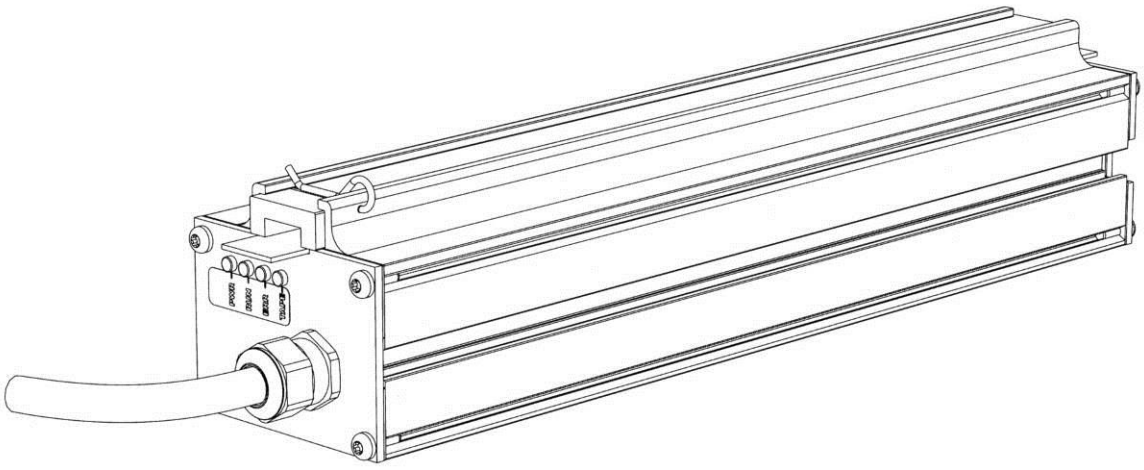
799 000 350 / Rev. 2 / 2015-05-12

ELGO

Operating Manual

LIMAX02



Magnetic Absolute Shaft Information System for Elevators

1 General

1.1 Information operational manual

The manual contains important information regarding the handling of the indicator.
For your own safety please note all safety warnings and instructions.

Precondition for safe operation is the compliance with the specified safety and handling instructions.
Moreover, observe the existing local accident prevention regulation and general safety rules.

Please read the operation manual carefully before starting to work. The manual should be kept accessible at anytime. The illustrations in the manual are for better representation of the facts they are not necessarily to scale and can be slightly different to the actual construction.

1.2 Explanation of symbols

Warning notices are characterised by symbols in the operation manual.
The notes will be introduced by signal words to express the magnitude of the danger.

Follow these advices in order to avoid accidents and injuries to persons and property.

	**DANGER!** This symbol in connection with the signal word „Danger“ indicates an immediate danger for the life and health of persons. Failure to heed these instructions can result in serious damage to health and even fatal injury.
	**WARNING!** This symbol in connection with the signal word „Warning“ indicates a possible danger to the life and health of persons. Failure to heed these instructions can result in serious damage to health and even fatal injury.
	**ATTENTION!** This symbol in connection with the signal word „Caution“ indicates a possibly dangerous situation. Failure to heed these instructions can lead to minor injury or property damage.

Specific safety instructions:

	**DANGER!** This symbol in connection with the signal word “Danger” indicates an immediate danger for the life and health of persons through electric potential. Non-observance of the safety instructions leads to harmful consequences up to the point of perilous injuries. The work is only to be carried out by an electrician.

Tips and recommendations:

NOTE!
Here you can see highlights, useful tips, information and recommendations for efficient and trouble-free operation.

1.3 Statement of Warranties

The warranty conditions are in a separate document in the sales documents.

Guarantee
The producer guarantees the functional capability of the process engineering and the selected parameter. The period of warranty is one year and begins with the date of delivery.
The warranty (1 year) is beginning with the date of purchase.

Demounting and Disposal
Unless otherwise authorized, dispose the item considering the safety and environmental instructions.

Before demounting
Disconnect the power supply and secure against re-start, then disconnect supply lines physically and discharge remaining energy.
Dispose operating supplies with respect to the environment

Disposal
Recycle the decomposed elements:

- Collect metal scrap
- Electronic components in electronic scrap
- Recycle plastic parts
- Dispose the rest of the components according to their material consistence

ATTENTION!
Wrong disposal ➔ damage caused to the environment!
Electronic waste, electronic components, lubricants and operating supplies are liable to treatment of hazardous waste.
Only approved specialized companies should perform disposal.

Local authorities and waste management facilities provide information about environmentally suitable disposal.

2 Product Features

LIMAX02 is an absolute measuring shaft information system that is used for positioning of elevator cars. It consists of only two components: sensor and magnetic band.

The band carries the unique positioning information as a magnetic code. It is installed free hanging in the elevator shaft by use of a mounting kit. The sensor head is mounted to the elevator car. While the actual measurement is contactless the band must be kept within a maximum distance to the sensor head. Therefore, the band is guided along the sensor by use of the polymer band guide which is an integral component of the sensor head.

The magnetic measurement principle is extremely robust. Dust, dirt and humidity do not affect the measurement in any way. Also, smoke and even higher temperatures have no influence on the measuring quality. Therefore, LIMAX02 is particularly suited for application in fire fighter elevators. Also is the band robust enough to withstand the sometimes-harsh conditions in elevator shafts.

Another advantage of the system is the simple and flexible installation. Typical installation time will take a few minutes by a versed technician. The system can be placed anywhere in the shaft where space conditions allow. With the small space requirement LIMAX02 is perfect for retrofitting and modernization.

With LIMAX02 travel heights up to 260 meters and speeds up to 10 m/s can be covered. Longer distances are available on request. In the standard configuration LIMAX02 evaluates the position with a resolution of 1 mm. Resolutions up to 0.0625 mm are possible.

LIMAX02 is provided with different interfaces and is tested with most established elevator controllers.

The features at a glance

- Robust measuring principle for usage in rough environments
- Simple and flexible installation
- High accuracy and reproducibility
- No slip
- Absolute position is always directly available - no referencing even after long power outages

3 Safety

3.1 General Cause of Risks

This chapter gives an overview about all important safety aspects to guarantee an optimal protection of employees.
Non-observance of the instructions mentioned in this operation manual can result in hazardous situations.

3.2 Personal Protective Equipment

Employees should wear protective clothing during installation of the device to minimize the risk of accidents.
Change into protective clothing before beginning the work process and wear it during the works. Also observe any labels in the operating area regarding protective clothing.

Protective clothing
Generally wear for all works**:**

	**Safety working clothing** ... is close-fitting ... is tear proof ... has tight sleeves without distant parts **Also wear no rings, necklaces or other jewellery.**
	**Protective gloves** ... For protecting the hands against abrasion and cuts.
	**Hardhat** ... for protection of the head during work in the elevator shaft

3.3 Conventional Use

The ELGO length measuring system LIMAX02 is for the limited purpose as described in this manual:

The purpose of the LIMAX02 – ELGO – length measuring system is to survey distances.

CAUTION!
Danger through non-conventional use!
Non-intended use and non-observance of this operation manual can lead to dangerous situations.

