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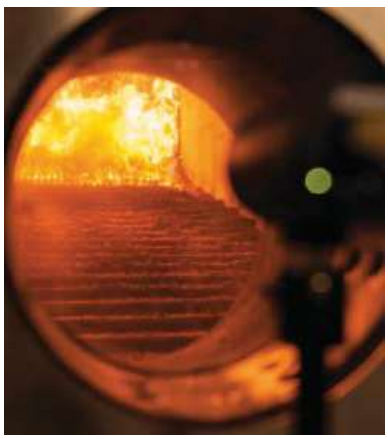

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price list 2020

CM-SERIE

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Your way to company SCHIEBEL

SCHIEBEL ANTRIEBSTECHNIK GMBH is placed in the South of Vienna close to the motorways A2, A21 and S1.

Sales, development and production is located in the headquarter in Vienna.

Additionally SCHIEBEL has a big stock for spare parts and a service area where actuators can be repaired independent from the year of manufacture.

SCHIEBEL is one of the leading companies in the electric actuator technology, so sales and service partners can be foand all over the world.

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Selection & dimensioning guide for electric actuators

For a perfect implementation, initial start-up and long lifetime of an electric actuator a correct actuator selection & dimensioning has a high priority in advance. This requires an exact specification of the valve (mechanics), the control concept (electric) and also of the operating and environmental conditions. This guide should give you a short overview with the most important key facts for the selection of an electric actuator.

MECHANIC

VALVE		ACTUATOR
- valve construction type	➡	actuator design (rotary-, part turn-, linear- or lever actuator)
- required torque / force	➡	actuator size or combination with gearbox
- On/Off or modulating valve type	➡	on/off actuator or modulating actuator
- Number of turns for full valve stroke	➡	actuator speed & stroking time
- Mechanical connection for actuator	➡	actuator output flange, maybe valve spindle cover tube

ELECTRIC

CONTROL CONCEPTS		ACTUATOR
- External control (control box in plant)	➡	Actuator without control unit
- control unit on actuator	➡	Actutator with control unit
Communication of drive commands & status information direct with PLC		
- Data communication with bus system	➡	Actuator with control unit and bus interface
Voltage levels		
- Main power supply, frequency	➡	3phase AC-, 1phase AC- or DC actuator
- Power supply for run commands and status returns	➡	Selection of switches and actuator control unit design

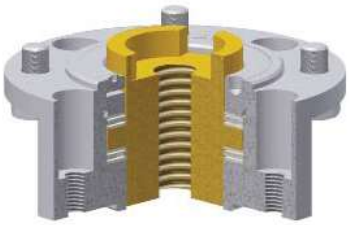
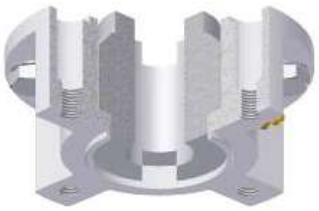
Note: The elcectrical design of each actuator has to be in accordance with a lot of different PLC systems and plant specifications, so please pay attention to the actuator wiring diagram.

OPERATING CONDITIONS

OPERATING CONDITIONS		ACTUATOR
- Explosive Atmosphere	➡	Actuator in explosion-proove design
- Temperature range	➡	Standard-, High- or low temperature design
- Installation place	➡	Standard IP protection degree or higher
- Low or high contaminated atmosphere	➡	Standard or special corrosion protection
- vibrations, inaccessibility	➡	Actuator control unit separated from actuator or other constructive measures

Overview output drives multi-turn actuators

For actuator assembling on many different industry valves several output drives are available as a modular construction system which easily can be mounted on the actuator housing. The output drives and measures are in accordance with ISO 5210, DIN 3210 or DIN 3338.
By request the output drives and there sleeves are available with special measures for valve mounting.

Output drive A/Am with stem nut according ISO 5210 or DIN 3210 **Type A**: Stem nut for valve shaft blank/unbored delivered **Type Am**: Stem nut for valve shaft delivered bored or with ACME thread according DIN103 ***Characteristics:*** - Torque-transmission - Thrust forces acceptance by axial bearing Housing of rotary actuator is free of axial forces - If acuator is dismounted from valve output type A/Am can remain on valve.		***Typical application:*** - gate valves, valves with rising, non-rotating valve stem - Rotary actuators with linear unit ***Notes:*** - Dependend on valve size and valve stroke the valve spindle can rise through the actuator or rotary gearbox housing. In this case you have to consider a spindle cover tube for the actuator or rotary gearbox. - Always check the maximum stem acceptance of the actuator or gearbox with dimension drawings!
Output drive B1,B2 with plug sleeve according ISO 5210 or B acc. DIN 3210 **Type B1**: Plug sleeve bored with keyway according norm (in Schiebel type code as B output identified) **Type BSo**: Plug sleeve according norm, but special bore and keyway dimensions (acc. customer speci fication) ***Characteristics:*** - Torque-transmission - No accceptance of thrust forces		***Typical application:*** - gate valves, valves with rotating, non-rising valve stem - gate valves, valves with non-rotating, rising valve stem if valve has a stem nut with axial bearing ***Notes:*** - If valve stem is rising please pay attention to notes from output drive A/Am!
Output drive C with claw coupling according DIN 3338 or DIN 3210 **Type C**: Plug sleeve with claws & bore according norm **Type CSo**: Plug sleeve with special claw & bore measures (acc. customer specification) ***Characteristics:*** - Torque-transmission - No accceptance of thrust forces		***Typical application:*** - gate valves, valves with rotating, non-rising valve stem - gate valves, valves with non-rotating, rising valve stem if valve has a stem nut with axial bearing ***Notes:*** - If valve stem is rising please pay attention to notes from output drive A/Am!
Output drive D free shaft according DIN 3210 **Type D**: Free shaft with keyway according norm **Type DO**: Two shafts with keyway according norm **Type E-DO**: B3 output drive according ISO 5210 on actuator bottom & free shaft with keyway on top ***Characteristics:*** - Torque-transmission - No accceptance of thrust forces		***Typical application:*** - 2 spindle sluice weir , weir gate valve - Valves operation by linkage or coupling
Output drive B3/E with bore & keyway according ISO 5210/DIN 3210 or B2,B4, ESo **Type B3/E:** Drive sleeve with bore and keyway accor-ding norm (in Schiebel type code generally as “E” output declared) **Form B2,B4,ESo:** Drive sleeve with special bore and keyway measures (in Schiebel type code generally as “ESo” output declared) ***Characteristics:*** - Torque-transmission - No accceptance of thrust forces		***Typical application:*** - valves with rotating, non-rising valve stem - Typical output drive for rotary actuators in combination with worm gearbox, bevel gearboxes & spur gearboxes
Output drives Q, X and S intern Schiebel identification **Type Q:** output drive for SF-lever gearboxes **Type X:** actuator delivered without any output drive **Type S:** output drive with hexagonal bore		***Typical application:*** - Type Q for SF-lever gearboxes - Type X for spare actuators - Type S for piston gate valves (old output drive) ***Notes:*** - Type S is not produced any more!

