RG Series

Rolling Ring Linear Drives

RG Series Rolling Ring Friction Drives uniquely operate by converting Unidirectional, Rotary Motion of a **Round, Unthreaded, Hardened shaft** into **totally backlash-free, Automatically Reciprocating**, Bi-directional Linear Travel.

Such drives are equipped with infinitely variable pitch (linear travel per shaft revolution) which can be set from zero to 76mm depending on unit size.

The maximum linear speed for instantaneous reversal (winding applications) is 0.25m/s and a speed of up to 4.2m/s can be achieved by utilising slowdown reversal systems.

A simple “free-movement lever” mechanism allows for manual disengagement and repositioning of the unit on the shaft.

Automatic reciprocating travel is achieved with a constant shaft speed and single direction of shaft rotation, with automatic reversal at set positions (changeable by the user) or controlled by pneumatic or electromagnetic actuators.

All functions (reversal, stroke width, pitch per revolution and free-movement) can be remotely controlled and heavy loads/high forces can be accommodated with additional load carriers.

A complete range of spares and parts is available, on request.

Customised solutions can be provided where required.

Eight models cover shaft diameters from 15mm to 80mm, with up to 3600N side thrust.

Joachim Uhing KG, Inventors and World Leading manufacturers of Rolling Ring Linear Drives and Systems have worked with Techna, for over 45 years, in the U.K.

This long relationship offers the market an unmatched combination of product ranges, optional features, high quality engineering, extensive applications knowledge, a continuous R & D programme, comprehensive spares and servicing together with after-sales support, in the widest available range of value added products.

Service Certificates

Techna provides Authorised Uhing Drive servicing

Uhing Drives Antarctic Research

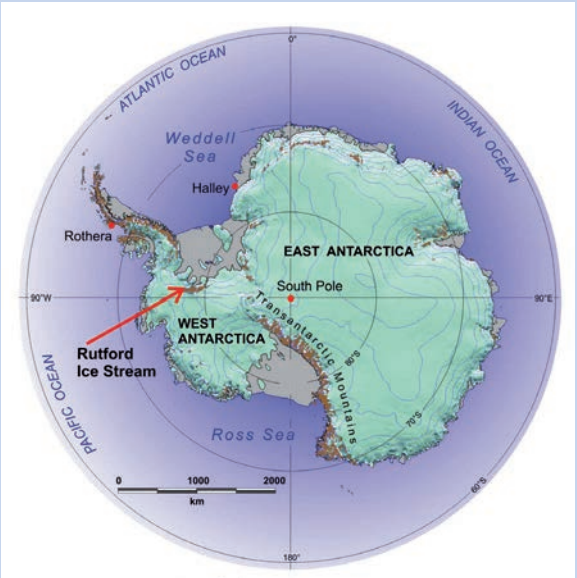
Operating in one of the harshest environments on the planet, The British Antarctic Survey (BAS) has, for over 60 years, undertaken the majority of Britain's scientific research on and around the Antarctic continent. A component of the Natural Environment Research Council, BAS supports three permanent research stations based in Antarctica, along with two stations on South Georgia and is at the forefront of research on "the frozen continent", work that recognises that "the Polar Regions may be at the ends of the Earth but what happens there affects us all".

BAS's operations are managed and co-ordinated from their headquarters in Cambridge, UK. When a requirement for hose handling in the extreme conditions of West Antarctica was identified, BAS called on Techna International Ltd.'s extensive experience to assist in the design of a bespoke winding system.

Techna's proposal of a custom-specified Uhing Rolling Ring Drive Assembly provided the durability and reliability required for such a demanding application.

Uhing ARG4-60 Rolling Ring Drive/Assembly with Load Carrier

RRS Ernest Shackleton at Halley Research Station



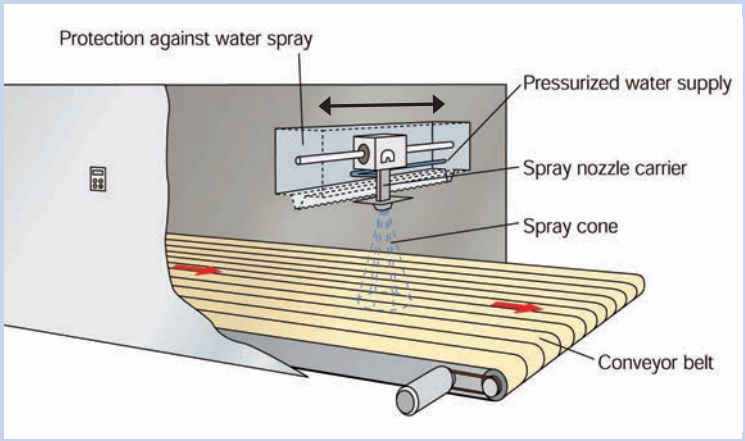
Final Destination:
Arrived 2016

RG Rolling Ring Linear Drives - Complete Versatility!

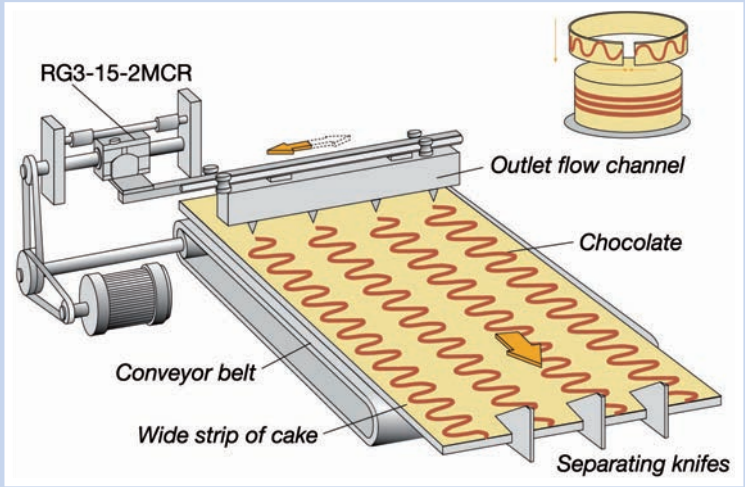
RG Drives can be found in these and many other industries:

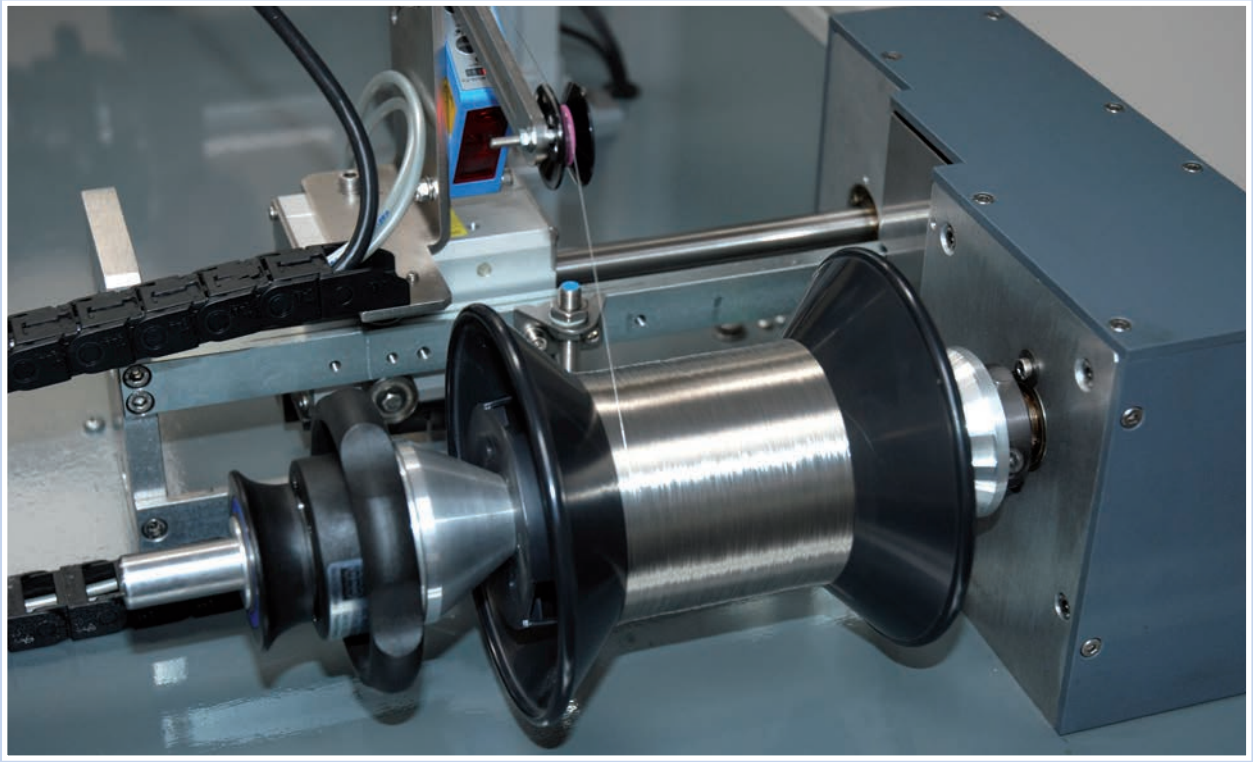
- **Automation**
- **Automobiles**
- **Baking Machinery**
- **Braiding Machinery**
- **Converting**
- **Drives**
- **Foil**
- **Food Industry**
- **Glass (Flat)/Mirrors**
- **Hollow Glassware**
- **Measuring & Testing**
- **Materials Handling**
- **Metrology (Positioning)**
- **Packaging**
- **Pharmaceuticals**
- **Paper/Cardboard**
- **Steel**
- **Sequential Feed Drives**
- **Synchronous Cutting Machines**
- **Surface Treatment**
- **Textiles**
- **Tyres**
- **Winding**

High-pressure water cleaning of conveyor



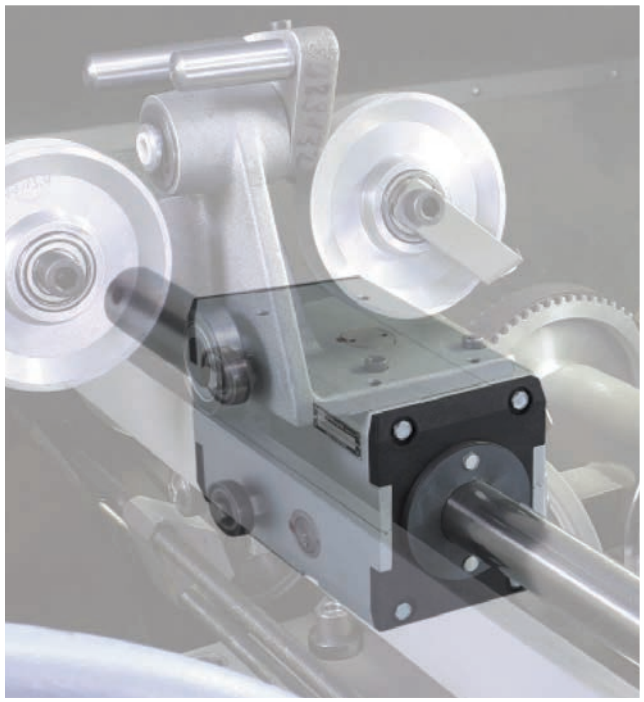
Cake Production

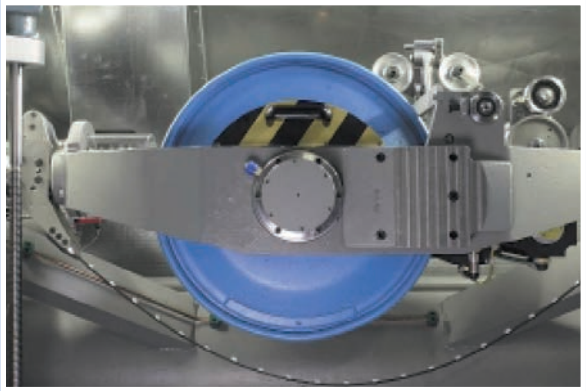




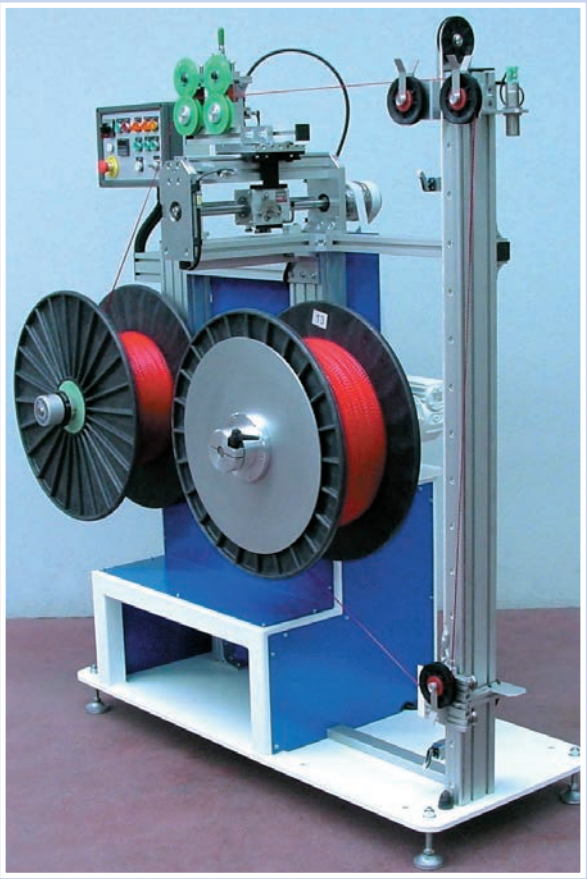
Non-contact Flange Detecting System

Some more applications

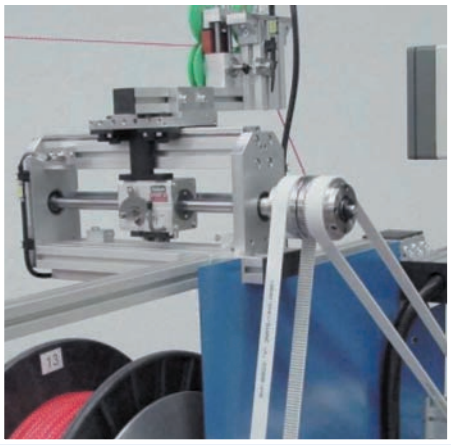


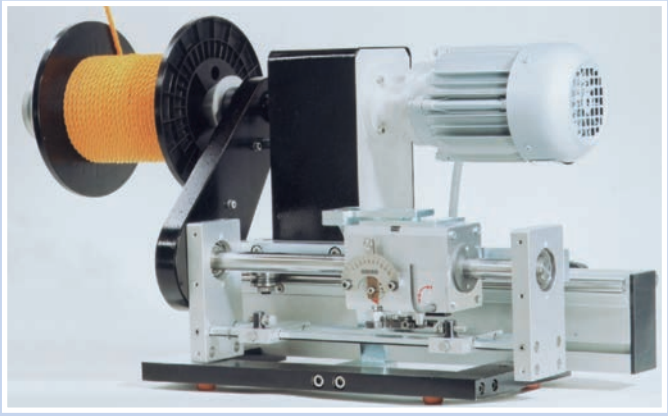


Buncher

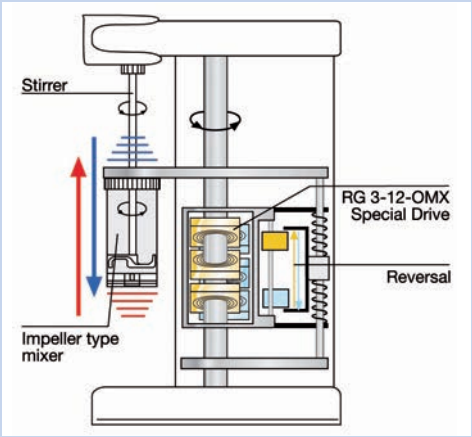


Double Winder





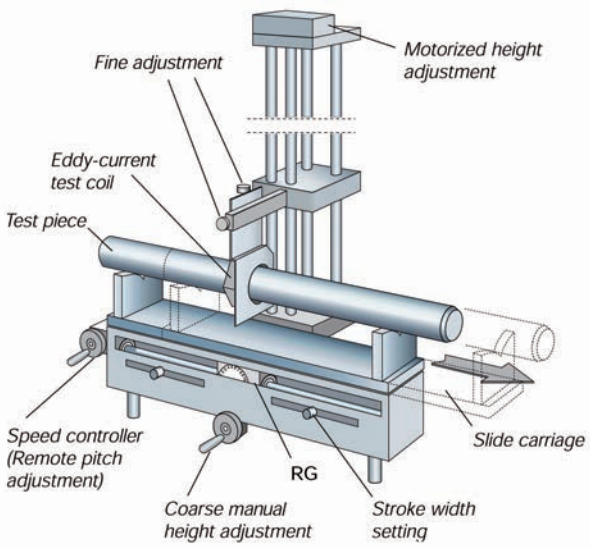
Winder “Moving Spool”-type (spool is moved back and forth while winding material)



