Technical information and instructions

Rollex-Multi-Drive-Card (RMD-Card)

for model 840-50

Publisher: **Rollex Förderelemente GmbH & Co. KG**

Please note:

the text, drawings and photography of this manual have been produced with the greatest possible care and to the best of our knowledge. As errors cannot be excluded, we would like to inform you of the following:

Your actions should be guided exclusively by your own calculations and plans based on the applicable valid standards and DIN regulations. We exclude any guarantee for the completeness of all texts, drawings and photographs published in this manual; they are representative in nature.

If the contents imparted here are used or applied, then this is done explicitly at the corresponding user‘s own risk. Any liability on the part of the publisher for improper, incomplete or incorrect details and any resulting damage is entirely excluded.

In this docment all decimals are comma seperated, thousands are seperated by dots.

Content

1. Introduction page 4

1.1 Function page 5

1.2 Technical Data page 6

1.3 Optional Accessories page 8

1.4 Safety instructions page 9

2. Connection and settings page 10

2.1 Assembly page 10

2.2 Installation page 10

2.2.1 SETUP configuration page 10

2.2.2 Connect the motors page 12

2.2.3 Connecting the light curtains page 12

2.2.4 Connection of the start signal / output signals page 12

2.2.5 Connection of communication page 13

2.2.6 Connect the release signal and the ext. error message page 14

2.2.7 Connection of 24 V DC voltage page 14

2.2.8 Delay time page 15

2.2.9 Connection via interface – standardized bus system page 16

2.2.10 Rollex bus master page 16

3. Other page 20

3.1 Error handling RMD card page 20

3.2 Error handling for motor roller page 21

3.3 Transport page 22

3.4 Disposal page 22

4. Notes page 23

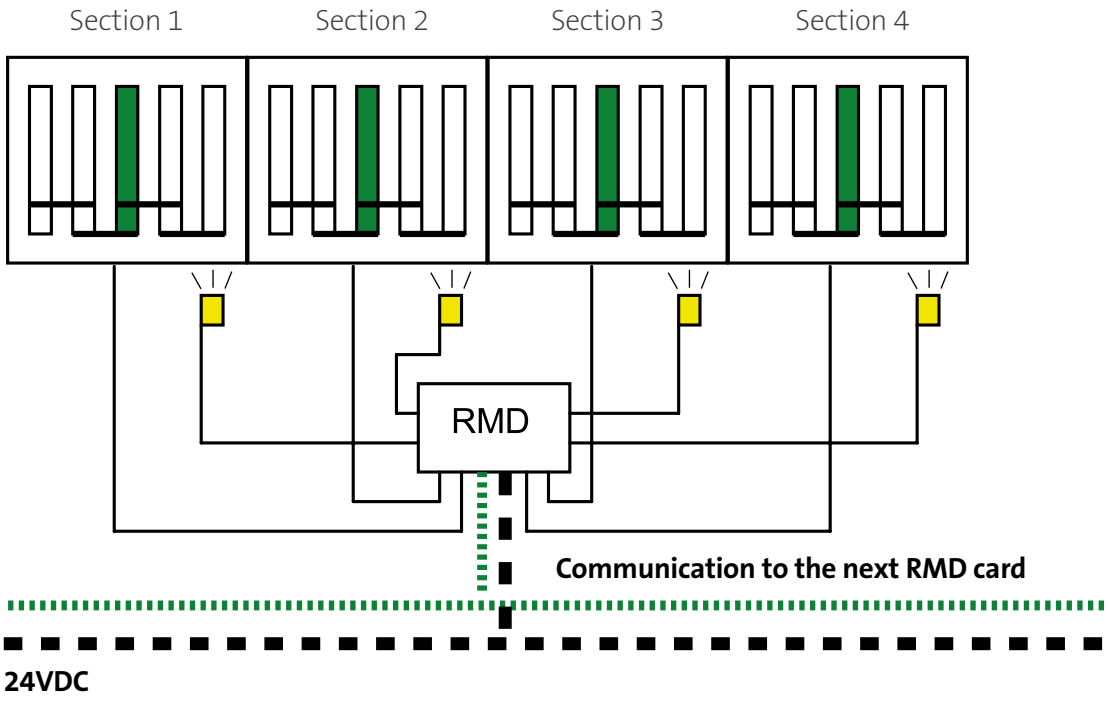
1. Introduction

The **Rollex-Multi Drive Card (RMD card)** simplifies implementation of a zero pressure system. With zero pressure conveying goods are transported without contact, meaning that goods cannot hit each other on the conveying lane. Simply by combining individual components with the control card (modular system), complex systems can be put into operation in a fast and cost-effective manner.

The **RMD card** card is arbitrarily expandable, meaning an arbitrary number of **RMD cards** can be connected in series.

The zero pressure switch has an internal logic. It is in a position to communicate with other bottleneck spaces, allowing it to control optimum material flow. The drive is only switched on if a conveyed good should flow through the light curtain of the conveying section. After leaving, the drive switches off automatically.

The **RMD card** contains all intelligent functions required for a zero pressure conveying.



- Connection option of up to 4 pieces of 24 VDC Rollex motor rollers model 840
- Connection option up to 4 pieces of light curtain
- Configuration options for speed and conveying direction
- Interface module for a standardised BUS connection

1.1 Function

The **Rollex-Multi Drive Card (RMD card)** controls up to 4 motors and transports the conveyed goods in a zero pressure condition within 4 sections. The controls have been set up so that 1 to 4 motors can be selectively controlled.