On-Off duty

S4-duty

Electric compact multi-turn actuator with integrated control unit & frequency inverter technology for mounting on valves, worm gearboxes, linear units, multi-turn gearboxes & lever gearboxes

Motor
PM-motor, controlled via frequency inverter, isolation class F

Operation mode
CMxx: short operatian duty (on/off) S2-15min, class A and B acc. EN 15714-2
rCMxx: Modulating duty S4-1200 cycles/hour with 40% duty cycle, class C acc. EN 15714-2

Local control
Selector switch LOCAL-OFF-REMOTE - lockable
Control switch OPEN-STOP-CLOSE
Large LC-display for detailed visualization of status information & parameters - different languagues adjustable
White display backlight for normal operation
Red display backlight for alarms
5 RGB LEDs for status indication & control information
Cover lid with display in 90° steps rotatable
Infrarot interface for data exchange with Schiebel Interface & Windows PC
Bluetooth interface for data exchange and actuator control with Android App or Windows PC

Remote control
5 binary inputs 24/48V DC (max. 60V DC):
Open - Stop - Close - Emergency Open - Emergency Close,
free programmable, 24V DC rated voltage with common groand potential,
inputs with jumpers configurable in groups with separated commons

Status signals
8 binary outputs:
Ready - Open - Closed - Opening - Closing - Torque - Local - Remote,
free programmable, 24V DC supply, max. load 0,5 A/channel

Features
Free adjustable step mode control for open and close
4 intermediate positions definable
actuator speed adjustable with adjustable ramps
acutator torque adjustable in a wide range
Password protection for reading and writing parameters
Alternative menu structure adjustable
Different userlevels adjustable
Counter values: powerOn hours, hours of operation, switching cycles, powerON cycles, count of overtorque switch-off
Preventive Maintanance notification

Handwheel handwheel for manual operation, switching free, without lever arm
Valve connection according ISO 5210 / DIN3210
Ambient temperature -25° up to +60° C
Enclosure protection IP67 according EN 60 529 and IEC 529
Corrosion protection K2 for installation in aggressive atmosphere
Colour RAL7024
Documentation in German or English language by e-mail
Final test Final test of each actuator with a final test certificate

TYPE	On-off duty / S4-duty	CM03 / rCM03	CM06 / rCM06	CM012 / rCM12
Torque range	Nm	**8-32**	**19-64**	**32-125**
Max. modulating torque	Nm	16	32	60
Speed range, free adjustable	rpm	2,5 – 72	2,5 – 64	2,5-60
Travel sensor range	Turns	max. 105	max. 105 or max. 300	max. 105 or max. 300
Valve flange	ISO 5210 / DIN 3210	F10 / G0 (Option F07)	F10 / G0	F10 / G0
Output drives	ISO 5210 / DIN 3210 / DIN 338	A / Am / B / B1 / Bso / C / CSo / D / E / ESo		
Max. spindle diameter	mm	20	32	36
approx. weight	kg	11,5	17,5	22
Dimension Drawing	--	MC36_1_07	MC50_1_04	MC63_1_01
Motor	M	Brushless DC motor controlled by integrated control unit		
Insulation class	F	max. 155°C continuous temperature		
Power factor	cos φ	> 0,95		
Power connection	Motor	6-pole plug with screw contacts 16A, max. 2,5mm² in roand plug housing		
Control connection	Signale	24-pole plug with screw contacts 16A, max. 2,5mm² in roand plug housing		
Metric cable entries 1)		M40x1,5 / M32x1,5 / M25x1,5		
Power supply 1ph (Standard)		AC1~90. . . 240Vrms 50/60Hz +/-10% and 100...220VDC +/-10%		
Nominal current - 1x230VAC	A	1,47A (16Nm / 72rpm)	2,17A (20Nm / 60rpm)	4,5A (40Nm / 60rpm)
Wiring diagram Power connection		SCP12.40.01/2		
Power supply 3ph (Option)		AC 3~380-480V 50/60Hz +/-10%		
Nominal current - 3x400VAC	A	0,46A (16Nm / 72rpm)	0,9A (32Nm / 60rpm)	1,8A (40Nm / 60rpm)
Wiring diagram Power connection		SCP11.40.01/2		
Power supply 24VDC (Option) *)		DC 24V +/-10%	--	--
Nominal current	A	4,6A (10Nm / 20rpm)	--	--
Wiring diagram Power connection		SCP13.40.02/2		
Wiring diagram Control connection	for 1ph/3ph/24VDC	SCC10.00.07/4		

*) max. output speed 20rpm with 24VDC power supply
1) Cable glands & reductions are not in the scope of supply.