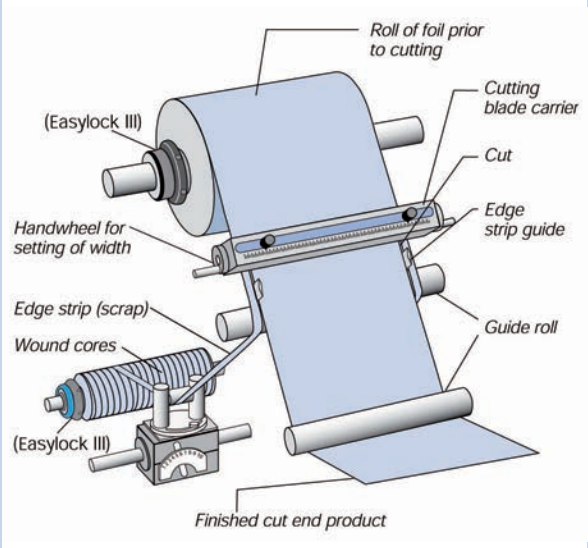
Vertical Mixer Traverse Drive RG12

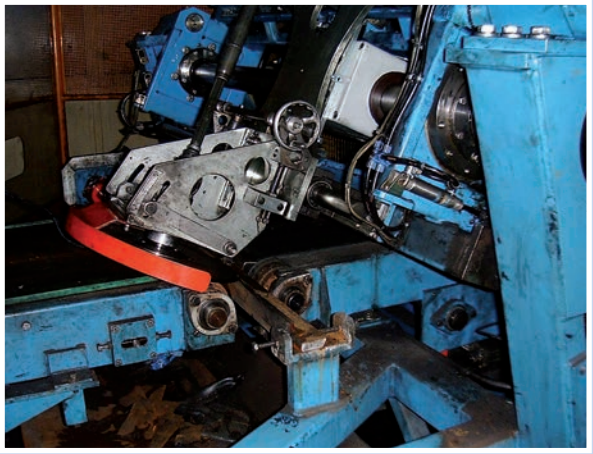
Some more applications

Eddy Current Test Slide

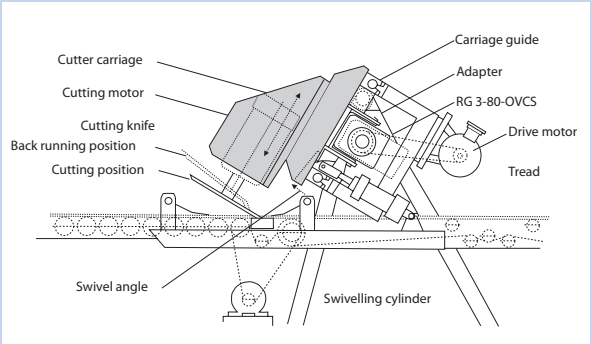


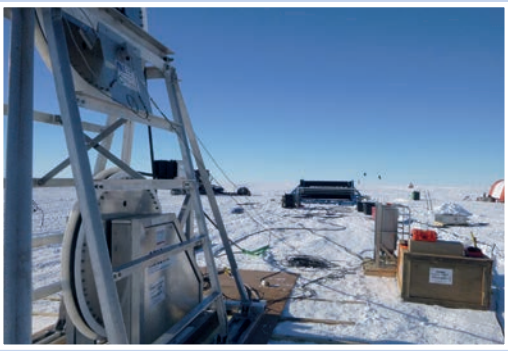
Converting-cut to final dimension





Tyre Tread Cutting Machine

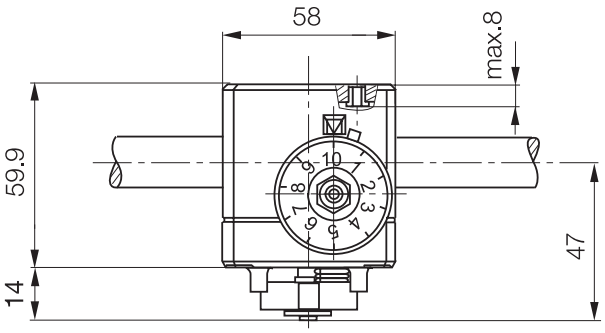


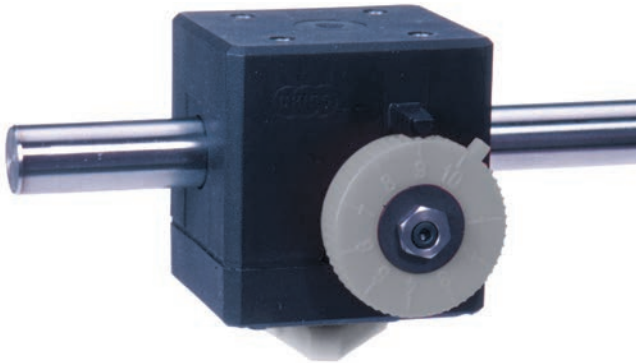


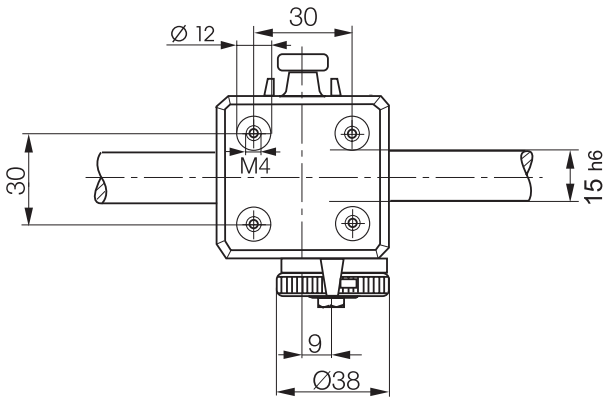
Application at -30°C in the Antarctic

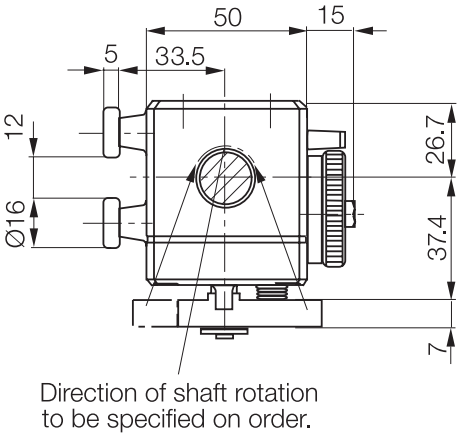
KI / AKI Series - Rolling Ring Linear Drive Unit & Assembly

KI Series Dimensional Diagrams

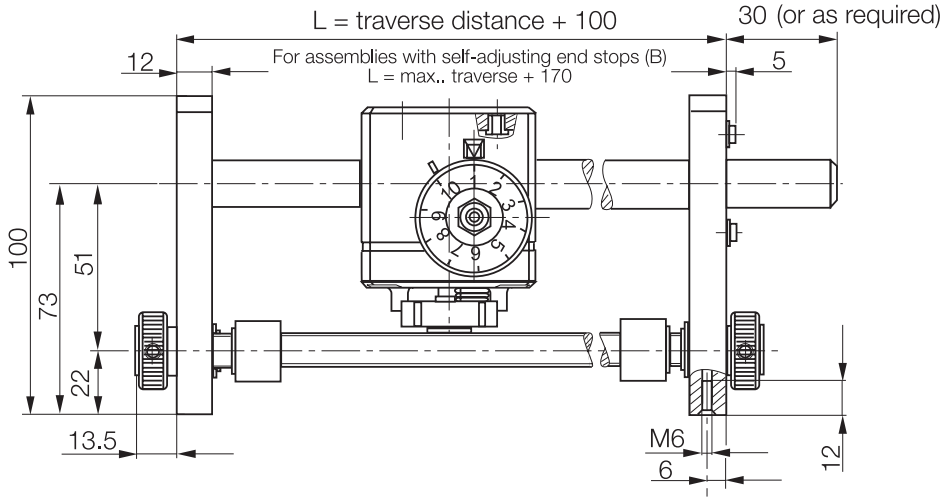


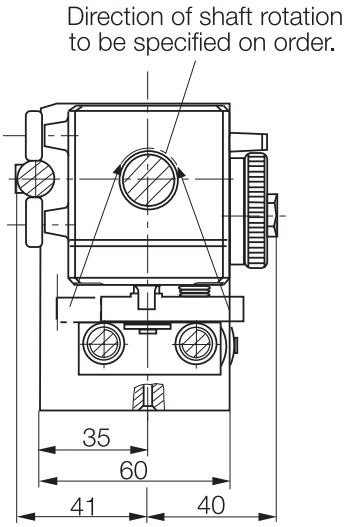


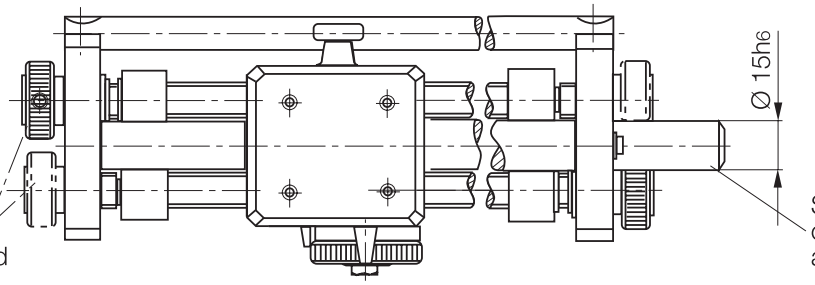




AKI Series Dimensional Diagrams



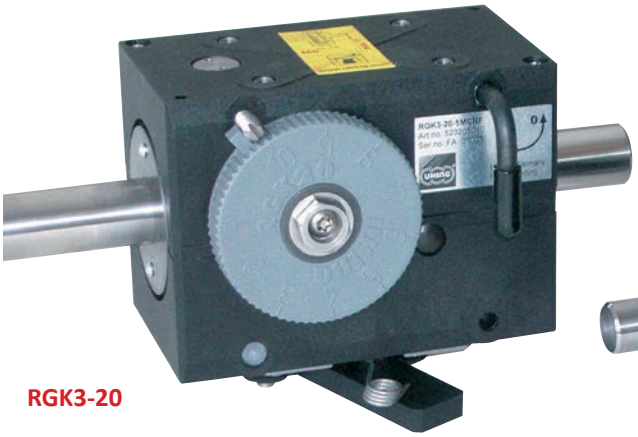




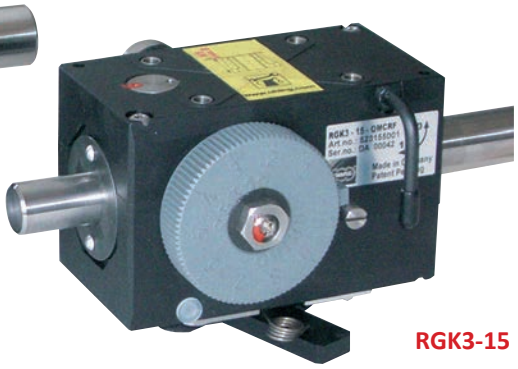
Technical Data				
Order Ref.	Max. Side Thrust F_{RG} (N)	Drive Torque M_0 (Ncm)	Max. Pitch h (mm)	Weight (kg)
KI3-15-6MCR	30	6 ± 0.5	6.0	0.28
AKI3-15-6MCR	30	6 ± 0.5	6.0	-

