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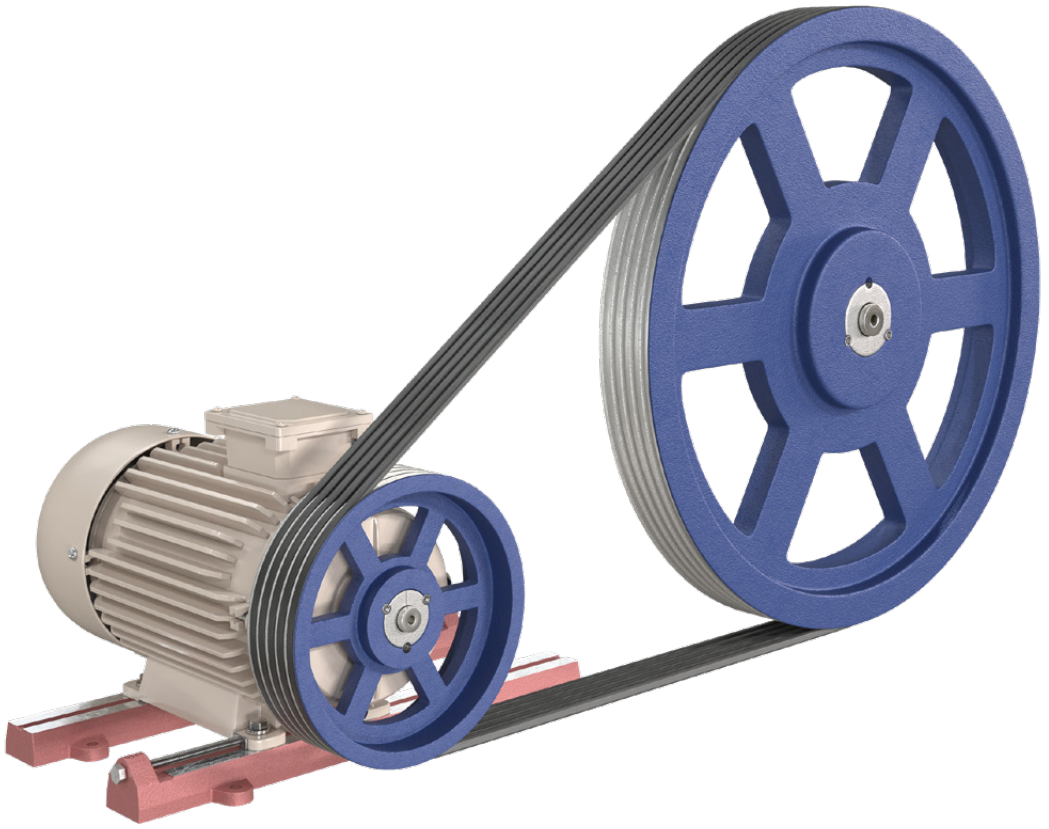
# Installation and Operating Manual



V-Belt Drives | Motor Slide Rails | Foundation Blocks

If performance is required

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# INSTALLATION AND OPERATING MANUAL

## V –BELT DRIVES

- All V–belts used should be manufactured in conformance with the relevant standards. Thoroughly remove any residues of oil and grease and other contamination. No traces of rust are permissable on the V-belt pulleys, especially in the area of the „V“ grooves.

- All V–belts used should be an original set of identical length. Avoid mixing V–belts of different manufacturers. The V–belts should have been stored free from damage and to the state of the art according to manufacturer´s specifications. You can clean dirty V–belts with a mix of glycerine and spirit in the ratio of 1:10.

- It is important to install the V–belt pulleys parallel to the axis and aligned to each other. Make sure that pulley concentricity and run–out tolerance will not exceed the predefined limit values according to DIN 2211 or 2217 (also refer to Table 1).

- For installation, move the belt pulleys to each other until the V–belts can be mounted without using force. It is prohibited to use any aids, such as tyre levers or similar, since this might lead to damage of the V–belts.

- If you have mounted the V-belts conforming to the grooves, tighten the drive according to manufacturer´s specifications. For this purpose, tighten the belt pulley, which can be moved parallel to the axis for tightening, by slowly turning the drive until the V–belt has reached the required initial tension. Always check the belt inital tension perpendicularly to the drawing part of the belt (load part) by means of appropriate strain gauge. Refer to Table 2 for the required amounts for inital tension, by using the impression depth mentioned on the continuation page of this Manual.

