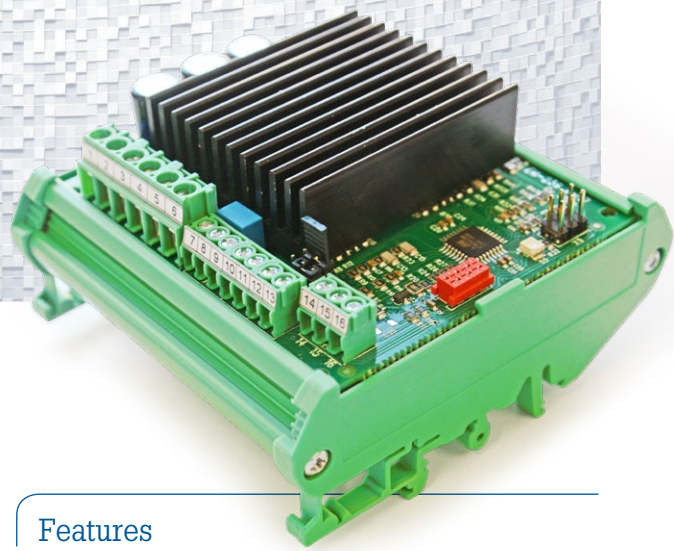
GB

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

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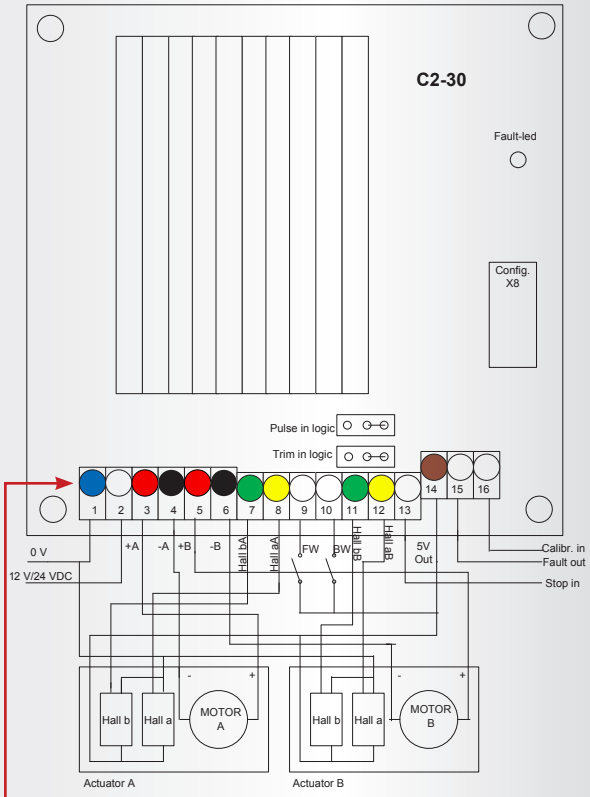
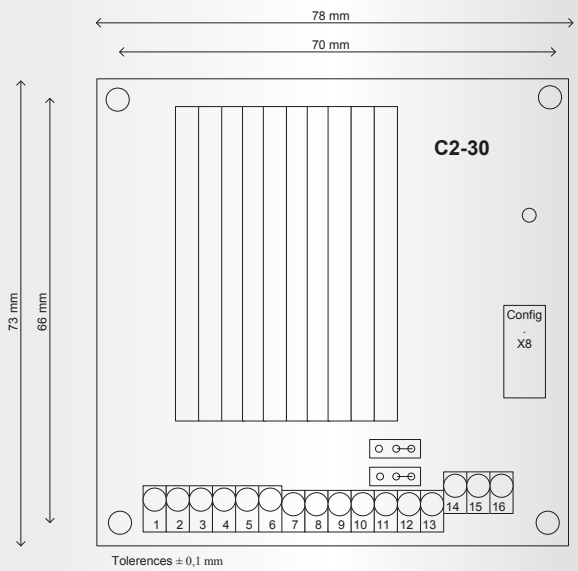
FIG. 1



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

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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)

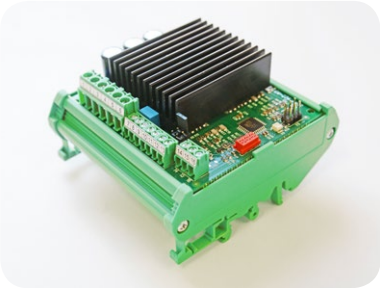
Monitoring
During normal use it is possible to monitor the function of controller with the C2-PROG. Select the monitor mode in C2-PROG and you can check the following values:
1 current, Motor A 10 - 250 = 1 - 25 A
2 current, Motor B 10 - 250 = 1 - 25 A
3 pulse count/run cycle, only motor A
4 pulse count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

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

C2-30

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