RGK / ARGK Series - Rolling Ring Linear Drive Units & Assemblies

For Shaft Ø 15mm, 20mm & 22mm

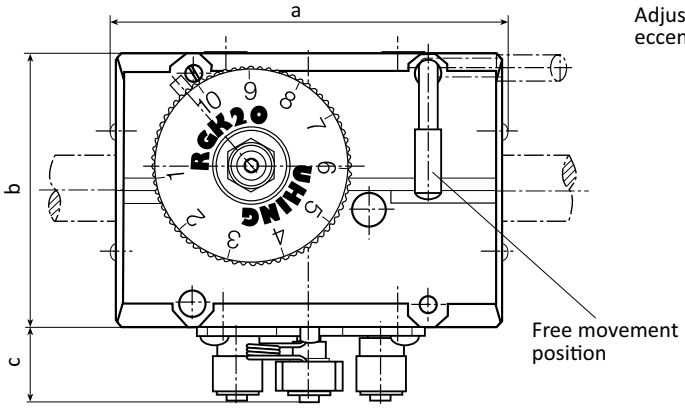


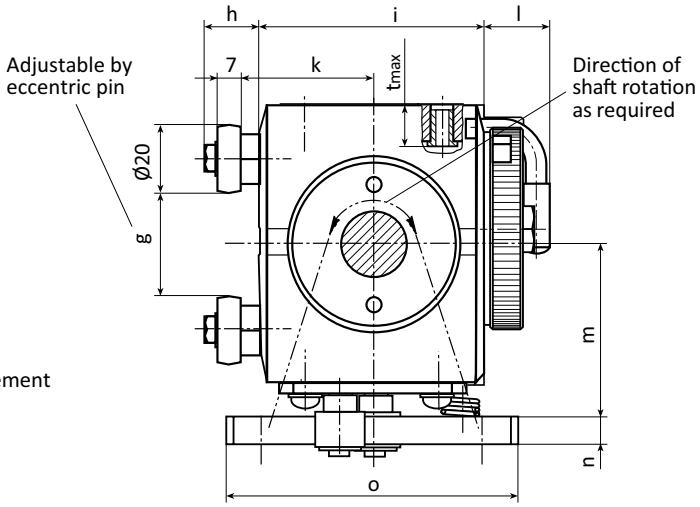
RGK3-20

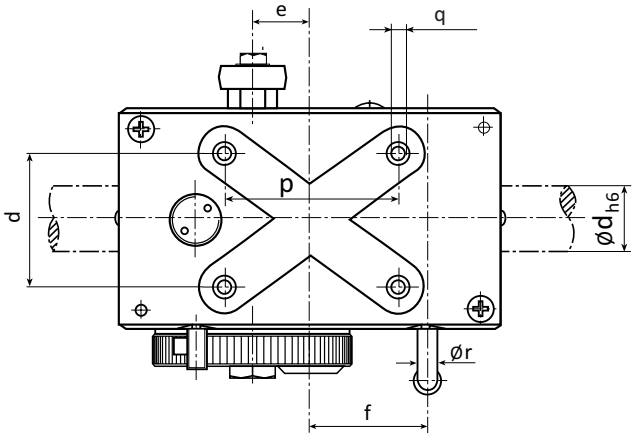


RGK3-15

RGK Series Dimensional Diagrams

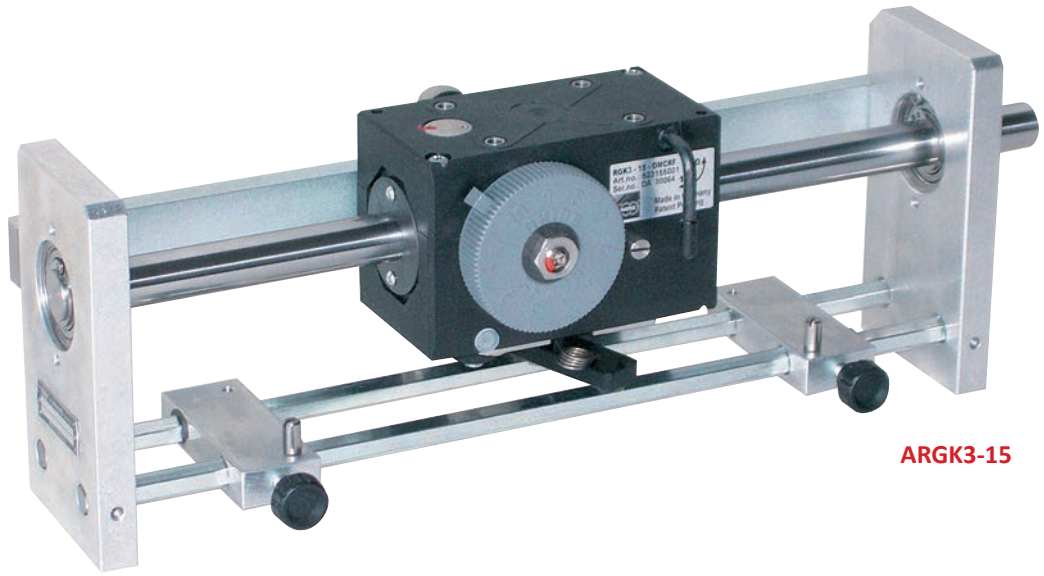






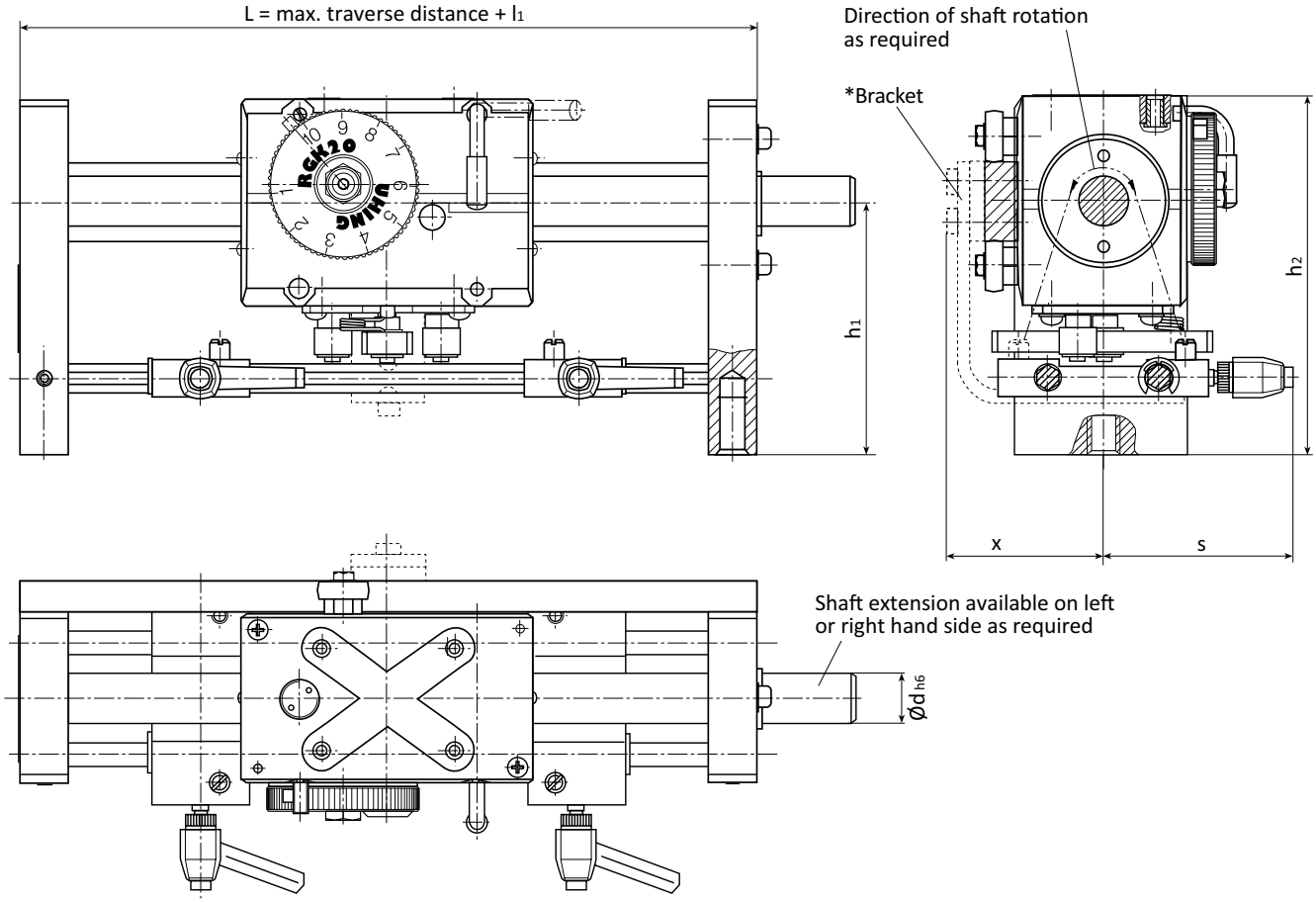
Dimensions for RGK Series (mm)

Order Ref.	Weight (kg)	a	b	c	d	Ød h6	e	f	g	h	i	k	l	m	n	o	p	tmax	q	Ør
RGK3-15-0	0.53	100	63	19	34	15	15	30	$20^{\pm 0.4}$	17	53	32.8	15.8	39.5	6	70	46	9	M5	4
RGK3-20-1	0.90	120	86	23	42	20	18	36	$32^{\pm 0.4}$	17.5	68	40.5	20	53.5	8	90	54	11	M5	6
RGK3-22-1	0.90	120	86	23	42	22	18	36	$32^{\pm 0.4}$	17.5	68	40.5	20	53.5	8	90	54	11	M5	6



ARGK3-15

ARGK Series Dimensional Diagrams

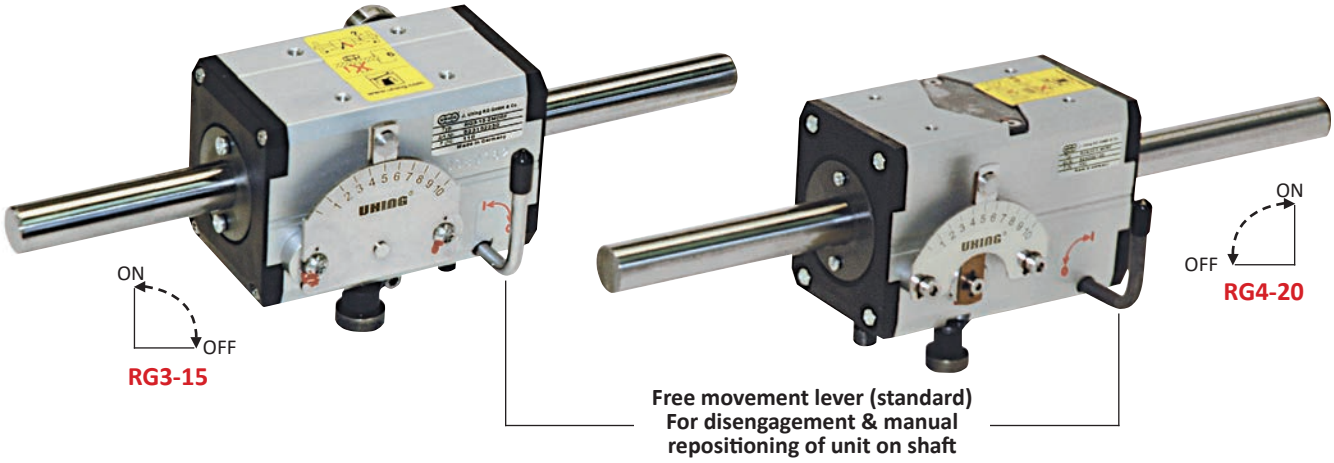


Additional Dimensions for ARGK Series (mm)																		
Order Ref.	f	h_1	h_2	i	k	l_1	m	n	p	s	t	v	w	x	Bracket for L ≥*	Side Force F_{RG} (N)	Drive Torque M_0 (Ncm)	Max. Pitch h (mm)
ARGK3-15-0	57	75	112	20	M6	150	6	30	60	53	30	3	12	53	750	90	2.0	8
ARGK3-20-1	72	104	147	24	M12	200	10	40	70	79	36	5.5	20	63	850	130	3.0	12
ARGK3-22-1	72	104	147	24	M12	200	10	40	70	79	36	5.5	20	63	850	130	3.0	13

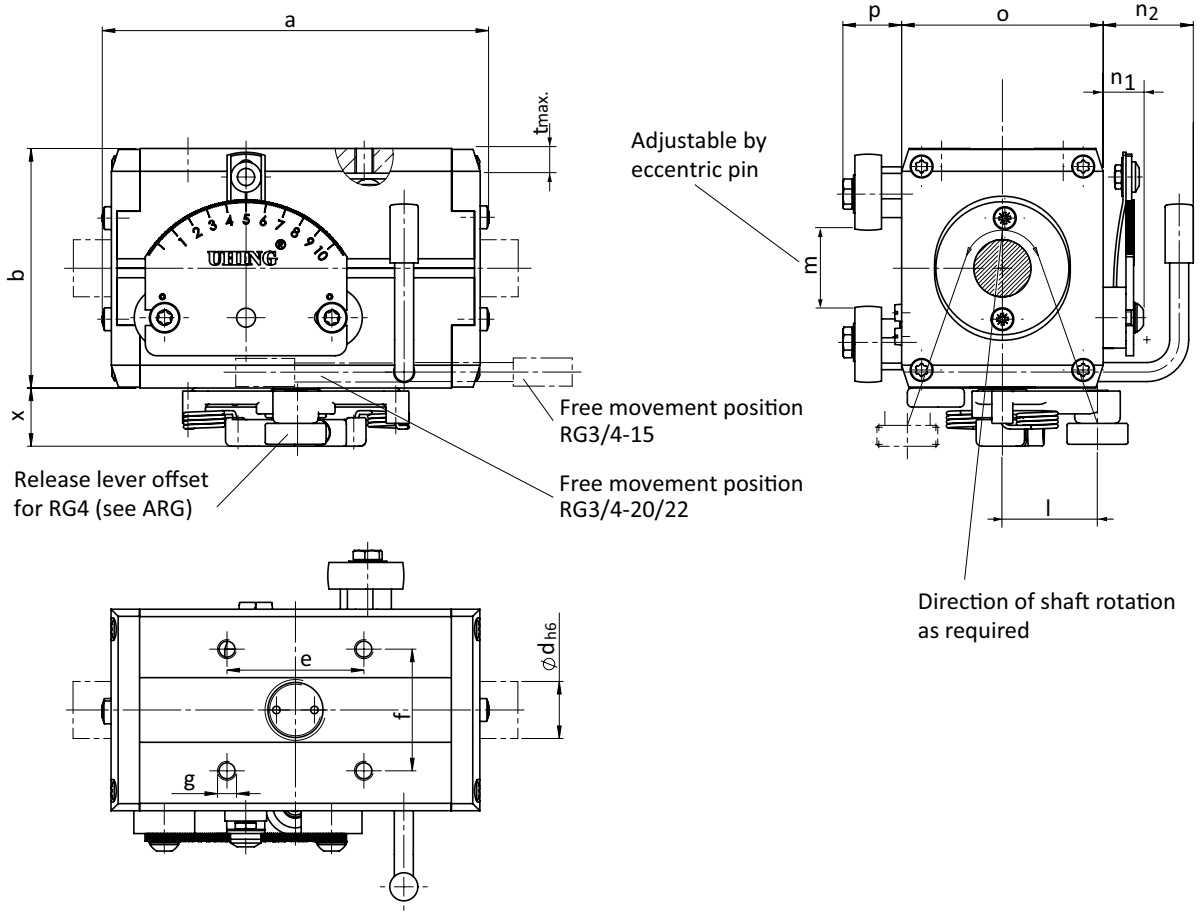
* Angle required for extended L dimension

RG / ARG Series - Rolling Ring Linear Drive Units & Assemblies

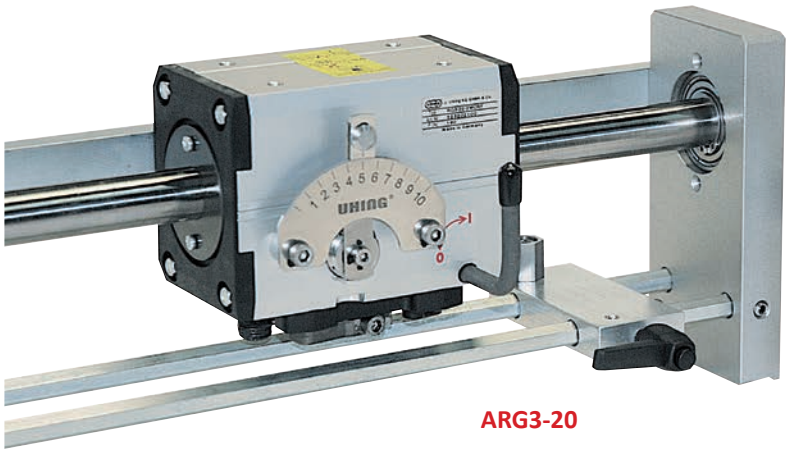
For Shaft Ø 15mm, 20mm & 22mm



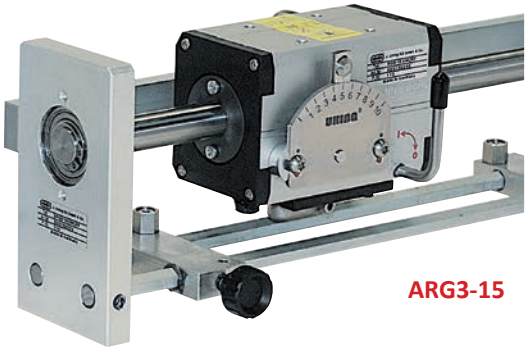
RG Series Dimensional Diagrams



Dimensions for RG Series (mm)															
Order Ref.	Weight (kg)	a	b	Ød h6	e	f	g	l	n1	n2	o	p	tmax	m	x
RG3-15-2MCRF	0.71	102	63	15	36	32	M5	25	10.6	24	53	16	6	$20^{+0.4}_{-0.2}$	15.5
RG4-15-2MCRF	0.86	121	63	15	36	32	M5	25	10.6	24	53	16	6	$20^{+0.4}_{-0.2}$	15.5
RG3-20-2MCRF	1.33	124	84	20	70	40	M6	37	16	37.5	68	17.5	9.5	$32^{\pm 0.4}$	21
RG4-20-2MCRF	1.53	133	84	20	70	40	M6	37	16	37.5	68	17.5	9.5	$32^{\pm 0.4}$	21
RG3-22-2MCRF	1.33	124	84	22	70	40	M6	37	16	37.5	68	17.5	9.5	$32^{\pm 0.4}$	21
RG4-22-2MCRF	1.53	133	84	22	70	40	M6	37	16	37.5	68	17.5	9.5	$32^{\pm 0.4}$	21