Therefore:
- Use LIMAX02 only as described
- Strictly follow this manual

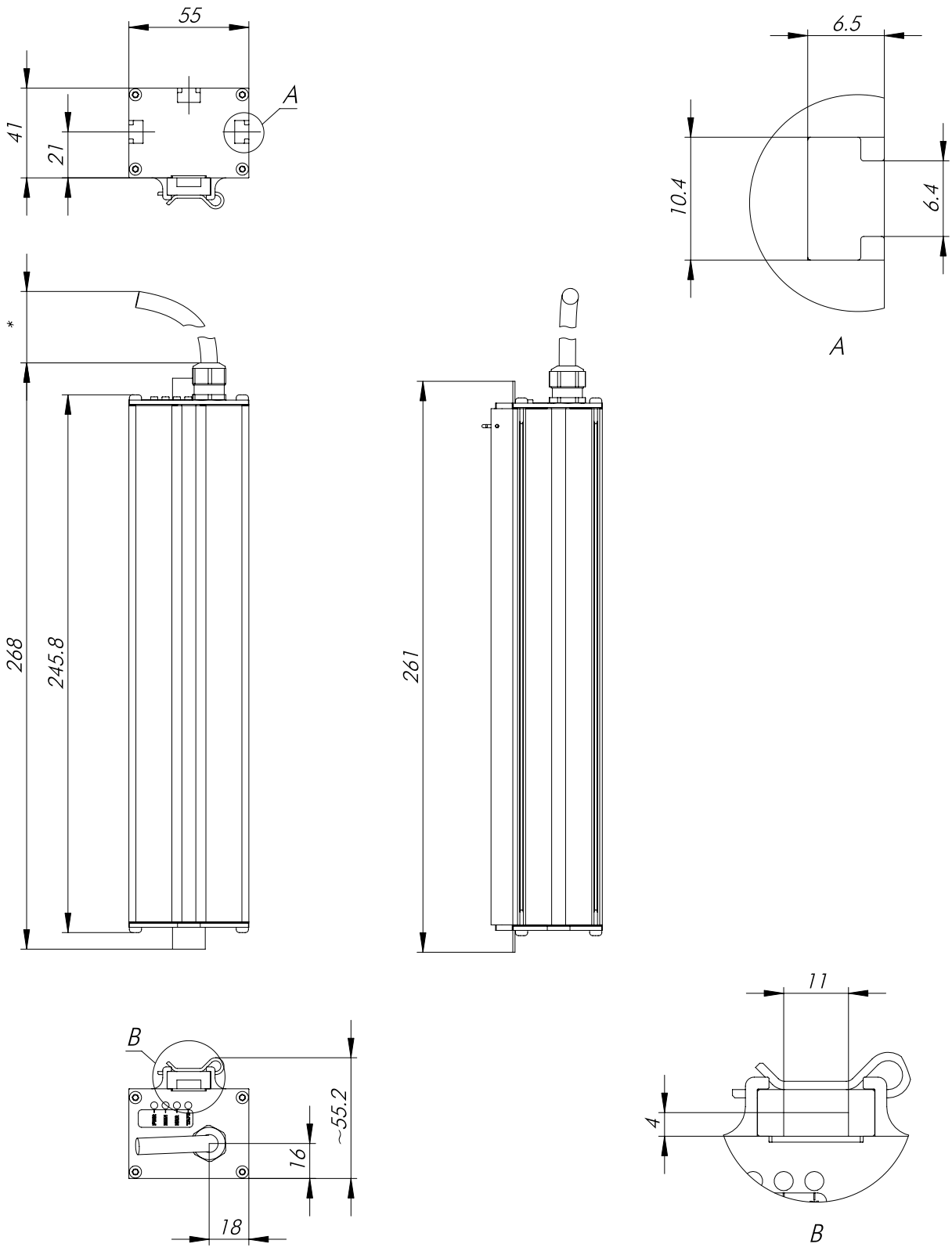
Avoid in particular the following uses, they are considered as non-conventional. Remodelling, refitting or changing of the device or parts of it with the intention to alter the functionality or the scope of the **LIMAX02**.

All claims, caused by damages as a result of improper assignment are excluded. For all damages, caused by improper using, the adhesion is concerned by the operator

4 Technical Data

Mechanical Data	
Measuring principle	absolute
Repeat accuracy	+/- 1 increment
System accuracy in µm at 20 °C	+/- (1000 µm + 50 µm x L) L = measuring length in meter
Distance from the sensor to magnetic tape	4 mm
Tape thickness	1.4 mm
Basic pole pitch	8 mm
Sensor housing material	Aluminium
Sensor housing dimensions	L x W x H = 246 x 55 x 55mm
Necessary magnetic tape	AB20-80-10-1-R-D-15-BK80
Max. measuring length	260 m
Cable connection	open cable end (optional plugs see type designation)
Weight	ca. 460 g without cable cable: ca. 60 g per meter
Ambient Temperature	
Storage temperature	-25… +85 °C
Operation temperature	-10… +70 °C (-25… +85 °C) on request
Protection class	IP50
Electrical Data	
Power supply	10 – 30 VDC
Periodic and random deviation	10 - 30 V: < 10%
Current consumption	max. 0.2 A
Interfaces	SSI, CAN, CANopen (DS406, DS417), RS422, RS232
Resolution	According to type designation
Max. output frequency	max. 10 m/s
Sensor cable	3 m standard cable length, Others on request, Drag chain compliant

4.1 Dimensions LIMAX02



5 Transport and packaging

5.1 Safety Instructions for Transport, Unpacking and Loading

ATTENTION!
Professional transport only.
Do not throw, hit or fold the package.

5.2 Handling of Packaging Material

Adverts for proper disposal refer to chapter demounting and disposal.

5.3 Check of Transport

Examine delivery immediately after receiving for completeness and transport damages.

In case of externally recognizable transport damages:

- Do not accept the delivery or do accept under reserve
- Note extent of damages on the transportation documents or on the delivery note
- File complaint immediately

NOTE!
Claim any damages you recognize as soon as possible. The claims for damage must be filed in the lawful reclaim periods.

5.4 Stocking

Store device only under following conditions:

- Do not store outside
- Keep dry and dust-free
- Do not expose to aggressive media
- Protect from direct sun light
- Avoid mechanical shocks
- Storage temperature: -25 °C to +85 °C
- Relative humidity: 100 % non-condensing
- Inspect packages regularly if stored for an extensive period of time (> 3 months)

6 Installation / Commissioning

6.1 Mounting

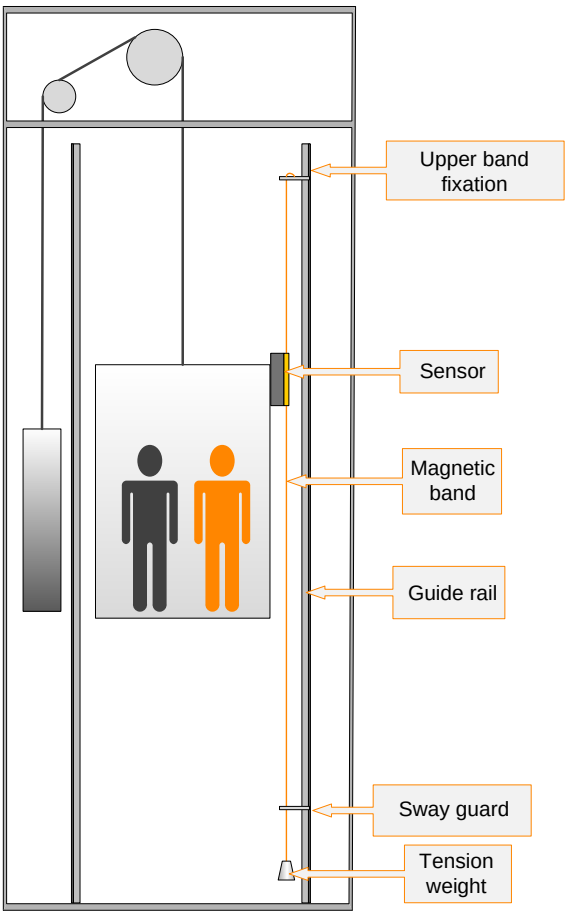
When mounting the sensor head two M3 screws are used. Please observe the tolerances for distance and angle.

Improper installation
... may lead to serious injuries or property damage.

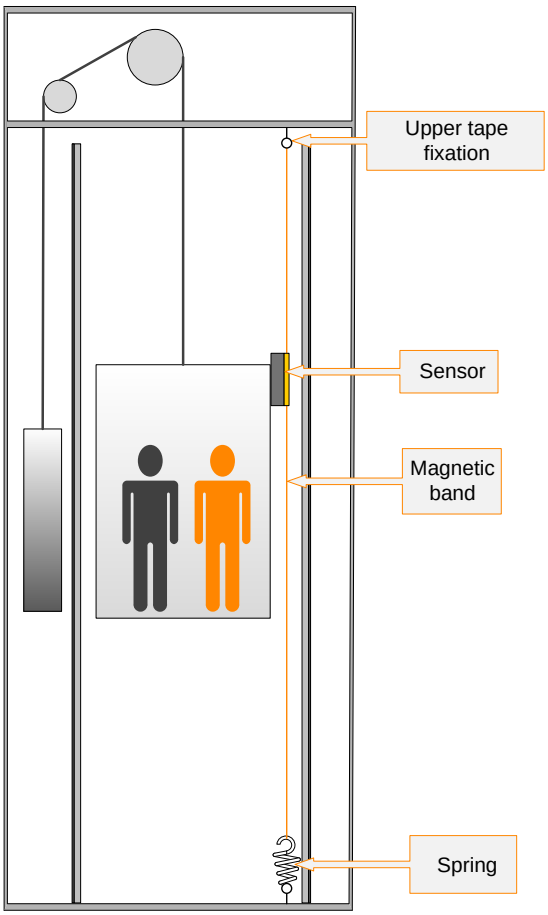
Therefore:
Maintenance work may only be carried out by authorized and instructed personnel, chosen by an operator.

