Excellent Electric Actuators

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DATA SHEET

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Linear In-line Actuator

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Standard Specifications *(Specifications for non-standard actuators, eg. HE-version, may vary)*

Motor/Gear

24 VDC permanent magnet motor (max. current is 1.8 A, absolute max. voltage is 28 VDC)

Gear ratio		5	14	19	27	51	71
Maximum load	[N]	120	400	600	900	1600	2200
Speed at maximum load	[mm/s]	33	16	12	7.5	4	3

12 VDC permanent magnet motor (max. current is 3.6 A, absolute max. voltage is 14 VDC)

Gear ratio			14	19	27	51	71
Maximum load	[N]		400	600	900	1500	2000
Speed at maximum load	[mm/s]		16	9	7.5	3.5	2.5

Max. static load/ Self locking force
PA brackets: 2000 N Alu/Stainless steel: 5400 N
Depending on stroke length for push-applications
Max. load limited to 1000 N for stroke lengths > 400 mm

Temperature
- Operation: - 20 °C to + 70 °C
- Storage: - 40 °C to + 70 °C

Protection class
IP66

Cable specification
1 m, 2 x 0,52 mm² (AWG20), Ø = 4.8 mm, black, Molex Mini-Fit Jr. 6 pin

Bending Radius
6 x cable diameter

Materials
Motor and actuator tube are powder coated steel
Piston rod is aluminum
Front and rear brackets are PA

Duty cycle
Max. 10 % or 2 minutes in use followed by 18 minutes rest

Color
Black (RAL 9005)

Stroke length/weight

Stroke	[mm]	50	100	150	200	250	300	350	400	500	750
Weight	[kg]	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.6	1.8	2.3

Actual weight may vary depending on model and options selected

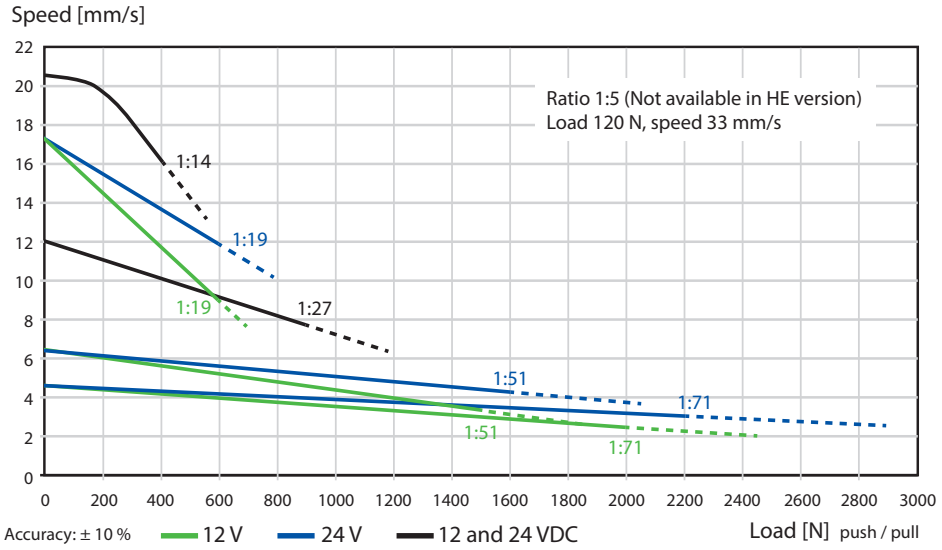
Options

- Stainless steel versions (AISI 316)
- Brackets in aluminum or stainless steel
- Brackets with clevis
- Brackets with spherical bearings
- Piston rod available in black
- Hall sensors for positioning and/or synchronization
- HE (Harsh Environment) version (Ratio1:5 not available). Tested according to IP68 and IP69 and passed the criteria for a depth of one meter for one hour. Test reports are available on request.
- Low noise version
- Other cable lengths (1 - 9 m)
- Version certified according to IEC60601-1, ANSI/AAMI/ES60601-1, CAN/CSA-22.2 No60601-1 available (24 VDC only)

On Request

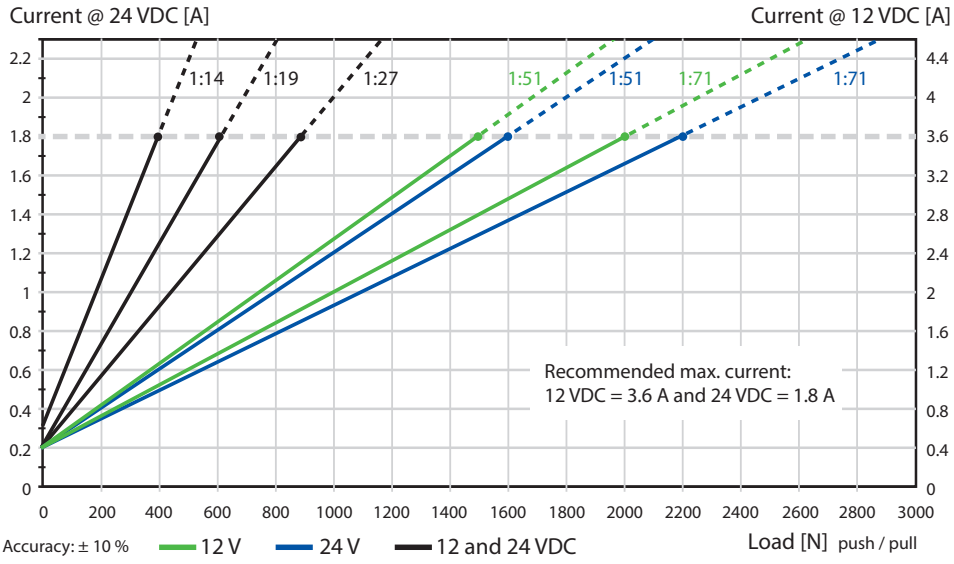
- Available in all RAL colors
- Customized stroke lengths available
- Customized front and rear brackets
- Customized build-in-dimensions

Speed/Force



Force/Current

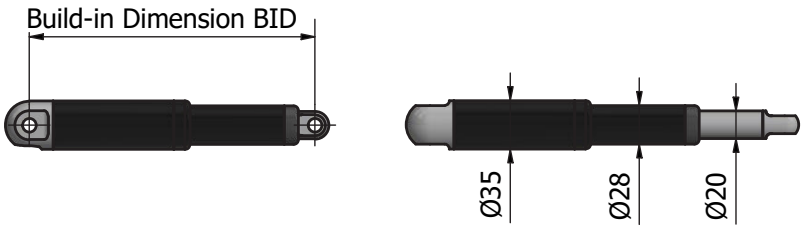
Use in the dashed area is not recommended. Please contact Concens for further information.



Dimensions

Axial backlash:
+/- 0.5 mm

General dimensional variation:
+/- 1 mm



Build-in Dimension 'BID'					
Gear Ratio	Standard	Clevis Rear	Hall	IEC/ANSI/AAMI/ES/CAN/CSA-22.2 No 60601-1	Harsh Enviroment
5, 14, 19, 27 51, 71	160 + stroke 170 + stroke	+ 10 + 10	+ 10 + 10	+ 10 + 10	+ 11 + 11
Stroke lengths > 400 mm: + 7 mm Stroke lengths > 700 mm: + 42 mm Stroke lengths > 750 mm + 100 mm (On request)					

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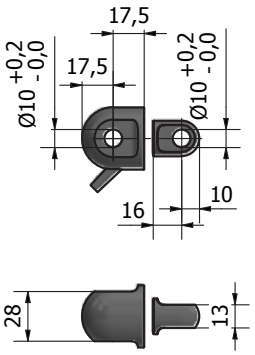
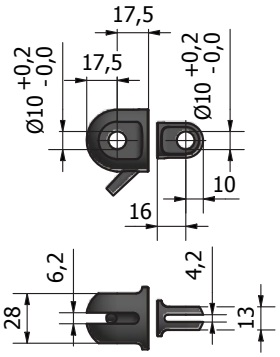
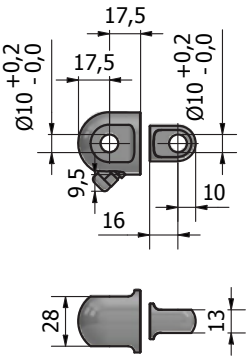
Standard Brackets



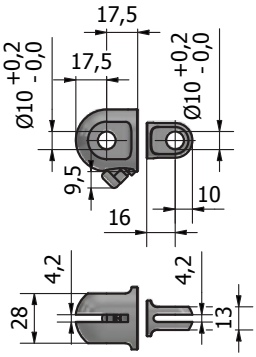
Polyamide (PA)
Max. static load 2000 N
Max. load 900 N
(gear ratio 1:27)



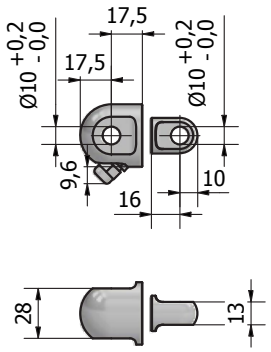
PA with clevis
Max. static load 2000 N
Max. load 900 N
(gear ratio 1:27)



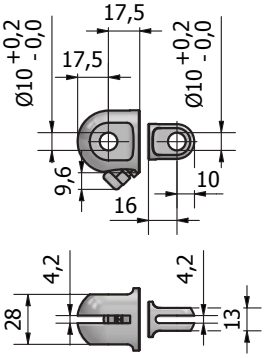
Alu
Max. static load 5400 N



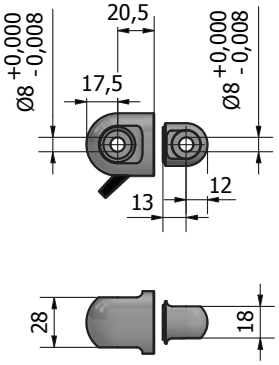
Alu with clevis
Max. load 5400 N



Stainless steel
Max. static load 5400 N

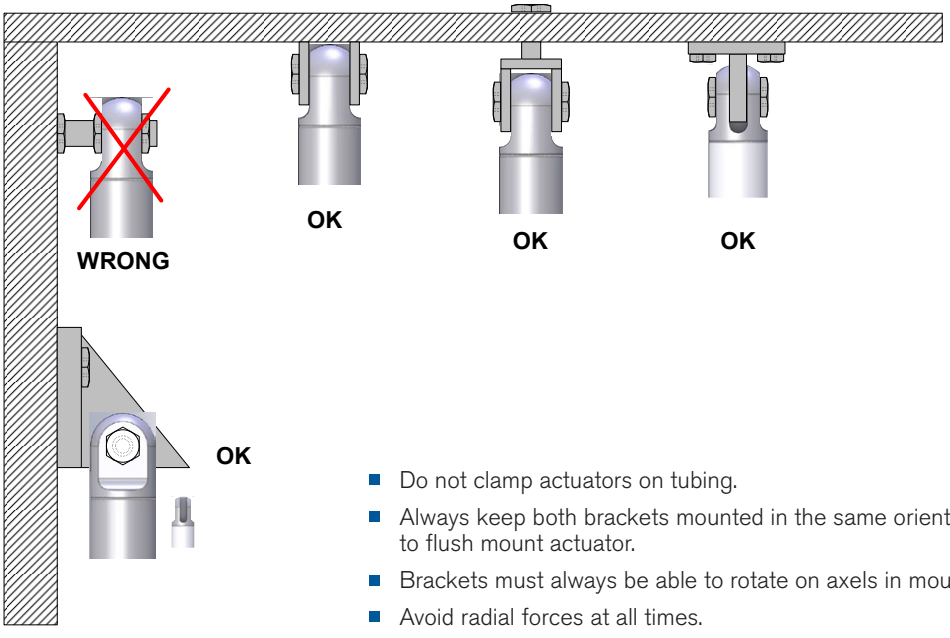


Stainless steel with clevis
Max. static load 5400 N



Alu with spherical bearings
Max. static load 5400 N

Recommended Mounting Methods



- Do not clamp actuators on tubing.
- Always keep both brackets mounted in the same orientation and ensure to flush mount actuator.
- Brackets must always be able to rotate on axels in mountings.
- Avoid radial forces at all times.

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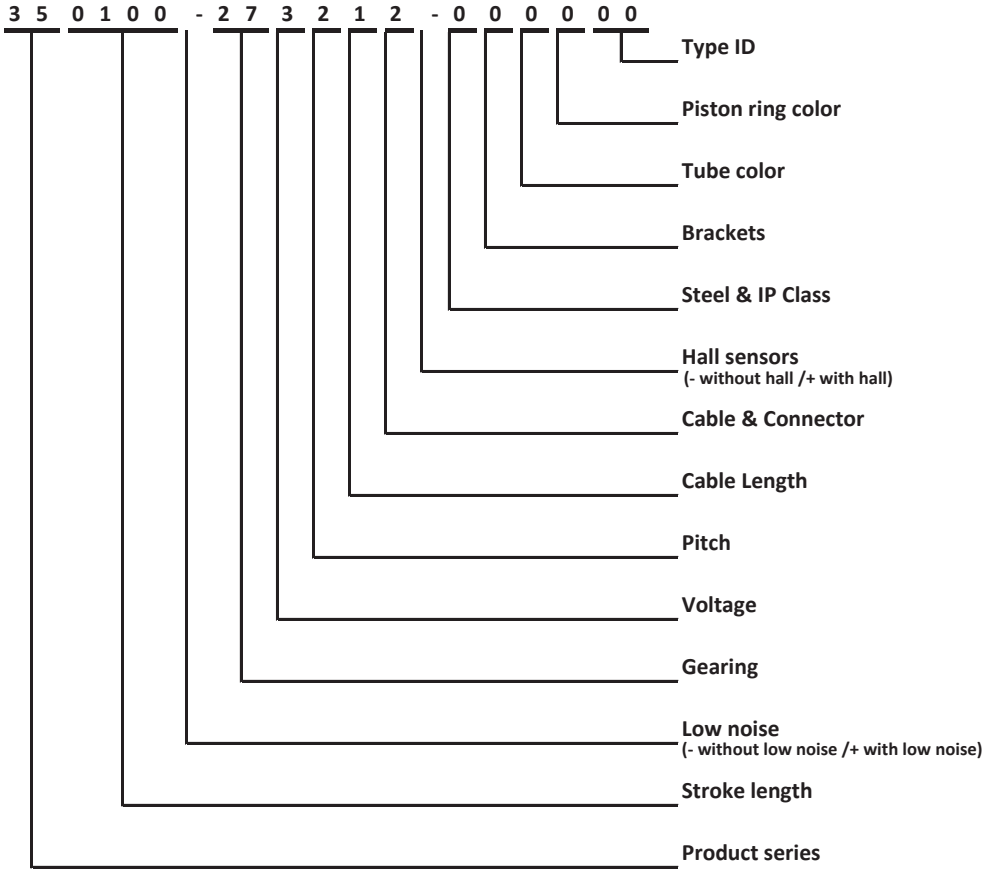
Con35 Item Number Combination



Recommendations and warnings

- Never expose the actuator to hammer strike during installation or in other situations.
- Retrofitted bushings should be pressed into the bracket-borings. No hammering.
- Power supply without over-current protection can cause serious damage to the actuator at mechanical end-stop or when actuator is overloaded in another way.
- Keep piston tube clean.
- Longer cable lengths may cause voltage drop which affects the performance of the actuator.
- For medical applications (IEC60601-1, ANSI/AAMI/ES60601-1, CAN/CSA-C22.2 No60601-1):
  Operating temperature + 5 ˚C to + 48 ˚C, , Relative humidity 20 % - 70 % atmospheric pressure = 1 atm.
  Connect to medically approved supply source only and according to guidelines provided with the source.
- Function of the actuator is subject to the settings of the controller. If using your own controller please contact Concens.
- The dust and water sealing of HE (Harsh Environment) actuators might affect their performance.
- All specifications are for 25 °C ambient – low temperature might affect performance.
- Depending on load and application, nominal and actual stroke length may differ due to internal disc springs not being fully compressed.
- The combination of gearing and stroke can cause limitations in the use of "End limit FW" when using the C2-30 control.
  See more in the datasheet for C2-30.

