

GB

USER MANUAL

icon

Linear In-line Actuator

DOC-ICON-USER-GB-00

concens



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icon

## Introduction

icon is the intelligent actuator from Concens. The integrated controller provides advanced features and enables the use of Modbus RTU on an RS-485 serial communication line.

The icon series of actuators – icon35, icon50 and icon60 – is based on the well-known con product line and has the same physical dimensions as a con35, con50 and a con60.

## Features

- Integrated controller
- Internal stroke limitation
- Internal current limitation with adjustable limits
- Internal heat protection
- Adjustable start/stop ramp
- Modbus RTU Interface on RS485
- Interconnection of up to 128 units – up to 8 units synchronous
- Plug & Play solution with conXion Box/Box+/DIN
- Free downloadable software – Concens Actuator Studio (CAS)

## Related documentation

- icon Datasheet: <https://www.concens.com/information/downloads/>
- icon Quick Guide: <https://www.concens.com/information/downloads/#manual>
- conXion Box/Box+/DIN Installation Guide: <https://www.concens.com/information/downloads/#manual>



icon Datasheet



icon Quick Guide &  
conXion Installation Guide

Ensure that the actuator is fixed in both its end brackets before use, as this will result in incorrect positioning.

## icon configurations

icon actuators come in six different factory configurations as shown in the table below.

icon configurations	SDB Single Actuator Direction Control Basic IO	SDH Single Actuator Direction Control Hall Output	SDP Single Actuator Direction Control Position Output	SPP Single Actuator Position Control Position Output	SBS Single Actuator BUS Control Status/Control IO	MDO Multiple Actuators Direction Control Override
Configuration letter	A	B	C	D	E	F
Voltage 12/24 VDC	✓	✓	✓	✓	✓	✓
Direction in/out	✓	✓	✓	-	-	✓
5/10 VDC ref. output	-	-	-	✓	-	-
Stop input	-	-	-	-	✓	-
Override input	-	-	-	-	-	✓
Error output	-	-	-	-	✓	-
Analog position input	-	-	-	✓	-	-
Analog position output	-	-	✓	-	-	-
Stop input/Pos. OK output	-	-	-	✓	-	-
Hall Output	-	✓	-	-	-	-
Single actuator setup						Multi actuator setup

All icon actuators come with an 8-pin Molex Mini fit JR connector unless specified otherwise and the connections for each configuration are shown in the table below.

Configuration	SDB	SDH	SDP	SPP	SBS	MDO
Description	Single/ Direction/Basic	Single/ Direction/Hall	Single/Direction/ Position	Single/Direction/ Position	Single/Bus/ Status	Multiple/ Direction/Override
Configuration letter	A	B	C	D	E	F
No./Color						
Yellow (2)	RS485 TX +A	RS485 TX +A	RS485 TX +A	RS485 TX +A	RS485 TX +A	RS485 TX +A
Green (1)	RS485 RX -B	RS485 RX -B	RS485 RX -B	RS485 RX -B	RS485 RX -B	RS485 RX -B
Orange (3)	GND Signal	Hall B output	GND Signal	GND Signal	GND Signal	GND Signal
Black (4)	GND Power	GND Power	GND Power	GND Power	GND Power	GND Power
White (7)	Not used	Hall A output	Position output	5-10 V reference	Not used	Override
Brown (6)	Dir. IN	Dir. IN	Dir. IN	Pos ok/stop input	Error out	Dir. IN
Blue (5)	Dir. OUT	Dir. OUT	Dir. OUT	Position input	Stop input	Dir. OUT
Red (8)	Power 12/24 V	Power 12/24 V	Power 12/24 V	Power 12/24 V	Power 12/24 V	Power 12/24 V

**For all configurations except SDH, Signal GND (pin 3) and Power GND (pin 4) must be connected at the end of the actuator cable, i.e. at the Molex Minifit jr. connector.** This connection is established inside the conXion units but can be removed with a jumper. Please refer to the installation manual for further details.

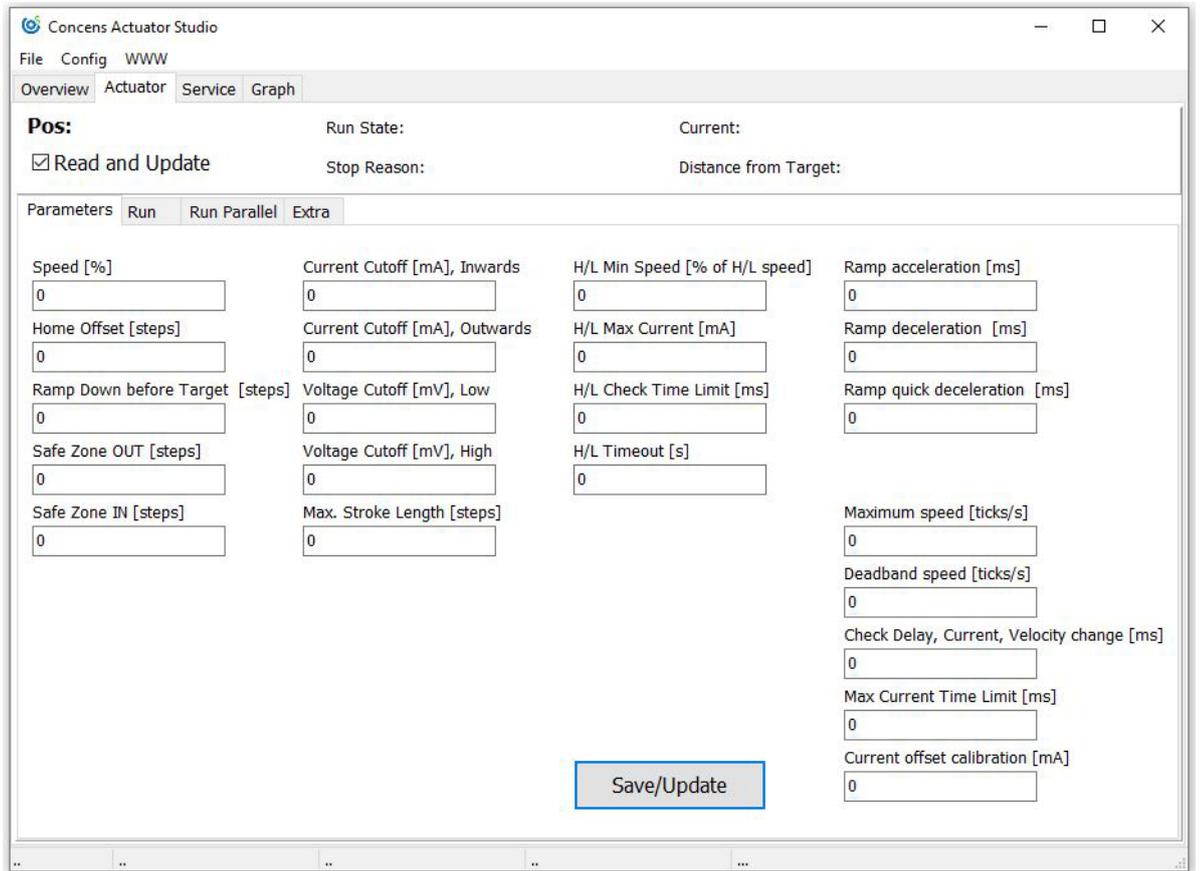
The numbers in the (parentheses) refer to the Molex Minifit layout.