6.2 Mounting principle

Rail installation with tension weight



Installation with dowel and spring



LIMAX02 can be installed at any position in the hoistway, depending on space situation and layout of the particular elevator installation.
The magnetic band is installed vertically in the hoistway. Top fixation is either on the guide rail or directly bolted into the ceiling. The necessary tension in the band is provided by a tension weight of about 5kg. A sway guard at the bottom is recommended. This will keep the band from swaying in an uncontrolled manner which may cause damage to the band or other components in the shaft.

The sensor head can be mounted onto the car body or car frame – again depending on the specific conditions of the elevator.

6.3 Installation of Sensor

The integrated mounting notches on the housing of the sensor head allow for a very simple and self-explanatory installation from three sides. You can either use M6 hexagon head screws (DIN 933) or M6 square nuts (DIN 562), to mount the system at the desired position.

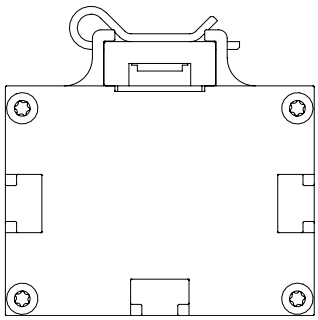


Illustration1: Mounting notches on sensor

ATTENTION!
During installation of the magnetic band in the sensor pay attention to the marks on the magnetic band and on the sensor head.

Wrong orientation of band vs. sensor head will yield incorrect position readings!
The arrows printed on the magnetic band and sensor head point in positive counting direction (in the direction of the shaft head)!

6.4 Installation

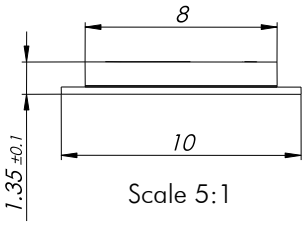
6.4.1 General Aspect

The technology has proven to be highly robust. LIMAX02 will work under the most adverse environmental conditions. Extreme temperatures, high moisture and excessive soiling will not alter the information coded onto the band nor will these conditions affect reading precision of the sensor. Even weak magnetic fields such as they are generated by door magnets can be tolerated.

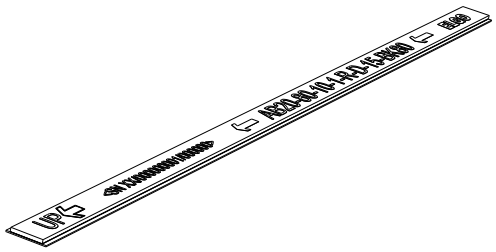
If some basic rules and guidelines are followed LIMAX02 systems require a minimum amount of installation and maintenance effort while offering maximum lifetime.

One important issue to consider is the protection of the magnet tape against mechanical wear. The LIMAX02 tape consists of two components:

- The magnetic tape which actually carries the position information
- A protective steel tape which gives the mechanical properties



Scale 5:1

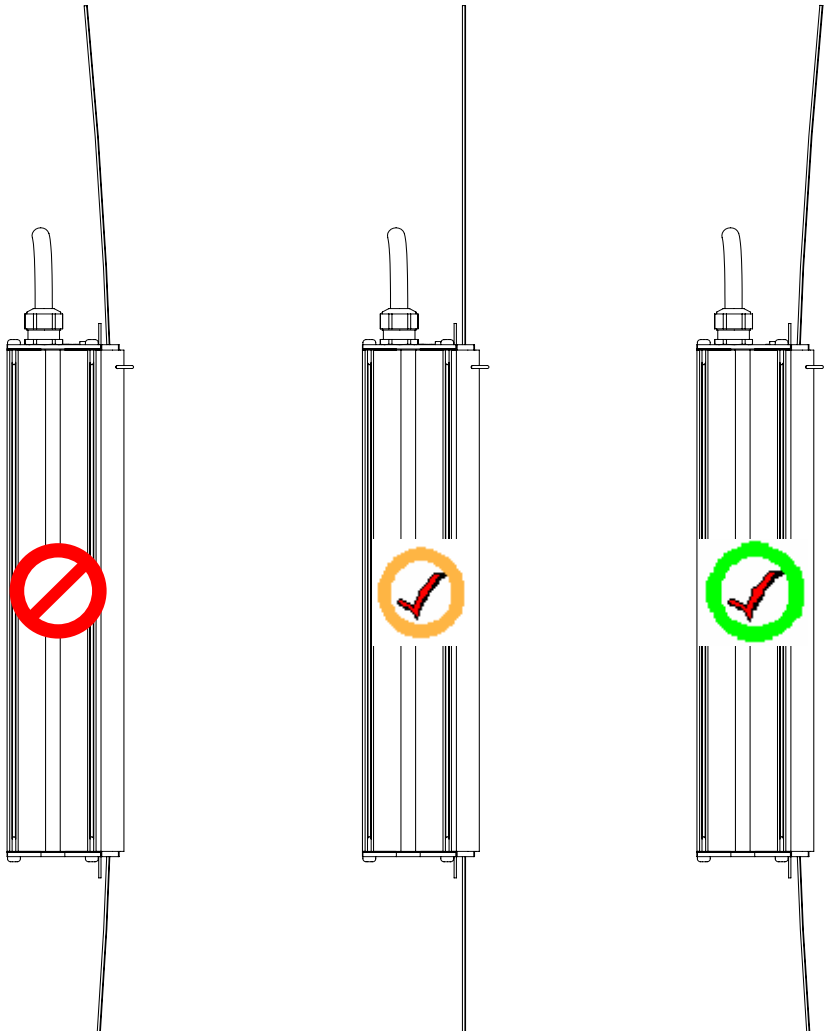


6.5 Concept of Installation

6.5.1 Basic principle for the mounting

	NOTE: The magnetic band itself is not designed to withstand excessive mechanical wear. It is therefore important to ensure that the system is installed such that the mechanical contact between band and sensor head is mainly between the steel band and the polymer sensor guide. These two materials have been specifically paired for this application.

Avoiding contact between the magnetic side and the sensor could be achieved with a perfectly perpendicular installation of the band. Yet, in reality this is not practicable.
It is therefore preferable to install the tape with a horizontal offset from the sensor. During operation this method will result in a forced contact between the steel side of the band and the polymer guide of the sensor which guarantees an optimal operation of the system.



Wrong
Constant contact between magnetized side and sensor housing lead to abrasion

Tolerable
Vertical alignment minima contact between band an sensor

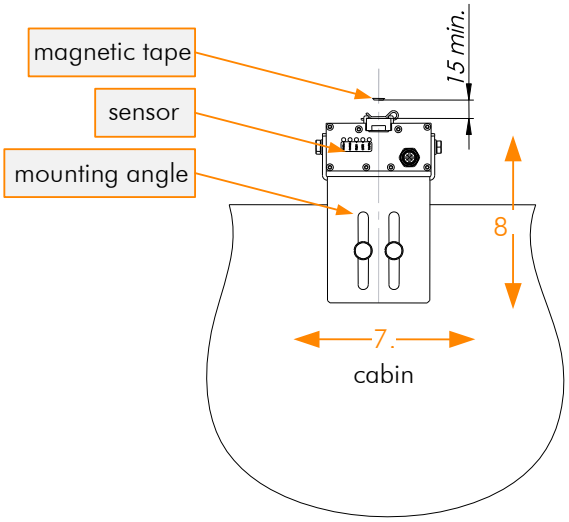
Recommended
Enforced contact between steel band and polymer housing

6.6 Installation procedure

Locate the optimal installation space for band and sensor. Placement is possible at any position in the hoistway. This offers maximum flexibility especially for modernization.

1. Attach the top end of the band in the shaft head with suitable installation hardware. Check for correct orientation of the band. The arrows on the magnetic side must point in upward direction.

