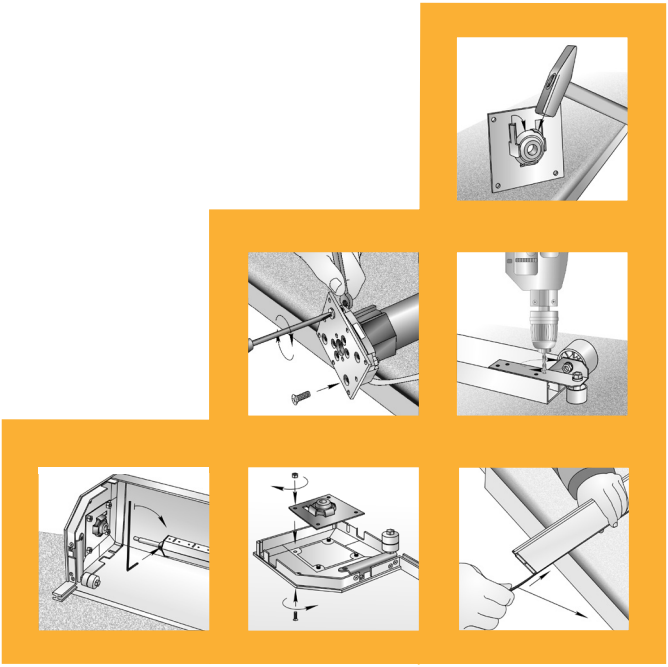
ALUTECH
ROLLER SHUTTER SYSTEMS

ROLLER SHUTTER

ROLLER SHUTTER
PRODUCTION MANUAL



JUN 2010

CONTENTS

This manual includes recommendations for calculation of roller shutter components' geometry, and describes different roller shutter configurations depending on the drive type.

The manual includes the recommended roller shutter production and assembly flow chart, describes main working operations, and lists required equipment and tools.

This manual can be used as the guidelines for technical staff training and work. The manual should be used together with the Technical Catalog since the product configuration (selecting the profile type, drive type, standard sizes of covers and shutter boxes) is developed based on the catalog data considering roller shutter dimensions and customer's requirements.

Alutech company reserves the right to amend this manual due to constant enhancement of roller shutter design.

1. ROLLER SHUTTER CONFIGURATIONS

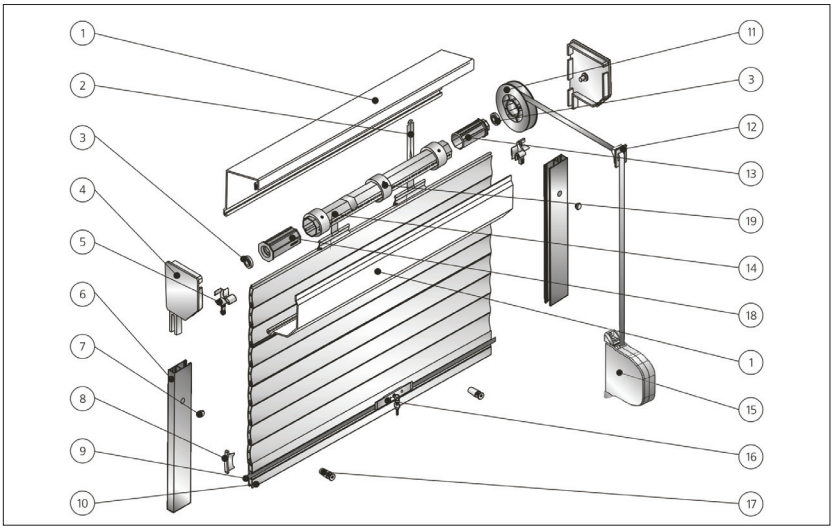


Figure 1.1 The roller shutter with the strap drive.

No	ID	Name	Quantity	Comments
1	SB45	Shutter box	1	Set (rear panel, front cover)
2	SS	Retainer spring	Set	Installed with the stroke not exceeding 500 mm
3	BB12x28	Ball bearing	2	
4	SF	End cap	couple	Set: the right and left ones
5	GD	Entry guide	couple	Is not used in case of flanged edge at the guide rail
6	GR	Guide rail	2	
7	PP12/PP14	Plug button	Set	Installed with the stroke not exceeding 400 mm
8	SP	Side lock	N	N is a number of curtain lamels. For AEG profile – 2N
9	PT	Locking flat bar	2	
10	ES	End slat profile	1	
11	TP	Pulley	1	
12	TG	Strap guide	1	
13	KU	Universal cap	1	
14	RT	Octagonal roll tube	1	
15	UC	Inertia-type universal coiler	1	Lifting capacity up to 15 kg complete with the strap 4.8 m long
16	RL	Key lock	1	Set: lock, mounting fasteners, 2 keys
17	ST40	Stopper	2	Set: stopper, washer and screw
18	BBC	Bearing cap	1	
19	RD	Adjusting ring	Set	Installed with the stroke not exceeding 500 mm

Note. 1. If roller shutters are equipped with SF250 or SF300 end caps, SBB12/100 supports must be additionally installed in them.

2. Actual standard sizes of components are chosen based on the Technical Catalog recommendations depending on the standard size of the chosen profile of the roller shutter curtain and roller shutter dimensions.

3. If roller shutters are equipped with RT40x0,6 octagonal roll tube, it is recommended to use TPC125 pulley combined with the cap, instead of KU40 cap and TP125 pulley.

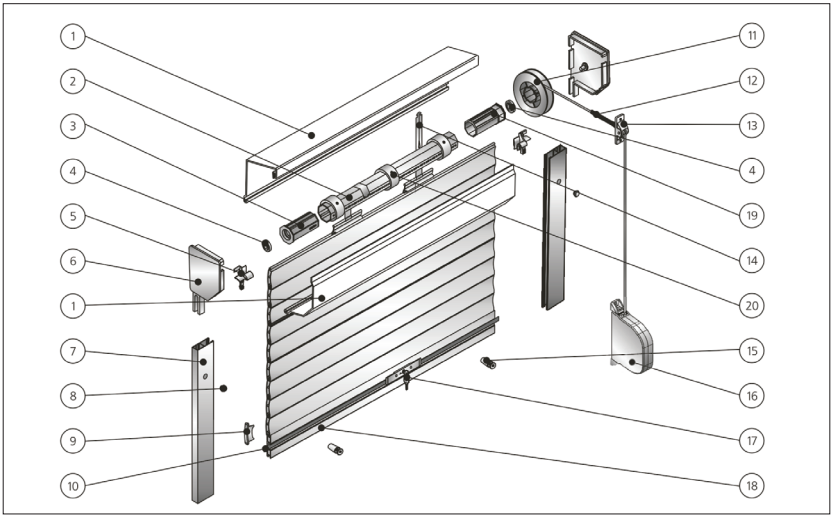


Figure 1.2 Roller shutter with the inertia-type rope drive

No.	ID	Name	Quantity	Comments
1	SB45	Shutter box	1	Set (rear panel, front cover)
2	RT	Octagonal roll tube	1	
3	BBC	Bearing cap	1	
4	BB12X28	Ball bearing	2	
5	GD	Entry guide	couple	Is not used in case of flanged edge at the guide rail
6	SF	End cap	couple	Set: the right and left ones
7	GR	Guide rail	2	
8	PP12/PP14	Plug button	Set	Installed with the stroke not exceeding 400 mm
9	SP	Side lock	N	N is a number of curtain lamels. For AEG profile – 2N
10	PT	Locking flat bar	2	
11	TP	Pulley	1	
12	SPR	Safety spring	1	
13	BGI	Rope guide	1	
14	SS	Retainer spring	Set	Installed with the stroke not exceeding 500 mm
15	ST40	Stopper	2	Set: stopper, washer and screw
16	UC	Inertia-type universal coiler	1	Lifting capacity up to 15 kg, complete with BP4 rope 5 m long
17	RL	Key lock	1	Set: the lock, mounting fasteners, 2 keys
18	ES	End slat profile	1	
19	KU	Universal cap	1	
20	RD	Adjusting ring	Set	Installed with the stroke not exceeding 500 mm

Note. 1. If roller shutters are equipped with SF250 or SF300 end caps, SBB12/100 supports must be additionally installed in them.

2. Actual standard sizes of components are chosen based on the Technical Catalog recommendations depending on the standard size of the chosen profile of the roller shutter curtain and roller shutter dimensions.

3. Instead of TP pulley, it is allowed to use RP pulley combined with the cap and assembled with BB12x28 ball bearing.

4. If roller shutters are equipped with RT40x0,6 octagonal roll tube, it is recommended to use TPC125 pulley combined with the cap, instead of KU40 cap and TP125 pulley.

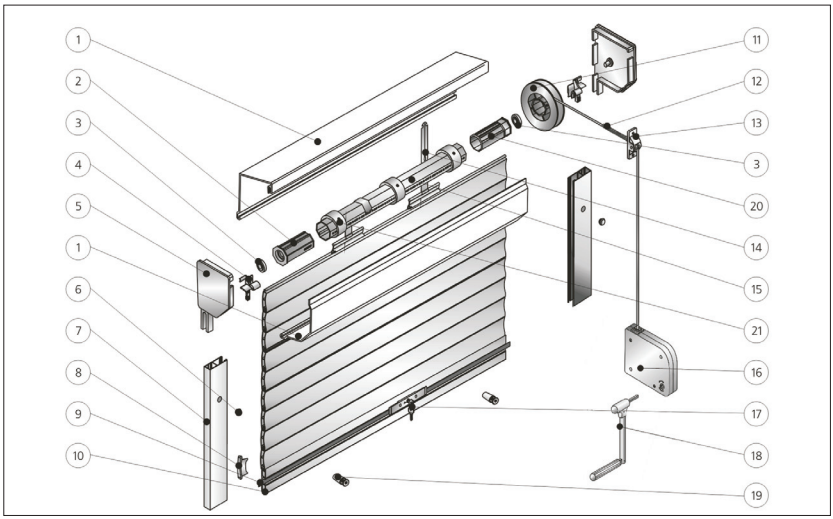


Figure 1.3 Roller shutter with the rope reduction drive

No.	ID	Name	Quantity	Comments
1	SB45	Shutter box	1	Set (rear panel, front cover)
2	BBC	Bearing cap	1	
3	BB12x28	Ball bearing	2	
4	GD	Entry guide	couple	Is not used in case of flanged edge at the guide rail
5	SF	End cap	couple	Set: the right and left ones
6	PP12/PP14	Plug button	Set	Installed with the stroke not exceeding 400 mm
7	GR	Guide rail	2	
8	SP	Side lock	N	N is a number of curtain lamels. For AEG profile – 2N
9	PT	Locking flat bar	2	
10	ES	End slat profile	1	
11	TP	Pulley	1	
12	SPR	Safety spring	1	
13	BGI	Rope guide	1	
14	SS	Retainer spring	Set	Installed with the stroke not exceeding 500 mm
15	RT	Octagonal roll tube	1	
16	SBG	Rope reduction coiler	1	Lifting capacity up to 20 kg, complete with BP4 rope 5 m long
17	RL	Key lock	1	Set: lock, mounting fasteners, 2 keys
18	KUR	Handle	1	
19	ST40	Stopper	2	Set: stopper, washer and screw
20	KU	Universal cap	1	
21	RD	Adjusting ring	Set	Installed with the stroke not exceeding 500 mm

Note. 1. If roller shutters are equipped with SF250 or SF300 end caps, SBB12/100 supports must be additionally installed in them.

2. Actual standard sizes of components are chosen based on the Technical Catalog recommendations depending on the standard size of the chosen profile of the roller shutter curtain and roller shutter dimensions.

3. Instead of TP pulley, it is allowed to use RP pulley combined with the cap and assembled with BB12x28 ball bearing.

If roller shutters are equipped with RT40x0,6 octagonal roll tube, it is recommended to use TPC125 pulley combined with the cap, instead of KU40 cap and TP125 pulley.

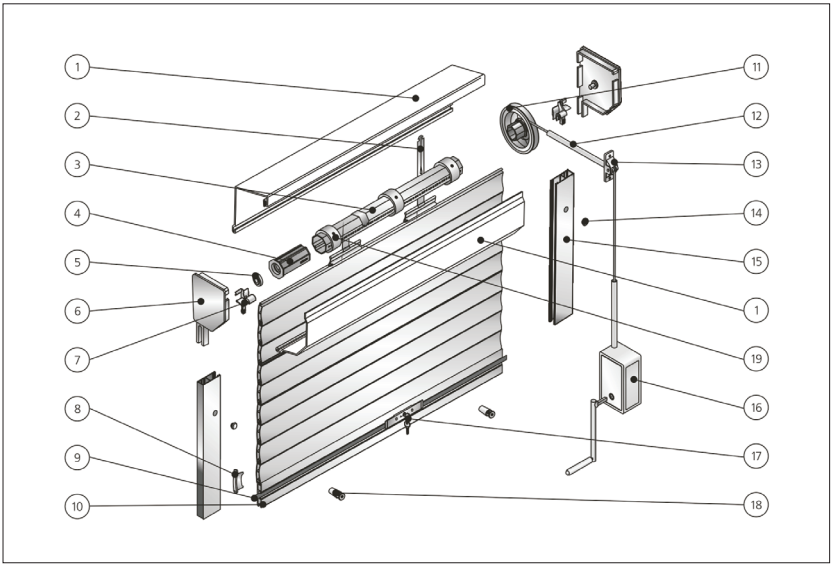


Figure 1.4 Roller shutter with the cord drive. The roller shutter curtain weight is up to 30 kg

No.	ID	Name	Quantity	Comments
1	SB45	Shutter box	1	Set (rear panel, front cover)
2	SS	Retainer spring	Set	Installed with the stroke not exceeding 500 mm
3	RT	Octagonal roll tube	1	
4	BBC	Bearing cap	1	
5	BB12X28	Ball bearing	1	
6	SF	End cap	couple	Set: the right and left ones
7	GD	Entry guide	couple	Is not used in case of flanged edge at the guide rail
8	SP	Side lock	N	N is a number of curtain lamels. For AEG profile – 2N
9	PT	Locking flat bar	2	
10	ES	End slat profile	1	
11	RP	Pulley	1	
12	PT	Protective tube	2	Is used together with SBR cord coiler
13	BGI/F	Cord guide	1	
14	PP12/PP14	Plug button	Set	Installed with the stroke not exceeding 400 mm
15	GR	Guide rail	2	
16	SBR	Reduction cord coiler	1	Complete with the handle
17	RL	Key lock	1	Set: lock, mounting fasteners, 2 keys
18	ST40	Stopper	2	Set: stopper, washer and screw
19	RD	Adjusting ring	Set	Installed with the stroke not exceeding 500 mm

Note.

1. If roller shutters are equipped with SF250 or SF300 end caps, SBB12/100 supports must be additionally installed in them.

2. Actual standard sizes of components are chosen based on the Technical Catalog recommendations depending on the standard size of the chosen profile of the roller shutter curtain and roller shutter dimensions.

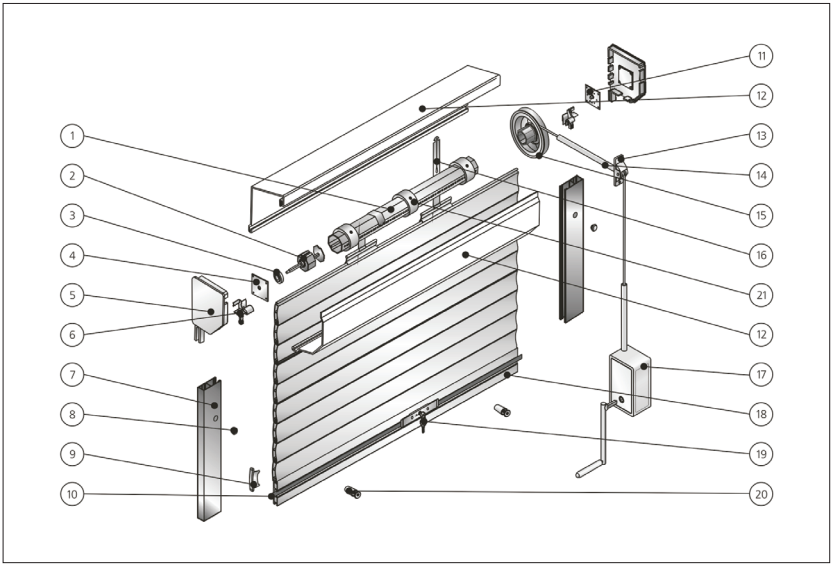


Figure 1.5 Roller shutter with the cord drive. The roller shutter curtain weight is over 30 kg

No.	ID	Name	Quantity	Comments
1	RT	Octagonal roll tube	1	
2	APB	Adjustable cap	1	
3	BB42	Ball bearing	1	
4	SBB42/100	Ball bearing support	1	
5	SF	End cap	couple	Set: the right and left ones
6	GD	Entry guide	couple	Is not used in case of flanged edge at the guide rail
7	GR	Guide rail	2	
8	PP12/PP14	Plug button	Set	Installed with the stroke not exceeding 400 mm
9	SP	Side lock	N	N is a number of curtain lamels. For AEG profile – 2N
10	PT	Locking flat bar	2	
11	SBB12/100	Ball bearing support	1	
12	SB45	Shutter box	1	Set (rear panel, front cover)
13	BGI/F	Cord guide	1	
14	PT	Protective tube	2	Is used together with SBR cord coiler
15	RP	Pulley	1	
16	SS	Retainer spring	Set	Installed with the stroke not exceeding 500 mm
17	SBR	Reduction cord coiler	1	Complete with the handle
18	ES	End slat profile	1	
19	RL	Key lock	1	Set: lock, mounting fasteners, 2 keys
20	ST40	Stopper	2	Set: stopper, washer and screw
21	RD	Adjusting ring	Set	Installed with the stroke not exceeding 500 mm

Note.

1. If roller shutters are equipped with SF180-205 and SF250/S end caps at the side opposite to the drive, SBB42 support must be installed. No SBB12/100 support is installed at the drive side.

2. Actual standard sizes of components are chosen based on the Technical Catalog recommendations depending on the standard size of the chosen profile of the roller shutter curtain and roller shutter dimensions.

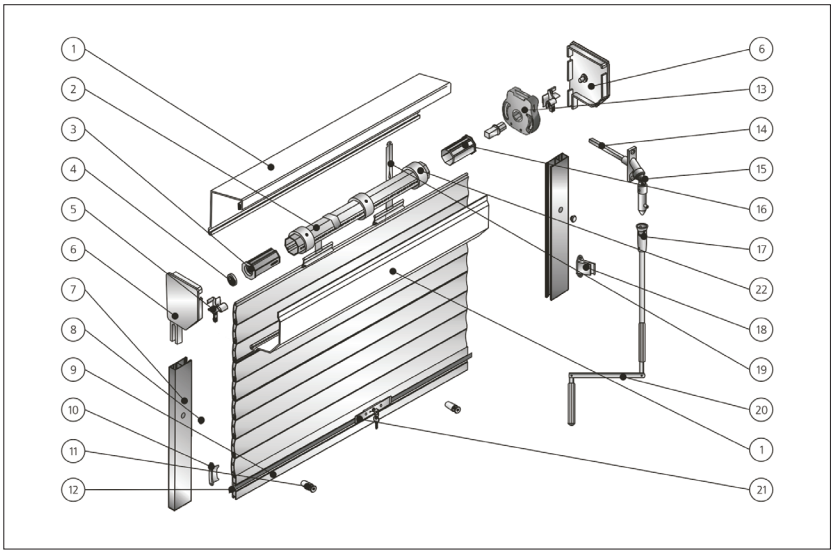


Figure 1.6 Roller shutter with the reduction (crank) drive and the removable crank rod. The roller shutter curtain weight is up to 35 kg

No.	ID	Name	Quantity	Comments
1	SB45	Shutter box	1	Set (rear panel, front cover)
2	RT	Octagonal roll tube	1	
3	BBC	Bearing cap	1	
4	BB12X28	Ball bearing	1	
5	GD	Entry guide	couple	Is not used in case of flanged edge at the guide rail
6	SF	End cap	couple	Set: the right and left ones
7	GR	Guide rail	2	
8	PP12/PP14	Plug button	Set	Installed with the stroke not exceeding 400 mm
9	ES	End slat profile	1	
10	SP	Side lock	N	N is a number of curtain lamels. For AEG profile – 2N
11	ST40	Stopper	2	Set: stopper, washer and screw
12	PT	Locking flat bar	2	
13	W	Reduction gear	1	
14	CJ	Cardan joint	1	
15	BC	Driving pivot	1	
16	GC	Reduction cap	1	
17	PV	Fast clutch	1	
18	CL	Spring clamp	1	
19	SS	Retainer spring	Set	Installed with the stroke not exceeding 500 mm
20	H150	Crank rod	1	
21	RL	Key lock	1	Set: lock, mounting fasteners, 2 keys
22	RD	Adjusting ring	Set	Installed with the stroke not exceeding 500 mm

Note.

If roller shutters are equipped with SF250 or SF300 end caps, SBB12/100 supports must be additionally installed in them.

Actual standard sizes of components are chosen based on the Technical Catalog recommendations depending on the standard size of the chosen profile of the roller shutter curtain and roller shutter dimensions.

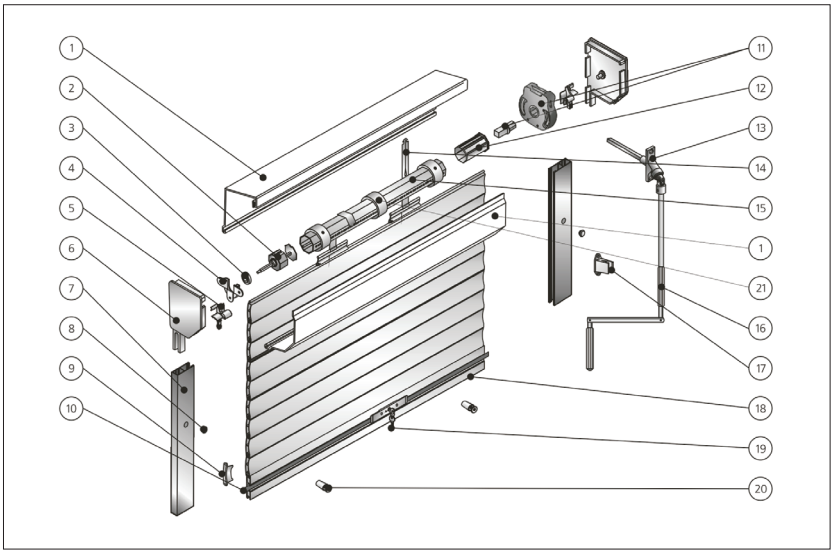


Figure 1.7 Roller shutter with the reduction (crank) drive.
Complete with APB adjustable cap. The roller shutter curtain weight is up 35 kg

No.	ID	Name	Quantity	Comments
1	SB45	Shutter box	1	Set (rear panel, front cover)
2	APB	Adjustable cap	1	
3	BB42	Ball bearing	1	
4	SBB42	Ball bearing support	1	
5	GD	Entry guide	couple	Is not used in case of flanged edge at the guide rail
6	SF	End cap	couple	Set: the right and left ones
7	GR	Guide rail	2	
8	PP12/PP14	Plug button	Set	Installed with the stroke not exceeding 400 mm
9	SP	Side lock	N	N is a number of curtain lamels. For AEG profile – 2N
10	PT	Locking flat bar	2	
11	W	Reduction gear	1	
12	GC	Reduction cap	1	The cap may be used for BP gear
13	CJ	Cardan joint	1	
14	SS	Retainer spring	Set	Installed with the stroke not exceeding 500 mm
15	RT	Octagonal roll tube	1	
16	H150	Crank rod	1	
17	CL	Spring clamp	1	
18	ES	End slat profile	1	
19	RL	Key lock	1	Set: lock, mounting fasteners, 2 keys
20	ST40	Stopper	2	Set: stopper, washer and screw
21	RD	Adjusting ring	Set	Installed with the stroke not exceeding 500 mm

Note.

If roller shutters are equipped with SF250 or SF300 end caps, SBB12/100 support must be installed additionally on the drive side. SBB42 support must be replaced by SBB42/100 support at the side opposite to the drive.

Actual standard sizes of components are chosen based on the Technical Catalog recommendations depending on the standard size of the chosen profile of the roller shutter curtain and roller shutter dimensions.

