

# LM.60i

## Manual



**Always keep this manual near the motor**

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Panningen (the Netherlands)

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This publication has been compiled with the greatest of care. If you should discover any errors, please inform Fancom B.V.

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## EC-declaration of compliance

Manufacturer Fancom B.V.  
Address Industrieterrein 34  
City Panningen (the Netherlands)

Hereby declares that the: **LM.60i**

Satisfies the conditions set out in:

1. The Low Voltage directive 2006/95/EC  
According to EN-61010
2. The Machine directive 2006/42/EC  
Winches motor driven NEN-EN 14492-1:2006
3. The EMC-directive 2004/108/EC  
Emission according to NEN-EN 61000-6-3:2001  
Immunity according to NEN-EN 61000-6-2:2001

City: Panningen

Date: 03-05-2010



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## About this manual

This manual has been written for the installer and the user of Fancom actuators and contains information about the installation and working, as well as service to the actuators.

### For the installer

Read this manual carefully and observe all safety instructions before making any installer settings and preparing the actuator for further use.

### For the user

This manual also contains a section for users, which contains all the information required for daily use.

If you have any questions, please contact your local Fancom sales & Service Centre.

The table of contents lists the subjects discussed in this manual.

Fancom uses the following symbols in this manual:



Suggestions, advice and remarks with additional information.



### Caution

Warning indicating damage to the product if procedures are not carefully observed.



### Caution

Warning indicating life threatening situation if procedures are not carefully observed.

## 1. Introduction

The Fancom LM.60i is a 24Vac winch motor with built in intelligence. The LM.60i is used in combination with a Fancom control computer to regulate air inlets in the agricultural sector.

The LM.60i can be used as a conventional end station, controlled via a 0-10/10-0Volt signal or as an IO-net module in a Fancom IO-Network.

As an IO-net module the intelligent module can measure the temperature and take over control in the event of an emergency. There are also features for internal and external emergency power supply. And a connection for manual operation for remote changes to controls.

For correct operation, the minimum and maximum position must be set beforehand.



### **Maintenance**

No maintenance is necessary to the LM.60i .

## 2. Technical specifications

### Power supply

Mains voltage	24 Vac (± 10%)
Emergency voltage	24 Vdc (± 10%)
Mains frequency	50/60Hz
Max. current used	0.8A
Power consumption	20W
Battery	2x12Vdc
PF input (Power Fail)	close contact

### Control

Voltage input (Analogue input) or I/O-net	0-10Vdc (10-0Vdc) Digital
---	------------------------------

### Drive

Pulling torque	max. 60 Nm
Holding torque	max. 50 Nm
Pulling capacity	210kg (ø 50mm)
Holding capacity	175kg (ø 50mm)
Min. number rotations	0,8
Max. number rotations	2,7
Running speed	1,2 rot/min
Min.-max. stroke length (ø 50mm) *	12,5-40 cm
Min.-max. stroke length (ø 65mm) *	16-53 cm

### Manual operation

Rotary switch	Closed -0- aut. - 0 - open
Potmeter input (for manual override on distance) and/or max. thermostat (if control via I/O-net)	10kΩ - close, 0kΩ - open, ∞ - no manual override

### Housing

Plastic housing with screw on lid	IP54
Dimensions (l×w×h)	284x237x182mm
Weight (unpacked)	4.7kg

### Ambient climate

Operating temperature range	0°C to +40°C (32°F to 104°F)
Storage temperature range	-10°C to 50°C (14°F to 112°F)
Relative humidity	< 95%, uncondensed

\*) 4 mm cable



**Accessories (optional)**

Battery pack	(A5160009)	2x12Vdc / 0,8 Ah
Cable reel	(A5450004)	∅ 50mm
Pipe tube connection	(A5459011)	∅ 1 inch
CE-protection cover	(A5459007)	
Temperature sensor	(A5045011)	Range -50+110°C Resolution 0,1°C
Manual potentiometer on distance	(A5130150)	10k
Max. thermostat	(A3040012)	Instead of or in combination with Manual potentiometer

### 3. Safety instructions and warnings

Installation of and solving any malfunctions should only be carried out by an authorised electro-installer, according to the prevailing regulations.

1. Check the actuator after unpacking for any transport damage. Report any damage to your supplier immediately. Never install a damaged actuator!
2. Read the safety instructions carefully before installing and using the actuator.
3. Mount the actuator in the installation, before setting the installation into operation.



Never touch any rotating parts of the actuator!

4. Check the actuator regularly for correct functioning.
5. Prevent electrostatic discharge (ESD)



Fancom cannot be held liable for any damage caused by incorrect mounting and/or non-or partial functioning of the entire installation.



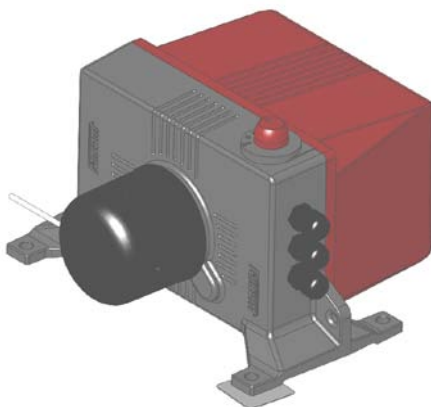
If the product in whatever form or version is modified and/or altered, any right to the guarantee and support offered by Fancom will be become null and void.

