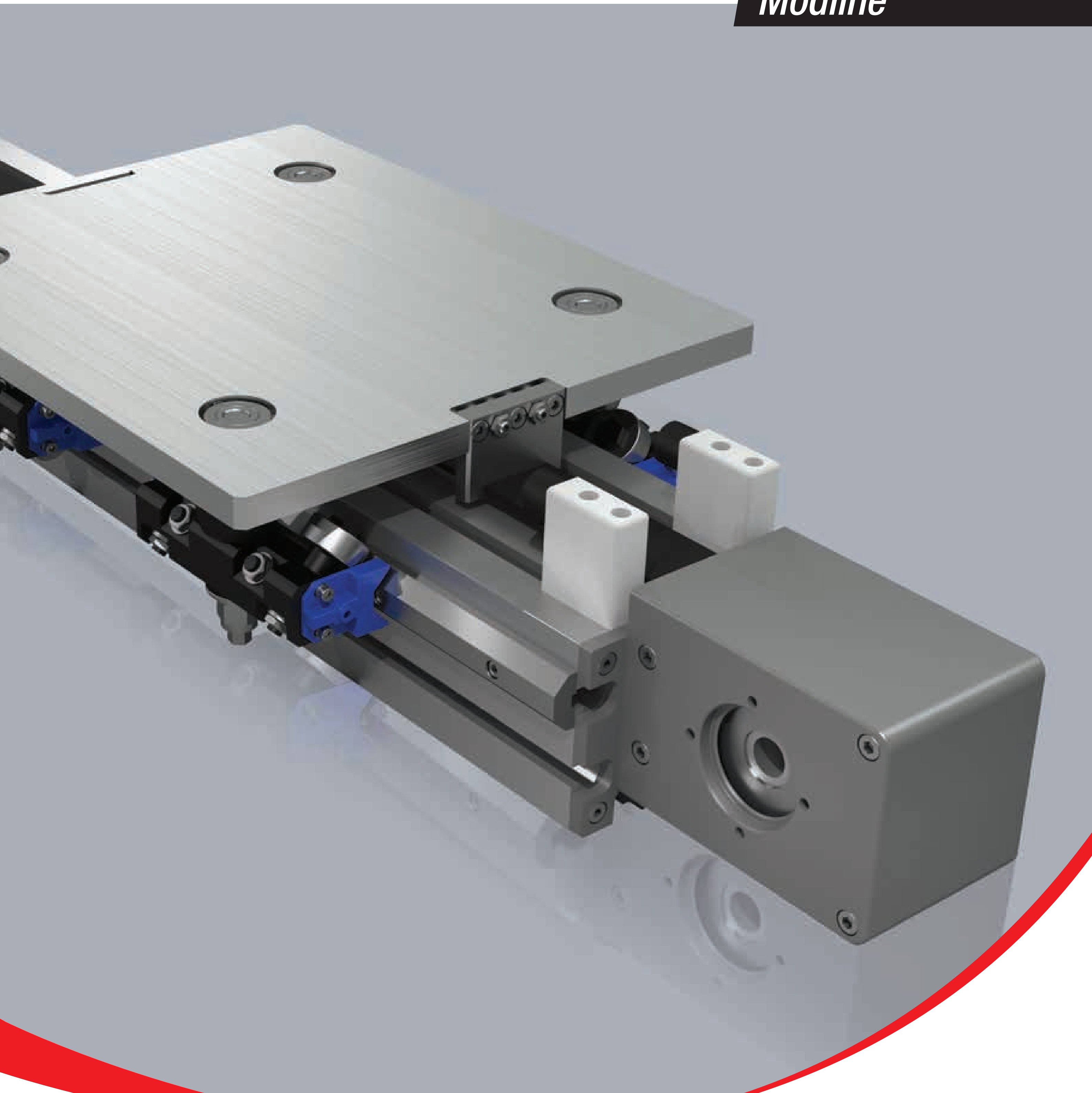
ROLLON®
BY TIMKEN

Modline



MCR/MCH series

MCR/MCH series description

Fig. 1

The MCR/MCH units are linear actuators made of a self-supporting extruded aluminum frame and are driven by a polyurethane belt with AT metric profile steel inserts.

- Reduced weight ensured by the light frame and the aluminum sliders
- Three different sizes available: 65mm, 80mm, 105mm
- High sliding speed

MCR

Featuring four + four rollers with a Gothic arch outer profile and flat outer profile, sliding on hardened steel bars placed inside the profile.

MCH

Featuring a recirculating ball linear guide rail placed inside the profile.

The components

Extruded bodies

The anodized aluminum extrusion used for the profile of the Rollon MCR/MCH series linear units was designed and manufactured by industry experts to optimise weight while maintaining mechanical strength. The anodized aluminum alloy 6060 used (see physical-chemical characteristics below) was extruded with dimensional tolerances complaint with EN 755-9 standards.

Driving belt

The Rollon MCR/MCH series linear units use steel reinforced polyurethane drive belts with AT pitch. This belt is ideal due to its high load transmission characteristics, compact size and low noise. Used in conjunction with a backlash-free pulley, smooth alternating motion can be achieved. Optimisation of the maximum belt width/body dimension ratio enables the following performance characteristics to be achieved:

- **High speed**
- **Low noise**
- **Low wear**

The driving belt is guided by specific slots in the aluminum extruded body thus covering the inside components.

Carriage

The carriage of the Rollon MCR/MCH series linear units is made of anodized aluminum. Two different length carriages are available for size 80 and 105.

General data about aluminum used: AL 6060

Chemical composition [%]

Al	Mg	Si	Fe	Mn	Zn	Cu	Impurites
Remaining	0.35-0.60	0.30-0.60	0.30	0.10	0.10	0.10	0.05-0.15

Tab. 1

Physical characteristics

Density	Coeff. of elasticity	Coeff. of thermal expansion (20°-100°C)	Thermal conductivity (20°C)	Specific heat (0°-100°C)	Resistivity	Melting point
$\frac{kg}{dm^3}$	$\frac{kN}{mm^2}$	$\frac{10^{-6}}{K}$	$\frac{W}{m \cdot K}$	$\frac{J}{kg \cdot K}$	$\Omega \cdot m \cdot 10^{-9}$	°C
2.70	69	23	200	880-900	33	600-655

Tab. 2

Mechanical characteristics

Rm	Rp (02)	A	HB
$\frac{N}{mm^2}$	$\frac{N}{mm^2}$	%	—
205	165	10	60-80

Tab. 3

The linear motion system

The linear motion system has been designed to meet the load capacity, speed, and maximum acceleration conditions of a wide variety of applications.

MCR with gothic arch bearing guides

- Hardened steel rods (58/60 HRC tolerance h6) are securely inserted inside the aluminum body.
- The carriage is fitted with four + four bearing assemblies, four having a gothic arch groove machined into its outer race, to run on the steel rods, and four having flat outer ring.
- The bearings are mounted on steel pins, two of which are eccentric, to allow setting of running clearance and pre-load.
- The driving belt is supported by the entire length of the profile to avoid deflection as well as to protect the linear guide.

MCH with ball bearing guides

- A recirculating ball guide with high load capacity is mounted in a dedicated seat inside the aluminum body.
- The carriage is assembled on two pre-loaded ball bearing blocks.
- The two ball bearing blocks enable the carriage to withstand loading in the four main directions.
- The two blocks have seals on both sides and, if necessary, an additional scraper can be fitted for very dusty conditions.
- The ball bearing carriages are also fitted with a retention cage that eliminates "steel-steel" contact between adjacent revolving parts and prevents misalignment.
- Lubrication reservoirs (pockets) installed on the front of the ball bearing blocks supply the appropriate amount of grease, thus promoting a long maintenance interval.

The linear motion system described above offers:

- Good positioning accuracy
- Low noise
- Maintenance Free (dependent on application)

The linear motion system described above offers:

- High permissible bending moments
- High speed and acceleration
- High load capacity
- Low friction
- Long life
- Low noise

MCR

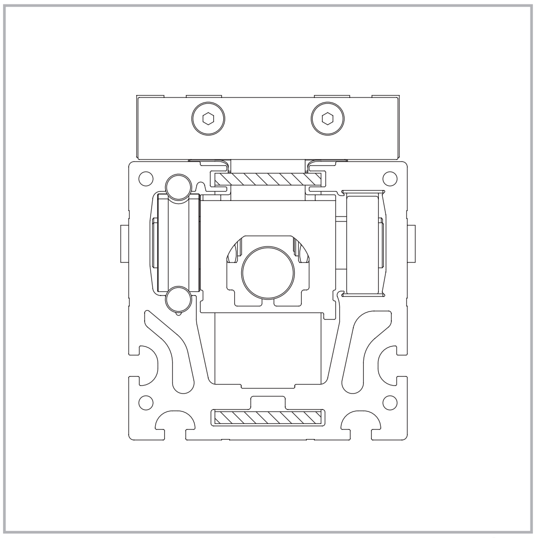


Fig. 2

MCH

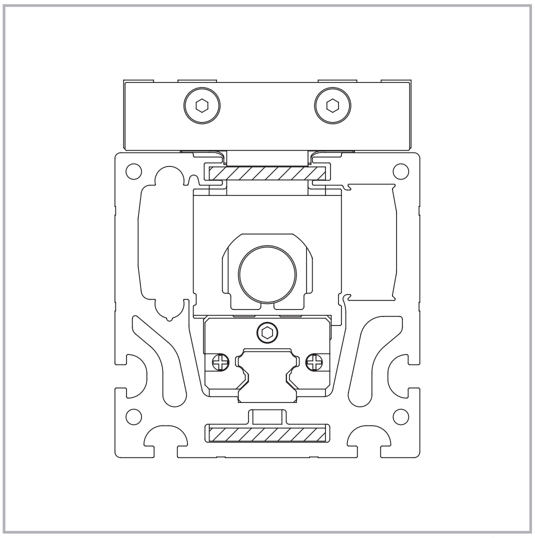
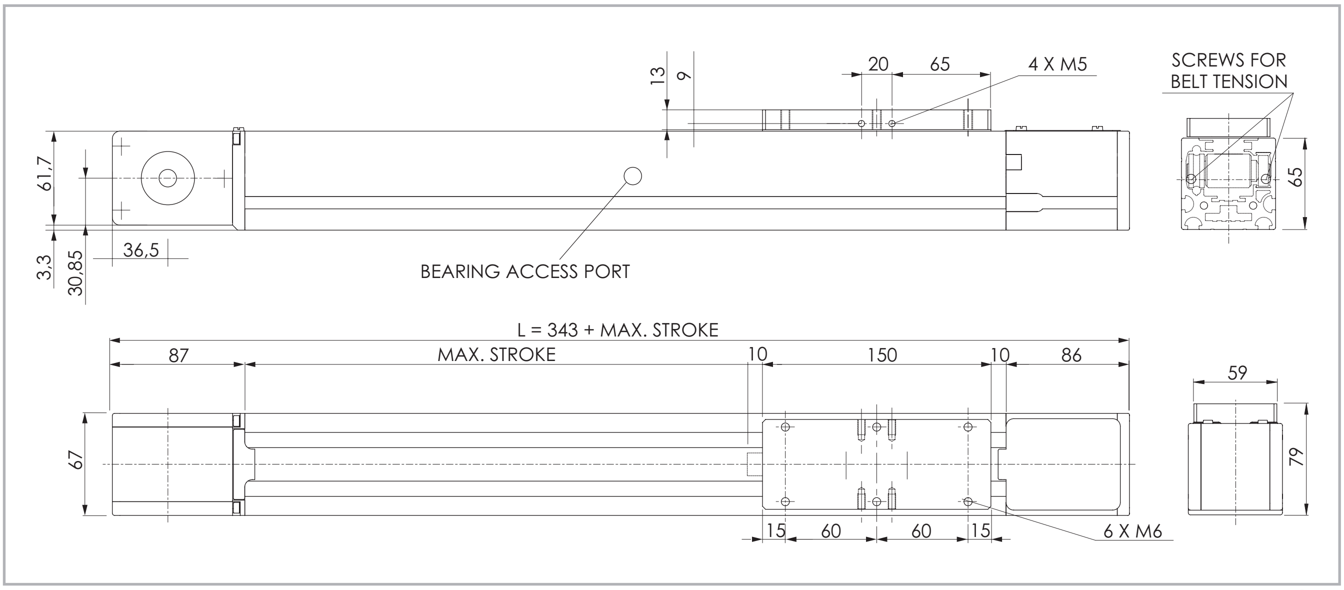


Fig. 3

MCR 65

MCR 65 Dimension



The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig. 4

Technical data

	Type
	MCR 65
Max. useful stroke length [mm]	5800
Max. positioning repeatability [mm]*1	± 0.1
Max. speed [m/s]	4
Max. acceleration [m/s²]	20
Type of belt	32 AT 05
Type of pulley	Z 32
Pulley pitch diameter [mm]	50.93
Carriage displacement per pulley turn [mm]	160
Carriage weight [kg]	0.87
Zero travel weight [kg]	3.7
Weight for 100 mm useful stroke [kg]	0.475
Starting torque [Nm]	0.4
Moment of inertia of pulleys [g mm²]	267443
Rail size [mm]	Ø8

*1) Positioning repeatability is dependent on the type of transmission used

Tab. 4

Moments of inertia of the aluminum body

Type	I_x [10^7 mm^4]	I_y [10^7 mm^4]	I_p [10^7 mm^4]
MCR 65	0.080	0.068	0.148

Tab. 5

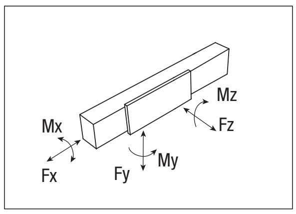
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight per meter [kg/m]
MCR 65	32 AT 05	32	0.105

Tab. 6

Belt length (mm) = 2 x L - 69



Load capacity

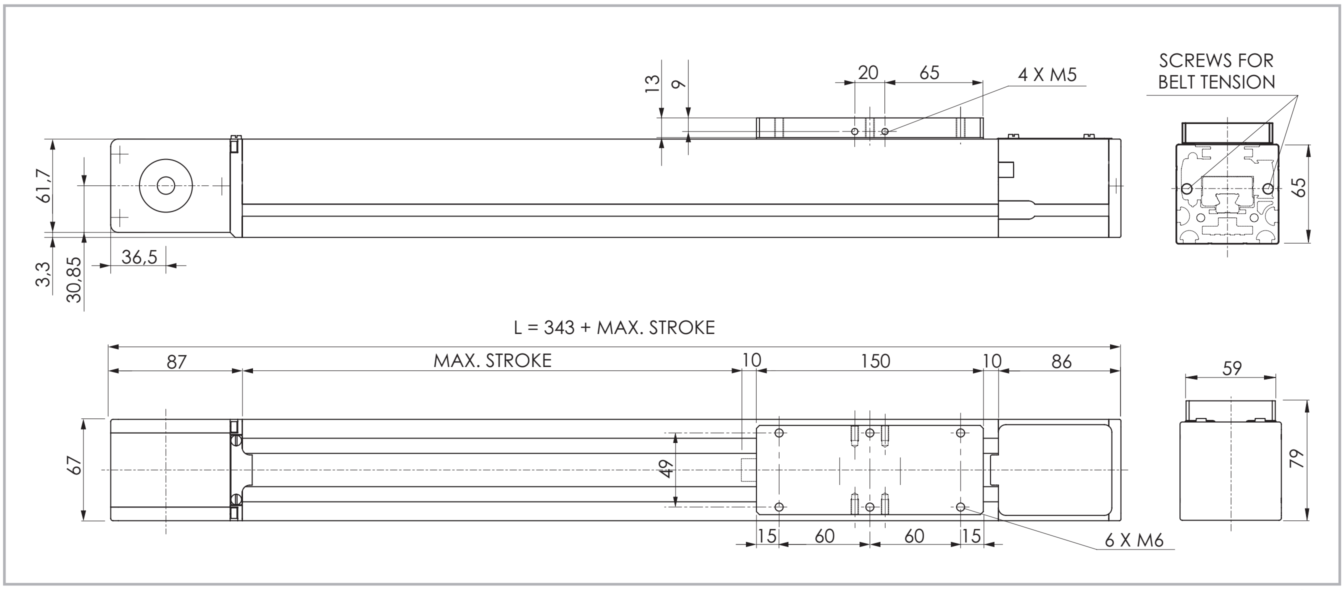
Type	F_x [N]		F_y [N]	F_z [N]		M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Stat.	Dyn.	Stat.	Stat.	Stat.
MCR 65	1344	960	1964	2192	9195	65.1	132	93.9

See verification under static load and lifetime on page SL-2 and SL-3

Tab. 7

MCH 65

MCH 65 Dimension



The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig. 5

Technical data

	Type
	MCH 65
Max. useful stroke length [mm]	8750
Max. positioning repeatability [mm]*1	± 0.1
Max. speed [m/s]	4
Max. acceleration [m/s²]	30
Type of belt	32 AT 05
Type of pulley	Z 32
Pulley pitch diameter [mm]	50.93
Carriage displacement per pulley turn [mm]	160
Carriage weight [kg]	0.9
Zero travel weight [kg]	3.85
Weight for 100 mm useful stroke [kg]	0.58
Starting torque [Nm]	0.3
Moment of inertia of pulleys [g mm²]	267443
Rail size [mm]	15

*1) Positioning repeatability is dependent on the type of transmission used

Tab. 8

Moments of inertia of the aluminum body

Type	I_x [10^7 mm^4]	I_y [10^7 mm^4]	I_p [10^7 mm^4]
MCH 65	0.080	0.068	0.148

Tab. 9

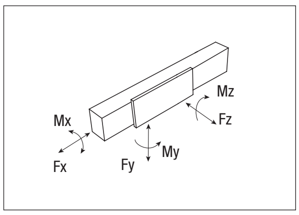
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight per meter [kg/m]
MCH 65	32 AT 05	32	0.105

Tab. 10

Belt length (mm) = 2 x L - 69



Load capacity

Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn.	Stat.	Stat.	Stat.	Stat.
MCH 65	1344	960	30560	19890	30560	240	1406	1406

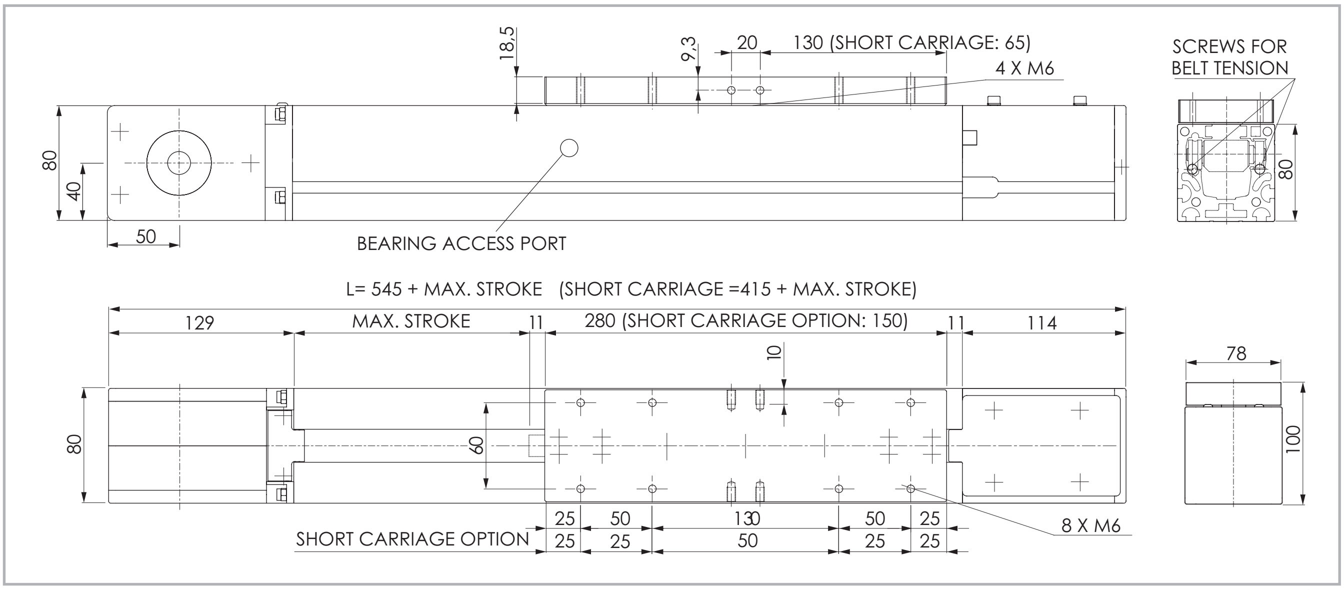
See verification under static load and lifetime on page SL-2 and SL-3

Tab. 11

ML

MCR 80

MCR 80 Dimension



The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig.6

Technical data

	Type	
	MCR 80	MCR 80 C
Max. useful stroke length [mm]	5650	5780
Max. positioning repeatability [mm] *1	± 0.1	± 0.1
Max. speed [m/s]	5	5
Max. acceleration [m/s²]	20	20
Type of belt	32 AT 10	32 AT 10
Type of pulley	Z 22	Z 22
Pulley pitch diameter [mm]	70.03	70.03
Carriage displacement per pulley turn [mm]	220	220
Carriage weight [kg]	2.2	1.25
Zero travel weight [kg]	8.8	6.95
Weight for 100 mm useful stroke [kg]	0.7	0.7
Starting torque [Nm]	0.7	0.7
Moment of inertia of pulleys [g mm²]	1174346	1174346
Rail size [mm]	Ø8	Ø8

*1) Positioning repeatability is dependent on the type of transmission used

Tab. 12

Moments of inertia of the aluminum body

Type	I_x [10^7 mm^4]	I_y [10^7 mm^4]	I_p [10^7 mm^4]
MCR 80	0.179	0.147	0.326

Tab. 13

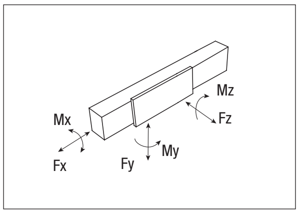
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight per meter [kg/m]
MCR 80	32 AT 10	32	0.185

Tab. 14

Belt length (mm) = 2 x L - 182
Short carriage (mm) = 2 x L - 52



Load capacity

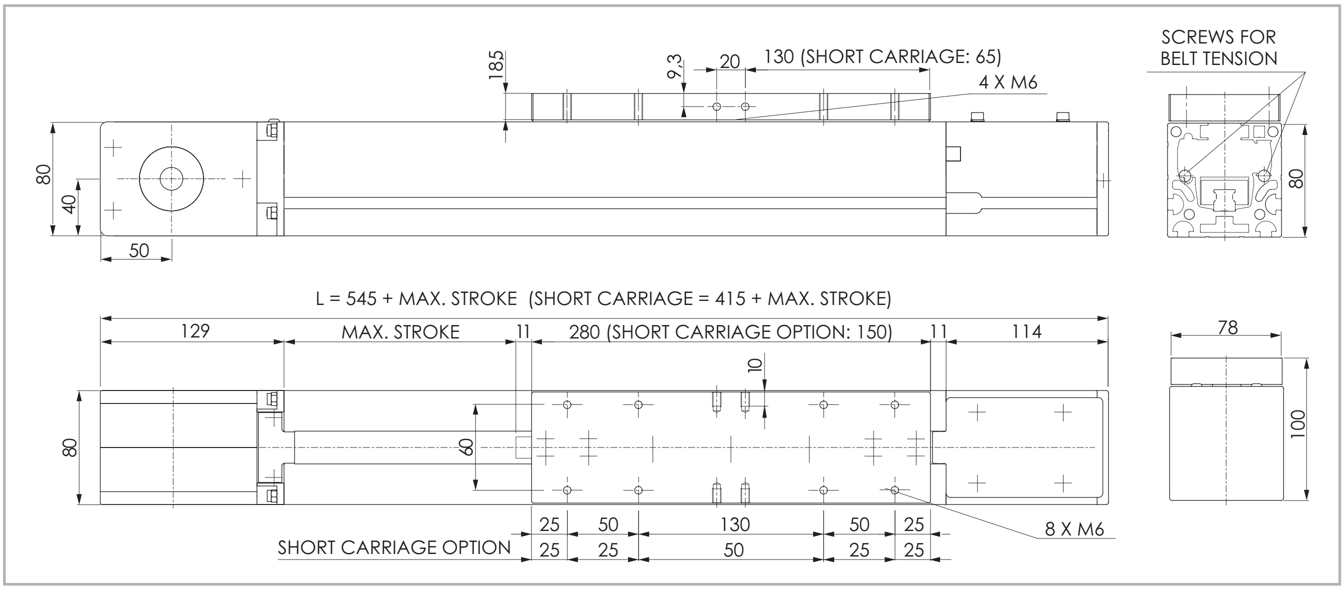
Type	F_x [N]		F_y [N]	F_z [N]		M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Stat.	Dyn.	Stat.	Stat.	Stat.
MCR 80	2656	1760	1964	2579	9195	85.4	361	193
MCR 80 C	2656	1760	1964	2579	9195	85.4	156	93.9

See verification under static load and lifetime on page SL-2 and SL-3

Tab. 15

MCH 80

MCH 80 Dimension



The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig. 7

Technical data

	Type	
	MCH 80	MCH 80 C
Max. useful stroke length [mm] *1	7650	7780
Max. positioning repeatability [mm]*2	± 0.1	± 0.1
Max. speed [m/s]	5	5
Max. acceleration [m/s²]	40	40
Type of belt	32 AT 10	32 AT 10
Type of pulley	Z 22	Z 22
Pulley pitch diameter [mm]	70.03	70.03
Carriage displacement per pulley turn [mm]	220	220
Carriage weight [kg]	2.45	1.3
Zero travel weight [kg]	9.4	7.1
Weight for 100 mm useful stroke [kg]	0.79	0.79
Starting torque [Nm]	0.9	0.9
Moment of inertia of pulleys [g mm²]	1174346	1174346
Rail size [mm]	15	15

*1) It is possible to obtain strokes up to 9000 mm by means of special Rollon joints
*2) Positioning repeatability is dependent on the type of transmission used

Tab. 16

Moments of inertia of the aluminum body

Type	I_x [10^7 mm^4]	I_y [10^7 mm^4]	I_p [10^7 mm^4]
MCH 80	0.179	0.147	0.326

Tab. 17

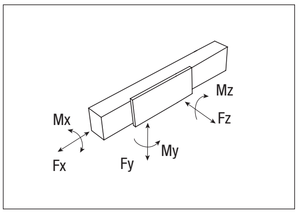
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight per meter [kg/m]
MCH 80	32 AT 10	32	0.185

Tab. 18

Belt length (mm) = 2 x L - 182
Short carriage (mm) = 2 x L - 52



Load capacity

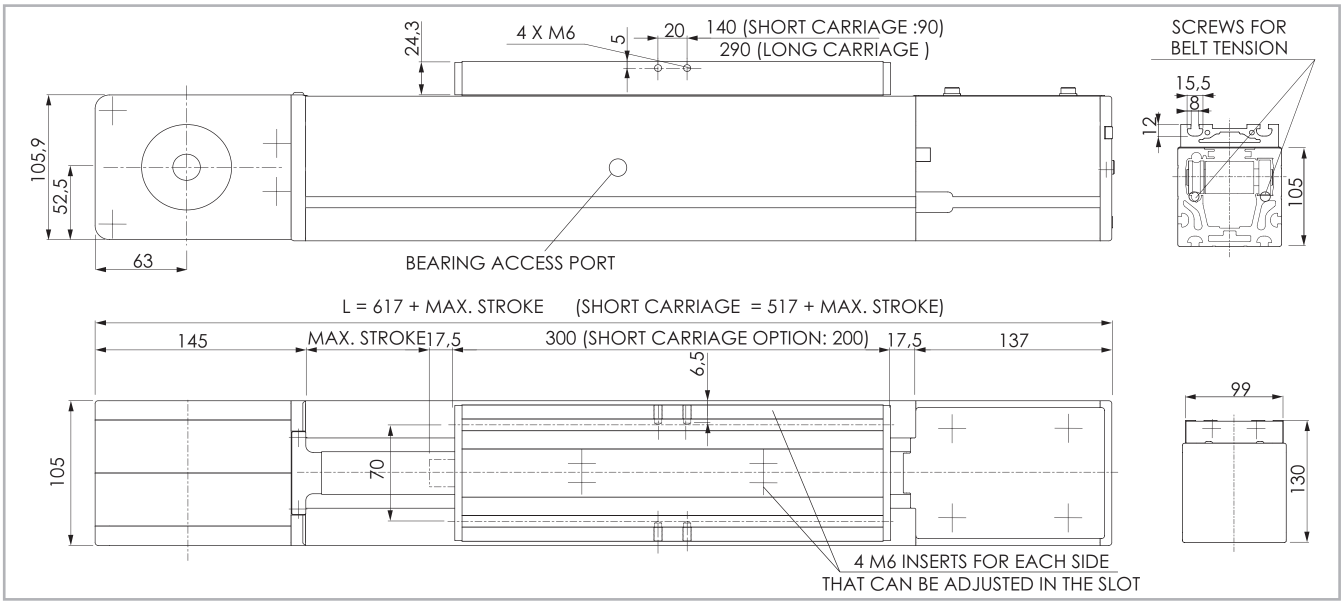
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn.	Stat.	Stat.	Stat.	Stat.
MCH 80	2656	1760	30560	19890	30560	240	3285	3285
MCH 80 C	2656	1760	15280	9945	15280	120	90	90

