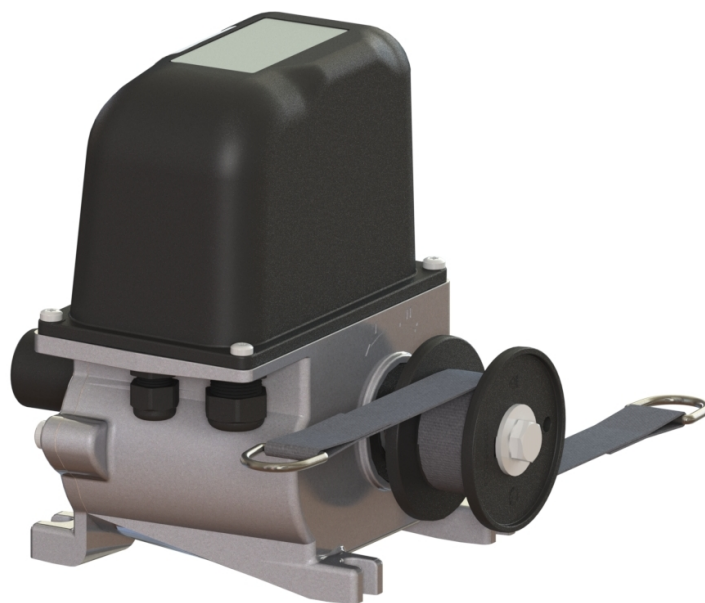
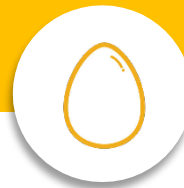


EcoDrive 90 Winch Installation Manual

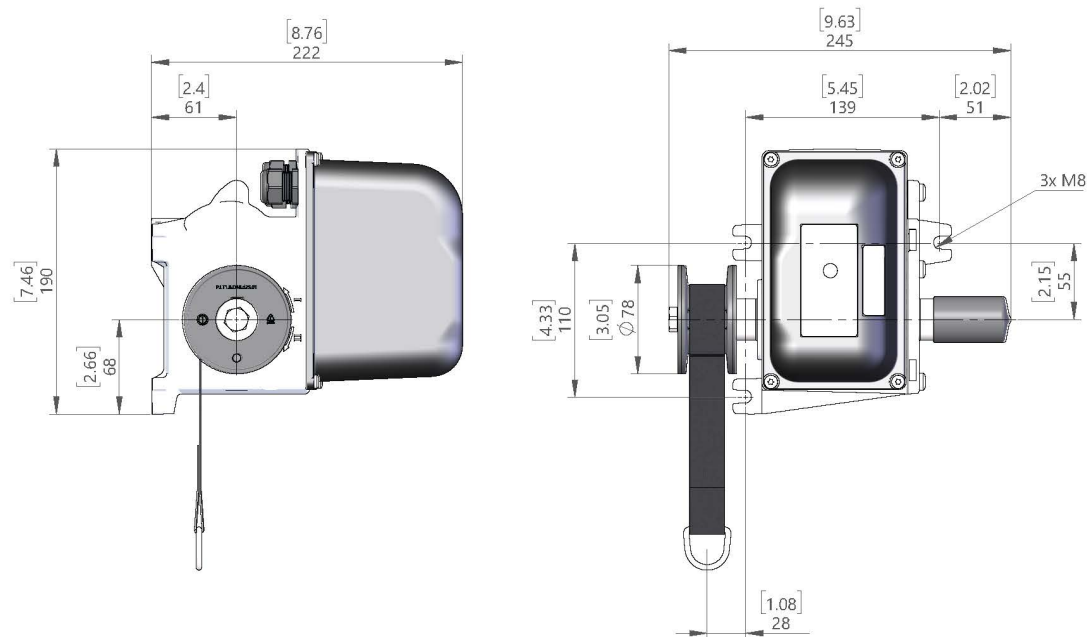


Index

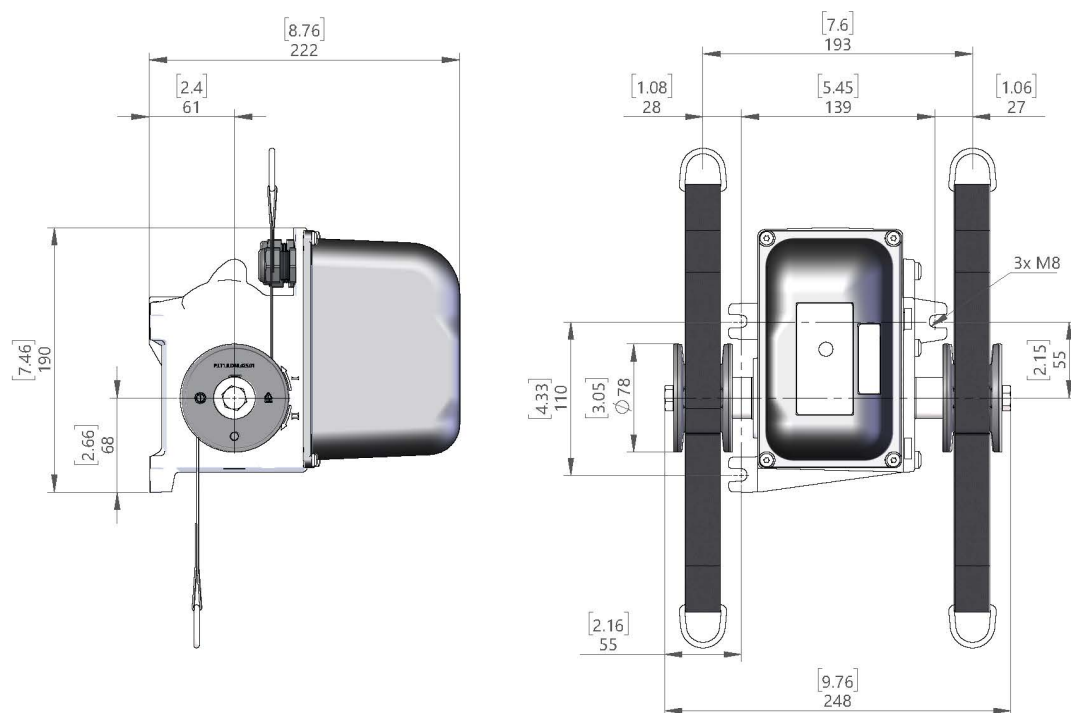
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|---|----|
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Dimensions

Single Belt

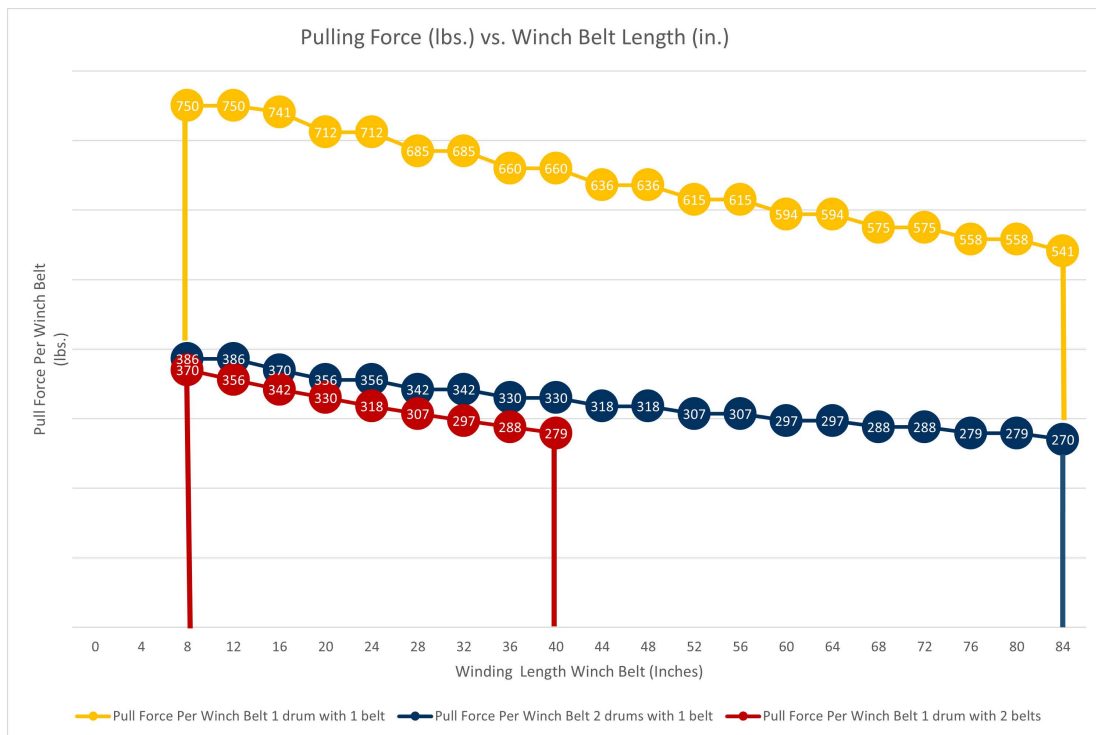


Double Belt



Technical Specifications

| | |
|---------------------------------|-----------------------------------|
| Maximum output torque | 90 Nm |
| Single belt maximum load rating | 750 lbs |
| Double belt maximum load rating | 386 lbs per belt - 772 lbs. total |
| Lift Rate Per Minute | 6 in/min |
| Motor | 24 DC |
| Amp Draw | 3 Amps |
| Travel Distance | 3 Feet |





Application Specifications



Application specifications below are based off of the inlet line distributed from Double L Group, LLC.

| | |
|---------------------|-------------------|
| Inlet Vents: | |
| DirectAire | 100 Inlets |
| CSW | 65 Inlets |
| DL | 35 Inlets |

1 Explanation of symbols and safety instructions

Important procedures are emphasised in this user manual in a separate box with the initial lines printed in bold. See below for an explanation of the various instructions you will encounter in this manual.