## 4. Mounting and Installation

### 4.1. Introduction

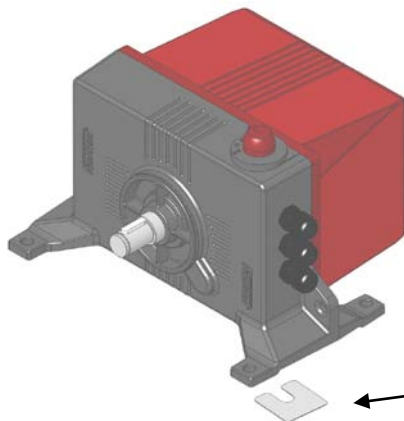
When mounting/installing the module, pay attention to the following points:

- Mount the actuator where the weather can have no direct influence; not in direct sunlight, or in places where the temperature can rise to extremes etc.
- Mount the actuator module in a place where the manual operation is easy to access.
- If the actuator is mounted within reach of people or animals (lower than 2.5 m above the floor) , a CE-protection cover must be mounted over the shaft (**article number A5459007**).
- It is advisable to seal all swivels after the actuator module has been connected. This will prevent the entry of moisture, dust and/or aggressive gasses.
- Preferably do not mount the LM.60 with the drive shaft upwards, otherwise water may enter the motor via the drive shaft. If mounting the actuator with the shaft pointing upwards is unavoidable, place a CE-protection cover over the shaft. (**article number A5459007**). this will offer extra protection against the ingress of water



## 4.2. Mechanical mounting

- Used the drilling jig supplied for the correct pattern of holes.
- Mount the actuator module solidly on a level surface; preferable with the swivels underneath.



If the mounting surface is not level, use the filling plates supplied ( 0.5 resp 1.0mm thick).



Ensure there is enough space to be able to remove the cover

### 4.2.1. Mounting the cable reel

⇒ See Mounting cable reel on page 31

### 4.2.2. Mounting steel wire on cable reel

⇒ See Mounting steel wire on page 32

### 4.2.3. Mounting CE-cover

⇒ See Mounting CE-protection cover on cable reel on page 33

## 4.3. Electrical connections

### 4.3.1. Introduction

#### Observe all regulations of the electricity company



Only apply power after the wiring has been connected correctly.



The actuator must be correctly earthed.

Connect the earth wire on the connection cable to the earth clamp , on the inside of the motor housing.

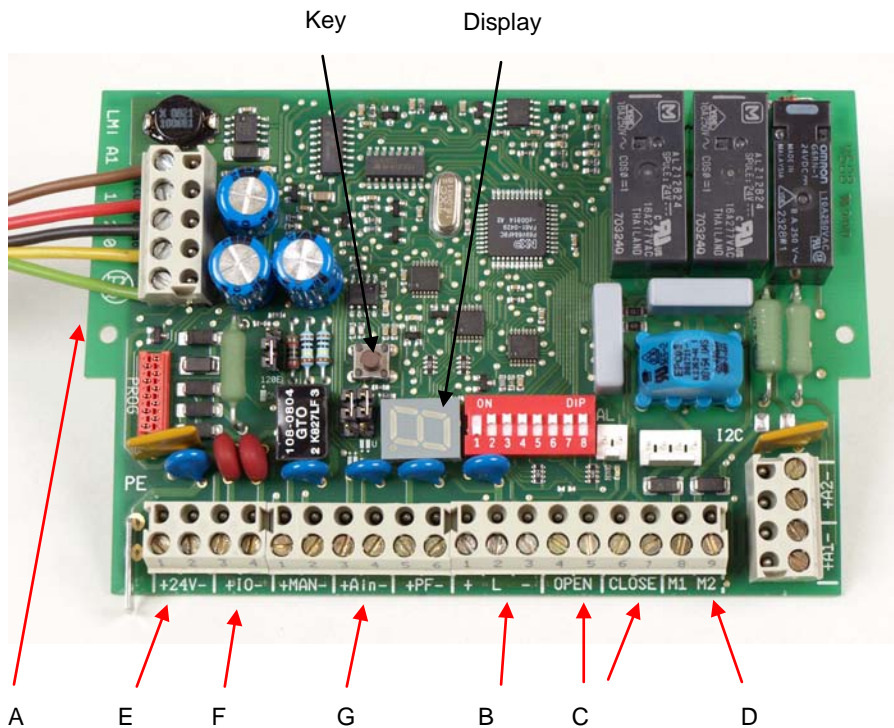
- Follow all the instructions on the connection diagrams.
- Use the correct wiring for the correct connections.
- Connect the LM60i to the correct supply voltage.
- Mount all wiring/cables so they cannot be damaged and can easily be replaced in the event of a malfunction.
- If metal cable channels are used, Fancom advises earthing the channel at Begin and end of the channel, and as often as possible at other points.



Limit the length of the signal cables as much as possible;

Separate heavy current and weak current cables. Crossings are allowed.