2. The magnetic side of the band must face the sensor body. In most situations this means that the steel side points to the hoistway wall.
3. Drive down the hoistway with inspection speed and unroll the band. The ELGO band packaging system has been specifically designed for this purpose. The band can be unwound directly from the box without opening.
4. Attach the tension weight (about 7.5 kg) at the bottom end of the band in the hoistway. Secure the band with a sway guard. Pay attention to a proper vertical mounting of the band.
   If you use dowels to fix the tape in the hoistway, tighten the spring such, that the according tractions results to minimum 7.5 kg. When using the ELGO Mounting Kit RMS/RMS90 this is equivalent to a spring elongation of about 90mm.
   Note that slightly higher tensile forces are never a problem, but avoid under-tensioning. In higher buildings it may even be preferable to slightly increase the tension in order to prevent flapping of the band during operation. However, if correctly installed tensile forces of more than 10 kg should never be necessary.
5. Drive the car to the middle of the hoistway.
6. Attach the sensor to the car. The side with the cable outlet and the LED's must face upward.
7. Adjust the sensor using the band as a reference. First, align sensor and magnet band on their centerline.

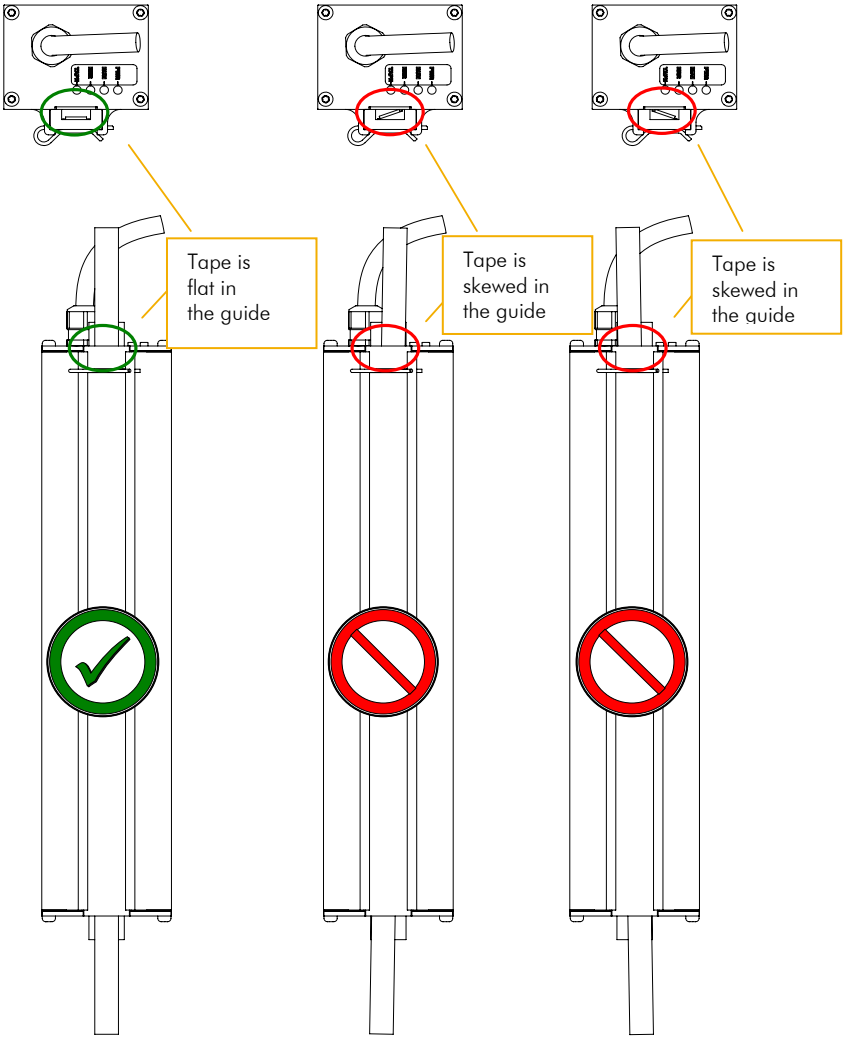


8. Adjust now the distance between sensor and band. Up to a travel height of 50m we recommend an offset of at least 15 mm. This will ensure steady contact between steel side of the band and the polymer guide of the sensor.
   In higher installations this distance may be increased.

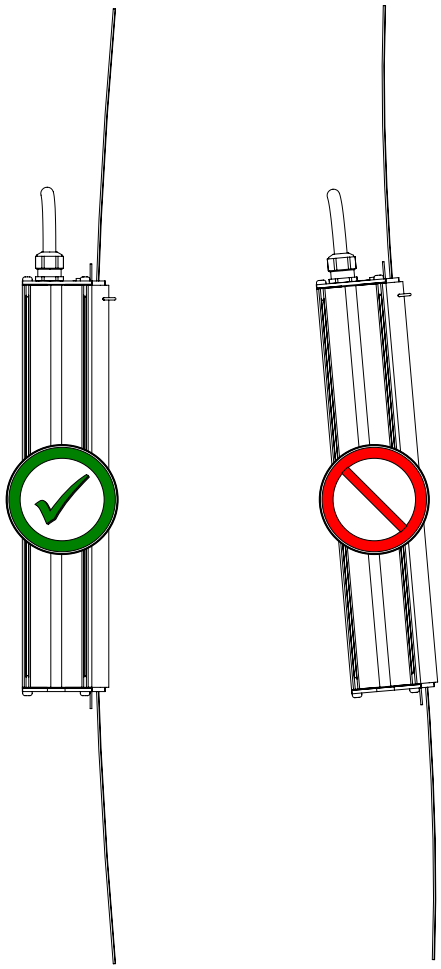
   Pay attention to a perpendicular alignment of the sensor. Misalignment will lead to increased wear.

9. Pass the band through the sensor. Loosen the splint-pin and release the polymer guide. Insert the tape and re-attach the guide with the tape in its position. Take care of the plastic base which should remain in the enclosure.

10. Check for proper alignment of band vs. sensor. Any angular offset should be corrected.



11. IMPORTANT: Installation check !
Values for band tension and offset between band and sensor are guidelines based on experience. But in any case, a proper check after installation is mandatory. **It must absolutely be avoided that the magnetic side constantly grinds on the sensor body during operation.**
Run an inspection trip along the complete hoistway. Observe the system and pay attention to the respective positions of band and sensor. You have achieved an optimal installation if the steel side of the band is constantly pressed slightly against the polymer guide of the sensor. At some points in the hoistway also double-check on the bottom side of the sensor. If the sensor is tilted it may look good on top but the band can still grind along the bottom edge of the sensor.



12. If the installation check reveals that the band slides on magnetic side, start to increase the offset between sensor and band. Values of up to 50mm are acceptable. If this measure does not solve the problem it is very likely that the band is not plumb in the hoistway. This is easy to check for, provided your elevator control allows for inspection trips without the absolute position signal: Just take the tape out of the sensor and run an inspection trip along the hoistway. Observe the distance between sensor and band along the travel. Misalignments will become obvious.
Also ensure that the tension on the band is sufficient. A loosely tensioned band will hinder proper guiding.

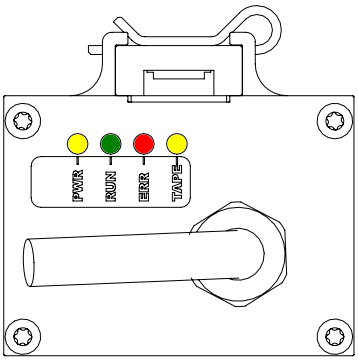
13. After completion of the installation clean the band. Beginning at the top of the hoistway drive down the complete travel distance pulling the magnet band through a dry cloth.
Be specifically alert if steel construction work is taking place in the hoistway. Steel particles released by grinding, welding, or such work will adhere to the magnetic band. Clean this debris off instantly as this may have an effect similar to sand paper.
Repeat the cleaning process before putting the elevator into service after complete installation.

7 Electrical Operation and Functions

7.1 LED's (Operating status and notices)

The LED's located on the front serve for monitoring of operating conditions.

With startup it has to be ensured that the yellow LED illuminates as this monitors the internal supply voltage.



