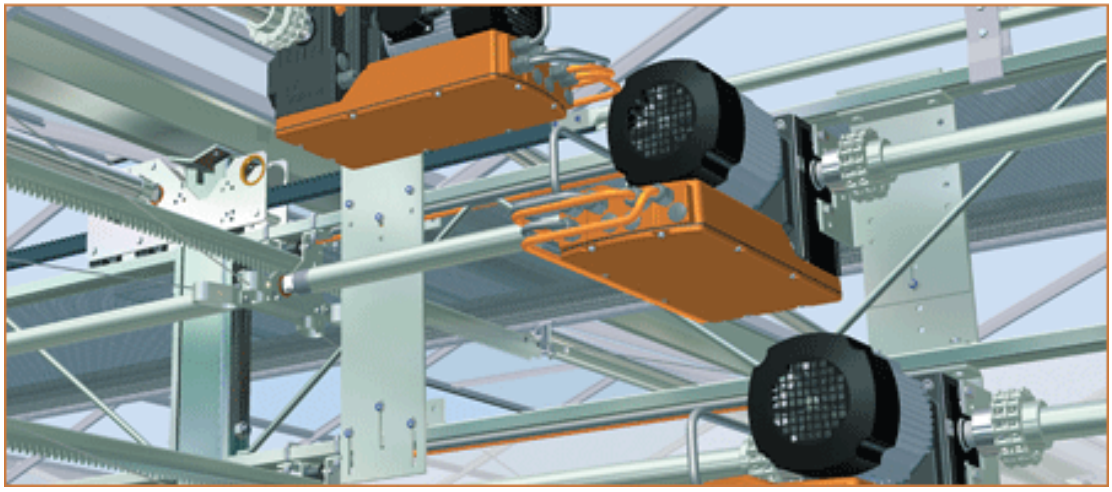
Ridder LogicLink® 600

User- and installer manual



De kracht van innovatie:
de Ridder LogicLink®

Art.nr. 103040 – Version 2007.05 – May 2007

1 General

1.1 User manual Ridder LogicLink 600

This user manual will provide the electrical installer a general introduction of the Ridder Logic Link 600 (RLL600) control system and cover the methods for proper site installation of the RLL600. The manual has been assembled with technical support literature, a step by step instruction for the installation, preventative measures and troubleshooting guidelines.
All activities as described in this manual concerning installing, connecting, and putting into operation of the RLL600 should be carried out by qualified and skilled electrical installers only.

1.2 Structure user manual

The user manual for the RLL600 is designed according the requirements laid out in the NEN 5509 standard. Conform this standard; the contents, structure and formulation are made.

This manual is divided into separate chapters. In each chapter the most important matters are handled by subject, like electrical installation of the RLL600 and safety.

It is absolutely necessary for all installers who have to install the RLL600 to read and study this user manual completely, attentively and to follow all instructions to be able to install the RLL600 correctly and safely.

1.3 Tips, warnings, precautions and dangers in the user manual

This user manual contains various notes dievided into: tips, warnings, precautions and dangers.
These notes are divided into a number of levels. Below you will find a summary and description of each note.

⚠ **ATTENTION**	It is very important an essential to read this user manual before installing the Ridder LogicLink 600 control system (RLL600).

Een suggestie of advies bij het uitvoeren van een handeling.

Opmerking met extra informatie welke wijst op mogelijke problemen bij het onjuist uitvoeren van een handeling.

Het product of systeem kan gevaar lopen bij het onjuist uitvoeren van een handeling.

De gebruiker, installateur of een andere persoon kan lichamelijk letsel oplopen of (levens-)gevaar lopen bij het onjuist uitvoeren van een handeling.

2 RLL600

The RLL600 is a universal integrated control interface for Ridder motor gearboxes. The characteristics of the RLL600 are:

- Simple installation;
- Improvement of the comunication between climate computer and motor gearbox;
- To create a more accurate control system.

2.1 Functionallity RLL600

The RLL600 has the following functions:

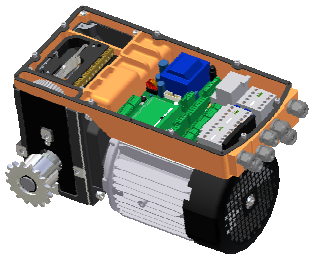
1. Clockwise / counter clockwise controlling of the motor gearbox;
2. To send the motor gearbox to a target position by using a 24V AC/DC control signal;
3. To send the motor gearbox to a target position by using a 0 -10V control signa lor by using a bus system (CANopen / BACnet);
4. Remote reset of the ermal overload relay of the motor gearbox;
5. Time delay between direct control in opposite direction;
6. Display of running hours;
7. System monitoring on maximum torque;
8. Feedback of fault messages by relay output contact;
9. Monitoring of position and fault messages by using the bus system;
10. Position feedback signal by using the potentiometer simulation;

11. Synchronous running control: to operate several motor gearboxes which drive one continuous (screening) system;
12. Sequential control: to operate several motor gearboxes, wich have always the same target position.
13. Option to control a frequency controlled motor gearbox;

The RLL600 can be delivered in the following versions;

- RLL610 and RLL611: This version is provided with functions 1 till 9;
- RLL660 and RLL661: This version is provided with functions 1 till 9 and 13;
- RLL620 and RLL621: This version is provided with functions 1 till 12;
- RLL670 and RLL671: This version is provided with functions 1 till 13, except function 11 (synchronous running control)

The RLL610/611; and the RLL660/661 are the "slave" motor gearboxes. The RLL620/621 and the RLL670/671 are the "master" motor gearboxes. Find below the configurations of the different RLL600-units;



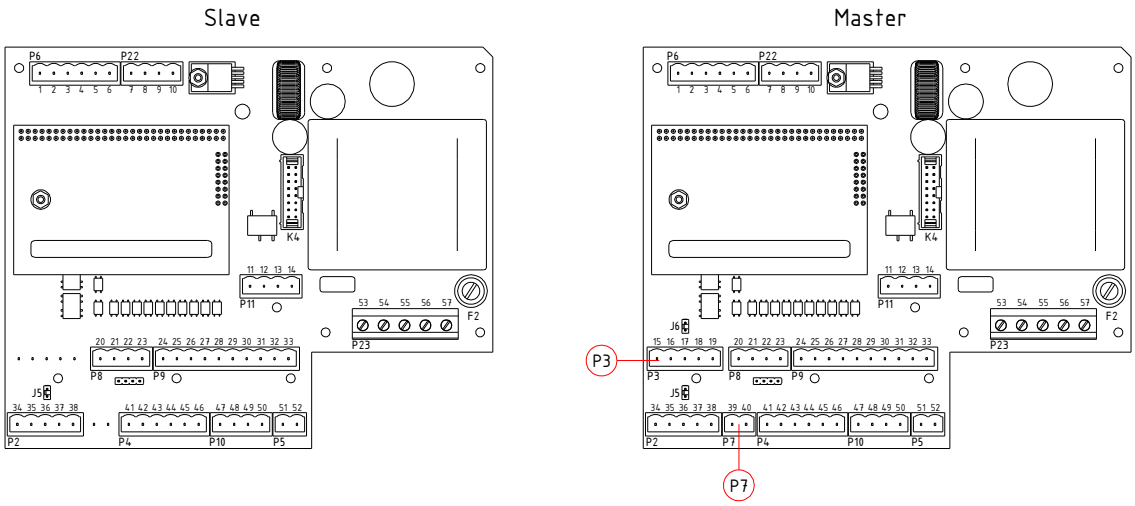
Internally (IN) The components are built in a aluminium control box on the motor gearbox:

- The RLL610/611/620/621-IN are supplied with an aluminium housing directly mounted on the Ridder motor gearbox in combination with a 3 phase electrical motor
- The RLL660/661/670/671-IN are supplied with an aluminium housing directly mounted gemonteerd on the Ridder motor gearbox in combination with a frequency controlled electrical motor.

Externally (EX) The components are built in a seperate plastic control box:

- The RLL610/611/620/621-EX are supplied with a PC housing in combination with a Ridder motor gearbox with a 3 phase electrical motor.
- The RLL660/661/670/671-EX are supplied with a PC housing in combination with a Ridder motor gearbox with a frequency controlled electrical motor.

The exterior difference between the RLL610/611/660/661 Slave motor gearboxes and the RLL660/661/670/671 Master motor gearboxes are clearly visable on print circuit board X1 due to the connectors. At the Master version, all connection positions are provided with a connector. At the Slave versions, the connectors P3 and P7 are not mounted on the printed circuit board.



Afbeelding 1 X1 als Slave of Master uitvoering

2.1 Function RLL600-Master in a climate control

The RLL600-Master version has the following functions:

- To control the Slave-units in a synchronous running control or sequential control, by using the internal CANopen- bus system. The following options can be used to control the Master-unit:
  - 24V AC-DC
  - 0-10V
  - CAN-open bus system
  - BAC-net bus system
  - Manual control
- Position feedback as a 4-20mA signal in case of using a 24V AC-DC control signal from the climate computer.

2.2 Function RLL600-Slave in a climate control

The RLL600-Slave version has the following functions:

- To operate as a CANopen or BAC-net Slave-unit controlled directly by the climate computer.
- To operate as a CANopen Slave-unit in an internal bussystem controlled by the RLL600-Master-unit.
- 0-10V control

- 24V AC-DC control without feedback signal.

2.3 Functions Manual control RLL600

The manual control has the following functions:

1. To control the system manually clockwise/counter clockwise direction or opening/closing;
2. To turn the drivesystem into automatic mode in order to be controlled by the climate computer;
3. To stop the drive system manually by turning the rotary knob on the manual controlbox on zero-position;
4. To reset faults in the RLL600 by turning the rotary knob on the manual control box on zero-position;
5. To read the status of the RLL600 by using the flashing codes of the LED's on the manual control box.

The manual control has the highest priority in the RLL600 control system. If the the rotary knob on the manual control box is not in the automatic position, all external controls are ignored. This could damage the system in case of a synchronous running control. More information in chapter "synchronous running control"

3. Installation RLL600.

3.1 General

During installation, the RLL600 has to be protected against outside influences. It is only allowed to remove the cover of the RLL600-unit during installation or maintenance-activities. Prevent any access of water or dust inside the control box. After the installation or maintenance activities are finished, the control box should be closed immediately to avoid any access of outside influences. The RLL600-unit has to be protected against splash water in case the RLL600-unit is installed in an outdoor environment.

Close the control box completely to protect the control system against outside influences.

The RLL600 has to be connected as soon as possible to the power supply voedingsspanning to keep the controlbox free of condensation. The transformer generates a constant heat emission which avoids condensation inside the control box.

Prevent condensation by connecting the powersupply.

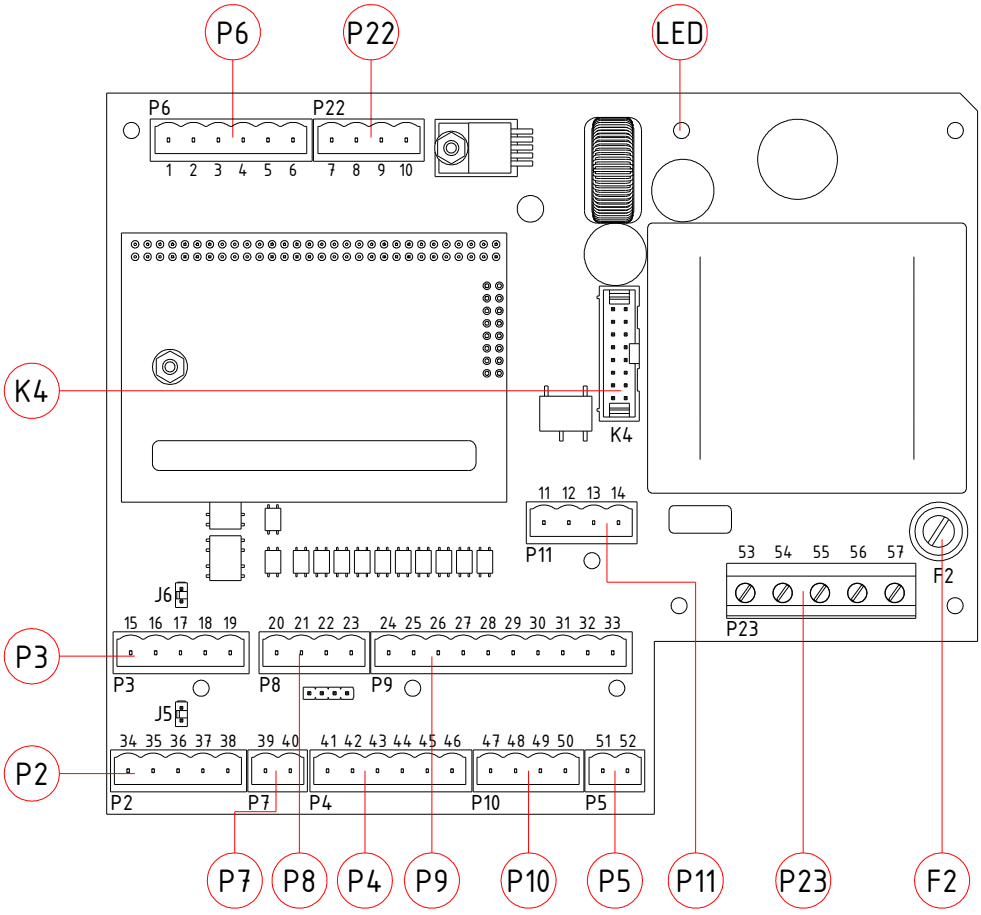
Do not touch the printed circuit board. Don not touch the printed circuit board with any solid or sharp objects like a screwdriver, etc. Damage of the printed circuit board can result in mal functioning of the RLL600.

Do not touch the printed circuit board with any solid or sharp object.

Avoid damage to the printed circuit board caused by static electricity. Discharge yourself before activities ate the printed circuit board. Also discharge yourself before connecting the connectors. The best way is to wear an earthed wrist belt.

Avoid any static electricity.

3.2 Layout RLL600-printed circuit board



Afbeelding 2 **Overzicht van de besturingsprint**

LED = Indication of powersupply at the printed cicrcuit board

F2 = Fusing of the printed circuit board

P6	Eindschakelaars
1	Rechts'
2	Rechts
3	Links'
4	Links
5	Noodstop'
6	Noodstop

P22	Incrementele Encoder
7	B
8	GND
9	A
10	5 V DC

P11	Frequentie Geregelde Motor
11	Snelheid hoog Relais
12	Snelheid hoog Relais'
13	Alarm contact
14	Alarm contact'

P3	CAN Bus (Master)
15	CAN Hi
16	CAN Lo
17	CAN GND
18	
19	

P8	Snelheid Wissel Schakelaars
20	Hoog
21	Hoog'
22	Laag
23	Laag'

P9	Klimaatcomputer
24	Links
25	Links'
26	Rechts
27	Rechts'
28	Snelheid hoog
29	Snelheid hoog'
30	Analoog in +
31	Analoog in GND
32	Alarm contact
33	Alarm contact'

P2	CAN Bus (Slave)
34	CAN Hi
35	CAN Lo
36	CAN GND
37	
38	

P7	Tussenliggende Positie uitgang
39	+
40	-

P4	Handbediening
41	12 V DC
42	Links
43	Auto
44	Rechts
45	Indicator 0 / Rood
46	Indicator 1 / Groen

P10	Draairichting Relais
47	24 V Voeding
48	Relais Links
49	Relais Noodstop
50	Relais Rechts

P5	Overstroom Beveiliging
51	Overstroom contact
52	Overstroom contact'

P23	Voeding
63	277 V
54	230 V
55	115 V
56	0 V
57	Aarde

K4	Speciale Handbediening
1	5 V DC
2	5 V DC
3	GND
4	-
5	Serieel TXD
6	Links
7	Serieel TXD
8	Stop
9	GND
10	Rechts
11	Indicator 0 / Rood
12	Stop / Annuleer Leertraject
13	5 V DC
14	Start Leertraject
15	Indicator 1 / Groen
16	GND

Tabel 1 Explanation connection terminals control-PCB RLL600

3.3 Installation

Pay attention and take care of the following issues during installation of the RLL600;

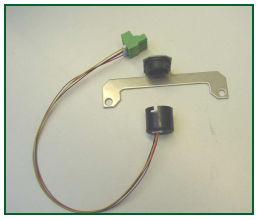
1. The power supply cable (mains) should be provided with a local isolator before the cable enters the RLL600-unit. In the local isolator the power supply cable can be looped to the next RLL600-unit. The size of the loop cable depends on the total power of the RLL-units which are connected and controlled.
2. In case of applications with frequency controlled electrical motors, the control cables have to be shielded cables.

For all other cases, in case the RLL600-unit is provided with a aluminium housing directly mounted at the Ridder motor gearbox, the connection is the same as for a standard Ridder motor gearbox.

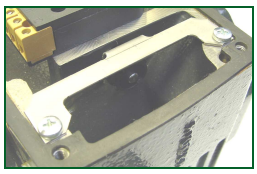
Pay attention to the following points during installation of the RLL600 with a plastic control box;

1. The controlbox has to be mounted as close as possible to the motor gearbox. The maximum distance is 10m.
2. The encoder must be installed according the following sequence. In contrast with a potentiometer, the position of the encoder or motor gearbox shaft is not important;

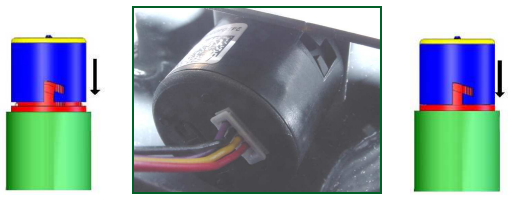
    1. Remove the encoder of the mounting bracket;

    2. Install the mounting bracket;

    3. Shift the encoder completely on the mounting bracket till the cams on the mounting bracket are touching the encoder;
    In case of a not completely proper placed encoder, the RLL600-unit can turn off the motor gearbox due to a torque protection fault. The encoder disc in relation to the encoder lens is not installed at the proper distance;

4. Turn the encoder till the mechanical stop;

5. The encoder is installed.

⚠ ATTENTION

Incorrect installation of the encoder will cause a faulty signal to the control PCB (printed circuit board). The RLL600-unit will be switched off due to a "torque protection fault"

3.4 Wiring diagrams

This section is diveded into 3 sub sections;

- Wiring diagram RLL600-IN (Mounted on the motor gear box)
- Wiring diagram RLL600-EX (Plastic box mounted beside motor gearbox)
- Wiring diagram external control (controlsignals from the climate computer)

The symbols displayed in the below table are used in the lay-outs and wiring diagrams in this manual.

	Symbol	Description
	S1	Working switch (S11 en S12)
	S2	Safety switch (S21 en S22)
	X0	Control box (intern / extern)
	X1	Control PCB (printed circuit board)
	X2	Manual control
	X3	Limit switch system
	X4	Encoder bracket with encoder
	K1	Running direction 1 relay
	K2	Running direction 2 relay
	K3	Safety relay
	K4	Frequency high relay
	Q1	Thermal overload protection
	L1	Phase 1
	L2	Phase 2
	L3	Phase 3

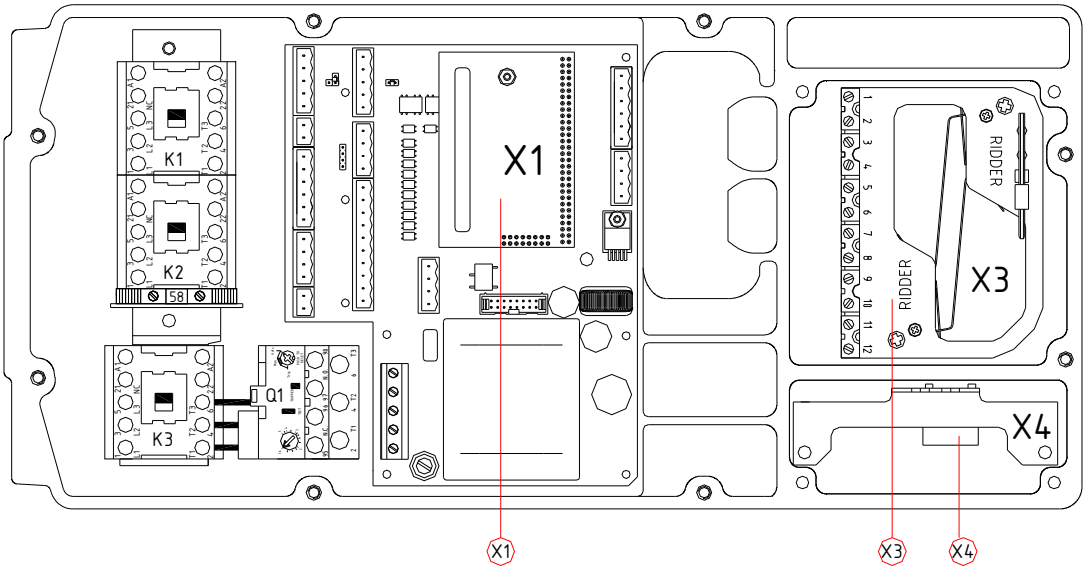
	N	Neutral
	PE	Ground / Earth
	D1	Red LED manual control
	D2	Green LED manual control
	LED	Green LED control PCB (printed circuit board)
	F2	Fuse

Tabel 2 Symbol description

In the wiring diagrams the prewired parts by Ridder are put into a frame.
All wiring outside the frame has to be connected and installed by the installer.

