

Setup and description of push/pull cables

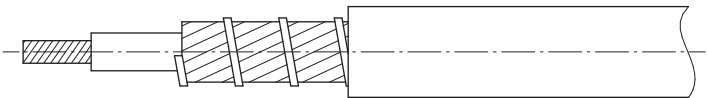


Setup

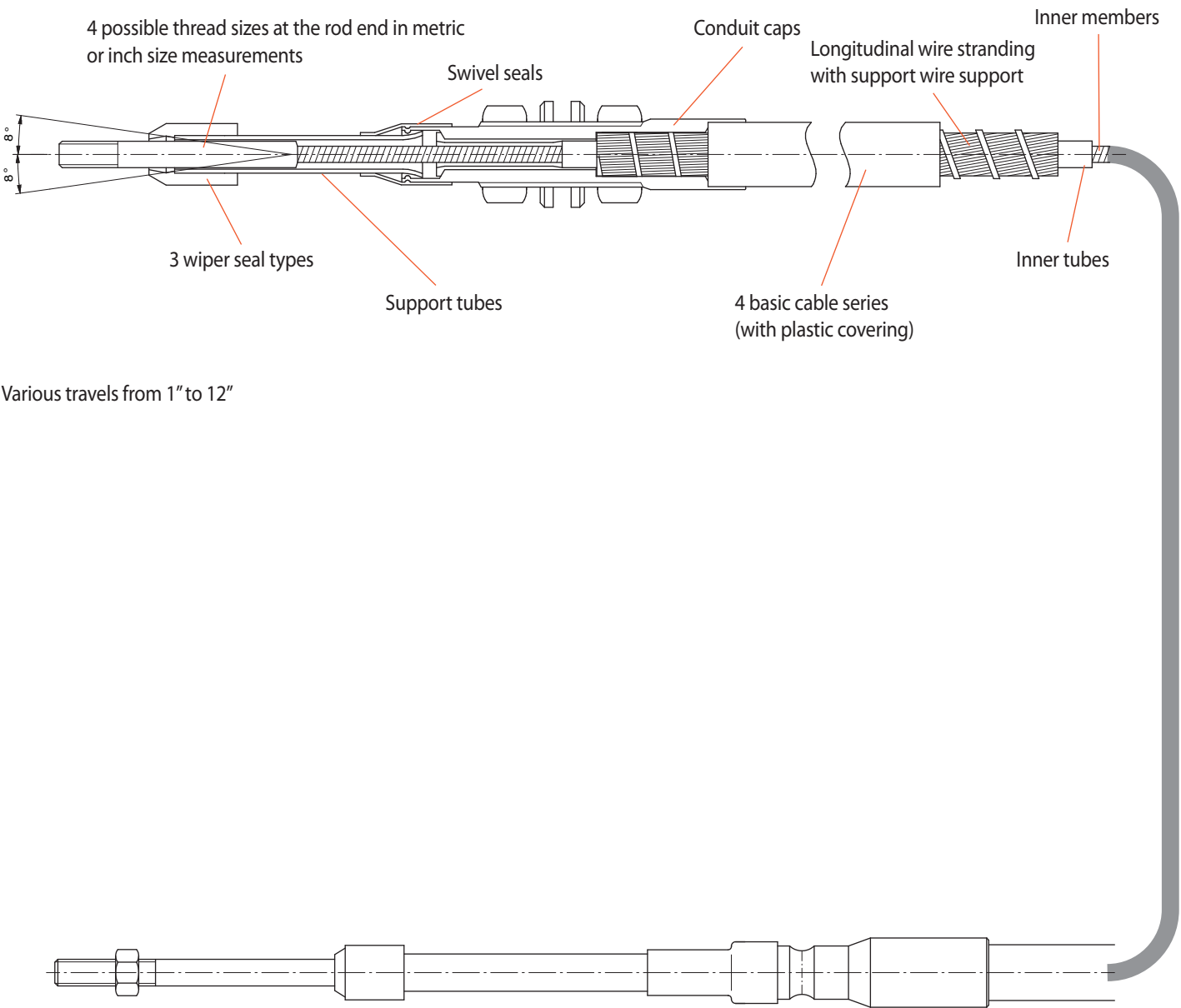
A flat wire-reinforced inner member is located in a conduit, which is formed by an inner-lying inner tube and specially arranged longitudinal wires (linear wire stranding). The linear wires on the other hand (with the exception of types 770) are supported and fixed by a support wire winding. A plastic extrusion is doing the outer coverage of the conduit. For the universal connection of elements, the inner member and

conduit are supported with pressed on zinc-coated or stainless steel end parts. The push/pull cables are designed lightly gliding and are supplied with low-friction permanent

































lubrication. Effective seals protect the moving elements of the push/pull cables against external influences such as spray water, dust and corrosion.