- **PWR YELLOW** → Supply voltage
  ON = Supply voltage OK
  OFF = Supply voltage not provided

- **RUN GREEN**
  for CANopen device: RUN-LED according to DR 303-3
  other device: Interface state, flashes during active communication

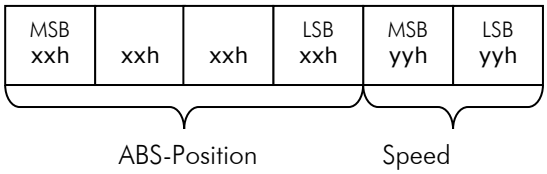
- **ERR RED**
  for CANopen device: ERR-LED according to DR303-3
  other device: Error message
  ON = State error, system not operational
  OFF = State OK, system ready for operation

- **TAPE YELLOW** → Indicator for magnet tape
  ON = Magnet tape missing
  OFF = Magnet tape available

7.2 Interfaces and Protocols

7.2.1 CAN Standard

Bitrate: **250 kbit/s**
Resolution: **1.0 mm**
Identifier: **184 (hex)**
First 4 Bytes: **Position in mm**
Next 2 Bytes: **Speed in mm/s**

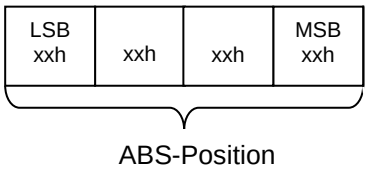


7.2.2 CANopen interface

For LIMAX02 the CANopen Interfaces DS406 (Encoderprofile) und DS417 (Liftprofile) are available. These interfaces are configured by default as follows:

CANopen DS417

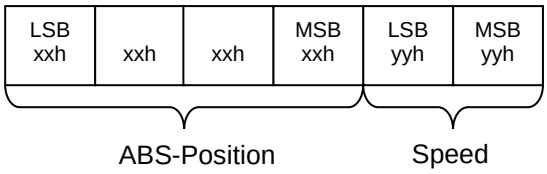
Bitrate: **250 kbit/s**
Identifier: **18C (hex) [Node ID 0x04]**
Eventtimer: **0 (switched off)**
Producer heartbeat: **500 ms**
Resolution: **0.5 mm**



CANopen DS406

Bit rate: **250 Kbit/s**
Identifier: **184 (hex)**
Eventtimer: **10 ms**
Producer Heartbeat: **500 ms**
Resolution: **1.0 mm**
First 4 Bytes: **Position in mm**
Next 2 Bytes : **Speed in mm/s**

Data protocol



7.3 Connections CANopen

9 pole D-SUB Connector		Open cable	
Pin Nr.	Function	Color	Function
Pin 6	0 V / GND	White	0 V / GND
Pin 9	+ 24 VDC	Brown	+ 24 VDC
Pin 2	CAN low	Green	CAN low
Pin 7	CAN high	Yellow	CAN high
Pin 3	CAN GND	Blue	CAN GND
Shield *	PE	Shield*	PE

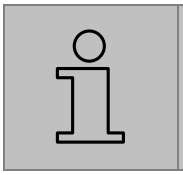
*) please connect shield only at control unit side!

7.4 Command Descriptions

7.4.1 Initial Operation

After starting the CANopen device is in the Pre-operational Mode (7.5.2) and therefore doesn't send any position data. In order to achieve this, the device needs to be set into Operational Mode (7.5.1) and if necessary the sending cycle of the position data has to be adjusted (7.4.4).

7.4.2 Regular Mode

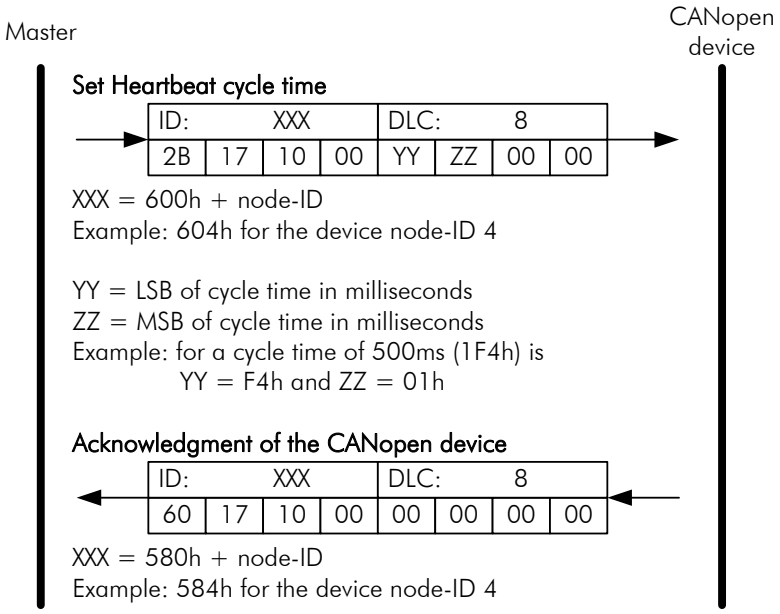


Note!
The commands which are described in section 7.4.2 Regular Mode are only processed by the CANopen device in the Operational and Pre-Operational mode.

7.4.3 Setting the Heartbeat Cycle Duration

A CANopen device sends the heartbeat cyclically. This message communicates the current Operating Mode to the other bus sharing units.

1. Change into the Operational or Pre-operational Mode, if necessary
2. The following illustration shows the CAN-message, which should be transmitted to the CANopen device and the following answer.

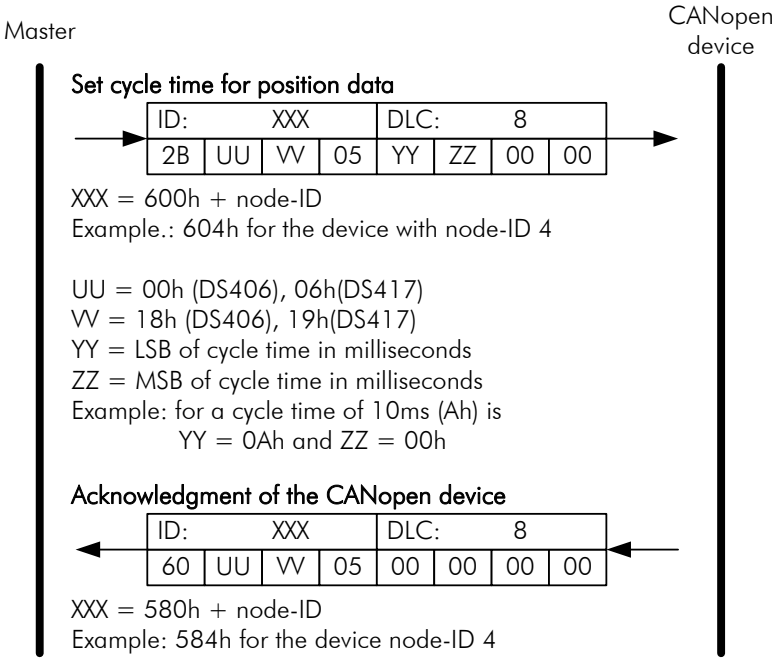


3. If the setting should be maintained in the case of a power failure, the changes have to be saved, as described in section 7.4.5.

7.4.4 Setting the Sending Cycle for the position data

The position data are sent cyclically by the device, therefore the device has to be in the Operational Mode (7.5.1)
The settings of the cycle duration takes place in the device profile DS406 in the object 1800h, Sub-index 5 and for devices with DS407 profile in object 1906h, Sub-index 5.

1. Change into the Operational or Pre-operational Mode, if necessary.
2. The following figure shows the CAN-message, which should be transmitted to the CANopen device and the following answer.

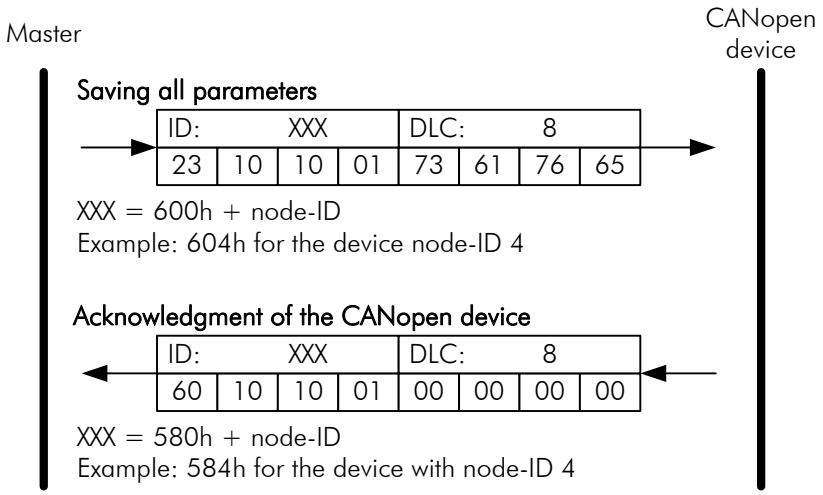


3. If the settings should be maintained in case of a power failure, the changes have to be saved, as described in section 7.4.5.

