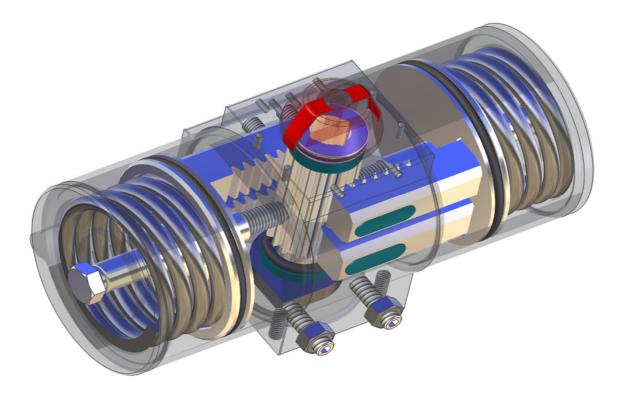


BA 1.1 - MRL

Pneumatic Actuators

Type MIG-KS-xx-D (double acting) Type MIG-KS-xx-S (single acting)



Installation and assembly instructions with operating manual and technical appendix

According to the EC Machinery Directive 2006/42/EC

Installation and assembly instructions for pneumatic actuators MIG-KS-xx-D & MIG-KS-xx-S

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Installation and assembly instructions for pneumatic actuators MIG-KS-xx-D & MIG-KS-xx-S

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DECLARATION ACCORDING TO EC GUIDELINES

Additional information can be downloaded or requested from the following addresses if necessary:

HEADQUARTER:

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<u>Sales:</u> KLINGER SCHÖNEBERG GmbH Cunoweg 7 65510 Idstein Tel.: 0049 - (0) 6126 - 7117 - 0 Fax: 0049 - (0) 6126 - 7117 - 341 www.klinger-schoeneberg.de



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A) General

A1 Explanation of symbols

Advice is identified in this operating manual with the following symbols:

^	Danger / Warning
	refers to a direct dangerous situation that can lead to death or
	serious injury to persons if it is not avoided.
	Advice
V	refers to an instruction, which must be observed.
•	
	Information
	provides useful tips and recommendations

A2 Intended use

Pneumatic actuator type MIG-KS-xx-D (double action) and type MIG-KS-xx-S (single action) are intended for the following:

- ° Operation after connection of the solenoid valve to a control unit provided by the system
- * Use with a gaseous control medium (generally compressed air) with control pressure according to the type label
- Ambient conditions between -20°C and +80°C (standard), or between -40°C and +140°C (special versions)
- For type MIG-KS-xx-D with a double action function, and type MIG-KS-xx-S with the "fail safe" function spring opening or spring closing
- To actuate fittings with a 90° pivoting motion (e.g. flaps and ball valves) with the electrical signals from the above-mentioned control unit in the positions <OPEN> and <CLOSED>.
- A correctly connected actuator must generally closed in a clockwise direction (when looking at the drive shaft on the fitting) and open in the opposite direction.

The output torque and characteristic curve of the actuator - refer to technical appendix - must be adapted to the fitting and the visual display must correctly shown the position of the fitting.

The compressed air must be filtered with a 40Pm mesh width (ISO 8573-1, class 5) to protect the solenoid valve.

An (optionally) installed assembly unit "position alarm" on the actuator serves the purpose of signalising the actuator position to the control unit on the system.

An (optionally) installed assembly unit "position transmitter" on the actuator serves the purpose of driving to intermediate positions on the fitting between <OPEN> and <CLOSED> and signalising this to the control unit on the system.

The actuator may only be taken into operation after observation of the following documents.

- ° The <manufacturer declarations on EC guidelines> included in the delivery
- ° This KLINGER SCHÖNEBERG assembly manual (included with delivery)

The safety advice in sections B1 and C1 must be observed when assembling and operating the actuator.





Which connection plan is used depends on the intended use of the fitting and, for actuators with a "fail safe" function, the type of spring assembly on the actuator: the decision must be made by the planner/person ordering the actuator and selected accordingly. Refer to section B4 for standard connection plans for specific applications.

Note 1:

This manual is valid, preferably together with the instructions for the fitting, which the actuator is assembled on - the manual for this fitting should be followed as a priority.

Note 2:

The ordering party is responsible for allocating an individually supplied actuator to the fitting. Appendix B of the construction norm EN15714 - 3 provides advice.

A3 Deviating use

In consultation with the manufacturer KLINGER SCHÖNEBERG, the actuator can also be operated with media other than compressed air.

A4 Identification of the actuator

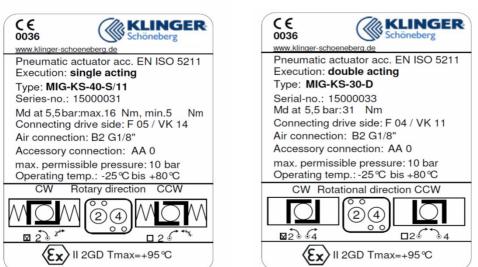
Each actuator is marked with a type label:

The type label on the actuator housing may not be covered over after assembly of the actuator on the fitting and after installation in the pipe section to ensure that the actuator remains identifiable.

Type plate

Single acting

Double acting





Exceeding the maximum pressure stated on the type label means a danger to subsequent operation.

A5 Transport and (intermediate) storage

	Actuators with additional electrical assemblies:
I	In order to avoid corrosion damages to electrical components during storage,
•	the unit should be stored at a constant room temperature.
	If an actuator is already assembled on the fitting:
Y	The transport advice and storage instructions in the fitting manual apply.
•	In this case, the unit should be stored in closed rooms at a constant temperature.



The following must be observed for proper transportation of an individually supplied actuator:

- ° Pay attention to the symbols on the packaging when transporting the parcels.
- ° Leave the actuator in the original packaging up until use (assembly on the fitting).
- ° Only place the actuator down on the flat side; any assembled accessories (e.g. solenoid valve/end switch) must be on the top or side.
- ° Protect the actuator against any dirt and moisture.
- ° If necessary, use retainer straps (and not chains) as transport aids.

!	When hanging up a strap, make sure that it is not tied to the additional assembly. Protect the actuator against any damage during transportation.
!	Only for special drives with installed (manual emergency actuation) gears: Due to the fact that the gears are generally heavier than the actuator, the retainer straps can also be attached to the gear housing (but not on the hand wheel!).

B Actuator attachment to the fitting and connection of additional assemblies



This manual contains safety advice on foreseeable risks when assembling the actuator on a fitting. It is the responsibility of the user to supplement these instructions with other risks specific to the fitting. Observation of all requirements for this system is required.

The connection of any supplied electrical/eletro-pneumatic additional assemblies is

described in the supplied documents.

These documents are valid in addition to this manual.

B1 Safety advice for assembly and connection

== 0	
	Assembly and pneumatic/electrical connection of an actuator to the operator's
	system(s) many only be carried out by qualified personnel.
	The word qualified, in terms of this manual, refers to persons who are familiar with pneumatic
	components due to their training, specialist knowledge and professional experience and
	who can correctly assess and correctly carry out the work given to them and who
I	can identify possible dangers and address them.
•	Knowledge of the typical properties of rotary actuators
	is also necessary for assembly and the assembly and connection should, if necessary,
	take place in consultation with qualified colleagues.
	Actuators are not "step ladders": external loads must be kept away from the fitting,
	actuator and supply lines.
^	Commissioning the actuator, which is assembled on a fitting, is only permitted
	once the fitting is enclosed from both sides by a section of pipe or apparatus.
	Any actuation before this means a risk of crushing and the
risk of crushing!	is exclusively the responsibility of the user.
	Commissioning the actuator, which is assembled on a fitting, is only permitted once the fitting is enclosed from both sides by a section of pipe or apparatus. Any actuation before this means a risk of crushing and the



B2 Interfaces

Compliance of the following interfaces must be ensured by the ordering party:

- a) Actuator/fitting flange connection: with dimensions according to ISO 5211 (actuator and/or fitting can have multiple drill holes!),
- b) Fitting/drill hole drive shaft, inner square in actuator
- ► The shape (=square) must correspond
- The fitting manufacturer must have specified the right dimensions and tolerances on the fitting shaft.

c) If accessories (e.g. solenoid valve/end switch) have not be supplied by KLINGER SCHÖNEBERG,

the ordering party must ensure compliance of the functions / interfaces of actuator accessories and VDI/VDE 3845 is definitive.

B3 Attachment of individually supplied actuators on the fitting

Put the actuator in the <CLOSED> or <OPEN> position - depending on the position of the fitting - using

- the (provisional) compressed air supply, attach the fitting and centre it.
 The position of the actuator on the fitting can be freely chosen and determined on-site.
- The screw connection must be tightened so much that the torque is transferred via frictional resistance refer to below table. Tighten the screws crosswise.

Flange size	F04	F05	F07	F10	F12	F14	F16
Torque with (Nm)	5-6 Nm	8-10 Nm	20-23 Nm	44-48 Nm	78-85 Nm	190-210 Nm	370-390 Nm

The position indicator must have been/be adjusted to suit the position of the fitting:

- ° ► Indicator transverse to the pipeline axis: fitting is closed,
- [◦] ► Indicator parallel to the pipeline axis: fitting is open,



An incorrect position indication means a danger to subsequent operation.

B4 Connection to the compressed air supply



At the beginning of assembly, make sure that the system data control pressure, control voltage and frequency correspond with the technical data for all assemblies, which are shown on the type labels of actuator and additional assemblies.

Non-binding recommendation for supply line cross-diameter:

Size MIG-KS-XX	30-D-S	120-D-S	200-D-S	380-D-S	740-D-S	1300-D-S
	to 80-D-S	to 150-D-S	to 270-D-S	to 510-D-S	to 920-D-S	to 1600-D-S
Recommended supply line nominal	6 mm	6 mm	6 mm	8 mm	8 mm	10 mm
width (up to 6m in length)						
Possible stroke time	0.2 sec	0.3 sec	0.4 sec	0.5 sec	1.0 sec	1.0 sec

Advice:

The shortest possible switch time according to this table is a guide value for standard double action actuators without attached fittings and with optimum supply and removal of the control medium. This value can extend after assembly of the actuator on the fitting.

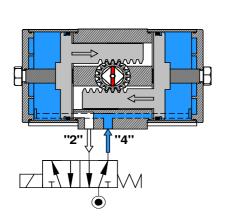


Control diagrams for

- ► Double action actuators MIG-KS-xx-D are illustrated in figure 1
- ► And single action actuators with spring withdrawal MIG-xx-S in figure 2.

Refer to the solenoid valve instructions for additional details.

The connection diagrams according to VDI/VDE 3845 (Namur) are equipped with a G $\ensuremath{\ensuremath{\mathscr{K}}}\xspace^{-1}$ thread.



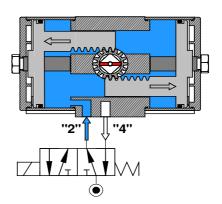
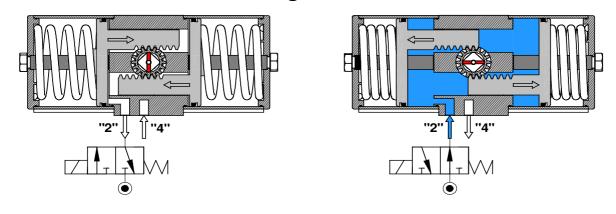


Figure 2

Figure 1



	On the standard version actuator, the supply of control air through
	connection "2" must actuate in an anti-clockwise direction and supply through
i i	connection "4" in a clockwise direction.
	Spring withdrawing actuators can only be supplied through connection "2" - see figure 2

B5 As required: connection of electrical/pneumatic additional assemblies to the control

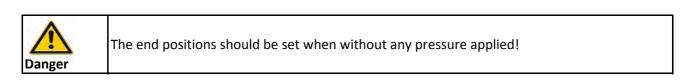
The supplied instruction(s) from the component manufacturer must be observed when connecting such assemblies.

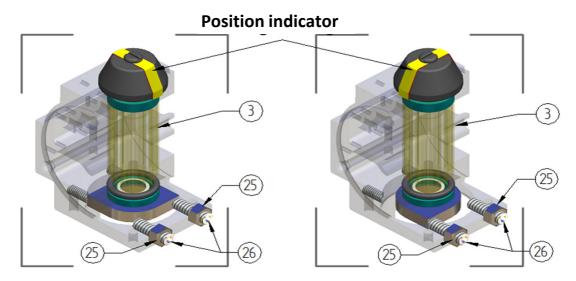


B6 All actuators: adjustment of the basic setting

This section should only be used if the fitting manufacturer has not precisely adjusted the positions <CLOSED> and <OPEN>.

The end stop in the actuator is adjusted to the position <open/CLOSED> in the factory: if required: adjust the stop screws.





- [°] Loosen both counter nuts (25) and unscrew the end stop screws (26) with three turns.
- ° Change the end positions by turning the drive shaft (**3**) until the visible indicator on the shaft corresponds with the end positions on the fitting.
- Screw in the end stop screws (26) on both sides until the resistance felt and then tighten the counter nuts (25).



B7 Test run: test steps to finish assembly and connection

In order to ensure the correct function of the actuators for automatic operation, the following must be checked after assembly

[°] Does the position indicator on the actuator and the position of the fitting correspond?

If not, the position of the indicator must be adjusted.

	\wedge	An incorrect position response (and incorrect visual display) means a danger to
4	<u>··</u>	subsequent operation.
D	anger	

[°] Is the "on-site" control pressure sufficient?

At least the control pressure, which corresponds with the initial pressure of the actuator, should exist directly on the solenoid valve to ensure "jerk-free" actuations by the fitting under operating conditions.

* Has the solenoid valve been correctly connected?

With the control pressure applied but loss of the control signal (check: e.g. pull the plug out), the fitting must drive to the position specified by the ordering party:

	· · · ·		
Actuator type	Type name	The fitting must be,	
a double action	MIG-KS-xx-D	unless specified otherwise in the order:	
		Driven to "CLOSED" position.	
Spring closing	MIG-KS-xx-S	Driven to "CLOSED" position.	
Spring opening	MIG-KS-xx-S	Driven to "OPEN" safety position.	

If this is not right, the control and/or solenoid valve switching must be corrected accordingly. Remedy: see section C3: troubleshooting.

- Is the actuator/fitting connection tightened properly?
 No relative movements between the fitting, assembly bridge (if available)
 and the pneumatic actuator should be able to be identified. Tighten all screws on the flange connection
 if necessary refer to table in section B3.
- [°] <u>Testing the actuation function and indicator:</u>

With the control pressure applied, the fitting must drive to the corresponding end position with the control commands "CLOSED" and "OPEN". The visual indicator on the actuator (and on the fitting if applicable) must show this correctly.

If this is not right, the control of the actuator and/or position of the indicator must be corrected accordingly.

(If assembly is available) check the electrical position response:

 The electrical signal display "OPEN" and "CLOSED" (in the system switch controls) should be compared with the visual indicator on the fitting. The signal and indicator must correspond.
 If this is not right, the control and/or adjustment of the position alarm must be checked. The installation instructions from the component manufacturer must be observed.



B8 Extra info: dismantling the actuator

The same safety regulations as for the pipeline system, compressed air supply and (electrical/electro-pneumatic) control system must be observed.

Then proceed with the following steps:

- ° Mark the allocation of the actuator position to the fitting position document it for subsequent assembly.
- ° Safely disconnect the compressed air supply and depressurise the fitting if necessary.
- ° Disconnect the compressed air supply and control connections.
- ° Loosen the flange connection on the fitting/actuator and lift the actuator from the fitting.

C Operating Manual

The manufacturer must prepare a comprehensive risk analysis according to MRL 2006/42/EC.

KLINGER SCHÖNEBERG thereby provides the following document:

- ° This assembly and operating manual,
- ° The initially enclosed declaration on EC guidelines.



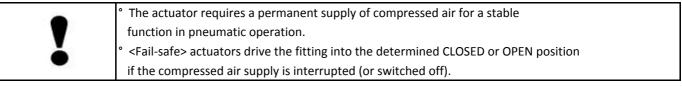
For industrial use, this manual contains safety advice on foreseeable risks when using the actuator. It is the responsibility of the user to supplement these instructions with other risks specific to the fitting.

C1 Safety advice for operation

	* The function of a pneumatic actuator assembled on a fitting must
	correspond with the <intended use=""> described in section A2.</intended>
	* The conditions of use must match the mark on the
- A	actuator type label.
	An actuator in the standard version should exclusively be operated within the
1	approved temperature limits.
•	 All work on the actuator may only be carried out by qualified personnel.
	The word qualified, in terms of this manual, refers to persons who, due to their
	training, knowledge and professional experience, can carry out the work given to them
	correctly, can identify possible dangers and address them.
^	Actuation of the the actuator, which is assembled on a fitting, is only permitted
	as long as the fitting is enclosed from both sides by a section of pipe or apparatus.
<u> ~ ` `</u>	Any actuation before this means a risk of crushing and the
risk of crushing!	is exclusively the responsibility of the user.

C2 Automatic mode/manual mode

If the actuator is correctly connected in accordance with section B, it runs automatically and is designed for permanent operation in accordance with EN15714-3, table 1.