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DATA SHEET

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Linear In-line Actuator

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Standard Specifications *(Specifications for non-standard actuators, eg. HE-version, may vary)*

Motor/Gear

24 VDC permanent magnet motor (max. current for ratio 4-14-17-24 is 8 A, ratio 49 is 7 A, ratio 84 is 4,5 A, absolute max. voltage is 28 VDC)

Gear ratio		4	14	17	24	49	84
Maximum load	[N]	500	1750	2200	3100	4500	4500
Speed at maximum load	[mm/s]	70	20	17	12	6	4

12 VDC permanent magnet motor (max. current for ratio 4-14-17-24 is 16 A, ratio 49 is 14 A, ratio 84 is 9 A, absolute max. voltage is 14 VDC)

Gear ratio			14	17	24	49	84
Maximum load	[N]		1400	1700	2400	4500	4500
Speed at maximum load	[mm/s]		14	10	6	3	3.5

Max. static load/ Self locking force
PA brackets: 4700 N Alu/Stainless steel: 16800 N
Depending on stroke length for push-applications
Max. Load limited to 2000 N for stroke lengths > 400 mm

Temperature
- Operation: - 20 °C to + 70 °C
- Storage: - 40 °C to + 70 °C

Protection class
IP66

Cable specification
1 m, 2 x 1.3 mm² (AWG16), Ø = 6.4 mm, black, Molex Mini-Fit Jr. 6 pin

Bending Radius
6 x cable diameter

Materials
Motor and actuator tube are powder coated steel
Piston rod is stainless steel
Front and rear brackets are PA

Duty cycle
Max. 10 % or 2 minutes in use followed by 18 minutes rest

Color
Black (RAL 9005)

Stroke length/weight

Stroke	[mm]	50	100	150	200	250	300	350	400	500	750
Weight	[kg]	2.1	2.3	2.6	2.8	3.1	3.3	3.6	3.8	4.3	5.6

Actual weight may vary depending on model and options selected

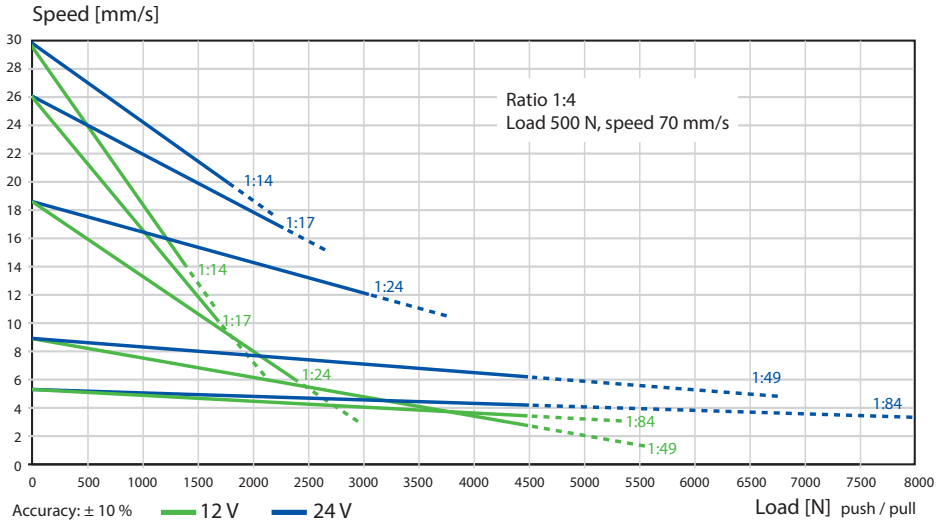
Options

- Stainless steel versions (AISI 316)
- Brackets in aluminum or stainless steel
- Brackets with clevis
- Brackets with spherical bearings
- Hall sensors for positioning and/or synchronization
- HE (Harsh Environment) version (gear ratio 1:4 not available) Tested according to IP68 and IP69 and passed the criteria for a depth of one meter for one hour. Test reports are available on request.
- Low noise version
- Spline and emergency lowering
- Other cable lengths (1 - 9 m)
- Version certified according to IEC60601-1, ANSI/AAMI/ES60601-1, CAN/CSA-22.2 No60601-1 available (24 VDC only)

On Request

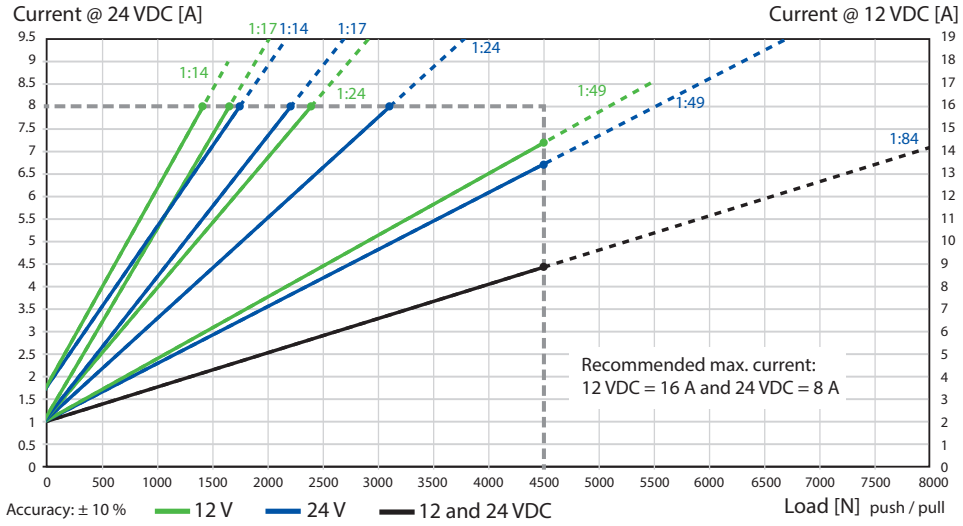
- Available in all RAL colors
- Other stroke lengths available
- Customized front and rear brackets
- Customized build-in-dimensions

Speed/Force



Force/Current

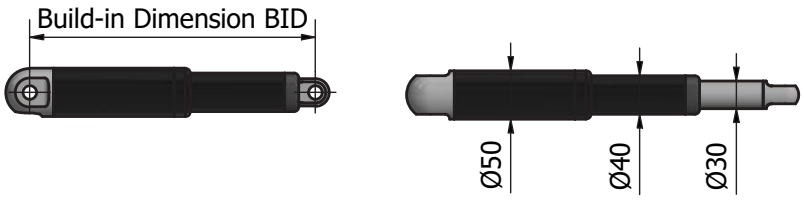
Use in the dashed area is not recommended. Please contact Concens for further information.



Dimensions

Axial backlash:
+/- 0.5 mm

General dimensional variation:
+/- 1 mm



Build-in Dimension BID						
Gear Ratio	Standard	Clevis Rear	Hall	IEC/ANSI/AAMI/ ES/CAN/CSA-22.2 No 60601-1	Harsh Enviroment	Emergency lowering/spline
4, 14, 17, 24	240 + stroke	-	+ 15	+ 15	+ 14	+ 23/+ 6
49, 84	255 + stroke	-	+ 15	+ 15	+ 14	
Stroke lengths > 750 mm + 100 mm (On request)						

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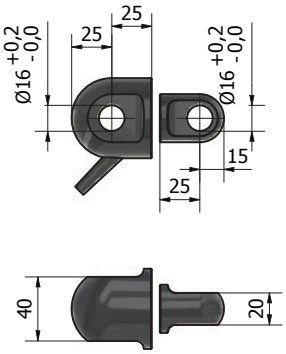
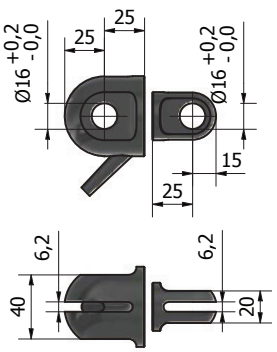
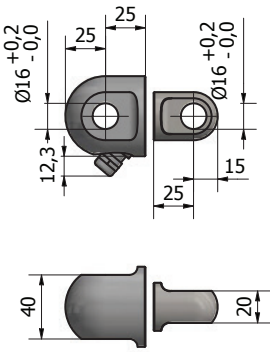
Standard Brackets



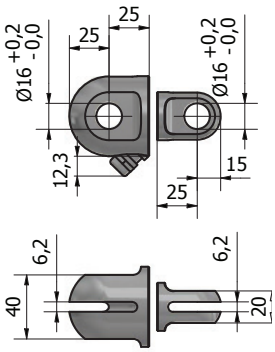
Polyamide (PA)
Max. static load 4700 N
Max. load 3100 N
(gear ratio 1:24)



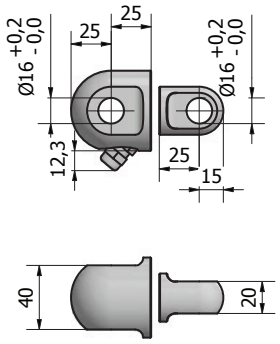
PA with clevis
Max. static load 4700 N
Max. load 3100 N
(gear ratio 1:24)



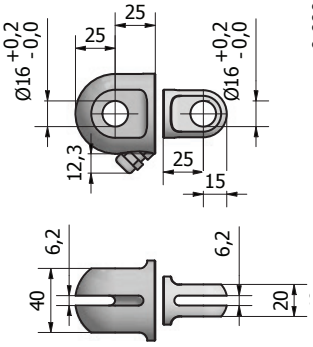
Alu
Max. static load
16800 N



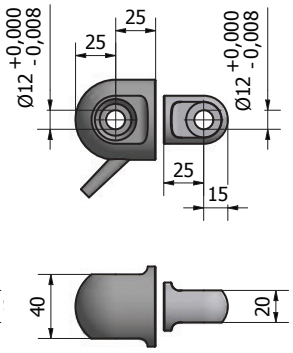
Alu with clevis
Max. static load
16800 N



Stainless steel
Max. static load 16800 N

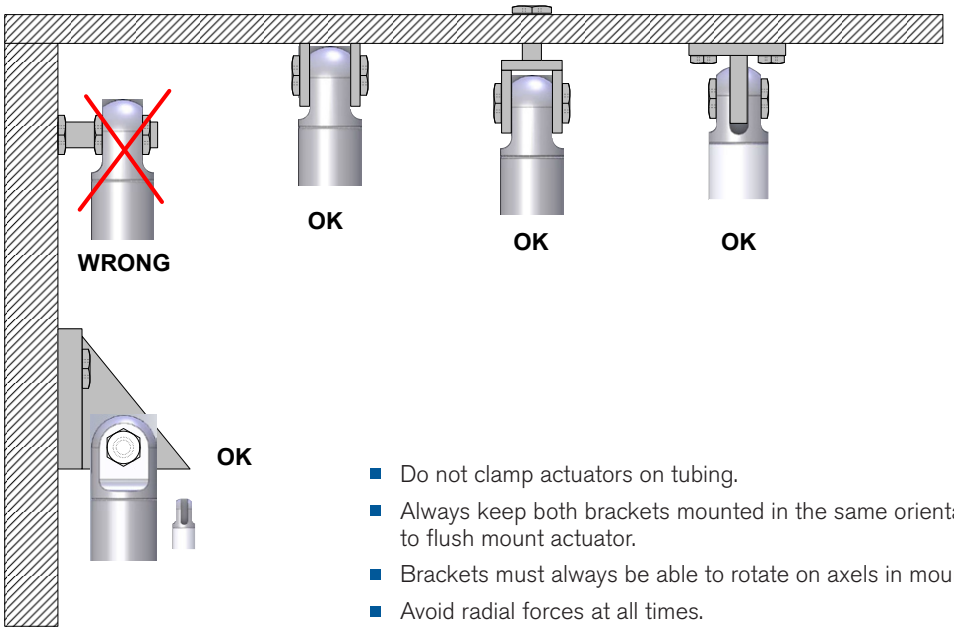


Stainless steel with clevis
Max. static load 16800 N



Alu with spherical bearings
Max. static load 11000 N

Recommended Mounting Methods



- Do not clamp actuators on tubing.
- Always keep both brackets mounted in the same orientation and ensure to flush mount actuator.
- Brackets must always be able to rotate on axels in mountings.
- Avoid radial forces at all times.

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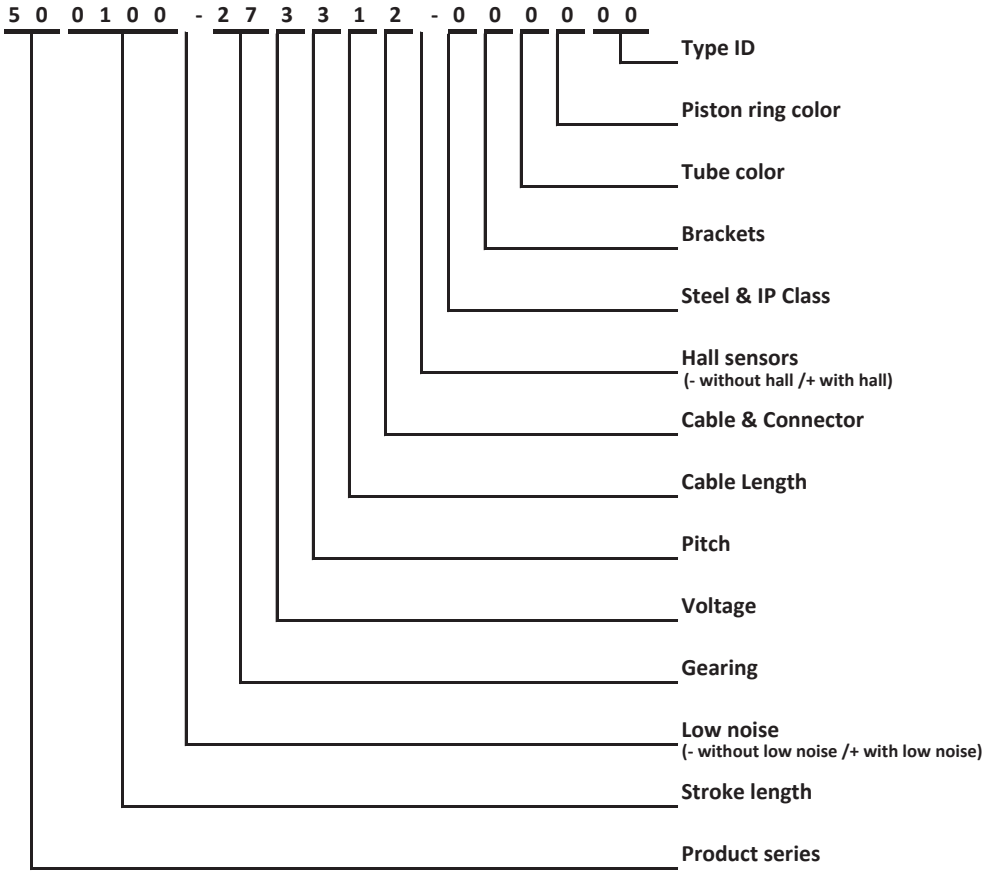
Con50 Item Number Combination



Recommendations and warnings

- Never expose the actuator to hammer strike during installation or in other situations.
- Retrofitted bushings should be pressed into the bracket-borings. No hammering.
- Power supply without over-current protection can cause serious damage to the actuator at mechanical end-stop or when actuator is overloaded in another way.
- Keep piston tube clean.
- Longer cable lengths may cause voltage drop which affects the performance of the actuator.
- For medical applications (IEC60601-1, ANSI/AAMI/ES60601-1, CAN/CSA-C22.2 No60601-1):
  Operating temperature + 5 ˚C to + 48 ˚C, , Relative humidity 20 % - 70 % atmospheric pressure = 1atm.
  Connect to medically approved supply source only and according to guidelines provided with the source.
- Function of the actuator is subject to the settings of the controller. If using your own controller please contact Concens.
- The dust and water sealing of HE (Harsh Environment) actuators might affect their performance.
- All specifications are for 25 °C ambient – low temperature might affect performance.
- Depending on load and application, nominal and actual stroke length may differ due to internal disc springs not being fully compressed.
- The combination of gearing and stroke can cause limitations in the use of "End limit FW" when using the C2-30 control.
  See more in the datasheet for C2-30.