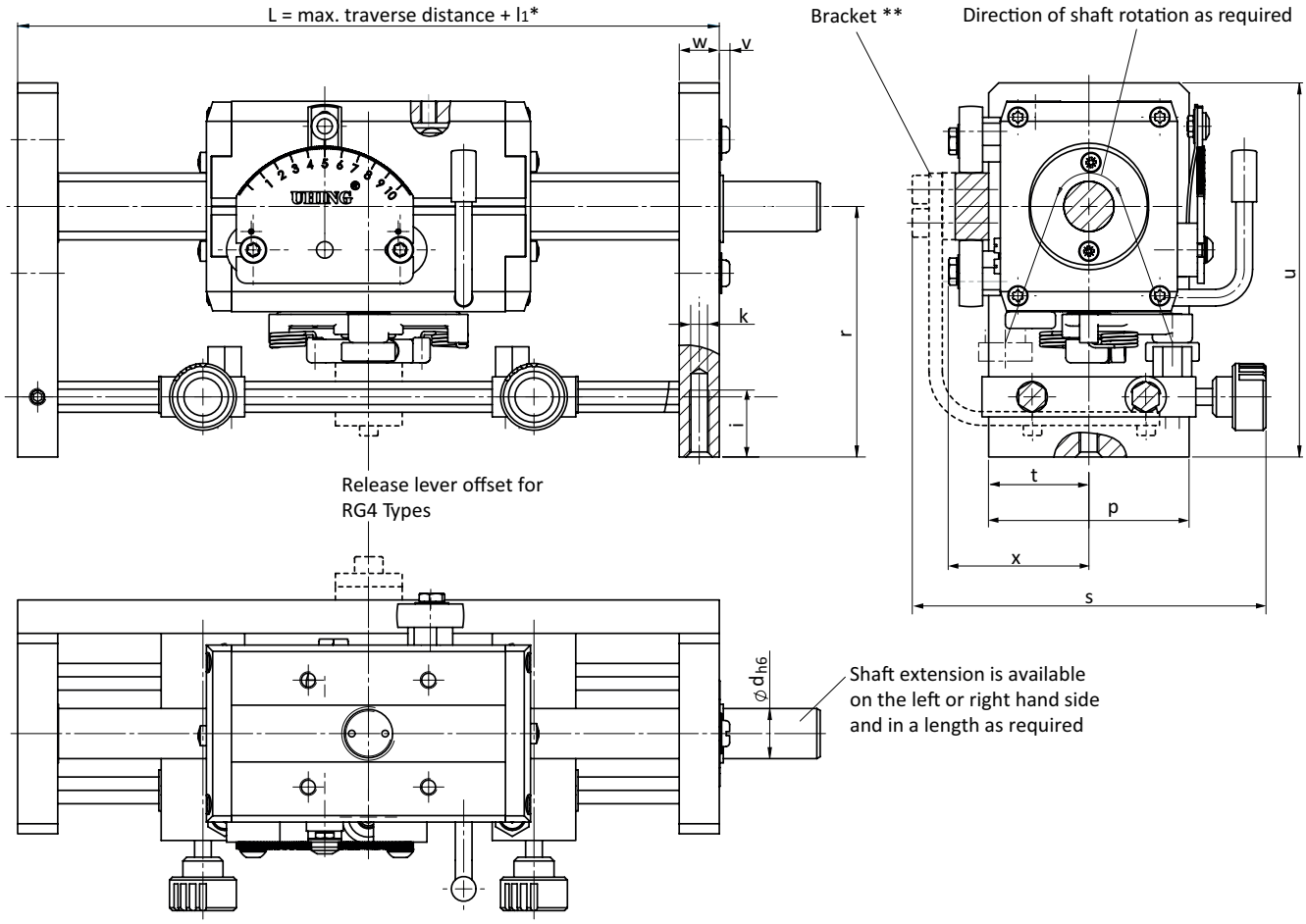


ARG3-20



ARG3-15

ARG Series Dimensional Diagrams



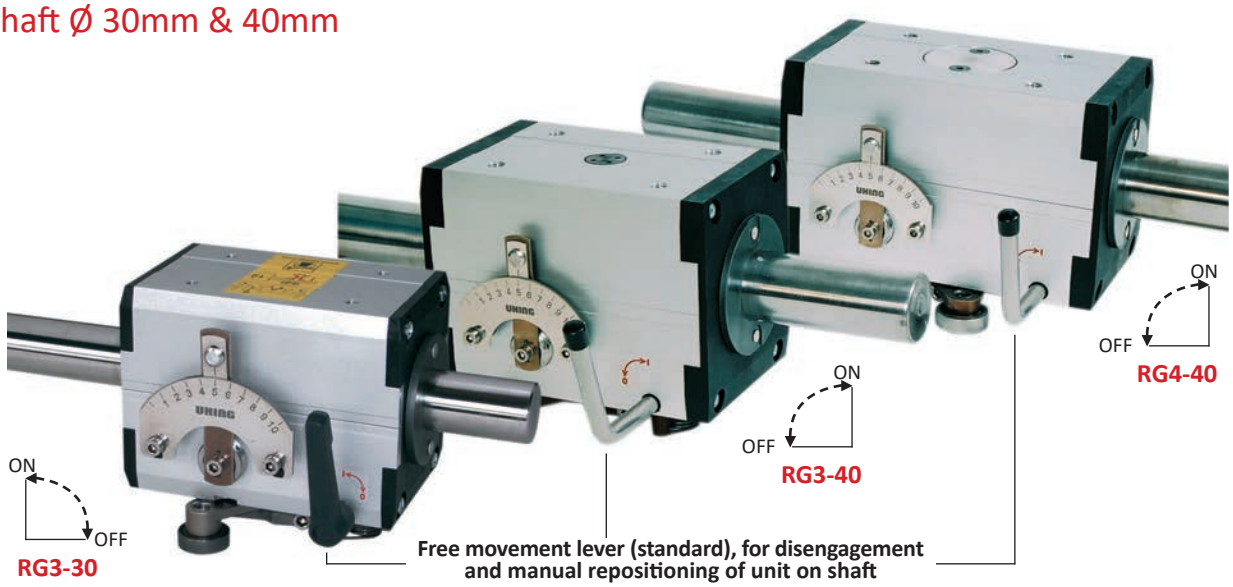
Additional Dimensions for ARG Series (mm)															
Order Ref.	r	u	i	k	l1*	p	s	t	v	w	x	Bracket for L ≥**	Side Force FRG (N)	Drive Torque M0 (Ncm)	Max. Pitch h (mm)
ARG3-15-2MCRF	75	112	20	M6	150	60	106	30	3	12	42	750	110	2.5	11.1
ARG4-15-2MCRF	75	112	20	M6	180	60	106	30	3	12	42	750	220	4.8	11.1
ARG3-20-2MCRF	104	145	24	M12	200	70	143	36	5.5	20	51.5	850	160	2.5	15.5
ARG4-20-2MCRF	104	145	24	M12	210	70	143	36	5.5	20	51.5	850	320	5.1	15.5
ARG3-22-2MCRF	104	145	24	M12	200	70	143	36	5.5	20	51.5	850	160	3.0	16.5
ARG4-22-2MCRF	104	145	24	M12	210	70	143	36	5.5	20	51.5	850	320	5.1	16.5

* l1 may change depending on optional features selected

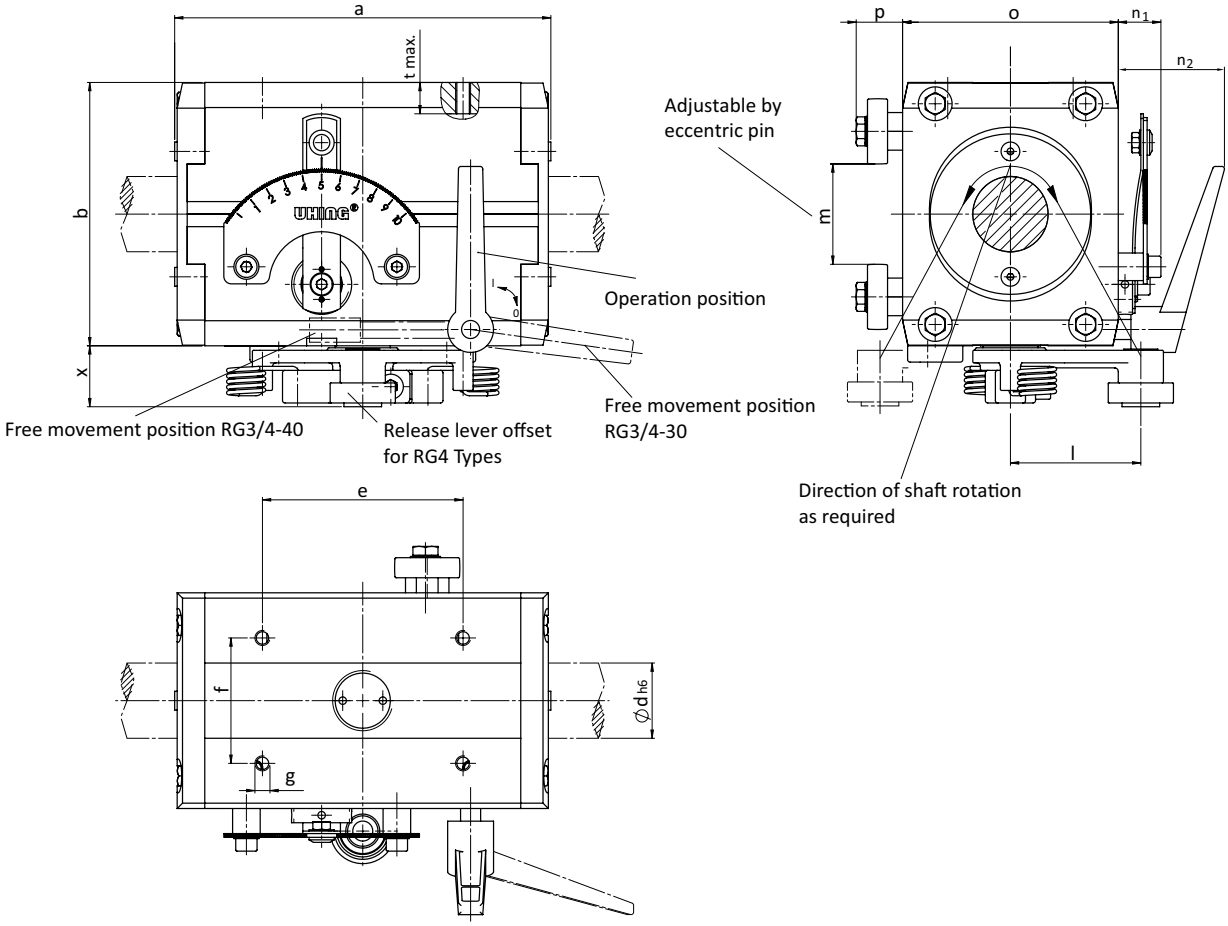
** Angle required for extended L dimension

RG / ARG Series - Rolling Ring Linear Drive Units & Assemblies

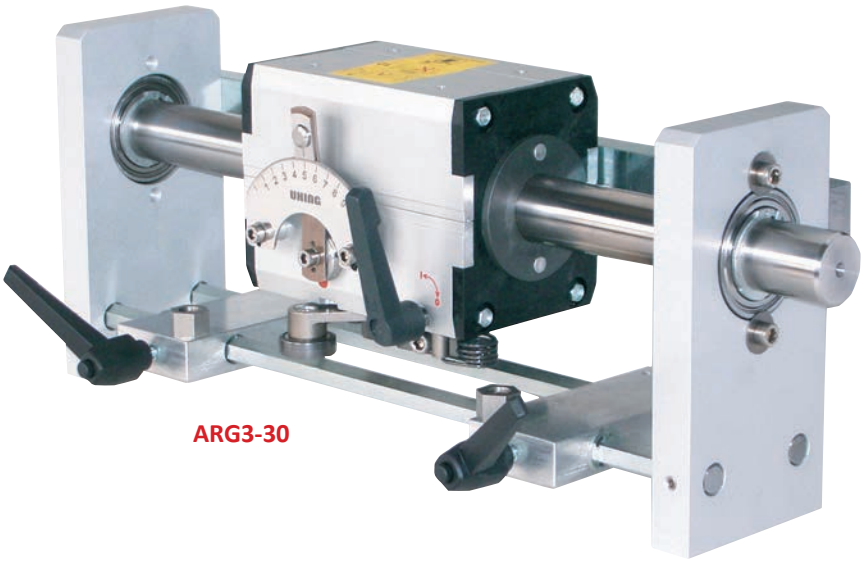
For Shaft Ø 30mm & 40mm



RG Series Dimensional Diagrams

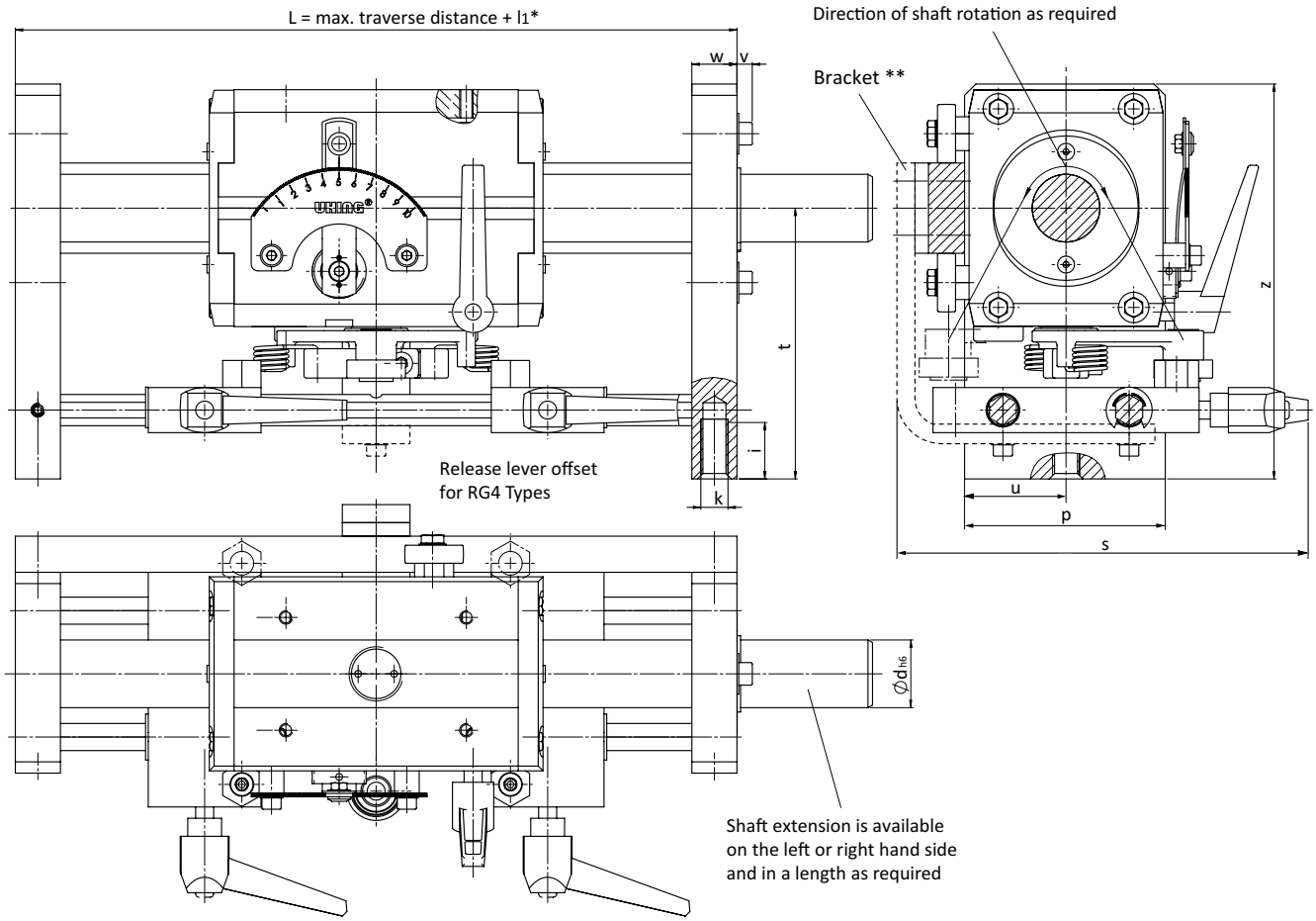


Dimensions for RG Series (mm)															
Order Ref.	Weight (kg)	a	b	Ød h6	e	f	g	l	n1	n2	o	p	tmax	m	x
RG3-30-2MCRF	2.7	150	105	30	80	50	M6	52	17	42.5	86	18.5	12	$40^{\pm 0.6}$	24.5
RG4-30-2MCRF	3.2	180	105	30	80	50	M6	52	17	42.5	86	18.5	12	$40^{\pm 0.6}$	24.5
RG3-40-2MCRF	4.4	182	128	40	100	68	M10	70	17	68	110	20	12	$50^{\pm 0.5}$	25.5
RG4-40-2MCRF	5.3	210	128	40	100	68	M10	70	17	68	110	20	12	$50^{\pm 0.5}$	25.5