- After a first service period of approx. 0.5 to 2 hours, check the belt initial tension again and retighten, if required. After further approx. 20 operating hours under load, it is recommended to check and retighten again in order to compensate for the V–belt stretching during the start–up period.

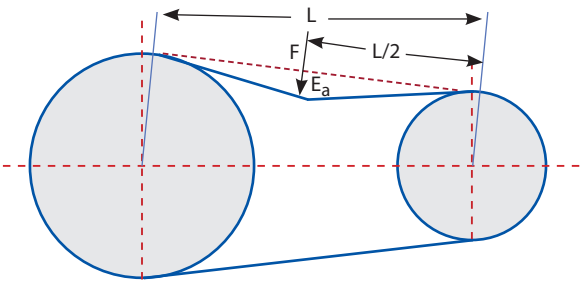
- V–belt drives using high–capacity V–belts of standardized profile series are mainly maintenance–free during operation for their entire service lives. It is advisable to regularly inspect the belts and belt pulleys for any trace of damage and wear and tear.

| Effective Ø | from<br>to | 50<br>100 | 106<br>160 | 170<br>250 | 280<br>400 | 450<br>630 | 710<br>1.000 | 1.120<br>1.600 | 1.800<br>4.000 |
|---|---|---|---|---|---|---|---|---|---|
| Admissible pulley concentricity and run-out tolerance | | 0,2 | 0,3 | 0,4 | 0,5 | 0,6 | 0,8 | 1,0 | 1,2 |

Table No. 1

| Profile | Ø Small pulley [mm] | Test force [N] | Deflection per 100 mm<br>Length of freerunning part of belt |
|---|---|---|---|
| SPZ | 63 - 180 | 25 | 2,3 |
| SPA | 90 - 140<br>160 - 250 | 50 | 3,2<br>2,7 |
| SPB | 140 - 200<br>224 - 400 | 75 | 3,7<br>2,7 |
| SPC | 224 - 315<br>355 - 630 | 125 | 3,2<br>2,7 |

Table No. 2




L = Length of free-running part of belt
F = Test force
$E_a$ = Deflection of free-running part of belt

**Example of application:**

Profile SPB

Ø Small pulley (e.g. motor pulley) = 180 mm
Length of free–running part of belt = 460 mm
Test force from the table = 75 N
Deflection = 3,7 x (460/100) = 17 mm

# INSTALLATION AND OPERATING MANUAL

## TAPERLOCK-BUSHES

The **TaperLock Bush** system consists of conical clamping bushes with various bores in standardized sizes and the V–belt or flat belt pulleys with appropriately matched conical bore.

The advantages of the taper bush system are easy assembly and dismantling and the capacity of the belt pulleys to adapt to different bore diameters by exchanging the corresponding taper bush.

### Assembly

- Clean all polished bush surface from grease, oil and dirt prior to assembly. Important surfaces are, in particular, the bore, the outside cone of the bush and all semi–bores and semi–thread bores. Also degrease the conical bore of the belt pulley.

- Fit the taper bush on to the hub of the pulley until the specific split–bores in the hub and in the bush coincide. Make sure that every thread (half–thread) in the bush corresponds to a smooth half-bore in the hub and vice versa. The fastening screws for the bush included in the supply are slightly lubricated with oil on the thread, pointed end to the bottom and manually screwed into the provided holes. Further keep in mind that the fastening bores are those, which are provided with a half–thread in their hubs.

- Now push the belt pulley unit with the pre–assembled taper bush to its correct position on the shaft. When using a key scat, insert key first into keyway of shaft prior to assembling the bush. Only use keys supporting on their flanks. Now tighten the fastening screws of the bush uniformly and step–by–step with the help of a torque wrench until reaching the recommended starting torque according to Table No. 3, in order to prevent any clamping between bush and pulley. Make sure that, at first, the bush is clamped on the shaft, and that the hub slides into its end position only afterwards. With light blows of a hammer on a sleeve or a wooden block, you can drive down the clamping bush into the cone to slightly increase the clamping effect. After that, the screws can be tightened until the recommended starting torque is obtained. Never exceed the starting torques mentioned in the assignment table

- With perpendicular shaft arrangement and particularly rough operation (shock load), further safety precautions should be taken to prevent any movement of the taper clamping bush on the shaft.