Please find further information on jumper settings for the conXion Box, Box+ and DIN versions in the conXion - Installation Guide:

<https://www.concents.com/information/downloads/#manual>

## Concents Actuator Studio

Concents Actuator Studio (CAS) is the software package, which is used to set the parameters and control the actuators during the development and test phase.



CAS can be downloaded free of charge from the Concents website:

<https://www.concents.com/information/downloads/#software>



To connect the icon actuator to CAS, we recommend using the Concents programming cable as shown below in conjunction with the conXion box, box+ or DIN.

Concents Actuator Studio (CAS)



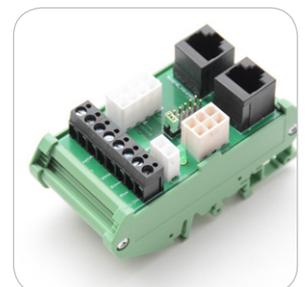
**Programming cable**  
CC-874-01-0000-00-00



**conXion Box**  
CC-971-07-0000-00-00

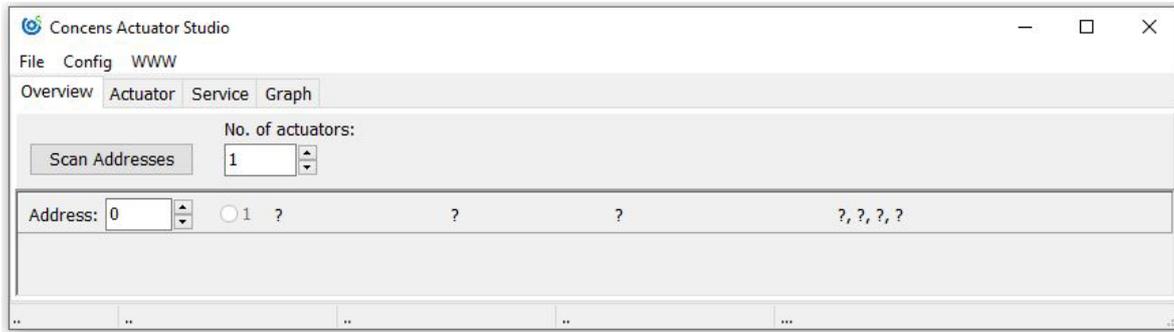


**conXion Box+**  
CC-971-05-0000-00-00



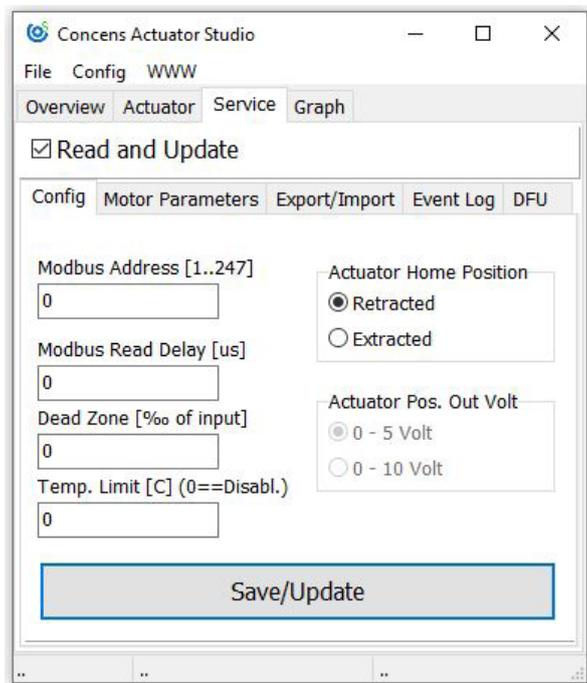
**conXion DIN**  
CC-971-06-0000-00-00

When CAS is started, it initially shows a window with information about version etc. This window closes automatically after 10 seconds or can be closed manually after which the overview screen appears.



The number of icons connected can be adjusted, and the number of lines shown in the overview window will change accordingly. Only one icon at a time can be active and operated in CAS. However, it is possible to see all actuators in the overview. If an actuator is recognized the uptime counter will be counting if "Active" is ticked.

When more icons are connected, they must have different addresses. All single setup icons come with default address 8. This can be changed under the "Service/Config" tab. Enter new address in "Modbus address" and click "Save/Update".



Address range for single actuators is 1 to 199. Multi setup icons (MDO) are preset to addresses from 200 to 207 with 200 being "Master" (please refer to MDO section).

## Basic operation

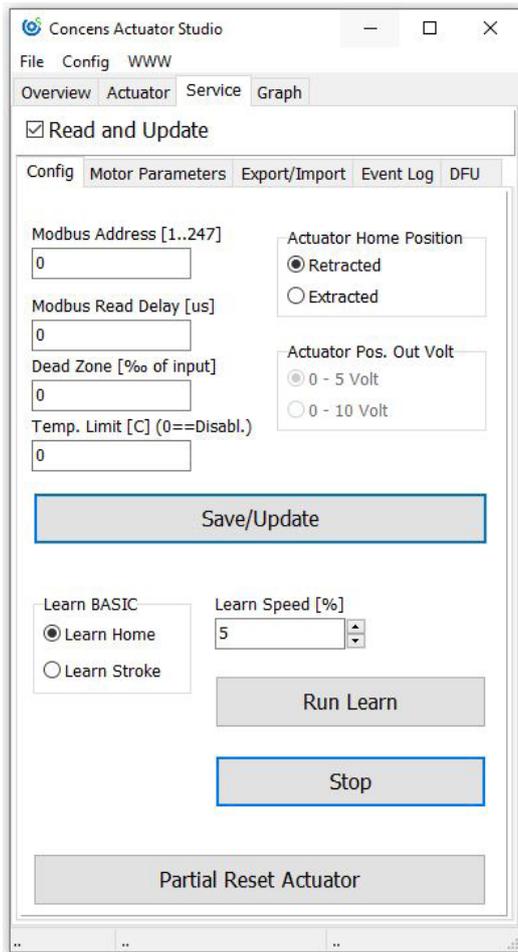
icon actuators use pulses generated by motor revolutions to control the position and to synchronize more actuators running in a multiple actuator setup.