Our deliveries and services are subject to our currently valid General Conditions of Business and Sale.

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Option - Bus-Interface

Design
Bus interface for multi-turn actuator

remote control
Control signals OPEN | STOP | CLOSE | EMERGENCY OPEN | EMERGENCY CLOSE via bus interface

status signals
Signals to PLC system READY | OPEN | CLOSED | OPENING | CLOSING | TORQUE | LOCAL | REMOTE via bus interface

analoge signals
Analogue position feedback signal ER and positioner signal SR via bus interface

Connection diagram

Profibus-DP:	SCB 10.00.06/2
Modbus RTU:	SCB 10.00.05/1
Profinet PN:	SCB 10.00.08/1
Modbus TCP:	SCB 10.00.04/2
Powerlink PL:	SCB 10.00.03/2
DeviceNet:	SCB 10.01.01/1
HART:	SCC 10.00.08/2

Electrical connectors cable entries
Plug lid with electrical with plugs for power supply, control and bus interface connection
3 metric cable entries (M40x1,5, M32x1,5 & M25x1,5) for power and control signals 1)
4 metric cable entries for bus wiring or 2pcs. M12 plugs depending on bus interface 1)

Bus-Interface	Power	Control plug	Bus plug	Cable entries for bus
Profbus DP	Han10E	Han24E	SMod16	4Pcs. M20x1,5
Modubus RTU	Han10E	Han24E	SMod16	4Pcs. M20x1,5
Profinet	Han10E	Han24E	M12	2Pcs. M12
Modus TCP	Han10E	Han24E	M12	2Pcs. M12
Powerlink	Han10E	Han24E	M12	2Pcs. M12
DeviceNet	Han10E	Han24E	SMod16	4Pcs. M20x1,5
HART	Han10E	Han24E	on Han24E	--

On-Off duty

S4-duty

Electric compact multi-turn actuator with integrated control unit & frequency inverter technology for mounting on valves, worm gearboxes, linear units, multi-turn gearboxes & lever gearboxes indended for use in potentially explosive atmospheres - Directive 2014/34/EU (ATEX)

Explosion protection II 2 G Ex de IIC T4 Gb (Option: II 2 G Ex de IIC T6 Gb)

Motor PM-motor, controlled via frequency inverter, isolation class F

Operation mode
exCMxx: short operatian duty (on/off) S2-15min, class A and B acc. EN 15714-2
exrCMxx: Modulating duty S4-1200 cycles/hour with 40% duty cycle, class C acc. EN 15714-2

Local control
Selector switch LOCAL-OFF-REMOTE - lockable
Control switch OPEN-STOP-CLOSE
Large LC-display for detailed visualization of status information & parameters - different languagues adjustable
White display backlight for normal operation
Red display backlight for alarms
5 RGB LEDs for status indication & control information
Cover lid with display in 90° steps rotatable
Infrarot interface for data exchange with Schiebel Interface & Windows PC
Bluetooth interface for data exchange and actuator control with Android App or Windows PC

Remote control
5 binary inputs 24/48V DC (max. 60V DC):
Open - Stop - Close - Emergency Open - Emergency Close,
free programmable, 24V DC rated voltage with common groand potential,
inputs with jumpers configurable in groups with separated commons

Status signals
8 binary outputs:
Ready - Open - Closed - Opening - Closing - Torque - Local - Remote,
free programmable, 24V DC supply, max. load 0,5 A/channel

Features
Free adjustable step mode control for open and close
4 intermediate positions definable
actuator speed adjustable with adjustable ramps
acutator torque adjustable in a wide range
Password protection for reading and writing parameters
Alternative menu structure adjustable
Different userlevels adjustable
Counter values: powerOn hours, hours of operation, switching cycles, powerON cycles, count of overtorque switch-off
Preventive Maintanance notification

Handwheel handwheel for manual operation, switching free, without lever arm

Valve connection according ISO 5210 / DIN3210

Ambient temperature -20° up to +40° C

Enclosure protection IP67 according EN 60 529 and IEC 529

Corrosion protection K2 for installation in aggressive atmosphere

Colour RAL7024

Documentation in German or English language by e-mail

Final test Final test of each actuator with a final test certificate

TYPE	On-off duty / S4-duty	exCM03 / exrCM03	exCM06 / exrCM06	exCM012 / exrCM12
Torque range	Nm	**8-32**	**19-64**	**32-125**
Max. modulating torque	Nm	16	32	60
Speed range, free adjustable	rpm	2,5 – 72	2,5 – 64	2,5-60
Travel sensor range	Turns	max. 105	max. 105 or max. 300	max. 105 or max. 300
Valve flange	ISO 5210 / DIN 3210	F10 / G0 (Option F07)	F10 / G0	F10 / G0
Output drives	ISO 5210 / DIN 3210 / DIN 338	A / Am / B / B1 / Bso / C / CSo / D / E / ESo		
Max. spindle diameter	mm	20	32	36
approx. weight	kg	11,5	17,5	22
Dimension Drawing		MC36_1_08	MC50_1_05	MC63_1_02