The **RMD card** is set up in a modular manner and can be arbitrarily expanded, meaning several **RMD cards** can be connected that communicate with each other.

With the **RMD card** it is possible to have a cost-effective design for zero pressure goods conveying.

Acquisition of individual conveyed goods is done by photo-electric sensors. For this, switchover of the switch outputs is not required as standardized PNP and also NPN outputs can be used.

The conveying direction can be released centrally via a common control signal. The logical direction then changes automatically. The rotation direction can also be previously defined via rotary encoder switch.

Optional control via a standardized bus system is possible.

After motor release these run for about 3sec to transport conveyed goods that may be between areas of light curtains into their range. This allows the **RMD card** to detect whether a position at the start of the unit is in use or not. If conveyed goods are in a light curtain area then the rollers in this area do not start.

For empty tracks the infeed conveying starts from an arbitrary position as soon as the conveyed good is set down (not a normal start!)

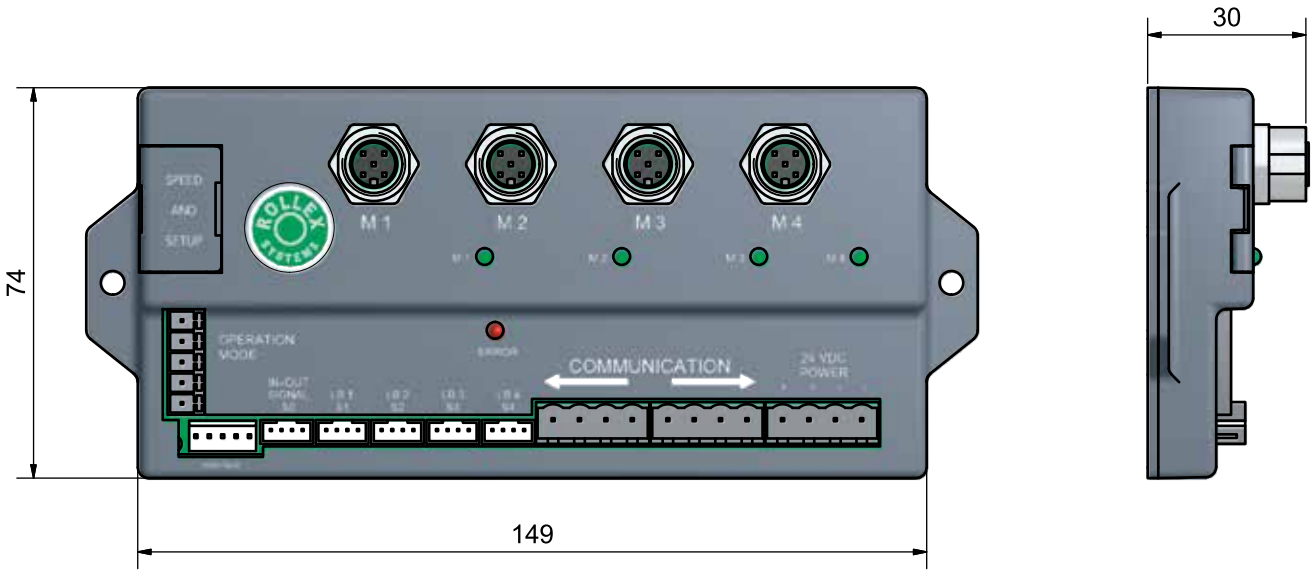
The motor function is provided with runtime monitoring (blocking protection). The switch off time is about 10sec. If a motor is switched off by runtime monitoring, it is blocked until its light curtain is released.

The error message generated by the motors (current limit / under voltage) is made available as a potential free collective message.

1.2 Technical Data

Rollex-Multi Drive Card

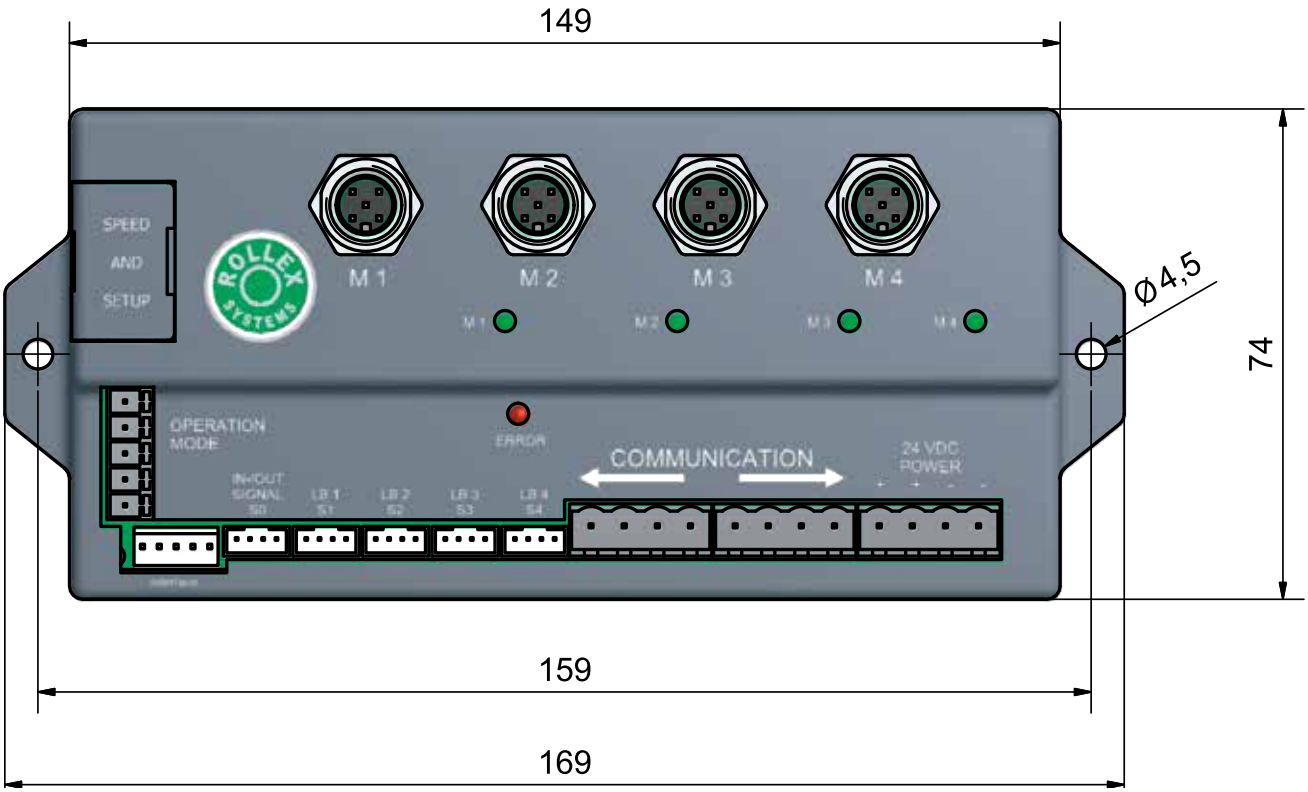
Housing dimensions: Width = 149 mm (without screw on tab)
Height = 74 mm
Depth = 30 mm (with screw fitting)
67 mm (with M12 angle plug)