All icon actuators are configured and initialized from factory, but it may be required to perform additional initialization during installation to ensure proper operation. This is done using the "Home" and "Learn" functions in CAS. Home returns the piston to the fully retracted position and stores this position as "Home" (Position 0). The Learn function runs a full cycle and determines both fully retracted and fully extracted positions of the piston. Please note that these positions may be determined by physical limitations in the mechanical design of the application and not by the end positions of the actuator.

Before performing a "Home" or "Learn" cycle the actuator(s) need to be pinned or installed in both the rear and front bracket. Otherwise the piston can spin and give an incorrect result.

Click the "Run Learn" under the "Service/Config" tab to perform a learn cycle. If required by the application, "Home" position can be changed to fully extracted position and, speed during learn can be adjusted. All actuators in a multi-actuator setup must be "Homed" individually.

If pin 5 and pin 6 are connected to GND simultaneously for more than 10 seconds, Homing/Learning is started. During this the actuator will travel at a lower speed and it is important that neither of the brackets can rotate freely. 0-point - (Homing) and maximum stroke length (Learning) are saved during this cycle.



Please note: Learn will reset settings for "Range Scale".

Performing a Learning without having access to the CAS software can be done by using either the handset or conXion Box+ by pressing and holding both in and out buttons for 10 seconds.

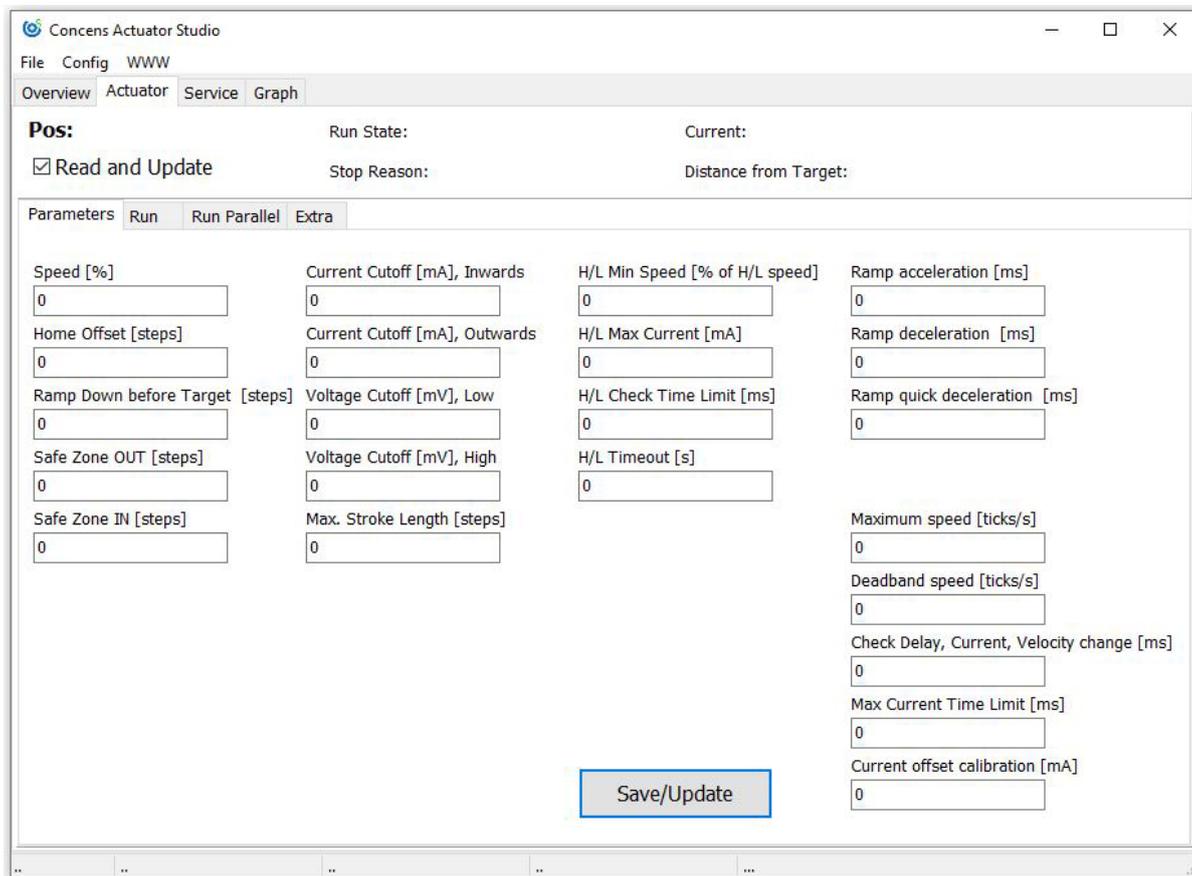
Depending on the original setting of the "actuator home position" the end position will either be Retracted or Extracted after performing the Learning process.

Safe zones can equally be set without having access to the CAS software by using the handset or conXion Box+.

Setting the safe zone out is done by pressing both buttons for 5 seconds and then pressing out button.

Setting the safe zone in is done by pressing both buttons for 5 seconds and then pressing in button.

Other basic parameters that can be adjusted under the “Actuator/Parameters” tab.



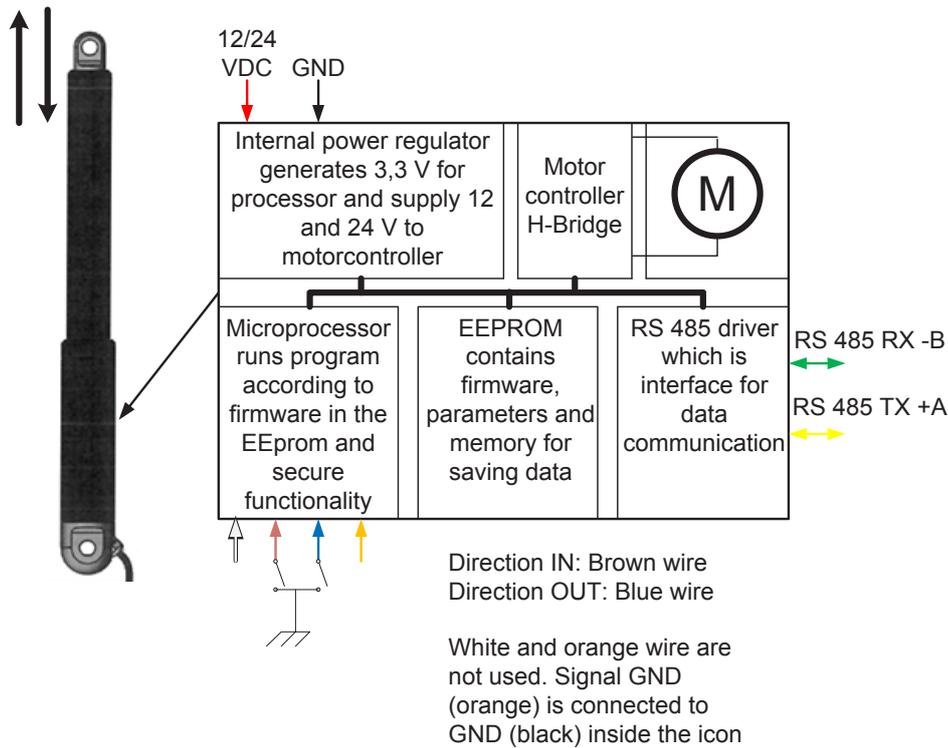
As a part of a learn cycle, “Safe Zone” values are default set to 50 steps (Backwards) and full stroke-50 steps (Forward). If the stroke length is entered manually, it is necessary also to enter Safe Zone values.