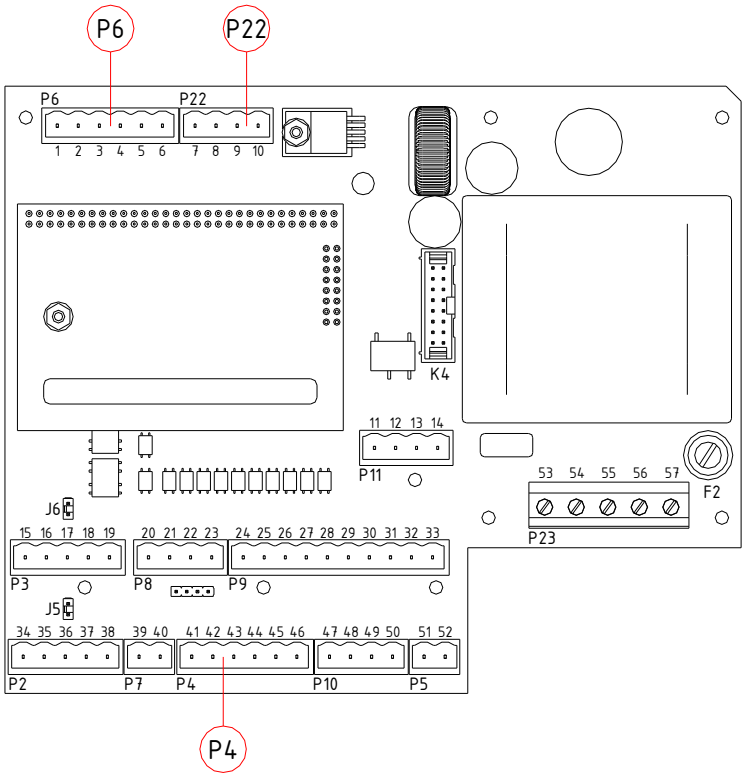
3.4.1 Wiring diagrams RLL600-IN

RLL600-IN general wiring diagram for : limit switch; encoder and manual control.

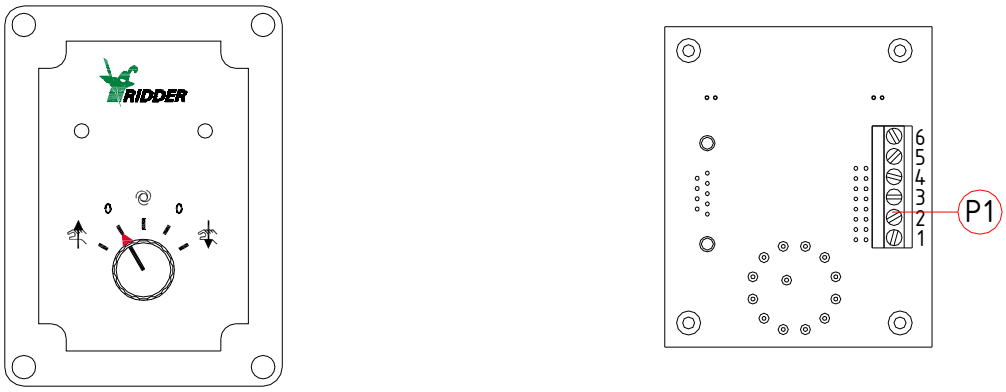


In the lay-out of the control box of the RW45, the limit switch is rotated 180 degrees in relation to the above lay-out.

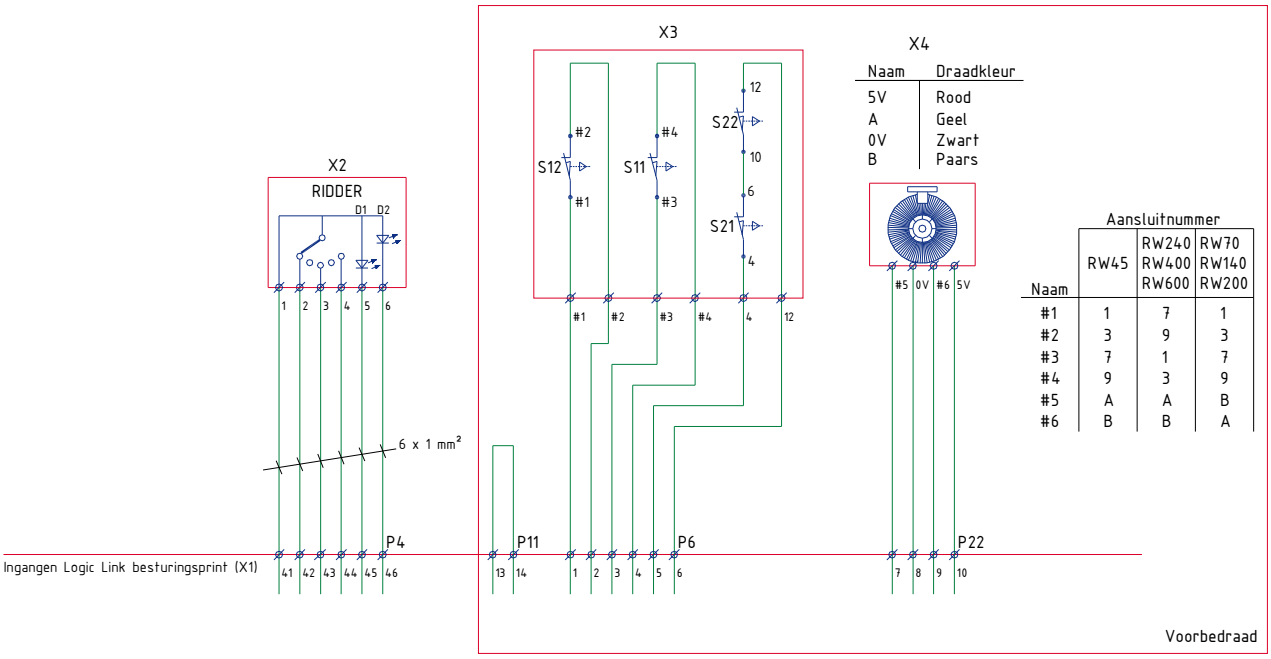
Picture 3 X0 (Lay-out control box motor gearbox internal, general connection)



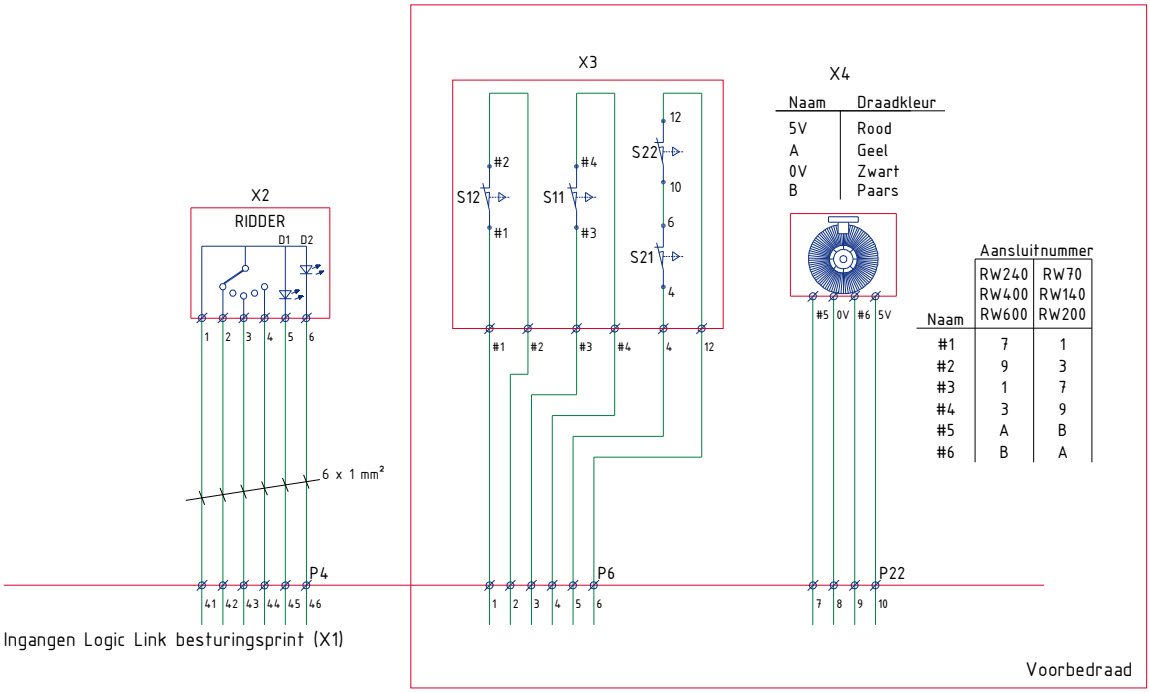
Picture 4 X1 (Control PCB (control circuit board), general connection)



Picture 5 X2 (manual control box + PCB (printed circuit board) manual control)

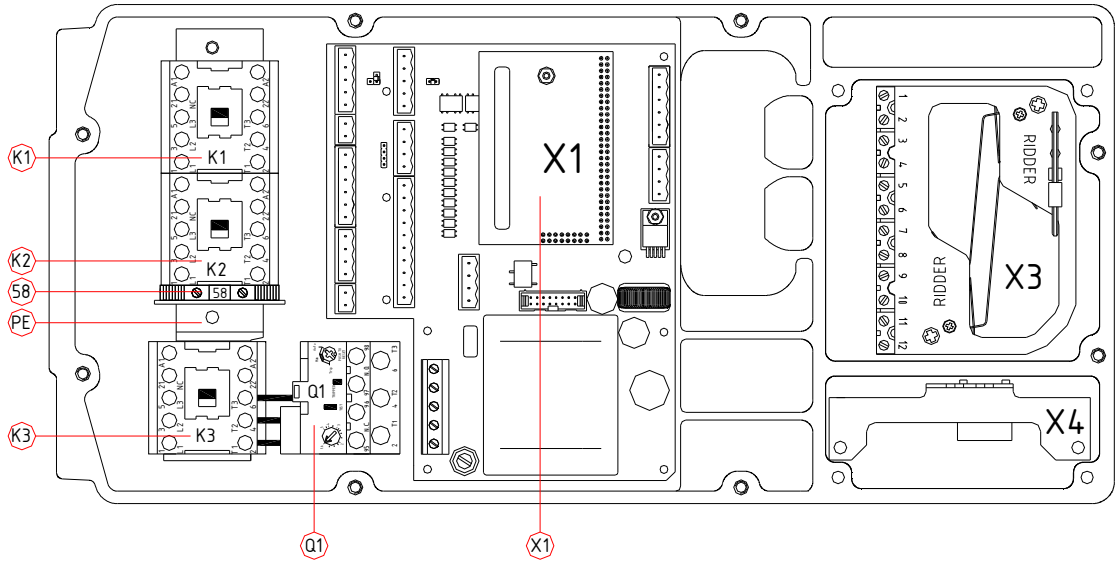


Wiring diagram 1 control PCB (printed circuit board) X1 for manual control; limit switch and encoder in combination with a 3-phase motor gearbox internal

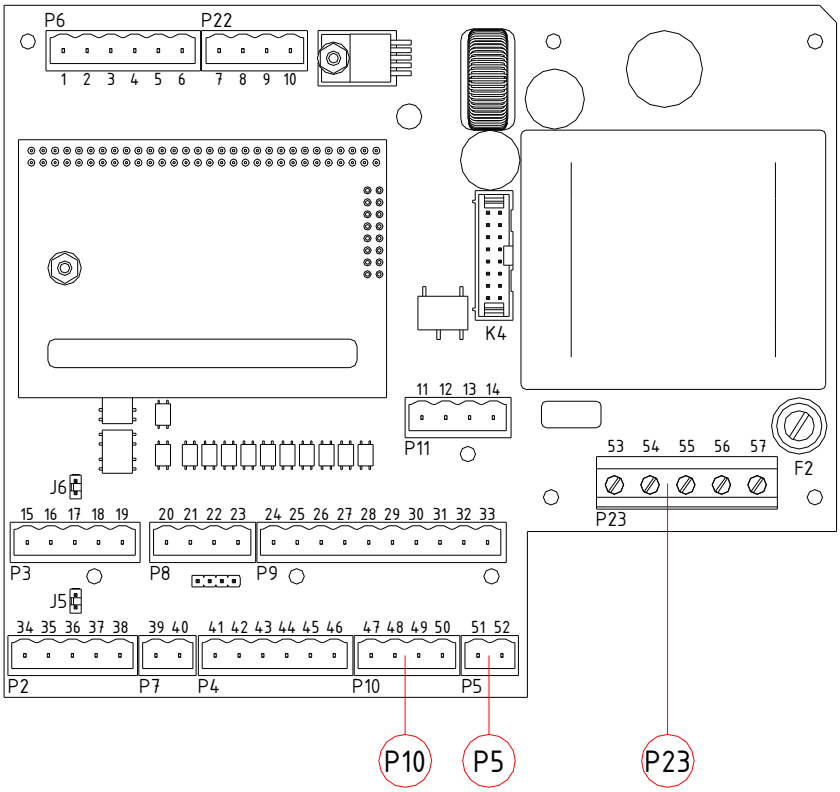


Wiring diagram 2 Inputs control PCB (printed circuit board) X1 for manual control; limit switch and encoder in combination with a frequency controlled motor gearbox internal.

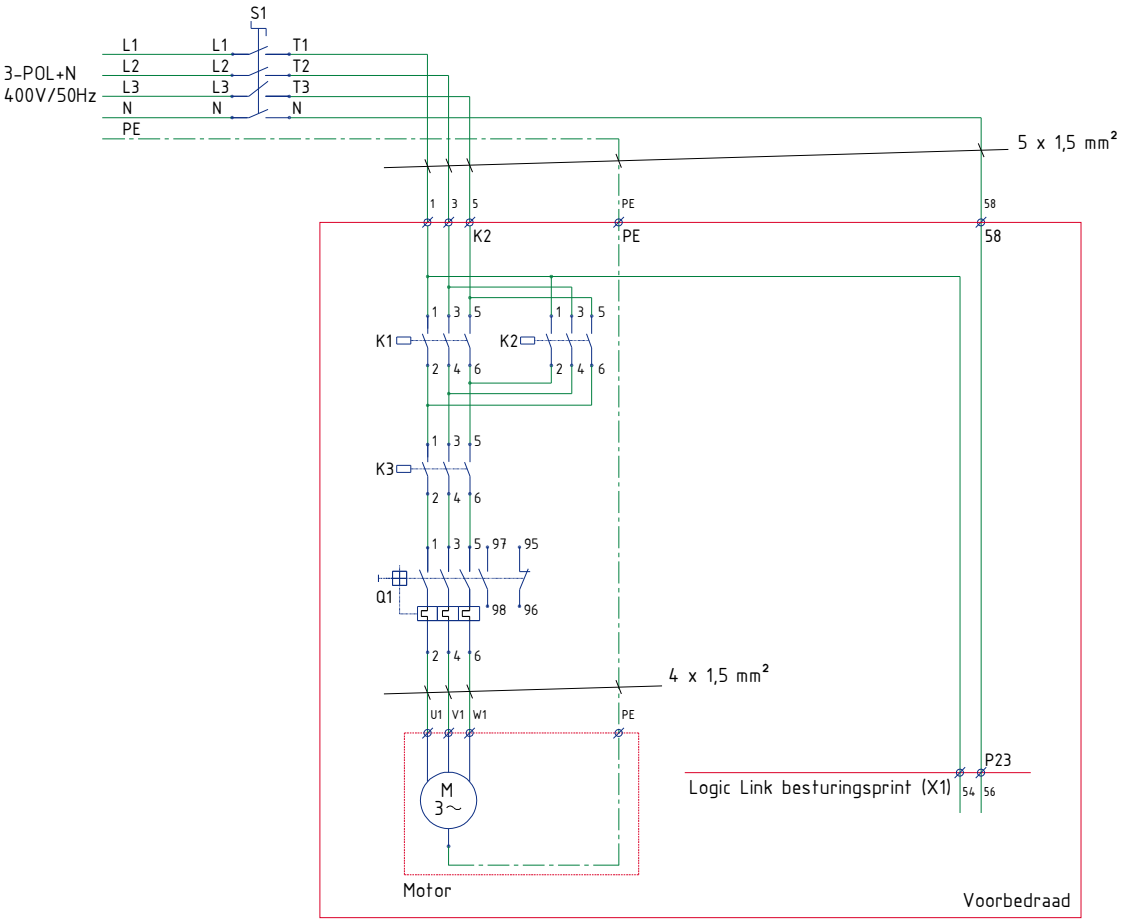
RLL610/611/620/621-IN wiring diagram : Aluminium housing, 3 phase electrical motor.



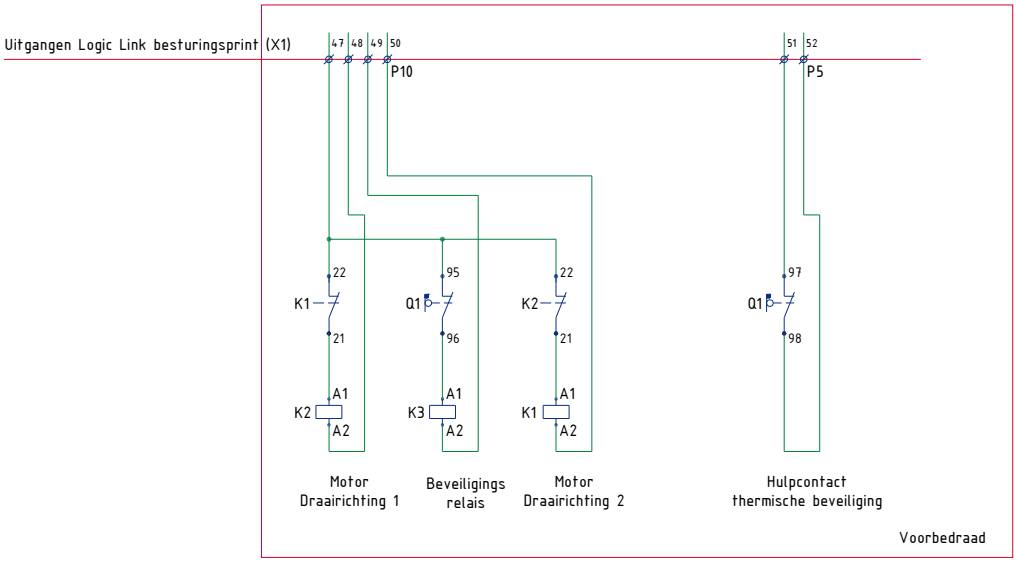
Picture 6 X0 (Lay-out control box 3-phase motor gearbox internally)



Picture 7 X1 Control PCB (printed circuit board), with connections for RLL610/611/620/621-IN 3-phase motor control)

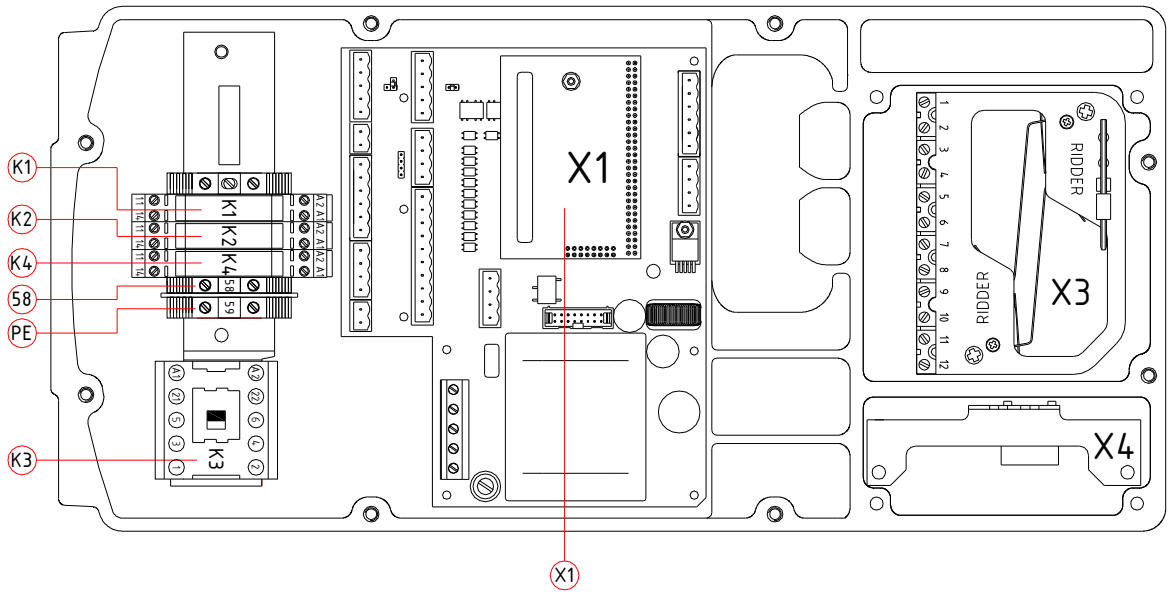


Wiring diagram 3 Power supply 3-phase motor gearbox Internal

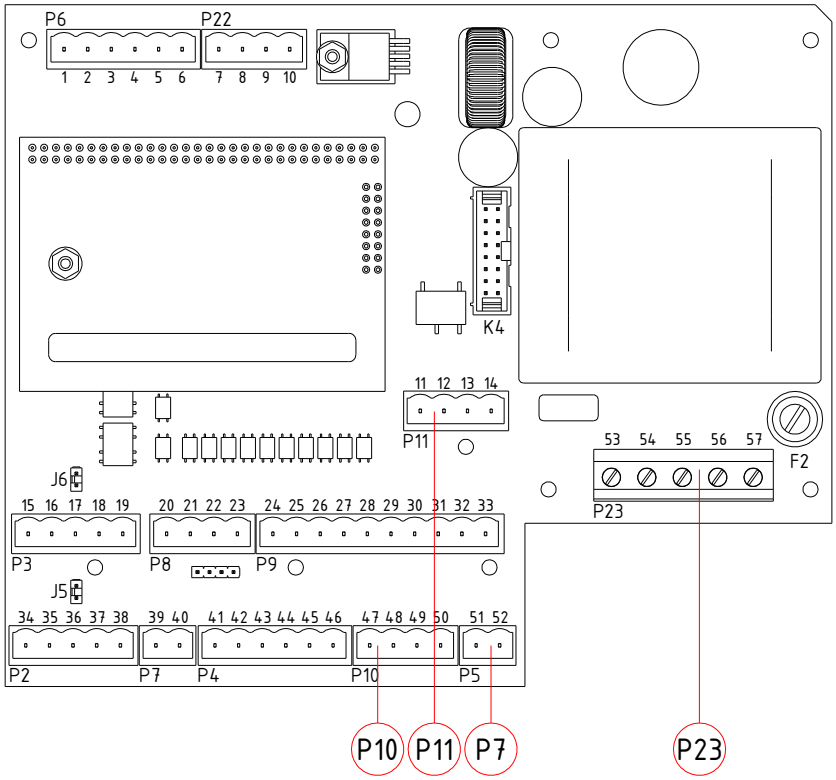


Wiring diagram 4 **Outputs control PCB (printed circuit board) X1 3-phase motor gearbox Internal**