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DATA SHEET

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Linear In-line Actuator

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Standard Specifications (Specifications for non-standard actuators eg. HE-version, may vary)

Motor/Gear

24 VDC power supply, permanent magnet motor (max. current is 11,5 A, absolute max. voltage is 28 VDC)

Gear ratio		19	43	66	81	100
Maximum load	[N]	1900	4300	6600	8100	10000
Speed at maximum load	[mm/s]	26	12	8	6	5

Max. static load/ Self locking force
Alu/Stainless steel: 18100 N
Depending on stroke length for push-applications
Max. load limited to 5000 N for stroke length > 400 mm

Temperature
- Operation: - 20 °C to + 50 °C
- Storage: - 40 °C to + 70 °C

Protection class
IP66

Cable specification
1 m, 2 x 1.3 mm² (AWG16), Ø = 6.4 mm, black, Molex Mini-Fit Jr. 6 pin

Bending Radius
6 x cable diameter

Materials
Motor and actuator tube are powder coated steel
Piston rod is stainless steel
Front and rear brackets are aluminium

Duty cycle
Max. 10 % or 2 minutes in use followed by 18 minutes rest

Color
Black (RAL 9005)

Stroke length/weight

Stroke	[mm]	50	100	150	200	250	300	350	400	500	750
Weight	[kg]	4.1	4.4	4.7	5	5.3	5.6	5.9	6.2	6.8	7.6

Actual weight may vary depending on model and specifications

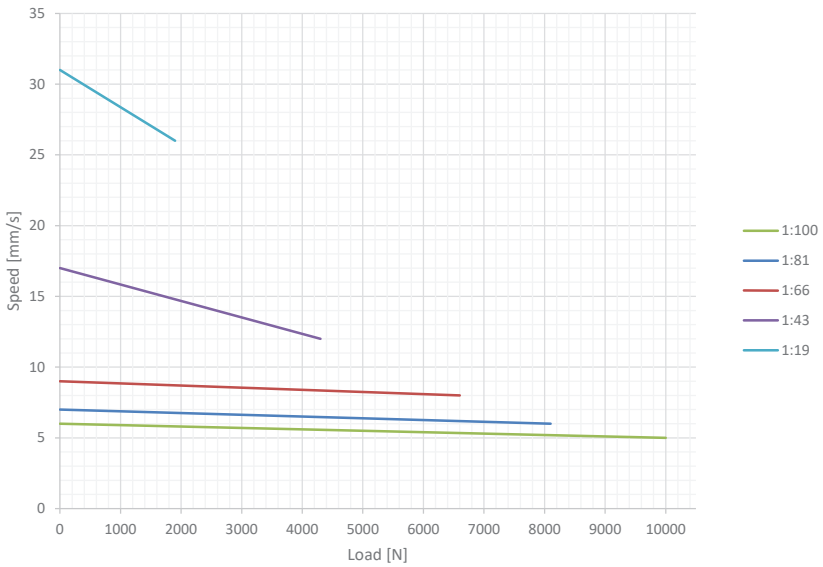
Options

- Stainless steel versions (AISI 316)
- Brackets in stainless steel
- Brackets with clevis
- Brackets with spherical bearings
- Hall sensors for positioning and/or synchronization
- HE (Harsh Environment) version
  Tested according to IP68 and IP69 and passed the criteria for a depth of one meter for one hour.
  Test reports are available on request.
- Low noise version
- Spline and emergency lowering
- Other cable lengths (1 - 9 m)
- Version certified according to IEC60601-1, ANSI/AAMI/ES60601-1, CAN/CSA-22.2 No60601-1 available

On Request

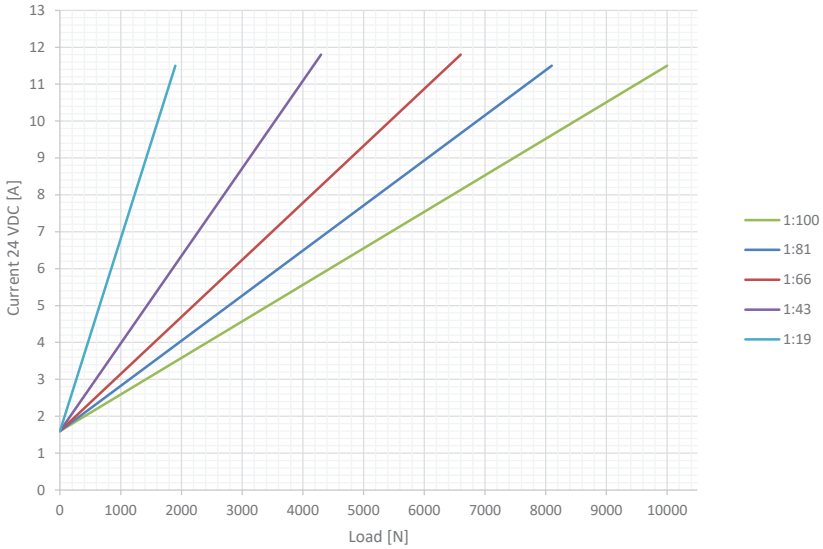
- Available in all RAL colors
- Other stroke lengths available
- Customized front and rear brackets
- Customized build-in-dimensions

Speed/Force



Accuracy ± 10 %

Force/Current

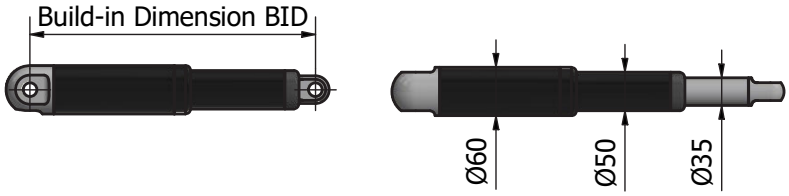


Recommended max. current: 24 VDC = 11,5 A. Accuracy ± 10 %

Dimensions

Axial backlash:
+/- 0.5 mm

General dimensional variation:
+/- 1 mm



Build-in Dimension 'BID'				
Gear Ratio	Standard	Hall	Harsh Enviroment	Emergency lowering/spline
All ratios	358 + stroke	+ 15	+ 25	+ 31/+ 10
Stroke length > 400 mm + 25 mm not HE-version Stroke lengths > 750 mm + 100 mm (On request)				

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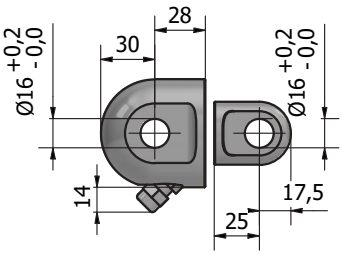
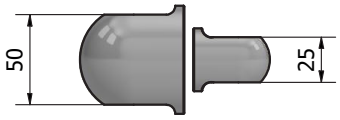
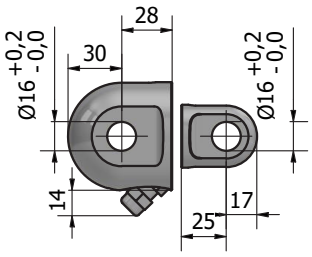
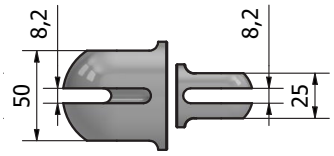
Standard Brackets



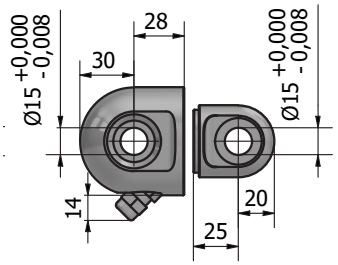


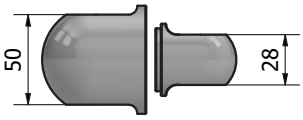
Alu/Stainless steel
Max. static load 18100 N





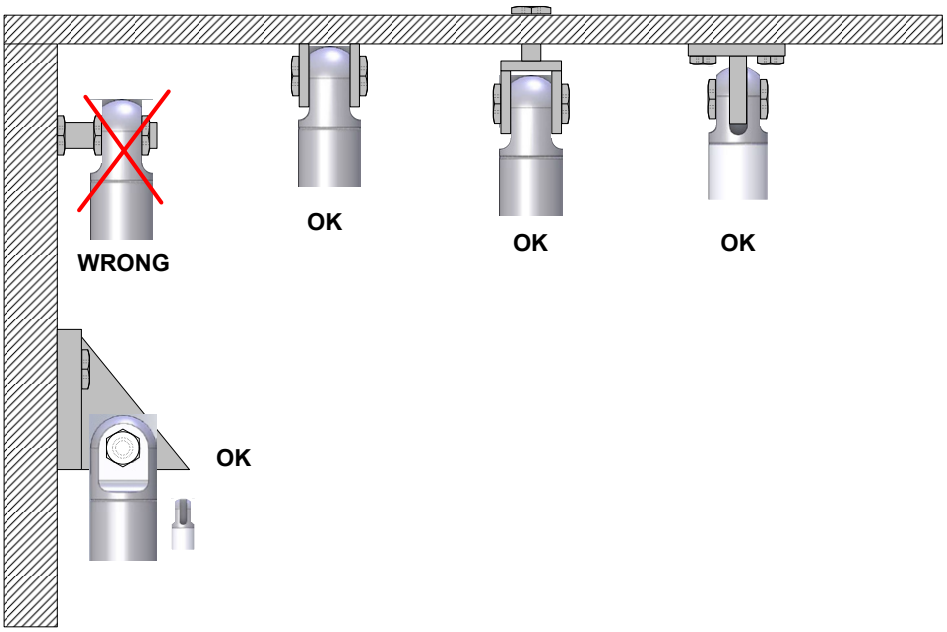
Alu/Stainless steel with clevis
Max. static load 18100 N





Alu with spherical bearings
Max. static load 11000 N

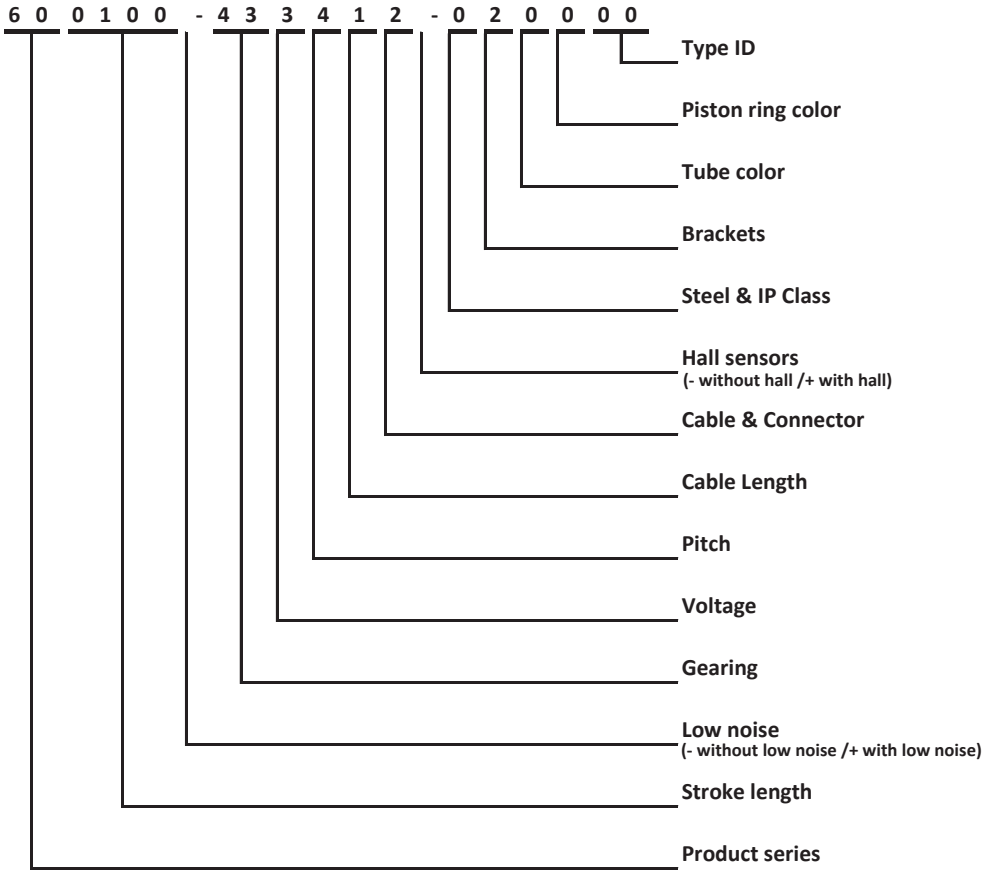
Recommended Mounting Methods



- Do not clamp actuators on tubing.
- Always keep both brackets mounted in the same orientation and ensure to flush mount actuator.
- Brackets must always be able to rotate on axels in mountings.
- Avoid radial forces at all times.

con60

Con60 Item Number Combination



Recommendations and warnings

- Never expose the actuator to hammer strike during installation or in other situations.
- Retrofitted bushings should be pressed into the bracket-borings. No hammering.
- Power supply without over-current protection can cause serious damage to the actuator at mechanical end-stop or when actuator is overloaded in another way.
- Keep piston tube clean.
- Longer cable lengths may cause voltage drop which affects the performance of the actuator.
- For medical applications (IEC60601-1, ANSI/AAMI/ES60601-1, CAN/CSA-22.2 No60601-1):
  Operating temperature + 5 °C to + 48 °C , Relative humidity 20 % - 70 % atmospheric pressure = 1atm. Connect to medically approved supply source only and according to guidelines provided with the source.
- Function of the actuator is subject to the settings of the controller. If using your own controller please contact Concens.
- The dust and water sealing of HE (Harsh Environment) actuators might affect their performance.
- All specifications are for 25 °C ambient – low temperature might affect performance.
- Depending on load and application, nominal and actual stroke length may differ due to internal disc springs not being fully compressed.
- The combination of gearing and stroke can cause limitations in the use of "End limit FW" when using the C2-30 control.
  See more in the datasheet for C2-30.

