

## Data Sheet ROTAX® Rxvp (vakuum pressure)

Edition September 2020

### Ultra-compact rotary axis ROTAX®



#### Highlights

- Resolution 64'000Inc per revolution,  
encoder directly on hollow shaft
- 360° endless rotation repeatability  
 $\pm 0.006^\circ$  /  $\pm 20$  arcsec
- Running accuracy <10um
- Direct mounting to ELAX® Ex  
Linear Motor Slide
- Vacuum/Compressed air tube up to 6bar
- Double bearing allows for axial  
force up to 180N (40lbf)
- One-cable connection to XENAX®
- Force control, force limitation and force  
recording with XENAX® servo controller

### General

This ultra-compact rotary axis with vacuum gripper picks parts within a typical weight range of 1mg up to 500g (*1.1lbs*). With the standard internal screw thread of M5, a lot of different commercially available vacuum grippers are applicable. This unit is the perfect fit for the ELAX® electric slide or for LINAX® linear motor axis.

The high precision rotary drive runs endless 360° with a resolution of 64'000 Inc/rev.

They can be assembled in a grid of 30mm (*1.18"*) next to each other. Opposing each other, the minimal distance of the ROTAX® shafts is also 30mm (*1.18"*). This saves space and applications can be built more compact.

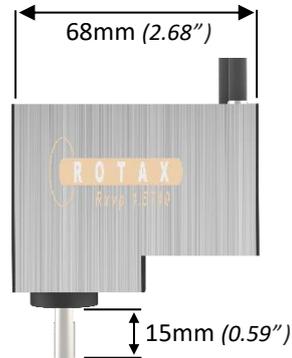
Alois Jenny  
Jenny Science AG

## Content

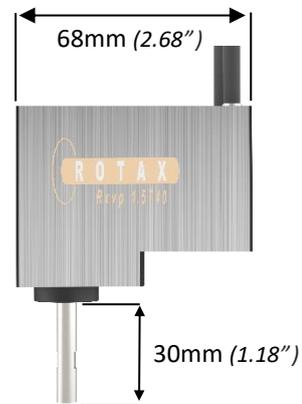
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### 1 Type Overview ROTAX® Rxvp

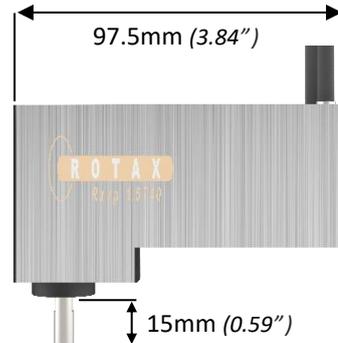
ROTAX® Rxvp 28-6T0.04  
with 15mm (0.59") shaft



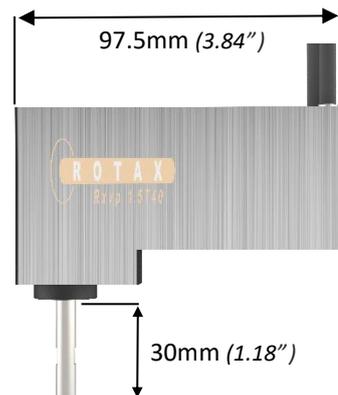
ROTAX® Rxvp 28-6T0.04  
with 30mm (1.18") shaft