7.4.5 Saving the parameters

In the normal case the settings are lost at power failure. In order to avoid this, they need to be saved according to the following procedure.

1. Change into the Operational or Pre-operational Mode, if necessary.
2. The following figure shows the CAN-message, which should be transmitted to the CANopen device and the following answer.

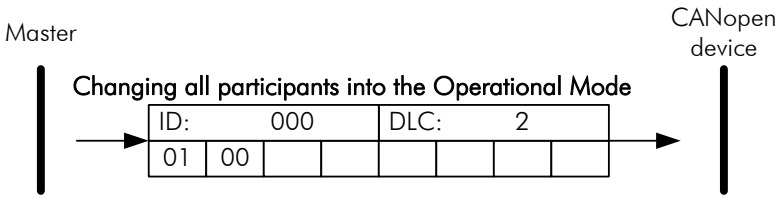


7.5 Changing the Operating Modes

7.5.1 Changing the device into the Operational Mode

In the Operational Mode the communication of the device is fully functional.

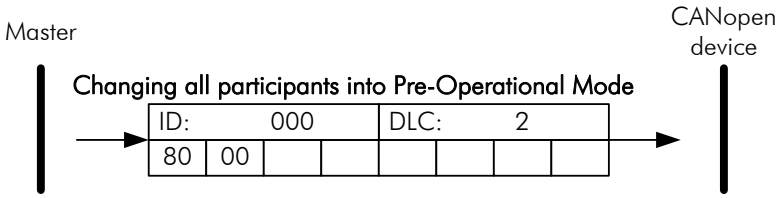
The following CAN-message causes the change of all CANopen participants into the Operational Mode.



7.5.2 Changing the device into the Pre-operational Mode

In the Pre-operational Mode the communicating settings of the device are adjusted.

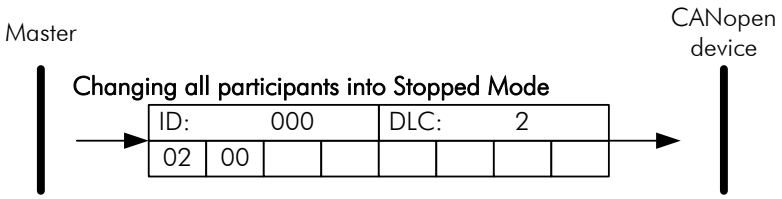
The following CAN-message causes the change of all CANopen participants into the Pre-Operational mode.



7.5.3 Changing the device into the Stopped Mode

Bus sharing units in the Stopped Mode are passive participants. In this mode all the communication is turned off, except the monitoring activity (e.g. heartbeat).

The following CAN-message causes the change of all CANopen participants into the Stopped Mode.

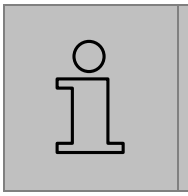


7.6 LSS Configuration

Basic settings like node-ID and baud rate have to be adjusted with the Layer Setting Services (LSS).

7.6.1 Changing into the LSS Configuration Mode

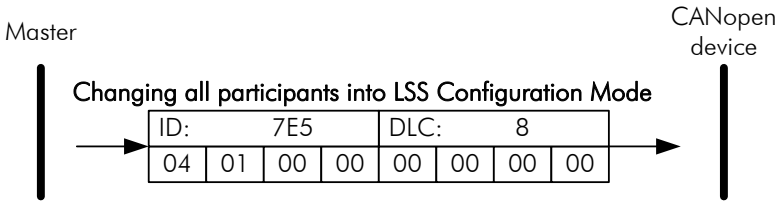
In order to be able to change the Parameter (node-ID, bit rate), the device has to be changed into the LSS Configuration Mode.



ATTENTION!

With the following command all the bus sharing units which are in the Stopped Mode are changed into the LSS Configuration Mode. Use this command, if only one device is connected to the bus, because other devices could be affected in their function.

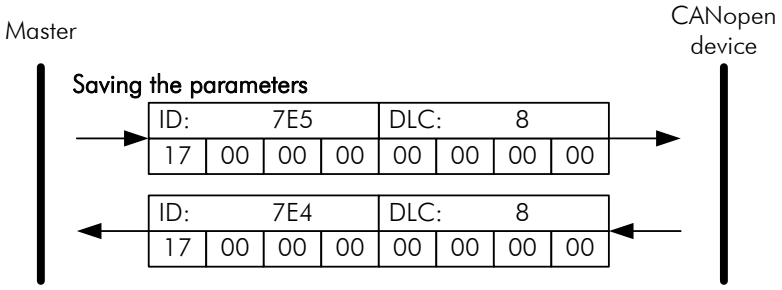
The following CAN-message causes the change into the LSS Configuration Mode.



7.6.2 Saving the parameters in the LSS Mode

In order not to lose the changes in case of a power failure, they have to be saved in the non-volatile memory of the CANopen device.

The following figure shows the necessary message for this procedure.

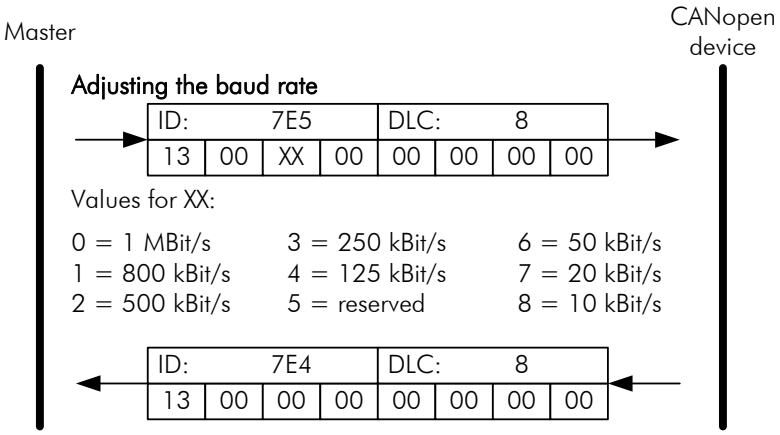


ATTENTION!

During the saving procedure the device is not accessible over a period of a few milliseconds.

7.6.3 Setting the baud rate

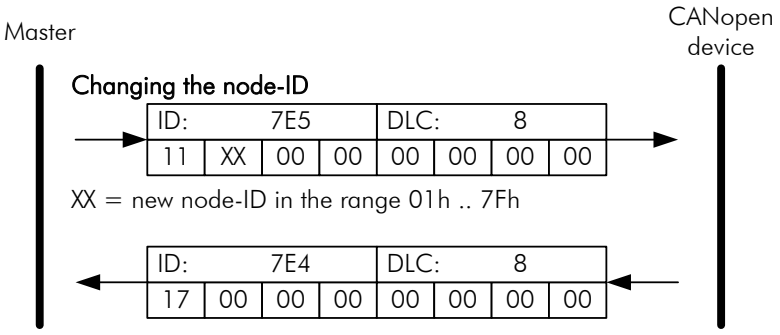
1. Change the device into the Stopped mode (see section 7.5.3)
2. Change the device into the LSS Configuration Mode (see section 7.6.1)
3. Change baud rate according to the following command:



4. Save parameter as described in section 7.6.2.
5. Turn the device off and restart it again.

7.6.4 Setting the node-ID

1. Change the device into the Stopped Mode (see section 7.5.3)
2. Change the device into the LSS Configuration Mode (see section 7.6.1)
3. Change node-ID with the following message:



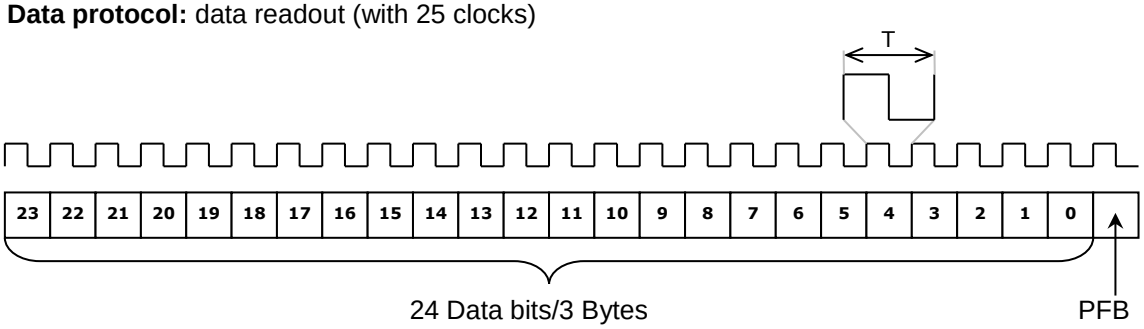
4. Save parameter as described in section 7.6.2.
5. Turn the device off and restart it again.