Setup of the conduit, depicted with the inner member



Overview of push/pull cables

Cable series	Bend radius		Temperature range		Sliding characteristics		Design of end parts	
	small	medium	medium	high	light	extra light	zinc-coated	stainless
383								
384								
283								
284								
275								
274								
775								
774								

Cable sizes				
U	V	L	M	H
• Travel up to 76 mm • Push forces 70 N • Pull forces 450 N	• Travel up to 152 mm • Push forces 135 N • Pull forces 540 N	• Travel up to 152 mm • Push forces 225 N • Pull forces 1 035 N	• Travel up to 152 mm • Push forces 450 N • Pull forces 1 800 N	• Travel up to 152 mm • Push forces 1 350 N • Pull forces 4 500 N
				
				
				
				
				
				
	*			
	*			

\* upon request

## Cable series

### the basis of Remote Control System

Our cable series are offered in five sizes. In the standard version, three end part configurations are designed. There are six different types of tra-

vel, which can be combined with three different seals. A multitude of additional possibilities for configuration and variation in the setup of the

cables are possible in order to create a solution that fits to the respective application.

#### Series 383 and 384

- Series 383 with zinc-coated end parts and stainless steel rod ends
- Series 384 with stainless steel end parts
- PTFE-covered inner member
- Highly efficient without stick-slip effect
- Remarkably small bend radii
- Extremely smooth at high loads
- Colour: blue/red marked
- For cable sizes V, L and M
- High temperature range from -50 °C to +100 °C (constant) and short term up to +170 °C



6-1

#### Series 283 and 284

- Series 283 with zinc-coated end parts and stainless steel rod ends
- Series 284 with stainless steel end parts
- PTFE-covered inner member
- Highly efficient without stick-slip effect
- Remarkably small bend radii
- Extremely smooth at high loads
- Colour: blue/yellow marked
- For cable sizes U, V, L, M and H
- High temperature range from -50 °C to +90 °C (constant) and short term up to +150 °C



6-2

### Series 275 and 274

- Series 275 with zinc-coated end parts and stainless steel rod ends
- Series 274 with stainless steel end parts
- Inner member stainless steel reinforced
- Highly efficient
- Remarkably small bend radii
- Extremely smooth
- High travel frequencies
- Colour: blue
- For cable sizes U, V, L and M
- High temperature range from -50 °C to +90 °C (constant) and short term up to +110 °C



### Series 775 and 774

- Series 775 with zinc-coated end parts and stainless steel rod ends
- Series 774 with stainless steel end parts
- Attractive pricing
- Highly efficient
- For applications without special requirements
- Colour: black
- For cable sizes U, L and M
- High temperature range from -50 °C to +80 °C (constant) and short term up to +100 °C














# Selection of cable sizes

Cable sizes, maximum travel, bend radii, seals, thread rod ends, outer diameter of conduits and push and pull forces depending on the travel



Cable sizes, maximum travel, bend radii, seals, thread rod ends and outer diameter of conduit

Cable size	Max. travel mm	Bend radius for cable series				Seals			Thread rod ends		Outer diameter of conduit for cable series			
		383/384	283/284	275/274	775/774	No. 05 for normal applications	No. 10* for fine dust	No. 20* for extreme conditions	metric	inch	383/384	283/284	275/274	275/274
U	76	-	51	51	115				M5	10-32	-	6,8	6,8	7,5
V	152	51	51	51	-				M5	10-32	8,8	8,8	8,8	-
L	152	76	76	76	180				M6	1/4-28	12,2	13,3	13,3	11,0
M	152	127	127	127	230				M8	5/16-24	14,5	15,0	15,0	14,0
H	152	-	152	-	-				M10	3/8-24	-	17,6	-	-

