RCF-1 DOOR OPERATOR CONTROLLER

OPERATION MANUAL

Software version 4041

WITTUR Gmbh
Voitgasse, 1220 Vienna, Austria
Tel. 0043-1-258 55 00/0 ; Fax. 0043-1-258 55 00/109
E-mail: wien@wittur.at; http://www.wittur.at

Table of Contents

1 Safety information

The RCF1 - door-motor regulator is suitable solely for the control of cabin door drives and is intended for assembly on the cabin roof. The RCF1 conducts dangerous electrical currents and controls moveable mechanical parts. Non-adherence to the instructions in this operating manual can lead to death, severe bodily injuries or considerable damage to property.

1.1 Safety- and accident-prevention regulations

Alongside the information in this operating manual, observe also the statutory safety- and accident-prevention regulations. The persons responsible for the safety of the installation must guarantee the following:

- Only appropriately qualified personnel may work on and with the door-motor regulator.
- The entire personnel who work with the door-motor regulator must be familiar with all warning indications and measures that are listed in this description for the assembly, control and operation of the door-motor regulator.
- Non-qualified personnel are to be prohibited from working on door drives.
- Personnel must possess knowledge of First-Aid measures as well as the local rescue facilities.

1.2 Qualified Personnel according to VDE 0105

Under qualified personnel, reference is made to those persons, who, based on their training, experience, instructions received as well as their knowledge of relevant standards, regulations, regulations for the prevention of accidents and working conditions, have been authorised by those responsible for the safety of the installation to carry out the respective activities necessary.

1.3 Exclusion of all guarantees by alteration or conversion

Fundamentally, the door-motor regulator RCF1 is to be disconnected from the supply voltage before every intervention in the electrical or mechanical parts of the installation.

Arbitrary alteration or conversions on or in the door-motor regulator, its elements or accessories automatically excludes all guarantees.

These safety instructions do not constitute or claim any statement of completeness.

The manufacturer undertakes no liability for damage or stoppages that could result from non-adherence to this operating manual.

2 Before assembly

2.1 After unpacking

Please check, whether the door-motor regulator delivered corresponds with your order.
A second identification plate is located in the device housing (for the system documentation) as well as three ferrite rings.
Should the delivered goods be incomplete or not correspond with your order, please contact your nearest sales office.

- **The identification plate**

Type:	RCF-1/6	**DOOR MOTOR REGULATOR**	
Model No.:	086-004677	I motor:	6A max.
Prod. No.:		U motor:	3 x 230V
		Mains:	230/115VAC

Type:	RCF-1/12	**DOOR MOTOR REGULATOR**	
Model No.:	086-004692	I motor:	12A max.
Prod. No.:		U motor:	3 x 230V
		Mains:	230/115VAC

- **Checking for transport damage**
  Examine the device on receipt for possible transport damage. If the device has any such damage, please do not install the device, but inform your nearest sales office instead.

- **Checking for loose components**
  If there are any loose mechanical or electronic components in the supplied device, please do not install the device, but inform your nearest sales office instead.

2.2 Safety measures

In order to ensure perfect and trouble-free operation of the door-motor regulator RCF1, please observe the following instructions concerning

- **Capacitor charge**
  When the device is disconnected from the mains voltage, a residual voltage still remains in the intermediate-circuit-capacitors of the door-motor regulator. Therefore, contact with the mains- and motor terminals immediately after the voltage has been switched off can lead to an electrical shock.

- **Working on the terminals**
  Wait at least two minutes after the voltage has been switched off before working on the terminals of the RCF1.

- **Alterations to the cabling**
  Always switch the device off before altering the cabling.

- **Carrying out an insulation test**
  An insulation test can lead to the destruction of the electronic components.

- **Parameterisation**
  Proceed with the parameterisation in accordance with the steps described in this operating manual.

2.3 Installation conditions

2.3.1 Installation location

Please observe the following information concerning the installation location:

- The door-motor regulator RCF1 is intended for assembly on the roof of the elevator cage.
- By the installation as well as by operation of the RCF1 care is to be taken, that above all **no metal chips**, oil, water or other foreign materials can get into the door-motor regulator.
- Do not install the door-motor regulator on inflammable materials.
- Install the door-motor regulator on the cabin roof in such a way, that good inspection of the display is guaranteed on the one hand, and as little soiling of the RCF1 as possible is guaranteed on the other.

2.3.2 Protection of the device during installation

Carefully cover the door-motor regulator during installation or when working on the remainder of the elevator components, so that above all, **no metal chips** or **grinding-wheel abrasion** can get into the door-motor regulator. Upon completing the mechanical work, all coverings must be removed again, in order to enable perfect and safe operation of the cabin door drive.

2.3.3 Safety information for cabling

- Ensure that the power supply to the door-motor regulator has been switched off for at least two minutes before commencing cabling work. Otherwise, the danger of an electrical shock or sparking exists.
- The cabling of the RCF1 may only be carried out by qualified personnel.
- Check that your safety switching-circuit is working correctly (Emergency-Stop).
- Ensure proper earthing of all electrical components.
- Make sure that the door-motor regulator has the correct power supply. Otherwise, damage to the device and/or other electrical devices may occur, and in the worst case, a fire.
- Make sure that the device is cabled correctly.
- **Never** connect the mains supply to the control-line terminals or the motor-connection terminals of the door-motor regulator, since this leads to certain destruction of the device.

2.3.4 Conformity to EMC-Guideline

- **Installation of the protective isolation switch**
  Ensure that a protective isolation switch is connected in series between the mains voltage terminals of the door-motor regulator and the power supply.

- **Installation of the residual current protective switch**
  For a residual current protective switch connected in series in the supply line, please use a protective switch with a release current of at least 100 mA.

- **Inserting the ferrite rings into the mains-, control- and motor lines**
  For adherence to the relevant EMV-guidelines it is cogently prescribed, to equip each of the mains-, control- and motor lines with one of the enclosed ferrite rings (see section 4.1, Page 8).

- **Instructions for cable arrangement**
  All lines should be laid as short as possible. Furthermore, control lines are to be laid spatially apart from the motor- and mains lines.

- **Instructions for earthing connection.**
  The earthing resistance must be 10 Ohm or less, the earth-line cross-section must be at least 1,5 mm^2.

3 Installation of the door-motor regulator

3.1 Instructions for installation

- The door-motor regulator RCF1 is intended for assembly on the roof of the elevator cabin.

- By the installation as well as by operation of the RCF1, care is to be taken, that above all **no metal chips**, water, oil or other foreign materials can get into the door-motor regulator.

- Do not install the door-motor regulator on inflammable materials.

- Install the door-motor regulator on the cabin roof in such a way, that good inspection of the display is guaranteed on the one hand, and as little soiling of the RCF1 as possible is guaranteed on the other.

3.2 Instructions for protection of the door-motor regulator during installation

Carefully cover up the frequency converter during the installation or when working on the other elevator components, so that above all **no metal chips** or **grinding-wheel abrasion** can get into the door-motor regulator. Upon completion of the mechanical work, all covers must be removed again in order to enable perfect and safe operation of the cabin door drive.

3.3 Device dimensions and necessary assembly holes

Dimensional sketch: (Units of measurement in mm) Housing assembly holes:

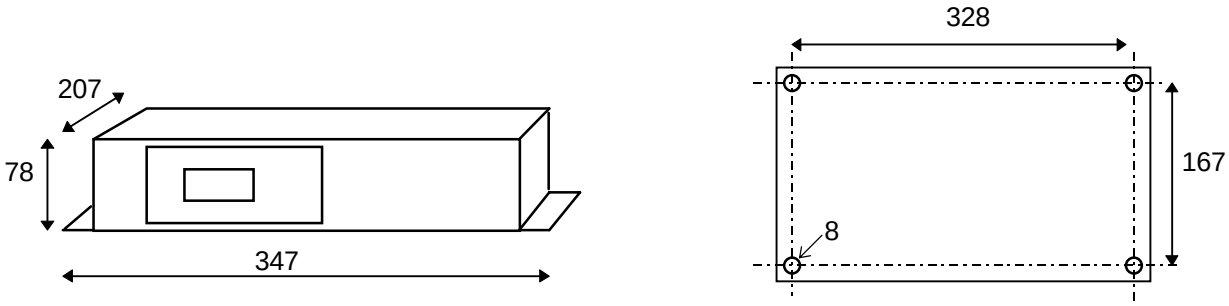


Figure 1

4 Cabling of the door-motor regulator

4.1 Instructions for cabling

For cabling the door-motor regulator only the small housing cover is opened. All terminals are designed for a cable cross-section of 0,08 to 2,5 mm^2.

