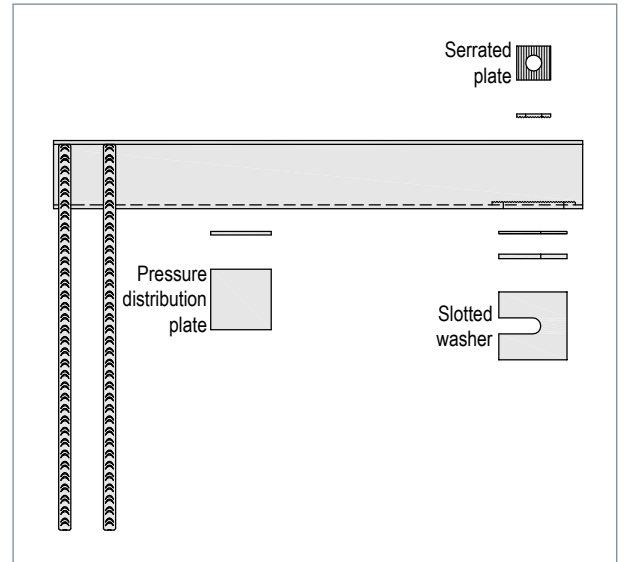
The parapet anchor is fastened to the in-situ concrete with an officially approved dowel or a MOSO® CE anchor channel. Please refer to the table for the dimensions.

Product information

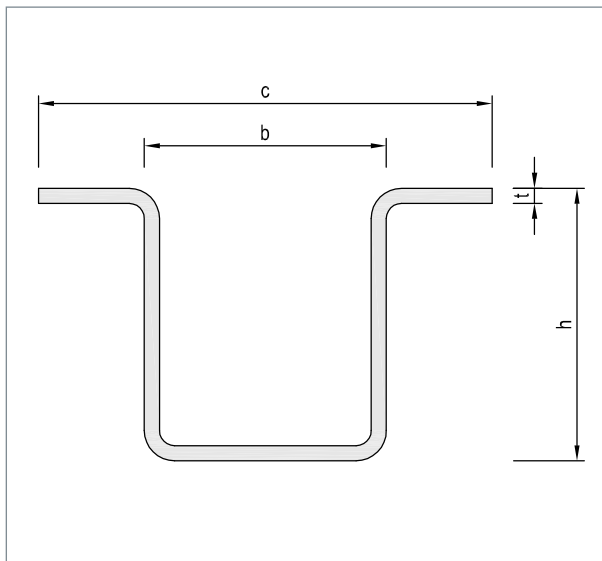
- Types: 1 - 8
- Cavity: up to 200 mm (> on request)
- Materials: corrosion resistance class (CRC) I-V
approved reinforcement B500B
approved reinforcement B500A NR $d_s \leq 14$ mm
- Certification: structural analysis



▲ Standard design FB-E



▲ Top of slab design FB-EA



▲ Profile cross-section

FB-E FB-EA	c [mm]	b [mm]	h [mm]	t [mm]
1	102	62	45	3
2	106	62	48	3
3	126	76	55	4
4	134	76	66	4
5	138	78	70	5
6	148	78	83	5
7	160	80	84	6
8	190	90	85	8

Technical data / Measurement table



Parapet anchor

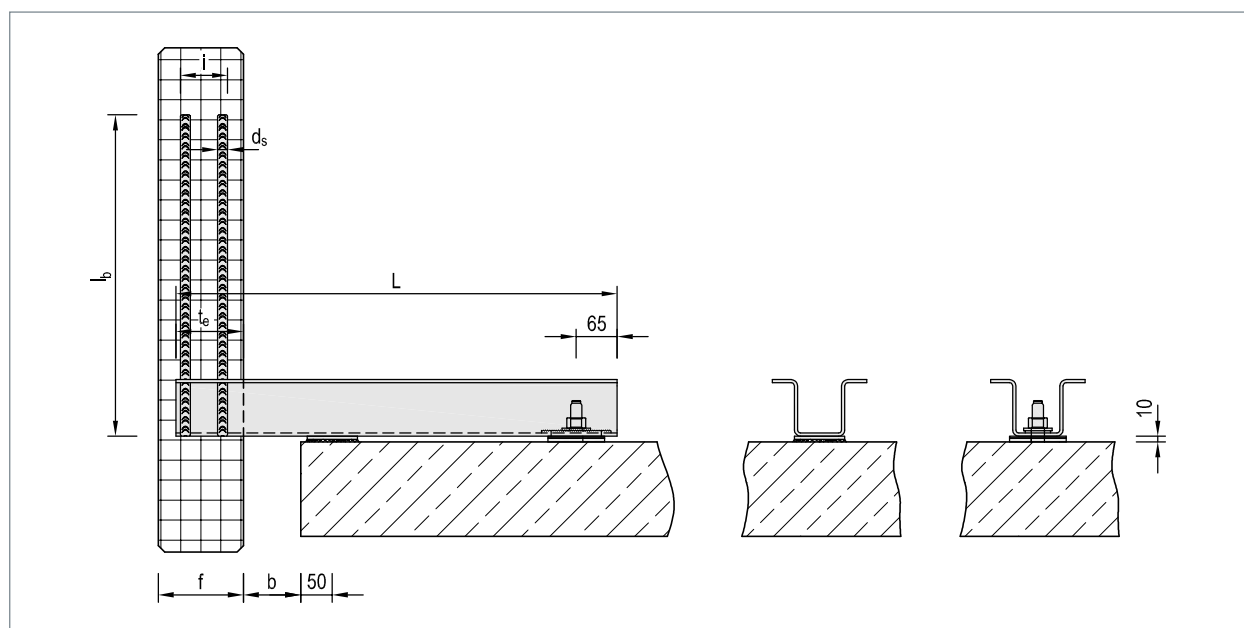
FB-E / FB-EA

	Standard lengths L in mm with cavity b				Slotted hole SH [mm]	Anchoring depth t_a [mm]	Panel thick- ness ① f_{min} [mm]	Parapet reinforcement		
	0 - 40 mm	50 - 100 mm	110 - 140 mm	150 - 200 mm				d_s [mm]	i [mm]	l_b [mm]
1	400	450	500 ②	600 ②	18 x 80	70	100	Ø 10	40	350
2	450	500	550	650	18 x 80	72	100	Ø 10	40	400
3	500	550	600	700	18 x 80	82	110	Ø 12	50	450
4	550	600	650	750	18 x 80	92	120	Ø 14	60	500
5	550	600	650	750	22 x 80	102	130	Ø 14	70	525
6	600	650	700	800	22 x 80	108	135	Ø 16	75	600
7	650	700	750	850	22 x 80	123	150	Ø 16	90	625
8	700	750	800	900	22 x 80	125	150	Ø 20	90	700

① f_{min} with $c_{nom,j} = 25$ mm and $c_{nom,a} = 35$ mm ② Select accessories set 2 with size M16.

Fixing accessories

	Max. size	W t = 3 mm		W t = 6 mm		serr. W t = 5 mm		PDP	
		Length [mm]	SL Ø [mm]	Length [mm]	SL Ø [mm]	Length [mm]	RL Ø [mm]	Width / Length [mm]	t [mm]
1	M12	50	13	50	13	34	13	60 / 60	5
2	M16	65	17	65	17	40	17	60 / 60	5
3	M16	65	17	65	17	40	17	60 / 60	5
4	M16	65	17	65	17	40	17	60 / 60	5
5	M20	90	21	90	21	45	21	60 / 80	5
6	M20	90	21	90	21	45	21	60 / 80	5
7	M20	90	21	90	21	45	21	60 / 80	5
8	M20	90	21	90	21	45	21	60 / 80	5



Order example: **FB - E - 4 - 600**



Scope of supply

- Parapet anchor
- Serrated plate
- 1x slotted plate t = 3 mm
- 1x slotted plate t = 6 mm
- Pressure distribution plate

Cross-references for additional information

Page	Topic
22 - 23	Basic static data
24 - 25	Assembly and mounting instructions

Text for invitation to tender

... pc. MOSO® precast fixing FB-E-4¹⁾-600²⁾ including officially approved dowel for cracked concrete, delivery and proper installation.

¹⁾ Profile size acc. to table

²⁾ Profile length acc. to table



Parapet anchor - with adjustment

FB-EJ

The MOSO® precast fixing FB-EJ is a parapet anchor for parapet elements. The system allows for the quick and easy compensation of structural tolerances using the adjusting screw. In order to achieve a uniform distribution of load, each concrete element is braced with at least two anchors. When using more than two anchors, a uniform distribution of load must also be ensured.

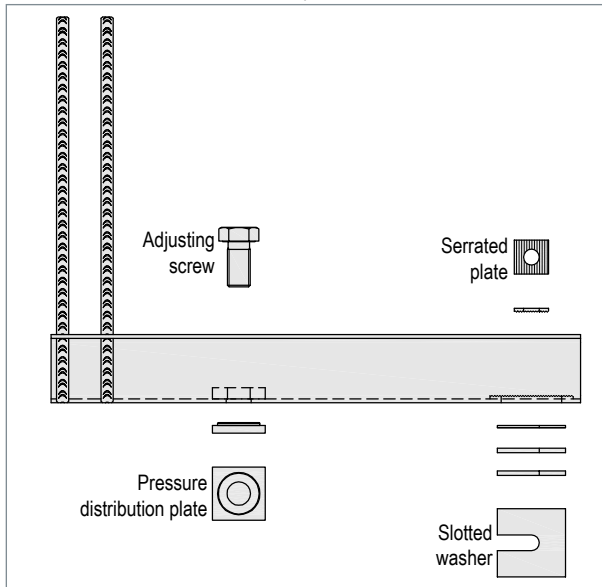
By default the parapet reinforcement is used with B500B. With increased requirements in the concrete cover, the parapet reinforcement B500A NR has to be chosen.

The parapet anchor is fastened to the in-situ concrete with an officially approved dowel or a MOSO® CE anchor channel.

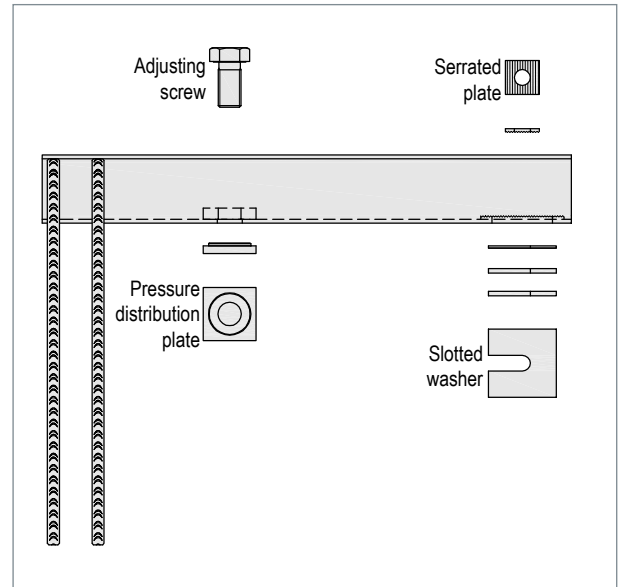
Please refer to the table for the dimensions.

Product information

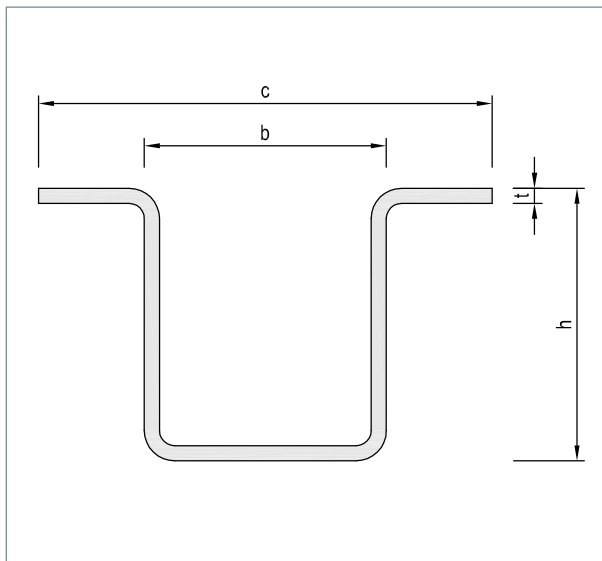
- Types: 1 - 8
- Cavity: up to 200 mm (> on request)
- Material: corrosion resistance class (CRC) I-V
approved reinforcement B500B
approved reinforcement B500A NR $d_s \leq 14$ mm
- Certification: structural analysis



▲ Standard design FB-EJ



▲ Top of slab design FB-EJA



▲ Profile cross-section

FB-EJ FB-EJA	c [mm]	b [mm]	h [mm]	t [mm]
1	102	62	45	3
2	106	62	48	3
3	126	76	55	4
4	134	76	66	4
5	138	78	70	5
6	148	78	83	5
7	160	80	84	6
8	190	90	85	8

Technical data / Measurement table



Parapet anchor

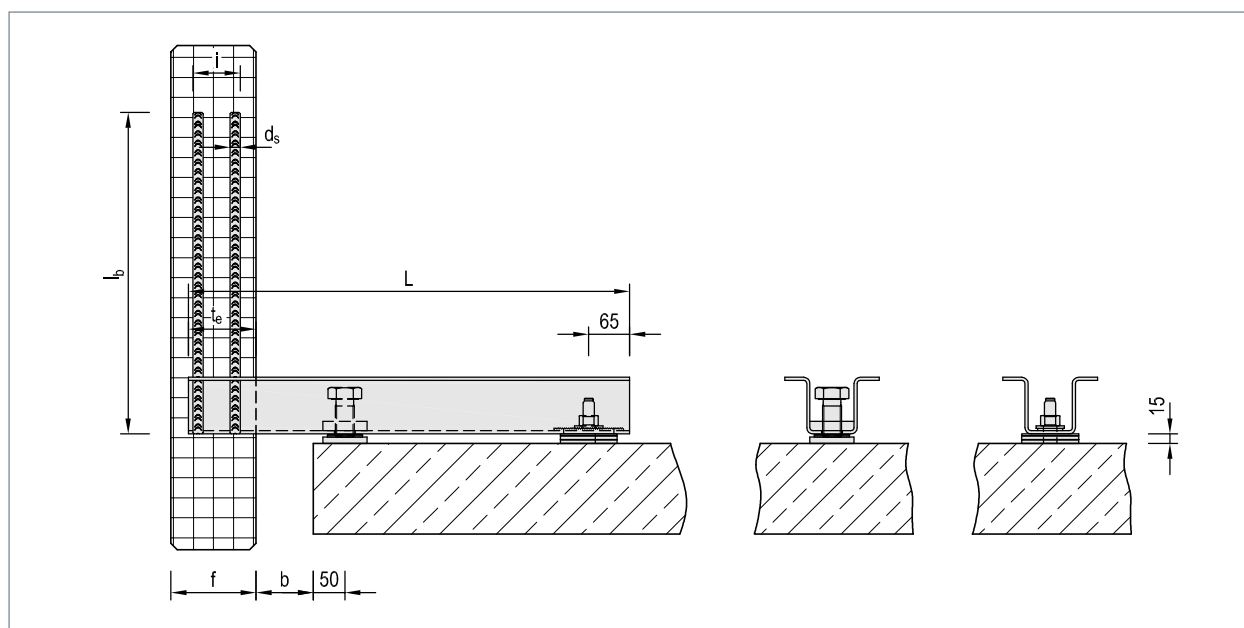
FB-EJ / FB-EJA

	Standard lengths L in mm with cavity b				Slotted hole SH [mm]	Anchoring depth t_a [mm]	Panel thickness ① f_{min} [mm]	Parapet reinforcement		
	0 - 40 mm	50 - 100 mm	110 - 140 mm	150 - 200 mm				d_s [mm]	i [mm]	l_b [mm]
1	400	450	500 ②	600 ②	18 x 80	70	100	Ø 10	40	350
2	450	500	550	650	18 x 80	72	100	Ø 10	40	400
3	500	550	600	700	18 x 80	82	110	Ø 12	50	450
4	550	600	650	750	18 x 80	92	120	Ø 14	60	500
5	550	600	650	750	22 x 80	102	130	Ø 14	70	525
6	600	650	700	800	22 x 80	108	135	Ø 16	75	600
7	650	700	750	850	22 x 80	123	150	Ø 16	90	625
8	700	750	800	900	22 x 80	125	150	Ø 20	90	700

① f_{min} with $c_{nom,j} = 25$ mm and $c_{nom,a} = 35$ mm ② Select accessories set 2 with size M16.