## 4.3.2. Print connections

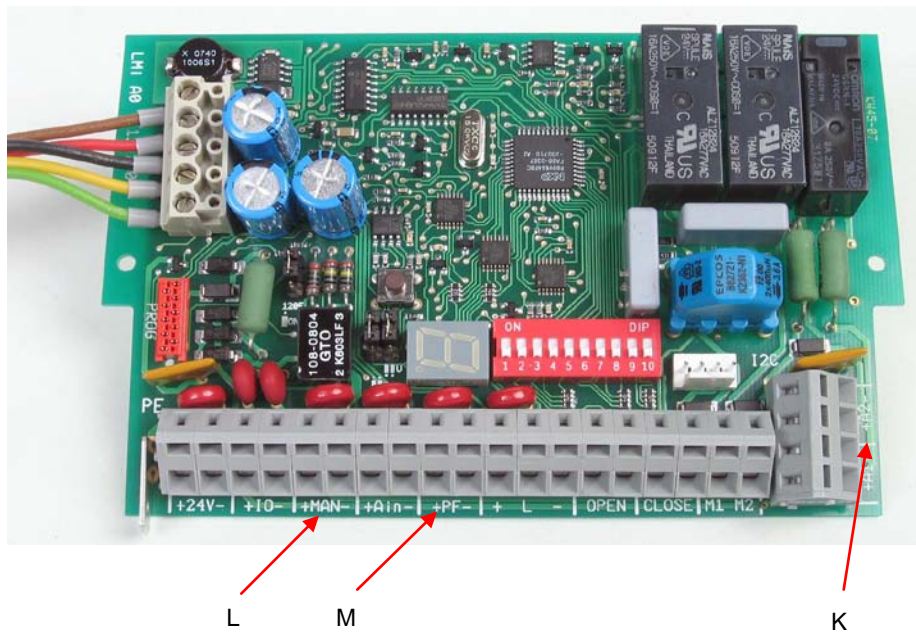


A	Operating switch	E	24 Volt AC
B	Potentiometer (W=Wiper)	F	IO-Net
C	Limit switches	G	Analogue in(0-10V/10-0Vcontrol)
D	Motor		or Temp. sensor (IO-net)



Connections A+B+C+D are already mounted.

### 4.3.3. Optional print connections



K Batteries (+A1- ; +A2-)

L Manual Override potentiometer or thermostat (+MAN-)

M Power Failure (+PF-)

### 4.3.4. Reversing the rotational direction

It may be necessary to reverse the rotational direction of the actuator. To do this exchange the connection wires of

- limit switches OPEN and CLOSE.
- potentiometer + and - ("L" remains)
- motor M1 and M2

## 5. Extra possibilities LM.60i

### 5.1. Pre-defined position / independent control

If the control signal or supply voltage 24 Vac fails the LM.60i can independently control the air inlet position. This can be a calculated position or a pre-defined position. This pre-defined position is settable (see chapter Adjusting), the standard factory setting is 50%.

#### No control signal (voltage)

If the control signal fails, the air inlet will open fully (10-0V control signal) or close fully (0-10V control signal).

**No control signal (communication)** On the internal display appears “A4”.

If the LM.60i is part of an IO-network, but communication is interrupted, control can continue independently under the following conditions:

- A. A temperature sensor is connected.
- B. The control computer has had the chance to transmit a control value, and also a setpoint and bandwidth.

The intelligent module will then calculate the air inlet position based on the temperature measurement and the settings. In this case “L” will appear on the internal display when the key on the print is pushed.

If these conditions cannot be met, the control will go to a *pre-defined* position. In this case “U” will appear on the internal display.



Attention! Not all control computers are able to over transmit these settings, check the manual of the control computer concerned.

#### Power failure (Powerfail)

If the regular 24Vac power fails, the LM.60i will go to the pre-defined position, when an internal emergency battery (option) has been installed.

If an external emergency power supply (UPS) is used instead of an internal emergency battery, the regular 24Vac power cannot fail. This UPS has to be provided with powerfail PF- (Normally open) output contact that will short the “PF”-input on the LM.60i, when the regular power fails. The LM.60i will go to the pre-defined position.

In this case “A3” will appear on the internal display.



## 6. Operation

### 6.1. Switch

The LM.60i has a 5-position switch. The switch is used to choose between automatic (**AUT**) control or manual, close/open or off (**O**). Manually operated options work directly on the motor, so do not involve the intelligent module. (see Figure 1).

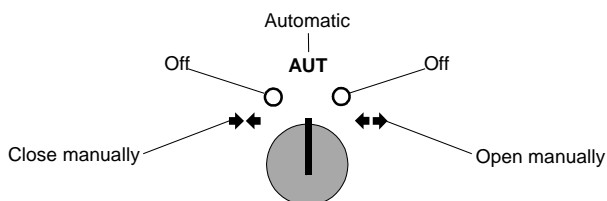


Figure 1: Switch

### 6.2. Remote setting potentiometer



This operation option will only work if the switch on the actuator is set to automatic.

In order to operate the actuator manually from a distance (from outside the house) (for example during disinfection), a potentiometer of 10k with switch can be connected. As soon as this is activated the control value of the air inlet will be determined by the position of the potentiometer.

### 6.3. Maximum thermostat



This operation feature only functions if the rotary switch on the motor is set to automatic.

A maximum thermostat can be connected as extra protection. The air inlet will open completely when the maximum thermostat activates. The maximum thermostat and the manual remote control can be connected in parallel. The maximum thermostat also overrules the manual remote control.

## 7. Display

The display indicates a possible status of the program (depending on the position of the manual operation on the LM.60i).

After the LM.60i has been switched on, 3 characters will be displayed in succession. These characters are the version number of the software (1 character per second).

### 7.1.1. In manual mode (at adjustment):

Display indication	Meaning
1.	Adjusting CLOSE (minimum air inlet position).
2.	Adjusting OPEN (maximum air inlet position).
3.	Adjusting pre-defined air inlet position
F.	Adjusting: Too small difference on the control input between Close and Open adjustment.
E	Error when determining a position within the control procedure. (Error)
C.	Controlling maximum air inlet position successful. (Close)
O.	Controlling minimum air inlet position successful. (Open)
P.	Controlling pre-defined air inlet position successful.
≡	Indication of the potentiometer value. Too high, correct or too low

### 7.1.2. In Automatic mode:

Display indication	Meaning
0.	Standstill position, waiting for a change in the control value or feedback.
1.	Actuator controls closed
2.	Actuator controls open
3.	Wait position after switch on (with control via 0-10V)
4.	Wait position after switch on (with control via IO-net; duration is address dependent)
5.	Minimum wait position after a control action

6.	Standstill position whereby control is determined by the remote control.
7.	Actuator is in standstill against a limit switch.
U.	Due to a problem LM.60i is now controlling based on the pre-defined position
L.	As the IO-net has failed, the LM.60i is now controlling independently based on its own temperature measurements and the settings made earlier.