Motor	M	Brushless DC motor controlled by integrated control unit		
Insulation class	F	max. 155°C continuous temperature		
Power factor	cos φ	> 0,95		
Leistungsanshluss	Motor	Terminals UK 5 N according guidline 2014/34/EU (ATEX) - increased safety		
Control connection	Signale	Terminals UK 2,5 N according guidline 2014/34/EU (ATEX) - increased safety		
Metric cable entries 1)		M40x1,5 / M20x1,5 / M20x1,5		
Power supply 1ph (Standard)		AC1~90. . . 240Vrms 50/60Hz +/-10% and 100...220VDC +/-10%		
Nominal current - 1x230VAC	A	1,47A (16Nm / 72rpm)	2,17A (20Nm / 60rpm)	4,5A (40Nm / 60rpm)
Wiring diagram Power connection		SCP42.40.01/2		
Power supply 3ph (Option)		AC 3~380-480V 50/60Hz +/-10% (Hardeware Option)		
Nominal current - 3x400VAC	A	0,46A (16Nm / 72rpm)	0,9A (32Nm / 60rpm)	1,8A (40Nm / 60rpm)
Wiring diagram Power connection		SCP 41.40.01/2		
Power supply 24VDC (Option) *)		DC 24V +/-10%	--	--
Nominal current	A	4,6A (10Nm / 20rpm)	--	--
Wiring diagramPower connection		SCP43.40.01/1		
Wiring diagramControl connection	for 1ph/3ph/24VDC	SCC 20.00.06/3		

*) max. output speed 20rpm with 24VDC power supply
1) Cable glands & reductions are not in the scope of supply.

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Option - Bus-Interface

Design
Bus interface for multi-turn actuator
according guidline ATEX 2014/34/EU

remote control
Control signals OPEN | STOP | CLOSE | EMERGENCY OPEN | EMERGENCY CLOSE via bus interface

status signals
Signals to PLC system READY | OPEN | CLOSED | OPENING | CLOSING | TORQUE |
LOCAL | REMOTE via bus interface

analoge signals
Analogue position feedback signal ER and positioner signal SR via bus interface

Connection diagram

Profibus-DP:	SCB 20.00.07/3
Modbus RTU:	SCB 20.00.11/1
Profinet PN:	SCB 20.00.15/1
Modbus TCP:	SCB 20.00.14/1
Powerlink PL:	--
DeviceNet:	--
HART:	SCC 20.00.07/2

Electrical connectors cable entries
Terminals according guidline 2014/34/EU (ATEX) - room of increased safety
motor terminals UK 5 N,
control terminals UK 2,5 N
bus terminals UK 2,5 N
metric cable entries for cable glands, closed with blind glands 1)
addtional 4 metric cable entries for bus wiring 1)

Bus-Interface	Power	SteuerSignals	Bus	Cable entries for bus
Profbus DP	UK 5 N	UK 2,5 N	UK 2,5 N	4Pcs. M20x1,5
Modubus RTU	UK 5 N	UK 2,5 N	UK 2,5 N	4Pcs. M20x1,5
Profinet	UK 5 N	UK 2,5 N	UK 2,5 N	4Pcs. M20x1,5
Modus TCP	UK 5 N	UK 2,5 N	UK 2,5 N	4Pcs. M20x1,5
Powerlink	UK 5 N	UK 2,5 N	UK 2,5 N	4Pcs. M20x1,5
DeviceNet	UK 5 N	UK 2,5 N	UK 2,5 N	4Pcs. M20x1,5
HART	UK 5 N	UK 2,5 N	UK 2,5 N	--

1) Cable glands & reductions are not in the scope of supply.

On-Off duty

S4-duty

Max. torque for part-turn actuators at on-off valves according ISO 5211

Flange size	Maximum torque [Nm]
F07	250
F10	500
F12	1000
F14	2000
F16	4000
F25	8000
F30	16000
F35	32000

Basic design worm gearboxes E-series

Rotation	Clockwise rotation of insert by clockwise rotation of input shaft
Self-locking	Self-locking gearbox with single worm
Actuator connection	Flange according ISO 5210
Ambient temperature	- 40° bis +120° C
Protection enclosure	IP67 according EN 60 529 and IEC529
Corrosion protection	K2 for installation in aggressive atmosphere
Colour	RAL7024 with CM-series and RAL7030 with AB-series actuator
Position indicator	Mechanical position indicator on gearbox
End stop	End stops with screws for an easliy stroke adjustment between 0° and 90° (+/- 5° adjustable)
Valve connection	Valve flange according ISO 5211
Output	Plug insert 45° rotateable

SELECTION CHART PART-TURN GEARBOXES E-SERIES

Type	Technical data											
	max. allowed output torque	max. torque S4-duty [1]	Gearbox ratio	Mechanical advantage [7]	max. input torque	Input flange for actuator [4]	Output flange for valve [2]	max. Ø valve shaft	max. valve square [3]	Weight	Suitable actuator size	max. allowed output speed
	Nm	Nm	--	--	Nm	ISO 5210	ISO 5210	mm	mm	kg		rpm
E210	**150**	75	37	11,6	13	F10	F05 F07 F10	22	17	4	**CM03 AB3**	40
E550	**768**	384	34	12	64	F10	F07 F10 F12 F14	30 [5] 45 [6]	27 [5] 33 [6]	11	**CM03 CM06 AB3 AB5**	60
E1250	**2000**	1000	48	16	125	F10	F10 F12 F14 F16	44 [5] 60 [6]	36 [5] 46	23	**CM06 CM12 AB5 AB8**	72
E1250/PR4	**2000**	1000	201	57,8	35	F10	F10 F12 F14 F16	44 [5] 60 [6]	36 [5] 46	30	**CM03 CM06 AB3 AB5**	120

Use of worm gearboxes E-series:
- For all valves which requires a 90° movement
- On/off applications
- Modulating applications with lower requirements and moderate operating frequencies
- Useable for smaller valves
- stock ware

$$\text{time [sec]} = 15 \times \frac{\text{Ratio gearbox}}{\text{actuator speed [rpm]}}$$

1) In combination with modulating acutators: max. allowed modulating torque = 0,5 of max. torque
2) For the selection of a correct flange size please consider the max. allowed flange torques acc. to ISO 5211 chart. Other flanges on request
3) Please specify the square stem position of the valve (parallel or diagonal to flange axis)
4) Actuator output drive E is required
5) Basic design with plug insert
6) with machining direct in worm quadrant
7) Conversion factor between output torque and input torque for actuator sizing

