Quickguide

Mechanical

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Verantwortlich für diese Schulungsunterlage: College Development

Responsible for this training documentation: College Development

Contents

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Robot designations

KR Quantec	300	R2500	xxxx		K - C - F			
KR	**210**	**L180**	**xxxx**	**-2**	**K - C - F**			**xxxx**
KUKA **R**OBOT	Payload identification (rated payload) in [kg]	Quantec and Small Robots: **R**each (arm length), translational travel **Z** in [mm] Other: Arm extension (**L**) with reduced payload in [kg]	Series (e.g. ultra, extra, comp, sixx, scara)	Generation (1st generation without this element)	Design (arc, HA, HW, K, KS, P, PA, SI, SL, spot)	Type of installation (C: Ceiling; W: Wall; F: Floor – not used)	Variant (arctic, CR, EX, F, HO)	Optional nickname (e.g. Titan, Nero)

arc	**Arc** welding	Arc welding robot
comp	**Comp**act	Series 2000 robot, more compact design
HA	**H**igh **A**ccuracy	High-accuracy robot
HW	**H**ollow **W**rist	Energy supply runs through in-line wrist
K	Shelf-mounted	Shelf-mounted robot
KS	Shelf-mounted small	Shelf-mounted robot with low base frame
P	**P**ress-to-press	Robot for press linking
PA	**Pa**lletizing	Palletizing robot
SI	**S**afe **I**nteraction	Robot without physical safeguards
SL	**S**tain**l**ess steel	Stainless steel robots
spot	**Spot** welding	Spot welding robot
C	**C**eiling	Robot for ceiling mounting
W	**W**all	Robot for wall mounting
arctic	**Arctic**	Robot for deep-freeze environments
CR	**C**lean**r**oom	Robots for cleanroom applications
EX	**Ex**plosion protection	Robots for potentially explosive environments
F	**F**oundry	Robots for systems with a high degree of fouling and high temperatures
HO	**H**1 **o**il	Robot with food-compatible oil

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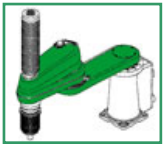
Belt tension – Small Robots



Robot	Axis	Art. no.	Tension [Hz]
KR 5 sixx R650 KR 5 sixx R850	A5 new	00-145-190	198 ±18
	A5 used		140 ±13
	A6 new	00-145-192	240 ±25
	A6 used		170 ±18
KR 5 scara R350 KR 5 scara R550	A3 new	00-152-516	228 ±25
	A3 used		191 ±10
	A4-A new	00-152-525	490 ±25
	A4-A used		411 ±21
	A4-B new	00-152-526	507 ±25
	A4-B used		426 ±22
KR 10 scara R600	A4-A new	00-145-524	432 ±48
	A4-A used		348 ±20
	A4-B new	00-145-525	157 ±18
	A4-B used		125 ±8
KR 10 scara R850	A4-A new	00-145-524	432 ±48
	A4-A used		348 ±20
	A4-B new	00-145-530	114 ±14
	A4-B used		91 ±6

Note: Check belts once a year and replace them after five years;
new belts have to be checked 100 operating hours after assembly.