ROTAX® Rxvp 28-6T0.04  
for ELAX® with weight Comp.  
and 15mm (0.59") shaft

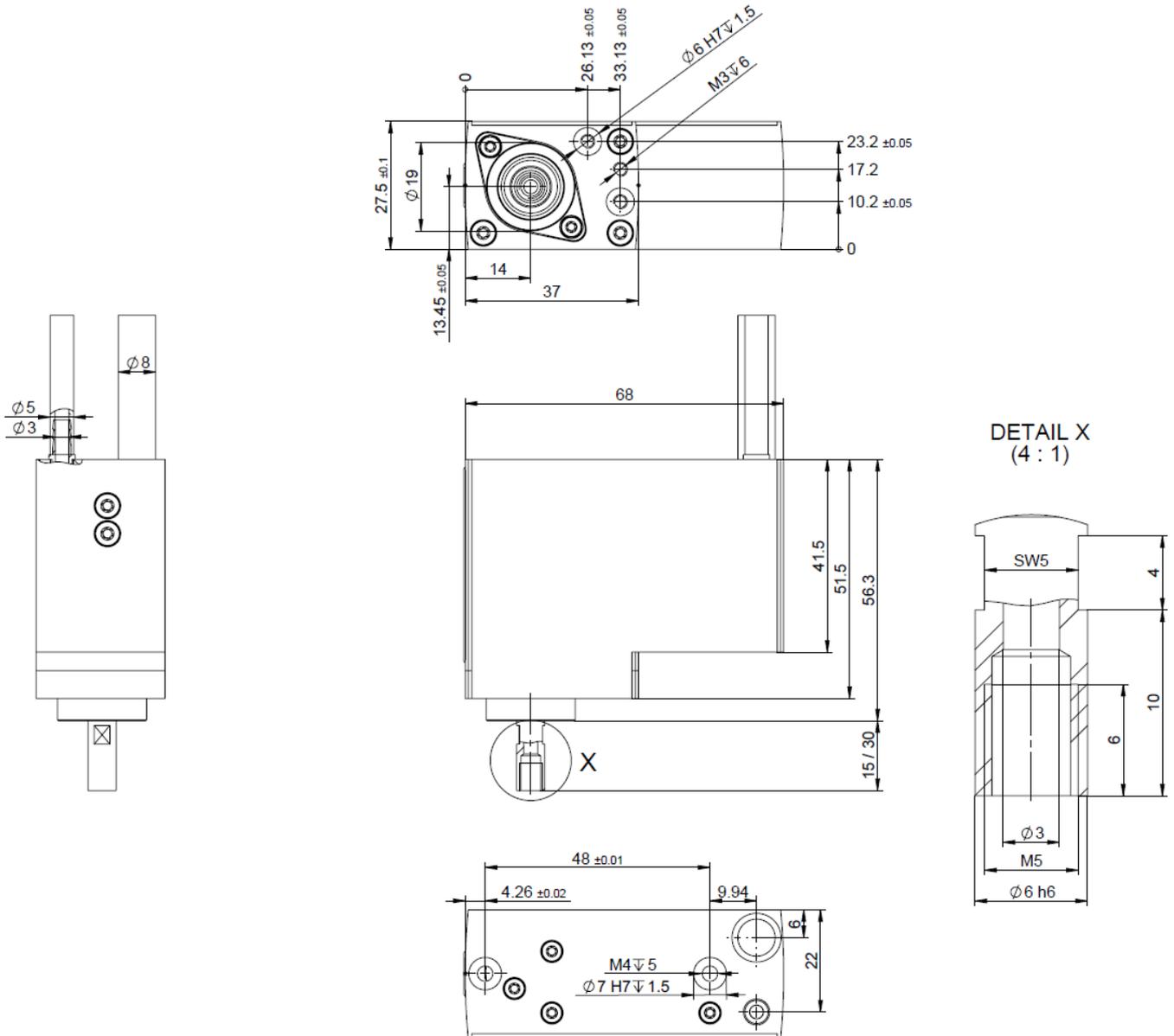


ROTAX® Rxvp 28-6T0.04  
for ELAX® with weight Comp.  
and 30mm (1.18") shaft

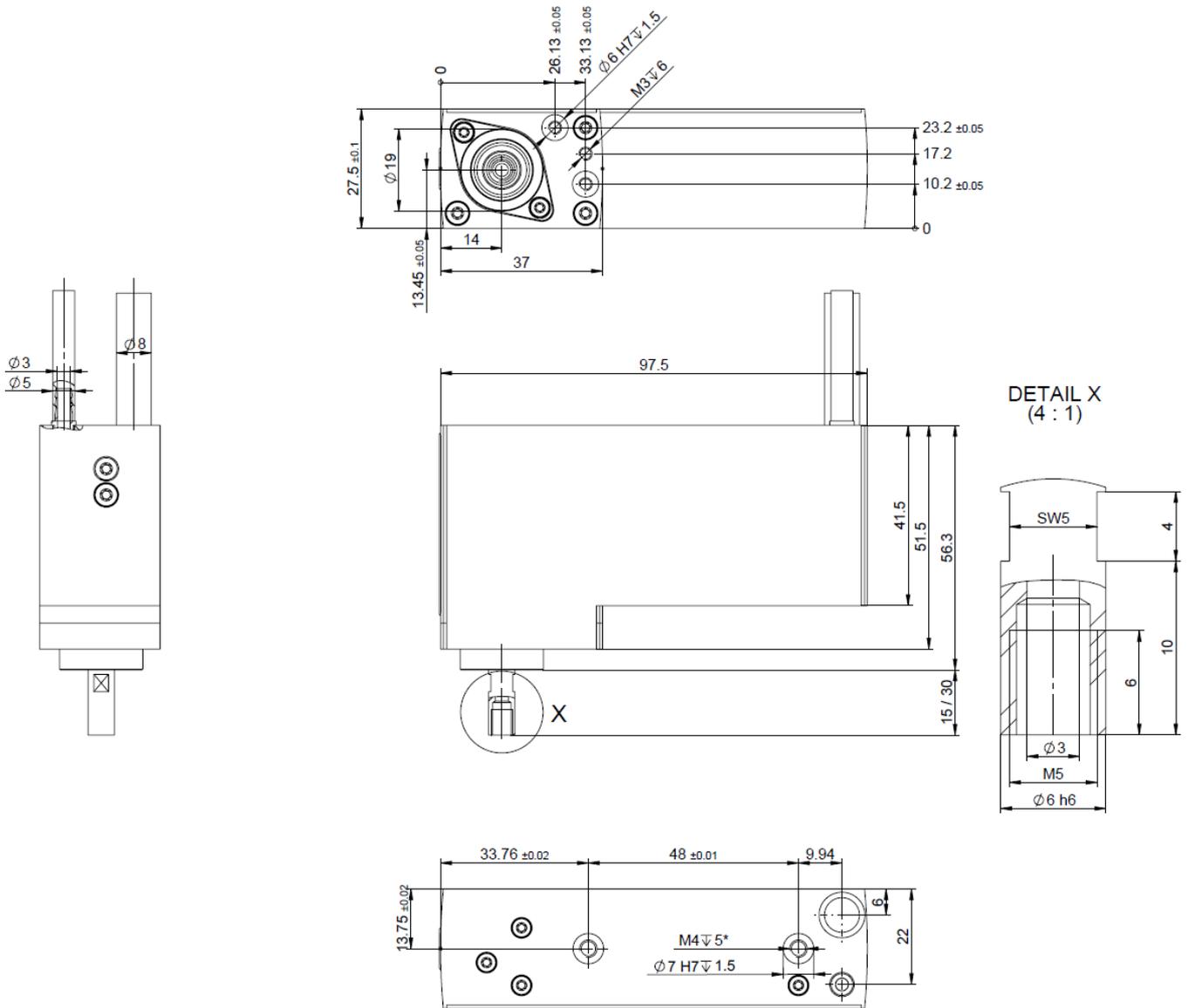


## 2 Dimension ROTAX® Rxvp 28-6T0.04

### 2.1 Installation for ELAX® without weight Comp. 68mm



2.2 Installation for ELAX® with weight Comp. 97.5mm



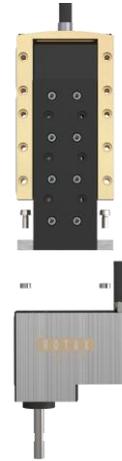
### 3 Modular System

#### 3.1 Mounting to ELAX® Ex front flange

Mounting to ELAX® Ex front flange

Example :

- 1 x ELAX® Ex50F20
- 1 x ROTAX® Rxvp 28-6T0.04
- 2 x Dowel bushings  $\varnothing 7\text{mm}$
- 2 x Torx, M4 x 8



#### 3.2 Mounting to ELAX® Y-Z composition

Mounting to ELAX® Y-Z composition

Example :

- 1 x ELAX® Ex50F20
- 1 x ELAX® Ex150F20
- 1 x ROTAX® Rxvp 28-6T0.04
- 2 x Dowel bushings  $\varnothing 7\text{mm}$
- 2 x Torx, M4 x 8
- 1 x Hose- and Cable Feedthrough sidewise for ELAX® Z and ELAX® Y upright
- incl. 4 x Torx M3 x 5
- 2 x Torx M4 x 18
- 4 x Dowel bushings  $\varnothing 7\text{mm}$
- 2 x Centering pins  $\varnothing 4 \times 6\text{mm}$



### 3.3 Mounting to ELAX® with GEKO

For the mounting to an ELAX® with weight compensation, the wider version 97.5mm (3.84") of the ROTAX® can be used.  
See type overview in chapter 1.