Fixing accessories

	Max. size	W t = 3 mm		W t = 6 mm		serr. W t = 5 mm		PDP		Pressure screw
		Length [mm]	SL Ø [mm]	Length [mm]	SL Ø [mm]	Length [mm]	RL Ø [mm]	Length [mm]	t [mm]	
1	M12	50	13	50	13	34	13	40	6	M16
2	M16	65	17	65	17	40	17	40	6	M16
3	M16	65	17	65	17	40	17	50	8	M24
4	M16	65	17	65	17	40	17	50	8	M24
5	M20	90	21	90	21	45	21	70	10	M30
6	M20	90	21	90	21	45	21	70	10	M30
7	M20	90	21	90	21	45	21	70	10	M30
8	M20	90	21	90	21	45	21	70	10	M30



Order example: **FB - EJ - 4 - 600**



Cross-references for additional information

Page	Topic
22 - 23	Basic static data
24 - 25	Assembly and mounting instructions

Scope of supply

- Parapet anchor
- Serrated plate
- 1x slotted plate t = 3 mm
- 2x slotted plate t = 6 mm
- Hexagon nut acc. to DIN EN ISO 4017 (DIN 933)
- Pressure distribution plate

Text for invitation to tender

... pc. MOSO® precast fixing FB-EJ-4¹⁾-600²⁾ including officially approved dowel for cracked concrete, delivery and proper installation.

¹⁾ Profile size acc. to table

²⁾ Profile length acc. to table



Basic static data

Determination of anchoring forces and the selection of the required fixing material for anchoring a facade panel:

The required profile of the parapet anchor is roughly determined by defining the torque $M_{y,d}$ and the shear force $V_{z,d}$ on support A of the parapet anchor for all forces acting on the respective anchor (facade panel, wind, beam load, etc.) and then balancing them with the bearing values according to the table.

Actions (DIN EN 1991-1):

G_k	=	vertical load from proportionate self-load of facade panel
V_k	=	vertical load from proportionate self-load (e.g. flower trough)
H_k	=	horizontal load from beam load
W_k	=	horizontal load from wind load

If the parapet anchors are arranged symmetrically, $\frac{1}{2}$ of the panel length must be applied as the load drawing length for each. If the varying load drawing lengths vary, they must be determined more precisely.

Partial safety factors for actions:

$\gamma_{G,sup}$	=	1.35	constant action with self-weight
γ_Q	=	1.50	variable action with beam and wind load

Anchoring forces:

D_d	=	$\max. \{V_{z,d}; M_{y,d} / y\}$	support A
Z_d	=	$M_{y,d} / y$	support B
Q_d	=	N_d	support B

with: y	=	$z - b - 50 \text{ mm} - 65 \text{ mm}$	inner lever arm
z	=	$L - t_e$	visible part of parapet anchor

Calculation:

$V_{z,d}$	=	$\gamma_{G,sup} * G_k + \gamma_{G,sup} * V_k$	vertical load on support A
N_d	=	$\gamma_Q * H_k + \gamma_Q * W_k$	horizontal load on support B
$M_{y,d}$	=	$\gamma_{G,sup} * G_k * (f/2 + b + 50 \text{ mm})$	from self-weight
	+	$\gamma_{G,sup} * V_k * (a1 + f/2 + b + 50 \text{ mm})$	from self-weight (e.g. flower trough)
	+	$\gamma_Q * H_k * h_1$	from horizontal load (e.g. beam load)
	+	$\gamma_Q * W_k * e_w$	from wind load

$V_{R,d}$	\geq	$V_{z,d}$	shear load analysis
ω_v	\leq	$\left(M_{y,k} * a * \left(\frac{y}{3} + \frac{a}{2} \right) \right) / (E * I_y)$	vertical adjustment
max. ω_v	=	$(t_e + b + 50 \text{ mm}) / 150$	

with: a	=	$f/2 + b + 50 \text{ mm}$
L_1	=	$z - 65 \text{ mm} + f/2$

Cross-section values

Profile type		1	2	3	4	5	6	7	8
A	[mm ²]	487	529	798	950	1.235	1.445	1.730	2.322
I_y	[mm ⁴]	139.941	175.900	340.700	593.575	842.722	1.401.930	1.674.320	2.186.660
I_z	[mm ⁴]	264.882	344.000	687.600	1.072.900	1.534.760	2.250.970	2.777.130	4.647.530
$W_{y,el}$	[mm ³]	6.220	7.328	12.390	17.987	24.078	33.782	39.865	51.451
$W_{z,el}$	[mm ³]	6.160	7.320	12.730	17.305	23.612	30.835	37.529	56.677

Material constants

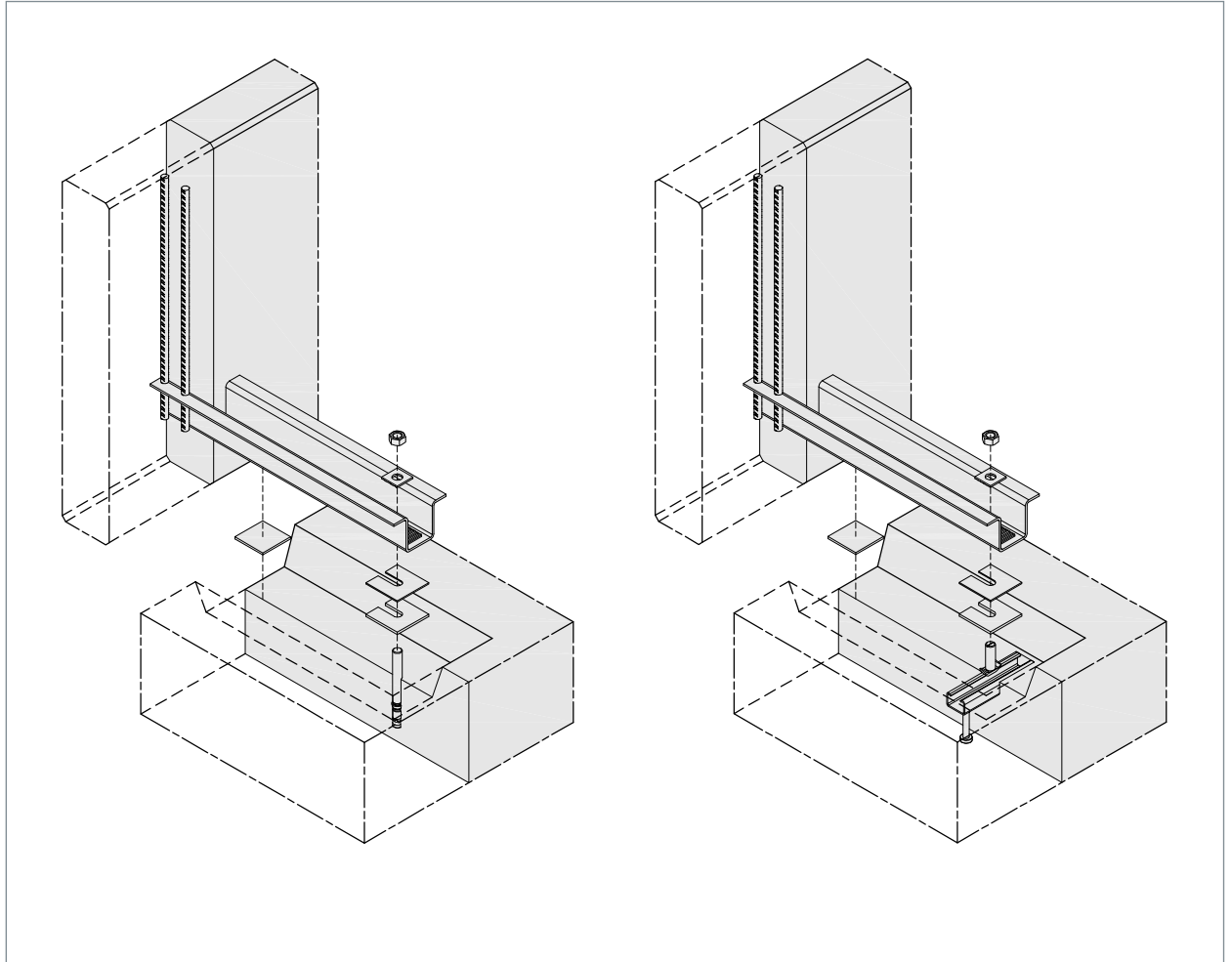
		1	2	3	4	5	6	7	8
$f_{y,k}$	[N/mm ²]	400	400	400	400	400	400	400	400
E-Modul	[N/mm ²]	200.000	200.000	200.000	200.000	200.000	200.000	200.000	200.000

Bearing values

Profile type		1	2	3	4	5	6	7	8
$M_{pl,y,d}$	[kNcm]	275	321	550	790	1072	1493	1785	2366
$M_{pl,z,d}$	[kNcm]	280	333	579	787	1073	1401	1706	2576
$N_{pl,d}$	[kN]	177	192	290	346	449	525	629	844
$V_{pl,z,d}$	[kN]	52.9	56.7	85.7	104.1	136.5	163.8	196.5	258.7
$V_{R,d}$	[kN]	17.5	18.7	28.3	34.4	45.0	54.0	64.8	85.4



Assembly instructions FB-E



▲ FB-E: Dowel mounting

▲ FB-E: Channel mounting

Mounting the parapet anchor in the precast concrete unit

The parapet anchor is installed in the precast concrete unit that the rear reinforcement rods have a concrete covering towards the inside of the precast part of at least 25 mm. The reinforcement rods must have sufficient concrete covering around it.

Please note the following during installation:

The height of the cast-in part depends on the mounting level of the parapet anchor on the upper edge of the slab. The lower edge of the profile should be $\Delta h = 5 - 10$ mm above this mounting level so that there is enough clearance for the adjustment. If the parapet anchor is mounted in a recess, as shown in the sketches, the mounting measurement depends on the lower edge of this recess plus the measurement Δh .

Mouting the parapet anchor on the slab

The parapet anchor is fastened to the slab with an officially approved dowel or MOSO® CE anchor channel. A height compensation can be made on the tension bearing by means of the included slotted washers. To do this, the mounting accessories of the relevant anchor must be used according to the table. If the anchor is to be mounted in a recess to be cast later, the profile must be coated with soft insulation. This allows the accommodation of temperature-dependent changes of length.

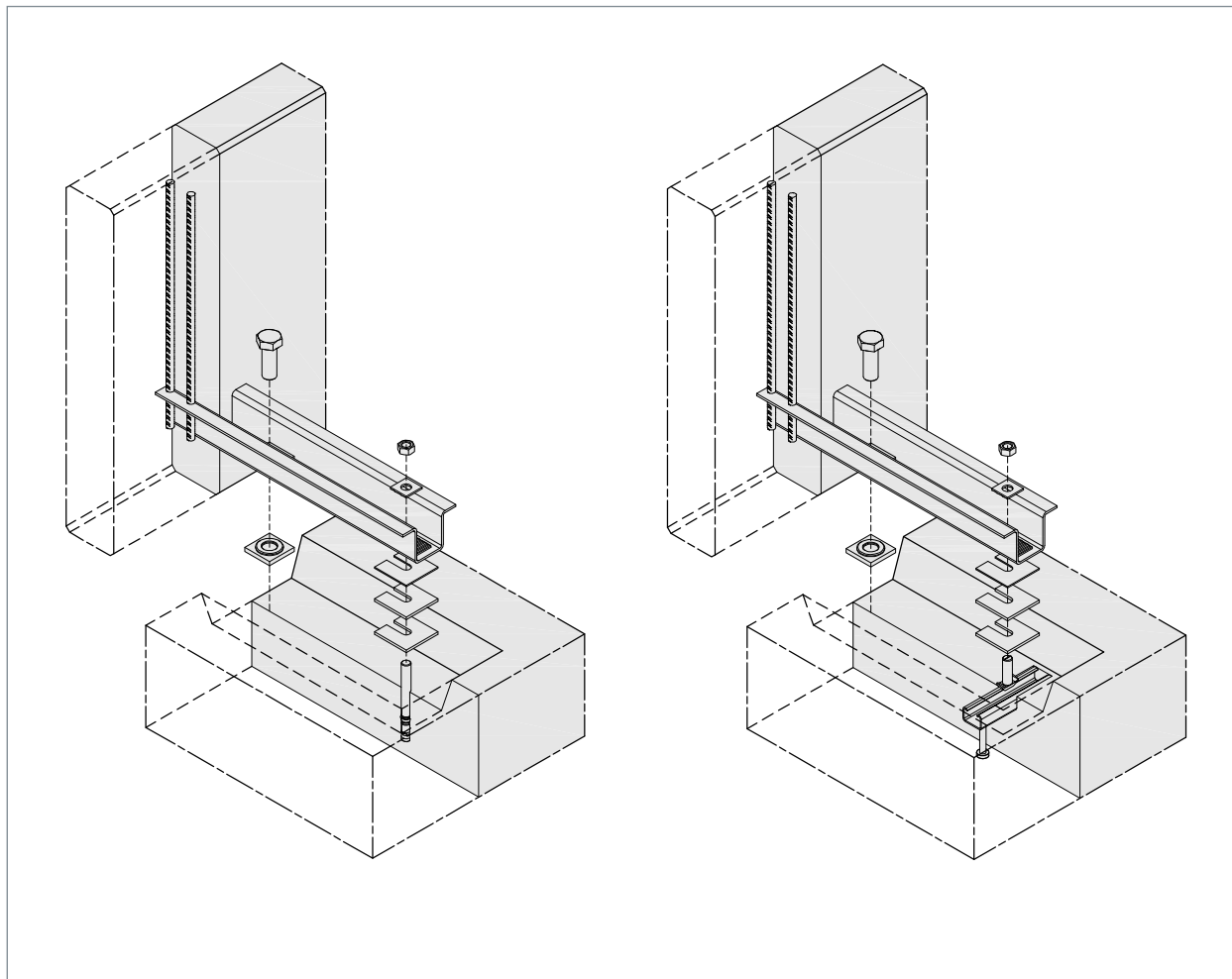
Cross-references for additional information

Page	Topic
19	Fixing accessories

Assembly instructions FB-EJ



Parapet anchor



▲ FB-EJ: Dowel mounting

▲ FB-EJ: Channel mounting

Mounting the parapet anchor in the precast concrete unit

The parapet anchor is installed in the precast concrete unit that the rear reinforcement rods have a concrete covering towards the inside of the precast part of at least 25 mm. The reinforcement rods must have sufficient concrete covering around it.