See verification under static load and lifetime on page SL-2 and SL-3

Tab. 19

MCR 105

MCR 105 Dimension



The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig. 8

Technical data

	Type	
	MCR 105	MCR 105 C
Max. useful stroke length [mm]	7100	7200
Max. positioning repeatability [mm]*1	± 0.1	± 0.1
Max. speed [m/s]	5	5
Max. acceleration [m/s²]	20	20
Type of belt	40 AT 10	40 AT 10
Type of pulley	Z 29	Z 29
Pulley pitch diameter [mm]	92.31	92.31
Carriage displacement per pulley turn [mm]	290	290
Carriage weight [kg]	3.51	2.56
Zero travel weight [kg]	17.15	14.9
Weight for 100 mm useful stroke [kg]	1.2	1.2
Starting torque [Nm]	1.2	1.2
Moment of inertia of pulleys [g mm²]	4482922	4482922
Rail size [mm]	Ø10	Ø10

*1) Positioning repeatability is dependent on the type of transmission used

Tab. 20

Moments of inertia of the aluminum body

Type	I_x [10^7 mm⁴]	I_y [10^7 mm⁴]	I_p [10^7 mm⁴]
MCR 105	0.448	0.576	1.015

Tab. 21

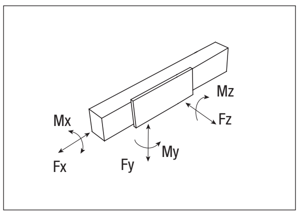
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight per meter [kg/m]
MCR 105	40 AT 10	40	0.231

Tab. 22

Belt length (mm) = 2 x L - 165
Short carriage (mm) = 2 x L - 65



Load capacity

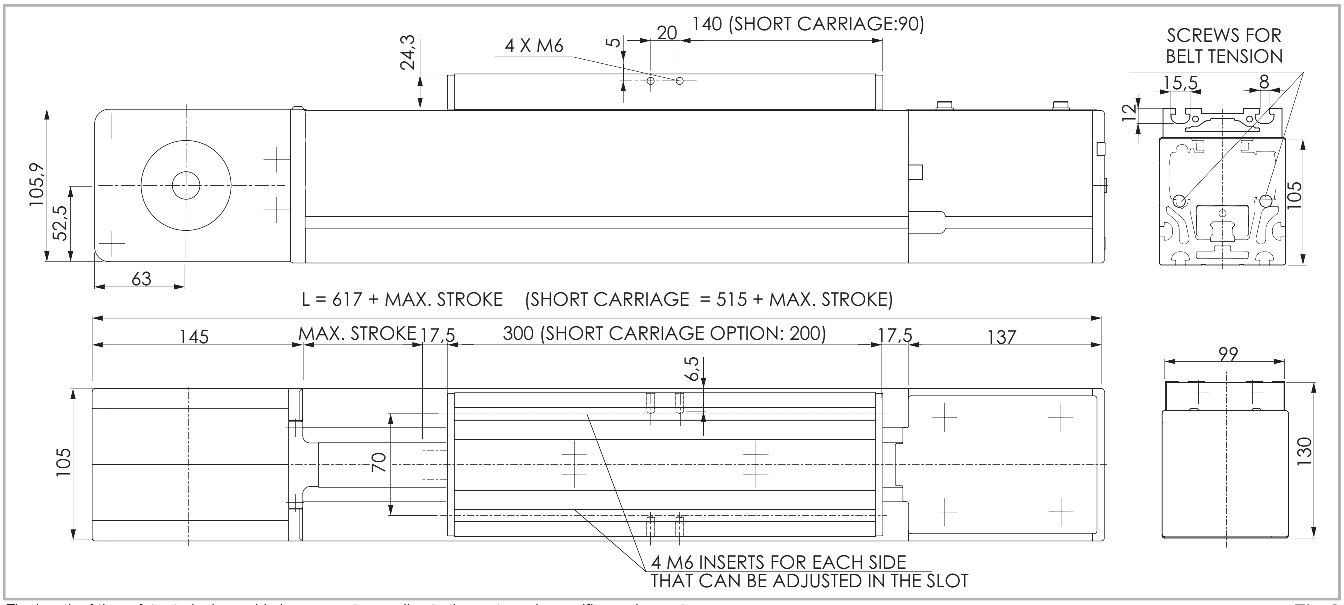
Type	F_x [N]		F_y [N]	F_z [N]		M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Stat.	Dyn.	Stat.	Stat.	Stat.
MCR 105	3984	2640	4250	7812	26997	340	1033	417
MCR 105 C	3984	2640	4250	7812	26997	340	544	250

See verification under static load and lifetime on page SL-2 and SL-3

Tab. 23

MCH 105

MCH 105 Dimension



The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig.9

Technical data

	Type	
	MCH 105	MCH 105 C
Max. useful stroke length [mm]	7100	7200
Max. positioning repeatability [mm]*2	± 0.1	± 0.1
Max. speed [m/s]	5	5
Max. acceleration [m/s^2]	50	50
Type of belt	40 AT 10	40 AT 10
Type of pulley	Z 32	Z 32
Pulley pitch diameter [mm]	92.31	92.31
Carriage displacement per pulley turn [mm]	290	290
Carriage weight [kg]	3.5	2.3
Zero travel weight [kg]	17.5	14.4
Weight for 100 mm useful stroke [kg]	1.36	1.36
Starting torque [Nm]	1.5	1.5
Moment of inertia of pulleys [g mm^2]	4482922	4482922
Rail size [mm]	20	20

*1) It is possible to obtain strokes up to 10000mm by means of special rollon joint
*2) Positioning repeatability is dependent on the type of transmission used

Tab. 24

Moments of inertia of the aluminum body

Type	I_x [10^7 mm^4]	I_y [10^7 mm^4]	I_p [10^7 mm^4]
MCH 105	0.448	0.576	1.015

Tab. 25

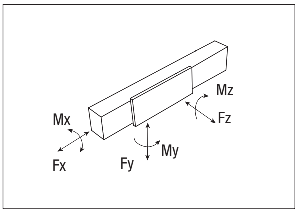
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight per meter [kg/m]
MCH 105	40 AT 10	40	0.231

Tab. 26

Belt length (mm) = 2 x L - 165
Short carriage (mm) = 2 x L - 65



Load capacity

Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn.	Stat.	Stat.	Stat.	Stat.
MCH 105	3984	2640	51260	36637	51260	520	5536	5536
MCH 105 C	3984	2640	25630	18319	25630	260	190	190

See verification under static load and lifetime on page SL-2 and SL-3

Tab. 27

Linear units in parallel

Synchronisation kit for use of MCR/MCH linear units in parallel

When movement consisting of two linear units in parallel is essential, a synchronisation kit must be used. The kit contains original Rollon blade type precision joints complete with tapered splines and hollow aluminum drive shafts.

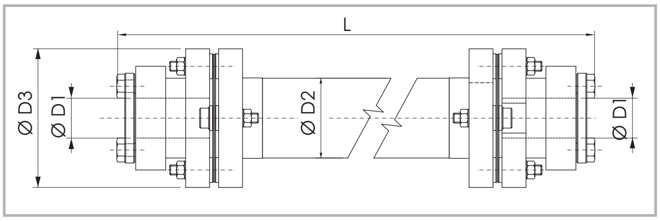


Fig. 10

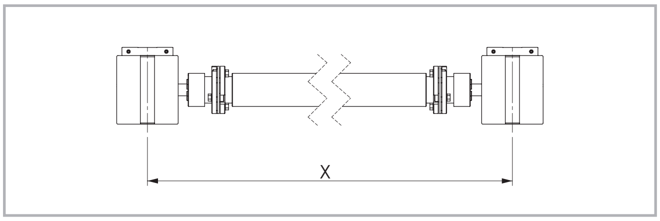
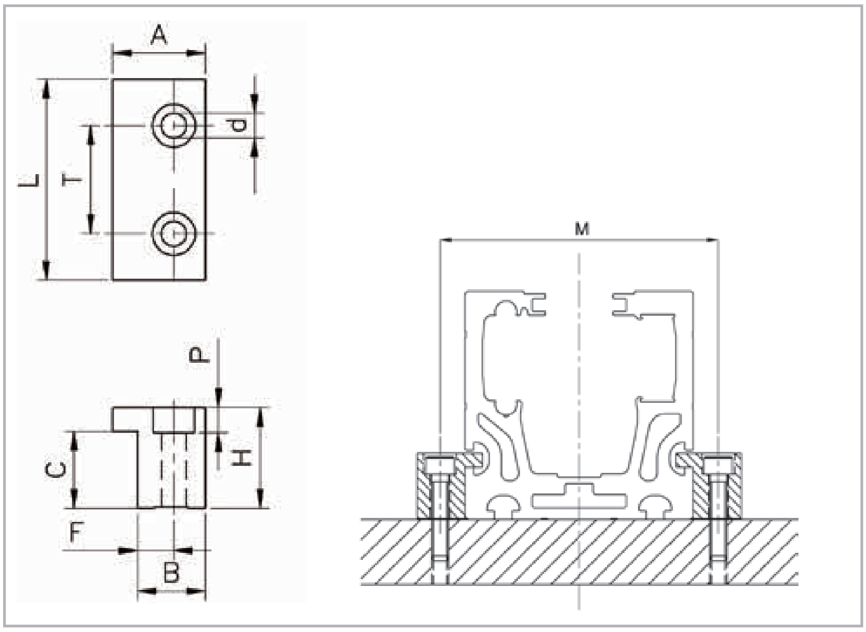


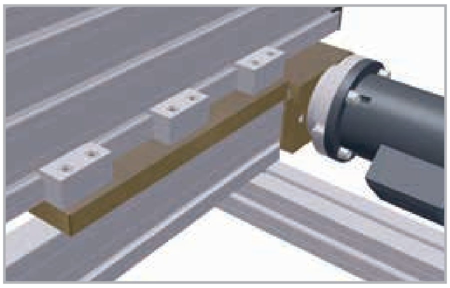
Fig. 11

Unit	Shaft type	D1	D2	D3	Code	Formula for length calculation
MCR/MCH 65	**AP 12**	12	25	45	GK12P...1A	L= X-80 [mm]
MCR/MCH 80	**AP 20**	20	40	69.5	GK20P...1A	L= X-97 [mm]
MCR/MCH 105	**AP 25**	25	70	99	GK25P...1A	L= X-130 [mm]

Tab. 28

Accessories





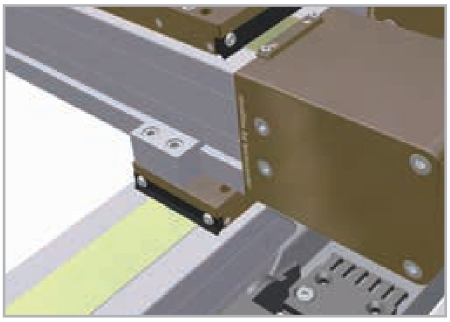


Fig. 12

Material: aluminum alloy 6082

Unit	A	L	T	d	H	P	C	F	B	M	Code
MCR/MCH 65	25	50	25	6.7	20	6.8	13.5	10	18	87	415.0380
MCR/MCH 80	25	50	25	6.7	25	6.8	18.6	10	18	100	415.0760
MCR/MCH 105	30	50	25	9	30	9.5	23.6	12	22	129	415.0761

Tab. 29

Insertable nuts and plates

Spring nut

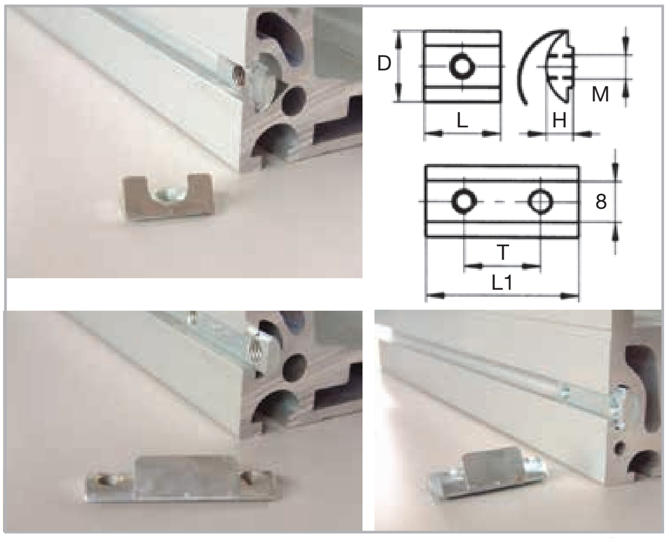


Fig. 13

Plate suitable for every kind of module (8 mm slot).

Material: nut in galvanised steel welded to the harmonic steel spring.

Single plate	MC 80-105	MC 65
M5	A32-55	B32-55
M6	A32-65	B32-65
M8	A32-85	B32-85

Tab. 30

Double plate	MC 80-105	MC 65
M6	A32-67	B32-67

Tab. 31

Size					
Base module	D	H	L	L1	T
MC 80-105	14	7.8	20	40	30
MC 65	11	4.1	20	40	30

Tab. 32

Simple nut

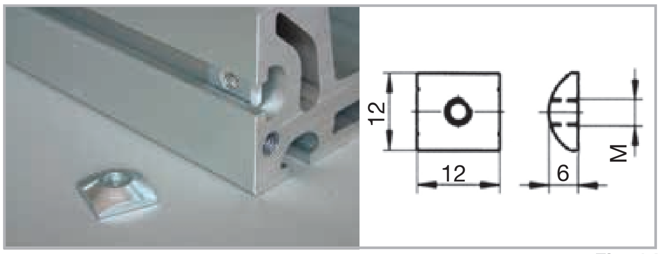


Fig. 14

Material: galvanised steel.

Insert through the end of the profile.

Suitable for series: MC 80-105

Thread	Code
M5	209.2431
M6	209.2432
M8	209.2433

Tab. 33

Front insertable spring nut

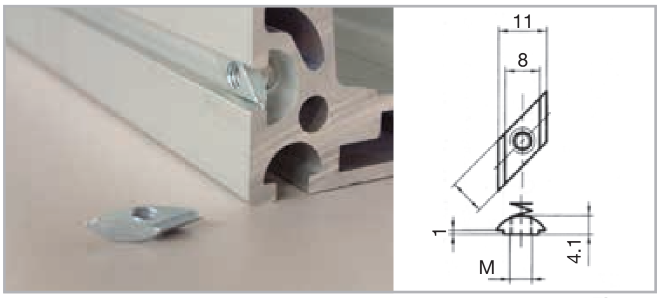


Fig. 15

Material: galvanised steel, harmonic steel spring.

To be inserted through the slot.

Suitable for series: MC 65

Thread	Code
M3	BD31-30
M4	BD31-40
M5	BD31-50
M6	BD31-60

Tab. 34

Simple nut

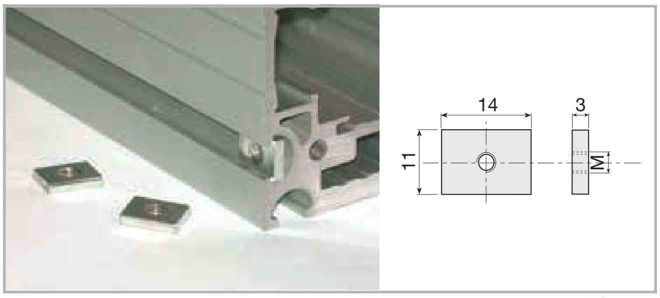


Fig. 16

Material: galvanised steel.

To be inserted through the slot.

Suitable for series: MC 65

Thread	Code
M4	D32.40
M5	D32.50
M6	D32.60

Tab. 35

ML

Sensor brackets

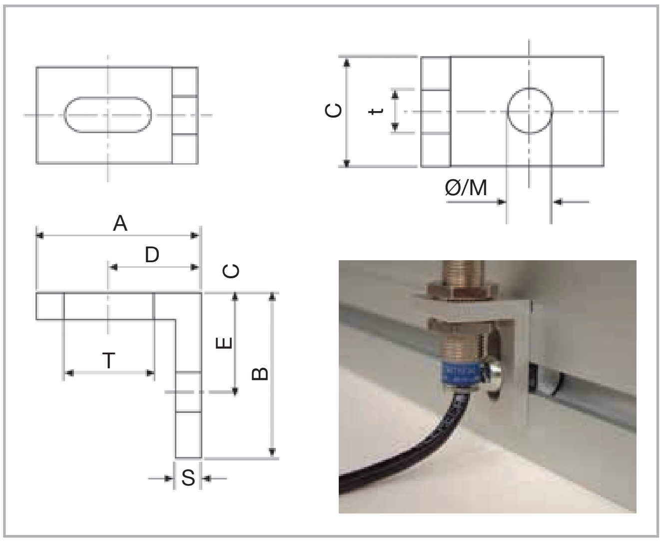


Fig. 17

Material: natural, anodized anticorodal alloy.

Thread								Code	
A	B	C	D	E	S	Txt	Ø/M	Ø	M
45	45	20	25	25	5	20X6.5	6	A30-76	A 30-86
35	25	20	19	15	5	20X6.5	4	A30-54	A30-64
35	25	20	19	15	5	20X6.5	5	A30-55	A30-65
35	25	20	19	15	5	20X6.5	6	A30-56	A30-66
25	25	15	14	15	4	13.5X5.5	3	B30-53	B30-63
25	25	14	14	15	4	13.5X5.5	4	B30-54	B30-64
25	25	15	14	15	4	13.5X5.5	5	B30-55	B30-65
25	25	15	14	15	4	13.5X5.5	6	B30-56	B30-66

Suitable for all the modules

Tab. 36

M = Threaded version

Ø = Passing through hole version

Steel strip protection for series MCR/MCH 80-105

Material: Stainless steel foil.

Optional: For additional protection from dust and debris, a magnetic seal strip can be added to the profile to cover the belt way.

Due to the magnetic strip, it is best to avoid use in the presence of ferrous debris.

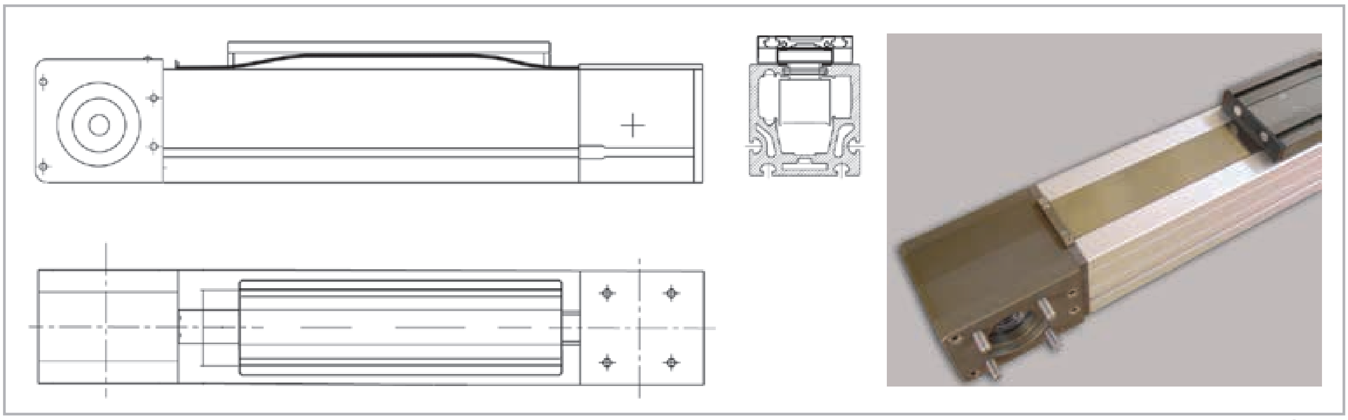


Fig. 18

Ordering key

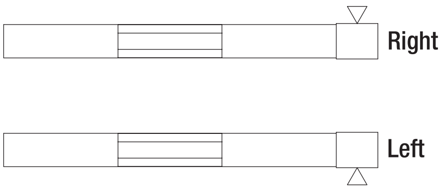
Identification codes for the MCR/MCH series

MCR	10	1A	02000	1A	D
MCH	06=65				
	08=80				
	10=105				
					Multiple carriages
				Carriage option	
			L=Total length of the unit		
		Driving head code			
	Linear unit size *see from pg. ML-6 to pg. ML-11*				
MCR/MCH Series *see pg. ML-3*					

In order to create identification codes for Actuator Line, you can visit: **http://configureactuator.rollon.com**

Configure Actuator

Left / right orientation



TCR/TCS series

TCR/TCS series description

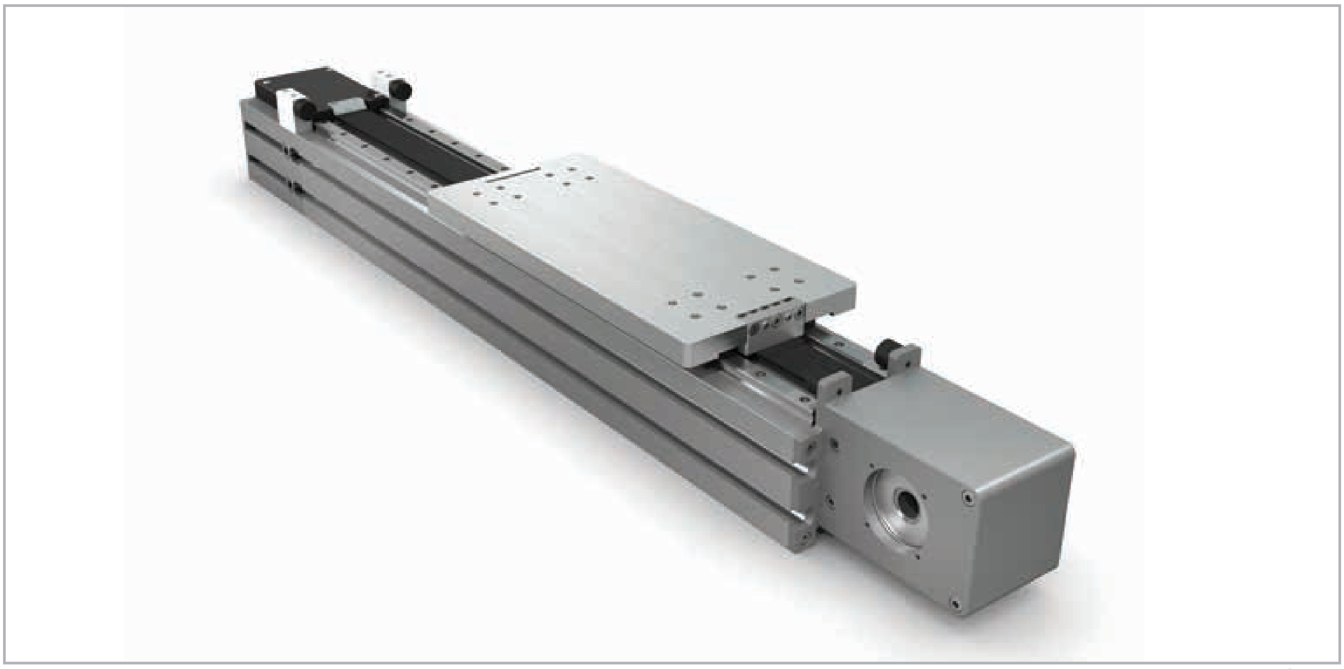


Fig. 19

The TCR/TCS series linear units are particularly suitable for: heavy loads, pulling and pushing very heavy weights, demanding work cycles, possible cantilever or gantry mounting and operations in industrial automated lines.

The extruded and anodized aluminum self-supporting structure with a rectangular section is available in different sizes ranging from 140 to 360 mm. Transmission is achieved with a polyurethane steel reinforced driving belt. Multiple sliders are available to further improve load capacity.

These units are best used in applications requiring very heavy loads in extremely confined spaces, and where machines cannot be stopped to carry out ordinary maintenance.

TCR

Features a dual Prismatic Rail system.

TCS

Features a dual rail system with four recirculating ball bearing runner blocks.

The components

Extruded bodies

The anodized aluminum extrusions used for the bodies of the Rollon TCR/TCS series linear units were designed and manufactured in cooperation with a leading company in this field, to obtain the right combination of high mechanical strength and reduced weight. The anodized aluminum alloy 6060 used (see physical chemical characteristics below) was extruded with dimensional tolerances complying with EN 755-9 standards.

Driving belt

The Rollon TCR/TCS series linear units use steel reinforced polyurethane drive belts with AT pitch. This belt is ideal due to its high load transmission characteristics, compact size, and low noise. Used in conjunction with a backlash-free pulley, smooth alternating motion can be achieved. Optimization of the maximum belt width/body dimension ratio enables the following performance characteristics to be achieved:

- **High speed**
- **Low noise**
- **Low wear**

Carriage

The carriage of the Rollon TCR/TCS series linear units is made entirely of machined anodized aluminum. The dimensions vary depending on the type. Rollon offers multiple carriages to accommodate a vast array of applications.

General data about aluminum used: AL 6060

Chemical composition [%]

Al	Mg	Si	Fe	Mn	Zn	Cu	Impurites
Remaining	0.35-0.60	0.30-0.60	0.30	0.10	0.10	0.10	0.05-0.15

Tab. 37

Physical characteristics

Density	Coeff. of elasticity	Coeff. of thermal expansion (20°-100°C)	Thermal conductivity (20°C)	Specific heat (0°-100°C)	Resistivity	Melting point
$\frac{kg}{dm^3}$	$\frac{kN}{mm^2}$	$\frac{10^{-6}}{K}$	$\frac{W}{m \cdot K}$	$\frac{J}{kg \cdot K}$	$\Omega \cdot m \cdot 10^{-9}$	°C
2.7	70	23.8	200	880-900	33	600-655

Tab. 38

Mechanical characteristics

Rm	Rp (02)	A	HB
$\frac{N}{mm^2}$	$\frac{N}{mm^2}$	%	—
250	200	10	75

Tab. 39

The linear motion system

The linear motion system has been designed to meet the load capacity, speed, and maximum acceleration conditions of a wide variety of applications.

TCR with Prismatic Rail:

Prismatic Rails are made of specially treated high-carbon steel and provided with a permanent lubrication system. Thanks to this kind of solution TCR is specifically dedicated for dirty environments and high dynamics in automation.

- The Prismatic Rails with high load capacity are mounted in a dedicated seat on the aluminum body.
- The carriage is assembled with preload, that enables to withstand loading in the four main directions.
- Hardened and ground steel guide rails.
- Sliders have felts for self-lubrication.

The linear motion system described above offers:

- Suitable for dirty environments
- High speed and acceleration
- Maintenance free
- High load capacity
- Low friction
- Long life
- Low noise

TCS with recirculating ball guides:

- The ball bearing guides with high load capacity are mounted in a dedicated seat on the aluminum body.
- The carriage is assembled on preloaded ball bearing blocks that allow to withstand loading in the four main directions.
- The ball bearing carriages are also fitted with a retention cage that eliminates "steel-steel" contact between adjacent revolving parts and prevents misalignment.
- The blocks have seals on both sides.