- Empty bores are filled with grease to avoid penetration of dirt or foreign substances. After a running in period of the drive under load, it is recommended to check the fastening screws of the taper clamping bush.

# INSTALLATION AND OPERATING MANUAL
## TAPERLOCK-BUSHES

### Dismantling

For dismantling, loosen all the fastening screws of the taper bush degrease the bores filled with lubricant. Degrease the pull–off bores, up to 2 items according to the bush size each, and slightly lubricate them with oil. You can recognize the pull–off from the fact that the relevant half–threads are located on the bush side.

- The screws are screwed into the pull–off bores and steadily tightened until the taper bush comes free from the hub and is freely moveable on the shaft.

- The parts can now be removed from the shaft.

| Bush Nr. | Bush bore [mm] | Theoretical slip torque without key [Nm] | Recomended screw tightening torque, max [Nm] |
|---|---|---|---|
| 1210 | 16<br>19<br>24<br>32 | 82<br>105<br>142<br>210 | 15 |
| 1610<br>1615 | 19<br>24<br>38<br>42 | 98<br>135<br>240<br>265 | 15 |
| 2012 | 24<br>38<br>42<br>48<br>50 | 165<br>310<br>340<br>400<br>420 | 25 |
| 2517 | 24<br>38<br>42<br>48<br>55<br>60 | 220<br>380<br>430<br>510<br>600<br>670 | 35 |
| 3020<br>3030 | 38<br>48<br>55<br>60<br>75 | 520<br>730<br>890<br>970<br>1300 | 70 |
| 3535<br>3525 | 42<br>60<br>75<br>90 | 1000<br>1580<br>2150<br>2600 | 85 |
| 4040<br>4030 | 48<br>60<br>75<br>100 | 1700<br>2150<br>3150<br>4400 | 120 |
| 4545<br>4535 | 55<br>75<br>100<br>110 | 2500<br>3900<br>5500<br>6300 | 140 |
| 5050<br>5040 | 75<br>100<br>125 | 3950<br>5650<br>7370 | 200 |
| 6050 | 100<br>125<br>150 | 8950<br>11900<br>14900 | 550 |
| 7060 | 125<br>150<br>175 | 15600<br>19400<br>23200 | 550 |

Table No. 3

### Tightening and slip torques for taper bushes

The indicated slip torques for the corresponding tightening torques were determined on the test bench for the respective bore Ø and theoretical values for friction type connection without key. If impact loading occurs then the slip torque should be divided by 2.

In principle it is recommended that the bush to shaft connection is always made with a key. The recommended tightening torques should not be exceeded and are sufficient to secure the connection between the shaft and the bore against axial slip during normal operation.

For impact-loaded, vibrating or suspended operation, an additional mechanical retaining device should be fitted to prevent slippage or creeping on the shaft.

# PROBLEM- / SOLUTION TABLE

## BELTS

| | Problem | Possible Cause | Remedy |
|---|---|---|---|
| PREMATURE BELT FAILURE | Broken belt(s) | Insufficiently rated drive<br>Belt is rolled or levered on pulley<br>Foreign body dropped into drive<br>Extreme shock load | New calculation required<br>On assembly, use retightening option<br>Install suitable safety device or drive protection<br>New calculation to adapt to shock load |
| | Belt(s) do(es) not resist load (creep); no visible cause | Insufficiently rated drive<br>Tension assembly damaged<br>Worn–out pulley grooves<br>Movement axle distance | New calculation required<br>Keep to correct assembly method<br>Check groove wear, replace, if required<br>Check drive for axle distance movement during operation |
| | Failure lateral assembly | Non–aligning pulleys<br>Tension assembly damaged | Check and correct alignment<br>Keep to correct assembly method |
| | Belt spalling and substructure detaching | Pulley too small<br>Tension assembly damaged | Check drive design, use larger pulleys<br>Increase diameter of outer tightening roller accordingly |
| STRONG OR UNUSUAL BELT WEAR | Wear on the upper belt edge | Friction on safeguarding equipment<br>Malfunction of tightening roller<br>Incorrect belt pulley seat (belt too small for groove) | Replace or repair safety equipment<br>Replace the tightening roller<br>Use the correct belt–pulley combination |
| | Wear on flanges | Belt creep<br>Non–alignment<br>Worn–out pulleys<br>Wrong belt | Retighten until creep is gone<br>Realign pulleys<br>Replace pulleys<br>Replace by correct belt size |
| | Wear on lower belt shell | Incorrect belt–pulley seat<br>Worn–out pulleys | Use the correct belt–pulley combination<br>Replace pulleys |
| | Wear on lower belt shell | Belt substructure on pulley groove (belt too small for groove)<br>Worn–out grooves<br>Dirty pulleys | Use the correct belt–pulley combination<br>Replace pulleys<br>Clean pulleys |
| | Crack formation in substructure | Pulley diameter too small<br>Belt creep<br>Outer tightening roller too small<br>Incorrect storage | Use larger pulley diameter<br>Retightening<br>Use larger diameter for outer tightening roller<br>Do not stretch belt too tight, do not bend or inflect.<br>Avoid heat and direct sunlight |