Nominal voltage:	24 VDC
Voltage range:	20 to 28 V
Current consumption without motors:	0,1 A
Current consumption with two motors:	5 A
Current consumption with three motors:	7,5 A
Current consumption with four motors:	10 A
Protection class:	IP20
Ambient temperature:	-5 to +40 °C
Recommended cable cross-section:	1,5 mm²

Motor roller 840-50:

Nominal voltage:	24 VDC
Voltage range:	18 to 28 VDC
Nominal performance:	40 W
Nominal current:	2,5 A
Nominal empty running current:	0,1 - 0,4 A
Start up current (empty run):	0,5 A



Connections:

M1	=	Motor 1
M2	=	Motor 2
M3	=	Motor 3
M4	=	Motor 4

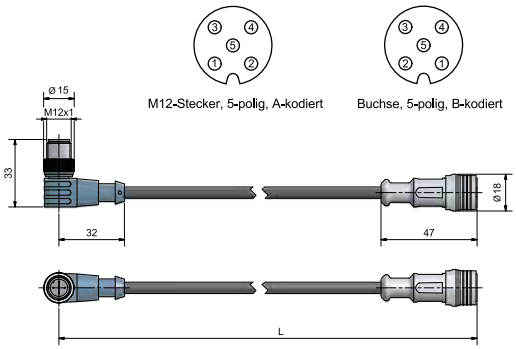
IN-/OUT SIGNAL S0	=	Connection of the start of output signal
LB 1 S1	=	Light curtain 1 (to motor 1)
LB 2 S2	=	Light curtain 2 (to motor 2)
LB 3 S3	=	Light curtain 3 (to motor 3)
LB 4 S4	=	Light curtain 4 (to motor 4)

COMMUNICATION ←	=	Communication to previous **RMD card**
COMMUNICATION →	=	Communication to following **RMD card**
24 VDC POWER ++ --	=	Power supply 24VDC
OPERATION MODE	=	Control of rotation direction and the release and external error message via a 5-pin plug
SETUP and SPEED	=	Set the number of motors and start or output signal via the DIP switch and control the motor speed
Interface	=	Connect a standardized bus system

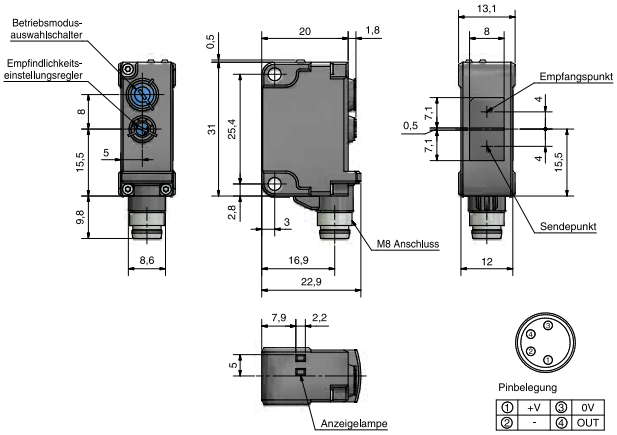
1.3 Optional accessories

Extension cable RMD card to motor 800 mm
M12 push-pull coupling 5 pin angled M12 plug

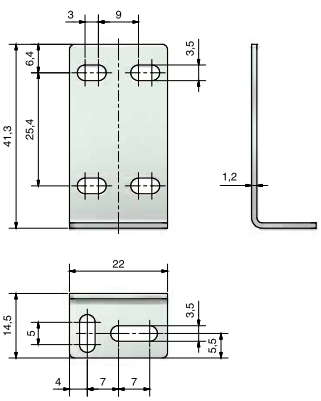
Extension cable RMD card to motor 1.600 mm
M12 push-pull coupling 5 pin angled M12 plug



Light curtain
Photoelectric sensor M8 plug 4-pin. Alignment by the red LED display.
Polarizing reflection optics (not a problem with metallic objects).