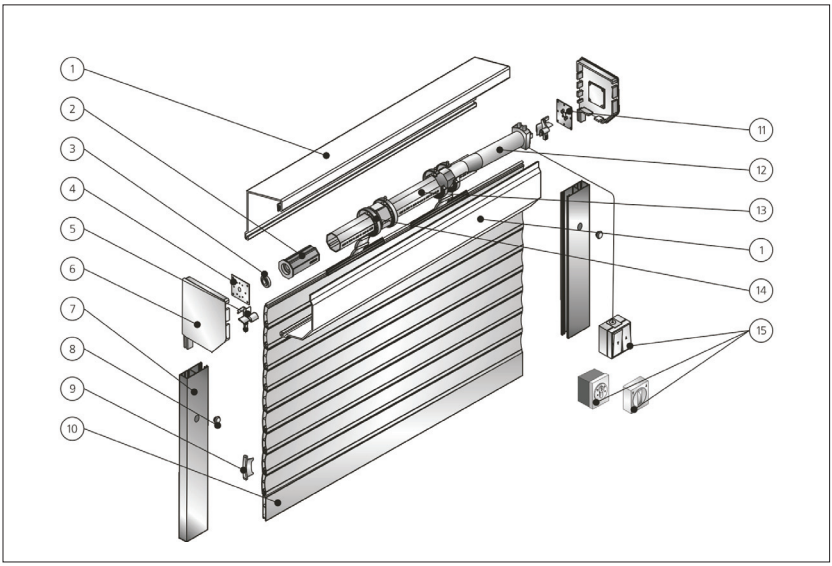


Figure 1.8 Roller shutter the electric motor

No.	ID	Name	Quantity	Comments
1	SB45	Shutter box	1	Set (rear panel, front cover)
2	BBC	Bearing cap	1	
3	BB12X28	Ball bearing	1	
4	-	Ball bearing support	1	
5	GD	Entry guide	couple	Is not used in case of flanged edge at the guide rail
6	SF	End cap	couple	Set: the right and left ones
7	GR	Guide rail	2	
8	PP12/PP14	Plug button	Set	Installed with the stroke not exceeding 400 mm
9	SP	Side lock	N	N is a number of curtain lamels. For AEG profile – 2N
10	ESU/ESL	End slat profile	1	
11	KM	Motor bracket	1	
12	-	Tube electric motor	1	A tube electric motor with the emergency manual lift system can be used
13	RT	Octagonal roll tube	1	
14	RG	Security lock	Set	Is used together with a couple of key lock rings
15	-	Switcher	1	

Note. 1. The roller shutter curtain weight is up to 30 kg.
If roller shutters are equipped with SF137-205 and SF250/S end caps at the side opposite to the drive the ball bearing support is not installed.
If roller shutters are equipped with SF250 and SF300 end caps, SBB12/100 support must be installed at the side opposite to the drive.
2. The roller shutter curtain weight is over 30 kg.
APB adjustable cap should be installed instead of BBC cap (pos. 2).
At the side opposite to the drive, SF180-205 and SF250/S end caps are used together with BB42 ball bearing and SBB42 support, while SF250 and SF300 covers are used together with BB42 ball bearing and SBB42/100 support.
If roller shutters are equipped with PT70x1,2 roll tube only APB adjustable cap is used at the side opposite to the drive.
Actual standard sizes of components are chosen based on the Technical Catalog recommendations depending on the standard size of the chosen profile of the roller shutter curtain and roller shutter dimensions.

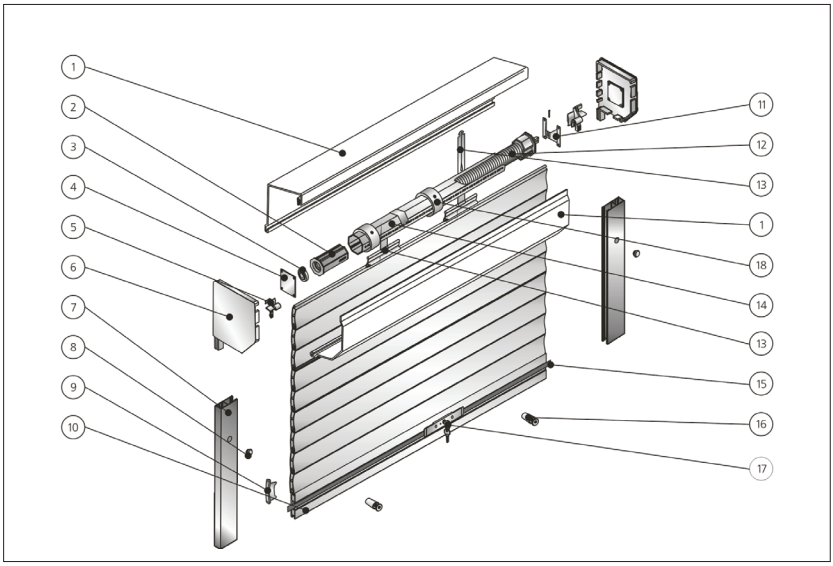


Figure 1.9 Roller shutter with the assistance and push-up mechanism.
The roller shutter curtain weight is up to 30 kg.

No.	ID	Name	Quantity	Comments
1	SB45	Shutter box	1	Set (rear panel, front cover)
2	BBC	Bearing cap	1	
3	BB12X28	Ball bearing	1	
4	SBB12/100	Ball bearing support	1	
5	GD	Entry guide	couple	Is not used in case of flanged edge at the guide rail
6	SF	End cap	couple	Set: the right and left ones
7	GR	Guide rail	2	
8	PP12/PP14	Plug button	Set	Installed with the stroke not exceeding 400 mm
9	SP	Side lock	N	N is a number of curtain lamels. For AEG profile – 2N
10	ES	End slat profile	1	
11	PLA100	Support plate	1	
12	SIM	Assistance and push-up mechanism	1	
13	SS	Retainer spring	Set	Installed with the stroke not exceeding 500 mm
14	RT	Octagonal roll tube	1	
15	PT	Locking flat bar	2	
16	ST40	Stopper	2	Set: stopper, washer and screw
17	RL	Key lock	1	Set: lock, mounting fasteners, 2 keys
18	RD	Adjusting ring	Set	Installed with the stroke not exceeding 500 mm

Note.

1. If roller shutters are equipped with SF137-205 and SF250/S end caps, SBB12/100 support is not installed.

2. Actual standard sizes of components are chosen based on the Technical Catalog recommendations depending on the standard size of the chosen profile of the roller shutter curtain and roller shutter dimensions.

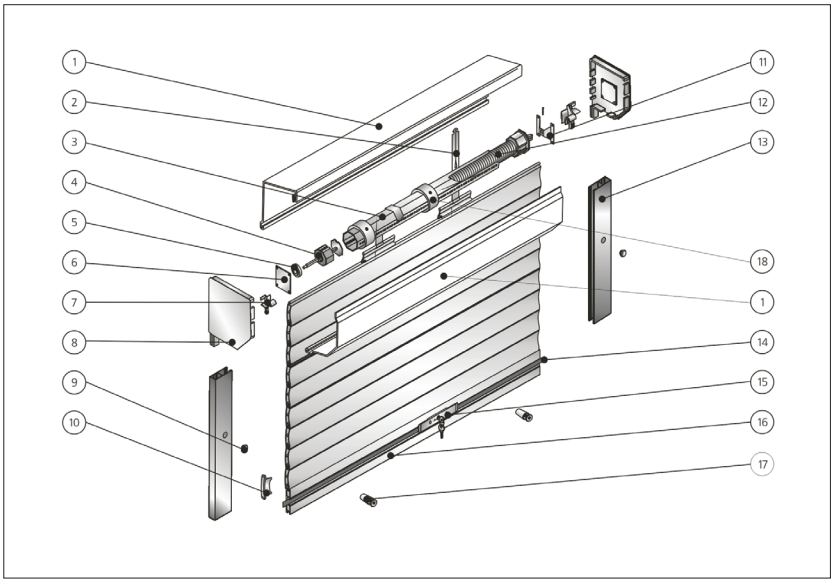


Figure 1.10 Roller shutter with the assistance and push-up mechanism.
The roller shutter curtain weight is over 30 kg

No.	ID	Name	Quantity	Comments
1	SB45	Shutter box	1	Set (rear panel, front cover)
2	SS	Retainer spring	Set	Installed with the stroke not exceeding 500 mm
3	RT	Octagonal roll tube	1	
4	APB	Adjustable cap	1	
5	BB42	Ball bearing	1	
6	SBB42/100	Ball bearing support	1	Is used with SF250 and SF300 covers
7	GD	Entry guide	couple	Is not used in case of flanged edge at the guide rail
8	SF	End cap	couple	Set: the right and left ones
9	PP12/PP14	Plug button	Set	Installed with the stroke not exceeding 400 mm
10	SP	Side lock	N	N is a number of curtain lamels. For AEG profile – 2N
11	PLA100	Support plate	1	
12	SIM	Assistance and push-up mechanism	1	
13	GR	Guide rail	2	
14	PT	Locking flat bar	2	
15	RL	Key lock	1	Set: lock, mounting fasteners, 2 keys
16	ES	End slat profile	1	
17	ST40	Stopper	2	Set: stopper, washer and screw
18	RD	Adjusting ring	Set	Installed with the stroke not exceeding 500 mm

Note.

1. If roller shutters are equipped with SF180-205 and SF250/S end caps, SBB42 support is installed at the side opposite to the drive.

2. Actual standard sizes of components are chosen based on the Technical Catalog recommendations depending on the standard size of the chosen profile of the roller shutter curtain and roller shutter dimensions.

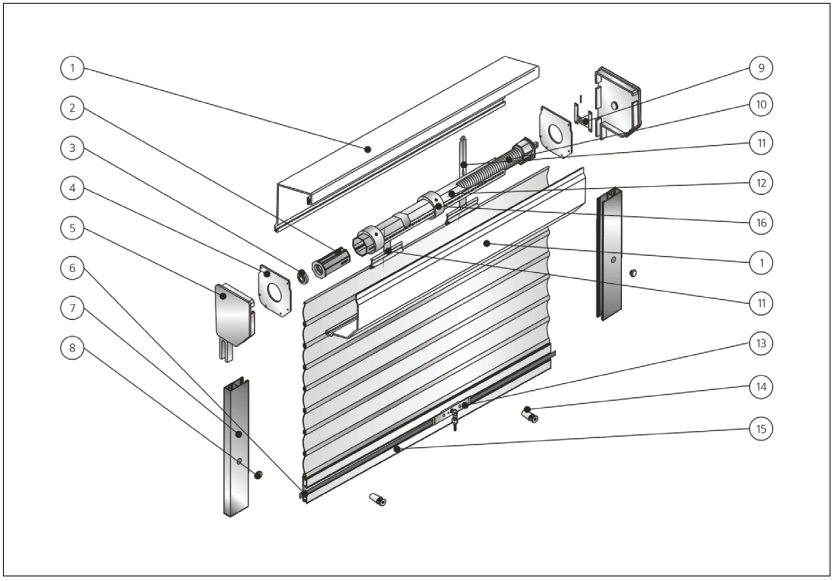


Figure 1.11 Roller shutter with the assistance and push-up mechanism, with the roller shutter curtain made of AER42 profile.

No.	ID	Name	Quantity	Comments
1	SB45	Shutter box	1	Set (rear panel, front cover)
2	BBC	Bearing cap	1	
3	BB12x28	Ball bearing	1	
4	GP60	Safety plate	2	
5	SF	End cap	couple	Set: the right and left ones
6	PT	Locking flat bar	2	
7	GR	Guide rail	2	
8	PP12/PP14	Plug button	Set	Installed with the stroke not exceeding 400 mm
9	PLA100	Support plate	1	
10	SIM	Assistance and push-up mechanism	1	
11	SS	Retainer spring	Set	Installed with the stroke not exceeding 500 mm
12	RT	Octagonal roll tube	1	
13	RL	Key lock	1	Set: lock, mounting fasteners, 2 keys
14	ST40	Stopper	2	Set: stopper, washer and screw
15	ES	End slat profile	1	
16	RD	Adjusting ring	Set	Installed with the stroke not exceeding 500 mm

Note.

1. Actual standard sizes of components are chosen based on the Technical Catalog recommendations depending on roller shutter dimensions.

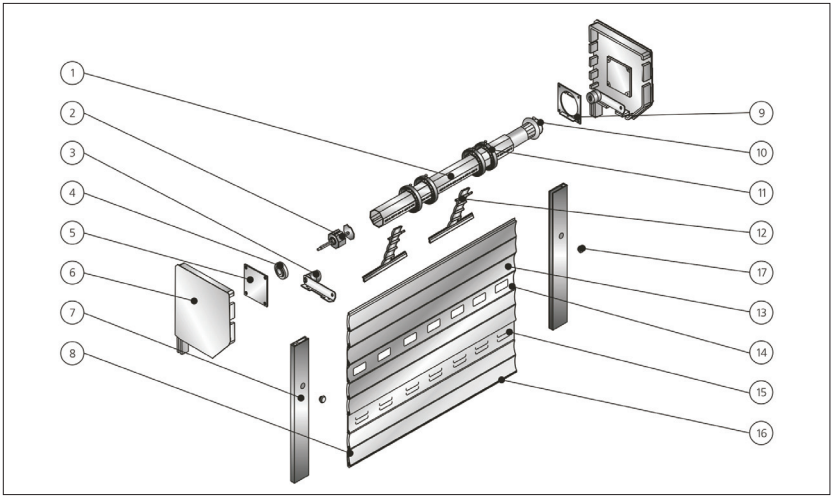


Figure 1.12 Roller shutter with the roller shutter curtain made of 77 series profile. Standard configuration

No.	ID	Name	Quantity	Comments
1	RT	Octagonal roll tube	1	
2	APB	Adjustable cap	1	
3	RGH/77	Guide roller	2	
4	BB42	Ball bearing	1	
5	SBB42/100	Ball bearing support	1	
6	SF	End cap	couple	
7	GR90X35	Guide rail	2	Is used with IS2/77 PVC insert
8	ESU/77	Universal end slat profile	1	
9	KM	Fastening	1	
10	-	Tube electric motor	1	
11	R	Key lock ring	Set	
12	RG	Latch lock	Set	Installed with the stroke not exceeding 500 mm
13	AG/77	Profile	Set	
14	EV/77	Profile with windows	Set	Is complete with P1/77 polycarbonate glazing
15	EA/77	Profile with vents	Set	
16	IS1/77	Sealing insert	1	
17	PP12 PP14	Plug button	Set	Installed with the stroke not exceeding 400 mm

Note.

The shutter box is not shown by convention.

Actual standard sizes of components are chosen based on the Technical Catalog recommendations depending on the standard size of the chosen profile of the roller shutter curtain and roller shutter dimensions.

Possible configuration options of the roller shutter curtain are provided in the Technical Catalog.

Instead of BB42 ball bearing and SBB42/100 ball bearing support, SBB32 support and ball bearing assembly may be installed.

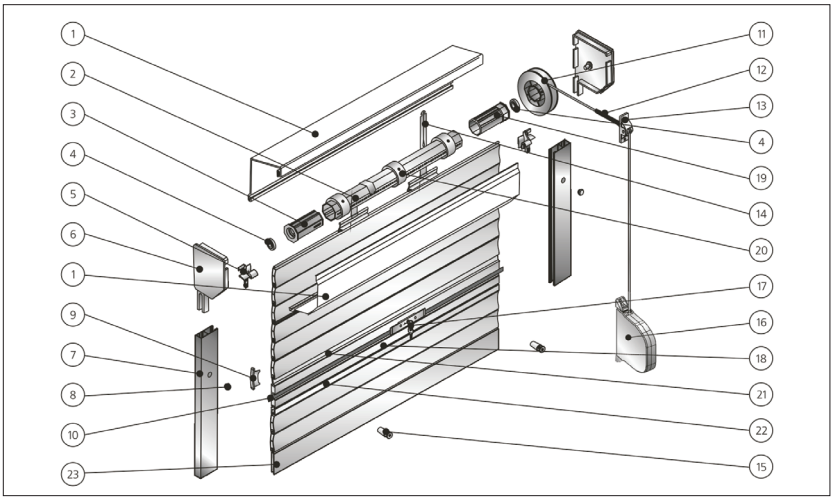


Figure 1.13 Roller shutter option complete with KPU/R lock profile

No.	ID	Name	Quantity	Comments
1	SB45	Shutter box	1	Set (rear panel, front cover)
2	RT	Octagonal roll tube	1	
3	BBC	Bearing cap	1	
4	BB12X28	Ball bearing	2	
5	GD	Entry guide	couple	Is not used in case of flanged edge at the guide rail
6	SF	End cap	couple	Set: the right and left ones
7	GR	Guide rail	2	
8	PP12/PP14	Plug button	Set	Installed with the stroke not exceeding 400 mm
9	SP	Side lock	N	N is a number of curtain lamels. For AEG profile – 2N
10	PT	Locking flat bar	2	
11	TP	Pulley	1	
12	SPR	Safety spring	1	
13	BGI	Rope guide	1	
14	SS	Retainer spring	Set	Installed with the stroke not exceeding 500 mm
15	ST40	Stopper	2	Set: stopper, washer and screw
16	SBI	Inertia-type rope coiler	1	Lifting capacity up to 15 kg, assembled with BP4 rope 5 m long
17	RL	Key lock	1	Set: lock, mounting fasteners, 2 keys
18	ES	End slat profile	1	
19	KU	Bearing cap	1	
20	RD	Adjusting ring	Set	Installed with the stroke not exceeding 500 mm
21	KPU/KPU/37	Lock profile	1	Is used depending on the installed profile
22	KPU/R	Lock profile	1	Is installed not higher than the fourth lamel
23	ESL	End slat profile	1	

Note. 1.If roller shutters are equipped with SF250 or SF300 end caps, SBB12/100 supports must be additionally installed in them.
2. Actual standard sizes of components are chosen based on the Technical Catalog recommendations depending on the standard size of the chosen profile of the roller shutter curtain and roller shutter dimensions.
3. Instead of TP pulley, it is allowed to use RP pulley combined with the cap and assembled with BB12x28 ball bearing.
4. If roller shutters are equipped with RT40x0,6 octagonal roll tube, it is recommended to use TPC125 pulley combined with the cap, instead of KU40 cap and TP125 pulley.

2. Calculating geometry of roller shutters and their parts produced by cutting long-length workpieces

2.1 Defining roller shutter dimensions

2.1.1 Roller shutter dimensions are calculated based on the size of the aperture closed by the roller shutter, and the mounting type.

2.1.2 Roller shutter width W for built-in mounting equals to the aperture width W_{ap}:

$$W=W_{ap}$$

2.1.3 Roller shutter width W for overlay and combined mounting (option 1) is calculated using the following formula:

$$W=W_{ap}+2W_r$$

where W_r is the guide rail width.

2.1.4 Roller shutter width W for combined mounting (option 2) is calculated using the following formula:

$$W=W_{ap}+W_r$$

where W_r is the guide rail width.

2.1.5 Roller shutter height H for built-in mounting equals to the aperture height H_{ap}:

$$H = H_{ap}$$

2.1.6 Roller shutter height H for overlay and combined mounting is calculated using the following formula:

$$H = H_{ap} + H_{shb} + H_{esp}$$

where H_{shb} is the shutter box height; H_{esp} is the end slat profile height.

2.1.7 Mounting type layouts are provided at Figures 2.1, 2.2, 2.3 and 2.4.

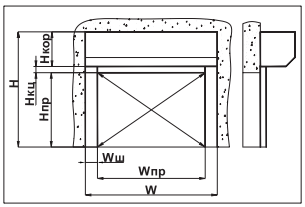


Fig. 2.1 Overlay mounting

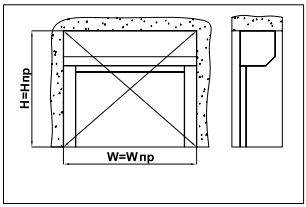


Fig. 2.2 Built-in mounting

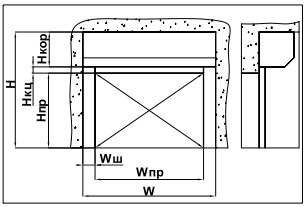


Fig. 2.3 Combined mounting (option 1)

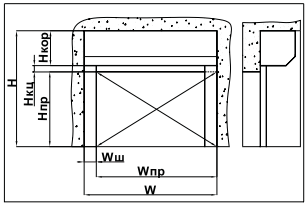


Fig. 2.4 Combined mounting (option 2)

2.2 Calculating length of the roller shutter curtain lamel

2.2.1 Lamel length L is calculated depending on the roller shutter width W, standard size of the profile and standard size of the guide rail. Lamel length L is calculated in the following way:

L=W-72 (mm) – for the following profiles: AR/37, ES8x45, KPU/37, KPU/R, ESU8x35, ES-L8x50, used with the guide rails: GR53x21, GR53/60, GR60x21/S, GR65x23.

L=W-75 (mm) – for the following profiles: AR/40, ARH/40, AER44/S, ES8x45, KPU, KPU/R, ESL8x50, used with the guide rails: GR53x21, GR53/60, GR60x21/S, GR65x23.

L=W-73 (mm) – for the following profiles: AR/41eco, AR/45, ES8x45, KPU/37, KPU/R, ESU8x35, ESL8x50, used with the guide rails: GR53x21, GR53/60, GR65x23.

L=W-80 (mm) – for the following profiles: AR/55eco, AR/55, ARH/55, AER55/S, ES14x50, ES8x45, KPU, KPU/R, ESU13x50, used with the guide rails: GRM65x26, GRM75x27.

L=W-75 (mm) – for the following profiles: AR/55eco, ES8x45, KPU, KPU/R, ESL8x50 used with the guide rail: GR65x23.

L=W-98 (mm) – for the following profiles: AR/55, ARH/55, AER55/S, ES14x50, KPU, ESU13x50, used with the guide rails: GR70x26, GR75x27/S.

L=W-105 (mm) – for the following profiles: AG/77, EV/77 (with PI/77 polycarbonate glazing PI/77), EA/77, ES/77, ESU/77, ESR/77, ESR/77R, used with the guide rail: GR90x35.

L=W-57 (mm) – for the following profiles: AER42, ES8x45, KPU, KPU/R, ESL8x50 used with the guide rails: GR53x21, GR53/60, GR60x21/S.

L=W-6 (mm) – for AER42 profile.

It is necessary to reduce the effective length of lamels by 5 mm for AR/37, AR/40, AR/41eco profiles if roller shutters are equipped with AL automatic locking device (automatic lock) and ESL8x50 profile.

2.3 Calculating length of the guide rail

2.3.1 The guide rail length L_r is calculated based on the roller shutter height, shutter box height, depending on whether the roller shutter design includes the lower frame and devices guiding the curtain. The guide rail length L_r is calculated in the following way:

$L_R = H - H_{shb}$ (mm) – for a roller shutter having entry guides without the lower frame or with the frame according to options 1 and 2.

$L_R = H - H_{shb} - W_R$, (mm) – for a roller shutter having entry guides with the frame according to option 3.

$L_R = H - H_{shb} + 20$ (mm) –for a roller shutter without entry guides, without the lower frame or with the frame according to options 1 and 2.

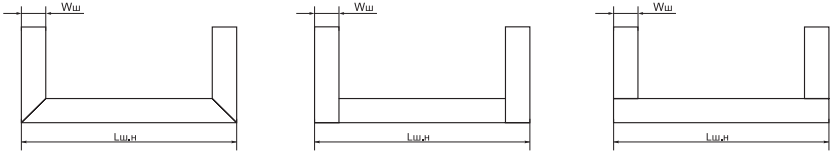
$L_R = H - H_{shb} + 20 - W_R$ (mm) – for a roller shutter without entry guides, with the frame according to option 3.

2.3.2 Length of the guide rail of the lower frame Llr is calculated in the following way:

L_{lr} = W (mm) – for the lower frame according to options 1 and 3.

$L_{lr} = W - 2W_r$ (mm) – for the lower frame according to option 2.

2.3.3 The lower frame options are provided in Figure 2.5.



Option 1 Option 2 Option 3

Figure 2.5 Options of the lower frame of the roller shutter.

2.4 Calculating the shutter box length

2.4.1 Shutter box length L_{shb} is calculated in the following way:

$L_{shb} = W - 10$ (mm) – for the following shutter boxes: SB45/137, SB45/150, SB45/165, SB45/180, SB45/205, SB45/250, SB45/300.

$L_{shb} = W - 10$ (mm) – for SB45/250 shutter box using SF250/S end cap.

2.5 Calculating the octagonal roll tube length

2.5.1 Octagonal roll tube length L_t is calculated depending on the roller shutter width W, standard size of the roll tube and the drive type. The roll tube length L_T is calculated in the following way:

a) RT40x0,6 octagonal roll tube complete with BBC40 bearing caps

L_t=W-50 (mm) – for strap and rope drives using TPC125/TP pulley;

L_t=W-46 (mm) – for rope and cord drives using RP pulley;

L_t=W-60 (mm) – for crank drive using GC40/BP reduction cap and a drive with the assistance and push-up mechanism;

L_t=W-55 (mm) – for an electric motor.

b) RT40x0,6 octagonal roll tube compete with KU40 universal caps.

L_t=W-65 (mm) – for a strap drive using TP pulley;

L_t=W-55 (mm) – for rope and cord drives using TP/RP pulley'

L_t=W-75 (mm) – for a crank drive and drives with the assistance and push-up mechanism;

L_t=W-60 (mm) – for an electric motor.

c) RT60x0,8 octagonal roll tube compete with BBC60 bearing caps.

L_t=W-55 (mm) – for strap and rope drives using TP pulley;

L_t=W-46 (mm) –for rope and cord drives using RP pulley;

L_t=W-60 (mm) –for a crank drive using GC60/BP reduction cap and drives with the assistance and push-up mechanism;

L_t=W-62 (mm) –for an electric motor.

d) RT60x0,8 octagonal roll tube compete with KU60 universal caps.