# PROBLEM- / SOLUTION TABLE

## BELTS

| | Problem | Possible Cause | Remedy |
|---|---|---|---|
| STRONG OR SUUNUAL BELT WEAR | Burned out and hard edges and substructure | Belt creep<br>Worn–out pulleys<br>Insufficiently rated drive<br>Wavy movement | Retighten until creep is gone<br>Replace the pulleys<br>New calculation of drive<br>Check if there are any changes in the axle distance |
| | Extreme hardening of belt shell | Hot environment of belt | Improve drive ventilation |
| | Flaky, sticky or swollen belt surface | Pollution through oil or chemicals at belts or in the pulleys | Do not use belt stretching agents; remove oil, grease or chemicals |
| V– BELTS TWIST OR JUMP OFF THE DRIVE | Individual or composite belts | Shock load or vibration<br>Foreign substances in pulley grooves<br>Non–aligned pulleys<br>Worn–out pulley grooves<br>Traction body damaged<br>Wrong position of flat tightening roller<br>Wrong belt set<br>Inappropriate drive design | Check drive design,<br>Shield grooves and drive<br>New alignment of the pulleys<br>Replace pulleys<br>Use correct assembly and storage Procedures<br>Carefully insert flat tightening roller into loose part of belt, as close as possible to the driving pulley<br>Replace with new belt set<br>Do not mix old and new belts<br>Check stability, axle distance and means of reducing vibration |
| BELT EXTENSIOND BEYOND RETIGHTENING VALU | Composite belts will not extend uniformly | Non–aligned drive<br>Dirty pulleys<br>Broken traction body or damaged Substructure<br>Wrong belt set | Realign and retighten drive<br>Clean pulleys<br>Replace all belts, assemble properly<br>Assembly the correct belt set |
| | Individual belts or all belts expand in the same way | Not sufficient clearance for retight-ening<br>High overloaded or not sufficiently rated drive<br>Broken traction bodies | Check the amount of retightening<br>Recalculation of the drive<br>Replacement of belts, correct assembly |
| NOISE CAUSED BY BELTS | Whistling or “chirping“ | Belt creep<br>Dirt | Retightening required<br>Clean belt and pulleys |
| | Whipping noise | Loose belt<br>Flat belt set<br>Non–alignment | Retightening required<br>Insert correct belt set<br>New alignment of pulleys, so that all pulleys are equally loaded |
| | Grinding noise | Safety equipment is in grinding contact | Repair, replacement or new design of safety equipment |

# PROBLEM- / SOLUTION TABLE

## BELTS

| | Problem | Possible Cause | Remedy |
|---|---|---|---|
| NOISES CAUSED BY BELT | Grinding noise | Bearings are damaged | Replace, align and grease |
| | Unusually loud drive | Wrong belt<br>Worn–out pulleys<br>Dirt on grooves | Use correct belt size<br>Replace pulleys<br>Clean pulleys, improve protection<br>Remove rust, colour or dirt from grooves |
| VIBRATIONS | Fluttering belts | Tension of belt is too low<br>Wrong belt sets<br>Non–alignment of pulleys | Retighten<br>Assemble new belt set<br>Alignment of pulleys |
| | Excessive vibration in drive system | Wrong belt<br>Unsuitable design of machinery or equipment<br>Pulleys jumped out<br>Loose drive components | Use proper belt profile section for each pulley<br>Check structure and clips for correct tightness<br>Replace pulley<br>Check all machine parts, safety equipment, motor supports, motor padding, bushes, clips and housing for stability, appropriate construction thickness, correct maintenance and assembly |
| FAULTS WITH COMPOSITE V– BELTS | Cover band coming off | Worn–out pulleys<br>Wrong groove space | Replace pulleys<br>Measure pulley grooves and replace with standard pulleys |
| | Worn–out or damaged cover band of belt | Safety equipment is obstructed<br>Malfunction or damage of outer tightening roller | Check safety equipment<br>Repair or replace outer tightening roller |
| | Composite belt comes off the drive | Dirty pulleys | Clean grooves<br>Use individual belts to avoid dirt collecting in the grooves |
| | One or several ribs are miss tracking outside the pulley | Non–alignment<br>Tension is too low | New alignment of drive<br>Retighten |