Belt tension – In-line wrists

Robot	Axis	Art. no.	Toothed belt	Tension [Hz]	Maintenance interval
KR 5arc, KR 6, KR 6/1, KR6/2, KR15L6/2	A5	00-134-215	8AT3/549E3/5S+Z	250 ±3	10.000 hours (2 years)
	A6	00-134-214	6AT3/450E3/5S+Z	280 ±3	
KR 15/2, KR 30 L15/2	A5	63-121-720	8ATS5/720-E6/8	195 ±3	10.000 hours (2 years)
	A6	63-121-620	8ATS5/620-E6/8	210 ±3	
KR 30 / 45 / 60-2 KR 30-3, KR 60-3 KR 60 L45-3 KR 60 L30-3	A5	71-053-328	12AT5/920-E5/8	130 ±5	10.000 hours (2 years)
	A6	71-053-329	10AT5/780-E5/8	185 ±5	
KR 60 P/2, KR 100 P/2 KR 100PA, KR 160PA KR 125/1 (/2)(/3)(/4) KR 150/1 (/2)(/3)(/4) KR 200/1 (/2)(/3)(/4)	A5	63-122-015	18AT5/1050-E5/8	130 ±5	10.000 hours (2 years)
	A6	63-122-010	14AT5/860-E5/8	190 ±5	
KR 100 comp (/2)(/3) KR 140 comp (/2)(/3) KR 200 comp (/2)(/3) KR 220 comp (/2)(/3)	A5	63-122-015	18AT5/1050-E5/8	130 ±5	5.000 hours (1 year)
	A6	63-122-010	14AT5/860-E5/8	190 ±5	
KR 350/1 (/2)	A5	00-100-267	22AT5/1230-E5/8	140 ±5	10.000 hours (2 years)
	A6	63-122-015	18AT5/1050-E5/8	220 ±5	
KR 360/1 (/2) KR 500/1 (/2)	A5	00-100-267	22AT5/1230-E5/8	135 ±5	5.000 hours (1 year)
	A6	63-122-015	18AT5/1050-E5/8	170 ±5	
KR 500/2 Robocoaster	A5	00-100-267	22AT5/1230-E5/8	135 ±5	1 year
	A6	63-122-015	18AT5/1050-E5/8	170 ±5	
KR 360/3 KR 500/3	A5	00-100-267	22AT5/1230-E5/8	115 ±5	5.000 hours (1 year)
	A6	63-122-015	18AT5/1050-E5/8	140 ±5	

Note: Check belts every 5.000 operating hours (1 year) for tear and wear;
belts of **FOUNDRY** robots have to be replaced after 5.000 operating hours (1 year);
repeat measuring & adjustment procedure at least 3 times and check again after 100 operating hours

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Belt tension – Wrist axis motor units

Robot	Axis	Art. no.	Toothed belt	Tension [Hz]
KR5 arc HW (/2) KR16L8 arc HW	A5	00-157-150	SFX9, 5AT5/780 GEN3	90 -5
	A6	00-157-150	SFX9, 5AT5/780 GEN3	90 -5
KR 6/2 KR 15 L6/2	A4	63-122-001	10ATS5/390-E6/8	255 ±3
	A5	63-122-001	10ATS5/390-E6/8	255 ±3
KR 15/2	A4	63-121-800	10ATS5/375-E6/8	280 ±3
	A5	63-122-001	10ATS5/390-E6/8	255 ±3
KR 16 arc HW	A5	00-133-135	SFX10 AT5/900 GEN3	98 -5
	A6	00-133-135	SFX10 AT5/900 GEN3	98 -5
KR 5arc, KR 6 KR 16	A4	00-134-217	10AT5/375E6/8S+Z	260 ±3 (or motor 118N)
	A5	00-134-217	10AT5/375E6/8S+Z	260 ±3 (or motor 118N)
KR 30/2, KR 45/2 KR 60/2 KR 30-3, KR 60-3 KR 60 L45-3, KR 60 L30-3	A4	63-122-169	200-S-8M-560	95 ±3 (or motor 130N)
	A5	63-122-169	200-S-8M-560	95 ±3 (or motor 130N)
KR 30 L16 (/2)	A4	00-122-486	16AT5/525 Gen III - E5/7,5	179 ±3 (or motor 150N)
	A5	00-122-486	16AT5/525 Gen III - E5/7,5	179 ±3 (or motor 150N)
KR 30 L15/2	A4	61-124-640	200-S-8M-584	95 ±3 (or motor 130N)
	A5	61-124-640	200-S-8M-584	95 ±3 (or motor 130N)

Note: Check belts every 10.000 operating hours for tear and wear (and replace, if required), replace after 2 years at the latest;
belts of **FOUNDRY** robots have to be replaced after 5.000 operating hours (1 year)