Please note the following during installation:

The height of the cast-in part depends on the mounting level of the parapet anchor on the upper edge of the slab. The lower edge of the profile should be $\Delta h = 15 - 25$ mm above this mounting level so that there is enough clearance for the adjustment. If the parapet anchor is mounted in a recess, as shown in the sketches, the mounting measurement depends on the lower edge of this recess plus the measurement Δh .

Mounting the parapet anchor on the slab

The parapet anchor is fastened to the top of slab with an officially approved dowel or MOSO® CE anchor channel. A height compensation can be made on the tension bearing by means of the included slotted washers as well as with the adjusting screw on the pressure bearing. To do this, the correct parts of the relevant anchor must be used according to the table. The pressure distribution plate is shimmed at the lower end of the screw in such a way that the screw is located in the recess of the plate. The hexagon bolt may only be rotated manually to adjust the height, during which the precast part must be lifted for load relief. In order to minimise the risk of cold welding, a lubricant must be applied (e.g. Molykote®). If the anchor is to be mounted in a recess to be cast later, the profile must be coated with soft insulation. This allows the accommodation of temperature-dependent changes of length.

Cross-references for additional information

Page	Topic
21	Fixing accessories



Pressure screws

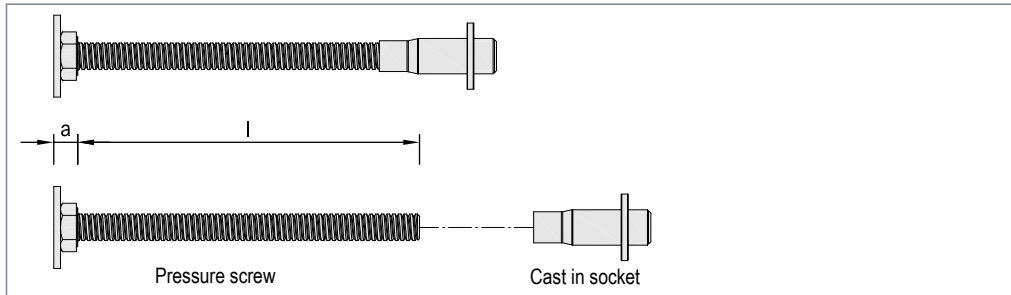
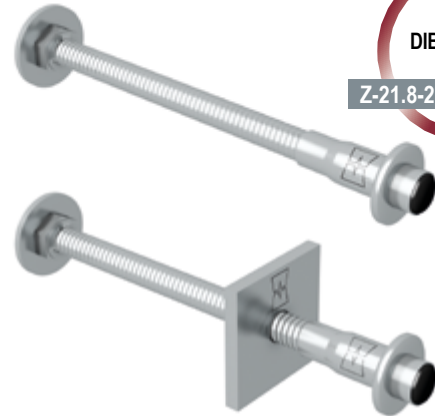
The MOSO® precast fixing FB-DS is used for the horizontal support of facade panels. The acting pressure forces are absorbed in combination with panel hangers. It is connected to the precast part by means of the officially approved cast in socket FB-M. The cast-in part must be ordered separately.

Product information FB-DS1, FB-DS2

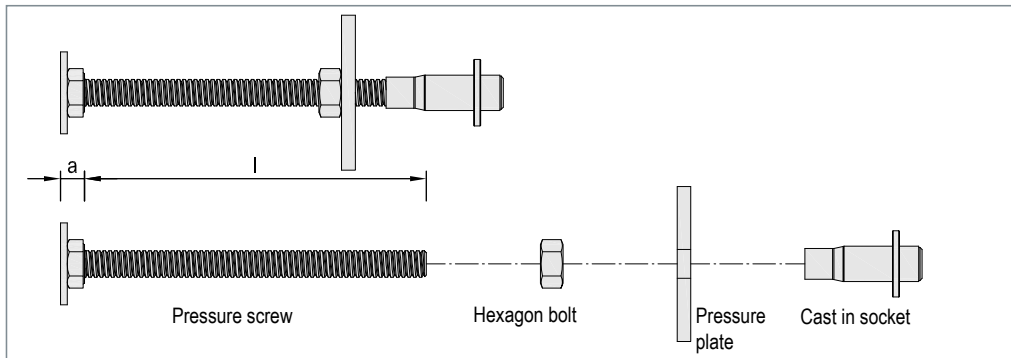
- Diameter: M12 - M30 (> by request)
- Cavity: up to 300 mm
larger distances on request
- Material: A4; 1.4362
- Certification: structural analysis

Product information FB-M

- Diameter: M12 - M20 (> by request)
- Material: stainless steel
corrosion resistance class (CRC) I-V
- Certificate: national technical approval



◀ FB-DS1



◀ FB-DS2

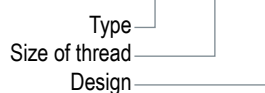
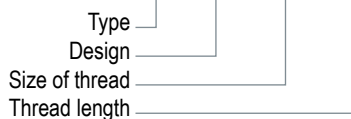
FB-DS1 / FB-DS2

	Cast-in part cast in socket [-]	Thread length l for the cavity b in mm												Adjust- ment [mm]	Pressure plate for Type DS2 [mm]	a [mm]	SW	
		60	80	100	120	140	160	180	200	220	240	260	280					300
M12	FB-M12K	80	100	120	140	160	180	200	220	240	260	280	300	320	± 10	80 / 80 / 8	13	19
	FB-M12L	80	100	120	140	160	180	200	220	240	260	280	300	320	± 15	80 / 80 / 8	13	19
M16	FB-M16K	80	100	120	140	160	180	200	220	240	260	280	300	320	± 15	80 / 80 / 10	16	24
	FB-M16L	90	110	130	150	170	190	210	230	250	270	290	310	330	± 20	80 / 80 / 10	16	24
M20	FB-M20K	80	100	120	140	160	180	200	220	240	260	280	300	320	± 15	100/100/12	20	30
	FB-M20L	90	110	130	150	170	190	210	230	250	270	290	310	330	± 20	100/100/12	20	30
M24	FB-M24K ①	80	100	120	140	160	180	200	220	240	260	280	300	320	± 15	110/110/12	24	36
	FB-M24L ①	90	110	130	150	170	190	210	230	250	270	290	310	330	± 20	110/110/12	24	36

① The cast-in parts FB-M24 K/ L are not subject of the approval.

Order example: **FB - DS1 - M12 x 130**

Order example: **FB - M12 L**



Please note

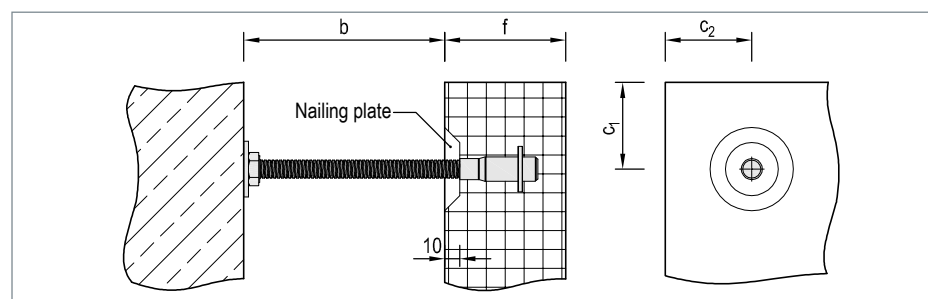
Cast in sockets (e.g. FB-M12L) to be set in concrete should be tendered separately.

Technical data / Measurement table



FB-DS1 + FB-M

FB-	Boundary conditions			Tensile load $F_{Z,Rd}$ [kN]	Bearing capacity (without reinforcement)													
	Panel thickness f_{min}	Edge distance $c_{1,min}$; $c_{2,min}$	Min. concrete quality		Pressure load for the cavity b in mm													
					60	80	100	120	140	160	180	200	220	240	260	280	300	
M12K	70 mm	50 mm	C25/30	3.15	3.15	→												3.15
M12K	85 mm	75 mm	C25/30	3.15	8.54	→						8.54	8.32	7.34	6.52	5.82	5.22	4.71
M12L	100 mm	75 mm	C25/30	8.54	8.54	→						8.54	8.32	7.34	6.52	5.82	5.22	4.71
M16K	80 mm	75 mm	C25/30	6.05	6.05	→												6.05
M16K	100 mm	100 mm	C25/30	6.05	12.13	→												12.13
M16L	120 mm	100 mm	C25/30	12.13	12.13	→												12.13
M20K	100 mm	75 mm	C30/37	8.80	8.80	→												8.80
M20K	120 mm	125 mm	C30/37	8.80	24.93	→												24.93
M20L	140 mm	125 mm	C30/37	24.93	24.93	→												24.93
M24K	100 mm	100 mm	C30/37	8.80	8.80	→												8.80
M24L	140 mm	150 mm	C30/37	24.93	24.93	→												24.93



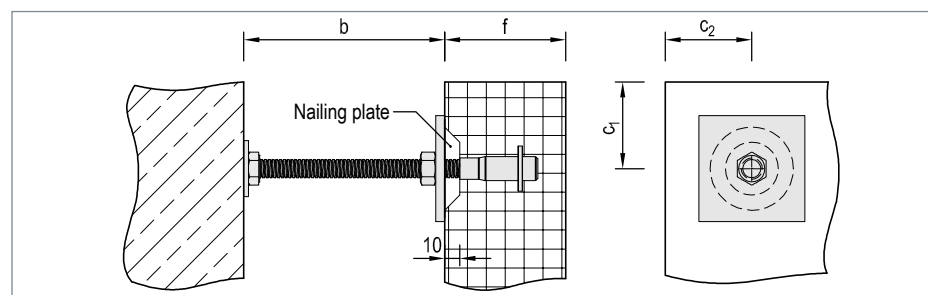
Scope of supply

- Pressure screw

◀ FB-DS1: Installation condition

FB-DS2 + FB-M

FB-	Boundary conditions			Tensile load $F_{Z,Rd}$ [kN]	Bearing capacity (with minimum reinforcement Q188 + pressure plate)														
	Panel thickness f_{min}	Edge distance $c_{1,min}$; $c_{2,min}$	Min. concrete quality		Pressure load for the cavity b in mm														
					60	80	100	120	140	160	180	200	220	240	260	280	300		
M12K	70 mm	150 mm	C25/30	3.15	12.84	→				12.84	12.45	10.84	9.47	8.32	7.34	6.52	5.82	5.22	4.71
M12L	100 mm	175 mm	C25/30	8.54	19.55	18.92	16.49	14.33	12.45	10.84	9.47	8.32	7.34	6.52	5.82	5.22			4.71
M16K	80 mm	125 mm	C25/30	6.05	12.64	→													12.64
M16L	120 mm	175 mm	C25/30	12.13	30.97	→			30.97	30.97	28.93	26.11	23.57	21.31	19.29	17.51	15.93		14.54
M20K	100 mm	200 mm	C30/37	8.80	22.91	→													22.91
M20L	140 mm	250 mm	C30/37	24.93	49.20	→				49.20	49.20	46.08	42.45	39.11	36.04	33.24			30.70



Scope of supply

- Pressure screw
- Pressure plate
- Hex nut DIN EN ISO 4032 (DIN 934)

◀ FB-DS2: Installation condition

Cross-references for additional information

Page	Topic
30, 32ff	In case of tensile loads, a suction protection device on the in-situ concrete must be planned. (e.g. FB-DZA ; FB-ZH)

Text for invitation to tender

...pc. MOSO® precast fixing FB-DS1¹⁾-M12²⁾x130³⁾ as accessory for precast concrete facade panels, delivery and proper installation.

- ¹⁾ Design acc. to table
- ²⁾ Thread size acc. to table
- ³⁾ Thread length acc. to table



Pressure screws

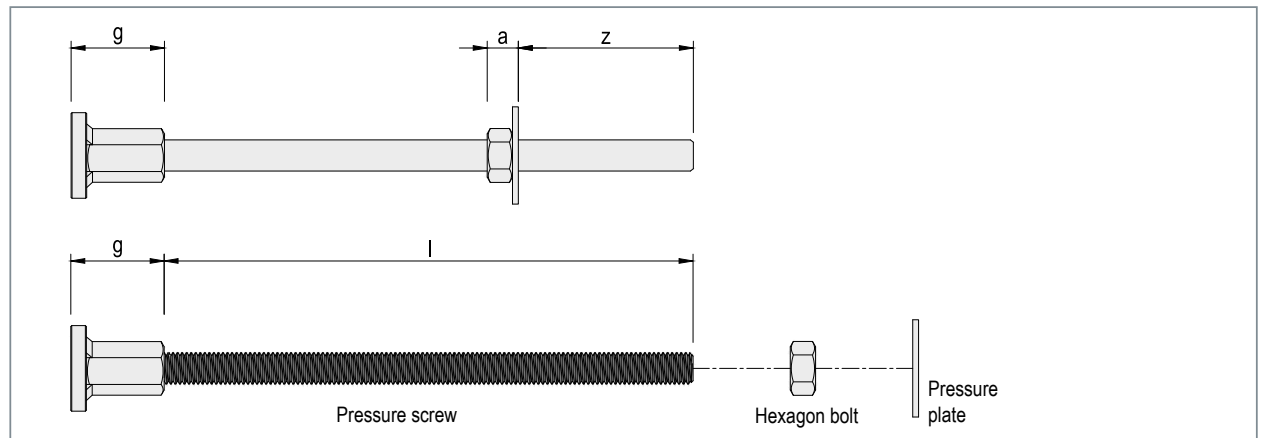
FB-DS

The MOSO® precast fastening FB-DS Type DS3 is used for horizontal support of façade panels. In combination with suspended tie rods, the compressive forces are absorbed. The DS3 system is used, among other things, when a subsequent pressure support is required or when the panel geometry precludes the use of a threaded sleeve.



