DATA SHEET

C2-30

Advanced Actuator Controller

concens⊙
- excellent electric actuators

The C2-30 is designed for driving two Concens actuators in parallel. The synchronization is achieved by adjusting actuator speed during drive. If adjustment cannot compensate unbalance between actuators the actuators will be stopped. In this way mechanical stress and breakage can be avoided. Additionally the C2-30 includes current limiter and power stage temperatur protection. The C2-30 has adjustable start and stop ramps for smooth operation.

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

For help in assembly and in other special situations, the C2-30 controller has Trim inputs for controlling both actuators individually. With these control inputs the user can override most of the limits of normal use and balance the actuators or restore the normal driving position after some unexpected occurrences.

Home-command input is for driving 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 with the handy interface C2-PROG or PC with the C2-USB Programming Cable.

Features

- Synchronized parallel driving
- Input for negative or positive pulses
- Current and temperature protection
- Settable drive speed
- Acceleration and deceletation ramps
- Different control modes
- Wide range of parameters
- Easy setting with serial interface
- Good repeatability of settings
- Autobalance feature

Technical Data

|	
Supply Voltage	12VDC/24VDC, filtered max. 20% ripple
Quiescent current	15mA
Actuator current	2x10A cont. 2x20A 25% duty
PWM frequency	2kHz
Current limit	1-20A
Temperature limit	120°C (Power stage)
Ramp times	0-2 sec
Pulse input freq.	max.1kHz
Pulse inputs	pull- up/down 10kohm (Hi/Lo; 4-30V/0-1V)
Control inputs	0-1V=OFF; 4-30V=ON (impedance 10kohm)
Fault output	Active, pull down max. 50mA
Aux. voltage output	5V/20mA
Measures	78 X 73 X 25mm
Operating temp.range	-20 to 60°C
Weight of card	110g
CE	Electromagnetic compatibility Industrial Environment

C2-30

FIG. 1
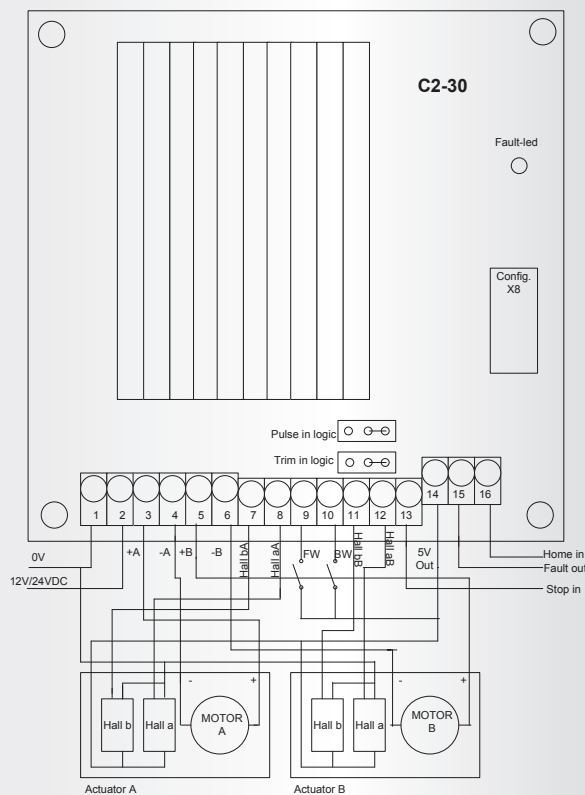
Terminals

1   **GND (0V)**

2   **Supply 12V/24V DC** (use fuse)

3   **Actuator A +**

4   **Actuator A -**

5   **Actuator B +**

6   **Actuator B -**

7   **Hall channel b actuator A (green)**

8   **Hall channel a actuator A (yellow)**

9   **Forward (out)** pos. command only

10   **Backward (in)** pos. command only

11   **Hall channel b actuator B (green)**

12   **Hall channel a actuator B (yellow)**

13   **Stop,** input for external stop input. Pos. command only.

14   **5V/20mA output** for hall and controls e.g. FW/BW command

15   **Fault output,** pulled down on alarm.

16   **Home,** starting "home-routine". Pos. command only.

Connect actuators and supply as in picture. Supply voltage 12VDC/24VDC must be filtered ripple less than 20%. Pulse inputs work with positive (PNP) or negative (NPN) pulses. Selection is made with "Pulse Logic" selection switch. All other inputs, including "Trim" works with positive commands or signals only.