| Symbol | Meaning | Unit |
|---|---------|------|
| T | Torque | Nm |
| P | Power | kW |
| U | Voltage | V |
| I | Current | A |
|  | Tip | - |
|  | Note | - |



| Symbol | Meaning | Unit |
|---|------------------|------|
| n | Rotational speed | rpm |
| L | Length | mm |
| m | Mass | lbs |
|  | Hazard | - |
|  | Electrical | - |

| Instruction | Explanation |
|--------------------------|---|
| Tip | Gives the user suggestions and advice for carrying out specific tasks easily or more practically. |
| Attention! | Remarks with supplementary information for the user. These remarks draw the user's attention to potential problems. |
| Caution! | Material damage can occur when the procedures are not followed carefully. |
| Warning! | Serious injury to the user and/or serious damage to the product can occur if the procedures are not followed carefully. |
| Risk of injury or death! | The user's life is directly endangered |

Explanation of symbols on the motor gearbox

The following symbols are shown on the motor gearbox

| Symbol | Meaning |
|---|-------------------------|
|  | No pressure cleaning |
|  | Electrically live parts |

| Symbol | Meaning |
|---|------------------------|
|  | Read the documentation |
|  | PE connection (earth) |

1 Explanation of symbols and safety instructions

- Read this installation manual carefully and in full.
- Check that the delivery is complete before starting to install the motor gearbox.
- Strictly observe the step-by-step procedures set out in the installation manual.
- Observe all of the information in the installation manual, in particular all information relating to safety, use, maintenance and servicing.
- Improper installation, commissioning, maintenance etc. of the motor gearbox can lead to personal injury and/or material damage due to the high torque of the motor gearbox.

General safety instructions

- With attached or driven components there is a risk of becoming trapped or injured. Amongst other things, the safety distances set out in EN 349 and EN 13857 must be observed and suitable precautions must be taken, such as safety devices or a dead-man vigilance system.
- Do not allow people to stand under or close to suspended loads.
- Attached or driven parts may have a shorter service life than the motor gearbox itself.
- Double L Group supplies motor gearboxes that are self-braking, but this function may not be effective under certain conditions. We strongly recommend that for hoisting applications you use a motor gearbox equipped with a mechanical brake and mount a fall-arrest brake on the drive shaft.
- Never loosen screws, couplings or other parts while the drive train is loaded externally.
- Also observe national legislation and guidelines regarding working conditions and safety.
- Clean up the hazard area and leave it before switching the power back on.
- Despite careful planning and compliance with all regulations, some risks cannot be prevented.

Qualified Staff

All activities described below must be performed by qualified staff. Qualified staff means persons who, based upon their training, experience and/or education, have obtained sufficient knowledge of the applicable standards, provisions, accident prevention regulations and operating conditions and are thus able to identify and avoid potential hazards during relevant activities (for instance, installers recommended by Double L Group). Approval by the safety officer for the overall plant or system is always required before work may be carried out.

2 Product

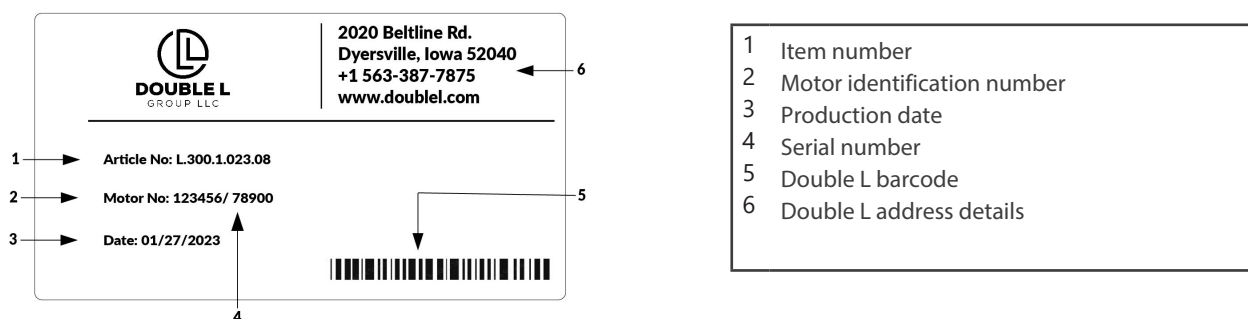
The EcoDrive 90 is a 24VDC winch motor controlled by a 0...10 VDC signal, Modbus RTU and CAN-LOCAL bus. One of these options can be chosen during installation. With a peak pulling force of 772 lbs, it can easily control air inlet valve. Three integrated buttons on the control board make it easy to set up the EcoDrive 90 and accurately determine all necessary positions. A brush less motor operates according to the step motor principle: if the next position is not reached, an alarm relay will be activated.

Manufacturer

The address details of Double L are set out below:

| | |
|--|---|
| Double L Group, LLC 2020 Beltline Rd. Dyersville, IA 52040 | I : www.doublel.com E : sales@doublel.com T : +1-563-875-6257 |
|--|---|

Identification plate



Example of an identification sticker which is fitted on every EcoDrive 90

Materials and parts of the gearbox

| Gearbox part | Materials |
|---|-----------------------------------|
| Gear wheels, shafts, bearings, retaining rings, ... | Steel |
| Gear unit housing, housing parts | Aluminium |
| Worm gears | Bronze |
| Shaft seals, sealing caps | Elastomer (with steel) |
| Gaskets | Paper based and plastic elastomer |
| Limit switch and protective cover | Plastic |
| Gear oil | Enriched mineral oil |
| Electronics | Various |

3 Instructions for use

Intended use

EcoDrive 90 motor gearboxes are intended for operating air inlets, ventilation curtains, mixing valves and vents for poultry and pig farms as well as storage facilities. The EcoDrive 90 is set to the correct position depending of the incoming signal.

Conditions of use

The following conditions of use are applicable when using the motor gearbox.

- Operating ambient temperature range is -5°C to +50°C [23°F to 122°F].
- Max. force on output shaft radial 4000 N, axial 400 N.
- The service life of the motor gearbox increases significantly with low loads.

Intended Use

The EcoDrive90 itself is maintenance-free. Check the following points regularly:

- Steel cable and steel cable attachment; these must not show any mechanical damage.
- Safety: check whether the cover is placed on the EciDrive 90.
- End positions: check whether the end positions are still correct.
- Emergency power supply: check, if present, whether the emergency power supply is still working correctly.
- Bolts and fasteners: check if bolts and screws are still firmly secured.

Restrictions on use

Structural modifications to the motor gearbox are not permitted. Any such modifications render the manufacturer's warranty null and void and relieve the manufacturer of liability for any consequences. In addition, the following restrictions are applicable with the regard to the use of the motor gearbox:

- Do not load the motor gearbox or drive train with a torque higher than specified.
- Do not use the motor gearbox to operate parts located in the immediate vicinity (within easy reach) of people. Maintain safe distances in accordance with EN ISO 13857.
- Do not expose the motor gearbox to direct water spray, rain or snow (EcoDrive 90 is IP65 rated).
- Do not use the motor gearbox to operate smoke and heat exhaust ventilation systems compliant with NEN 6093 or DIN 18232.
- Do not use the motor gearbox to operate automatic doors or gates used by people.
- Do not use the motor gearbox in explosion hazard areas if express permission has not been granted to do so.

Unintended Use

We expressly warn against the following types of unintended use:

- Do not use the motor gearbox for lifting suspended loads especially in areas in which people are present.
- Do not use the motor gearbox for transporting people (for example, for passenger lifts, etc.).

Transport

To safeguard the service life and correct functionality of our products, the following rules must be followed:

- Transport the gearbox carefully and avoid shocks.
- Force causes damage to the gearbox.
- Use a work platform, or lift the gearbox using hoisting equipment and appropriate slings fitted around the output shaft.



Risk of injury or death! Falling objects can present a danger to people!

3 Instructions for use

Storage

To safeguard the service life and correct functionality of our products, the following rules must be followed:

- Ensure that the motor gearboxes are stored in a dust-free and moisture-free environment.
- The relative air humidity of the storage location must be less than 60%.
- Store the motor gearboxes at temperatures between -15 and +60°C [5°F to 140°F].
- Avoid sudden changes in temperature to prevent the formation of condensation.

If you wish to store the motor gearboxes for a lengthy period of time, you can use preservatives to protect the unpainted surfaces, such as threaded holes and mounting surfaces for chain couplings, against corrosion.

Disposal

Drain used oil from the motor gearbox. Used oil must be collected, temporarily stored, transported and replaced properly. Observe national legislation. Collect waste oil and dispose of it in accordance with regulations. Clean up any spilled oil immediately using a suitable emulsifier or absorbent material.

Caution!



Improper disposal of waste oil is hazardous to the environment and to health. Used oil must be taken to a collection point for waste oil. Avoid prolonged skin contact.

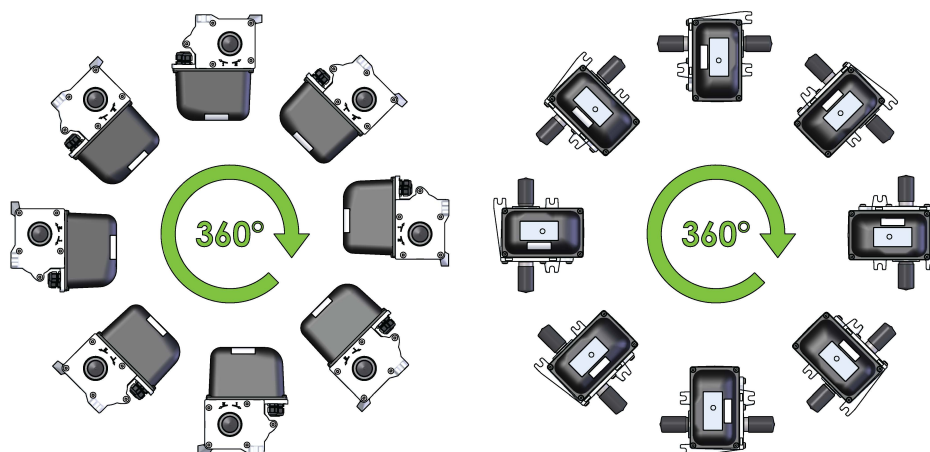
Dispose of housing parts, gear wheels, shafts and roller bearings of the transmission as scrap metal. The worm gears may contain black non-ferrous metal alloys and must be disposed of accordingly. Dispose of the packaging materials in accordance with regulations or bring them to a recycling station.