Gearbox oil

Robot	Axis	Oil quantity * approx. [liters]	Interval [hours]	Oil
KR 5 arc HW (/2) main axes	A1	0.25	20,000	RO 150
	A2	0.25		
	A3	0.16		
KR 5 arc HW (/2) KR 16 L8 arc HW wrist axes	A4	0.05		
	A4/A5	0.12		
	A5	0.01		
	A5/A6	0.10		
KR 5 arc (/2)	A1	0.25	30,000	
	A2	0.25	20,000	
	A3	0.16		
	A4	0.10		
	A5/A6	0.10		
KR 6/1 (/2) KR 15/1 (/2) main axes	A1	0.32		
	A2	0.32		
	A3	0.17		
KR 6/1 (/2) KR 15 L6/1 (/2) wrist axes	A4	0.09	10,000	
	A5/A6	0.09		
KR 15/1 (/2) KR 30 L15/1 (/2) wrist axes	A4	0.10		
	A5/A6	0.35		

*** Oil quantities for first filling**
(for oil change, refill the same amount of oil as was drained)

Note: Irrespective of the number of operating hours, the gear oil should be changed after 5 years at the latest; with **FOUNDRY** robots, after 2 years or half of the above shown operating hours.

Robot	Axis	Oil quantity * approx. [liters]	Interval [hours]	Oil
KR 6 (/2) KR 16 (/2) main axes	A1	0.54	20,000	RO 150
	A2	0.54		
	A3	0.22		
KR 6 (/2) wrist axes	A4	0.10		
	A5/A6	0.10		
KR 16 (/2) KR 30 L16 (/2) wrist axes	A4	0.32		
	A5	0.16		
	A6	0.18		
KR 16 arc HW KR 16 L8 arc HW main axes	A1	0.54		
	A2	0.54		
	A3	0.22		
KR 16 arc HW wrist axes	A4	0.11		
	A4/A5	0.30		
	A5	0.16		
	A5/A6	0.38		
KR 30/2, KR 30 L15/2 KR 45/2, KR 60/2 main axes	A1	3.30		
	A2	2.70		
	A3	1.00		
KR 30/2, KR 45/2 KR 60/2 wrist axes	A4	0.55	10,000	
	A5/A6	0.75		

*** Oil quantities for first filling**
(for oil change, refill the same amount of oil as was drained)

Note: Irrespective of the number of operating hours, the gear oil should be changed after 5 years at the latest; with **FOUNDRY** robots, after 2 years or half of the above shown operating hours.

Robot	Axis	Oil quantity * approx. [liters]	Interval [hours]	Oil
KR 30/3 KR 60/3 KR 30 L16 (/2) main axes	A1	3.30	20,000	RO 150
	A2	1.00		
	A3	1.00		
KR 30/3 KR 60/3 wrist axes	A4	0.55		
	A5/A6	0.75		
KR 40 PA	A1	6.30		
	A2	1.50		
	A3	1.50		
	A6	0.30		
KR 50 PA	A2	1.00		
	A3	1.50		
KR 60/1 P KR 100/1 P	A1	3.00		
	A2	2.00		
	A3	0.90		
	A4	1.00	6,000	
	A5/A6	1.30		
KR 60/2 P ZF KR 100/2 P ZF	A1	5.25	20,000	Optigear 320
	A2	5.25		
	A3	1.70		
	A4	1.00	6,000	
	A5/A6	1.30		

*** Oil quantities for first filling**
(for oil change, refill the same amount of oil as was drained)

Note: Irrespective of the number of operating hours, the gear oil should be changed after 5 years at the latest; with **FOUNDRY** robots, after 2 years or half of the above shown operating hours.