ARG3-30

ARG Series Dimensional Diagrams



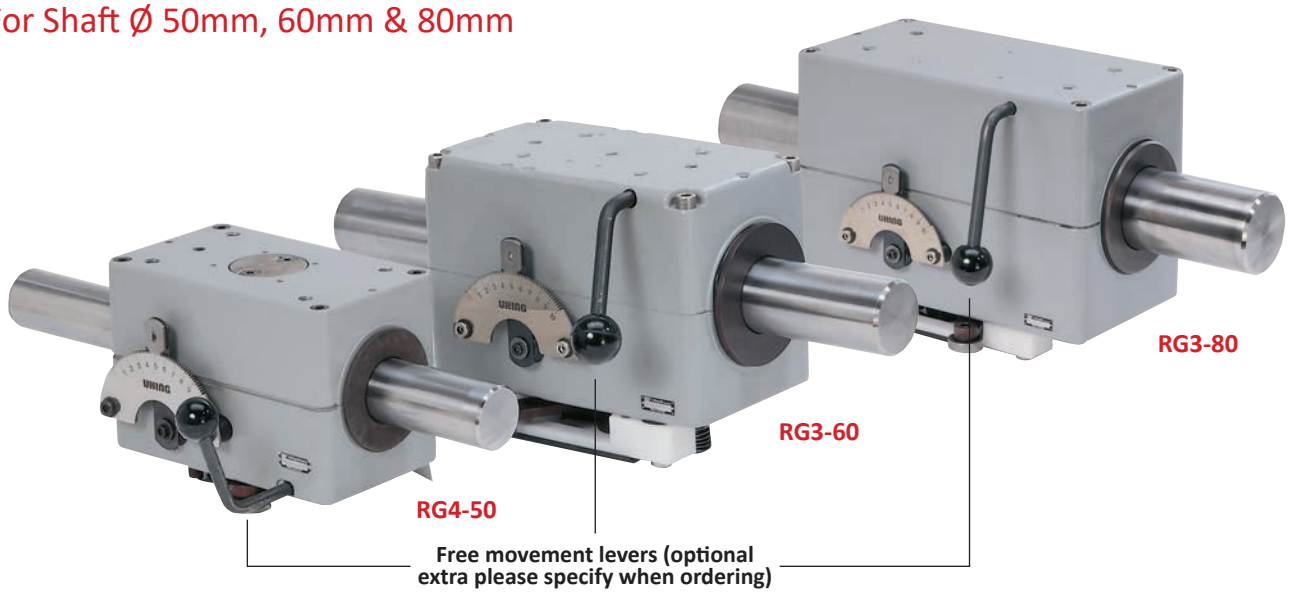
Additional Dimensions for ARG Series (mm)

Order Ref.	t	z	i	k	l1*	p	s	u	v	w	Bracket for L ≥**	Side Force FRG (N)	Drive Torque M0 (Ncm)	Max. Pitch h (mm)
ARG3-30-2MCRF	120	175	25	M12	240	89	182.5	45	7	20	940	260/400***	8/10.2	24
ARG4-30-2MCRF	120	175	25	M12	280	89	182.5	45	7	20	940	520	12	24
ARG3-40-2MCRF	150	220	32	M16	320	114	230.5	57	6.5	30	1100	420	28	32
ARG4-40-2MCRF	150	220	32	M16	350	114	230.5	57	6.5	30	1100	840	50	32

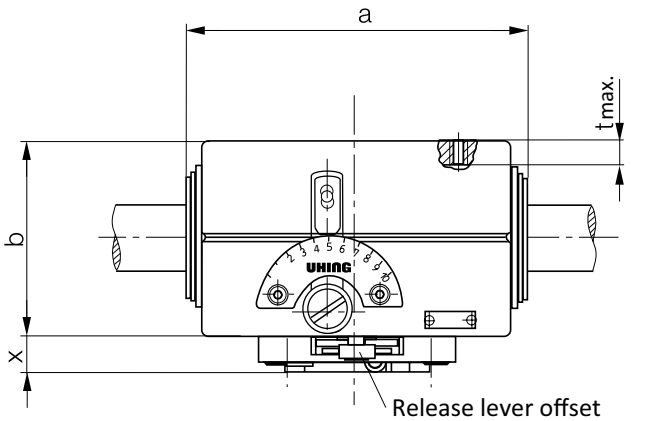
* l1 may change depending on optional features selected
** Angle required for extended L dimension
*** 260N as standard, increased side force of 400N available as an option

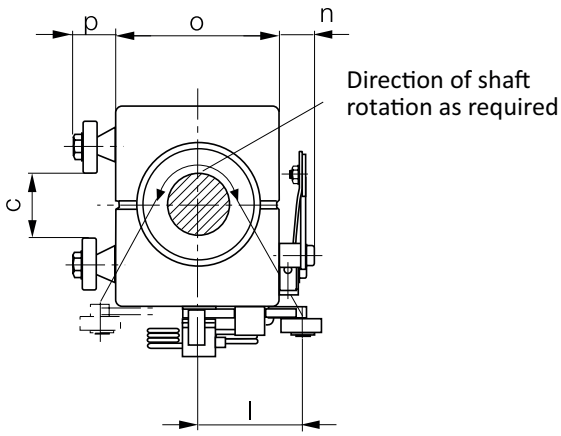
RG / ARG Series - Rolling Ring Linear Drive Units & Assemblies

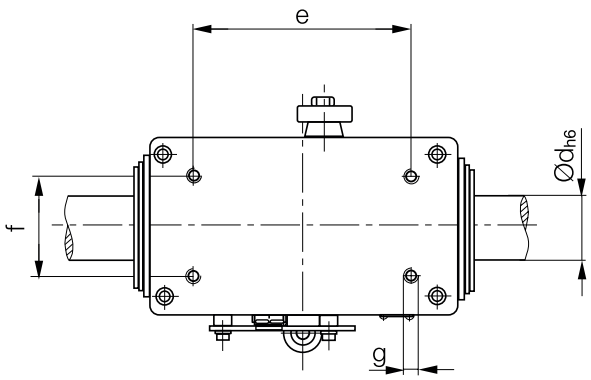
For Shaft Ø 50mm, 60mm & 80mm



RG Series Dimensional Diagrams





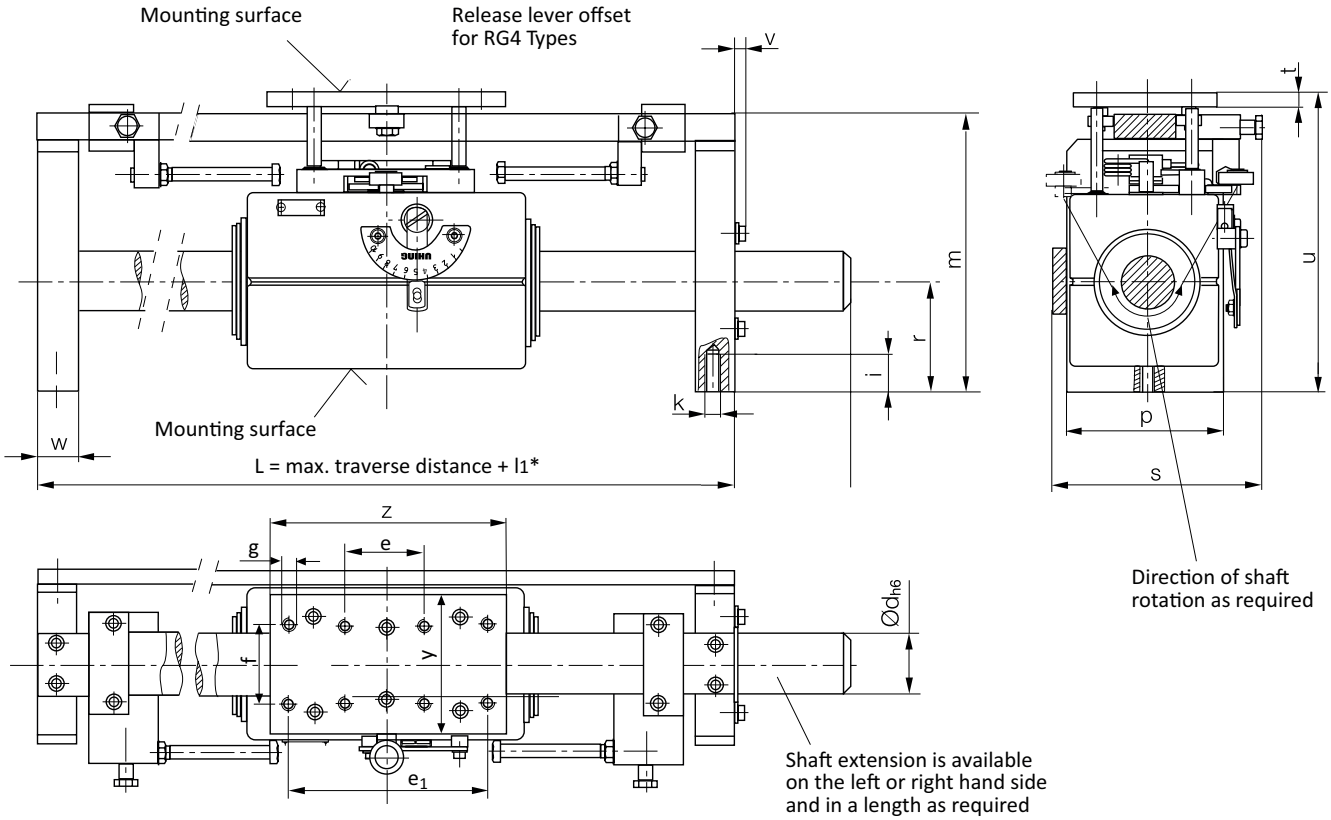


Dimensions for RG Series (mm)														
Order Ref.	Weight (kg)	a	b	Ød h6	e	f	g	l	n	o	p	t max	c	x
RG3-50-0MCR	9.8	240	154	50	160	90	M12	70	22.5	132	35	15	65	25.5
RG4-50-0MCR	11.1	240	154	50	160	90	M12	70	22.5	132	35	15	65	25.5
RG3-60-0MCR	17.0	297	190	60	120	80	M12	114	25.5	160	34	15	100	40
RG4-60-0MCR	19.6	297	190	60	120	80	M12	114	25.5	160	34	15	100	40
RG3-80-0MCR	27.0	368	236	80	240	80	M12	114	22.5	188	42	19	92	40
RG4-80-0MCR	32.0	368	236	80	240	80	M12	114	22.5	188	42	19	92	40

Note: On size RG80 MCRF, roller is on centre line of unit

ARG4-80

ARG Series Dimensional Diagrams



Note: ARG50 to ARG80 assemblies are supplied as standard with the traversing unit mounted upside down. Therefore when specifying direction of shaft rotation please note that the top of the unit may be at the bottom of your machine, as shown on page 20.

Additional Dimensions for ARG Series (mm)

Order Ref.	e_1	e	f	g	r	m	i	k	l_1*	p	s	t	u	v	w	z	y	Heavy Duty Steady Bar for L ≥	Side Force F_{RG} (N)	Drive Torque M_0 (Ncm)	Max. Pitch h (mm)
ARG3-50-0MCR1	160	0	90	M12	91	235 250[1]	32	M16	460	150	176 181[1]	12	256 271[1]	9.5	38	190	130	2000	700	70	40
ARG4-50-0MCR1	160	0	90	M12	91	235 250[1]	32	M16	460	150	176 181[1]	12	256 271[1]	9.5	38	190	130	2000	1400	120	40
ARG3-60-0MCR1	240	120	80	M12	140	330 340[2]	35	M16	580	170	253	15	352 362[2]	8	48	300	180	3000	1000	90	48
ARG4-60-0MCR1	240	120	80	M12	140	330 340[2]	35	M16	580	170	253	15	352 362[2]	8	48	300	180	3000	2000	150	48
ARG3-80-0MCR1	240	120	80	M12	140	350 380[3]	35	M16	620	200	268	15	375 405[3]	8	48	300	180	3600	1800	300	70
ARG4-80-0MCR1	240	120	80	M12	140	350 380[3]	35	M16	620	200	268	15	375 405[3]	8	48	300	180	3600	3600	350	70

* l_1 may change depending on optional features selected

[1] where L ≥ 2000, [2] where L ≥ 3000, [3] where L ≥ 3600

How to Order

Uhing Linear Drives												
Product Group	**Rolling Ring Drive**											**Kinemax**
Type Reference	**RG** (pages 14, 16 & 18) **ARG** (pages 15, 17 & 19)								**RGK** (page 12) **ARGK** (page 13)			**KI** (page 11) **AKI** (page 11)
Style (Number of Rolling Rings)	**3 or 4**								**3**			**3**
Size (Shaft Diameter)	**15**	**20**	**22**	**30**	**40**	**50**	**60**	**80**	**15**	**20**	**22**	**15**
Design Category	**2**	**2**	**2**	**2**	**2**	**0**	**0**	**0**	**0**	**1**	**1**	**6**
Features	**See pages 21-23**								**See pages 21-23**			
Customer Specific Features	**See page 23**								**Wipers**			**See page 23**

Example of Ordering specifications

Type Reference	**KI, AKI, RGK, ARGK, RG, ARG**										
Example	**RG**	**3**	**-**	**30**	**-**	**2**	**M**	**C**	**R**	**F**	**X**
Type Reference	●										
Style		●									
Separator Symbol			●		●						
Size				●							
Design Category						●					
Features							●	●	●	●	
Customer Specific Features*											●

* **X** e.g. Adapter (twist-free coupling), intermediate support bracket, heavy duty steady bar, drive motor, wipers, special paint finish, additional anti-corrosion protection, double bearing support, special pitch, noise dampening, sequence control, etc.

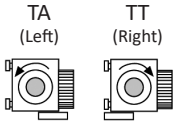
The following is also required:

- **Direction of shaft rotation**

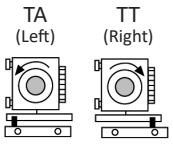
  TT (top towards) = Top of shaft rotating towards pitch scale

  TA (top away) = Top of shaft rotating away from pitch scale

KI/AKI



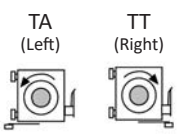
RGK/ARGK



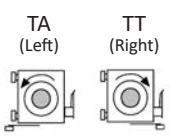
end stop position

Note: standard configuration for ARG50 to ARG80 is with top of unit at the bottom

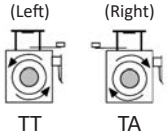
RG15 to **RG80**



ARG15 to **ARG40**



ARG50 to **ARG80**

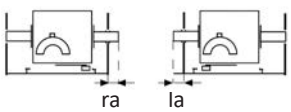


- **For assemblies shaft extension side and length (mm) are also required**

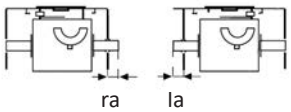
  ra = extending beyond the right-hand bracket when looking at the pitch selection scale

  la = extending beyond the left-hand bracket when looking at the pitch selection scale

for **ARG15** to **ARG40**

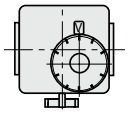


for **ARG50** to **ARG80**

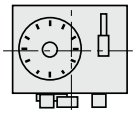


Base Model

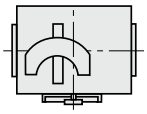
Rolling Ring Drives Types KI, RGK and RG



KI3-15



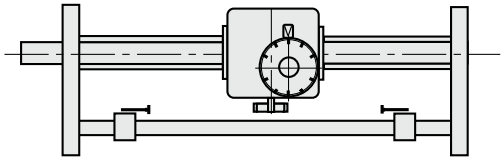
RGK3-15/20

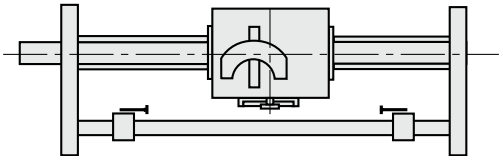


RG3/4-15 to **RG3/4-80**

Note: A Free-Movement Lever is standard with RG3/4-15 to RG3/4-40 and RGK.

Rolling Ring Drives Types AKI, ARGK and ARG



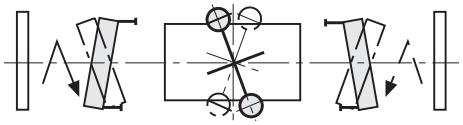


Rolling Ring Drive Units **KI**, **RGK** and **RG** with Shaft, Steady Bars, End Brackets and End Stops.

Optional Features

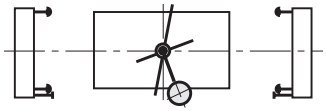
Reversal

D - Two-Way Shaft Rotation *2



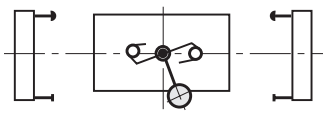
If a reversal mechanism is required suitable for either direction of shaft rotation (TA/TT), a push-rod is required which engages with the end stops to alter the direction of travel. The push-rod is not supplied.

H - Control Lever, Double-Sided *2



Provides reversal slowdown over short and adjustable slowdown length. Can be used to provide slowdown control both **before and after the reversal**.