- **Equipping the mains-, control- and motor lines with a ferrite ring**
  For adherence to EMV-guidelines it is required, that the mains supply line, the control line and the motor line each be equipped with one of the enclosed ferrite rings.

- **Assembly instructions for the attachment of the ferrite rings**
  1. Remove ca. 20 cm of the cable sheathing.
  2. Guide the cable through the cable strain relief.
  3. Guide all wires of the respective cable through the ferrite three times (two windings, see Figure 2).

  Exception: The earthing connection of the mains supply line and the motor line must <u>not</u> be guided through the ferrite.

  4. Fasten the wires in the appropriate connection terminals.

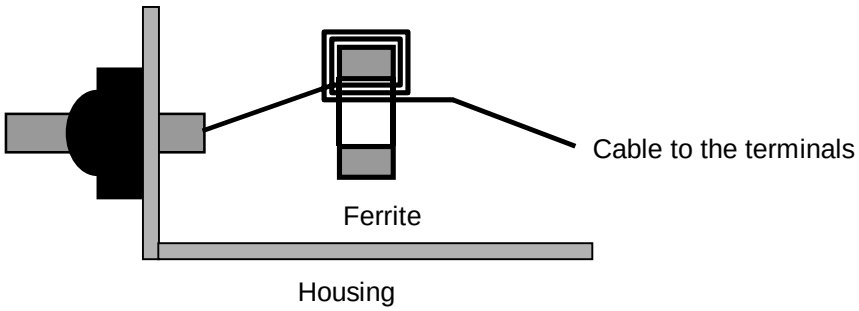


Figure 2

- **Cabling the mains supply line**
  Connect the phase to terminal 1, the neutral conductor to terminal 2.
  Connect the earth line to the earth connection of the housing (grey sticker with earth symbol) as well as to terminal 3.
  Instructions for cabling the mains supply line:
  1. The earthing resistance must be 10 Ohm or less.
  2. Keep the earth line as short as possible.
  3. The earth line must have a cross-section of at least 1,5 mm^2.

- **Cabling the control lines**
  The control line inputs require potential-free contacts (make contacts) between the respective control input and the reference potential C on terminal 11.
  Relays for small currents (24V, 20mA) must be used as circuit elements.
  Instructions for cabling the control lines:
  Take care, that the control lines are laid spatially apart from the motor- and mains supply lines.

- **Cabling the output lines**
  The potential-free circuit elements **can be coupled with the elevator controller if required**. The circuit elements can be set as make contacts or break contacts depending on the parameter setting of **parameter (II 1)** (see section 9.3.1, page 17).

- **Cabling the motor line**
  The output terminals U,V and W must be coupled with the motor terminals U,V and W.
  Instructions for cabling the motor line:
  The motor line is to be laid out as short as possible.
  With a mains voltage of 230V and a motor voltage specification of 127/220V the motor windings must be „Delta“ connected.
  The motor output terminals **must not be short-circuited to earth**.

4.2 Description of door-motor regulator terminals

Terminal-number	Terminal-designation	Functional description	Number of control-LED
1	Ph	Voltage supply phase	
2	N	Voltage supply neutral conductor	
3	E	Earth connection	
4	I 1	„Open door "-command	L1
5	I 2	„Close door "-command	L2
6	I 3	„Light screen "-command	L3
7	I 4	„Nudge"-command (Closing the door with slower constant speed)	L4
8	I 5	No function	L5
9	I 6	No function	L6
10	I 7	No function	L7
11	C	Common connection for inputs I 1 to I 7	
12 , 13	Rel 1	Output contact „Open door"	L9
14 , 15	Rel 2	Output contact „Door open" (reversing)	L10
16 , 17	Rel 3	Output contact „Door position"	L11
18 , 19	Rel 4	Output contact „Door closed"	L12
20	D	Shaft encoder pulse input A	L15
21	Th	Shaft encoder pulse input B	L16
22	+	Shaft encoder voltage supply + 20V	
23	C	Shaft encoder voltage supply GND	
3a	Earth	Connection for shaft encoder cable screening	
24, 25, 26	U; V; W;	Motor connection	

4.3 Wiring diagram

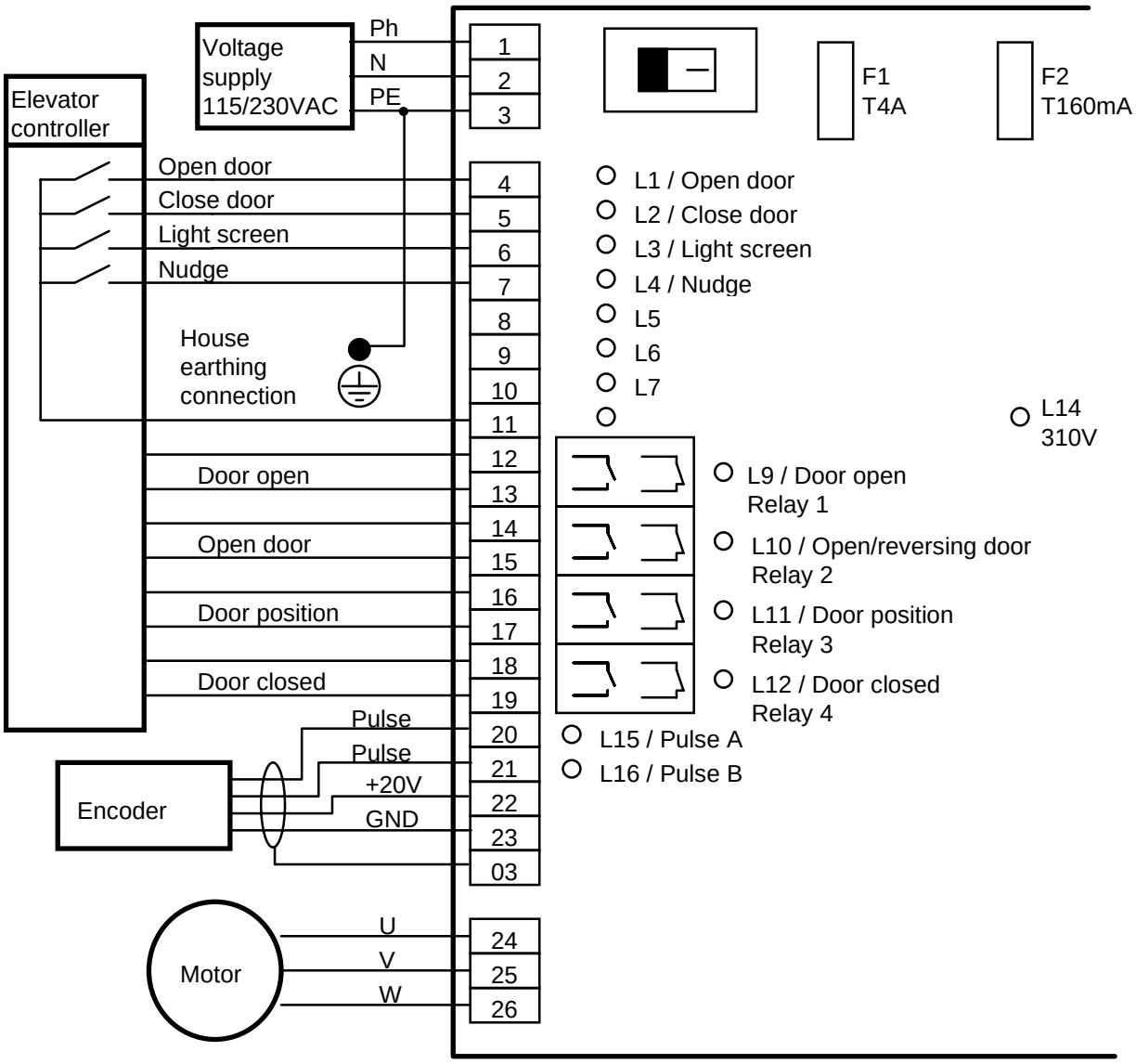


Figure 3

Instructions for cabling the shaft encoder:

Wire colour	Description	RCF1 - terminal number	
		left opening or central (2-piece) door mechanism	Right opening or central (4-piece) door mechanism
Yellow wire	Pulse output A	20	21
green wire	Pulse output B	21	20
brown wire	Voltage supply (+ 20 V)	22	22
white wire	Voltage supply (GND)	23	23

5 Initiation

- **Checking the cabling**
  Examine once again the cabling of the door-motor regulator. Thereby particular attention is to be paid to correct cabling of the mains supply line and the motor line.
  Attention: The earth connection of the mains supply line and the motor line must <u>not</u> be guided through the ferrite.
  Pay particular attention to the prevention of short-circuits and the correct assembly of the ferrite rings.
  Check whether the switching conditions of the output relays of the door-motor regulator correspond with the demands of the elevator controller (see section 9.3.1, page 17).