On-Off duty

S4-duty

Max. torque for part-turn actuators an ot valves according ISO 5211

Flange size	Maximum torque [Nm]
F07	250
F10	500
F12	1000
F14	2000
F16	4000
F25	8000
F30	16000
F35	32000

Basic design gearboxes QT-series

QT3/QT6	Adpater parts which restricts rotation to 90°
QT12/QT25/QT50	Planetary gerboxes which restricts rotation to 90°
Rotation	Clockwise rotation of insert by clockwise rotation of input shaft
Actuator connection flange	according ISO 5210
Ambient temperature	- 40° up to +85° C
Protection enclosure	IP67 according EN 60 529 and IEC529
Korrosionssch	K2 for installation in aggressive atmosphere
Colour	RAL7024 with CM-series and RAL7030 with AB-series actuator
End stop	QT12/QT25/QT50: Mechanical end stops for 90° movement
	QT3/QT6: The selection of the end stop turns turns the drive sleeve 45°
Output	valve flange according ISO 5210

SELECTION CHART 90° GEARBOXES QT-SERIES

Type	Technical data											
	max. allowed output torque	max. torque S4-duty [1]	Gearbox ratio	Mechanical advantage [7]	max. input torque	Flangenput for actuator [4]	Output flange for valve [2]	max. Ø valve shaft	max. valve square	Weight	Suitable actuator size	max. allowed output speed
	Nm	Nm	--	--	Nm	ISO 5210	ISO 5210	mm	mm	kg		rpm
QT3	**30**	15	1:1	1	30	F10	F05 F07 F10	20	17	2,3	**CM03 AB3**	2,5
QT6	**60**	30	1:1	1	60	F10	F05 F07 F10	20	17	2,3	**CM06 AB5**	2,5
QT12	**120**	60	4,88	4,16	25	F10	F05 F07 F10	20	17	3,2	**CM03 AB3**	10
QT25	**250**	125	9	7,92	28	F10	F07 F10	25	22	4,8	**CM03 CM06 AB3 AB5**	20
QT50	**500**	250	9	7,92	63	F10	F10 F12	40	32	8,9	**CM06 AB5**	20

Use of QT-gearboxes:
- For all valves which requires a 90° movement
- On/Off applications
- Modulating applications with high requirements and high operating frequencies
- General for small valves with high requirements, actuator and gearbox are in the center line of valve shaftl and hardly causes any bending moments on the valve
- Applications wiht limited space

$$\text{time [sec]} = 15 \times \frac{\text{Ratio gearbox}}{\text{actuator speed [rpm]}}$$

1) In combination with modulating acutators: max. allowed modulating torque = 0,5 of max. torque
2) For the selection of a correct flange size please consider the max. allowed flange torques acc. to ISO 5211 chart. Other flanges on request
4) Actuator output drive E is required
7) Conversion factor between output torque and input torque for actuator sizing

On-Off duty

S4-duty

Max. torque for part-turn actuators an on valves according ISO 5211

Flange size	Maximum torque [Nm]
F07	250
F10	500
F12	1000
F14	2000
F16	4000
F25	8000
F30	16000
F35	32000

Basic design worm gearboxes IW-series

Rotation	Clockwise rotation of insert by clockwise rotation of input shaft
Self-locking	Self-locking gearbox with single worm
Actuator connection	flange according ISO 5210
Ambient temperature	- 40°C bis +120°C 8)
Protection enclosure	IP67 according EN 60 529 and IEC529
Corrosion protection	K2 for installation in aggressive atmosphere
Colour	RAL7024 with CM-series and RAL7030 with AB-series actuator
Position indicator	Mechanical position indicator on gearbox (except QT12)
End stop	End stops with screws for an easliy stroke adjustment between 0° and 90° (+/- 5° adjustable)
Valve connection	Valve flange according ISO 5211
Output	Base plate with screws rotateable [4] output drive sleeve blank

SELECTION CHART FOR 90° WORM GEARBOXES IW-SERIES

Type	Technical data												
	max. allowed output torque	max. torque S4-duty [1]	Gearbox ratio	Mechanical advantage [5]	max. input torque	Input flange for actuator [6]	Output flange for valve [2]	max. Ø valve shaft	max. valve square [3]	max. height valve stem	Weight	Suitable actuator size	max. allowed output speed
	Nm	Nm	--	--	Nm	ISO 5210	ISO 5210	mm	mm	mm	kg		rpm
IW3	**813**	407	70	23	35	F10	F10 F12 F14	45	36	70	11	**CM03 | CM06 AB3 | AB5**	**120**
IW3	**1085**	543	40	15	72	F10	F10 F12 F14	45	36	70	11	**CM03 | CM06 AB3 | AB5**	**80**
IW4	**2440**	1220	120	43	61	F10	F12 F14 F16	64	51	85	30	**CM03 | CM06 AB3 | AB5**	**200**
IW5	**4447**	2224	160	65	68	F10	F14 F16 F25	76	62	110	53	**CM06 | CM12 AB5 | AB8**	**200**
IW52	**5334**	2667	200	81	66	F10	F14 F16 F25	76	62	110	58	**CM06 | CM12 AB5 | AB8**	**200**
IW6	**9274**	4637	210	66	141	F10	F16 F25 F30	102	83	113	79	**CM12 AB8 | AB18**	**200**
IW63	**11000**	5500	280	88	125	F10	F16 F25 F30	102	83	113	79	**CM12 AB8 | AB18**	**200**
IW7	**15253**	7627	360	142	107	F10	F25 F30 F35	136	108	140	152	**CM12 AB8**	**200**
IW82	**37000**	18500	360	142	261	F14	F25 F30 F35 F40 F48	157	122	160	212	**AB18 | AB40**	**200**
IW9	**48809**	244050	480	189	258	F14	F30 F35 F40 F48	178	132	168	262	**AB18 | AB40**	**200**
IW10	**65078**	32539	360	142	458	F14	F35 F40 F48 F60	203	152	180	408	**AB18 | AB40**	**408**
IW11	**107000**	53500	540	214	507	F14	F35 F40 F48 F60	203 270	152 190	200	570	**AB40**	**570**