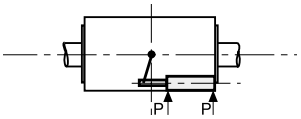
M - Instantaneous Reversal (Standard Option)



Mechanical spring operated trigger action automatic reversal of the direction of travel.

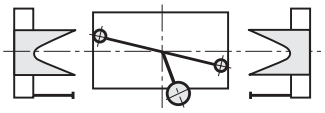
Minimum length of traverse stroke = approx. 1x shaft diameter.

N - Pneumatic *1



The direction of travel is reversed by the action of a two-way pneumatic cylinder (operating pressure = 6 bar).

V - Reversal Slowdown *2



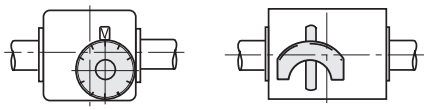
Reversal slowdown for slowdown lengths in excess of 15mm via cam and contact lever system.

*1 Reversal characteristic **N** can be further combined with reversal characteristics **H** and **V** and with stopping characteristic (**O**). With such combination, an additional restart system (**O1**) or (**O2**) is not required as the restart can be activated by pneumatic cylinder (**N**).

*2 Feature is not available for KI or RGK

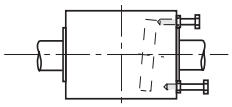
Pitch Setting

C - Scale
(Standard Option)



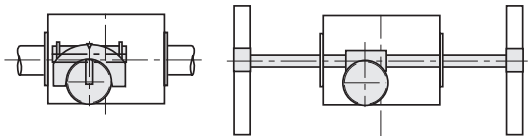
Pitch setting via knob (KI / RGK) or the engagement of a lever in a serrated scale (RG). Simultaneous setting of the same pitch in both directions of travel.

S - Set Screws *2



Infinitely variable pitch setting with separate settings for each direction.

Z - Worm Drive *2



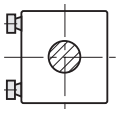
Simultaneous infinitely variable setting of the same pitch in each direction of travel.

Types RG: Supplied without wormwheel drive shaft. If required an operation knob is available (X).

Types ARG: Supplied with worm drive shaft for remote adjustment from either end (to be specified). Also available with adjustment control (X).

Steady Rollers

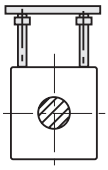
R



Rolls on rear of unit which (in conjunction with a rear steady bar) prevent the rotation of the unit on the shaft.

Standard with RG3/4-15 to RG3/4-80, ARG3-15 to ARG3/4-40, RGK3-15/20/22 and ARGK3-15/20/22.

R1

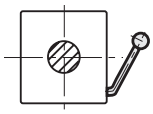


Rolls on rear of unit which (in conjunction with a rear steady bar) prevent the rotation of the unit on the shaft.

Standard with ARG3/4-50 to ARG3/4-80.

Free-Movement Lever

F - Mechanical
(Standard Option)



After operation of the free-movement lever, the unit can be pushed freely along the shaft.

Standard with RG3/4-15 to RG3/4-40 and RGK.

P - Pneumatic *2

Side thrust of the unit is achieved pneumatically, free movement (pushing the unit freely along the shaft) by venting the pneumatic cylinder. System also suitable for remote control.

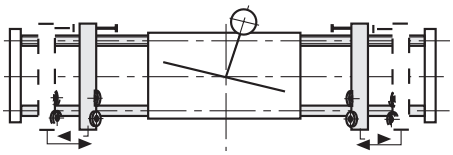
Operating pressure = 6 bar

Note:
In vertical applications, before operating the free-movement lever, please ensure that the load cannot fall in an uncontrolled manner, which could result in injury.

Attention:
All Rolling Ring Drive Units, especially if fitted with feature F or P are not allowed to be rigidly connected to a separate load carrier (see page 28, item 5).

Stroke width adjustment

B - Self-Adjusting End Stops *2

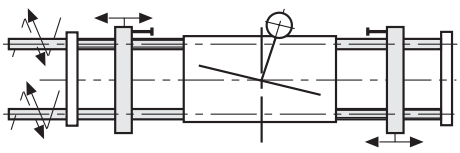


For continuously increasing or decreasing the traverse width during the winding operation.

Only recommended with units having a free-movement lever (F).

Please contact Techna if application is vertical.

W - Lead Screw Operated End Stops *2



Remote lead screw adjustment of the traverse width operated from one of the end bracket positions.

Can also be supplied with a handwheel control or with a control motor drive (X).

*2 Feature is not available for KI or RGK

Stopping on a rotating shaft and restarting

O - Stopping *2

The Rolling Ring Drive is brought to a standstill position on the rotating shaft by reducing the pitch to 0.

Only available in combination with units having reversal type **H**, **K** and **V**.

Restart via **O1** or **O2**.

For information concerning standstill times, please contact Techna.

O1 - Pneumatic Restart *2

Restart activated by a single action pneumatic cylinder (operating pressure = 6 bar) which operates the reversal mechanism.

O2 - Electro-Magnetic Restart *2

Restart activated by solenoids (operating voltage 24 Vdc) which operate the reversal mechanism.

Load Carrier

LZ

Roller style load carrier designed to absorb loads and twisting forces. Dimensions upon request.

Customer specific special features

X

Adapter (twist-free coupling) *2
Angle Bracket
Heavy Duty Steady Bar
Drive Motor
Wipers (between unit and shaft)
Special Paint Finish
Anti Corrosion Protection
Double Bearing Support
Special Pitch
Noise Dampening
Sequence Control

*2 Feature is not available for KI or RGK

RG Drives Selection

Formulae and Related Units

a(m/sec²)	- Acceleration at the reversal point
d(mm)	- Shaft diameter
F(N)	- Side thrust required
F_{RG}(N)	- Side thrust produced by Rolling Ring Linear Drive Unit
F_R(N)	- Friction (F_N .µ) only relevant when the associated mass is mounted on its own independent carriage
F_N(N)	- Normal force of total weight of associated mass and carriage
µ	- Coefficent of friction
F_Z(N)	- Additional force requirement e.g. where unit is utilised as a reciprocating cutting device, the force required to cut material
f(mm)	- Shaft sag from Fig. 1 (see page 24)
g(m/sec²)	- Acceleration due to gravity (9.81m/sec²)
h(mm)	- Pitch of unit (travel per shaft revolution)
h_{max}(mm)	- Maximum pitch see Fig. 3 (see page 25)
l(mm)	- Length of shaft between centres of bearing brackets
m(kg)	- Total mass to be moved, including the Rolling Ring Linear Drive Unit, connections etc.
M_d (Ncm)	- Drive torque
M_O (Ncm)	- Idling torque
n(r.p.m.)	- Shaft speed
n_{crit}(r.p.m.)	- Critical shaft speed
P(kW)	- Drive power required
s(mm)	- Length of reversal slowdown cam
t(sec)	- Reversal time from Fig. 2 (see page 24)
v(m/sec)	- Max. traverse speed required. Should always be calculated at maximum unit pitch (pitch setting 10 from Fig. 2 on page 24)
C(N)	- Dynamic loading of Rolling Rings
P_R(N)	- Radial loading of Rolling Rings

1 - Preselection

A unit should be preselected by estimating the side thrust required and/or giving consideration to the permissible shaft sag **f** with reference to Fig. 1.

1.1 - Rolling Ring Linear Drive Units with Instantaneous Reversal (Feature M)

Only suitable for traverse speeds up to:

Kinemax, RG15, RG20:	**0.30 m/sec**
RG30, RG40:	**0.40 m/sec**
RG50, RG60, RG80:	**0.25 m/sec**

The reversal time **t** is dependent on the size of the Rolling Ring Unit and the pitch selected via the scale (pitch angle). The reversal action is of the triggered throwover type.

$$F = 2.5 \frac{m \cdot v}{t} + F_R + F_Z + 1.25 \cdot m \cdot g + (F_k)^*$$

*see section 5 - Winding Applications

To find reversal time **t**:
Using the pitch selection scale value 10 in Fig. 2, find the curve for the appropriate unit size and read off the corresponding reversal time **t**.

Note: The value of side thrust **F** calculated must be less than that of the Rolling Ring Linear Drive Unit selected. $F < F_{RG}$

If necessary, select a different size of unit and repeat the process.

For winding applications please also refer to section 5.

Reduce shaft sag by using double shaft bearings.

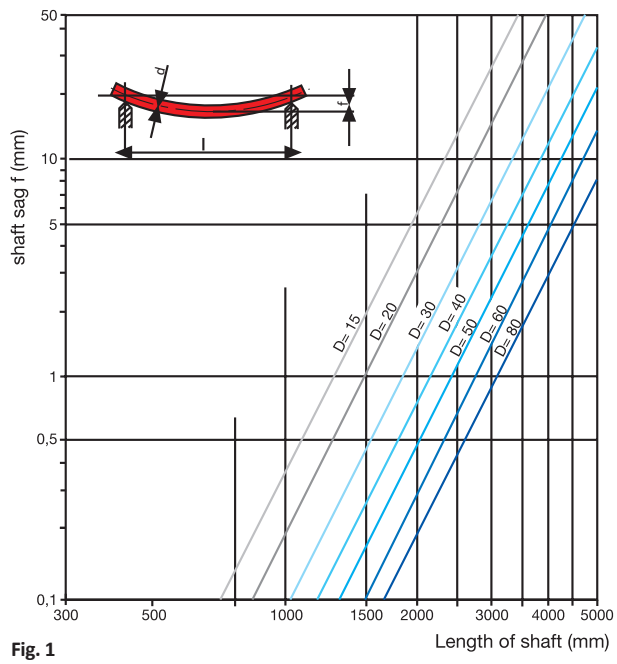


Fig. 1

1.2 - Rolling Ring Linear Drive Units with Reversal Slowdown (Feature V)

Suitable for traverse speeds up to approx. 4.2 m/sec.

A reversal with slowdown reduces the forces imposed on the unit at the reversal point.

$$F = 1.25 \cdot m \cdot a + F_R + F_Z + 1.25 \cdot m \cdot g$$

If a maximum rate of acceleration **a** is specified, the required length **s** for the delay cam is calculated as follows:

$$s = \frac{v^2 \cdot 10^3}{a}$$

If the delay cam length s is specified, the acceleration a is calculated as follows:

$$a = \frac{v^2 \cdot 10^3}{s}$$

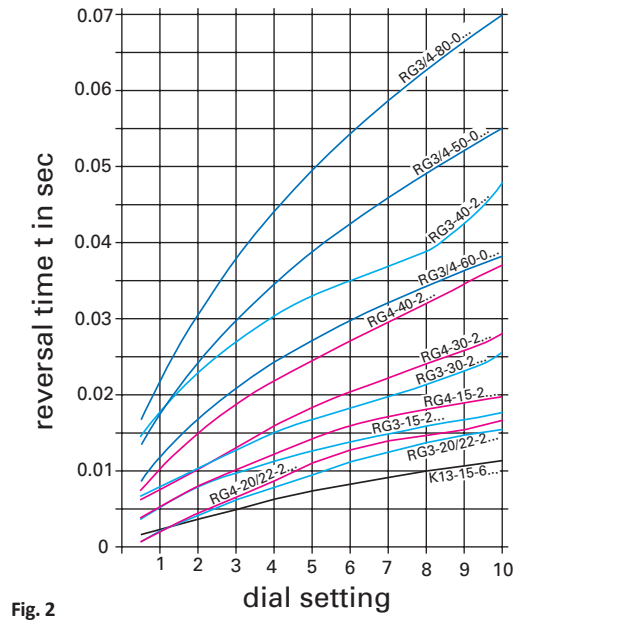


Fig. 2

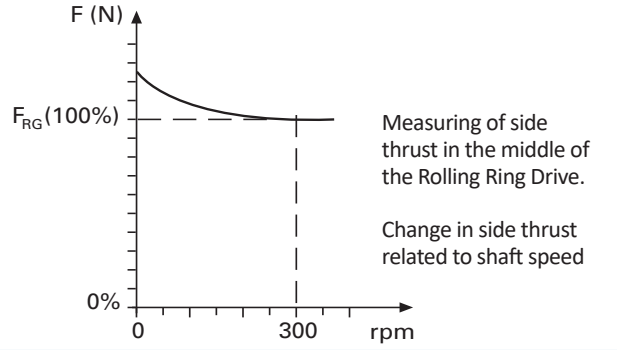
2 - Side Thrust

The value of side thrust **F** calculated must be less than that of the Rolling Ring Linear Drive Unit selected. $F < F_{RG}$

If the side thrust available from the unit chosen is too little, either a larger unit or a longer length of delay must be selected.

The thrust provided by the units is virtually constant for shaft speeds above 300 rpm. For slower speeds the thrust increases a little over the specified catalogue values as the speed reduces towards zero.

Increased life can be attained by adjustment (reduction) of required side thrust calculated from (1.1) or (1.2).



3 - Shaft Rotation Speed: RPM

3.1 - Calculation

$$n = \frac{v \cdot 6 \cdot 10^4}{h_{max}}$$

Recommended speed range:

n_{min} = 5 rpm. (min)
n_{max} = 3000 rpm. (max)

For speeds outside this range, please consult Techna.

The pitch h is obtained by taking the 10 setting value for the pitch selection scale and relating it to the graph for the appropriate unit size. (Fig. 3)

Minimum reversal distance:

Feature **M** (see page 21) ≈ 1 x d
Feature **E+N** (see page 21) > 0

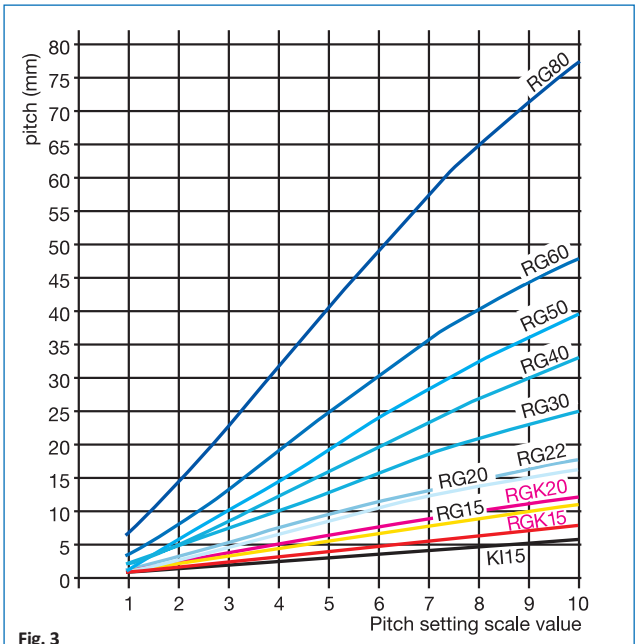


Fig. 3

3.2 - Critical Shaft Speed

$$n_{crit} = 1.225 \cdot 10^8 \quad \frac{d}{l^2}$$

Note: Depending upon its quality, the shaft can go out of balance at a speed of up to 25% lower than that specified above.

If it is necessary to go through a critical range in order to reach the operational speed, this can lead to short term shaft vibration. This has no effect on the operation of the drive.

If the operational speed is in the critical speed range, this can be rectified as follows:

1. with a double bearing support at one end:
   Increase factor approx. 1.5.

2. with double bearing supports at both ends:
   Increase factor approx. 2.2.

The distance between the bearing support brackets should be at least 2.5 x the diameter of the shaft.

4 - Shaft Drive

4.1 - Drive Torque

$$M_d = \frac{F_{RG} \cdot h_{max}}{20 \cdot \pi} + M_O$$

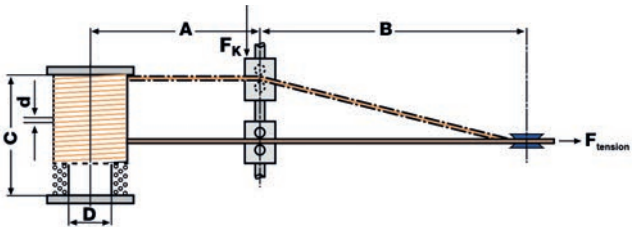
M_O to be taken from pages 13 to 19 depending upon model.