- **Checking the mains voltage supply**
  Verify whether the available mains voltage on-site also corresponds with the voltage selection set in the door-motor regulator (115/230V, 50/60Hz).
  Tip: The device is preset to a nominal voltage of 230V +/-10% at works.

- **Bringing the cabin door to the half-open position**
  Slide the cabin door by hand to the half-open position in order to be able to determine the door movement direction after switching on the power and with activated door command.

- **Switching on the supply voltage and checking the door movement direction**
  Switch on the supply voltage. On screen, the software revision number is first briefly visible and then the **display** „**-. . . .**“.
  Now press the **Button Value** + several times and pay attention whether the cabin door moves in a **closing direction**.
  If the door moves in the **closing direction**, the motor cabling is correct.
  If the door moves in the **opening direction,** the rotational direction of the motor is to be reversed by exchanging two of the motor line phases.

- **Initiating the learning run**
  After checking the rotational direction of the motor the learning run can now be carried out. This can take place

  1. by pressing the **Button Value** +, until the door is completely closed and subsequently opens fully again, or
  2. by a „**Open door“-command** at the terminals. The door first closes fully and then opens again fully.

  After a successful learning run the device switches over automatically to normal mode (or to manual- or automatic mode) and the door position is displayed in % of door width.

- **Optical control of door commands and the switching condition of the output relays**
  Whether and which control inputs and output relays are active can be checked by way of the control-LEDs in the terminal area of the control inputs and next to the switching relays.

Function	Terminal number / Terminal designation	Control-LED
„Open door“-command	4 / I 1	L1
„Close door“-command	5 / I 2	L2
„Light-screen “-command	6 / I 3	L3
„Nudge“-command	7 / I 4	L4
„Door open“-relay	12, 13 / Rel 1	L9
„Open door“-relay (reversing relay)	14, 15 / Rel 2	L10
„Door position“ relay	16, 17 / Rel 3	L11
„Door closed“-relay	18, 19 / Rel 4	L12

6 Description of the control panel

- **Display**

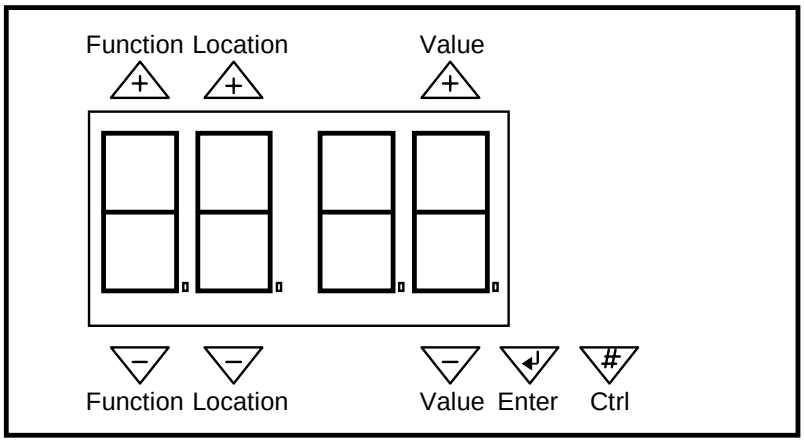


Figure 4

Setting the parameters for the device takes place via the control panel which is fitted with eight push-buttons as well as a four-place seven-segment display.

- **Meaning of individual figures in the seven-segment display**

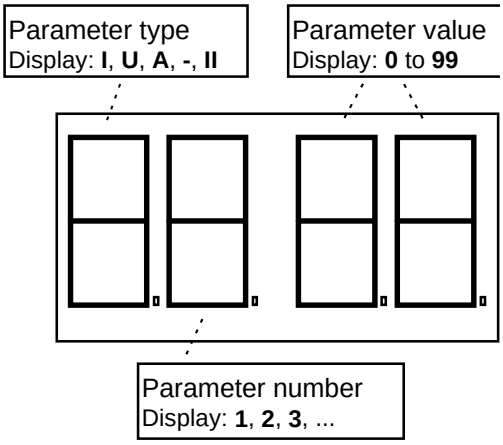


Figure 5

- **Functions of push-buttons in the control panel**

Button		Function
Function + **Function** -	or	Parameter selection
Location + **Location** -	or	Parameter number selection
Value + **Value** -	or	Parameter value setting
Enter j		For storing an altered parameter value (Press the button so long until the display flashes once)
Control #		For adopting the works parameters (Keep button depressed when switching on)
Enter j **Control** #	and	Change over from operational- to setting mode and vice versa (press both buttons)
Function -**Enter** j	and	Switch over to learning-run mode
Value +		Initiating the learning run in learning-run mode
Value + **Value** -	or	Door commands in manual mode

7 Modes of operation of the door-motor regulator

7.1 Setting mode

The parameterisation of the door-motor regulator is carried out in setting mode. There, all parameters can be adapted to suit the door drive as well as the elevator controller.

- **Switching over to setting mode**
  By simultaneously pressing the **buttons Enter** j **and Control** # the switch-over from normal operation to setting mode occurs, or vice-versa.
  In setting mode one of the variable parameters is displayed on screen with its associated value (e.g.: „**A0 60**“).

7.2 Learning-run mode

By way of the learning run, the door width of the elevator cabin is determined through the door-motor regulator counting the number of pulses delivered by the shaft encoder during the learning run. After switching on the device the door-motor regulator is always first in learning-run mode, recognisable on the **screen display** „ **. . .-.**“ .
In learning-run mode the elevator controller first waits for a „**Close door“-command**, until the cabin door is fully closed.
Subsequently, an „**Open door“-command** initiates the actual learning run. The closed cabin door is thereby fully opened and the door width thus determined.
During the learning run the sum of the pulses delivered by the shaft encoder is visible in the seven-segment display.
After the learning run is complete, the device switches over automatically to normal mode (or to manual- or automatic mode), and the door position is displayed in % of the door width.

- **Switching over to learning-run mode**
  This can be done by switching the device on or by simultaneously pressing the **buttons Function - and Enter j**.

- **Initiating the learning run in learning-run mode**
  This can either be done by way of an **„Open door"-command** at the terminals or by pressing the **button Value** +.
  Attention: During the learning run (door opens) further door commands are ineffective.

- **Screen displays in learning-run mode**
  The learning-run mode (without door command) is recognisable by the **display „ . . .-."** on screen.
  With the **„Close door"-command** or on closure of the door the horizontal bar **„-„** on the screen travels across from left to right.
  When the door is completely closed, the **display „ . . .0."** follows.
  With the **„Open door"-command** or on opening the door (Learning run) the display of the sum of pulses delivered by the shaft encoder occurs (Figures in ascending succession).

- **Parameters of the learning run**
  1. Parameter (U7) for the door speed during the learning run
  2. Parameter (A8) for the torque during the learning run

7.3 Normal mode

In this operational mode the control of the door-motor regulator is effected via the control inputs, which means, that the door commands from the elevator controller are forwarded to the door-motor regulator.

- **Screen display in normal operation mode**
  In normal mode the screen display normally corresponds with the current door position in % of door width. The **display „0"** signifies „Door completely closed", the **display „99"** signifies „ Door completely open".

7.4 Manual mode

In manual mode the control of the cabin door is effected by pressing the following two buttons on the control panel:
1. Button Value - closes the cabin door, as long as the button is held depressed.
2. Button Value + opens the cabin door, as long as the button is held depressed.

7.5 Automatic mode

In automatic mode the cabin door is opened and closed in cycles automatically, which means, without external door commands.

8 Closing force monitoring

If the cabin door is closed, a monitoring of the closing force necessary for the door closing movement occurs in a particular range. If the maximum permissible closing force (or torque) is exceeded, then the cabin door stops and the „Open door"-relay (Reversing relay) is activated.
If no „**Open door"-command** is activated by the elevator controller, the device attempts to close the cabin door anew.
An exceeding of the closing force (or torque exceeding) can occur for example, if an obstacle obstructs the door closure movement.

The closing force monitoring is active in normal mode, manual mode and automatic mode.
The range limits, within which the closing force monitoring is active, can be adjusted by the following two parameters.