The linear motion system described above offers:

- High permissible bending moments
- High accuracy of the movement
- High speed and acceleration
- High load capacity
- High rigidity
- Low friction
- Long life
- Low noise

TCR section

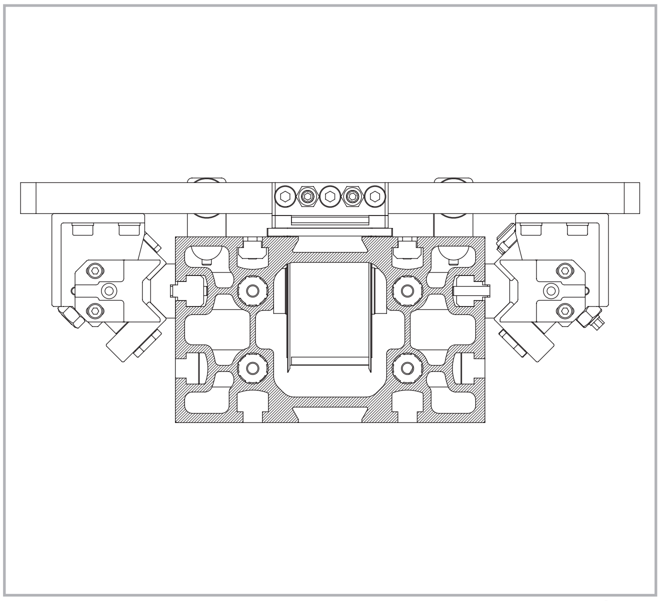


Fig. 20

TCS section

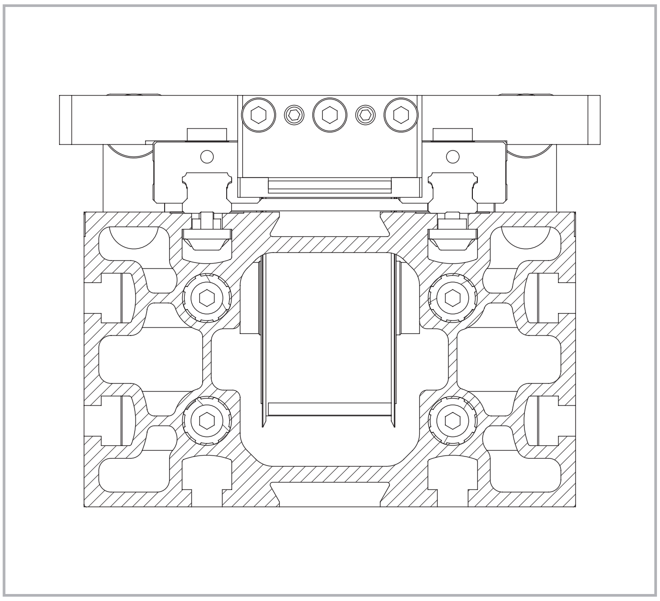
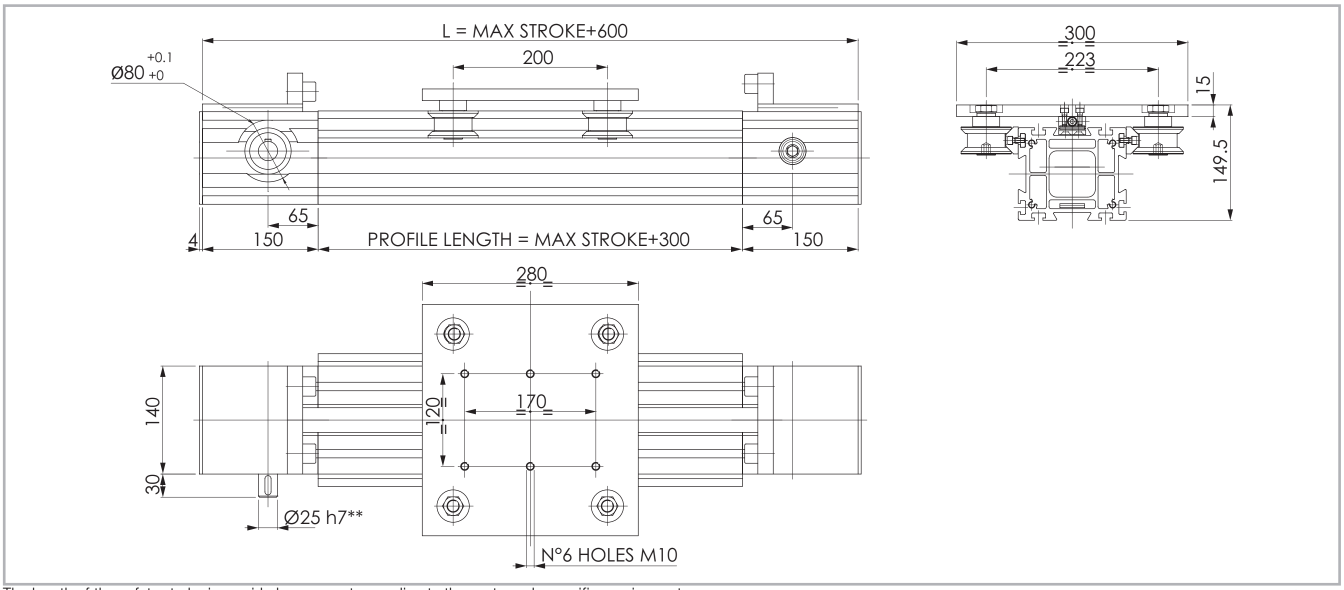


Fig. 21

TCR 140

TCR 140 Dimension



The length of the safety stroke is provided on request according to the customer's specific requirements.
** Output shaft is the only option available

Fig.22

Technical data

	Type
	TCR 140
Max. useful stroke length [mm]	9700
Max. positioning repeatability [mm]*1	± 0.1
Max. speed [m/s]	5
Max. acceleration [m/s²]	20
Type of belt	32 AT 10
Type of pulley	Z 32
Pulley pitch diameter [mm]	101.86
Carriage displacement per pulley turn [mm]	320
Carriage weight [kg]	6.0
Zero travel weight [kg]	21.2
Weight for 100 mm useful stroke [kg]	2.2
Starting torque [Nm]	3
Moment of inertia of pulleys [g mm²]	978467
Rail size [mm]	35x16

*1) Positioning repeatability is dependent on the type of transmission used

Tab. 40

Moments of inertia of the aluminum body

Type	I_x [10^7 mm⁴]	I_y [10^7 mm⁴]	I_p [10^7 mm⁴]
TCR 140	1.148	0.892	2.040

Tab. 41

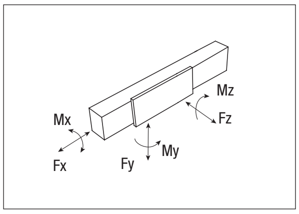
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight per meter [kg/m]
TCR 140	32 AT 10	32	0.185

Tab. 42

Belt length (mm) = 2 x L - 160



Load capacity

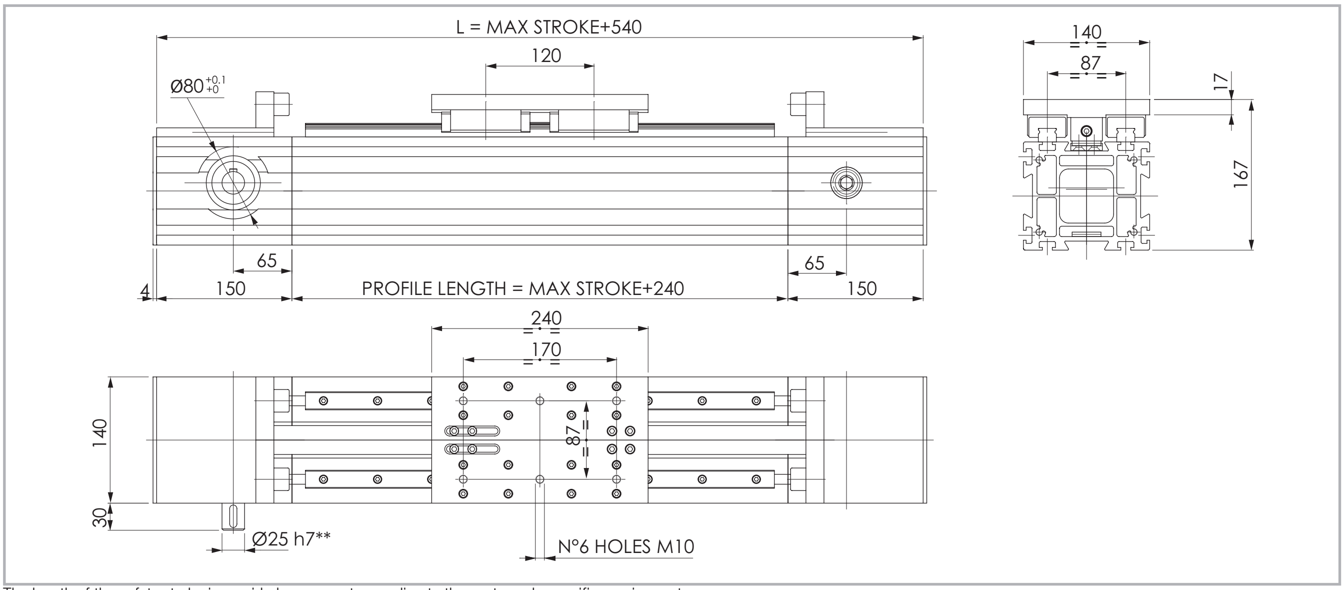
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn.	Stat.	Stat.	Stat.	Stat.
TCR 140	3187	2170	6000	23405	4000	280	400	600

See verification under static load and lifetime on page SL-2 and SL-3

Tab. 43

TCS 140

TCS 140 Dimension



The length of the safety stroke is provided on request according to the customer's specific requirements.
** Output shaft is the only option available

Fig. 23

Technical data

	Type
	TCS 140
Max. useful stroke length [mm]	9760
Max. positioning repeatability [mm]*1	± 0.1
Max. speed [m/s]	5
Max. acceleration [m/s²]	50
Type of belt	32 AT 10
Type of pulley	Z 32
Pulley pitch diameter [mm]	101.86
Carriage displacement per pulley turn [mm]	320
Carriage weight [kg]	4.2
Zero travel weight [kg]	18
Weight for 100 mm useful stroke [kg]	1.9
Starting torque [Nm]	3.5
Moment of inertia of pulleys [g mm²]	978467
Rail size [mm]	20

*1) Positioning repeatability is dependent on the type of transmission used

Tab. 44

Moments of inertia of the aluminum body

Type	I_x [10^7 mm⁴]	I_y [10^7 mm⁴]	I_p [10^7 mm⁴]
TCS 140	1.148	0.892	2.040

Tab. 45

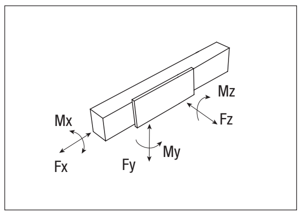
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight per meter [kg/m]
TCS 140	32 AT 10	32	0.185

Tab. 46

Belt length (mm) = 2 x L - 100



Load capacity

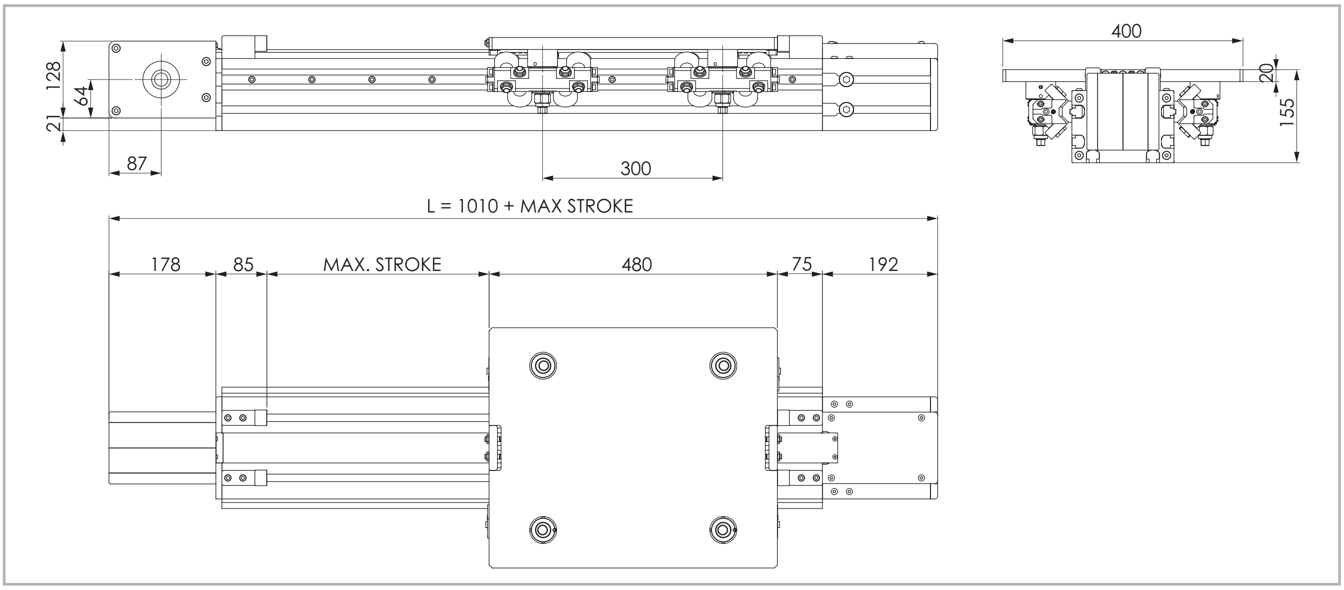
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
TCS 140	3187	2170	153600	70798	153600	6682	9216	9216

See verification under static load and lifetime on page SL-2 and SL-3

Tab. 47

TCR 170

TCR 170 Dimension



The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig. 24

Technical data

	Type
	TCR 170
Max. useful stroke length [mm]	11360
Max. positioning repeatability [mm]*1	± 0.1
Max. speed [m/s]	5
Max. acceleration [m/s²]	20
Type of belt	50 AT 10 HP
Type of pulley	Z 30
Pulley pitch diameter [mm]	95.49
Carriage displacement per pulley turn [mm]	300
Carriage weight [kg]	17.2
Zero travel weight [kg]	51.1
Weight for 100 mm useful stroke [kg]	2.4
Starting torque [Nm]	4.2
Moment of inertia of pulleys [g mm²]	7574717
Rail size [mm]	35x16

*1) Positioning repeatability is dependent on the type of transmission used

Tab. 48

Moments of inertia of the aluminum body

Type	I_x [10^7 mm^4]	I_y [10^7 mm^4]	I_p [10^7 mm^4]
TCR 170	1.973	0.984	2.957

Tab. 49

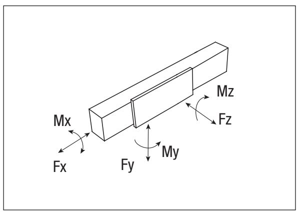
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight per meter [kg/m]
TCR 170	50 AT 10 HP	50	0.290

Tab. 50

Belt length (mm) = 2 x L - 250



Load capacity

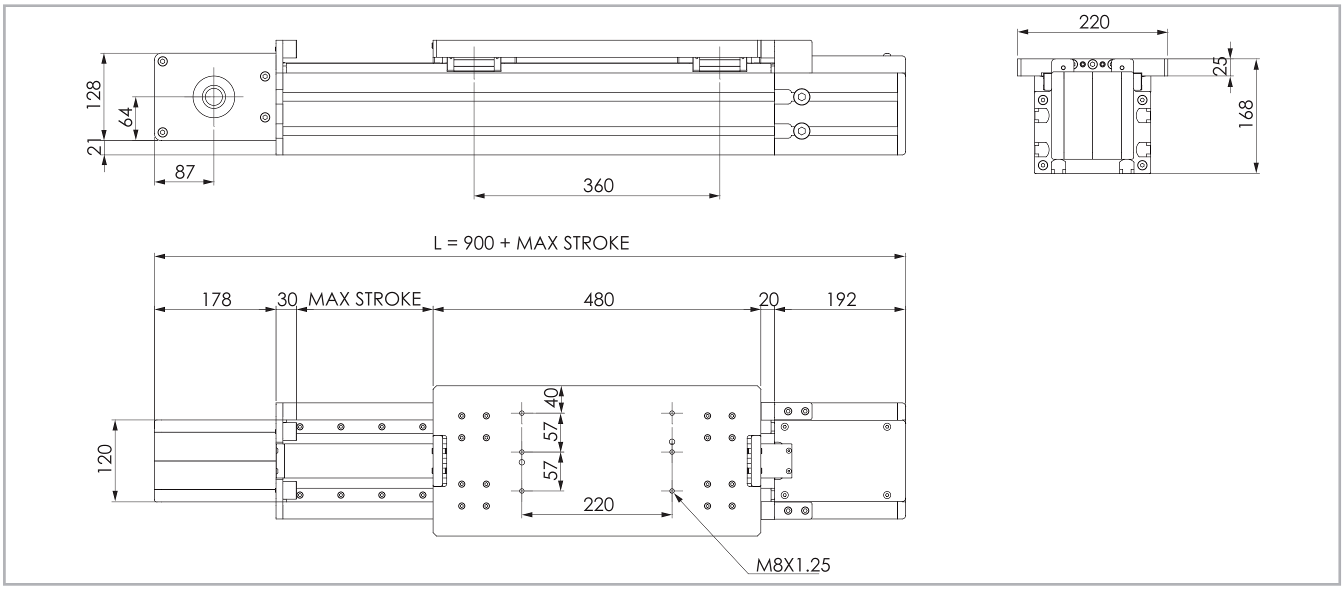
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
TCR 170	4980	3300	14142	65928	14142	1202	2121	2121

See verification under static load and lifetime on page SL-2 and SL-3

Tab. 51

TCS 170

TCS 170 Dimension



The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig. 25

Technical data

	Type
	TCS 170
Max. useful stroke length [mm]	11470
Max. positioning repeatability [mm]*1	± 0.1
Max. speed [m/s]	5
Max. acceleration [m/s²]	50
Type of belt	50 AT 10 HP
Type of pulley	Z 30
Pulley pitch diameter [mm]	95.49
Carriage displacement per pulley turn [mm]	300
Carriage weight [kg]	8.6
Zero travel weight [kg]	34.2
Weight for 100 mm useful stroke [kg]	2,2
Starting torque [Nm]	4.8
Moment of inertia of pulleys [g mm²]	7574717
Rail size [mm]	20

*1) Positioning repeatability is dependent on the type of transmission used

Tab. 52

Moments of inertia of the aluminum body

Type	I_x [10^7 mm^4]	I_y [10^7 mm^4]	I_p [10^7 mm^4]
TCS 170	1.973	0.984	2.957

Tab. 53

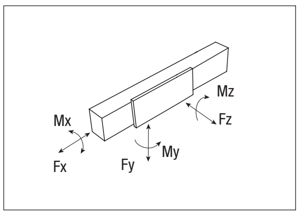
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight per meter [kg/m]
TCS 170	50 AT 10 HP	50	0.290

Tab. 54

Belt length (mm) = 2 x L - 250



Load capacity

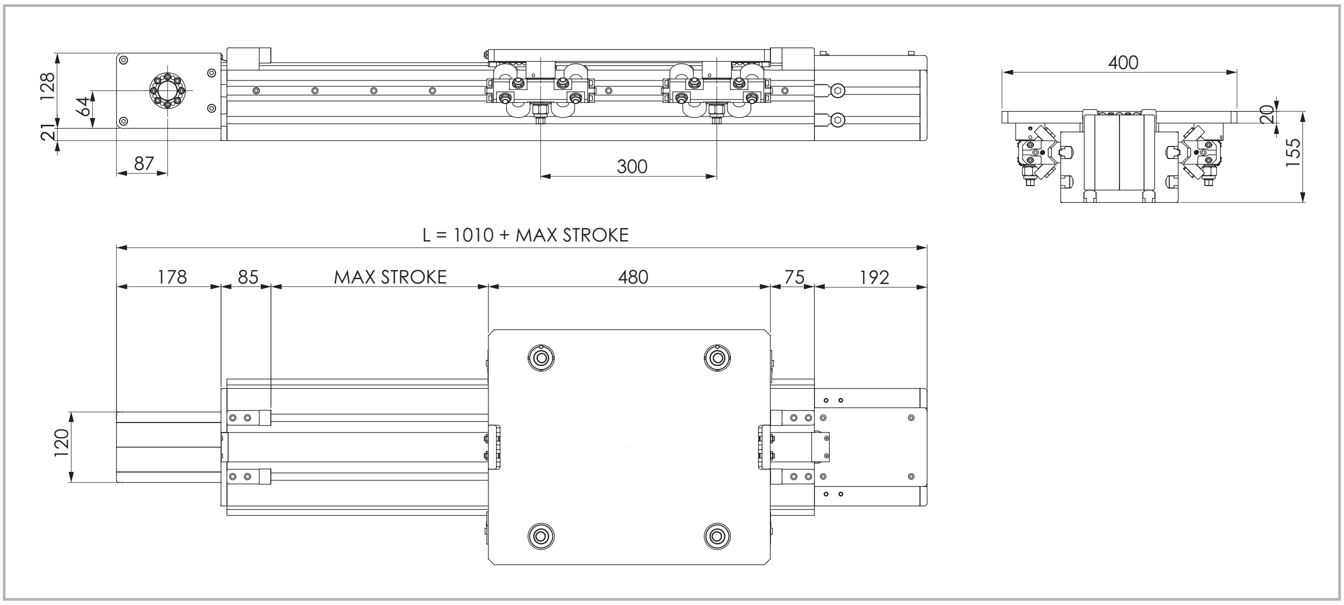
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
TCS 170	4980	3300	153600	70798	153600	7680	27648	27648

See verification under static load and lifetime on page SL-2 and SL-3

Tab. 55

TCR 200

TCR 200 Dimension



The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig.26

Technical data

	Type
	TCR 200
Max. useful stroke length [mm]	11360
Max. positioning repeatability [mm]*1	± 0.1
Max. speed [m/s]	5
Max. acceleration [m/s²]	20
Type of belt	50 AT 10 HP
Type of pulley	Z 30
Pulley pitch diameter [mm]	95.49
Carriage displacement per pulley turn [mm]	300
Carriage weight [kg]	17.3
Zero travel weight [kg]	54.5
Weight for 100 mm useful stroke [kg]	2.7
Starting torque [Nm]	4.2
Moment of inertia of pulleys [g mm²]	7574717
Rail size [mm]	35x16

*1) Positioning repeatability is dependent on the type of transmission used

Tab. 56

Moments of inertia of the aluminum body

Type	I_x [10^7 mm^4]	I_y [10^7 mm^4]	I_p [10^7 mm^4]
TCR 200	3.270	1.298	4.586

Tab. 57

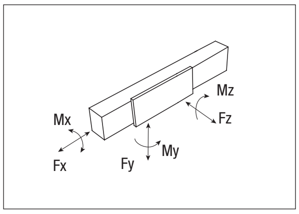
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight per meter [kg/m]
TCR 200	50 AT 10 HP	50	0.290

Tab. 58

Belt length (mm) = 2 x L - 250



Load capacity

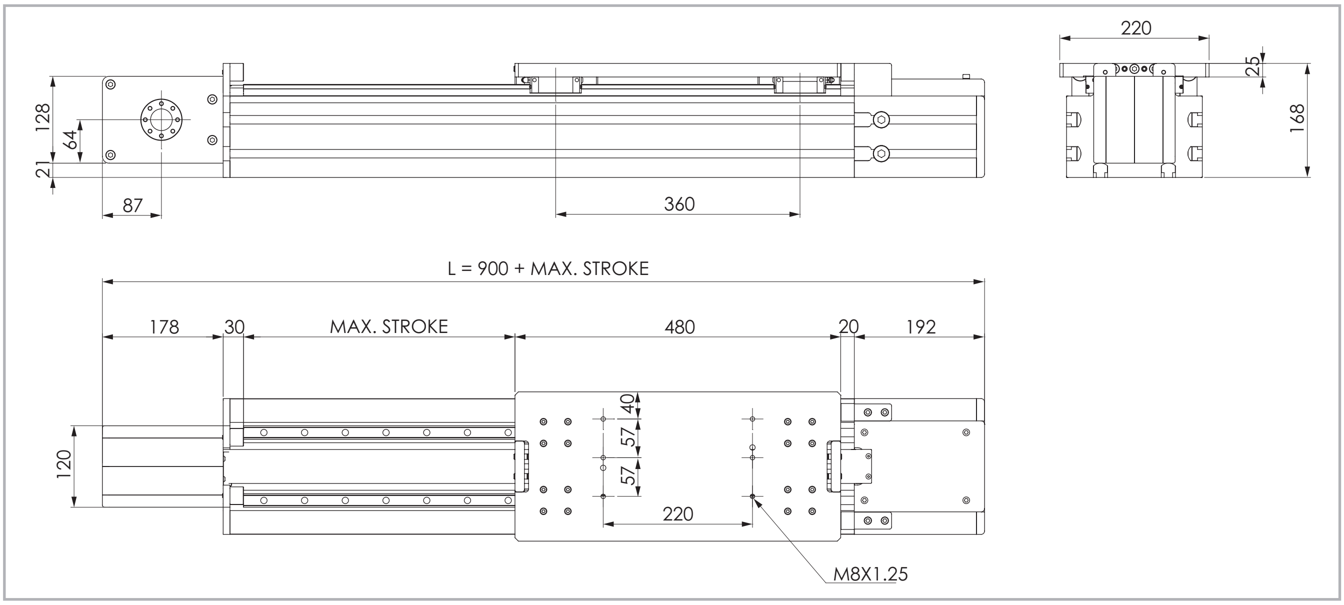
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
TCR 200	4980	3300	14142	65928	14142	1414	2121	2121

See verification under static load and lifetime on page SL-2 and SL-3

Tab. 59

TCS 200

TCS 200 Dimension



The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig. 27

Technical data

	Type
	TCS 200
Max. useful stroke length [mm]	11470
Max. positioning repeatability [mm]*1	± 0.1
Max. speed [m/s]	5
Max. acceleration [m/s²]	50
Type of belt	50 AT 10 HP
Type of pulley	Z 30
Pulley pitch diameter [mm]	95.49
Carriage displacement per pulley turn [mm]	300
Carriage weight [kg]	8.6
Zero travel weight [kg]	39.7
Weight for 100 mm useful stroke [kg]	2.6
Starting torque [Nm]	4.8
Moment of inertia of pulleys [g mm²]	7574717
Rail size [mm]	20

*1) Positioning repeatability is dependent on the type of transmission used

Tab. 60

Moments of inertia of the aluminum body

Type	I_x [10^7 mm^4]	I_y [10^7 mm^4]	I_p [10^7 mm^4]
TCS 200	3.270	1.298	4.586

Tab. 61

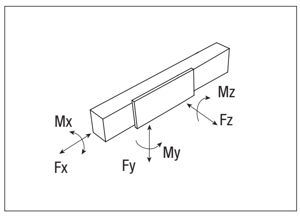
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight per meter [kg/m]
TCS 200	50 AT 10 HP	50	0.290

Tab. 62

Belt length (mm) = 2 x L - 250



Load capacity

Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
TCS 200	4980	3300	153600	70798	153600	7680	27648	27648

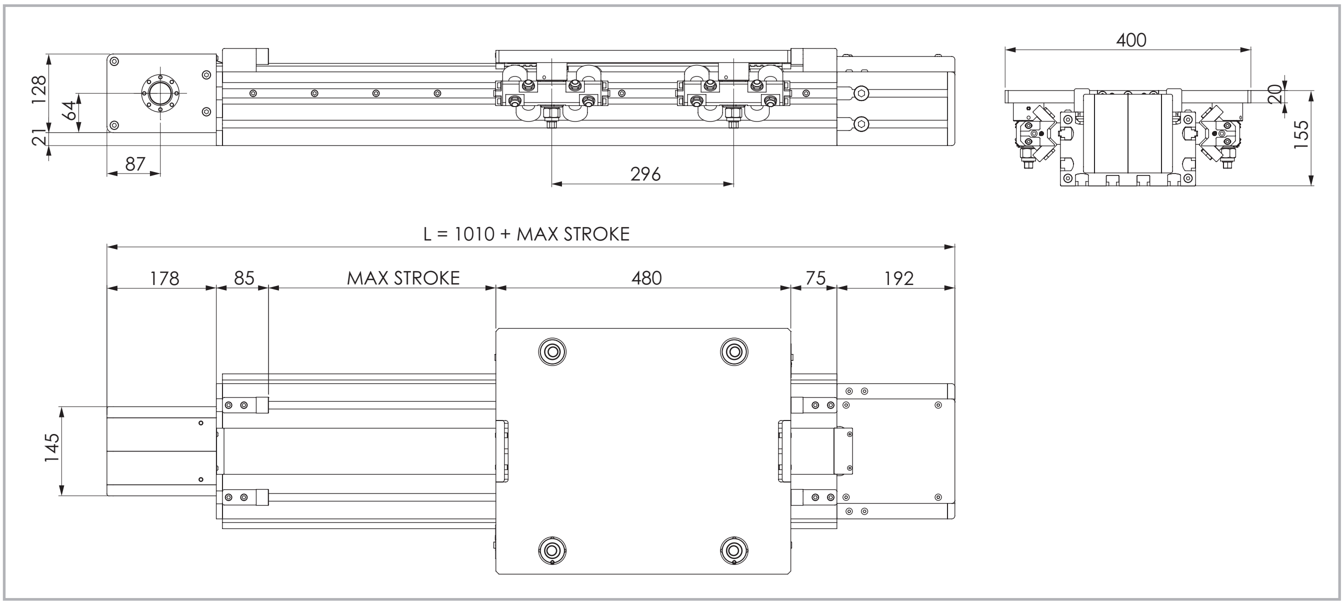
See verification under static load and lifetime on page SL-2 and SL-3

Tab. 63

M
L

TCR 220

TCR 220 Dimension



The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig. 28

Technical data

	Type
	TCR 220
Max. useful stroke length [mm]	11360
Max. positioning repeatability [mm]*1	± 0.1
Max. speed [m/s]	5
Max. acceleration [m/s²]	20
Type of belt	75 AT 10 HP
Type of pulley	Z 30
Pulley pitch diameter [mm]	95.49
Carriage displacement per pulley turn [mm]	300
Carriage weight [kg]	17.3
Zero travel weight [kg]	60.1
Weight for 100 mm useful stroke [kg]	3.7
Starting torque [Nm]	5.8
Moment of inertia of pulleys [g mm²]	9829829
Rail size [mm]	35x16