4.2 - Drive Power Requirement

$$P = \frac{M_d \cdot n}{9550 \cdot 10^2}$$

5 - Winding Applications

5.1 - Formulae and Related Units



A(mm)	= Distance between traverse and spool
B(mm)	= Distance from previous pay-off
C(mm)	= Traverse width
D(mm)	= Barrel diameter of bobbin
d_{max}(mm)	= Maximum diameter of material to be wound or maximum pitch
$F_{tension}$(N)	= Tension in the material to be wound
F_K(N)	= Component of force working against the direction of travel of the traverse
h_{max}(mm)	= Max. pitch of unit selected, taken from pages 13, 15, 17 and 19 depending upon model
v_w(m/sec)	= Winding line speed

5.2 - Tension

In winding operations, the force F_K acting on the traverse and related to the tension $F_{tension}$ in the material to be wound, is a major factor in the selection of a Rolling Ring Traverse.

$$F_K = \frac{C \cdot F_{tension}}{1.6 \times \sqrt{\frac{C^2}{4} + B^2}}$$

As, almost invariably, traverses with instantaneous reversal are used for winding applications, the value calculated for F_K must be added to the side thrust required figure taken from section (1.1).

5.3 - Calculation of Traverse Speed

$$v = \frac{v_w \cdot d_{max}}{D \cdot \pi \cdot 0.95}$$

5.4 - Optimum Ratio between Spool Shaft and Traverse Shaft Speeds

$$i_{opt} = 0.95 \frac{h_{max}}{d_{max}}$$

$i_{opt} > 1$ = traverse shaft slower than spool shaft
$i_{opt} < 1$ = traverse shaft faster than spool shaft

For definitions see (5.1).

5.5 - Please Note

Pitch settings lower than "1" on the scale should be avoided if the requirement is for a high quality of wind. Compensate by changing the ratio between the spool shaft and traverse shaft speeds. (Reduce traverse shaft speed).

6 - Calculation of the operational life of Uhing Rolling Rings

1. Select a "C" (constant) value for the unit type in use:

   C1 = Unit operating continuously on rotating shaft without a standstill.
   C2 = Unit operating continuously and including a standstill on a rotating shaft.

Type RG	C1(N)	C2(N)	Type RG	C1(N)	C2(N)
15/KI	6050	2800	50	29600	18300
20/22	11200	5600	60	37700	24500
30	16800	9300	80	58800	39000
40	21600	13200			

2. **Calculate P_R**

   KI and all RG3-types: $P_R = 5 \cdot F_{RG}$*
   all RG 4-types: $P_R = 2.5 \cdot F_{RG}$*

   Note: *F = standard maximum side thrust produced by Rolling Ring drive unit, unless the side thrust has been de-rated to increase operational life of the rolling-rings. (see note: Derating Side Thrust).

3. Divide C by P_R
4. Calculate the required shaft speed as shown.

$$n = \frac{v \cdot 6 \cdot 10^4}{h_{max}}$$

5. Determine the operational life in hours from the chart opposite.

Example 1	Example 2
ARG 3-30-2 VCRF Speed 0.9 m/sec. Standard Thrust F = 260 N	ARG 3-30-2 VCRF Speed 0.9 m/sec. Reduced Thrust F = 200 N
$C_1 = 16{,}800$	$C_1 = 16{,}800$
$P_R = 5 \cdot 260\ N = 1{,}300\ N$	$P_R = 5 \cdot 200\ N = 1{,}000\ N$
$\frac{C_1}{P_R} = \frac{16{,}800}{1{,}300} = 12.92$	$\frac{C_1}{P_R} = \frac{16{,}800}{1{,}000} = 16.8$
$n = \frac{0.9 \cdot 6 \cdot 10^4}{25} = 2{,}160$ rpm	$n = \frac{0.9 \cdot 6 \cdot 10^4}{25} = 2{,}160$ rpm
$L_{10h} = 16{,}500$ Hours of Operation	$L_{10h} = 35{,}000$ Hours of Operation

Note: Derating Side Thrust

If the width of the required traverse dictates that the unit selected is larger than otherwise necessary we generally end up with a Uhing traverse unit with more thrust than is required for the application. Using a unit with de rated side thrust in this type of application will extend the life of the rolling rings in a Uhing traverse giving considerably extended service periods.

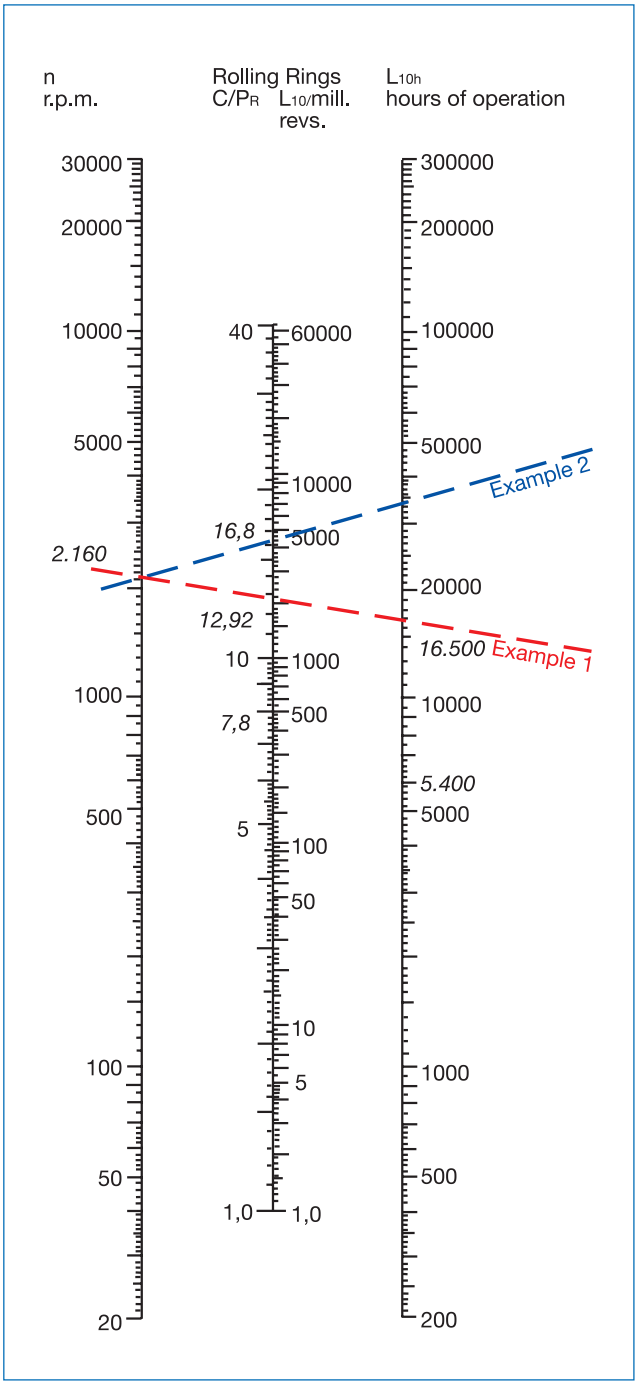
This MUST be included on your order

Example:

A 3000mm long traverse width will dictate a selection of an RG4-80-0 unit to achieve the required shaft sag specification. However if the application only requires 1000N of side thrust we are using a unit that has more than three times this side thrust at 3600N.

At 3000mm the shaft sag for an RG4-80-0 unit approximately 0.75mm; however a RG4-50-0 has 3mm of shaft sag.

In this case we would use an RG4-80-0 and de rate the thrust to 1200N, thus extending its service intervals.



RG Drives Operating Guide

Safety advice: the movements of the traverse drive can cause crushes and therefore the traverse must be guarded.

1 - Shaft Material

1.1 - Basic Requirements

Uhing Linear Drives should only be used in conjunction with steel shafts manufactured from induction surface hardened, ground and finished bar of the following quality, minimum:
- surface hardness: 50 HRC
- tolerance on diameter: h6
- out of roundness: maximum one half of the diameter variation permitted by ISO tolerance h6
- true running tolerance (DIN ISO 1101): ≤ 0.1 mm/m

1.2 - Precision Shaft

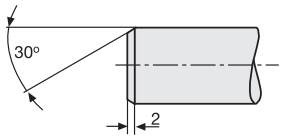
Standard: Material Cf 53,
Mat.-Nr. 1.1213 induction surface hardened, 60-64 HRC
Rust resistant:
Material X 40 Cr 13, Mat.-Nr. 1.4034 induction surface hardened, 51-55 HRC
Rust and acid resistant:
Material X 90 CrMoV 18 Mat.-Nr. 1.4112 induction surface hardened, 52-56 HRC
- all ground and superfinished
- surface roughness: mean value (DIN 4768 T.1) R_a: ≤ 0.35 µm
- tolerance on diameter: h6
- out of roundness: maximum one half of the diameter variation permitted by ISO tolerance h6
- true running tolerance (DIN ISO 1101): ≤ 0.1 mm/m

1.3 - Precision Shafts with Enhanced True Running Tolerance

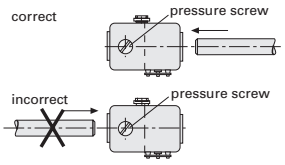
As 1.2, but
- true running tolerance (DIN ISO 1101): ≤ 0.03 mm/m

1.4 - Leading End Chamfer

The leading end of the shaft should be chamfered to avoid damage to the Rolling Rings when screwing the unit onto the shaft.



The following method should be followed to facilitate screwing the shaft into the unit:



For units not having a pressure screw (KI and types RG 4-15/20/22/30-2) the entry side for the shaft does not matter.

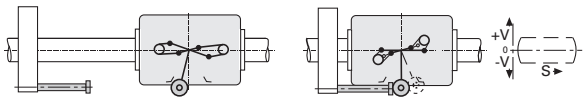
2 - Shaft Rotation

The mechanical reversal of the Rolling Ring Linear Drive is related to the direction of shaft rotation. Therefore it is critical to specify the required direction of rotation when ordering. (except for feature **D - either direction of shaft rotation**).

3 - Reversal

3.1 - Instantaneous Reversal (Feature M)

Mode of operation: on making contact with a traverse stroke limiting endstop, the torsion springs in the reversal mechanism, trigger the reversal once the throwover position has been reached.



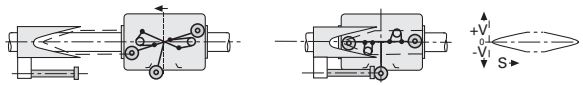
For the reversal mechanism to operate, a minimum distance of travel equivalent approximately to the diameter of the shaft (dependent of the pitch setting) is required. The reversal time is also pitch related (see Fig. 2, page 24). Consequently, as the pitch is increased, there is a slight increase in the traverse stroke length (and a decrease if the pitch is reduced).

Differences in the stroke length also result when the speed of a unit, the pitch of which remains unaltered, is varied by significantly changing the shaft speed.

Drive speed increases = increase in length of stroke,
Drive speed decreases = decrease in length of stroke.

3.2 - Reversal Slowdown (Feature V)

Mode of operation: just prior to the reversal point an additional lever, which terminates in a contact bearing, makes contact with a V-shaped slowdown cam which causes it to swivel. This swivel action serves to reduce the unit's pitch as it approaches the reversal point such that the instantaneous reversal which follows is at a greatly reduced traverse speed.



As a result of the reversal slow-down, the forces exerted on the unit through the reversal are reduced, and high traverse speeds, without slip, are possible.

The reversal slowdown is predominantly distance related and changes in pitch do not effect the length of traverse stroke.

4 - Pitch Setting

The pitch is the distance travelled per revolution of the shaft. With a Uhing Rolling Ring Linear Drive, this is variable between nearly zero and a maximum specified value. The pitch can be set either when the unit is in motion or stationary.

The following pitch setting possibilities are available:
Kinemax: self retaining knob for infinite variability.

Feature C: 100/50 pitch selection scale covering the full pitch range.

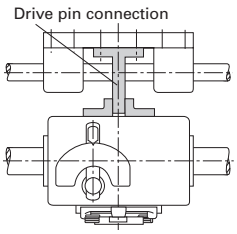
Feature S: Set screws for the infinitely variable setting of the pitch in each direction.
Feature Z: Worm gear drive for infinitely variable pitch setting. Remote control from one of the end bracket positions possible.

Note: With the exception of S type units, the pitch is generally set to be the same for both directions of travel. The difference in pitch in the two directions (symmetry) is factory set not to exceed 2.5%.

5 - Separately Carried Additional Loads

If Rolling Ring Linear Drives are used to move separately carried loads, a “floating, self-aligning”, torque-free coupling must be used to compensate for any normal misalignment between the drive shaft and the carriage bar, to avoid any detrimental effect on the side thrust.

Fig. 1



It should be additionally ensured that the distance between the point of connection and the unit is as short as possible, as twisting moments affect the thrust produced.

Optimum couplings are twist-free as shown in Fig. 2 and 3.

Fig. 2 Coupling connection at end of unit

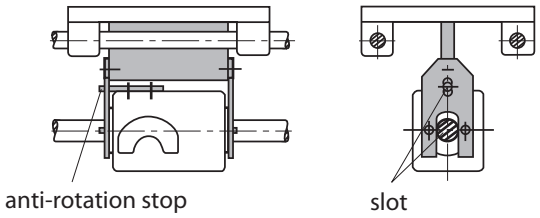
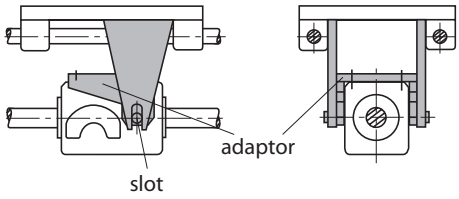


Fig. 3 Coupling connection at side of unit

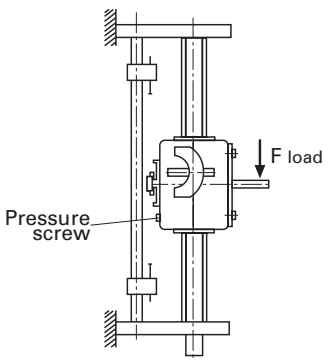


6 - Vertical Applications

Attention should be given to the direction of the applied load and the position of the pressure setting screw so as to avoid a drop in thrust efficiency (except with KI 3-15-6, RG 4-15/20/22/30-2).

In the arrangement illustrated, there is an increase in thrust when unit is moving up the shaft.

In applications using units with a free-movement-lever, care must be taken before operation to ensure that the load can not drop in an uncontrolled way - injury could result.



7 - Stopping on Rotating Shaft

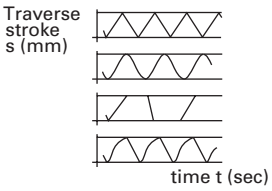
Rolling Ring Linear Drives fitted with slowdown cams (type V) or a control lever (H or K) can, with appropriate control, be brought to a standstill (pitch setting “0“) without the need to stop the shaft. This could be necessary if the drive is being used as a feed mechanism and is required to wait for a start signal at one or both ends of its traverse stroke.

Intermediate stop positions between the end stop positions are also possible. If tolerance of positional accuracy is greater than ± 0.5 mm, slowdown cams are adequate. Otherwise, if accuracy better than ± 0.5 mm is sought, a control lever should be used.

To protect the condition of the shaft, we recommend that the drive to the shaft be switched out if the standstill period exceeds 5 sec. at full rated thrust. The standstill time can be extended if the shaft speed is low or the thrust is reduced. Please ask for further information.

8 - Traversing Characteristics

By using a lever, the end of which is in the form of a roll which makes contact with cams which are arranged along the length of the traverse stroke, the pitch - and with it the speed - can be matched to the most varied requirements, the distances travelled being exactly repeatable.



9 - Synchronization of Processes

Drives fitted with set screws (type S) offer the possibility of exactly relating the speed to that of already existing processes, e.g. synchronisation of a travelling cutting head in cutting operations involving continuously fed materials.

If the Uhing shaft and the material feed have a common drive, synchronization is maintained even if the material speed varies.

10 - Operating Temperature

Suitable for a temperature range of -10° to +80° C.
Special styles available for other temperatures on request.

11 - Maintenance

Shaft: MoS2 free ballbearing greases can be used, e.g. SKF Alfalub LGMT, Shell Alvania R2 or G2 Esso Beacon 2.

Procedure: Clean the shaft and spread the grease with a rag as thinly as possible.

Unit: Lubricate the reversal mechanism, particularly the springs, with high viscosity machine oil (SAE 90).

Frequency: Monthly.

shorter intervals are recommended e.g.
- where a unit is required to be stationary on a rotating shaft
- it is working in shifts
- where it operates under extremely dusty conditions
- at temperatures over 80°C.