C3 Troubleshooting

The following safety advice for assembly and repair work should be observed before carrying our troubleshooting measures. Troubleshooting measures may only be carried our by trained our by trained personnel.

The tools used must correspond with the relevant regulations and be in perfect condition.

The responsible operating department must give approval (release) before rotary actuator is dismantled for troubleshooting.

The following troubleshooting table describes a selection of common

causes of error and measures for rectification:

Error	Cause of error	Addressing the error
Rotary actuator does not	Voltage supply for	Provide voltage supply;
react	control solenoid valve	Function test
	cut off	
	Control medium supply	Control medium supply
	cut off	reinstate;
		Function test
	Control pressure before actuate	Check control pressure
	low	(adjust if necessary),
		Function test
	Solenoid valve defective	Release solenoid valve and
		replace or repair;
		Function test

Rotary actuator will not	Stop screws	Adjust the stop screws;
adjust to the	end positions	Function test
Move		
	Fitting defective (jammed)	See "troubleshooting" from the
		fitting manufacturer



Technical appendix/planning documents

Advice:

D

This appendix is not part of the <installation and assembly manual>; it only provides additional information.

The actuator must be adapted by the planned/ordering party to

► the fitting it is assembled on

► as well as the system's compressed air supply and the control system. Important technical details are listed as follows.

D1 Standard version of actuators

D1-1 Adaptation to the fitting

Pneumatic rotary actuators type MIG-KS-xx-D (double action) and type MIG-KS-xx-S (with closing or opening spring) can be assembled on all fittings with a pivoting motion (90°), which have a setup flange according to EN ISO 5211.

D1-2 Initial actuator torque

The initial torques of rotary actuators stated in section D5 are nominal torques. They are achieved with a compressed air supply with nominal pressure of 5.5 bar.

•	
•	

The output torque changes with the control pressure currently affecting the actuator.

Overpressures up to 10 bar are covered by the actuator design,

► Working pressures must be considered by the planner/ordering party when selecting

the actuator size – see also D 1.4 below.

D1-3 Rotary direction of actuator

It is defined, in accordance with construction norm EN 15714-3, that the fitting closes in a clockwise direction. This must be realised on-site by correctly connecting the solenoid valve to the voltage supply and control – see also section B4 – the solenoid valve documentation must provide the necessary information.

D1-4 Fitting allocation

The fundamental influential factors for the necessary actuation torque are determined by the fitting (nominal width), operating pressure and the medium. The necessary actuation torque results for the fitting, under consideration of these parameters, which is to be specified by the fitting manufacturer. It is advisable to add a safety margin to this value for designing the actuator.

D1-5 Self-disabling at standstill

► All double action rotary actuators only have a self-disabling function with a control pressure applied

▶ and all <fail-safe> actuators with springs in the end positions of the actuator torque according to the technical data in section D3.

The hydraulic torque of the medium generally cannot influence the position of the shut-off unit.



D1-6 Permanent hold

The design of the actuator according to EN 15714-3, table 1, is the specification for the type test of the actuator in permanent testing at 30% of the nominal power under laboratory conditions.

It depends on the operating conditions - especially the pressure and cleanliness of compressed air - whether and when actuator maintenance is required:

	It is generally the case that the maintenance interval of an actuator is considerably longer
	than the maintenance intervals of the fitting:
	If maintenance takes place for the fitting, the correct
	function of the actuator should at least be checked and ensured.

D1-7 Manual emergency actuation

A manual emergency actuation with additional gears with freewheel is not a standard for pneumatic actuators.

D1-8 Installation position

The installation position of the fitting/rotary actuator can be freely chosen.

- ► Arrangement above the fitting is the usual position for an actuator
- ► The construction of the fitting may restrict the possible installation positions
- With a horizontal position of the fitting shaft on an actuator with additional manual gears, the system planner or fitting manufacturer must decide whether an actuator exercises an unauthorised torsional torque on the fitting and/or pipeline and whether it needs support.

D1-9 Corrosion protection

In accordance with the norm EN 15714-3 for pneumatic actuators, this corresponds with corrosion category C4.

D2 Optional additional equipment

D2-1 Solenoid valve

A solenoid valve can be supplied on customer request and directly attached - the brand, voltage and current (DC or AC) must be specified for the valve.

D2-2 End switches (for position report)

2 (or more) end switches can be supplied on customer request for the response of "OPEN" and "CLOSED" and directly attached – the brand, voltage and current (DC or AC) must be specified for the end switches.

D2-3 Manual emergency actuation (with additional gears)

Additional gears for manual actuation of the rotary actuator can be attached on customer request.



Technical features of the actuator Type MIG-KS-xx-D - double acting MIG-KS-xx-S – single acting

Double action torque in Nm

Actuator							Mo	I (Nm) a	t press	ure (bar)				
Туре	1.5 bar	2 bar	2.5 bar	3 bar	3.5 bar	4 bar	4.2 bar	4.5 bar	5 bar	5.5 bar	6 bar	7 bar	8 bar	9 bar	10 bar
MIG-KS-30-D	8	11	14	17	19	22	23	24	27	31	34	39	44	49	55
MIG-KS-40-D	10	14	17	21	24	28	29	30	34	38	42	49	56	63	70
MIG-KS-60-D	15	22	27	33	39	44	46	49	55	60	66	77	88	99	110
MIG-KS-80-D	23	30	37	45	53	60	62	66	74	81	89	103	117	131	146
MIG-KS-120-D	33	44	55	66	77	88	92	99	110	126	138	161	184	207	230
MIG-KS-150-D	41	55	69	83	97	111	115	124	138	157	172	200	228	256	285
MIG-KS-200-D	64	86	107	129	151	172	180	193	215	236	258	301	344	387	430
MIG-KS-270-D	76	103	129	155	181	207	216	232	258	284	310	361	412	463	515
MIG-KS-380-D	111	148	185	222	259	296	310	333	370	403	440	513	586	659	732
MIG-KS-510-D	148	198	246	297	346	396	414	444	494	542	592	690	788	886	985
MIG-KS-740-D	212	283	354	425	497	567	595	638	709	780	851	992	1133	1274	1416
MIG-KS-920-D	266	355	444	533	621	710	745	798	887	975	1064	1241	1418	1595	1772
MIG-KS-1300-D	397	529	661	794	926	1058	1110	1189	1322	1454	1587	1851	2115	2379	2643
MIG-KS-1600-D	476	635	794	953	1111	1270	1333	1428	1587	1746	1905	2222	2539	2856	3173

Single action torque in Nm

	Spring	Spring	g force							~~~			N	ld (Nm)	at pres	sure (ba	ar)					a			
Actuator	set	Md (Nm)	2.5	bar	3	bar	3.5	bar	4	bar	4.2	bar	4.5	bar	5	bar	5.5	bar	6	bar	7	bar	8	bar
Туре	No.	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min
*	1	4	3	11	10	14	13	17	16	20	18	21	20	22	21	25	24	28	27	31	30	36	35	42	41
*	2	6	5	10	8	12	11	15	13	18	16	19	17	21	19	24	22	26	25	29	28	35	33	41	39
*	3	8	6	8	6	11	9	14	11	17	14	18	15	19	17	22	20	25	23	28	25	33	31	39	37
*	4	10	8	7	4	9	6	12	9	15	12	16	13	18	15	21	18	23	21	26	23	32	29	38	35
*	5	13	9	5	2	8	4	11	7	14	10	15	11	16	13	19	16	22	18	25	21	30	27	36	33
MIG-KS-30-S*	6	15	11			6	2	9	5	12	8	13	9	15	11	18	14	20	16	23	19	29	25	35	30
*	7	17	12					8	3	11	6	12	7	13	9	16	11	19	14	22	17	27	23	33	28
*	8	19	14							9	4	10	5	12	7	15	9	17	12	20	15	26	21	32	26
*	9	21	15									9	3	10	4	13	7	16	10	19	13	24	19	30	24
*	10	23	17													12	5	14	8	17	11	23	16	29	22
*	11	25	18															13	6	16	9	21	14	27	20
					1																				
	Spring	Spring	g force										N	1d (Nm)	at pres	sure (ba	ar)								
Actuator	set	Md (Nm)	2.5	bar	3	bar	3.5	bar	4	bar	4.2	bar	4,5	bar	5	bar	5.5	bar	6	bar	7	bar	8	bar
Type	No.	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min
*	1	5	4	13	12	17	15	20	18	23	22	25	23	27	25	30	28	34	32	37	35	44	42	50	49
*	2	8	5	11	9	15	12	18	16	22	19	23	20	25	22	28	26	32	29	35	33	42	39	49	46
*	3	11	7	10	6	13	10	16	13	20	16	21	18	23	20	27	23	30	26	33	30	40	37	47	43
*	4	13	9	8	4	11	7	15	10	18	14	19	15	21	17	25	20	28	24	32	27	38	34	45	41
*	5	16	11			9	4	13	8	16	11	18	12	20	14	23	18	26	21	30	25	36	31	43	38
MIG-KS-40-S*	6	19	13					11	5	14	8	16	10	18	12	21	15	25	19	28	22	35	29	41	35
*	7	21	14							13	6	14	7	16	9	19	12	23	16	26	19	33	26	40	33
*	8	24	16									12	4	14	6	18	10	21	13	24	17	31	23	38	30
*	9	27	18											12	4	16	7	19	11	23	14	29	21	36	27
*	10	29	20													14	4	17	8	21	11	27	18	34	25
*	11	32	22															16	5	19	9	26	15	32	22
	Spring	Spring	g force										N	ld (Nm)	at pres	sure (ba	ar)								
Actuator	set		Nm)	2.5	bar	3	bar	3.5	bar	4	bar	4.2	bar	4.5	bar	5	bar	5.5	bar	6	bar	7	bar	8	bar
Туре	No.	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min
*	1	8	6	22	19	27	25	33	30	- 38	36	40	38	44	41	49	47	55	52	60	58	71	69	82	80
*	2	12	9	19	15	24	21	30	26	35	32	38	34	41	37	46	43	52	48	57	54	68	65	79	76
*	3	16	12	16	11	21	17	27	22	32	28	35	30	38	33	43	39	49	44	54	50	65	61	76	72
*	4	20	15	13	7	18	13	24	18	29	24	32	26	35	29	40	35	46	40	51	46	62	57	73	68
*	5	24	17			16	9	21	14	27	20	29	22	32	25	38	31	43	36	49	42	60	53	71	64
MIG-KS-60-S*	6	28	20					18	10	24	16	26	18	29	21	35	27	40	32	46	38	57	49	68	60
*	7	32	23					15	6	21	12	23	14	26	17	32	23	37	28	43	34	54	45	65	56
	8	36	26							18	8	20	10	23	13	29	19	34	24	40	30	51	41	62	52
*	9	40	29	_								17	6	20	9	26	15	31	20	37	26	48	37	59	48
	10	44	32											18	5	23	11	29	16	34	22	45	33	56	44
*	11	49	35													20	6	26	12	31	17	42	28	53	39



Installation and assembly instructions for pneumatic actuators MIG-KS-xx-D & MIG-KS-xx-S