*1) Positioning repeatability is dependent on the type of transmission used

Tab. 64

Moments of inertia of the aluminum body

Type	I_x [10^7 mm^4]	I_y [10^7 mm^4]	I_p [10^7 mm^4]
TCR 220	4.625	1.559	6.184

Tab. 65

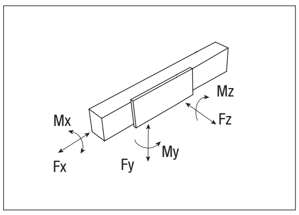
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight per meter [kg/m]
TCR 220	75 AT 10 HP	75	0.435

Tab. 66

Belt length (mm) = 2 x L - 250



Load capacity

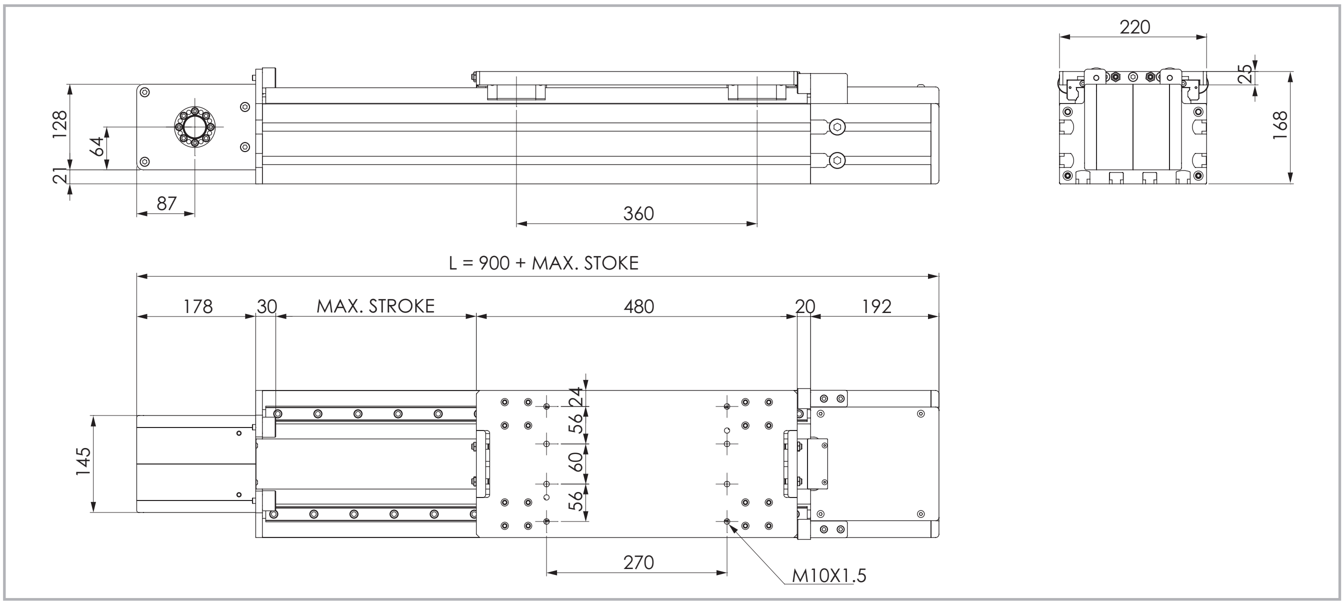
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
TCR 220	7470	4950	14.142	65928	14142	1556	2093	2093

See verification under static load and lifetime on page SL-2 and SL-3

Tab. 67

TCS 220

TCS 220 Dimension



The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig. 29

Technical data

	Type
	TCS 220
Max. useful stroke length [mm]	11470
Max. positioning repeatability [mm]*1	± 0.1
Max. speed [m/s]	5
Max. acceleration [m/s²]	50
Type of belt	75 AT 10 HP
Type of pulley	Z 30
Pulley pitch diameter [mm]	95.49
Carriage displacement per pulley turn [mm]	300
Carriage weight [kg]	9.5
Zero travel weight [kg]	49.3
Weight for 100 mm useful stroke [kg]	3.2
Starting torque [Nm]	6.9
Moment of inertia of pulleys [g mm²]	9829829
Rail size [mm]	25

*1) Positioning repeatability is dependent on the type of transmission used

Tab. 68

Moments of inertia of the aluminum body

Type	I_x [10^7 mm⁴]	I_y [10^7 mm⁴]	I_p [10^7 mm⁴]
TCS 220	4.625	1.559	6.184

Tab. 69

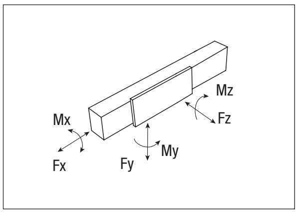
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight per meter [kg/m]
TCS 220	75 AT 10 HP	75	0.435

Tab. 70

Belt length (mm) = 2 x L - 250



Load capacity

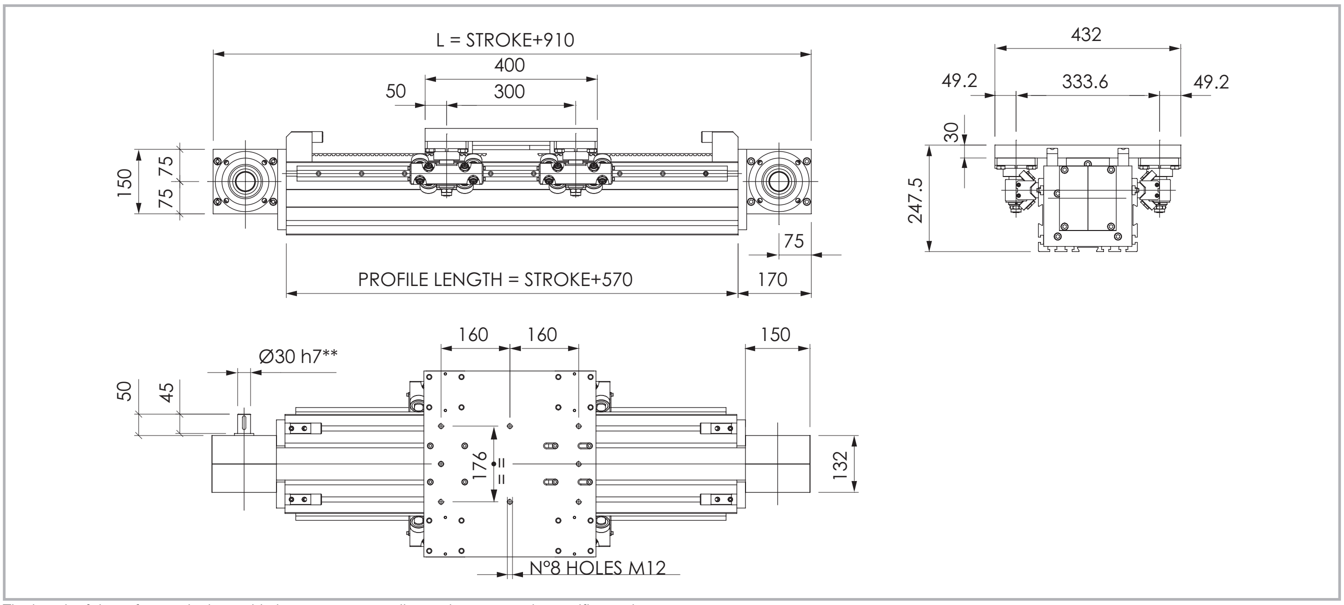
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
TCS 220	7470	4950	258800	116833	258800	19410	46584	46584

See verification under static load and lifetime on page SL-2 and SL-3

Tab. 71

TCR 230

TCR 230 Dimension



The length of the safety stroke is provided on request according to the customer's specific requirements.
** Output shaft is the only option available

Fig. 30

Technical data

	Type
	TCR 230
Max. useful stroke length [mm]	11430
Max. positioning repeatability [mm]*1	± 0.1
Max. speed [m/s]	5
Max. acceleration [m/s²]	20
Type of belt	75 AT 10
Type of pulley	Z 40
Pulley pitch diameter [mm]	127.32
Carriage displacement per pulley turn [mm]	400
Carriage weight [kg]	23.0
Zero travel weight [kg]	60
Weight for 100 mm useful stroke [kg]	3.3
Starting torque [Nm]	10.5
Moment of inertia of pulleys [g mm²]	12020635
Rail size [mm]	35x16

*1) Positioning repeatability is dependent on the type of transmission used

Tab. 72

Moments of inertia of the aluminum body

Type	I_x [10^7 mm^4]	I_y [10^7 mm^4]	I_p [10^7 mm^4]
TCR 230	6.501	3.778	1.028

Tab. 73

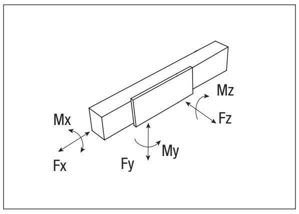
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight per meter [kg/m]
TCR 230	75 AT 10	75	0.435

Tab. 74

Belt length (mm) = 2 x L - 100



Load capacity

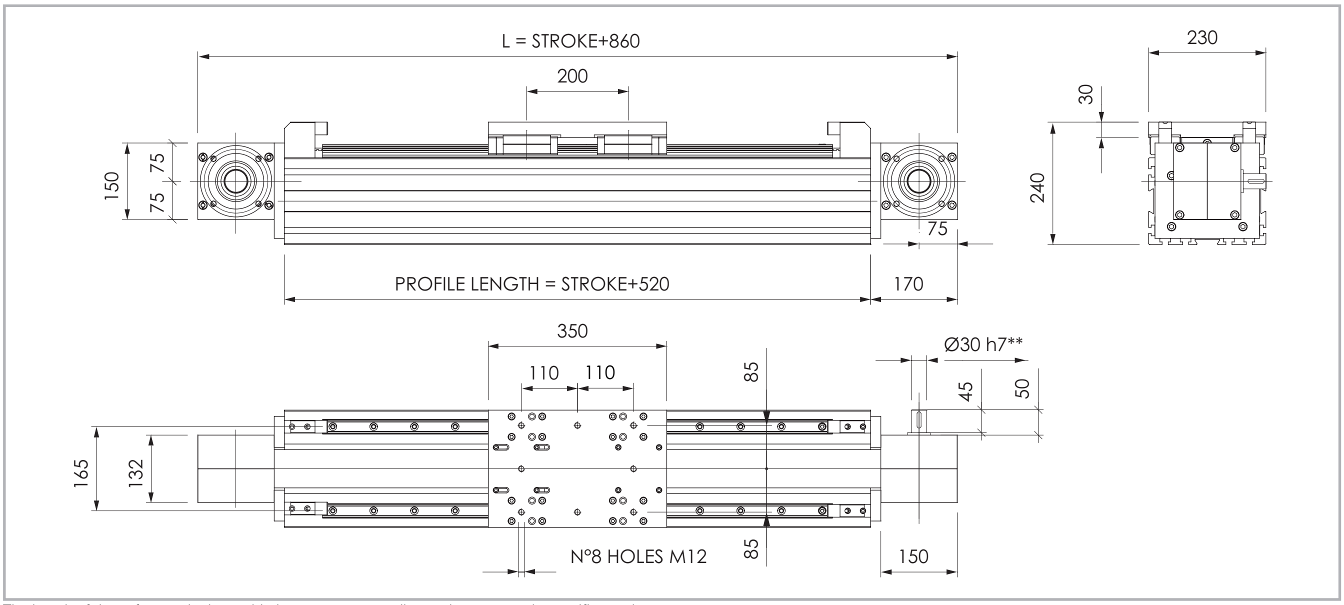
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
TCR 230	7470	5220	14142	65928	14142	1626	2121	2121

See verification under static load and lifetime on page SL-2 and SL-3

Tab. 75

TCS 230

TCS 230 Dimension



The length of the safety stroke is provided on request according to the customer's specific requirements.
** Output shaft is the only option available

Fig.31

Technical data

	Type
	TCS 230
Max. useful stroke length [mm]	11480
Max. positioning repeatability [mm]*1	± 0.1
Max. speed [m/s]	5
Max. acceleration [m/s²]	50
Type of belt	75 AT 10
Type of pulley	Z 40
Pulley pitch diameter [mm]	127.32
Carriage displacement per pulley turn [mm]	400
Carriage weight [kg]	10.5
Zero travel weight [kg]	43.5
Weight for 100 mm useful stroke [kg]	3.7
Starting torque [Nm]	11.5
Moment of inertia of pulleys [g mm²]	12020635
Rail size [mm]	30

*1) Positioning repeatability is dependent on the type of transmission used

Tab. 76

Moments of inertia of the aluminum body

Type	I_x [10^7 mm^4]	I_y [10^7 mm^4]	I_p [10^7 mm^4]
TCS 230	6.501	3.778	1.028

Tab. 77

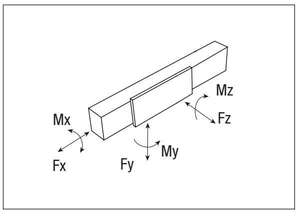
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight per meter [kg/m]
TCS 230	75 AT 10	75	0.435

Tab. 48

Belt length (mm) = 2 x L - 50



Load capacity

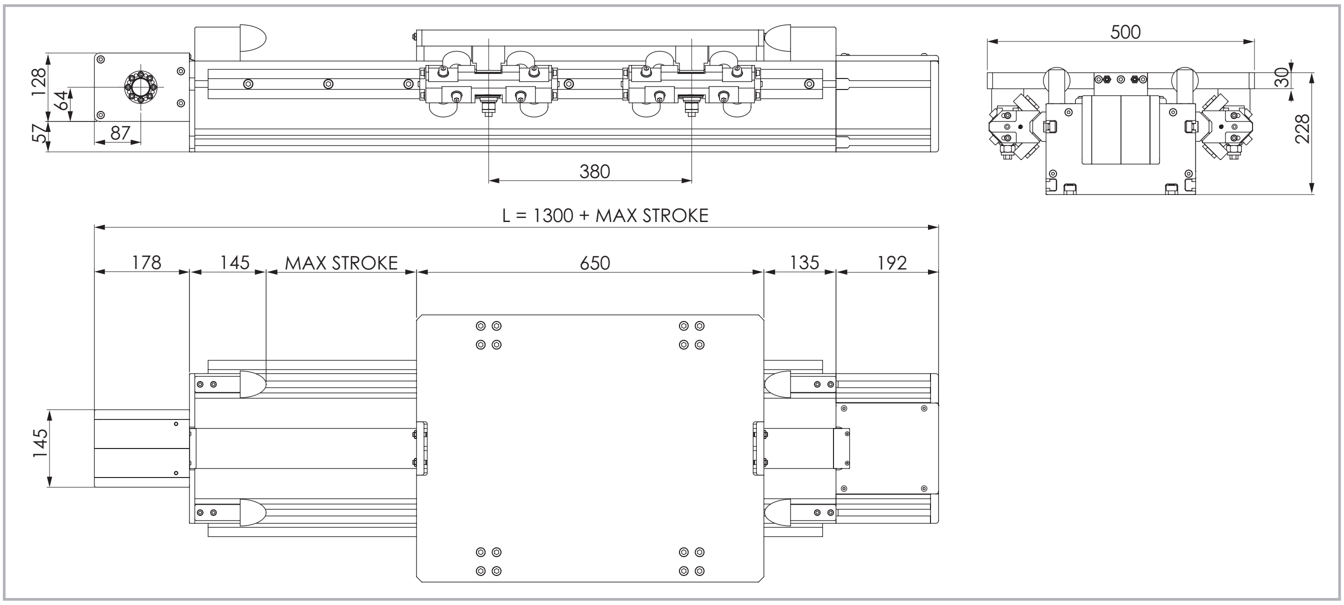
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
TCS 230	7470	5220	355200	172074	355200	29304	35520	35520

See verification under static load and lifetime on page SL-2 and SL-3

Tab. 79

TCR 280

TCR 280 Dimension



The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig. 32

Technical data

	Type TCR 280
Max. useful stroke length [mm]	11070
Max. positioning repeatability [mm]*1	± 0.1
Max. speed [m/s]	5
Max. acceleration [m/s²]	20
Type of belt	75 AT 10 HP
Type of pulley	Z 30
Pulley pitch diameter [mm]	95.49
Carriage displacement per pulley turn [mm]	300
Carriage weight [kg]	47.3
Zero travel weight [kg]	126.1
Weight for 100 mm useful stroke [kg]	4.8
Starting torque [Nm]	8.5
Moment of inertia of pulleys [g mm²]	9829829
Rail size [mm]	55x25

*1) Positioning repeatability is dependent on the type of transmission used

Tab. 80

Moments of inertia of the aluminum body

Type	I_x [10^7 mm^4]	I_y [10^7 mm^4]	I_p [10^7 mm^4]
TCR 280	12.646	4.829	17.475

Tab. 81

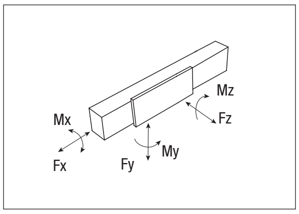
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight per meter [kg/m]
TCR 280	75 AT 10 HP	75	0.435

Tab. 82

Belt length (mm) = 2 x L - 420



Load capacity

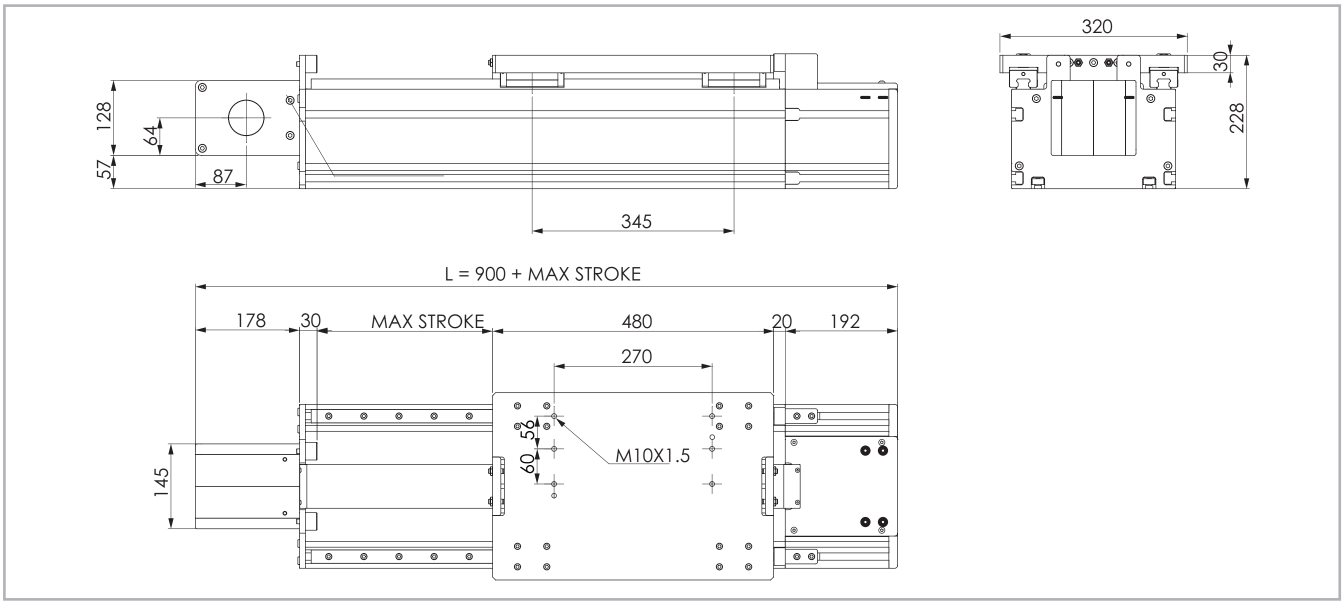
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
TCR 280	7470	4950	24042	112593	24042	3366	4568	4568

See verification under static load and lifetime on page SL-2 and SL-3

Tab. 83

TCS 280

TCS 280 Dimension



The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig. 33

Technical data

	Type
	TCS 280
Max. useful stroke length [mm]	11470
Max. positioning repeatability [mm]*1	± 0.1
Max. speed [m/s]	5
Max. acceleration [m/s²]	50
Type of belt	75 AT 10 HP
Type of pulley	Z 30
Pulley pitch diameter [mm]	95.49
Carriage displacement per pulley turn [mm]	300
Carriage weight [kg]	18
Zero travel weight [kg]	65.1
Weight for 100 mm useful stroke [kg]	4.6
Starting torque [Nm]	8.3
Moment of inertia of pulleys [g mm²]	9829829
Rail size [mm]	25

*1) Positioning repeatability is dependent on the type of transmission used

Tab. 84

Moments of inertia of the aluminum body

Type	I_x [10^7 mm⁴]	I_y [10^7 mm⁴]	I_p [10^7 mm⁴]
TCS 280	12.646	4.829	17.475

Tab. 85

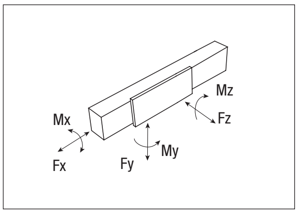
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight per meter [kg/m]
TCS 280	75 AT 10 HP	75	0.435

Tab. 86

Belt length (mm) = 2 x L - 250



Load capacity

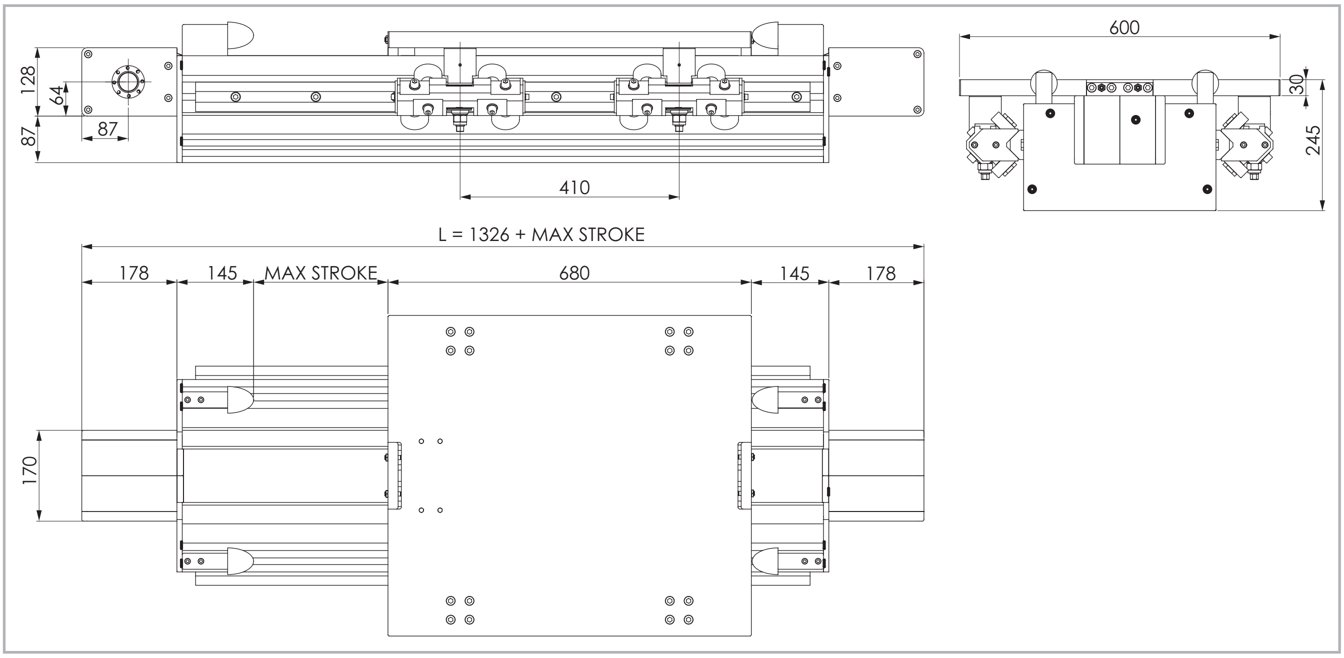
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
TCS 280	7470	4950	258800	116833	258800	31056	46584	46584

See verification under static load and lifetime on page SL-2 and SL-3

Tab. 87

TCR 360

TCR 360 Dimension



The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig. 34

Technical data

	Type
	TCR 360
Max. useful stroke length [mm]	11030
Max. positioning repeatability [mm]*1	± 0.1
Max. speed [m/s]	5
Max. acceleration [m/s²]	10
Type of belt	100 AT 10 HP
Type of pulley	Z 30
Pulley pitch diameter [mm]	95.49
Carriage displacement per pulley turn [mm]	300
Carriage weight [kg]	56.3
Zero travel weight [kg]	163
Weight for 100 mm useful stroke [kg]	6.8
Starting torque [Nm]	8.5
Moment of inertia of pulleys [g mm²]	14085272
Rail size [mm]	55x25

*1) Positioning repeatability is dependent on the type of transmission used

Tab. 88

Moments of inertia of the aluminum body

Type	I_x [10^7 mm^4]	I_y [10^7 mm^4]	I_p [10^7 mm^4]
TCR 360	31.721	10.329	42.05

Tab. 89

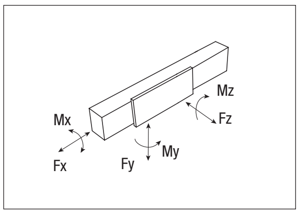
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight per meter [kg/m]
TCR 360	100 AT 10 HP	100	0.58

Tab. 90

Belt length (mm) = 2 x L - 460



Load capacity

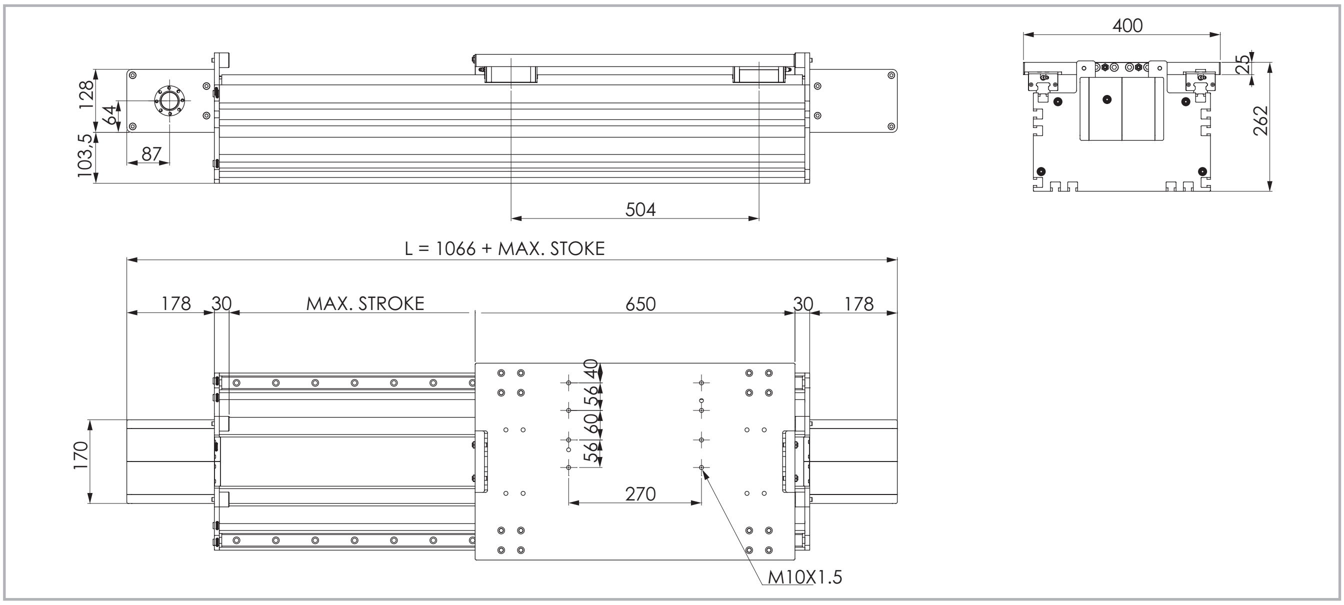
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn.	Stat.	Stat.	Stat.	Stat.
TCR 360	9960	6600	24042	112593	24042	4327	4929	4929

See verification under static load and lifetime on page SL-2 and SL-3

Tab. 91

TCS 360

TCS 360 Dimension



The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig. 35

Technical data

	Type
	TCS 360
Max. useful stroke length [mm]	11290
Max. positioning repeatability [mm]*1	± 0.1
Max. speed [m/s]	5
Max. acceleration [m/s²]	50
Type of belt	100 AT 10 HP
Type of pulley	Z 30
Pulley pitch diameter [mm]	95.49
Carriage displacement per pulley turn [mm]	300
Carriage weight [kg]	25.2
Zero travel weight [kg]	104.6
Weight for 100 mm useful stroke [kg]	6.9
Starting torque [Nm]	8.3
Moment of inertia of pulleys [g mm²]	14085272
Rail size [mm]	30

*1) Positioning repeatability is dependent on the type of transmission used

Tab. 92

Moments of inertia of the aluminum body

Type	I_x [10^7 mm^4]	I_y [10^7 mm^4]	I_p [10^7 mm^4]
TCS 360	31.721	10.329	42.05

Tab. 93

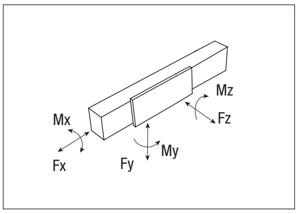
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight per meter [kg/m]
TCS 360	100 AT 10 HP	100	0.580

Tab. 94

Belt length (mm) = 2 x L - 430



Load capacity

Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
TCS 360	9960	6600	266400	142231	266400	42624	61272	61272

See verification under static load and lifetime on page SL-2 and SL-3

Tab. 95

Lubrication

TCS linear units with ball bearing guides

TCS Linear units are equipped with ball bearing carriage fitted with a retention cage that eliminates "steel-steel" contact between adjacent revolving parts and prevents misalignment. Lubrication interval between maintenance every 2000 Km or 1 year of use, based on the value reached first.