Product information

- Durchmesser: M12 - M24 (> by request)
- Cavity: up to 300 mm
larger distances on request
- Material: A4; 1.4362
- Certification: structural analysis

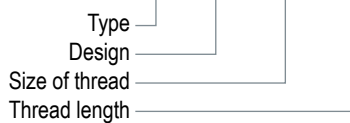


▲ FB-DS3

FB-DS3

	Nut + washer a	Length of sleeve with washer g	Embedment depth in shell z_{min}	Adjustment	Thread length l_{min} with wall distance b in mm												
					60	80	100	120	140	160	180	200	220	240	260	280	300
M12	13 mm	46 mm	78 mm	±18 mm	120	140	160	180	200	220	240	260	280	300	320	340	360
M16	16 mm	48 mm	88 mm	±17 mm	-	150	170	190	210	230	250	270	290	310	330	350	370
M20	20 mm	60 mm	92 mm	±22 mm	-	-	170	190	210	230	250	270	290	310	330	350	370
M24	24 mm	65 mm	103 mm	±23 mm	-	-	180	200	220	240	260	280	300	320	340	360	380

Order example: **FB - DS3 - M12 x 200**



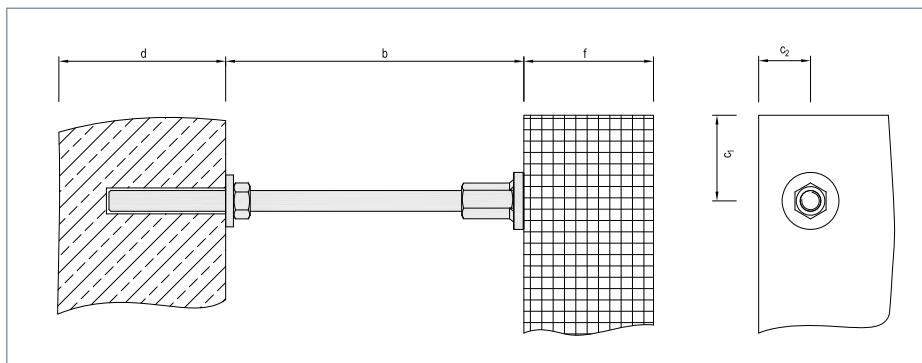
Technical data / Measurement table



FB-DS3

	Boundary conditions				
	Edge distance precast part in mm $c_1, \text{min}; c_2, \text{min}$	Precast part thickness f_{min} in mm	Wall thickness of shell dependant on f d_{min} in mm		Minimum concrete quality
			$f \leq d_{\text{min}}$	$f > d_{\text{min}}$	
M12 / M16	120	60 / 80	110 / 125	min. precast part tickness	C25 / C30
M12 / M16	240	60 / 80	110 / 125	min. precast part tickness	C25 / C30
M20 / M24	120	100	140 / 160	min. precast part tickness	C30 / C37
M20 / M24	240	100	140 / 160	min. precast part tickness	C30 / C37

	Compressive load-bearing capacity due to punching of the <u>precast part</u> f in mm (with minimum reinforcement Q188) $F_{D, Rd}$ [kN]												
	60 (M12)	80	100	120	140	160	180	200	220	240	260	280	300
	M12 / M16	4.36	5.18	6.00	7.08	8.41	9.78	11.30	12.85	14.52	16.24	18.13	20.00
M12 / M16	7.42	11.21	12.95	14.71	16.82	18.86	21.07	23.39	25.70	28.18	30.77	33.41	36.00
M20 / M24	-	-	6.67	8.08	9.55	11.13	12.80	14.63	16.41	18.42	20.48	22.66	24.86
M20 / M24	-	-	14.07	16.41	18.69	21.16	23.71	26.13	28.77	31.61	34.14	37.11	40.01



◀ FB-DS3: Installation condition

Scope of supply

- Pressure screw
- Pressure support
- SKM DIN 934
- Washer DIN 9021

Cross-references for additional information

Page	Topic
30, 32ff	In case of tensile loads, a suction protection device on the in-situ concrete must be planned. (e.g. FB-DZA ; FB-ZH)

Text for invitation to tender

...pc. MOSO® precast fixing FB-DS3¹⁾-M12²⁾x140³⁾ as accessory for precast concrete facade panels, delivery and proper installation.

¹⁾ Design acc. to table

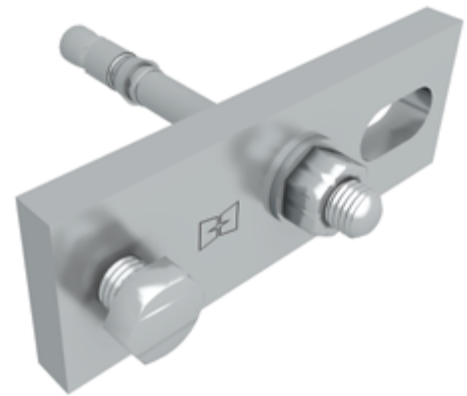
²⁾ Thread size acc. to table

³⁾ Thread length acc. to table



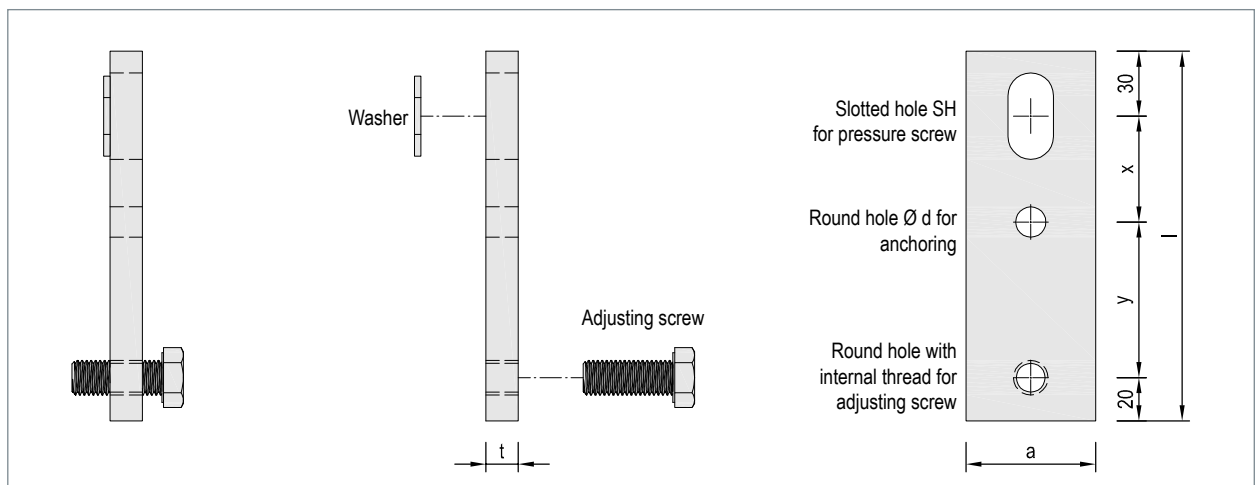
Restraint anchor

The MOSO® precast fixing FB-DZA is used for the horizontal suction of facade panels. This is used in combination with pressure screw FB-DS. It is connected to the precast part by means of the officially approved cast in socket FB-M. The cast-in part and the pressure screw must be ordered separately.



Product information

- Load range: 2.0 - 6.0 kN (> by request)
- Material: stainless steel
corrosion resistance class (CRC) I-V
- Certification: structural analysis
- * Further corrosion resistance classes on request



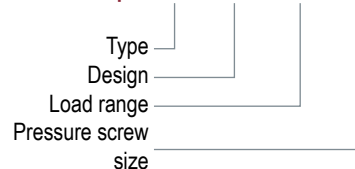
▲ FB-DZA

FB-DZA

	Load range (suction) [kN]	Suitable pressure screws ①	Dimensions						
			l [mm]	a [mm]	t [mm]	x [mm]	y [mm]	Ø d [mm]	LL [mm]
Type	- 2.0	M12	157	40	10	38	69	12	13 x 40
	- 3.5	M12 / M16	148	48	12	39	59	14	17 x 40
	- 6.0	M16 / M20	171	60	15	49	72	18	21 x 40

① See table "Pressure screws" for the admissible compressive forces on page 27. Further combinations of load lvl and the size of pressure screw on request

Order example: FB - DZA - 3.5 - M16



Scope of supply

- Anchor plate with hex. bolt DIN EN ISO 4017 (DIN 933) pre-assembled
- Washer DIN 7349 acc. to pressure screw size

Please note

The pressure screw and the cast in socket to be set in concrete must be tendered separately.

Text for invitation to tender

...pc. MOSO® precast fixing FB-DZA-3.5¹⁾-M16²⁾ including dowel for cracked concrete as accessory for precast concrete panels, delivery and proper installation.

¹⁾ Load range acc. to table

²⁾ Suitable pressure screw acc. to table

Cross-references for additional information

Page	Topic
26 - 27	Pressure screw FB-DS
29	Assembly and mounting instructions

Technical data / Measurement table

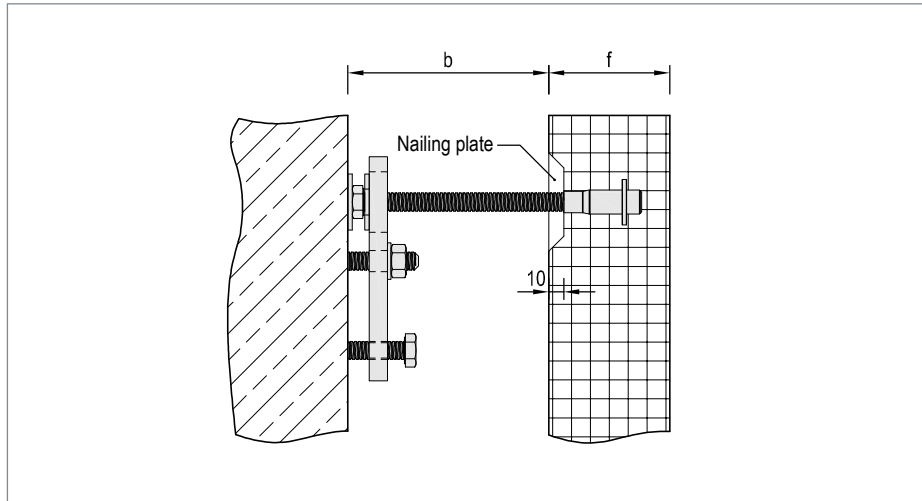


FB-DZA

	Load range (suction) [kN]	Design load $F_{H,Rd}$ [kN]	Recommended mount ①	Adjusting screw	Suitable ews ②
Type	- 2.0	- 3.00	FAZ II 10/50	M10 x 40	M12
	- 3.5	- 5.25	FAZ II 12/60	M12 x 40	M12 / M16
	- 6.0	- 9.00	FAZ II 16/60	M16 x 50	M16 / M20

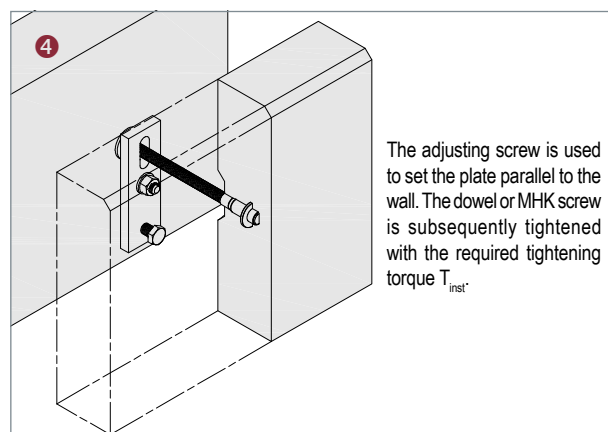
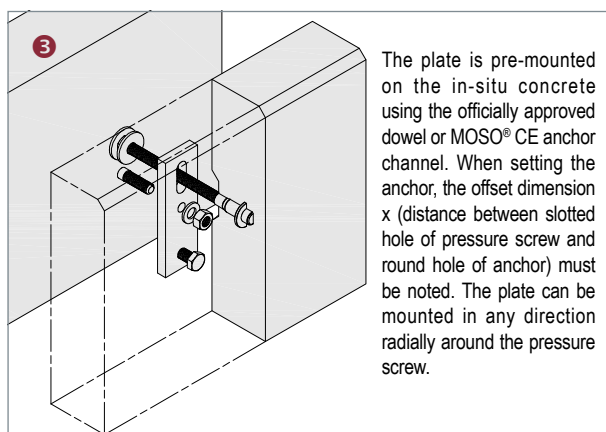
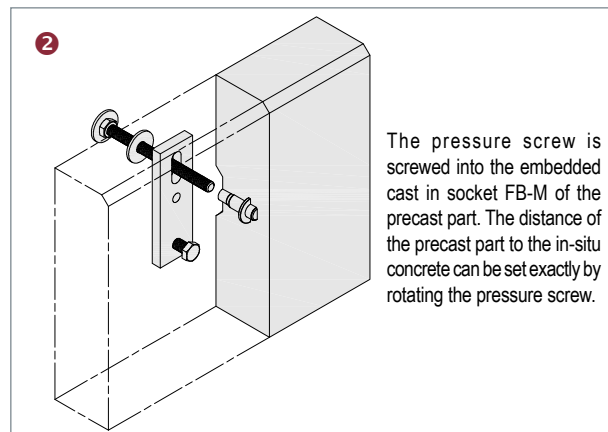
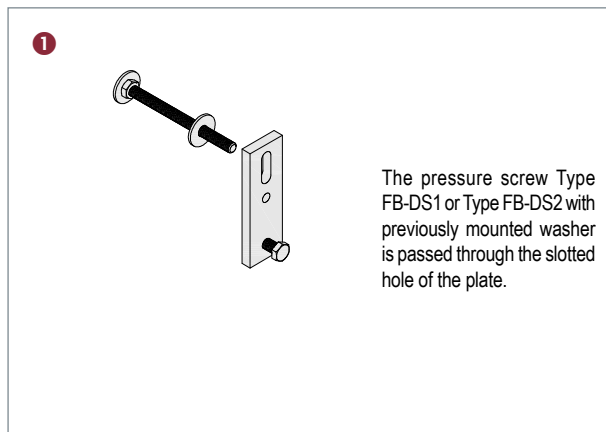
① The proof of anchoring must be provided in consideration of the respective boundary conditions.

② See table "Pressure screws" for the admissible compressive forces on page 27.



▲ FB-DZA: Mounting condition

Assembly instructions FB-DZA





Serrated restraint anchor with hammer-head bolt

FB-ZH

Due to its force locked connection to the installed MOSO® CE anchor channel, the serrated restraint anchor with welded-in hammer-head bolt can be pressure- and tension-loaded.

The serration on the plate guarantees an optimal force transmission and the slotted hole allows precise adjusting.

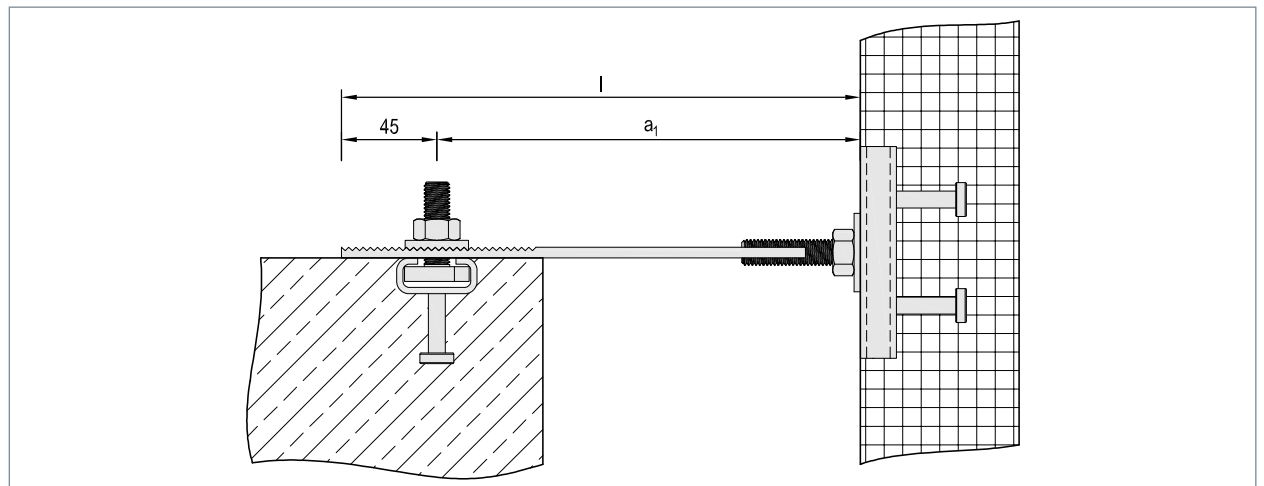
The serrated restraint anchor is fastened to the in-situ concrete with an officially approved dowel or a MOSO® CE anchor channel.

Please refer to the table for the dimensions.