The flashing dot on the display indicates that the intelligent module is functioning normally and is being powered by a regular 24VAC source.

### 7.1.3. Alarms

An “A” in the display, alternated by a figure indicates an alarm. The table below contains an alarm overview.

Alarm indication	Meaning
A0	Backup alarm: No settings available, <b>adjusting necessary!</b> (via IO-net A100)
A1	Memory defect.
A2	Inlet position not reached within 10 min.
A3	Power failure, system controls based on emergency power supply.
A4	No IO-net communication.
A5	Battery test indicates error.
A6	Current limiting activated

Note 1: Clear a cancelled alarm by pressing the key in the print.

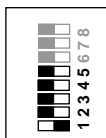
Note 2: A control computer connected to the LM.60i via I/O-net, can adopt the alarm message, provided this feature is supported.

## 8. Control

### 8.1. The LM.60i as IO-network module

#### 8.1.1. Addressing

In a single IO-network all the IO-network modules must have a unique address (1..31).



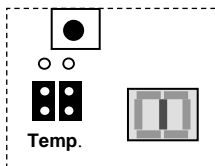
Set an address using dipswitches 1 thru 5

This address is also set on the control computer used to control the LM.60i

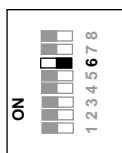
See appendix 1 for an overview of the addresses

#### 8.1.2. Temperature measurement

As IO-network module the LM.60i can measure the temperature itself. This value can be used by the control computer, or to control independently in the case of an emergency.



To enable the analog input to be used for a temperature sensor, the jumpers of JP1 must be set to the Temp position.



To activate temperature measurement, set dipswitch 6 to OFF.

### 8.1.3. Independent control

The LM.60i adopts control with communication problems. If the connected computer can communicate the setpoint and control range to the LM.60i, these values will be used for further control. The LM.60i will continue control based on the last received settings and the temperature it measured on its own sensor.

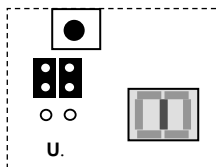
If there is no temperature measurement or no settings have been communicated, the LM.60i will control to the position set as the pre-defined position.

Adjust the LM.60i according to the described procedures. (see chapter.10 "Adjustment procedure").

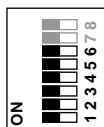
## 8.2. The LM.60i as conventional end station

### 8.2.1. Addressing

If the LM.60i is used as a traditional end station it is controlled by a 0-10V or 10-0V voltage signal. In this application temperature measurement is not possible.



To enable the analog input to be used for control voltage, the jumpers JP1 must be set to the U position.



To enable the control voltage to be controlled, the dipswitches 1 thru 6 must be set to ON.

Adjust the LM.60i according to the described procedures. When adjusting, ensure the correct voltage is on the input. This influences the choice between 0-10 V and 10-0 V control.

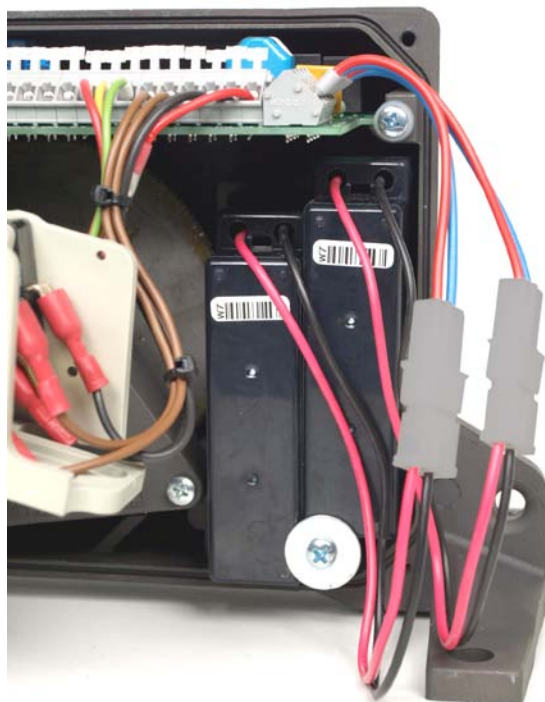
## 9. Built-in emergency battery (optional)

If a battery pack is incorporated, this is fed by a built-in trickle charger. The condition of the battery is automatically tested during charging. If it does not meet the requirements, the message **A5** will appear on the internal display. (see Alarms on page 15).

The battery status is also available via the I/O Network allowing a control computer with the corresponding functionality to report if the battery is reliable or not.

### DIP 7 – Using an internal battery.

If the LM.60i is equipped with an internal emergency battery, DIP-7 must be set to OFF to activate the trickle charger.



## 10. Adjustment procedure

### 10.1. General

For safe and correct functioning of the LM.60i, the following must be adjusted beforehand.

- The limit switches (mechanical adjustment).
- Adjustment with control (calibration)
- CLOSED-position and the potentiometer that measures the inlet position
- OPEN-position
- PREDEFINED-position



In the event of a power failure the LM.60i controls to a pre-defined position

The motor can be sent to the required position using the 5-position manual operation switch.