Single action torque in Nm

	Spring	Sprin	ng force			~							N	d (Nm)	at pres	sure (ba	ar)								
Actuator	set	Md	(Nm)		5 bar		bar		bar	-	bar		bar	4.5	bar	5	bar		bar		bar		bar	8 b	
Type *	No.	max 11	min 8	29	25	max 36	min 33	max 44	min 40	max 51	min 47	max 54	min 50	max 58	min 55	max 66	62	max 73	min 69	max 80	min 77	max 95	min 92	max 110	min 106
*	2	17	12	25	20	32	27	40	35	47	42	50	45	54	49	62	57	69	64	76	71	91	86	106	101
*	3	22	16	21	14	28	22	36	29	43 39	36	46	39 34	50 47	44	58 54	51 45	65	58	72	66	87	80 75	102	95
*	5	28	19	17	9	25 21	16 11	32 28	23 18	39 35	31 25	42 38	28	47	38 33	54	45	61 57	53 47	69 65	60 55	83 79	69	98 94	89 84
MIG-KS-80-S*	6	39	27			~ .		24	12	32	20	35	23	39	27	46	34	54	42	61	49	76	64	90	78
*	7	45 50	31 35							28	14	31 27	17	35	21 16	42	29	50 46	36 31	57	43 38	72 68	58	86	73 67
*	9	50	35	-	-							21	12	31 27	10	39 35	23 18	40	25	53 49	38	64	53 47	83 79	62
*	10	61	43													31	12	38	19	45	27	60	41	75	56
*	11	67	46															34	14	42	21	56	36	71	51
	Spring	Sprin	ng force										N	d (Nm)	at pres	sure (b	ar)								
Actuator	set	Md	(Nm)		5 bar		bar		bar		bar		bar	4.5	bar	5	bar		bar		bar		bar	8 b	
Туре	No.	max 17	12	max 46	min 41	max 57	min 53	max 69	min 64	max 81	min 76	max 85	min 81	max 92	min 88	max 104	min 99	max 116	min 111	max 127	min 123	max 151	min 146	max 174	min 169
*	2	25	18	40	33	51	44	63	56	75	68	79	72	86	79	98	91	110	103	121	114	144	140	168	161
*	3	34	24	34	24	45	36	57	48	69	59	73	64	80	71	92	82	103	94	115	106	138	129	162	152
*	4	42 51	31 37	28 21	16	39 33	27 19	51 45	39 31	62 56	51 42	67 61	55 47	74 68	62 54	86 80	74 65	97 91	86	109 103	97 89	132 126	120 112	155 149	144 135
MIG-KS-120-S*	6	59	43	21	· ·	27	10	38	22	50	34	55	38	62	45	73	57	85	69	97	80	120	103	143	127
*	7	68	49					32	14	44	25	49	30	56	37	67	48	79	60	90	72	114	95	137	118
*	8	76 85	55 61					26	5	38 32	17 8	43 36	21 13	49 43	28	61 55	40 32	73 67	52 43	84 78	63 55	108	87 78	131 125	110 101
*	10	93	67							32	0	- 50	15	37	20 11	49	23	61	35	78	55 46	102 95	78	125	93
*	11	102	74													43	15	54	26	66	38	89	61	113	84
	Curvin	Caralia												al (bloce)											
Actuator	Spring set		ng force (Nm)	2.5	5 bar	3	bar	3.5	bar	4	bar	4.2	bar		at pres bar	sure (bi 5	ar) bar	5.5	bar	6	bar	7	bar	8 b	bar
Туре	No.	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min
*	1	22	15	57	51	72	65	86	80	101	94	107	100	115	109	130	124	145	138	159	153	188	182	217	211
*	2	33 44	23	50 42	40 29	64 57	55 44	79	69 58	93 86	84 73	99 92	89 79	108	98 87	122 115	113	137	127	151 144	142 131	181 173	171 160	210 202	200 189
*	4	55	38	34	18	49	33	63	47	78	62	84	68	93	76	107	91	122	105	136	120	165	149	194	178
*	5	65	46	27	7	41	22	56	36	70	51	76	57	85	65	99	80	114	94	128	109	158	138	187	167
MIG-KS-150-S*	6	76	54 61		-	34	11	48 40	25 14	63 55	40 29	68	46 35	77 69	54 43	92 84	69 58	106 99	84 73	121 113	98 87	150 142	127 116	179 171	156 145
*	8	87 98	69		-			33	4	47	18	61 53	24	62	33	76	47	99 91	62	105	76	135	105	164	134
*	9	109	77							40	7	46	13	54	22	69	36	83	51	98	65	127	95	156	124
*	10	120 131	84 92											47	11	61	25	76	40	90	55	119	84	148	113
	11																								
		101	02													53	14	68	29	82	44	112	73	141	102
	Spring	Sprin	ng force													sure (b	ar)								
Actuator	set	Sprin Md	ig force (Nm)	2.5	5 bar	-	bar		bar	-	bar		bar	4.5	bar	sure (ba 5	ar) bar	5.5	bar	6	bar	7	bar	8 b	bar
Actuator Type		Sprin	ng force		5 bar min 80	3 max 112	bar min 102	3.5 max 135	bar min 125	4 max 158	bar min 148	4.2 max 167				sure (b	ar)								
Type * *	set No. 1 2	Sprin Md max 34 51	ng force (Nm) 24 36	2.5 max 90 78	min 80 63	max 112 100	min 102 86	max 135 123	min 125 108	max 158 146	min 148 131	max 167 155	bar min 157 140	4.5 max 180 168	bar min 171 154	sure (b) 5 max 203 191	ar) bar <u>min</u> 193 177	5.5 max 226 214	bar min 216 199	6 max 249 237	bar <u>min</u> 239 222	7 max 294 282	bar <u>min</u> 284 267	8 b max 340 328	bar min 330 313
Туре	set No. 1 2 3	Sprin Md max 34 51 67	ng force (Nm) 24 36 48	2.5 max 90 78 66	min 80 63 46	max 112 100 88	min 102 86 69	max 135 123 111	min 125 108 92	max 158 146 134	min 148 131 114	max 167 155 143	bar 157 140 124	4.5 max 180 168 156	bar min 171 154 137	sure (b) 5 max 203 191 179	ar) bar 193 177 160	5.5 max 226 214 202	bar min 216 199 183	6 max 249 237 225	bar min 239 222 205	7 max 294 282 270	bar <u>min</u> 284 267 251	8 b max 340 328 316	min 330 313 296
Type * *	set No. 1 2	Sprin Md max 34 51	ng force (Nm) 24 36	2.5 max 90 78	min 80 63	max 112 100	min 102 86	max 135 123	min 125 108	max 158 146	min 148 131	max 167 155	bar min 157 140	4.5 max 180 168	bar min 171 154	sure (b) 5 max 203 191	ar) bar <u>min</u> 193 177	5.5 max 226 214	bar min 216 199	6 max 249 237	bar min 239 222	7 max 294 282	bar <u>min</u> 284 267	8 b max 340 328	bar min 330 313
Type * *	set No. 1 2 3 4 5 6	Sprin Md 34 51 67 84 101 118	ng force (Nm) 24 36 48 60 72 84	2.5 max 90 78 66 54	min 80 63 46 29	max 112 100 88 76	min 102 86 69 52	max 135 123 111 99 87 75	min 125 108 92 75 58 41	max 158 146 134 122 110 98	min 148 131 114 98 81 64	max 167 155 143 131 119 107	bar min 157 140 124 107 90 73	4.5 max 180 168 156 144 132 120	bar min 171 154 137 120 103 87	sure (b) max 203 191 179 167 155 143	ar) bar 193 177 160 143 126 109	5.5 max 226 214 202 190 178 166	bar min 216 199 183 166 149 132	6 max 249 237 225 213 201 189	bar min 239 222 205 188 172 155	7 max 294 282 270 258 246 234	bar min 284 267 251 234 217 200	8 b max 340 328 316 304 291 279	min 330 313 296 279 263 246
Type * * * * * * * * * *	set No. 1 2 3 4 5 6 7	Sprin Md 34 51 67 84 101 118 135	mg force (Nm) min 24 36 48 60 72 84 96	2.5 max 90 78 66 54	min 80 63 46 29	max 112 100 88 76 64	min 102 86 69 52 35	max 135 123 111 99 87	min 125 108 92 75 58	max 158 146 134 122 110 98 86	min 148 131 114 98 81 64 47	max 167 155 143 131 119 107 95	bar min 157 140 124 107 90 73 56	4.5 max 180 168 156 144 132 120 108	bar min 171 154 137 120 103 87 70	sure (b) max 203 191 179 167 155 143 131	ar) bar 193 177 160 143 126 109 92	5.5 max 226 214 202 190 178 166 154	bar min 216 199 183 166 149 132 115	6 max 249 237 225 213 201 189 177	bar min 239 222 205 188 172 155 138	7 max 294 282 270 258 246 234 222	bar min 284 267 251 234 217 200 183	8 b max 340 328 316 304 291 279 267	min 330 313 296 279 263 246 229
Type * * * * * * * * * *	set No. 1 2 3 4 5 6 7 8	Sprir Md max 34 51 67 84 101 118 135 152	min 24 36 48 60 72 84 96 108	2.5 max 90 78 66 54	min 80 63 46 29	max 112 100 88 76 64	min 102 86 69 52 35	max 135 123 111 99 87 75	min 125 108 92 75 58 41	max 158 146 134 122 110 98 86 74	min 148 131 114 98 81 64 47 30	max 167 155 143 131 119 107	bar min 157 140 124 107 90 73 56 39	4.5 max 180 168 156 144 132 120	bar min 171 154 137 120 103 87 70 53	sure (b) 5 max 203 191 179 167 155 143 131 119	ar) bar 193 177 160 143 126 109 92 76	5.5 max 226 214 202 190 178 166 154 142	bar 216 199 183 166 149 132 115 98	6 max 249 237 225 213 201 189 177 165	bar min 239 222 205 188 172 155 138 121	7 max 294 282 270 258 246 234 222 210	bar <u>min</u> 284 267 251 234 217 200 183 166	8 b max 340 328 316 304 291 279 267 255	Dar min 330 313 296 279 263 246 229 212
Type * * * * * MIG-KS-200-S* * * * * * * * * * * * * * * * * * *	set No. 1 2 3 4 5 6 7 8 9 9 10	Sprir Md 34 51 67 84 101 118 135 152 168 185	ng force (Nm) 24 36 48 60 72 84 96 108 120 132	2.5 max 90 78 66 54	min 80 63 46 29	max 112 100 88 76 64	min 102 86 69 52 35	max 135 123 111 99 87 75	min 125 108 92 75 58 41	max 158 146 134 122 110 98 86	min 148 131 114 98 81 64 47	max 167 155 143 131 119 107 95 83	bar min 157 140 124 107 90 73 56	4.5 max 180 168 156 144 132 120 108 96	bar min 171 154 137 120 103 87 70	sure (b) 5 max 203 191 179 167 155 143 131 119 107 95	ar) bar 193 177 160 143 126 109 92 76 59 42	5.5 max 226 214 202 190 178 166 154 142 130 118	bar min 216 199 183 166 149 132 115 98 82 65	6 max 249 237 225 213 201 189 177 165 153 141	bar min 239 222 205 188 172 155 138 121 104 87	7 max 294 282 270 258 246 234 222 210 198 186	bar min 284 267 251 234 217 200 183 166 150 133	8 b max 340 328 316 304 291 279 267 255 243 231	min 330 313 296 279 263 246 229 212 195 178
Type 	set No. 1 2 3 4 5 6 7 8 9	Sprir Md max 34 51 67 84 101 118 135 152 168	Image force (Nm) min 24 36 48 60 72 84 96 108 120	2.5 max 90 78 66 54	min 80 63 46 29	max 112 100 88 76 64	min 102 86 69 52 35	max 135 123 111 99 87 75	min 125 108 92 75 58 41	max 158 146 134 122 110 98 86 74	min 148 131 114 98 81 64 47 30	max 167 155 143 131 119 107 95 83	bar min 157 140 124 107 90 73 56 39	4.5 max 180 168 156 144 132 120 108 96 84	bar min 171 154 137 120 103 87 70 53 36	sure (b) 5 max 203 191 179 167 155 143 131 119 107	ar) bar 193 177 160 143 126 109 92 76 59	5.5 max 226 214 202 190 178 166 154 142 130	bar min 216 199 183 166 149 132 115 98 82	6 max 249 237 225 213 201 189 177 165 153	bar min 239 222 205 188 172 155 138 121 104	7 max 294 282 270 258 246 234 222 210 198	bar min 284 267 251 234 217 200 183 166 150	8 b max 340 328 316 304 291 279 267 255 243	min 330 313 296 279 263 246 229 212 195
Type * * * * * MIG-KS-200-S* * * * * * * * * * * * * * * * * * *	set No. 1 2 3 4 5 6 7 8 9 9 10	Sprir Md 34 51 67 84 101 118 135 152 168 185 202	ng force (Nm) 24 36 48 60 72 84 96 108 120 132	2.5 max 90 78 66 54	min 80 63 46 29	max 112 100 88 76 64	min 102 86 69 52 35	max 135 123 111 99 87 75	min 125 108 92 75 58 41	max 158 146 134 122 110 98 86 74	min 148 131 114 98 81 64 47 30	max 167 155 143 131 119 107 95 83	bar min 157 140 124 107 90 73 56 39 23	4.5 max 180 168 156 144 132 120 108 96 84 72	bar min 171 154 137 120 103 87 70 53 36 19	sure (b) 5 max 203 191 179 167 155 143 131 119 107 95	ar) bar 193 177 160 143 126 109 92 76 59 42 25	5.5 max 226 214 202 190 178 166 154 142 130 118	bar min 216 199 183 166 149 132 115 98 82 65	6 max 249 237 225 213 201 189 177 165 153 141	bar min 239 222 205 188 172 155 138 121 104 87	7 max 294 282 270 258 246 234 222 210 198 186	bar min 284 267 251 234 217 200 183 166 150 133	8 b max 340 328 316 304 291 279 267 255 243 231	min 330 313 296 279 263 246 229 212 195 178
Type	set No. 1 2 3 4 5 6 7 8 9 10 11 5 10 11 5 5 7 8 9 9 10 11	Sprir Md 34 51 67 84 101 118 135 152 168 185 202 Sprir Md	r (Nm) min 24 36 48 60 72 84 96 108 120 132 144 r (Nm)	2.5 max 90 78 66 54 42	min 80 63 46 29 13	max 112 100 88 76 64 52	min 102 86 69 52 35 18	max 135 123 111 99 87 75 63 63 	min 125 108 92 75 58 41 24	max 158 146 134 122 110 98 86 74 62	min 148 131 114 98 81 64 47 30 13	max 167 155 143 131 119 107 95 83 71 4.2	bar min 157 140 124 107 90 73 56 39 23 23 W bar	4.5 max 180 168 156 144 132 120 108 96 84 72 d (Nm) 4.5	bar min 171 154 137 120 103 87 70 53 36 19 19 at pres bar	sure (b: 5 max 203 191 179 167 155 143 131 119 107 95 83 sure (b: 5	ar) bar 193 177 160 143 126 109 92 76 59 42 25 25 ar) bar	5.5 max 226 214 202 190 178 166 154 142 130 118 106 5.5	bar min 216 199 183 166 149 132 115 98 82 65 48 bar	6 max 249 237 225 213 201 189 177 165 153 141 129 6	bar min 239 222 205 188 172 155 138 121 104 87 70 bar	7 max 294 282 270 258 246 234 222 210 198 186 174 7	bar min 284 267 251 234 217 200 183 166 150 133 116 bar	8 b max 340 328 316 304 291 279 267 255 243 231 219 8 b	min 330 313 296 279 263 246 229 212 195 178 161
Type	set No. 1 2 3 4 5 6 7 8 9 10 11 11 Spring set No.	Sprir Md 34 51 67 84 101 118 135 152 168 185 202 Sprir Md max	ng force (Nm) 24 36 48 60 72 84 96 108 120 132 144 120 132 144 (Nm) min	2.5 max 90 78 66 54 42 42 2.5 max	min 80 63 46 29 13 	max 112 100 88 76 64 52	min 102 86 69 52 35 18	max 135 123 111 99 87 75 63	min 125 108 92 75 58 41 24	max 158 146 134 122 110 98 86 74 62	min 148 131 114 98 81 64 47 30 13 bar min	max 167 155 143 131 119 107 95 83 71 4.2 max	bar min 157 140 124 107 90 73 56 39 23 23 23 W bar min	4.5 max 180 168 156 144 132 120 108 96 84 72 72 d (Nm) 4.5 max	bar min 171 154 137 120 103 87 70 53 36 19 19 at pres bar min	sure (b) max 203 191 179 167 155 143 131 119 107 95 83 sure (b) 5 max	ar) bar 193 177 160 143 126 109 92 76 59 42 25 25 ar) bar min	5.5 max 226 214 202 190 178 166 154 142 130 118 106 5.5 max	bar min 216 199 183 166 149 132 115 98 82 65 48 bar min	6 max 249 237 225 213 201 189 177 165 153 141 129 6 max	bar min 239 205 188 172 155 138 121 104 87 70 bar min	7 max 294 282 270 258 246 234 222 210 198 186 174 7 7 max	bar min 284 267 251 234 217 200 183 166 150 133 116 bar min	8 b max 340 328 316 304 291 279 267 255 243 231 231 231 231 231 231 8 b max	296 279 263 246 229 242 242 242 242 242 242 242 242 242
Type	set No. 1 2 3 4 5 6 7 8 9 10 11 5 9 10 11	Sprir Md 34 51 67 84 101 118 135 152 168 185 202 Sprir Md	r (Nm) min 24 36 48 60 72 84 96 108 120 132 144 r (Nm)	2.5 max 90 78 66 54 42	min 80 63 46 29 13	max 112 100 88 76 64 52	min 102 86 69 52 35 18	max 135 123 111 99 87 75 63 63 	min 125 108 92 75 58 41 24	max 158 146 134 122 110 98 86 74 62	min 148 131 114 98 81 64 47 30 13	max 167 155 143 131 119 107 95 83 71 4.2	bar min 157 140 124 107 90 73 56 39 23 23 W bar	4.5 max 180 168 156 144 132 120 108 96 84 72 d (Nm) 4.5	bar min 171 154 137 120 103 87 70 53 36 19 19 at pres bar	sure (b: 5 max 203 191 179 167 155 143 131 119 107 95 83 sure (b: 5	ar) bar 193 177 160 143 126 109 92 76 59 42 25 25 ar) bar	5.5 max 226 214 202 190 178 166 154 142 130 118 106 5.5	bar min 216 199 183 166 149 132 115 98 82 65 48 bar	6 max 249 237 225 213 201 189 177 165 153 141 129 6	bar min 239 222 205 188 172 155 138 121 104 87 70 bar	7 max 294 282 270 258 246 234 222 210 198 186 174 7	bar min 284 267 251 234 217 200 183 166 150 133 116 bar	8 b max 340 328 316 304 291 279 267 255 243 231 219 8 b	min 330 313 296 279 263 246 229 212 195 178 161
Type	set No. 1 2 3 4 5 6 7 8 9 10 11 11 Spring set No. 1 2 3	Sprir Md max 34 51 67 84 101 118 135 152 168 185 202 Sprir Md max 41 61 81	Image Image 24 36 48 6 60 72 84 96 108 120 132 144 9 6 (Nm) 132 144 36 58 58	2.5 max 90 78 66 54 42 42 42 42 42 42 78 79 79	min 80 63 46 29 13	max 112 100 88 76 64 52	min 102 86 69 52 35 18 bar 102 bar 1123 103 83	max 135 123 111 99 87 75 63	min 125 108 92 75 58 41 24 bar min 150 130 110	max 158 146 134 122 110 98 86 74 62	min 148 131 114 98 64 47 30 13 bar min 177 157 137	max 167 155 143 131 119 107 95 83 71 4.2 max 2000 186 171	bar min 157 140 124 107 90 73 56 39 23 23 23 23 73 56 39 23 73 56 39 23 73 56 39 23 73 56 39 23 56 39 23 56 14 24 57 140 107 107 90 73 56 39 23 56 140 107 107 107 107 107 107 107 107 107 10	4.5 max 180 168 156 144 132 120 108 96 84 72 72 d (Nm) 4.5 max 217 202 188	bar min 171 154 137 120 103 87 70 53 36 19 87 19 at pres bar 205 185 164	sure (b. 5 max 203 191 179 167 155 143 131 119 107 95 83 107 95 83 \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	ar) bar 193 177 160 143 126 109 92 76 59 42 25 ar) bar min 232 212 192	5.5 max 2266 214 202 190 178 166 154 142 130 118 106 5.5 max 271 257 242	bar min 216 199 183 166 149 132 115 98 82 65 48 bar min 259 239 219	6 max 249 237 225 213 201 189 177 165 153 141 129 6 max 298 284 284 270	bar min 239 222 205 188 172 155 138 121 104 87 70 bar min 287 266 246	7 max 294 282 270 258 234 234 222 210 198 186 174 7 max 353 338 338	bar min 284 267 251 234 217 200 183 166 150 133 116 bar min 341 321 301	8 b max 340 328 316 291 279 267 255 243 231 219 8 b max 407 393 3379	Dar min 330 313 296 279 263 246 229 212 195 178 161 Dar 396 375 355