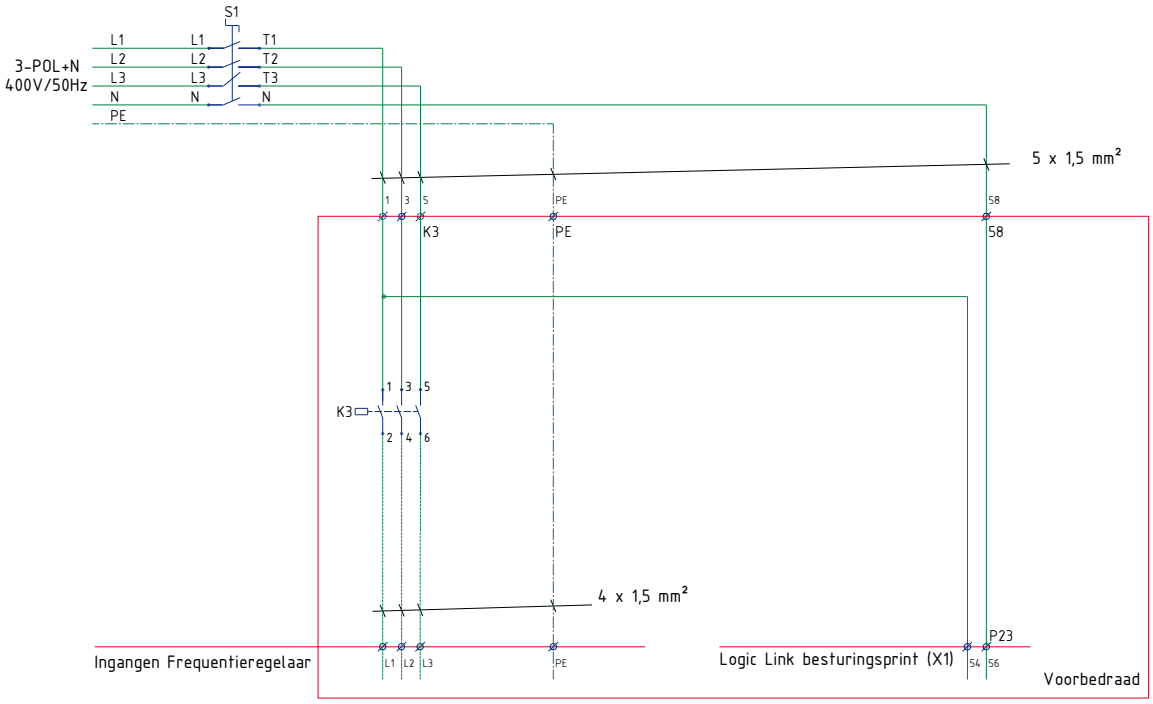
RLL660/661/670/671-IN wiring diagram: Aluminium housing, frequency controlled motor.



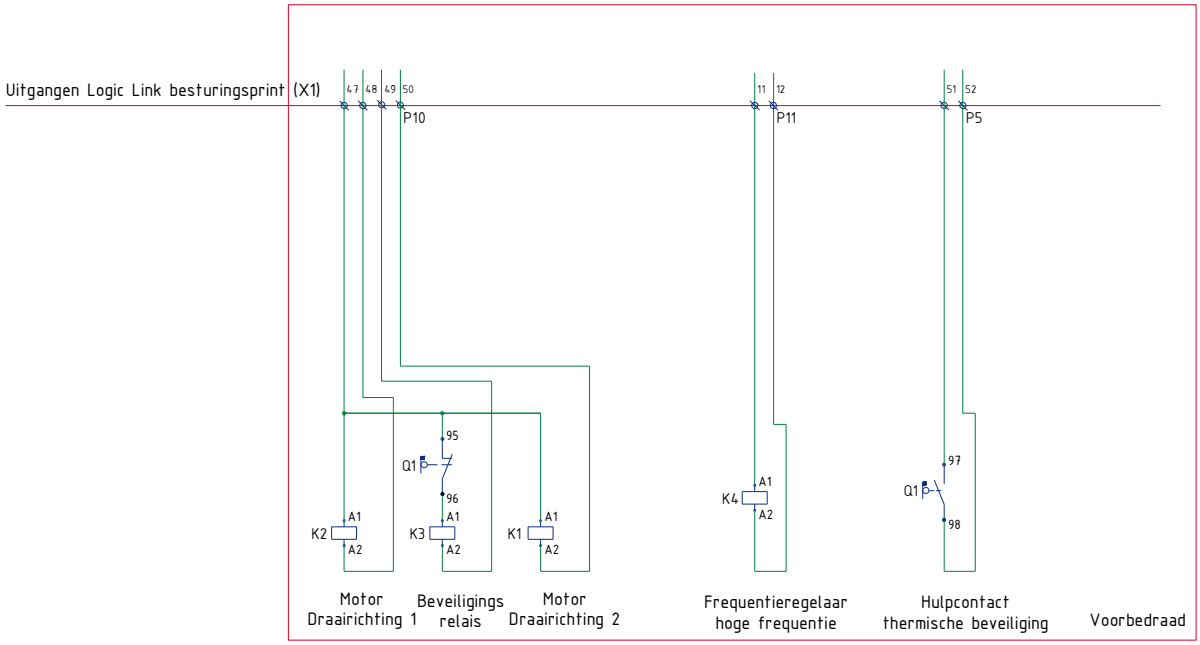
Picture 8 **X0 (Lay-out controlbox frequency controlled motor gearbox internal)**



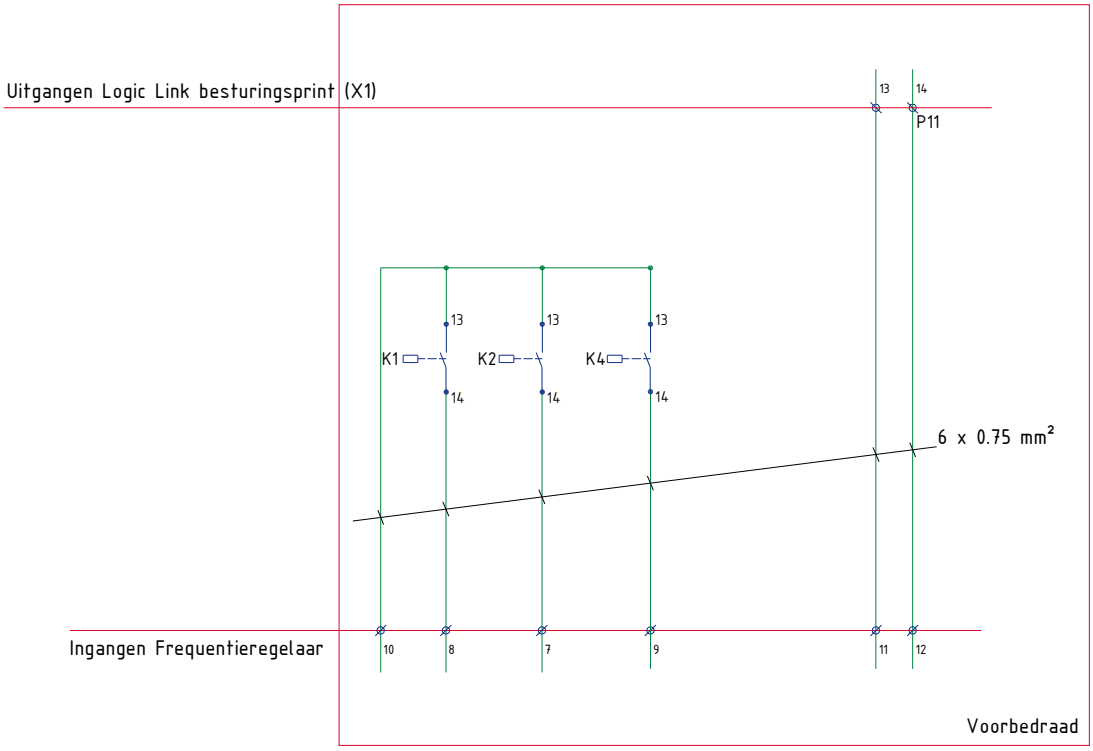
Picture 9 **X1 (Control PCB (printed circuit board), with external connections for RLL660/661/670/671-IN)**



Wiring diagram 5 **Power supply frequency controlled motor gearbox**



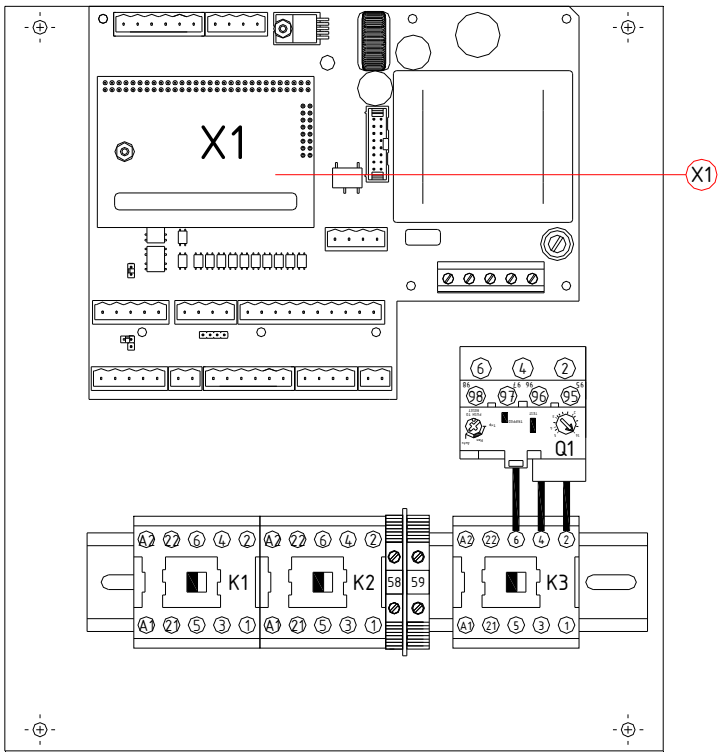
Wiring diagram 6 **Output control PCB (printed circuit board) X1 frequency controlled motor gearbox Internal**



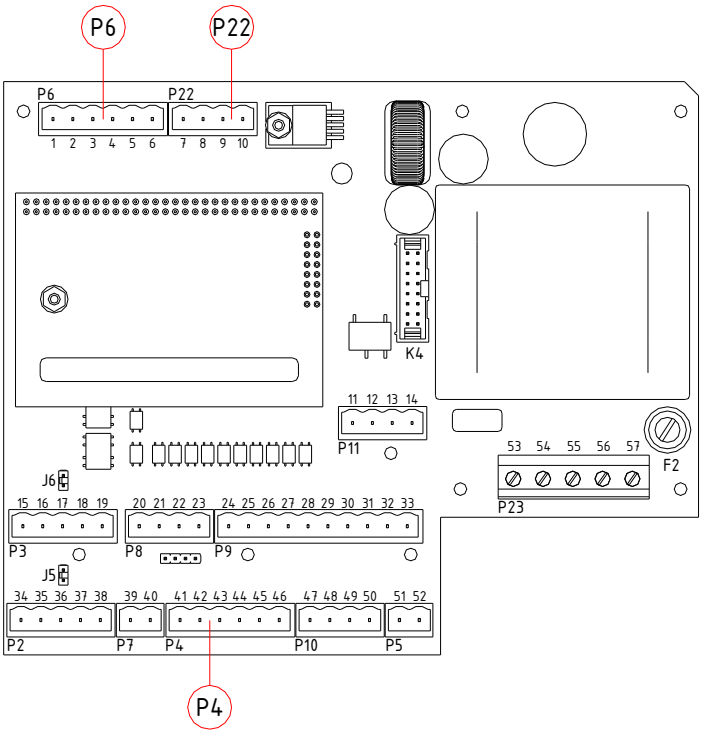
Wiring diagram 7 Inputs frequency controlled motor gearbox Internal

3.4.2 Wiring diagrams RLL600-EX

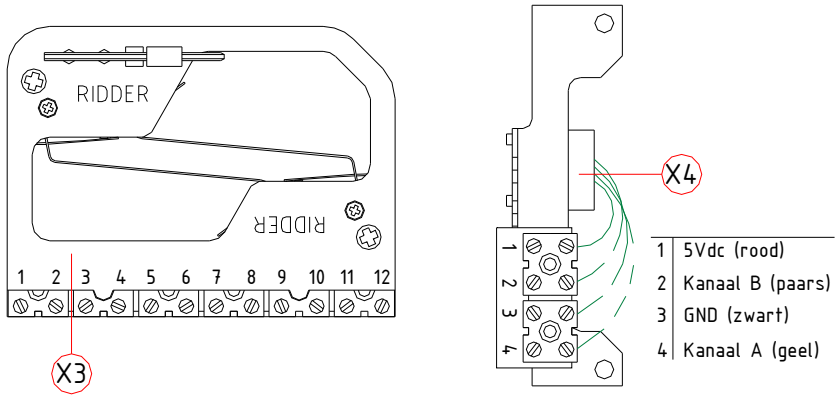
RLL600-EX general wiring diagram for: Plastic control box, limit switch; encoder and manual control.



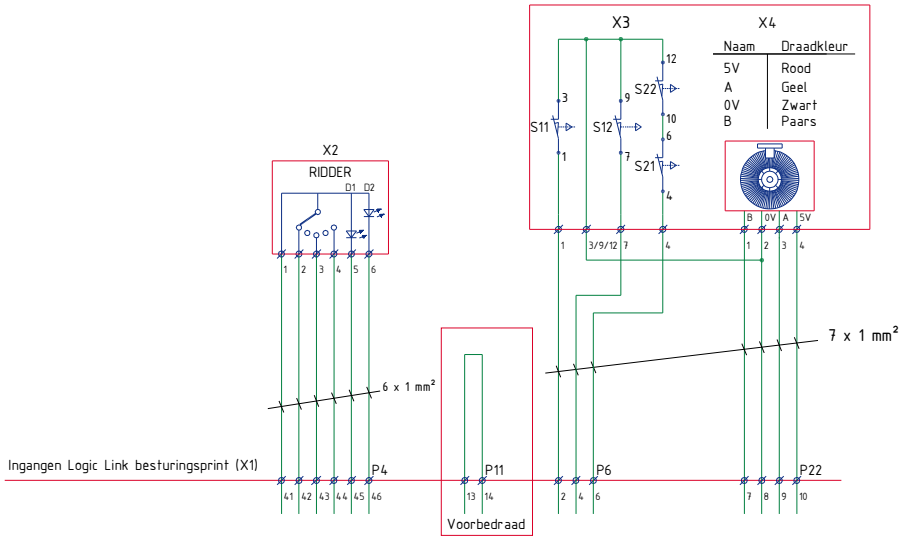
Picture 10 X0 (Lay-out control box 3-phase motor gearbox External)



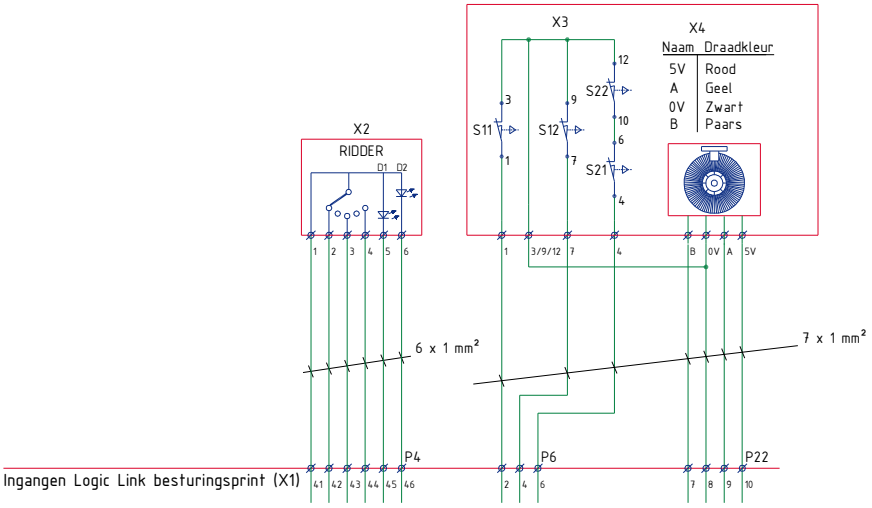
Picture 11 **X1 (Control PCB (printed circuit board), general connection)**



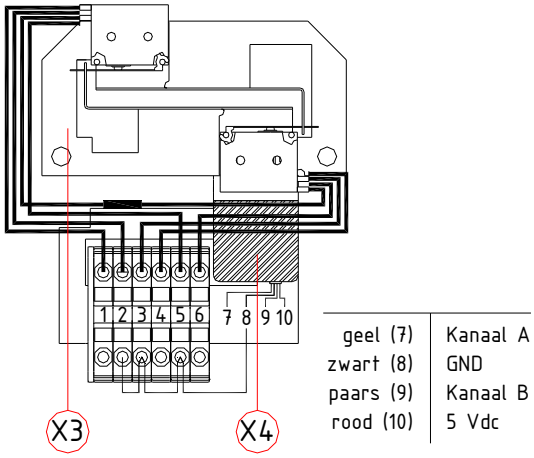
Picture 12 **X3 + X4 (Lay-out limit switch + encoder motor gearbox External)**



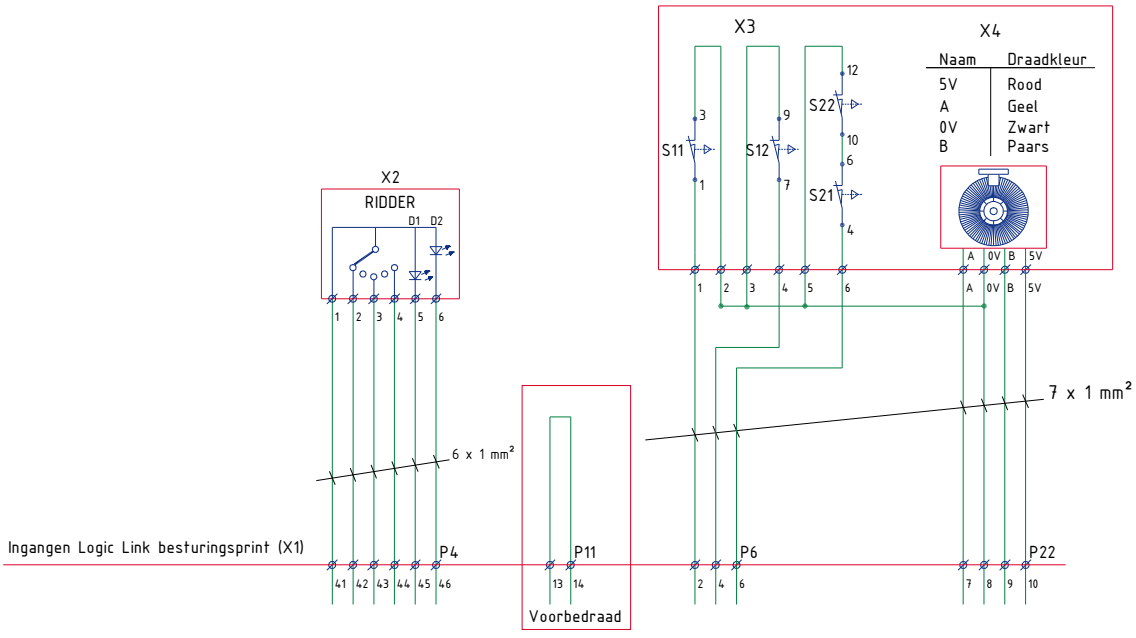
Wiring diagram 8 **Inputs control PCB (printed circuit board) X1 for manual control; limit switch and encoder in combination with 3-phase motor gearbox External**