4 Installation and mounting instructions

Installation of the motor gearbox may only be carried out by qualified staff, see section 1.

Installation positions

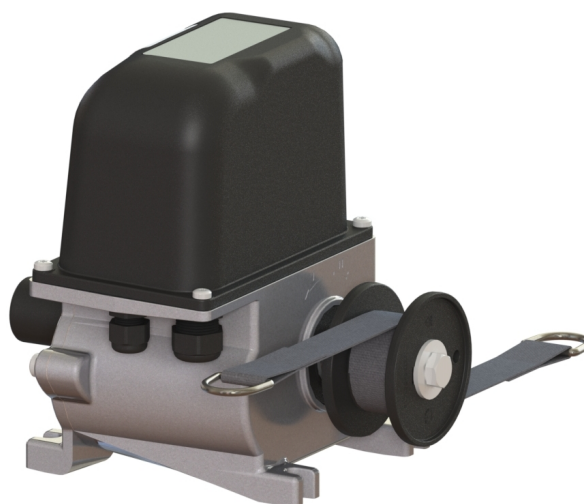
Maintain a clearance of approximately 500 mm above the protective cover for adjusting the limit switch. There are no further limitations in mounting positions of the EcoDrive 90.



Mounting the motor gearbox

Secure the gearbox with three bolts and apply a torque of 20 ... 25 Nm to tighten the bolts. Use M8 bolts with a strength class of 8.8 according to ISO 4014 or better.

If wood screws or wall anchors are used for mounting, the right screws and tightening torques must be determined by the installer. These mounting materials must provide the same clamping force as the M8 bolts with a strength class of 8.8 according to ISO 4014, tightened at 20 ... 25 Nm of torque.



Warning

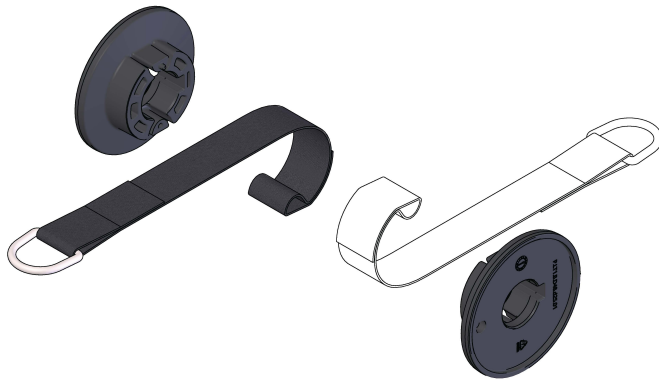
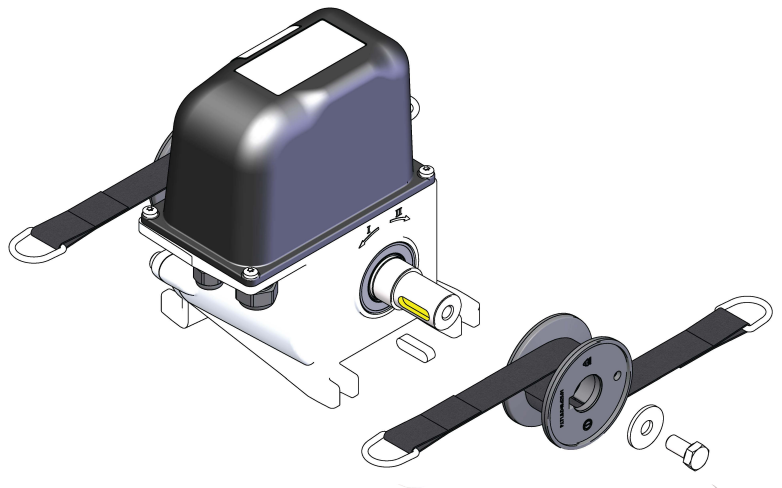


Please ensure that the building structure can sufficiently absorb the forces applied by the EcoDrive 90.

4 Installation and connection

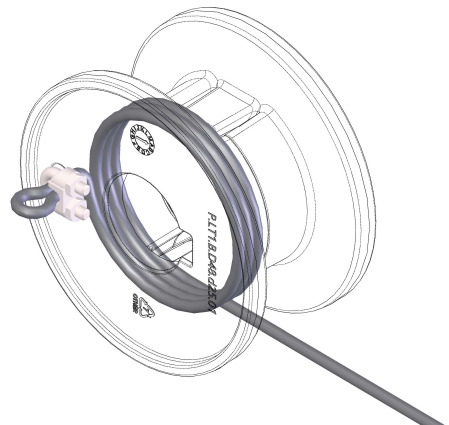
Mounting the belt/cable drum

The belt/cable drum can be mounted on both ends of the EcoDrive 90 shaft as shown below. Use the key, M10 bolt and ring (included in delivery) and apply a torque of 40 ... 50 Nm to tighten the M10 bolt.



One or 2 belts can be mounted on each drum. Unscrew both bolts to take away the flanges. Slide the end of the belt over the bolt and refit the flanges and bolts. Apply a torque of approximately 6 Nm to tighten the M5 bolts.

Also a cable (max. 3mm) can be mounted on the drum. The cable must be passed through the available hole in the flange. Mount a suitable cable clamp to secure the end of the cable.

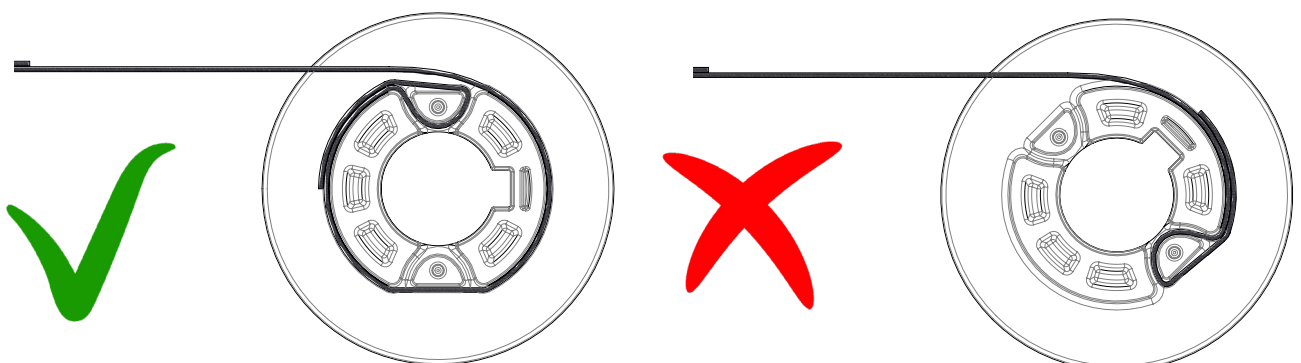


Pre-winding the drum

Before the drum can be used, it is necessary to pre-wind the belt or cable on the drum.

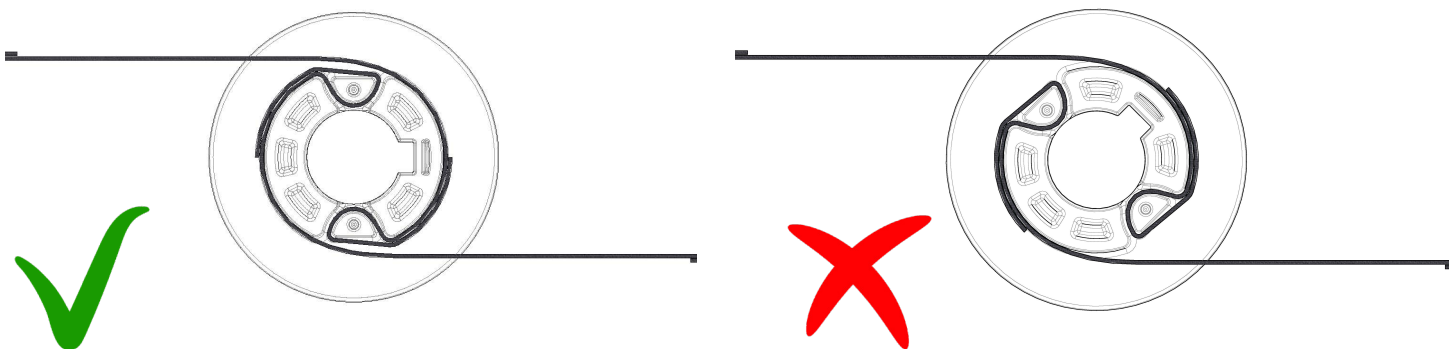
Drum with a cable: At least 3 revolutions.

Drum with a single belt: At least one revolution.



4 Installation and connection

Drum with two belts: At least half a revolution.