Robot	Axis	Oil quantity * approx. [liters]	Interval [hours]	Oil
KR 60/2 P TJ KR 100/2 P TJ	A1	5.80	20,000	RO 150
	A2	5.40		
	A3	1.00		
	A4	1.00	6,000	
	A5/A6	1.30		
KR 100 PA KR 160 PA	A1	5.80	20,000	
	A2	5.40		
	A3	1.00		
	A4	1.30	6,000	
	A5/A6	1.50		
KR 100 comp (/2)(/3) KR 140 comp (/2)(/3) KR 200 comp (/2)(/3) KR 220 comp (/2)(/3)	A1	6.70	20,000	
	A2	2.60		
	A3	1.00		
	A4	1.50		
	A5/A6	1.30		
KR 125/1 KR 150/1 KR 200/1	A1	2.00		
	A2	1.80		
	A3	0.90		
	A4	1.00		
	A5/A6	1.30		

*** Oil quantities for first filling**
(for oil change, refill the same amount of oil as was drained)

Note: Irrespective of the number of operating hours, the gear oil should be changed after 5 years at the latest; with **FOUNDRY** robots, after 2 years or half of the above shown operating hours.

Robot	Axis	Oil quantity * approx. [liters]	Interval [hours]	Oil
KR 125/1A KR 150/1A KR 200/1A	A1	2.40	20,000	Optigear 320
	A2	2.40		
	A3	0.90		RO 150
	A4	1.00	10,000	
	A5/A6	1.30		
KR 125/2 ZF KR 150/2 ZF KR 200/2 ZF	A1	2.40	20,000	Optigear 320
	A2	2.40		
	A3	1.85		
	A4	1.00	10,000	RO 150
	A5/A6	1.30		
KR 125/2 (/3) (/4) TJ KR 150/2 (/3) (/4) TJ KR 200/2 (/3) (/4) TJ	A1	3.30	20,000	
	A2	2.70		
	A3	1.00		
	A4	1.00	10,000	
	A5/A6	1.30		
Series 2000: KR 150 (/2) KR 180 (/2) KR 210 (/2) KR 240 (/2) KR 270 (/2)	A1	6.70	20,000	
	A2	3.00		
	A3	1.90		
	A4	2.80		
	A5	1.80		
	A6	2.40		

*** Oil quantities for first filling**
(for oil change, refill the same amount of oil as was drained)

Note: Irrespective of the number of operating hours, the gear oil should be changed after 5 years at the latest; with **FOUNDRY** robots, after 2 years or half of the above shown operating hours.

Robot	Axis	Oil quantity * approx. [liters]	Interval [hours]	Oil
Quantec series: KR 90 R2700 pro KR 120 R2500 pro KR 90 R3100 extra KR 120 R2900 extra KR 150 R2700 extra KR 180 R2500 extra *(KR 210 R2700 extra)*	A1	6.50 (ceiling: 7,80)	20,000	RO 150
	A2	2.40		
	A3	1.90		
	A4	2.10		
	A5	0.90		
	A6	1.0		
Quantec series: KR 150 R3100 prime KR 180 R2900 prime	A1	6.50 (ceiling: 7,80)		
	A2	2.70		
	A3	1.80		
	A4	2.10		
	A5	0.90		
	A6	1.0		
Quantec series: KR 210 R2700 prime KR 240 R2500 prime KR 210 R3100 ultra KR 240 R2900 ultra KR 270 R2700 ultra KR 300 R2500 ultra KR 120 R3900 press KR 150 R3700 press KR 180 R3500 press KR 210 R3300 press KR 240 R3100 press KR 270 R2900 press	A1	6.50 (ceiling: 7,80)		
	A2	2.70		
	A3	1.80		
	A4	2.10		
	A5	1.10		
	A6	1.20		

*** Oil quantities for first filling**
(for oil change, refill the same amount of oil as was drained)

Note: Irrespective of the number of operating hours, the gear oil should be changed after 5 years at the latest; with **FOUNDRY** robots, after 2 years or half of the above shown operating hours.