Use of worm gearboxes IW-series:
- For all valves which requires a 90° movement
- On/Off & Modulating applications with a high operating frequency and long life

$$\text{time [sec]} = 15 \times \frac{\text{Ratio gearbox}}{\text{actuator speed [rpm]}}$$

1) In combination with modulating acutators: max. allowed modulating torque = 0,5 of max. torque
2) For the selection of a correct flange size please consider the max. allowed flange torques acc. to ISO 5211 chart. Other flanges on request
3) Please specify the square stem position of the valve (parallel or diagonal to flange axis)
4) Drive sleeve rotateable: 90° steps for IW3 and 45° for IW4 up to IW11; Base plate rotateable - 45° steps for IW3 up to IW5 and 22,5°steps for IW6 up to IW12
5) Conversion factor between output torque and input torque for actuator size selection
6) Actuator output drive E is required

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On-Off duty

S4-duty

Max. torque & thrust forces for multi-turn actuators and multi-turn gearboxes		
Flange size	max. Torque [Nm]	max. Thrust [kN]
F07	40	20
F10	100	40
F14	400	100
F16	700	150
F25	1200	200
F30	2500	325
F35	5000	700
F40	10000	1100

Basic design spur gearboxes IS-series

Rotation	Clockwise rotation of drive sleeve by clockwise rotation of input shaft
Actuator connection	flange according ISO 5210
Ambient temperature	- 40°C up to +120°C
Protection enclosure	IP67 according EN 60 529 and IEC529
Corrosion protection	K2 for installation in aggressive atmosphere
Colour	RAL7024 with CM-series and RAL7030 with AB-series actuator
Input	Input shaft with key for handwheel or with input flange according ISO 5210 for actuator
Valve connection	Base plate with flange according ISO 5211
Output	Output sleeve in version A1 or A2 - blank

SELECTION CHART SPUR GEARBOXES IS-SERIES

TYPE	TECHNICAL DATA																							
	max. TORQUE 1)	max. THRUST 2)	RATIO						MECHANICAL ADVANTAGE						ACTUATOR SIZE WITH MAXIMUM. OUTPUT TORQUE						FLANGE ACTUATOR	A1 max. BORE	A2 max. SPINDLE-Ø 3)	VALVE FLANGE 2)
--	Nm	kN	--						--						Nm						ISO 5210	mm	mm	ISO 5210
IS2	406	53	1,25	2,04	3,00				1,250	1,830	2,700				325	222	150				F10,F14	40	45	F10
IS3	406	177	1,25	2,04	3,00				1,250	1,830	2,700				325	222	150				F10,F14	52	55	F14
IS4	678	53	2,12	3,00	4,10	6,00			1,900	2,700	3,690	5,400			357	251	184	126			F10,F14	40	45	F10
IS5	678	177	2,12	3,00	4,10	6,00			1,900	2,700	3,690	5,400			357	251	184	126			F10,F14	52	55	F14
IS6	1355	177	2,00	3,00	4,00	6,00	8,00		1,800	2,700	3,600	5,400	7,200		753	502	376	251	188		F10,F14,F16	52	55	F14
IS7	1355	266	2,00	3,00	4,00	6,00	8,00		1,800	2,700	3,600	5,400	7,200		753	502	376	251	188		F10,F14,F16	68	73	F16
IS8	2033	266	4,01	6,10	7,95	10,20	12,26	15,03	3,600	5,490	7,156	9,180	11,030	13,520	565	370	284	221	184	150	F10,F14,F16,F25	68	73	F16
IS9	2033	355	4,01	6,10	7,95	10,20	12,26	15,03	3,600	5,490	7,156	9,180	11,030	13,520	565	370	284	221	184	150	F10,F14,F16,F25	76	86	F25
IS10	4067	355	4,04	6,11	7,81	10,17	12,11	14,66	3,633	5,500	7,025	9,156	10,900	13,194	1119	739	579	444	373	308	F14,F16,F25	76	86	F25
IS11	4067	500	4,04	6,11	7,81	10,17	12,11	14,66	3,633	5,500	7,025	9,156	10,900	13,194	1119	739	579	444	373	308	F14,F16,F25	96	100	F30
IS12	8135	500	8,09	9,99	11,83	15,15			7,280	8,993	10,649	13,632			1117	905	764	597			F14,F16,F25	96	100	F30
IS13	8135	834	8,09	9,99	11,83	15,15			7,280	8,993	10,649	13,632			1117	905	764	597			F14,F16,F25	121	127	F35
IS15	16270	834	9,86	12,00	15,00				8,870	10,800	13,500				1834	1506	1205				F14,F16,F25	121	127	F35
IS16	16270	1320	9,86	12,00	15,00				8,870	10,800	13,500				1834	1506	1205				F14,F16,F25	130	150	F40
IS17	43386	834	15,17	24,09					13,650	21,680					3178	2001					F16,F25,F30,F35	121	127	F35
IS18	43386	1320	15,17	24,09					13,650	21,680					3178	2001					F16,F25,F30,F35	130	150	F40
IS19	43386	1668	15,17	24,09					13,650	21,680					3178	2001					F16,F25,F30,F35	170	190	F40
IS20	43386	2224	15,17	24,09					13,650	21,680					3178	2001					F16,F25,F30,F35	203	225	a.A.

$$\text{time [sec]} = 60 \times \frac{\text{gearbox ratio}}{\text{actuator speed [rpm]}} \times \text{turns per valve stroke}$$

$$\text{turns per valve stroke} = \frac{\text{valve stroke [mm]}}{\text{valve spindle pitch [mm]}}$$