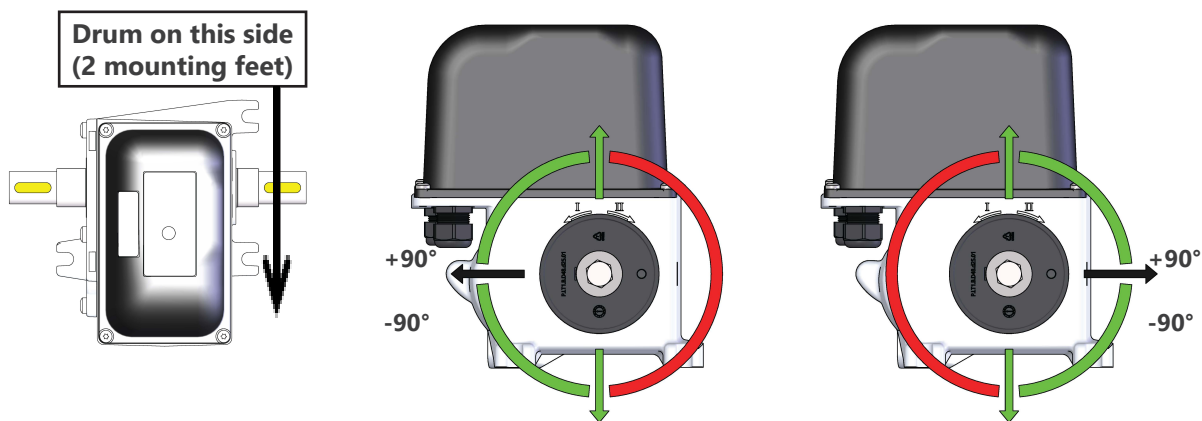
Caution



Not pre-winding the belt or cable may result in failure and possible injury at high loads.

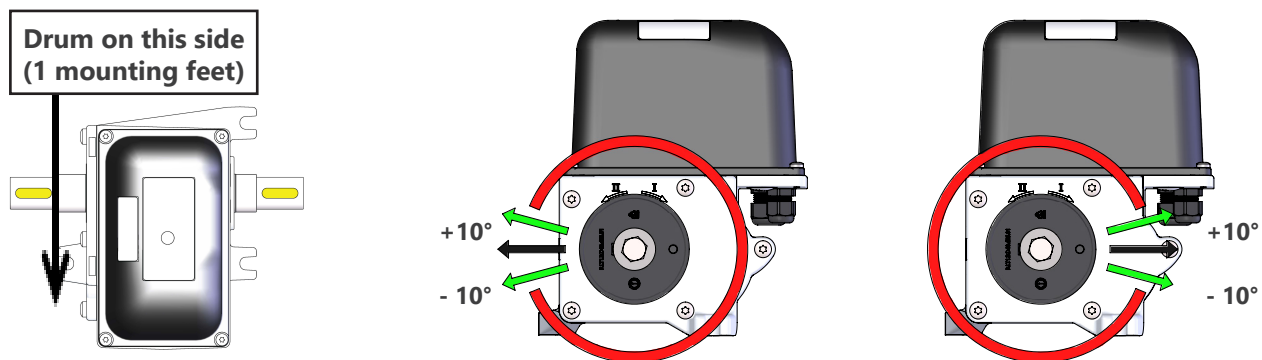
Allowed angles belt & wire

When two belts are mounted opposite each other on 1 drum, there is no restriction in applied direction of the belts. If only one wire or belt is mounted on a drum, the allowed directions are limited, as stated below. All other angles are not allowed.



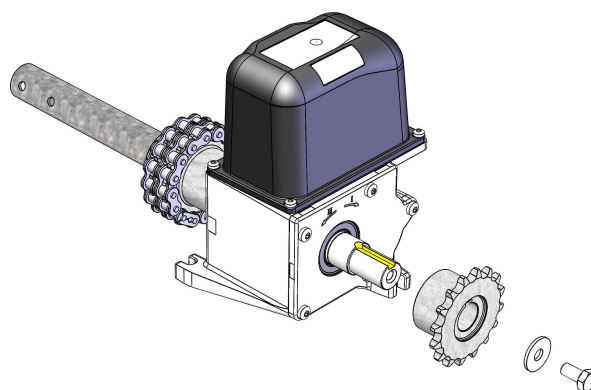
1. Single drum with one belt. The drum is mounted on the right side of the EcoDrive 90 (the side with two mounting points on the housing). In this situation it is possible to pull 340 kg in every direction, as shown in the picture above.
2. Single drum with two belts in opposite direction, it is always best to mount the drum on the right side of the EcoDrive 90 (the side with two mounting points on the housing as shown in the picture above), but it is not required. In this situation it is possible to pull 170 kg with each belt (340 kg) in total because of the available torque of the EcoDrive 90).
3. Single drum with one belt. The drum is mounted on the left side of the EcoDrive 90 (the side with one mounting point on the housing). This situation it is possible to pull 340 kg in parallel direction to the mounting surface of the EcoDrive 90, as shown in the picture below. Option 1 is preferred over this situation.
4. Two drums, both fitted with one belt. In this situation it is possible to pull 170 kg with each belt in parallel direction to the mounting surface of the EcoDrive 90, as shown in the picture on the next page.

4 Installation and connection



Mounting the chain coupling

The chain coupling can be mounted on both ends of the EcoDrive 90 shaft as shown below.
Use the key, M10 bolt and ring (included in delivery) and apply a torque of 40 ... 50 Nm to tighten the M10 bolt.



Attention! The drive-shaft and the driven system must be aligned.



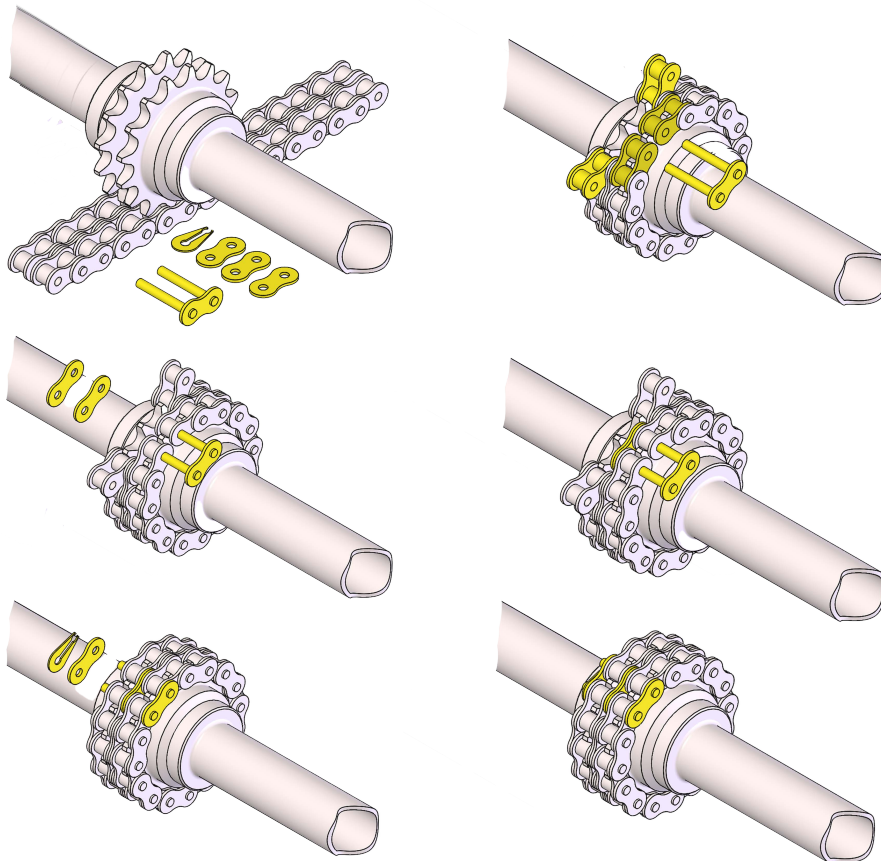
Not pre-winding the belt or cable may result in failure and possible injury at high loads.

The EcoDrive 90 winch can also be coupled to the load by means of chain coupling(s) to the drive shaft. See the details below for maximum torque and maximum alignment error.

| Type of chain coupling | Max. angle | Max. torque |
|------------------------|------------|-------------|
| 10B Z16 (5/8" x 3/8") | 4" | 420 Nm |

4 Installation and connection

1. Mount both chain sprockets of the coupling on the EcoDrive 90 shaft and the drive tube.
2. Turn the chain sprockets of the coupling until the teeth are aligned.
3. Wrap the duplex chain around the teeth of the sprockets, the ends of the chain should be on top of the coupling.
4. Mount the connecting link as shown in the diagram below.



Warning



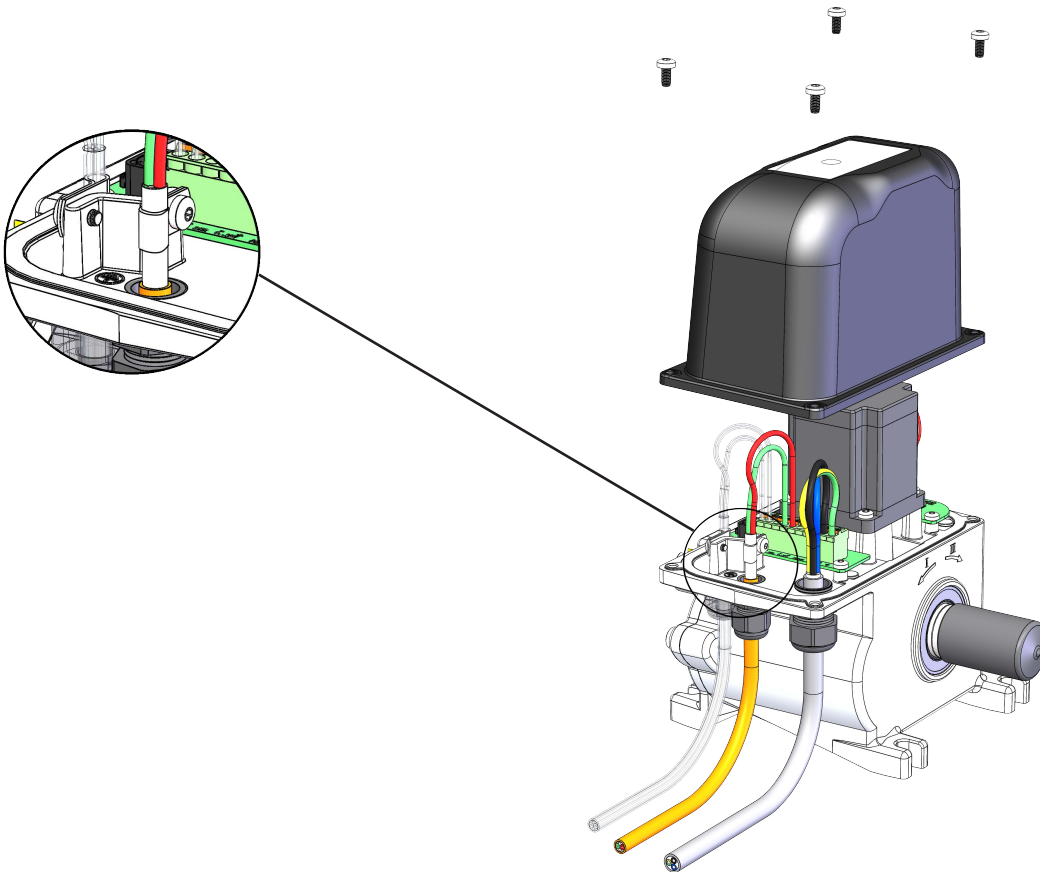
- Preferably fit the motor gearbox in the middle of the driven system.
- The maximum angle a chain coupling is allowed to make must remain below the specified value.