Robot	Axis	Oil quantity * approx. [liters]	Interval [hours]	Oil
KR 175 spot	A1	2,20	20.000	RO 150
	A2	2,45		
	A3	1,90		
	A4	1,50		
	A5/A6	1,50		
KR 100 PA (/2) KR 180 PA (/2) (Serie 2000)	A1	6,70		
	A2	3,00		
	A3	1,90		
	A4	0,53	8.000	
KR 180 PA arctic (Serie 2000)	A1	6,70	20.000	RO 32
	A2	3,00		
	A3	1,90		
	A4	0,55	8.000	
Quantec Serie: KR 120 R3200 palletizing	A1	6,50	20.000	RO 150
	A2	2,40		
	A3	1,90		
	A5	0,80		
	A6	1,20		
Quantec Serie: KR 180 R3200 palletizing KR 240 R3200 palletizing	A1	6,50		
	A2	2,90		
	A3	1,80		
	A5	0,80		
	A6	1,20		

*** Oil quantities for first filling**
(for oil change, refill the same amount of oil as was drained)

Note: Irrespective of the number of operating hours, the gear oil should be changed after 5 years at the latest; with **FOUNDRY** robots, after 2 years or half of the above shown operating hours.

Robot	Axis	Oil quantity * approx. [liters]	Interval [hours]	Oil
KR 350/2	A1	5,80	20.000	RO 150
	A2	5,40		
	A3	1,80		
	A4	1,80		
	A5/A6	3,50		
KR 360/1 (/2) (/3) KR 500/1 (/2) (/3)	A1	6,70		
	A2	7,10		
	A3	3,00		
	A4	2,30		
	A5/A6	4,20		
KR 300 PA KR 470 PA	A1	7,10		
	A2	7,10		
	A3	3,00		
	A4	1,65		
KR 700 PA	A1	13,55		
	A2	10,00		
	A3	8,00		
	A4	1,70		
KR 700 PA arctic	A1	13,55	20.000	RO 32
	A2	10,00		
	A3	8,00		
	A4	1,70		
KR 1000	A1	25,00	20.000	Optigear 320
	A2	24,00		RO 150
	A3	12,00		
	A4	10,00		
	A4/A5	3,00		
	A6	10,00		

*** Oil quantities for first filling**
(for oil change, refill the same amount of oil as was drained)

Note: Irrespective of the number of operating hours, the gear oil should be changed after 5 years at the latest; with **FOUNDRY** robots, after 2 years or half of the above shown operating hours.

Counterbalancing systems

	Hydropneumatic	Gas pressure P_0 in [bar]	Oil pressure $P_{setting}$ in [bar]
KR125/150/200	KR 125/1 (/2)(/4)	70	88
	KR 150/1 (/2)(/4) KR 200/1 (/2)(/4)	98	123
	KR 125/1 **C**	50	73
	KR 150/1 **C** KR 200/1 **C**	79	105
	KR 125/1 **W** KR 125/2 **W**	68	85
	KR 125/2 **C** (/4)	62	88
	KR 125 L100/2 **C** (/4) KR 125 L 90/2 **C** (/4)	55	78
	KR 150/2 **C** (/4)	90	130
	KR 150 L150/2 **C** (/4)	88	126
	KR 150 L120/2 **C** (/4)	77	110
	KR 200/2 **C**	94	135
	KR 125/3 **C**	65	105
	KR 150/3 **C**	90	140
	KR 200/3 **C**	95	145

Basis for the table of CBS settings:

Robot position in A2 (exceptions for ceiling-mounted robots **must** be observed)	Temperature	Lower limit value	Nitrogen is only checked and filled when the oil has been drained
-90° (mech. zero)	20° C	**5 bar** below specified value	

Note: Check Counterbalancing Systems every 5.000 operating hours (1 year) for leakages, pressure loss and damages, etc.