### icon SDB (Single Actuator/Direction Control/Basic IO)

The icon SDB is the basic version of the icon family. It is recognized by the capital letter A in the part number (e.g. 350100-713232A020000). The SDB version can be used as a “Plug and Play” solution controlled by a simple handset, two dry contacts or by a PLC. The conXion Box/Box+/DIN can be used as an interface. Please refer to conXion Box/Box+/DIN documentation for further details.

#### Block diagram

A block diagram for the icon SDB configuration is shown below:



Please Note:

White, Brown, Blue and Orange wire have different functionality according to configuration.

See Data sheet for more information.

SDB Pin Assignment		
Pin no.	Wire color	Function
1	Green	RS485 -B
2	Yellow	RS485 +A
3	Orange	GND signal
4	Black	GND
5	Blue	Direction OUT
6	Brown	Direction IN
7	White	Not used
8	Red	Power (12 or 24 VDC)



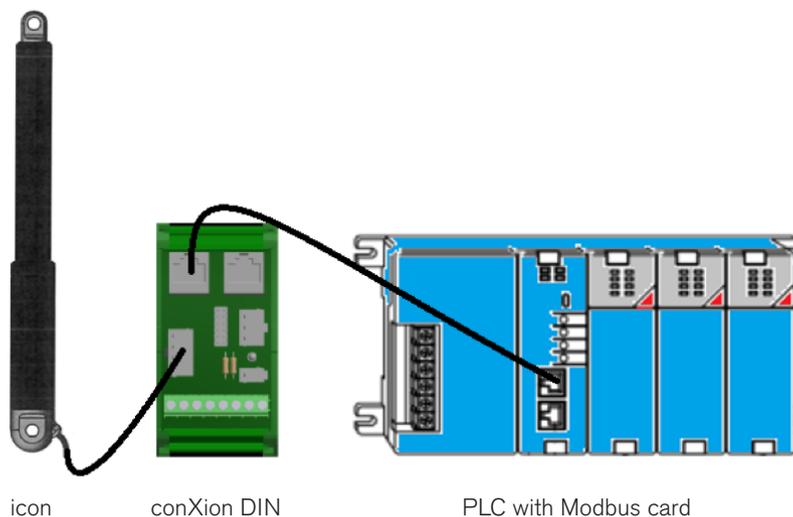
Pin numbers refer to Molex 8-pin connector. Signal GND and Power GND is connected inside the icon.

SDB has inputs for direction (in/out). Pin 5 and pin 6 are used for direction commands. They are active low and must be pulled to power GND to activate.

**Interconnection/Modbus control**

The icon SDB can also be controlled via Modbus with the same functions as mentioned above. More SDB icons can be connected to the same bus if they have individual addresses. If controlled with Modbus it is still possible to override with input from the handset or contacts. However, the handset or contact-set should be, either common for all icons or each would need its own.

Application example with an icon connected to PLC with Modbus interface via conXion DIN:

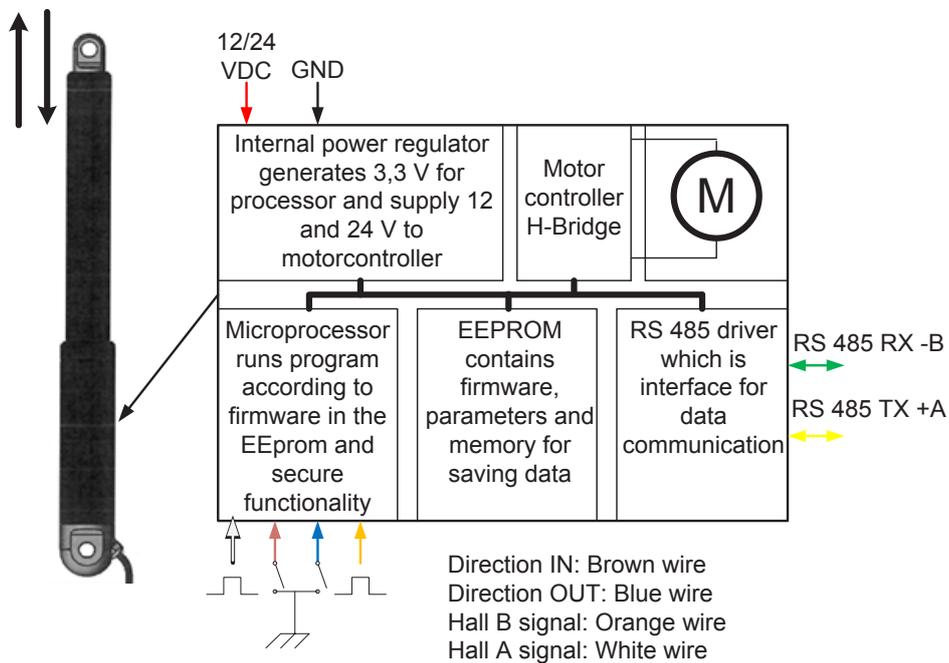


### icon SDH (Single Actuator/Direction Control/Hall output)

The SDH configuration of icon provides the same features as SDB and in addition to this, it has outputs for hall signals. SDH is recognized by the capital letter B in the part number (e.g., 350100-713232B020000). The SDH version can work as a “Plug and Play” solution controlled by a simple handset with two dry contacts or by a PLC. The conXion Box/Box+/DIN is used as an interface for these options. Please refer to conXion Box/Box+/DIN documentation for further details.

#### Block diagram

A block diagram for the SDH configuration is shown below:

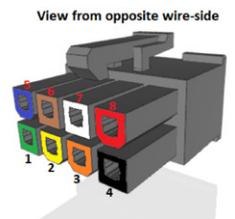


Please Note:

White, Brown, Blue and Orange wire have different functionality according to configuration.

See Data sheet for more information.