Type	set No. 1 2 3 4 5 6 6 7 8 9 10 11 1 5 9 10 11 1 5 set No. 1 2 3 4	Sprir Md max 34 51 67 84 101 118 135 152 168 185 202 Sprir Md max 41 61 81 101	ng force (Nm) 24 36 48 60 72 84 96 108 120 132 144 120 132 144 9 58 72	2.5 max 90 78 66 54 42 42 2.5 max 108 93 79 64	min 80 63 46 29 13 5 5 min 96 76 55	max 112 100 88 76 64 52 3 max 135 120 106 92	min 102 86 69 35 18	max 135 123 111 99 87 75 63	min 125 108 92 75 58 41 24 5 bar min 150 1300 110 90	max 158 146 134 122 110 98 86 62 4 max 189 175 161 146	min 148 131 114 98 64 47 30 13 bar 177 157 137 117	max 167 155 143 131 119 107 95 83 71 4.2 max 200 186 171 157	bar min 157 140 124 107 90 73 56 39 23 23 23 23 W bar min 188 168 148 148	4.5 max 180 168 156 144 132 120 108 96 84 72 08 84 72 d (Nm) 4.5 max 217 202 188 173	bar min 171 154 137 120 103 87 70 53 36 19 at pres bar min 205 185 164 144	sure (b. 5 max 203 191 179 167 155 143 131 107 95 83 5 max 244 229 215 201	ar) bar 193 177 160 143 126 109 92 76 59 42 25 42 25 ar) bar min 232 212 232 212 192	5.5 max 226 214 202 178 166 154 142 130 118 106 5.5 max 271 257 242 228	bar min 216 199 183 166 149 132 115 98 82 65 48 bar min 259 239 219 199	6 max 249 237 225 213 201 189 177 165 153 141 129 6 max 298 284 270 255	bar min 239 2025 188 172 155 138 121 104 87 70 bar min 287 266 246 226	7 max 294 282 270 258 246 234 222 210 198 186 174 7 max 353 338 324 310	bar min 284 267 251 234 217 200 183 166 150 133 166 150 133 116 bar min 341 321 301 280	8 b max 340 328 316 304 291 279 267 255 243 231 219 219 8 b max 407 393 379 364	Dar min 330 313 296 279 263 246 229 212 195 178 161 Dar min 396 3755 335
Type	set No. 1 2 3 4 5 6 7 8 9 10 11 11 Spring set No. 1 2 3	Sprir Md max 34 101 118 135 152 168 185 202 Sprir Md max 41 61 81 101 121	Image Image 24 36 48 6 60 72 84 96 108 120 132 144 9 6 (Nm) 132 144 36 58 58	2.5 max 90 78 66 54 42 42 42 42 42 42 78 79 79	min 80 63 46 29 13	max 112 100 88 76 64 52	min 102 86 69 52 35 18	max 135 123 111 99 87 75 63	min 125 108 92 75 58 41 24 bar min 150 130 110	max 158 146 134 122 110 98 86 74 62	min 148 131 114 98 81 64 47 30 13 bar min 177 157 137 97	max 167 155 143 131 119 107 95 83 71 4.2 max 2000 186 157 143	bar min 157 140 124 107 90 73 56 39 23 23 23 73 58 39 23 8 48 8 8 8 8 8 188 188 188 128 108	4.5 max 180 168 156 144 132 120 108 96 84 72 72 4 (Nm) 4.5 max 217 202 188 173 159	bar min 171 154 137 120 103 87 70 53 36 19 36 19 at pres bar min 205 185 185 185 185 144	sure (b. 5 max 203 191 179 167 155 143 131 119 107 95 83 107 95 83 \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	ar) bar min 193 177 160 143 126 109 92 76 59 42 25 25 ar) bar min 232 212 192 212 171 151	5.5 max 226 214 202 190 178 166 154 142 130 118 106 5.5 max 271 257 242 228 213	bar min 216 199 183 166 149 132 115 98 82 65 48 82 65 48 82 65 48 82 65 48 82 65 239 239 239 239 239 219 179	6 max 249 237 225 201 189 177 165 163 141 129 6 max 298 284 270 255 241	bar min 239 222 205 188 172 155 138 121 104 87 70 bar 287 266 246 226 206	7 max 294 282 270 258 234 234 222 210 198 186 174 7 max 353 338 338	bar min 284 267 251 234 217 200 183 166 150 133 116 bar min 341 321 301	8 b max 340 328 316 304 279 267 255 243 231 219 8 b max 407 393 379 364 350	Dar min 330 313 296 279 263 246 229 212 195 178 161 Dar min 396 335 335
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Type	set No. 1 2 3 4 5 6 7 8 9 10 11 11 8 9 10 11 11 2 8 5 6 6 7 7 8 8 7 7 8	Sprin Md 34 51 67 84 101 118 135 152 202 Sprin Md max 41 61 81 101 121 142 162 168 185 202	rg force (Nm) min 24 36 60 72 84 96 108 84 96 108 84 90 132 144 120 132 144 97 286 101 132 84 120 132 144 120 132 144 133	2.5 max 90 78 66 54 42 42 2.5 max 108 93 79 64	min 80 63 46 29 13 5 5 min 96 76 55	max 112 100 88 76 64 52 3 max 135 120 106 92 77	min 102 86 69 52 35 18	max 135 123 111 99 87 75 63 max 162 148 133 119 90	min 125 108 92 75 58 41 24	max 158 146 134 122 110 98 74 62 4 max 189 175 161 146 132 117 103 89	min 148 131 64 47 30 13 bar min 177 157 137 56 36	max 167 143 131 119 95 83 71 4.2 max 200 186 177 143 157 143 99	bar min 157 140 124 107 90 56 39 23 56 39 23 56 39 23 56 39 23 56 39 23 56 39 23 56 39 23 56 39 23 56 87 88 168 168 168 168 168 168 168	4.5 max 180 168 156 144 132 120 108 96 84 72 4.5 max 217 202 188 173 159 145 130 116	bar min 1711 154 137 120 103 87 70 53 87 70 53 36 19 19 19 19 19 19 19 19 19 10 205 185 185 185 184 124 124 124 124 124 135 144 124 135 145 187 19 19 19 19 19 19 19 19 19 19	sure (b) 5 max 203 191 179 167 143 131 143 131 107 95 83 sure (b) 5 5 7 244 229 245 244 229 241 186 172 186 172 143 143 143 143 143 143 143 143	ar) bar min 193 1777 160 143 126 109 92 76 59 42 25 27 25 ar) 232 212 192 212 192 212 192 171 151 131 91	6.5 max 226 214 202 190 158 154 142 130 06 5.5 5.5 5.7 242 271 257 242 271 257 242 228 213 199 185 170	bar min 216 199 183 166 149 132 115 98 65 48 bar min 259 239 219 179 158 138 138 138 138 138	6 max 249 225 213 201 189 177 165 141 129 6 6 max 298 284 275 298 284 275 241 226 212 198	bar min 239 205 188 172 155 138 121 104 87 70 87 70 87 70 87 206 287 287 287 287 286 206 185 206 185 185	7 max 294 282 270 258 234 222 210 188 186 174 188 186 174 7 max 338 338 338 324 338 324 295 281 295 281	bar min 284 267 251 234 217 200 183 166 133 116 bar min 341 321 300 260 240 260 240 260 200	8 b max 340 328 316 304 291 279 267 255 243 231 219 267 255 243 231 219 8 b max 407 393 379 364 350 335 335 321	par min 330 313 296 279 263 246 229 212 195 178 161 var min 396 375 335 3315 2954
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95 103 96 103 96 103 96 103 96 103 96 103 96 <td>max 135 123 111 99 87 75 63 162 148 133 148 133 104 90 76 </td> <td>min 125 108 92 76 58 41 24 24 100 101 102 90 90 70 49 29 100 90 90 90 70 49 29 100 101 90 90 70 49 29 100 101 90 90 70 40 29 100 100 100 100 100 100 100 100 100 100 100 100 100 100</td> <td>max 158 146 134 122 110 98 86 74 62 4 max 189 74 103 89 74 4 max 271</td> <td>min 148 131 131 114 98 64 30 13 13 64 47 30 13 13 13 13 13 13 13 13 13 13 13 13 13 147 97 97 76 36 16 16 17 97 97 96 36 16 16 17 18 19 117 97 36 16 16 17 18 19 10 1</td> <td>max max 167 155 143 155 143 19 107 95 33 71 42 200 186 171 186 177 143 186 171 186 171 186 187 143 99 85 42 207 max 207</td> <td>bar min 157 140 124 107 90 73 56 39 23 89 23 87 67 47 27 87 67 47 27 87 67 47 27 87 67 47 27 87 87 67 87 87 87 87 87 87 87 87 87 8</td> <td>4.5 max 180 180 168 156 144 132 120 96 84 72 72 4.5 202 217 202 217 202 188 217 202 188 130 130 116 101 130 1173 130 145 145 145 144 144 144 144 144 144 144</td> <td>bar 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max 353 324 295 281 209 7 max 506</td> <td>bar min 284 267 251 234 217 200 183 166 150 bar min 321 331 321 3280 2800 2600 200 139 bar min 490</td> <td>8 b B max 340 328 336 2291 291 292 255 243 210 211 212 212 213 214 215 303 335 335 335 335 335 213 307 292 278 283 max 584</td> <td>Dat min 330 296 279 263 2263 2212 1955 178 161 Dear min 336 3375 3355 315 296 274 234 214 193</td>	max 135 123 111 99 87 75 63 162 148 133 148 133 104 90 76	min 125 108 92 76 58 41 24 24 100 101 102 90 90 70 49 29 100 90 90 90 70 49 29 100 101 90 90 70 49 29 100 101 90 90 70 40 29 100 100 100 100 100 100 100 100 100 100 100 100 100 100	max 158 146 134 122 110 98 86 74 62 4 max 189 74 103 89 74 4 max 271	min 148 131 131 114 98 64 30 13 13 64 47 30 13 13 13 13 13 13 13 13 13 13 13 13 13 147 97 97 76 36 16 16 17 97 97 96 36 16 16 17 18 19 117 97 36 16 16 17 18 19 10 1	max max 167 155 143 155 143 19 107 95 33 71 42 200 186 171 186 177 143 186 171 186 171 186 187 143 99 85 42 207 max 207	bar min 157 140 124 107 90 73 56 39 23 89 23 87 67 47 27 87 67 47 27 87 67 47 27 87 67 47 27 87 87 67 87 87 87 87 87 87 87 87 87 8	4.5 max 180 180 168 156 144 132 120 96 84 72 72 4.5 202 217 202 217 202 188 217 202 188 130 130 116 101 130 1173 130 145 145 145 144 144 144 144 144 144 144	bar min 171 154 137 120 103 87 70 53 36 70 53 36 19 19 19 19 205 184 205 185 185 184 205 185 185 185 184 124 3 3 63 23 3 3 63 23 23 23 23 23 23 23 23 23 23 23 23 23	sure (b) 5 max 203 191 179 167 155 143 119 107 95 5 83 sure (b) 83 5 7 229 2215 229 2215 188 172 201 188 172 201 188 179 179 179 179 179 179 179 179	ar) bar min 193 177 160 143 126 109 92 25 25 25 27 27 27 27 27 27 27 27 27 27 27 27 27	5.5 max 226 1214 202 190 154 142 130 118 106 5.5 max 271 257 242 228 213 199 156 141 127 5.5 5.5 170	bar min 216 139 136 149 132 115 98 82 65 98 239 239 219 179 158 98 98 239 219 179 158 98 98 98 77 57 bar min 372	6 max 249 249 237 225 213 201 189 177 165 153 201 189 177 165 153 241 129 265 242 284 270 255 241 198 183 255 241 154 189 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Type Type T	set No. 3 4 5 6 6 7 8 9 10 11 1 2 3 3 4 5 6 6 7 7 8 9 10 11 1 2 3 3 4 5 5	Sprir Md max 34 51 67 84 101 118 135 202 Sprir Md 121 142 162 85 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7	rg force g force (Nm) min 24 48 60 72 84 49 6 48 40 72 84 120 132 144 9 6 132 144 9 6 132 144 9 6 132 144 9 6 132 144 158 132 144 158 132 144 158 132 144 158 132 144 158 132 144 158 132 144 158 132 144 158 132 144 158 132 144 158 132 132 144 158 132 144 158 132 132 144 158 132 132 144 158 132 132 144 158 132 144 158 132 144 158 132 132 144 158 132 132 144 158 132 132 144 158 132 132 132 132 144 158 132 132 132 132 132 132 132 132	2.6 max 90 78 66 54 42 2.6 2.6 93 93 93 93 93 93 93 93 93 93 93 93 93	min 80 80 63 46 29 13 13 13 - - 5 bar min 96 55 bar 15 - 5 bar 15 - 13 - - 5 bar 15 - 13 - - 5 bar 109 - 980 51 -	max 112 110 120 88 76 64 52 3 max 135 120 106 92 77 63 103 173 173 152 131 173 152 131 1111	min 102 86 69 52 35 18 103 83 62 22 22 22 23 22 110 103 83 62 22 100 101 103 102 103 103 83 62 22	max 135 123 111 99 75 63 162 148 133 119 90 76 3.5 max 104 90 76 3.5 max 232 212 191 170 180	min 125 108 92 75 58 41 24 24 30 150 bar min 150 90 90 29 29 5 6 bar min 29 5 5 bar min 216 187 188 130 121	max 158 146 134 122 10 98 62 4 max 189 175 161 132 117 189 74 4 max 271 251 209 198 148	min 148 131 131 114 98 64 47 30 13 148 64 47 30 13 149 64 47 30 13 13 141 56 36 16 56 36 16 56 36 16 55 226 197 140 82	max max 167 155 143 155 143 155 143 199 95 33 71	bar 157 140 124 107 90 73 23 23 23 23 23 23 23 23 23 2	4.5. max 180 180 168 156 144 1322 120 148 84 72 72 4.5. 188 173 159 145 130 145 130 145 146 101 87 87 145 146 101 87 202 249 249 249	bar min 171 154 137 120 103 87 70 53 87 70 53 87 120 103 87 120 103 87 120 103 87 104 104 104 104 104 104 104 104 104 104	sure (b) 5 max 203 191 179 167 155 143 119 107 95 5 83 119 107 95 5 83 229 2215 201 188 172 201 187 143 129 167 143 129 167 143 129 167 144 109 5 109 107 107 107 107 107 107 107 107	ar) bar min 1933 1777 1860 143 126 109 92 25 25 25 27 27 27 30 30 30 30 30 30 33 304 2776 247 2776 247 2776 247 2776 160	5.5 max 226 1214 202 130 154 142 130 118 166 5.5 max 271 106 5.5 170 156 127 127 156 127 156 127 1389 368 347 327 306 286 285	bar min 216 139 132 115 98 82 65 239 239 219 183 198 82 65 57 57 bar min 138 118 98 98 98 77 57 bar min 372 344 315 2286 257 2286 257 228 199	6 max 249 237 225 213 201 189 177 165 153 141 129 298 284 226 225 241 226 255 241 226 154 154 154 154 154 154 154 155 241 366 345 325 368 345 326 304	bar min 239 222 205 188 172 155 138 70 bar min 286 206 206 208 208 208 208 208 208 208 208 208 208 208 105 84 bar min 4111 383 354 206 207 208 209 209 200	7 max 294 294 294 294 297 298 246 234 201 198 186 177 max 353 324 310 7 max 295 281 209 209 7 max 506 506 4444 424	bar min 284 267 251 234 177 200 183 166 150 133 116 133 116 133 240 280 260 200 461 432 403 374 347	8 b max 340 328 336 231 291 292 233 234 235 243 231 219 212 213 213 303 335 335 335 335 335 278 8 b max 303 335 335 335 335 335 335 335 335 335 335 335 336 337 338 331 3321 3335 335 335 335 335 335 335 335	Dar min 330 296 279 263 2263 2263 2263 2263 2263 2263 2263 2263 2263 2263 2263 2263 3271 3355 3355 3355 3355 3355 3355 3355 3355 3355 3355 3355 3355 3355 3355 3355 3355 3355 3355 3355 335 335 335 335 335 335 335 335 335 335 335 335
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Type	set No. 3 4 5 6 6 7 8 9 10 11 5 9 10 11 2 3 4 4 5 6 6 7 7 8 9 9 10 11 1 2 3 3 4 4 5 5 6 6 7 7 8 9 9 10 11 2 10 11 12 10 10 10 10 10 10 10 10 10 10 10 10 10	Sprir Md max 34 51 67 78 4 101 118 1355 202 Sprir Md 1355 202 Sprir Md 141 61 182 202 223 243 243 101 1142 162 223 243 243 Sprir Md 1151 122 223 243 243 243 115 1152 1152 1152 1152 1152 1152 1152	rg force g force (Nm) min 24 36 48 60 72 84 43 60 72 84 120 132 84 120 132 84 120 132 84 120 132 84 120 132 84 120 132 84 120 132 84 120 132 84 120 132 84 120 132 84 120 132 144 144 58 60 72 88 120 132 144 144 144 144 144 144 144 14	2.6 max 90 78 66 54 42 2.6 2.6 93 93 93 93 93 93 93 93 93 93 93 93 93	min 80 80 63 46 29 13 13 13 - - 5 bar min 96 55 15 5 bar - 13 - - 5 bar - 13 - - 5 bar - 133 109 80 80 51 -	max 112 110 120 88 76 64 52 3 max 135 120 106 92 77 63 103 173 173 152 131 173 152 131 1111	min 102 86 69 52 35 18 103 83 62 22 22 22 23 22 110 103 83 62 22 100 101 103 102 103 103 83 62 22	max 135 123 111 99 87 75 63 162 148 133 148 133 149 90 76 3.5.5 max 232 212 191 109 120 109	min 125 121 108 92 76 58 41 24 24 120 121 130 110 91 1110 1110 1110	max 158 146 134 122 110 98 86 74 62 175 161 175 161 189 74 32 177 188 189 74 132 117 103 201 203 209 168 148 127	min 148 131 114 98 64 47 30 13 64 47 30 13 64 47 13 64 47 13 64 47 13 13 64 47 70 76 56 16 56 16 525 197 169 140 111 82 53	max 167 155 143 131 131 19 5 33 71 42 max 200 186 171 157 143 99 85 114 99 85 287 286 246 225 184 163 143	bar 157 140 124 107 90 73 56 39 23 23 8 bar min 188 108 108 188 128 108 108 107 107 107 107 107 107 107 107	4.5 max max 180 180 168 156 120 120 108 96 84 72 72 72 72 02 4 0 84 84 72 72 72 72 120 108 130 166	bar min 171 154 137 120 103 87 70 53 87 70 53 87 70 53 87 120 19 19 205 185 185 185 185 185 185 185 185 185 18	sure (b): 5 max 203 191 179 167 155 143 119 107 155 143 119 107 143 195 83 sure (b): 7 83 5 6 83 83 83 83 83 83 83 83 83 83	ar) bar min 193 143 126 109 92 76 59 225 ar) bar min 232 232 242 232 242 232 242 232 242 192 177 180 304 247 303 ar) bar min 232 232 232 232 232 232 232 23	6.5. max 226 14 202 190 178 178 178 178 178 178 178 178 178 170 271 257 242 228 213 271 257 242 228 213 185 170 155 155 170 155 155 141 127 142 142 142 142 142 142 142 142 142 144 145 144 145 144 145 144 145 144 145 144 145 144 145 144 145 144 145 144 145 144 145 144 145 144 145 144 145 144 145 145	bar min 216 139 183 166 149 132 98 82 48 bar min 199 132 98 239 219 115 98 138 118 98 77 57 bar min 372 286 287 284 315 286 199 1372 286 1315 286 1315 286 199 199 199 199 199 199 199 199 199 199 199	6 max 249 249 249 249 247 248 249 249 249 249 249 249 241 249 249 248 248 248 248 248 248 248 248 248 248	bar min 239 205 188 172 155 188 121 138 121 138 121 04 207 287 287 287 287 287 286 206 246 226 226 185 185 185 185 185 185 185 185 185 266 272 205 287 239 240 247 246 246 246 246 246 246 246 246 246 246	7 max 294 282 270 258 246 234 234 24 210 198 186 174 7 max 353 338 324 330 295 209 7 max 506 252 209 7 max 506 485 465 465 465 465 465 465 465 465 465 46	bar min 284 267 251 234 217 200 183 166 133 116 500 700 234 133 116 500 230 200 200 200 200 200 200 200 200 2	8 b B max 340 328 3328 328 328 328 328 231 255 243 212 212 2131 219 8 b max 407 393 379 364 350 222 278 292 278 285 max 407 563 563 562 502 481 460 4401	Dar min 330 313 296 279 246 279 212 195 161 336 335 335 335 274 254 279 212 98r min 396 375 335 315 274 254 274 254 274 254 274 254 274 214 193 204r min 568 539 510 481 395 366