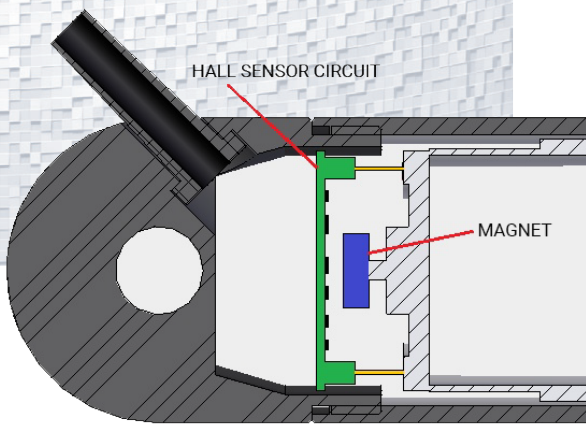
GB

DATA SHEET

Hall Sensor

Option for con35, con50 and con60

concens
- excellent electric actuators



Hall Sensor Option

The hall sensor option is available for all three Concens actuator models. The hall sensor enables control of the position of the piston rod very precisely. Furthermore, the hall option allows driving of two or more actuators synchronously, depending on the choice of controller. A combination of the above features is also possible.

The circuit board is fully backwards compatible with earlier versions. Previous versions have a limited supply voltage range.

Electrical Data

Supply voltage: con35/60, 5 - 24 VDC (± 10 %)
con50, 5 VDC (± 10 %)

Current consumption: 5 - 20 mA depending on supply voltage (Current consumption when using Concens controllers with 5 VDC power supply for hall circuit is approx. 5 mA).

Output: 5 - 24 V amplitude depending on supply voltage, 90 ° or ¼ cycle delay between output A and B. Output is "open collector" - type with internal 10 kΩ pull-up resistors. Concens controllers are equipped with pull-up resistors (4,7 kΩ - 10 kΩ).

Certified: according to IEC60601-1, ANSI/AAMI/ES60601-1, CAN/CSA-22.2 No60601-1 available (24 VDC actuators only).

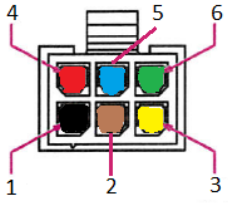
Build in dimension BID:	con35 – BID increased by 10 mm con50/60 – BID increased by 15 mm
Cable:	con35 – 1 m, 2 x AWG20 +4 x AWG26, Ø = 4.85 mm, black jacket, bending radius is 6 x Ø con50/con60 – 1 m, 2 x AWG16 +4 x AWG26, Ø = 6.35 mm, black jacket, bending radius 6 x Ø
Concens control unit:	C1, C2-20, C2-30, C3 and C4
Customer control unit:	PLC or similar

Electrical Wiring *Fig. 1*

con35/con50/con60 with standard Concens cable					
Yellow	Green	Brown	Blue	Red	Black
Hall A output	Hall B output	5–24 V DC supply for hall	0 V GND for hall	Actuator +	Actuator -

The table above shows the standard Concens cable for all three models. If other color combinations are experienced, please ask for advice or scan QR code for further information, before connecting actuator to the controller.

Fig. 2



Pin 1: Actuator - black
Pin 2: Hall supply brown
Pin 3: Hall output ch A yellow
Pin 4: Actuator + red
Pin 5: Hall GND blue
Pin 6: Hall output ch B green

Looking at the connector from opposite side of the cable

Hall Resolution

In the tables below hall resolution is calculated for con35/50/60. Also note the formulas for calculating number of pulses in a full stroke.

con35/100 mm/pitch 2

		C1 - C3 - C4			C2-20 - C2-30		
Gear ratio	Exact Gearing	Pulses	Pulses/mm	mm/pulse	Pulses	Pulses/mm	mm/pulse
1:5	1:5 2/11	259	2.59	0.386	1036	10.36	0.096
1:14	1:13 11/15	687	6.87	0.146	2747	27.47	0.036
1:19	1:19 13/64	960	9.60	0.104	3841	38.41	0.026
1:27	1:26 63/74	1343	13.43	0.074	5370	53.70	0.019
1:51	1:50 17/19	2545	25.45	0.039	10179	101.79	0.009
1:71	1:71 15/91	3558	35.58	0.028	14233	142.33	0.007

con50/100 mm/pitch 3

		C1 - C3 - C4			C2-20 - C2-30		
Gear ratio	Exact Gearing	Pulses	Pulses/mm	mm/pulse	Pulses	Pulses/mm	mm/pulse
1:4	1:4	133	1.33	0.750	533	5.33	0.188
1:14	1:14	467	4.67	0.214	1867	18.67	0.054
1:17	1:17 1/3	578	5.78	0.173	2311	23.11	0.043
1:24	1:24	800	8.00	0.125	3200	32.00	0.031
1:49	1:49	1633	16.33	0.061	6533	65.33	0.015
1:84	1:84	2800	28.00	0.036	11200	112.00	0.009

con60/100 mm/pitch 4

		C1 - C3 - C4			C2-20 - C2-30		
Gear ratio	Exact Gearing	Pulses	Pulses/mm	mm/pulse	Pulses	Pulses/mm	mm/pulse
1:19	1:18 7/9	469	4.69	0.213	1878	18.78	0.053
1:43	1:42 7/8	1072	10.72	0.093	4288	42.88	0.023
1:66	1:65 13/18	1643	16.43	0.061	6572	65.72	0.015
1:81	1:81 10/27	2034	20.34	0.049	8137	81.37	0.012
1:100	1:100 2/7	2507	25.07	0.040	10029	100.29	0.001

Fig. 3

C1, C3 and C4:

$$\frac{\text{gearing x stroke}}{\text{pitch}} = \text{pulses (full stroke)}$$

Example:

Stroke length: 60 mm Gearing: 1:84 Pitch: 3

$$\frac{84 \times 60\ \text{mm}}{3} = 1680 \rightarrow 28\ \text{p/mm}$$

Fig. 4

C2-20 and C2-30:

$$\frac{\text{gearing x stroke x 4}}{\text{pitch}} = \text{pulses (full stroke)}$$

Example:

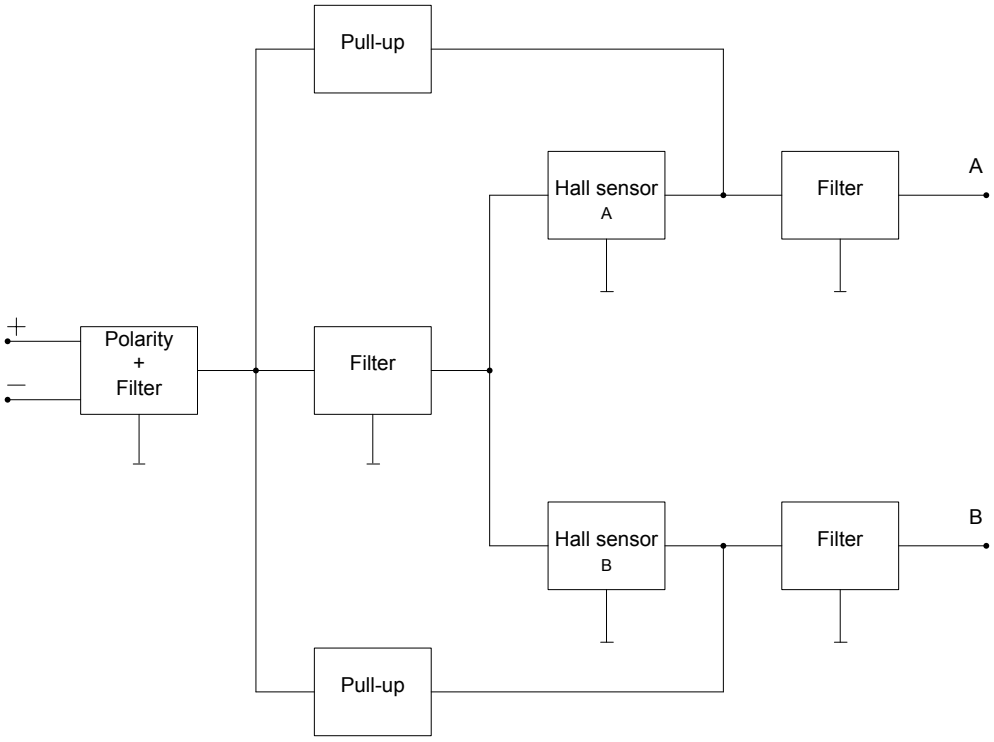
Stroke length: 60 mm Gearing: 1:84 Pitch: 3

$$\frac{84 \times 60\ \text{mm} \times 4}{3} = 6720 \rightarrow 112\ \text{p/mm}$$

Hall Sensor Option

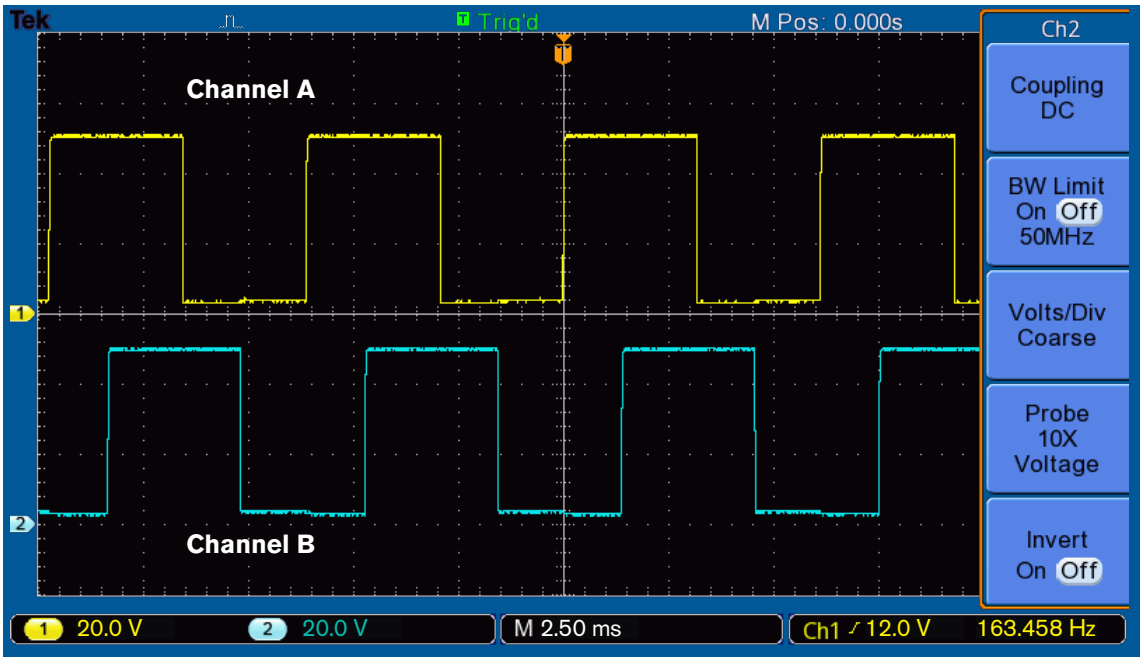
Hall Sensor Circuit Block Diagram *Fig. 5*

The hall circuit inside the actuator has four connections. Two connections for power supply and two for output signals. The hall sensor works with supply voltage from 5 - 24 VDC (+/- 10 %). The outputs, A and B, each provide a square wave signal with ¼ cycle or 90 ˚ delay between them. The amplitude of the output corresponds to the supply voltage (power supply 5 VDC => output is 5 V_{pp}/power supply 24 VDC => output is 24 V_{pp}). The output are "open collector"-type with internal pull-up resistors (10 kΩ).



Hall Pulse Waveform *Fig. 6*

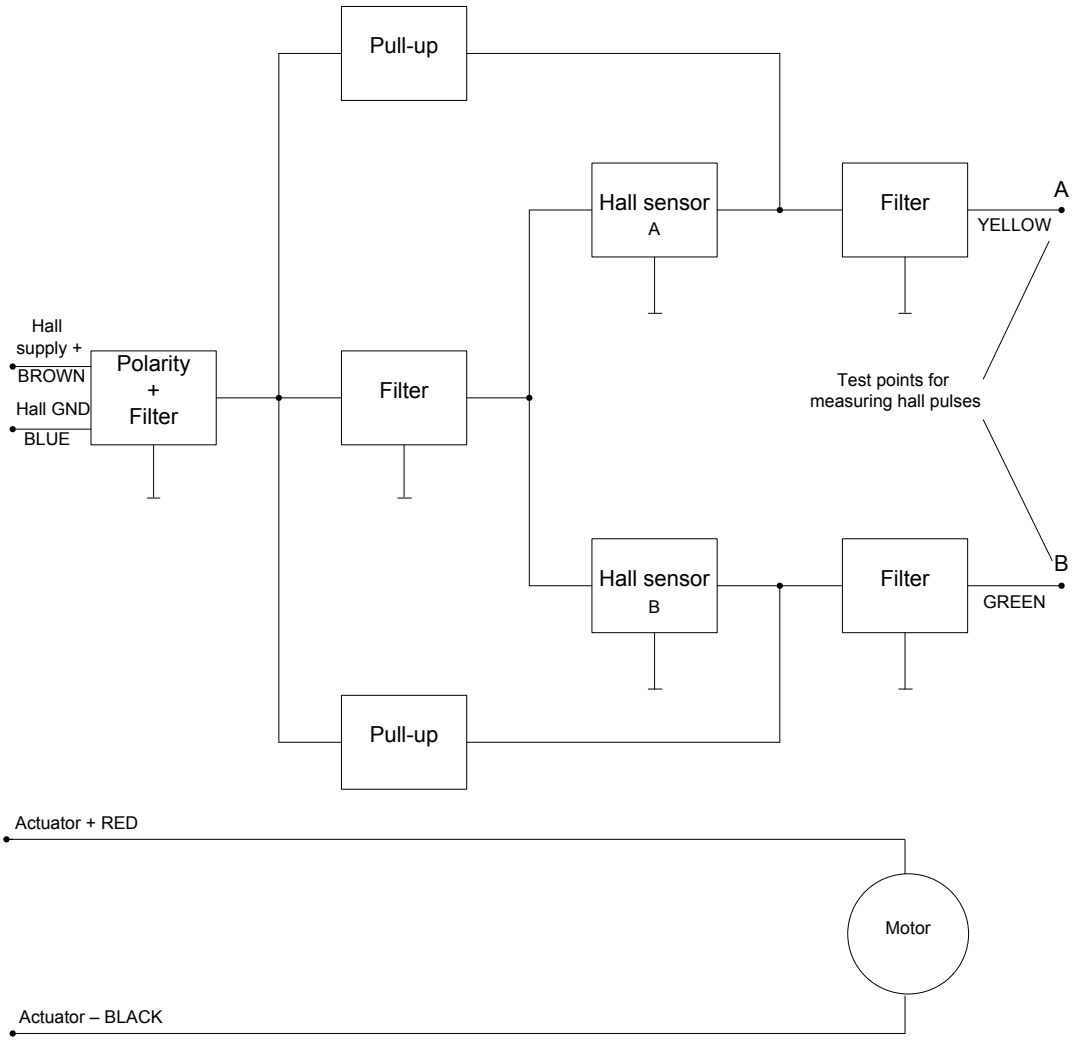
This screen print of the output of the hall circuit shows the square wave with ¼ cycle or 90 ˚ delay between them.



Hall Sensor Option

Hall Test *Fig. 7*

Supply motor with 24 VDC to the motor wires(red and black)
Supply hall with + 5 VDC to the brown wire and 0 V (GND) to the blue wire
Now measure the signal from each hall output
It should be a square signal with 5 V_{pp} amplitude as shown in fig. 6



Recommendations and warnings

- When using actuators with hall sensor option, calibration or learning cycle must be performed before system is ready for use.
- Electrical noise from the environment where the actuators are used may disturb the hall signal. These disturbances are usually increased by longer cable lengths.