Product information

- Load range: 3.5 - 7.0 kN (> by request)
- System length: up to 375 mm (> by request)
- Material: stainless steel
corrosion resistance class (CRC) I-V
- Certification: structural analysis



▲ FB-ZH: Installation condition

Technical data / Measurement table

FB-ZH

Type	Load range (tensile-compressive) [kN]	Design load $F_{H,Rd}$ [kN]	utilised screw ②	Dimensions				Recommended mount ①	
				Spacing a_1 [mm]	Length l [mm]	Adjustment [mm]	Slotted hole SH [mm]	Dowel	Anchor channel
Type	± 3.5	± 5.25	MHK 28/15	125	170	±30	12 x 50	FAZ II 10/10 A4	MBA-CE 38/17 L=150 mm MHK 38/17 M12 x 40
				175	220				
				225	270				
				275	320				
				325	370				
				375	420				
Type	± 7.0	± 10.50	MHK 38/17	175	220	±29	14 x 50	FAZ II 12/10 A4	MBA-CE 38/17 L=150 mm MHK 38/17 M12 x 40
				225	270				
				275	320				
				325	370				
				375	420				

Scope of supply

- Serrated restraint anchor with welded-in hammer-head bolt, pre-assembled hex nut and washer
- Serrated washer

Please note

Parts to be set in concrete (MOSO® CE anchor channels) and installation accessories should be tendered separately.

Text for invitation to tender

...pc. MOSO® precast fixing FB-ZH-150¹⁾-3.5²⁾ including officially approved dowel for cracked concrete³⁾, delivery and proper installation.

¹⁾ Distance a_1 acc. to table

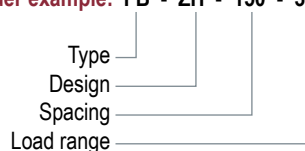
²⁾ Load range acc. to table

³⁾ Fixing in-situ concrete acc. to table

① The proof of anchoring must be provided in consideration of the respective boundary conditions.

② more hammer / hookheadscrews on request

Order example: FB - ZH - 150 - 3.5



Serrated restraint anchor U-profile

FB-ZU



Serrated restraint anchor

Due to its force locked connection to the installed MOSO® CE anchor channel, the serrated restraint anchor with welded-in MHK bolt can be pressure- and tension-loaded. The FB-ZU is specially designed for high loads and great shell distances.

The serration on the plate guarantees an optimal force transmission and the slotted hole allows precise adjusting.

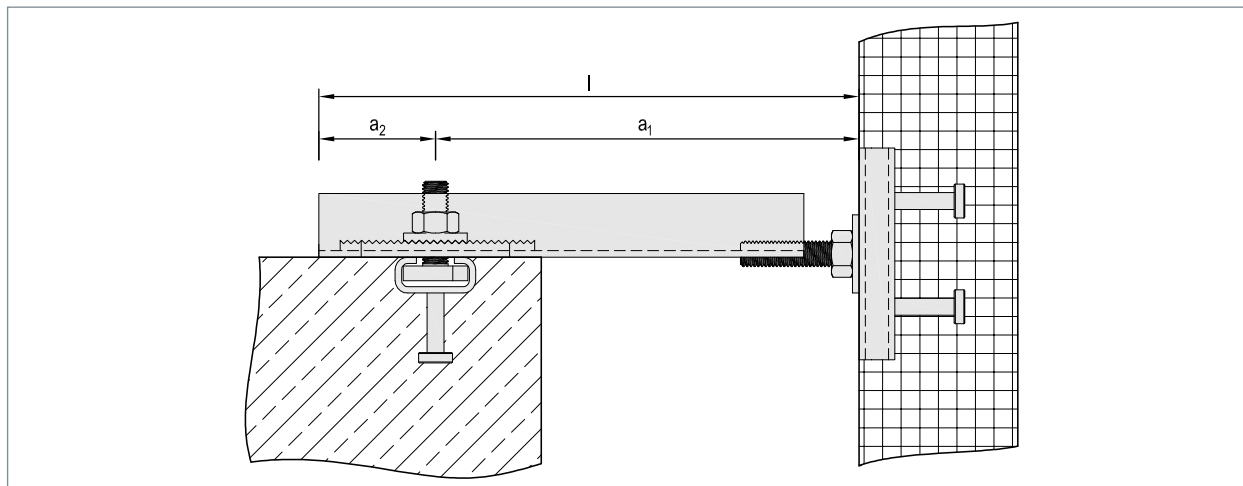
The serrated restraint anchor is fastened to the in-situ concrete with an officially approved dowel or a MOSO® CE anchor channel.

Please refer to the table for the dimensions.



Product information

- Load range: 7.0 - 12.0 kN (> by request)
- System length: up to 500 mm (> by request)
- Material: stainless steel
corrosion resistance class (CRC) I-V
- Certification: structural analysis



▲ FB-ZU: Installation condition

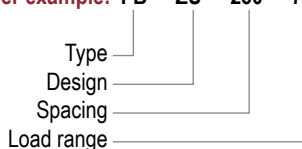
Technical data / Measurement table

FB-ZU

Type	Load range (tensile compressive) [kN]	Design load $F_{H,Rd}$ [kN]	utilised screw ②	Dimensions					Recommended mount ①	
				Spacing a_1 [mm]	Spacing a_2 [mm]	Length l [mm]	Adjustment [mm]	slotted hole SH [mm]	Dowel	Anchor channel
Type	± 7.0	± 10.50	MHK 38/17	300	45	345	±19	14 x 50	FAZ II 12/30	MBA-CE 38/17 L=150 mm
				325		370				
				350		395				
				375		420				
	± 12.0	± 18.00	MHK 50/30	300	50	350	±17	18 x 50	FAZ II 16/25	MBA-CE 50/31 L=150 mm
				325		375				
				350		400				
				375		425				
			400		500			A4	MHK 38/17 M12 x 40	

① The proof of anchoring must be provided in consideration of the respective boundary conditions.
② more hammer / hookheadscrews on request

Order example: FB - ZU - 250 - 7.0



Scope of supply

- Serrated restraint anchor with welded-in MHK bolt, pre-assembled hex nut and washer
- Serrated washer

Please note

Parts to be set in concrete (MOSO® CE anchor channels) and installation accessories should be tendered separately.

Text for invitation to tender

...pc. MOSO® precast fixing FB-ZU-250¹⁾-7.0²⁾ including officially approved dowel for cracked concrete³⁾, delivery and proper installation.

¹⁾ Distance a_1 acc. to table

²⁾ Load range acc. to table

³⁾ Fixing in-situ concrete acc. to table



Serrated restraint anchor with bracket

The serrated restraint anchor with bracket can be fastened to the in-situ concrete with an officially approved dowel or a MOSO® CE anchor channel. Tensile and compressive loads can be absorbed on the lower and upper side of the precast part.

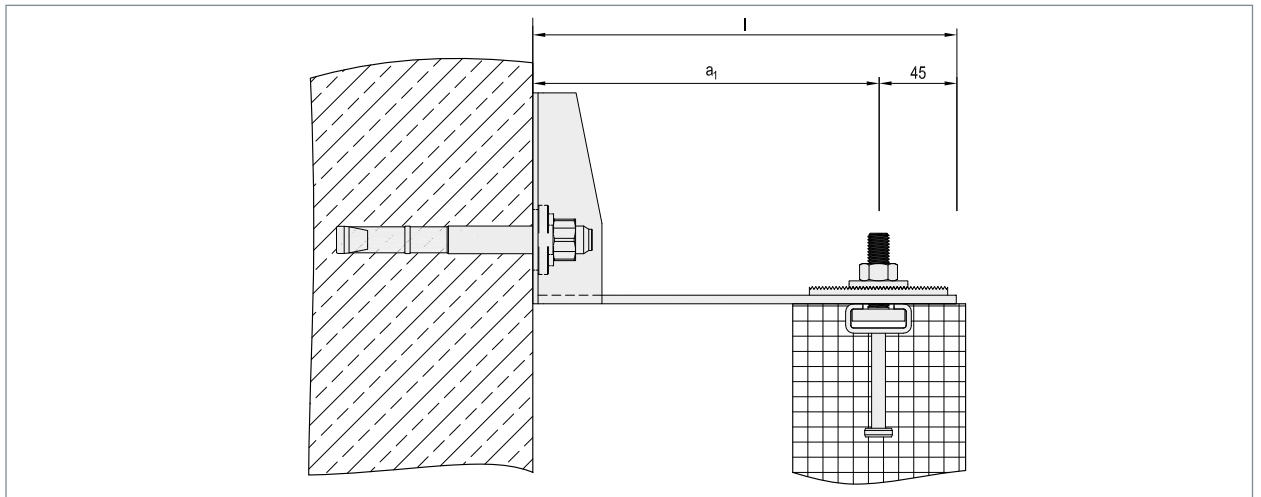
The serration on the plate guarantees an optimal force transmission and the slotted hole allows precise adjusting!

Please refer to the table for the dimensions.



Product information

- Load range: 3.5 - 7.0 kN (> by request)
- System length: up to 300 mm (> by request)
- Material: stainless steel
- Certification: corrosion resistance class (CRC) I-V
- Certification: structural analysis



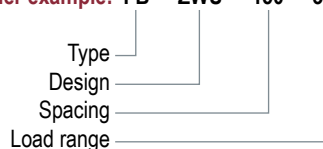
▲ FB-ZW: Installation condition

Technical data / Measurement table

FB-ZW								
	Load range (tensile-compressive) [kN]	Design load $F_{H,Rd}$ [kN]	Dimensions				Recommended mount ①	
			Spacing a_1 [mm]	Length l [mm]	Adjustment [mm]	Slotted hole SH [mm]	Dowel	Anchor channel
Type	± 3.5	± 5.25	100	145	±30	12 x 50	FAZ II 10/10 A4	MBA-CE 38/17 L=150 mm
			125	170				
			150	195				
			175	220				
			200	245				
	± 7.0	± 10.50	225	270	±25	14 x 50	FAZ II 12/10 A4	MBA-CE 38/17 L=150 mm
			250	295				
			275	320				
			300	345				
			325	370				

① The proof of anchoring must be provided in consideration of the respective boundary conditions.

Order example: **FB - ZWU - 150 - 3.5**



Scope of supply

- Serrated restraint anchor
- Serrated washer

Please note

Parts to be set in concrete (MOSO® CE anchor channels) and installation accessories should be tendered separately.

Text for invitation to tender

...pc. MOSO® precast fixing FB-ZW-150¹⁾-3.5²⁾ including officially approved dowel for cracked concrete³⁾, delivery and proper installation.

¹⁾ Distance a, acc. to table

²⁾ Load range acc. to table

³⁾ Fixing in-situ concrete acc. to table

Serrated restraint anchor with bracket without reinforcement

FB-ZWO



Serrated restraint anchor

The serrated restraint anchor with bracket without reinforcement is a structural anti-tilt device for small loads.

The serration on the plate guarantees an optimal force transmission and the slotted hole allows precise adjusting!

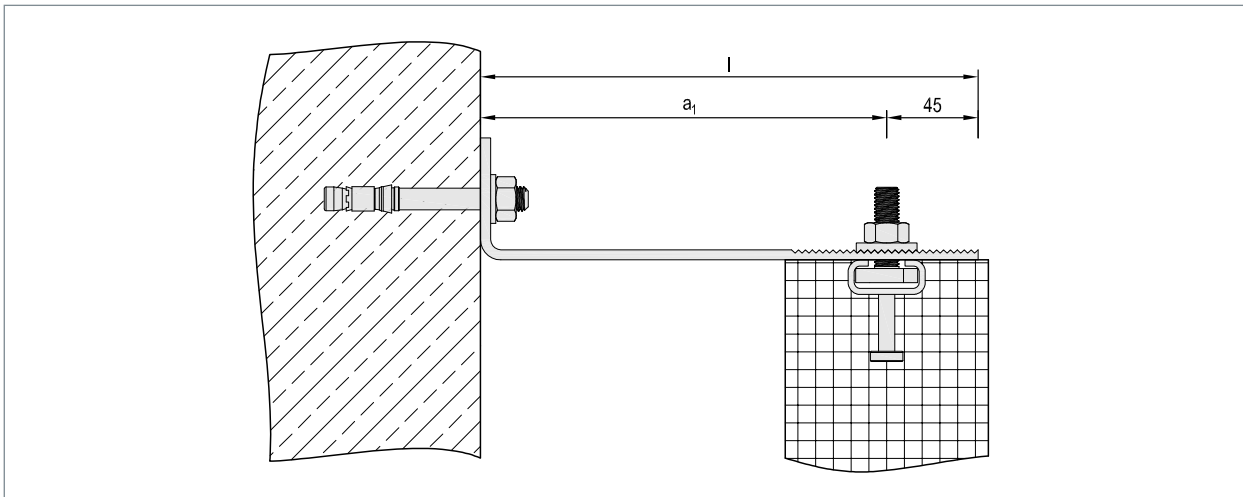
The serrated restraint anchor is fastened to the in-situ concrete with an officially approved dowel or a MOSO® CE anchor channel.

Please refer to the table for the dimensions.



Product information

- Load range: 1.0 kN (> by request)
- System length: up to 260 mm (> by request)
- Material: stainless steel
- Certification: corrosion resistance class (CRC) I-V structural analysis



▲ FB-ZWO: Installation condition

Technical data / Measurement table

FB-ZWO

Type	Load range (tensile-compressive) [kN]	Dimensioning load $F_{H,Rd}$ [kN]	Dimensions				Recommended mount ①	
			Spacing a_1 [mm]	Length l [mm]	Adjustment [mm]	Slotted hole SH [mm]	Dowel	Anchor channel
Type	± 1.0	± 1.50	100	145	±30	12 x 70	FAZ II	MBA-CE 28/15 L=150 mm
			120	165				
			140	185				
			160	205				
			180	225				
			200	245				
			220	265				
			240	285				
260	305					MHK 28/15 M10 x 30		

① The proof of anchoring must be provided in consideration of the respective boundary conditions.

Scope of supply

- Serrated restraint anchor
- Serrated washer

Please note

Parts to be set in concrete (MOSO® CE anchor channels) and installation accessories should be tendered separately.

Text for invitation to tender

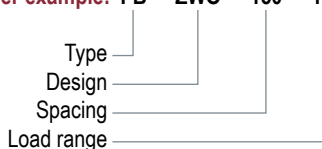
...pc. MOSO® precast fixing FB-ZWO-150¹⁾-1.0²⁾ including officially approved dowel for cracked concrete³⁾, delivery and proper installation.

¹⁾ Distance a_1 , acc. to table

²⁾ Load range acc. to table

³⁾ Fixing in-situ concrete acc. to table

Order example: FB - ZWO - 150 - 1.0





Serrated restraint anchor with hammer head

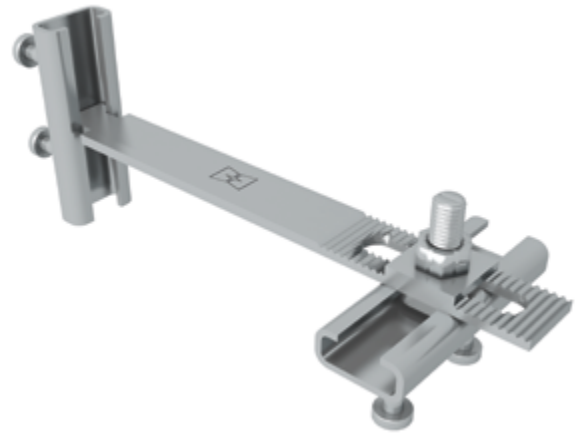
FB-ZK

The serrated restraint anchor with punched hammer head is the installation-friendly solution for absorbing low tensile loads from precast parts.

The serration on the plate guarantees an optimal force transmission and the slotted hole allows precise adjusting!