5 Electrical connection

Installation and connection of the motor gearbox may only be carried by qualified staff, see section 1.

Connecting the cables

1. Remove the plastic protective cover from the gearbox.
2. Insert the cable through the cable glands.
 - a. 24 VDC Supply cable through the M20 cable gland
 - b. 0...10 VDC control cable or bus cable through the M16 cable gland
 - c. The Optional M16 cable gland is for the second bus cable
3. Make sure that the cables are free before tightening the cable gland.
4. The earthing conductor of the 24 VDC cable can be connected to the designated earthing terminal on the PCB.
5. The shield of the bus cables or 0...10 VDC cable must be connected to the aluminium housing with the supplied cable clamps and M4 screws.
6. It is advisable to seal the cable glands with acid-free kit after cable installation.



Attention



Do not store loose parts or documents under the protective cover. This could damage and influence the functionality of the EcoDrive 90 Winch.

5 Electrical connection

Max cable length

Prior to installation, please determine the required cable conductor diameter. In the reduced power-mode the EcoDrive 90 has a limited power and a limited torque. See section 9 to set EcoDrive 90 in reduced power-mode. In the table below the maximal length of the 24VDC supply cable is set against the conductor diameter:

| Conductor diameter | 24 VDC (dipswitch 5 = OFF) | 24 VDC reduced power mode (dipswitch 5 = ON) |
|--------------------|-------------------------------|---|
| 14 Gauge | 1.25 in. | 150 FT. |
| 10 Gauge | 2.25 in. | 250 FT. |
| 6 Gauge | 3.25 in. | 400 FT. |

Example: When the power supply cable has a length of 35 meter, the EcoDrive 90 is in standard setting (dipswitch 5 =OFF) and voltage is 24 VDC, the required cable is 2 x 2,5 mm².

Note: If longer cable lengths are required, compensating for the voltage loss by increasing the supply voltage must be considered. A conductor diameter of 1.5 mm² requires a 1 VDC increase per 10 m of cable length and a diameter of 2.5 mm² requires a 1 VDC increase per 15 m of cable length (both in addition to the relevant value specified in the table).

Attention!

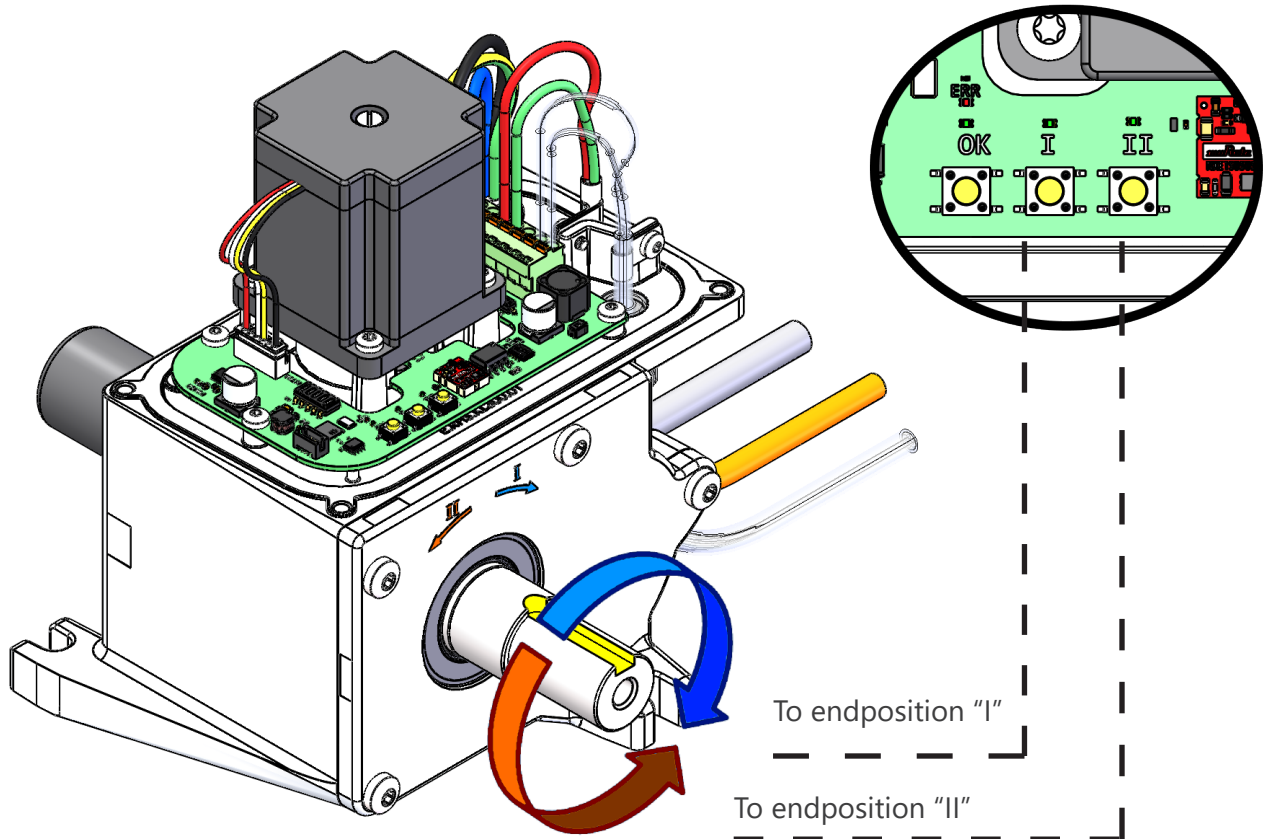


Supply voltage for the EcoDrive 90 MultiWinch is 24 VDC \pm 10%

| Cable | Voltage | Min. conductor diameter |
|---------------------------------------|--------------|------------------------------|
| Power cable 24 VDC | 24 VDC | see other table |
| Control cable 0...10 VDC | 0 ... 10 VDC | 0,75 mm ² |
| Modbus RTU (<1000 m @ max. 9600 baud) | n.a. | 1 x 2 x 0,64 mm ² |
| CAN-LOCAL (<500 m @ max 100.000 baud) | n.a. | 1 x 2 x 0,64 mm ² |












6 Settings

Installation and connection of the motor gearbox may only be carried out by qualified staff, see section 1. Remove the plastic protective cover from the gearbox. The control buttons are placed directly on the control board.



LED's on the control board

You can determine the status of the EcoDrive 90 on the basis of the LED's on the control board. See section 9 for the location of the LED's on the board. See section 13 for explanation of the symbols of the LED flashing patterns.

| OK | I | II | Description |
|---|---|---|---|
| <input checked="" type="checkbox"/> (ON) | <input checked="" type="checkbox"/> (ON) | <input type="checkbox"/> (OFF) | Operating mode: EcoDrive 90 is @ endposition "I" |
| <input checked="" type="checkbox"/> (ON) | <input type="checkbox"/> (OFF) | <input checked="" type="checkbox"/> (ON) | Operating mode: EcoDrive 90 is @ endposition "II" |
| <input checked="" type="checkbox"/> (ON) |  | <input type="checkbox"/> (OFF) | Operating mode: EcoDrive 90 moves in direction "I" |
| <input checked="" type="checkbox"/> (ON) | <input type="checkbox"/> (OFF) |  | Operating mode: EcoDrive 90 moves in direction "II" |
|  | <input type="checkbox"/> (OFF) | <input type="checkbox"/> (OFF) | Operating mode: no control signal detected |
|  |  |  | Endpositions have not been set |
| <input type="checkbox"/> (OFF) |  | <input type="checkbox"/> (OFF) | Programming mode: setting 1st endposition (100%) |
|  | <input type="checkbox"/> (OFF) | <input type="checkbox"/> (OFF) | Programming mode: waiting for correct control signal. Not applicable for endposition settings for bus |
| <input type="checkbox"/> (OFF) | <input type="checkbox"/> (OFF) |  | Programming mode: setting 2nd endposition (0%) |
| <input type="checkbox"/> (OFF) |  |  | Programming mode: setting emergency position |

6 Settings

Programming endpositions for 0...10 VDC control signal

Note: for status messages and troubleshooting read-in problems please check section 8.

1. Press button "OK" for 5 seconds.
2. Determine if the inlet is opening or closing by pressing the I button
3. *Set controller to 1st endpoint, that corresponds to open or closed (1/10V or 0/100%)
4. I LED light should be blinking. Use this button to run the actuator to the first endpoint, use the II button if you overshoot the limit

Caution



The EcoDrive 90 will not stop in automatic mode. If a maximum position is overrun, damage may occur to the system and/or construction.