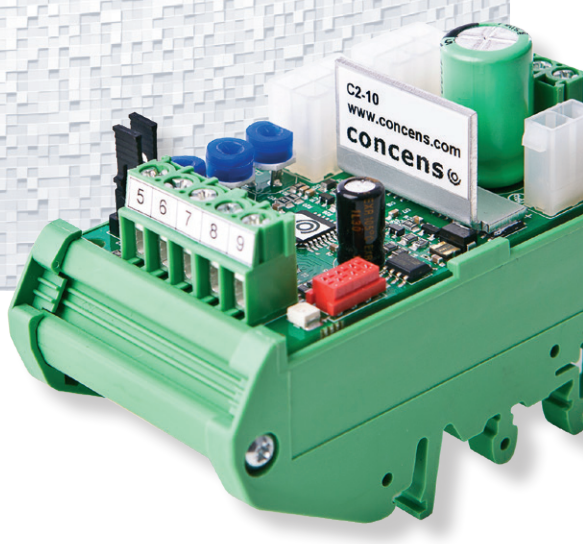
GB

DATA SHEET

C2-10

Control and protection of electric actuators

concens
- excellent electric actuators



The C2-10 is developed for controlled ON-OFF Operating and direction change of Concens actuators. The C2-10 has advanced current limit features. It limits the actuator current in start-up, braking and jam-situations and in that way protects the motor and the application. The C2-10 also has a fault in- and output which indicates error/over-current status and can be used to stop the actuator (for example if an emergency-stop switch is used). The C2-10 is only suitable for use with actuators without hall sensors.

The start and stop ramp times are individually adjustable to suit each application. In other words the motor voltage can be controlled to give a preferred smooth start and stop. When the C2-10 controller is without power, the motor is dynamically braked with so called short-circuit braking, i.e. the motor poles are connected together. The reverse and forward inputs can be set to work with negative or positive voltage by moving a jumper (See Fig. 3).

This datasheet is related to C2-10 firmware version 1.7 (v1.7) only.

Features

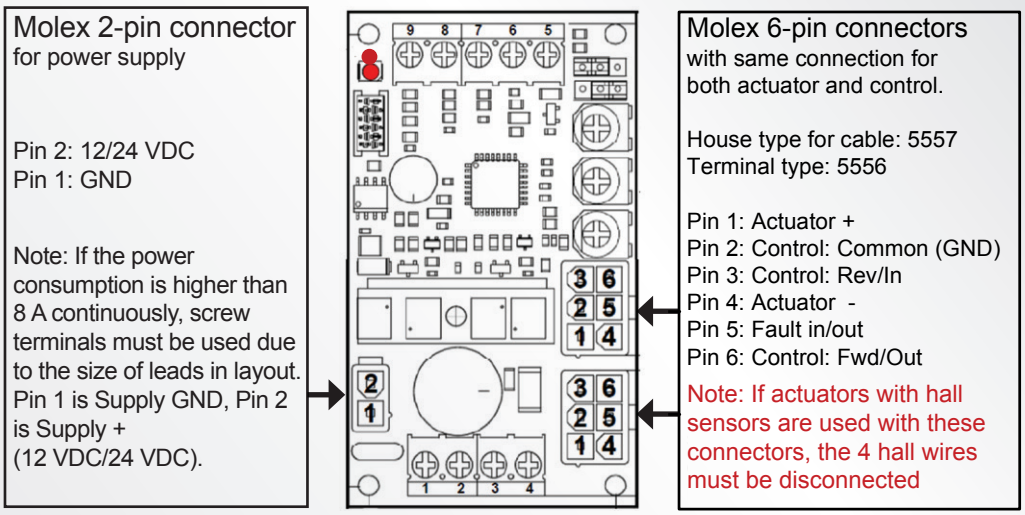
- Adjustable start ramp
- Adjustable stop ramp
- Adjustable current limit
- Continuous-mode, impulse-mode
- High momentary load capacity
- Easy interfacing to PLC etc.
- Connectors and terminals
- DIN-rail fittable
- Status LED

Technical Data

Supply	12/24 VDC (filtered max ripple < 30 % @ full load)
Over voltage protection	40 V
Idle current	Approx. 15 mA
Driving current	10 A continuous, 16 A with duty cycle 50 % Max 16 A on duty 2 min
Current limit	0,5 ... 16 A
Current trip delay	20 ms
Start delay	5 ms
Voltage loss	0,5 V (I_{motor} = 4 A)
PWM frequency	2 kHz
Ramps	0,1 ... 2,5 s
Digital inputs	'High' @ U_{in} 4 V → supply voltage, 'Low' @ U_{in} 0 V → 1 V
Operating temp. (Ta)	- 20 °C to + 60 °C
Weight	36 g
Dimensions	73 x 42 x 26 mm (L x W x H)

C2-10

FIG. 1 WIRING FOR C2-10



General

Status LED signals:

Fast blink:	Current trip
Four blinks:	Overvoltage
Solid light:	Overtemp
One long blink followed by two short blinks:	Fault input active

The C2-10 has a 'trip' feature that cuts the motor voltage if the current limit value is exceeded (after trip delay of 20 ms). After trip the motor can only be started in the opposite direction. Additionally the C2-10 provides 'kick-start' which translates to 100 ms at full speed (100 % PWM). Current limit during kick-start is up to 55 A.

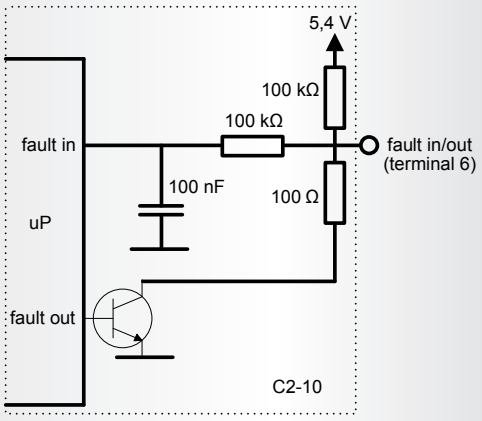
If the actuator is stopped without going into trip mode, the C2-10 controller will allow 50 % higher current from start and until 500 ms after ending start ramp (see timing figure).

The fault terminal is both input and output (see fig. 2). During normal operation the signal is pulled high to 5,4 V on the C2-10 board in series with a 100 kΩ resistor. When a fault occurs the fault terminal changes to low voltage (GND via 100 Ω resistor).

Screw Terminals

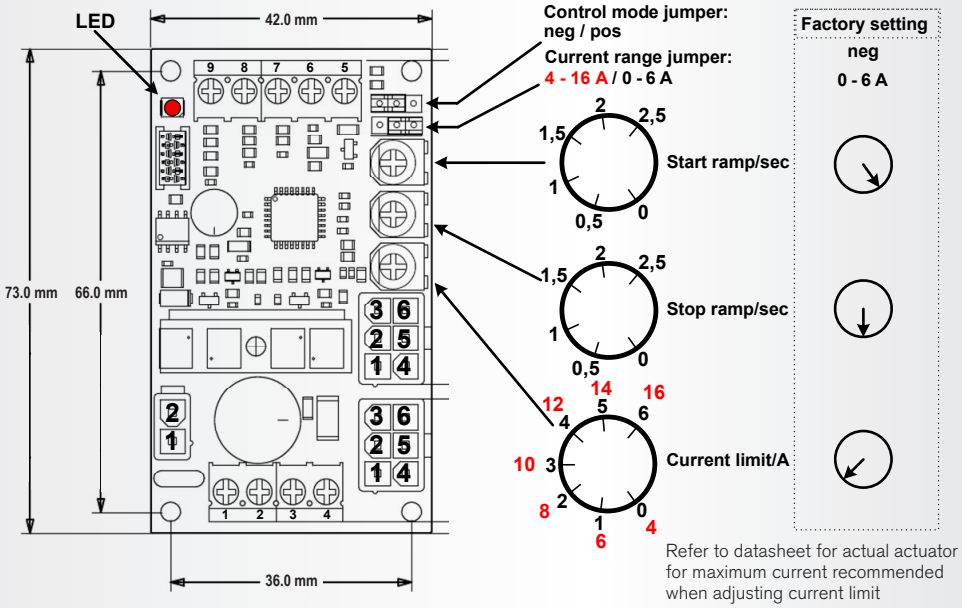
1 Supply GND
2 Supply + (12/24 VDC) fuse required
3 Actuator + red wire
4 Actuator – black wire
5 + 5,4 V output for control-use max. 10 mA load
6 Fault in- and output
7 Reverse (Rev/In) signal input (0,5 mA)
8 Forward (Fwd/Out) signal input (0,5 mA)
7+8 Used to activate the actuator reverse and forward. Please refer to description of 'Control mode' on page 3
9 GND for control-use (not to be used as supply input)

FIG. 2 CIRCUIT DIAGRAM



C2-10

FIG.3 SETTINGS AND MECHANICAL DIMENSIONS



Refer to datasheet for actual actuator for maximum current recommended when adjusting current limit

Control mode

When jumper is put in mode 'neg' (left hand side) a negative (GND) signal is put on terminal 7 and 8 to run motor.

When using 'neg' mode, terminal 9 can be used as the negative supply.

When jumper is put in mode 'pos' (jumper in right side) a positive (> 4 V) signal is put on terminal 7 and 8 to run motor.

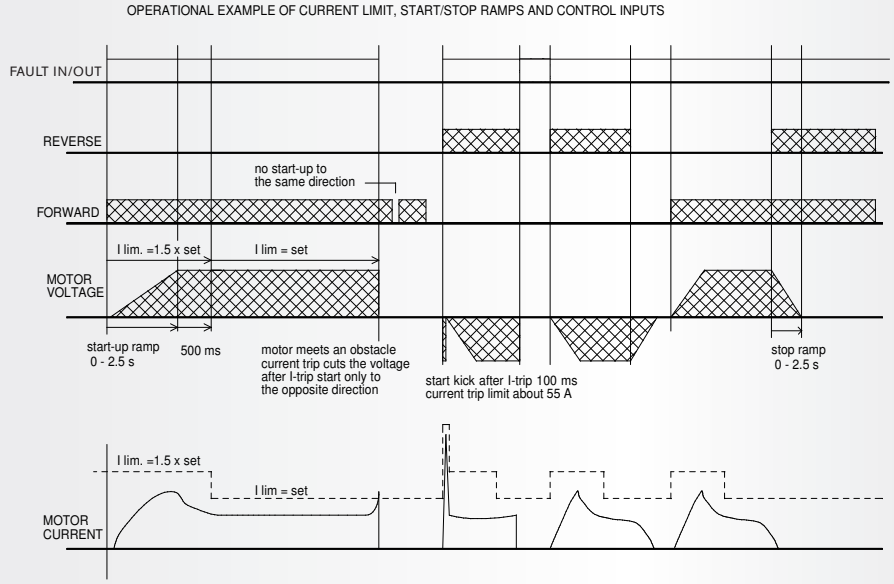
When using 'pos' mode, terminal 5 can be used as the positive supply.

NOTE: When using the connectors for remote control, the jumper MUST be in 'neg' mode (left side).

Input current for reverse & forward control is 0.5 mA.

Parameter #1 is as default set to '0' which enables 'continous mode'. If #1 is changed to '1' 'impulse mode' is enabled. Use C2-USB/C2 Config Tool Light for changing. Warning: Do not change other parameters.

FIG. 4 TIMING DIAGRAM



C2-10

C2-10-PCB-00-0000-00
board alone, weight 36 g
73 x 42 x 26 mm (L x W x H)

C2-10-DIN-00-0000-00
DIN rail version, weight 66 g
90 x 46 x 56 mm (L x W x H)

C2-10-BOX-00-0000-00
BOX version, weight 64 g, IP55
102 x 73 x 47 mm (L x W x H)

BOX-version is not for use with Molex Minifit, only open ends.

C2-10 Part number combination

C 2 - 1 0 - P C B - 0 1 - 0 0 0 0 - 0 0

Type ID	**00 = All standard** *XX = Special*
Configuration	**0000 = Std. Unconfigured** **0001 = 2 A sealed (Con35, 24 V)** **0002 = 4 A sealed (Con35, 12 V)** **0003 = 8 A sealed (Con50, 24 V)** **0004 = 16 A sealed (Con50, 12 V)** **0006 = 12 A sealed (Con60, 24 V)** **xxxx = Special configuration**
For future use	**01 = Std.**
Option	**PCB = Board only** **DIN = DIN rail version** **BOX = BOX version**
Type	**10 = C2-10**
Product series	**C2 = C2 system**

Recommendations and warnings

- Attention! C2-10 controller has no fuse in it. Use external fuse according to application.
- If C2-10 goes into "trip" (overcurrent), it is only possible to run actuator in opposite direction.
- Please adjust the max. current to be 10 % higher than maximum current during running the actuator. This ensures the best possible conditions for mechanical and electrical longevity.
- It is very important to ensure that the power supply for the controller is capable of supplying sufficient current – otherwise the controller and the actuator may be damaged.
- Double-check correct polarity of power supply. If wrong connected, the C2-10 will be damaged.
- If wire colors differ from what is expected, please check with supplier or check on our YouTube channel before connecting the actuator to the controller.
- Braking load resistor (C2-A23) for surpressing flyback is available.

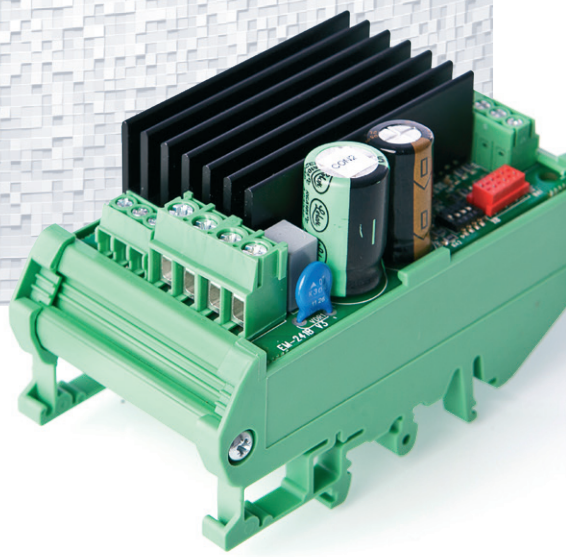
GB

DATA SHEET

C2-20

Advanced Actuator Controller

concens
- excellent electric actuators



The C2-20 actuator controller provides advanced positioning and control of actuators through easy and flexible integration with the application. The controller is designed to work with Concens electrical in-line actuators in applications where positioning is required. C2-20 has adjustable start and stop ramps, which make smooth starts and stops possible. The C2-20 works in conjunction with actuators with hall only.

Adjustable current limits in both directions protect the motor against overcurrent. In learning mode the number of hall pulses in a full stroke of the actuator is counted which enables accurate positioning during normal operation.

The position of the actuator is controlled by a DC voltage between 0 - 5,4 V or 0 - 10,8 V to the C2-20. Adjustments and parameter settings like current limit value, ramp times, speed etc. are set with C2-PROG interface unit or C2-USB “dongle” connected to a PC. Both must be connected to the red connector on the PCA.

This datasheet is related to C2-20 firmware version 2.6 (v2.6) only.