The beginning of the closing force monitoring range can be set with the **Parameter (I 5),** the end of the closing force monitoring range with the **Parameter (II 3)**.
(for this see also section 9.2, page 17)

9 Parameters of the door-motor regulator

9.1 Setting and checking the parameters

1. Switching over to setting mode
By simultaneously pressing the **buttons Enter j a**nd **Control** # one reaches the setting mode.

2. Parameter selection in setting mode
The selection of the type of parameter takes place by pressing the **buttons Function** + or **Function** -.
The selection of the parameter number takes place by pressing the **buttons Location** + or **Location** -.
The individual parameters and their values are displayed on screen.

3. Altering the parameter value in setting mode
The parameter values can be altered by pressing the **buttons Value** + or **Value** -.
Attention: Each parameter alteration must be stored on completion.

4. Storing an altered parameter
To store altered parameter values, the **button Enter j** must be pressed so long until the display flashes once.

If necessary, steps 2. to 4. are to be carried out for several parameter alterations. After parameter setting and -control, you must then leave setting mode.

- **Leaving setting mode**
  By simultaneously pressing the **buttons Enter j** and **Control #** the door-motor regulator returns to normal mode (or to manual- or automatic mode).

9.2 Parameter overview

Fundamentally one can differentiate between the following parameter main- and subgroups:

Parameter main groups	**Parameter subgroups**	**Parameter designation**
Mode parameter	Normal mode	**- 1 00**
	Manual mode	**- 1 01**
	Automatic mode	**- 1 02**
	Output relay parameters	**II 1 xx**
	Control parameters	**II 6 xx**
	Position relay switch point	**- 5 xx**
	Mains frequency	**- 4 xx**
Motor parameter	Motor nominal speed	**- 2 xx**
	Motor nominal speed	**- 3 xx**
Transmission parameter	Transmission ratio	**- 7 xx**
Shaft encoder parameter	Shaft encoder pulse figure per revolution	**- 6 xx**
Torque parameter	Basic torque	**- 9 xx**
	Beginning of the closing force monitoring range	**I 5 xx**
	End of the closing force monitoring range	**II 3 xx**
	Reduced torque	**A 9 xx**
	Response time of the torque reduction	**II 2 xx**
Display parameter	Display of the door position in % of door width	**- 0 00**
	Display of the door position in actual number of pulses of the shaft encoder	**- 0 01**
	Display of the current motor voltage frequency	**- 0 02**
DC injection brake parameter	Braking time of the DC injection brake when closing	**II 4 xx**
	Braking time of the DC injection brake when opening	**II 5 xx**
Door progression parameter	Door position for speed - and torque change	**I 0** to **I 7**
	Speed parameter	**U0** to **U7**
	Torque parameter	**A0** to **A9**

xx = Parameter value

9.3 Description of Parameters

9.3.1 Mode parameter

Activated Parameter	**Parameter**	**Parameter value**
Normal mode	**- 1**	**0 0** (Works setting)

In this operational mode the control of the door-motor regulator takes place via the control inputs.
The door commands are transmitted to the door-motor regulator by the elevator controller.
The normal mode is activated by setting the **Parameter (- 1)** to „**00**“.
The device is set to normal mode at works.

Manual mode	**- 1**	**0 1**

In manual mode, control of the door is effected by pressing the following two buttons of the control panel:

- the **button Value** - closes the cabin door as long as the button is pressed.
- the **button Value** + opens the cabin door as long as the button is pressed.

The manual mode is activated by setting the **Parameter (- 1)** to „**01**“.

Automatic mode	**- 1**	**0 2**

In automatic mode, is opened and closed in cycles automatically, i.e. without applying any external door-commands.
The automatic mode is activated by setting the **Parameter (- 1)** to „**02**“.

Output relay setting	**II 1**	**see Table**

„Door open“-Relay	„Open door“-(Reversing) Relay	„Door position“-Relay	„Door closed“-Relay			
NO	NO	NO	NO	II 1	0 0	
NO	NO	NO	NC	II 1	0 1	
NO	NO	NC	NO	II 1	0 2	
NO	NO	NC	NC	II 1	0 3	
NO	NC	NO	NO	II 1	0 4	
NO	NC	NO	NC	II 1	0 5	
NO	NC	NC	NO	II 1	0 6	
NO	NC	NC	NC	II 1	0 7	
NC	NO	NO	NO	II 1	0 8	
NC	NO	NO	NC	II 1	0 9	
NC	NO	NC	NO	II 1	1 0	
NC	NO	NC	NC	II 1	1 1	
NC	NC	NO	NO	II 1	1 2	
NC	NC	NO	NC	II 1	1 3	(Works setting)
NC	NC	NC	NO	II 1	1 4	
NC	NC	NC	NC	II 1	1 5	

*NO (**N**ormally **O**pen) = make contact* *NC (**N**ormally **C**losed) = break contact*

Control parameter	**II 6**	**see Table**

Function 0 (Slave)	II 6	0 0 (Works setting)
Function 1 (Master)	II 6	0 1
Function 2	II 6	0 2

Description of the individual functions:

	by active light screen input or by an exceeding of closing force
Function 0 (Slave)	Stops the door closing and the „Open door“-relay becomes active
Function 1 (Master)	Reverses the door automatically and the „ Open door “-relay becomes active
Function 2	Only the „Open door“-relay becomes active

Position relay switch point	**- 5**	**3 0 (%)** (Works setting)

The door position at which the door position relay should switch can be determin
ed by the **Parameter (- 5)**. With this, for very large door-widths the information can be transmitted to the elevator controller that, e.g., the door is still 30% open.

Motor nominal frequency (in Hz)	**- 4**	**5 0** (Works setting)

The motor nominal frequency („50“ Hz or „60“ Hz) of the voltage supply for the motor is set via **Parameter (- 4)**.

9.3.2 Motor parameter

Motor nominal speed	**- 2**	**0 9** (thousandths-/hundredths)
Motor nominal speed	**- 3**	**0 0** (tenths-/units)

The motor nominal speed is set with the **Parameters (- 2) and (- 3)**. The works-setting corresponds with a motor nominal speed of 0900 R/min. (The nominal speed of SELCOM-Motors is 0900 R/min.)

9.3.3 Transmission parameter

Transmission ratio	**- 7**	**6 5** (Works setting)

The transmission ratio of the drive is set with **Parameter (- 7)**.
If e.g. a transmission ratio of 1:6.5 results, the **Parameter (- 7)** must be set to **„65“**.
(The transmission ratio of SELCOM-door drives is 1:6.5.)

9.3.4 Shaft encoder parameter

Shaft encoder pulse figure	**- 6**	**5 0** (Pulses / revolution)

The shaft encoder pulse figure per revolution is set with **Parameter (- 6)**.
If the shaft encoder has a pulse figure of 50 pulses per revolution, the **Parameter (- 6)** must be set to „**50**“.
(The pulse figure for SEPULS - shaft encoders is 50 pulses per revolution)

9.3.5 Torque parameter

Basic torque	**- 9**	**1 7** (Works setting)

With the basic torque **Parameter (- 9)** a simple adaptation of the necessary torque for the acceleration and braking of the cabin door (and shaft door) is possible for differing door weights.
For **light** doors the **Parameter (- 9)** is set to e.g. „**14**“.
For **medium-weight** doors the **Parameter (- 9)** is set to e.g. „**17**“.
For **heavy** doors the **Parameter (- 9)** is set to e.g. „**20**“.

Reduced torque	**A 9**	**3 0** (Works setting)

In cases where a door is blocked or an elevator unused, the active torque is reduced to the value set in **Parameter (A 9)** after the response time has elapsed. This way it is possible to

exclude overheating of the motor when a door is blocked on the one hand, and to reduce the load on the mechanical components of the door drive when an elevator is unused on the other. The response time for torque reduction can be set with the parameter „Response time for torque reduction “ **Parameter (II 2)**.

Response time for torque reduction	**I I 2**	**3 0 (sec.)** (Works setting)

With **Parameter (II 2)** the response time (in seconds) for the torque reduction (see also parameter „Reduced torque “) can be set.
The setting range of the response time lies between 2 and 98 seconds.

To switch off torque reduction the **Parameter (II 2)** must be set to „**99**“.

9.3.6 Range limits of closing force monitoring

Beginning of closing force monitoring range	**I 5**	**7 5** (Works setting)

Tip: When the cabin door closes, monitoring of the closing force necessary for the closing movement of the door occurs in the closing force monitoring range. If the maximum permissible closing force (or torque) is exceeded, the cabin door stops and the **„Open door“-relay (Reversing relay)** is activated.
If no „**Open door“-command** is activated by the elevator controller, the device attempts the close the door anew.