L_t=W-75 (mm) – for a strap drive using TP pulley and an electric motor;

L_t=W-65 (mm) – for rope and cord drives using TP/RP pulley;

L_t=W-80 (mm) – for a crank drive, a drive with the assistance and push-up mechanism and an electric motor with the emergency manual lift system,

e) RT60x0,8 octagonal roll tube compete with APB adjustable caps.

L_t=W-105 (mm) – for all drive types.

f) RT70x1,2 octagonal roll tube compete with APB adjustable caps.

L_t=W-105 (mm) – for all drive types.

g) RT102x2,5 octagonal roll tube.

L_t=W-115 (mm) – complete with the electric motor.

Note:

Alutech partners are offered AluRoll software designed to automate settlements for orders of ALUTECH roller shutter systems. AluRoll software supports the entire CRM work cycle (maintaining customer database, creating and editing price lists, generating and calculating orders of different types, generating and printing various production-oriented and financial reports).

You can download current version of AluRoll software and learn about its functionality at www.aluroll.alutech.ru

3. Recommended process flow of roller shutter manufacture and assembly

Below is the recommended process flow of roller shutter manufacture and assembly.

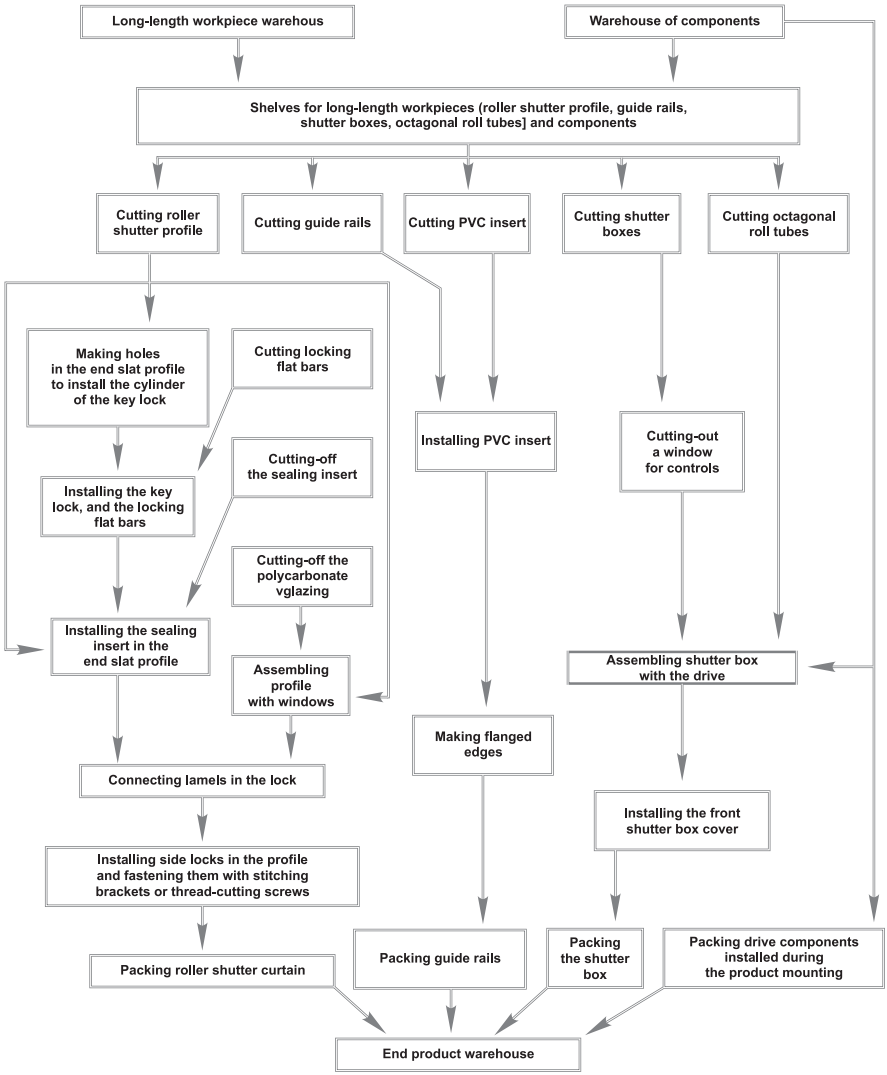


Fig. 3.1

4. Process flow of the roller shutter manufacture and assembly site

Below is the recommended process flow of the roller shutter manufacture and assembly site.

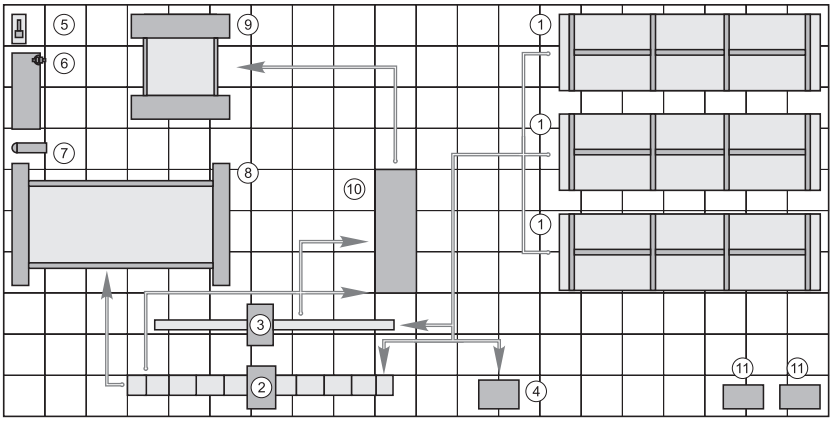


Fig. 4.1

Shop floor area is 200 m2. Number of operating personnel is 4 people. Product output per shift is 15 – 20.

1. Shelves for long-length workpieces and components.
2. The cutting machine to cut roller shutter profile, guide rails, shutter box
3. The cutting machine to cut octagonal roll tube
4. Trimming saw to make angle cuts of guide rails while manufacturing frames
5. Drilling machine
6. File bench
7. Compressor
8. Pullout table to assemble roller shutter curtain
9. Pullout table to assemble shutter box with drive
10. Table for bench work of guide rails, shutter box, octagonal roll tube
11. Tool storage cabinet

The table below lists required tools.

Tool name	Number	Comment
Electric drilling machine	1	
Angle grinder	1	
Air gun	1	To fasten side locks in the roller shutter curtain with brackets
Riveting gun	1	
Bench tool ser	3	

5. Roller shutter manufacture and assembly process description

5.1 Roller shutter manufacture procedure

Roller shutter manufacture and assembly process can be conventionally divided into the following stages:

- cutting lamels of the roller shutter curtain followed by treatment of the cutting areas to remove spills (Fig. 01, 02);
- installing the sealing insert in the end slat profile (Fig. 03);
- cutting guide rails followed by treatment of the cutting areas to remove spills (Fig. 01, 02);
- installing the sealing inserts in the guide rails (Fig. 05, 06);
- if necessary, making flanged edges of the guide rails followed by treatment of the cutting areas to remove spills (Fig. 04, 07);
- cutting the shutter box; if necessary, making a window to lead out the controls (Fig. 01, 02, 08);
- cutting the octagonal roll tube followed by treatment of the cutting areas to remove spills (Fig. 9, 10);
- assembling roller shutter curtain (see Section 5.2);
- assembling the shutter box with drive components (see Section 5.3);
- packing (see Section 5.4).

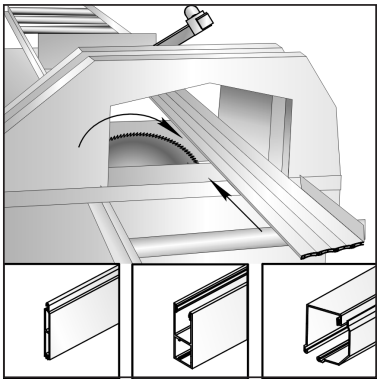


Fig. 01

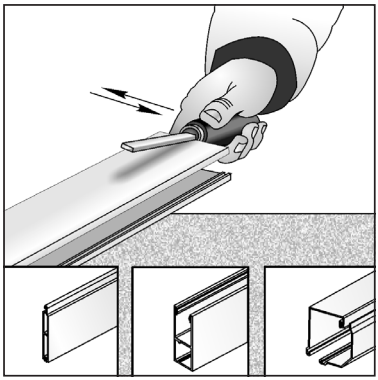


Fig. 02

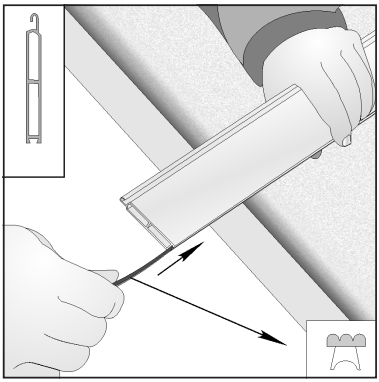


Fig. 03

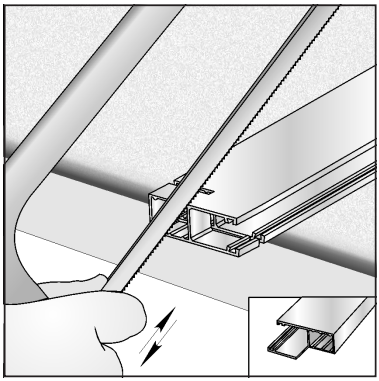


Fig. 04

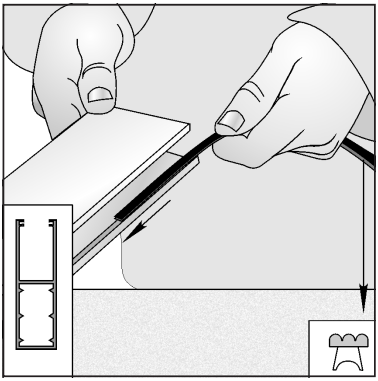


Fig. 05

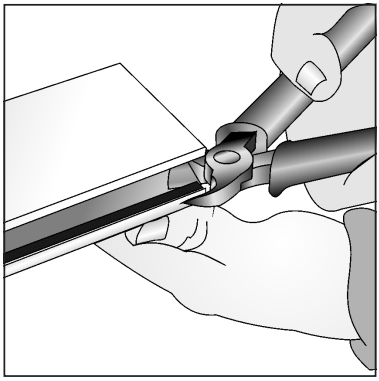


Fig. 06

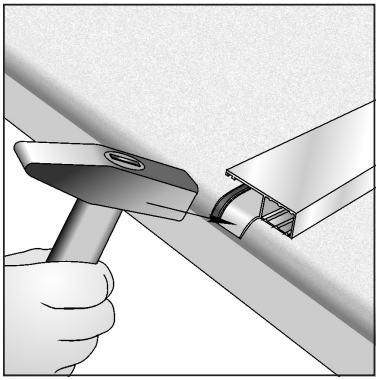


Fig. 07

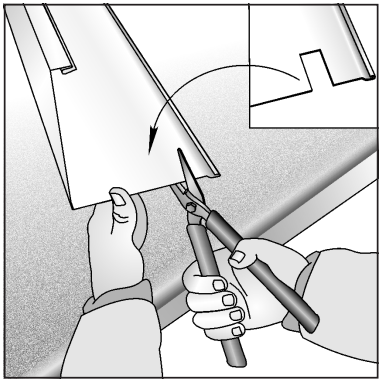


Fig. 08

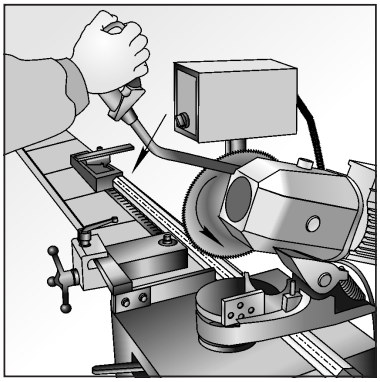


Fig. 09

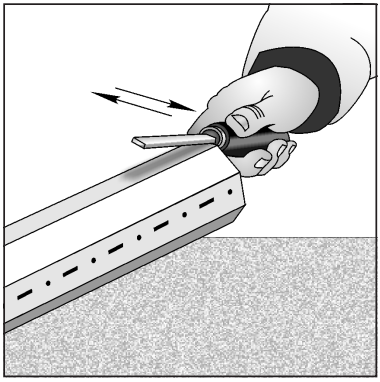


Fig. 10

5.2 Assembling roller shutter curtain

5.2.1 Roller shutter curtain is assembled in the following order:

- installing locking devices in the end slat profile (if necessary):
- connecting lamels in the roller shutter curtain.

5.2.2 Locking devices are installed in the end slat profile in the following way:

а) Prepare the end slat profile for installation of the key lock:

- mark location of holes for the lock core (Fig. 01):
- drill X23.5 mm hole (Fig. 02):
- remove spills in the hole (Fig. 03).

б) Assemble the end slat profile with the key lock:

- install the lock core in the hole (Fig. 04):
- install embedded plates in the T slot of the end slat profile and lead them under the lock housing matching openings in the plates and the lock housing (Fig. 05):
- connect the embedded plates with the lock housing using screws so that the lock housing would still be able to move (Fig. 06):
- cut off the locking flat bar of the required size (Fig. 07):
- remove spills:
- drill holes in the locking flat bars for the lock pivots (Fig. 08):
- install locking flat bars in the T slot of the end slat profile, and connect the bars with the latch lock (Fig. 09):
- completely fix the lock housing in the profile by tightening screws that connect the lock housing with embedded plates (Fig. 10):
- check the key lock operation with a key (Fig. 11). In “Open” position: locking flat bars must not stand out for the butt ends of the end slat profile.

Note: upon customer’s request, SL manual latch locks can be installed instead of the key lock. In this case steel profiles with the spring insert are inserted in the T slot from the butt ends of the end slat profile (Fig. 12).

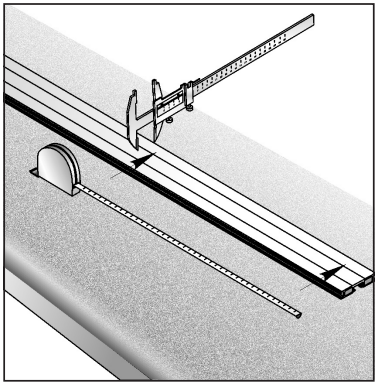


Fig. 01

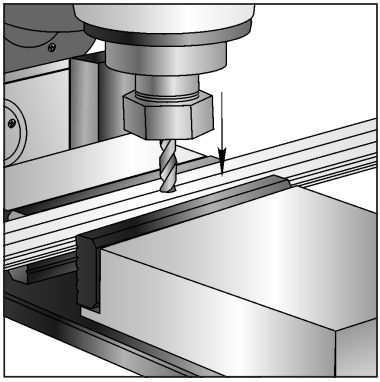


Fig. 02

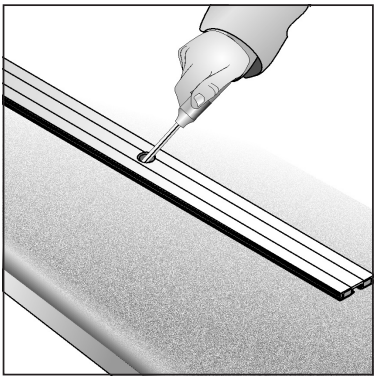


Fig. 03

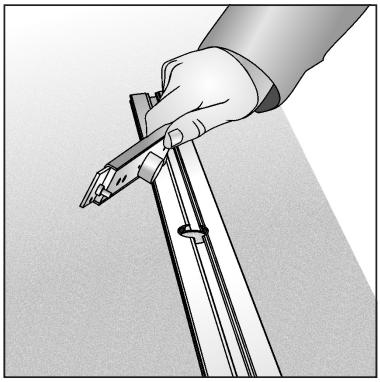


Fig. 04

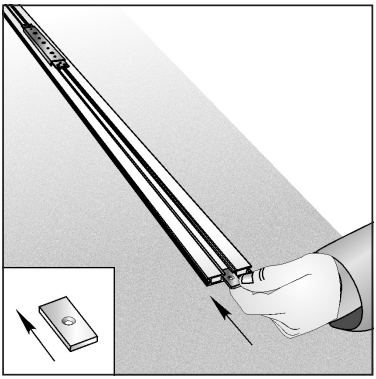


Fig. 05

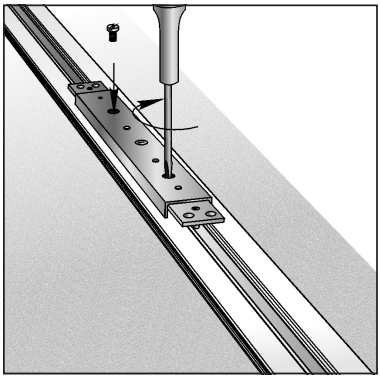


Fig. 06

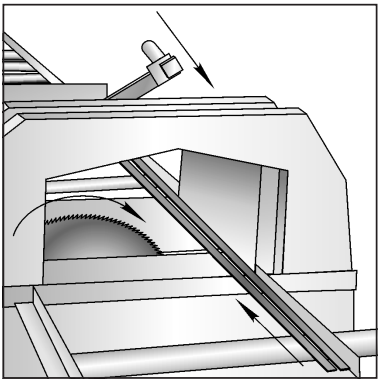


Fig. 07

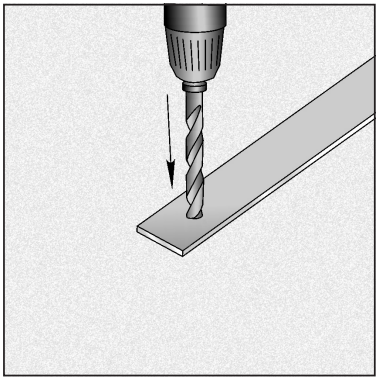


Fig. 08

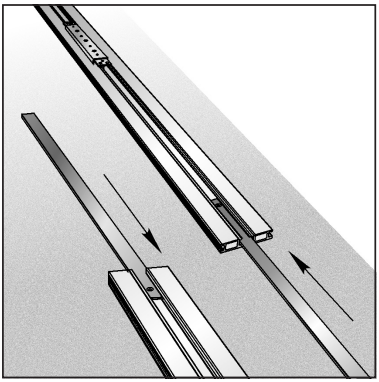


Fig. 09

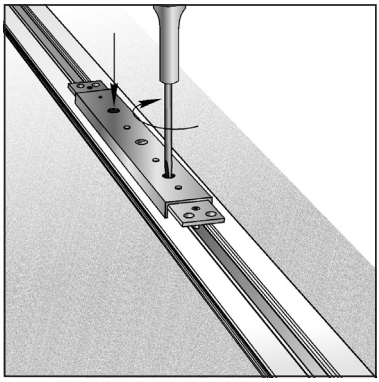


Fig. 10

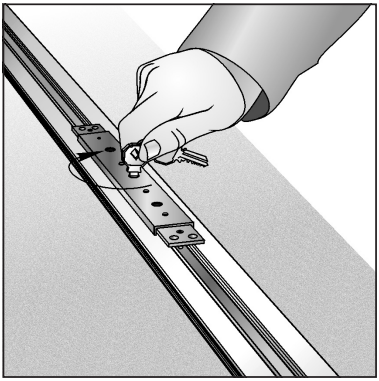


Fig. 11

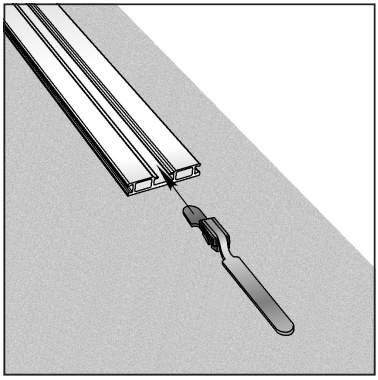


Fig. 12

5.2.3 Lamels are assembled to form the curtain in the following order:

- connect lamels of the curtain with each other with the lock part (Fig. 01);
- connect the end slat profile to the curtain;
- install side locks (a set of operations):

a) drive SP55/S, SP44/S side locks in the side cavity of the profile in the next but one lamel starting with the first lamel coming after the end slat profile (Fig. 02);

b) drive SP37, SP40, SP45, SP55, SP/77, SPE41, SPE55 side locks in soft foam filling at the profile butt ends in the next but one lamel starting with the first lamel coming after the end slat profile. Fix the side locks in the profile using stitching brackets (Fig. 03, 04);

c) install SP40/H, SP55/H, SP/77E side locks a t the profile butt ends in the next but one lamel starting with the first lamel coming after the end slat profile, and fix them with thread-cutting screws (Fig. 05). Before that, install PI/77 polycarbonate glazing (if applicable) in EV/77 profile with windows.

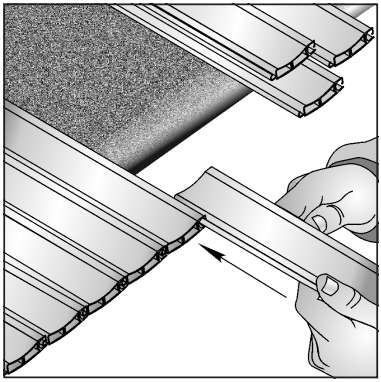


Fig. 01

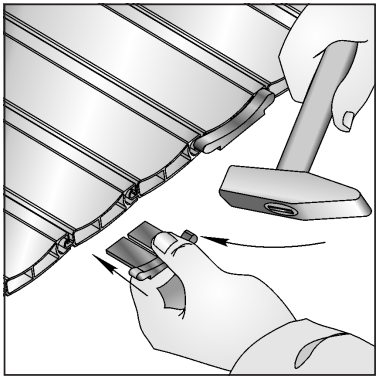


Fig. 02

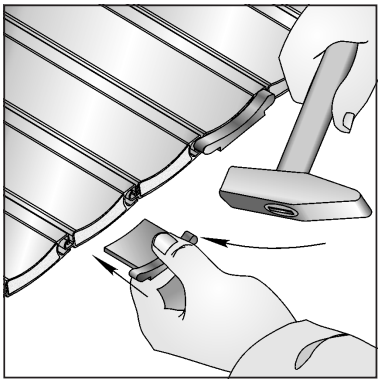


Fig. 03

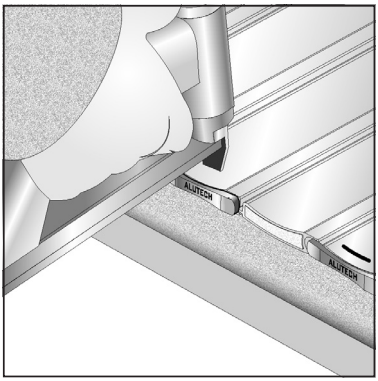


Fig. 04

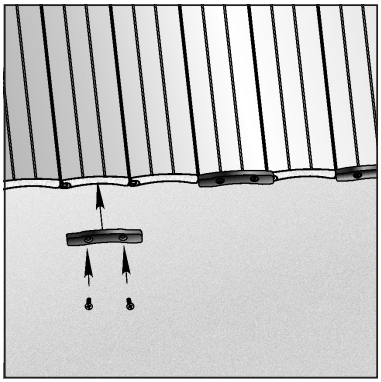


Fig. 05

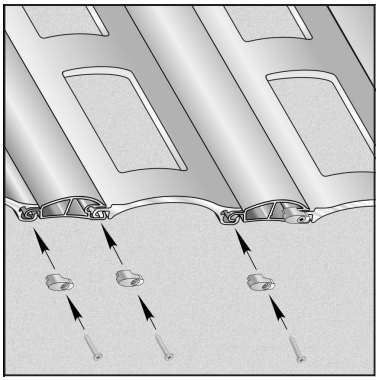


Fig. 06

5.3 Assembling the shutter box with the drive components

5.3.1 Roller shutters with the strap drive (SD drive)

a) Assemble end caps with drive components:

- When equipped with SF250 or SF300 caps, it is necessary to fix SBB12/100 supports at the rest pads of each couple of caps. Supports must be fixed with M5x8 screws in the four M5 holes that must be made previously in each cap (Fig 01 - 03), or M6x15 flat-head screws with nuts; before that, it is necessary to drill X6.5 mm through holes and to make counterbores for screw heads at the front face of caps (Fig. 05 - 07, Section 5.3.3.);
- If SF137, SF150, SF165, SF180, SF205 and SF250/S caps are used, the above operations should not be fulfilled.

b) Assemble the octagonal roll tube with the drive:

- install a set of RD adjusting rings at the octagonal roll tube;
- put TP pulley at the universal cap;
- install BB12x28 ball bearing in the cap/TPC125 pulley
- install the cap with the pulley in the roll tube against the stop (Fig. 04);
- install the second BB12x28 ball bearing in BBC bearing cap
- install BBC cap at the other side of the roll tube against the stop (Fig. 05);

c) Assemble the rear panel of the shutter box with end caps:

- mark and drill two X4,2+0,3 holes in the shutter box and in the upper part of end caps
- for rivets (Fig. 06);
- install X4x10 aluminium rivets and rivet the rear panel of the shutter box with end caps (Fig. 07);

d) Install the roll tube assembly in the shutter box (Fig. 08);

e) Pull out the cap from the roll tube against the stop in the end cap from the side opposite to the drive and fix it with the rivet; before that it is necessary to drill holes for the rivet in the roll tube and in the cap (Fig. 09, 10);
f) Mark and drill two X4,2+0,3 holes for rivets in the shutter box and in end caps at the side of the rear wall (Fig. 11);

g) Install X4x10 aluminium rivets and rivet the rear panel of the shutter box with end caps (Fig. 12).