Wiring diagram 9 Inputs control PCB (printed circuit board) X1 for manual control; limit switch and encoder in combination with frequency controlled motor gearbox External

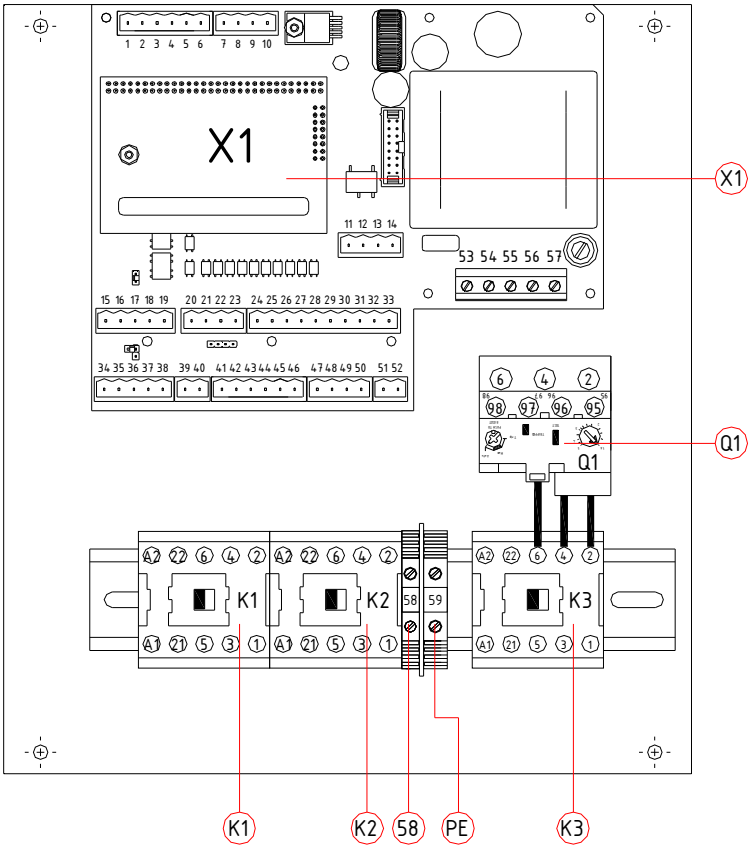


Picture 13 **X3 + X4 (Lay-out Limit switch + encoder motor gearbox External especially for the RPR100 Ridder power roller)**

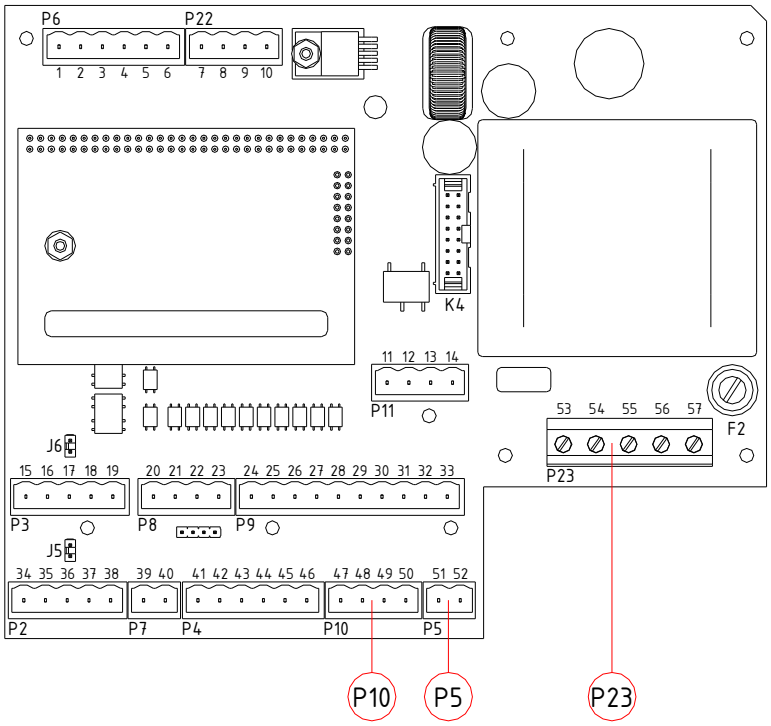


Wiring diagram 10 **Inputs control PCB (printed circuit board) X1 manual control; limit switch and encoder in combination with the Ridder Power-Roller External**

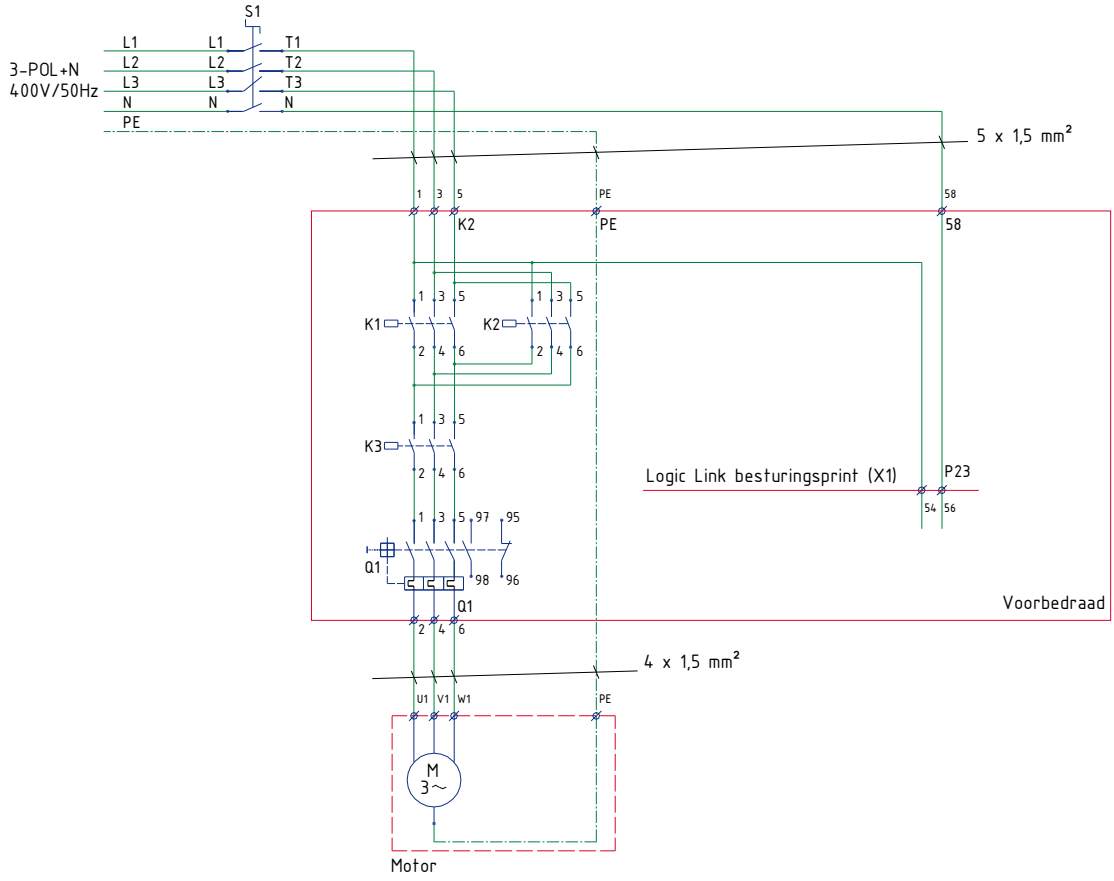
RLL610/611/620/621-EX Wiring diagram: Plastic housing, 3 phase motor.



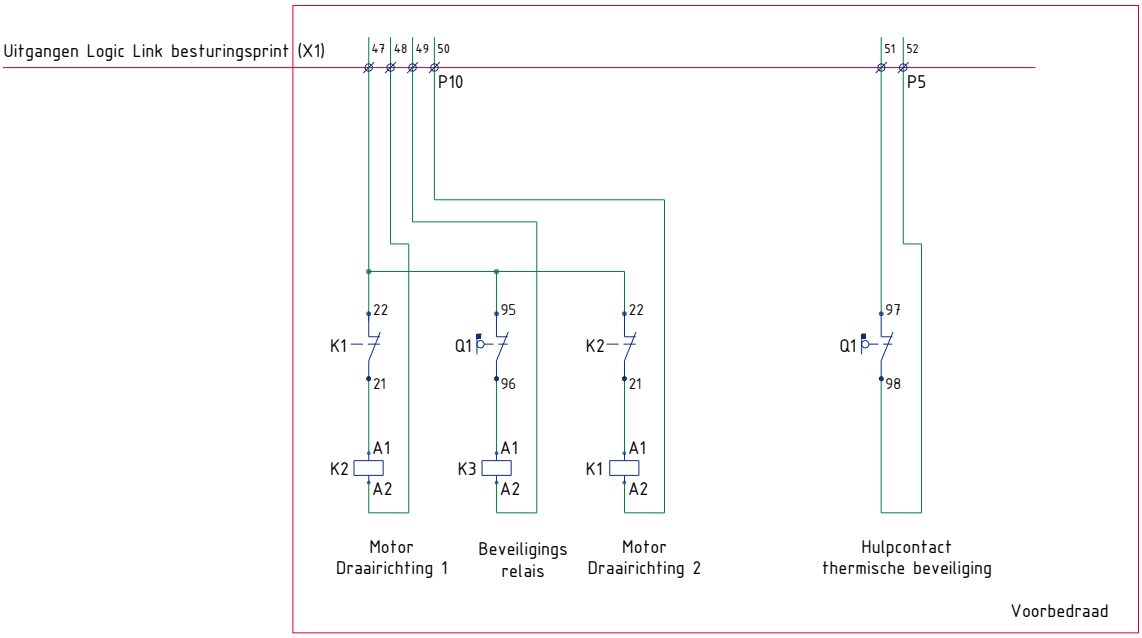
Picture 14 X0 (Lay-out control box 3-phase motor gearbox External)



Picture 15 X1 (control PCB (printed circuit board) with connections for RLL610/611/620/621-EX 3-phase motor control)

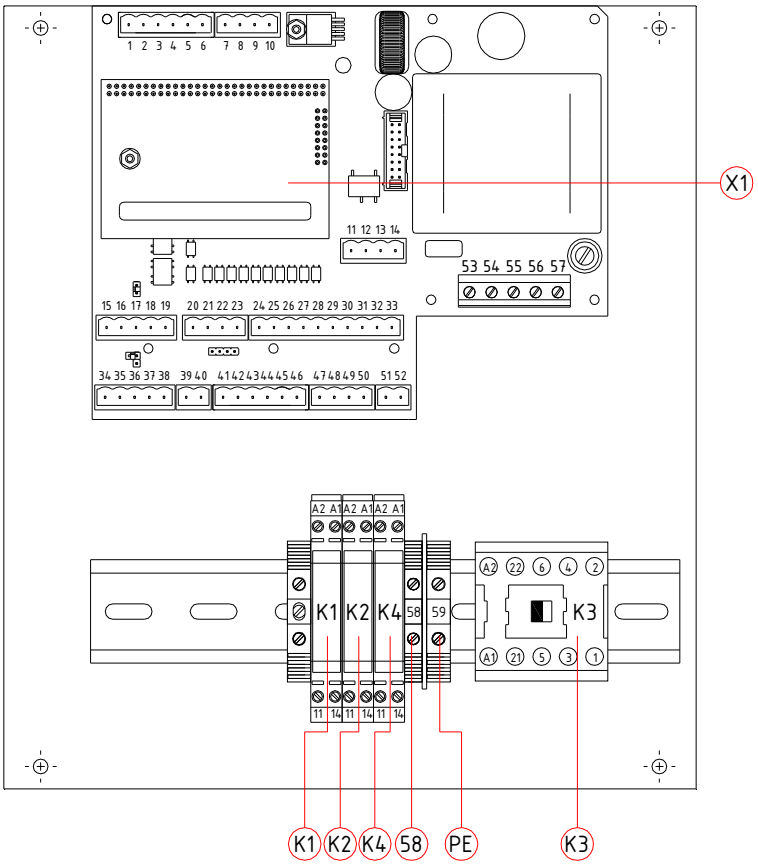


Wiring diagram 11 Power supply 3-phase motor gearbox External

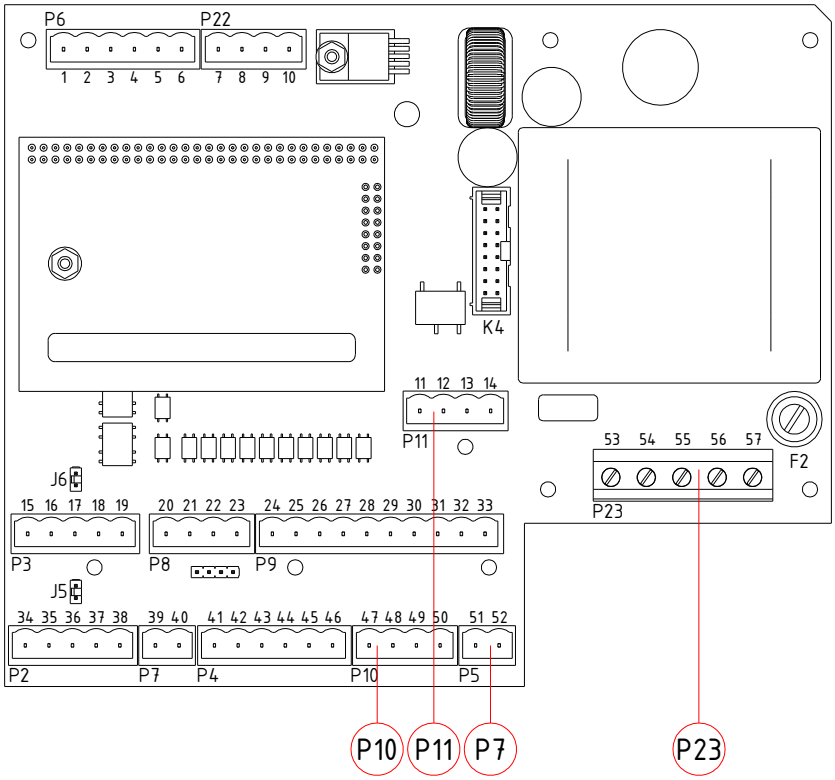


Wiring diagramcontrol PCB (printed circuit board) External

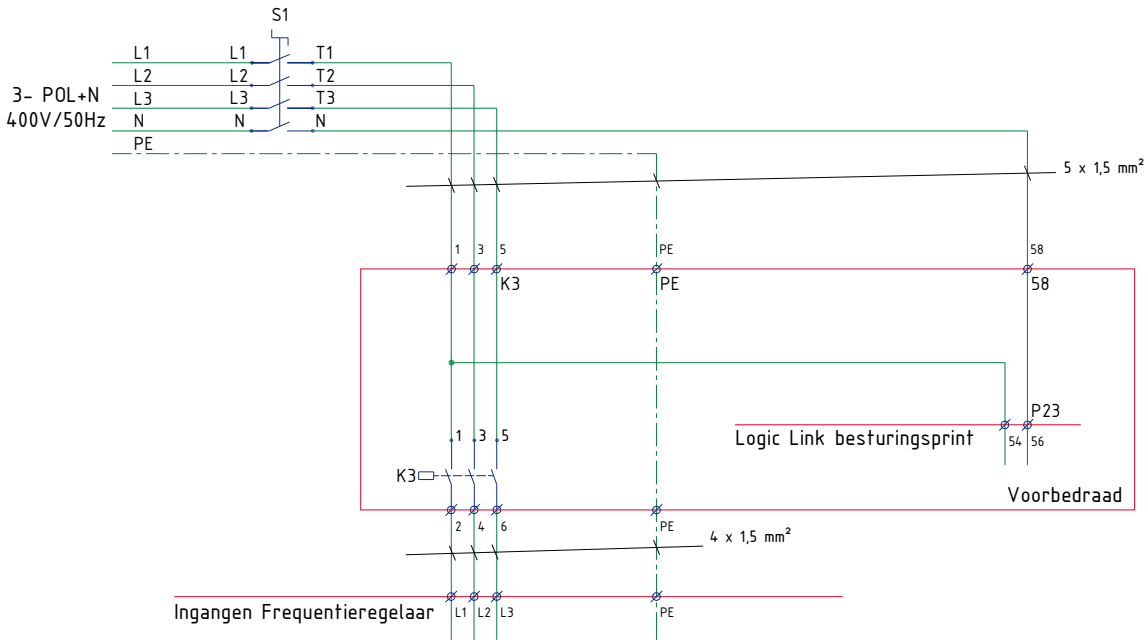
RLL660/661/670/671-EX Wring diagram: Plastic housing, frequency controlled motor.



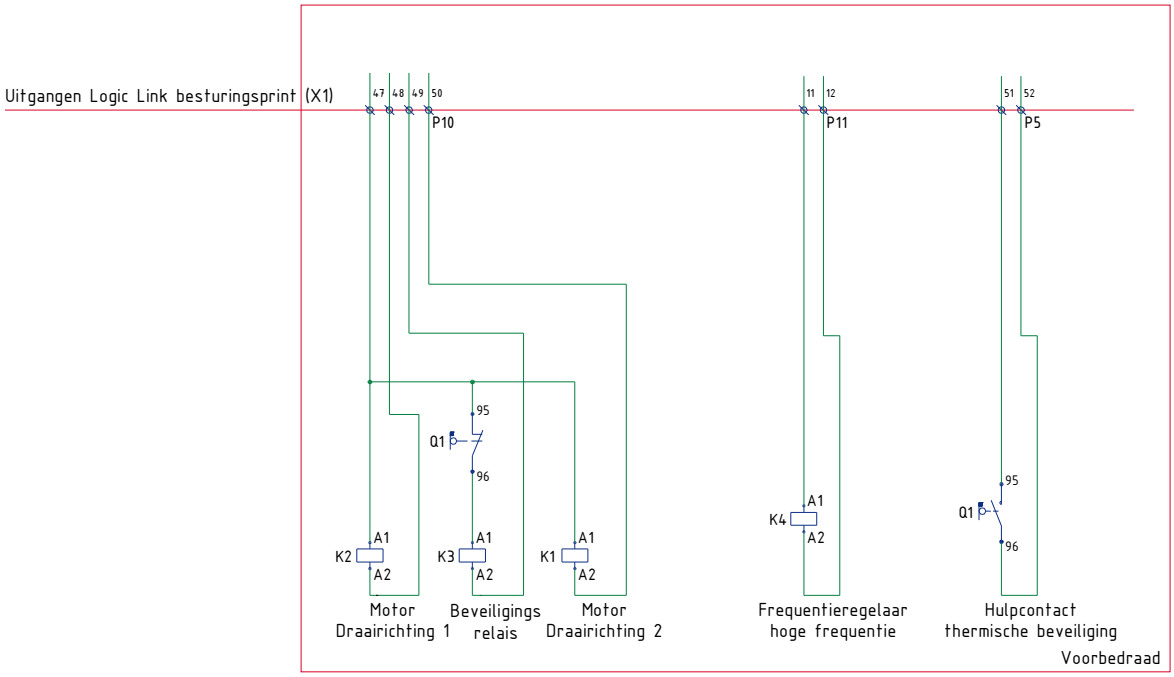
Picture 16 **X0 (Lay-out control box frequency controlled motor gearbox External)**



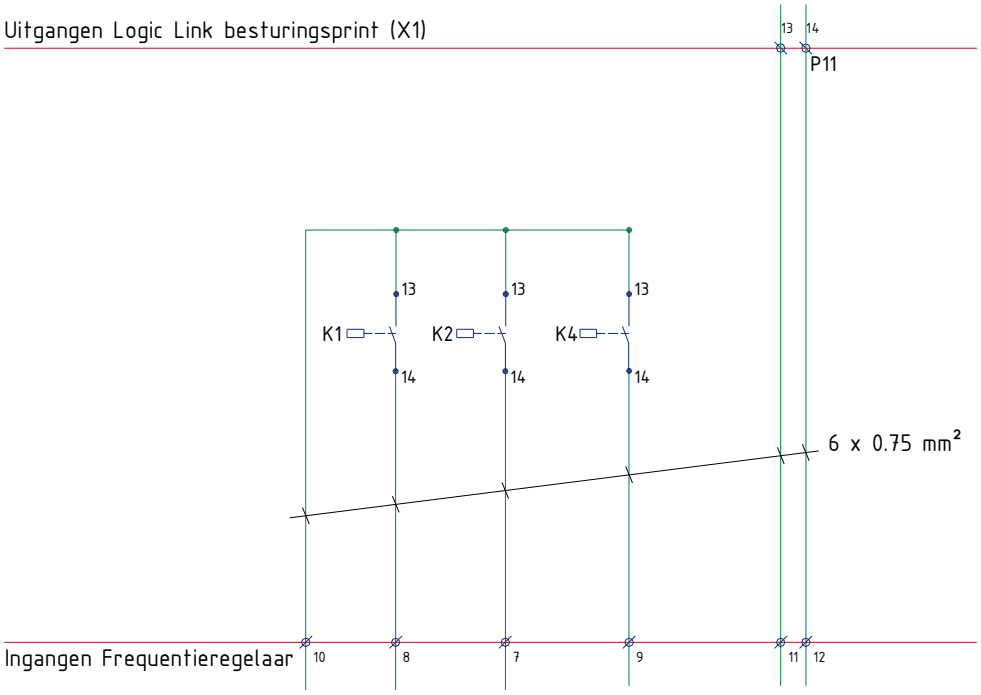
Picture 17 **X1 (Control PCB (printed circuit board),with external connections for RLL660/661/670/671-EX)**