If a long service life is required or in case of high dynamic or high loaded applications please contact our offices for further verification.

TCS

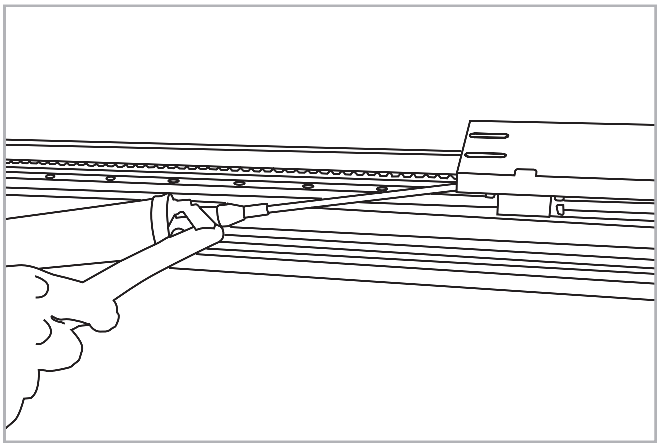


Fig. 36

- Insert the tip of the grease gun into the specific grease blocks.
- Type of lubricant: Lithium soap grease of class NLGI 2.
- For specially stressed applications or hostile environmental conditions, lubrication should be applied out more frequently.
  Contact Rollon for further advice

Quantity of lubricant necessary for re-lubrication of each block:

Type	Quantity of Grease [cm^3]
TCS 140	1.4
TCS 170	1.4
TCS 200	1.4
TCS 220	2.4
TCS 230	4.2
TCS 280	2.4
TCS 360	3.2

Tab. 96

TCR linear units with roller guides

Roller slides are provided with a self- lubrication system for a long lubrication interval. For applications on plants with a high number of daily cycles, or with a significant build-up of impurities, please check the need for lubrication, seals and additional tanks with our technical dept. Do not use solvents to clean rollers or roller slides, as you could unintentionally remove the grease lubricating coat applied to the rolling elements during assembly. Use lithium soap based mineral grease according to DIN 51825 - K3N.

Guide rails do not require excessive lubrication, which would attract impurities and have negative consequences. Should there be any surface defects on the guide rails and/or on the rolling parts, such as pitting or erosion, this might be indicative of an excessive loading. In this case, all worn parts must be replaced and the load geometry and alignment checked.

Accessories

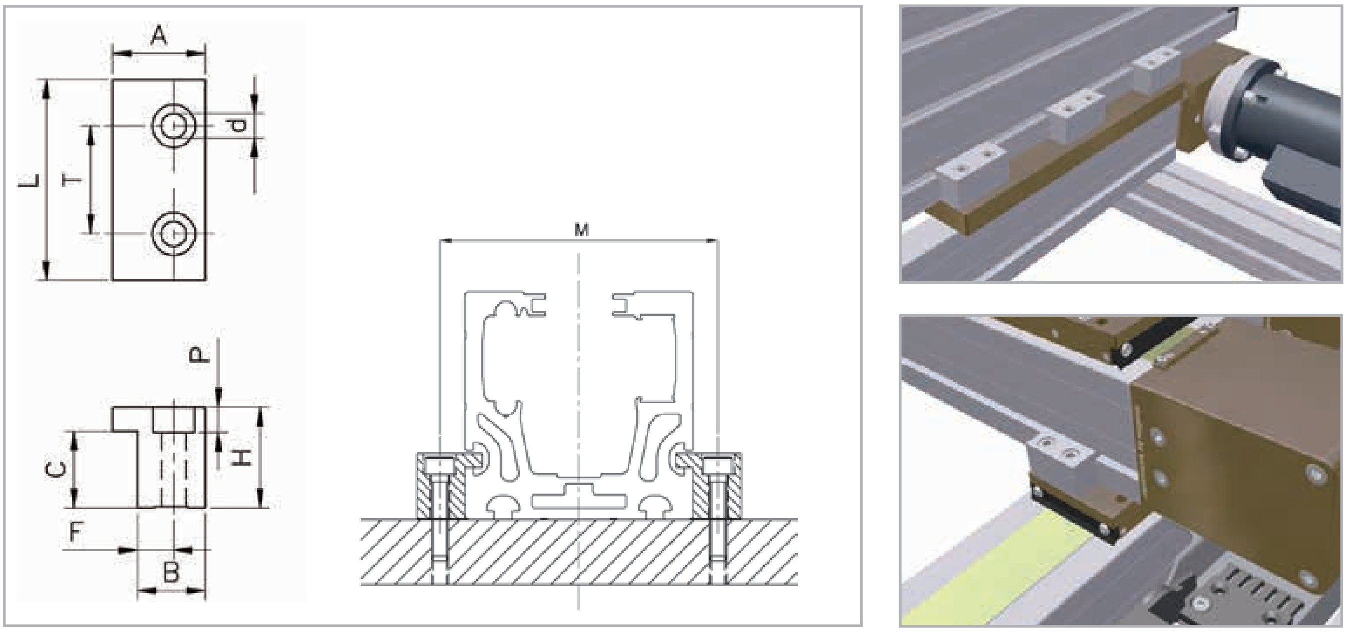


Fig.37

Material: aluminum alloy 6082

Unit	bxh	A	L	T	d	H	P	C	F	B	M	Code
TCR/TCS 170	120x170										198	
TCR/TCS 200	120x200	30	90	50	11	40	11	28.3	14	25	228	415.0762
TCR/TCS 220	120x220										248	
TCR/TCS 280	170x280	30	90	50	11	20	11	11.3	14	25	308	415.0763
TCR/TCS 280 Vert.	280x170	30	90	50	11	20	11	13.5	14	25	198	915.1174

Tab. 97

Semi-rounded threaded inserts with spring

Threaded plate for base profile 45, 50 and 60. Material: galvanised steel.

Important: to be inserted through the longitudinal slots before assembling.

Suitable for series:

TC 170-180-200-220-360

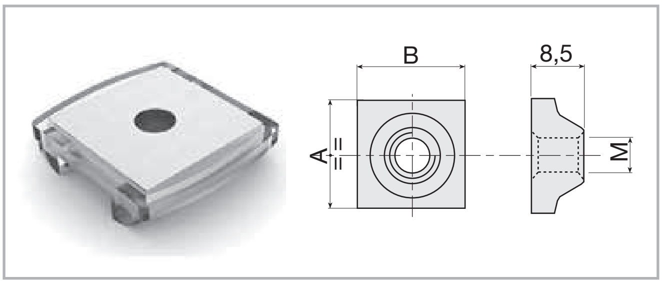


Fig. 38

Thread	AxB	
	18x18	20x20
M4	209.0031	209.0023
M5	209.0032	209.0019
M6	209.033	209.1202
M8	209.0034	209.0467

Tab. 98

Plastic compound spring for vertical positioning of insert.

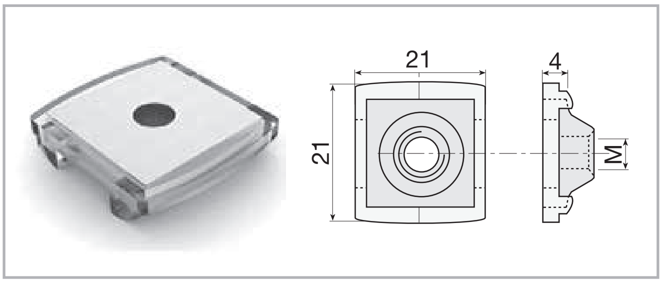


Fig. 39

Spring	Code
Suitable for all inserts 18x18	101.0732

Tab. 99

Assembly brackets

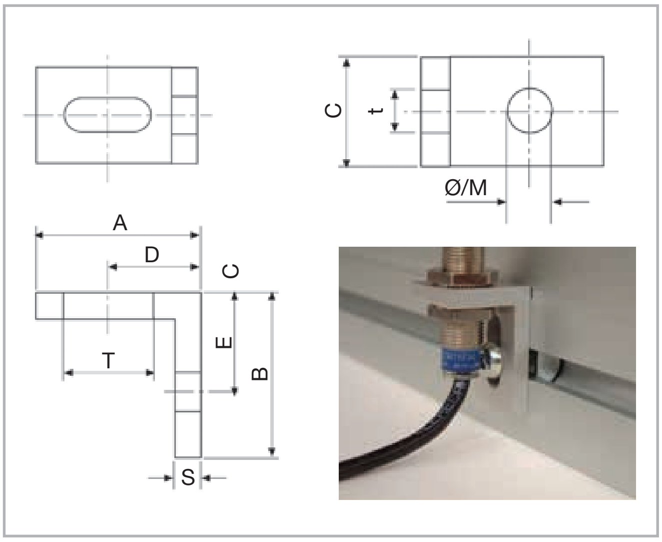


Fig. 40

Material: natural, anodized anticorodal alloy.

Thread								Code	
A	B	C	D	E	S	Txt	Ø/M	Ø	M
45	45	20	25	25	5	20X6.5	6	A30-76	A 30-86
35	25	20	19	15	5	20X6.5	4	A30-54	A30-64
35	25	20	19	15	5	20X6.5	5	A30-55	A30-65
35	25	20	19	15	5	20X6.5	6	A30-56	A30-66
25	25	15	14	15	4	13.5X5.5	3	B30-53	B30-63
25	25	14	14	15	4	13.5X5.5	4	B30-54	B30-64
25	25	15	14	15	4	13.5X5.5	5	B30-55	B30-65
25	25	15	14	15	4	13.5X5.5	6	B30-56	B30-66

Suitable for all the modules

Tab. 100

M = Threaded version

Ø = Passing trough hole version

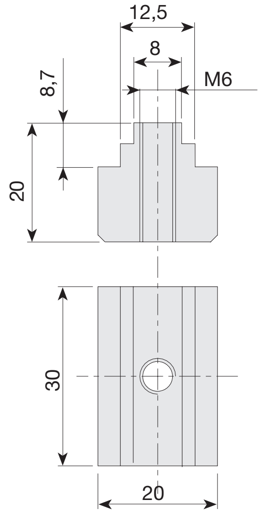
Alignment nuts

Nuts for steel guide rails

Material: galvanised steel.

Code 209.1855

Alignment nuts.
V-shaped guide rail: 35x16
Profile with slot. 12.5 mm.
Series: **TC 170-200-220-280-360**



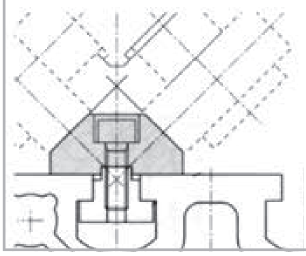


Fig. 41

Alignment nut for slot 12.5 mm

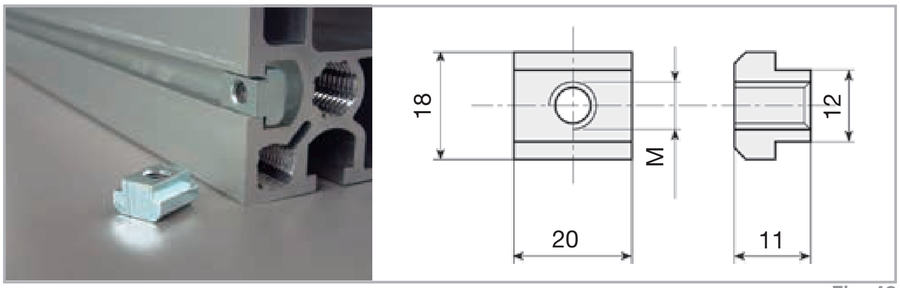


Fig. 42

Material: galvanised steel. Suitable for series: **TC 170-200-280-360**

Thread	Code
M5	215.1768
M6	215.1769
M8	215.1770
M10	215.2124

Tab. 101

Alignment nut for slot 12.5 mm front insertable

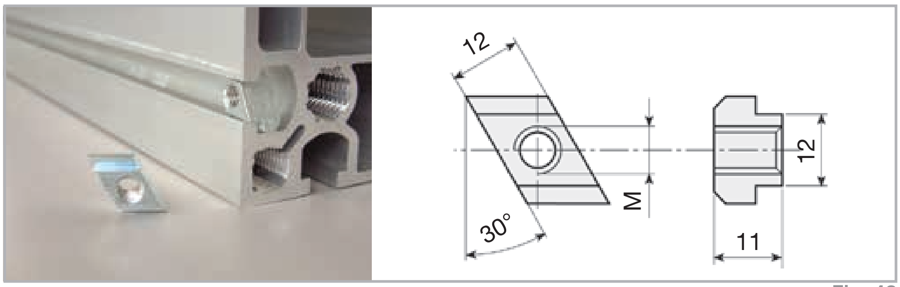


Fig. 43

Material: galvanised steel. Suitable for series: **TC 170-200-280-360**

Thread	Code
M5	215.1771
M6	215.1772
M8	215.1773
M10	215.2125

Tab. 102

Threaded nuts and plates

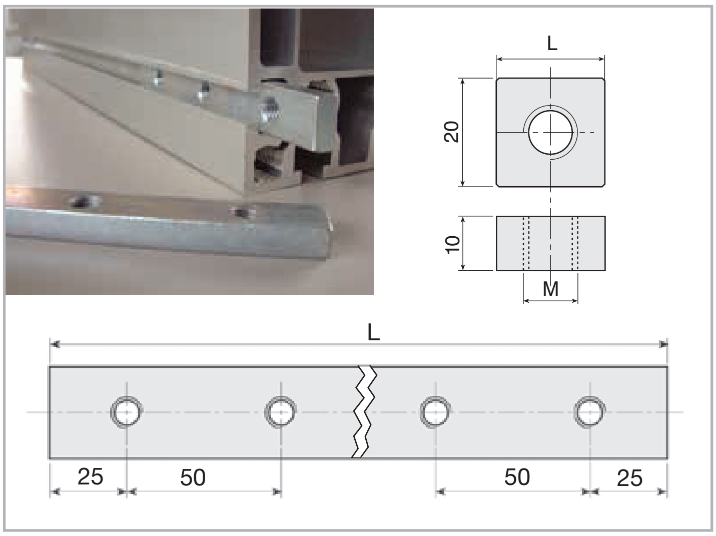


Fig. 44

M12 (CH19) hexagonal-head screws can be used as stud bolts in profiles with 12.5 mm slots.

Material: galvanised steel. Suitable for series: **TC 170-200-220-280-360**

Thread	Threaded holes	L	Code
M10	1	40	215.0477
M12	1	40	209.1281
M10	1	20	209.1277
M10	2*	80	209.1776
M10	3*	150	209.1777
M10	4*	200	209.1778
M10	5*	250	209.1779
M10	6*	300	209.1780
M10	7*	350	209.1781

* Hole centre-distance: 50 mm.

Tab. 103

Ordering key

Identification codes for the TCR/TCS series

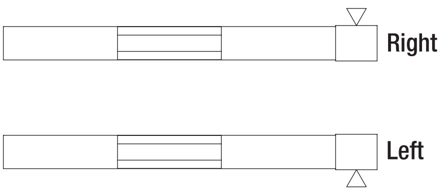
TCR	14	1A	02000	1A	D	1000
TCS	14=140 17=170 20=200 22=220 23=230 28=280 36=360					

Code	Description
1000	Center distance
D	Multiple carriages
1A	Carriage option
02000	L=Total length of the unit
1A	Driving head code
14	Linear unit size *see from pg. ML-20 to pg. ML-33*
TCR	TCR/TCS Series *see pg. ML-17*

In order to create identification codes for Actuator Line, you can visit: **http://configureactuator.rollon.com**

Configure Actuator

Left / right orientation



ZCR/ZCH series

ZCR/ZCH series description

Fig. 45

The ZCR/ZCH series linear units are designed to meet the vertical motion requirements in gantry applications or where the aluminum profile must be moving and the carriage must be fixed. The self-supporting extruded and anodized aluminum structure is available in different sizes from 60 to 220 mm. Being a rigid system, it is ideal for a "Z" axis in a 3-axis system. In addition, the ZCR/ZCH series has been specifically designed and configured to be easily assembled with the R-SMART, TCR/TCS series and ROBOT series.

ZCR

Features a dual Prismatic Rail system.

ZCH

Features a dual recirculating ball guide system.

The components

Extruded profile

The anodized aluminum extrusions used for the bodies of the Rollon ZCR/ZCH series linear units were designed and manufactured in cooperation with a leading company in this field, to obtain the right combination of high mechanical strength and reduced weight. The anodized aluminum alloy 6060 used (see physical chemical characteristics below) was extruded with dimensional tolerances complying with EN 755-9 standards.

Driving belt

The Rollon ZCR/ZCH series linear units use steel reinforced polyurethane drive belts with AT pitch. This belt is ideal due to its high load transmission characteristics, compact size and low noise. Used in conjunction with a backlash-free pulley, smooth alternating motion can be achieved. Optimization of the maximum belt width/body dimension ratio enables the following performance characteristics to be achieved:

- **High speed**
- **Low noise**
- **Low wear**

Carriage

The carriage of the Rollon ZCR/ZCH series linear units is made entirely of anodized aluminum. The dimensions vary depending on the type.

General data about aluminum used: AL 6060

Chemical composition [%]

Al	Mg	Si	Fe	Mn	Zn	Cu	Impurites
Remaining	0.35-0.60	0.30-0.60	0.30	0.10	0.10	0.10	0.05-0.15

Tab. 104

Physical characteristics

Density	Coeff. of elasticity	Coeff. of thermal expansion (20°-100°C)	Thermal conductivity (20°C)	Specific heat (0°-100°C)	Resistivity	Melting point
$\frac{kg}{dm^3}$	$\frac{kN}{mm^2}$	$\frac{10^{-6}}{K}$	$\frac{W}{m \cdot K}$	$\frac{J}{kg \cdot K}$	$\Omega \cdot m \cdot 10^{-9}$	°C
2.7	70	23.8	200	880-900	33	600-655

Tab. 105

Mechanical characteristics

Rm	Rp (02)	A	HB
$\frac{N}{mm^2}$	$\frac{N}{mm^2}$	%	—
250	200	10	75

Tab. 106

The linear motion system

The linear motion system has been designed to meet the load capacity, speed, and maximum acceleration conditions of a wide variety of applications.

ZCR with Prismatic Rail:

Prismatic Rails are made of specially treated high-carbon steel and provided with a permanent lubrication system. Thanks to this kind of solution ZCR is specifically dedicated for dirty environments and high dynamics in automation.

- The Prismatic Rails with high load capacity are mounted in a dedicated seat on the aluminum body.
- The carriage is assembled with preload, that enables to withstand loading in the four main directions.
- Hardened and ground steel guide rails.
- Sliders have felts for self-lubrication.

The linear motion system described above offers:

- Suitable for dirty environments
- High speed and acceleration
- Maintenance free
- High load capacity
- Low friction
- Long life
- Low noise

ZCH with recirculating ball guides:

- The ball bearing guides with high load capacity are mounted in a dedicated seat on the aluminum body.
- The carriage is assembled on preloaded ball bearing blocks that allow to withstand loading in the four main directions.
- The ball bearing carriages are also fitted with a retention cage that eliminates "steel-steel" contact between adjacent revolving parts and prevents misalignment.
- The blocks have seals on both sides.

The linear motion system described above offers:

- High permissible bending moments
- High accuracy of the movement
- High speed and acceleration
- High load capacity
- High rigidity
- Low friction
- Long life
- Low noise

ZCR section

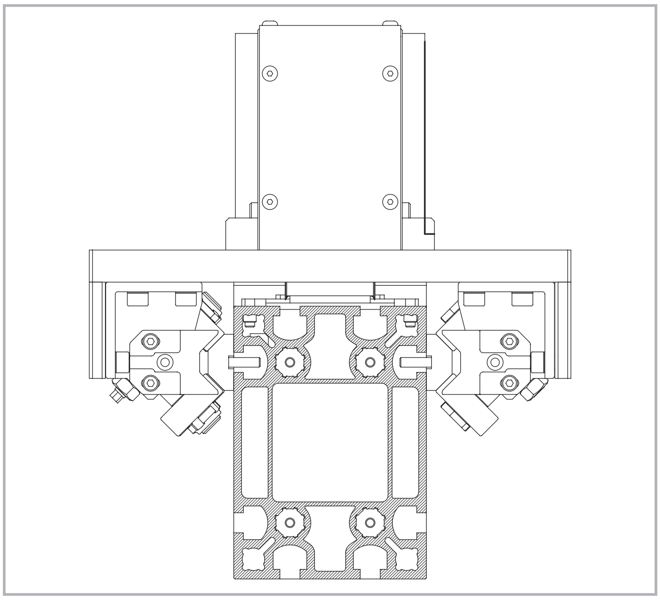


Fig. 46

ZCH section

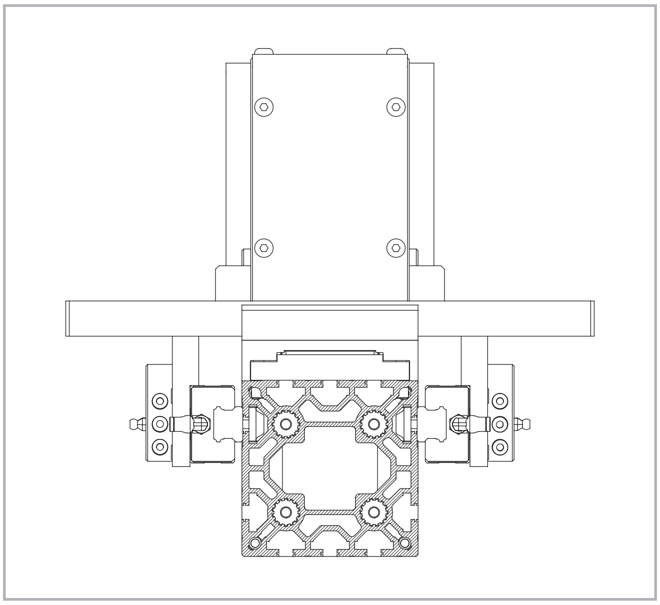
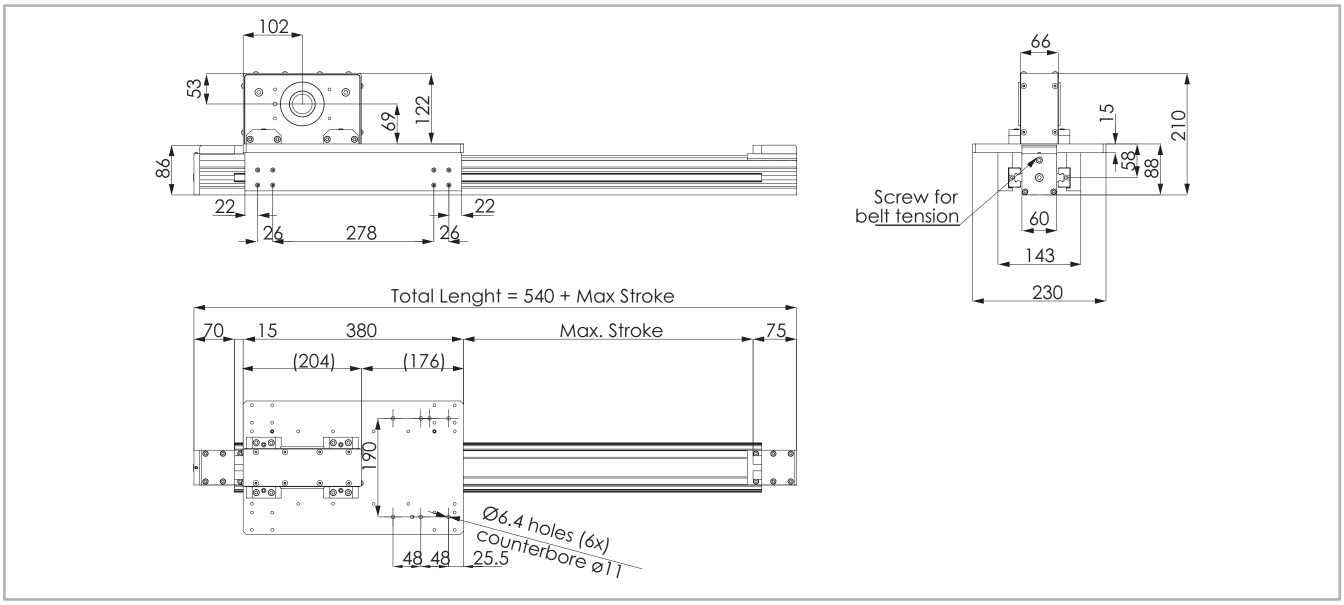


Fig. 47

ZCH 60

ZCH 60 Dimension



The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig.48

Technical data

	Type
	ZCH 60
Max. useful stroke length [mm]	1500
Max. positioning repeatability [mm]*1	± 0.1
Max. speed [m/s]	4
Max. acceleration [m/s²]	40
Type of belt	32 AT 10 HF
Type of pulley	Z 22
Pulley pitch diameter [mm]	70.03
Carriage displacement per pulley turn [mm]	220
Carriage weight [kg]	11.1
Zero travel weight [kg]	15.8
Weight for 100 mm useful stroke [kg]	0.8
Starting torque [Nm]	1.8
Rail size [mm]	15

*1) Positioning repeatability is dependent on the type of transmission used

Tab. 107

Moments of inertia of the aluminum body

Type	I_x [10^7 mm^4]	I_y [10^7 mm^4]	I_p [10^7 mm^4]
ZCH 60	0.043	0.043	0.086

Tab. 108

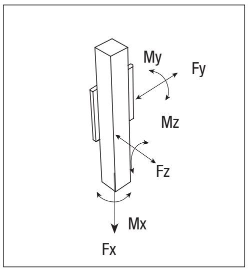
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight per meter [kg/m]
ZCH 60	32 AT 10 HF	32	0.185

Tab. 109

Belt length (mm) = L + 190



Load capacity

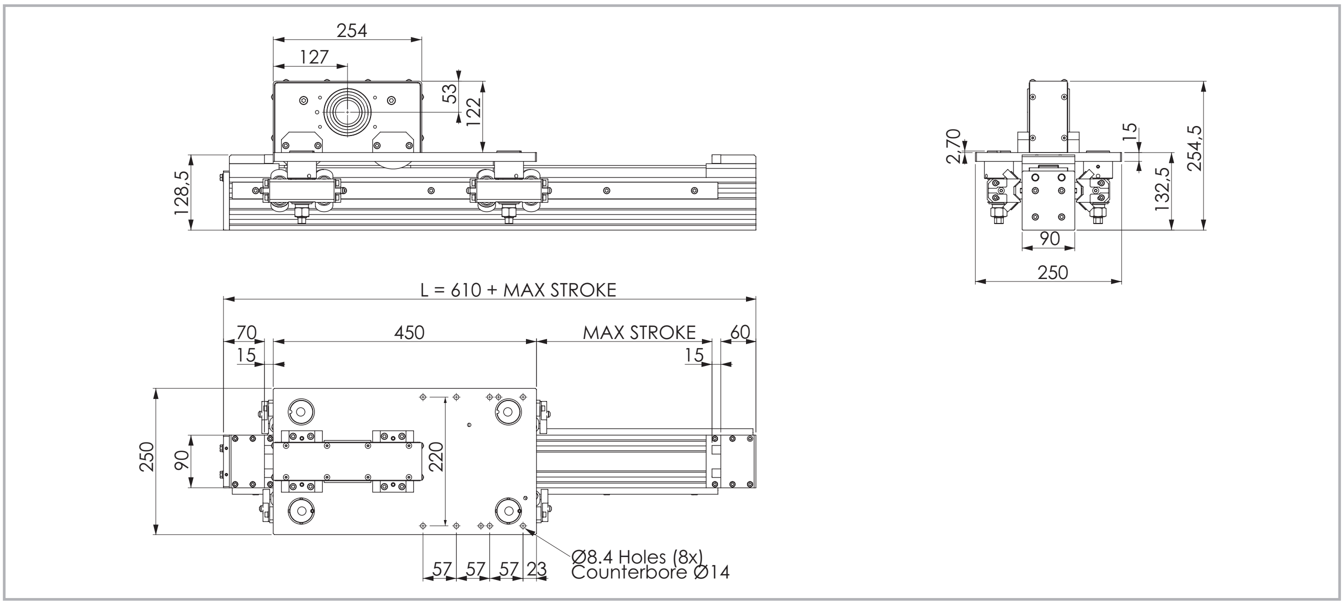
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
ZCH 60	2656	1760	61120	39780	61120	2216	7946	7946