An exceeding of the closing force (or torque exceeding) occurs for example when an obstacle obstructs the door-closing movement.

With **Parameter (I 5)** the beginning of the closing force monitoring range is set in % of door width (see figure 6, page 21 and figure 8, page 24).

End of the closing force monitoring range	**II 3**	**3 6** (Works setting)

Tip: When the cabin door closes, monitoring of the closing force necessary for the closing movement of the door occurs in the closing force monitoring range. If the maximum permissible closing force (or torque) is exceeded, the cabin door stops and the **„Open door“-relay (Reversing relay)** is activated.
If no „**Open door“-command** is activated by the elevator controller, the device attempts the close the door anew.

An exceeding of the closing force (or torque exceeding) occurs for example when an obstacle obstructs the door-closing movement.

With **Parameter (II 3)** the end of the closing force monitoring range is set to the corresponding number of shaft encoder pulses. The entry in pulses is necessary to enable an exact setting.

Example: The door closes at a pulse figure of „**26**“, and the torque monitoring should be active until the cabin door is closed.
When the blade closes in the pulse-figure range „**25** to **0**“, the torque on closing of the blade is however no longer monitored.
The **Parameter (II 3)** is therefore set to „**26**“.
(See section 9.3.7 and figure 7, page 22**)**

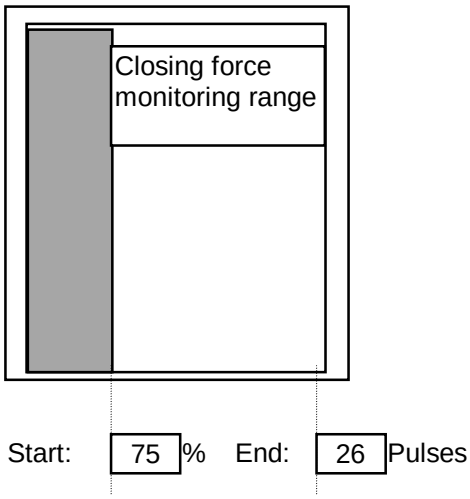


Figure 6

9.3.7 Display parameter

Display of the door position in % of door width	**- 0**	**0 0** (Works setting)

By setting the **Parameter (- 0)** to „**00**“ the display of the current door position occurs in % of the total door width. (see also figure 7, page 22)

Display of the door position as a number of shaft encoder pulses	**- 0**	**0 1** (Works setting)

By setting the **Parameter (- 0)** to „**01**“ the display of the current door position occurs as a number of shaft encoder pulses. (see also figure 7, page 22)

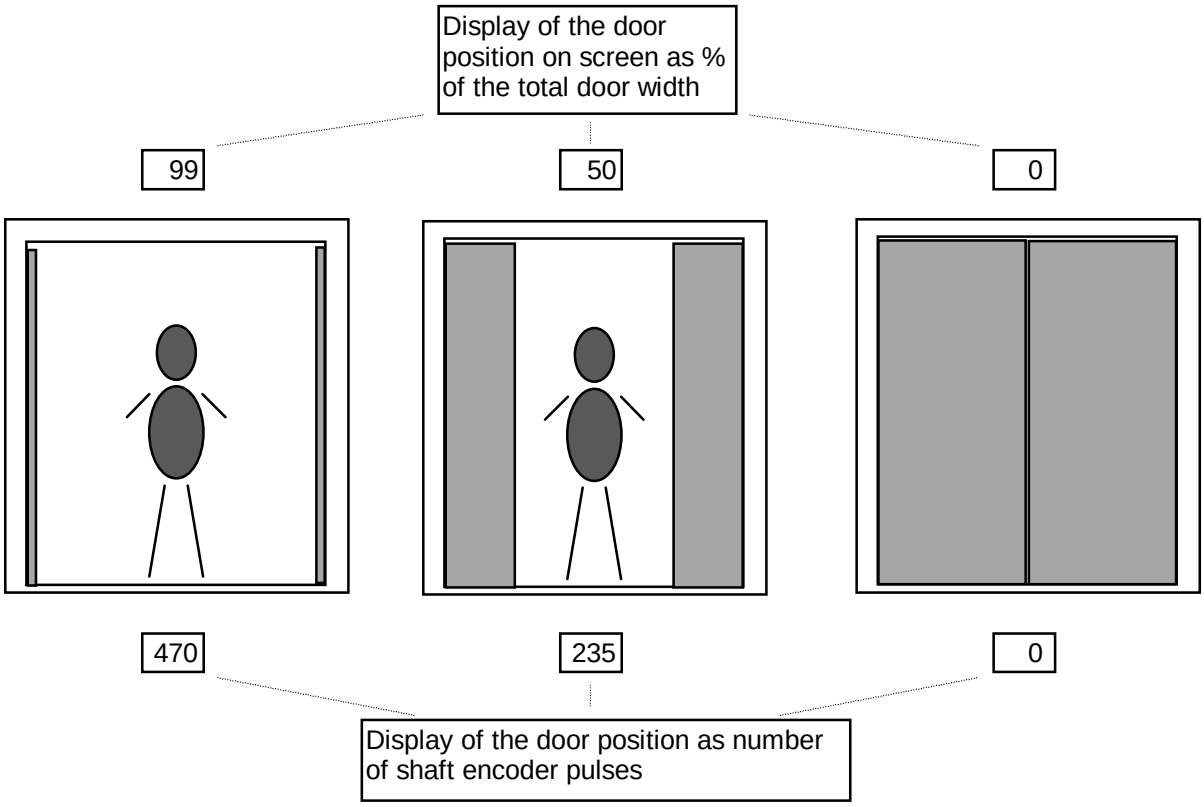


Figure 7

Display of current motor cyclic frequency	**- 0**	**0 2**

By setting the **Parameter (- 0)** to „**02**“ the display of the current motor cyclic frequency occurs.

9.3.8 DC injection brake parameter

Braking time of the DC injection brake on closing the door from travel curve position (I 7)	**II 4**	**0 5** (x 15 ms) (Works setting)
Braking time of the DC injection brake on opening the door from travel curve position (I 4)	**II 5**	**0 5** (x 15 ms) (Works setting)

For more heavier cabins- or shaft doors it is possible to activate a DC injection brake in the braking range of the door travel.
The DC injection brake is effective on **closing** the door from **travel curve position (I 7)** and on **opening** the door from **travel curve position (I 4)**.
The braking time of the DC injection brake on **closing** can be set with **Parameter (II 4)** and on **opening** with **Parameter (II 5)**.
A parameter value of „**01**“ equals a braking time of 15 Milliseconds.

Example: A parameter value „**10**“ thus equals a braking time of 150ms, a parameter value „**99**“ equals a braking time of 1,5 seconds.

Switching off the DC injection brake:
If the **Parameter (II 4)** or **Parameter (II 5)** is set to „**0**“, the DC injection brake is **not** activated.

9.3.9 Parameter overview (sorted according to parameter numbers)

Parameter		Value		Description	Setting range	Unit
-	**0**	**0**	**0**	Door position display		% of door width
-	**0**	0	1	Door position display in number of shaft encoder pulses		Shaft encoder pulses
-	**0**	0	2	Display of motor cyclic frequency		Hz
-	**1**	**0**	**0**	Normal operating state		
-	**1**	0	1	Manual mode		
-	**1**	0	2	Automatic mode		
-	**2**	**0**	**9**	Motor nominal speed	01 to 35	thousandths/ hundredths
-	**3**	**0**	**0**	Motor nominal speed	00 to 99	tenths/ units
-	**4**	**5**	**0**	Motor nominal frequency	45 to 62	Hz
-	**5**	**3**	**0**	Position relay switching point	1 to 99	% of door width
-	**6**	**5**	**0**	Shaft encoder pulse figure	10 to 80	Pulses per revolution
-	**7**	**6**	**5**	Transmission ratio	10 to 99	
-	**9**	**1**	**7**	Basic torque	3 - 20	
I	**0 - 7**			Travel curve positions	see travel curve	% of door width
I	**5**	**7**	**5**	Beginning of the closing force monitoring range	27 to 97	% of door width
II	**1**	**1**	**3**	Output relay setting	0 to 15	
II	**2**	**3**	**0**	Response time for torque reduction	2 to 98	sec
II	**3**	**3**	**6**	End of the closing force monitoring range	5 to 99	Shaft encoder pulses
II	**4**	**1**	**0**	Braking time of the DC injection brake from travel curve position I 7	0 to 99	x 15 msec.
II	**5**	**1**	**0**	Braking time of the DC injection brake from travel curve position I 4	0 to 99	x 15 msec.
II	**6**	**0**	**0**	Control parameter		
A	**0 - 7**			Torque parameter in the individual travel curve segments	See travel curve	
A	**8**	**6**	**0**	Torque during the learning run	1 to 90	
A	**9**	**3**	**0**	Reduced motor torque	1 to 90	
U	**0 - 6**			Door speed parameter in the individual travel curve segments	See travel curve	
U	**7**	**2**	**5**	Door speed during the learning run and nudge-speed	2 to 49	

9.4 Door travel parameters

9.4.1 Door position parameter

The **door positions (I 0)** to **(I 7)** represent the limitations of the individual speed- and torque ranges of the travel curve. The closing force monitoring is active in the range from **Position (I 5)** up to the shaft encoder pulse figure set in **Parameter (II 3)**. If an exceeding of the closing force occurs in this range, then the cabin door stops and the **„Open door"-relay** (reversing relay) is activated.

