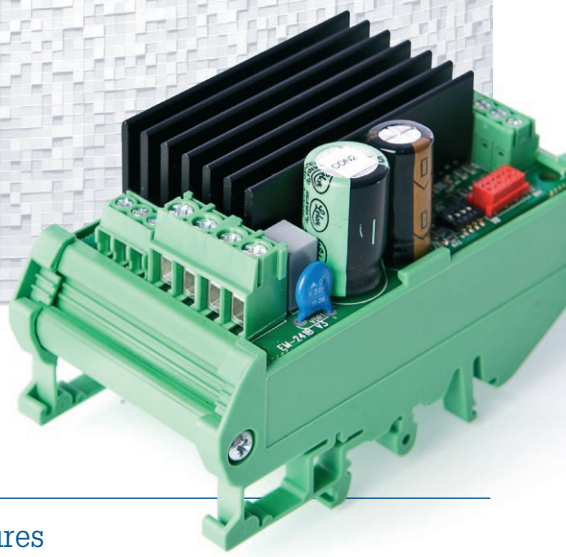
GB

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

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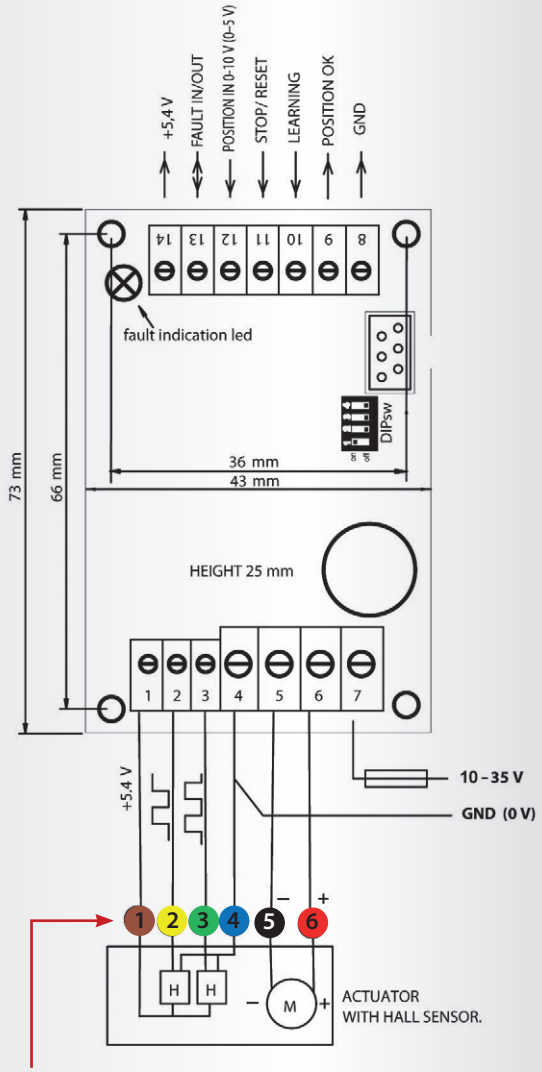
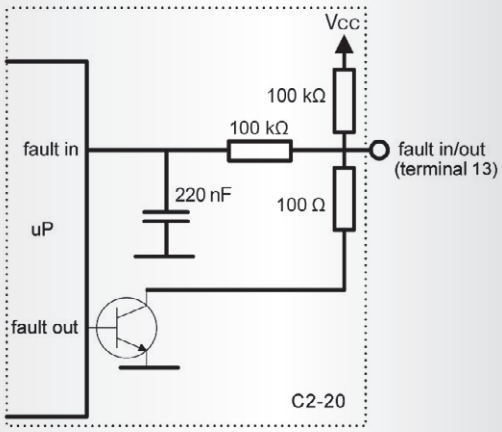
FIG. 1 WIRING FOR C2-20



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

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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)

FIG. 3 POSITIONING WINDOW

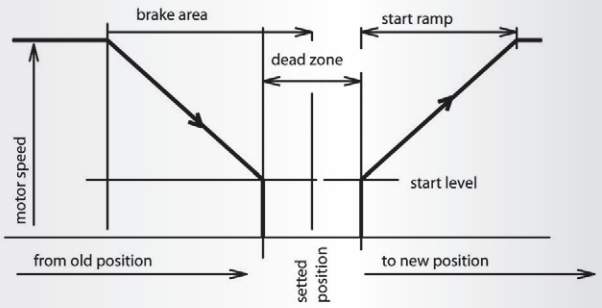


FIG. 4 LEARNING CYCLE

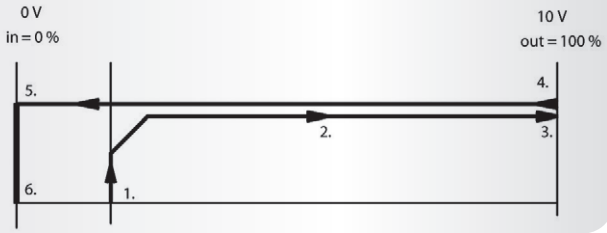
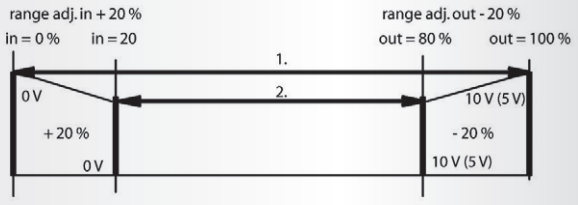


FIG. 5 RANGE SCALING



- **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.

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

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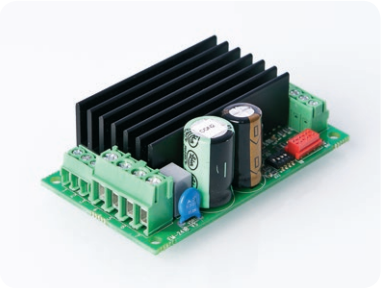
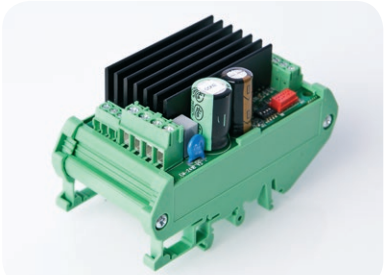


C2-20-PCB-00-0000-00
board alone, weight 63 g
73 x 43 x 25 mm (L x W x H)



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.

Disclaimer

- Concens products are continuously developed, built and tested for highest requirements and reliability but it is always the responsibility of the customer to validate and test the suitability of our products in a given application and environment.
- We do our utmost to provide accurate and up-to-date information at all times. In spite of that, Concens cannot be held responsible for any errors in the documentation. Specifications are subject to change without prior notice.

For more information, please visit our website at www.concens.com

C2-20

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