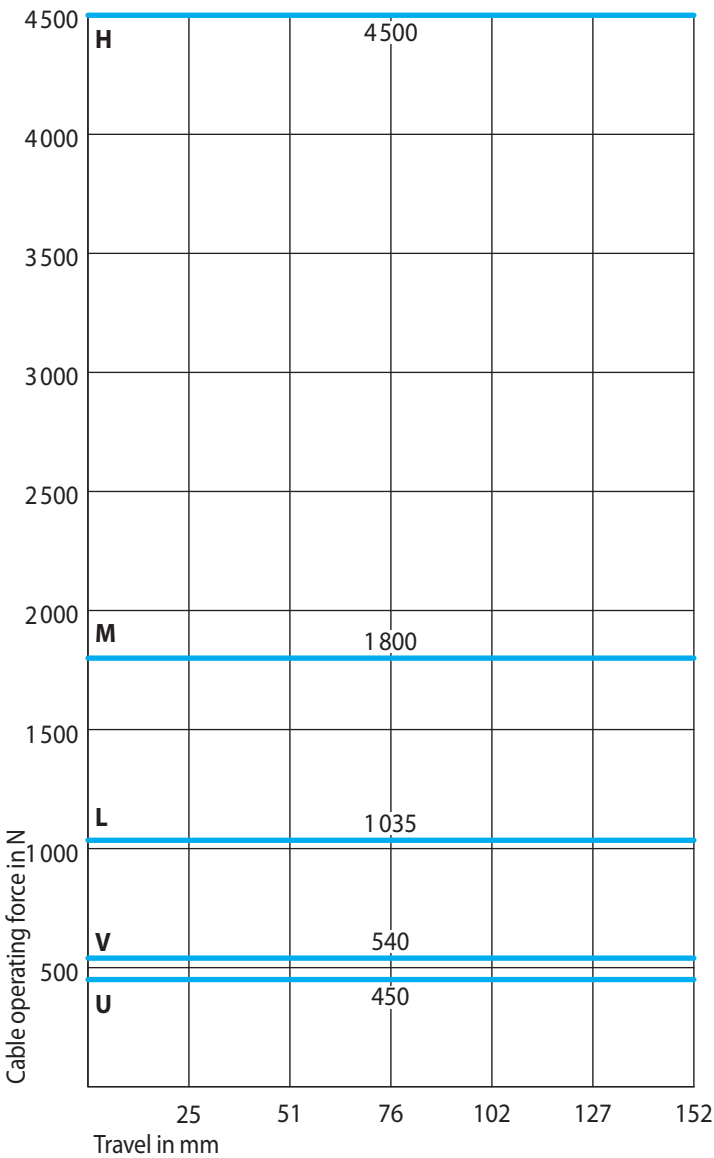
\* except for connections S and R

Push and pull forces depending on the travel

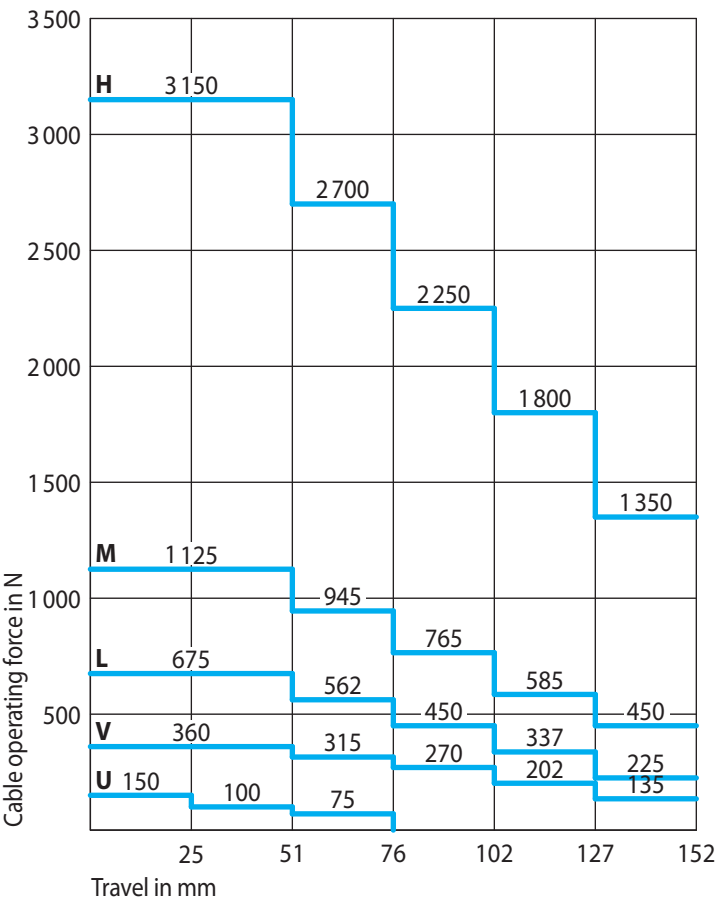
The specified forces are applicable for use in permanent operation with a long service life.

A safety factor of 1.5 can be used to calculate the temporary overloads.

Pull forces diagram



Push forces diagram



Selection of cable sizes

Efficiencies

RINGSPANN®

RCS

Efficiencies

The efficiency of a push/pull cable (the relation of the required cable operating force to a given output force) is particularly influenced by the number of bends laid in the cable.