The control board has a button for this adjustment. The adjacent display indicates the status.



Adjusting is only possible if the manual operation switch is not in the automatic position (**AUT**)!

If 0-10v/10-0v control between the LM.60i and the control computer is used, the control voltage during the adjustment of the OPEN-CLOSED position must also be 0-10v/10-0v.

For the CLOSED position the connected control computer must output a control value of 1%.

This value should be 99% for the OPEN-position.



If the LM60i is connected to the control computer via the IO-net, then 1 and 99% are not important.

## 10.2. General information relating to calibration

Press the button on the print to start the adjustment procedure. After 2 seconds a counter on the display will start to count from “0”. Release the button as soon as the required option appears on the display:

- “1” = Adjusting CLOSED position
- “2” = Adjusting OPEN position
- “3” = Adjusting PREDEFINED position

To confirm/end the adjustment procedure press the button until the indication below appears on the display:

Indication	Meaning
<b>C</b>	“C”lose = Adjusting “CLOSED” position successful.
<b>O</b>	“O”pen = Adjusting “OPEN” position successful
<b>P</b>	“P”redefined” = Adjusting “PREDEFINED” position successful
<b>E</b>	Adjusting failed. → Repeat adjustment procedure.
<b>F</b>	Adjusting accepted; however the difference on the control input between CLOSED and OPEN (the voltage difference between 1 and 99%) is too small for reliable control. Carry out the CLOSED or OPEN procedure (repeat) with the correct control value on the input.

### Starting the procedure

1. Ensure the manual operation switch is not set to “Automatic’ (AUT).
2. Press the button until the required option appears on the display.
3. Release the button; otherwise you will access the next mode.

### Completing the procedure

1. Press the button briefly a number of times, until the display is clear. The adjustment procedure will be aborted automatically if no actions have taken place for longer than 10 minutes.
2. Set the manual operation switch to “Automatic’ (AUT). This enables normal operation.



**Attention!**

Ensure the steel cable is wound at least once around the drum when the air inlet is fully open.



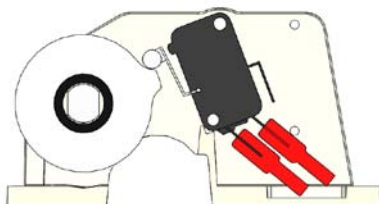
The minimum length of stroke from Open to Closed must be a minimum of 0.8 revolutions (12.5 cm).

### 10.3. Step 1: Adjusting the limit switches

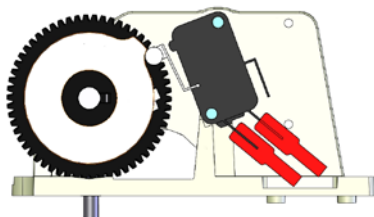


**Careful!** Check that the electrical connections are correct before starting to adjust the limit switches.

1. Open the LM.60i housing.
2. Ensure the cam discs (1 and 4) are loose on the shaft, so the discs can be twisted.
3. Set the manual operation switch to position (→←).  
Close the inlet fully to adjust the "CLOSED" position.
4. Twist the cam disc (1) until the disc is positioned against the lower side of the roller of the handle (8) of the limit switch (9).

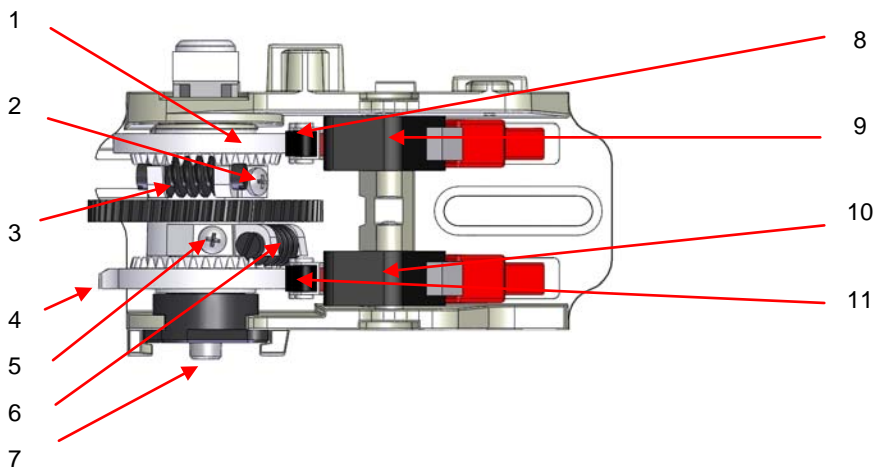


5. Tighten the screw on the (2) cam disc.
6. Fine tune by twisting the worm wheel (3).
7. Set the manual operation switch to position (←→).  
Open the inlet fully to adjust the "OPEN" position.



8. Twist the cam disc (4) until the disc is positioned against the upper side of the roller of the handle (11) of the limit switch (10)
9. Tighten the screw (5) on the cam disc.
10. Fine tune by twisting the worm wheel (6)

Fig. 2: Limit switches



1	Cam disc closed position
2	Screw to fix cam disc closed position
3	Worm wheel for fine tuning closed position
4	Cam disc open position
5	Screw to fix cam disc open position
6	Worm wheel for fine tuning open position
7	Potentiometer setting
8	Roller on handle closed position
9	Limit switch for closed position
10	Limit switch for open position
11	Roller on handle open position

## 10.4. Step 2: Adjusting CLOSED position

Set the manual operation switch to position ( $\rightarrow\leftarrow$ ). Allow the air inlet to close fully.