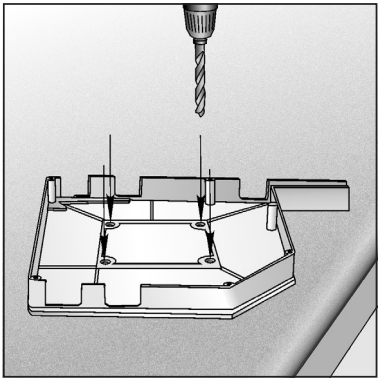
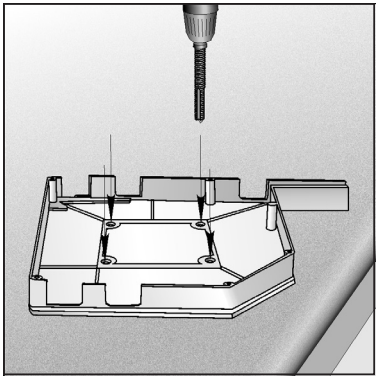


Fig. 01



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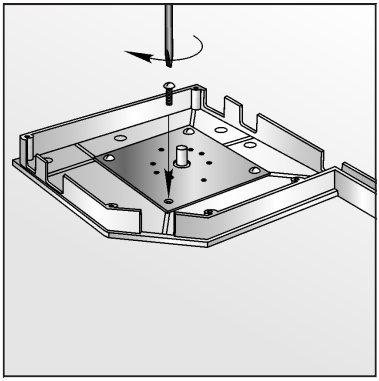

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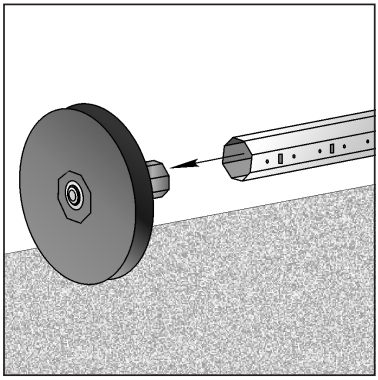
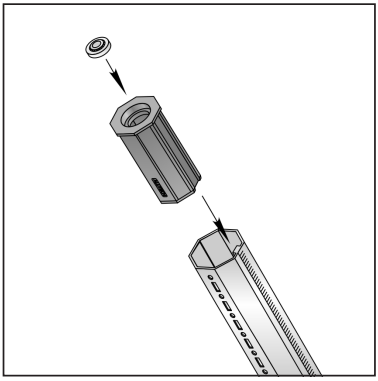


Fig. 04



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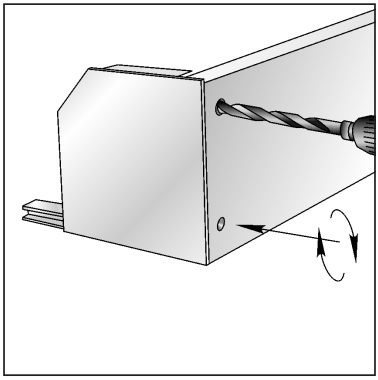

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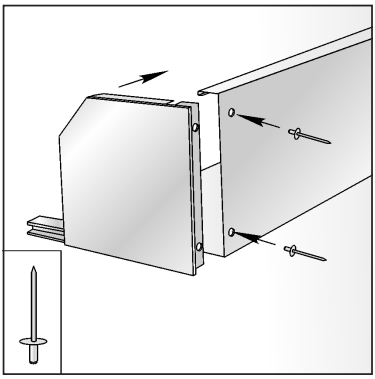


Fig. 07

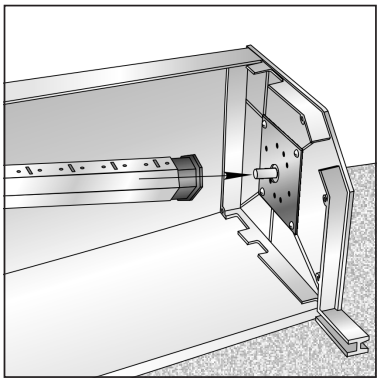


Fig. 08

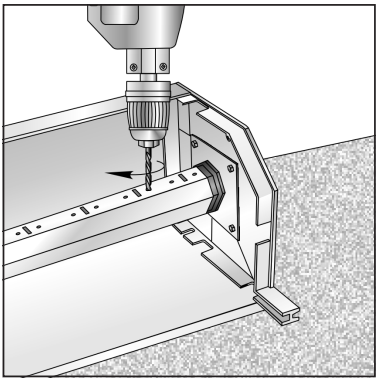


Fig. 09

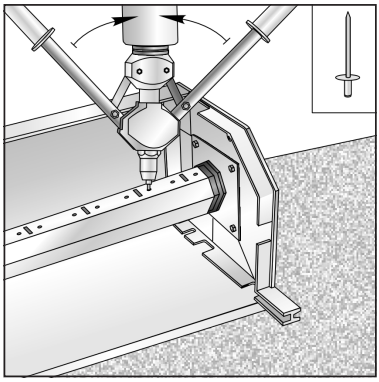


Fig. 10

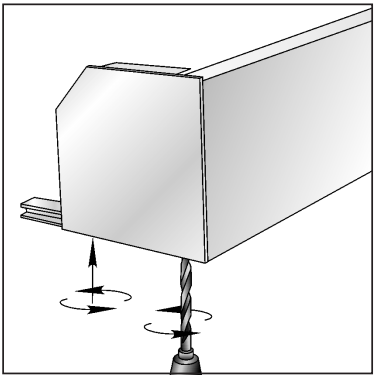


Fig. 11

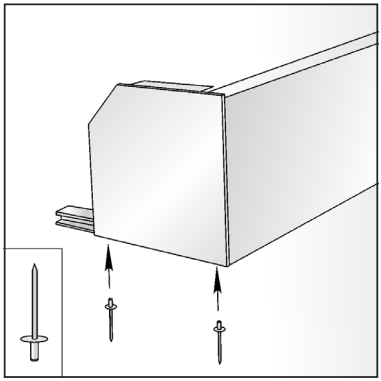


Fig. 12

5.3.2 Roller shutters with the rope drive (RD drive). Roller shutters with the cord drive (CD drive). Roller shutter curtain weight doesn't exceed 30 kg

a) Assemble end caps with drive components:

- When equipped with SF250 or SF300 caps, it is necessary to fix SBB12/100 supports at the rest pads of each couple of caps. Supports must be fixed with M5x8 screws in the four M5 holes that must be made previously in each cap (Fig 01 - 03), or M6x15 flat-head screws with nuts; before that, it is necessary to drill X6.5 mm through holes and to make counterbores for screw heads at the front face of caps (Fig. 05 - 07, Section 5.3.3.);
- If SF137, SF150, SF165, SF180, SF205, SF250/S caps are used, the above operations should not be fulfilled;

b) Assemble

- the octagonal roll tube with the drive:
- install a set of RD adjusting rings at the octagonal roll tube;
- install BB12x28 ball bearing in BBC bearing cap, install the cap in the roll tube against the stop (Fig. 04);
- install RP pulley in the roll tube at the opposite side (Fig. 05). Instead of RP pulley, it is allowed to use TP pulley installed at KU universal cap and assembled with BB12x28 ball bearing

c) Assemble the rear panel of the shutter box with end caps:

- for rivets (Fig. 06);
- install ø4x10 aluminium rivets and rivet the rear panel of the shutter box with end caps (Fig. 07);

d) Install the roll tube in the shutter box (Fig. 08);

e) Pull out BBC bearing cap from the roll tube against the stop in the end cap and fix it with the rivet; before that it is necessary to drill holes for the rivet in the roll tube and in the cap (Fig. 09, 10);
f) Mark and drill two ø4,2+0,3 holes for rivets in the shutter box and in end caps at the side of the rear wall (Fig. 11);

g) Install ø4x10 aluminium rivets and rivet the rear panel of the shutter box with end caps (Fig. 12).

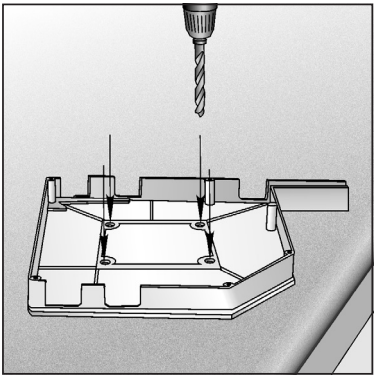


Fig. 01

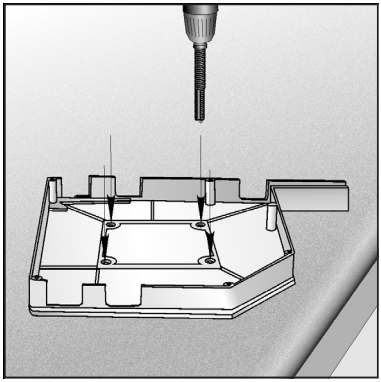


Fig. 02

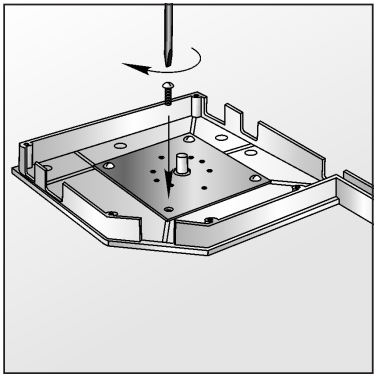


Fig. 03

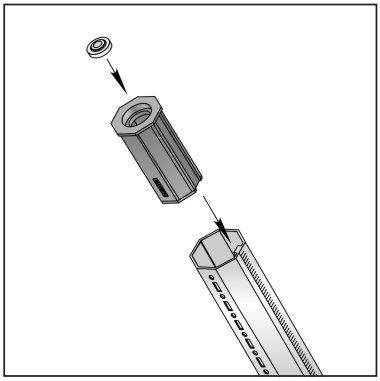


Fig. 04

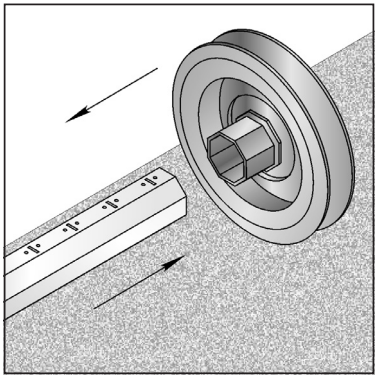


Fig. 05

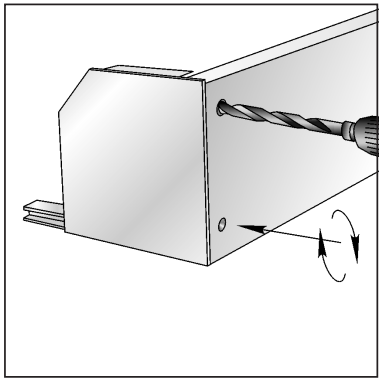


Fig. 06

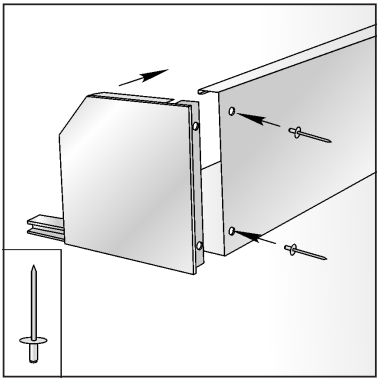


Fig. 07

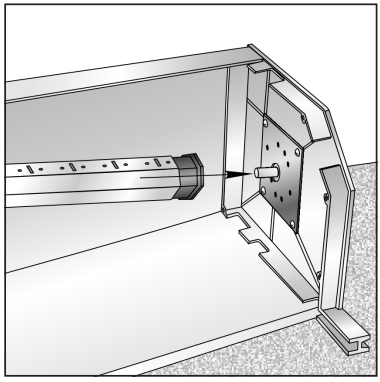


Fig. 08

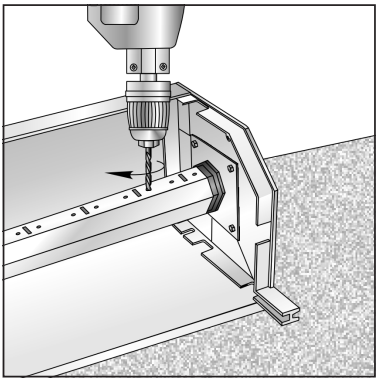


Fig. 09

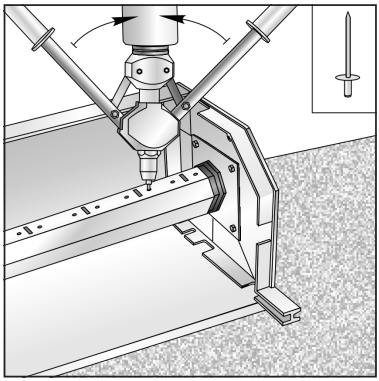


Fig. 10

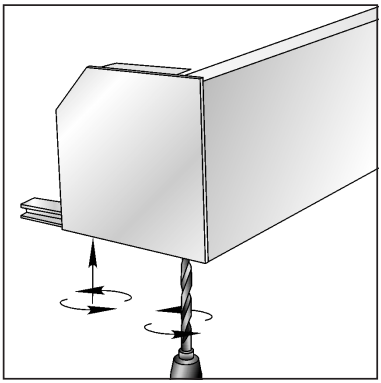


Fig. 11

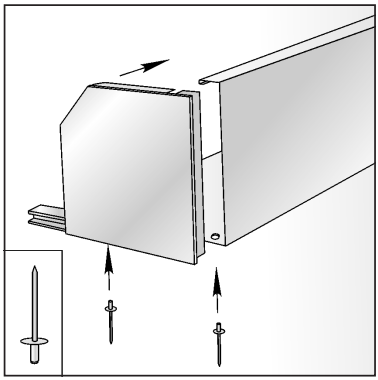


Fig. 12

5.3.3 Roller shutters with the cord drive (CD drive). The curtain weight exceeds 30 kg

a) Assemble end caps with drive components:

- If SF180, SF205 and SF250/S caps are used, it is necessary to cut off the central shank flush with the wall only for the cap installed at the side opposite to the drive (Fig. 01);
- install BB42 ball bearing in SBB42 support and fix SBB42 ball bearing support at the cover using three M6x15 screws with nuts; before that, it is necessary to drill three X6,5 mm through holes in the cover and make counterbores for screw heads at the outer side of the wall (Fig. 02 - 04);
- if SF250 and SF300 caps are used, it is necessary to fix SBB12/100 ball bearing support at the rest pad of the cap installed at the side of the drive using four M6x15 screws with nuts, before that, it is necessary to drill four X6,5 mm through holes in the cover and make counterbores for screw heads at the outer side of the wall (Fig. 05 - 07);
- install the ball bearing in SBB42/100 support (Fig. 08). For the roller shutter having curtain weight not more than 50 kg, BB42 ball bearing is used; for the roller shutter having the curtain weight over 50 kg, it is necessary to use the support with SBB32 ball bearing;

- it is necessary to fix SBB42/100 ball bearing support with four M6x15 screws with nuts at the cover installed at the side opposite to the drive; to fix it, drill four X6,5 mm through holes in the cover and make counterbores for screw heads at the outer side of the wall (Fig. 09 - 11);

b) Assemble the octagonal roll tube with the drive:

- install a set of RD adjusting rings at the octagonal roll tube;
- install APB adjustable cap in the roll tube at the side opposite to the drive, (Fig. 12);
- install RP pulley assembled with BB12x28 ball bearing in the roll tube at the side of the drive (Fig. 13);

c) Assemble the rear panel of the shutter box with end caps:

- mark and drill two X4,2+0,3 holes in the shutter box and in the upper part of end caps
- for rivets (Fig. 14);
- install X4x10 aluminium rivets and rivet the rear panel of the shutter box with end caps (Fig. 15);

e) To adjust APB adjustable cap, do the following:

- unscrew the expansion screw of the cap and pull out the bearing rod until it is seated in the ball bearing (Fig. 17); (Fig. 17);
- tighten the screw by force to make a cast at the rod (Fig. 18);
- extract the cap from the roll tube, unscrew the expansion screw and pull out the bearing rod to provide the space for center drilling; perform the center drilling of 1 – 2 mm deep hole for the expansion screw according to the cast (Fig. 19). It is allowed to perform center drilling in the box without extracting the cap;
- install the cap in the roll tube and fix its position by tightening the expansion screw (Fig. 20);

f) Mark and drill two X4,2+0,3 holes for rivets in the shutter box and in end caps at the side of the rear wall (Fig. 21);

g) Install ø4x10 aluminium rivets and rivet the rear panel of the shutter box with end caps

(Fig. 22).

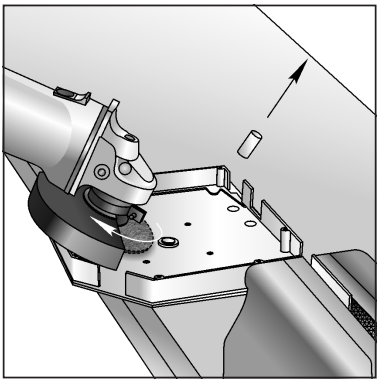


Fig. 01

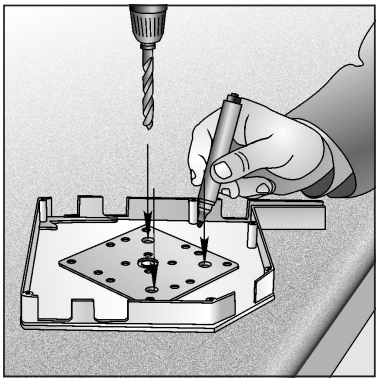


Fig. 02

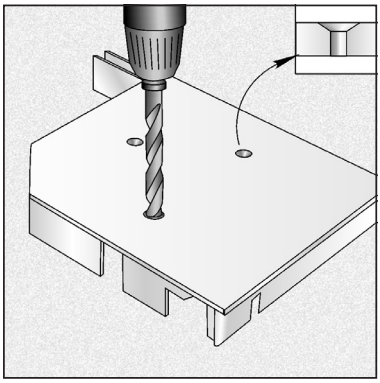


Fig. 03

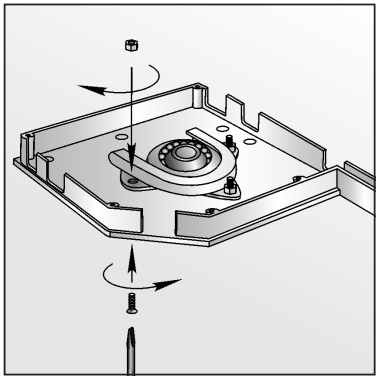


Fig. 04

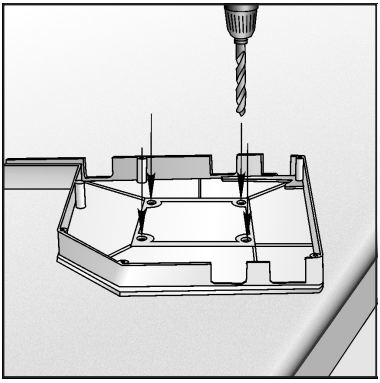


Fig. 05

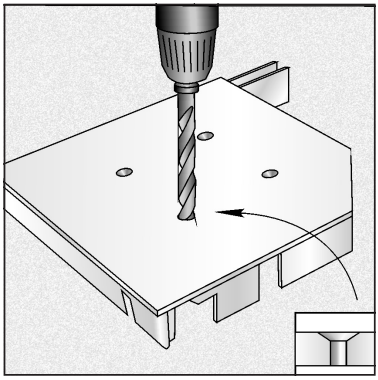


Fig. 06

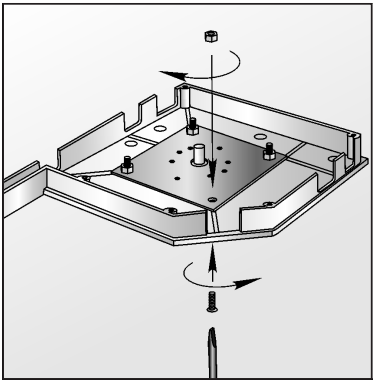


Fig. 07

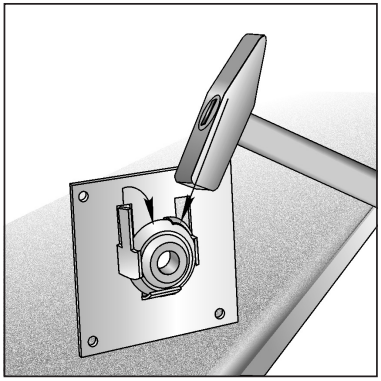


Fig. 08

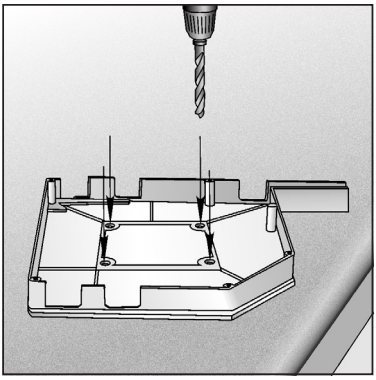
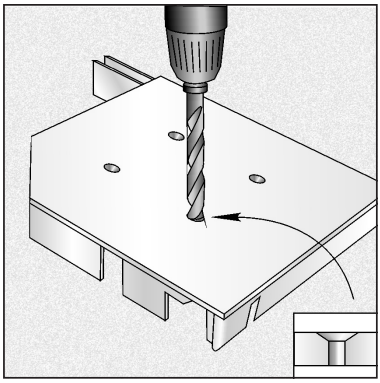


Fig. 09



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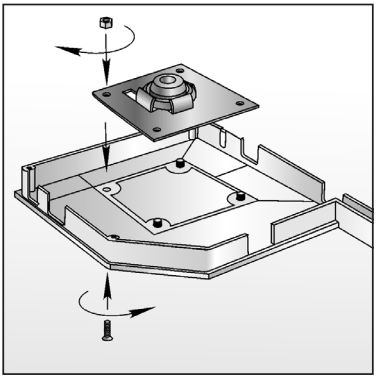

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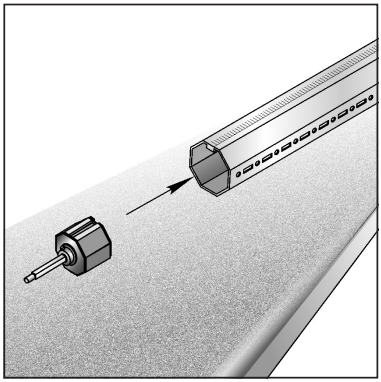


Fig. 12

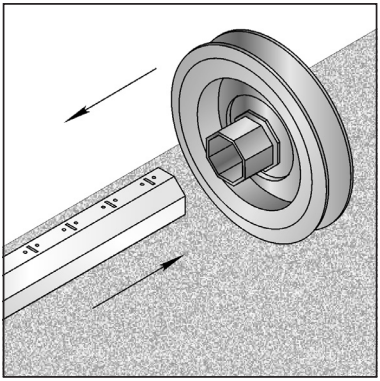


Fig. 13

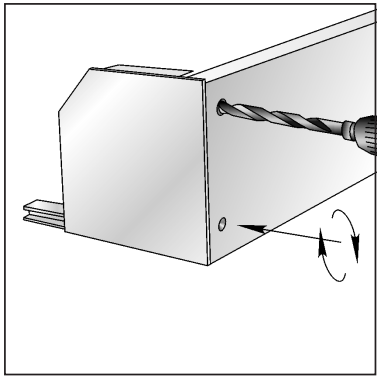
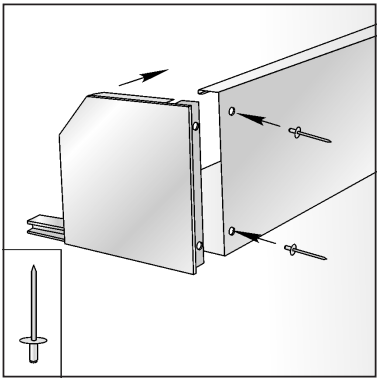


Fig. 14



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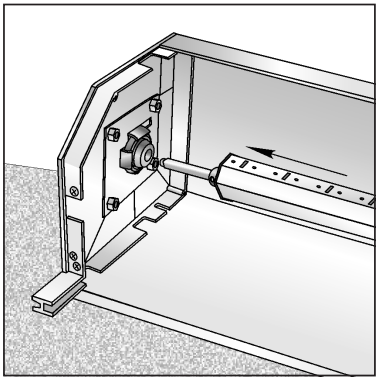