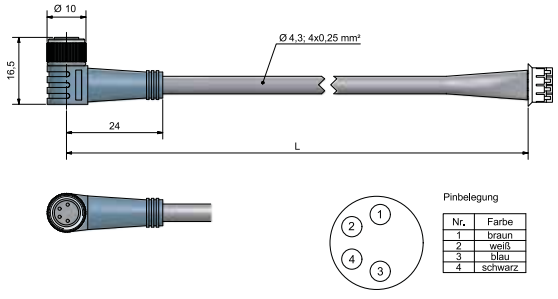
Assembly bracket



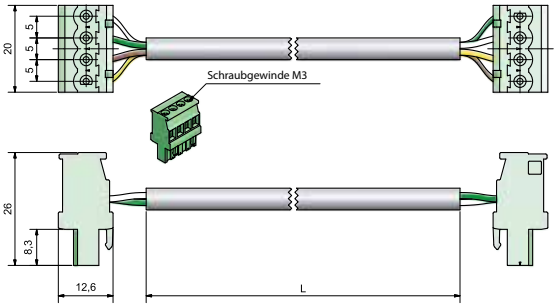
Should light curtains from third party manufacturers be used we ask for details about the manufacturer and model number before ordering.

Extension cable RMD card to light curtain 2.000 mm
Jack M8 4-in, angled JST jack

Extension cable RMD card to light curtain 1.000 mm
Jack M8 4-in, angled JST jack



Communication cable (length arbitrarily selectable)
Double sided 4-pin plug



1.4 Safety information

This document contains important information and instructions about installation of the **Rollex-Multi Drive Card** in connection with the motor roller model 840-50.

Changes that are done after installation by **Rollex** are not included here.

Damage or operating errors resulting from failure to comply with the operating manual are not the liability of **Rollex Förderelemente GmbH & Co. KG**.

When integrating and operating the motor roller comply with all general safety regulations and accident prevention measures. This not only includes wearing safety clothing and general behaviour during assembly work but also the following points:

- To prevent personal damage, the **RMD card** and motor roller may only be put into operation by trained specialists.
- Installations and also maintenance work may only be done on the **RMD card** and the motor roller with the power disconnected.
- **RMD card** and motor roller are not to be used in spaces at risk of explosion.
- **RMD card** and motor roller are not to be removed or opened.
- Ensure that people are not standing in the hazardous area.
- Ensure that all safety devices have been properly installed.
- Ensure that connections and wiring meet all legal conditions.

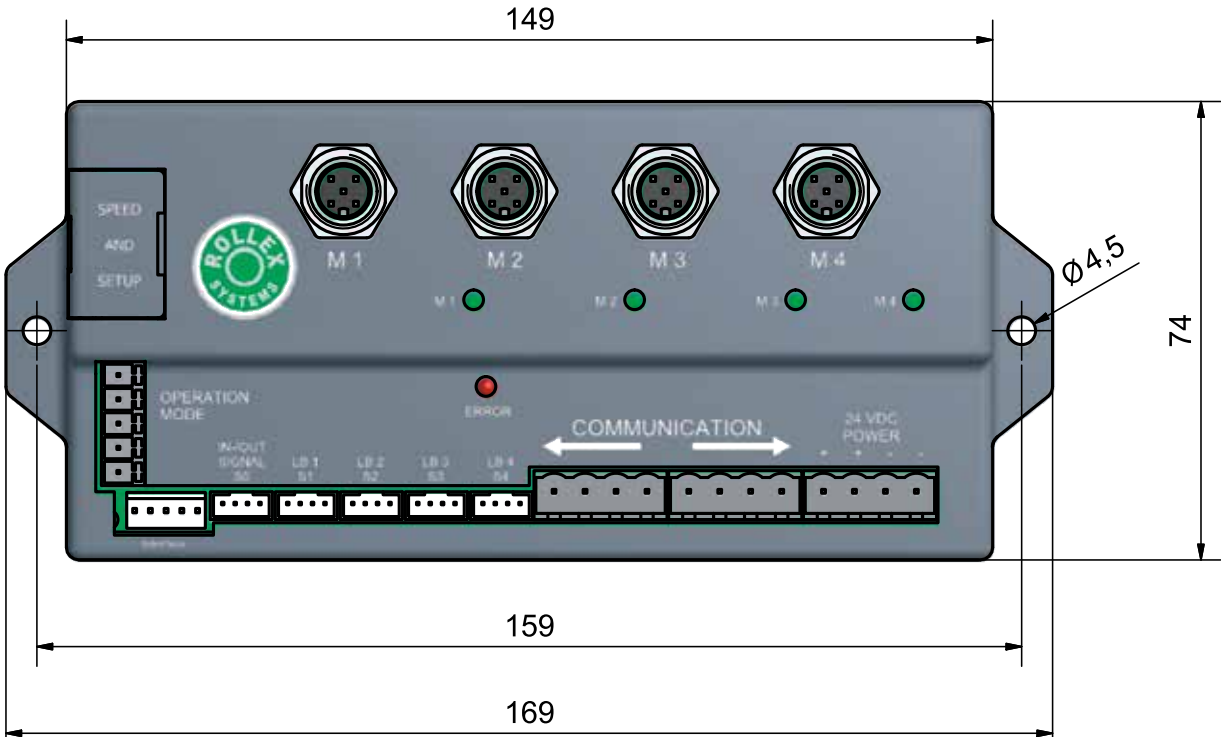
The motor roller is only suitable for industrial use and may not be implemented together with personnel conveying or for transport of bulk goods. The application case should be coordinated in advance with the sales department of **Rollex Förderelemente GmbH & Co. KG**.