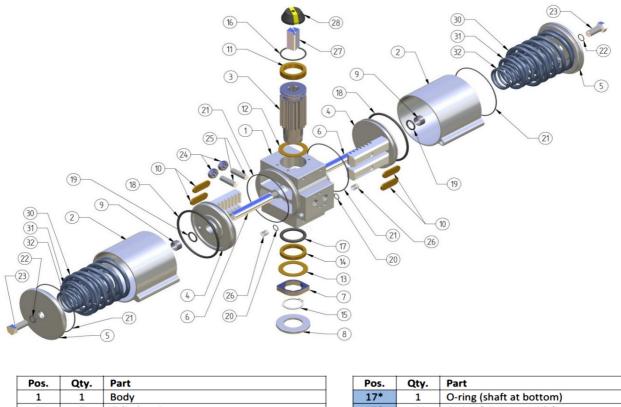


Single action torque in Nm

Actuator	Spring	Spring	force										N	d (Nm)	at pres	sure (b	ar)									
	set		Nm)	2.5	bar	3	bar	3.5	bar	4	bar	4.2	bar		bar		bar	5.5	bar	6	bar	7	bar	8	bar	
Туре	No.	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	
*	1	78	55	205	183	258	235	310	287	362	339	383	360	414	391	466	443	518	495	570	547	674	652	779	756	
	2	116 155	83 110	178 150	144 106	230 203	196 158	282 255	248 210	334 307	300 262	355 328	321 283	386 359	353 314	439 411	405 366	491 463	457 418	543 515	509 470	647 619	613 574	751 724	717 679	
*	4	194	138	123	67	175	119	200	171	279	202	300	244	331	275	383	327	436	379	488	431	592	536	696	640	
*	5	232	165	96	29	148	81	200	133	252	185	273	206	304	237	356	289	408	341	460	393	565	498	669	602	
MIG-KS-510-S*	6	271	192			120	42	172	94	225	146	245	167	277	198	329	250	381	302	433	354	537	459	641	563	
*	7	310	220					145	55	197	107	218	128	249	159	301	211	353	263	405	315	510	420	614	524	
*	8	348	247					117	16	169	68	190	89	222	121	274	173	326	225	378	277	482	381	586	485	
*	9 10	387 426	275 302							142	30	163	51	194 167	82 43	246 219	134 95	298 271	186 147	350 323	238 199	455 427	342 304	559 531	447	
	11	465	330											107	43	191	56	243	108	295	160	400	265	504	369	
	Spring	Spring	g force										M	d (Nm)	at pres	sure (b	ar)									
Actuator	set		Nm)		bar		bar		bar		bar		bar	4.5			bar	5.5			bar		bar		bar	
Туре	No.	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	
	1	112	79	296	263	370	338	445	412	520	487	550	517	595	562	670	637	745	712	820	787	970	937	1120	1087	
*	2	168 224	119 158	256 216	206 150	331 291	281 225	406 366	356 300	481 441	431 375	511 471	461 405	556 516	506 450	631 591	581 525	705 666	656 600	780 741	731 675	930 891	881 824	1080 1041	1030 974	
*	4	224	198	177	94	252	169	327	244	441	319	471	349	477	394	552	469	626	544	701	619	851	768	1041	914	
*	5	336	237	138	38	213	113	288	188	363	263	392	293	437	338	512	413	587	488	662	563	812	713	962	862	
MIG-KS-740-S*	6	392	276			173	57	248	132	323	207	353	237	398	282	473	357	548	432	623	507	772	657	922	806	
*	7	448	316					209	76	283	151	313	181	358	226	433	301	508	376	583	451	733	601	883	750	
*	8	504	355					169	20	244	95	274	125	319	170	394	245	469	320	544	395	693	544	843	694	
*	9 10	561 617	395 434							204	39	234 195	69 13	279 240	114 58	354 315	188 133	429 390	263 207	504 465	282	654 614	488 432	804 764	638 582	
*	11	673	454									195	15	240	50	275	77	350	151	405	202	575	376	725	526	
		010			-											210		000	101	120	220	0.0	0.0	120	020	
	Spring	Spring	force										M	d (Nm)	at pres	sure (b	ar)									
Actuator	set	Md (Nm)	2.5	bar	3	bar	3.5	bar	4	bar	4.2	bar	4.5	bar	5	bar	5.5	bar	6	bar	7	bar	8	bar	
Туре	No.	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	
*	1	142	99	369	326	463	419	557	513	650	607	688	644	744	700	838	794	931	888	1025	981	1212	1169	1399	1356	
*	2	226	157	311	242	404	336	498	429	592	523	629	560	685	617	779	710	873	804	966	898	1154	1085	1341	1272	
*	3	310 381	216 265	252 203	158 87	346 296	252 181	439 390	346 274	533 484	439 368	571 521	477 406	627 577	533 462	720 671	627 555	814 765	720 649	908 858	814 743	1095 1046	1001 930	1282 1233	1189	
*	5	424	296	172	44	266	137	359	231	453	325	491	362	547	418	640	512	734	606	828	699	1040	887	1202	1074	
MIG-KS-920-S*	6	496	345			216	66	310	160	404	253	441	291	497	347	591	441	685	534	778	628	966	815	1153	1003	
*	7	567	395					261	89	354	182	392	220	448	276	542	370	635	463	729	557	916	744	1103	931	
*	8	651	453			_				296	99	333	136	389	192	483	286	577	380	670	473	858	660	1045	848	
*	9	734	512									275	52	331	109	424	202	518	296	612	390	799	577	986	764	
*	10 11	805 877	561 611											281	37	375 326	131 60	469 419	225 153	562 513	318 247	750 700	506 434	937 887	693 622	
		011	011												_	520	00	419	155	515	247	700	434	007	022	
-	Spring	Spring	force																							
Actuator	set		Nm)										N	d (Nm)	at pres	sure (b	ar)								har	
Type	No.	max		2.5	bar	3	bar	3.5	bar	4	bar	4.2		d (Nm) 4.5	at pres bar			5.5	bar	6	bar	7	bar	8	Dar	
	1	max	min	2.5 max	bar min	3 max	bar min	3.5 max	bar min	4 max	bar min	4.2 max	N bar min				ar) bar min	5.5 max	bar min	6 max	bar min	7 max	bar min	8 max	min	
		214	min 147	max 551	min 485	max 691	min 624	max 831	min 764	max 970	min 904	max 1026	bar min 960	4.5 max 1110	bar min 1043	5 max 1250	bar min 1183	max 1389	min 1323	max 1529	min 1463	max 1808	min 1742	max 2088	min 2021	
	2	214 317	min 147 221	max 551 478	min 485 381	max 691 617	min 624 521	max 831 757	min 764 660	max 970 897	min 904 800	max 1026 953	bar 960 856	4.5 max 1110 1036	bar min 1043 940	5 max 1250 1176	bar min 1183 1079	max 1389 1316	min 1323 1219	max 1529 1456	min 1463 1359	max 1808 1735	min 1742 1638	max 2088 2014	min 2021 1917	
* * *	2	214 317 421	min 147 221 294	max 551 478 404	min 485 381 277	max 691 617 544	min 624 521 417	max 831 757 684	min 764 660 557	max 970 897 823	min 904 800 696	max 1026 953 879	bar <u>min</u> 960 856 752	4.5 max 1110 1036 963	bar min 1043 940 836	5 max 1250 1176 1103	bar min 1183 1079 976	max 1389 1316 1242	min 1323 1219 1115	max 1529 1456 1382	min 1463 1359 1255	max 1808 1735 1661	min 1742 1638 1534	max 2088 2014 1941	min 2021 1917 1814	
	2 3 4	214 317 421 528	min 147 221 294 368	max 551 478	min 485 381	max 691 617 544 470	min 624 521 417 310	max 831 757 684 610	min 764 660 557 450	max 970 897 823 750	min 904 800 696 589	max 1026 953 879 806	bar 960 856 752 645	4.5 max 1110 1036 963 889	bar min 1043 940 836 729	5 max 1250 1176 1103 1029	bar min 1183 1079 976 869	max 1389 1316 1242 1169	min 1323 1219 1115 1009	max 1529 1456 1382 1309	min 1463 1359 1255 1148	max 1808 1735 1661 1588	min 1742 1638 1534 1428	max 2088 2014 1941 1867	min 2021 1917 1814 1707	
	2	214 317 421	min 147 221 294	max 551 478 404	min 485 381 277	max 691 617 544	min 624 521 417	max 831 757 684	min 764 660 557	max 970 897 823	min 904 800 696	max 1026 953 879	bar <u>min</u> 960 856 752	4.5 max 1110 1036 963	bar min 1043 940 836	5 max 1250 1176 1103	bar min 1183 1079 976	max 1389 1316 1242	min 1323 1219 1115	max 1529 1456 1382	min 1463 1359 1255	max 1808 1735 1661	min 1742 1638 1534	max 2088 2014 1941	min 2021 1917 1814	
*	2 3 4 5 6 7	214 317 421 528 632 739 845	min 147 221 294 368 441 515 588	max 551 478 404	min 485 381 277	max 691 617 544 470	min 624 521 417 310	max 831 757 684 610 537	min 764 660 557 450 346	max 970 897 823 750 676	min 904 800 696 589 486	max 1026 953 879 806 732 659 585	bar min 960 856 752 645 541 435 328	4.5 max 1110 1036 963 889 816 742 669	bar min 1043 940 836 729 625 518 412	5 max 1250 1176 1103 1029 956 882 808	bar min 1183 1079 976 869 765 658 551	max 1389 1316 1242 1169 1095 1022 948	min 1323 1219 1115 1009 905 798 691	max 1529 1456 1382 1309 1235 1161 1088	min 1463 1359 1255 1148 1044 937 831	max 1808 1735 1661 1588 1514 1441 1367	min 1742 1638 1534 1428 1324 1217 1110	max 2088 2014 1941 1867 1794 1720 1646	min 2021 1917 1814 1707 1603 1496 1389	
* * MIG-KS-1300-S* * *	2 3 4 5 6 7 8	214 317 421 528 632 739 845 949	min 147 221 294 368 441 515 588 662	max 551 478 404	min 485 381 277	max 691 617 544 470	min 624 521 417 310	max 831 757 684 610 537	min 764 660 557 450 346	max 970 897 823 750 676 603	min 904 800 696 589 486 379	max 1026 953 879 806 732 659	bar 960 856 752 645 541 435	4.5 max 1110 1036 963 889 816 742 669 595	bar min 1043 940 836 729 625 518 412 308	5 max 1250 1176 1103 1029 956 882 808 735	bar min 1183 1079 976 869 765 658 551 448	max 1389 1316 1242 1169 1095 1022 948 875	min 1323 1219 1115 1009 905 798 691 587	max 1529 1456 1382 1309 1235 1161 1088 1014	min 1463 1359 1255 1148 1044 937 831 727	max 1808 1735 1661 1588 1514 1441 1367 1294	min 1742 1638 1534 1428 1324 1217 1110 1006	max 2088 2014 1941 1867 1794 1720 1646 1573	min 2021 1917 1814 1707 1603 1496 1389 1286	
*	2 3 4 5 6 7 8 9	214 317 421 528 632 739 845 949 1053	min 147 221 294 368 441 515 588 662 735	max 551 478 404	min 485 381 277	max 691 617 544 470	min 624 521 417 310	max 831 757 684 610 537	min 764 660 557 450 346	max 970 897 823 750 676 603	min 904 800 696 589 486 379	max 1026 953 879 806 732 659 585	bar min 960 856 752 645 541 435 328	4.5 max 1110 1036 963 889 816 742 669	bar min 1043 940 836 729 625 518 412	5 max 1250 1176 1103 1029 956 882 808 735 662	bar min 1183 1079 976 869 765 658 551 448 344	max 1389 1316 1242 1169 1095 1022 948 875 801	min 1323 1219 1115 1009 905 798 691 587 483	max 1529 1456 1382 1309 1235 1161 1088 1014 941	min 1463 1359 1255 1148 1044 937 831 727 623	max 1808 1735 1661 1588 1514 1441 1367 1294 1220	min 1742 1638 1534 1428 1324 1217 1110 1006 902	max 2088 2014 1941 1867 1794 1720 1646 1573 1500	min 2021 1917 1814 1707 1603 1496 1389 1286 1182	
* * MIG-KS-1300-S* * * *	2 3 4 5 6 7 8 9 10	214 317 421 528 632 739 845 949 1053 1160	min 147 221 294 368 441 515 588 662 735 809	max 551 478 404	min 485 381 277	max 691 617 544 470	min 624 521 417 310	max 831 757 684 610 537	min 764 660 557 450 346	max 970 897 823 750 676 603	min 904 800 696 589 486 379	max 1026 953 879 806 732 659 585	bar min 960 856 752 645 541 435 328	4.5 max 1110 1036 963 889 816 742 669 595	bar min 1043 940 836 729 625 518 412 308	5 max 1250 1176 1103 1029 956 882 808 735	bar min 1183 1079 976 869 765 658 551 448	max 1389 1316 1242 1169 1095 1022 948 875 801 728	min 1323 1219 1115 1009 905 798 691 587 483 377	max 1529 1456 1382 1309 1235 1161 1088 1014 941 867	min 1463 1359 1255 1148 1044 937 831 727 623 516	max 1808 1735 1661 1588 1514 1441 1367 1294 1220 1147	min 1742 1638 1534 1428 1324 1217 1110 1006 902 796	max 2088 2014 1941 1867 1794 1720 1646 1573 1500 1426	min 2021 1917 1814 1707 1603 1496 1389 1286 1182 1075	
* * MIG-KS-1300-S* * *	2 3 4 5 6 7 8 9	214 317 421 528 632 739 845 949 1053	min 147 221 294 368 441 515 588 662 735	max 551 478 404	min 485 381 277	max 691 617 544 470	min 624 521 417 310	max 831 757 684 610 537	min 764 660 557 450 346	max 970 897 823 750 676 603	min 904 800 696 589 486 379	max 1026 953 879 806 732 659 585	bar min 960 856 752 645 541 435 328	4.5 max 1110 1036 963 889 816 742 669 595	bar min 1043 940 836 729 625 518 412 308	5 max 1250 1176 1103 1029 956 882 808 735 662	bar min 1183 1079 976 869 765 658 551 448 344	max 1389 1316 1242 1169 1095 1022 948 875 801	min 1323 1219 1115 1009 905 798 691 587 483	max 1529 1456 1382 1309 1235 1161 1088 1014 941	min 1463 1359 1255 1148 1044 937 831 727 623	max 1808 1735 1661 1588 1514 1441 1367 1294 1220	min 1742 1638 1534 1428 1324 1217 1110 1006 902	max 2088 2014 1941 1867 1794 1720 1646 1573 1500	min 2021 1917 1814 1707 1603 1496 1389 1286 1182	
* MIG-KS-1300-S* * * *	2 3 4 5 6 7 8 9 10 11	214 317 421 528 632 739 845 949 1053 1160 1267	min 147 221 294 368 441 515 588 662 735 809 882	max 551 478 404	min 485 381 277	max 691 617 544 470	min 624 521 417 310	max 831 757 684 610 537	min 764 660 557 450 346	max 970 897 823 750 676 603	min 904 800 696 589 486 379	max 1026 953 879 806 732 659 585	bar min 960 856 752 645 541 435 328 224	4.5 max 1110 1036 963 889 816 742 669 595 522	bar min 1043 940 836 729 625 518 412 308 204	5 max 1250 1176 1103 1029 956 882 808 735 662 588	bar min 1183 1079 976 869 765 658 551 448 344 237	max 1389 1316 1242 1169 1095 1022 948 875 801 728	min 1323 1219 1115 1009 905 798 691 587 483 377	max 1529 1456 1382 1309 1235 1161 1088 1014 941 867	min 1463 1359 1255 1148 1044 937 831 727 623 516	max 1808 1735 1661 1588 1514 1441 1367 1294 1220 1147	min 1742 1638 1534 1428 1324 1217 1110 1006 902 796	max 2088 2014 1941 1867 1794 1720 1646 1573 1500 1426	min 2021 1917 1814 1707 1603 1496 1389 1286 1182 1075	
* * MIG-KS-1300-S* * * * * * * * * * * * * * * * * * *	2 3 4 5 6 7 8 9 10 11 Spring	214 317 421 528 632 739 845 949 1053 1160 1267 Spring	min 147 221 294 368 441 515 588 662 735 809 882 882	max 551 478 404 331	min 485 381 277 170	max 691 617 544 470 397	min 624 521 417 310 206	max 831 757 684 610 537 463	min 764 660 557 450 346 239	max 970 897 823 750 676 603 529	min 904 800 696 589 486 379 272	max 1026 953 879 806 732 659 585 512	bar min 960 856 752 645 541 435 328 224	4.5 max 1110 1036 963 889 816 742 669 595 522	bar min 1043 940 836 729 625 518 412 308 204 204 at pres	5 max 1250 1176 1103 1029 956 882 808 735 662 588 735 662 588	bar min 1183 1079 976 869 765 658 551 448 344 237 237 ar)	max 1389 1316 1242 1169 1095 1022 948 875 801 728 654	min 1323 1219 1115 1009 905 798 691 587 483 377 270	max 1529 1456 1382 1309 1235 1161 1088 1014 941 867 794	min 1463 1359 1255 1148 1044 937 831 727 623 516 410	max 1808 1735 1661 1588 1514 1441 1367 1294 1220 1147 1073	min 1742 1638 1534 1428 1324 1217 1110 1006 902 796 689	max 2088 2014 1941 1867 1794 1720 1646 1573 1500 1426 1352	min 2021 1917 1814 1707 1603 1496 1389 1286 1182 1075 968	
* MIG-KS-1300-S* * * * *	2 3 4 5 6 7 8 9 10 11	214 317 421 528 632 739 845 949 1053 1160 1267 Spring	min 147 221 294 368 441 515 588 662 735 809 882	max 551 478 404 331	min 485 381 277	max 691 617 544 470 397	min 624 521 417 310	max 831 757 684 610 537 463	min 764 660 557 450 346	max 970 897 823 750 676 603 529	min 904 800 696 589 486 379	max 1026 953 879 806 732 659 585 512	bar min 960 856 752 645 541 435 328 224	4.5 max 1110 1036 963 889 816 742 669 595 522	bar min 1043 940 836 729 625 518 412 308 204	5 max 1250 1176 1103 1029 956 882 808 735 662 588 735 662 588	bar min 1183 1079 976 869 765 658 551 448 344 237	max 1389 1316 1242 1169 1095 1022 948 875 801 728 654	min 1323 1219 1115 1009 905 798 691 587 483 377	max 1529 1456 1382 1309 1235 1161 1088 1014 941 867 794	min 1463 1359 1255 1148 1044 937 831 727 623 516	max 1808 1735 1661 1588 1514 1441 1367 1294 1220 1147 1073	min 1742 1638 1534 1428 1324 1217 1110 1006 902 796	max 2088 2014 1941 1867 1794 1720 1646 1573 1500 1426 1352	min 2021 1917 1814 1707 1603 1496 1389 1286 1182 1075	