5. Press OK to set 1st position
6. *Set controller to 2nd endpoint, this should be opposite of your first endpoint (1/10V or 0/100%)
7. II LED light should be blinking. Use this button to run the actuator to the second endpoint, use the I button if you overshoot the limit

Caution



The EcoDrive 90 will not stop in automatic mode. If a maximum position is overrun, damage may occur to the system and/or construction.

8. Press OK to set 2nd position
 9. Test operation by running the actuator off the controller
 10. Run actuator to desired emergency position
 11. Hold I and II for 5 seconds to set
 12. Press OK to confirm
- *Note: See controller specific setup for exact values for the endpoints

Tip!



Verify if the EcoDrive 90 is set at the correct positions before automatic operation.

6. Settings

LED indication for 0 ... 10 VDC control

| Step | Action | OK | I | II | Description |
|------|---|-------|-------|-------|--|
| | | | | | Endposition have not been programmed |
| 1 | Press "OK" button for 5 sec | | | | |
| | | (OFF) | | (OFF) | ready to set 1 th endposition |
| 2 | Set climate controller to 1st endposition | | | | |
| 3 | Press "I" to adjust the EcoDrive 90 to the correct position | | | | |
| 4. | Press "OK" to set 1st position | | | | |
| | | (ON) | (OFF) | (OFF) | Programming mode: waiting on correct control signal |
| 5 | Set climate controller to 2 nd endposition. | | | | |
| | | (OFF) | (OFF) | | Ready to set 2 nd endposition |
| 6 | Press "II" to adjust the EcoDrive 90 to the correct position | | | | |
| 7 | Press "OK" to set the 2nd position | | | | |
| | | (ON) | (ON) | (OFF) | Programming ready, EcoDrive 90 is in endposition direction "I" |
| or | | | | | |
| | | (ON) | (OFF) | (ON) | Programming ready, EcoDrive 90 is in endposition direction "II" |
| 8 | Set climate controller in automatic mode | | | | |
| | | (ON) | (OFF) | (OFF) | Operating mode: EcoDrive 90 is between endpositions |
| | | (ON) | | (OFF) | Operating mode: EcoDrive 90 moves in direction "I" |
| | | (ON) | (OFF) | | Operating mode: EcoDrive 90 moves in direction "II" |
| | | (ON) | (ON) | (OFF) | Operating mode: EcoDrive 90 is @ endposition "I" |
| | | (ON) | (OFF) | (ON) | Operating mode: EcoDrive 90 is @ endposition "II" |

See section 13 for explanation of the symbols of the LED flashing patterns.

6. Settings

Programming emergency position for 0...10 VDC control signal

When the 0...10 VDC control signal fails (= 0 VDC), the EcoDrive 90 will automatically move to the emergency position. To apply the emergency position, next requirements need to be met:

- Control signal needs to be in the range of 1...10 VDC.
- The emergency position needs to be set.
- The control signal fails for at least 45 seconds (alarm delay).

To set the emergency position the following steps need to be taken:




















1. Both endpositions of the EcoDrive 90 must be set and the operating mode is active.
2. Set the climate controller to a position that meets the desired emergency position.
3. When the EcoDrive 90 has reached the desired position LED's "I" or "II" stop flashing.
4. Press both buttons "I" and "II" simultaneously for minimal 5 seconds. The LED's "I" and "II" will flash.
5. Press button "OK" to set the emergency position.

Note



To remove the emergency position press both buttons "I" and "II" simultaneously for minimal 5 seconds again. Then switch off the 24 VDC power.

Led indication

| Step | Action | OK | I | II | Description |
|------|---|--|---|--|---|
| 1 | Both endpositions have been programmed and the operating mode is active | | | | |
| | |  (ON) |  (OFF) |  (OFF) | EcoDrive 90 is bet-ween endpositions "I" and "II" |
| Or | | | | | |
| | |  (ON) |  (ON) |  (OFF) | EcoDrive 90 is in endposition direction "I" |
| Or | | | | | |
| | |  (ON) |  (OFF) |  (ON) | EcoDrive 90 is in endposition direction "II" |
| 2 | Set climate controller to emergency position | | | | |
| | |  (ON) |  |  (OFF) | EcoDrive 90 moves in direction "I" to emergency position |
| Or | | | | | |
| | |  (ON) |  (OFF) |  | EcoDrive 90 moves in direction "II" to emergency position |
| 3 | EcoDrive 90 has reached desired emergency position |  (ON) |  (OFF) |  (OFF) | Ready to set emergency position |
| 4 | Press "I" and "II" simultaneously for 5 sec. | | | | |
| | |  (ON) |  |  | |
| 5 | Press "OK" to set emergency position | | | | |

See section 13 for explanation

6. Settings

Programming endpositions for Modbus RTU / CAN-LOCAL

Note: for status messages and troubleshooting read-in problems please check section 8.

1. Press button "OK" for 5 seconds.
2. Determine if the inlet is opening or closing by pressing the I button
3. *Set controller to 1st endpoint, that corresponds to open or closed (1/10V or 0/100%)
4. I LED light should be blinking. Use this button to run the actuator to the first endpoint, use the II button if you overshoot the limit

Caution



The EcoDrive 90 will not stop in automatic mode. If a maximum position is overrun, damage may occur to the system and/or construction.

5. Press OK to set 1st position
6. *Set controller to 2nd endpoint, this should be opposite of your first endpoint (1/10V or 0/100%)
7. II LED light should be blinking. Use this button to run the actuator to the second endpoint, use the I button if you overshoot the limit

Caution



The EcoDrive 90 will not stop in automatic mode. If a maximum position is overrun, damage may occur to the system and/or construction.

8. Press OK to set 2nd position
 9. Test operation by running the actuator off the controller
 10. Run actuator to desired emergency position
 11. Hold I and II for 5 seconds to set
 12. Press OK to confirm
- *Note: See controller specific setup for exact values for the endpoints

Tip!



Verify if the EcoDrive 90 is set at the correct positions before automatic operation.

6 Settings

Led indication for Modbus RTU/ CAN-LOCAL

| Step | Action | OK | I | II | Description |
|------|--|-------|-------|-------|---|
| | | | | | Endposition have not been programmed |
| 1 | Press "OK" button for 5 sec | | | | |
| | | (OFF) | | (OFF) | ready to set 1 th endposition |
| 2 | Press "I" to adjust the EcoDrive 90 to the correct position | | | | |
| 3 | Press "OK" to set the 1th position | | | | |
| | | (ON) | (OFF) | (OFF) | Programming mode: waiting on correct control signal |
| 4 | Press button "OK"for 5 sec. | | | | |
| | | (OFF) | (OFF) | | Ready to set 2 nd endposition |
| 5 | Press "II" to adjust the EcoDrive 90 to the correct position | | | | |
| 6 | Press "OK" to set the 2nd position | | | | |
| | | (ON) | (ON) | (OFF) | Programming ready, EcoDrive 90 is in endposition direction "I" |
| | | or | | | |
| | | (ON) | (OFF) | (ON) | Programming ready, EcoDrive 90 is in endposition direction "II" |
| 7 | Set climate controller in automatic mode | | | | |
| | | (ON) | (OFF) | (OFF) | Operating mode: EcoDrive 90 is between endpositions |
| | | (ON) | | (OFF) | Operating mode: EcoDrive 90 moves in direction "I" |
| | | (ON) | (OFF) | | Operating mode: EcoDrive 90 moves in direction "II" |
| | | (ON) | (ON) | (OFF) | Operating mode: EcoDrive 90 is @ endposition "I" |
| | | (ON) | (OFF) | (ON) | Operating mode: EcoDrive 90 is @ endposition "II" |

7 Modbus RTU protocol - Register Implementation

Setting communication parameters:

The Modbus “baud-rate” can be changed through a Modbus command. The “Device address” can be changed through a Modbus command in combination with dipswitches 1...3 of the Address dipswitch (Address = dipswitch + Address Offset). See section 9 for the dipswitch positions.

Parameters:

- Device address 0 (Default)
- Baud-rate 9600
- Data Bits 8
- Parity None
- Stop Bits 1

Modbus commands

The following Modbus commands are supported by this Modbus implementation:

- 0x06: “Write single register”. This command can only be used to write a 16 bit value to a single Modbus register.
- 0x10: “Write multiple registers”. Use this command e.g. to write a 32 bit value into two consecutive Modbus registers.
- 0x03: “Read holding registers”. Use this command to read one or more “holding registers”.