Wiringdiagram 13 **Power supply frequency controlled motor gearbox External**



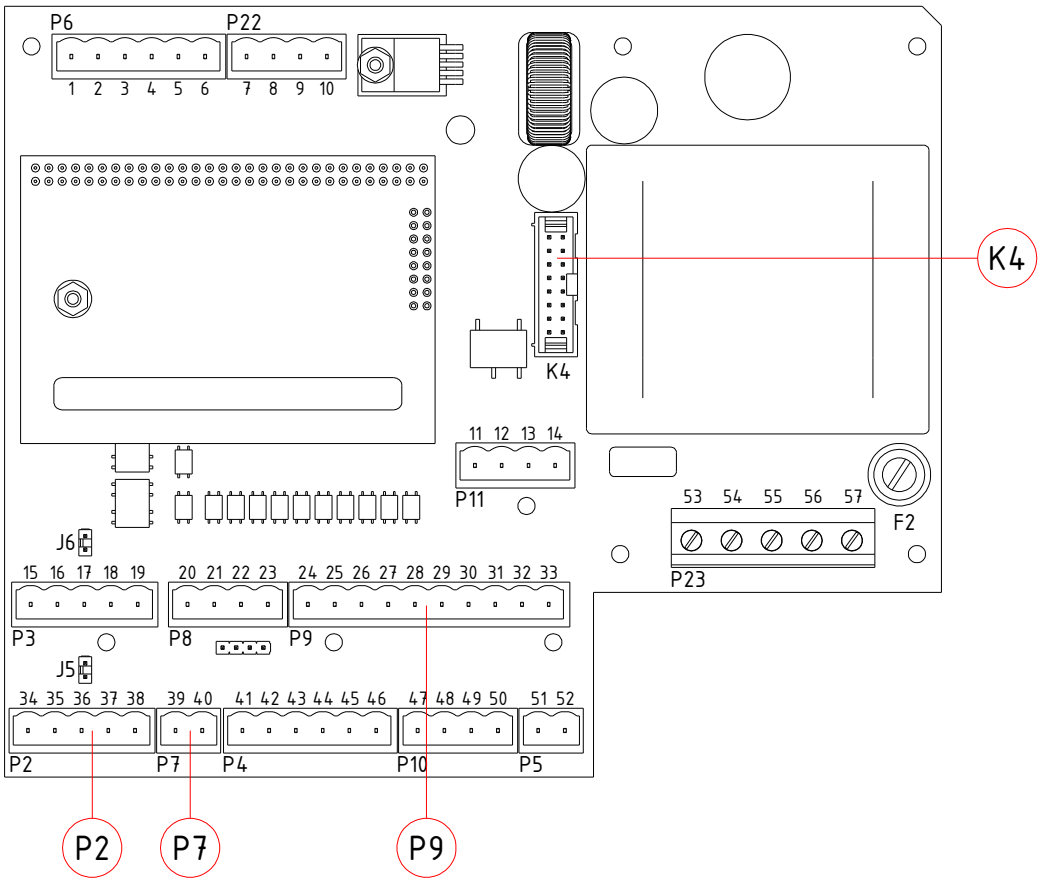
Wiring diagram 14 **Outputs control PCB (printed circuit board) X1 frequency controlled motor gearbox External**



Wiring diagram 15 Inputs frequency controlled motor gearbox External

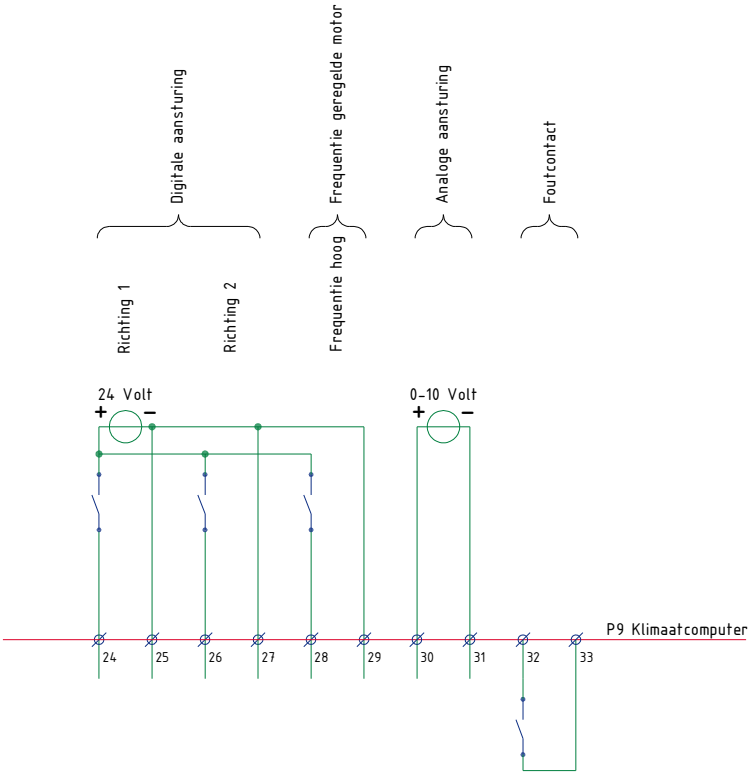
3.4.3 Wiring diagrams external control and feedback signal.

The RLL600 can be controlled in different ways. Find below the wiring diagrams for the different options. In the RLL600 only 1 control option can be used at the same time.



Picture 18 X1 (Control PCB (printed circuit board) with connection external control and feedback)

Digital / Analog Control.



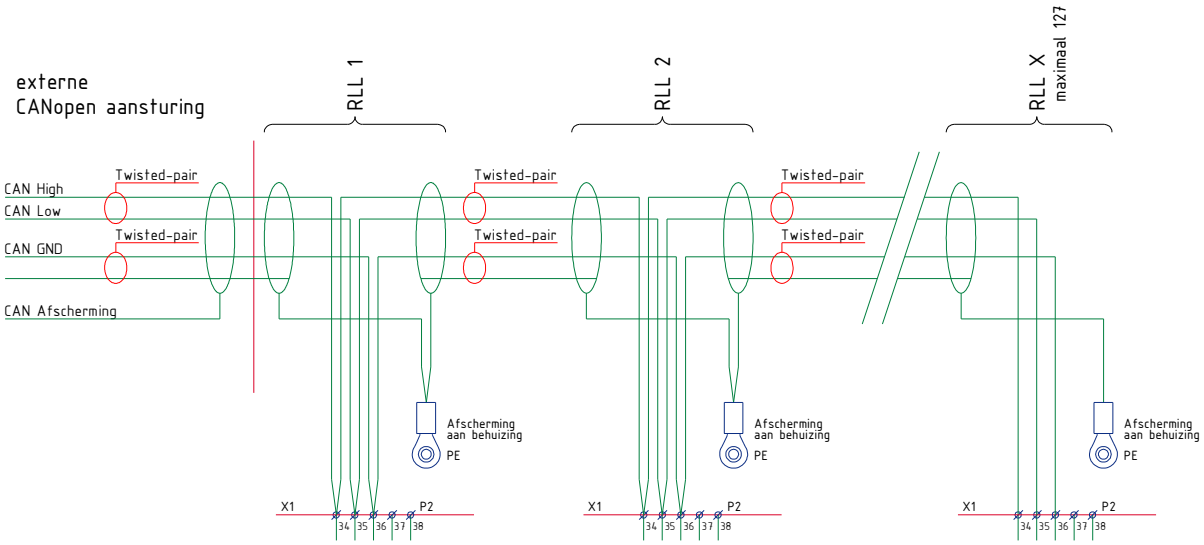
Wiring diagram 16 Connection digital and analog external control on connector P9.

If both inputs of the digital control (pin 24 and pin 26) are controlled at the same time, the RLL600-unit will not react, the motor shaft will not turn.

Digital control	
Power supply	24 Volt AC
	10.5 mA
Power supply	24 Volt DC
	10 mA
Analog control	
Power supply	0-10 Volt DC
	0.05 mA

Table 3 Technical data digital and analog external control.

CAN open bus system control.



Wiring diagram 17 Connection CAN-bus control to connect on connector P2 and shield on PE (housing).

To connect the shield.

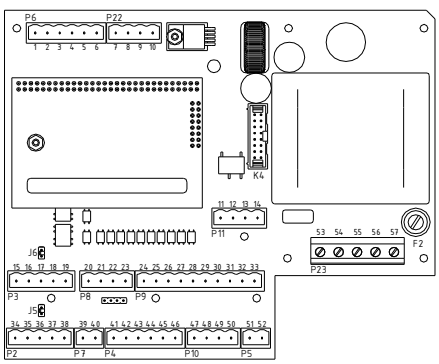
The shield of the cable must be connected to the aluminium housing of the RLL600-IN or at the mounting plate of the RLL600-EX.

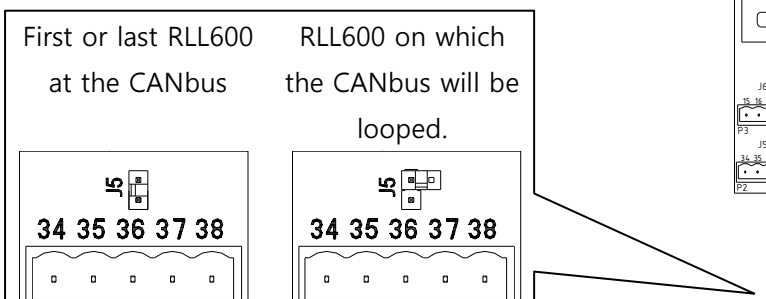
ATTENTION

CAN High en CAN Low dient in één twisted-pair bedrading te worden aangesloten. CAN GND wordt via het tweede twisted-pair bedrading aangesloten. Daarbij dient er wel op gelet te worden dat steeds dezelfde ader wordt gebruikt. Een andere mogelijkheid is beide draden op CAN GND aan te sluiten.

To remove the terminating resistors.

The CAN-open bus cable has to be terminated at both ends of the cable by using a resistor. This resistor is mounted at the PCB (printed circuit board). This terminating resistor is connected to a jumper at the RLL600 PCB (printed circuit board). By using the jumper it's possible to activate or to de-activate the terminating resistor. By removing the jumper (to turn the jumper 45 degrees) the terminating resistor is not connected.





Picture 18, Jumper J5 of the CANopen bussystem.

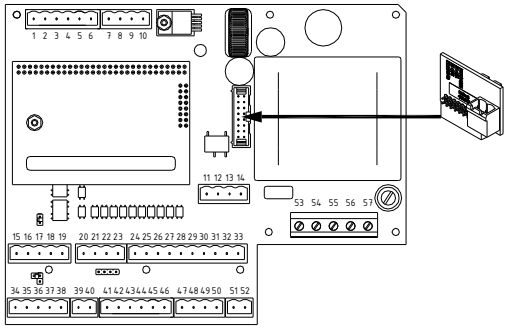
ATTENTION

If the RLL600-unit is the first or the last unit in the CAN bus line, the jumper J5 s houldn't be turned. In all other cases the jumper should be turned 45 degrees, The standard setting is that the jumperis connected.

The specifications of the CAN cable are:

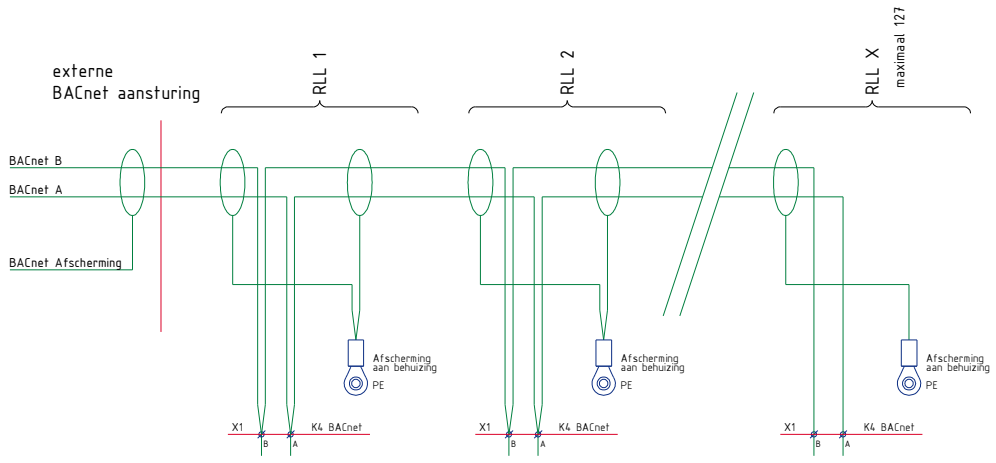
- Shielded cable with 2 x 2 twisted pair cores of 0,75mm2
- AC characteristics: 120 ohm impedance and maximum 5 ns/m line delay
- To connect according ISO11898-2

BAC-net bus system control.



Picture 19 **BAC-net connection on X1.**

At connector K4 the special BAC-net PCB (printed circuit board) will be connected. During learning/programming the BAC-net PCB should not be removed because K4 is also used to connect the special manual controlbox for learning or programming the RLL600 PCB (printed circuit board).



Wiring diagram 18 **Connection BAC-net to X1.**

The shield of the cable has to be connected to the aluminium housing of the RLL600-IN or at the mounting plate of the RLL600-EX.

The length of the bus cable and the maximum number of units/nodes depends on the load of the bus cable. Advise the electrical installer concerning the length and the number of units/nodes.

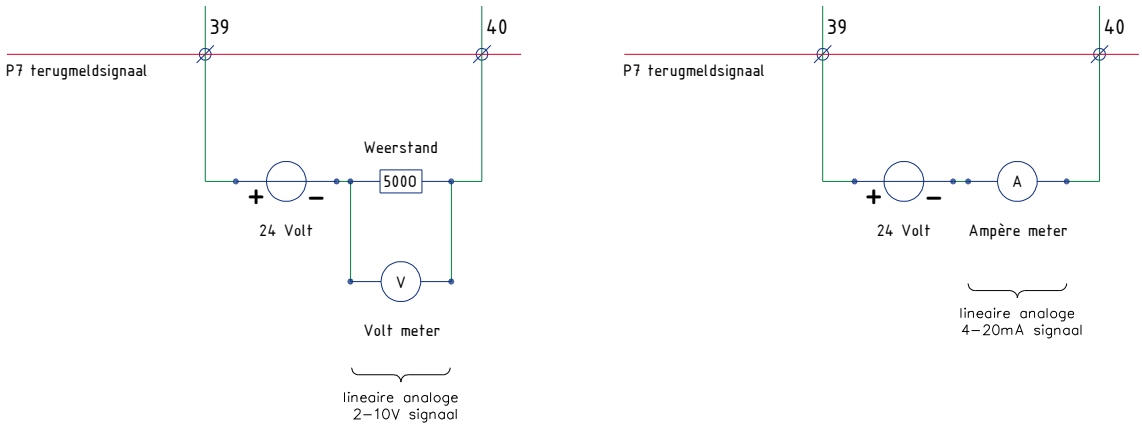
ATTENTION	In case of BAC-net the end or the beginning of the bus cable will NOT be terminated by using a terminating resistor.

ATTENTION	De BAC-net bus cable needs to meet certain requirements. The specifications and data of this bus cable can be obtained from Priva-company.

Analog position feedback signal (RLL620 / RLL670 only)

The RLL600 has an output (P7, pin 39 and 40) which simulates the potentiometer, this output delivers a 4-20 mA signal. The output will give a 4 mA signal if one of the motor gearbox is in one of the endpositions, it means the belonging limit/working switch is triggered, the output will give a 20 mA signal if the motor gearbox is in the opposite end position and the belonging limit/working switch is triggered.

Wiring diagram analag position feedback signal:



Wiring diagram 19 4-20 mA output

The powersupply for this circuit is an external 24 VDC source. The resistance value for the 2-10V signal can be selected, for example:

A resistor of 500 Ω is selected:

$U = I * R \Rightarrow 4 * 500 = 2Volt$

$\Rightarrow 20 * 500 = 10Volt$

The voltage which will be measured at the resistor will be from 2 till 10 Volt between the two limit/working switches, it means the running distance of the motor gearbox.

3.4.4 Wiring diagrams synchronous running system / sequence system

Synchronous running system;

The synchronous running system will be used in a system where several motor gearboxes are controlled and where the system is connected together physically. (for example a screen system which exists of one continuous shading cloth and which is controlled by several motor gearboxes). In this system there is one RLL600 Master-unit (RLL620/621) the other units (maximum 5-units) are the Slave-units (RLL610). The Master-unit is controlled by the manual controlbox or an external control and controls itselve and also at the same time the Slave-units. Further the Master-unit controls the complete running distance of all motor gearboxes and if the motor gearboxes don't deviate within a programmed offset from eachother. Indien de afwijking te groot wordt schakelt de Master het gehele gelijkloopsysteem uit. De Slaves zijn RLL600`s die met CANopen worden aangestuurd.

Due to the fact that the manual control box has always a higher priority than the external control (external signal source) Ridder recommends not to connect the Forward/Reverse control on the manual control box of the Slave-units. During manual controlling of the Slave-units, the system can be damaged. Connect the wiring of the manual control of the Slave-units in case of a synchronous running system in the way that only the automatic control and LED`s are functioning.

⚠ **CAUTION**	It is not allowed to control the system with the manual control box before the complete system is teached / learned / programmed.

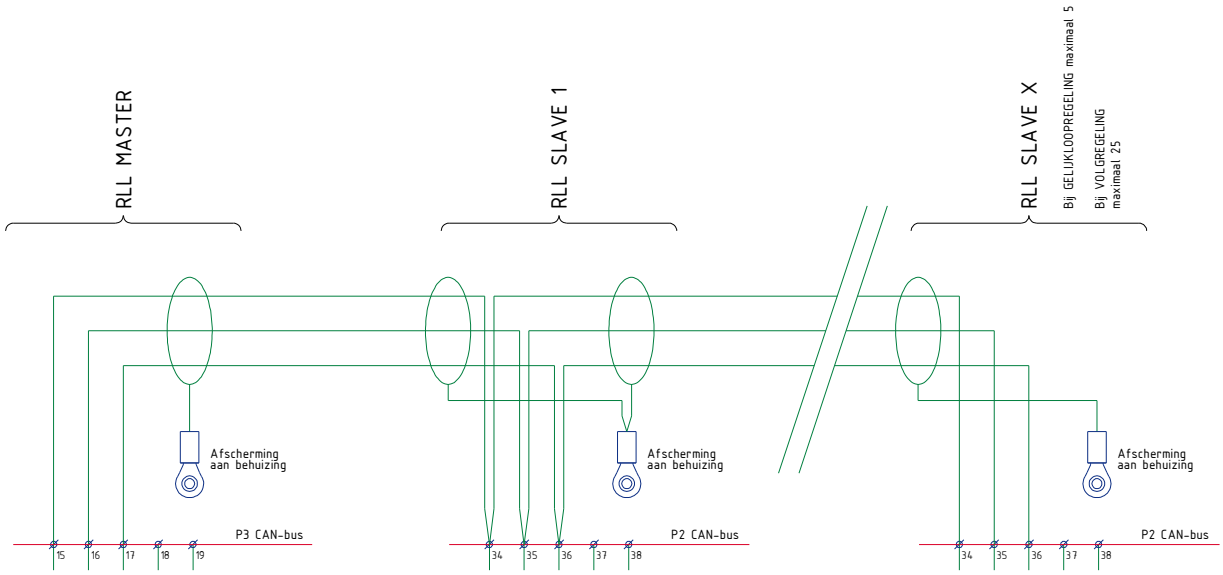
⚠ **CAUTION**	Don't connect pin 2and pin 4 in case of a synchronous running system at the Slave-units. Controlling the Slave-unit with the manual control box can cause damage at the system.

Sequence Running Control System;

The sequence running control system can be used in a system where several motor gearboxes have to be controlled at the same time but where the system is not connected physically.
At this system there is only one RLL600 Master-unit (RLL620/621 or RLL670/671) all other units are Slave-units (till a maximum of 24 units) (RLL610; RLL660). All units are provided with a manual control box which operates for each individual unit. The Master-unit sends the external control to the Slave-units. The Slave-units are RLL600-units which are controlled by a CANopen bus system. These Slave-units can be controlled with their own individual manual control box because the systems are not connected mechanically.

Connecting the synchronous running system and sequence running control system.