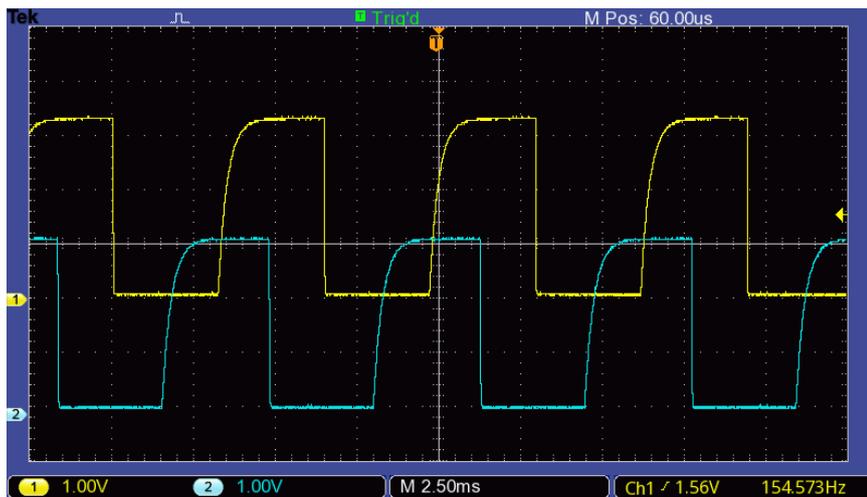
SDH Pin Assignment		
Pin no.	Wire color	Function
1	Green	RS485 -B
2	Yellow	RS485 +A
3	Orange	Hall B signal
4	Black	GND
5	Blue	Direction OUT
6	Brown	Direction IN
7	White	Hall A signal
8	Red	Power (12 or 24 VDC)



SDH has inputs for direction (in/out) and two channel hall outputs. Pin 5 and pin 6 are active low and must be pulled down to power GND to activate. The hall channels at pin 3 and pin 7 are 3.3 Vpp square wave signal (max 5mA) with a 50% duty cycle and a 90° phase shift. Hall outputs are NPN logic TTL level.

If pin 5 and pin 6 are connected to GND simultaneously for more than 10 seconds, Homing/Learning is started. During this the actuator will travel at a lower speed and it is important that neither of the brackets can rotate freely. 0-point - (Homing) and maximum stroke length (Learning) are saved during this cycle.

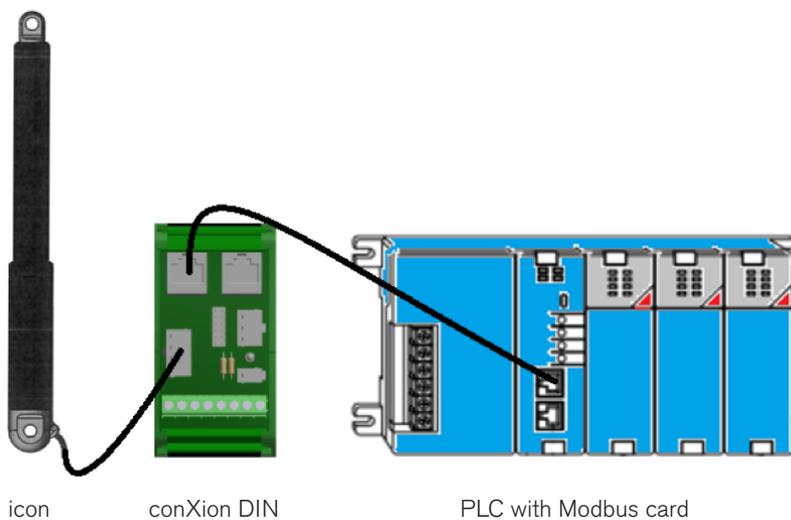
Special function for SDH is hall output at pin 3 (hall A) and pin 7 (hall B)



**Interconnection/Modbus control**

The icon SDH can also be controlled by Modbus but with the same limitations as already mentioned. You can add numerous SDH icons to your application if each is provided with an individual address. If controlled with Modbus it is still possible to override with an analogue input from the handset or contacts. However, the handset or contact-set should be, either common for all icons or each would need its own.

Application example with an icon connected to PLC with Modbus interface via conXion DIN:

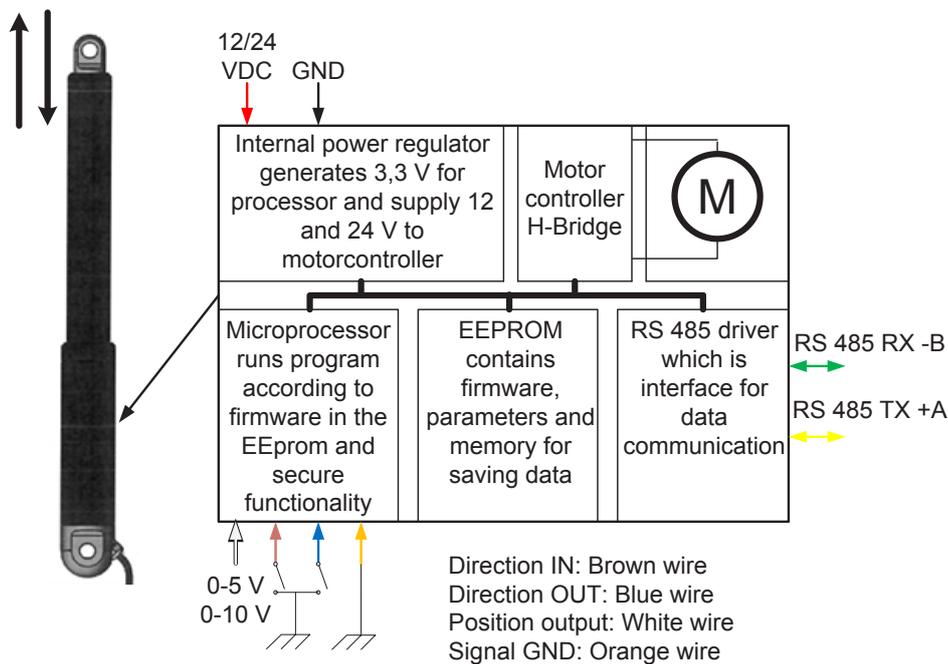


### icon SDP (Single Actuator/Direction Control/Position output)

The SDP configuration of icon provides the same features as SDB and in addition to this, it has an analogue position output. SDP is recognized by the capital letter C in the part number (e.g., 350100-713232C020000). The SDP version can work as a “Plug and Play” solution controlled by a simple handset with two dry contacts or by a PLC. The conXion Box/Box+/DIN can be used as an interface. Please refer to conXion Box/Box+/DIN documentation for further details.

#### Block diagram

A block diagram for the SDP configuration is shown below:

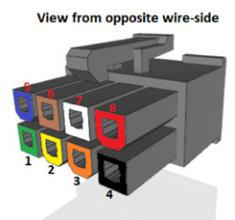


Please Note:

White, Brown, Blue and Orange wire have different functionality according to configuration.

See Data sheet for more information.