* * MIG-KS-1300-S* * * * * * * * * * * * * * * * * * *	2 3 4 5 6 7 8 9 10 11 5pring set	214 317 421 528 632 739 845 949 1053 1160 1267 Spring Md ()	min 147 221 294 368 441 515 588 662 735 809 882 882 Vm)	max 551 478 404 331	min 485 381 277 170	max 691 617 544 470 397	min 624 521 417 310 206	max 831 757 684 610 537 463	min 764 660 557 450 346 239	max 970 897 823 750 676 603 529	min 904 800 696 589 486 379 272	max 1026 953 879 806 732 659 585 512	bar min 960 856 752 645 541 435 328 224 224 	4.5 max 1110 1036 963 889 816 742 669 595 522 522 4 (Nm) 4.5	bar min 1043 940 836 729 625 518 412 308 204 204 at pres bar	5 max 1250 1176 1103 1029 956 882 808 735 662 588 588 588 588 588 588 588 588 588 58	bar min 1183 1079 976 869 765 658 551 448 344 237 237 ar) bar	max 1389 1316 1242 1169 1095 1022 948 875 801 728 654 5.5	min 1323 1219 1115 1009 905 798 691 587 483 377 270 bar	max 1529 1456 1382 1309 1235 1161 1088 1014 941 867 794 6	min 1463 1359 1255 1148 1044 937 831 727 623 516 410 bar	max 1808 1735 1661 1588 1514 1441 1367 1294 1220 1147 1073	min 1742 1638 1534 1428 1324 1217 1110 1006 902 796 689 bar	max 2088 2014 1941 1867 1794 1750 1646 1573 1500 1426 1352 8	min 2021 1917 1814 1707 1603 1496 1389 1286 1182 1075 968	
MIG-KS-1300-S* * * * * Actuator Type * * * * * * * * * * * * * * * * * * *	2 3 4 5 6 7 8 9 10 11 11 Spring set No. 1 2	214 317 421 528 632 739 845 949 1053 1160 1267 Spring Md (max 256 382	min 147 221 294 368 441 515 588 662 735 809 882 809 882 Vm) min 177 265	max 551 478 404 331 	min 485 381 277 170 	max 691 617 544 470 397 397 3	min 624 521 417 310 206 	max 831 757 684 610 537 463 	min 764 660 557 450 346 239 239 50 40 50 70 50 70 70 70 70 70 70 70 70 70 70 70 70 70	max 970 897 823 750 676 603 529 -	min 904 800 696 589 486 379 272	max 1026 953 879 806 732 659 585 512	bar min 960 856 541 435 328 224 224 V bar Min 1152 1026	4.5 max 1110 1036 963 889 816 742 669 595 522 522 522 (d (Nm) 4.5 max 1332 1244	bar min 1043 940 836 729 625 518 412 308 204 204 at pres bar min 1253 1127	5 max 1250 1176 1103 1029 956 882 808 735 662 588 588 588 588 588 588 588 588 588 58	bar min 1183 1079 9765 869 7655 658 551 448 344 237 237 ar) bar min 1420 1294	max 1389 1316 1242 1095 1022 948 875 801 728 654 5.5 max 1667 1579	min 1323 1219 1115 1009 905 798 691 587 483 3777 270 bar min 1588 1462	max 1529 1456 1382 1309 1235 1161 1088 1014 941 867 794 6 max 1835 1747	min 1463 1359 1255 1148 1044 937 831 727 623 516 410 bar min 1756 1630	max 1808 1735 1661 1588 1514 1367 1294 1220 1147 1073 7 max 2170 2082	min 1742 1638 1534 1428 1324 1217 1110 1006 902 796 689 bar min 2091 1965	max 2088 2014 1941 1867 1794 1720 1646 1573 1500 1426 1352 max 2505 2417	min 2021 1917 1814 1707 1603 1496 1389 1286 1182 1075 968 bar min 2426 2300	
MIG-KS-1300-S*	2 3 4 5 6 7 8 9 10 11 Spring set No. 1 2 3	214 317 421 528 632 739 845 949 1053 1160 1267 Spring Md (max 256 382 508	min 147 221 294 368 441 515 588 662 735 809 882 809 882 g force Vm) min 177 265 353	max 551 478 404 331 	min 485 381 277 170 	max 691 617 544 747 744 747 741 741 653 741 <th 741<="" td="" th<=""><td>min 624 521 310 206 </td><td>max 831 757 684 610 537 463 </td><td>min 764 660 557 450 346 239 </td><td>max 970 897 823 750 676 603 529 </td><td>min 904 800 696 589 486 379 272 </td><td>max 1026 953 879 806 732 659 585 512 </td><td>bar min 960 856 752 645 541 435 328 224 224 541 435 328 224 541 6 541 541 541 541 541 541 541 541 541 541</td><td>4.5 max 1110 1036 963 889 816 742 669 595 522 522 d (Nm) 4.5 max 1332 1244 1156</td><td>bar min 1043 940 8366 729 625 518 412 308 204 204 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0</td><td>5 max 1250 1176 1103 1029 956 880 735 662 588 588 588 588 588 588 588 588 588 58</td><td>bar min 1183 1079 9766 869 765 658 551 448 344 237 8 448 344 237 8 4 4 8 344 237 8 4 4 8 344 237 1 24 1 4 20 1 294 1 168</td><td>max 1389 1316 1242 1169 1025 948 875 801 728 654 5.5 max 1667 1579 1491</td><td>min 1323 1219 1115 1009 905 798 691 587 3777 2700 bar 1588 1462 1336</td><td>max 1529 1456 1382 1309 1235 1161 1088 1014 941 867 794 6 max 1835 1747 1659</td><td>min 1463 1359 1255 1148 1044 937 831 727 623 516 410 bar 1756 1630 1503</td><td>max 1808 1735 1661 1588 1514 1441 1367 1294 1417 1073 1073 2170 2082 1994</td><td>min 1742 1638 1534 1428 1324 1217 1110 1006 902 796 689 bar 2091 1965 1839</td><td>max 2088 2014 1941 1867 1794 1720 1646 1500 1426 1352 8 2505 2417 2329</td><td>min 2021 1917 1814 1707 1603 1496 1389 1286 1182 1075 968 bar min 2426 2300 2174</td></th>	<td>min 624 521 310 206 </td> <td>max 831 757 684 610 537 463 </td> <td>min 764 660 557 450 346 239 </td> <td>max 970 897 823 750 676 603 529 </td> <td>min 904 800 696 589 486 379 272 </td> <td>max 1026 953 879 806 732 659 585 512 </td> <td>bar min 960 856 752 645 541 435 328 224 224 541 435 328 224 541 6 541 541 541 541 541 541 541 541 541 541</td> <td>4.5 max 1110 1036 963 889 816 742 669 595 522 522 d (Nm) 4.5 max 1332 1244 1156</td> <td>bar min 1043 940 8366 729 625 518 412 308 204 204 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0</td> <td>5 max 1250 1176 1103 1029 956 880 735 662 588 588 588 588 588 588 588 588 588 58</td> <td>bar min 1183 1079 9766 869 765 658 551 448 344 237 8 448 344 237 8 4 4 8 344 237 8 4 4 8 344 237 1 24 1 4 20 1 294 1 168</td> <td>max 1389 1316 1242 1169 1025 948 875 801 728 654 5.5 max 1667 1579 1491</td> <td>min 1323 1219 1115 1009 905 798 691 587 3777 2700 bar 1588 1462 1336</td> <td>max 1529 1456 1382 1309 1235 1161 1088 1014 941 867 794 6 max 1835 1747 1659</td> <td>min 1463 1359 1255 1148 1044 937 831 727 623 516 410 bar 1756 1630 1503</td> <td>max 1808 1735 1661 1588 1514 1441 1367 1294 1417 1073 1073 2170 2082 1994</td> <td>min 1742 1638 1534 1428 1324 1217 1110 1006 902 796 689 bar 2091 1965 1839</td> <td>max 2088 2014 1941 1867 1794 1720 1646 1500 1426 1352 8 2505 2417 2329</td> <td>min 2021 1917 1814 1707 1603 1496 1389 1286 1182 1075 968 bar min 2426 2300 2174</td>	min 624 521 310 206 	max 831 757 684 610 537 463 	min 764 660 557 450 346 239 	max 970 897 823 750 676 603 529	min 904 800 696 589 486 379 272	max 1026 953 879 806 732 659 585 512	bar min 960 856 752 645 541 435 328 224 224 541 435 328 224 541 6 541 541 541 541 541 541 541 541 541 541	4.5 max 1110 1036 963 889 816 742 669 595 522 522 d (Nm) 4.5 max 1332 1244 1156	bar min 1043 940 8366 729 625 518 412 308 204 204 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	5 max 1250 1176 1103 1029 956 880 735 662 588 588 588 588 588 588 588 588 588 58	bar min 1183 1079 9766 869 765 658 551 448 344 237 8 448 344 237 8 4 4 8 344 237 8 4 4 8 344 237 1 24 1 4 20 1 294 1 168	max 1389 1316 1242 1169 1025 948 875 801 728 654 5.5 max 1667 1579 1491	min 1323 1219 1115 1009 905 798 691 587 3777 2700 bar 1588 1462 1336	max 1529 1456 1382 1309 1235 1161 1088 1014 941 867 794 6 max 1835 1747 1659	min 1463 1359 1255 1148 1044 937 831 727 623 516 410 bar 1756 1630 1503	max 1808 1735 1661 1588 1514 1441 1367 1294 1417 1073 1073 2170 2082 1994	min 1742 1638 1534 1428 1324 1217 1110 1006 902 796 689 bar 2091 1965 1839	max 2088 2014 1941 1867 1794 1720 1646 1500 1426 1352 8 2505 2417 2329	min 2021 1917 1814 1707 1603 1496 1389 1286 1182 1075 968 bar min 2426 2300 2174
MIG-KS-1300-S* * * * * Actuator Type * * * * * * * * * * * * * * * * * * *	2 3 4 5 6 7 8 9 10 11 Spring set No. 1 2 3 4	214 317 421 528 632 739 845 949 1053 1160 1267 Spring Md ((max 256 382 508 636	min 147 221 294 368 441 515 588 662 735 809 882 662 735 809 882 735 809 882 735 809 882 735 809 882 735 809 882 735 809 882 735 809 882 735 809 882 735 809 882 735 809 882 735 809 882 735 809 882 735 809 882 735 809 882 735 809 882 735 809 882 735 809 882 735 809 882 735 809 882 735 809 882 735 809 882 735 809 882 735 809 882 735 809 882 735 809 882 735 809 882 735 809 882 735 809 882 735 809 882 735 809 882 735 809 882 735 809 882 735 809 882 735 809 882 735 809 882 735 809 882 735 809 882 735 809 882 735 809 882 735 809 882 735 809 809 809 809 809 809 809 809 809 809	max 551 478 404 331 	min 485 381 277 170 	max 691 617 544 470 397 397 397 397 397 397 300 <td>min 624 521 310 206 </td> <td>max 831 757 684 610 537 463 </td> <td>min 764 660 557 450 346 239 </td> <td>max 970 897 823 750 676 603 529 </td> <td>min 904 800 696 589 486 379 272 -</td> <td>max 1026 953 879 806 732 659 585 512 </td> <td>bar min 960 856 752 645 541 435 328 224 224</td> <td>4.5 max 1110 1036 963 889 816 595 522 522 522 d((Nm) 4.5 max 1332 1244 1156 1067</td> <td>bar min 1043 940 836 729 625 518 412 308 204 204 at pres bar min 1253 1127 1001 873</td> <td>5 max 1250 1106 1103 1029 956 808 735 662 588 735 735 735 735 735 735 735 735 735 735</td> <td>bar min 1183 1079 976 869 765 551 448 344 237 448 344 237 851 448 344 237 851 448 344 237 851 448 344 237 1420 1294 1168 1204 1204</td> <td>max 1389 1316 1242 1169 1095 1022 948 875 801 728 654 5.5 max 1667 1579 1491 1403</td> <td>min 1323 1219 1115 1009 905 798 691 587 483 377 2700 bar 1588 1462 1336 1208</td> <td>max 1529 1456 1382 1309 1235 1161 1088 1014 941 867 794 6 max 1835 1747 1659 1570</td> <td>min 1463 1359 1255 1148 1044 937 831 727 623 516 410 bar min 1756 1603 1503 1376</td> <td>max 1808 1735 1661 1588 1514 1441 1367 1294 1294 1147 1073 7 max 2170 2082 1994 1905</td> <td>min 1742 1638 1534 1428 1324 1217 1110 1006 902 796 689 bar min 20915 1839 1711</td> <td>max 2088 2014 1941 1867 1794 1720 1646 1573 1500 1426 1352 8 max 2505 2417 2329 2241</td> <td>min 2021 1917 1814 1707 1603 1496 1389 1286 1182 1075 968 bar min 2426 23000 2174 2046</td>	min 624 521 310 206 	max 831 757 684 610 537 463	min 764 660 557 450 346 239 	max 970 897 823 750 676 603 529	min 904 800 696 589 486 379 272 -	max 1026 953 879 806 732 659 585 512	bar min 960 856 752 645 541 435 328 224 224	4.5 max 1110 1036 963 889 816 595 522 522 522 d((Nm) 4.5 max 1332 1244 1156 1067	bar min 1043 940 836 729 625 518 412 308 204 204 at pres bar min 1253 1127 1001 873	5 max 1250 1106 1103 1029 956 808 735 662 588 735 735 735 735 735 735 735 735 735 735	bar min 1183 1079 976 869 765 551 448 344 237 448 344 237 851 448 344 237 851 448 344 237 851 448 344 237 1420 1294 1168 1204 1204	max 1389 1316 1242 1169 1095 1022 948 875 801 728 654 5.5 max 1667 1579 1491 1403	min 1323 1219 1115 1009 905 798 691 587 483 377 2700 bar 1588 1462 1336 1208	max 1529 1456 1382 1309 1235 1161 1088 1014 941 867 794 6 max 1835 1747 1659 1570	min 1463 1359 1255 1148 1044 937 831 727 623 516 410 bar min 1756 1603 1503 1376	max 1808 1735 1661 1588 1514 1441 1367 1294 1294 1147 1073 7 max 2170 2082 1994 1905	min 1742 1638 1534 1428 1324 1217 1110 1006 902 796 689 bar min 20915 1839 1711	max 2088 2014 1941 1867 1794 1720 1646 1573 1500 1426 1352 8 max 2505 2417 2329 2241	min 2021 1917 1814 1707 1603 1496 1389 1286 1182 1075 968 bar min 2426 23000 2174 2046	
* MIG-KS-1300-S* * * * * * * * * * * * * * * * * * *	2 3 4 5 6 7 8 9 10 11 5 5 8 9 10 11 2 3 4 5	214 317 421 528 632 739 845 949 1053 1160 1267 Spring Md ((max 256 382 508 636 762	min 147 221 294 368 441 515 588 662 735 809 882 662 735 809 882 662 735 809 882 662 735 809 882 663 735 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 817 1777 2653 3533 4411 529	max 551 478 404 331 	min 485 381 277 170 	max 691 617 544 747 744 747 741 741 653 741 <th 741<="" td="" th<=""><td>min 624 521 310 206 </td><td>max 831 757 684 610 537 463 </td><td>min 764 660 557 346 239 </td><td>max 970 897 823 750 676 603 529 </td><td>min 904 800 696 589 486 379 272 </td><td>max 1026 953 879 806 732 659 585 512 </td><td>bar min 960 856 752 645 328 224 224 328 224 bar min 1152 1026 900 772 646</td><td>4.5 max 1110 1036 963 889 816 742 669 595 522 522 6d (Nm) 4.6 max 1332 1244 1156 1067 979</td><td>bar min 1043 940 836 729 625 518 412 308 204 204 308 204 41 204 107 1253 1127 1001 873 746</td><td>5 max 1250 1176 1103 1029 956 882 808 735 662 588 588 588 588 588 588 588 1449 1411 1323 1235 1147</td><td>bar min 1183 1079 976 869 765 551 448 344 237 551 448 344 237 bar n h 2237 bar 1420 1294 1168 1040 914</td><td>max 1389 1316 1242 1169 1025 1022 948 875 801 728 654 5.5 max 1667 1579 1491 1403 1314</td><td>min 1323 1219 1115 1009 905 798 691 587 483 377 270 bar min 1588 1462 13236 1208 1082</td><td>max 1529 1456 1382 1309 1235 1161 1088 941 867 794 6 max 1835 1747 1659 1570 1482</td><td>min 1463 1359 1255 1148 1044 937 831 727 623 516 410 bar min 1756 1630 1503 13766 1249</td><td>max 1808 1735 1661 1588 1514 1441 1367 1294 1220 1147 1073 7 max 2170 2082 1994 1905 1817</td><td>min 1742 1638 1534 1428 1324 1217 1100 902 796 689 bar min 2091 1965 1839 1711 1584</td><td>max 2088 2014 1941 1867 1794 1720 1646 1573 1500 1426 1352 8 max 2505 2417 2329 22411 2152</td><td>min 2021 1917 1814 1707 1603 1496 1389 12866 1182 1075 968 bar min 2426 2300 2174 2046 1920</td></th>	<td>min 624 521 310 206 </td> <td>max 831 757 684 610 537 463 </td> <td>min 764 660 557 346 239 </td> <td>max 970 897 823 750 676 603 529 </td> <td>min 904 800 696 589 486 379 272 </td> <td>max 1026 953 879 806 732 659 585 512 </td> <td>bar min 960 856 752 645 328 224 224 328 224 bar min 1152 1026 900 772 646</td> <td>4.5 max 1110 1036 963 889 816 742 669 595 522 522 6d (Nm) 4.6 max 1332 1244 1156 1067 979</td> <td>bar min 1043 940 836 729 625 518 412 308 204 204 308 204 41 204 107 1253 1127 1001 873 746</td> <td>5 max 1250 1176 1103 1029 956 882 808 735 662 588 588 588 588 588 588 588 1449 1411 1323 1235 1147</td> <td>bar min 1183 1079 976 869 765 551 448 344 237 551 448 344 237 bar n h 2237 bar 1420 1294 1168 1040 914</td> <td>max 1389 1316 1242 1169 1025 1022 948 875 801 728 654 5.5 max 1667 1579 1491 1403 1314</td> <td>min 1323 1219 1115 1009 905 798 691 587 483 377 270 bar min 1588 1462 13236 1208 1082</td> <td>max 1529 1456 1382 1309 1235 1161 1088 941 867 794 6 max 1835 1747 1659 1570 1482</td> <td>min 1463 1359 1255 1148 1044 937 831 727 623 516 410 bar min 1756 1630 1503 13766 1249</td> <td>max 1808 1735 1661 1588 1514 1441 1367 1294 1220 1147 1073 7 max 2170 2082 1994 1905 1817</td> <td>min 1742 1638 1534 1428 1324 1217 1100 902 796 689 bar min 2091 1965 1839 1711 1584</td> <td>max 2088 2014 1941 1867 1794 1720 1646 1573 1500 1426 1352 8 max 2505 2417 2329 22411 2152</td> <td>min 2021 1917 1814 1707 1603 1496 1389 12866 1182 1075 968 bar min 2426 2300 2174 2046 1920</td>	min 624 521 310 206 	max 831 757 684 610 537 463 	min 764 660 557 346 239 	max 970 897 823 750 676 603 529	min 904 800 696 589 486 379 272	max 1026 953 879 806 732 659 585 512	bar min 960 856 752 645 328 224 224 328 224 bar min 1152 1026 900 772 646	4.5 max 1110 1036 963 889 816 742 669 595 522 522 6d (Nm) 4.6 max 1332 1244 1156 1067 979	bar min 1043 940 836 729 625 518 412 308 204 204 308 204 41 204 107 1253 1127 1001 873 746	5 max 1250 1176 1103 1029 956 882 808 735 662 588 588 588 588 588 588 588 1449 1411 1323 1235 1147	bar min 1183 1079 976 869 765 551 448 344 237 551 448 344 237 bar n h 2237 bar 1420 1294 1168 1040 914	max 1389 1316 1242 1169 1025 1022 948 875 801 728 654 5.5 max 1667 1579 1491 1403 1314	min 1323 1219 1115 1009 905 798 691 587 483 377 270 bar min 1588 1462 13236 1208 1082	max 1529 1456 1382 1309 1235 1161 1088 941 867 794 6 max 1835 1747 1659 1570 1482	min 1463 1359 1255 1148 1044 937 831 727 623 516 410 bar min 1756 1630 1503 13766 1249	max 1808 1735 1661 1588 1514 1441 1367 1294 1220 1147 1073 7 max 2170 2082 1994 1905 1817	min 1742 1638 1534 1428 1324 1217 1100 902 796 689 bar min 2091 1965 1839 1711 1584	max 2088 2014 1941 1867 1794 1720 1646 1573 1500 1426 1352 8 max 2505 2417 2329 22411 2152	min 2021 1917 1814 1707 1603 1496 1389 12866 1182 1075 968 bar min 2426 2300 2174 2046 1920