See verification under static load and lifetime on page SL-2 and SL-3

Tab. 110

ZCR 90

ZCR 90 Dimension



The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig. 49

Technical data

	Type
	ZCR 90
Max. useful stroke length [mm]	2000
Max. positioning repeatability [mm]*1	± 0.1
Max. speed [m/s]	4
Max. acceleration [m/s²]	25
Type of belt	32 AT 10 HF
Type of pulley	Z 22
Pulley pitch diameter [mm]	70.03
Carriage displacement per pulley turn [mm]	220
Carriage weight [kg]	11.6
Zero travel weight [kg]	19.4
Weight for 100 mm useful stroke [kg]	1
Starting torque [Nm]	1.8
Rail size [mm]	28.6x11

*1) Positioning repeatability is dependent on the type of transmission used

Tab. 111

Moments of inertia of the aluminum body

Type	I_x $[10^7\ mm^4]$	I_y $[10^7\ mm^4]$	I_p $[10^7\ mm^4]$
ZCR 90	0.197	0.195	0.392

Tab. 112

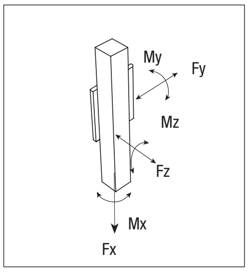
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight per meter [kg/m]
ZCR 90	32 AT 10 HF	32	0.185

Tab. 113

Belt length (mm) = L + 190



Load capacity

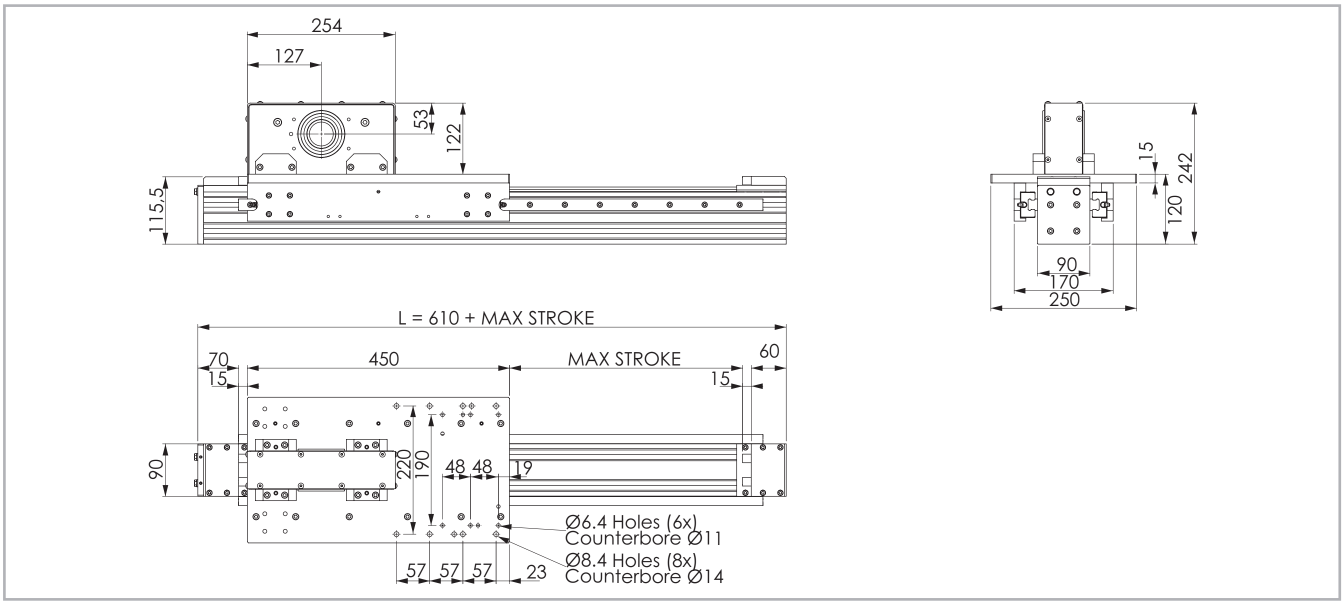
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn.	Stat.	Stat.	Stat.	Stat.
ZCR 90	2656	1760	7637	28286	7637	344	1298	1298

See verification under static load and lifetime on page SL-2 and SL-3

Tab. 114

ZCH 90

ZCH 90 Dimension



The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig. 50

Technical data

	Type
	ZCH 90
Max. useful stroke length [mm]	2000
Max. positioning repeatability [mm]*1	± 0.1
Max. speed [m/s]	4
Max. acceleration [m/s²]	20
Type of belt	32 AT 10 HF
Type of pulley	Z 22
Pulley pitch diameter [mm]	70.03
Carriage displacement per pulley turn [mm]	220
Carriage weight [kg]	12.8
Zero travel weight [kg]	20.6
Weight for 100 mm useful stroke [kg]	1.3
Starting torque [Nm]	1.8
Rail size [mm]	20

*1) Positioning repeatability is dependent on the type of transmission used

Tab. 115

Moments of inertia of the aluminum body

Type	I_x [10^7 mm^4]	I_y [10^7 mm^4]	I_p [10^7 mm^4]
ZCH 90	0.197	0.195	0.392

Tab. 116

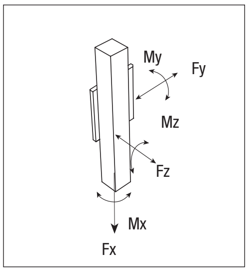
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight per meter [kg/m]
ZCH 90	32 AT 10 HF	32	0.185

Tab. 117

Belt length (mm) = L + 190



Load capacity

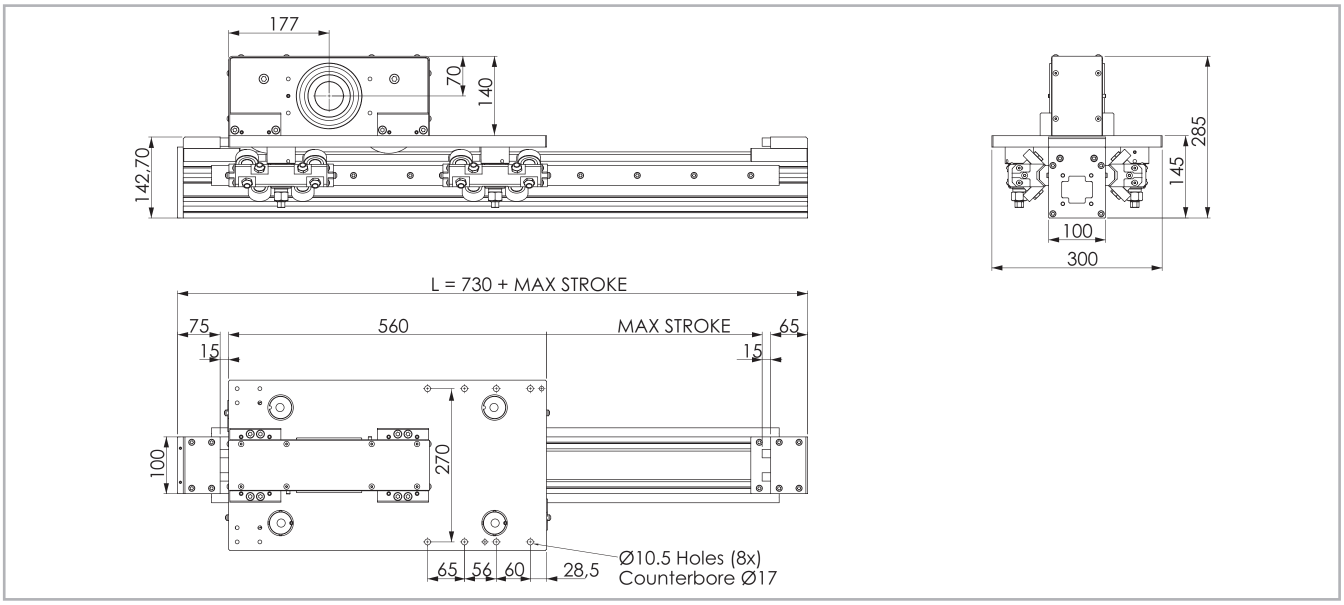
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
ZCH 90	2656	1760	102520	73274	102520	5510	14865	14865

See verification under static load and lifetime on page SL-2 and SL-3

Tab. 118

ZCR 100

ZCR 100 Dimension



The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig. 51

Technical data

	Type
	ZCR 100
Max. useful stroke length [mm]	2100
Max. positioning repeatability [mm]*1	± 0.1
Max. speed [m/s]	4
Max. acceleration [m/s²]	25
Type of belt	50 AT 10 HPF
Type of pulley	Z 30
Pulley pitch diameter [mm]	95.49
Carriage displacement per pulley turn [mm]	300
Carriage weight [kg]	27.6
Zero travel weight [kg]	41
Weight for 100 mm useful stroke [kg]	1.3
Starting torque [Nm]	4.5
Rail size [mm]	35x16

*1) Positioning repeatability is dependent on the type of transmission used

Tab. 119

Moments of inertia of the aluminum body

Type	I_x [10^7 mm^4]	I_y [10^7 mm^4]	I_p [10^7 mm^4]
ZCR 100	0.364	0.346	0.709

Tab. 120

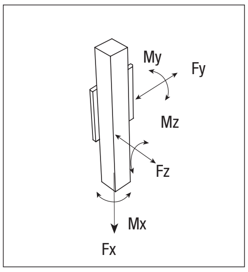
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight per meter [kg/m]
ZCR 100	50 AT 10 HPF	50	0.290

Tab. 121

Belt length (mm) = L + 250



Load capacity

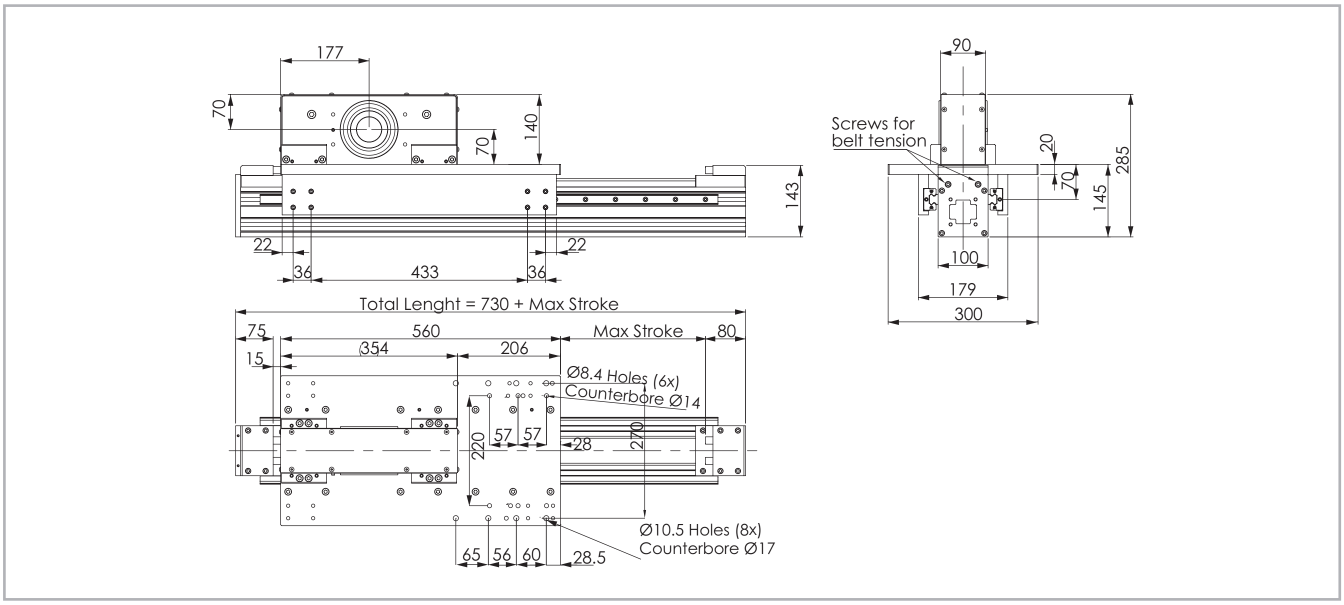
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
ZCR 100	4980	3480	14142	65298	14142	707	2666	2666

See verification under static load and lifetime on page SL-2 and SL-3

Tab. 122

ZCH 100

ZCH 100 Dimension



The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig. 52

Technical data

	Type
	ZCH 100
Max. useful stroke length [mm]	2100
Max. positioning repeatability [mm]*1	± 0.1
Max. speed [m/s]	4
Max. acceleration [m/s²]	25
Type of belt	50 AT 10 HPF
Type of pulley	Z 30
Pulley pitch diameter [mm]	95.49
Carriage displacement per pulley turn [mm]	300
Carriage weight [kg]	25.1
Zero travel weight [kg]	37.4
Weight for 100 mm useful stroke [kg]	1.5
Starting torque [Nm]	4.5
Rail size [mm]	20

*1) Positioning repeatability is dependent on the type of transmission used

Tab. 123

Moments of inertia of the aluminum body

Type	I_x [10^7 mm^4]	I_y [10^7 mm^4]	I_p [10^7 mm^4]
ZCH 100	0.364	0.346	0.709

Tab. 124

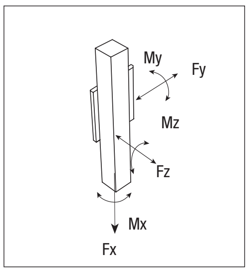
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight per meter [kg/m]
ZCH 100	50 AT 10 HPF	50	0.290

Tab. 125

Belt length (mm) = L + 250



Load capacity

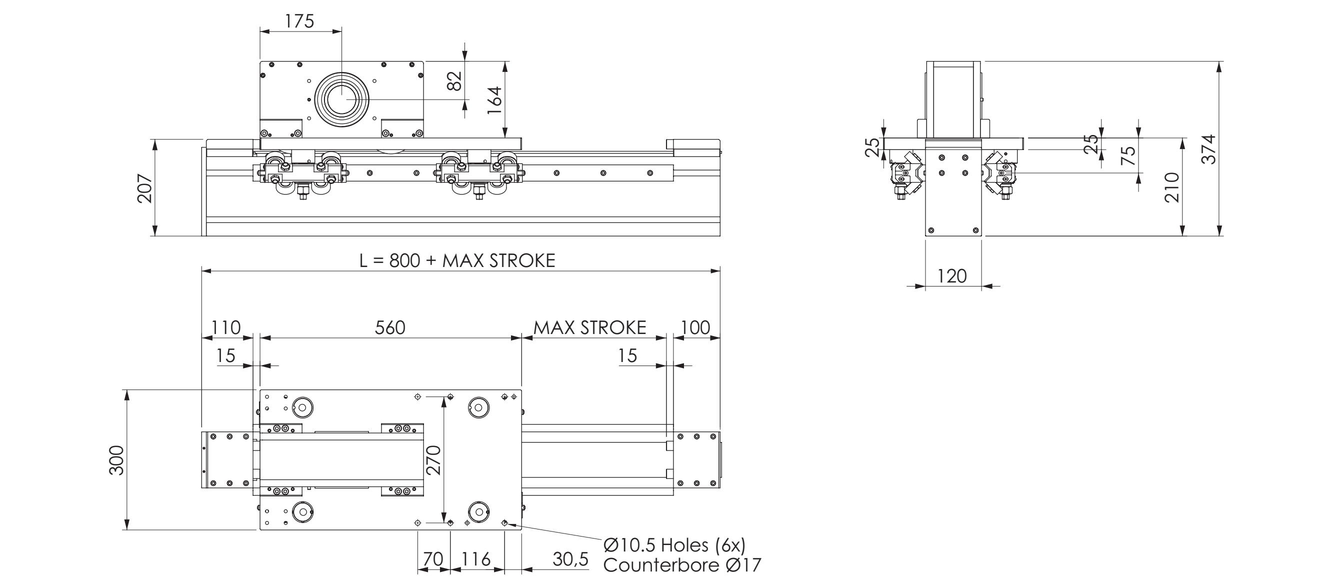
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
ZCH 100	4980	3480	102520	73274	102520	6023	22503	22503

See verification under static load and lifetime on page SL-2 and SL-3

Tab. 126

ZCR 170

ZCR 170 Dimension



The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig. 53

Technical data

	Type
	ZCR 170
Max. useful stroke length [mm]	2500
Max. positioning repeatability [mm]*1	± 0.1
Max. speed [m/s]	4
Max. acceleration [m/s²]	25
Type of belt	75 AT 10 HPF
Type of pulley	Z 30
Pulley pitch diameter [mm]	95.49
Carriage displacement per pulley turn [mm]	300
Carriage weight [kg]	32.5
Zero travel weight [kg]	55.4
Weight for 100 mm useful stroke [kg]	2.6
Starting torque [Nm]	7.8
Rail size [mm]	35x16

*1) Positioning repeatability is dependent on the type of transmission used

Tab. 127

Moments of inertia of the aluminum body

Type	I_x [10^7 mm^4]	I_y [10^7 mm^4]	I_p [10^7 mm^4]
ZCR 170	1.973	0.984	2.957

Tab. 128

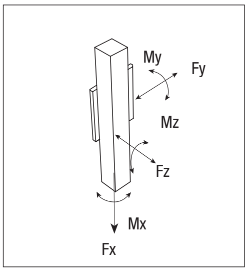
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight per meter [kg/m]
ZCR 170	75 AT 10 HPF	75	0.435

Tab. 129

Belt length (mm) = L + 280



Load capacity

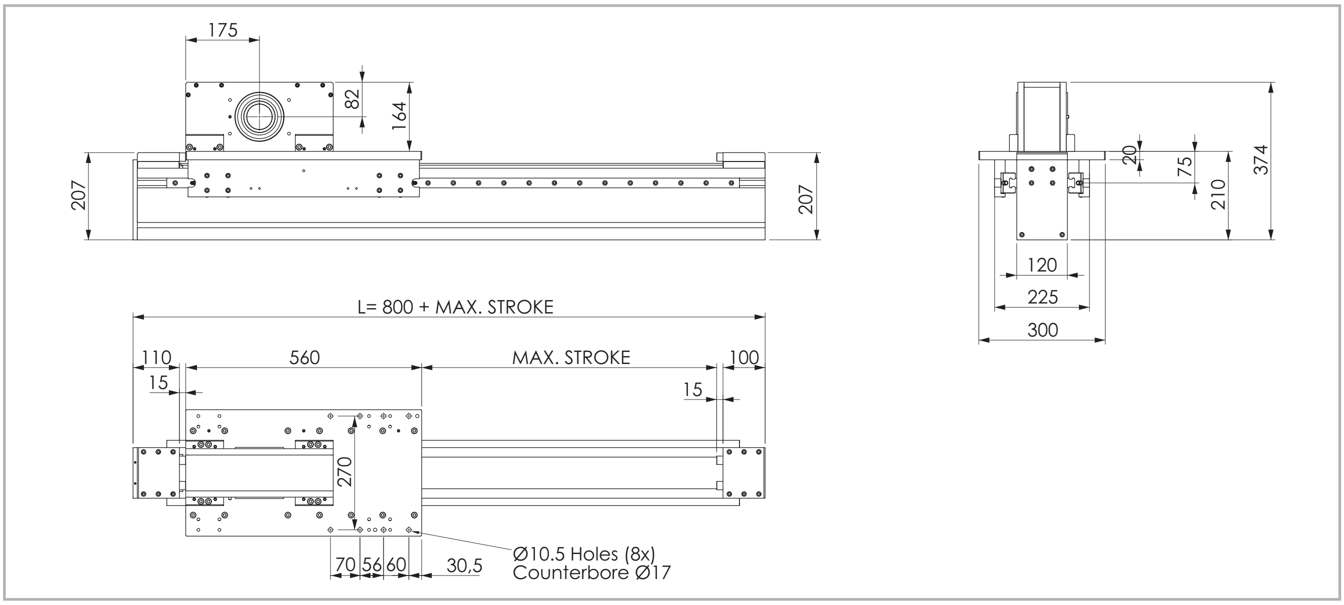
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
ZCR 170	7470	5220	14142	65298	14142	849	2666	2666

See verification under static load and lifetime on page SL-2 and SL-3

Tab. 136

ZCH 170

ZCH 170 Dimension



The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig.54

Technical data

	Type
	ZCH 170
Max. useful stroke length [mm]	2500
Max. positioning repeatability [mm]*1	± 0.1
Max. speed [m/s]	4
Max. acceleration [m/s²]	25
Type of belt	75 AT 10 HPF
Type of pulley	Z 30
Pulley pitch diameter [mm]	95.49
Carriage displacement per pulley turn [mm]	300
Carriage weight [kg]	34.4
Zero travel weight [kg]	53.7
Weight for 100 mm useful stroke [kg]	2.5
Starting torque [Nm]	7.8
Rail size [mm]	25

*1) Positioning repeatability is dependent on the type of transmission used

Tab. 130

Moments of inertia of the aluminum body

Type	I_x [10^7 mm⁴]	I_y [10^7 mm⁴]	I_p [10^7 mm⁴]
ZCH 170	1.973	0.984	2.957

Tab. 131

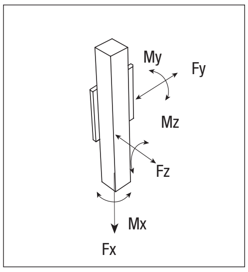
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight per meter [kg/m]
ZCH 170	75 AT 10 HPF	75	0.435

Tab. 132

Belt length (mm) = L + 280



Load capacity

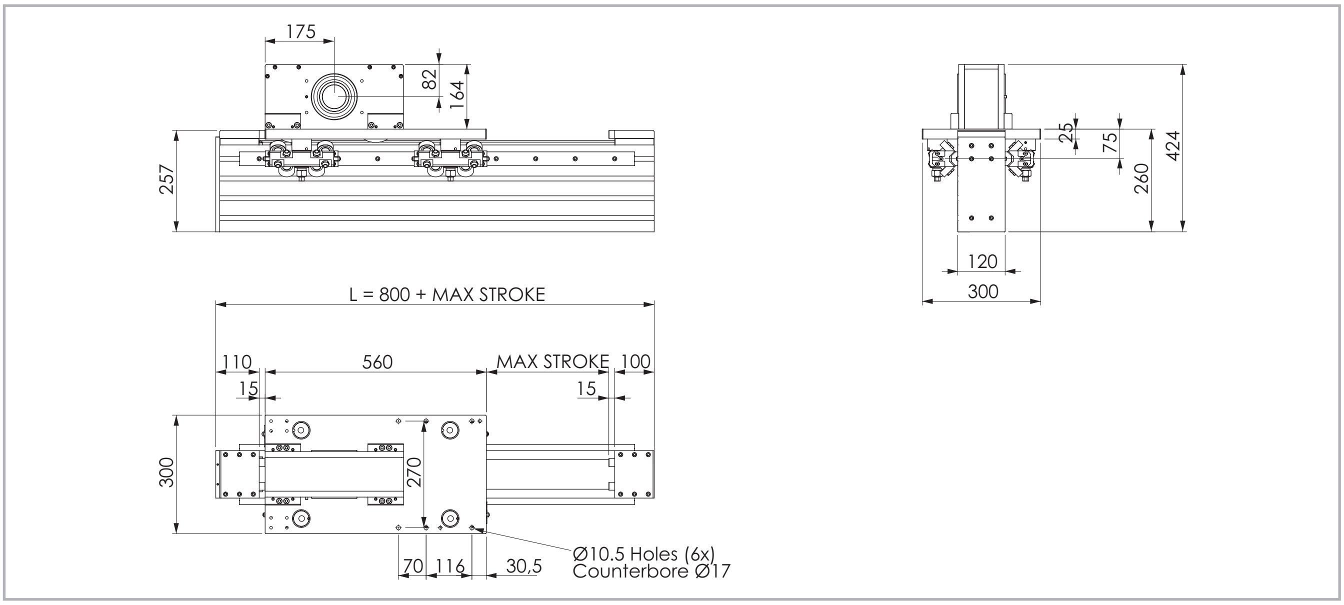
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
ZCH 170	7470	5220	174480	124770	174480	12388	35681	35681

See verification under static load and lifetime on page SL-2 and SL-3

Tab. 133

ZCR 220

ZCR 220 Dimension



The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig. 55

Technical data

	Type
	ZCR 220
Max. useful stroke length [mm]	2500
Max. positioning repeatability [mm]*1	± 0.1
Max. speed [m/s]	4
Max. acceleration [m/s²]	25
Type of belt	75 AT 10 HPF
Type of pulley	Z 30
Pulley pitch diameter [mm]	95.49
Carriage displacement per pulley turn [mm]	300
Carriage weight [kg]	32.5
Zero travel weight [kg]	61
Weight for 100 mm useful stroke [kg]	3.2
Starting torque [Nm]	7.8
Rail size [mm]	35x16

*1) Positioning repeatability is dependent on the type of transmission used

Tab. 134

Moments of inertia of the aluminum body

Type	I_x [10^7 mm^4]	I_y [10^7 mm^4]	I_p [10^7 mm^4]
ZCR 220	4.625	1.559	6.184

Tab. 135

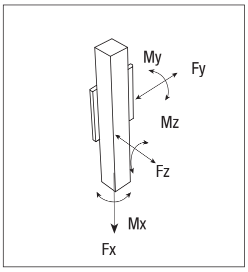
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight per meter [kg/m]
ZCR 220	75 AT 10 HPF	75	0.435

Tab. 136

Belt length (mm) = L + 280



Load capacity

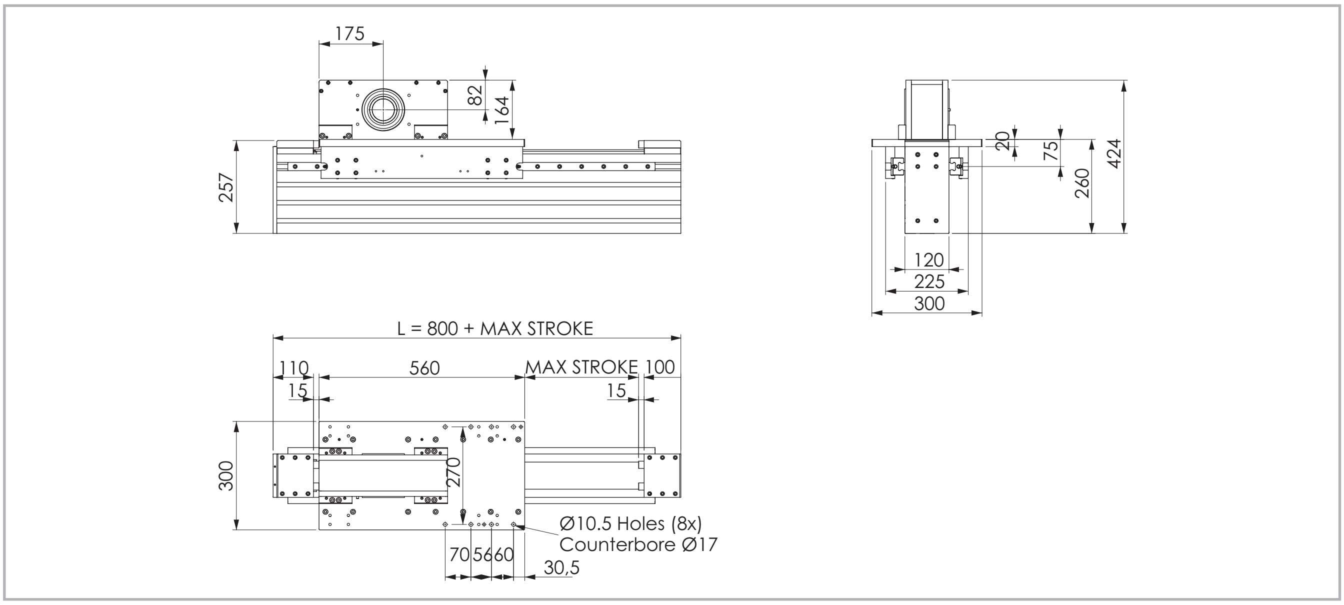
Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
ZCR 220	7470	5220	14142	65298	14142	849	2666	2666

See verification under static load and lifetime on page SL-2 and SL-3

Tab. 137

ZCH 220

ZCH 220 Dimension



The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig.56

Technical data

	Type
	ZCH 220
Max. useful stroke length [mm]	2500
Max. positioning repeatability [mm]*1	± 0.1
Max. speed [m/s]	4
Max. acceleration [m/s²]	25
Type of belt	75 AT 10 HPF
Type of pulley	Z 30
Pulley pitch diameter [mm]	95.49
Carriage displacement per pulley turn [mm]	300
Carriage weight [kg]	34.4
Zero travel weight [kg]	60.7
Weight for 100 mm useful stroke [kg]	3.5
Starting torque [Nm]	7.8
Rail size [mm]	25

*1) Positioning repeatability is dependent on the type of transmission used

Tab. 138

Moments of inertia of the aluminum body

Type	I_x [10^7 mm^4]	I_y [10^7 mm^4]	I_p [10^7 mm^4]
ZCH 220	4.625	1.559	6.184

Tab. 139

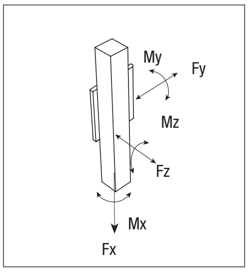
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight per meter [kg/m]
ZCH 220	75 AT 10 HPF	75	0.435

Tab. 140

Belt length (mm) = L + 280



Load capacity

Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn.	Stat.	Stat.	Stat.	Stat.
ZCH 220	7470	5220	174480	124770	174480	12388	35681	35681

See verification under static load and lifetime on page SL-2 and SL-3

Tab. 141

Lubrication

ZCH linear units with ball bearing guides

The ball bearing carriages of the ZCH versions are fitted with a retention cage that eliminates "steel-steel" contact between adjacent revolving parts and prevents misalignment of these in the circuits.
This system guarantees a long interval between maintenances: every 2000 Km or 1 year of use, based on the value reached first. If a longer service life is required or in case of high dynamic or high loaded applications please contact our offices for further verification.