Variables

The variables can be accessed via the Modbus registers as stated below. For each variable two Modbus registers are used as the variables are 32 bit values. The least significant bits are stored in the first register and the most significant bits are stored in the second register (as defined by the Modbus standard). Use only the registers that are described in this document.

| Registers | Name | Description |
|-------------|--------------------|--|
| 0x390:0x391 | Current position | 0 ... 1000 = 0.0 ... 100.0% |
| 0x392:0x393 | Desired position | 0 ... 1000 = 0.0 ... 100.0% |
| 0x396:0x397 | Motor voltage | e.g. 246 = 24.6V |
| 0x398:0x399 | Software version | e.g. 102 = Version 1.02 |
| 0x39C:0x39D | EcoDrive 90 Status | bit 1: Not used bit 2: Not used bit 3: Running towards 0% bit 4: Running towards 100% bit 5: Current in end position 0% bit 6: Current in end position 100% bit 7: Not used bit 8: Not used |
| | | If Communication-failsafe is active in this register a ‘1’ has to be written within the Communication-failsafe timeout time |
| 0x3A0:0x3A1 | | |

7 Modbus RTU protocol - Register Implementation

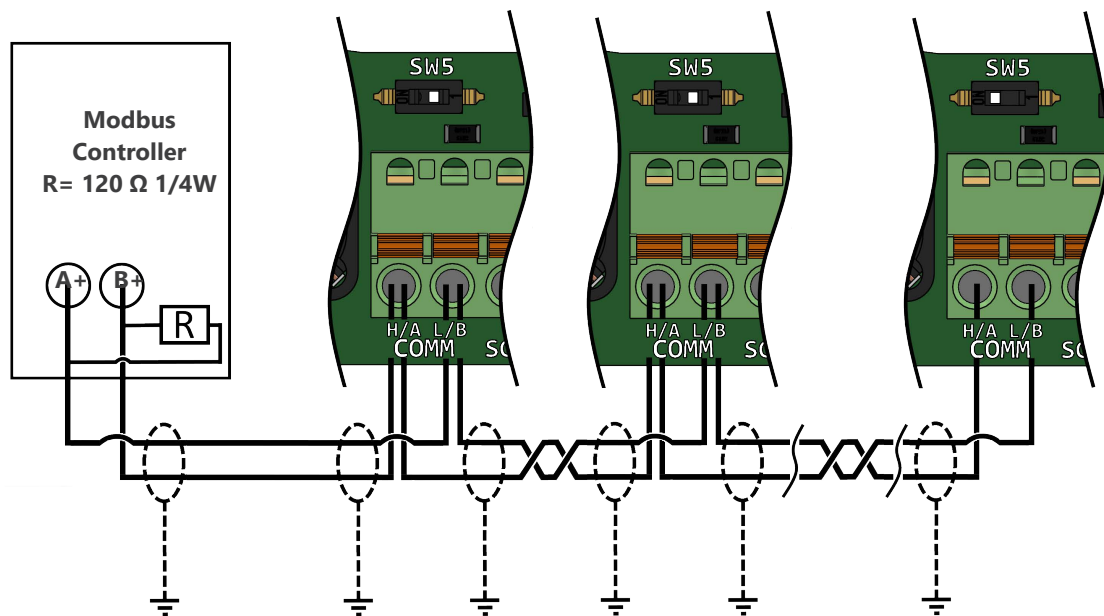
Caution



When too many commands are sent within a short time frame Modbus communication may fail. Spread messages within the longest possible time frame by selecting the lowest baud-rate.

Modbus wiring diagram

The diagram below shows how to wire, according to the RS-485 specification (TIA/EIA-485-A), an RTU Network. In this example the master needs to have a termination resistor and last EcoDrive 90 (Node 7) needs to have the termination resistor activated (dipswitch SW5 switched to "1", see section 9).



RTU Network

A maximum number of 256 modules can be connected. In theory this means one master and 255 EcoDrive 90 can be connected on one RTU network. Please note: the distances and type of cable can limit this maximum number.

Termination resistors

In order to avoid reflections the use of termination resistors is necessary. These resistors (R) of 120 ohms must be connected in parallel between the data lines + and -. A termination resistor is only required at the first and the last module in the network. The EcoDrive 90 is equipped with a built in termination resistor which can be activated with dipswitch SW5 to close the Modbus.

7 Modbus RTU protocol - Register Implementation

Modbus settings

Access to the settings is possible via the Modbus registers below. For each variable two Modbus registers are used as the variables are 32 bit values. The least important bits are stored in the first register and the most important bits are stored in the second register (as defined by the Modbus standard). Only use registers which are described in this document. Default settings are in bold.

| Registers | Name | Description |
|-------------|----------------------------------|---|
| 0x3A6:0x3A7 | Invert Modbus | 0 = Modbus 0-100% 1 = Modbus 100-0% |
| 0x3A8:0x3A9 | Offset Modbus Device address | 0...255 (default 0) Modbus address = Dipswitch + Offset |
| 0x3AA:0x3AB | Modbus baud-rate | 0 = 9600 baud 4 = 38400 baud 1 = 14400 baud 5 = 57600 baud 2 = 19200 baud 6 = 76800 baud 3 = 28800 baud 7 = 115200 baud |
| 0x3CC:0x3CD | "Communication-failsafe ON/OFF" | 0 = Communication-failsafe OFF 1 = Communication-failsafe ON |
| 0x3CE:0x3CF | Communication- failsafe setpoint | When Communication-failsafe is active and communication is interrupted, the EcoDrive 90 will run to this position. 0 ... 1000 = 0.0 ... 100.0 % (default 0) |
| 0x3D0:0x3D1 | Communication failsafe Timeout | If Communication-failsafe is active this is the maximum time within the heartbeat register has to be written with '1'. 0 ... 60000 (ms) (default 0) |
| 0x3E0:0x3E1 | Save settings | Write at least a '1' in this register to save the settings |

Attention!



A new Modbus Device-address and/or baud-rate setting will only be active after a restart of the EcoDrive 90 Modbus.

8 Troubleshooting

Troubleshooting may only be performed by qualified staff, see section 1. If you encounter a problem not listed below, please contact your supplier or the manufacturer.

Alarm relays

During normal operation of the EcoDrive 90 the alarm contact is made, the green OK LED is ON and the red Error LED is OFF. During setting of the endpositions and emergency position, or at a failure the alarm contact is opened. At a failure the RED error LED will flash or be permanently ON. Details on the error LED flash patterns are shown in the table below.

Fault: no control signal

- Check the climate controller and control signal cables.
- Check the screen of the cable, possibly interference from other sources is blocking a correct control signal. **Fault: endpositions cannot be set**






- The setting of the second endposition will be rejected if the difference between both endpositions is less than $\frac{1}{4}$ revolution of the main shaft.
- The setting of the second endposition will be rejected if the difference of the control signal between both endpositions is less than 2 VDC.

Fault: oil leak

- Contact the installer when the cause of oil leakage is not related to installation error.

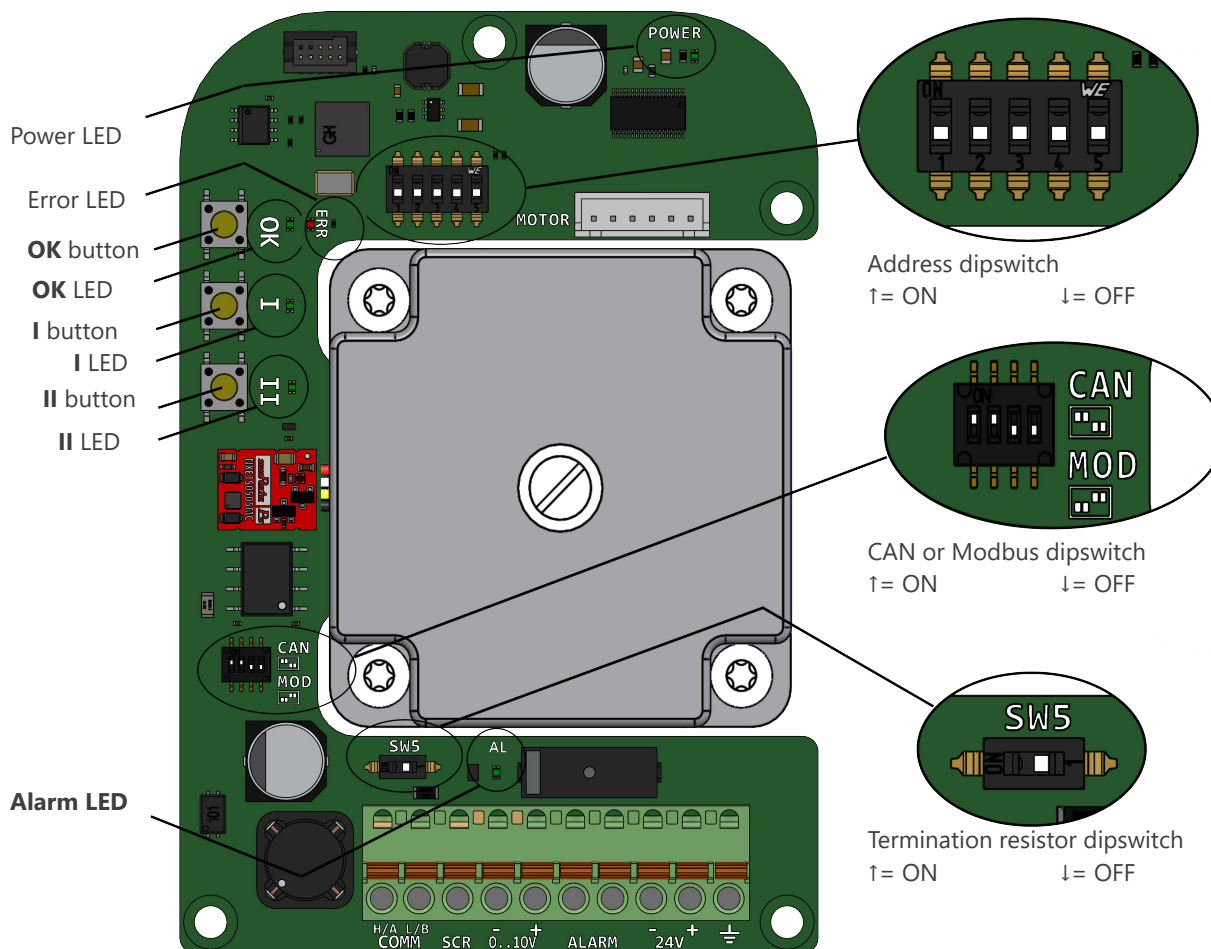
Fault: voltage loss

- The power cables are too long or the conductor diameter is too small
- The power cable is used by multiple motors / consumers. Preferably use one cable for every EcoDrive 90 .

| Error Led | Alarm contact | Description |
|---|-------------------|---|
|  (OFF) | Closed (no alarm) | No alarm |
|  (ON) | Open (alarm) | System alarm |
|  | Open (alarm) | Jamming. EcoDrive 90 is jammed in 1 direction. Alarm resets automatically if EcoDrive 90 moves in the opposite direction. |
|  | Open (alarm) | Stuck. EcoDrive 90 is jammed in 2 directions |
|  | Closed (no alarm) | Power voltage too low or has been too low. This alarm will be automatically be reset after 4 starts of the EcoDrive 90 |

See section 13 for explanation of the symbols of the LED flashing patterns.