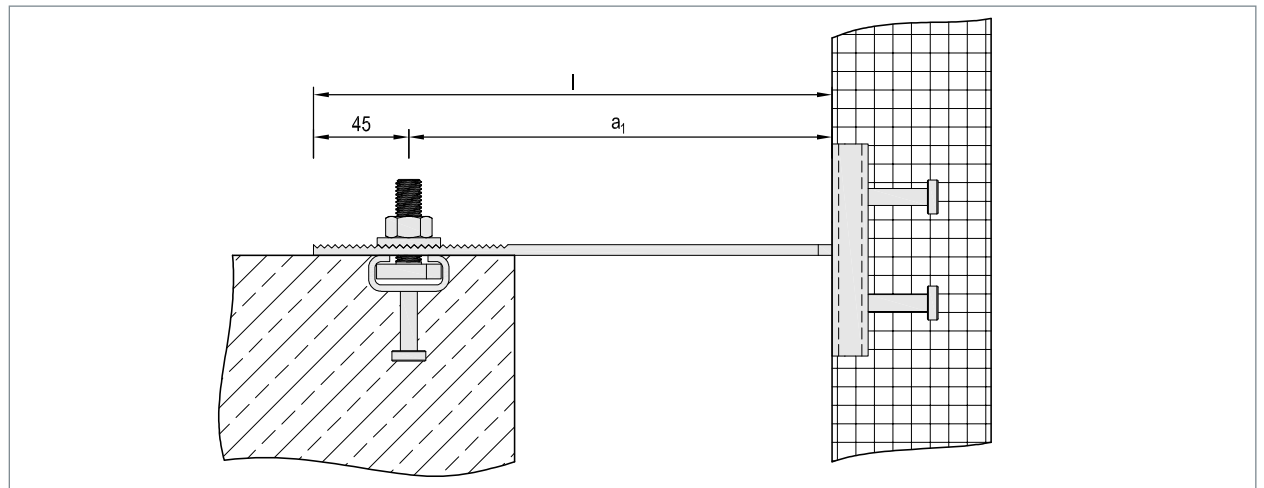
The serrated restraint anchor is fastened to the in-situ concrete with an officially approved dowel or a MOSO® CE anchor channel.

Please refer to the table for the dimensions.



Product information

- Load range: 3.5 kN
- System length: up to 350 mm (> by request)
- Material: stainless steel
corrosion resistance class (CRC) I-V
- Certification: structural analysis



▲ FB-ZK: Installation condition

Technical data / Measurement table

FB-ZK

	Load range (tensile) [kN]	Design load $F_{H,Rd}$ [kN]	for anchor channel profile 28/15 ②	Dimensions				Recommended mount ①	
				Distance a_1 [mm]	Length l [mm]	Adjustment [mm]	Slotted hole SH [mm]	Dowel	Anchor channel
Typ	- 3.50	- 5.25	28/15	100	145	± 30	12 x 70	FAZ II 10/10 A4	MBA-CE 28/15 L=150 mm
				150	195				
				175	220				
				200	245				
				250	295				
				300	345				
350	395	MHK 28/15 M10 x 30							

① The proof of anchoring must be provided in consideration of the respective boundary conditions.
 ② For other profile sizes on request.

Scope of supply

- Serrated restraint anchor
- Serrated washer

Please note

Parts to be set in concrete (MOSO® CE anchor channels) and installation accessories should be tendered separately.

Text for invitation to tender

...pc. MOSO® precast fixing FB-ZK-150¹⁾-3.5²⁾ including officially approved dowel for cracked concrete³⁾, delivery and proper installation.

¹⁾ Distance a_1 acc. to table
²⁾ Load range acc. to table
³⁾ Fixing in-situ concrete acc. to table

Order example: FB - ZK - 150 - 3.5



Serrated restraint anchor with round hole

FB-ZL



Serrated restraint anchor

The serrated restraint anchor with round hole is the standard solution for absorbing tensile and compressive loads on the upper edge of the precast part.

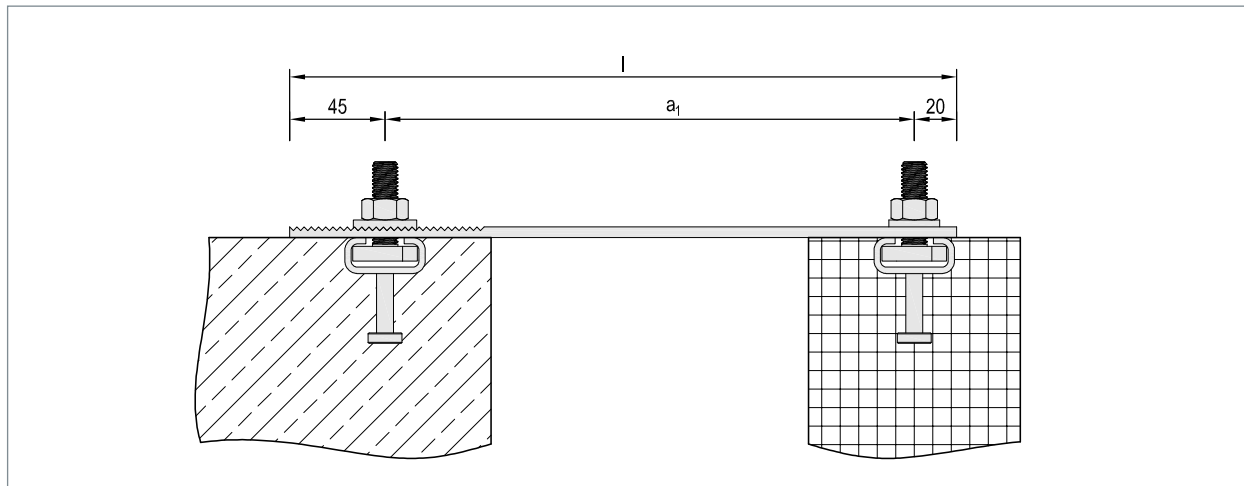
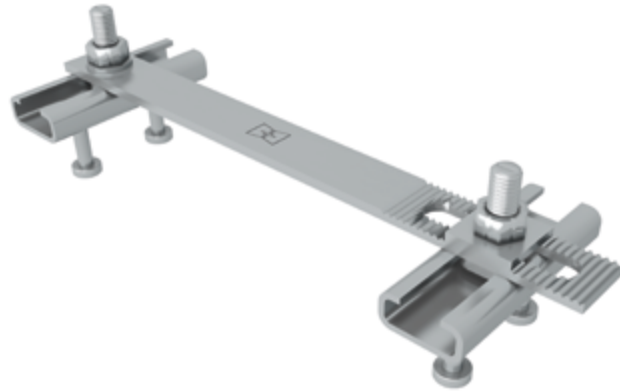
The serration on the plate guarantees an optimal force transmission and the slotted hole allows precise adjusting!

The serrated restraint anchor is fastened to the in-situ concrete with an officially approved dowel or a MOSO® CE anchor channel.

Please refer to the table for the dimensions.

Product information

- Load range: 3.5 - 7.0 kN
- System length: up to 350 mm (> by request)
- Material: stainless steel
corrosion resistance class (CRC) I-V
- Certification: structural analysis



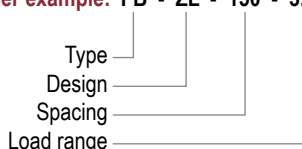
▲ FB-ZL: Installation condition

Technical data / Measurement table

FB-ZL										
Type	Load range (tensile-compressive) [kN]	Design load $F_{H,Rd}$ [kN]	Dimensions					Recommended mount ①		
			Spacing a_1 [mm]	Length l [mm]	Adjustment [mm]	Slotted hole SH [mm]	Round hole d [mm]	Dowel	Anchor channel	
Type	± 3.5	± 5.25	150	215	±30	12 x 70	12	FAZ II 10/10 A4	MBA-CE 28/15	
			175	240					MHK 28/15	
			200	265					M10 x 30	
			225	290					MBA-CE 38/17	
	± 7.0	± 10.50	250	315	±25	14 x 70	14		FAZ II 12/10 A4	MHK 38/17
			275	340						MHK 38/17
			300	365						M12 x 40
			325	390						
			350	415						

① The proof of anchoring must be provided in consideration of the respective boundary conditions.

Order example: FB - ZL - 150 - 3.5



Scope of supply

- Serrated restraint anchor
- Serrated washer

Please note

Parts to be set in concrete (MOSO® CE anchor channels) and installation accessories should be tendered separately.

Text for invitation to tender

...pc. MOSO® precast fixing FB-ZL-150¹⁾-3.5²⁾ including officially approved dowel for cracked concrete³⁾, delivery and proper installation.

¹⁾ Distance a_1 acc. to table

²⁾ Load range acc. to table

³⁾ Fixing in-situ concrete acc. to table



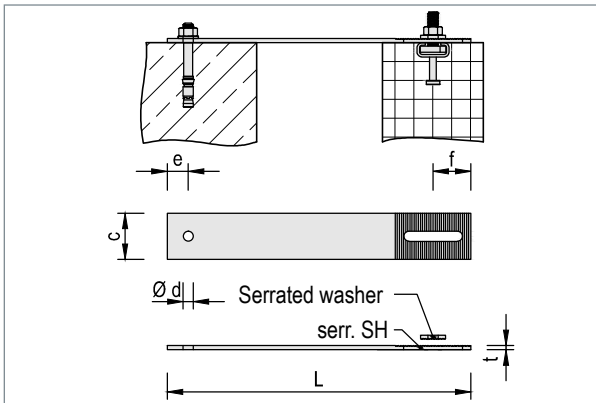
Universal butt strap

The slotted universal retaining bracket serves as individual bracing of load. The size and bending mould can be adapted to nearly every cast-in situation. The tothing of the strap ensures an optimal load transmission and enables an exact adjustability by the slotted hole.

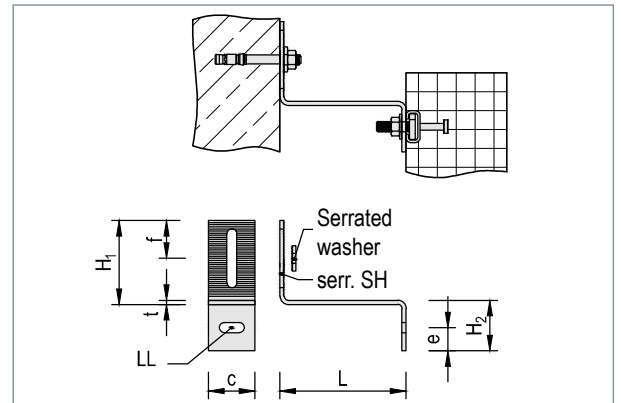


Product information

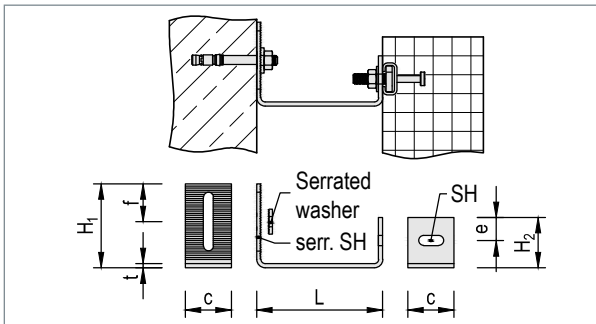
- Load range: 3.5 - 12.0 kN
- Material: stainless steel
corrosion resistance class (CRC) I-V
elastic limit $f_{y,k} = 450 \text{ N/mm}^2$
tensile strength $f_{u,k} = 600 \text{ N/mm}^2$
elastic modulus: 200.000 N/mm^2



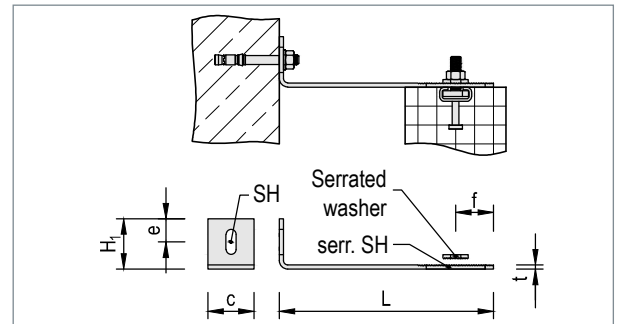
▲ Model 1



▲ Model 3



▲ Model 2



▲ Model 4

Technical data / Measurement table

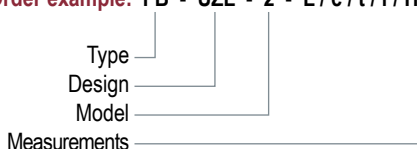
FB-UZL

	Measurements ①				Serrated slotted hole	Adjustment	Strength of tothing
	L [mm]	c [mm]	t [mm]	f [mm]			
Type	≥ 150	30	5	45	12 x 70	± 30	± 5.25
		45	6		14 x 70	± 28	± 10.50
		55	6		18 x 70	± 26	± 18.00
		80	8		18 x 70	± 26	± 18.00

Further measurements on request.

① The strength of the strap depends on design and measurement. Statics have to be calculated on own responsibility.

Order example: FB - UZL - 2 - L / c / t / f / H1 / e / LL / H2



Scope of supply

- Universal butt strap
- Serrated washer

Please note

Parts to be set in concrete (MOSO® CE anchor channels) and installation accessories should be tendered separately.

Text for invitation to tender

...pc. MOSO® precast fixing FB-UZL¹⁾-2²⁾-...³⁾ delivery and proper installation.

¹⁾ Type acc. to table

²⁾ Model

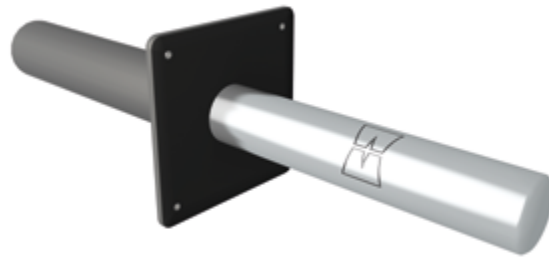
³⁾ Measurement acc. to table



Dowel connections allow the transmission of shear forces between two precast parts.

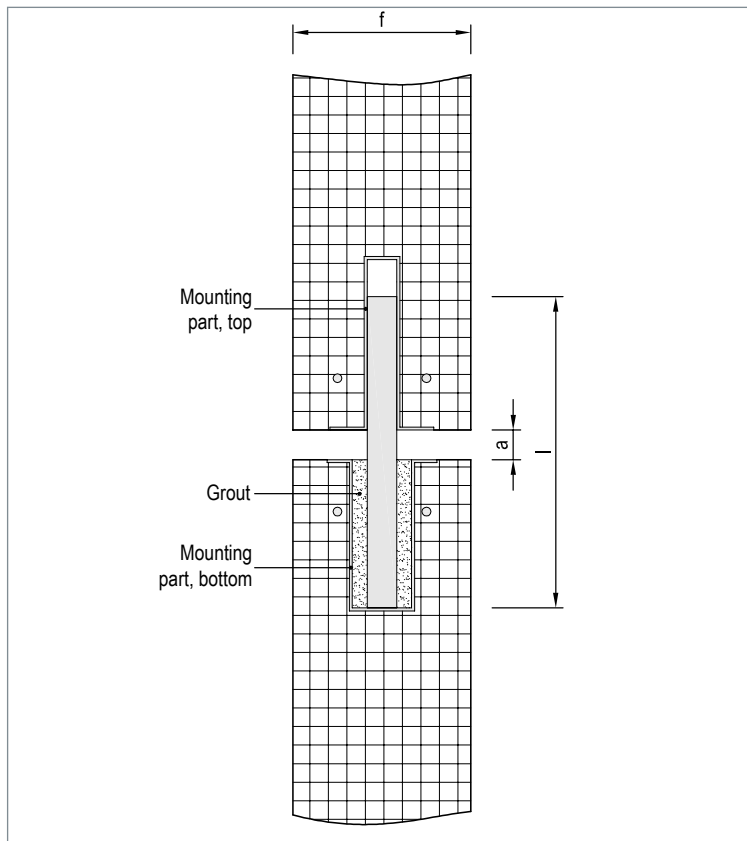
A round sleeve is embedded into the bottom of the upper panel and a mortar sleeve is embedded into the top of the lower panel.