SDP Pin Assignment		
Pin no.	Wire color	Function
1	Green	RS485 -B
2	Yellow	RS485 +A
3	Orange	GND signal
4	Black	GND
5	Blue	Direction OUT
6	Brown	Direction IN
7	White	Position voltage output
8	Red	Power (12 or 24 VDC)



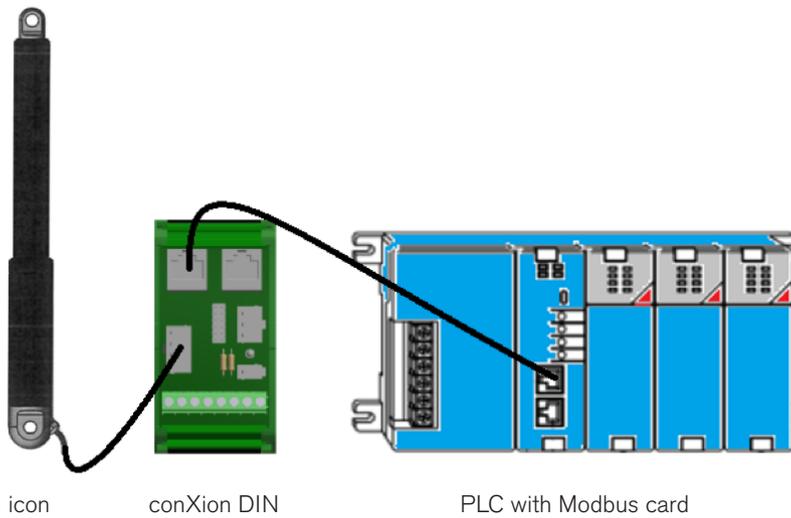
Numbers refer to pin layout of the 8-pin Molex plug of the icon.

SDP has inputs for direction (in/out), and analog feedback output for position. The inputs for direction at pin 5 and pin 6 are active low and must be pulled to power GND to activate. Pin 7 is an analog output that relate to the actual position of the piston. The output has two ranges, which can be selected in CAS: 0-5 VDC and 0-10 VDC for 24 VDC icons, but only 0-5 V range for 12 VDC icons. Power GND and Signal GND must be connected at the PLC or at the end of the cable. If pin 5 and pin 6 are connected to GND simultaneously for more than 10 seconds, Homing/Learning is started. During this the actuator will travel at a lower speed and it is important that neither of the brackets can rotate freely. 0-point - (Homing) and maximum stroke length (Learning) are saved during this cycle. The "homing" process can only be performed from the CAS software.

**Interconnection/Modbus control**

The SDP configuration can also be controlled by Modbus but with the same limitations as already mentioned. You can add numerous SDP icons to your application if each is provided with an individual address. If controlled with Modbus it is still possible to override with analog input from handset or contacts. However, the handset or contact-set should be, either common for all icons or each would need its own.

Application example with an icon connected to PLC with Modbus interface via conXion DIN:



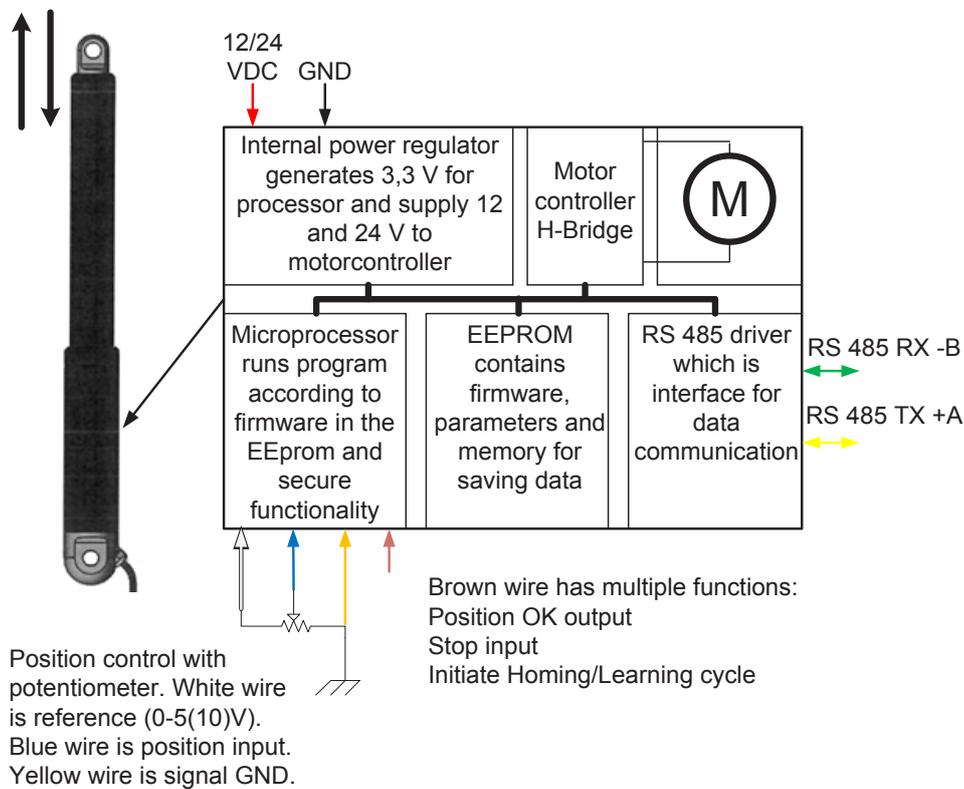
icon SPP (Single Actuator/Position control/Position output)

The SPP configuration of icon has the same feature as SDB and in addition to this it has is an analog position input and a position OK output. It is recognized by the capital letter D in the part number (e.g., 350100-713232D020000). With SPP the position of the actuator can be controlled by an analogue voltage, i.e. 5 VDC will move the piston to 50% of the stroke if 10 VDC input range is used. The conXion Box/Box+/DIN are used as an interface for these options, but you are free to use other options. Please refer to the conXion Box/Box+/DIN documentation for further details.

Modbus control is not recommended with the SPP configuration as the analogue input always has higher priority than Modbus commands.

Block diagram

A block diagram for the SPP configuration is shown below:

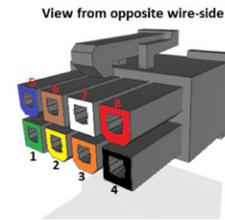


Please Note:

White, Brown, Blue and Orange wire have different functionality according to configuration.

See Data sheet for more information.