9 Position of the buttons, LED's and dipswitches



Address dipswitch

Dipswitch 1...3

Dipswitch 4

Dipswitch 5

Bus address setting.

Speed setting; "off" 0,8 rpm (standard setting), "on" 0,4 rpm.

Reduced power-modus. When set to "ON", the EcoDrive 90 is limited to it's power.

- maximum current is reduced to 2A
- maximum pulling force is reduced to 160 kg

| Offset Device address = 0 (Default value register 0x3A8:0X3A9) | | | |
|--|--------------|--------------|--------------|
| Address 1 ON | Address 2 ON | Address 3 ON | Address 4 ON |
| Address 5 ON | Address 6 ON | Address 7 ON | Address 8 ON |

Modbus RTU or CAN-LOCAL bus selection dipswitch

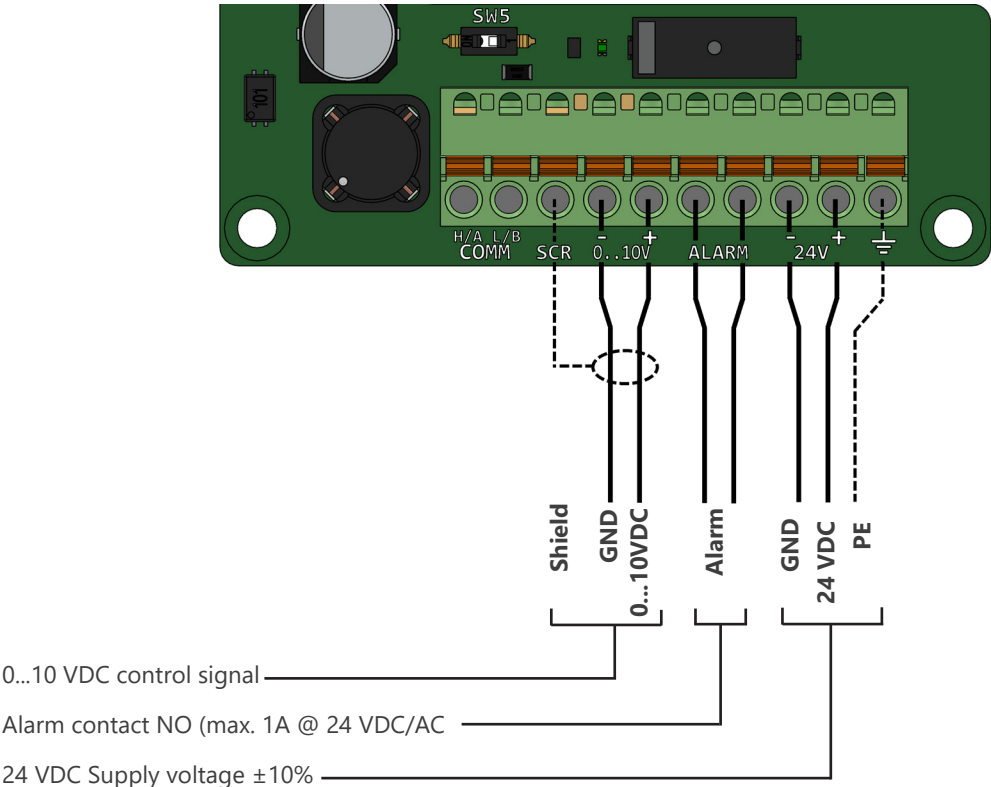
In order to select the correct bus, set the dipswitches in the correct position. For CAN-LOCAL bus switches 1 & 2 must be set to "on", 3 & 4 is set to "off". For Modbus RTU switches 1 & 2 must be set to "off", 3 & 4 is set to "on". See picture for reference.

Termination resistor dipswitch

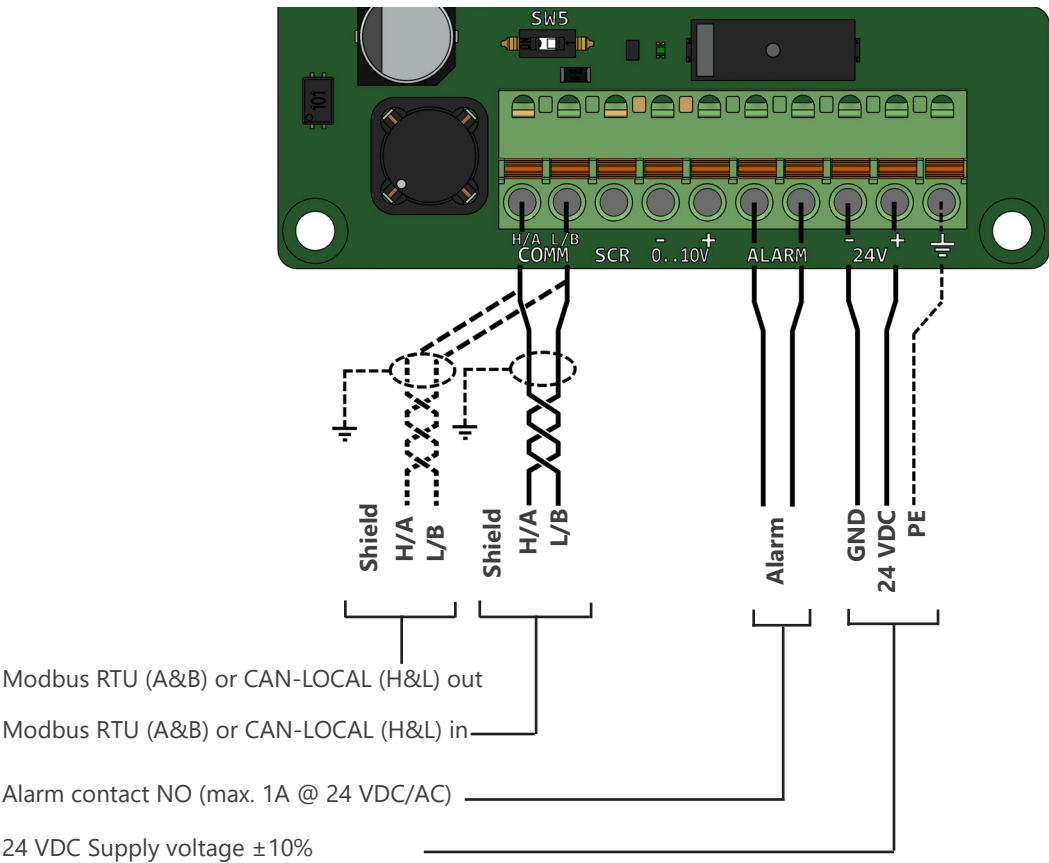
When a bus system is connected, the use of a termination resistor is necessary. This termination resistor is activated by switching the dipswitch to "1". This is only required at the last EcoDrive 90 in the network.

10 Wiring diagram

Wiring diagram 0 ... 10 VDC control



Wiring diagram Modbus RTU and/or CAN-LOCAL bus



11 Inspection and maintenance

Inspection and maintenance tasks may only be carried out by qualified staff, see section 1. The EcoDrive 90 itself is maintenance free. The gearbox has lifetime lubrication. Changing the gear oil is unnecessary.

Maintenance intervals

Every 6 months

- Check if the plastic protective cover is mounted correctly and is free of any damages.
- Check the steel cable and steel cable connections. These parts may have under no circumstances have any kind of mechanical damage.
- Check for increased noise level.

Every year







- Check and re-tighten mounting bolts.
- Check couplings for wear and corrosion.
- If present, lubricate chain couplings (oil viscosity 80 cST to 120 cST at 20°C).
- Backup power; check (if present) the functionality of the emergency backup power source.
- Check whether the endpositions are still correct. Adjust if necessary.

Risk of injury or death due to electrical or mechanical forces!



Before starting to work on the gearbox or related parts, always switch the power off at the master switch or operating switch and lock it out with a padlock to prevent switching on again.

12 LED explanation

| LED symbol | Description |
|---|---|
|  (OFF) | LED is permanently off |
|  (ON) | LED is permanently on |
|  | LED flashes 10 times per second (10 Hz) E.g. EcoDrive 90 runs |
|  | LED switches off 10 times per second (10 Hz) E.g. EcoDrive 90 is jammed in 2 directions |
|  | LED flashes 2 times per second (2 Hz) E.g. EcoDrive 90 is in programming mode |
|  | LED flashes 1 time per second (1 Hz) E.g. voltage warning |

13 Glossary

| Name | Explanation |
|------------------------------|--|
| Axial | In the length direction of the shaft |
| Baud-rate | Communication transfer speed in bits per second |
| Dead-man vigilance system | Emergency switch actuated by a pull cord spanned along the entire length of the system |
| Fall-arrest protection brake | A protective device which stops descending loads if they are moving too fast |
| Flexible coupling | A coupling which is able to compensate for alignment errors, for instance a chain coupling, universal joint or cardan shaft |
| Gearbox | A gear unit that reduces the shaft speed of the input shaft |
| Hazard area | The area below or directly around the driven or moving parts |
| Linear | Straight line |
| Motor gearbox | A gear unit in combination with a motor |
| Protective cover | Cover to prevent direct contact between people, rain, dust and the motor gearbox electronics |
| Self-braking | The gear unit can only be driven by the motor the drive-shaft cannot be moved by the load |
| Tightening torque [Nm] | Torque to which a bolted joint has to be tightened in units of in Newton-metre |
| Torque [Nm] | A measure of the rotational effect of a force. The magnitude of the torque is equal to the force time the radius (arm) and is expressed in Newton-metres |
| PE | Protective Earth, electrical connection |
| Radial | Perpendicular to the shaft |
| Relay | A switch operated by an electromagnet |
| Residual risks | Risks which cannot reasonably be avoided (inherent in the product) |
| rpm | Revolutions per minute |
| VDC | Voltage Direct Current |



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