# PROBLEM- / SOLUTION TABLE

## BELTS / PERIPHERIE

| | Problem | Possible Cause | Remedy |
|---|---|---|---|
| FAULTS WITH PULLEYS | Broken or damaged pulley | Wrong assembly of pulleys<br>Wrong assembly of belts<br>Excessive circumferential speed | Do not tighten bush bolts beyond recommended torques<br>Do not lever belts onto pulleys<br>Keep circumferential speed of pulleys below recommended maximum limits |
| | Pollution | Foreign body in the drive | Use appropriate protection for drive |
| | Excessive wear of grooves | Excessive tension of belts<br>Sand, dirt or other pollution | Retighten, check drive design<br>Clean and protect the drive to the optimum extent |

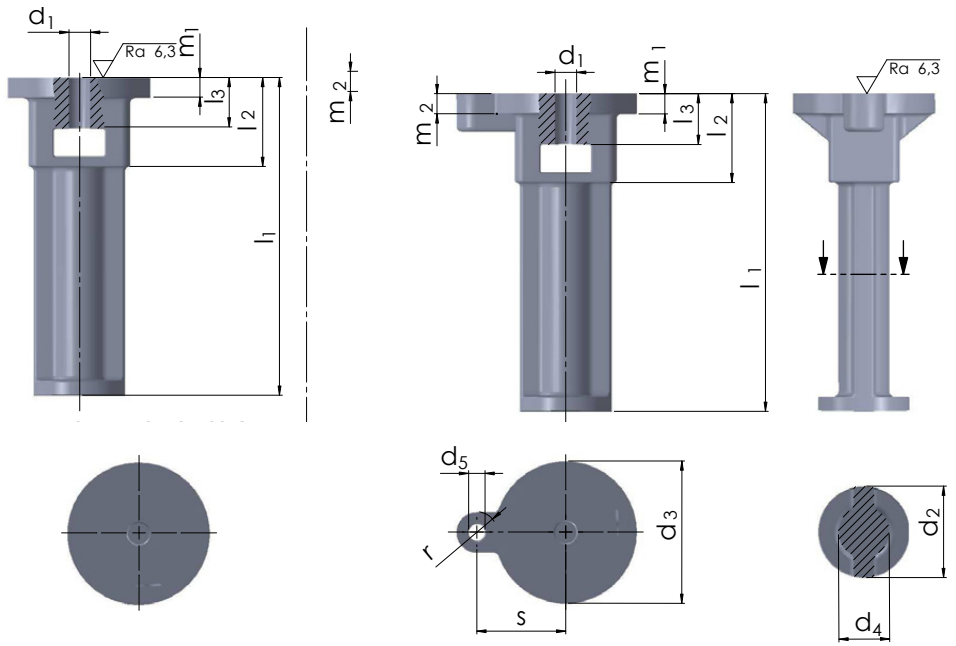
| | Problem | Possible Cause | Remedy |
|---|---|---|---|
| FAULTS WITH DRIVE | Bent or broken shaft | Extreme overstrain of belts<br>Over–dimensioned drive*<br>Accidental damage<br>Error of machine design | Retighten<br>Check drive design, mount smaller belts or fewer belts if required<br>Recalculation of safety equipment<br>Check machine design |
| | Safety equipment damaged | Damage by error or inappropriate design of safety equipment | Repair, design for longer life |
| HOT STORE | Over–tightened drive belt | Worn–out grooves, belt makes contact, but no power is transmitted unless it is over tightened<br>Wrong tension | Replace pulleys<br>Tighten the drive properly<br>Retighten |
| | Diameter of pulley too small | Diameters of pulleys advised by motor manufacturer were not observed | Recalculation of drive |
| | Bad condition of bearings | Over–dimensioned bearings<br>Insufficient maintenance of bearings | Check bearing<br>Align and lubricate bearings |
| | Pulleys are seated on shaft too close to the front | Error or obstacle | Position the pulleys as close as possible to bearings<br>Eliminate obstacles |
| | Belt creep | Tension of drive is too small | Retighten |