Fig. 16

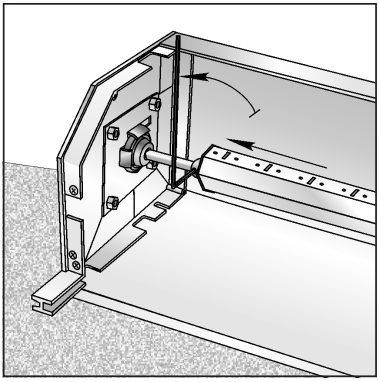


Fig. 17

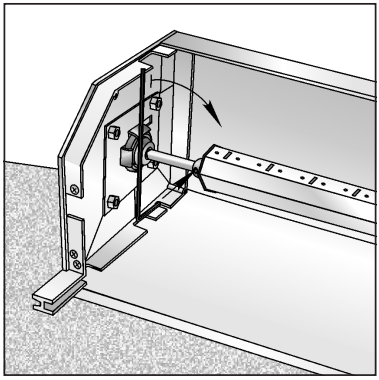


Fig. 18

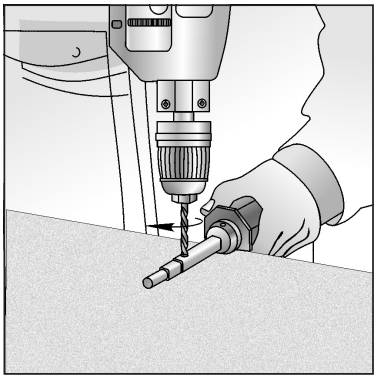


Fig. 19

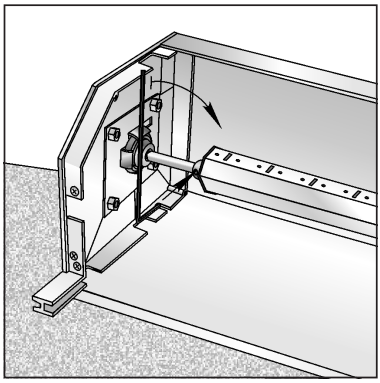


Fig. 20

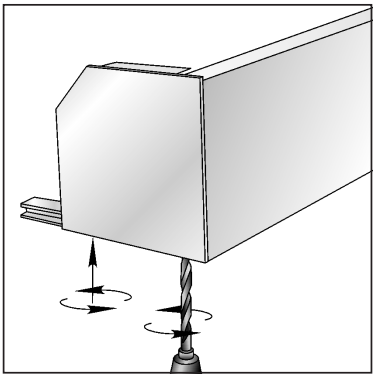


Fig. 21

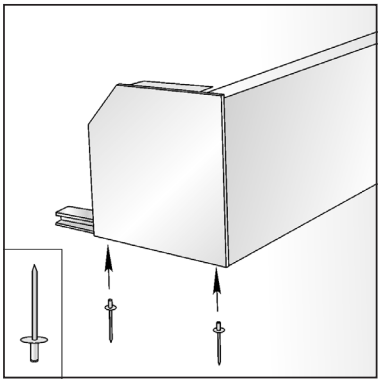


Fig. 22

5.3.4 Roller shutters with the reduction (crank) drive (RD drive). Weight of the roller shutter curtain is up to 35 kg.

a) Assemble SF137- SF205 or SF250/S end caps with drive components:

- to fasten the reduction gear, it is necessary to mark location of two holes in one of the caps according to the template (Fig. 01);
- drill two ǿ 6.5 holes, make counterbores for screw holes at the outer side of the cover (Fig. 02);
- install the reduction gear in the cover and fasten it with two M6x25 screws with nuts (Fig. 03);
- b) Assemble the octagonal roll tube with the drive:
- install a set of RD adjusting rings at the octagonal roll tube;
- install BB12x28 ball bearing in BBC bearing cap, install the cap in the roll tube against the stop (Fig. 04);
- install GC reduction cap in the roll tube at the opposite side (Fig. 05);

c) Assemble the rear panel of the shutter box with end caps:

- mark and drill two ǿ4,2+0,3 holes for rivets in the shutter box and in the upper part of the end caps (Fig. 06);
- install ǿ4x10 aluminium rivets and rivet the rear panel of the shutter box with end caps (Fig. 07);

d) Install the roll tube assembly in the shutter box (Fig. 08);

e) Pull out BBC bearing cap from the roll tube against the stop to the end cap and fix it with the rivet; before that it is necessary to drill holes for the rivet in the roll tube and in the cap (Fig. 09, 10);

f) Mark and drill two ǿ4,2+0,3 holes for rivets in the shutter box and in end caps at the side of the rear wall (Fig. 11);

g) Install ǿ4x10 aluminium rivets and rivet the rear panel of the shutter box with end caps

(Fig. 12).

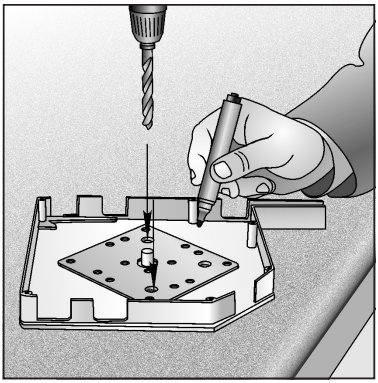


Fig. 01

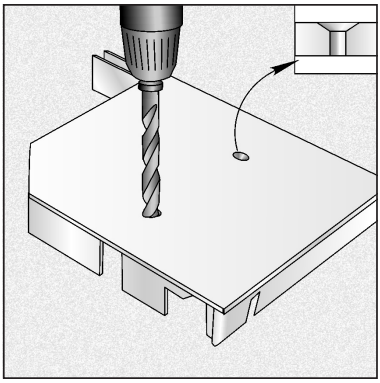


Fig. 02

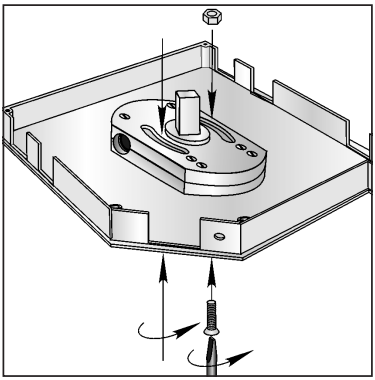


Fig. 03

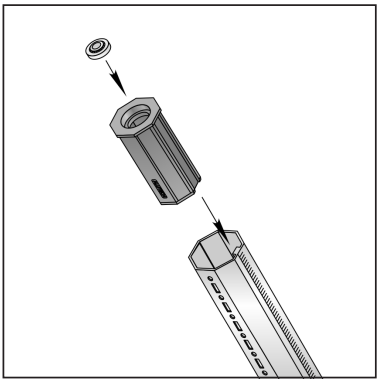


Fig. 04

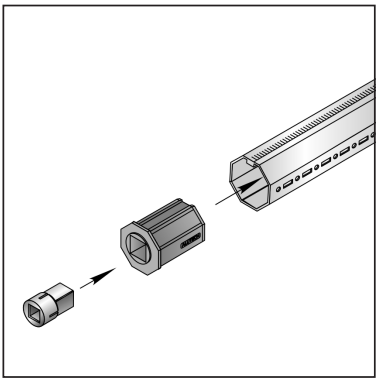


Fig. 05

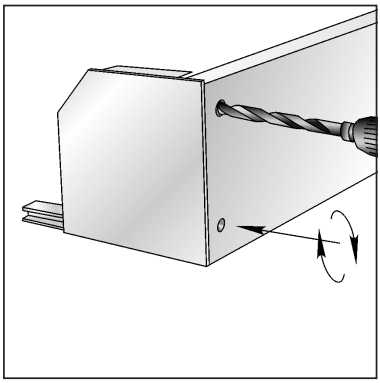


Fig. 06

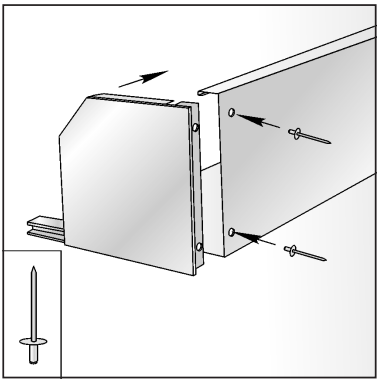


Fig. 07

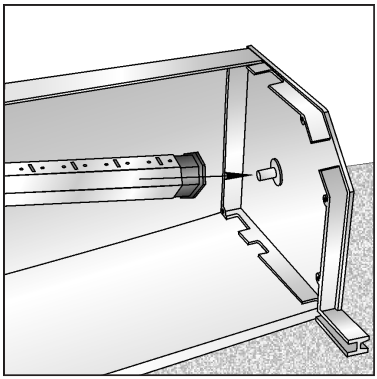
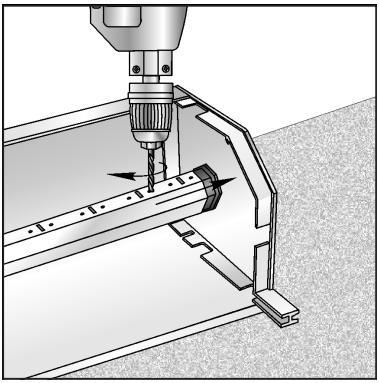


Fig. 08



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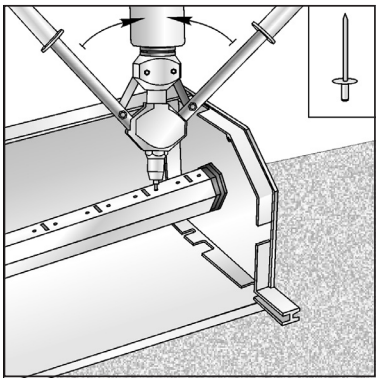


Fig. 10

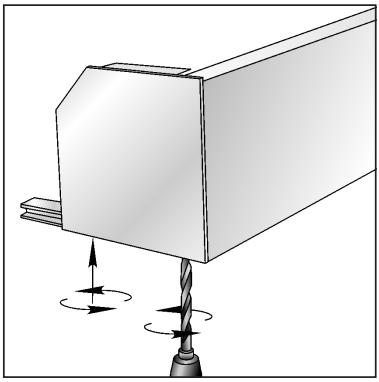


Fig. 11

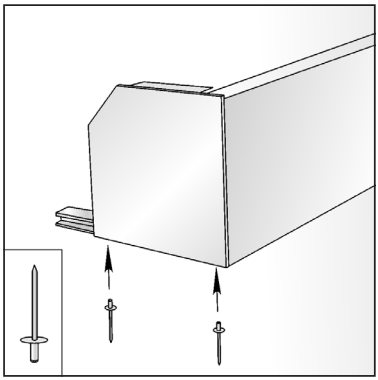


Fig. 12

5.3.5 Roller shutters with the reduction (crank) drive (RD drive). Weight of the roller shutter curtain is up to 35 kg. Complete with the adjustable cap

a) Assemble the reduction gear with SBB12/100 ball bearing support fixing it with two M6x15 screws with nuts (Fig. 01);

b) Assemble SF250 and SF300 end caps with drive components:

- at the cap installed at the side of the drive, fix SBB12/100 ball bearing supports with the reduction gear at the rest pad with four M6x15 screws with nuts; before that, it is necessary to drill four ø6,5 mm through holes on the cap and to make counterbores for screw heads at the outer side of the cap (Fig 02 - 04);
- install BB42 ball bearing in SBB42/100 support (Fig. 05);
- fix SBB42/100 ball bearing support at the cap installed at the side opposite to the drive using four M6x15 screws with nuts, before that, it is necessary to drill four ø6,5 mm through holes in the cap and make counterbores for screw heads at the outer side of the cap (Fig. 06 - 08);

c) Assemble the octagonal roll tube with the drive:

- install a set of RD adjusting rings at the octagonal roll tube;
- install APB adjustable cap in the roll tube at the side opposite to the drive (Fig. 09);
- install GC reduction cap in the roll tube at the side of the drive (Fig. 10). It is allowed to use caps for BP reduction gear;

d) Assemble the rear panel of the shutter box with end caps:

- Mark and drill two ø4,2+0,3 holes for rivets in the shutter box and in the upper part of the end caps (Fig. 11);
- Install ø4x10 aluminium rivets and rivet the rear panel of the shutter box with end caps (Fig. 12);

e) Install the roll tube assembly in the shutter box (Fig. 13);

f) To adjust APB adjustable cap, do the following:

- unscrew the expansion screw of the cap and pull out the bearing rod until it is seated in the ball bearing (Fig. 14);
- tighten the screw by force to make a cast at the rod (Fig. 15);
- extract the cap from the roll tube, unscrew the expansion screw and pull out the bearing rod to provide the space for center drilling; perform the center drilling of 1 – 2 mm deep hole for the expansion screw according to the cast (Fig. 16). It is allowed to perform center drilling in the shutter box without extracting the cap;
- install the cap in the roll tube and fix its position by tightening the expansion screw (Fig. 17);

g) Rivet the rear panel of the shutter box with caps:

- Mark and drill two ø4,2+0,3 holes for rivets in the shutter box and in the end caps at the side of the rear wall, install ø4x10 aluminium rivets and rivet the rear panel of the shutter box with end caps (Fig. 18).

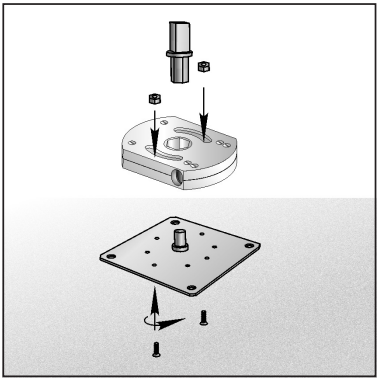


Fig. 01

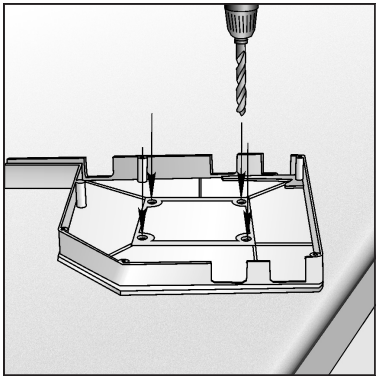


Fig. 02

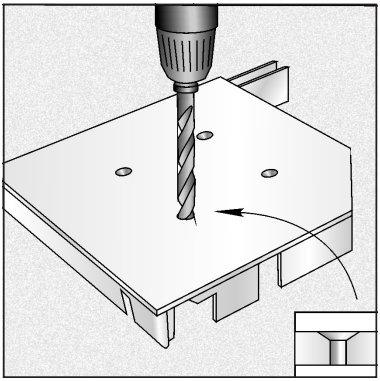


Fig. 03

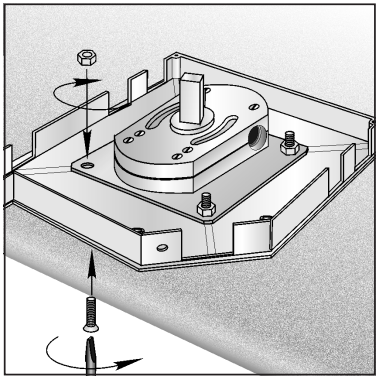


Fig. 04

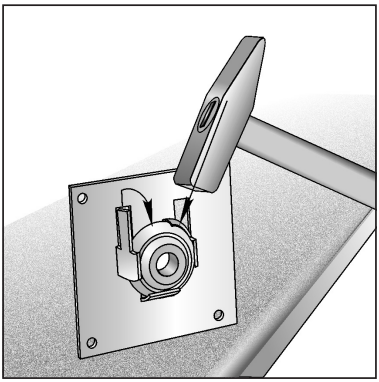
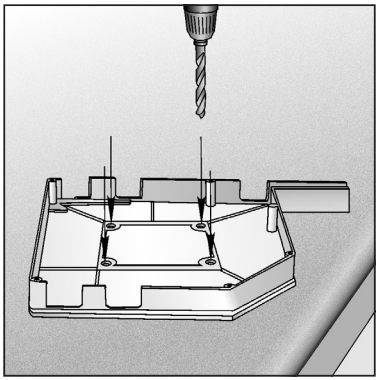


Fig. 05



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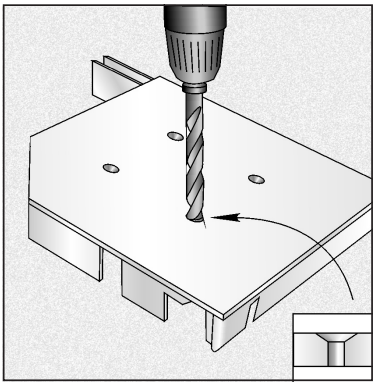
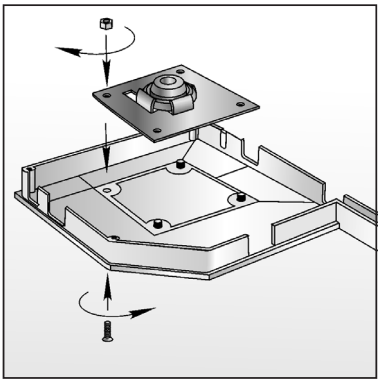


Fig. 07



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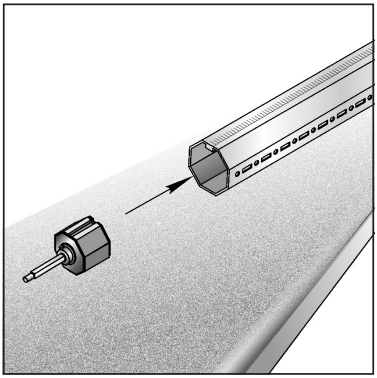

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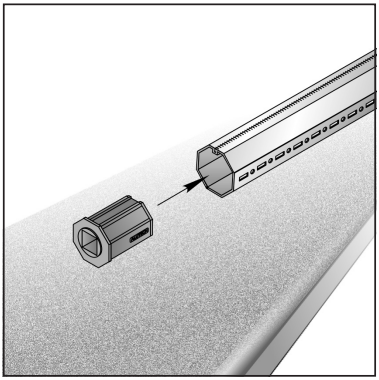

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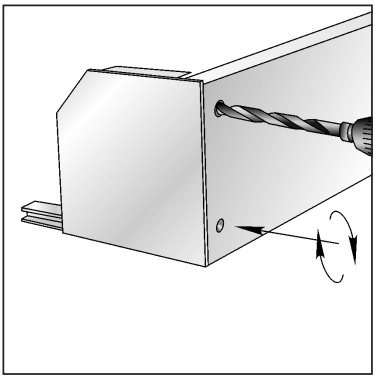

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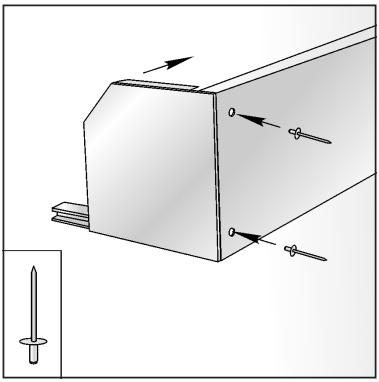


Fig. 12

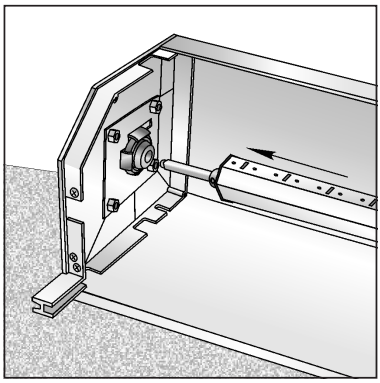


Fig. 13

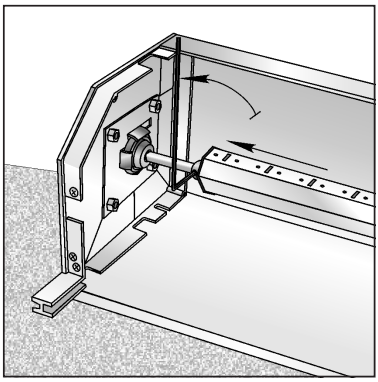


Fig. 14

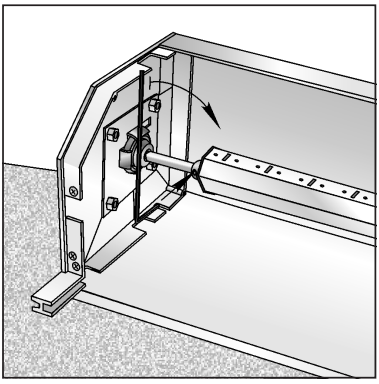


Fig. 15

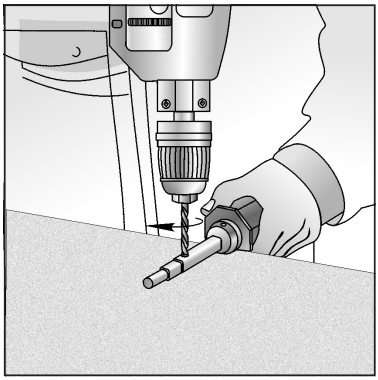


Fig. 16

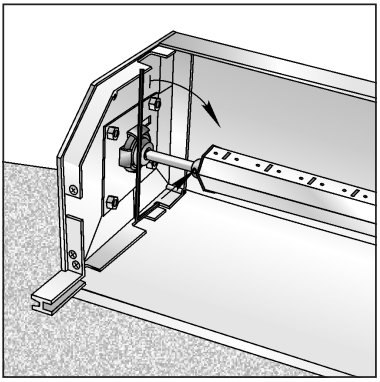


Fig. 17

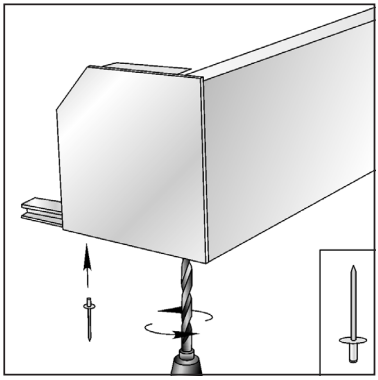


Fig. 18

5.3.6 Roller shutters with the electric motor. Roller shutter curtain weight is up to 30 kg

a) Install the adapter and the end-position ring at the electric motor (Fig. 01);

b) Fix the motor bracket at the electric motor (Fig. 02);

c) If SF250 and SF300 caps are used, it is necessary to fix SBB12/100 ball bearing support at cap installed at the side opposite to the drive using four M6x15 screws with nuts, before that, it is necessary to drill four ø6,5 mm through holes in the cap and make counterbores for screw heads at the outer side of the cap (Fig. 03 - 05);

d) It is necessary to fix the electric motor with four M6x15 screws with nuts to the cover installed at the side of the drive; to fix it, drill the required number of ø6,5 mm through holes in the cover and make counterbores for screw heads at the outer side of the cover (Fig. 06 - 08);

e) Assemble the octagonal roll tube with the drive of the roller shutter curtain:

- install BB12x28 ball bearing in BBC bearing cap; install the cap in the roll tube against the stop (Fig. 09);
- install a set of key lock rings at the roll tube (Fig. 10);
- install the electric motor assembly with the cover in the roll tube (Fig. 11);
- drill two ø4,2+0,3 holes in the roll tube and in the adapter of the electric motor. Install ø4 rivets in the holes and rivet them over (Fig. 12, 13);

e) Assemble the rear panel of the shutter box with end caps:

- mark and drill two ø4,2+0,3 holes for rivets in the shutter box and in the upper part of the end caps (Fig. 14);
- install ø4x10 aluminium rivets and rivet the rear panel of the shutter box with end caps (Fig. 15);

f) Pull out the bearing cap from the roll tube against the stop to the end cap and fix it with the rivet; before that it is necessary to drill holes for the rivet in the roll tube and in the end cap (Fig. 16, 17);

g) Mark and drill two ø4,2+0,3 holes for rivets in the shutter box and in the end caps at the side of the rear wall. Install ø4x10 aluminium rivets and rivet the rear panel of the shutter box with end caps (Fig. 18).