The cable operating force can be calculated in accordance with the following formula:  
Operating force = Output force x Efficiency factor

$\alpha$  is the sum of all cable bends in degrees. In addition to the cable bends, the cable length is to be taken into consideration with 15° for every 1 meter.

Series	Efficiency factor for $\alpha$				
	180°	360°	540°	720°	900°
383 + 384	1,17	1,36	1,59	1,85	2,16
283 + 284	1,17	1,36	1,59	1,85	2,16
275 + 274	1,31	1,72	2,26	2,96	3,88
775 + 774	1,31	1,72	2,26	2,96	3,88

Example of efficiency factor

Cable series283

Cable sizeL

Cable length12 m

Sum of bends180°

alpha180° + 12 x 15° = 360°

Efficiency factor1,36

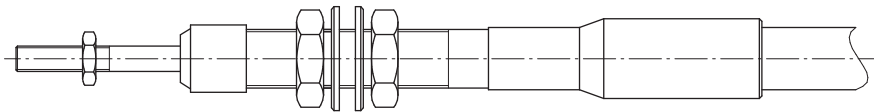
Standard end parts

RINGSPANN®

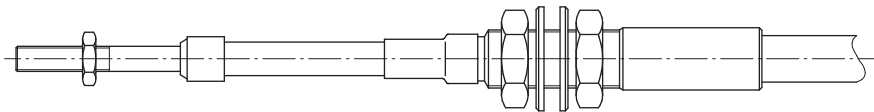
Connection types of cable end parts, wiper seals and lubrication



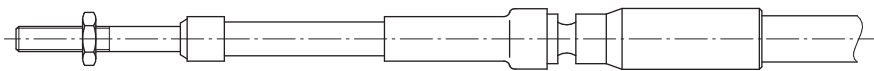
Connection types of cable end parts



Rigid screw endfitting type S and R



Swiveled bulkhead endfitting type T



Swiveled clamp endfitting type G

Wiper seals

Seal no. 05

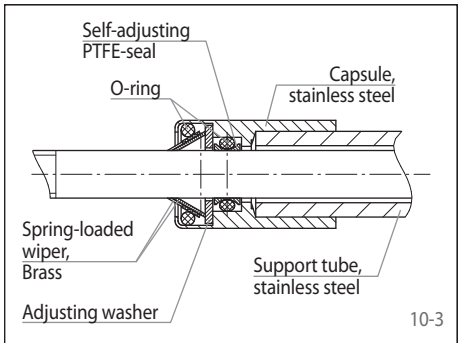
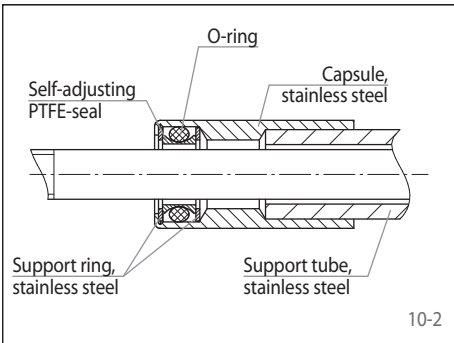
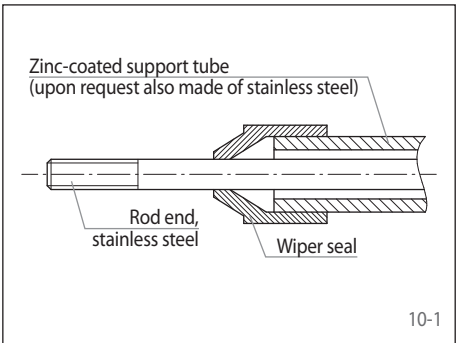
The rubber wiper seal has been proven for all cable sizes for normal applications in the entire machine construction. Upon request also with a support tube from stainless steel.

Seal no. 10

Automatic self-adjusting PTFE wiper seal in case of wear for cable sizes U, V and L. Protects well against fine dust.

Seal no. 20

Design like seal no. 10 with additional double spring-loaded metal wiper, for cable sizes L, M and H. For extreme conditions such as sludge, coarse dirt and ice.