ZCH

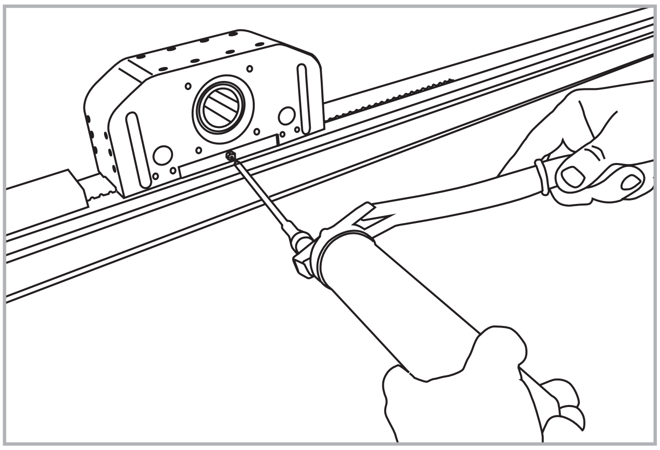


Fig.57

Quantity of lubricant necessary for re-lubrication of each block:

Type	Quantity of Grease [cm³]
ZCH 60	0.2
ZCH 90	0.5
ZCH 100	0.5
ZCH 170	0.6
ZCH 220	0.6

Tab. 142

- Insert the tip of the grease gun into the specific grease blocks.
- Type of lubricant: Lithium soap grease of class NLGI 2.
- For specially stressed applications or hostile environmental conditions, lubrication should be applied out more frequently.
  Contact Rollon for further advice

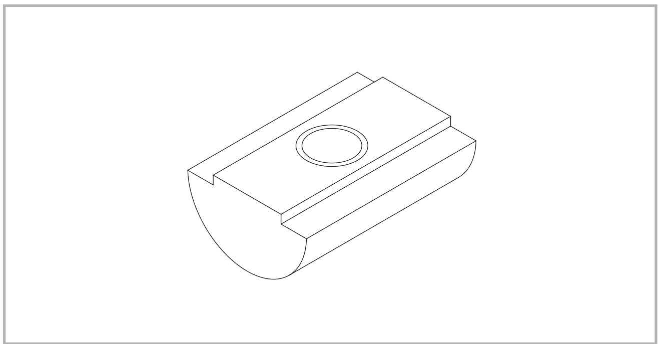
ZCR linear units with roller guides

Roller slides are provided with a self- lubrication system for a long lubrication interval. For applications on plants with a high number of daily cycles, or with a significant build-up of impurities, please check the need for lubrication, seals and additional tanks with our technical dept. Do not use solvents to clean rollers or roller slides, as you could unintentionally remove the grease lubricating coat applied to the rolling elements during assembly. Use lithium soap based mineral grease according to DIN 51825 - K3N.
Guide rails do not require excessive lubrication, which would attract impurities and have negative consequences. Should there be any surface defects on the guide rails and/or on the rolling parts, such as pitting or erosion, this might be indicative of an excessive loading. In this case, all worn parts must be replaced and the load geometry and alignment checked.

Accessories

To install accessories on ZCH series aluminum profile we recommend to use the T-nuts shown below

T-nuts



Steel nuts to be used in the slots of the body.

Fig.58

Units (mm)

	Hole	Length	Code Rollon
ZCH 60	M4	8	1001046
ZCH 90	M5	10	1000627
ZCH 100	M6	13	1000043
ZCR 90	M4	8	1000627
ZCR 100	M5	10	1000043

Tab. 143

Bushings for ZCR/ZCH series

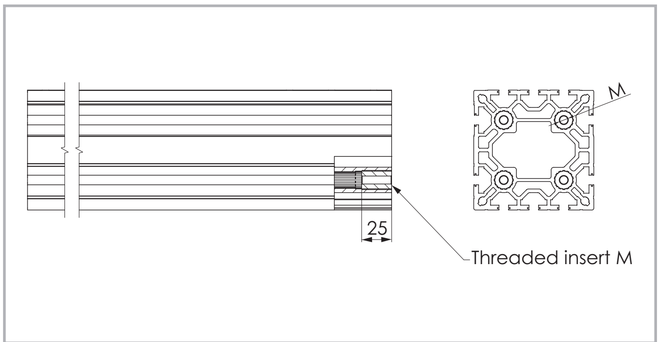


Fig. 59

	Threaded insert Nb. x M			
ZCH 60	1 x M6	**1 x M8**	1 x M10	
ZCH 90	**4 x M6**	4 x M8	4 x M10	
ZCH 100	4 x M6	**4 x M8**	4 x M10	
ZCH 170		4 x M8	**4 x M10**	4 x M12
ZCH 220		4 x M8	**4 x M10**	4 x M12

The highlighted threaded inserts are standard.
In case of need, the others have to be ordered separately.

Tab. 144

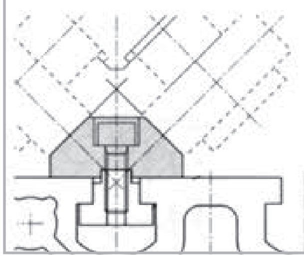
Alignment nuts

Nuts for steel guide rails

Material: galvanised steel.

<u>Code 209.1855</u>

Alignment nuts.
V-shaped guide rail: 35x16
Profile with slot. 12.5 mm.
Series: **ZC 170-220**



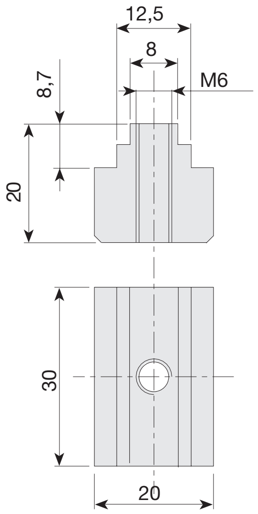
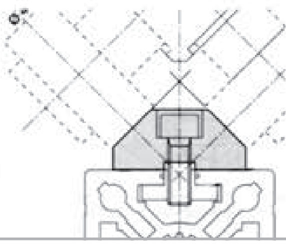


Fig. 60

<u>Code 209.0298</u>

Alignment nuts.
V-shaped guide rail: 35x16
Profile with slot 8 mm.
Series: **ZC 100**



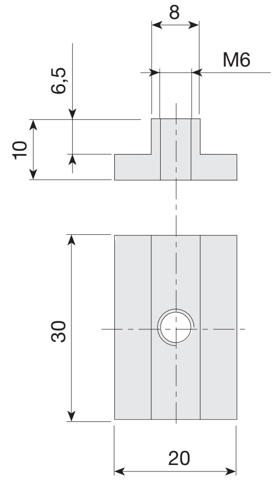


Fig.61

Alignment nut for slot 12.5 mm

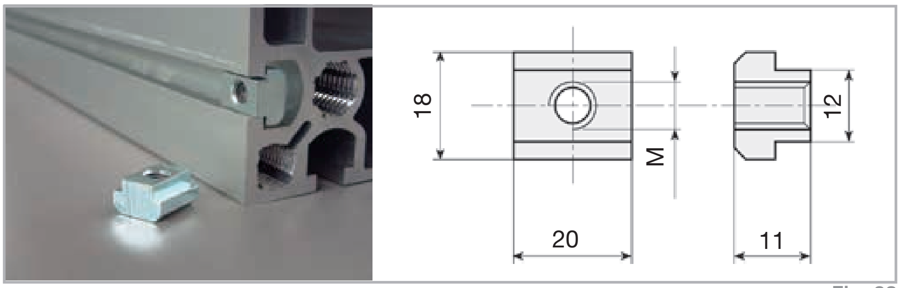


Fig. 62

Material: galvanised steel. Suitable for series:
ZC 170-220

Thread	Code
M5	215.1768
M6	215.1769
M8	215.1770
M10	215.2124

Tab. 145

Alignment nut for slot 12.5 mm front insertable

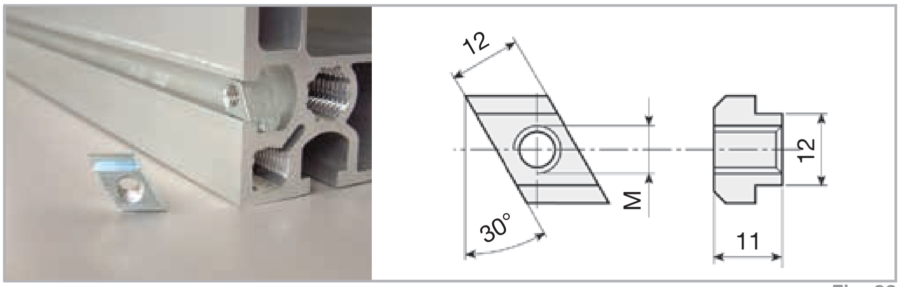


Fig. 63

Material: galvanised steel. Suitable for series:
ZC 170-220

Thread	Code
M5	215.1771
M6	215.1772
M8	215.1773
M10	215.2125

Tab. 146

Threaded nuts and plates

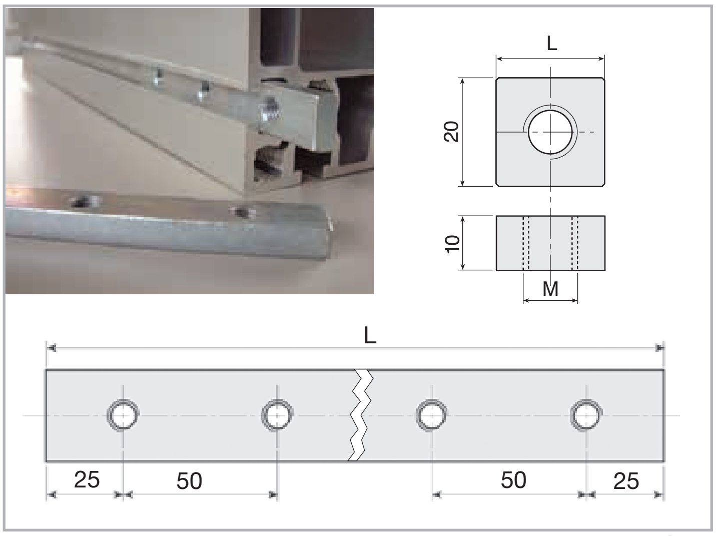


Fig.64

M12 (CH19) hexagonal-head screws can be used as stud bolts in profiles with 12.5 mm slots.

Material: galvanised steel. Suitable for series:
ZC 170-220

Thread	Threaded holes	L	Code
M10	1	40	215.0477
M12	1	40	209.1281
M10	1	20	209.1277
M10	2*	80	209.1776
M10	3*	150	209.1777
M10	4*	200	209.1778
M10	5*	250	209.1779
M10	6*	300	209.1780
M10	7*	350	209.1781

* Hole centre-distance: 50 mm.

Tab. 147

Adapter flange for gearbox assembly

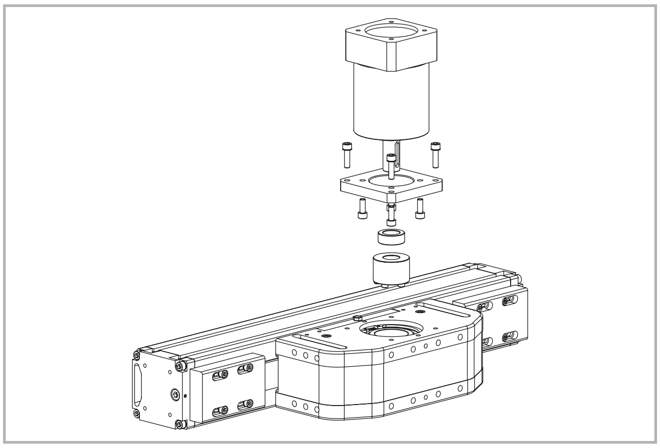


Fig. 65

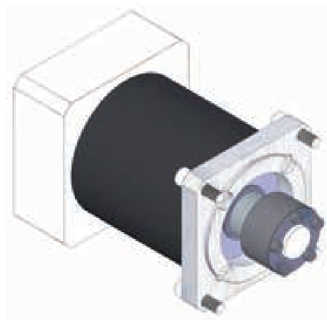


Fig. 66

Assembly kit includes: shrink disk; adapter plate; fixing hardware

Unit	Gearbox type (not included)	Kit Code
ZCH 60	SP 100	G002255
	LP 090	G001920
	LP 070	G002264
	MP080	G001915
	CP080	G001970
	PSF221	G001917
ZCR/ZCH 90	RF 27	G002335
	LP 090	G002254
	SP 100	G002316
	MP 080	G002328
	PSF 321	G002345
	PSF 221	G002348
ZCR/ZCH 100	LP120; PE5; LC120	G001856
	SP100; P5	G001857
	PSF321	G001858
	PSF521	G001859
	EP120TT	G001860
	MP105	G001861
	MP080	G001951

Tab. 148

For other gearbox type ask Rollon

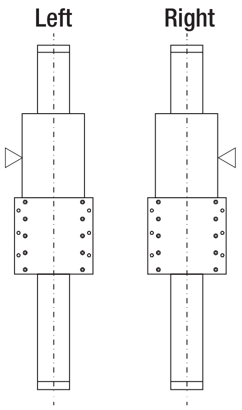
Ordering key

Identification codes for the ZCR/ZCH linear unit

ZCR / ZCH	10	1A	02000	1A
ZCR ZCH	06 = 60 09 = 90 10 = 100 17 = 170 22 = 220			
				Linear motion system *see pg. ML-42*
			L=total length of the unit	
		Drive head code		
	Linear unit size *see from pg. ML-43 to pg. ML-51*			
ZCR/ZCH series *see pg. ML-40*				

In order to create identification codes for Actuator Line, you can visit: **http://configureactuator.rollon.com**

Left / right orientation



ZMCH series

ZMCH series description

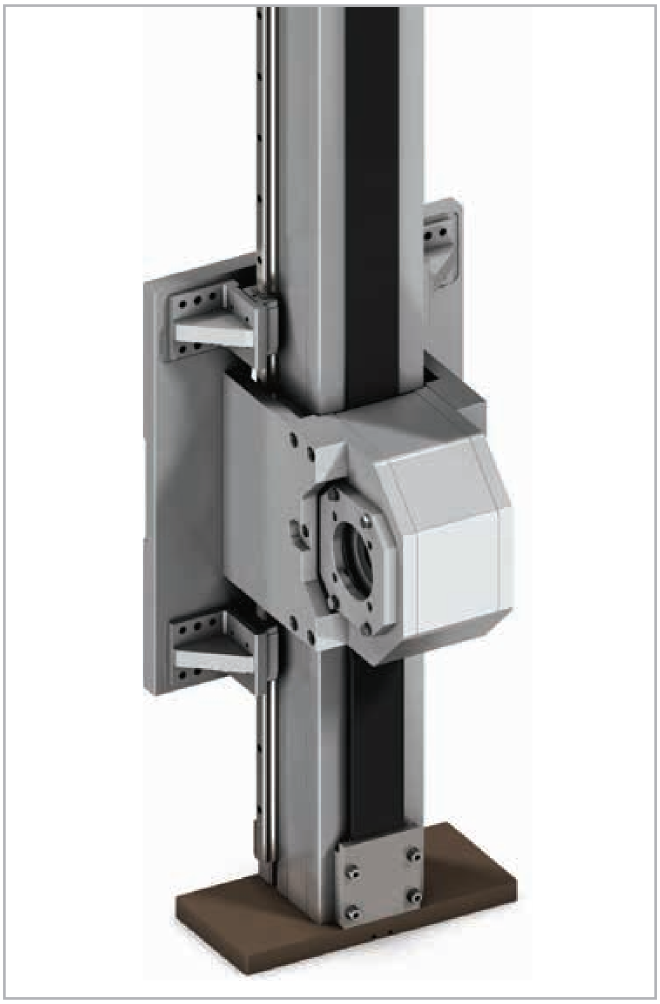


Fig. 67

ZMCH

The ZMCH series linear units were designed to meet the vertical motion requirements in gantry applications or for applications where the aluminum profile must be moving and the carriage must be fixed.

The self-supporting extruded and anodized aluminum structure is available in three sizes. Since it is a rigid system, it is ideal for a "Z" axis in a 3-axis system by using a linear guide rail.

In addition, the ZMCH series has been specifically designed and configured to be easily assembled with the R-SMART, TCS/TCR series and ROBOT series.

The components

Extruded profile

The anodized aluminum extrusions used for the bodies of the Rollon ZMCH series linear units were designed and manufactured in cooperation with a leading company in this field to obtain the right combination of high mechanical strength and reduced weight. The anodized aluminum alloy 6060 used (see physical chemical characteristics below for further information) was extruded with dimensional tolerances complying with EN 755-9 standards.

Driving belt

The Rollon ZMCH series linear units use steel reinforced polyurethane drive belts with AT pitch. This belt is ideal due to its high load transmission characteristics, compact size and low noise. Used in conjunction with a backlash-free pulley, smooth alternating motion can be achieved. Optimization of the maximum belt width/body dimension ratio enables the following performance characteristics to be achieved:

- **High speed**
- **Low noise**
- **Low wear**

Carriage

The carriage of the Rollon ZMCH series linear units is made entirely of anodized aluminum. The dimensions vary depending on the type.

General data about aluminum used: AL 6060

Chemical composition [%]

Al	Mg	Si	Fe	Mn	Zn	Cu	Impurites
Remaining	0.35-0.60	0.30-0.60	0.30	0.10	0.10	0.10	0.05-0.15

Tab. 149

Physical characteristics

Density	Coeff. of elasticity	Coeff. of thermal expansion (20°-100°C)	Thermal conductivity (20°C)	Specific heat (0°-100°C)	Resistivity	Melting point
$\frac{kg}{dm^3}$	$\frac{kN}{mm^2}$	$\frac{10^{-6}}{K}$	$\frac{W}{m \cdot K}$	$\frac{J}{kg \cdot K}$	$\Omega \cdot m \cdot 10^{-9}$	°C
2.7	70	23.8	200	880-900	33	600-655

Tab. 150

Mechanical characteristics

Rm	Rp (02)	A	HB
$\frac{N}{mm^2}$	$\frac{N}{mm^2}$	%	—
250	200	10	75

Tab. 151

The linear motion system

The linear motion system has been designed to meet the load capacity, speed, and maximum acceleration conditions of a wide variety of applications. Rollon ZMCH System series systems feature a linear motion system with ball bearing guides:

ZMCH with recirculating ball guides:

- The ball bearing guides with high load capacity are mounted in a dedicated seat on the aluminum body.
- The carriage of the linear unit is assembled on pre-loaded ball bearing blocks that enables the carriage to withstand loading in the four main directions.
- The ball bearing carriages are also fitted with a retention cage that eliminates "steel-steel" contact between adjacent revolving parts and prevents misalignment.
- The blocks have seals on both sides and, when necessary, an additional scraper can be fitted for very dusty conditions.

The linear motion system described above offers:

- High speed and acceleration
- High load capacity
- High permissible bending moments
- Low friction
- Long life
- Low noise

ZMCH section

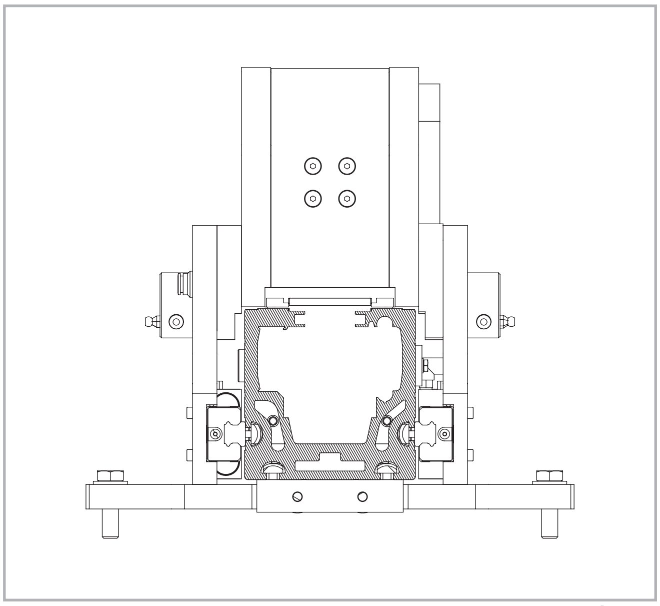
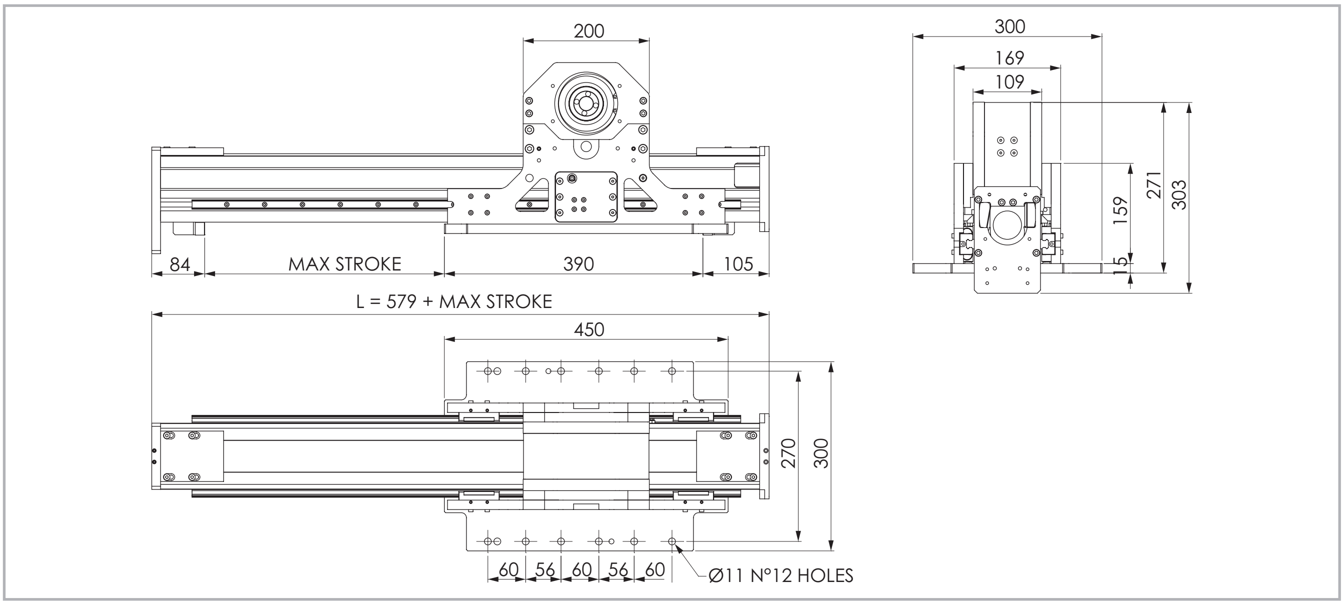


Fig. 68

ZMCH 105

ZMCH 105 Dimension



The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig. 69

Technical data

	Type ZMCH 105
Max. useful stroke length [mm]	2100
Max. positioning repeatability [mm]*1	± 0.1
Max. speed [m/s]	3
Max. acceleration [m/s²]	25
Type of belt	50 AT 10 HPF
Type of pulley	Z 29
Pulley pitch diameter [mm]	92.31
Carriage displacement per pulley turn [mm]	290
Carriage weight [kg]	16.5
Zero travel weight [kg]	28
Weight for 100 mm useful stroke [kg]	1.5
Starting torque [Nm]	4.4
Rail size [mm]	15

*1) Positioning repeatability is dependent on the type of transmission used

Tab. 152

Moments of inertia of the aluminum body

Type	I_x [10^7 mm^4]	I_y [10^7 mm^4]	I_p [10^7 mm^4]
ZMCH 105	0.568	0.448	1.015

Tab. 153

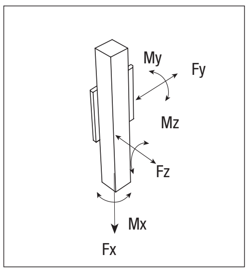
Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

Type	Type of belt	Belt width [mm]	Weight per meter [kg/m]
ZMCH 105	50 AT 10 HPF	50	0.290

Tab. 154

Belt length (mm) = L + 260



Load capacity

Type	F_x [N]		F_y [N]		F_z [N]	M_x [Nm]	M_y [Nm]	M_z [Nm]
	Stat.	Dyn.	Stat.	Dyn	Stat.	Stat.	Stat.	Stat.
ZMCH 105	4980	5850	61120	39780	61120	3591	10390	10390

See verification under static load and lifetime on page SL-2 and SL-3

Tab. 155

Lubrication

ZMCH linear units with ball bearing guides

The ball bearing carriages are fitted with a retention cage that eliminates "steel-steel" contact between adjacent revolving parts and prevents misalignment of these in the circuits.
This system guarantees a long interval between maintenances: every 2000 km or 1 year of use, based on the value reached first. If a longer service life is required or in case of high dynamic or high loaded applications please contact our offices for further verification.

ZMCH

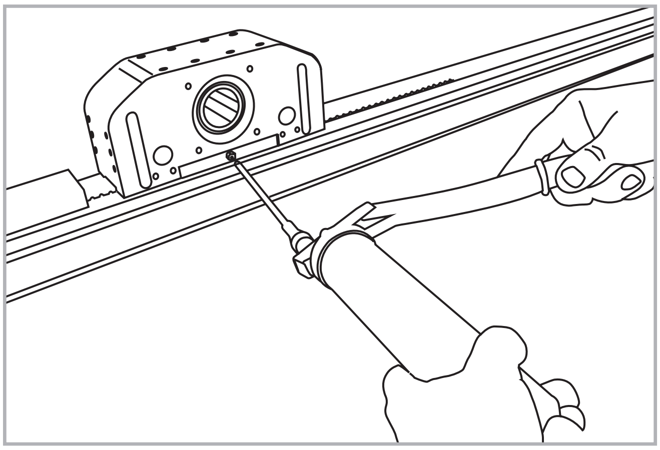


Fig. 70

Quantity of lubricant necessary for re-lubrication of each block:

Type	Quantity of Grease [cm³]
ZMCH 105	0.2

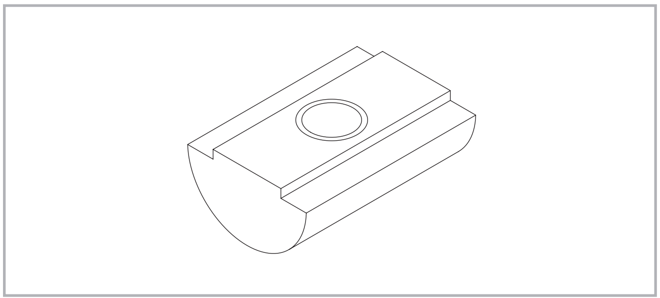
Tab. 156

- Insert the tip of the grease gun into the specific grease blocks.
- Type of lubricant: Lithium soap grease of class NLGI 2.
- For specially stressed applications or hostile environmental conditions, lubrication should be applied out more frequently.
  Contact Rollon for further advice

Accessories

To install accessories on ZMCH series aluminum profile we recommend to use the T-nuts shown below

T-nuts



Steel nuts to be used in the slots of the body. Fig. 71

Units (mm)

	Hole	Length	Code Rollon
ZMCH 105	M4	8	1001046

Tab. 157

Spring nut

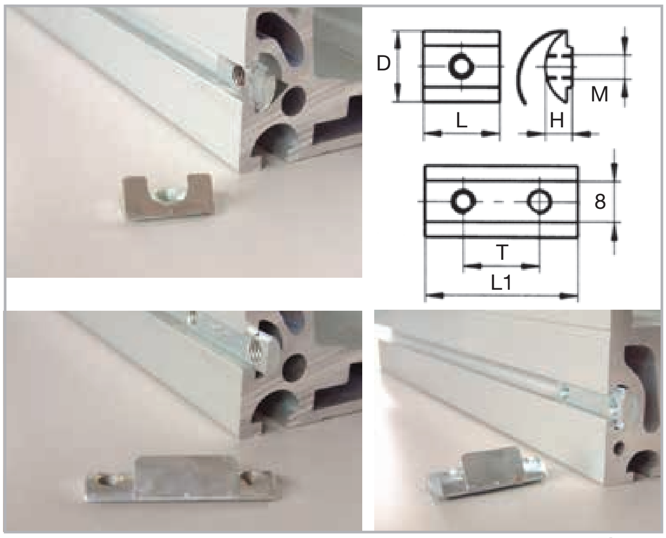


Fig. 72

Plate suitable for every kind of module (8 mm slot).