### 3.4 Mounting to LINAX® Lxu ground plate

Mounting to an LINAX® Lxu ground plate

Example :

- 1 x LINAX® Lxu160F60
- 1 x ROTAX® Rxvp 28-6T0.04
- 1 x Angle bracket for LINAX® Lxu  
incl. 4x torx M4 x 8
- 2 x Dowel bushings  $\varnothing$ 7mm
- 2 x Centering pins  $\varnothing$ 4 x 6mm



#### 4 Smart Praxis Oriented Details

##### 4.1 Vacuum-/compressed air feed-through $\varnothing$ 3mm

The flow rate is designed for vacuum or compressed air up to 6bar. This allows vacuum grippers, precise "semiconductor nozzles" or parallel grippers with spring return to be operated.



##### 4.2 Encoder directly on the hollow shaft

For the rotation angle measuring, the encoder is mounted directly on the shaft. With a resolution of 64,000 inc. per revolution, a repetitive accuracy of  $\pm 20$ asec can be achieved. The shaft rotates with a concentricity of  $<10\mu\text{m}$  ( $<0.4\text{mil}$ ). A zero-point sensor within  $360^\circ$  is already integrated.



##### 4.3 Compact design

These compact electric servo axes are only 28mm (1.10") wide. In combination with the ELAX® Linear motor slides, Pick & Place arrangements in combination with the ELAX® linear motor slides, Pick & Place arrangements in a grid of only 30mm (1.18") are possible. This saves space and the systems can be built more compactly, especially in comparison with the oversized robot installations.



#### 4.4 One-Cable connection reduces cabling requirements

The one-cable connection from Jenny Science simplifies the whole machine cabling complexity. In addition, the cable chains are more compact and lighter, need less room and achieve higher dynamics.

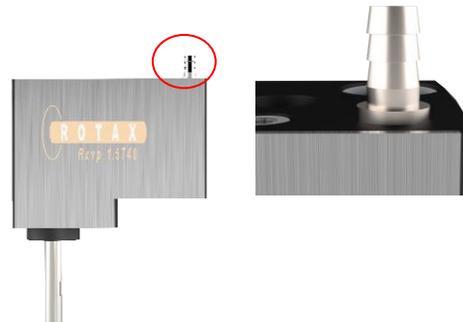


## 5 Vacuum/Compressed Air Variants

### 5.1 With connection plug outside diameter 4mm

The ROTAX® Rxvp is supplied with a  $\varnothing 4\text{mm}$  (0.16") connection plug as standard. Recommended hose inner diameter 3mm (0.12").

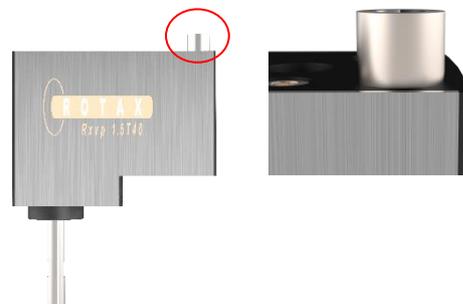
Suitable for mounting on the flange side of ELAX® Rx linear motor slides.



### 5.2 With M5 internal thread

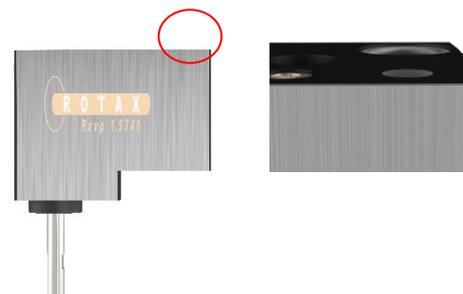
Plug nipple with M5 female thread for connection coupling such as Festo QSM-M5-4I.

**Not suitable for flange-side attachment to ELAX® Ex linear motor slides.**



### 5.3 With blind plug

Blind plug, without vacuum/compressed air connection.