MIG-KS-1300-S* * * * * Actuator Type * * * * * * * * * * * * * * * * * * *	2 3 4 5 6 7 8 9 10 11 11 Spring set No. 1 2 3 4 5 6	214 317 421 528 632 739 845 949 1053 1160 1267 Spring Md (max 256 382 508 636 636 636 636 636 8390	min 147 221 294 368 441 515 588 662 735 809 882 gforce \mmin 1777 2653 3533 441 529 618	max 551 478 404 331 	min 485 381 277 170 	max 691 617 544 470 397 397 397 397 397 300 <td>min 624 521 310 206 </td> <td>max 831 757 684 610 537 463 </td> <td>min 764 660 557 450 346 239 </td> <td>max 970 897 823 750 676 603 529 </td> <td>min 904 800 696 589 486 379 272 </td> <td>max 1026 953 879 806 732 659 585 512 </td> <td>bar min 960 856 752 645 328 224 224 328 224 328 224 328 224 328 224 328 224 328 224 328 224 328 224 328 50 50 50 50 50 50 50 50 50 50 50 50 50</td> <td>4.5 max 1110 1036 963 889 816 742 669 595 522 522 522 4 (Nm) 4.5 max 1332 1244 1156 1067 979 891</td> <td>bar min 1043 940 836 729 625 518 412 308 204 204 204 204 204 204 204 204 204 204</td> <td>6 max 1250 1176 1103 1029 956 882 808 735 662 588 588 662 588 588 588 588 588 588 1499 1411 1323 1411 1323 1417 1058</td> <td>bar min 1183 1079 976 869 765 658 551 448 344 237 448 344 237 448 344 237 448 344 237 448 344 237 448 344 237 448 344 237 142 142 142 142 142 142 142 142 142 142</td> <td>max 1389 1316 1242 1169 1025 948 875 801 728 654 5.5 max 1667 1579 1491 1403 1314 1226</td> <td>min 1323 1219 1115 1009 905 798 691 587 483 377 270 bar min 1588 1462 1336 1208 1082 954</td> <td>max 1529 1456 1382 1309 1235 1161 1088 1014 941 867 794 6 max 1835 1747 1659 1570 1482 1394</td> <td>min 1463 1359 1255 1148 1044 937 831 727 623 516 410 bar min 1756 1630 1503 1376 1249 1121</td> <td>max 1808 1735 1661 1588 1514 1411 1367 1294 1200 1147 1073 7 max 2170 2082 1994 1905 1817 1729</td> <td>min 17.42 1638 1534 1428 1324 1428 1324 1217 1110 1006 902 796 689 bar min 2091 1965 1839 1711 1584 1457</td> <td>max 2088 2014 1941 1867 1794 1770 1646 1573 1500 1426 1352 8 max 2505 2417 2329 22412 2152 2064</td> <td>min 2021 1917 1814 1707 1603 1496 1389 1286 1182 1075 968 bar min 2426 2300 2174 2046 1920 1792</td>	min 624 521 310 206 	max 831 757 684 610 537 463	min 764 660 557 450 346 239 	max 970 897 823 750 676 603 529	min 904 800 696 589 486 379 272	max 1026 953 879 806 732 659 585 512	bar min 960 856 752 645 328 224 224 328 224 328 224 328 224 328 224 328 224 328 224 328 224 328 224 328 50 50 50 50 50 50 50 50 50 50 50 50 50	4.5 max 1110 1036 963 889 816 742 669 595 522 522 522 4 (Nm) 4.5 max 1332 1244 1156 1067 979 891	bar min 1043 940 836 729 625 518 412 308 204 204 204 204 204 204 204 204 204 204	6 max 1250 1176 1103 1029 956 882 808 735 662 588 588 662 588 588 588 588 588 588 1499 1411 1323 1411 1323 1417 1058	bar min 1183 1079 976 869 765 658 551 448 344 237 448 344 237 448 344 237 448 344 237 448 344 237 448 344 237 448 344 237 142 142 142 142 142 142 142 142 142 142	max 1389 1316 1242 1169 1025 948 875 801 728 654 5.5 max 1667 1579 1491 1403 1314 1226	min 1323 1219 1115 1009 905 798 691 587 483 377 270 bar min 1588 1462 1336 1208 1082 954	max 1529 1456 1382 1309 1235 1161 1088 1014 941 867 794 6 max 1835 1747 1659 1570 1482 1394	min 1463 1359 1255 1148 1044 937 831 727 623 516 410 bar min 1756 1630 1503 1376 1249 1121	max 1808 1735 1661 1588 1514 1411 1367 1294 1200 1147 1073 7 max 2170 2082 1994 1905 1817 1729	min 17.42 1638 1534 1428 1324 1428 1324 1217 1110 1006 902 796 689 bar min 2091 1965 1839 1711 1584 1457	max 2088 2014 1941 1867 1794 1770 1646 1573 1500 1426 1352 8 max 2505 2417 2329 22412 2152 2064	min 2021 1917 1814 1707 1603 1496 1389 1286 1182 1075 968 bar min 2426 2300 2174 2046 1920 1792	
* MIG-KS-1300-S* * * * * * * * * * * * * * * * * * *	2 3 4 5 6 7 8 9 10 11 5 5 8 9 10 11 2 3 4 5	214 317 421 528 632 739 845 949 1053 1160 1267 Spring Md (f max 256 382 508 636 762 890 1018	min 147 221 294 368 441 515 588 662 735 809 882 662 735 809 882 662 735 809 882 662 735 809 882 663 735 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 809 817 1777 2653 3533 4411 529	max 551 478 404 331 	min 485 381 277 170 	max 691 617 544 470 397 397 397 397 397 300 <td>min 624 521 310 206 </td> <td>max 831 757 684 610 537 463 </td> <td>min 764 660 557 346 239 </td> <td>max 970 897 823 750 676 603 529 </td> <td>min 904 800 696 589 486 379 272 bar min 1085 959 833 705 579</td> <td>max 1026 953 806 732 659 585 512 </td> <td>bar min 960 856 752 645 541 435 328 224 224 541 541 435 328 224 0 0 0 0 0 0 772 646 518 390</td> <td>4.5 max 1110 1036 963 889 816 742 669 595 522 522 6d (Nm) 4.6 max 1332 1244 1156 1067 979</td> <td>bar min 1043 940 836 729 625 518 412 308 204 518 412 308 204 518 412 308 204 518 412 308 204 518 412 308 204 518 518 412 308 204 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 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<td>max 1529 1456 1382 1309 1235 1161 1088 1014 941 867 794 6 max 1835 1747 1659 1570 1482 1304 1305</td> <td>min 1463 1359 1255 1148 1044 937 831 727 623 516 410 bar min 1756 1630 1503 13766 1249</td> <td>max 1808 1735 1661 1588 1514 1441 1367 1294 1294 1200 1147 1073 7 max 21700 2082 1994 1905 1817 1729 1640</td> <td>min 17.42 1638 1534 1428 1324 1428 1324 1428 1324 1428 1324 1428 1324 1428 1324 1006 902 796 689 bar min 2091 1965 1839 1711 15847 1329</td> <td>max 2088 2014 1941 1867 1794 1720 1646 1573 1500 1426 1352 8 max 2505 2417 2329 22411 2152</td> <td>min 2021 1917 1814 1707 1603 1496 1389 1286 1182 1075 968 bar min 2426 2300 2174 2046 1920 1792 1664</td>	min 624 521 310 206 	max 831 757 684 610 537 463 	min 764 660 557 346 239 	max 970 897 823 750 676 603 529	min 904 800 696 589 486 379 272 bar min 1085 959 833 705 579	max 1026 953 806 732 659 585 512	bar min 960 856 752 645 541 435 328 224 224 541 541 435 328 224 0 0 0 0 0 0 772 646 518 390	4.5 max 1110 1036 963 889 816 742 669 595 522 522 6d (Nm) 4.6 max 1332 1244 1156 1067 979	bar min 1043 940 836 729 625 518 412 308 204 518 412 308 204 518 412 308 204 518 412 308 204 518 412 308 204 518 518 412 308 204 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 518 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1428 1324 1006 902 796 689 bar min 2091 1965 1839 1711 15847 1329	max 2088 2014 1941 1867 1794 1720 1646 1573 1500 1426 1352 8 max 2505 2417 2329 22411 2152	min 2021 1917 1814 1707 1603 1496 1389 1286 1182 1075 968 bar min 2426 2300 2174 2046 1920 1792 1664	
* MIG-KS-1300-S* * * * * * * * * * * * * * * * * * *	2 3 4 6 7 8 9 10 11 11 Spring set No. 1 2 3 4 5 6 7	214 317 421 528 632 739 845 949 1053 1160 1267 Spring Md (max 256 382 508 636 636 636 636 636 8390	min 147 221 294 368 441 515 588 662 735 809 882 gforce Vm) min 177 265 353 441 529 618 706	max 551 478 404 331 	min 485 381 277 170 	max 691 617 544 470 397 397 397 397 397 300 <td>min 624 521 310 206 </td> <td>max 831 757 684 610 537 463 </td> <td>min 764 660 557 346 239 </td> <td>max 970 897 823 750 676 603 529 </td> <td>min 904 800 696 589 486 379 272 </td> <td>max 1026 953 879 806 732 659 585 512 </td> <td>bar min 960 856 752 645 328 224 224 328 224 328 224 328 224 328 224 328 224 328 224 328 224 328 224 328 50 50 50 50 50 50 50 50 50 50 50 50 50</td> <td>4.5 max 1110 963 889 886 742 669 595 522 522 522 4 (Nm) 4.5 max 1332 1244 1156 1067 979 8891 802</td> <td>bar min 1043 940 836 729 625 518 412 308 204 204 204 204 204 204 204 204 204 204</td> <td>6 max 1250 1176 1103 1029 956 882 808 735 662 588 588 662 588 588 588 588 588 588 1499 1411 1323 1411 1323 1417 1058</td> <td>bar min 1183 1079 976 869 765 658 551 448 344 237 448 344 237 448 344 237 448 344 237 448 344 237 448 344 237 448 344 237 142 142 142 142 142 142 142 142 142 142</td> <td>max 1389 1316 1242 1169 1025 948 875 801 728 654 5.5 max 1667 1579 1491 1403 1314 1226</td> <td>min 1323 1219 1115 1009 905 798 691 587 483 377 270 bar min 1588 1462 1336 1208 1082 954</td> <td>max 1529 1456 1382 1309 1235 1161 1088 1014 941 867 794 6 max 1835 1747 1659 1570 1482 1394</td> <td>min 1463 1359 1255 1148 1044 937 831 727 623 516 410 bar min 1756 1630 1503 1376 121 994</td> <td>max 1808 1735 1661 1588 1514 1411 1367 1294 1200 1147 1073 7 max 2170 2082 1994 1905 1817 1729</td> <td>min 17.42 1638 1534 1428 1324 1428 1324 1217 1110 1006 902 796 689 bar min 2091 1965 1839 1711 1584 1457</td> <td>max 2088 2014 1941 1867 1790 1646 1573 1500 1426 1352 8 20505 2417 2329 2241 2152 2064 1976</td> <td>min 2021 1917 1814 1707 1603 1496 1389 1286 1182 1075 968 bar min 2426 2300 2174 2046 1920 1792</td>	min 624 521 310 206 	max 831 757 684 610 537 463 	min 764 660 557 346 239 	max 970 897 823 750 676 603 529	min 904 800 696 589 486 379 272	max 1026 953 879 806 732 659 585 512	bar min 960 856 752 645 328 224 224 328 224 328 224 328 224 328 224 328 224 328 224 328 224 328 224 328 50 50 50 50 50 50 50 50 50 50 50 50 50	4.5 max 1110 963 889 886 742 669 595 522 522 522 4 (Nm) 4.5 max 1332 1244 1156 1067 979 8891 802	bar min 1043 940 836 729 625 518 412 308 204 204 204 204 204 204 204 204 204 204	6 max 1250 1176 1103 1029 956 882 808 735 662 588 588 662 588 588 588 588 588 588 1499 1411 1323 1411 1323 1417 1058	bar min 1183 1079 976 869 765 658 551 448 344 237 448 344 237 448 344 237 448 344 237 448 344 237 448 344 237 448 344 237 142 142 142 142 142 142 142 142 142 142	max 1389 1316 1242 1169 1025 948 875 801 728 654 5.5 max 1667 1579 1491 1403 1314 1226	min 1323 1219 1115 1009 905 798 691 587 483 377 270 bar min 1588 1462 1336 1208 1082 954	max 1529 1456 1382 1309 1235 1161 1088 1014 941 867 794 6 max 1835 1747 1659 1570 1482 1394	min 1463 1359 1255 1148 1044 937 831 727 623 516 410 bar min 1756 1630 1503 1376 121 994	max 1808 1735 1661 1588 1514 1411 1367 1294 1200 1147 1073 7 max 2170 2082 1994 1905 1817 1729	min 17.42 1638 1534 1428 1324 1428 1324 1217 1110 1006 902 796 689 bar min 2091 1965 1839 1711 1584 1457	max 2088 2014 1941 1867 1790 1646 1573 1500 1426 1352 8 20505 2417 2329 2241 2152 2064 1976	min 2021 1917 1814 1707 1603 1496 1389 1286 1182 1075 968 bar min 2426 2300 2174 2046 1920 1792	
* MIG-KS-1300-S* * * * * * Actuator Type * * * MIG-KS-1600-S* * * * * * * * * * * * * * * * * * *	2 3 4 5 6 7 8 9 10 11 1 8 set No. 1 2 3 4 5 6 7 8	214 317 421 528 632 739 845 949 1053 1160 1267 Spring Md (max 256 636 762 508 636 762 890 1018 1144	min 147 221 368 441 515 588 662 735 809 882 gforce ymm 1777 265 353 441 529 618 706 706 706 706 707	max 551 478 404 331 	min 485 381 277 170 	max 691 617 544 470 397 397 397 397 397 397 300 <td>min 624 521 310 206 </td> <td>max 831 757 684 610 537 463 </td> <td>min 764 660 557 346 239 </td> <td>max 970 897 823 750 676 603 529 </td> <td>min 904 800 696 589 486 379 272 </td> <td>max 1026 953 806 732 659 585 512 </td> <td>bar min 960 856 752 645 541 435 328 224 224 541 541 435 328 224 0 0 0 0 0 0 772 646 518 390</td> <td>4.5 max 11100 963 889 595 522 522 4 (Nm) 4.5 max 1332 1244 1156 1067 979 891 802 714</td> <td>bar min 1043 940 836 729 625 518 412 308 204 204 1253 1127 1001 1253 1127 1001 873 746 619 491 491 365</td> <td>6 max 1250 1176 1103 1029 956 882 808 735 662 588 662 588 662 588 5 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8</td> <td>bar 1183 1079 976 869 658 658 658 658 448 237 237 0 0 1420 1294 1420 1294 1420 1294 1168 1168 1069 659 658 658 658 658 658 658 658 658</td> <td>max 1389 1316 1242 1169 1095 1022 948 875 801 728 654 654 1667 1579 1491 1403 1314 1226 1050</td> <td>min 1323 1219 1115 1009 905 798 691 587 483 3777 2700 bar min 1588 1462 13366 1208 1208 1208 7700</td> <td>max 1529 1456 1382 1309 1235 1161 1088 1014 941 867 794 6 max 1835 1747 16570 1570 1482 1305 1217</td> <td>min 1463 1359 1255 1148 1044 937 831 727 623 516 410 bar min 1756 1630 1503 1376 1249 14249 994 868</td> <td>max 1808 1735 1661 1588 1514 1441 1367 1294 1207 1147 1073 7 max 2170 2082 1994 1905 1817 1729 16410 1552</td> <td>min 1742 1638 1534 1428 1324 1217 1110 1006 902 796 689 bar min 2091 1965 1839 1711 1584 1428 1203</td> <td>max 2088 2014 1941 1867 1794 1720 1646 1573 1500 1426 1352 8 max 2505 2417 2329 2241 2152 2064 1988</td> <td>min 2021 1917 1814 1707 1603 1496 1389 1286 1182 1075 968 bar min 2426 2300 2174 2046 1920 1792 1664 1538</td>	min 624 521 310 206 	max 831 757 684 610 537 463 	min 764 660 557 346 239 	max 970 897 823 750 676 603 529	min 904 800 696 589 486 379 272	max 1026 953 806 732 659 585 512	bar min 960 856 752 645 541 435 328 224 224 541 541 435 328 224 0 0 0 0 0 0 772 646 518 390	4.5 max 11100 963 889 595 522 522 4 (Nm) 4.5 max 1332 1244 1156 1067 979 891 802 714	bar min 1043 940 836 729 625 518 412 308 204 204 1253 1127 1001 1253 1127 1001 873 746 619 491 491 365	6 max 1250 1176 1103 1029 956 882 808 735 662 588 662 588 662 588 5 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	bar 1183 1079 976 869 658 658 658 658 448 237 237 0 0 1420 1294 1420 1294 1420 1294 1168 1168 1069 659 658 658 658 658 658 658 658 658	max 1389 1316 1242 1169 1095 1022 948 875 801 728 654 654 1667 1579 1491 1403 1314 1226 1050	min 1323 1219 1115 1009 905 798 691 587 483 3777 2700 bar min 1588 1462 13366 1208 1208 1208 7700	max 1529 1456 1382 1309 1235 1161 1088 1014 941 867 794 6 max 1835 1747 16570 1570 1482 1305 1217	min 1463 1359 1255 1148 1044 937 831 727 623 516 410 bar min 1756 1630 1503 1376 1249 14249 994 868	max 1808 1735 1661 1588 1514 1441 1367 1294 1207 1147 1073 7 max 2170 2082 1994 1905 1817 1729 16410 1552	min 1742 1638 1534 1428 1324 1217 1110 1006 902 796 689 bar min 2091 1965 1839 1711 1584 1428 1203	max 2088 2014 1941 1867 1794 1720 1646 1573 1500 1426 1352 8 max 2505 2417 2329 2241 2152 2064 1988	min 2021 1917 1814 1707 1603 1496 1389 1286 1182 1075 968 bar min 2426 2300 2174 2046 1920 1792 1664 1538	