SPP Pin Assignment		
Pin no.	Wire color	Function
1	Green	RS485 -B
2	Yellow	RS485 +A
3	Orange	GND Signal
4	Black	GND
5	Blue	Position input
6	Brown	Position ok output/stop input
7	White	5 – 10 VDC reference
8	Red	Power (12 or 24 VDC)



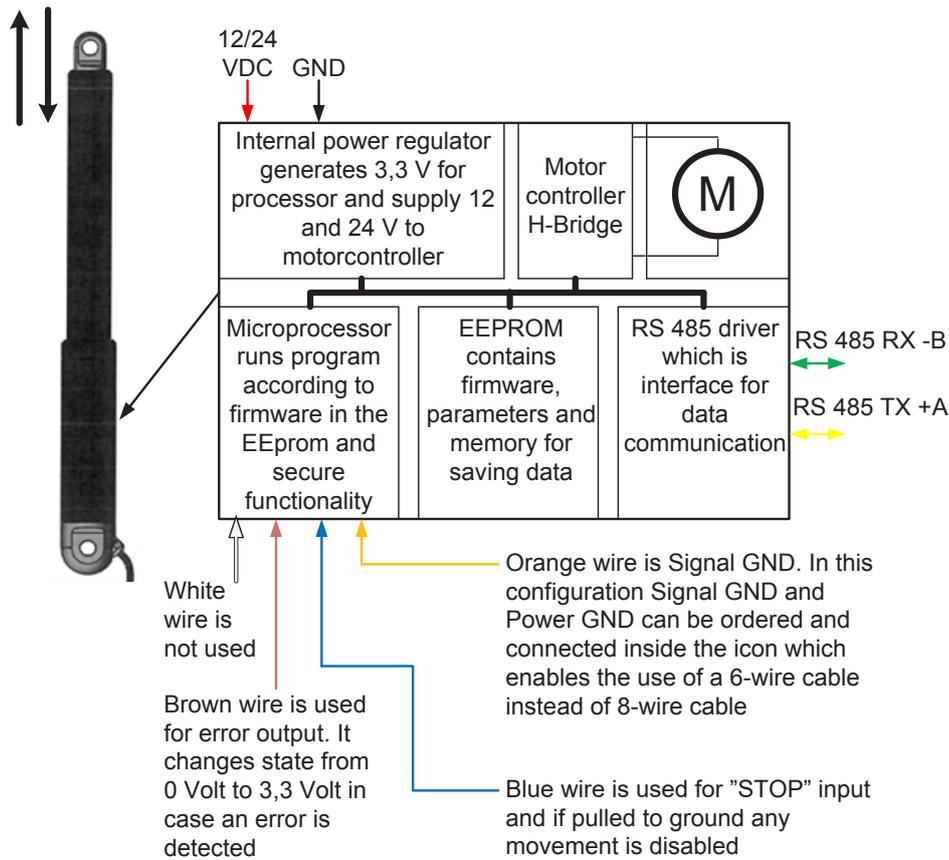
The icon SPP has an analog input for positioning at pin 5 and a reference output at pin 7. Reference voltage is selectable via CAS, i.e. 5 or 10 VDC (5 VDC only for 12 VDC actuators). Pin 6 has combined purpose for "Position OK", "STOP", and "Home/Learn". Under normal conditions pin 6 is "high" (3.3 VDC/max 5mA) when the actuator is moving. When the target position is reached it signals "Position OK" by switching to 0 V (low) and the actuator stops. In addition to this, pin 6 can also be used as an input by pulling it down to GND. This will stop the actuator. If pin 6 is connected to pin 5 during power up the Homing/Learning cycle is activated.

### icon SBS (Single Actuator/Bus control/Status control IO)

The SBS configuration of icon is designed for Modbus communication and control only. It has, however, one digital stop input and one digital error output. SBS is recognized by the capital letter E in the part number (e.g. 350100-713232E020000).

#### Block diagram

A block diagram for the SBS configuration is shown below:



Please Note:

White, Brown, Blue and Orange wire have different functionality according to configuration.

See Data sheet for more information.

SBS Pin Assignment		
Pin no.	Wire color	Function
1	Green	RS485 -B
2	Yellow	RS485 +A
3	Orange	GND Signal
4	Black	GND
5	Blue	Stop input
6	Brown	Error output
7	White	Not used
8	Red	Power (12 or 24 VDC)

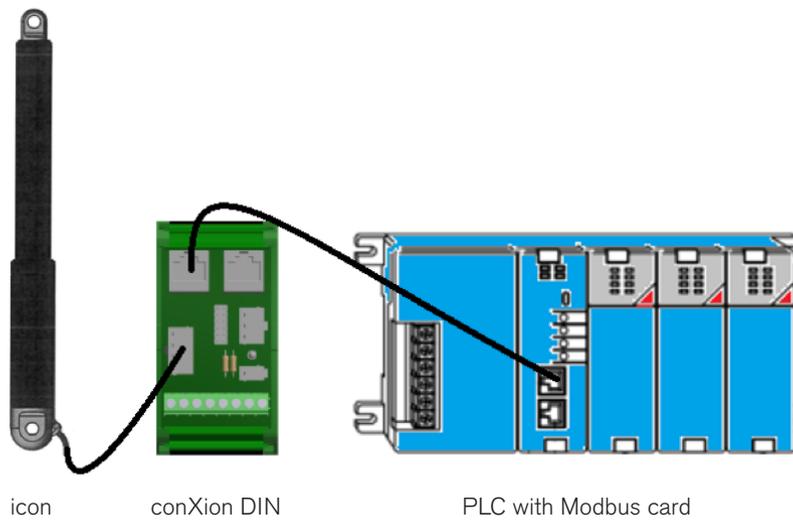


Pin 5 (active low) is a digital stop input, which disables the motor drivers in the icon completely. Pin 6 (active high) is a fault output. Any fault detected is indicated by a change from 0 VDC to 3.3 VDC at this pin. Pin 3 is a signal GND connection.

The conXion Box/Box+/DIN can be used as an interface. Please refer to the conXion Box/Box+/DIN documentation for further details.

### Interconnection/Modbus control

The interconnection of icon SBS is illustrated below. Up to 10 icons can be connected in the same setup without additional hardware. More than 10 units require a Modbus hub or similar.



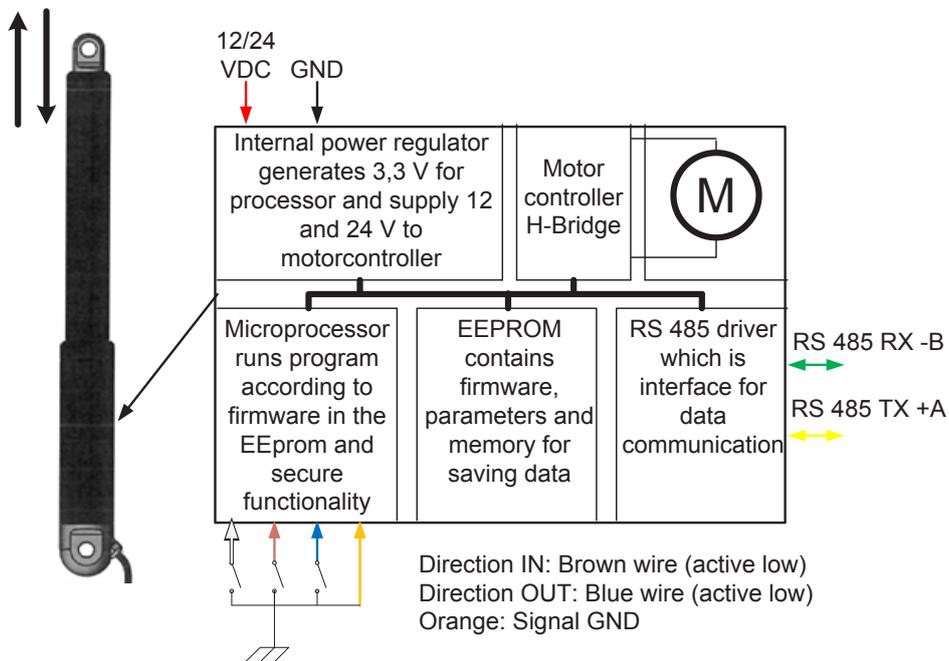
### icon MDO (Multiple actuator/Direction control/Override)