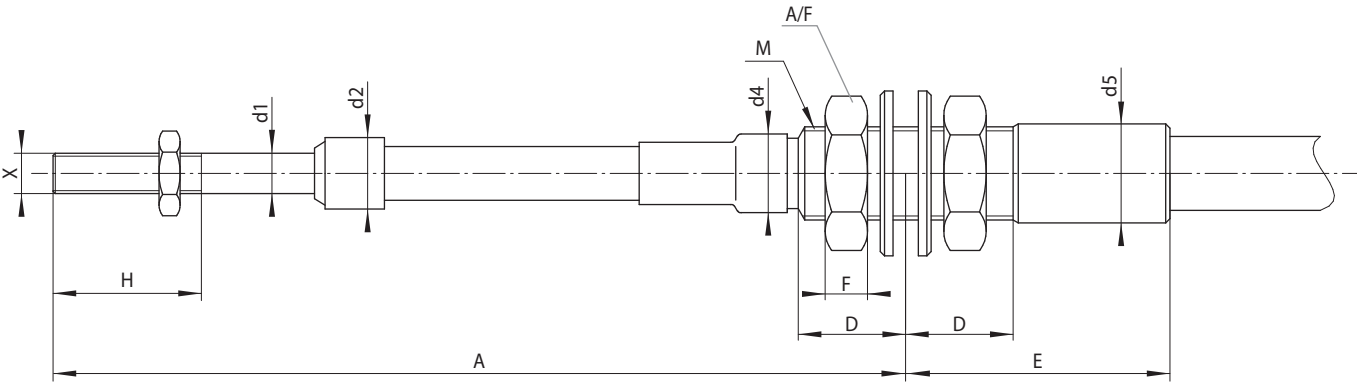
Lubrication

RCS® push/pull cables are designed and lubricated for optimum performance and life. Under no circumstances should you re-lubricate or attempt any other kind of maintenance!

Connections of cable end parts

Connection type T  
Swiveled bulkhead endfitting

**RINGSPANN®**  
RCS



11-1

Cable size	d1 mm	d2* mm	d4 mm	d5 mm	D mm	E mm	F mm	H mm	M	A/F mm	X
U	4,75	10	11,3	11,5	14	33	7	20	7/16-20-UNF	17	M5
V	4,75	10	11,3	11,5	14	33	7	20	7/16-20-UNF	17	M5
L	6,35	13	14,7	16,5	19	51	8	24	M16 x 1,5	24	M6
M	8,0	14,5	16,3	19,3	22	54	9	24	M18 x 1,5	27	M8
H	9,5	17,0	18,5	23,4	25	66	10	35	M22 x 1,5	32	M10

\* for seal no. 05

Dimensions A

Cable size	Push/pull cables* at travel of						Cable with hand operation** NL/TL (1)/MA				Cables for levers***		
	25 mm	51 mm	76 mm	102 mm	127 mm	152 mm	25 mm	51 mm	76 mm	TL (2) 38 mm	16RFA7.2 mm	58.x mm	22.x mm
U	111	149	187	-	-	-	124	174	225	161	151	-	-
V	111	149	187	225	263	301	124	174	225	-	-	189	189
L	117	155	193	231	270	308	130	180	231	-	-	195	-
M	-	166	205	243	281	319	-	-	-	-	-	-	-
H	-	182	221	259	297	335	-	-	-	-	-	-	-

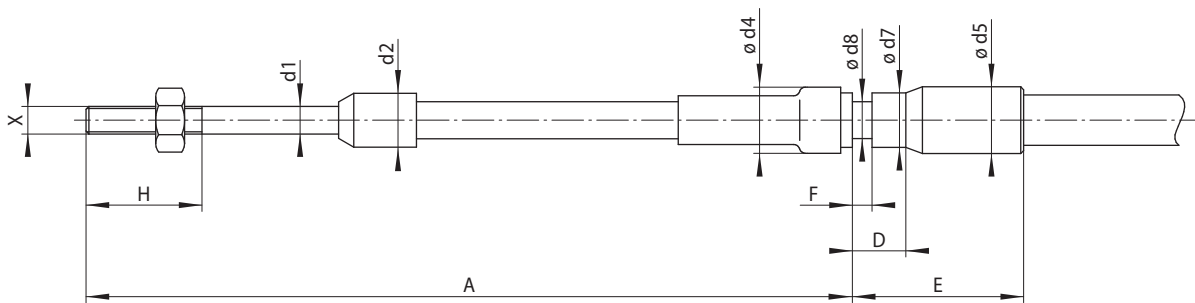
\* Rod end in mid position  
\*\* Rod end completely moved out (see from page 22), TL (1) = variant 1, TL (2) = variant 2 (see page 25)  
\*\*\* Rod end in mid position (see from page 32)

Can also be supplied with end parts made of stainless steel.