With 0-10V or 10-0 V control, ensure that the analog output of the connected outputs is 1%.



This is not important with an IO-net controlled system.

### Method 1% adjustment

1. Turn the potentiometer completely to the left
2. Press the button until “1” appears on the display.
  - Release the button as soon as “1” appears; otherwise you will access the next mode.
  - A dash will appear on the display.



The drive module is now in the 1% adjustment mode.

3. If the air inlet is fully closed, adjust the potentiometer using a screwdriver so that the dash on the display is in the centre position.
4. Press the button to confirm.

If “C” appears on the display, then adjusting “CLOSED” is successful.

If another symbol appears, refer to table in 10.2 General information relating to calibration.
5. If “E” appears, repeat the procedure.



If no improvement is noticed, continue adjusting the OPEN position. If the OPEN position is now adjusted correctly, then the adjustment procedure is successful.

**Display****Status/action**

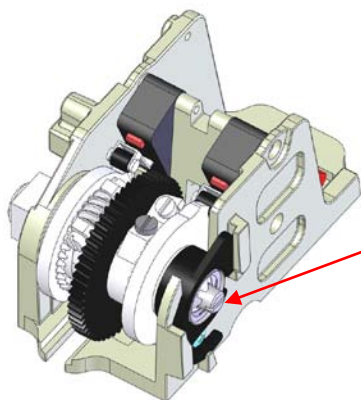
Signal too high, turn potentiometer further to the left



Signal too low, turn potentiometer further to the right.



Signal OK, proceed with the next step.



## 10.5. Step 3: Adjusting OPEN-position

Set the manual operation switch to position ( $\leftrightarrow$ ) and allow the inlet to open to the required position.

With 0-10V or 10-0 V control, ensure that the analog output of the connected control computer outputs 99%.



This is not important with an I/O-net controlled system.

1. Press the button until “2” appears on the display.
2. Release the button as soon as “1” appears; otherwise you will access the next mode.
3. A dash will appear on the display as soon as the button is released. This dash must be in the centre of the display. If the dash is not in the centre, the stroke length is too short. Adjusting will fail. Increase the stroke length (e.g. by reeving the cable).
4. With 0-10V or 10-0V control, an “F” may also appear. Adjustment of the OPEN position has been accepted, but the CLOSED and OPEN positions are too close together. Check if the control computer is outputting 99%. Repeat the adjustment procedure of the OPEN position.
5. Press the button to confirm and check if “O” appears on the display: (Adjusting “OPEN” successful)



If “E” appears, then adjusting has failed. Repeat the adjustment procedure of the OPEN position. Pay particular attention to the stroke length.



If no improvement is noticed, repeat the entire procedure.

## 10.6. Step 4: Adjusting PREDEFINED position

1. Use the manual operation switch to set the air inlet in the position it must assume in the event of a power failure.
2. Press the button until “**3**” appears on the display.  
(release the button as soon as “**3**” appears; otherwise you will access the next mode).
3. Press the button to confirm and check if “**P**” appears on the display (Adjusting “PREDEFINED” successful):  
If another symbol appears, refer to table in 10.2 General information relating to calibration.

## 10.7. Step 5: Ending adjusting

After adjusting set the manual operating switch to “Automatic’ (**AUT**). This enables normal operation.

## Appendix 1: Table of I/O addresses

I/O-Address					
IO-Add	DIP 1	DIP 2	DIP 3	DIP 4	DIP 5
AN.	On	On	On	On	On
1	Off	On	On	On	On
2	On	Off	On	On	On
3	Off	Off	On	On	On
4	On	On	Off	On	On
5	Off	On	Off	On	On
6	On	Off	Off	On	On
7	Off	Off	Off	On	On
8	On	On	On	Off	On
9	Off	On	On	Off	On
10	On	Off	On	Off	On
11	Off	Off	On	Off	On
12	On	On	Off	Off	On
13	Off	On	Off	Off	On
14	On	Off	Off	Off	On
15	Off	Off	Off	Off	On
16	On	On	On	On	Off
17	Off	On	On	On	Off
18	On	Off	On	On	Off
19	Off	Off	On	On	Off
20	On	On	Off	On	Off
21	Off	On	Off	On	Off
22	On	Off	Off	On	Off
23	Off	Off	Off	On	Off
24	On	On	On	Off	Off
25	Off	On	On	Off	Off
26	On	Off	On	Off	Off
27	Off	Off	On	Off	Off
28	On	On	Off	Off	Off
29	Off	On	Off	Off	Off
30	On	Off	Off	Off	Off
31	Off	Off	Off	Off	Off
Restart the module after changing a network address.					