The connection of the RLL600 Maste-unit and Slave-unit in the synchronous running system and sequence running control system are simular. Because it concerns an internal bussystem, one of the RLL600-units needs to operate as a Master-unit. There should be taken into account also that the internal bussystem should be provided with a resistor at both ends of the bus cable.
It is not necessary to install the Master unit at the beginning of the bus cable. Depending on the position of the external control, the position of the Master for the synchronous or sequence running control has to be selected.

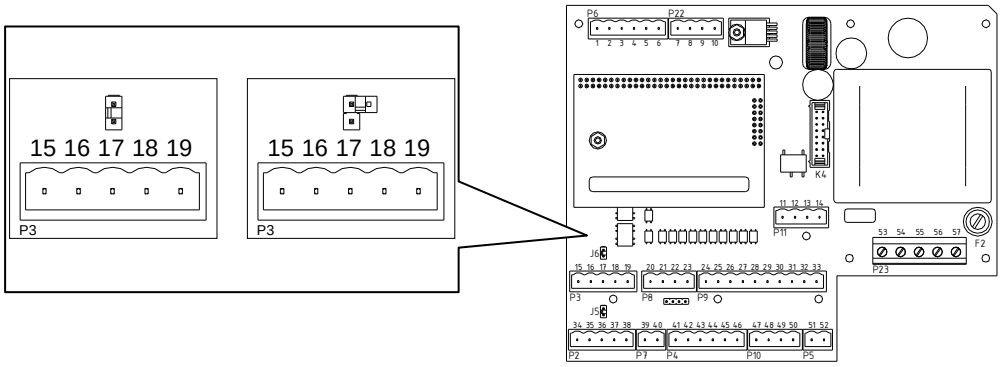


Wiring diagram 20 Wiring diagram CANopen bus-control synchronous or sequence running system.

ATTENTION

CAN High and CAN Low have to be connected with one twisted-pair cable. CAN GND will be connected by the second twisted-pair cable. There should be paid attention that the same wire is always used. Another possibillity is to connect both wires at the CAN GND.

Just like the standard CANopen bus-control has the CANopen bus system in the synchronous and sequence running system a termination resistor at both ends of the CAN kabel.



Picture 20 **Jumper CAN bus gelijkloop-/volgregeling.**

Jumper J6 should be checked only at the Master-unit. At the Slave-units jumper J5 has to be checked.

ATTENTION	Starts or finishes the CAN bus with a RLL600-unit, it means is RLL600-uinit the first or the last unit at the CAN bus, jumper J6 should not be rotated. In all other circumstances rotate the jumper 45 degrees.

3.5 Adjusting the RLL600.

After the RLL600-unit is installed and connected, the RLL600-unit should be adjusted. Adjusting of the RLL600-units means the following steps:

1. to check the thermal overload;
2. to check the direction of rotation with the belonging limit switches;
3. to adjust the limit switches;
4. to teach / program the RLL600-unit;
5. to check the control signals:

At a stand alone RLL600-unit or a RLL600-unit which is used in a sequence running system, these steps can be done seperately. In case of a synchronous running system, step number one can be controlled for each motor gearbox individually. Because all units are connected mechanically in a synchronous running system, steps 2 till 4 have to be done at all RLL600-units at the same time. Check during adjusting a synchronous

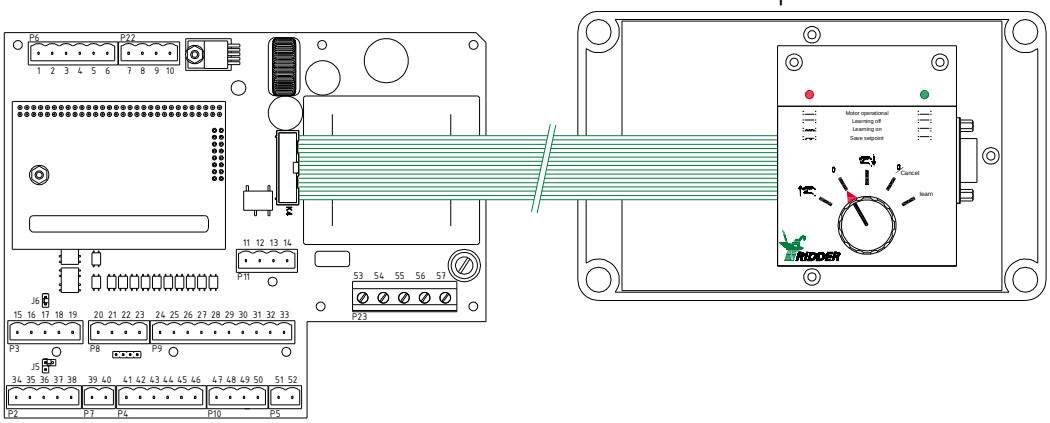
running system continuously if the RLL600-units are running synchronously or standing at the same position.

⚠ ATTENTION	Check if all RLL600 in a synchronous running system have the same running direction at the same control direction of the teaching/learning control box. Check this before teaching/learning the unit. In case the running directions aren't equal but the RLL600-unit is controlling the motor gearbox correctly, it means the faulty running direction is solved by switching the wiring of the limit switches and encoder.

⚠ CAUTION	Controlling of one RLL600 in a synchronous running system during adjusting can cause damage at the system. Send during adjusting of the system all RLL600-units at the same time in the same direction! Check this during the complete travel distance.

⚠ ATTENTION	In case of a synchronous running system all units need to have the "same" travel distance. All limit switches need to be adjusted at the same position to be sure that all units are starting and stopping at the same positions. The individual travel distance between all units should not have a bigger distance than 20mm because the sequence running system will correct the system where it isn't necessary.

Adjusting of the RLL600-unit will be done with the teaching learning control box, theis unit will be connected with a flat cable at the printed circuit board. At picture 8 the teaching/learning control box is hown and also where the flat cable should be connected at the printed circuit board.



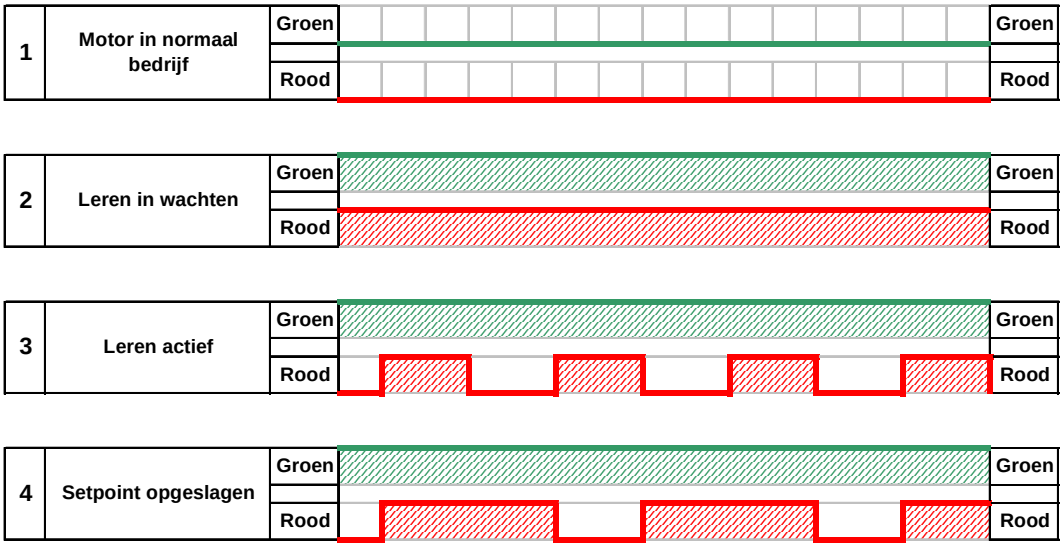
Picture 21 **X1 (Control printed circuit board) + Special manual control**

Turning switch

A turning switch is mounted at the teaching / learning control box to send the motor gearbox in the desired direction. During teaching/learning, it's possible that the symbols at the teaching / manual control box don't match with the real running direction.
After teaching / learning the system, it's neccessary to check if the control direction of the manual control box with the running direction of the system.
More information about checking this is described in chapter 3.3.5 "Checking the direction of control".
In case the teaching / learning control box is active and the turning switch is switched more than 5 seconds in the position "0/Cancel", the teaching / learning control box will be de-activated and the manual control box will be activated. Everything which happens between the time during making the teaching / learning control box active and de-activating will not be stored. The RLL600-unit will use the data which were valid before the teaching / learning unit was activated.

LED`s

At the manual control box there are 2 led`s which indicate by a flashing code the actual status of the system. In the next sheet all codes are presented and described.



Tabel 4 Flashing codes of the learning control box.

1. Motor gearbox in normal mode.

The RLL600-unit operates normally and doesn't react at the teaching / learning unit.

2. Teaching / Learning unit in waiting mode.

The RLL600 will be controlled by the learning / teaching control box and can be adjusted and teached / learned.

3. Learning / teaching active.

The RLL600-unit is ready or busy to teach/learn/program the travelling distance of the system.

4. Setpoint stored.

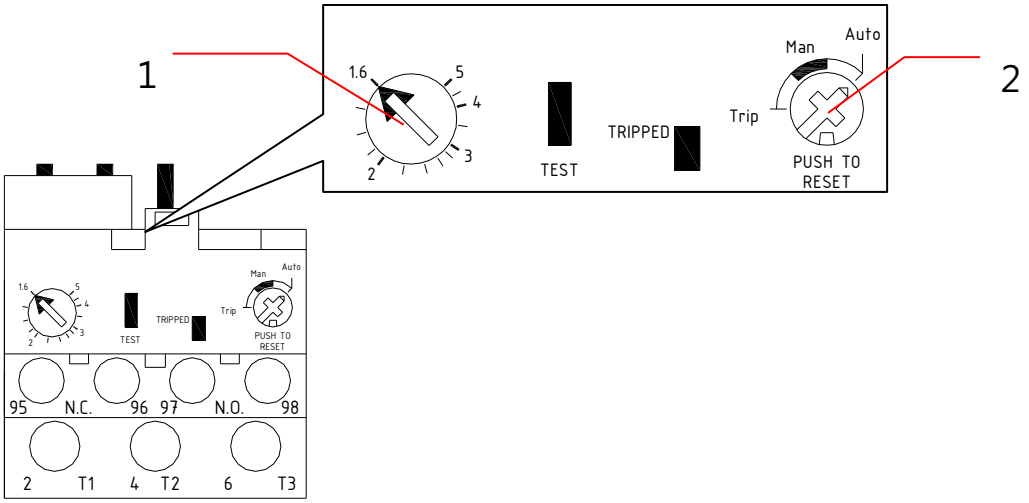
A setpoint of the frequency controlled motor gearboxs is stored.

Make sure that during checking of the system the motor gearbox is running in the direction in which no damage can be caused at the system.

3.5.1 Checking the thermal overload protection.

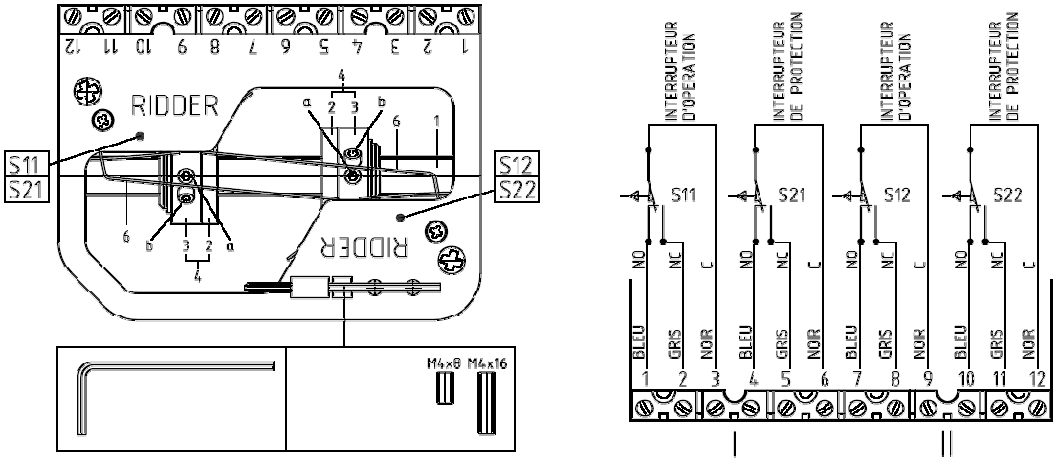
Check at the RLL600-EX-unit, after connecting, if the thermal overload relay is adjusted at the right value (See the below picture, item 1). At the RLL600-IN-unit, the correct value is already adjusted.

The turning switch (See the below picture, item 2) at the thermal overload relay should be in the “auto” position. In case the turning switch is not in the “auto”-position, the thermal overload relay will not be resetted automatically. At the RLL600-IN-unit and RLL600-EX-unit, the turning switch is adjusted in the “auto”-position.



Picture 22 **Thermal overload relay.**

3.5.2 Checking the running direction.



Picture 23 **RSU Limitswitch system.**

1. Turn off the power supply;
2. Connect the teaching/learning control box at the RLL600-unit;
3. Turn the turning switch at the teaching/learning control box at the position “learn”;
4. Turn on the power supply;
5. Turn the turning switch in position “0” after the red and green LED are continously lighting;
6. Send the motor gearbox in the direction in which no damage can be caused at the system;
7. Check if the actuator nut (Picture 23) is running in the direction of the limit switch which turns off the motor gearbox;
8. If running correctly continue with “adjusting the limit switches”;
9. If not running correctly, turn off the power supply;
10. Swap at a 3 phase electrical motor 2 phases of the power supply and swap at a frequency controlled electrical motor pin 14 of relay K1 with pin 14 of relay K2;
11. In case the wiring is swapped, return to step 3.

⚠ ATTENTION

Don’t swap the wiring of the RSU limit switch because of the running direction of the encoder!

3.5.3 Adjusting the limit switches.

1. Move, by using the teaching/learning control box, the system to the “start”-position or “end”-position and determine which working switch of the RSU limit switch system (Picture 23, S11 or S12) has to be actuated;
2. Rotate manually to the determined direction the actuator nut against the end stop (Picture 23). The actuator nut can be manually rotated easily at the threaded limit switch shaft (Picture 23). The actuator nut (Picture 23,4) moves itself along the threaded limit switch shaft;
3. Rotate the adjusting ring (Picture 23,3) at the actuator nut till the working switch of the limit switch system is actuated;
4. Fasten the adjusting ring with the adjusting (allen) bolts (Picture 23, a en b) at the actuator nut. The adjusting ring can’t be rotated anymore at the actuator nut;
5. Runthe motor gearbox to the other end position;
6. Repeat steps 1 till 4 to adjust the otherlimit switch.

In case the motor gearbox is controlled manually (after the RSU

⚠ **ATTENTION**	limit switch system is adjusted) by rotating mechanically the electrical motor shaft at the back side of the electrical motor, the adjusted end positions should not be exceeded. Exceeding the end positions can cause damage and mal functioning at the limit switch system!

3.5.4 Teaching / learning (programming) of the RLL600-unit.

Teaching or Learning means programming of the complete travelling distance between the two limit switches of the both end positions. During programming, the direction of the travelling distance should be the direction where the highest torque should be delivered by the motor gearbox. The procedure of programming depends on the type of electrical motor which is mounted at the gearbox. ("3 phase" or a "frequency controlled" electrical motor.

During changing the travelling distance or modifying the demanded drive torque by the motor gearbox, for exemple due to replacement of the shading cloth, the RLL600-unit should be teached/learned (programmed) again! After reprogramming, the RLL600-unit recognizes the new travelling distance or the new drive torque. The RLL600-unit will optimally control the system.

3 phase electrical motor.

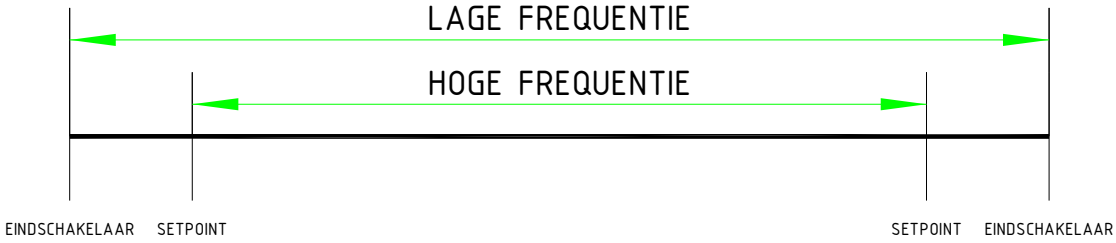
In case the teaching / learning control box is connected to the printed circuit board, step 1 till 5 can be skipped.

1. Turn off the power supply of the RLL600 unit;
2. Turn the turning switch at the teaching / learning control box at the position "Learn";
3. Connect the "flatcable" of the teaching / learning control box at the belonging connector of the printed circuit board.
4. Turn on the power supply of the RLL600-unit;
5. Turn the turning switch at the teaching / learning control box into the "0"-position, after the red and green LED are lighting continuously;
6. Runthe motor gearbox to the first limit switch, learn/teach/program from light to heavy. (in case of a ventilation system and a screening system from "close" to "open");
7. Wait till the motor gearbox stops at the adjusted limit switch;
8. Turn the turning switch at the teaching / learning control box in the position "Learn";
9. Wait 5 seconds, the red LED is flashing and the green LED is lighting continously;
10. Turn the turning switch at the teaching / learning control box in the position where the motor gearbox will run to the other limit switch. (In this direction the motor gearbox has to deliver the highest torque);
11. Wait till the motor gearbox stops at the other limit switch, the teaching / learning / programming process is finished;

12. Turn off the power supply of the RLL600-unit;
13. Remove the flat cable of the teaching / learning control box from the connector of the pronted circuit board, take care that the printed circuit board is not loaded mechanically during disconnecting the flat cable;
14. Turn on the power supply of the RLL600-unit, the RLL600-unit can be controlled now with the manual control box.

Frequency controlled motor gearbox (on RLL660/RLL670 only).

The procedure of Teaching / learning / programming of a frequency controlled motor gearbox is the same procedure as with a standard motor gearbox. The only difference is that two setpoints should be programmed. Because of these two set points, the control system recognizes when the motor gearbox should run in high speed. (Higher frequency) On the below picture a schematic view is shown of the travelling distance of the motor gearbox with two setpoints. In case there should be used only one setpoint, put the second set point as close as possible to the limit switch.



Picture 24 **Schematic view travelling distance of the motor gearbox.**

In case the teaching / learning control box is already connected at the printed circuit board, step 1 till 5 can be skipped.

1. Turn off the power supply of the RLL600 unit;
2. Turn the turning switch at the teaching / learning control box at the position "Learn";
3. Connect the "flatcable" of the teaching / learning control box at the belonging connector of the printed circuit board.
4. Turn on the power supply of the RLL600-unit;
5. Turn the turning switch at the teaching / learning control box into the "0"-position, after the red and green LED are lighting continuously;
6. Runthe motor gearbox to the first limit switch, learn/teach/program from light to heavy. (in case of a ventilation system and a screening system from "close" to "open");
7. Wait till the motor gearbox stops at the adjusted limit switch;
8. Turn the turning switch at the teaching / learning control box in the position "Learn";
9. Wait 5 seconds, the red LED is flashing and the green LED is lighting continously;
10. Turn the turning switch at the teaching / learning control box in the position where the motor gearbox will run to the other limit switch. (In this direction the motor gearbox has to deliver the highest torque);
11. Turn the turning switch to the "Learn position" after the motor gearbox has arrived at the first setpoint, The minimum running time between the limit switch and setpoint of the frequency controller is 20 seconds;
12. Wait 3 seconds, the red LED will start flashing slowly, the green LED will light continuously;

13. Turn the turning switch at the teaching / learning control box in the position described in step 10, to continue the travelling distance of the motor gearbox.;
14. Turn the turning switch of the teaching / learning control box in the position “Learn” after the motor gearbox has reached the second setpoint;
15. Wait 3 seconds, the red LED will start flashing slowly, the green LED will light continously;
16. Turn the turning switch at the teaching / learning control box in the position described in step 10, to continue the travelling distance of the motor gearbox.;
17. Wait till the motor gearbox has stopped at the already adjusted limit switch, the teaching / learning / programming procedure is finished;
18. Turn off the power supply of the RLL600-unit;
19. Remove the flat cable of the teaching / learning control box from the connector of the pronted circuit board, take care that the printed circuit board is not loaded mechanically during disconnecting the flat cable;
20. Turn on the power supply of the RLL600-unit, the RLL600-unit can be controlled now with the manual control box.

3.5.5 Checking the running direction.

Changing the running direction at the manual control and the 24V-control can be done by swapping the wiring.
In case of changing the running direction of an external control of a 0-10V-signal and bus system, the running direction can be changed in the software and the same for the feedback signal of the analog position. (Potentiometer simulation)
To change the running direction in the software, the programm "Tera Term Pro" (or another hyperterminal programm) should be used.
For more information of making changes in the software of the RLL600-unit with the "Tera Term Pro"-programm, we refer to the user manual "Adjusting menu RLL600 installer".

During changing the running directions at a synchronous or sequence running system, the Master and the following Slaves need to be modified, to get all CANopen positions equally.