Connections of cable end parts

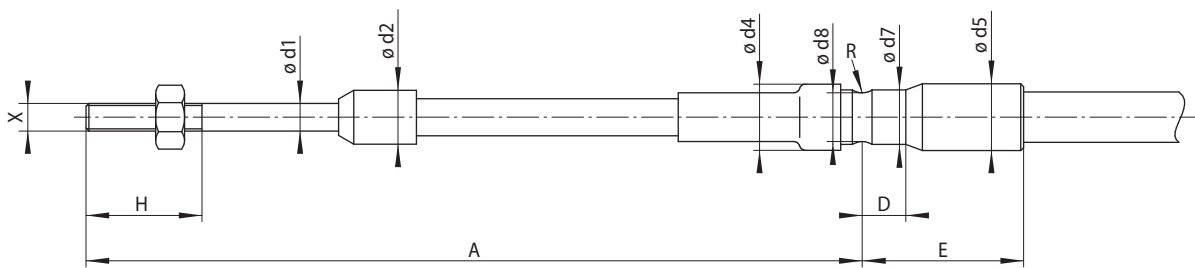
RINGSPANN®

Connection type G  
Swiveled clamp endfitting



12-1

for cable sizes U and V



12-2

for cable sizes L, M and H

Cable size	d1 mm	d2* mm	d4 mm	d5 mm	d7 mm	d8 mm	D mm	E mm	F mm	H mm	R mm	X
U	4,75	10	11,3	10,2	9,4	6,35	11	29,5	3,4	20	-	M5
V	4,75	10	11,3	11,5	9,4	6,35	8,7	29,5	3,4	20	-	M5
L	6,35	13	14,7	16,5	12,7	10,4	11,1	44,5	-	24	4,3	M6
M	8,0	14,5	16,3	19,3	14,3	11,9	18	48	-	24	4,3	M8
H	9,5	17	18,5	23,4	16,6	12,7	9,6	67	-	35	5,0	M10

\* for seal no. 05

Dimensions A

Cable size	Push/pull cables* at travel of						Cable with hand operation** NL/TL (1)/MA				Cables for operating level***		
	25 mm	51 mm	76 mm	102 mm	127 mm	152 mm	25 mm	51 mm	76 mm	38 mm	16RFA7.2 mm	58.x mm	22.x mm
U	94	132	170	-	-	-	107	157	208	144	134	-	-
V	94	132	170	208	246	284	107	157	208	-	-	172	172
L	102	140	178	216	254	292	114	165	216	-	-	180	-
M	-	149	187	225	263	301	-	-	-	-	-	-	-
H	-	170	208	246	284	322	-	-	-	-	-	-	-

Can also be supplied with end parts made from stainless steel.

\* Rod end in mid position

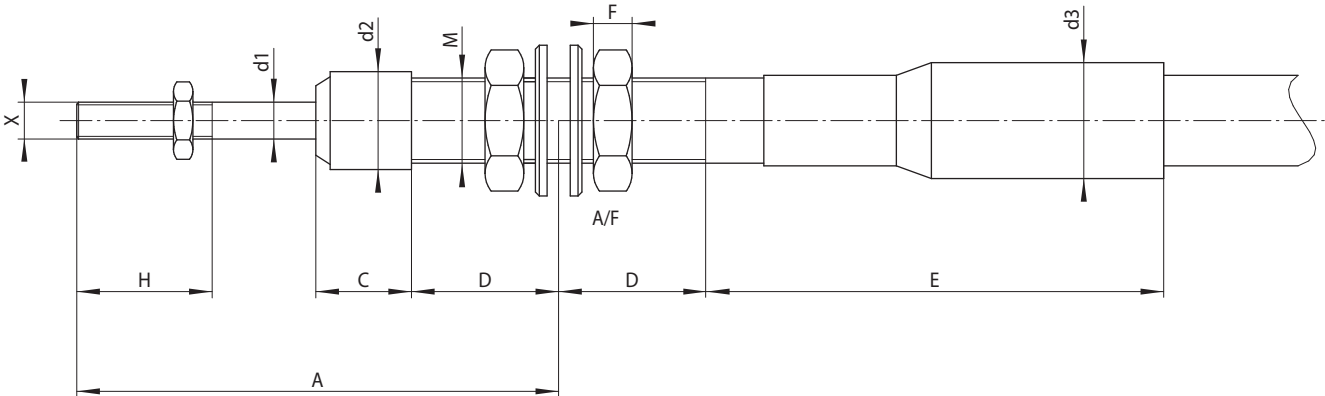
\*\* Rod end completely moved out (see from page 22), TL (1) = variant 1, TL (2) = variant 2 (see page 25)

\*\*\* Rod end in mid position (see from page 32)

Connections of cable end parts

RINGSPANN®

Connection type R or S  
Rigid screw type endfitting



13-1

Cable size	C mm	d1 mm	d2 mm	d3 mm	E mm	F mm	H mm	M	A/F mm	X
U	13	4,75	10	12,7	35	5	20	M10 X 1	17	M5
V	13	4,75	10	12,7	35	5	20	M10 X 1	17	M5
L	16	6,35	13	16,5	-	7	24	7/16-20 UNF	17	M6
M	16	8,0	14,5	19,3	71	6	24	M12 X 1	19	M8
H	16,5	9,5	17	23,4	70	8	35	M16 X 1,5	24	M10