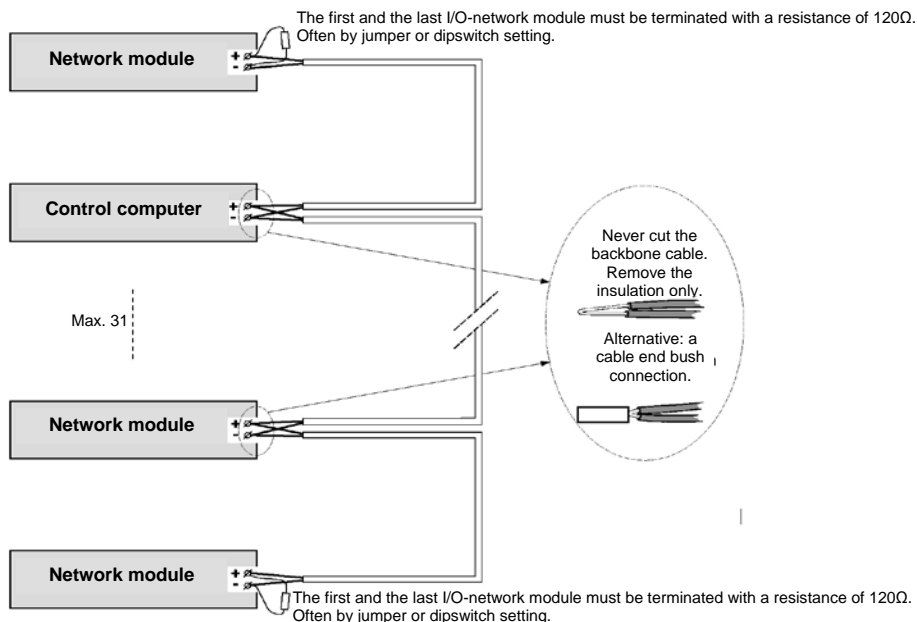


## Appendix 2: Connecting the IO Network

(1 control computer and max. 31 network modules)

### Connection I/O-Network

(one control computer and max. 31 network modules)



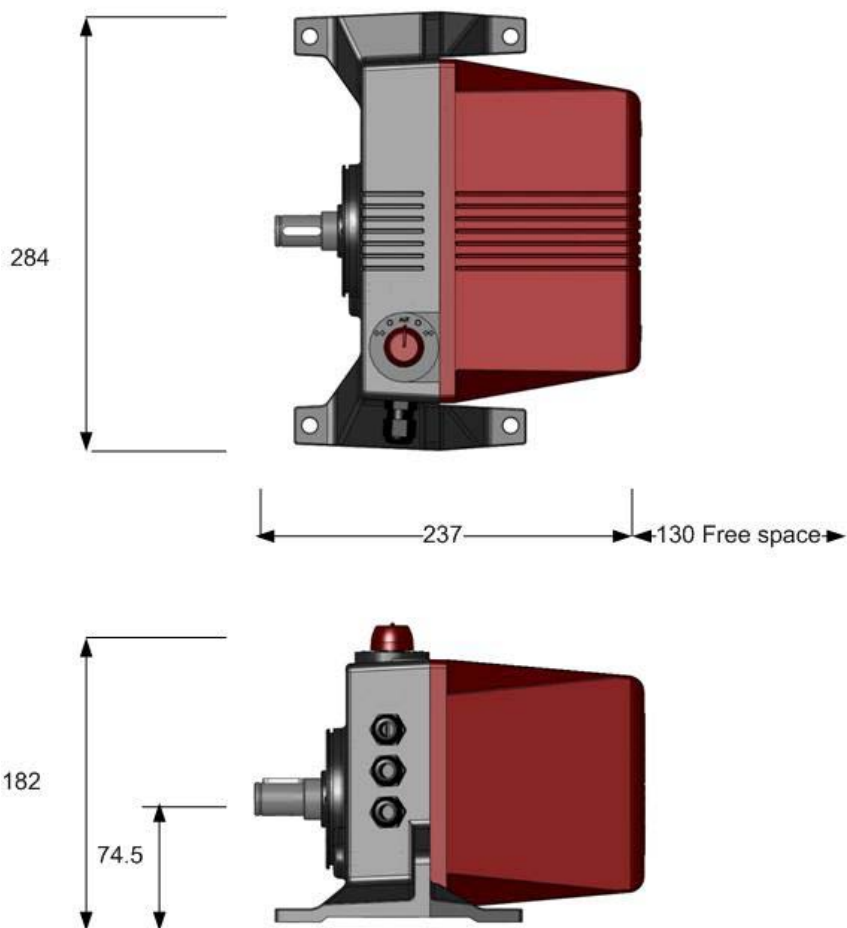
The order of network modules is not important.

#### Wiring of I/O-network:

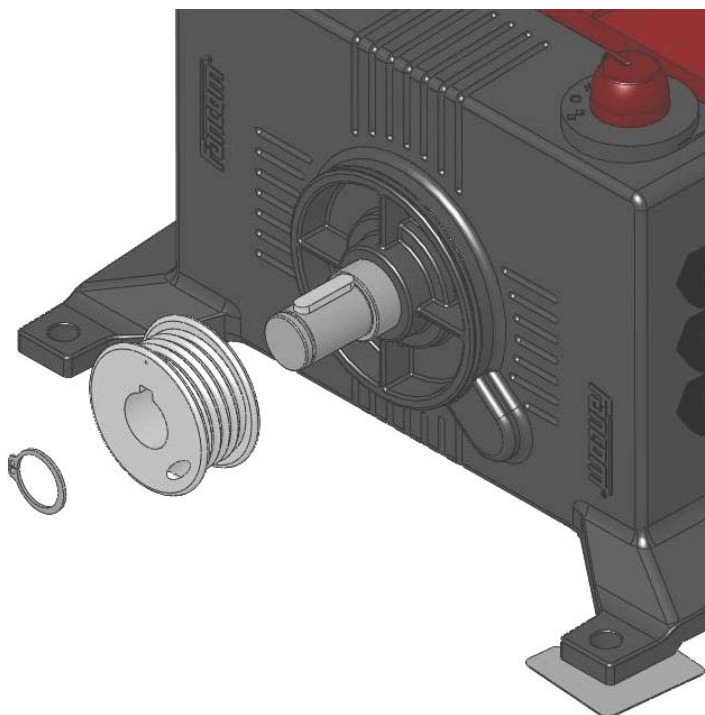
Fancom Greenlink cable (A1732005) UTP 1x2x0.8 mm  
(unshielded twisted pair)  
Max. length of I/O-network → 900m

Connect Fancom equipment according to the prevailing standards of the local electricity company.