Features

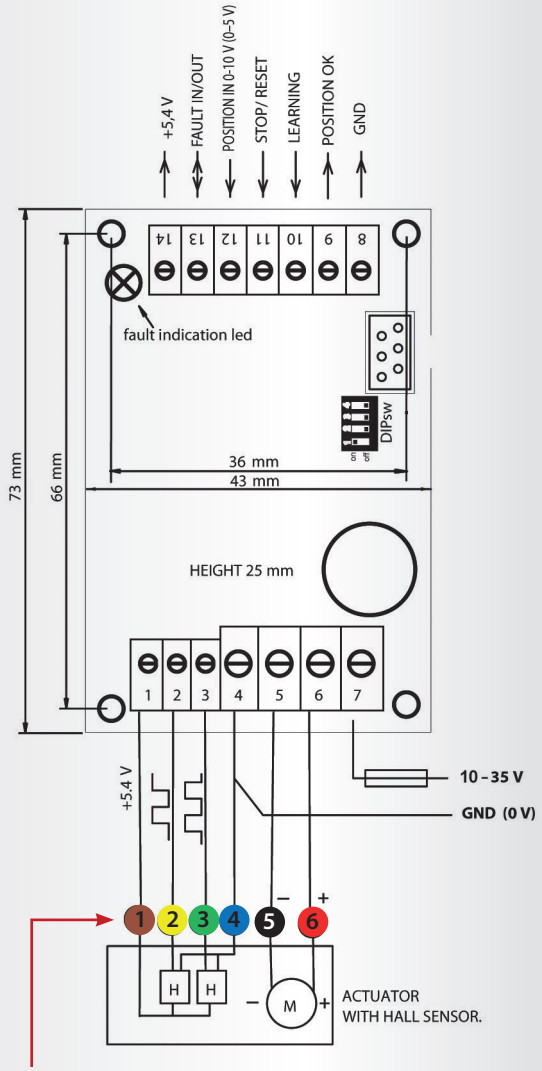
- Precise position control from analog voltage input
- Adjustable start ramp
- Adjustable stop ramp
- Settable current limit
- High efficiency
- High momentary load capacity
- DIN-rail base fittable
- “Position reached” - signal
- Learning cycle in both directions. Kick start after I-trip

Technical Data

Supply voltage	12/24 VDC
Ripple	Less than 20 %
Actuator current continuous max	15 A (Ta < 60 °C)
Actuator current max	20 A (short time)
Current limit adj.	0.1 - 20 A
Overheat limit	100 °C
PWM frequency	2 kHz
Hall input freq.	Max 1 kHz
Input control logic (pos.)	High = 4 - 30 V, Low = 0 - 1 V or open
Control input impedances typ.	30 kΩ
Motor and supply connectors	2.5 mm wires max
Control connectors	1 mm wires max
Dimensions	73 x 43 x 25 mm (L x W x H)
Weight	63 g
Operating temp. (Ta)	- 20 °C to + 60 °C
Idle current	45 mA

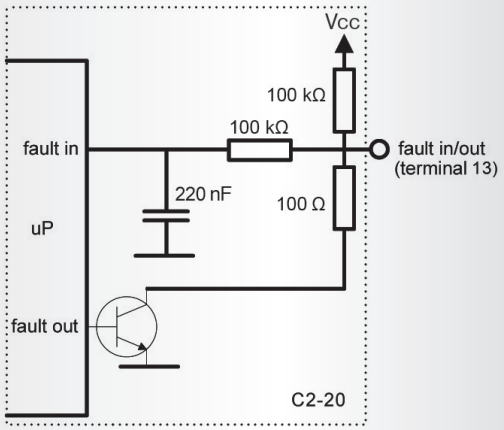
C2-20

FIG. 1 WIRING FOR C2-20



Note: Color combination is example only

FIG. 2 CIRCUIT DIAGRAM



Screw Terminals

1 **Supply for hall sensors** (+ 5,4 V output)

2 **Hall channel A**

3 **Hall channel B**

4 **GND (0 V)** and GND for hall

5 **Actuator –**

6 **Actuator +**

7 **Supply** 12/24 VDC (fuse required)

8 **GND (0 V)**

9 **Position OK**
Digital output 5,4 V through 1 kΩ when wanted position is reached and low during travel.

Note: If "stop ramp" is very long, then POSITION OK signal can be difficult to reach, since the motor only gets very low power to reach within the "dead zone"

10 **Learning**
Digital input (> 4 V and max supply voltage) starts "learning". Rin 47 kΩ

11 **Stop/Reset**
Digital input (> 4 V and max supply voltage) Stops the motor and resets any fault. Rin 47 kΩ

12 **Pos. Set**
Analog input
DIPsw 1 on = 0 - 10,8 V
DIPsw 1 off = 0 - 5,4 V
DIPsw 2 - 4 not used, must be set to off
Rin 30 kΩ

13 **Fault IN/OUT**
NPN open collector max 100 mA can be connected to other C2-20 modules, thereby all modules connected will stop if one module sends a FAULT signal. If wire length is more than 1 meter, a 10 kΩ pull-up resistor connected to supply is recommended. Diagram in FIG. 2

Pin13/	Vcc = 12 VDC	Vcc = 24 VDC
No fault	9,3 V	15,3 V
Fault	0 V	0 V

14 **+ 5,4 V** output, max 10 mA

C2-20

Wiring and Settings

First run the learning cycle and then do the settings with serial interface unit "C2-PROG" or PC. *Default values in* ( )

1/15 Speed: 35 - 100 % <=> 35–100 (100)

2/15 Learning speed: 35 - 100 % <=> 35 - 100 (50)

3/15 I-limit "forward": 0,1 - 20,0 A <=> 1 - 200 (20)

4/15 I-limit "reverse": 0,1 - 20,0 A <=> 1 - 200 (20)

Notice! Current limits are 1.5 times higher during **start ramp** and 1 sec. thereafter

5/15 I-trip enable: 0/1 <=> off/on (1)

6/15 I-trip delay: 0 - 255 ms <=> 0 - 255 (5)

7/15 Load compensation: 0 - 255 <=> 0 - 255 (0)

8/15 Pulse lost timeout: 1 - 5 s <=> 1 - 5 (2)

9/15 Start value: 0 - 50 % <=> 0 - 50 (30)

10/15 Hour/Start count reset: 0 - 1, reset when set to 1

11/15 Stop ramp: 0,0 - 20,0 % <=> 0 - 200 (50)

12/15 Dead zone: 0,0 - 10,0 % <=> 0 - 100 (10)

13/15 Range scale in: + 0,0 - 50,0 % <=> 0 - 500 (7)

14/15 Range scale out: - 0,0 - 50,0 % <=> 0 - 500 (70)

15/15 Start ramp: 0,1 - 5 s <=> 0 - 500 (100)

- **Speed** limits the maximum speed.
- **Learning speed** sets the learning cycle speed. (FIG. 4)
- **I-limits** are individual for reverse and forward directions. Refer to datasheet for actual actuator for maximum recommended current when adjusting.
- **I-trip** enables the trip function, so that motor will be shut down when the set I-limit is exceeded. Motor has to be started in opposite direction after trip.
- **I-trip delay** defines the reaction time for trip.
- **Load compensation** increases the torque at low speed. Note that over-compensation will cause oscillation and twiching of the motor.
- **Pulse lost timeout** stops motor after the set time without pulses.
- **Start value** is a voltage level for start (% of full), this ensures that the motor gets an adequate voltage to start properly, but note that too high start level will cause motor vibration (FIG. 3).
- **Stop ramp** is proportional value of the full stroke. In low speed application good value is near 1 %, and in high speed solution it can be near to 20 % (FIG. 3).
- **Dead zone** is steady area, suitable size of this zone depends on the mechanical accuracy of the system, this value is also a ratio of the full stroke (%) (FIG. 3).
- **Hour/Start** count reset makes possible to set the hour/start counter to zero.
- **Range scale** adjustment is for scaling of the stroke, with this the scale can be adjusted after learning. The reverse and forward ends are individually scaleable to get the suitable mechanical stroke for set value from 0 - 10 V (0 - 5 V) (FIG. 5).
- **Start ramp** (soft-start) defines the time before reaching full speed.

FIG. 3 POSITIONING WINDOW

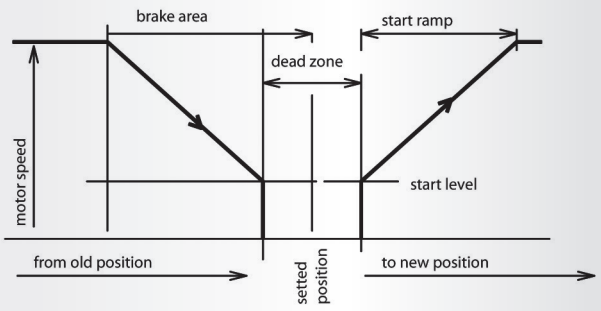


FIG. 4 LEARNING CYCLE

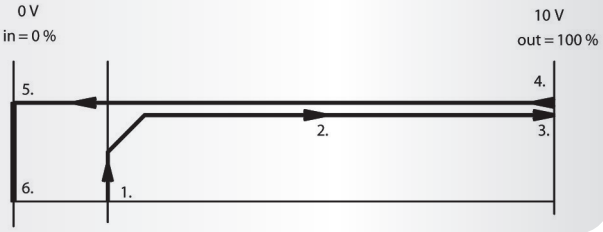
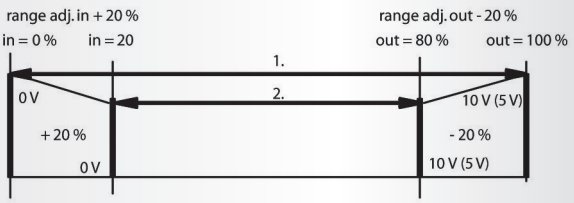


FIG. 5 RANGE SCALING



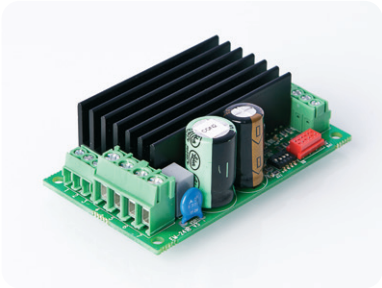
Status Led Signals

1. Fast blinking = Stopped due to current limiter active
2. Slow blinking = Overtemperature
3. 2 x short, mid, long... = Hall pulse lost
4. 4 x fast blinking (burst), pause = Overvoltage
5. 1 x long, 2 x short = Fault in active
6. LED permanent on = Learning not completed, new learning required

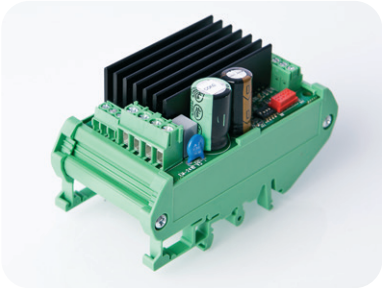
1. Start learning by giving an impulse to learn input (10).
2. Motor starts to run "out" direction with learn speed.
3. Current limit stops the motor when mechanical end is reached.
4. Motor starts to "in" direction and makes a full stroke. During stroke the pulse counter measures the range.
5. Motor reaches the mechanical end "in", and current limit stops the motor.
6. Device stores full range value and is ready for use.
7. The learning cycle can also be performed in the opposite direction, starting travelling inwards.

1. Original learned range = mechanical full range equals the signal range 0 - 10,8 V (0 - 5,4 V)
2. Modified range example:
   If range scale in = + 20 % and
   range scale out = - 20 %.
   now stroke of actuator is compressed to:
   positioning set value 0 V = 20 % position
   positioning set value 10,8 V (5,4 V) = 80 % position

C2-20



C2-20-PCB-00-0000-00
board alone, weight 63 g
73 x 43 x 25 mm (L x W x H)



C2-20-DIN-00-0000-00
DIN rail version, weight 93 g
90 x 46 x 56 mm (L x W x H)

Optional as Box version
C2-20-BOX-00-0000-00
BOX version, weight 130 g, IP55
101 x 73 x 48 mm (L x W x H)

Accessories:
- C2-USB
- C2-PROG
- C2-Minifit-adaptor

Note orientation of connector-pin/hole in PCB

C2-20 Part number combination

C 2 - 2 0 - P C B - 0 0 - 0 0 0 0 - 0 0

Type ID	**00 = All standard** *XX = Special*
Configuration	**0000 = Std. Unconfigured** **0011 = Con35, 24 VDC** **0012 = Con35, 12 VDC** **0013 = Con50, 24 VDC** **0014 = Con50, 12 VDC** **0015 = Con60, 24 VDC** **xxxx = Special configuration**
For future use	**00 = Std.**
Option	**PCB = Board only** **DIN = DIN rail version** **BOX = BOX version**
Type	**20 = C2-20**
Product series	**C2 = C2 system**

Recommendations and warnings

- Attention! C2-20 has no fuse in it. Use external fuse according to application.
- If C2-20 goes into "trip" (overcurrent) it is only possible to run actuator in opposite direction.
- Please adjust the max. current to be 10 % higher than maximum current during load.
  This ensures the longest actuator lifetime.
- Please ensure that the power supply for the controller is capable of supplying sufficient current – otherwise the controller and the actuator may be damaged.
- Double-check correct polarity of power supply. If connected wrong the C2-20 will be damaged.
- If wire colors differ from what is expected, please check with supplier or check on our YouTube channel before connecting the actuator to the controller.
- Connect to power during programming.

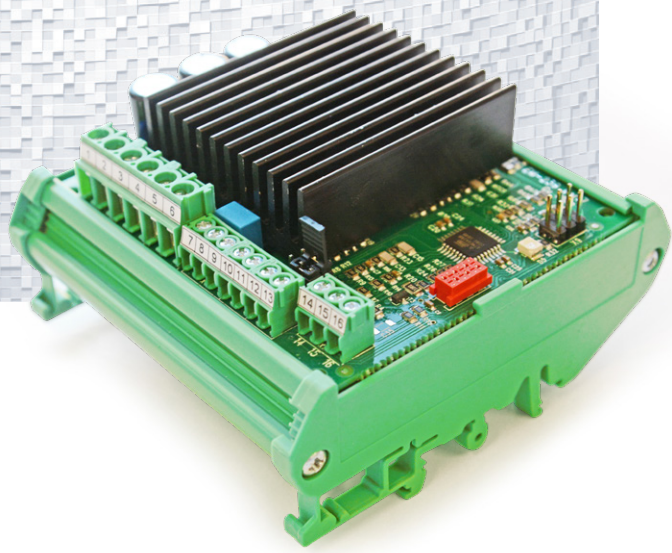
GB

DATA SHEET

C2-30

Advanced Actuator Controller

concens
- excellent electric actuators



The C2-30 is designed for operating two Concens actuators in parallel. Synchronization is achieved by adjusting actuator speed during operation.

Failure to synchronize will result in the actuators stopping, this way possible mechanical stress and breakage can be avoided. Additionally the C2-30 includes current limiter and power stage temperature protection. The C2-30 has adjustable start and stop ramps for smooth operation. The C2-30 works in conjunction with actuators with hall sensors only.

The basic control is done with Forward-, Backward-, and Stop-commands, either in continous mode or pulse mode.

Calibration input is for operating the system to its initial position. This is done with low speed.

A wide range of parameters can be altered to suit to different demands and applications.

The parameters are set by using the handy interface C2-PROG or by using the C2-USB dongle and your computer. Both must be connected to the red connector on the PCA.

This datasheet is related to C2-30 firmware version 2.5 (v2.5) only.