The icon MDO is designed to work in a multi-actuator setup. It allows up to eight icons to run synchronized sharing a common load based on the master/slave principle. MDO is recognized by the capital letter F in the part number (e.g. 350100-713232F020000).

The conXion Box/Box+/DIN can be used to cascade the actuators to simplify wiring etc. Please refer to the conXion Box/Box+/DIN documentation for further details. Each conXion needs it's own connection to the main power supply. It is not possible to control an MDO setup via Modbus as this bus is used for synchronization purposes.

#### Block diagram

A block diagram for the MDO configuration is shown below:



White wire is used for Override. In normal state voltage level is 3.3 V, when Override is activated it is pulled to ground (0 V = active low)

Please Note:

White, Brown, Blue and Orange wire have different functionality according to configuration.

See Data sheet for more information.

MDO Pin Assignment		
Pin no.	Wire color	Function
1	Green	RS485 -B
2	Yellow	RS485 +A
3	Orange	GND Signal
4	Black	GND
5	Blue	Direction OUT
6	Brown	Direction IN
7	White	Override (active low)
8	Red	Power (12 or 24 VDC)



All actuators in an MDO setup must have different addresses with the master being number 200 and slaves counting from 201 to 207. All other parameters in the icons must be identical. This is configured from factory but can be changed via CAS.

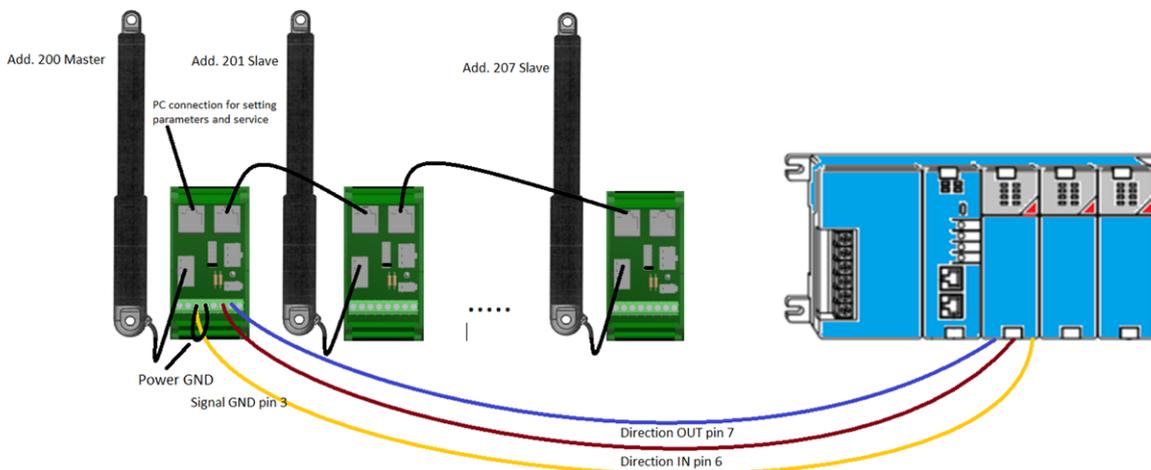
Please refer to the Basic Operation section to perform Homing of the actuators and please note that all actuators in an MDO setup must be Homed individually.

Pin 5 and pin 6 of the master icon are used to control the actuators out and in respectively. Both pins are active low, i.e. they need to be pulled down to GND to activate.

Pin 7 is an override input (active low), which enables individual travel (adjustment) of one actuator in the setup. After activating pin 7, pin 5 and pin 6 on the specific actuator can be used to move the piston.

### Interconnection

The figure below shows an MDO setup with conXion DIN units connected to a PLC using the Direction Out and Direction In pins on the master actuator. Please refer to Installation Guide for conXion Box/Box+/DIN for details about interconnections etc.



icon Accessories - incl. Part No.

Part No. for our conXion products and the optional accessories



**conXion Box**  
CC-971-07-0000-00-00



**conXion Box+ with buttons In/Out**  
CC-971-05-0000-00-00



**conXion DIN**  
CC-971-06-0000-00-00



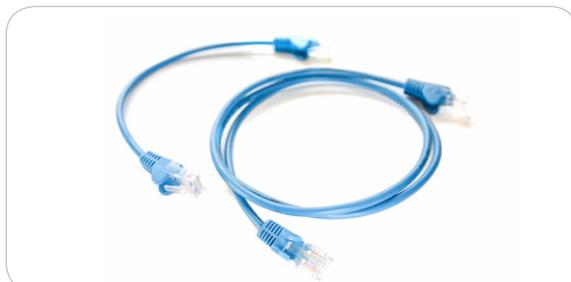
**Power supply 24VDC/2A w/cable (EU/UK/US/AU)**  
CC-980-02-0000-00-01



**Programming cable**  
CC-874-01-0000-00-00



**Handset - Online configurATOR (C3/4)**  
CC-HST-001920-011000



**conXion cable, 0,25 m** CC-875-01-0000-00-00  
**conXion cable, 1 m** CC-875-02-0000-00-00  
**conXion cable, 5 m** CC-875-03-0000-00-00  
**conXion cable, 10 m** CC-875-04-0000-00-00  
**conXion cable, 20 m** CC-875-05-0000-00-00



**Concens Free Downloadable software CAS**  
(Concens Actuator Studio)

## Contact information

For further information or a product demonstration, do not hesitate to contact our Partner near you, or us directly if there is no local presence in your country.

- Find your local partner here - [Concens contacts](#)
- Contact us directly - [sales@concens.com](mailto:sales@concens.com)
- Or give us a call: +45 7011 1131

## Recommendations and warnings

- Wrong polarity of power supply can damage the actuator.
- Be sure to use a power supply, which can provide at least 150% of nominal power of each actuator.
- Concens is not responsible for damage or injury caused by customer modification of the default actuator parameters.

## 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. Concens products must not be used in safety critical applications.
- 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](http://www.concens.com)

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