2. Connections and settings

2.1 Assembly

The card is mounted to the conveying system with two M4 screws.
The actual dimensions of both bores is 159 mm.

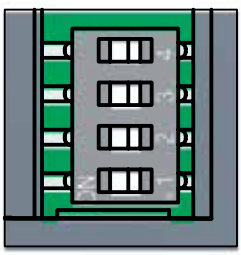
Drawing with actual dimensions:



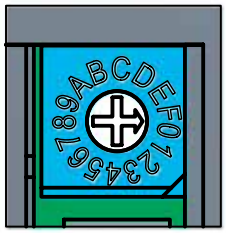
2.2 Installation

2.2.1 SETUP configuration of the number of motors, the speed and rotation direction

A DIP switch is used to define the number of motors that should be connected to the **RMD card**.



Motor 1	=	Set DIP 3 to ON and DIP 4 to OFF
Motors 1 and 2	=	Set DIP 4 to ON and DIP 3 to OFF
Motor 1, 2 and 3	=	Set DIP 3 and DIP 4 to ON
Motor 1, 2, 3 and 4	=	Set DIP 3 and DIP 4 to OFF



The speed and rotation direction is controlled via the rotary encoder switch.

The motor roller mode 840-50 can be delivered in three variants with different drive translations so that an optimum torque in use can be guaranteed.

Variants	Drive	Speed in m/s	Torque in Nm
I	26,67 : 1	0,20 - 0,48	1,8
II	12,65 : 1	0,51 - 0,77	0,9
III	7,5 : 1	0,76 - 1,30	0,6

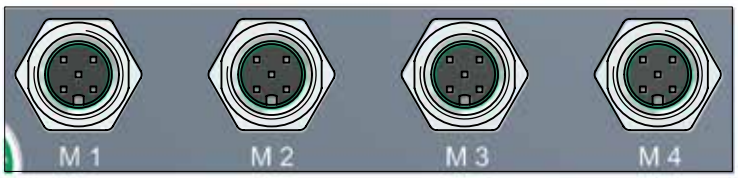
The speed and rotation direction is controlled via the rotary encoder switch.

The following settings are possible:

Switch settings	Speed in m/s			Direction
	i = 7,5	i = 12,65	i = 26,67	
0	1,30	0,77	0,48	Counter clockwise
1	1,19	0,71	0,44	
2	1,08	0,64	0,40	
3	0,97	0,58	0,36	
4	0,87	0,51	0,32	
5	0,76	0,45	0,28	
6	0,65	0,39	0,24	
7	0,54	0,32	0,20	
8	1,30	0,77	0,48	Clockwise
9	1,19	0,71	0,44	
A	1,08	0,64	0,40	
B	0,97	0,58	0,36	
C	0,87	0,51	0,32	
D	0,76	0,45	0,28	
E	0,65	0,39	0,24	
F	0,54	0,32	0,20	

2.2.2. Connect the motors

The motors can be connected to the card using the optionally available extension cables (0,8 and 1,6 m). The plug on the motor is available via a 5-pin push-pull coupling. The other side of the extension cable is mounted into the M12 screw fitting on the card. Please make sure that motors are connected in the proper order to the **RMD card** (M1 to M4).

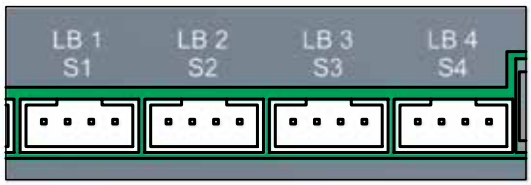


Note: Please also ensure that the cable and plug are not under high tension or compressional loads.

Please also ensure that the cable and plug are not under high tension or compressional loads.

2.2.3 Connecting the light curtains

The optionally available light curtains and extension cables are connected using M8 screw fittings. The other side is plugged to the **RMD card** using the JST jacks. The JST jacks must be plugged into the card in the proper order (LB 1 - S1 to LB 4 - S4). The switch output need not be changed as the outputs can be used as PNP or NPN.

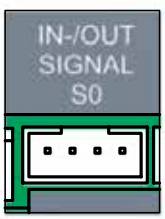


Information: Please also ensure that the cable and plug are not under high tension or compressional loads.

Should light curtains from third party manufacturers be used we ask for details about the manufacturer and model number before ordering. **Please note:** For light curtains from other manufacturers the residual voltage must be non-damping = 7 VDC.

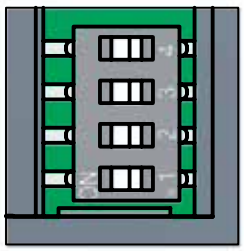
2.2.4 Connection of the start signal / output signals

The start signal can be generated by light curtains, buttons, PLC or a pre-switched logic. The signal is then plugged to the card connection IN/ OUT SIGNAL - S0 with a JST jack. The output signal will also be connected via the IN / OUT SIGNAL - S0.



The output signal can also be generated by a light curtain, switch, PLC or pre-switched logic.

Information: Please also ensure that the cable and plug are not under high tension or compressional loads.



The function of this signal is selected on DIP switch 1 in the SETUP area.