7.7 SSI Interface

Functional principle

If the clock is not interrupted for the time Tm-T/2 (output of further 25 periods), the shift register clocks once again the same data value (error recognition in the evaluation). Some encoders contain a Power Failure Bit (PFB). **Attention**: With the LIMAX02 the PFB is always “LOW”!

Data protocol: data readout (with 25 clocks)



PFB = Power Failure Bit
T = length of clock signal
Tm = monostable multivibrator time > 10µs

Connections:

Open wires (standard)	
Color	**Function**
White	0 V / GND
Brown	+ 24 VDC
Pink	Data -
Grey	Data +
Yellow	Clock -
Green	Clock +
Shield *	PE

D-SUB 9 pins	NEWLIFT FST1 (D9M0)	NEWLIFT FST2 (D9M1)
Pin No.	**Function**	**Function**
1	Data +	0V / GND
2	Clock -	Clock +
3	-	N.C.
4	24 VDC	Data +
5	0V / GND	0V / GND
6	Data -	+ 24 VDC
7	Clock +	Clock -
8	-	Data -
9	PE	N.C.

7.8 RS-232 / RS-422 / RS485*) Interfaces

*) Attention: RS485 just unidirectional

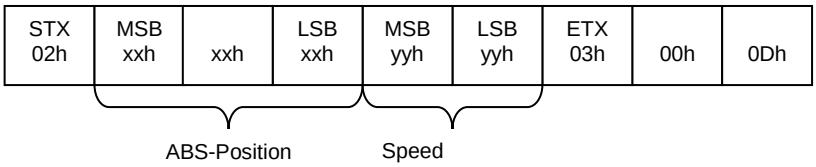
If the measuring system is equipped with an RS232, RS422 or RS485 interface, the data communication has the following format:

9600 baud (other baud rates on request)
1 Start bit
8 data bits
1 stop bit
no parity

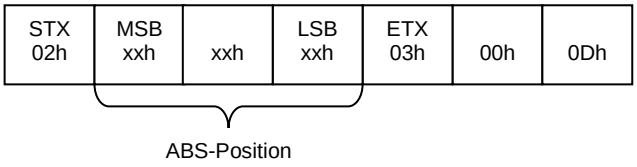
Data protocol:

The measured absolute position will be represented in the three ABS-position data bytes.

Version 2321 / 4221 / 4851



Version 2320 / 4220 / 4850



STX = starts a message
ETX = ends a message

Connections

Open cable ends (Standard)			
Color	**RS232**	**RS422**	**RS485**
White	0 V / GND	0 V / GND	0 V / GND
Brown	+ 24 VDC	+ 24 VDC	+ 24 VDC
Pink	TX	TX -	TX -
Gray	RX	TX +	TX +
Yellow	-	RX -	
Green	-	RX +	
Shield*	PE ⏚	PE ⏚	PE ⏚

*) please connect shield only at control unit side!

7.9 RS-422 (version 1.4) ADRESSABLE (Option A22)

Principle format of a message

to LIMAX02

STX 02h	Byte 1	Byte 2	Byte check	ETX 03h

answer

STX 02h	Byte 1	Byte 2	Byte 3	Byte 4

STX = starts a message
ETX = ends a message

Position request of LIMAX02 **with the address „i“**

to LIMAX02

STX 02h	04h	i	Byte check	ETX 03h

answer

STX 02h	MSB xxh	xxh	LSB xxh	Adr. i

ABS-Position

04h = characterises the message as position request
i = address of the LIMAX02 (0Bh – 7Fh) to request
Bit 0 has the value 10µm, position values are always smaller than FFFF00h

A LIMAX02 address request
Attach in each case only one LIMAX02 e.g. over a RS422/RS232 converter to the serial interface (COM-port) of a PC.

to LIMAX02

STX 02h	05h	05h	Byte check	ETX 03h

answer

STX 02h	FFh	FFh	i xxh	ETX 03h

05h = characterizes a message as address request
i = LIMAX02 address
FFh FFh does not occur immediately after STX with position inquires as answer!
In this case (0Bh <= i <= 7Fh) this is the answer of the address request.

Allocation of a LIMAX02 address

Attach in each case only one LIMAX02 e.g. over a RS422/RS232 converter to the serial interface (COM-port) of a PC.

to LIMAX02

STX 02h	06h	i	Byte check	ETX 03h

answer

STX 02h	FFh	FFh	i + 80h	ETX 03h

06h = characterizes a message as address allocation
i = the new LIMAX2 address. Important: At the answer you get the new address + 80h.

The addresses 80h – FFh as well as 00h – 0Ah are FORBIDDEN. If you try to assign an address smaller than eight, LIMAX02 gives you a negative answer and keeps its former address.

Important:
Before you send a new message to the LIMAX02 wait for the answer first. After allocating a new address the LIMAX02 answers in max. 0.5 seconds. In other cases it even in a few milliseconds. After this time it is not expected to get an answer (transmission error).

Negative answer:
If one of the described operations failed for some reason LIMAX02 gives a negative answer with a respective error-code.

Answer from LIMAX02

ST X	FFh	FFh	ERR xxh	ET X

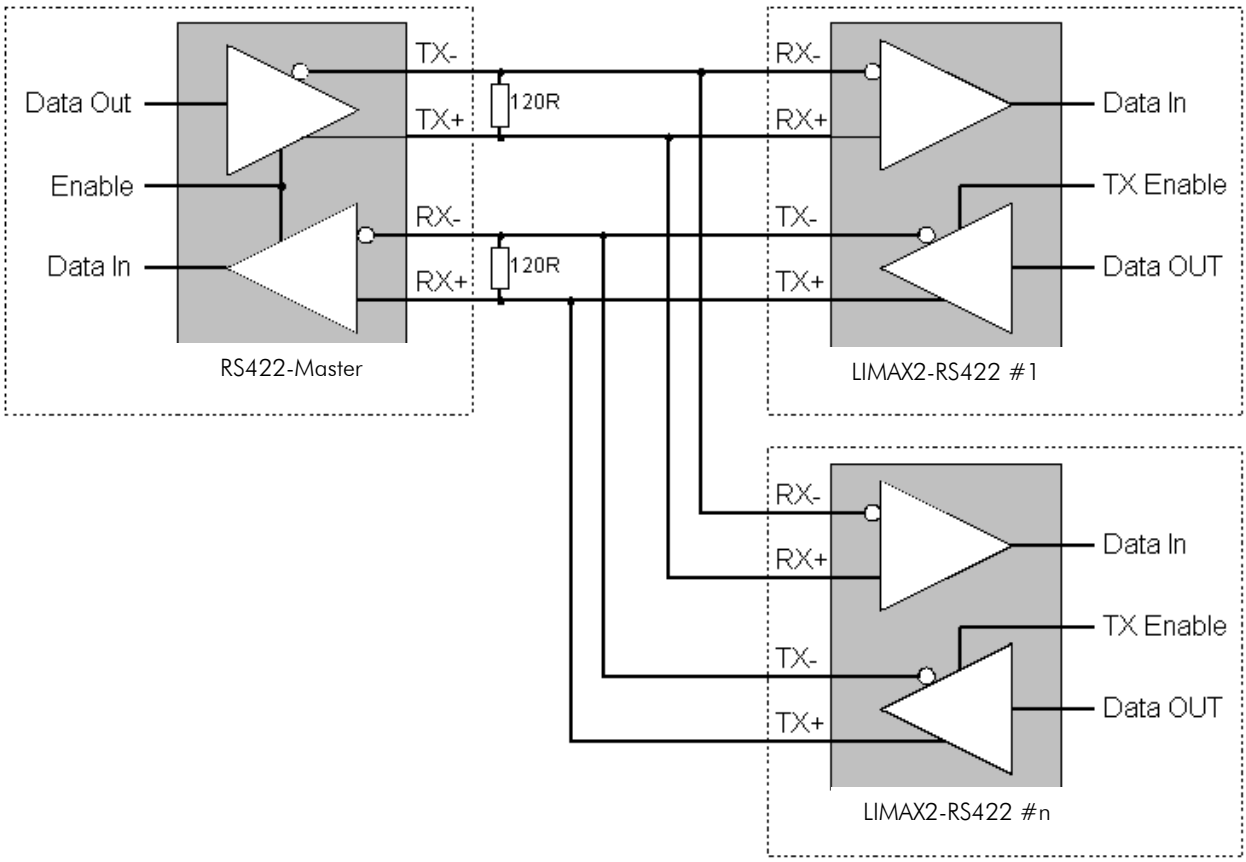
ERR = Error-Code (04h – 0Ah) error – codes are listed at the next page.