1) In combination with modulating acutators: max. allowed modulating torque = 0,5 of max. torque
2) max. thrust force A2 version
A1 - Drive sleeve for torque transmission, without handling of axial loads
A2 - Drive sleeve with axial bearing to absorb axial loads (for example: rising gate valve spindle)
For the selection of a correct flange size please consider the max. allowed flange torques and thrusts acc. to ISO 5211 chart. Other flanges on request

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On-Off duty

S4-duty

Basis design bevel gearboxes IB-series

Rotation	Clockwise rotation of drive sleeve by clockwise rotation of input shaft
Actuator connection	flange according ISO 5210
Ambient temperature	- 40°C up to +120°C
Protection enclosure	IP67 according EN 60 529 and IEC529
Corrosion protection	K2 for installation in aggressive atmosphere
Colour	RAL7024 with CM-series and RAL7030 with AB-series actuator
Input	Input shaft with key for handwheel or with input flange according ISO 5210 for actuator
valve connection	Base plate with flange according ISO 5211
Output	Output sleeve in version A1 or A2 - blank

Max. torque & thrust forces for multi-turn actuators and multi-turn gearboxes

Flange size	max. Torque [Nm]	max. Thrust [kN]
F07	40	20
F10	100	40
F14	400	100
F16	700	150
F25	1200	200
F30	2500	325
F35	5000	700
F40	10000	1100

SELECTION CHART BEVEL GEARBOXES IB-SERIES

TYPE	TECHNICAL DATA															
	max. TORQUE 1)	max. THRUST 2)	RATIO			MECHANICAL ADVANTAGE			ACTUATOR SIZE WITH MAXIMUM. OUTPUT TORQUE			FLANGE ACTUATOR	A1 max. BORE	A2 max. SPINDLE-Ø 3)	A2 VALVE FLANGE 2)
--	Nm	kN	--			--						ISO 5210	mm	mm	ISO 5210
IB2	306	53	1			0,85			AB40			F10,F14	40	45	F07/10
IB3	306	177	1			0,85			AB40			F10,F14	52	55	F14
IB4	306	53	2			1,70			AB18			F10,F14	40	45	F10
	678		3	4		2,55	3,40		AB40	AB18					
	542		6			5,10			AB8						
IB5	306	177	2			1,70			AB18			F10,F14	52	55	F14
	678		3	4		2,55	3,40		AB40	AB18					
	542		6			5,10			AB8						
IB6	1355	177	3	4		2,55	3,40		AB80	AB40		F10,F14	52	55	F14
	1084		6			5,10			AB18						
IB7	1355	266	3	4		2,55	3,40		AB80	AB40		F10,F14	68	73	F16
	1084		6			5,10			AB18						
IB8	2033	266	3	4		2,55	3,40		AB80	AB80		F14,F16,F25	68	73	F16
	1627		6			5,10			AB40						
IB9	2033	355	3	4		2,55	3,40		AB80	AB80		F14,F16	76	86	F25
	1627		6			5,10			AB40						
IB10	4067	355	4	6		3,40	5,10		AB200	AB80		F14,F16,F25	76	86	F25
IB11	4067	500	4	6		3,40	5,10		AB200	AB80		F14,F16,F25	96	100	F30
IB12	8135	500	6	8		5,10	6,80		AB200	AB200		F14,F16,F25	96	100	F30
IB13	8135	500	6	8		5,10	6,80		AB200	AB200		F14,F16,F25	121	127	F35
IB14	8135	500	6	8		5,10	6,80		AB200	AB200		F14,F16,F25	130	150	F40

$$\text{time [sec]} = 60 \times \frac{\text{gearbox ratio}}{\text{actuator speed [rpm]}} \times \text{turns per valve stroke}$$

$$\text{turns per valve stroke} = \frac{\text{valve stroke [mm]}}{\text{valve spindle pitch [mm]}}$$

1) In combination with modulating acutators: max. allowed modulating torque = 0,5 of max. torque
2) max. thrust force A2 version
A1 - Drive sleeve for torque transmission, without handling of axial loads
A2 - Drive sleeve with axial bearing to absorb axial loads (for example: rising gate valve spindle)
For the selection of a correct flange size please consider the max. allowed flange torques and thrusts acc. to ISO 5211 chart. Other flanges on request

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On-Off duty

S4-duty

Basic design linear units

Mode of operation	S2-20min (On/Off) or S4-1200 cycles/h with 40% duty cycle LK-units: up to S9-operation [3]
Rotation	Spindle of Linear-Unit moves out of the housing with cw movement of the actuator and closes the valve
Actuator connection	Flange according ISO 5210
Self-locking	L-units: self-locking (except L500) LK-units: not self-locking
Ambient temperature	- 25° bis +80° C
Protection enclosure	L-units: IP66 according EN 60 529 and IEC529 LK-units: IP67 according EN 60 529 and IEC529
Corrosion protection	K2 for installation in aggressive atmosphere
Colour	RAL7024 with CM-series & RAL7030 with AB-series actuator
Valve connection	Units with flange according ISO 5210