Set start signal = DIP 1 to ON

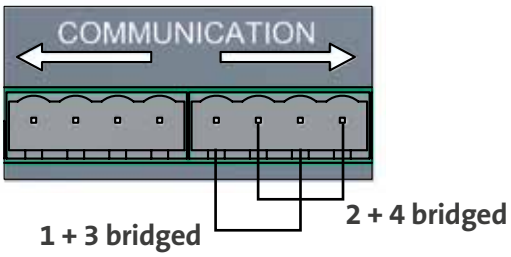
Set output signal = DIP 1 to Off

2.2.5 Connection of communication

Several **RMD cards** can be connected using a single communication cable. The individual plugs are plugged into the corresponding COMMUNICATION connections. Simply ensure that the outputs are connected to the inputs of the next **RMD card**.

The inputs on the **RMD card** are galvanically isolated from one another.

Should only one **RMD card** be implemented, communication to the next card must be bridged as follows:

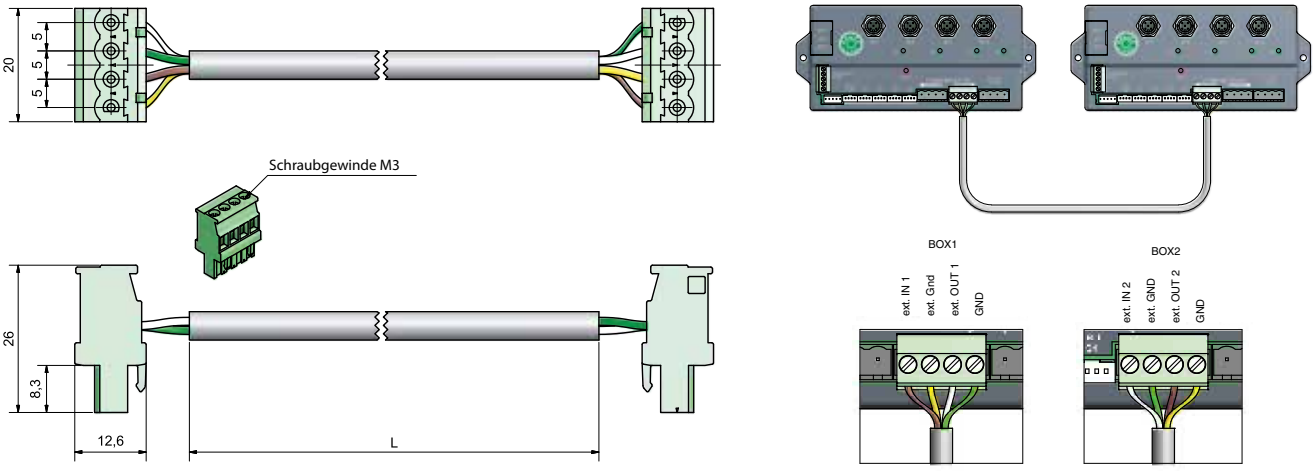


← = input from the previous card

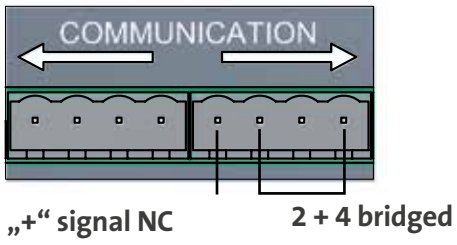
→ = output to the following card

The communication line can be ordered pre-assembled from **Rollex**. Only standard 4-pin plugs are supplied here.

Connections to the plugs are done as follows:



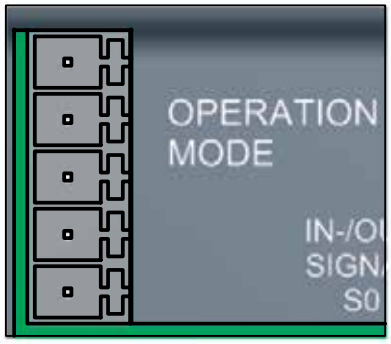
To enable continued conveying from the last position without another **RMD card**:



Information: Cable and plug may not be placed under too high tension or compression loads.

2.2.6 Connect the release signal and the ext. error message in the OPERATION MODE area

For the card to give the release signal the ext. release must be wired to + 24 VDC on terminal 1 and -24 V DC on terminal 3.



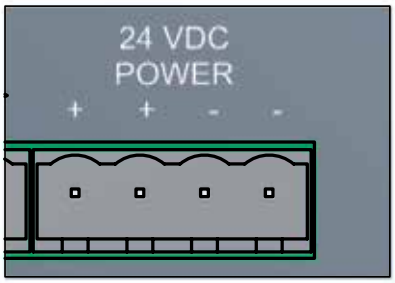
1 = ext. release
2 = ext. Direction
3 = ext. GND
4 = error +
5 = error -

The error message can continue to be processed via connection terminals 4 and 5 (open collector).

Information:
Control of the release signal and the external rotation direction change is galvanically isolated via the optocoupler.
Should the rotation direction 2 be used in running operation, ensure that the light curtains are centred in the section and the section is correspondingly large.
Please also ensure that the cable and plug are not under high tension or compressional loads.

2.2.7. Connection of 24VDC voltage

The **RMD card** is connected via the 4-pin plug to the 24 V DC POWER connections. The + and – terminals are redundantly implemented.

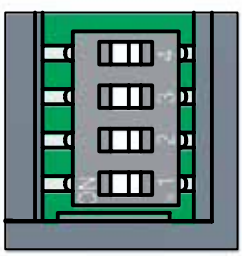


+ = 24VDC
- = GND

Information:
The voltage supply should make the max. current (10 A) available to the controls. The supply voltage of several **RMD cards** can be linked to up to 8 cards. It is recommended that the individual **RMD cards** be controlled separately. Please check for same potential.