7.10 Error Messages

Error-codes of an addressable LIMAX02

Code	Meaning
04h	Wrong sequence of bytes sent to LIMAX02, for example if 4. Byte after STX is no ETX or the Byte after STX is not 0x04, 0x05 or 0x06.
05h	Receiving Error / Interface Error (for example if a message with a wrong baud rate was sent etc.)
06h	Invalid LIMAX02 address: appears after trying to assign an address smaller 0Bh or bigger 7Fh to LIMAX02.
07h	LIMAX02 has lost its address: internal check of X redundantly stored address of LIMAX02 has failed. This message is sent at power up immediately if an error in reading EEPROM is detected or if the internal address error cannot be fixed.
08h	Internal EEPROM storage error.
09h	Error in transmission of position (no tape, tape damaged or distance between tape and sensor head too big).
0Ah	Check-Sum-Error: Check-sum of a message sent to LIMAX02 is wrong.

Connection to a RS 422 Master



8 Interference

The following chapters describe possible causes for malfunction and the instructions to correct them.
If you encounter problems check for proper installation first. Make sure that power is supplied to the system and that band and sensor head have the correct orientation.
If you observe recurring errors you might consider electrical interference suppression measures as described in section 9.2.
If errors cannot be corrected with the following instructions please contact the manufacturer (see last page).

8.1 Safety

Basics:

WARNING!
Risks of injury from improper fault clearances!
Improper fault clearances can cause serious personal or property damage.

Therefore:

- Fault clearance may only be carried out by qualified and instructed personnel
- Prior to the beginning of work provide sufficient room to assemble the equipment
- Please look for cleanliness at the place of installation
- Loosely around laying parts and tools are sources of accidents

If components have to be replaced:

- Look for correct installation of spare parts
- All mounting elements have to be assembled correctly
- Before resetting please ensure that all covers and protective devices are installed correctly and function properly

8.2 Electrical Interference Suppression

The screen of the signal output cable should only be connected to the following circuit on one side. The screens should not be grounded on both sides. Signal cables always have to be routed separately from the load power line. A safety distance of least 0.5 m has to be kept from inductive and capacitive sources of interference such as contactors, relays, motors, switching power supplies, clocked controllers etc!

If interferences occur in spite of all the items stated above being observed, please proceed as follows:

- Installation of RC elements above contactor coils of AC contactors (e.g. 0,1 µF / 100 Ω).
- Installation of recovery diodes via DC inductors
- Installation of RC elements via the different drive phases and via the drive brake (in the terminal box of the drive)
- Do not connect protective earth and ground (GND)
- Connected a mains filter ahead of the external power pack

8.3 Restart after fault clearance

After fault clearance:

1. Reset emergency stop switch.
2. Quit disturbance on the control system.
3. Make sure that no person is located in the danger zone.
4. Start operating as explained in chapter “Operation”.

9 Maintenance

The LIMAX02 shaft information system requires little maintenance. On the occasion of regular elevator inspection and maintenance do the following:

- Optical inspection of proper alignment between sensor and band. Worn off material indicates possible alignment flaws. Check for proper guiding of the band along the complete travel distance. Correct if necessary as described in the installation procedure above.
- Optical inspection of the band. Check for abrasions or other mechanical damages. Small mechanical damages (scratches, dents, or even small chips) do not interfere with the measuring performance at all.
  However, a pre-damaged band is more exposed to mechanical stress and is prone to further wear.
- Check for proper tension of the band. If the mounting was via a flute, the tension can decrease over time. Readjust if necessary.
- Inspect the polymer guide for wear. Clean if dust and dirt have accumulated between polymer guide and sensor case. The polymer guide is a wear part. Replace if necessary.
- Clean the band. Use a dry and clean cloth. Begin at the head of the hoistway drive down the complete travel distance pulling the magnet band through a dry cloth.

10 Type Designation

Example: LIMAX2 - 00 - 030 - 1000 - CO0T - D9M

Device designation:

LIMAX2 = LIMAX02 (1-channel)

Version:

00 = Standard version
01 = 1. special version (etc.)

Cable length:

030 = 3,0 m (standard)
050 = 5,0 m
other cable length on request

Resolution

62N5 = 62,5 µm = 0,0625 mm
0125 = 125 µm = 0,125 mm
0250 = 250 µm = 0,25 mm
0500 = 500 µm = 0,50 mm
1000 = 1000 µm = 1,00 mm

Interface:

2320	= RS232	[Standard protocol RS232 / position]
2321	= RS232	[Extended protocol RS232 / position & speed]
4220	= RS422	[Standard protocol RS422 / position]
4221	= RS422	[Extended protocol RS232 / position & speed]
4850	= RS485	on request
CN0	= CAN	[Standard protocol Basic-CAN]
CO0	= CANopen	[Encoder profile DS406]
CO1	= CANopen	[Elevator profile DS417]
SSB0	= SSI-Interface	[25 Bit binary code / position]
SSG0	= SSI-Interface	[25 Bit gray code / position]

Caution:
-> CAN interface is optional available with galvanic isolation / assembly CAN-load resistor selectable
-> RS232 interface is never terminated!
-> RS422 & RS485 & SSI interface is basically terminated!

CAN interface	Without galvanic isolation	With galvanic isolation (G)
Terminated 120R (T)	CN0**T** (Standard)	CN0**TG**
Not terminated	CN0	CN0**G**
Terminated 120R (T)	CO0**T** (Standard)	CO0**TG**
Not terminated	CO0	CO0**G**
Terminated 120R (T)	CO1**T**	CO1**TG**
Not terminated	CO1 (Standard)	CO1**G**

SSI interface	
Without optocoupler at clock input (terminated 120R)	**With optocoupler at clock input (G) (terminated 120R)**
SSB0 (standard)	SSB0**G**
SSG0 (standard)	SSG0**G**

connector- options:

D9M	= 9-pol. D-Sub-connector	[CAN & CANopen]
D9M1	= 9-pol. D-Sub-connector	[SSI / option NEWLIFT FST2]
D9M3	= 9-pol. D-Sub-connector	[SSI / option LödigeSEW]
D9F0	= 9-pol. D-Sub-connector	[RS232 / to connect to DEE/DTE]
M12M	= 5(8)-pol. M12-round plug	[Number of poles or assignment depending on interface]

(open cable end if no option is selected)

other connectors on request

Product key	Control type
LIMAX2-00-030-0500-CO1TG-D9M	Böhnke bp306/bp308 (CANopen CiA 417)-terminated
LIMAX2-00-030-0500-CO1G-D9M	Böhnke bp306/bp308 (CANopen CiA 417)- not terminated
LIMAX2-00-030-62N5-SSG0-D9M1	NEWLift FST2
LIMAX2-00-030-1000-SSB0	KW Aufzugstechnik David 606
LIMAX2-00-030-1000-CO0	LIMAX02 with CANopen encoder profile DS406
LIMAX2-05-030-1000-SSB0	Kollmorgen MRL4 / MFE4 (MPK400)
LIMAX2-04-015-1000-CO1-D9M	Sodimas Quickinstall
LIMAX-003-03.0-1000-CO0	Schindler MX-GC (customer specific version)

11 Document History

Rev.	Date	Author	Changes
0	17.02.11	RL	
1	15.11.12	CP	Layout changes, description of CANopen
2	12.05.15	CD	Connections CANopen Site 20, CAN GND completed

ELGO Electronic GmbH & Co. KG
Measure - Control - Position
Carl - Benz - Straße 1, D-78239 Rielasingen
Fon: +49 (7731) 9339-0, Fax: +49 (7731) 28803
Internet: www.elgo.de. Mail: info@elgo.de