Material: nut in galvanised steel welded to the harmonic steel spring.

Single plate	MC 80-105	MC 65
M5	A32-55	B32-55
M6	A32-65	B32-65
M8	A32-85	B32-85

Tab. 158

Double plate	MC 80-105	MC 65
M6	A32-67	B32-67

Tab. 159

Size					
Base module	D	H	L	L1	T
MC 80-105	14	7.8	20	40	30
MC 65	11	4.1	20	40	30

Tab. 160

Ordering key

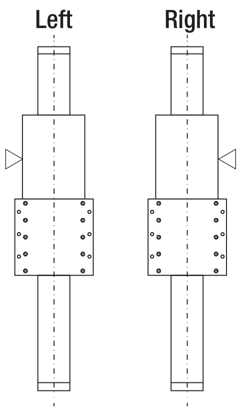
Identification codes for the ZMCH series

ZMCH	10	1A	01200	1A
	10 = 105			
				Linear motion system *ML-59*
			L=total length of the unit	
		Drive head code		
	Linear unit size *see pg. ML-60*			
ZMCH series *see pg. ML-57*				

In order to create identification codes for Actuator Line, you can visit: **http://configureactuator.rollon.com**

Configure Actuator

Left / right orientation

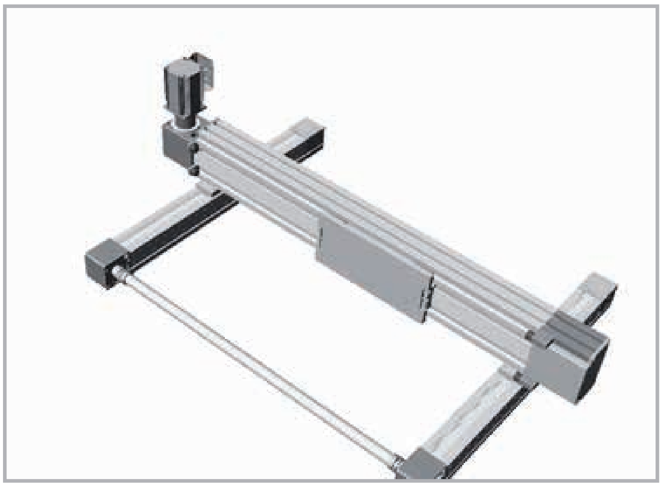


ML

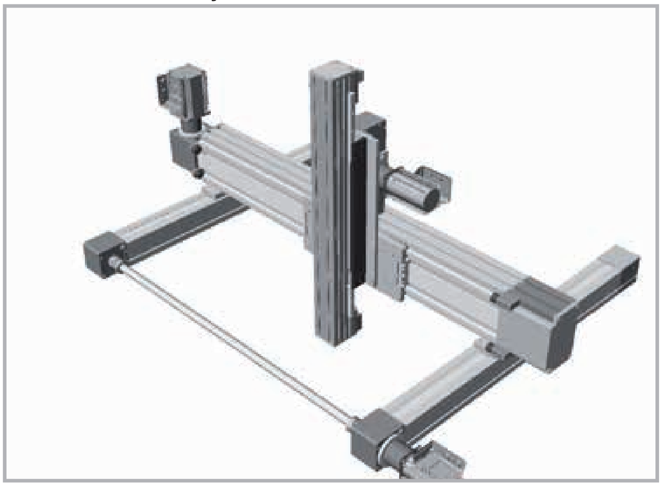
Multiaxis systems

1 - Two axis Y-Z system

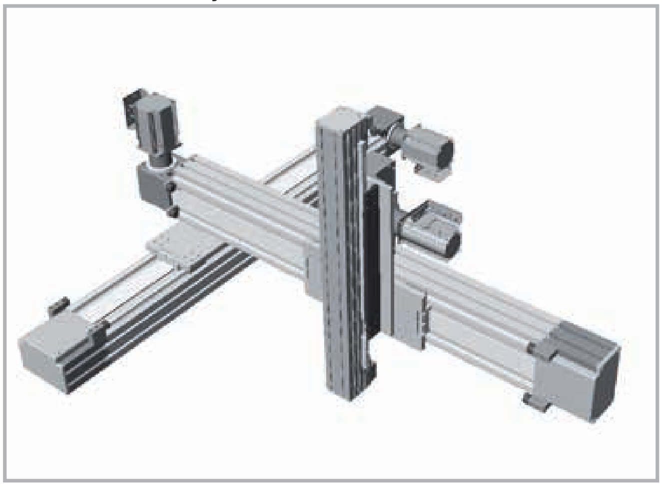
2 - Two axis X-Y system



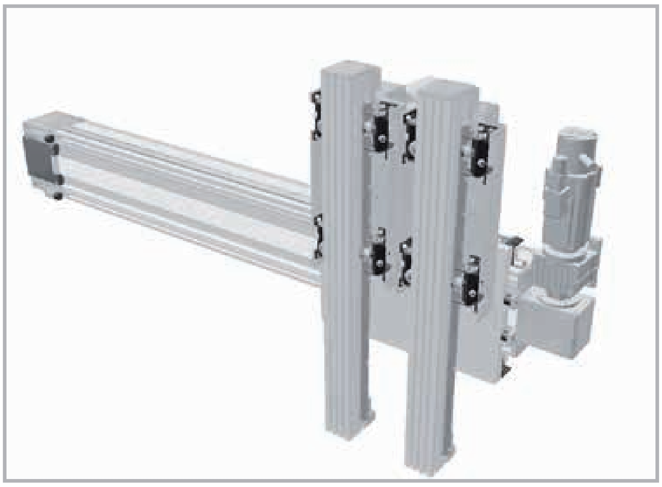
3 - Three axis X-Y-Z system



4 - Three Axis X-Y-Z system



5 - Two axis Y-Z system



6 - Two axis Y-Z system

Static load and service life

Static load

In the static load test, the radial load rating F_y, the axial load rating F_z, and the moments M_x, M_y und M_z indicate the maximum allowed load values. Higher loads will impair the running characteristics. To check the static load, a safety factor S_0 is used, which accounts for the special conditions of the application defined in more detail in the table below:

All load capacity values refer to the actuator well fixed to a rigid structure. For cantilever applications the deflection of the actuator profile must be taken in account.

Safety factor S_0

No shocks or vibrations, smooth and low-frequency change in direction High mounting accuracy, no elastic deformations, clean environment	2 - 3
Normal assembly conditions	3 - 5
Shocks and vibrations, high-frequency changes in direction, substantial elastic deformations	5 - 7

Fig. 1

The ratio of the actual to the maximum allowed load must not be higher than the reciprocal value of the assumed safety factor S_0.

$$\frac{P_{fy}}{F_y} \leq \frac{1}{S_0} \qquad \frac{P_{fz}}{F_z} \leq \frac{1}{S_0} \qquad \frac{M_1}{M_x} \leq \frac{1}{S_0} \qquad \frac{M_2}{M_y} \leq \frac{1}{S_0} \qquad \frac{M_3}{M_z} \leq \frac{1}{S_0}$$

Fig. 2

The above formulae only apply to a one load case. If one or more of the forces described are acting simultaneously, the following calculation must be carried out:

$$\frac{P_{fy}}{F_y} + \frac{P_{fz}}{F_z} + \frac{M_1}{M_x} + \frac{M_2}{M_y} + \frac{M_3}{M_z} \leq \frac{1}{S_0}$$

P_{fy} = acting load (y direction) (N)
F_y = static load rating (y direction) (N)
P_{fz} = acting load (z direction) (N)
F_z = static load rating (z direction) (N)
M_1, M_2, M_3 = external moments (Nm)
M_x, M_y, M_z = maximum allowed moments in the different load directions (Nm)

Fig. 3

The safety factor S_0 can be at the lower limit given if the acting forces can be determined with sufficient accuracy. If shocks and vibrations act on the system, the higher value should be selected. In dynamic applications, higher safeties are required. For further information, please contact our Application Engineering Department.

Belt safety factor referred to the dynamic F_x

Impact and vibrations	Speed / acceleration	Orietation	Safety Factor
No impacts and/or vibrations	Low	horizontal	1.4
		vertical	1.8
Light impacts and/or vibrations	Medium	horizontal	1.7
		vertical	2.2
Strong impacts and/or vibrations	High	horizontal	2.2
		vertical	3

Tab. 1

Service life

Calculation of the service life

The dynamic load rating C is a conventional quantity used for calculating the service life. This load corresponds to a nominal service life of 100 km. The calculated service life, dynamic load rating and equivalent load are linked by the following formula:

$$L_{km} = 100\ \text{km} \cdot \left(\frac{Fz\text{-}dyn}{P_{eq}} \cdot \frac{1}{f_i} \right)^3$$

L_{km} = theoretical service life (km)
Fz-dyn = dynamic load rating (N)
P_{eq} = acting equivalent load (N)
f_i = service factor (see tab. 2)

Fig. 4

The effective equivalent load P_{eq} is the sum of the forces and moments acting simultaneously on a slider. If these different load components are known, P is obtained from the following equation:

For SP types

$$P_{eq} = P_{fy} + P_{fz} + \left(\frac{M_1}{M_x} + \frac{M_2}{M_y} + \frac{M_3}{M_z} \right) \cdot F_y$$

Fig. 5

For CI and CE types

$$P_{eq} = P_{fy} + \left(\frac{P_{fz}}{F_z} + \frac{M_1}{M_x} + \frac{M_2}{M_y} + \frac{M_3}{M_z} \right) \cdot F_y$$

Fig. 6

The external constants are assumed to be constant over time. Short-term loads that do not exceed the maximum load ratings have no relevant effect on the service life and can therefore be neglected in the calculation.

Service factor f_i

	f_i
no shocks or vibrations, smooth and low-frequency changes in direction; ($\alpha < 5m/s^2$) clean operating conditions; low speeds (<1 m/s)	1.5 - 2
Slight vibrations; medium speeds; (1-2 m/s) and medium-high frequency of the changes in direction ($5m/s^2 < \alpha < 10\ m/s^2$)	2 - 3
Shocks and vibrations; high speeds (>2 m/s) and high-frequency changes in direction; ($\alpha > 10m/s^2$) high contamination, very short stroke	> 3

Tab. 2

Speedy Rail A Lifetime

The rated lifetime for SRA actuators is 80,000 Km.

Static load and service life Uniline

Static load

In the static load test, the radial load rating F_y, the axial load rating F_z, and the moments M_x, M_y und M_z indicate the maximum allowed load values. Higher loads will impair the running characteristics. To check the static load, a safety factor S_0 is used, which accounts for the special conditions of the application defined in more detail in the table below:

Safety factor S_0

No shocks or vibrations, smooth and low-frequency change in direction High mounting accuracy, no elastic deformations, clean environment	1 - 1.5
Normal assembly conditions	1.5 - 2
Shocks and vibrations, high-frequency changes in direction, substantial elastic deformations	2 - 3.5

Fig. 7

The ratio of the actual to the maximum allowed load must not be higher than the reciprocal value of the assumed safety factor S_0.

$$\frac{P_{fy}}{F_y} \leq \frac{1}{S_0} \qquad \frac{P_{fz}}{F_z} \leq \frac{1}{S_0} \qquad \frac{M_1}{M_x} \leq \frac{1}{S_0} \qquad \frac{M_2}{M_y} \leq \frac{1}{S_0} \qquad \frac{M_3}{M_z} \leq \frac{1}{S_0}$$

Fig. 8

The above formulae apply to a one load case. If one or more of the forces described are acting simultaneously, the following test must be carried out:

$$\frac{P_{fy}}{F_y} + \frac{P_{fz}}{F_z} + \frac{M_1}{M_x} + \frac{M_2}{M_y} + \frac{M_3}{M_z} \leq \frac{1}{S_0}$$

P_{fy} = acting load (y direction) (N)
F_y = static load rating (y direction) (N)
P_{fz} = acting load (z direction) (N)
F_z = static load rating (z direction) (N)
M_1, M_2, M_3 = external moments (Nm)
M_x, M_y, M_z = maximum allowed moments in the different load directions (Nm)

Fig. 9

The safety factor S_0 can be at the lower limit given if the acting forces can be determined with sufficient accuracy. If shocks and vibrations act on the system, the higher value should be selected. In dynamic applications, higher safeties are required. For further information, please contact our Application Engineering Department.

Calculation formulae

Moments M_y and M_z for linear units with long slider plate

The allowed loads for the moments M_y and M_z depend on the length of the slider plate. The allowed moments M_{zn} and M_{yn} for each slider plate length are calculated by the following formulae:

$$S_n = S_{min} + n \cdot \Delta S$$

$$M_{zn} = \left(1 + \frac{S_n - S_{min}}{K} \right) \cdot M_{z\,min}$$

$$M_{yn} = \left(1 + \frac{S_n - S_{min}}{K} \right) \cdot M_{y\,min}$$

M_{zn} = allowed moment (Nm)
$M_{z\,min}$ = minimum values (Nm)
M_{yn} = allowed moment (Nm)
$M_{y\,min}$ = minimum values (Nm)
S_n = length of the slider plate (mm)
S_{min} = minimum length of the slider plate (mm)
ΔS = factor of the change in slider length
K = constant

Fig. 10

Type	$M_{y\,min}$ [Nm]	$M_{z\,min}$ [Nm]	S_{min} [mm]	ΔS	K
A40L	22	61	240	10	74
A55L	82	239	310		110
A75L	287	852	440		155
C55L	213	39	310		130
C75L	674	116	440		155
E55L	165	239	310		110
E75L	575	852	440		155
ED75L (M_z)	1174	852	440		155
ED75L (M_y)	1174	852	440		270

Tab. 3

Moments M_y and M_z for linear units with two slider plates

The allowed loads for the moments M_y and M_z are related to the value of the distance between the centers of the sliders. The allowed moments M_{yn} and M_{zn} for each distance between the centers of the sliders are calculated by the following formulae:

$$L_n = L_{min} + n \cdot \Delta L$$

$$M_y = \left(\frac{L_n}{L_{min}}\right) \cdot M_{y\,min}$$

$$M_z = \left(\frac{L_n}{L_{min}}\right) \cdot M_{z\,min}$$

M_y = allowed moment (Nm)
M_z = allowed moment (Nm)
$M_{y\,min}$ = minimum values (Nm)
$M_{z\,min}$ = minimum values (Nm)
L_n = distance between the centers of the sliders (mm)
L_{min} = minimum value for the distance between the centers of the sliders (mm)
ΔL = factor of the change in slider length

Fig. 11

Type	$M_{y\,min}$ [Nm]	$M_{z\,min}$ [Nm]	L_{min} [mm]	ΔL
A40D	70	193	235	5
A55D	225	652	300	5
A75D	771	2288	416	8
C55D	492	90	300	5
C75D	1809	312	416	8
E55D	450	652	300	5
E75D	1543	2288	416	8
ED75D	3619	2288	416	8

Tab. 4

Service life

Calculation of the service life

The dynamic load rating C is a conventional quantity used for calculating the service life. This load corresponds to a nominal service life of 100 km. The corresponding values for each liner unit are listed in Table 45 shown below. The calculated service life, dynamic load rating and equivalent load are linked by the following formula:

$$L_{km} = 100\,km \cdot \left(\frac{C}{P} \cdot \frac{f_c}{f_i} \cdot f_h\right)^3$$

L_{km} = theoretical service life (km)
C = dynamic load rating (N)
P = acting equivalent load (N)
f_i = service factor (see tab. 5)
f_C = contact factor (see tab. 6)
f_h = stroke factor (see fig. 13)

Fig. 12

The effective equivalent load P is the sum of the forces and moments acting simultaneously on a slider. If these different load components are known, P is obtained from the following equation:

$$P = P_{fy} + \left(\frac{P_{fz}}{F_Z} + \frac{M_1}{M_x} + \frac{M_2}{M_y} + \frac{M_3}{M_z} \right) \cdot F_y$$

Fig. 13

The external constants are assumed to be constant over time. Short-term loads that do not exceed the maximum load ratings have no relevant effect on the service life and can therefore be neglected in the calculation.

Service factor f_i

f_i	
No shocks or vibrations, smooth and low-frequency changes in direction; clean operating conditions; low speeds (<1 m/s)	1 - 1.5
Slight vibrations; medium speeds; (1-2,5 m/s) and medium-high frequency of the changes in direction	1.5 - 2
Shocks and vibrations; high speeds (>2.5 m/s) and high-frequency changes in direction; high contamination	2 - 3.5

Tab. 5

Contact factor f_c

f_c	
Standard slider	1
Long slider	0.8
Double slider	0.8

Tab. 6

Stroke factor f_h

The stroke factor f_h accounts for the higher stress on the raceways and rollers when short strokes are carried out at the same total run distance. The following diagram shows the corresponding values (for strokes above 1 m, f_h remains 1):

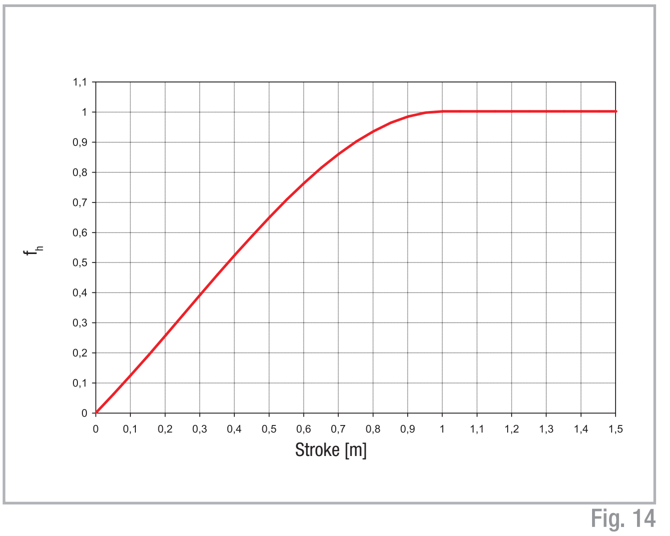


Fig. 14

Determination of the motor torque

The torque C_m required at the drive head of the linear axis is calculated by the following formula:

$$C_m = C_v + \left(F \cdot \frac{D_p}{2} \right)$$

C_m = torque of the motor (Nm)
C_v = starting torque (Nm)
F = force acting on the toothed belt (N)
D_p = pitch diameter of pulley (m)

Fig. 15

Warnings and legal notes

Before incorporating the partly completed machinery, we recommend consulting this chapter carefully, in addition to the assembly manual supplied with the individual modules. The information contained in this chapter and in the manuals for the individual modules, is provided by highly qualified and certified personnel, possessing adequate competence in incorporating the partly completed machinery.

Precaution in installation and handling operations. Significantly heavy equipment.

When handling the axis or system of axes, always make sure that the support or anchoring surfaces do not leave room for bending.

In order to stabilize the axis or system of axes, before handling it is mandatory to securely block the mobile parts. When moving axes with vertical translation (Z AXES) or combination systems (horizontal X and/or more than one vertical Z), it is mandatory to use the vertical movement to put all of the axes at the corresponding lower limit switch.

Do not overload. Do not subject to torsion stress.

Do not leave exposed to atmospheric agents.

Before mounting the motor on the gearbox, it is advisable to perform a pre-test of the motor itself, without connection to the gear unit. The testing of this component was not carried out by the manufacturer of the machine. It will therefore be the responsibility of the customer of Rollon to perform the testing of the same, in order to verify its correct operation.

The manufacturer cannot be considered responsible for any consequences derived from improper use or any use other than the purpose the axis or system of axes was designed for, or derived from failure to comply, during incorporation phases, with the rules of Good Technique and with what is indicated in this manual.

Avoid damage. Do not operate with inadequate tools

Warning: moving parts. Do not leave objectson the axis

Special installations: check the depth of the threads on moving elements

Make sure that the system has been installed on a level floor surface.

In use, accurately comply with the specific performance values declared in the catalog or, in particular cases, the load and dynamic performance characteristics requested in the phase prior to design.

For modules or parts of modular systems with vertical movement (Z axis), it is mandatory to mount self-braking motors to neutralize the risk of the axis dropping.

The images in this manual are to be considered merely an indication and not binding; therefore, the supply received could be different from the images contained in this manual, and Rollon S.p.A has deemed it useful to insert only one example.

Systems supplied by Rollon S.p.A. were not designed/envisaged to operate in ATEX environments.

Residual risks

- Mechanical risks due to the presence of moving elements (X, Y axes).
- Risk of fire resulting from the flammability of the belts used on the axes, for temperatures in excess of 250 °C in contact with the flame.
- The risk of the Z axis dropping during handling and installation operations on the partly completed machinery, before commissioning.
- Risk of the Z axis dropping during maintenance operations in the case of a drop in the electrical power supply voltage.
- Crushing hazard near moving parts with divergent and convergent motion.
- Shearing hazard near moving parts with divergent and convergent motion.
- Cutting and abrasion hazards.

Basic components

The Partly Completed Machinery shown in this catalog is to be considered a mere supply of simple Cartesian axes and their accessories agreed when the contract is stipulated with the client. The following are therefore to be considered excluded from the contract:

1. Assembly on the client's premises (direct or final)
2. Commissioning on the client's premises (direct or final)
3. Testing on the client's premises (direct or final)

It is therefore understood that the aforementioned operations in points 1.,2., and 3. are not chargeable to Rollon. Rollon is the supplier of Partly Completed Machinery, the (direct or final) client is responsible for testing and safely checking all equipment which, by definition, cannot be theoretically tested or checked at our facilities where the only movement possible is manual movement (for example: motors or reduction gears, cartesian axes movements that are not manually operated, safety brakes, stopper cylinders, mechanical or induction sensors, decelerators, mechanical limit switches, pneumatic cylinders, etc.). The partly completed machine must not be commissioned until the final machine, in which it is to be incorporated, has been declared compliant, if necessary, with the instructions in Machinery Directive 2006/42/CE.

Instructions of an environmental nature

Rollon operates with respect for the envirorment, in order to limit environmental impact. The following is a list of some instructions of an environmental nature for correct management of our supplies. Our products are mainly composed of:

Material	Details of the supply
Alluminum alloys	Profiles, pleates, various details
Steel with various composition	Screws, racks and pinions, and rails
Plastic	PA6 – Chains PVC – Covers and sliding block scrapers
Rubber of various types	Plugs, seals
Lubrification of various types	Used for the lubrication of sliding rails and bearings
Rust proof protectione	Rust proof protection oil
Wood, polyethylene, cardboard	Transport packaging

At the end of the product's life cycle, it is therfore possible to recover the various elements, in compliance with current regulations on waste issues.

Safety warnings for handling and transport

- The manufacturer has paid the utmost attention to packaging to minimize risks related to shipping, handling and transport.
- Transport can be facilitated by shipping certain components dismantled and appropriately protected and packaged.
- Handling (loading and unloading) must be carried out in compliance with information directly provided on the machine, on the packing and in the user manuals.
- Personnel authorized to lift and handle the machine and its components shall possess acquired and acknowledged skills and experience in the specific sector, besides having full control of the lifting devices used.
- During transport and/or storage, temperature shall remain within the allowed limits to avoid irreversible damage to electric and electronic components.
- Handling and transport must be carried out with vehicles presenting adequate loading capacity, and the machines shall be anchored to the established points indicated on the axes.
- DO NOT attempt to bypass handling methods and the established lifting points in any way.
- During handling and if required by the conditions, make use of one or more assistants to receive adequate warnings.
- If the machine has to be moved with vehicles, ensure that they are adequate for the purpose, and perform loading and unloading without risks for the operator and for people directly involved in the process.
- Before transferring the device onto the vehicle, ensure that both the machine and its components are adequately secured, and that their profile does not exceed the maximum bulk allowed. Place the necessary warning signs, if necessary.
- DO NOT perform handling with an inadequate visual field and when there are obstacles along the route to the final location.
- DO NOT allow people to either transit or linger within the range of action when lifting and handling loads.
- Download the axes just near the established location and store them in an environment protected against atmospheric agents.
- Failure to comply with the information provided might entail risks for the safety and health of people, and can cause economic loss.
- The Installation Manager must have the project to organize and monitor all operative phases.
- The Installation Manager shall ensure that the lifting devices and equipment defined during the contract phase are available.
- The Manager of the established location and the Installation Manager shall implement a “safety plan” in compliance with the legislation in force for the workplace.
- The “safety plan” shall take into account all surrounding work-related activities and the perimeter spaces indicated in the project for the es tablished location.
- Mark and delimit the established location to prevent unauthorized personnel from accessing the installation area.
- The installation site must have adequate environmental conditions (lighting, ventilation, etc.).
- Installation site temperature must be within the maximum and minimum range allowed.
- Ensure that the installation site is protected against atmospheric agents, does not contain corrosive substances and is free of the risk of explosion and/or fire.
- Installation in environments presenting a risk of explosion and/or of fire must ONLY be carried out if the machine has been DECLARED COMPLIANT for such use.
- Check that the established location has been correctly fitted out, as defined during the contract phase and based on indications in the relative project.
- The established location must be fitted out in advance to carry out complete installation in compliance with the defined methods and schedule.

Note

- Evaluate in advance whether the machine must interact with other production units, and that integration can be implemented correctly, in compliance with standards and without risks.
- The manager shall assign installation and assembly interventions ONLY to authorized technicians with acknowledged know-how.
- State of the art connections to power sources (electric, pneumatic, etc.) must be ensured, in compliance with relevant regulatory and legislative requirements.
- “State of the art” connection, alignment and leveling are essential to avoid additional interventions and to ensure correct machine function.
- Upon completion of the connections, run a general check to ascertain that all interventions have been correctly carried out and compliance with requirements.
- Failure to comply with the information provided might entail risks for the safety and health of people, and can cause economic loss.

Transport

- Transport, also based on the final destination, can be done with different vehicles.
- Perform transport with suitable devices that have adequate loading capacity.
- Ensure that the machine and its components are adequately anchored to the vehicle.

Handling and lifting

- Correctly connect the lifting devices to the established points on the packages and/or on the dismantled parts.
- Before handling, read the instructions, especially safety instructions, provided in the installation manual, on the packages and/or on the dismantled parts.
- DO NOT attempt, in any way, to bypass handling methods and the established lifting, moving and handling points of each package and/or dismantled part.
- Slowly lift the package to the minimum necessary height and move it with the utmost caution to avoid dangerous oscillations.
- DO NOT perform handling with an inadequate visual field and when there are obstacles along the route to reach the final location.
- DO NOT allow people to either transit or linger within the range of action when lifting and handling loads.
- Do not stack packages to avoid damaging them, and reduce the risk of sudden and dangerous movements.
- In case of prolonged storage, regularly ensure that there are no variations in the storage conditions of the packages.

Check axis integrity after shipment

Every shipment is accompanied by a document (“Packing list”) with the list and description of the axes.

- Upon receipt check that the material received corresponds to specifications in the delivery note.
- Check that packaging is perfectly intact and, for shipments without packaging, check that each axis is intact.
- In case of damages or missing parts, contact the manufacturer to define the relevant procedures.

Data sheet

General data:

Date: .... Inquiry N°: ....

Address: ....

Contact: ....

Company: ....

Zip Code: ....

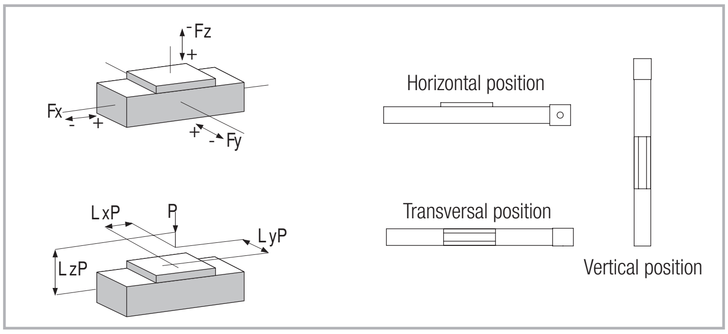
Phone: ....

Fax: ....

E-Mail: ....

Technical data:

				X axis	Y axis	Z axis
Useful stroke (Including safety overtravel)		S	[mm]			
Load to be translated		P	[kg]			
Location of Load in the	X-Direction	LxP	[mm]			
	Y-Direction	LyP	[mm]			
	Z-Direction	LzP	[mm]			
Additional force	Direction (+/-)	Fx (Fy, Fz)	[N]			
Position of force	X-Direction	Lx Fx (Fy, Fz)	[mm]			
	Y-Direction	Ly Fx (Fy, Fz)	[mm]			
	Z-Direction	Lz Fx (Fy, Fz)	[mm]			
Assembly position (Horizontal/Vertical/Transversal						
Max. speed		V	[m/s]			
Max. acceleration		a	[m/s^2]			
Positioning repeatability		Δs	[mm]			
Required life		L	yrs			



Attention: Please enclose drawing, sketches and sheet of the duty cycle