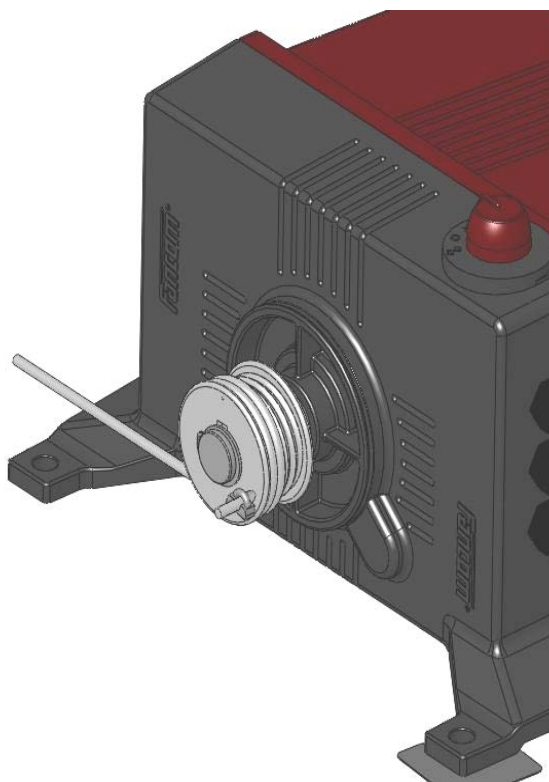
## Appendix 3: Mountings



## 1. Mounting cable reel

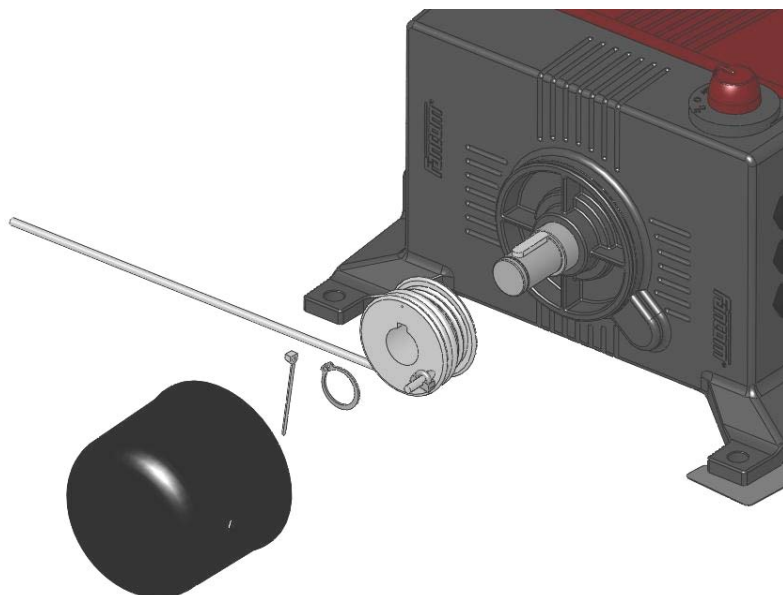


## 2 Mounting steel wire

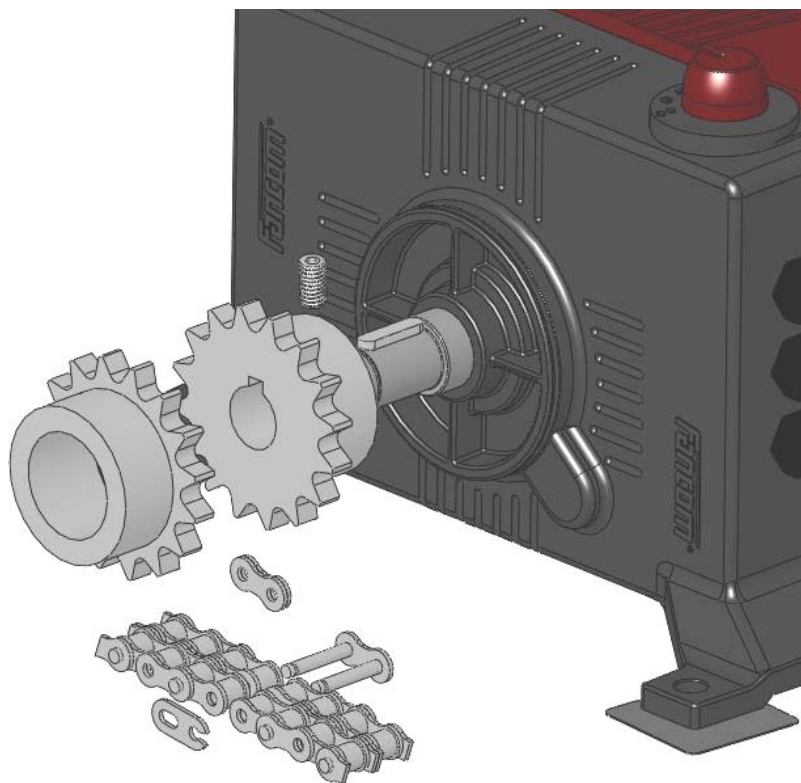


- 2A Feed the cable through the opening
- 2B Place the retainer clamp at the end of the steel cable
- 2C **VERY IMPORTANT:**  
Wind at least 1 stroke before loading the cable.

### 3 Mounting CE-protection cover on cable reel



#### 4 Mounting pipe/chain coupling (1")



# Appendix 4: Wiring diagram