Please refer to the table for the dimensions.



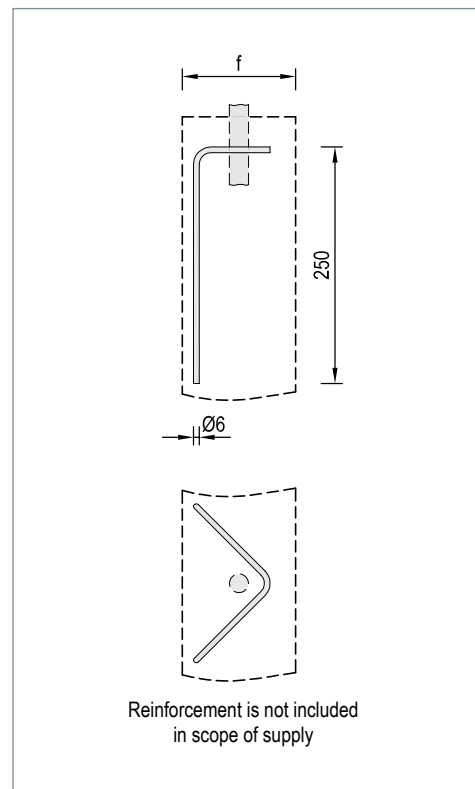
Product information

- Load range: 1.0 - 5.0 kN
- Material: stainless steel
corrosion resistance class (CRC) I-V
- Certification: structural analysis



▲ FB-VD: Installation condition

Additional reinforcement



▲ Illustration

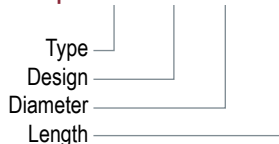
Technical data / Measurement table

FB-VD

	Load range [kN]	Design load $F_{H,Rd}$ [kN]	Dimensions				Accessories			
			Dia- meter $\varnothing d$ [mm]	Length of circular sleeve l [mm]	Panel thick- ness f_{min} [mm]	Joint thick- ness a_{max} [mm]	Fitting sleeve		Mortar sleeve	
							top	bottom	round	oval
Type	± 1.0	± 1.50	12	180	100	20	$\varnothing 12,5 \times 85$	-	$\varnothing 40 \times 100$	60/32 x 120
	± 2.5	± 3.75	16	200	100	20	$\varnothing 16 \times 100$	44/18 x 100	$\varnothing 40 \times 100$	60/32 x 120
	± 5.0	± 7.50	20	220	120	20	$\varnothing 20 \times 140$	46/21 x 140	$\varnothing 40 \times 100$	60/32 x 120

⊙ $l = 100 + a + 5 \cdot \varnothing d$ According to booklet 346 DAfStb (when using a round mortar sleeve)
 $l = 120 + a + 5 \cdot \varnothing d$ According to booklet 346 DAfStb (when using an oval mortar sleeve)

Order example: **FB - VD - 16 x 200**



Scope of supply

- Round bolts A4

Please note

Parts to be set in concrete (plastic sleeve) should be tendered separately.

Text for invitation to tender

...pc. MOSO® precast fixing FB-VD-16x200¹⁾, delivery and proper installation.

¹⁾ Measurements acc. to table



Gallow anchor

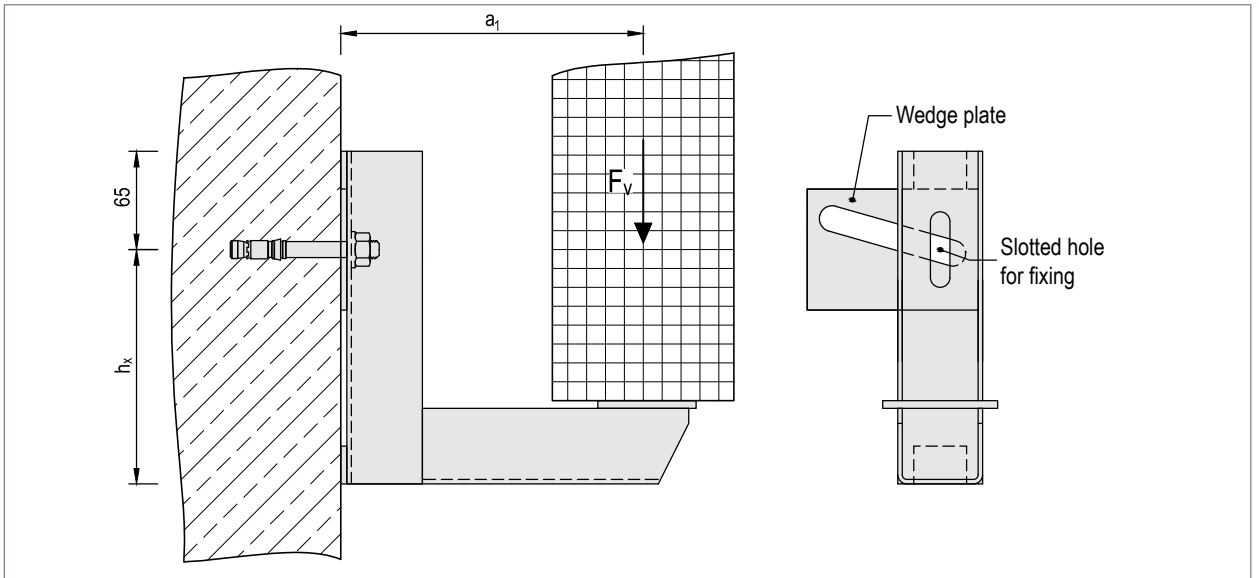
FB-G

The MOSO® precast fixing FB-G is an anchor for vertical loads. This can be manufactured in different types, depending on the situation. The gallow anchor can be adapted to the requirements of the shell and the precast unit.



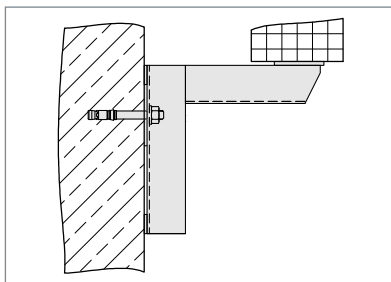
Product information

- Load range: 3.5 - 10.5 kN (> on request)
- Material: stainless steel
corrosion resistance class (CRC) I-V
- Certification: structural analysis

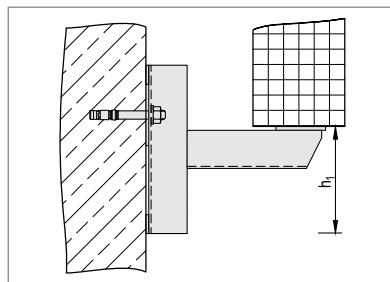


▲ System

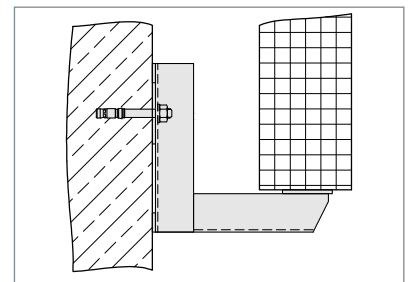
Alternatives of construction – Gallow anchor



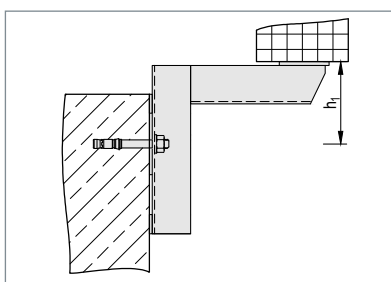
▲ FB-GO



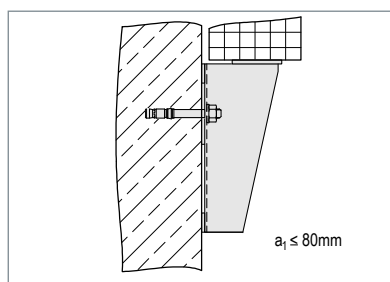
▲ FB-GM



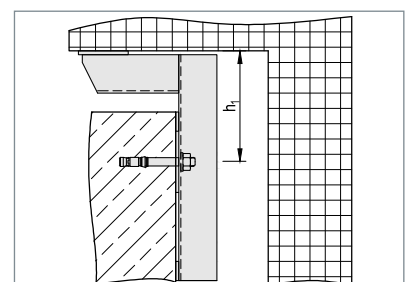
▲ FB-GU



▲ FB-GOV



▲ FB-GE



▲ FB-GA

Technical data / Measurement table



Gallow anchor

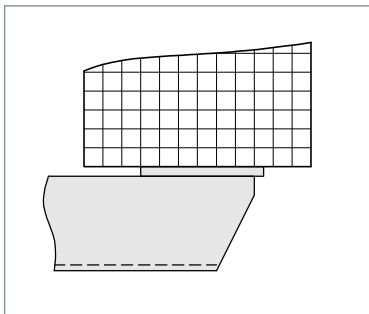
FB-G

Type	Load range kN	Design load $F_{V,Rd}$ kN	Dimensions				Adjustment		recommended mount		
			Spacing a_1 ① [mm]	Bracket height h_x ① [mm]	Slotted hole SH [mm]	a_1 ③ [mm]	h_x [mm]	Dowel ②	Edge distance [mm]	Panel thickness [mm]	
Type	3.5	4.73	100	150	13 x 50	± 20	± 19	FAZ II 12 x 30 A4	≥ 100	≥ 120	
			150	150							
			200	200							
			250	200							
			300	200							
	7.0	9.45	100	200	13 x 50	± 20	± 19	RG M12 x 160 A4 + cartridge RSB 12	≥ 125	≥ 140	
			150	200							
			200	250							
			250	300							
			300	300							
	10.5	14.18	100	250	18 x 50	± 20	± 17	FAZ II 16 x 25 A4	≥ 150	≥ 150	
			150	250							
			200	300							
			250	300							
			300	350							

① Further measurement on application

② For the calculation of the dowels, structural circumstances must be taken into consideration.

③ With type 2 adjustment ± 20 mm



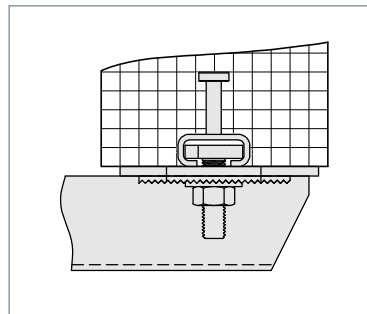
▲ Type 1

Standard configuration:

The precast reinforced-concrete is placed non-positively on the bearing plate of the gallow anchor.

Horizontal loads cannot be taken.

Set serrated restraint anchor FB-ZW if necessary.



▲ Type 2

Serrated construction:

The precast reinforced concrete is placed non-positively on the bearing plate of the gallow anchor.

Through the welded serrated plate with slotted hole, horizontal loads up to ± 3.5 kN are taken.

Please note

For both anchor types please indicate cavity b and panel thickness f in mm!

Scope of supply

- Gallow anchor
- Wedge plate

Please note

Parts to be set in concrete (MOSO® CE anchor channels) and installation accessories should be tendered separately.

Text for invitation to tender

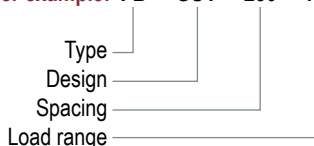
...pc. MOSO® precast fixing FB-GU1¹⁾-250²⁾-7.0³⁾ delivery and proper installation.

¹⁾ Type acc. to table

²⁾ Spacing acc. to table

³⁾ Load range acc. to table

Order example: FB - GU1 - 250 - 7.0





Other products

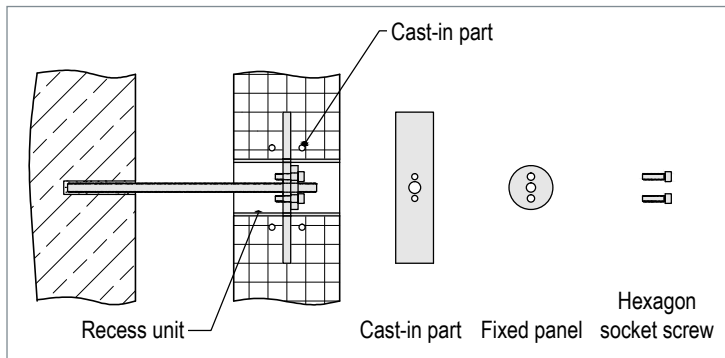
Here you can find additional products from our product range. Please contact our Service Team for any questions about technical details, special-purpose solutions, standard part from stainless steel, as well as fixing accessories.

Wind anchor

The wind anchor FB-WA is used for the horizontal pressure and suction protection of facade panels. The connection to the shell is done during the mounting of the precast unit on the embedded cast-in part, the round fixed panel and on the two hexagon socket screws.

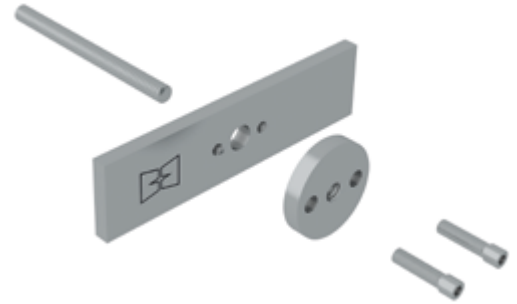
Product information

- Load range: 3.5 - 7.0 kN
- Diameter: M12 and M16
- Material: stainless steel
corrosion resistance class (CRC) I-V
- Certification: structural analysis



▲ FB-WA: cast-in part

FB-WA



The wind anchor can be applied flexible and can be used for suspended top of slab panels.

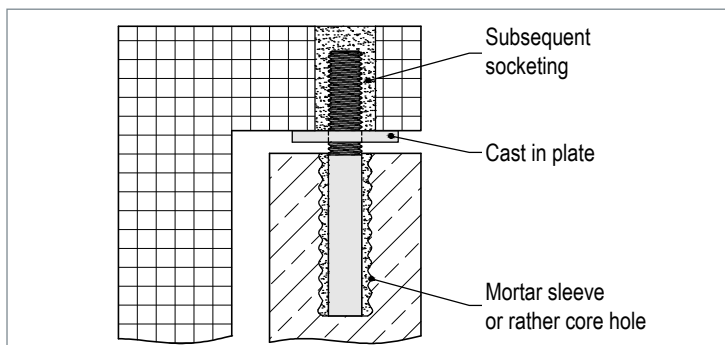
The threaded bar is anchored in the bore hole by an approved injection mortar. The distance from the precast part to the shell can be regulated continuously by the thread with the setting tool. The recess, which is necessary for mounting, is locked subsequently with a plastic plug or a concrete sealing cone.

Stud bolt anchor

The stud bolt anchor FB-SBA allows the fastening of angle plates in the range of reinforced concrete parapet. The anchor consists of a threaded rod with partial thread and a bearing plate with an internal thread. With the pressure screws which are instructed additionally at the bottom of the precast part, the stud anchor represents a complete fastening system.