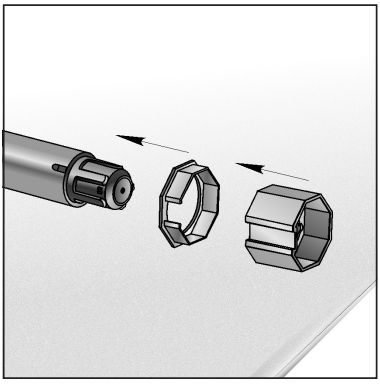


Fig. 01

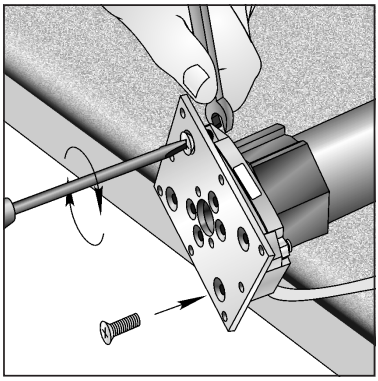


Fig. 02

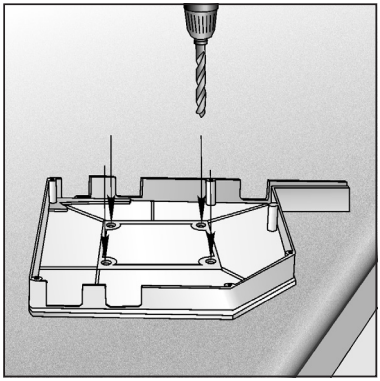


Fig. 03

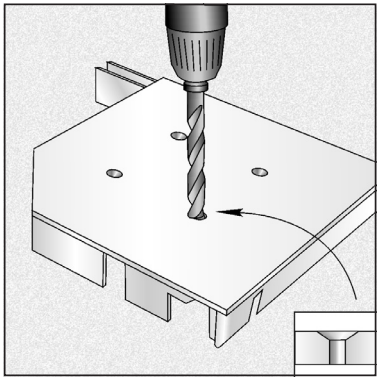


Fig. 04

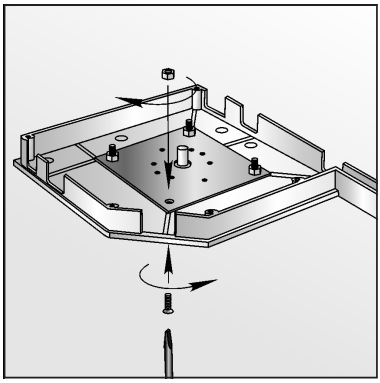


Fig. 05

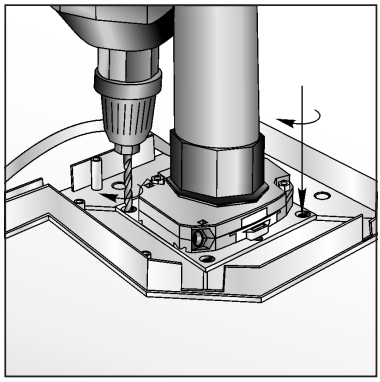


Fig. 06

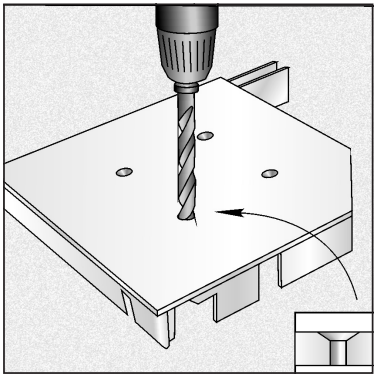


Fig. 07

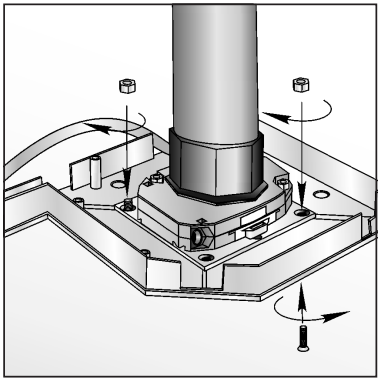
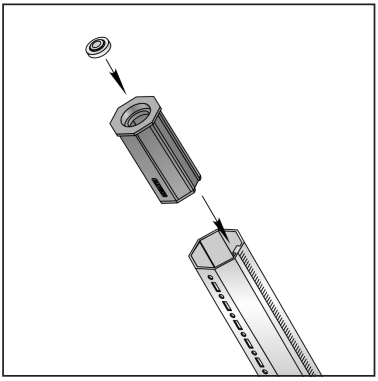


Fig. 08



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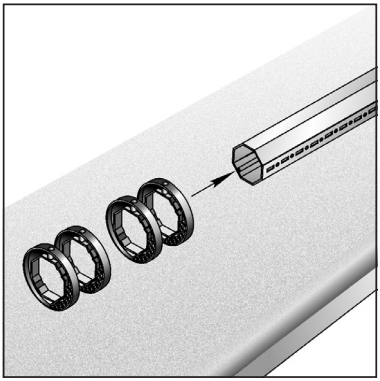

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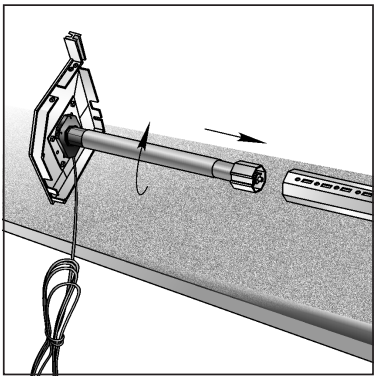


Fig. 11

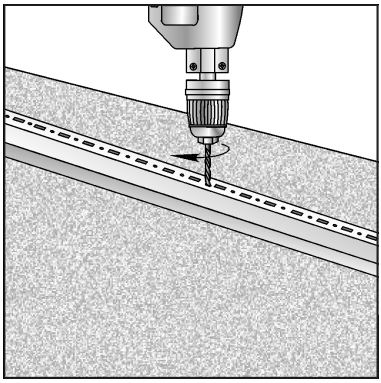


Fig. 12

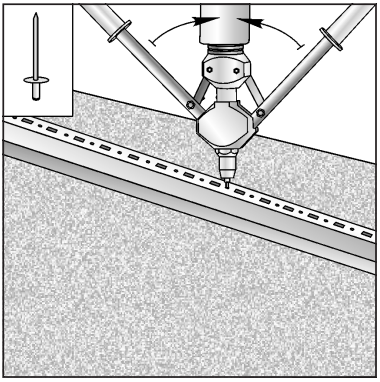


Fig. 13

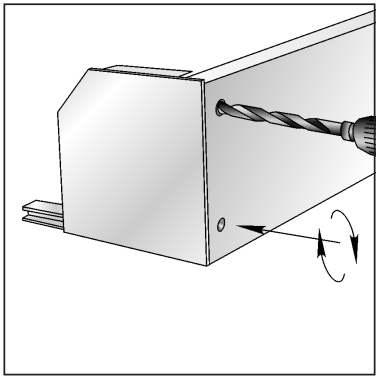


Fig. 14

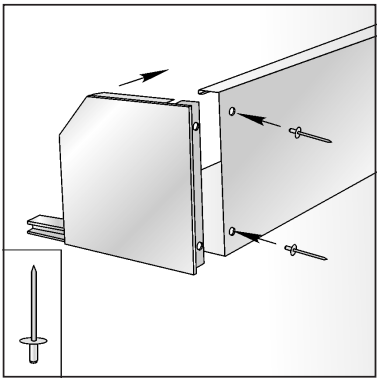


Fig. 15

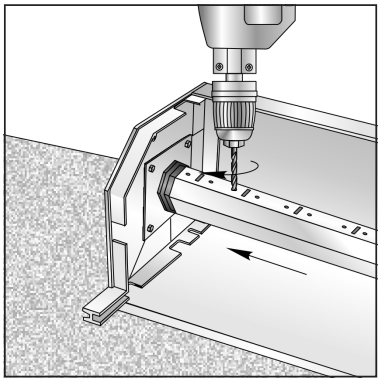
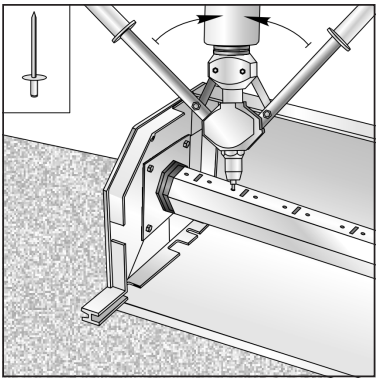


Fig. 16



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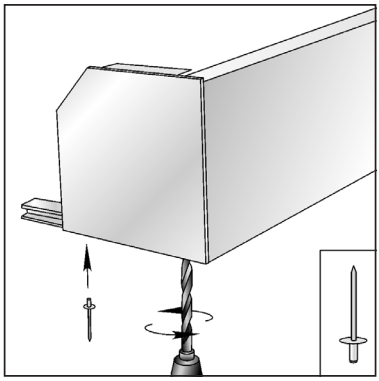


Fig. 18

5.3.7 Roller shutters with the electric motor. The curtain weight is over 30 kg

a) Install the adapter and the end-position ring at the electric motor (Fig. 01);

b) Fix the motor bracket at the electric motor (Fig. 02);

c) Fix the electric motor with four M6x15 screws with nuts to the cover installed at the side of the drive; to fix it; previously drill the required number of ø6,5 mm through holes in the cover and make counterbores for screw heads at the outer side of the cover (Fig. 03 - 05);

d) If SF180, SF205 and SF250/S caps are used, it is necessary to cut off the central shank flush with the wall for the cap installed at the side opposite to the drive (Fig. 06);

e) Assemble the cover from the side opposite the drive with the support:

- If SF180, SF205 and SF250/S caps are used at the side opposite to the drive, it is necessary to install BB42 ball bearing in SBB42 support and fix SBB42 ball bearing support at the cover using three M6x15 screws with nuts; before that, it is necessary to drill three ø6,5 mm through holes in the cover according to the template and make counterbores for screw heads at the outer side of the cover (Fig. 07 - 09);

- if SF250 and SF300 caps are used at the side opposite to the drive it is necessary to install the ball bearing in SBB42/100 support (Fig. 10). If weight of the roller shutter curtain is up to 50 kg, BB42 ball bearing is used; for the roller shutter curtain with the weight over 50 kg, it is necessary to use the support with SBB32 ball bearing. Fix SBB42/100 ball bearing support at the cover with four M6x15 screws with nuts; before that, it is necessary to drill four X6,5 mm through holes in the cover and make counterbores for screw heads at the outer side of the cover (Fig. 11 - 13);

f) Assemble the octagonal roll tube with the drive of the roller shutter curtain:

- install APB adjustable cap in the roll tube (Fig. 14);
- install a set of key lock rings at the roll tube (Fig. 15);
- install the electric motor assembly with the cover in the roll tube (Fig. 16);
- drill two ø4,2+0,3 holes in the roll tube and in the adapter of the electric motor. Install ø4 rivets in the holes and rivet them over (Fig. 17, 18);

g) Assemble the rear panel of the shutter box with the end cap installed at the side opposite to the drive;

- mark and drill four ø4,2+0,3 holes for rivets in the shutter box and in the end cap (Fig. 19);
- install ø4x10 aluminium rivets and rivet the rear panel of the shutter box with the end cap (Fig. 20);

h) Install the end cap assembly with the drive in the shutter box (Fig. 21);

i) To adjust APB adjustable cap, do the following:

- unscrew the expansion screw of the cap and pull out the bearing rod until it is seated in the ball bearing (Fig. 22);
- tighten the screw by force to make a cast at the rod (Fig. 23);
- extract the cap from the roll tube, unscrew the expansion screw and pull out the bearing rod to provide the space for center drilling; perform the center drilling of 1 – 2 mm deep hole for the expansion screw according to the cast (Fig. 24). It is allowed to perform center drilling in the shutter box without extracting the cap;
- install the cap in the roll tube and fix its position by tightening the expansion screw (Fig. 25);

j) Mark and drill four ø4,2+0,3 holes for rivets in the shutter box and in the end cap at the side of the drive. Install rivets and then rivet the rear panel of the shutter box with the end cap (Fig. 26, 27).

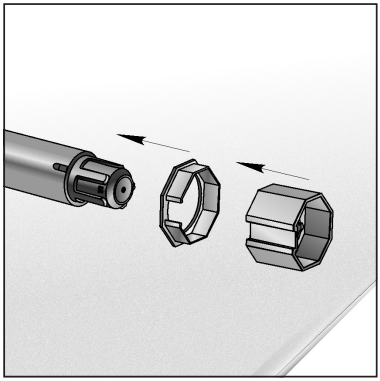


Fig. 01

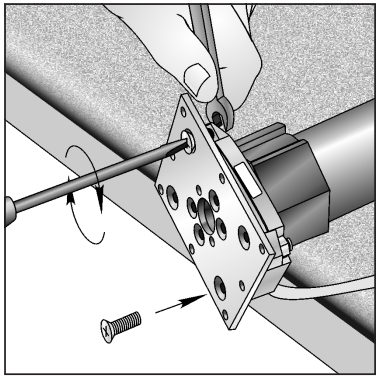


Fig. 02

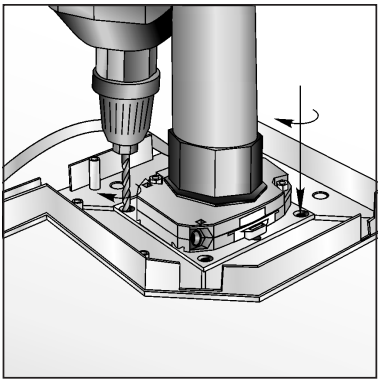


Fig. 03

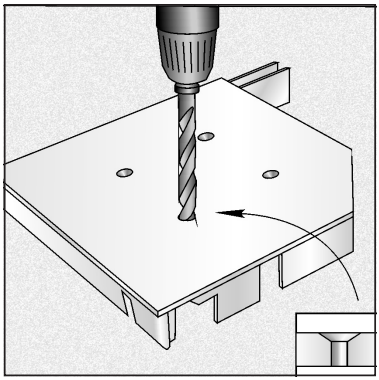


Fig. 04

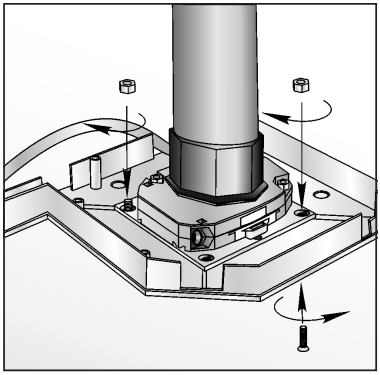


Fig. 05

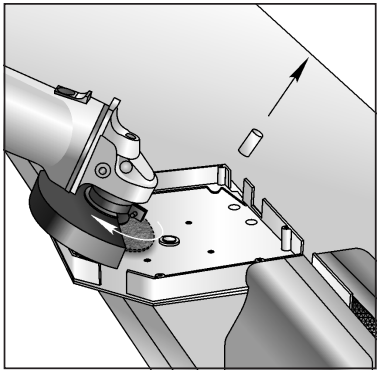


Fig. 06

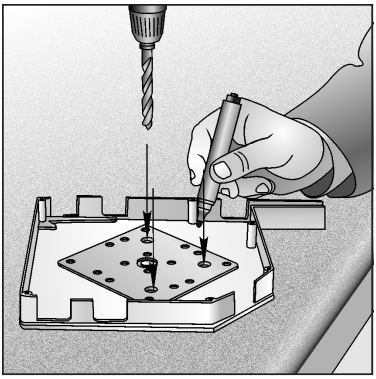


Fig. 07

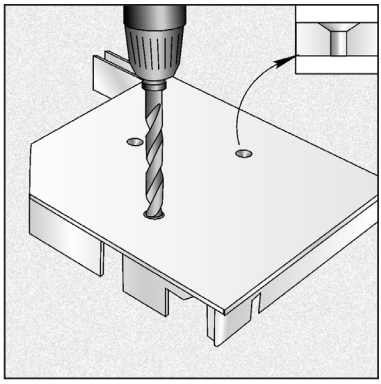


Fig. 08

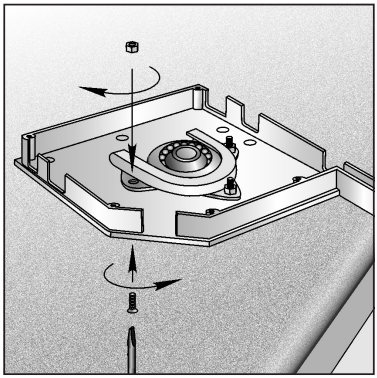


Fig. 09

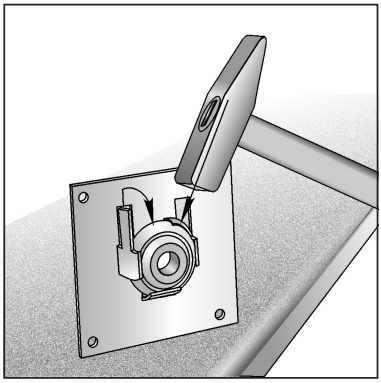


Fig. 10

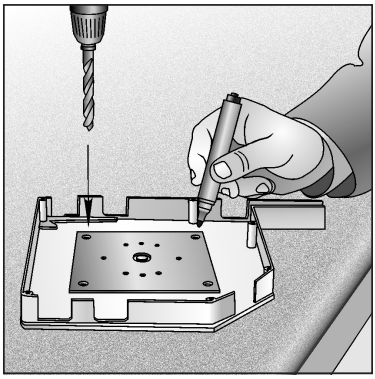


Fig. 11

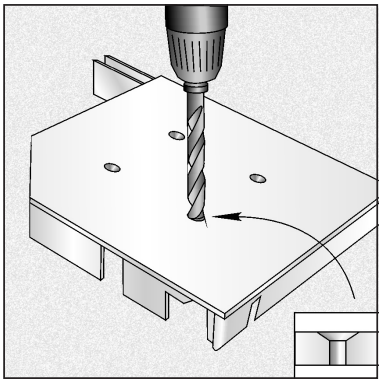


Fig. 12

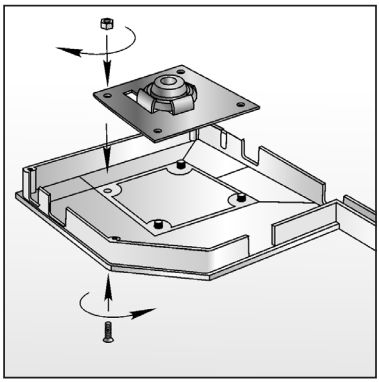
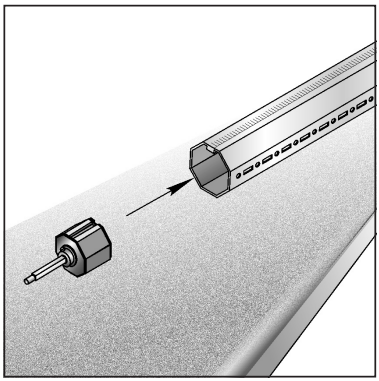


Fig. 13



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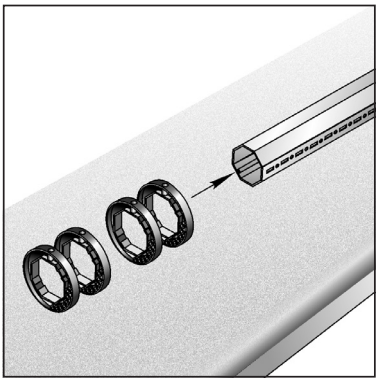

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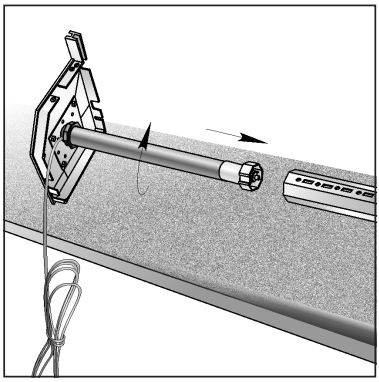


Fig. 16

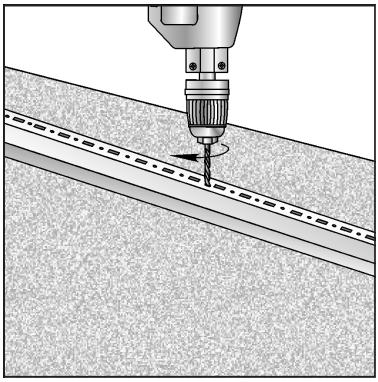


Fig. 17

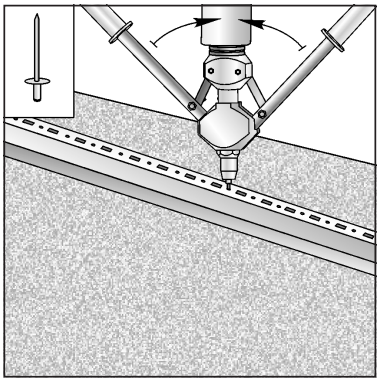
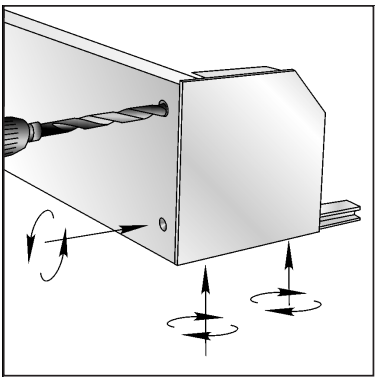


Fig. 18



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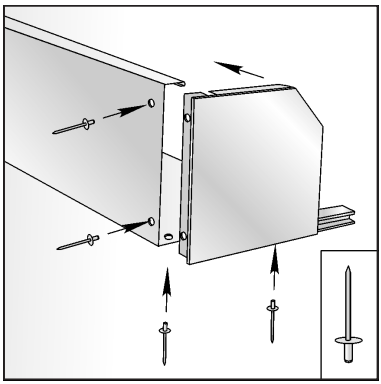

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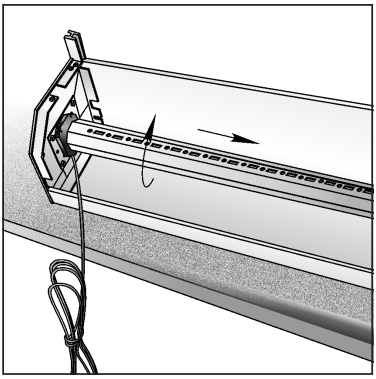

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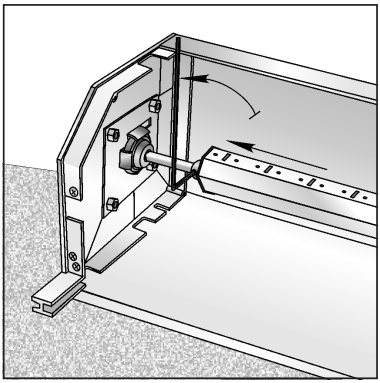

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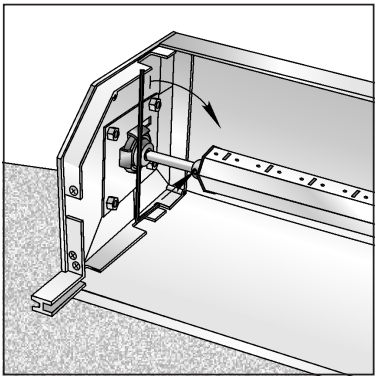

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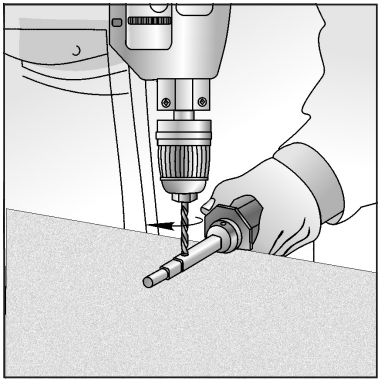

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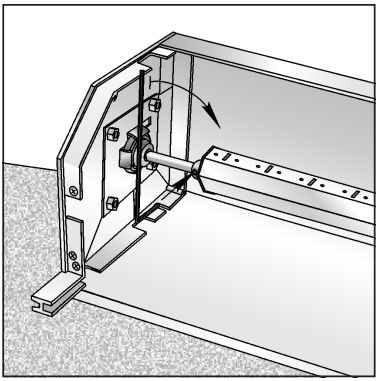

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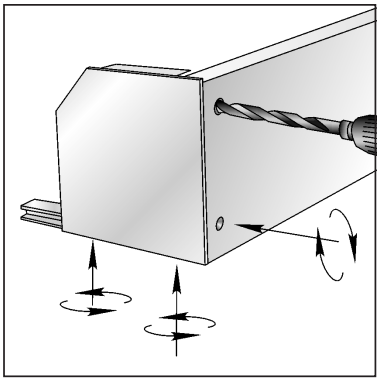

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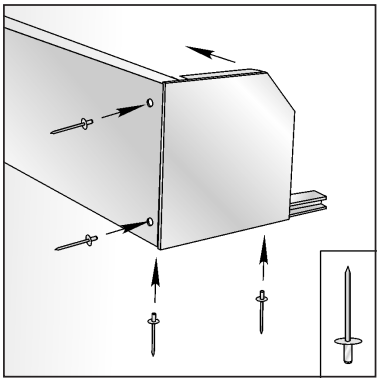


Fig. 27

5.3.8 Roller shutters with the assistance and push-up mechanism. The roller shutter curtain weight is up to 30 kg

a) If SF137-SF205, SF250/S caps are used, it is necessary to cut off the central shank of the cap flush with the wall only for the cap installed at the side of the drive (Fig. 01);

b) Fix PLA100 support plate to the cap installed at the side of the drive using four M6x15 screws with nuts; before that, it is necessary to drill four X6.5 mm through holes and to make counterbores for screw heads at the outer side of the cap (Fig. 05 - 07),

c) If SF250 and SF300 caps are used, fix SBB12/100 ball bearing support at the cap installed at the side opposite to the drive using four M6x15 screws with nuts; before that, it is necessary to drill four X6.5 mm through holes in the cap and to make counterbores for screw heads at the external side of the cap (Fig. 02 - 04);

d) Assemble the rear panel of the shutter box with end caps. Mark and drill eight X4,2+0,3 holes for rivets in the shutter box and in end caps. Install X4x10 aluminium rivets and rivet the rear panel of the shutter box with end caps (Fig. 08, 09);

e) Assemble the octagonal roll tube with the drive:

- install a set of RD adjusting rings at the octagonal roll tube;
- install BB12x28 ball bearing in BBC bearing cap; install the cap in the roll tube against the stop (Fig. 10);
- install the assistance and push-up mechanism in the roll tube (Fig. 11);

f) Mount the assembled roll tube in the shutter box (Fig. 12) installing the assistance and push-up mechanism axle in the seat of the support plate (Fig. 13), fasten it with the catch pin (Fig. 14);

g) Pull out the bearing cap from the roll tube against the stop to the end cap and fix it with the rivet; before that it is necessary to drill a hole for the rivet in the roll tube and in the cap (Fig. 15, 16).