	Door position	Works setting	Adjustment to door system	Setting range
Beginning of release speed	I 0	4		1 to 5
Beginning of door acceleration on opening	I 1	7		7 to 28
End of door acceleration on opening	I 2	30		9 to 50
Beginning of door deceleration on opening	I 3	70		11 to 89
End of door deceleration on opening	I 4	91		13 to 96
Beginning of run-in speed on opening		97	Not adjustable	
End of door acceleration on closing	I 5	75		8 to 97
Beginning of door deceleration on closing	I 6	30		6 to 95
End of door deceleration on closing	I 7	13		4 to 93
Beginning of run-in speed on closing		2	Not adjustable	
Beginning of closing force monitoring range on closing	I 5	75		8 to 97
End of closing force monitoring range on closing	II 3	36		5 to 99

For the values of **door positions** the following conditions are also valid:

0 < I 0 < I 1 < I 2 < I 3 < I 4 < 97 and 3 < I 7 < I 6 < I 5 < 98

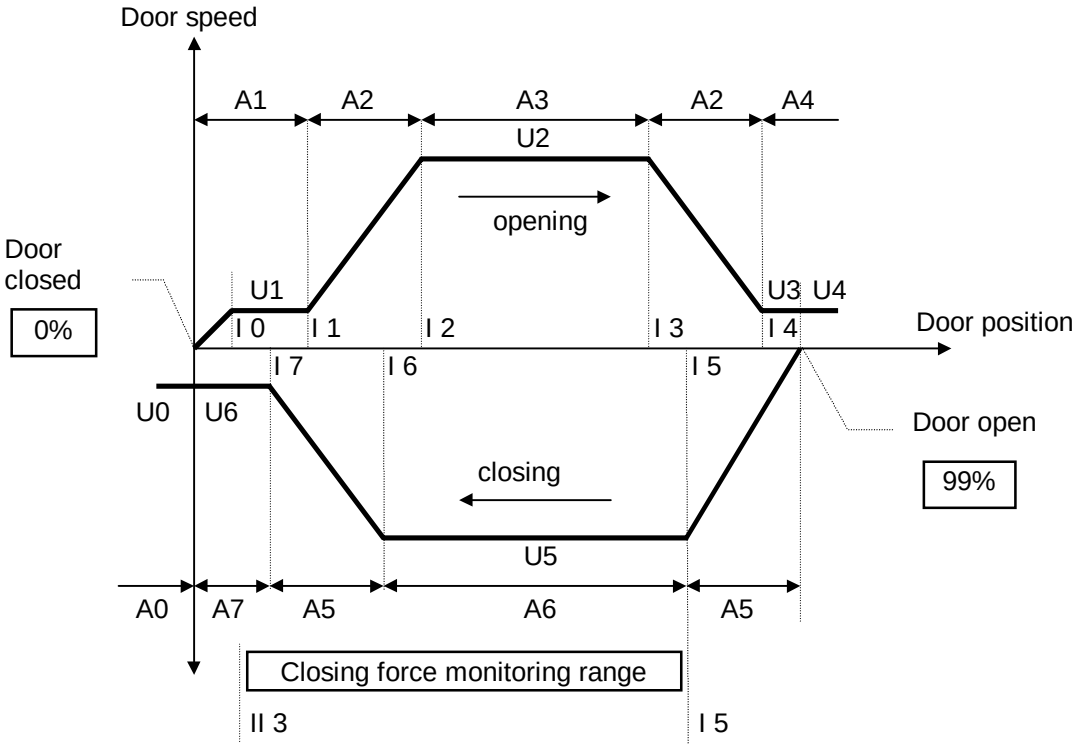


Figure 8

9.4.2 Torque parameter

The **Parameters (A1), (A2), (A3)** and **(A4)** influence the torque on opening the cabin door, the **Parameters (A5), (A6), (A7)** and **(A0)** influence the torque on closing the cabin door.

The individual ranges are visible from the travel curve.

Tip: The torque monitoring is active in the range from **Position (I 5)** up to the number of shaft encoder pulses set in **Parameter (II 3)**. If an exceeding of the torque occurs in this range, the cabin door stops and the **„Open door"-relay** (reversing relay) is activated.

	Parameter	Works setting	Adjustment to door system	Active range
Torque, to keep door closed	A 0	60		2% -- 0%
Torque on opening in the release range	A 1	60		0% -- I1.xx
Torque on acceleration and deceleration	A 2	50		I1.xx – I2.xx I3.xx – I4.xx
Torque on rapid opening	A 3	50		I2.xx – I3.xx
Torque on approaching the open position	A 4	51		I3.xx – 99%
Torque on acceleration and deceleration	A 5	51		99% – I5.xx I6.xx – I7.xx
Torque on rapid closing	A 6	50		I5.xx – I6.xx
Torque on approaching the closed position	A 7	60		I7.xx – II 3.xx
Torque during the learning run	A 8	60		0% -- 99%
Reduced torque	A 9	30		0% -- 99%

Basically, the setting range of 1 to 90 is sufficient for all torque parameters.
Tip: The torque value of „50" means, that the motor is delivering its nominal torque.

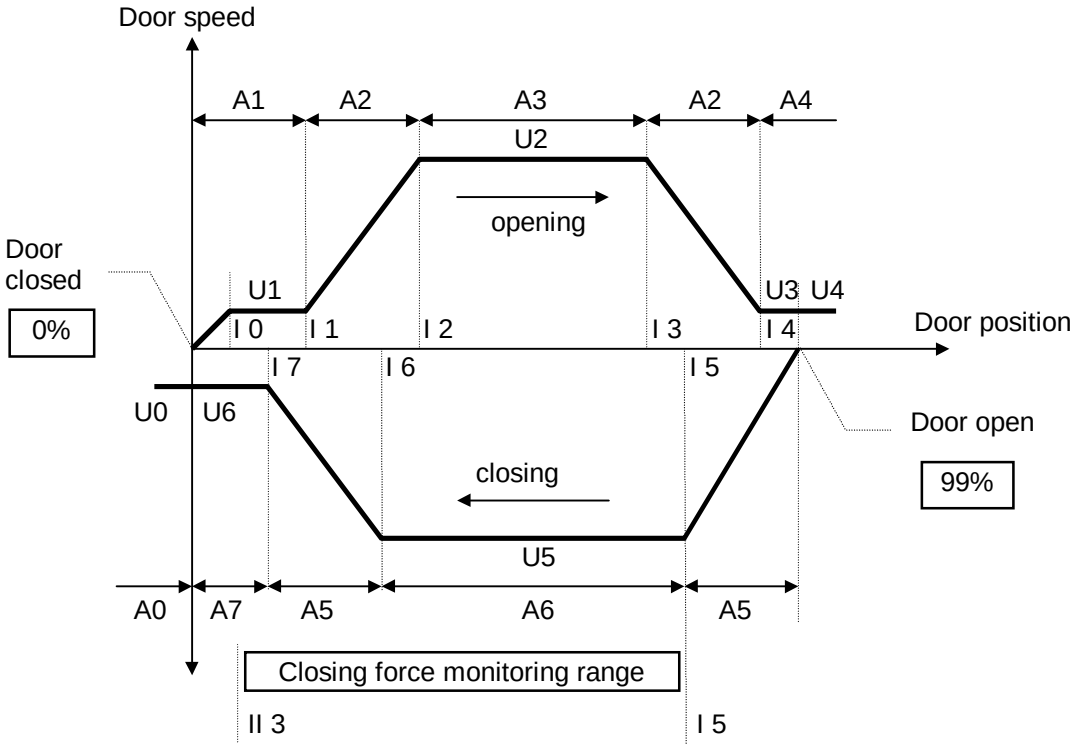


Figure 9

9.4.3. Door speed parameter

The **Parameters (U1), (U2), (U3)** and **(U4)** influence the door speed on opening the cabin door.
The **Parameters (U0), (U5)** and **(U6)** influence the door speed on closing the cabin door.