	Hydropneumatic		Gas pressure P_0 in [bar]	Oil pressure $P_{setting}$ in [bar]
Series 2000	Series 2000 press **C** (ceiling mounted A2= **-120°**)	KR 100-2 P C KR 120-2 P C	30	47
	Series 2000 **C** (ceiling mounted A2= **-133°**)	KR 150 (/2) C KR 180 (/2) C KR 210 (/2) C KR 240 (/2) C KR 270 (/2) C	75	95
QUANTEC series	KR QUANTEC press	KR 100 R3500 press KR 120 R3500 press	162	182
	KR QUANTEC **K** prime	KR 120 R3500 prime K KR 150 R3300 prime K KR 180 R3100 prime K KR 210 R2900 prime K	162	182
	KR QUANTEC **K** ultra	KR 120 R3900 ultra K KR 150 R3700 ultra K KR 180 R3500 ultra K KR 210 R3300 ultra K KR 240 R3100 ultra K KR 270 R2900 ultra K		
	KR QUANTEC pro	KR 90 R2700 pro KR120 R2500 pro	100	115
	KR QUANTEC extra	KR 90 R3100 extra KR 120 R2900 extra KR 150 R2700 extra KR 180 R2500 extra	120	141
		(KR 210 R2700 extra)	*156*	*176*
	KR QUANTEC prime	KR 150 R3100 prime KR 180 R2900 prime KR 210 R2700 prime KR 240 R2500 prime	156	176
	KR QUANTEC ultra	KR 210 R3100 ultra KR 240 R2900 ultra KR 270 R2700 ultra KR 300 R2500 ultra		
	KR QUANTEC palettizing	KR 120 R3200 palettizing KR 180 R3200 palettizing KR 240 R3200 palettizing		

Basis for the table of CBS settings:

Robot position in A2 (exceptions for ceiling-mounted robots **must** be observed)	**Temperature**	**Lower limit value**	Nitrogen is only checked and filled when the oil has been drained
-90° (mech. zero)	**20° C**	**5 bar** below specified value	

Note: Check Counterbalancing Systems every 5.000 operating hours (1 year) for leakages, pressure loss and damages, etc.

	Hydropneumatic		Gas pressure P_0 in [bar]	Oil pressure $P_{setting}$ in [bar]
QUANTEC series	KR QUANTEC prime **C** (ceiling mounted A2= **-140°**)	KR 210 R2700 prime C	120	205
	KR QUANTEC extra **C** (ceiling mounted A2= **-140°**)	KR 150 R2700 extra C KR 180 R2500 extra C		
		KR 90 R3100 extra C KR 120 R2900 extra C	156	252
	KR QUANTEC ultra **C** (ceiling mounted A2= **-140°**)	KR 210 R3100 ultra C KR 240 R2900 ultra C KR 270 R2700 ultra C KR 300 R2500 ultra C		
	KR QUANTEC press **C** (ceiling mounted A2= **-120°**)	KR 100 R3500 press C KR 120 R3500 press C	162	239
Heavy-duty robots and palletizers	KR 350/2		80	88
	KR 350/2 C		50	73
	KR 360/1 (/2)(/3) KR 500/1 (/2)(/3)		138	151
	KR 360L150P/1 (/2)		95	108
	KR 360/1 (/2)(/3) **C** KR 500/1 (/2)(/3) **C**		85	155
	KR 300 PA KR 470 PA		70	115
	KR 700 PA		115	138
	KR1000		100	130

Basis for the table of CBS settings:

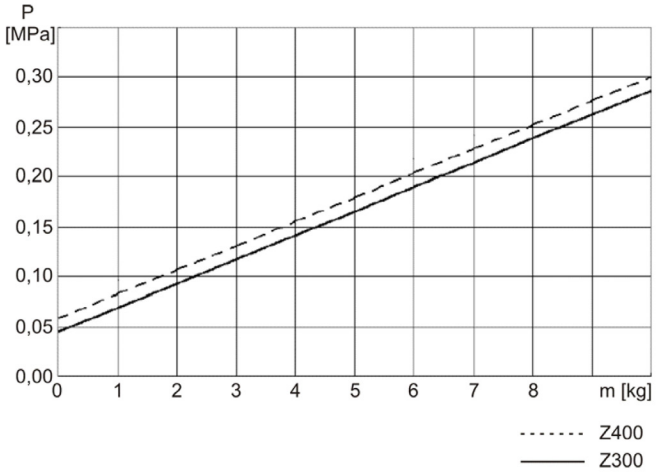
Robot position in A2 (exceptions for ceiling-mounted robots **must** be observed)	**Temperature**	**Lower limit value**	Nitrogen is only checked and filled when the oil has been drained
-90° (mech. zero)	**20° C**	**5 bar** below specified value	