## 6 Accessories

### 6.1 Compressed air accessories

#### Hose PUR

Outside diameter 5mm (0.20")

Inside diameter 3mm (0.12")

Fits to plug nipples  $\varnothing$ 4mm (0.16")



#### Hose Coupling

Plug nipple  $\varnothing$ 4mm (0.16") with a M5 female thread

Fits to hose PUR inside diameter 3mm (0.12")



Festo QSM-M5-4I

M5 outside thread

Hose diameter 4mm (0.16")

Festo QSM-M5-6I

M5 outside thread

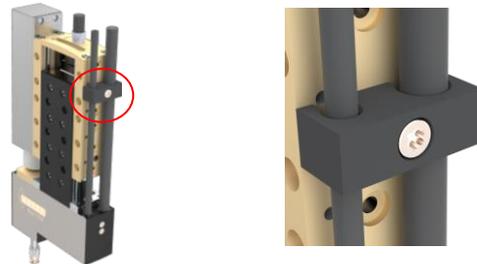
Hose diameter 6mm (0.24")

Fits to plug nipple  $\varnothing$ 4mm (0.16") with M5 female thread



## 6.2 General accessories

Hose- and Cable Feedthrough on ELAX® Ex sidewise



Hose- and Cable Feedthrough on LINAX® Lxu



Hose- and Cable Feedthrough ROTAX® on ELAX® Z and ELAX® Y upright



Forked ends for vacuum shaft ROTAX® Rxvp



## 7 Performance data

### 7.1 Technical specification

#### Supply voltage

24V DC

Max. speed	$n_0$	rpm	1'500
Nominal speed <sup>(1)</sup>	$n_N$	rpm	1'000

Stall torque	$M_0$	mNm	(lbf·in)	40 (0.009)
Nominal torque <sup>(1)</sup>	$M_N$	mNm	(lbf·in)	40 (0.009)
Peak torque <sup>(2)</sup>	$M_P$	mNm	(lbf·in)	110 (0.025)

Nominal current <sup>(1)</sup>	$I_N$	A	0.920
Peak current <sup>(2)</sup>	$I_P$	A	2.530

#### Mechanical Data

Max. axial load		N	(lbf)	180 (40.5)
Max. moment load		Nm	(lbf·in)	1.4 (12.4)
Rotor moment of inertia	$J_{Rot}$	$g \cdot cm^2$	(lbf·in <sup>2</sup> )	550 (0.188)
Total weight with shaft 30mm (1.18")	m	g	(lbs)	180 (0.04)
Total weight with shaft 15mm (0.59")	m	g	(lbs)	175 (0.39)
Total weight for ELAX <sup>®</sup> with weight comp. & shaft 30mm (1.18")	m	g	(lbs)	200 (0.44)
Total weight for ELAX <sup>®</sup> with weight comp. & shaft 15mm (0.59")	m	g	(lbs)	195 (0.43)

(1) continuous operation with 25°C (77°F) ambient temperatur and convection cooling (ambient air)

(2) peak operation (duty 10%)