Checking the manual control:

1. Runthe motor gearbox by using the standard manual control box in one of the directions;
2. Check if the symbol at the manual control box is in accordance with the movement of the system, Arrow up is open and arrow down is closing;
3. In this case continue at step 8;
4. If not, turn off the power supply;
5. Swap the wire at pin 42 with the wire at pin 44 of connector P4.
6. Turn on the power supply;
7. In case the wiring is swapped, return to step 1;
8. The RLL600-unit is ready to be operated with the manual control box;
9. The LED`s are connected correctly if the green LED lights continuously and the red LED is off.

Checking the external 24 volt control:

1. Turn the turning switch at the manual control box in the position "auto";
2. Runthe motor gearbox with the external 24V control in one of the directions;
3. Check if the desired direction of the external control is in accordance with the movement of the system;
4. In this case, continue with step **Fout! Verwijzingsbron niet gevonden.**;
5. If not, turn off the power supply;
6. Swap the wire at pin 24 with the wire at pin 26 and swap the wire at pin 25 with the wire at pin 27 of connector P9.
7. Turn on the power supply;
8. In case the wiring is swapped, return to step 1;

9. The RLL600-unit is ready to be operated by the external 24V signal;

Checking the external 0-10 volt control:

1. Turn the turning switch at the manual control box in the position "auto";
2. Runthe motor gearbox with the external control 0-10V with 0 volt;
3. Check if the desired direction of the external control is in accordance with the movement of the system;
4. In this case, continue with step 18;
5. If not, change the running direction if possible in the climate computer or follow the next steps;
6. Turn off the power supply;
7. Connect the teaching / learning control box at the RLL600-unit;
8. Turn the turning switch of the teaching / learning control box at the "0"-position;
9. Connect the Personal Computer to the teaching / learning control box by using a RS232 serial cable;
10. Start the software program "Tera Term";
11. Turn on the power supply and push within 3 seconds the space bar of the PC keyboard;
12. Go from by the "*Installation menu / Motor settings*" to "*Switch analogue control settings*" and change the signal from 0-10 to 10-0 or the other way around.
13. Leave the menu by pressing 4 times the "0"-key.
14. Turn off the power supply;
15. Remove the flat cable of the teaching / learning control box from the connector of the pronted circuit board, take care that the printed circuit board is not loaded mechanically during disconnecting the flat cable;
16. Turn on the power supply;
17. In case the adjustment is changed, return to step **Fout! Verwijzingsbron niet gevonden.**;
18. The RLL600-unit is ready to be controlled externally.

Checking the CAN-bus external control:

1. Turn the turning switch at the manual control box in the position "auto";
2. Runthe motor gearbox with the value 0000_{HEX} at the external CAN-bus control;
3. Check if the desired direction of the external control is in accordance with the movement of the system;
4. In this case continue with step 17;
5. If not, change the running direction if possible in the climate computer or follow the next steps;
6. Turn off the power supply;
7. Connect the teaching / learning control box at the RLL600-unit;
8. Turn the turning switch of the teaching / learning switch in the "0"-position;
9. Connect the Personal Computer at the teaching / learning control box by using a RS232 serial cable;

10. Start the software program "Tera Term";
11. Turn on the power supply and push within 3 seconds the space bar of the PC keyboard;
12. Go by the "*Installation menu / Motor settings*" to "*Switch CAN control settings*" and change the value 0000_{HEX}-$FFFF_{HEX}$ to $FFFF_{HEX}$-0000_{HEX} or the other way around.
13. Leave the menu by pressing 4 times the "0"-key.
14. Turn off the power supply;
15. Remove the flat cable of the teaching / learning control box from the connector of the pronted circuit board, take care that the printed circuit board is not loaded mechanically during disconnecting the flat cable;
16. Turn on the power supply;
17. In case the adjustment is changed return to step **Fout! Verwijzingsbron niet gevonden.**;
18. The RLL600-unit is ready to be controlled externally.

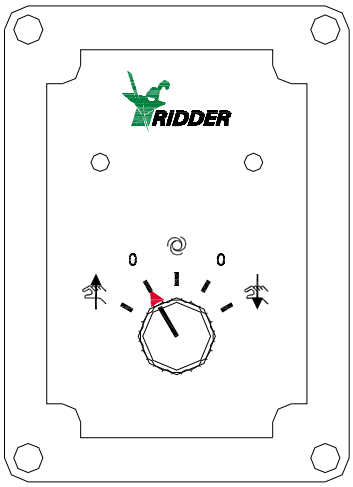
Checking the analog position feedback signal (for RLL620 / RLL670 only):

1. Runthe motor gearbox with the standard manual control box in one of the directions;
2. Check if the changes of the signal are in accordance with the movement of the system:
3. In this case, continue with step 15;
4. If not, change the running direction if possible in the climate computer or follow the next steps;
5. Turn off the power supply;
6. Connect the teaching / learning control box at the RLL600-unit;
7. Turn the turning switch of the teaching / learning switch in the "0"-position;
8. Connect the Personal Computer at the teaching / learning control box by using a RS232 serial cable;
9. Start the software program "Tera Term";
10. Turn on the power supply and push within 3 seconds the space bar of the PC keyboard;
11. Go by the "*Installation menu / Motor settings*" to "*Analoque output settings*" and change the signal 4 - 20mA to 20 - 4mA or the other way around.
12. Leave the menu by pressing 4 times the "0"-key.
13. Schakel de voedingspanning uit;
14. Trek voorzichtig de "flatcable" van de inleerhandbediening uit de connector;
15. Turn off the power supply;
16. In case the adjustment is changed return to step **Fout! Verwijzingsbron niet gevonden.**;
17. The value change will be according the desired movement of the motor gearbox.

After all these checkings, the RLL600-unit is ready for use.

⚠ CAUTION Store the teaching / learning control box after use properly.

4 (Manual) operation.



Picture 25 Manual control

Each RLL600 has a manual control box, see picture 25. The RLL600-unit can be controlled manually with the manual control box. In case of a synchronous running system the slaves are provided with a manual control box, but can not be used to control the motor gearboxes. Check before manual operation if the green LED on the manual control box is burning continuously, it means there are no faults in the system. The priority of the manual operation is higher than the external control for example by a climate computer. In the Table all functions are displayed of the different positions of the rotary switch on the manual control box.

symbol	Description
	Running direction 1 (Open)
0	Motor is not controlled or operated, to read running hours and also reset position after a fault.
	Automatic mode, RLL600 reacts on external control signals
0	Motor is not controlled or operated, to read running hours and also reset position after a fault.
	Running direction 2 (Close)

Table 5 Functions rotary switch manual control box.

The manual control box provides the user also information concerning the status of the RLL600-unit by means of the two LED's. This information is important to solve possible faults. It is recommended to install the manual control box at a visable position. See picture 13 to check the flashing codes which can appear

on the manual control box provided with the explanation.

The turning switches of the manual control boxes of the Slave-units have to be switched in automatic mode, in this mode only the system is functioning and controls the Master-unit the Slave-units.

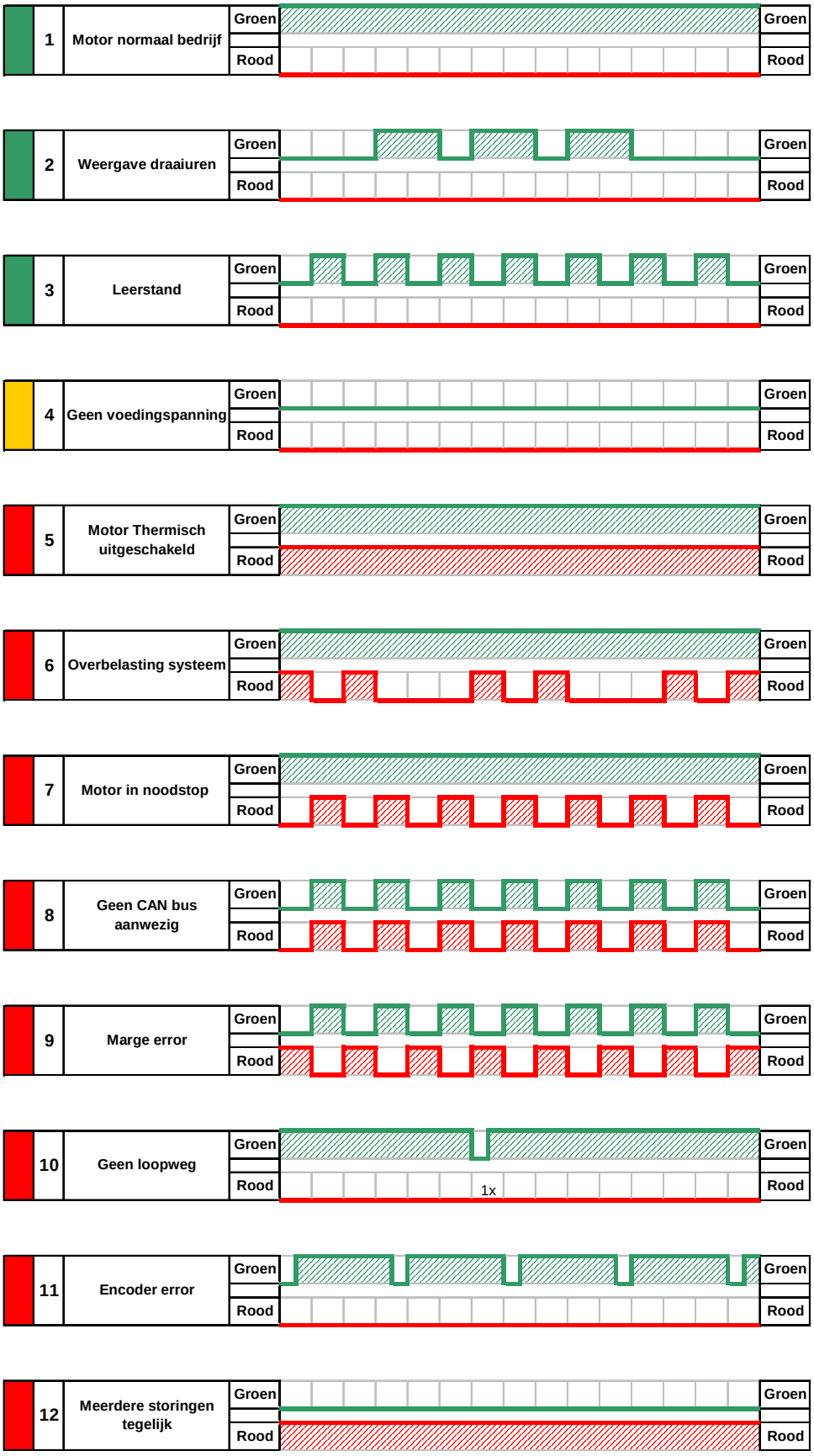

1
Motor normaal bedrijf
Groen
Rood
2
Weergave draaiuren
3
Leerstand
4
Geen voedingspanning
5
Motor Thermisch uitgeschakeld
6
Overbelasting systeem
7
Motor in noodstop
8
Geen CAN bus aanwezig
9
Marge error
10
Geen loopweg
1x
11
Encoder error
12
Meerdere storingen tegelijk

Table 6 Flashing codes standard manual operation.

1. Motor in normal mode.

Motor controle is operating normally.

2. Display running hours.

The RLL600 controlled motor gearbox has been running 100 hours or a multiple from this value. This signal will be displayed 3 days at the manual control box. The number the green LED is flashing between the longer time that the LED is off (t3), multiplied by 100 is the number of running hours (round down at hundreds).

This signal is shown only once if the turning switch at the manual control box is turned into the "0"-position. In picture 13 the RLL600-unit has been running for 300 hours.

3. Learning / teaching mode.

The RLL600-unit is in the learning / teaching - mode, learn / teach the RLL600-unit according this users manual. If the flashing code of the learning / teaching mode remains, contact your installer.

4. No power supply.

There will be no flashing code at the manual control box, in case the printed circuit board doesn't have any power. Both LED's at the manual control box are off. The reason could be that the power supply is turned off externally. Also can't be measured any power at the input of the printed circuit board. In case there is power at the input of the printed circuit board but the green LED above the transformer is off, it means the fuse at the printed circuit board is blown. Replace the fuse. In case replacement of the fuse doesn't give any solution, change the complete printed circuit board. The reason could be a problem with the printed circuit board or a wrong power supply to the printed circuit board. Check always during replacing the printed circuit board if the power supply is connected correctly.

5. Electrical motor turned off by a thermal overload.

The electrical motor has drawn for a longer time higher Amperage as adjusted at the thermal overload relay. Wait for 5 minutes and reset the RLL600-unit by turning the turning switch at the manual control box into the "0"- position and turning the turning switch back to the original position.

In case of several thermal overloads contact your installer.

6. Overloaded system.

Through a certain reason the motor gearbox (System) has started running heavily. Check the system on mal functioning and reset the RLL600-unit by turning the turning switch into the "0"-position and after this back to the original position. In case of several thermal overloads contact your installer.

7. Motor gearbox in emergency stop.

The RLL600-unit didn't actuate the working switch of the limit switch system and has continued running into the emergency stop limit switch. The power supply should remain at the RLL600-unit, otherwise the control system doesn't recognize which emergency stop limit switch is actuated, and should the motor gearbox moved manually out of the emergency stop limt switch.
The motor gearbox can only runinto the opposite direction till the motor gearbox has run out of the emergency stop limit switch, hiermee kan de motor aangestuurd worden in geval van nood. Gebeurt dit meerdere malen neem dan contact op met uw installateur.

In case of an emergency stop situation due to wrongly connected phases, run by using the manual control box out of the emeregncy stop limit switch. Afterwards swap two phases of the power supply.

8. No CAN-bus communication.

There is no control by the CAN-bus, consult the fault information belonging to the source which is controlling the RLL600-unit.

9. Marge error.

Due to a certain reason the actual position of the motor gearbox with the RLL600-unit has changes with a too big number of pulses. This fault message will not turn off the motor gearbox / RLL600-unit (if not used in a synchronous running system), but the RLL600-unit should be checked by Ridder Drive Systems or a skilled representative.

In case if the RLL600-unit is used in a synchronous running system, this fault will stop the complete system. The manual control box of the master RLL600-unit operates only for the master RLL600-unit and not for the complete system! To reset the fault message each RLL600-unit in the synchronous running system should be moved by its own special manual control box to the same limit switch. After all RLL600-units have arrived in the same position / limit switches, the fault message will dissapear, the manual control box will operate now for the complete system, the system should be checked by Ridder Drive Systems or a skilled representative.

⚠ **CAUTION**	During a Margin error in a synchronous running system, the manual control box operates of the Master for the Master-unit only. During controlling/moving the Master-unit (motor gearbox) with the manual control box, the system can be damaged.

10. No running distance

In case the LED's indicate that there is no running distance or incorrectly teached/learned/programmed for the RLL600-unit, teach/learn/program the RLL600-unit again, the fault will disappear.

11. Encoder error.

This fault ia caused due an incorrectly connected wiring or dirt at the encoder. The RLL600-unit gets the wrong number of pulses of the encoder and can't determine the correct position and running speed of the system. Check the sequence of the wiring. In case the wiring is connected correctly, the encoder isn't installed properly or is dirty. Remove the encoder from the motor gearbox by disconnecting the encoder from the threaded shaft of the limit switch system. Check the encoder disc and the lens of the encoder on dirt. If the encoder parts are dirty, replace the complete encoder according the installation procedure described in this user's manual.

12. Several faults simultaneously

The red LED is lighting continuously in case there are occuring several faults at the same time.

The flashing code doesn't give any guide line of searching the fault. By turning the turning swith at the manual control box at the "0"-position, one fault at the time will be canceled temporary, the remaining fault will shown its flashing code.

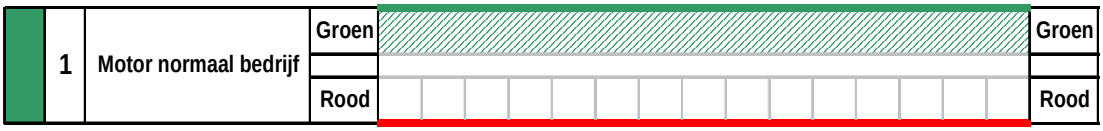
A combination of faults can be caused through several reasons. Often the faults are caused by an incorrect bussignal in combination with an incorrect running direction of the RLL600-unit / motor gearbox. Check the running direction and the connection of the wiring and a proper installation of the encoder.

Faults can be monitored better by programming the RLL600-unit to the configuration of a RLL600-unit without external control. External faults will be eliminated. After this internal connection faults can be corrected. By programming the RLL600-unit back into the original configuration, the earlier detected external fault will appear again.

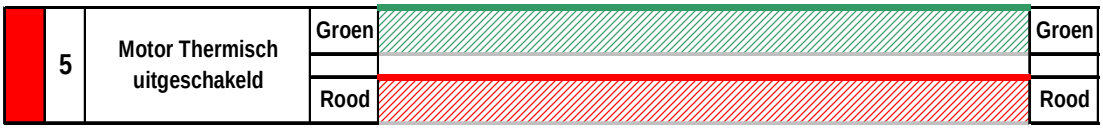
5 Trouble shooting, fault finding and repair

In case a fault appears, the user can only use the solutions as described in the chapter “user”. In case this doesn’t give the solution to solve the problem, please contact the installer who can solve the problem by using the solutions described in the chapter “installater”. In case the parameters have to be modified of the RLL600-unit, please read the instructions described in the chapter “Adjusting menu RLL600” of the user’s manual thoroughly.

5.1 User

Problem	**Signals at the manual control box**
Observation	

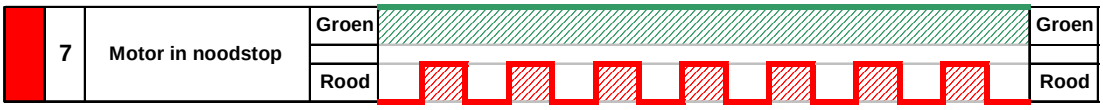
Cause 1	Motor gearbox in normal mode.
Remedy 1	Motor control is operating normally.

Problem	**Signals at the manual control box.**
Observation	

Cause 1	Motor in thermal overload.
Remedy 1	Wait 5 minutes and reset the RLL600 by turning the turning switch at the manual control box into the “0”-position, afterwards turn the turing switch back to the original position. In case this happens several times, or if the fault can’t be reset anymore, please contact the installer.

Problem	**Signals at the manual control box.**

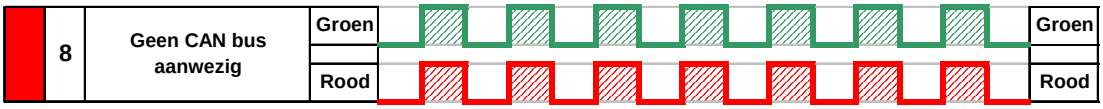
Observation



Cause 1	Motor in emergency stop, the working switch of the limit switch system of the RLL600 is not detected. The motor gearbox has actuated the emergency stop limit switch
Remedy 1	The RLL600-unit / motor gearbox can only run in the opposite direction till the emergency stop limit switch is not actuated anymore, this function is only active in case of emergency. . In case this happens several times, or if the fault can't be reset anymore, please contact the installer.

Problem	**Signals at the manual control box.**

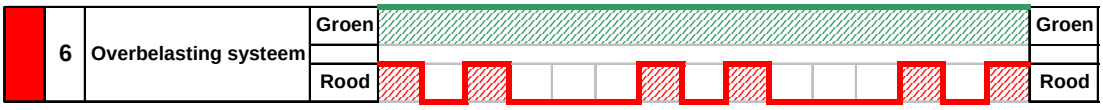
Observation



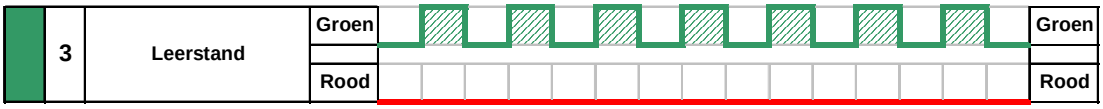
Cause 1	No CAN-bus communication
Remedy 1	Consult the user's manual/fault information of the bus system which belongs to the external control. In case the fault can't be solved, contact the installer.

Problem	**Signals at the manual control box.**

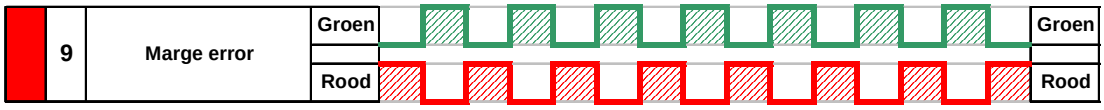
Observation



Cause 1	Overloaded system
Remedy 1	Check the system on heavy loads and reset the RLL600-unit by turning the turning switch on the manual control box into the "0"- position, and turn the turning switch into the original position. In case this fault occurs more often, contact the installer.

Problem	**Signals at the manual control box.**
Observation	

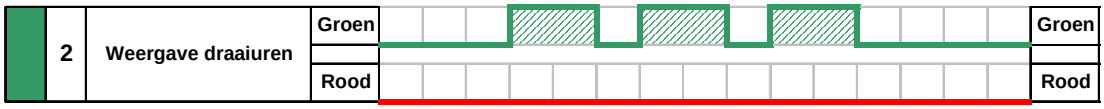
Cause 1	The RLL600 is in the teaching / learning mode
Remedy 1	Contact the installer

Problem	**Signals at the manual control box.**
Observation	

Cause 1	Margin error, the position of the RLL600-unit / motor gearbox has made a too big gap.
Remedy 1	In case of RLL600-unit working in an independent system or in case of RLL600-unit working in a sequency running system, the fault message scan b ereset by turning the turning switch at the manual control box into the “0”-position, and to turn the turning switch back to the original position. Resetting a synchronous running system is different, the manual control box of the RLL600 master unit is active for the RLL600 master unit only.