Note: Check Counterbalancing Systems every 5.000 operating hours (1 year) for leakages, pressure loss and damages, etc.

	Gas cylinder	Gas pressure P_0 in [bar]
KR 125/150/200	KR 125/3	100
	KR 150/3	125
	KR 200/3	135

	Mechanical	Number of springs
Series 2000	KR 150, KR 150-2 (Series 2000)	2
	KR 180, KR 180-2 (Series 2000)	3
	KR 210, KR 210-2 (Series 2000)	3
	KR 240-2 (Series 2000)	3
	KR 270-2 (Series 2000)	3

Counterbalancing system on KR 10 scara



Remarks on the settings: (using the compressed air characteristic)	
$curr_act[3]	- Robot must be under servo-control (enabling switch and jogging) - Variable must be continuously updated (SHIFT and ENTER) - Limit value 0.05% (setting on the pressure regulator)
$compensated_load	Enter the total weight on flange in kg (tool and workpiece)

Assignment of motor types (selection)

	Main axes			Wrist axes		
	1	2	3	4	5	6
Quantec series						
KR QUANTEC **pro**	**G1:** 00-117-606			**D01:** 00-179-159		
KR QUANTEC **extra**	**G1**: 00-117-606	**I2:** 00-179-161				
KR QUANTEC **prime**	**I2:** 00-179-161					
KR QUANTEC **ultra**	**I2:** 00-179-161	**K2:** 00-188-018				
KR QUANTEC **press**	**K2:** 00-188-018					
KR QUANTEC **K prime**	**I2:** 00-179-161					
KR QUANTEC **K ultra**	**I2:** 00-179-161	**K2:** 00-188-018	**I2:** 00-179-161			

For the Quantec series, the motors are available as part of a combined spare parts package. This comprises: motor (see above), assembly grease, Allen screws and O-ring.
Article numbers of the spare parts packages:

D01	G1	I2	K2
00-192-297	00-192-296	00-192-295	00-192-293

Series 2000 and comp				
KR 100 comp	**G1:** 00-117-606			**H:** 00-122-209
KR 140 comp				
KR 200 comp	**G1:** 00-117-606	**I:** 00-119-766		
KR 100/2 comp (/3)	**G1:** 00-117-606			**H:** 00-115-925
KR 140/2 comp (/3)				
KR 200/2 comp (/3)	**G1:** 00-117-606	**I:** 00-119-766		
KR 220/2 comp (/3)				
KR 150	**G1:** 00-104-692	**I:** 00-104-897	**G1:** 00-104-692	**H:** 00-104-695
KR 180		**I:** 00-104-897		
KR 210		**I1:** 00-109-450		