Note: The figure shows left mounting of the assistance and push-up mechanism.

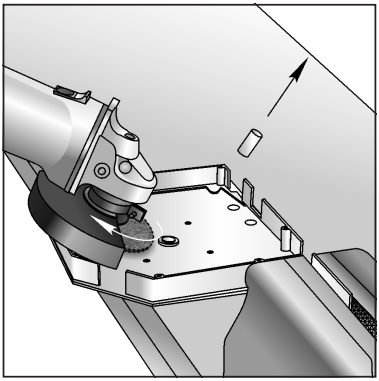


Fig. 01

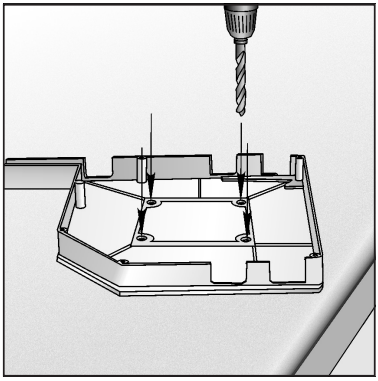


Fig. 02

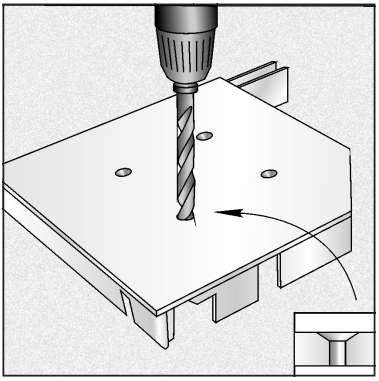


Fig. 03

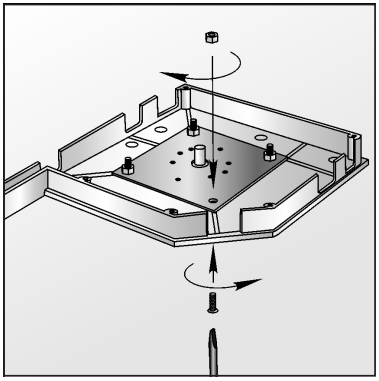


Fig. 04

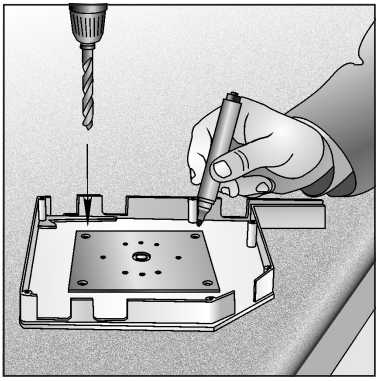


Fig. 05

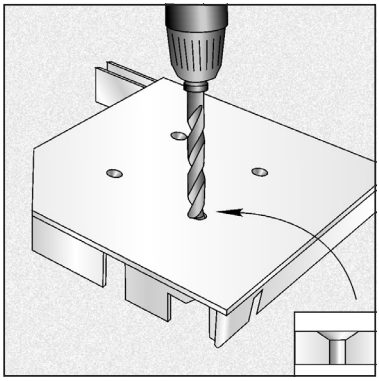


Fig. 06

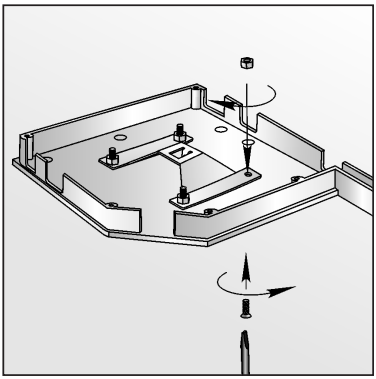


Fig. 07

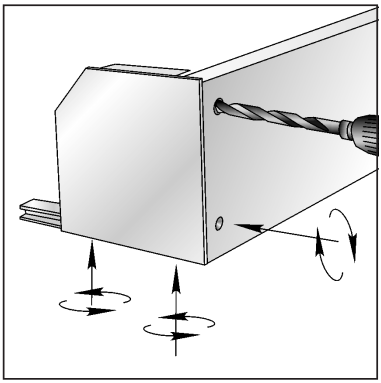


Fig. 08

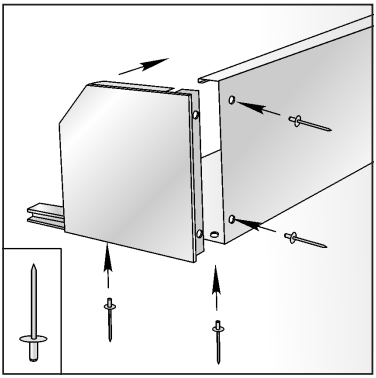


Fig. 09

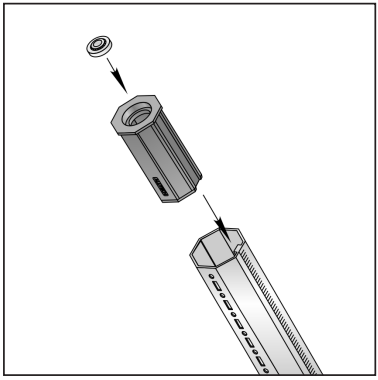


Fig. 10

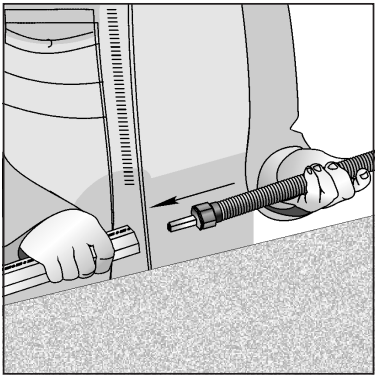


Fig. 11

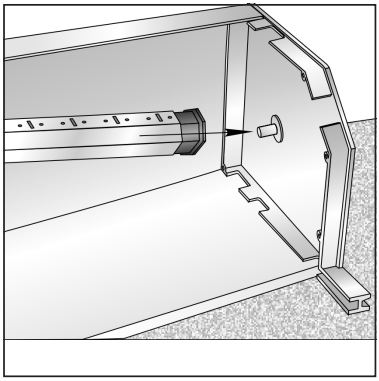


Fig. 12

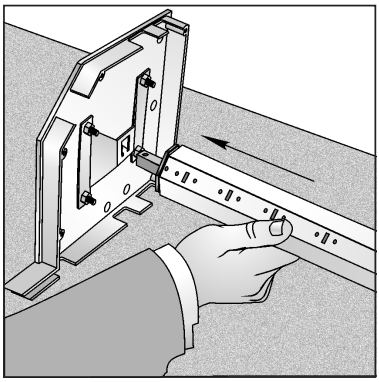


Fig. 13

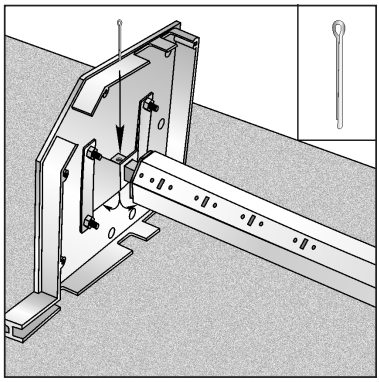


Fig. 14

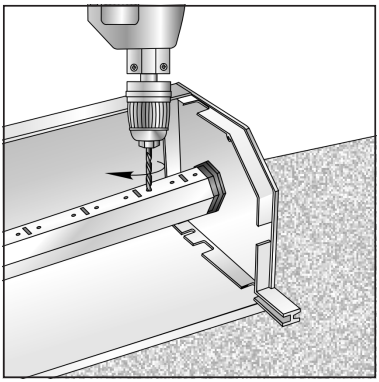


Fig. 15

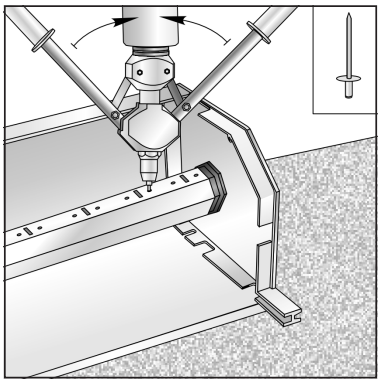


Fig. 16

5.3.9 Roller shutters with the assistance and push-up mechanism. The roller shutter curtain weight is over 30 kg

a) If SF180, SF205, SF250/S caps are used, it is necessary to cut off the central shank of the cap flush with the wall for each cap of the cap couple (Fig. 01);

b) Fix PLA100 support plate to the cap installed at the side of the drive using four M6x15 screws with nuts; before that, it is necessary to drill four X6.5 mm through holes and to make counter-bores for screw heads at the outer side of the cap (Fig. 02 - 04),

c) Assemble the cover at the side opposite to the drive, with the support:

- If SF180, SF205, SF250/S caps are used, at the side opposite to the drive, it is necessary to install BB42 ball bearing in SBB42 support, fix SBB42 ball bearing support at the cap using three M6x15 screws with nuts; before that, it is necessary to drill three X6.5 mm through holes in the cap according to the template and to make counterbores for screw heads at the outer side of the cap (Fig. 05 - 07);
- If SF250 and SF300 caps are used, at the side opposite to the drive it is necessary to install the ball bearing in SBB42/100 support (Fig. 08). If weight of the roller shutter curtain is up to

50 kg, BB42 ball bearing is used; for the roller shutter curtain with the weight over 50 kg, it is necessary to use the support with SBB32 ball bearing.

- Fix SBB42/100 ball bearing support at the cover using four M6x15 screws with nuts; before that, it is necessary to drill four X6,5 mm through holes in the cover and make counterbores for screw heads at the outer side of the cover (Fig. 09 - 11);

d) Assemble the octagonal roll tube with the drive:

- install a set of RD adjusting rings at the octagonal roll tube;
- install APB adjustable cap in the roll tube (Fig. 12);
- install the assistance and push-up mechanism in the roll tube (Fig. 13);

e) Assemble the rear panel of the shutter box with end caps. Mark and drill eight X4,2+0,3 holes for rivets in the shutter box and in end caps. Install X4x10 aluminium rivets and rivet the rear panel of the shutter box with end caps (Fig. 14, 15);

f) Mount the assembled roll tube in the shutter box installing the assistance and push-up mechanism axle in the seat of the support plate, and fasten it with the catch pin (Fig. 16, 17);

g) To adjust APB adjustable cap, do the following:

- unscrew the expansion screw of the cap and pull out the bearing rod until it is seated in the ball bearing (Fig. 18);
- tighten the screw by force to make a cast at the rod (Fig. 19);
- unscrew the expansion screw and pull out the bearing rod to provide the space for center drilling; perform the center drilling of 1 – 2 mm deep hole for the expansion screw according to the cast (Fig. 20).
- fix the adjustable cap position by tightening the expansion screw (Fig. 21).

Note: The figure shows left mounting of the assistance and push-up mechanism.

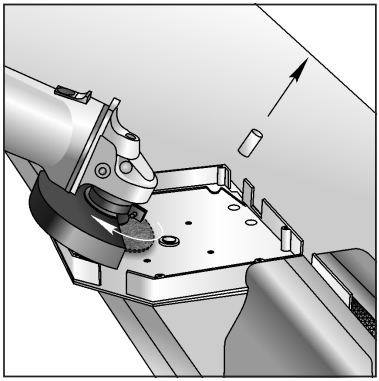


Fig. 01

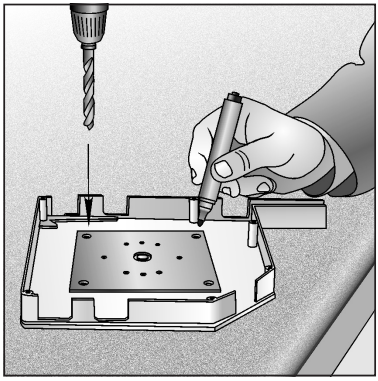


Fig. 02

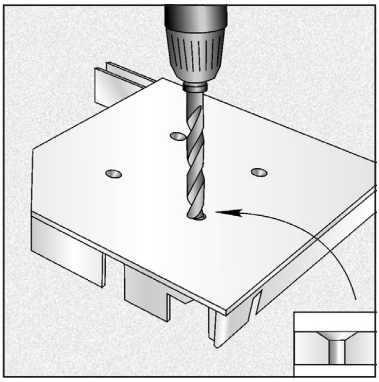


Fig. 03

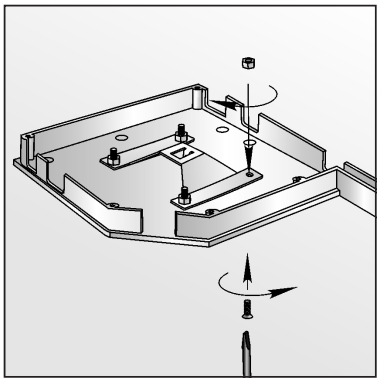


Fig. 04

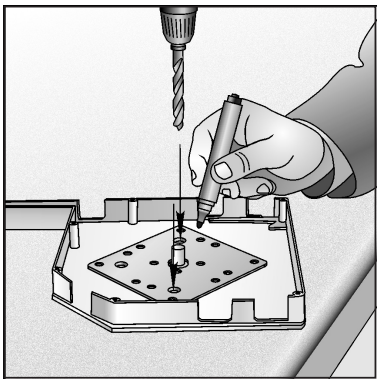


Fig. 05

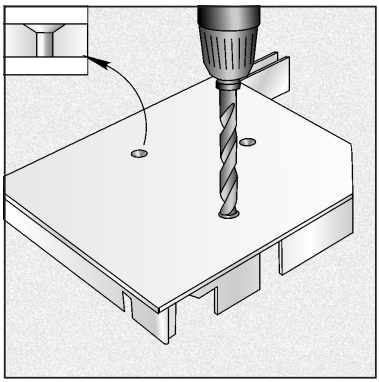


Fig. 06

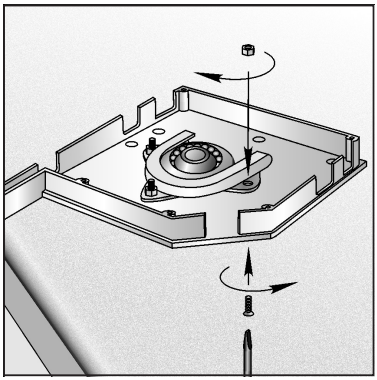


Fig. 07

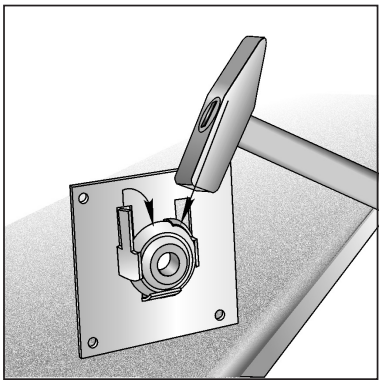


Fig. 08

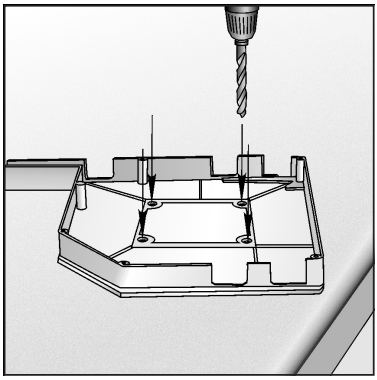
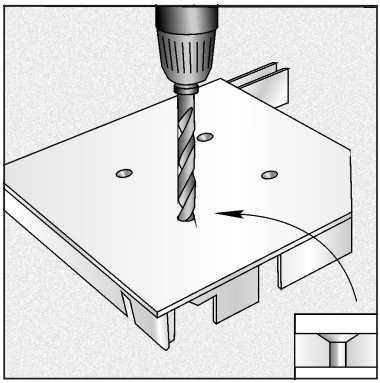


Fig. 09



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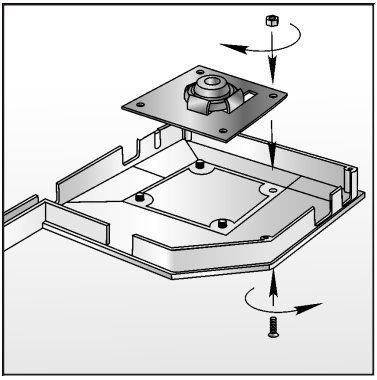

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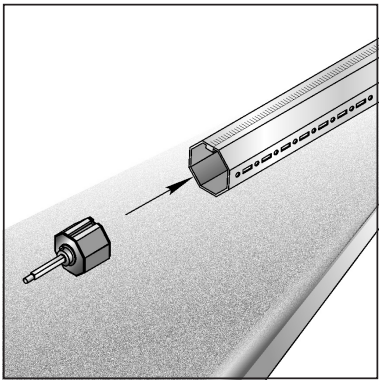

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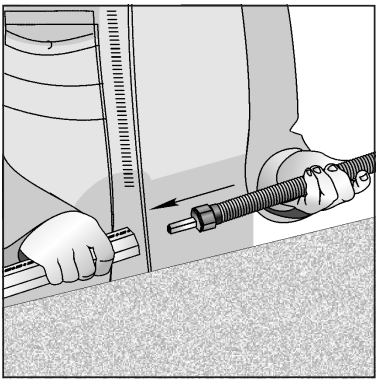

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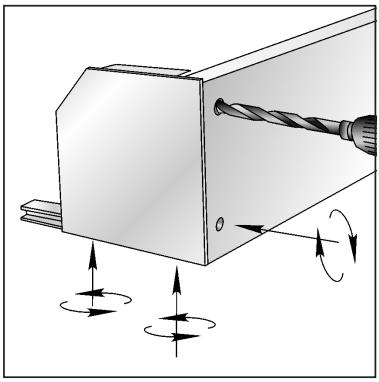

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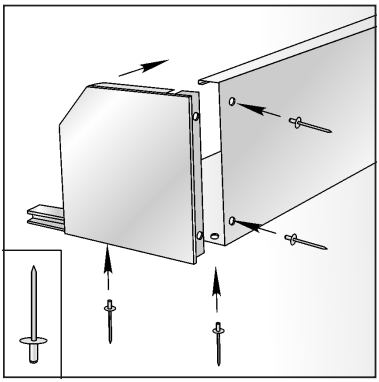

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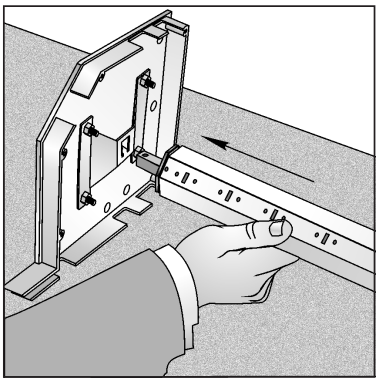
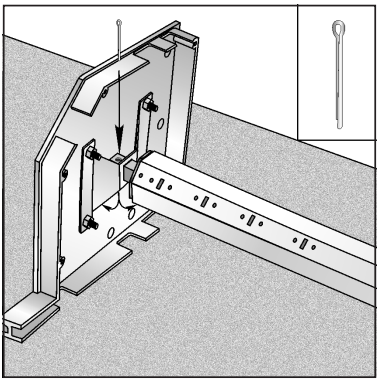


Fig. 16



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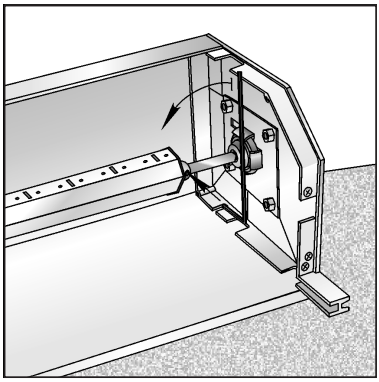

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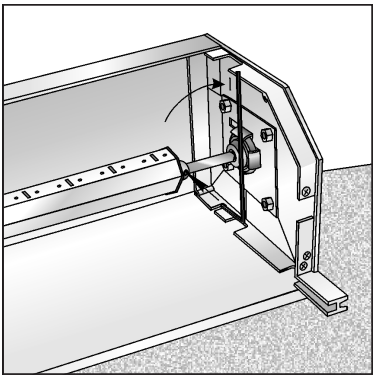

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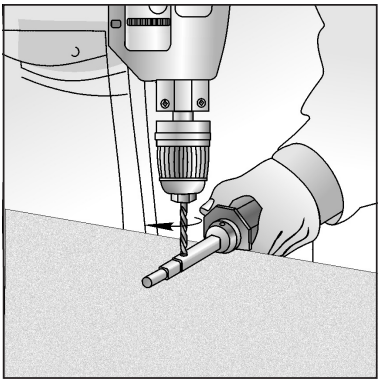


Fig. 20

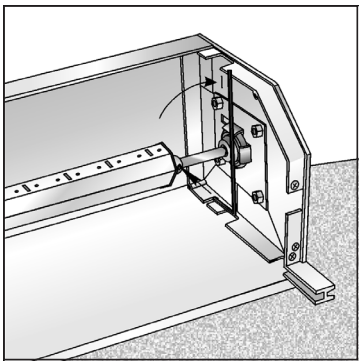


Fig.21

5.3.10 Roller shutters with the assistance and push-up mechanism with the curtain made of AER42 profile

a) If SF137-SF205, SF250/S caps are used, it is necessary to cut off the central shank of the cap flush with the wall for the cap installed at the side of the drive (Fig. 01);

b) Drill six 10 mm deep ø3,2+0,3 holes in the flanged edges of the covers to fasten safety plates (Fig. 02);

c) Fix PLA100 support plate to the cover installed at the side of the drive using four M6x15 screws with nuts; before that, it is necessary to drill four ø6.5 mm through holes in the cover and to make counterbores for screw heads at the external side of the cover(Fig. 03 - 05);

d) Assemble the assistance and push-up mechanism with the cover installing its axle in the seat of the support plate. Fix it with the bolt or fasten it with the catch pin (Fig. 06, 07).

e) Install safety plates and rivet them to the covers (Fig. 08);

f) Assemble the octagonal roll tube with the drive:

- install a set of RD adjusting rings at the octagonal roll tube;
- install BB12x28 ball bearing in BBC bearing cap; install the cap in the roll tube against the stop (Fig. 09);
- install the assistance and push-up mechanism assembly with the cover in the roll tube against the stop (Fig. 10);

g) Assemble the rear panel of the shutter box with end caps and the drive. Mark and drill eight ø4,2+0,3 holes for rivets in the shutter box and in end caps. Install ø4x10 aluminium rivets and rivet the rear panel of the shutter box with end caps (Fig. 11, 12).

h) Pull out the bearing cap from the roll tube against the stop to the end cap and fix it with the rivet; before that it is necessary to drill a hole for the rivet in the roll tube and in the cap (Fig. 13, 14).

Note: The figure shows left mounting of the assistance and push-up mechanism.