The individual ranges are visible from the travel curve.

	Parameter	Works setting	Adjustment to door system	Setting range
Theoretical speed in the closed position	U 0	10		2 to 25
Speed on release of the blade (clutch range)	U 1	14		2 to 32
High speed on opening the door	U 2	70		2 to 99
Speed on approaching the door-open position	U 3	8		2 to 32
Theoretical speed in the open position	U 4	10		2 to 25
High speed on closing the door	U 5	50		2 to 75
Speed on approaching the door-closed position	U 6	6		2 to 32
Speed during the learning run and speed when running without shaft encoder	U 7	25		2 to 49

10 Shaft encoder (SEPULS)

10.1 Shaft encoder assembly

The SEPULS must be assembled according to the following illustration, i.e. the distance to the marked disk must be 4 mm +/- 1mm.

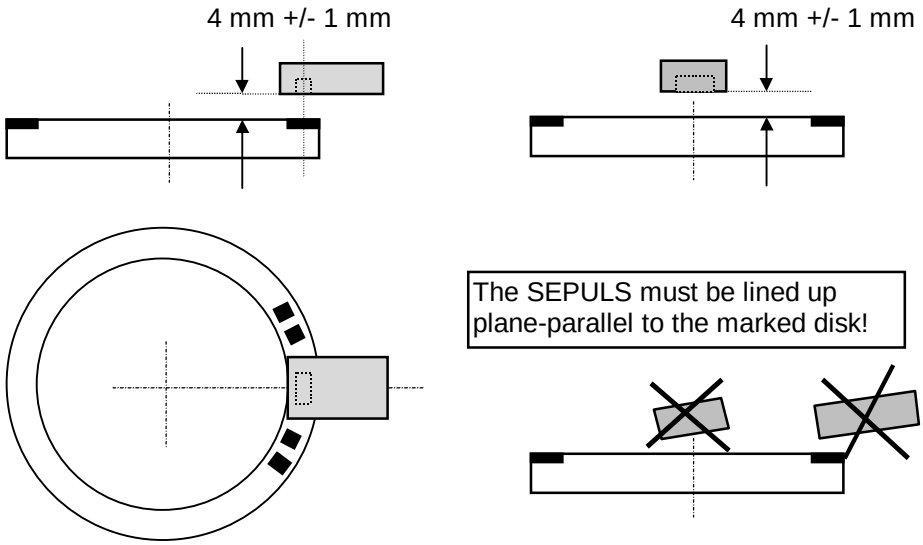


Figure 10

10.2 Shaft encoder cabling

Wire colour	Description	RCF1 - Terminal number	
		left opening or central (2-piece) door mechanism	right opening or central (4-piece) door mechanism
Yellow wire	Pulse output A	20	21
Green wire	Pulse output B	21	20
Brown wire	Voltage supply (+ 20 V)	22	22
White wire	Voltage supply (GND)	23	23

10.3 Control of shaft encoder function

- Set the screen display to „Shaft encoder pulse display “, i.e. the **parameter (- 0)** to „**01**“. Afterwards, after several cycles the pulse figures in the door-end positions must correspond, which means, that the pulse figure „**0**“ may only then be reached when the door is fully closed, and the maximum pulse figure (as with the learning run) may only then be reached when the door is fully open.

- The principal function of the shaft encoder can also be checked via the optical display of the shaft encoder pulse outputs: Firstly, alter the value of the **parameter (- 9)** to „**03**“, through this the motor has very little power. Then slowly slide the cabin door by hand, observing thereby the shaft encoder control-LEDs (L15, L16). The LEDs must flash alternately and overlapping. (see also the following illustration)

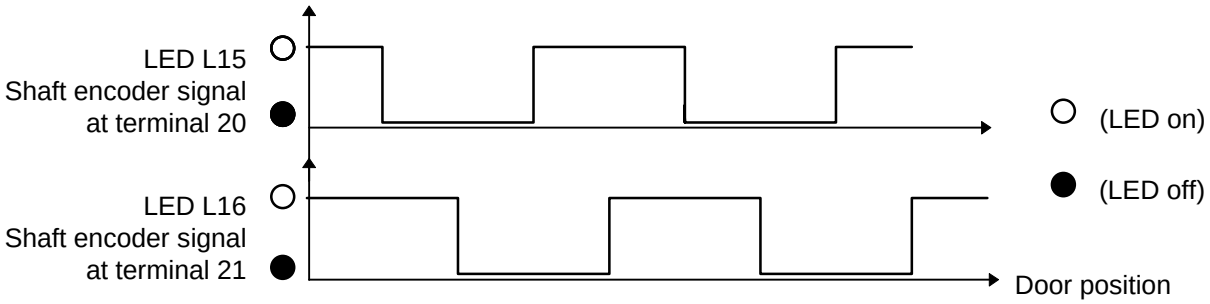


Figure 11

Attention: After the shaft encoder check, the parameter (- 9) must be set to its original value again!

10.4 Shaft encoder defect detection

- **Display signal: „S.-.-.-.“**
  If, during operation, a shaft encoder defect is detected by the door-motor regulator, in normal mode (or in manual- or automatic mode) the **signal** „**S.-.-.-.**“ appears in the display. The door now moves with a constant reduced speed, which is equal to the learning-run speed (Parameter (U7).

Attention: During the learning run the device itself detects <u>no</u> shaft encoder defects. During the learning run a shaft encoder defect (without opening the device) can only be detected by the fact, that the figures on the display during the learning run do not count up and the display signal remains at „0“!

In the event of a shaft encoder defect, the following points must be checked in the sequence stated:

1. The shaft encoder assembly (distance to marked disk: 4 mm +/- 1 mm and lined up plane-parallel).
2. The shaft encoder cabling.
3. The indications of LED 15 and LED 16.

10.5 Emergency operation without shaft encoder

Without the shaft encoder, a door movement with a reduced and constant door speed which is equal to learning-run speed (**parameter (U7)**) is possible. The **parameter (A9)** however must in this case be set to „**60**“.

Attention: When operating the door-motor regulator without a shaft encoder, <u>no</u> monitoring of the closing force takes place !!!

11 Error identification and error elimination

Immediately after the door-motor regulator is switched on the software revision number (e.g. 3.9) appears briefly in the display. Please inform the contact person of your customer department of the software revision number if you have problems with the door controller.

Error description	Possible cause	Remedy
No display on the screen	• Mains supply is missing	• Check mains voltage and set device mains switch to „1“
	• 115V mains nominal voltage	• Set voltage selector to 115V
	• 5V-supply is missing, Control-LED L13 dark	• Check fuse F2
Motor does not rotate	• Defective motor cable	• Check motor cable
	• 310V-supply is missing, control-LED L14 dark	• check mains voltage
	• Fuse F1 defect	• Exchange fuse F1 or device
	• Electronic overload fuse reacts	• Check motor cable for short-circuit or exchange device
Motor hums or has too little power	• incorrect motor winding wiring or mains voltage	• check motor rating plate and motor winding wiring (Star-Delta)
Direction of door movement does not correspond with the door commands	• defective control line connection	• check input states at control line indicators L1 to L7
	• Rotational direction of motor is reversed	• Exchange two motor line phases
Display remains at „ . . .-.“	• After switching on, no „Door closed“ - command is active	• Check command via control-LED L2
During learning run display remains at „ . . .0.“	• Shaft encoder pulse outputs reversed	• Exchange shaft encoder outputs on terminals 20 and 21
	• Shaft encoder badly adjusted	• Check shaft encoder control-LEDs L15 and L16
	• Shaft encoder defect	• Shaft encoder emergency operation or exchange shaft encoder
Learning run takes too long	• Learning-run speed too slow	• Increase parameter value of **(U7)**
During the learning run the door does not open fully	• Too little torque during the learning run	• Increase parameter value of **(A8)**
Too little acceleration when the door is opened	• Heavy doors	• Basic torque **(-9)** to „**20**“
	• Too little torque	• Increase parameter value of **(A2)**
Door does not open fully	• Excessive closing force of shaft door springs	• Increase parameter values of **(A4)** and eventually of **(U3)** and **(U4)**
The doors brake badly when opened and the door-leaves strike the end position	• heavy doors	• Increase basic torque **(- 9)** to „**20**“
	• Too little torque	• Increase parameter value of **(A2)** and **(A4)**
	• Braking range too short	• Decrease parameter value of **(I 3)** (i.e. shift to the left, the braking range is thereby increased, see door travel, figure 8, page 24)
	• Braking time of DC injection brake too short	• Increase parameter value of **(II 5)**