Please also ensure that the cable and plug are not under high tension or compressional loads.

2.2.8 Delay runtime

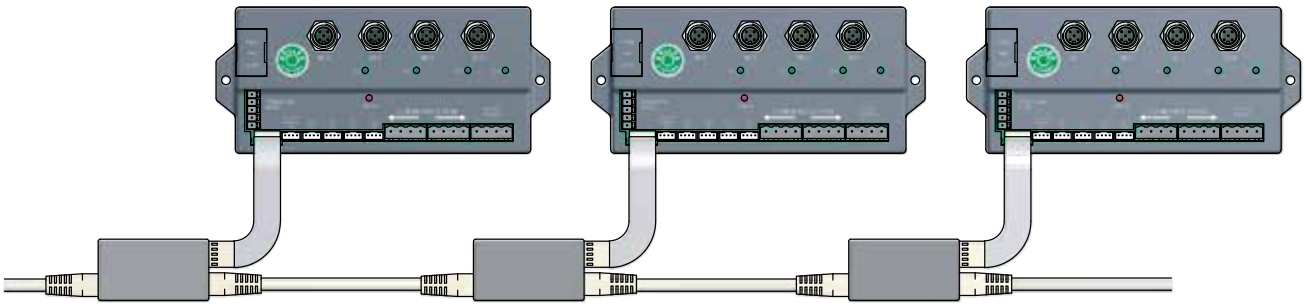


If a longer runtime delay is desired, this can be set via DIP switch 2.

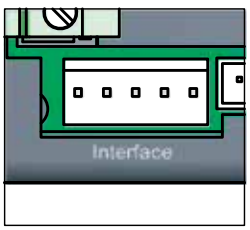
Delay runtime 2 seconds = set DIP switch 2 to OFF
Delay runtime 10 seconds = set DIP switch 2 to ON

2.2.9 Connection via interface – standardized bus system

Controls are optional and it is possible to read out data via a standardized bus system.
For this, a bus adapter is connected to the **RMD card**.



The **RMD card** has a microcontroller that is responsible for logic. At the same time the microcontroller makes all information in a bus system available via the RS-485 interface. The advantage of the RS-485 BUS system is high speed data transfer over long line lengths.



Information is then stored by an external processor (interface adaptor) and read in /out. Data can then be called up from there via an RJ45 interface.

Different bus protocols can therefore be processed via protocol converters (different manufacturers).
A PLC control can be implemented as a master for this purpose, for example.

All motors and sensors can be visually displayed.

2.2.10 Rollex Bus master

Using the bus master, data can be exchanged for example between a PLC and the motor controls bi-directionally via the USB connection. Data is exchanged on the basis of an ASCII table.

The bus master is connected to the bus adapter with RJ45 cable. Up to 25 **RMD cards** can be connected per Rollex bus master.

System specification

Control module for cap rail assembly (120 x 90 x 30 mm)
LED displays for inputs / outputs
Status LEDs for Bus activity, USB, power
Operating voltage 24 V DC

Function

After the reset there is a lamp test of status LEDs for about 2 seconds. Afterwards the Bus master scans the available motor modules (status display scan, bus LED flashes)

After acquisition of the active module, the bus master starts a periodic query of module data (all, 0.6 seconds).

The acquired data are temporarily stored in the bus master and can be called up at any time via the USB interface (g = get command).

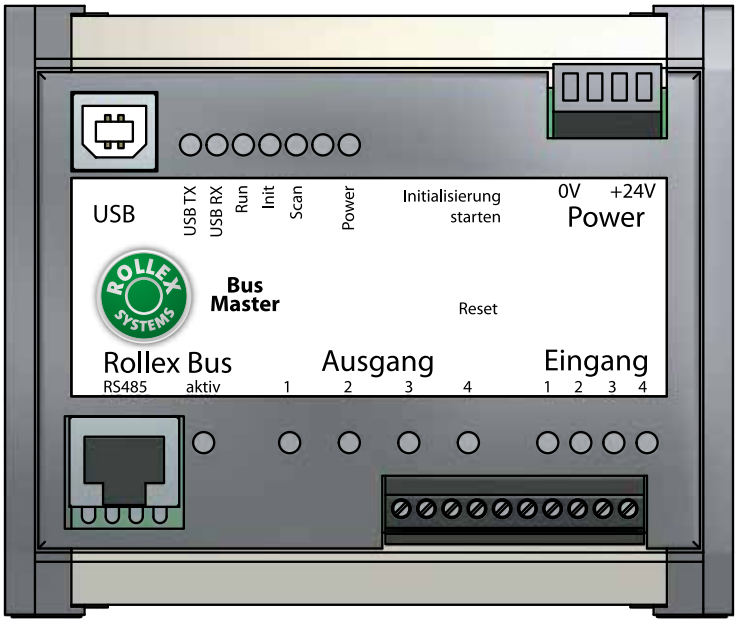
Control commands such as release on/off, clockwise and counter clockwise running are controlled by commands via the USB interface.

With one button on the front an initialisation run can be triggered when a new motor controller is installed.

The addresses of the motor controllers are assigned independently and stored in the motor controller.