* Too many drive belts or too wide ones can adversely affect the motor or driving shafts. This may occur if load requirements for a drive are reduced, but the belts are not recalculated accordingly. This can also occur by calculation of too high loads for belts. The forces arising due to belt tension will be too high for those shafts.

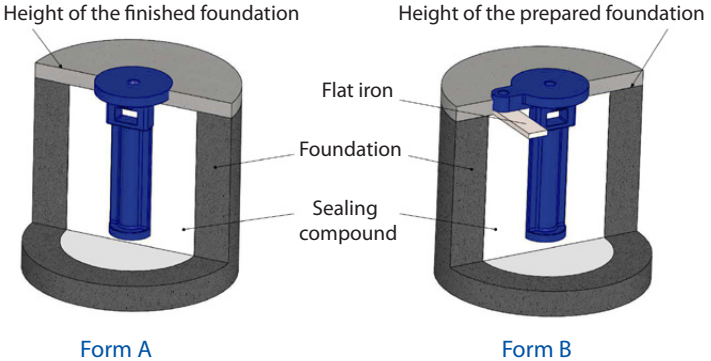
# INSTALLATION MANUAL
## FOUNDATION BLOCKS

Regarding their functional dimensions, the foundation blocks are conforming to DIN 799.
They are manufactured of the material EN–GJL 200 in accordance with DIN EN 1561.

For installation, use foundation blocks without any paint. Prepare openings in the cement floor in specified sizes referring to DIN 799 where the foundation blocks can be sealed. To prevent concrete or mortar from penetrating into the threads, seal them or fill them with grease. For pouring the openings, use concrete of the same solidity and granulation classes as for the surrounding concrete surfaces.




| D1 | L1 | D3 | D5 | L2 | L3 | m1 | m2 |
|---|---|---|---|---|---|---|---|
| M 10 | 125 | 56 | M 8 | 35 | 20 | 8 | 16 |
| M 12<br>M 16<br>M 20 | 150<br>180<br>200 | 72<br>85<br>100 | M 12 | 40<br>50<br>56 | 22<br>25<br>28 | 10<br>12<br>14 | 20 |
| M 24<br>M 30 | 250<br>280 | 125<br>140 | M 16 | 70<br>79 | 36<br>40 | 18<br>20 | 25<br>30 |
| M 36<br>M 42 | 340<br>425 | 180<br>225 | M 20 | 100<br>120 | 50<br>60 | 25<br>28 | 25<br>30 |
| M 48 | 475 | 250 | M 24 | 129 | 64 | 30 | 32 |




Form A

Form B

**Form A**
Standard shape without side casting lug (cam)

**Form B**
Version with lug (cam) for thread and adjusting screw

# INSTALLATION AND OPERATING MANUAL

## MOTOR SLIDE RAILS

### 1. Quality

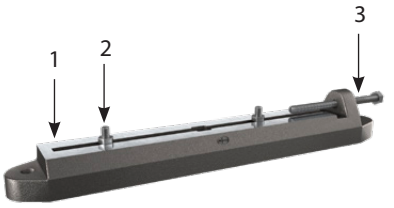
Slide rail made of material: EN–GJL–200 according to DIN 1561. Fastening screws for the machine, as well as straining screws, are included in the supply.

Concrete fixing bolts with hexagonal nut for anchoring are to be ordered separately.

### 2. Safety Precautions

Screws coming loose are very dangerous. Always make sure that you keep to the prescribed starting torques for the screws, and to check them regularly.

Never carry out adjusting work with the machine running. Make sure to lock the main switch of the machine against unintentional restarting.




1 Motor slide rail
2 Tightening screw
3 Fastening screw and nut

### 3. Mounting the Slide Rail

When fastening the slide rails to foundations, check, prior to tightening the concrete fixing bolts, the concrete base should be set firm according to the specified setting period.