SELECTION TABLE LINEAR UNITS

TYPE	Technical data																				
	FORCE (max.)	FORCE (min.)	S4 FORCE (max.)	STROKE (max.)	Mech. advantage	Spindelgewinde	vavle connection	Spindle machining for connection with valve stem	max. thrust forces in combination with multi-turn actuator [kN]									required acuator output drive	requried stem cover tube actuator SpA	flange for multi-turn actutor	approx. weight
--	kN	kN	kN	mm	--	--	ISO 5210		AB3	CM03	AB5	CM06	AB8 CM12	AB18	AB40	AB100	AB200	--	mm	ISO 5210	kg
L50	15	3,5	15	50	2	Tr20x4 li	F10	M16x1,5	15	15	15	15	--	--	--	--	--	Am	--	F10	7
L75	25	3,5	20	75	2	Tr20x4 li	F10	M16x1,5	15	15	15	25	25	--	--	--	--	Am	--	F10	8
L100				100	2	Tr20x4 li			15	15	15	25	25	--	--	--	--	Am	--	F10	9
L350 [1]				350	2,43	Tr24x5 li		M24x2,0	12	--	15	26	25	--	--	--	--	Am	230	F10	15
L500 [1]				500	3,62	Tr24x10 2gg li			8	--	15	17,5	25	--	--	--	--	Am	380	F10	19
L200.5 [1]	30	10	20	200	2,44	Tr24x5 li	F10	M16x1,5	12	13	15	15	--	--	--	--	--	X	50	F10	15
L200.8 [1]									--	--	--	--	30	--	--	--	--	X	50	F10	15
L100.8	45	18	22	100	2,73	Tr28x5 li	F10	M16x1,5	--		--	--	45	--	--	--	--	X	--	F10	14
L120.18	75	38	39,5	120	3,16	Tr32x6 li	F14 F10	M36x3,0 M20x1,5	--		--	--	--	75	--	--	--	X	--	F14	28
L220.18 [1]				220	3,16	Tr32x6 li	F14	M36x3,0	--		--	--	--	75	--	--	--	X	50	F14	30
L150.40	100	45	55,5	150	4,45	Tr40x7 li	F14	M36x3,0	--		--	--	--	--	100	--	--	X	--	F14	39
L300.40 [1]				300	4,45	Tr40x7 li			--		--	--	--	--	100	--	--	X	100	F14	43
L100.100	220	108	108	100	4,61	Tr48x8 li	F16	M42x3,0	--		--	--	--	--	--	217	--	X	--	F16	110
L200.100				200	4,61	Tr48x8 li			--		--	--	--	--	--	217	--	X	--	F16	120
L200.200	350	177	177	200	5,64	Tr60x9 li	F25	M48x3,0	--		--	--	--	--	--	--	350	X	--	F25	150
Linear Units with ball type drive 2)																					
LK50	15	8	7,5 [3]	50	1,06	5mm pitch	F10	M20x1,5	--	15	--	--	--	--	--	--	--	ESo Ø15mm	--	F10	12,3
LK100	30	8	15 [3]	100	1.06	5mm pitch	F10	M20x1,5	--	30	--	--	--	--	--	--	--	ESo Ø17mm	--	F10	15,0
LK120	60	16	30 [3]	120	1,06	5mm pitch	F10 F14	M20x1,5 M36x3,0	--	--	--	60	--	--	--	--	--	E Ø20mm	--	F10	19,2

$$\text{stroking time [sec]} = \frac{60}{\text{actutator speed [rpm]}} \times \frac{\text{valve stroke [mm]}}{\text{Spindle pitch of linear unit [mm]}}$$

$$\text{stroke speed [mm/sec]} = \frac{\text{valve stroke [mm]}}{\text{stroking time [sec]}} = \frac{\text{actuator speed [rpm]}}{60} \times \text{spindle pitch of linear unit [mm]}$$

1) the spindle of the linear unit goes through the actuator, therefore a spindle cover tube for the actuator is required (see hardware options actuator)
2) Linear units for CM-series actuators with very high control accuracy and long lifetime
3) max. modulating force S9-operation: LK50: 4,5kN | LK100: 9kN | LK120: 18kN

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On-Off duty

S4-duty

Basis design lever gearboxes SF-series

Rotation	Lever arm movement counterclockwise with clockwise actuator rotation Multi-turn lever arm for connection with valve linkage
Output	Base flange for mounting
Gearbox	Output shaft with double bearing for a reliable modulating duty
Ambient temperature	- 25°C up to +80°C
Protection enclosure	IP67 according EN 60 529 and IEC529
Corrosion protection	K2 for installation in aggressive atmosphere
Colour	RAL7024 with CM-series and RAL7030 with AB-series actuator

SELECTION CHART FOR LEVER GEARBOXES SF-SERIES

TYPE	TECHNICAL DATA												
	TORQUE (max.)	TORQUE (min.)	MODULATING TORQUE (max.)	Ratio	Mechanical advantage	required output drive actuator 2)	connection flange for actuator	approx. weight	MAX. TORQUE IN COMBINATION WITH ACTUTAOR SIZE [Nm]				
--	Nm	Nm	Nm	--	--	--	ISO 5210 DIN 3210	kg	AB3|CM03	AB5|CM06	AB8|CM12	AB18	AB40
SF47	**240**	167	240	56,60:1	23,78	Q	F10/G0	10	**240**	--	--	--	--
SF57	**430**	167	430	56,60:1	24,29	Q	F10/G0	15	**430**	**430**	--	--	--
SF67	**740**	303	740	58,80:1	25,23	Q	F10/G0	27	**740**	**740**	--	--	--
SF77	**1600**	759	1469	56,92:1	24,42	Q	F10/G0	49	--	**1469**	**1600**	--	--
SF87	**3000**	1196	2989	55,60:1	23,86	Q	F10-G0 od. F14-G1/2	97	--		**2869**	**3000**	
SF97	**5000**	2924	5000	56,68:1	24,33	Q	F10/G0 od. F14-G1/2	178	--	--	--	**5000**	**5000**

OPTIONS for mech. connection to valve	Size
2 ball joints suitable to lever with lock nut and welding ends suitable for tubes according lever gearbox drawings	Ø 22
	Ø 30
Valve lever	GM100
	GM250

$$\text{stroking time [sec]} = 60 \times \frac{\text{ratio lever gearbox}}{\text{actuator speed [rpm]}} \times \frac{\text{turning angle [°]}}{360}$$