Inputs/Out

■ **Pulse A and B** are for incoming feedback pulse-lines. Parameter 13 also enables the use of two pulse-lines/actuators. If chosen the input pin order is changed and trim-inputs are disabled.

■ **FW & BW** are command inputs forward/backward.

■ **Stop** input is for the use of external stop command (eg. end switches).

■ **Home** input is for starting the "drive home" routine.

■ **Trim** inputs enable driving only one actuator for setting the balance of the system or an emergency over-riding of actuators, one or both. Trim inputs are changed to Pulse B and Pulse B-90° input, if double pulse mode is chosen (par.13).

■ **Fault** output is activated in following situations:
- Difference limit exceeded
- Pulses have disappeared
- Temperature too high
- Current limit exceeded, if enabled

■ **Inputs: 4V-30V** as "high" signal level and 0V-1V as "low" signal level

■ **Output: NPN** open collector max. 50mA

FIG. 2
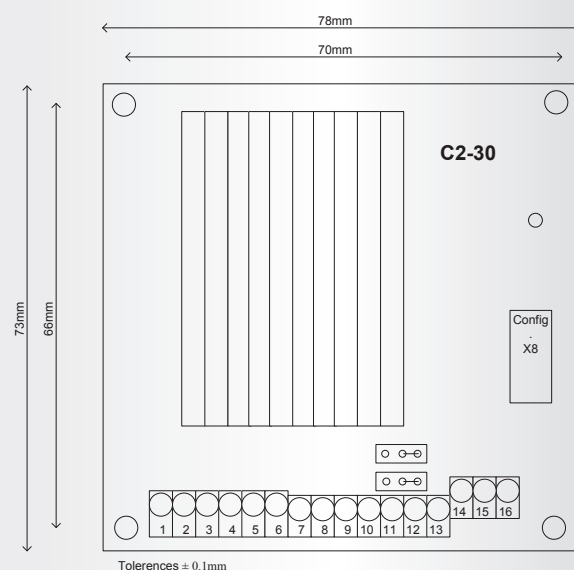
Parameter Discription

- **Running Speed** is the speed which is used in normal mode.

- **Home Speed** is the low speed used during home-routine.

- **Start- and stop ramps** define the acceleration and deceleration time to 0-100%-0 speed.

- **Current limit** is limit value for current trip. If current value is exceeded the actuators will be stopped. During the period of start ramp + 1 sec the current limit is 1,5 times the current limit set value.

- **Difference limit** is the value for largest allowable difference between A and B pulse counters. If value is exceeded actuators will be stopped.

- **Adjust behavior** defines how fast and intensively the controller will adjust the synchronization between actuators A and B. Smooth 1 Aggressive 10.

- **I-trip-indication** – fault output can be set to "on" also in current trip situation.

- **Start condition** enables the device to re-start the actuator to both or only to opposite direction after a trip or stop situation.

- **Mode** sets the control-mode. In continuous mode the actuator runs as long as command (fw or bw) is "on". In impulse mode a short command starts the actuator and the direction is changed with opposite command. Actuator will stop only with "stop" command. In "Impulse-2 mode actuator starts with short (fw/bw) impulse. Following command stops the actuator, and next command (fw/bw) starts the actuator again. Of course, in all modes the difference limit, current limit and stop-command will stop the actuators.

- **Power-on home** sets device to make drive home routine every time the power comes on.

- **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** makes it possible to use two pulse sensors for one actuator and this way the controller can always detect the right direction of movement. This is always recommended when double-pulses are available. NOTICE: the trim function is not possible to use in double pulse mode.

- **End limit fw** is a pulse counter "end stop" for FW direction. The positions is determined in pulse edges from 1-32000. Value 0 means that end stop is not in use.

- **Drive home routine** is a calibration cycle for balancing the system. Home routine can be started by giving FW and BW commands at the same time for 3 sec or with incoming signal to home input. If "power-on home" parameter is enabled the home routine is started every time when power comes on. Drive home routine can be interrupted with new FW or BW command or signal to STOP input. When drive home routine starts, both actuators start to run to same direction and will run until current limit stops the actuator or pulses stop coming. During the drive home routine the fault led is blinking slowly. When blinking stops and both actuators have stopped the device has reset the pulse counters. Now the devise is ready for use. If there is need to change the home drive direction, swap the actuator wires. In double feedback mode the hall signal wires should be swapped too (A to A-90 and B to B-90).

- **Auto balance** starts balancing routine before "real" home. 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 home direction.