Resetting a synchronous running system can be done by moving each RLL600-unit / motor gearbox with each individual special manual control box to the same limit switch / position. In case all motor gearboxes / RLL-600 units have arrived in the same limit switch / position, the fault message is reset, the manual control box of the master unit operates now for the complete system.

Contact in both cases the installer

Problem	**Signals at the manual control box.**
Observation	
Cause 1	Displaying number of running hours
Remedy 1	This is not a fault message but a status indication. The RLL600 controlled motor gearbox has been running 100 hours or a multiple of this value. The signal will be displayed for 3 days at the manual control box. The number of flashing of the LED between the longer time the LED is off (t3), multiplied by 100 is the number of running hours (round down at hundreds). This signal is shown once in case the turning switch of the manual control box is turned into the "0"-position. In the above diagram, the RLL600-unit has been running 300 hours.

5.2 Installer

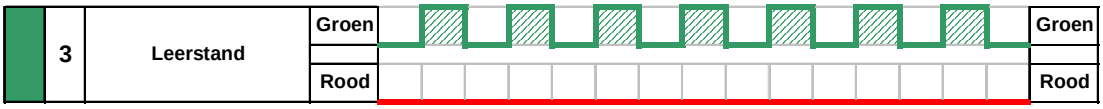
The faults are diveded into two chapters due the fact that the observation during teaching/learning can be different;

- During teaching / learning
- After teaching / learning

DANGER The power supply should always be disconnected during activities at the RLL600-unit.

5.2.1 Faults during teaching / learning the RLL600-unit

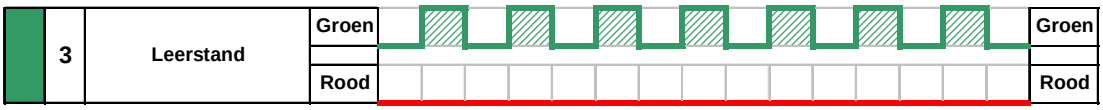
Problem	**Motor draait niet.**
Observation	During controlling the motor gearbox, the relay is turned on but the motor gearbox doesn't run.



Cause 1	The wiring is broken or not connected correctly
Remedy 1	Turn off the power supply, check by using the wiring diagram the wiring and check the wiring on damages or broken cores.

Cause 2	The connection terminals of the relay are not fastened correctly.
Remedy 2	Turn of the power supply, check if all connection terminals are fastened correctly.

Problem	**Motor gearbox stops after 3 seconds running**
Observation	3 seconds after controlling the motor stops and can't be controlled with the learning/teaching-unit. After resetting the unit with the manual control box, the unit can be controlled again for three seconds with the special control box.

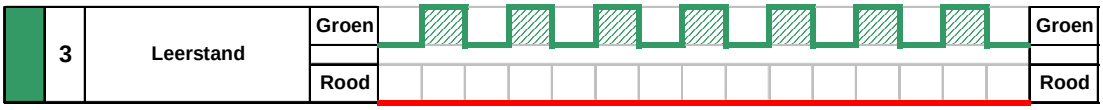


Cause 1	The encoder is not connected
Remedy 1	Connect the encoder

Cause 2	Damage of or broken core in the encoder cable.
Remedy 2	Replace the encoder cable

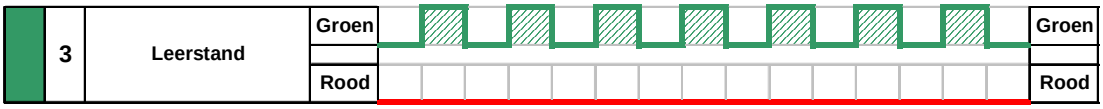
Cause 3	The encoder is broken
Remedy 4	Replace the encoder.

Problem	**Motor gearbox remains in thermal overload**
Observation	Thermal overload remains, wait for 5 minutes and reset the unit.



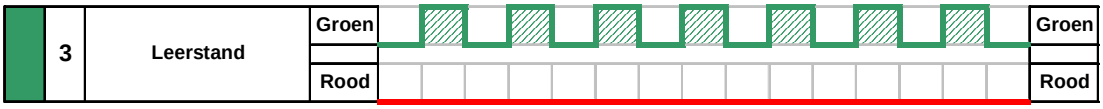
Cause 1	The adjusting switch at the thermal overload relay is not at the "AUTO"-position
Remedy 1	Turn the adjusting switch to the "AUTO"-position

Problem	**Motor gearbox runs into emergency limit switch**
Observation	One of the emergency limit switches is triggered.



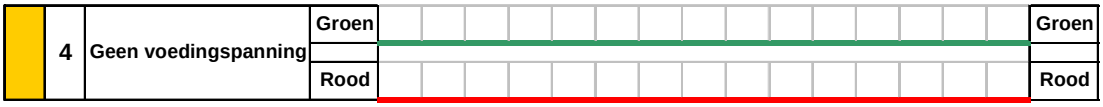
Cause 1	Motor gearbox runs in the wrong direction.
Remedy 1	Runthe motor gearbox out of the emergency limit switch by controlling the motor gearbox in the oposite direction. Swap 2 phases of the power supply at a regular 3-phase motor gearbox, for a frequency controlled motor gearbox swap pin 14 of relay K1 and pin 14 of K2;

Problem	**RLL600 gaat in de inleerfase terwijl er geen eindschakelaar is bekrachtigd**
Observation	De LED`s op de inleerhandbediening gaan knipperen volgens de melding "Leren actief" zonder dat er een eindschakelaar bekrachtigd is



Cause 1	Wrongly connected or damaged wiring of the limit switches.
Remedy 1	Turn of the power supply, check and if necessary change the wiring

Problem	**RLL600-unit doesn't react**
Observation	The green led at the manual control box and the LED at the printed circuit board are not lighting

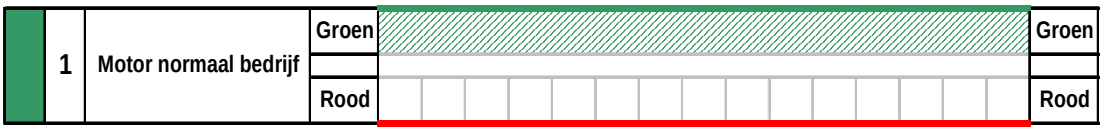


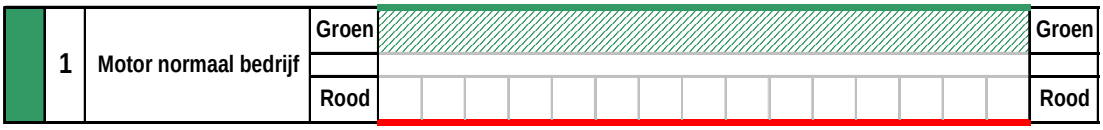
Cause 1	No power at the printed circuit board.
Remedy 1	Check the power supply at the printed circuit board with a Voltage tester.

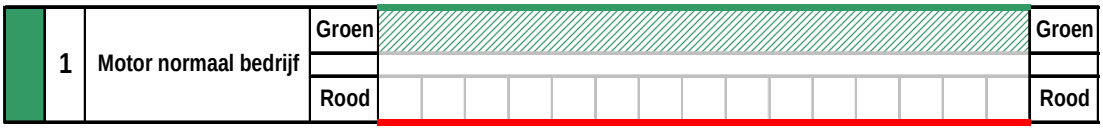
Cause 2	Broken fuse.
Remedy 2	Turn off the power supply, replace the fuse.

Cause 3	Printed circuit board connected incorrectly.
Remedy 3	Turn off the power supply, check the connection by using the wiring diagram.

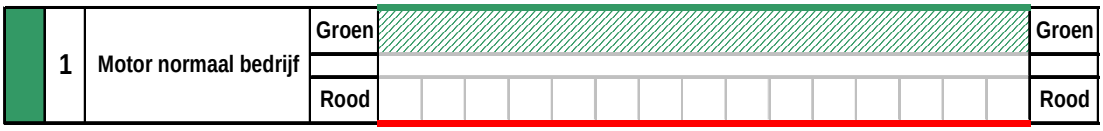
5.2.2 Faults after teaching / learning the RLL600-unit.

Problem	**Signals at the manual control box.**
Observation	
Cause 1	Motor gearbox in normal operation.
Remedy 1	Motor gearbox control is running ok.

Problem	**Motor gearbox is not running.**
Observation	During controlling the motor gearbox, the relay is turning on but the motor gearbox doesn't run. 
Cause 1	The cabling of the motor gearbox is broken or damaged.
Remedy 1	Turn off the power supply and check the cabling and motor gearbox.

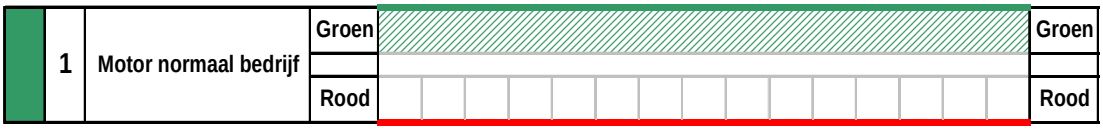
Problem	**The system is not reacting at any control signal.**
Observation	The green LED is turned on, but the rLL600-unit can't be controlled by using the manual control box. 
Cause 1	The wiring of the encoder and or the limit switches is not connected according the wiring diagram.
Remedy 1	Turn off the power supply, check where necessary and correct the wiring, teach/learn the RLL600-unit again. Possibly two phases have to be swapped.

Problem	**Sending the actual position on the CAN-bus doesn't work proparly.**
Observation	The message of the motor gearbox concerning the actual position changes between 0000_{HEX} and $FFFF_{HEX}$



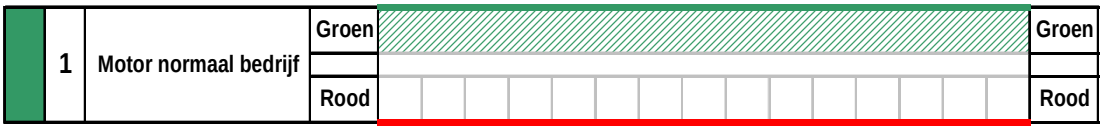
Cause 1	The wiring of the encoder or the limit switches are not correct or not according the wiring diagram connected.
Remedy 1	Turn off the power supply, check where necessary the wiring and teach / program the RLL-unit again. Possibly two phases have to be swapped.

Problem	**The feedback signal of the 4-20mA – signal doesn't work.**
Observation	Value of the feedback signal doesn't change after running the motor gearbox.



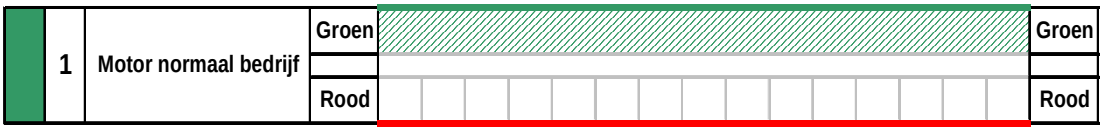
Cause 1	The wiring to the encoder or to the limit switches are not correct or not according the wiring diagram connected.
Remedy 1	Turn off the power, check where necessary the wiring and teach/learn the RLL600-unit again. Possibly two phases have to be swapped.

Problem	**The feedback signal of the 4-20mA-control changes very fast.**
Observation	The value of the feedback changes very fast during running the motor gearbox.

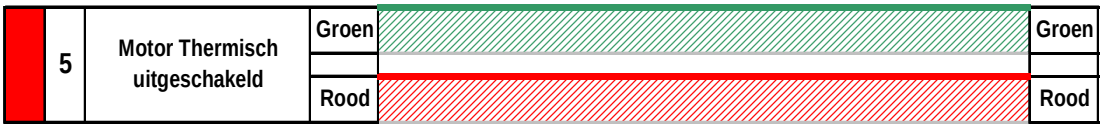


Cause 1	The RLL600-unit is not teached/learned/programmed proparly.
Remedy 1	Teach/learn/program the RLL600-unit again.

Problem	**The synchronous running system corrects and controls the wrong motor gearbox.**
Observation	One motor gearbox is topped without any reason by the master-unit, the other RLL600-units continue running. The motor gearbox which is running behind, is not corrected properly, and can be stopped only by itself.



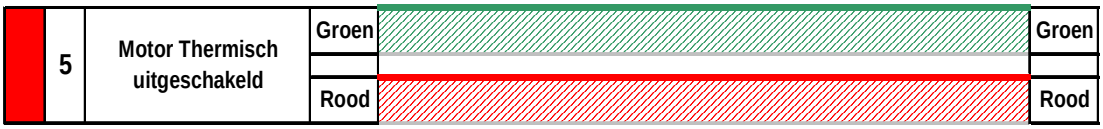
Cause 1	The encoder of one of the other RLL600-units is not installed properly.
Remedy 1	Dismantle and install all encoders of the synchronous running system according the procedure described in this user's manual and teach/learn/program the synchronous running system again.

Problem	**Signals at the manual control box.**
Observation	

Cause 1	Thermal overload is not adjusted correctly.
Remedy 1	Adjust the thermal overload relay at the correct value.

Cause 2	Motor gearbox in thermal overload.
Remedy 2	Check and solve the cause why the thermal overload relay is triggered.

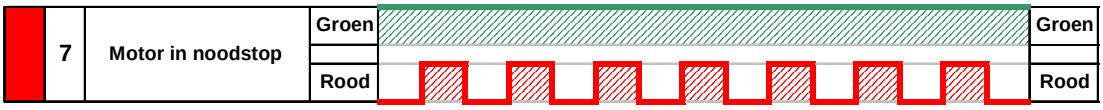
Problem	**Motor gearbox remains in thermal overload**
Observation	Fault thermal overload remains waiting after 5 minutes, resetting with the manual control box doesn't solve the problem.



Cause 1	The adjusting switch of the thermal overload relay is not in the "AUTO"-position
Remedy1	Turn the adjusting switch into the "AUTO"-position

Problem	**Signals at the manual control box.**

Observation



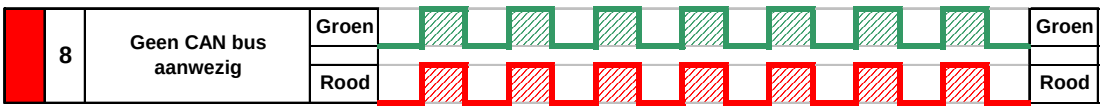
Cause 1	Motor gearbox in emergency stop, emergency stop limit switch not detected.
Remedy1	Run the motor gearbox ot of the emergency stop limit switch by running the motor gearbox in opposite direction. Check and if necessary the limit switches and the wiring.

Cause 2	Motor gearbox in emergency stop, motor gearbox is running in the wrong direction.
Remedy2	Run the motor gearbox ot of the emergency stop limit switch by running the motor gearbox in opposite direction. Swap at a standard electrical motor two phases of the power supply. Swap in case of a frequency controlled motor gearbox the wiring at pin 14 of relay K1 and pin 14 of relay K2;

Cause 3	In case of a three phase motor gearbox the connection in connector P11 at terminals 13 and 14 is not present or the wire is broken.
Remedy3	Check and put if necessary the connection at connector P11.

Problem	**Signals at the manual control box.**

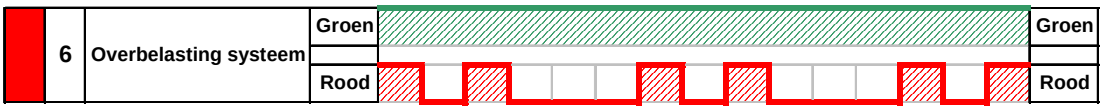
Observation



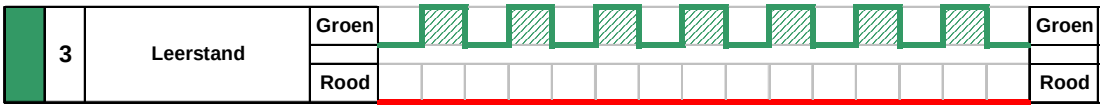
Cause 1	No CAN-bus communication
Remedy1	Consult the user's manual / fault information of the bus system which belongs to the external control.

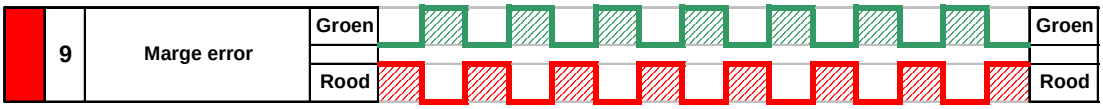
Cause 2	Wire breakage in the CAN cable.
Remedy2	Check the CAN cable on wire breakage and replace the cable.

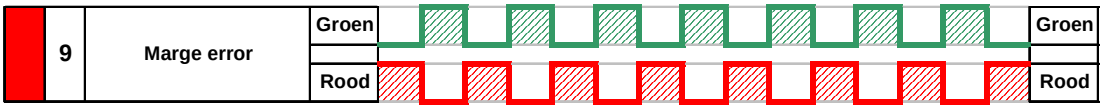
Cause 3	Faulty placed jumper P2 and/or P3.
Remedy3	Check the position of the jumpers according the user's manual and place the jumpers in the correct position.

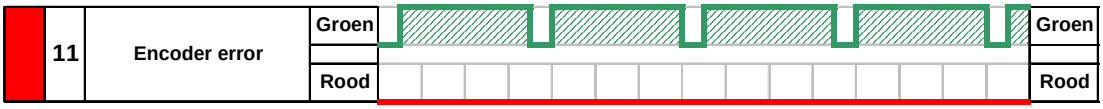
Problem	**Signals at the manual control box.**
Observation	
Cause 1	Overloaded system
Remedy1	Check the reason why the motor gearbox is loaded heavily, solve the problem and try to run the motor gearbox again.

Cause 1	If this occurs after teaching/learning during controlling the RLL600-unit, the wiring of the encoder or limit switches is not correct or not according the wiring diagram connected.
Remedy1	Turn off the power supply, check and correct the wiring if necessary. Teach/learn the RLL600-unit again. Possibly two pahses have to be swapped.

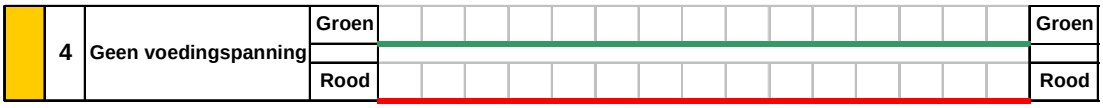
Problem	**Signals at the manual control box.**
Observation	
Cause 1	The RLL600 is in the teaching / learning mode
Remedy1	Leer de RLL600 opnieuw in, mocht dit zich vaker voordoen neem dan contact op met uw leverancier.

Problem	**Signals at the manual control box after teaching / learning the RLL600-unit**
Observation	Directly after teaching / learning the RLL600-unit, the below flashing code appears and can't be resetted as long the limit switch is actuated. If the fault is reset in case the limit switch is not actuated, the flashing code will appear after the limit switch is actuated. 
Cause 1	The wiring of the encoder or limit switch is not correct or not connected according the wiring diagram.
Remedy1	Turn off the power supply, check and if necessary modify the wiring and teach/learn the RLL600-unit again. Possibly two phases have to be swapped.

Problem	**LED flashing codes at the manual control box.**
Observation	
Cause 1	Bad contact between printed cicrcuit board and limit switches.
Remedy1	Check and if necessary replace the wiring.
Cause 2	Nuts at the threaded shaft of the limit switch system are running heavily and with friction.
Remedy2	Contact your supplier.

Problem	**The system doesn't react at any control signal.**
Observation	The green LED is turned on for 3 seconds, is turning off shortly and is again turned on.
	
Cause 1	The wiring of the encoder or limit switches are not connected according the wiring diagram.
Remedy1	Turn off the power supply, check and where necessary modify/correct the wiring and teach/learn/program the system again. Possibly also two phases needs to be swaped.
Cause 2	The encoder isn't installed properly or has become dirty.
Remedy2	Disassemble the encoder and check the encoder disc and the lens on dirt. Replace the complete encoder in case dirt is present. Install a clean (new) encoder according the installation guide line which is described in this manual.

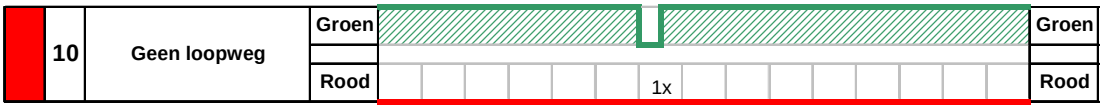
Problem	**RLL600 is not functionning**
Observation	The green LED at the manual control box and the green LED at the printed circuit board are not turned on.



Cause 1	No power at the printed circuit board.
Remedy1	Check by using a tester if there is power present.

Cause 2	Fuse is blown
Remedy2	Disconnect the power, replace the fuse.

Problem	**The system does not react during controlling the rotation direction.**
Observation	After controlling the rotation direction, the green LED is turned off and again turned on.



Cause 1	Teaching/programming of the unit has failed.
Remedy1	Teach/program the system again.

Notes.