D3 Components and recommended spare parts

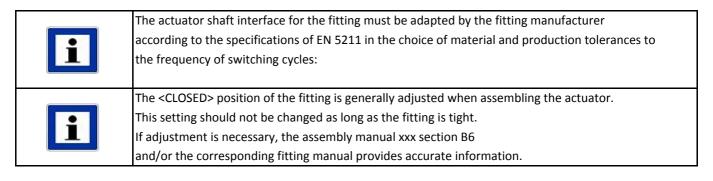


POS.	QLY.	Fart	POS.	QLY.	Fart
1	1	Body	17*	1	O-ring (shaft at bottom)
2	2	Cylinder pipe	18*	2	O-ring (piston outside)
3	1	Shaft	19*	2	O-ring (piston inside)
4	2	Piston	20*	2	O-ring (fixing sleeve)
5	2	End cap	21*	4	O-ring (end cap/housing outside)
6	2	Guide bar	22*	2	O-ring (end cap central)
7	1	Stopper	23	2	Hexagonal bolt
8*	1	Centring disc DIN/ISO 5211	24	2 (4)	Counter nut
9*	2	Sliding bearing (piston inside)	25	2 (4)	Threaded pin (grub screw)
10*	4	Guide bearing (piston/gear rack outside)	26	2	Fixing sleeve
11*	2	Sliding bearing shell (shaft at top)	27	1	VDI-VDE tappet
12*	1	Start-up disc (shaft at top)	28	1	Visual display
13*	1	Start-up disc (shaft at bottom)	30	2	Pressure spring (outside)
14*	1	Sliding bearing (shaft at bottom)	31	2	Pressure spring (central)
15*	1	Retainer ring (shaft at bottom)	32	2	Pressure spring (inside)
16*	1	O-ring (shaft at top)			
*	Spare p	arts recommended for maintenance			



D4 Advice on risks involved with permanent operation

- ° The actuator is designed for permanent operation, based on EN15714-3, table 1.
- The actuator is screw connected with the fitting in the interface according to ISO5211. Section B2 contains the necessary torque of the screw connection.
 Actuators with a higher actuation frequency should be monitored at appropriate intervals (when maintaining the fitting at the latest) by visual inspection for a tight fit and tightened accordingly if required.
- The actuator is designed for actuation with compressed air according to section 1 <intended use>.



D5 Advice on other risks

[°] Securing the pre-tensed springs:

The type MIG-xx-S spring packages are secured, pre-tensed, with end caps with long fixing screws. It is essential that the springs are not subject to any corrosive control medium.

^o Replacement of spring packages:

If necessary, spring packages of type MIG-KS-xx-S can be replaced if required due to the fitting torque requirements.

° Mechanical loads:

► Actuators are not "step ladders": external loads must be kept away from the fitting.

▶ The actuator is designed for static loads in the pipe system. Risks due to loads

caused by vibrations in the system are not covered: permanent securing of screw connections on the actuator must be coordinated with the manufacturer KLINGER SCHÖNEBERG GmbH in such cases.



Declaration according to MRL (voluntary addition)

The manufacturer

KLINGER SCHÖNEBERG GmbH

Heidelberger Straße 3 76676 Graben-Neudorf

declares that the pneumatic rotary actuators correspond with EC guidelines

Type MIG-KS-xx-D double action

Type MIG-KS-xx-S single action

are manufactured according to the following norms:

DIN EN ISO 5211	Connections of rotary actuators to fittings
DIN EN 15081	Assembly sets for connections of rotary actuators to fittings
VDI / VDE 3845	Control element connection point
EN 12100	Safety of machines
ISO 8573-1 class 3 and 5	Quality of compressed air

Product documents are available as follows:

Technical data sheets, xxxxxx

These products correspond with the following specified guidelines:

Machinery directive 2006/42 EC (MRL) [only applies in combination with a fitting.]

- 1. The products are a "component or partial machine" in terms of Art 2 g) of this guideline
- 2. The table overleat lists whether and how requirements of this guideline should be fulfilled
- 3. This declaration is the assembly declaration in terms of this guideline

The following applies to compliance with the above-mentioned guidelines:

- The user must comply with the <intended use> defined in the "installation and assembly manual" supplied with the delivery (xxxMRLxxxxx).
 - Failure to observe this manual can in relevant cases release the manufacturer from product liability.
- Commissioning the fitting (and the attached actuator if necessary) is not permitted until the conformity of the system in which the fitting is installed is declared by the responsible person with all of the applicable above-mentioned EC guidelines.
 A separate declaration is supplied for the above-mentioned actuator.
- 3. The manufacturer MIG GmbH has carried out and documented the necessary risk analyses. The commissioned employee for this available documentation is the QM officer at MIG GmbH.

Graben-Neudorf, on



The manufacturer	KLINGER SCHÖNEBERG GmbH, Heidleberger Straße 3, 76676 Graben-Neudo
declares that the pneumatic act	uators MIG-KS-D/S correspond with the following regulations:
Requirements according to a	ppendix I of the machinery directive 2006/42/EC
I.1.1, g) Intended use	Refer to operating manual
L.1.2.,c) Warnings for incorrect use	Refer to operating manual
	Same as the pipe section in which the fitting is installec
1.2.,e) Accessories	No special tools for replacement of expendable parts necessary
	The material of parts in contact with media have been coordinated in advance of the
	delivery and are specified in both the type data sheet and in the
1.1.3 Parts in contact with media	MIG GmbH order confirmation.
	Performance of a corresponding risk analysis for resistance to the operating medium by the user is required.
1.5 Handling	Fulfilled by advice in the installation manual
2 and 1.2.11 control	
	at the responsibility of the user in consultation with the actuator installation manual
.3.2 Breakage risk prevention	For function parts: ensured by intended use of the actuators
3.4 Sharp corners and edges	Requirements fulfilled
.3.7/8 Injury due to	Requirement fulfilled with intended use. Maintenance and repair
noving parts	are only permitted with the actuator disabled and with the power supply to the actuator switched of
5.1-1.5.3 Power supply	Responsibility of the user - also refer to the installation manual for the actuator
5.5 Operating temperature	Warning advice against unauthorised excess: see operating manual, sectior <intended use=""></intended>
1.5.7 Explosion	Explosion protection is necessary. Must be explicitly agreed in the purchase contract. In this case: Only for use as marked on the actuator.
1.5.13 Emission of dangerous ubstances	Not applicable
.6.1 Maintenance	Refer to operating manual
7.3 Identification	See manufacturer documentation
7.4 Operating manual	This installation manual also contains advice on operating the actuator
	Necessary supplements for the operating manual for the <full machine=""> are the</full>
	responsibility of the planner/user.
Appendix III	The actuator is not a <complete machine="">: Therefore no CE mark for</complete>
	conformity with the machinery directive
Appendices IV, VIII-XI	Not applicable
According to EN 12100	
	The basis is decades of experience in the use of the actuator construction types stated
	on page 1.
. Area of application	Note: It is essential for the user of the pipeline section, including the
	fittings used performs a customised risk analysis for the specific type of operation according to sections 4 to 6 of EN 12100 - it is not possible for the manufacture
	Klinger Schöneberg to do so.
.20,6.1 Inherently safe construction	The actuators are designed according to the principle of <inherently construction="" safe=""></inherently>
analysis according to sections 4, 5, & 6	Experiences with the malfunctions and misuse documented by the manufacture
	within the scope of cases of damage (doc no. ISO9001) have been used as a basis
5.3 Machine limits	Demarcation of the <incomplete machine=""> has been undertaken according to the <intended use:<br="">of the actuator.</intended></incomplete>
.4 Decommissioning and disposal	Not within the scope of responsibility of MIG GmbH.
5.2.2 Geometric factors	Due to the fact that the fitting & actuator cover the functional parts when used as intended this section is not applicable.
3.3 Technical protective equipment	Only required for accessories if applicable.
	Due to the fact that fittings with an actuator work "automatically" according to the control commands,
6.4.5 Operating manual	the aspects that are <typical actuator="" the="" to=""> are described in the operating manua</typical>
	and need to be provided to the manufacturer of the (pipeline) system
Risk analysis	The performed risk analysis according to MRL appendix VII, B) has been carried out by the manufacture
	MIG GmbH and documented according to MRL appendix VII,B).