Dimensions A

Cable size	Push/pull cables* at travel of						Cable with hand operation** NL/TL (1)/MA				Cables for operating level***		
	25 mm	51 mm	76 mm	102 mm	127 mm	152 mm	25 mm	51 mm	76 mm	TL (2) 38 mm	16RFA7.2 mm	58.x mm	22.x mm
U	63	88	113	-	-	-	77	116	153	103	90	-	-
V	63	88	113	138	163	-	77	116	153	-	-	117	115
L	-	90	113	126	138	151	-	116****	151****	-	-	117	-
M	-	94	119	146	-	-	-	-	-	-	-	-	-
H	-	-	-	161	-	211	-	-	-	-	-	-	-

\* Rod end in mid position  
\*\* Rod end completely moved out (see from page 22), TL (1) = variant 1, TL (2) = variant 2 (see page 25)  
\*\*\* Rod end in mid position (see from page 32)  
\*\*\*\* only for hand operation TL and MA, not available for NL

Dimensions D for cable size and travel:

Cable size	Travel					
	25 mm	51 mm	76 mm	102 mm	127 mm	152 mm
U	15	27	40	-	-	-
V	15	27	40	53	-	-
L	-	20	30	30	30	30
M	-	24	36	50	-	-
H	-	-	-	54	-	79

Dimensions E for cable size L and travel:

Cable size	Travel				
	51 mm	76 mm	102 mm	127 mm	152 mm
L	73	79	104	129	155

Cable series 275 and 283 are available for cable sizes U-M.  
The cable size H can only be supplied with cable series 283.  
"S" denotes the rigid cable ends for cable sizes U, V, M and H. "R" is the designation for a rigid end for cable size L.

Codes of practice and health and safety regulations

RINGSPANN®



Codes of practice

- Do not install push/pull cables in any applications, which may exceed the design parameters of the cable.
- Do not remove seals! RCS® cables cannot be disassembled!
- RCS® push/pull cables are designed and lubricated for optimum performance and life; under no circumstances should you re-lubricate or attempt any other kind of maintenance.
- Cables that have moisture inside or are frozen should be replaced. Do not apply heat to remove moisture.
- Protect cables from physical damage such as bending, crushing, heavy vibration and from contamination such as moisture, dirt or chemicals. Do not paint ends!
- A gradual or sudden increase in friction or decrease in the travel length of a control cable is an indication of possible performance issues and/or cable failure. We recommend that you replace the cable in this event as a precautionary measure.

Health and safety regulations

Control cables and actuators contain thermoplastic materials in the form of knobs etc. or as covering and/or lining of assemblies. These materials include polypropylene, acetyl resin, high and low-density polyethylene, nylon etc. In normal use these do not constitute any hazard. But, if burnt, they may give fumes, some of which may be toxic, and all recommended fire-fighting precautions shall be observed.

## Assembly information

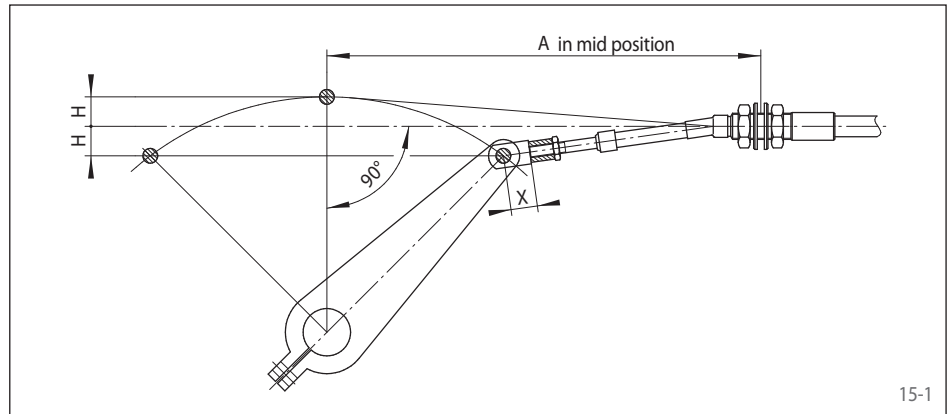
**RINGSPANN®**

**RCS**

If a push/pull cable is connected to a lever that describes an arc, it should be adjusted at the right angle to half travel position and half the height of the segmental arc of the lever.

Swiveled endings (connection types G and T) allow for an arc from centerline of  $\pm 8^\circ$  all way around.