Product information

- Diameter: M24 to M44
- Material: stainless steel
corrosion resistance class (CRC) I-V
- Certification: structural analysis



▲ FB-SBA: cast-in part

FB-SBA

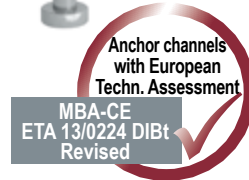


The stud anchor takes vertical- and horizontal loads. It is characterized by a simple mounting and a very good adjustability. For the absorption of thermal expansion a stud anchor is encased elastically and superimposed on an elastomer support.



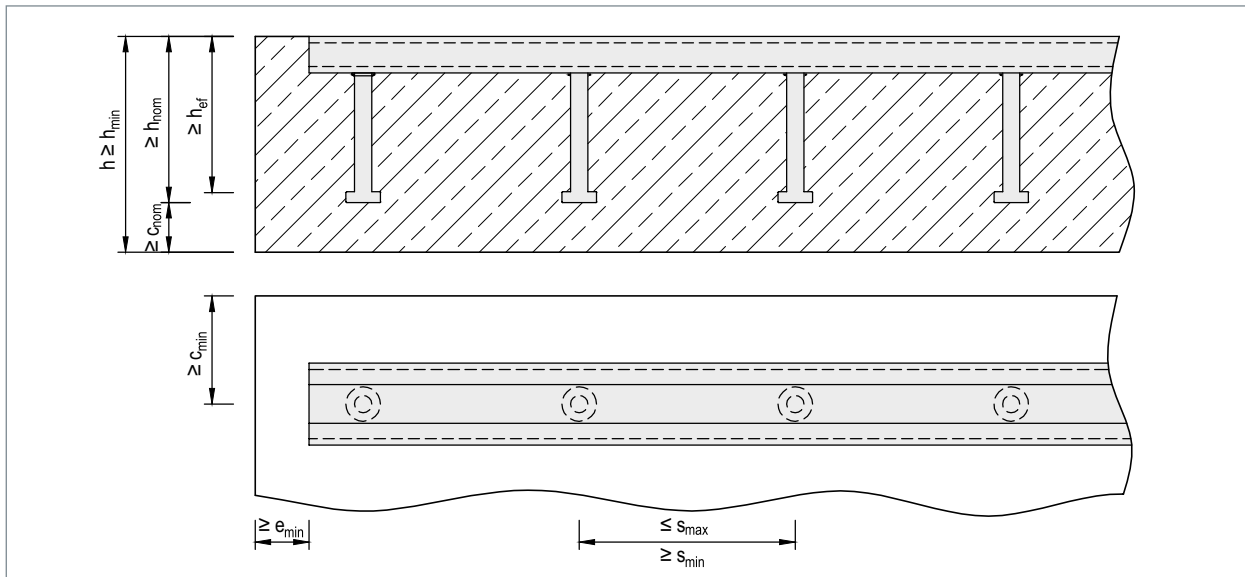
Officially approved in Europe, anchor channel MBA-CE is used to mount installation parts in in-situ concrete or as a cast-in part in the pre-cast part. The MBA-CE anchor channel offers a horizontal or a vertical adjustment option depending on the mounting situation. MOSO® hammer-head/hook-head bolts MHK are used as fasteners.

Please refer to the table for the dimensions.



Product information

- Profile sizes: 28/15, 38/17, 50/31 and 52/34
Additional profile sizes on request
- Material: stainless steel
corrosion resistance class (CRC) I-V
- Certificate: European Technical Assessment ETA-13/0224



▲ MBA-CE: Installation condition

Order example: **MBA - CE - 50/31 - 150**



Technical data / Measurement table

MBA-CE

Anchor channel		28/15	38/17	50/31	52/34
min. h_{ef}	[mm]	45	72	99	151
min. h_{nom}	[mm]	50	77	106	159
c_{min}	[mm]	40	50	75	100
e_{min}	[mm]	15	25	50	65
s_{min}/s_{max}	[mm]	50 / 200	50 / 200	50 / 250	80 / 250
h_{min}	[mm]	75	100	130	185

Please note

The hammer-head/hook-head bolt should be tendered separately.

Text for invitation to tender

...pc. MOSO® precast fixing MBA-CE-50/31¹⁾-150²⁾, delivery and proper installation.

¹⁾ Profile size acc. to table

²⁾ Profile length acc. to table

Profile size	Length [mm] ①											MHK	Bolt size ①			
	100	150	200	250	300	350	400	550	1050	3025	6050		M10	M12	M16	M20
28/15	x	x	x	x	x	x	x	x	x	x	x	28/15	x			
38/17	x	x	x	x	x	x	x	x	x	x	x	38/17	x	x	x	
50/31		x	x	x	x	x	x	x	x	x	x	50/30				
52/34		x	x	x	x	x		x	x	x	x			x	x	x

① Additional dimensions on request.

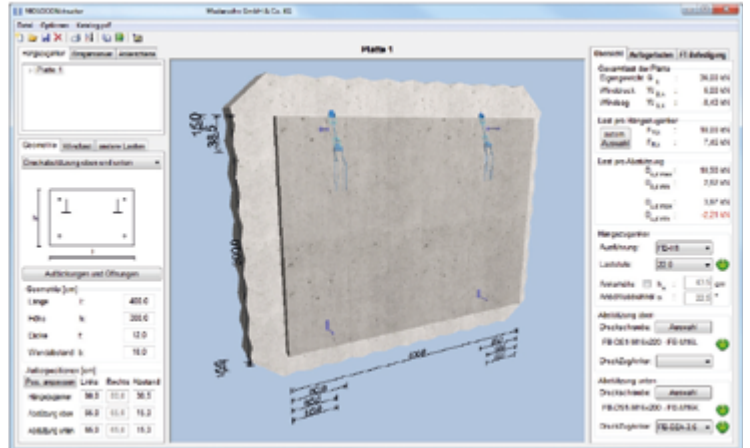


MOSOCONstructor

MOSOCONstructor is a flexible calculation software for engineers. We developed the software based on the official technical approval for panel hangers, the structural analysis for parapet anchors and the European Technical Assessment for anchor channels.

Software for:

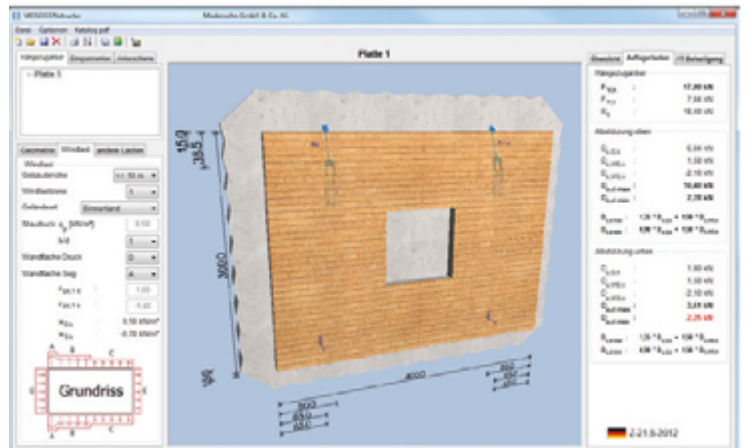
Panel hanger	FB-H	Z-21.8-2012
Parapet anchor	FB-E	structural analysis
Anchor channels	MBA-CE	Dimensioning procedure EN 1992-4:2018, EOTA TR047, ETA-13/0224



▲ Surface FB-H

Advantages

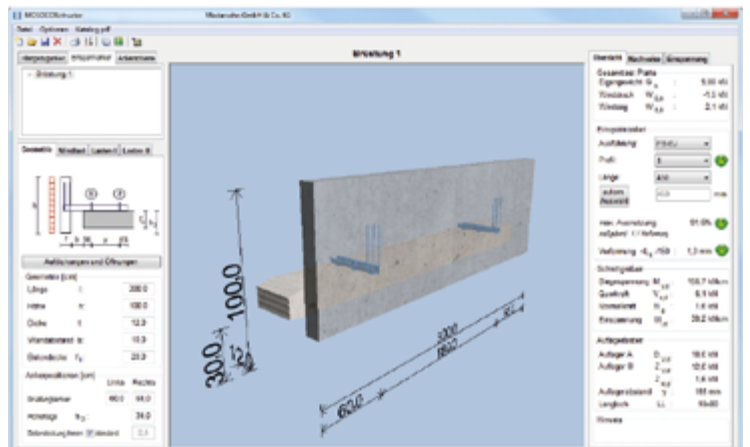
- intuitive user interface
- dimensioning without any time lag!
- clear presentation with 3D animation
- project-related saving and loading
- all results at a glance
- arrangement of clinker veneers
- extensive wind load calculation
- detailed listing of bearing loads
- input of local maximum thickness and cut-out
- forces resulting from other panels can be considered (FB-H)
- variable angle adjustment of the anchor (FB-H)
- applying and taking into account the expense of open and closed railings (FB-E)
- variable embedment depth (FB-E)



▲ Panel hanger

Documents for print

- Clear overview for all project partners:
- structural analysis for the auditor and as summary for planners and structural engineers
 - separate assembly plans for the precast plant
 - complete bill of quantities for purchasing

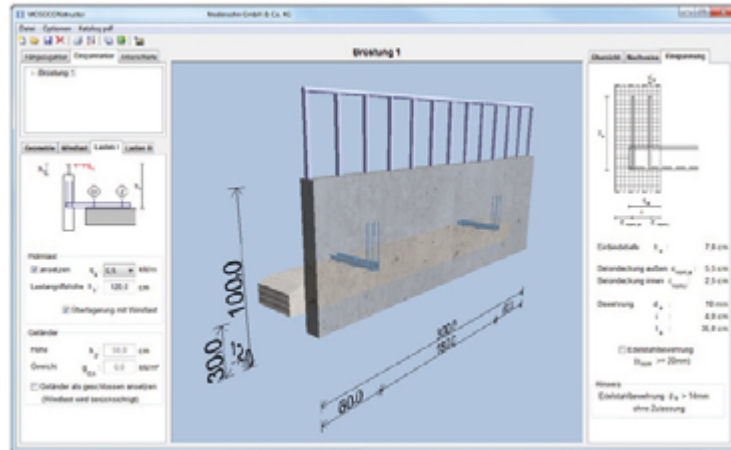


▲ Surface FB-E



MOSOCONstructor as project planner

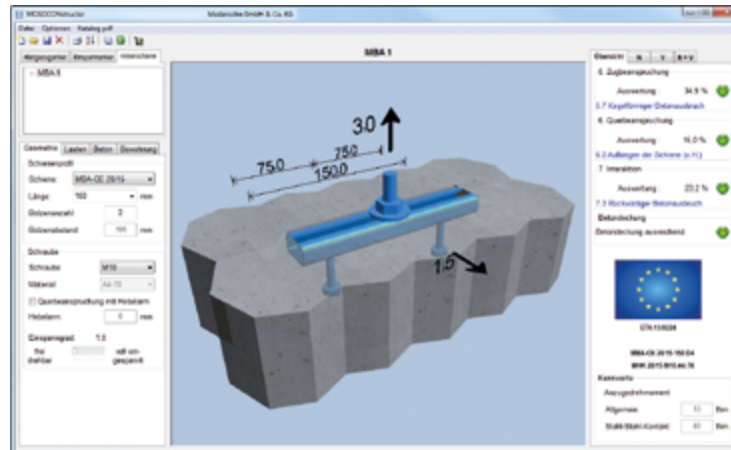
- enter all concrete elements with the software
- additional necessary installation and assembly parts can be measured panel related
- the panels are clearly presented in the project window and can be sorted alphabetically - even retroactively
- all included products can be provided in a separate input mask with detailed descriptions
- the bill of quantities contains all relevant details, required for ordering



▲ Parapet anchor

Further advantages of the new version

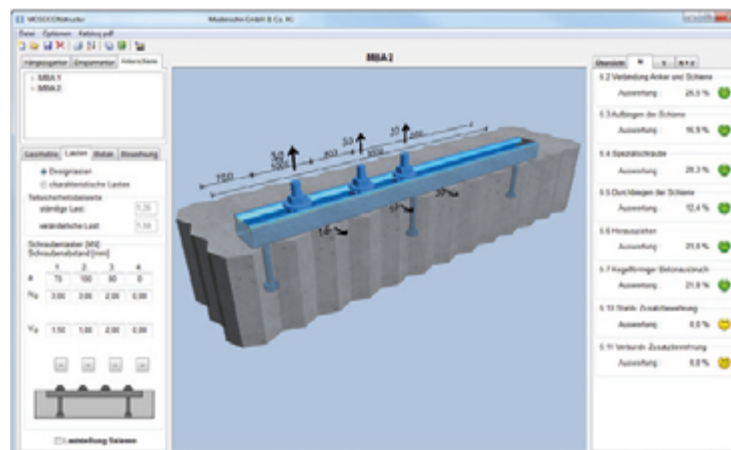
- Bilingual (German / English)
- Consideration of additional reinforcement (Reinforcement in tension) (MBA-CE)



▲ Surface MBA-CE

Installation

- After receiving the software, simply execute the file "MOSOCON_setup_3_1_70.exe".
- If you have any questions about the programme or about installing, feel free to call us at +49 5225 87 99-0 or send an e-mail to mosocon@modersohn.de. We look forward to receiving your call or your e-mail!
- **System requirements:**
Windows 8 or Windows 10, 32/64-Bit.



▲ Anchor channel

Download the software for free at:
<https://www.modersohn.eu/en/downloads/dimensioning-software/>



Our references

Modersohn's constructions made of stainless steel can be found in many buildings and monuments all over the country.

V&A-Museum, Dundee

- Type of building: Design museum
- Location: Dundee, Scotland
- Completion date: 2018
- Products: Anchor channel MBA-CE, serrated anchor channel, welded constructions und custom-made products for the exterior facade



▲ V&A Dundee design museum



Kornmarkt-Arcades, Frankfurt am Main

- Type of building: Business-Center
- Location: Frankfurt am Main, Germany
- Completion date: November 2018
- Products: Precast fixings, panel hangers, laser cuts



▲ Kornmarkt-Arcades

SOLARLUX Campus, Melle

- Type of building: Office and administration building
- Location: Melle, Germany
- Completion date: September 2016
- Products: Parapet anchors, panel hangers, MBA CE anchor channels, accessory



▲ SOLARLUX Campus



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Hufton + Crow (V&A-Museum, Dundee)
Solarlux GmbH (© Copyright 2017)

Complete system solutions for masonry facade fixings



MOSO® perforated tape



Single bracket anchors



Angle bracket anchors



Angle bearings



Precast fixings



Horizontal connections



Scaffold anchors



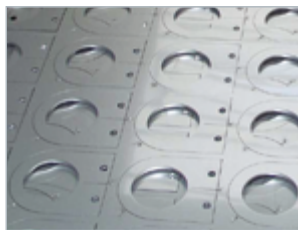
Accessories & variants



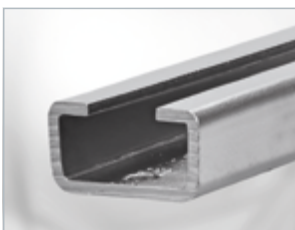
... as well as individual special solutions

NiroFix® - The experts for stainless steel

Cutting service



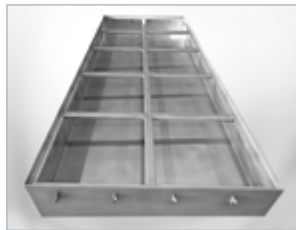
Profile production



Special services stainless steel



Assembly production



Joining technology



Surface treatment



Tunnel- / Bridge fixings



Monument renovation



- ▲ Special heavy duty fixings for tunnels and bridges
- ▲ Renovation of old buildings, fortifications for churches, castles and palaces
- ▲ Custom-made products and special constructions
- ▲ Industrial parts

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