Connection layout

Layout control assembly bus master



Plug layout:

Power	Gnd	
	Gnd	
	+24 V	Controller and outputs supply
	+24 V	
Input / Output	A2	Direction output
	A3	–
	A4	–
	E1	--
	E2	--
	E3	–
	E4	–
	+24 V	
	Gnd	

LEDs	4	Green	Inputs
	4	Green	Outputs
	1	Yellow	Bus active (if board sending)
	2	Yellow / red USB	TX/RX
	4	Green	Status run, init, scan , free
	1	Green	Power ok

Button

Start initialization
Free
Trigger reset

Protocol on the USB interface (ASCII table)
Baud rate 19200,n,8,1, driver FTDI virtual com port:
(Com : Select port 6 in device manager!)

Commands consist of the command and a <CR><LF> line end

i <CR><LF>	Start initialization of the motor module Return: Number of modules initialized, for example 2<CR><LF>
a <CR><LF>	Scan to query existing module (test) Return: Number of modules found, for example 2<CR><LF>
n <CR><LF>	Display of existing modules Return: Number of modules found, for example 2<CR><LF>
gn <CR><LF>	Display of motor module data n (1...25) Return: Data set <CR><LF>
x <CR><LF>	Display of data of all motor modules behind each other separated by: Return: Data set: Data set: Data set <CR><LF>
F <CR><LF>	Switch on release output
f <CR><LF>	Switch off release output
l <CR><LF>	Turn on direction output (left)
r <CR><LF>	Turn off direction output (right)

Record structure 01;0;0;0;0;0;0;0;0;0;0;0;0;0;0;0:9;0;0;0;0;9;9;9;9;9;9;9;9

for digital values 0 (false) and 9 (true) are output

01	Module No. (1..25);	16	Motor 4 on;
02	Release ;	17	DIP switch 1 light curtain function;
03	Direction;	18	DIP switch 2 free;
04	External 1 input;	19	DIP switches 3 + 4 number of motors 0...3
05	External 1 output;	20	Speed (Rotary switch 5...75);
06	External 2 input;	21	Direction off rotary switch;
07	External 2 output;	22	Motor error 1;
08	Light curtain 1;	23	Motor error 2;
09	Light curtain 2;	24	Motor error 3;
10	Light curtain 3;	25	Motor error 4;
11	Light curtain 4;	26	Total motor error (ERR LED);
12	Light curtain 5;	27	In use marker 1;
13	Motor 1 on;	28	In use marker 2;
14	Motor 2 on;	29	In use marker 3;
15	Motor 3 on;	30	In use marker 4

3. Other

3.1 Error handling RMD card

Green M1 to M4 do not illuminate	Connect the motors and check the voltage supply.
Red error LED illuminates	Check whether the motors are connected in the correct sequence (M1 to M4). Check, whether the light curtains are connected in the correct order (LB 1 to LB 4). Check whether the DIP switch is in the correct position. Check whether the external release has been connected in parallel.
Yellow LED (below set up) does not illuminate	The yellow LED is located below the flap to the right beside the rotary encoder switch. Check whether the communication line is properly connected (sequence and possibly cable). (Only valid for use with bus).
Motors turning in the wrong direction	Please check whether the rotary encoder switch is properly set or an external direction parameter is connected (OPERATION MODE).

The motor function is provided with runtime monitoring (blocking protection). The switch off time is about 10sec. If a motor is switched off by runtime monitoring, it is blocked until its light curtain is released.

3.2 Error handling for motor roller

In the following description of error management the terms „Error output has been set“ and „Error output has been reset“ will be used.

Over or under voltage

The drive works in an operating voltage range from 18...30 Volts. This is continuously monitored by the microcontroller. If the operating voltage lowers below 17.5 V or increases above 30.5 V the drive switches off. In addition an error output is set for an under voltage. If the operating voltage is again in a range from 18...30 V the error output is reset (for an under voltage) and the drive starts itself automatically.

Over-temperature

The microcontroller monitors the temperature of the high performance electronics and switches the drive off for temperatures above 100 °C. This is signalled by setting an error output. After cooling of the power electronics to 90 °C the error output is reset and the drive restarts automatically.

Over-current

Current limiting is implemented in the roller drive using software and hardware. If the motor current increases above a value of ~5A there is a hardware shutdown of the end point. As soon as a lower current has been set this is released again. In this case an error output is not set.

Furthermore, the microcontroller monitors the current consumption of the motor. During motor running if the current increases above ~4 A for longer than 3 s, the motor is switched off and an error output is set. After a wait time of 3 s the error output is reset and the drive starts itself automatically.

Blocking protection

If the motor is abruptly blocked during movement or start up, a motor current limit of 2,5 A is set, immediate shut off is done and an error output is set. After a wait time of 3 s a restart attempt is made. Also during this the motor current is limited to 2,5 A to prevent damage to the drive.

After 5 unsuccessful start attempts the wait time increases to 30 s between start attempts.

3.3 Transport

To ensure a seamless implementation, comply with the following points when transporting the motor rollers:

- The **RMD card** and the motor rollers are to be transported so that damage is prevented.
- Prevent impacts on the **RMD card** and motor roller:
- Report transport damage directly to the transport company as well as **Rollex Förderelemente GmbH & Co. KG**
- Prevent excessive temperature differences when transporting to prevent condensation and subsequent oxidation inside the motor rollers and **RMD card**.

3.4 Disposal

The operating company of the conveying unit is responsible for the disposal of the motor roller in compliance with disposal regulations.

Your notes

ROLLEX Förderelemente GmbH & Co. KG
Gewerbehof 22
D-59368 Werne

Phone: (0049) 23 89 / 98 97 -0
Fax: (0049) 23 89 / 68 66
Email: info@rollex-group.com

www.rollex-group.com