<table>
<tr><th></th><th colspan="3">Main axes</th><th colspan="3">Wrist axes</th></tr>
<tr><th></th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th></tr>
<tr><td colspan="7">Series 2000</td></tr>
<tr><td>KR 150-2</td><td rowspan="4">G1: 00-117-606</td><td>I: 00-119-766</td><td>G1: 00-117-606</td><td colspan="3" rowspan="5">H: 00-115-925</td></tr>
<tr><td>KR 180-2</td><td colspan="2">I: 00-119-766</td></tr>
<tr><td>KR 210-2</td><td colspan="2">I1: 00-119-767</td></tr>
<tr><td>KR 240-2</td><td colspan="2">I: 00-119-766</td></tr>
<tr><td>KR 270-2</td><td colspan="3">I: 00-119-766</td></tr>
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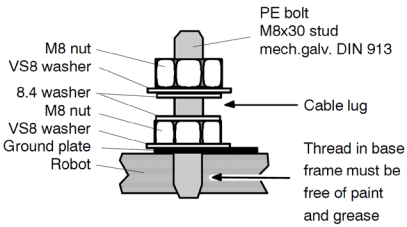
<tr><td>KR 210-2 K</td><td colspan="2">I1: 00-119-767</td></tr>
<tr><td>KR 100-2 P</td><td colspan="2">K: 00-119-768</td><td>I: 00-119-766</td><td colspan="3">H: 00-115-925</td></tr>
<tr><td>KR 180 PA</td><td colspan="3">G1: 00-104-692</td><td colspan="3">H: 00-104-695</td></tr>
<tr><td>KR 100-2 PA</td><td colspan="3" rowspan="2">G1: 00-117-606</td><td colspan="3" rowspan="2">H: 00-115-925</td></tr>
<tr><td>KR 180-2 PA</td></tr>
<tr><td colspan="7">KR 125/150/200</td></tr>
<tr><td>KR 125/1 (/2)(/3)(/4)</td><td colspan="3" rowspan="3">B: 69-225-463</td><td colspan="3" rowspan="3">C: 00-100-596</td></tr>
<tr><td>KR 150/1 (/2)(/3)(/4)</td></tr>
<tr><td>KR 200/1 (/2)(/3)(/4)</td></tr>
<tr><td>KR 125 K/1</td><td colspan="3">A: 69-225-468</td><td colspan="3" rowspan="3">C: 00-100-596</td></tr>
<tr><td>KR 125/1 W</td><td colspan="2" rowspan="2">A0: 69-000-579</td><td rowspan="2">B: 69-225-463</td></tr>
<tr><td>KR 125/2 W</td></tr>
</table>

Tightening torque for screws

Metric thread	Wrench size		Strength class		
	e.g. ISO 4014 	e.g. ISO 4762 	8.8	10.9	12.9
M3	*5.5*	*2.5*	1.2	1.6	2.0
M4	*7*	*3*	2.8	3.7	4.4
M5	*8*	*4*	5.6	7.5	9.0
M6	*10*	*5*	9.5	12.5	15.0
M8	*13*	*6*	23.0	31.0	36.0
M10	*17*	*8*	45.0	60.0	70.0
M12	*19*	*10*	78.0	104.0	125.0
M14	*22*	*12*	113.0	165.0	195.0
M16	*24*	*14*	195.0	250.0	305.0
M20	*30*	*17*	370.0	500.0	600.0
M24	*36*	*19*	640.0	860.0	1030.0
			All torque ratings specified in [Nm]		

Ground conductor



Tightening torque for eccentric shaft

Metric thread	Wrench size in [mm]	Robot examples	Tightening torque in [Nm]
M4	7	KR 6	3,3
M8	13	KR 15, KR 30, KR 125	18
M10	17	KR 350, KR 500	36

Oil drain plug

Plug screw		Tightening torque in [Nm]
00-157-378	M8 x 1	5
00-122-802	M10 x 1	7,5
62-440-539	VSTI M10 x 1-ED	10
62-440-543	VSTI M18 x 1,5-ED	20
00-157-850	M20 x 1,5 Ms	20
62-440-546	VSTI M22 x 1,5-ED	25
00-101-805	VSTI M27 x 2-ED	30
00-101-365	VSTI M33 x 2-ED	70
Magnetic plug screw		**Tightening torque in [Nm]**
00-190-265	M16 x 1,5	20
00-109-023 00-104-963	M18 x 1	20
Magnetic plug screw and gasket ring		**Tightening torque in [Nm]**
00-101-660	M18 x 1,5-Typ 9118	40

Tightening torque for CBS allen key bolt (nitrogen)

e. g.: KR 125/150/200 and KR Quantec	20 Nm