Features

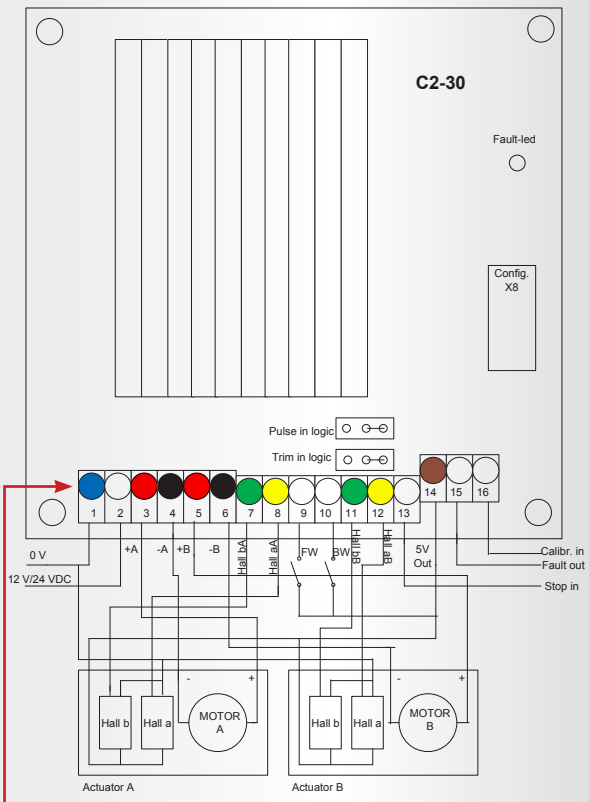
- Synchronized
- Current and temperature protection
- Settable drive speed
- Adjustable start- and stop ramp
- Different control modes
- Wide range of parameters
- Easy setting with serial interface
- Good repeatability of settings
- Autobalance feature

Technical Data

Supply Voltage	12/24 VDC, filtered less than 20 % ripple
Quiescent current	15 mA
Motor current	2 x 10 A cont. 2 x 20 A 25 % duty
PWM frequency	2 kHz
Current limit	1 - 20 A
Temperature limit	120 °C (Power stage)
Ramp times	0 - 2 sec
Pulse input freq.	max. 1 kHz
Pulse inputs	pull- up/down 10 kΩ (Hi/Lo; 4 - 30 V/0 - 1 V)
Control inputs	0 - 1 V = OFF; 4 - 30 V = ON (impedance 10 kΩ)
Fault output	Active, pull down max. 50 mA
Aux. voltage output	5,4 V/20 mA
Dimensions	78 x 73 x 25 mm (L x W x H)
Operating temp. (Ta)	- 20 °C to + 60 °C
Weight of board	106 g
CE	Electromagnetic compatibility Industrial Environment

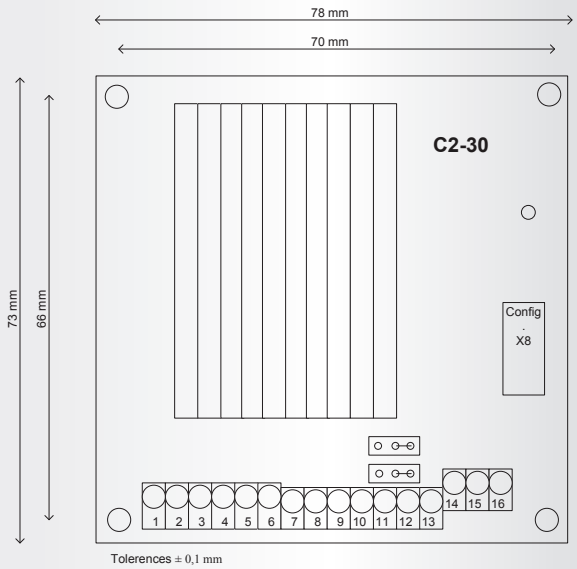
C2-30

FIG. 1



Note: Color combination is example only

FIG. 2



Screw Terminals

1 **GND (0 V) + (blue wire for hall)**
2 **Supply 12/24 VDC (fuse required)**
3 **Actuator A +**
4 **Actuator A -**
5 **Actuator B +**
6 **Actuator B -**
7 **Hall b motor A (green)**
8 **Hall a motor A (yellow)**
9 **Forward(out)** pos. command only
10 **Backward(in)** pos. command only
11 **Hall b motor B (green)**
12 **Hall a motor B (yellow)**
13 **Stop**, input for external stop input
Pos. command only.
14 **5,4 V/20 mA output for Hall and controls**
e.g. FW/BW command (brown wire for hall)
15 **Fault output**, active low on alarm. Open collector.
16 **Calibration**, pos. command starts
calibration routine.

Connect motors and supply as in picture.

Inputs/Outputs

- **Pulse A and B** are for incoming feedback pulse-lines. Parameter 13 must be set to “1” .
- **FW & BW** are command inputs forward/backward.
- **STOP** input is for the use of external stop command (eg. end switches).
- **Calibration input** is for starting the calibration routine.
- **FAULT output** - refer to fault situations on page 3
- **INPUTS:** 4 V - 30 V as “high” signal level and 0 V - 1 V as “low” signal level
- **OUTPUT:** NPN open collector max. 50 mA

C2-30

Parameter Discription

- **Running Speed** is the speed which is used in normal mode.
- **Calibration Speed** is the low speed used during calibration-routine.
- **Start- and stop ramps** define the acceleration and deceleration time from 0 - 100 % and back to 0 speed.
- **Current limit** is limit value for current trip. If current value is exceeded the motors will be stopped. During the period of start ramp + 1 sec the current limit is 1,5 times the current limit set value. Refer to datasheet for actual actuator for maximun current recommended when adjusting. Current limit value goes for both actuators (when limit is set to 20 it means 2 A for each actuator).
- **Difference limit** is the value for largest allowable difference between A an B pulse counters. If value is exceeded motors will be stopped.
- **Adjust behavior** defines how fast and intensively the controller will adjust the synchronization between motors A and B. Smooth 1 → Aggressive 10.
- **I-trip-indication** – fault output can be set to "on" (default) also in current trip situation.
- **Start condition** enables the device to re-start the motor to both or only to opposite direction after a trip or stop situation.
- **Control Mode** sets the control-mode. In continuous mode the motor runs as long as command (fw or bw) is "on". In impulse mode a short command starts the motor and the direction is changed with opposite command. Motor will stop only with "stop" command. In "Impulse-2" mode motor starts with short (fw/bw) impulse. Following command stops the motor, and next command (fw/bw) starts the motor again. In "Continous (4)" mode actuators run as long as buttons are activated and during calibration buttons must be activated too. Of course, in all modes the difference limit, current limit and stop-command will stop the motors.
- **Safety Reverse** means automatic reverse run if the actuator has been stopped as a result of overload = I-trip. Stop input also triggers this function.
- **Auto-balance trigger** parameter value sets the starting point for auto balance. Value is the number of pulses counted from mechanical home.
- **Double pulse mode** enables the controller to handle actuators with double hall pulses. Must always be enabled when using Concens actuators.
- **End limit fw** is a pulse counter "end stop" for fw direction. The positions is determined in pulse edges from 1–65535. Value 0 means that end stop is not in use. Note: This feature cannot be used in all combinations of gear ratio and stroke length due to number of pulses may exceed 65535.

	con35		con50		con60
Gear ratio I	max. stroke/mm	I	max. stroke/mm	I	max. stroke/mm
5	6325	4	12295	19	3489
14	2385	14	3510	43	1528
19	1706	17	2835	66	997
27	1220	24	2047	81	805
51	643	49	1003	100	653
71	460	84	585		
These are the maximum stroke lengths where "End limit FW" (65535) can be used.					

- **Auto balance** starts balancing routine before mechanical endstop. The trigger point is set with parameter 12. If "auto balance" is active it balances the system automatically in the end of stroke. This will prevent the possible pulse error accumulation. Auto balance always works to the calibration direction.
- **Calibration routine** is a calibration cycle for balancing the system. Calibration can be started by giving fw and bw commands at the same time for 3 sec or with incoming signal to calibration input. Calibration routine can be interrupted with new FW or BW command or signal to STOP input. When calibration routine starts, both motors start to run to same direction and will run until current limit stops the motor or pulses stop coming. During the calibration routine the fault led is blinking slowly. When blinking stops and both motors have stopped the device has reset the pulse counters. Now the devise is ready for use. If there is need to change the calibration direction, swap the motor wires and the hall wires.

Status LED signals

Motor is jammed (current trip), pulses disappear or pulse counter difference is too high (difference limit). The controller will stop the motors and FAULT output will be pulled down (also in I-trip if indication is enabled). When motor is restarted the FAULT output is reset. Faults are also indicated with fault-led as follows:
1 blink = position corrupted(calibration needed)
2 blinks = current trip
3 blinks = pulses disappear
4 blinks = difference limit
5 blinks = temperature protection

Jumpers

The Jumpers must be set to the most right position.
(See FIG. 1)

Monitoring

During normal use it is possible to monitor the function of controller with the C2-PROG. Select the monitor mode in C2-PROG and you can check the following values:
1 current, Motor A 10 - 250 = 1 - 25 A
2 current, Motor B 10 - 250 = 1 - 25 A
3 pulse count/run cycle, only motor A
4 pulse count difference
5 position counter A 0 - 65535
6 position counter B 0 - 65535

Feedback Pulses

The controller counts pulse edges so counted value is double compared to the actual number of pulses.

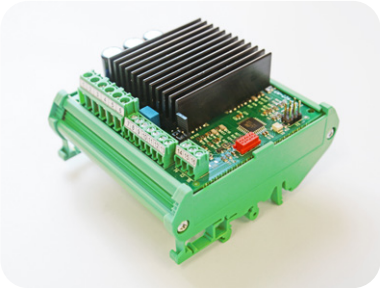
Parameter List

Connect C2-PROG or PC to the Config-connector. This must be done with power on. C2-PROG displays the type of the device. Push the select button and you can scan the parameters with arrow buttons. Parameters are changed with +/- buttons. Store new settings with save button (press and hold for more than 5 sec).

Parameter list with:	Quality	Set range	Default
1 Running speed	40 - 100 %	40 - 100	100 (%)
2 Calibration speed	20 - 60 %	20 - 60	60 (%)
3 Start ramp	0 - 2 sec	0 - 20	0.5 (sec)
4 Stop ramp	0 - 2 sec	0 - 20	0 (sec)
5 Current limit	1 - 25 A	10 - 250	20 (2 A)
6 Difference limit	3 - 50 pulses	3 - 50	10 (pulses)
7 Behavior	smo -> aggr	1 - 10	5
8 I-trip indication	disa = 0; ena = 1		1
9 Start condition	both dir = 0; only rev if I-trip = 1;		
	only rev if stop = 2; only rev = 3		1
10 Control mode	cont = 1; impuls = 2; impuls -2 = 3;		1
	Cont + cont calibration = 4		
11 Safety reverse time	disa = 0; 1 - 30 reverse time after I-trip		0 (sec)
12 Auto balance trigger	disa = 0; 1 - 255 trigger point active		0 (pulses)
13 Double pulse mode	disa = 0; ena = 1		1
14 End limit FW	disa = 0; FWD end limit = 1-65535		0 (pulses)

C2-30

C2-30-PCB-00-0000-00
Board alone, weight 106 g
78 x 73 x 25 mm (L x W x H)



C2-30-DIN-00-0000-00
DIN rail version, weight 148 g
90 x 85 x 54 mm (L x W x H)

Optional as Box version
C2-30-BOX-00-0000-00
BOX version, weight 212 g, IP55
104 x 104 x 47 mm (L x W x H)

Accessories:
C2-Minifit-adaptor
C2-PROG Programming Unit
C2-USB Programming Cable for PC
Note orientation of connector-pin/hole in PCB

C2-30 Item Number Combination

C 2 - 3 0 - P C B - 0 0 - 0 0 0 0 - 0 0

Type ID	00 = All standard *XX = Special*
Configuration	0000 = Std. Unconfigured 0011 = Con35, 24 VDC 0012 = Con35, 12 VDC 0013 = Con50, 24 VDC 0014 = Con50, 12 VDC 0015 = Con60, 24 VDC xxxx = Special configuration
For future use	00 = Std.
Option	PCB = Board only DIN = DIN rail version BOX = BOX version
Type	30 = C2-30
Product series	C2 = C2 system

Recommendations and warnings

- Attention! C2-30 has no fuse in it. Use external fuse according to application.
- Please adjust max current to be 10 % higher than maximum current during load to ensure the longest actuator lifetime.
- Please ensure that the power supply for the controller is capable of supplying sufficient current - otherwise controller and actuator may be damaged.
- Double-check correct polarity of power supply. If connected wrong C2-30 will be damaged.
- If wire colors differ from what is expected, please check with supplier or check on our YouTube channel before connecting the actuator to the controller.
- Connect to power during programming.

GB

DATA SHEET

C4

Battery Based Actuator Control System

concens
- excellent electric actuators

The C4 system is a versatile solution for the control of electric actuators. The unique design, strong power supply system and the option of controlling multiple actuators makes the C4 system ideal for use in various applications. Certified to medical standard (IEC60601-1).

The C4 system consists of:

- Controller
- Handset
- Battery
- Battery charger

The C4 solution is designed for optimal flexibility making configuration, programming and installation very easy. Additionally, service and replacement of e.g. batteries are extremely easy with the patented magnetic principle. No tools are required.

The C4 Controller is designed to handle up to four actuators in groups, synchronous or individually. It is controlled with a wired handset, which can be delivered in five different button layouts depending on customer needs. Furthermore, the C4 can be equipped with an external emergency stop.

The C4 system contains a rechargeable 24 VDC NiMh or Li-Ion battery, enabling the actuator solution to be fully mobile.

Standard C4 solution includes IP50 protection with IP65 protection available.

This datasheet is related to C4 firmware version 659 (v659) only.