Fault Situations

Actuator is jammed (current trip), pulses disappear or pulse counter difference is too high (difference limit). The controller will stop the actuators and FAULT output will be pulled down (also in I-trip if indication is enabled). When actuator is restarted the FAULT output is reset. Faults are also indicated with fault-led as follows:

2 blinks = current trip

3 blinks = pulses missing

4 blinks = difference limit

5 blinks = temperature protection

Trim and Override

Trim input allow the balance trimming and emergency use. When one of the TRIM inputs are activated only the corresponding actuator will run. During trim-run the balance adjust and pulse counters are disabled. If both TRIM inputs are activated, it is possible to override actuators and only the current limit is active.

In normal mode both switches SW1/SW2 are set to position "right". When TRIM mode is chosen SW2 is set to position "left". Remove hall-wires from 11+12. Connect 11 to 14 to move actuator A. Connect 12 to 14 to move actuator B.

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, Actuator A 10-200 = 1-20A

2 current, Actuator B 10-200 = 1-20A

3 pulse count/run cycle, only actuator A

4 pulse count difference

5 position counter A 0-32000

6 position counter B 0-32000

Feedback Pulses

Pulse inputs can work with positive or negative feedback pulses. When pulse logic switch is in negative position, the inputs are internally pulled to 5V with 10kohm resistor. When positive logic is chosen the inputs are pulled to 0V correspondingly. The controller counts pulse edges so counted value is double compared to the actual number of pulses.
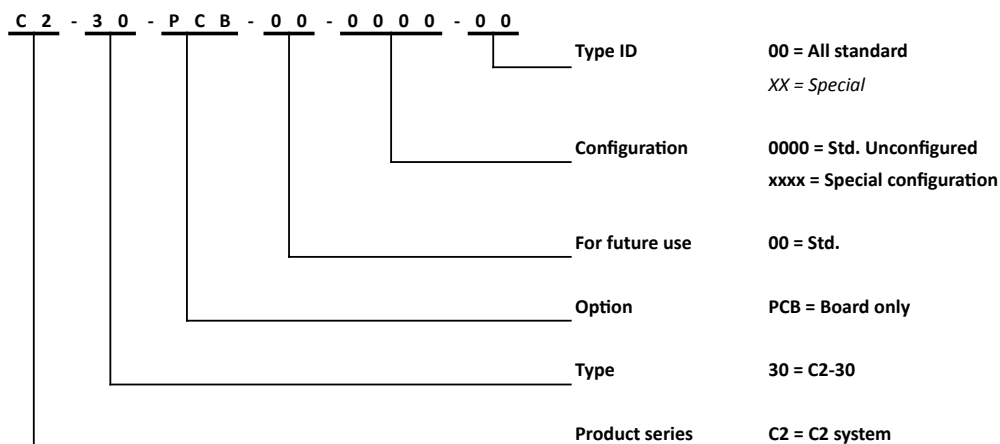
Parameter List

Connect C2-PROG or PC to the Config-connector. This can 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	Home speed	20-60%	20-60	60%
3	Start ramp	0-2sec	0-20	0.5sec
4	Stop ramp	0-2sec	0-20	0sec
5	Current limit	1-20A	10-200	5A
6	Difference limit	3-50pulses	3-50	10pulses
7	Behavior	smo->aggr	1-10	5
8	I-trip indication	disa=0; ena=1		0
9	Start condition	both dir=0; only rev if I-trip=1;	only rev if stop=2; only rev=3	1
10	Mode	cont=1; impuls=2; impuls-2=3		1
11	Power on home	disa=0; ena=1		0
12	Auto balance trigger	0-255	0-255; 0=not in use	0
13	Double pulse mode	disa=0; ena=1		1
14	End limit FW	0-32000	0-32000; 0=disabled	0

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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**
	xxxx = Special configuration
For future use	**00 = Std.**
Option	**PCB = Board only**
Type	**30 = C2-30**
Product series	**C2 = C2 system**

If something special is required write an "X"
Bold letters = standard lead time
Italic letters = longer lead time, ask Concens

C2-30-PCB-00-0000-00 (board alone)
73 x 78 x 25mm (L x W x H)

C2-PROG Programming Unit **and**
C2-USB Programming Cable for PC

Warnings and recommendations

- C2-30 has no fuse in it. Use external fuse according to application.
- Double-check correct polarity of power supply. If connected wrong C2-30 will be damaged.
- Please ensure that the power supply for the controller is capable of supplying sufficient current - otherwise controller and actuator may be damaged.
- Please adjust max current to be 10% higher than maximum current during load to ensure the longest actuator lifetime.
- Concens does not have any responsibility over the possible errors in this data sheet.
- Specifications are to be changed without notice.