Shafts

- Induction surface hardened
- All sizes available, cut to length
- Can be machined to customer drawings (keyway, undercut etc.)

Shaft Diameter (mm)	h_6 Tolerance (µm)
6-10	-0 -9
10-18	-0 -11
18-30	-0 -13
30-50	-0 -16
50-80	-0 -19

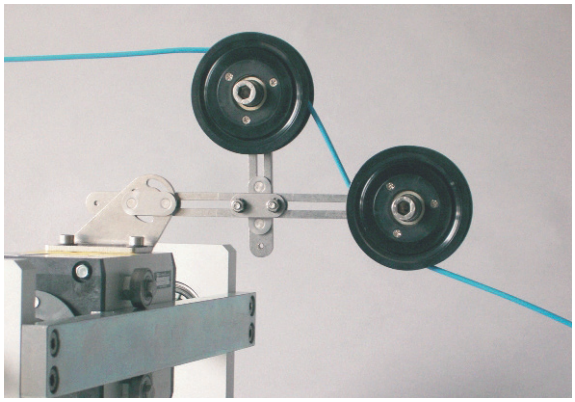
GS Guide System

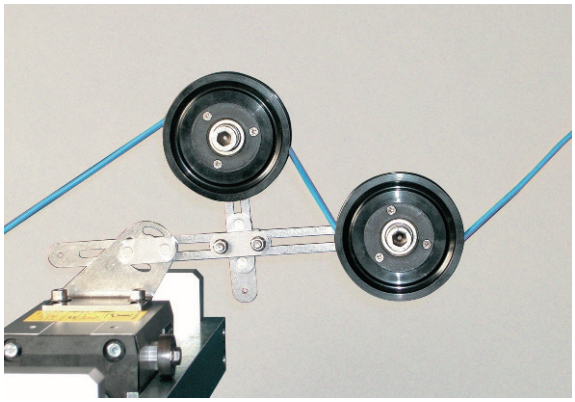
Developed for use with Rolling Ring Linear Drive Types RG15/RG20/RG22 and RG30, the GS Guide System uses various connection components which can be assembled in numerous configurations to suit individual applications.

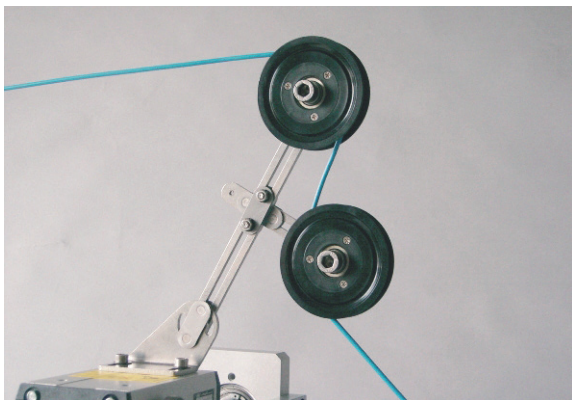
Also available, the HGS Guide System, which is optimally suited for higher tractive forces that are caused by heavy material or more precise guidance of the material to be wound. This specially designed guide system is intended for use with Rolling Ring types RG15, RG20 and RG30. For more information on the HGS Guide System, please contact Techna.

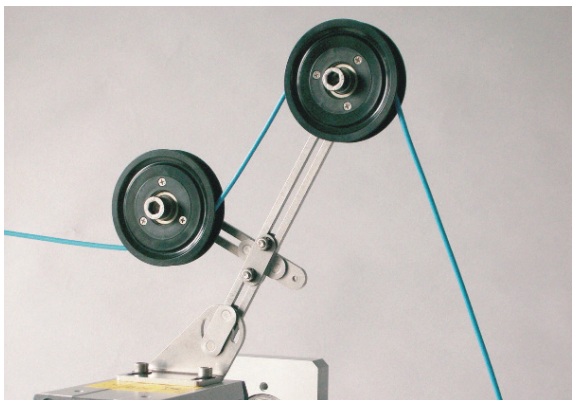
Advantages

- Modular design
- Continuously adjustable
- High rigidity
- Adapter available for assembly onto Rolling Ring Drives from KI to RG30
- Made from stainless steel
- Versatile attachment options for Guide Rollers
- Suitable for all traversing systems

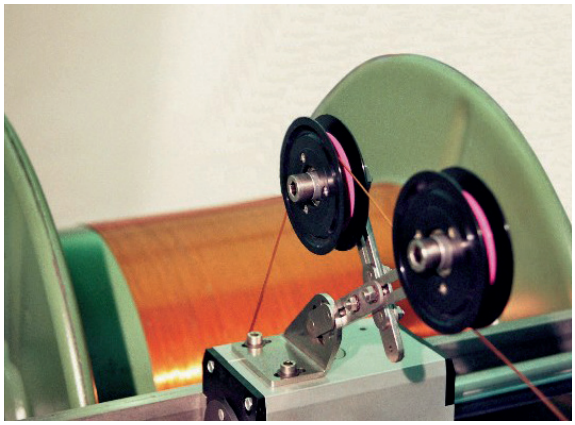


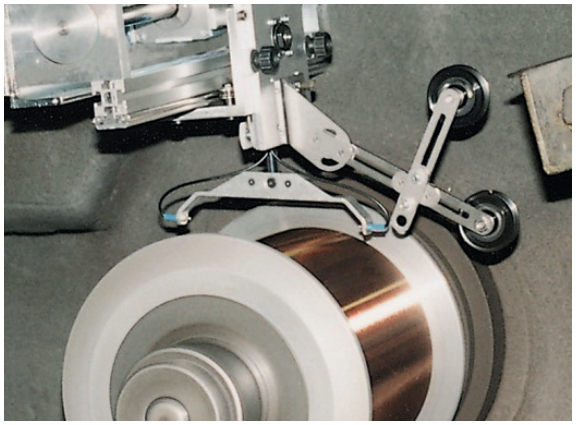


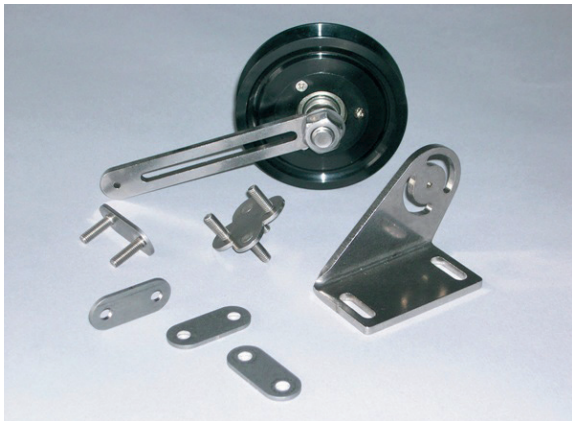




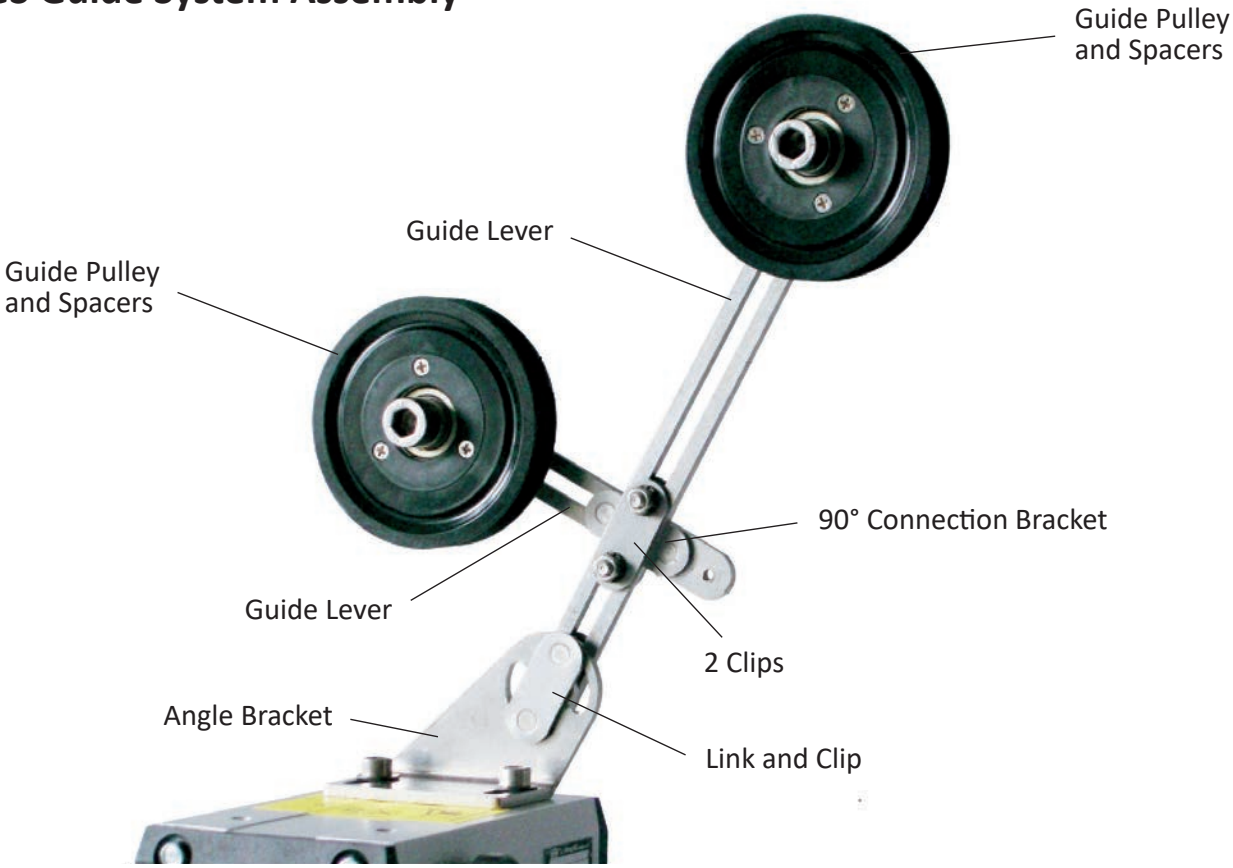
Examples of Application





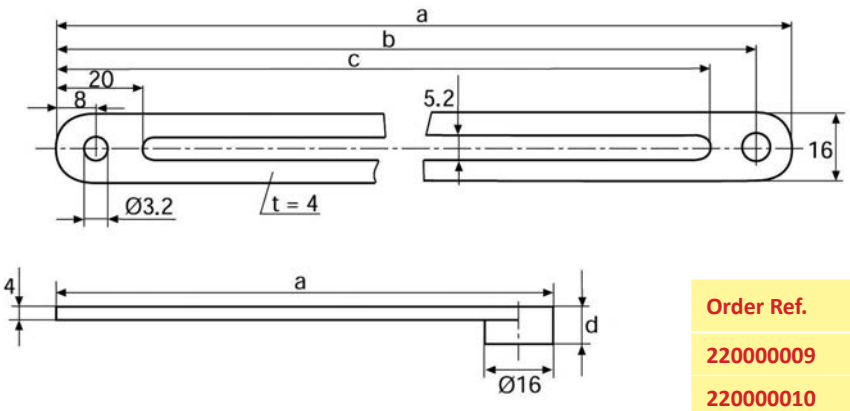


GS Guide System Assembly



Technical Data

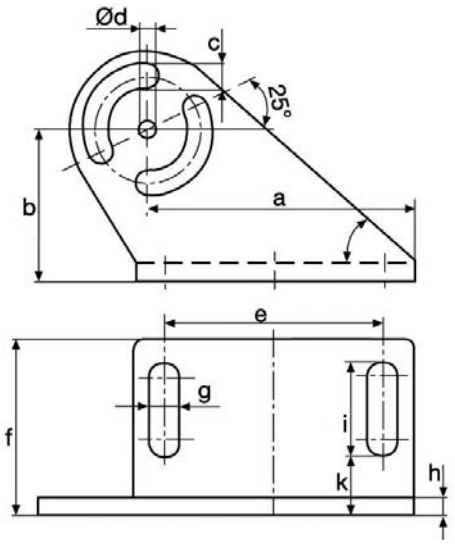
1 - Guide Lever



Nuts and washers supplied.

Order Ref.	a	b	c	d
220000009	234	226	214	-
220000010	175	167	155	-
220000011	117	109	97	10

2 - Angle Bracket

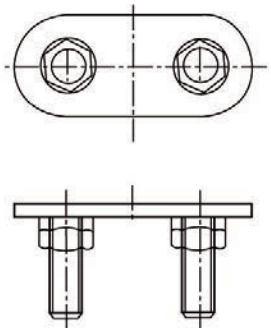


Order Ref.	a	b	c	Ød*	e	f	g	h	i	k
for KI/RG15 220150002	54	35	5.5	3.2	32	25	6.4	4	15	7
for RG20/22 220200002	56	35	5.5	3.2	40	35	6.4	4	21	9
for RG30 220300002	61	35	5.5	3.2	50	40	6.4	4	21	14

*Bore hole if required

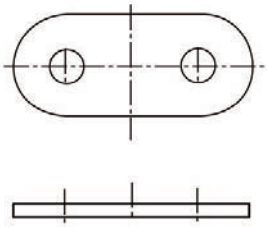
3 - Link

220000012



4 - Clip

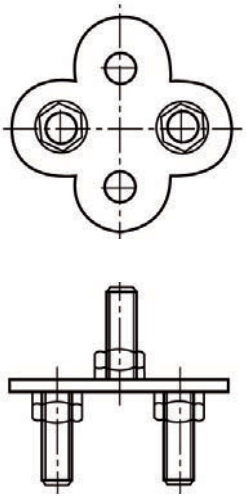
220000013



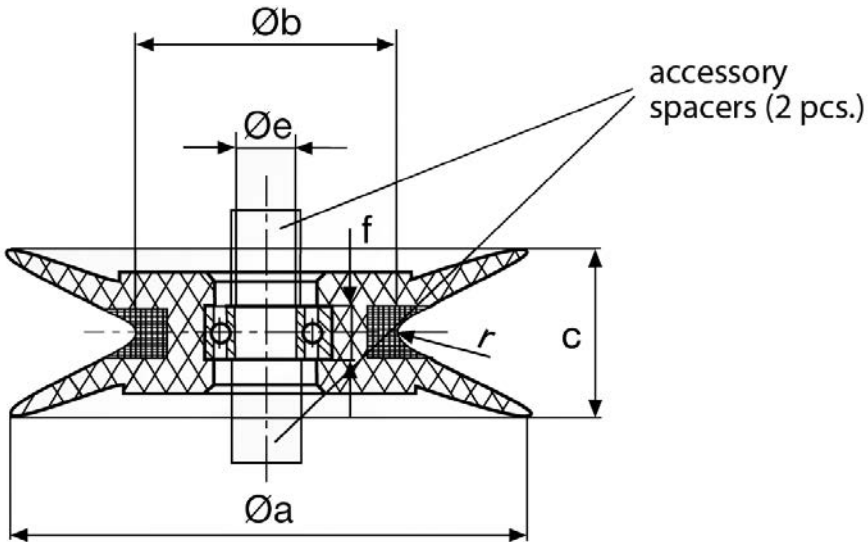
5 - 90° Connection Bracket

Assembly requires 2 x clips (item 4, bottom left)

220000005



6 - Guide Pulleys/Spacers



Dimensions (mm) / Guide Pulleys

Order Ref.	Øa	Øb	c	Øe	f	r
UA 1001	20	15.5	5	3	3	0.5
UA 1002	30	20.5	6	4	4	1
UA 1004	40	20	14.5	4	4	1
UA 1005	45	29.5	10.5	6	6	1
UA 1006	60	41.5	12.5	8	7	1
UA 1007	60.5	29.5	20	6	6	1
UA 1008	80	50	16.5	10	9	2
UA 1009	80	39.5	25	8	7	1
UA 1010	100	50	29	10	9	2

Spacers

Order Ref.	Inner Ø	Outer Ø	Width
220000020	3.2	4	2
220000021	4.2	6	3
220000023	4.2	6	6.5
220000024	6.2	10	4
220000025	8.2	12	4
220000026	6.2	10	8
220000027	10.2	16	5
220000028	8.2	12	10
220000029	10.2	16	11

How to Order

Order Ref.	Guide Lever	Angle Bracket	Connector	Pulleys	Spacers
GS	220000009	220150002	220000005	UA1001	220000020