When fastening the slide rails on frames, plates and such, use rails with machined base surface in order to avoid breakage due to distortion. All contact surfaces should be even and properly aligned.

The connecting screws may not turn themselves; there must be enough space for the wrench.

### 3.1 Arrangement of Slide Rails

Keep to the motor foot distance X. Arrangement of slide rails acc. to Fig. 1. Make sure that the lide rails are placed in parallel. Maximum parallel deviation should not exceed X +/- 1mm. The height relating to each other can be checked with a spirit level.

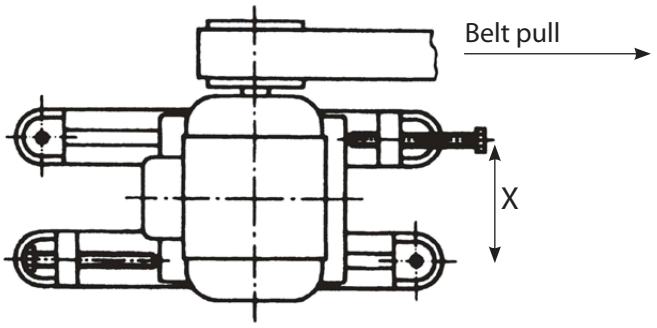



Fig. 1

### 3.2 Slide Rail Design

Fig. 2

Lightweight version A up to 650 mm and DIN 42923–version up to 500 mm

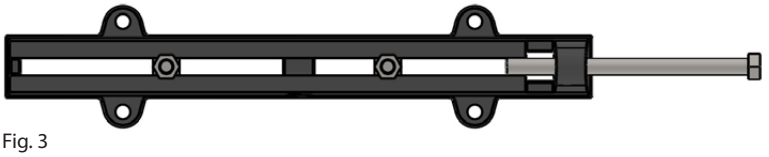


Fig. 3

Lightweight version B up to 700 - 1500 mm and DIN 42923–version from 630 up to 1000 mm

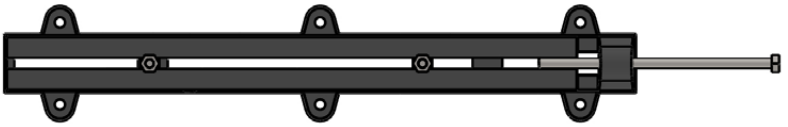


Fig. 4

Lightweight version C from 1600 - 2200 mm and DIN 42923-version up to 1250 mm

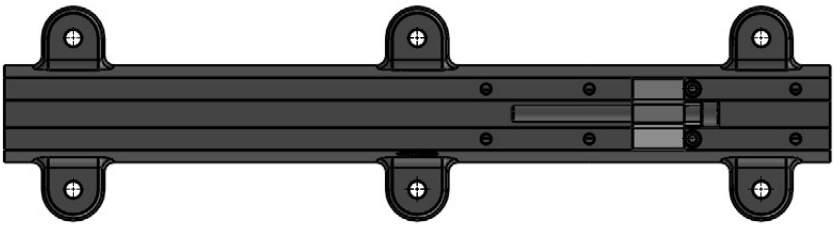


Fig. 5

Heavy version WEN 40.003

## 4. Fastening the Motor

Place the motor on the slide rail and tighten the fastening nut checking that the motor still remains moveable. Accurately align the motor by means of the straining screws. With flat belt drives or chain drives, adjust the required initial tension (keep to supplier´s instruction). Then firmly tighten the fastening nuts.

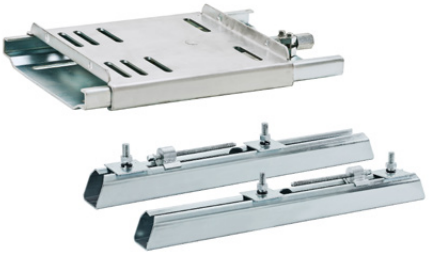
# PRODUCT OVERVIEW
EXCERPT

## Drive pulleys

V-belt pulleys | V-belt pulleys | Flywheels | Grid pulleys | Timing belt pulleys | Rubberized Pulleys | Split pulleys | Aluminium pulley

## Supplies for drive belts

TaperLock clamping bushes | Motor mounting systems | V-belts / Drive belts | V-belt metrology | Rubber suspension units| Ocillating mountings| Tensioner devices | Foundation blocks | Shafts and rolls



**More information required?**

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