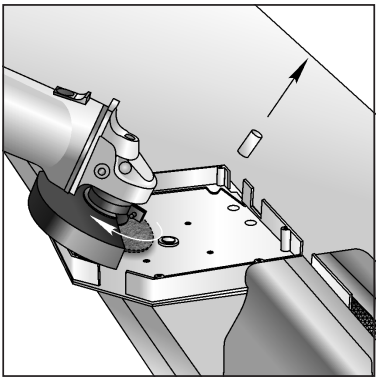


Fig. 01

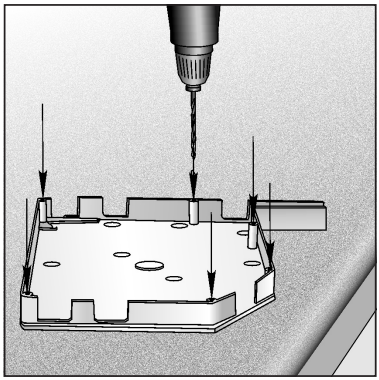


Fig. 02

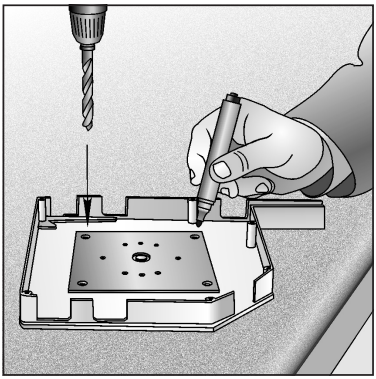


Fig. 03

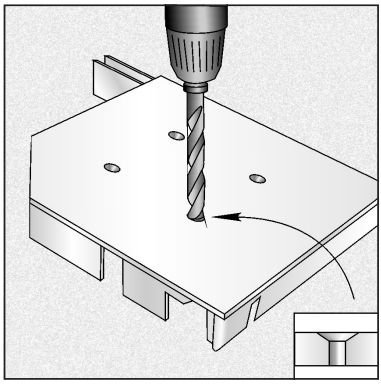


Fig. 04

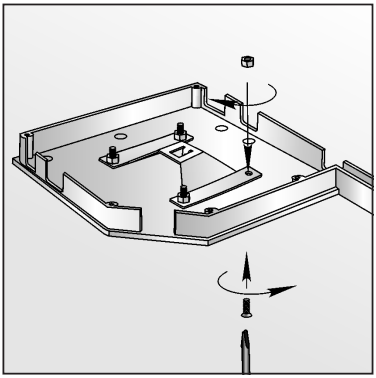


Fig. 05

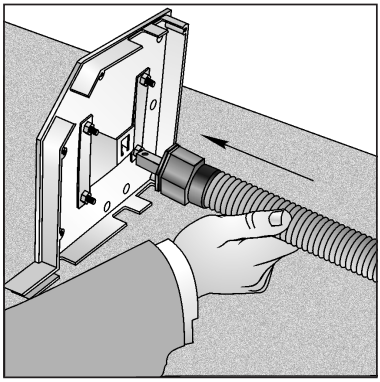


Fig. 06

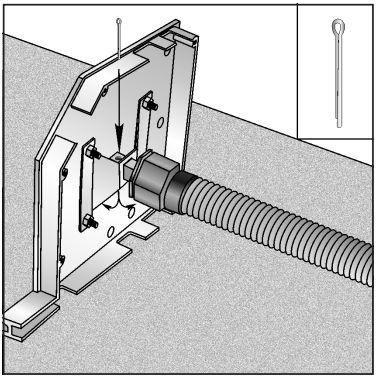


Fig. 07

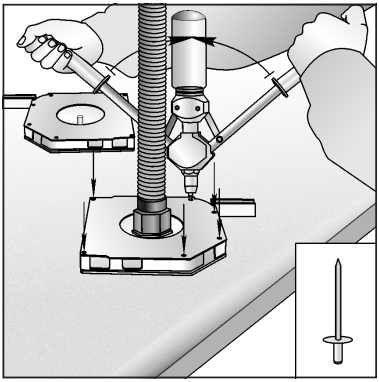


Fig. 08

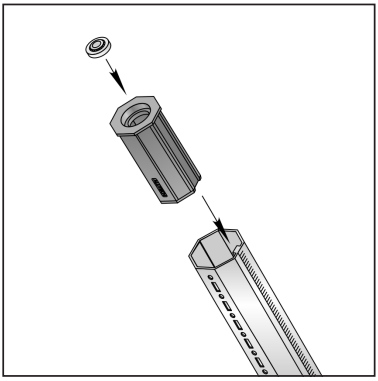


Fig. 09

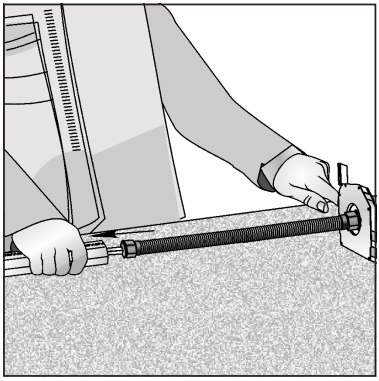


Fig. 10

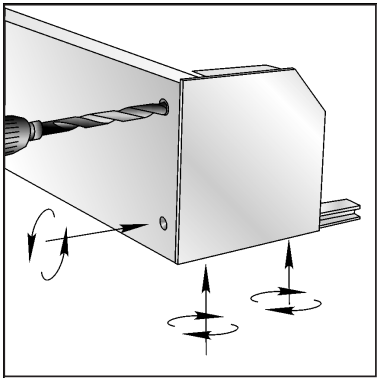


Fig. 11

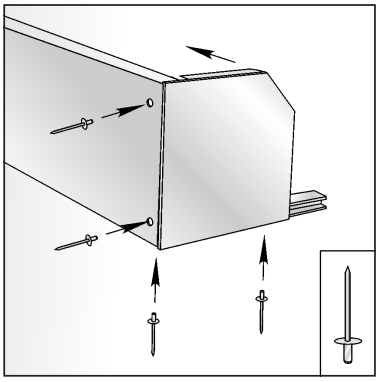


Fig. 12

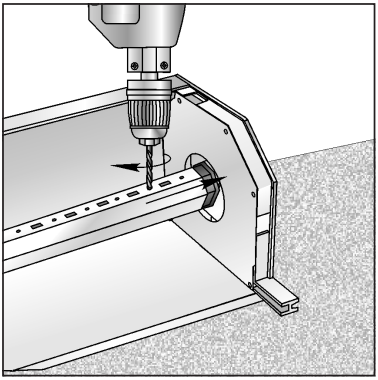


Fig. 13

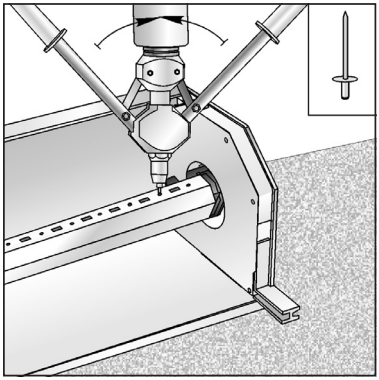


Fig. 14

5.3.11 Roller shutters with the curtain made of 77 series profile (standard design)

a) Install the adapter and the end-position ring at the electric motor (Fig. 01);

b) Fix the motor bracket at the electric motor (Fig. 02);

c) Mark and drill three X 6,5 mm through holes in the covers to install RGH/77 guide rollers. Make counterbores for screw heads at the outer side of the cover (Fig. 10 -12);

d) Fix the electric motor with four M6x15 screws with nuts to the cover installed at the side of the drive; to fix it; previously drill the required number of ø6,5 mm through holes in the cover and make counterbores for screw heads at the outer side of the cover (Fig. 03 - 05);

e) It is necessary to install the ball bearing in SBB42/100 support at the cover installed at the side opposite to the drive (Fig. 06):

- If weight of the roller shutter curtain is up to 50 kg, BB42 ball bearing is used; for the roller shutter curtain with the weight over 50 kg, it is necessary to use the support with SBB32 ball bearing;
- Fix SBB42/100 ball bearing support at the cover using four M6x15 screws with nuts; before that, it is necessary to drill four ø6,5 mm through holes in the cover and make counterbores for screw heads at the outer side of the cover (Fig. 07 - 09)

f) Fix rollers using M5 screws with nuts (Fig. 13);

g) Assemble the octagonal roll tube with the drive of the roller shutter curtain:

- install a set of key lock rings at the octagonal roll tube (Fig. 14);
- install APB adjustable cap in the roll tube (Fig. 15);
- install the electric motor assembly with the cover in the roll tube (Fig. 16);
- drill two X4,2+0,3 holes in the roll tube and in the adapter of the electric motor. Install X4 rivets in the holes and rivet them over (Fig. 17, 18);

h) Assemble the rear panel of the shutter box with the end cap installed at the side opposite to the drive

- mark and drill four ø4,2+0,3 holes for rivets in the shutter box and in the end cap (Fig. 19);
- install X4x10 aluminium rivets and rivet the rear panel of the shutter box with the end cap (Fig. 20);

i) Install the end cap assembly with the drive in the shutter box (Fig. 21);
j) To adjust APB adjustable cap, do the following:

- unscrew the expansion screw of the cap and pull out the bearing rod against the stop to the ball bearing (Fig. 22);
- tighten the screw by force to make a cast at the rod (Fig. 23);
- extract the cap from the roll tube, unscrew the expansion screw and pull out the bearing rod to provide the space for center drilling; perform the center drilling of 1 – 2 mm deep hole for the expansion screw according to the cast (Fig. 24). It is allowed to perform center drilling in the shutter box without extracting the cap;
- install the cap in the roll tube and fix its position by tightening the expansion screw (Fig. 25);

k) Mark and drill four X4,2+0,3 holes for rivets in the shutter box and in end cap installed at the side of the drive. Install rivets and rivet the rear panel of the shutter box with end cap (Fig. 26, 27).

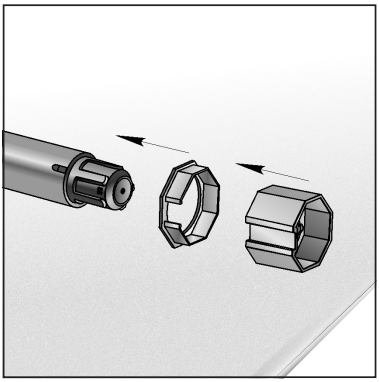
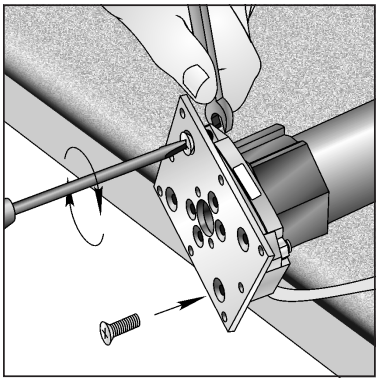


Fig. 01



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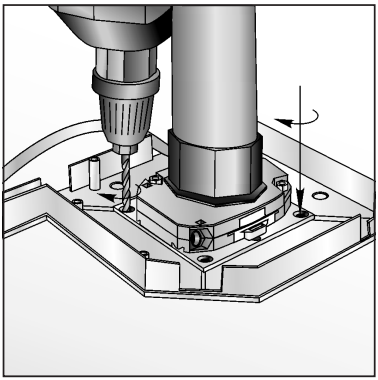


Fig. 03

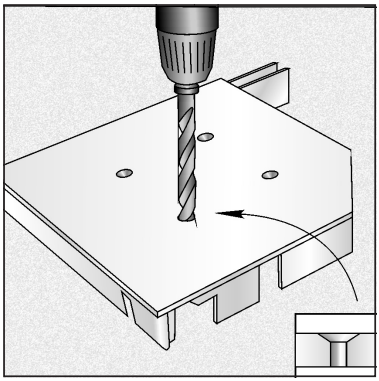
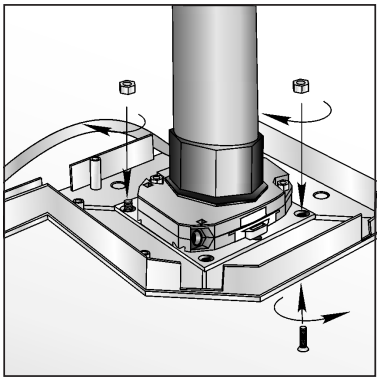


Fig. 04



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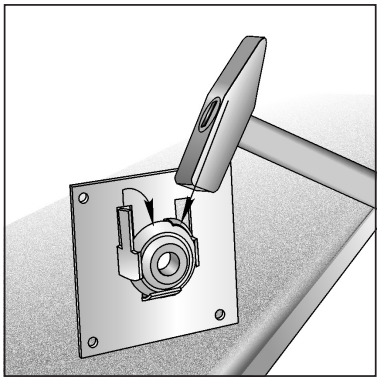
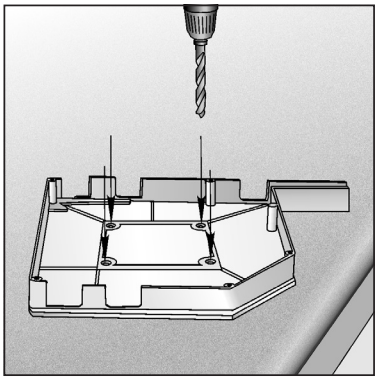


Fig. 06



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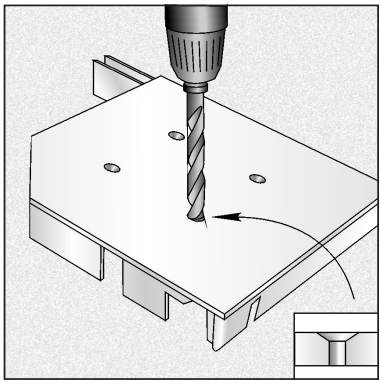

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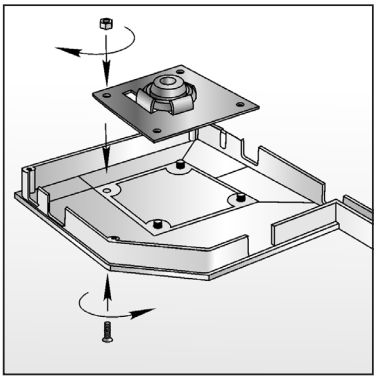

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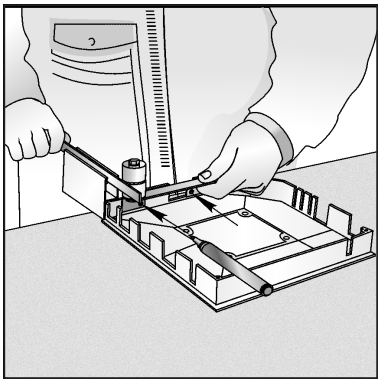

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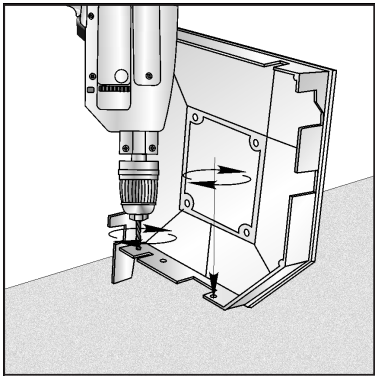

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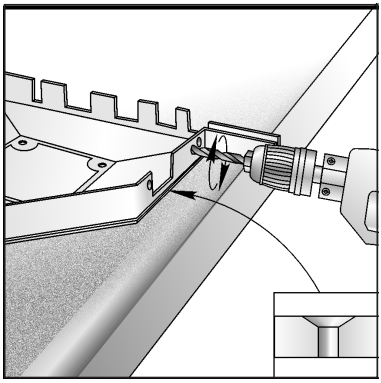

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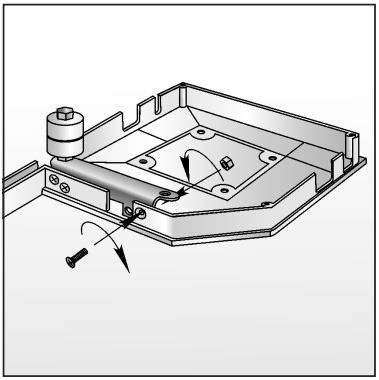

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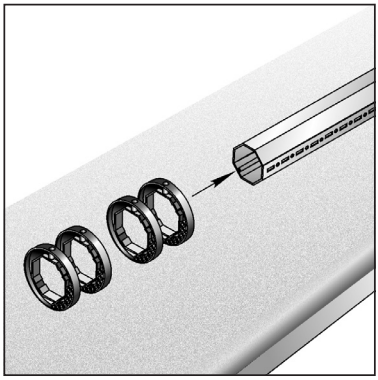

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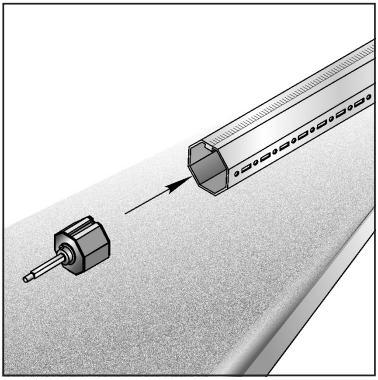

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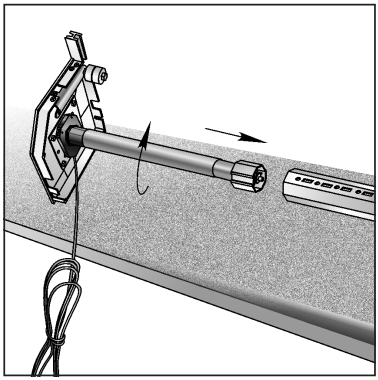

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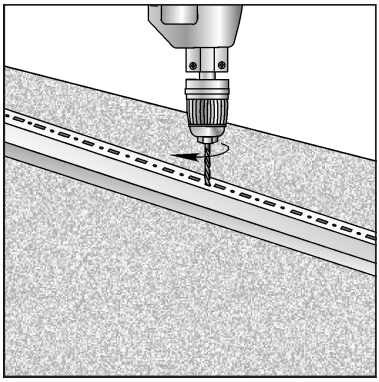

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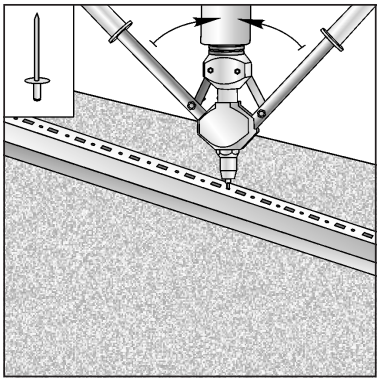

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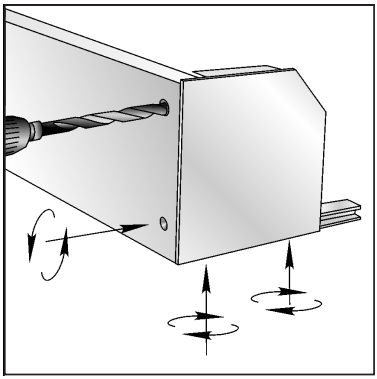

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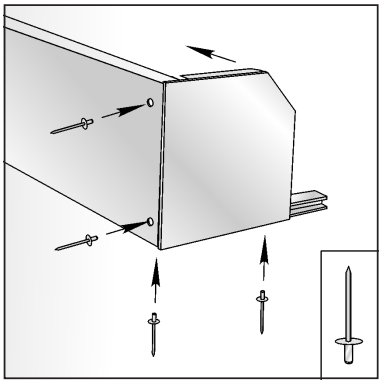

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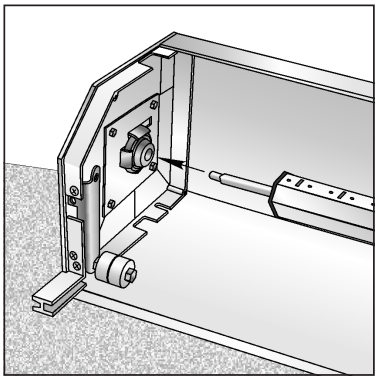


Fig. 21

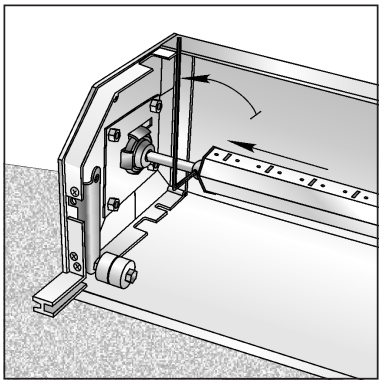
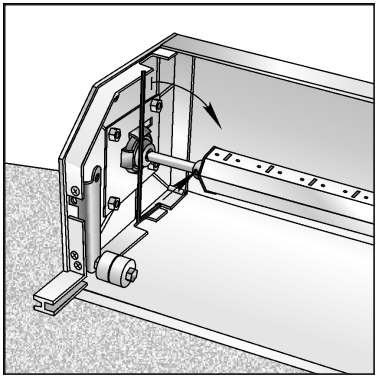


Fig. 22



5.3.11. *Puc. 23*

Fig. 23

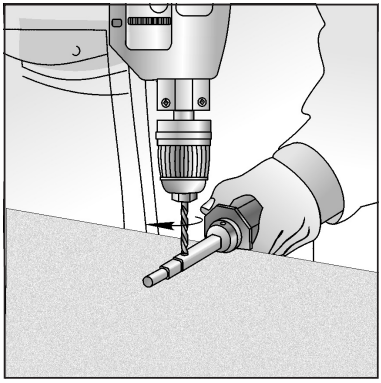


Fig. 24

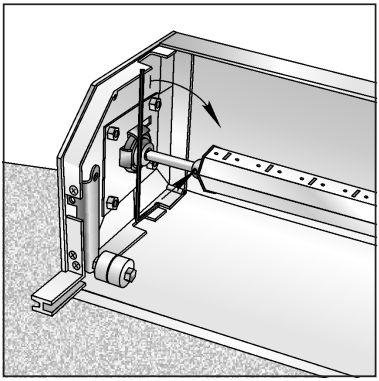


Fig. 25

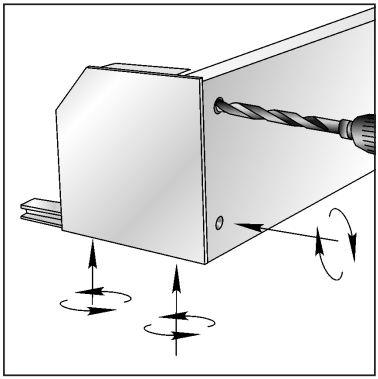


Fig. 26

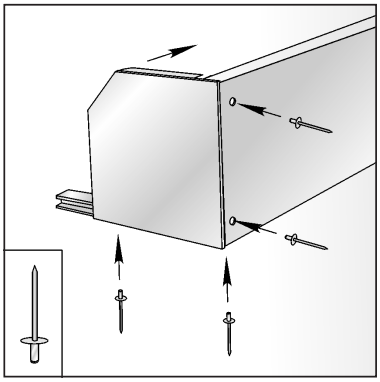


Fig. 27

5.4 Packing

5.4.1 Roller shutters are packed in 4 freight pieces:

a) packing the curtain (Fig. 01, 02);

b) packing the shutter box (Fig. 03, 04);

c) packing the guides (Fig. 05);

d) packing the components (Fig. 06).

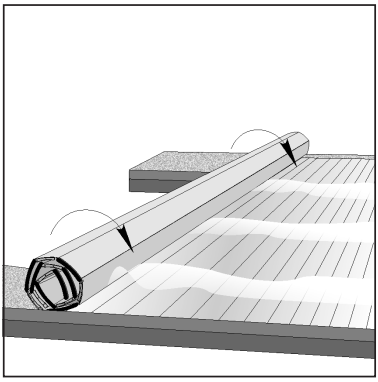


Fig. 01

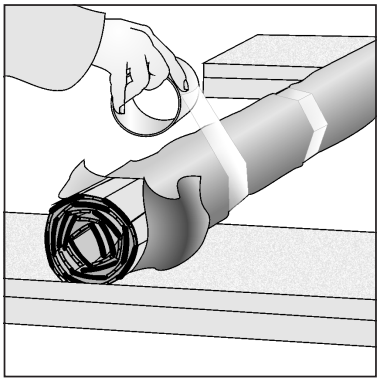


Fig. 02

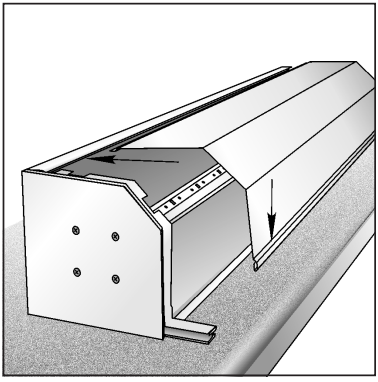


Fig. 03

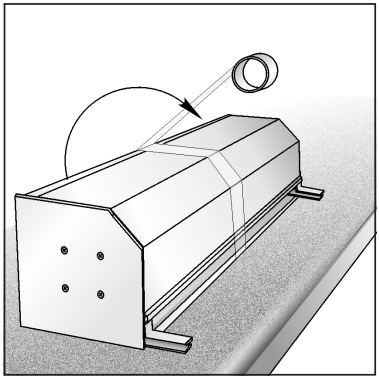


Fig. 04

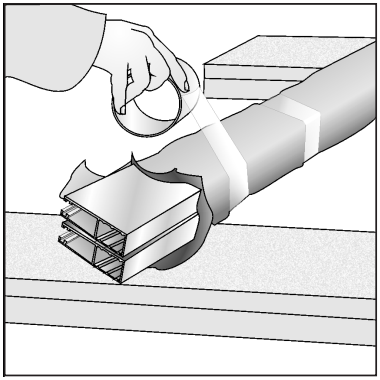


Fig. 05

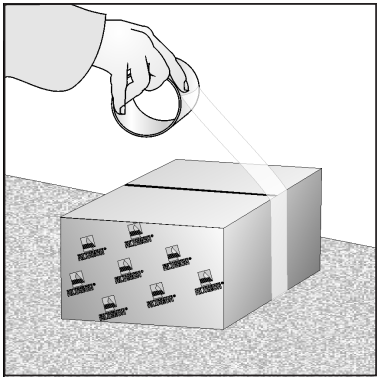


Fig. 06

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