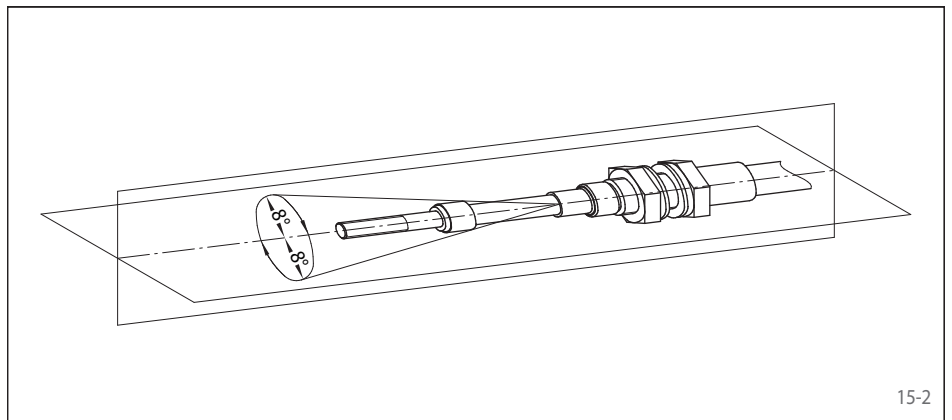
(Push/Pull Cables with swiveled end)



15-1

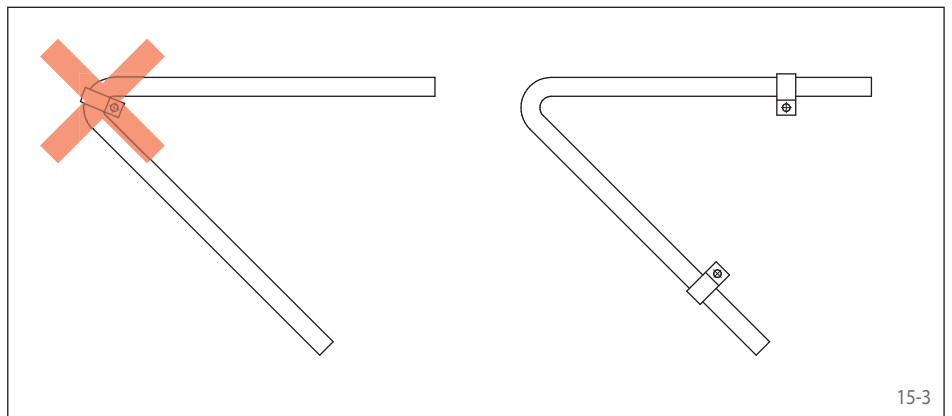
For linear movement only (e.g. spool valves) accurate alignment of both planes of the cable and the object to be controlled is necessary!

(Push/Pull Cables with swiveled end)



15-2

Only correct installation and layout of push/pull cables assure proper function. Anchor cable end parts securely so that they cannot move or twist under load. Clamps shall be placed at one-meter intervals; they should fasten the cable but not squeeze it, in bends only at the ends of bend radii.



15-3

Order key for push/pull cables



Features

Order code: 283 - L - G 05 M / T 10 M - 3 - 0200

Cable serie:

383/384, 283/284, 275/274, 775/774

Cable size:

Selection according to operating forces,  
connection threads, bend radii etc.:  
U, V, L, M or H

Connection first cable end part:

In accordance with installation conditions T, G, S or R

Wiper seal:

Seal no. 05, 10 or 20

Thread at rod end:

The size of the connection thread can  
be calculated from the cable size,  
M for metric,  
Z for inch (UNF) thread

Connection second cable end part:

In accordance with installation conditions T, G, S or R

Wiper seal:

Seal no. 05, 10 or 20

Thread at rod end:

M for metric,  
Z for inch (UNF) thread

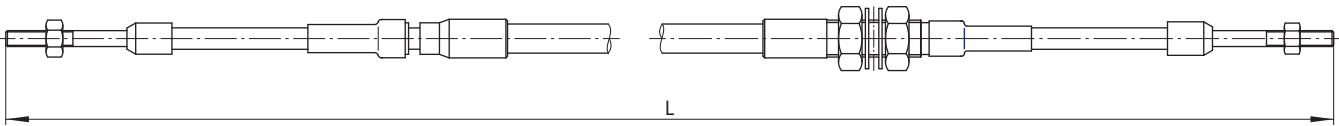
Travel code:

The following values are possible as travel code,  
in compliance with a travel in mm:

1	2	3	4	5	6
25	51	76	102	127	152

Cable length:

Entire length, denoted in cm,  
principally 4-figure:  
e. g.: 3 400 mm = -0340  
e. g.: 5 m = -0500



Notes

RINGSPANN®