Features

- 4-channel fully programmable controller
- Battery powered for mobile use
- 24 VDC NiMh or Li-Ion replaceable battery
- Patented battery system
- Customized colors and foil design
- Wired handset
- Adjustable soft- start and stop
- Adjustable current limit in and out
- Adjustable calibration speed and current
- Adjustable virtual min/max-position
- Individual or synchronous operation for drive 2 - 3 - 4 or 2 + 2 actuator
- Audible and visual status signal
- Version certified according to IEC60601-1, ANSI/AAMI/ES60601-1, CAN/CSA-22.2 No60601-1 available (24 VDC only)

Technical Data

Supply	24 VDC NiMH or Li-Ion battery
Idle current	< 5 mA
Current limit	8 A/ch max. total 12 A
Current trip delay	30 ms
Ramps	0 - 3 sec
Operating temp.	5 … 40 °C
Connector type	Molex Mini-Fit 6 pin
Weight	Controller: 430 g NiMH Battery Charger: 430 g Li-Ion Battery Charger: 410 g Battery: 530 g (Li-Ion: 400 g)
Battery Capacity	NiMH: 1400 mAh Li-Ion: 2150 mAh

C4

System Components

Controller

Brackets

Handsets

Customizable Foils

Battery Charger

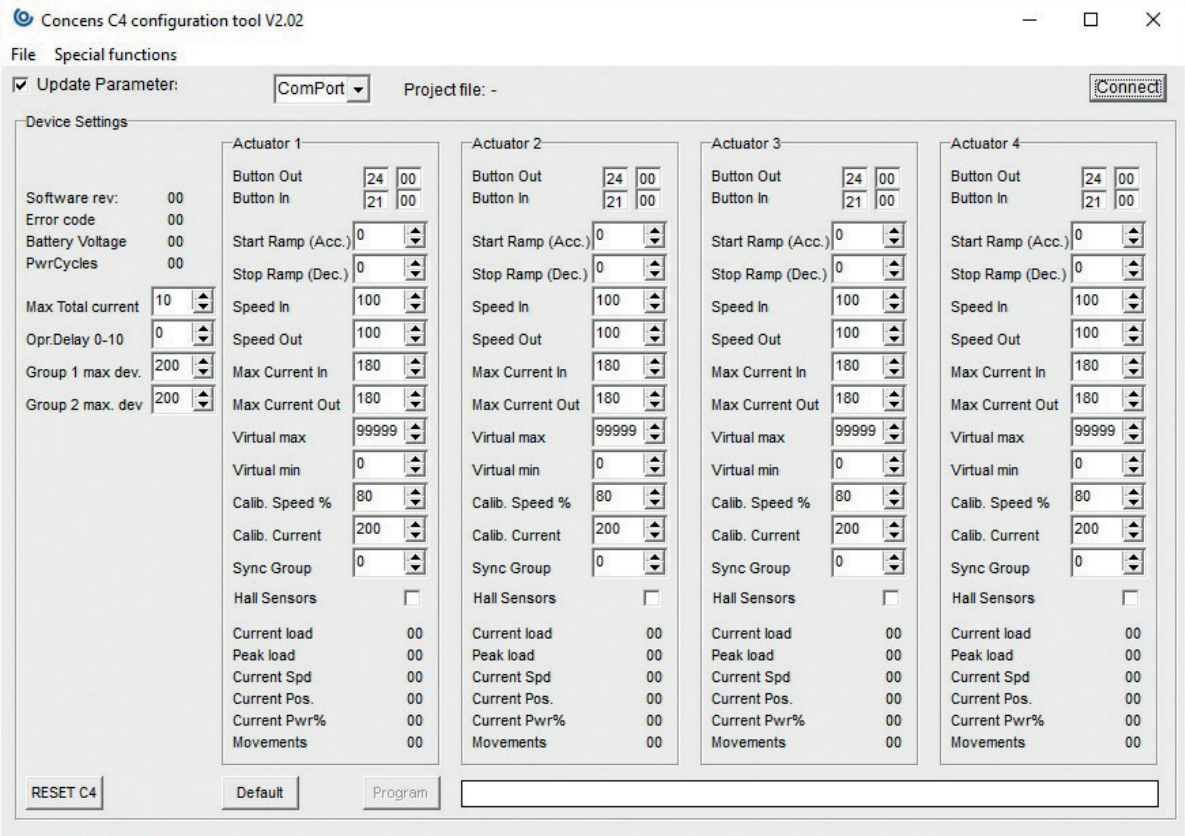
Battery

Electrical Connections

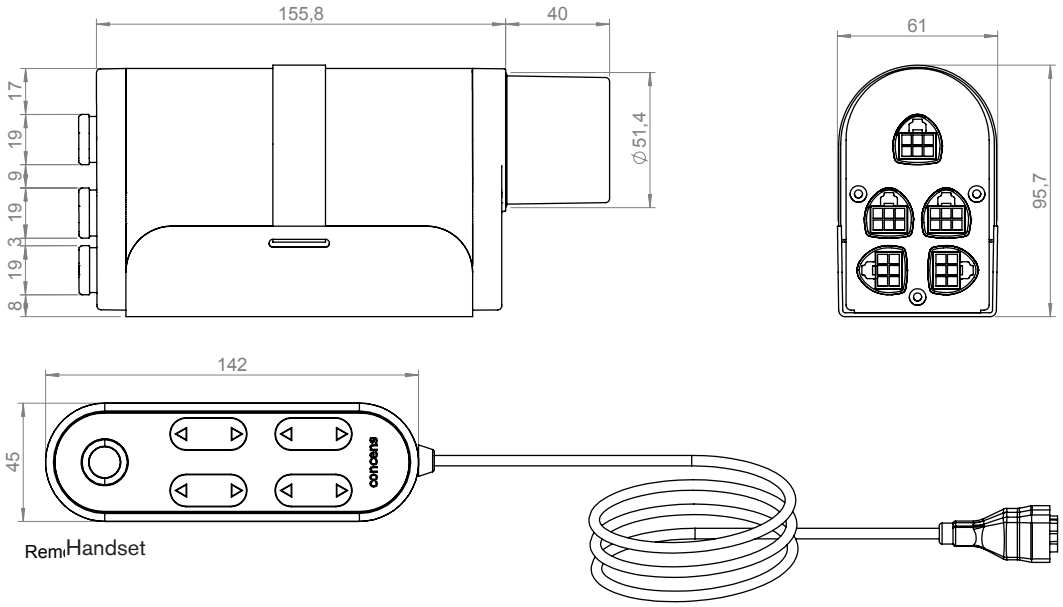
① **Actuator 1**
② **Actuator 2**
③ **Actuator 3**
④ **Actuator 4**
⑤ **Handset,**
External Power
Emergency Stop

C4

System Parameters



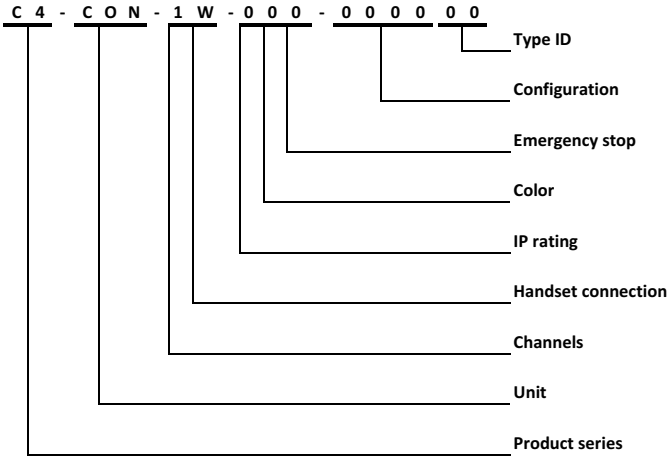
Mechanical Dimensions



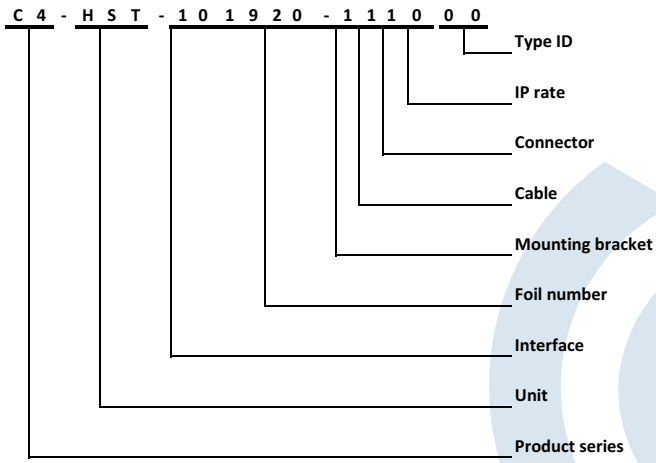
C4

C4 Item Number Combination

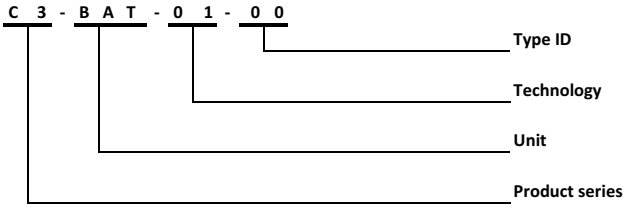
Controller



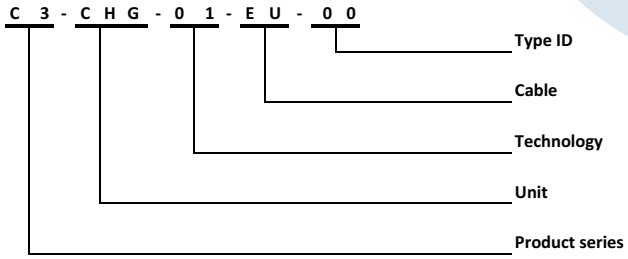
Handset



Supply



Charger

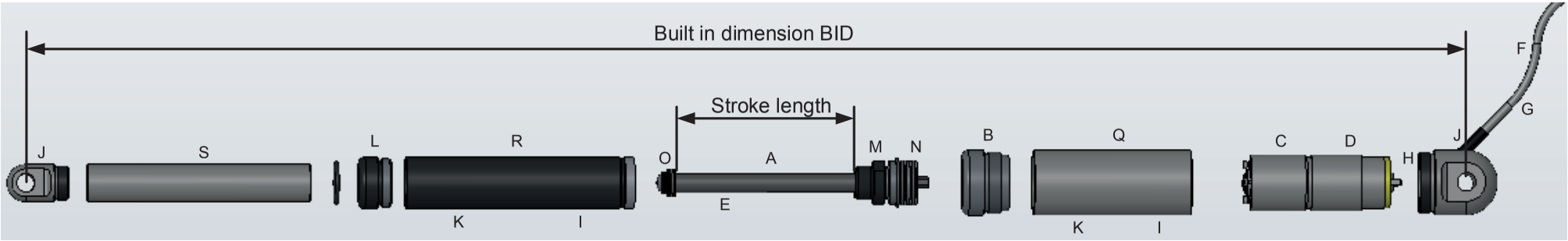


C4 Accessories

C4-PROG **Programming-cable for the C4 controller**
C4-YCBL **Splitter-cable for the C4 controller**
C4-LOCK **Clip for securing the C4 controller in the mounting bracket.**

C4

Actuator Configuration Guide



3	5	0	1	0	0	-	2	7	3	2	1	2	-	0	0	0	0	0	0
5	0	0	1	0	0	-	2	4	3	3	1	2	-	0	0	0	0	0	0
6	0	0	1	0	0	-	6	6	3	4	1	2	-	0	2	0	0	0	0
Product Series		**Std./ Protected**	**Stroke Length**			**Low Noise**	**Gearing**		**Voltage**	**Pitch**	**Cable length**	**Connector**	**Hall**	**Steel IP**	**Brackets**	**Tube Color**	**Ring Color**	**Type ID**				

'35' = con35
'50' = con50
'60' = con60

'0' = Standard
'x' = Protected

Standard:
'050' = 50 mm
'100' = 100 mm
'150' = 150 mm
'200' = 200 mm
'250´ = 250 mm
'300' = 300 mm
'350' = 350 mm
'400' = 400 mm
'500' = 500 mm
'750' = 750 mm
Custom:
'xxx' = xxx mm

'-' = Standard
'+' = Low Noise(not AISI)

con35	con50	con60
05	04	19
14	14	43
19	17	66
27	24	81
51	49	100
71	84	

Standard:
'1' = 12Vf
'3' = 24Vf
'7' = 24Vf - EN/UL 60.601

Standard:
'2' = 2 mm std. nut (35)
'3' = 3 mm std. nut (50)
'4' = 4 mm std. nut (60)
'5' = 2 mm std. low temp. Grease (discontinued)
'6' = 2 mm std. high temp. Grease (discontinued)
'7' = 3 mm 'Spline' and emer. Low.
'1' = Nut with magnets. Actuator tube AISI316 only
'8' = 3 mm std. low temp. Grease (discontinued)
'9' = 3 mm std. high temp. Grease (discontinued)

Standard:
1-9m
'x' = customized

Standard:
'2' = Black cable, Molex Minifit
'0' = Black cable, no connector
'6' = Shielded black cable, no connector
'7' = Shielded black cable with Molex connector and open end shield
'X' = custom connector

'-' = without hall sensors
'+' = with hall sensors

Standard:
'0' = Std. steel, IP66
'2' = AISI316, IP66
'4' = AISI316, HE
'1' = AISI304, IP66 (discontinued)
'3' = AISI304, IP68 (discontinued)
'6' = AISI316, IP69K (discontinued)
'7' = AISI304, IP68, ATEX (discontinued)
'8' = AISI316, HE*, ATEX (discontinued)
'9' = Std. steel, HE*

Standard:
'00' = All standard
Custom:
'XX' = Special requirement

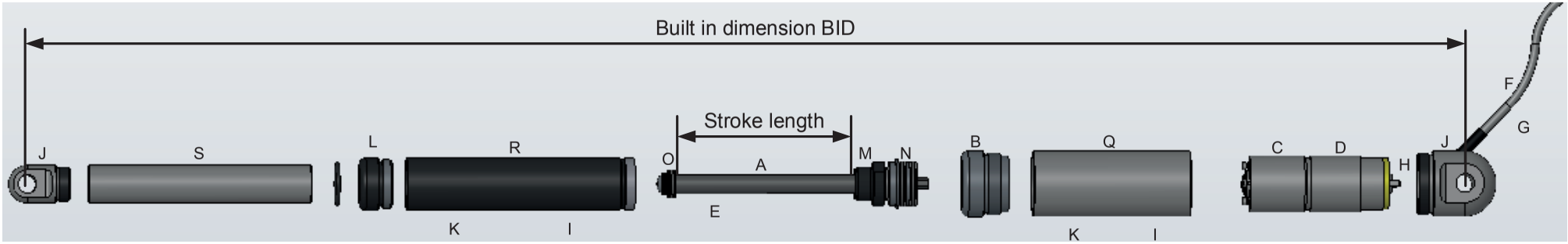
Standard:
'0' = Black
'2' = Black std. Steel (HE*)
'9' = AISI316(HE*) only
Custom:
'1' = Grey (Con 35 only)

Standard:
'0' = Black, RAL9005, shine 25
'9' = AISI316
Custom:
'X' = Custom color

Standard:
'0' = PA
'1' = PA with clevis
'2' = Alu
'3' = Alu with clevis
'4' = AISI316
'5' = AISI316 with clevis
'6' = Alu w/spherical bearings

Notes:
1) Special requirements must be marked as 'x'
2) Type ID equals '00' for standard actuators
3) * HE = Harsh Environment

Actuator Configuration Vocabulary



A= Stroke length
B = Gear bracket/Low noise
C = Gearing
D = Motor voltage
E = Leadscrew/pitch
F = Cable length
G = Cable color/ connector
H = Feedback/Hall sensor
I = Tube material and IP rate
J = Brackets
K = Tube color
L = Piston ring
M = Nut
N = Bearing bushing
O = Top screw
Q = Motor tube
R = Actuator tube
S = Piston tube

	A	B	C	D	E	F	G	H	I	J	K	L	
Product Series	Stroke Length	Low Noise	Gearing	Vol-tage	Pitch	Cable length	Cable/ Conn.	Hall	Steel IP	Brac-kets	Tube Color	Ring Color	Type ID

Three actuator series are available from Concens: con35, con50 and con60

Stroke length is defined as the maximum length the actuator can move. Not to be mixed with 'built in dimension', which is measured from center hole in front bracket to center hole in rear bracket.

Concens' patented low noise option reduces the noise level considerably.

The gearing of the actuator determines speed and force/load.

Choose motor voltage between 12 and 24 volts. Recommended duty cycle is max.10%.

Standard pitch of lead screw is 2 mm for con35, 3 mm for con50 and 4mm for con60. However, 3 mm pitch is available for con35 upon request.

Cable length is measured 'end-to-end' i.e. including connector (if mounted). Maximun length recommended is 9m.

Concens actuators come with black cable and are delivered without connectors or with 6p Molex MiniFit connectors as standard. Other special connectors can be mounted according to customer requirements. Shielded cable, with or without connector, is also an option

Hall sensors are used to keep track of the position of the actuator.

Tube material is painted standard steel (IP66) or stainless steel AISI316 (IP66, HE=Harsh Environment).

Front and rear brackets are available in PA (not con60), aluminum and stainless steel. They can be with or without clevis. Aluminum brackets can be equipped with spherical bearings. Special brackets can be made upon request

Standard steel actuators are delivered with black motor- and actuator tube as standard. Other RAL colors are available on request.

For IP66 actuators the piston ring (PA) is black. HE(=Harsh Environment) are stainless steel.

Type ID is used to specify special requirements. Standard actuators have type ID = 00

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