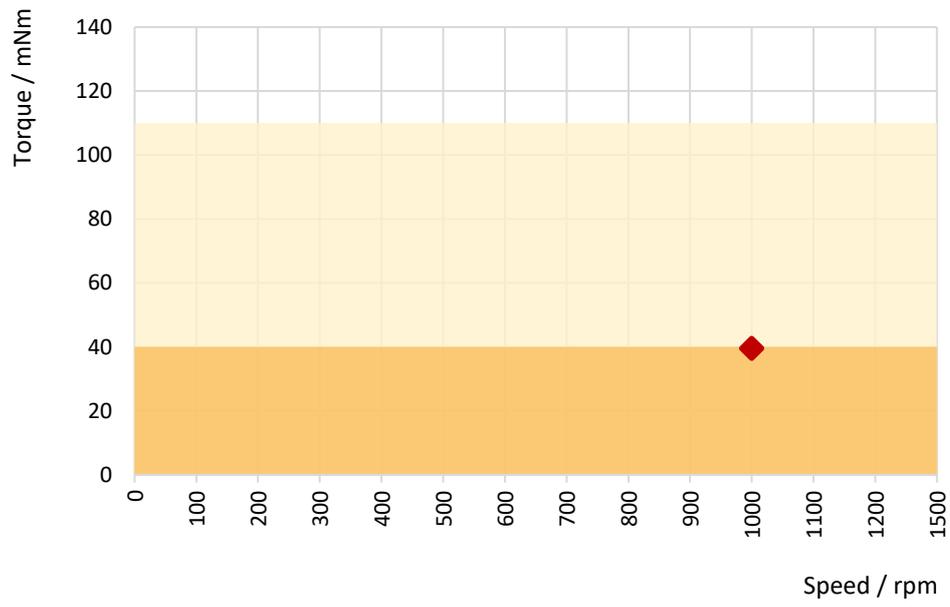
## 7.2 Torque/Speed curve

Nominal operation

Continuous operation

Peak operation

Supply voltage  $U_s = 24\text{VDC}$



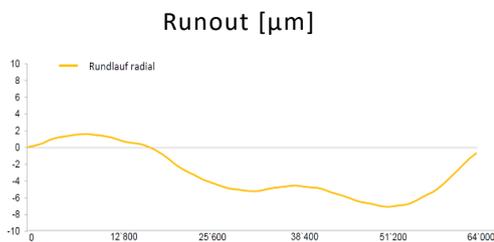
## 8 Accuracy

### 8.1 Positioning

Resolution polring	64`000 Inc. / revolution
Uni-directional repeatability	± 12 asec
Bi-directional repeatability	± 20 asec
Reference drive	A zero point sensor is integrated within 360°

### 8.2 Mechanical accuracy

The ROTAX® Rxvp is delivered with the following tolerances as standard.



Runout radial 15mm (0.59") shaft	10µm (0.4mil)
Runout radial 30mm (1.18") shaft	10µm (0.4mil)

## 9 Maintenance, Life time

### 9.1 Lubrication

The double row angular contact ball bearing of ROTAX® Rxvp is maintenance-free and cannot be relubricated.

### 9.2 Life time

**SWISS  
MADE**  
+

**Life time calculation**

ROTAX® Rxvp 28-6T0.04

$$L_{10h} = \frac{\left(\frac{C}{P}\right)^p * 10^6}{60 * n}$$

$L_{10h}$  nominal life time  
 $C$  dynamic load rating  
 $P$  dynamic equivalent bearing load  
 $p$  Life time exponent: Ball bearing  $p=3$   
 $n$  Speed of the bearing

**Example calculation:**

$C= 3050[N]$  (687lbf)  
 $P= 180[N]$  (40.5lbf)  
 $n= 1000[rpm]$

$$L_{10h} = \frac{\left(\frac{3050}{180}\right)^3 * 10^6}{60 * 1000} = \underline{\underline{81 * 10^3 h}}$$

#### Actions with which life time can be extended:

- Trajectories with curve profiles instead of trapezoidal profiles (XENAX® Servo controller, default value S-curve profile = 20%).
- Dynamics not higher than needed.
- Completing non cycle time critical motions slower.
- Avoid pollution in the guides.

## 10 Safety, Environment

### 10.1 Safety with XENAX® Servo Controller

**EN 61000-6-2:2005**  
Electromagnetic compatibility (EMC),  
Immunity for industrial environments

EMC Immunity Testing, Industrial Class A

EN 61326-3-1  
IFA:2012  
EN 61326-1, EN 61800-3, EN 50370-1

Immunity for Functional Safety  
Functional safety of power drive systems  
Electrostatic discharges ESD, Electromagnetic Fields,  
Fast electric transients Bursts, radio frequency common  
mode

**EN 61000-6-3:2001**  
Electromagnetic compatibility (EMC),  
Emission standard for residential,  
commercial and light-industrial  
environments

EMC Emissions Testing, Residential Class B

EN 61326-1, EN61800-3, EN50370-1  
IFA:2012

Radiated EM Field, Interference voltage  
Functional safety of power drive systems

### 10.2 Environmental Conditions

Storage and transport

No outdoor storage. Storage rooms have to be well vented  
and dry. Storage temperature -25°C up to +55°C  
(-13°F up to 131°F).

Operational temperature

5°C - 50°C (41°F - 122°F) Environment, reduction in  
performance at 40°C (104°F).

Operational humidity

10-90% non-condensing.

Cooling

No need of external cooling.

Protection category

IP 40

## 11 Note

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