Door remains briefly stationary at almost open position and then subsequently opens further Door remains stationary on opening and the reversing relay is activated or **Display signal** „**S.-.-.-.**“	• Braking time of DC injection brake too long on opening • Shaft encoder badly adjusted or defect	• Reduce parameter value of **(II 5)** • Check assembly (plane-parallel adjustment, distance 4mm) • Control: set display to pulse display (**parameter (- 0)** to „**01**“). The pulse figure „0“ must only be reached when the door is fully closed. The maximal pulse figure (as with the learning run) must only be reached when the door is fully opened
On closing, the door remains stationary in the centre of travel and Reversing relay is activated	• Heavy doors	• Increase basic torque **(- 9)** to „**20**“
	• Too little torque	• Increase parameter value of **(A6)**
On closing the door the doors brake badly and the door-leaves strike together	• Heavy doors	• Increase basic torque **(- 9)** to „**20**“
	• Too little torque	• Increase parameter value of **(A5)**
	• Braking range too short	• Increase parameter value of **(I 6)** (i.e. shift to the right, the braking range is thereby increased, see door travel)
	• Braking time of DC injection brake too short	• Increase parameter value of **(II 4)**
Blade does not close	• Blade mechanism stiff	• Determine cause and eliminate
	• Too little torque	• Increase parameter value of **(A7)**
Door remains briefly stationary at almost closed position and then closes subsequently further	• Braking time of DC injection brake on closing too long	• Reduce parameter value of **(II 4)**
The door-position indicator does not correspond with the actual door position	• Shaft encoder badly adjusted	• Check assembly (plan-parallel alignment, distance 4mm)
	• Shaft encoder defect	• Exchange shaft encoder

12 Circuit-board general drawing

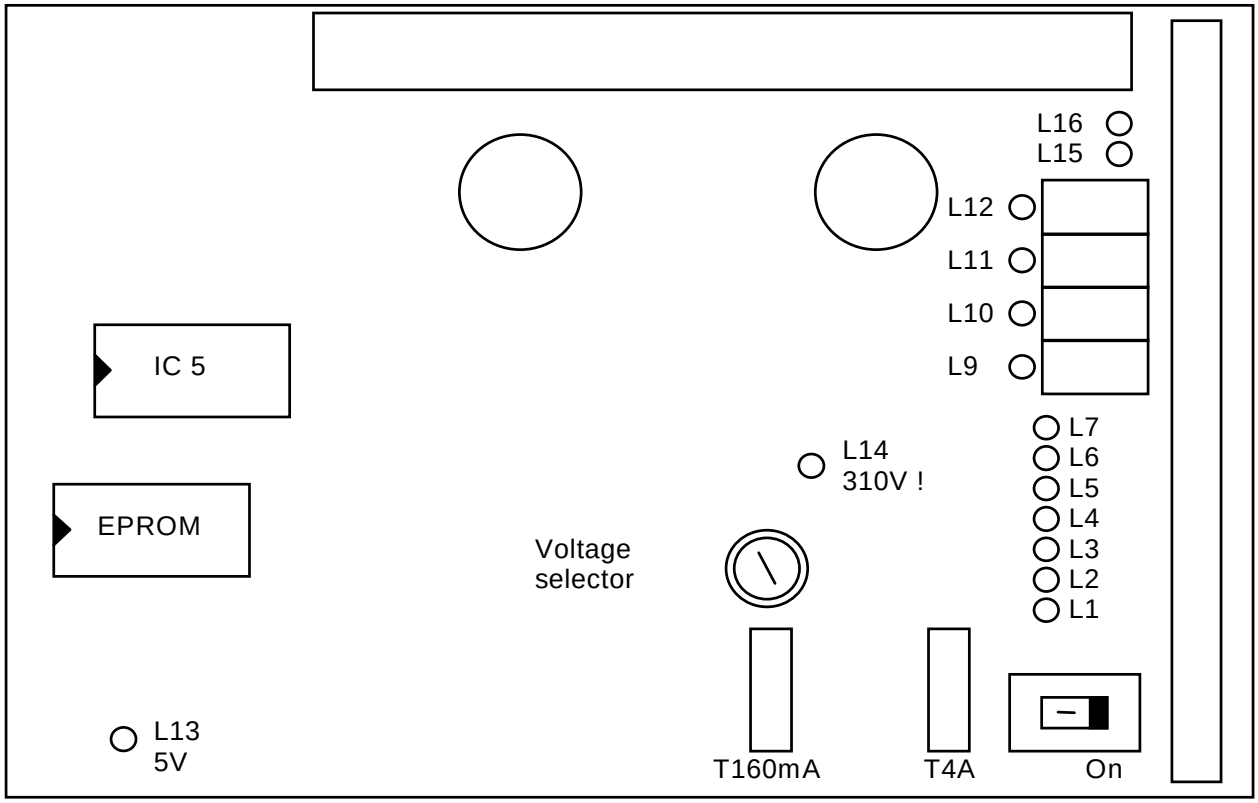


Figure 12

13 Technical Data

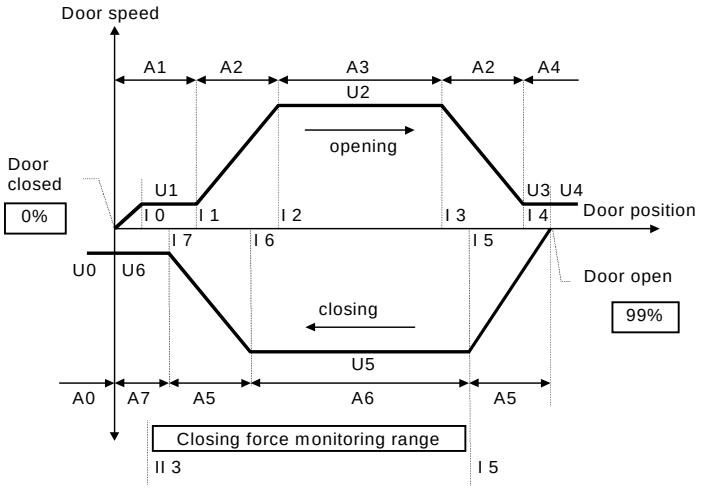
1) Operational data

Protection system	IP 20
Vibration resistance	IEC 60-2-6, 2 mm point-to-point (5 to 16 Hz) 2g point to 150 Hz
Contamination level	Level 2 according to IEC 664
Relative humidity	90%, without formation of steam
Ambient temperature	- 25 to + 70°C in storage 0 to + 50°C in operation

2) Electrical Data

Supply voltage	230V +/- 10%, 115V +/- 10% 50/60 Hz +/- 2%, set at works to 230 V
Output voltage (Motor voltage)	3 x 220V 0,1 to 50Hz 6A max. for 6A - Device 12A max. for 12A - Device
Impulse transmitter supply voltage	20V, max. 30mA
Control inputs	Potential-free contacts for small loads (24V, 20mA)
Control outputs	Potential-free contacts 250V max., 3A max.

14 Summary of the most important parameters



Function of control buttons

Parameter selection with **button Function (+)** or **Function (-)**
Parameter-number selection with **button Location (+)** or **Location (-)**
Parameter value setting with **button Value (+)** or **Value (-)**

Storing an altered parameter value
By pressing the **button Enter (↵)**

Adopting works parameters by pressing
the **button Ctrl (#)** whilst switching on the device

Switch between operational- and setting mode
by simultaneously pressing the **buttons Enter (↵) and Ctrl (#)**

Switch to learning-run mode by simultaneously pressing the
buttons Function (-) and Enter (↵)
Initiate the learning run in learning-run mode
By pressing the **button Value (+)**

Door commands in manual mode
By pressing the **buttons Value (+)** or **Value (-)**

		Adjustment to door system				
	Parameter	Works setting				Setting range
Beginning of release speed	I 0	4				1 to 5
Beginning of door acceleration on opening	I 1	7				7 to 28
End of door acceleration on opening	I 2	30				9 to 50
Beginning of door deceleration on opening	I 3	70				11 to 89
End of door deceleration on opening	I 4	91				13 to 96
Beginning of run-in speed on opening		97	Not adjustable			
End of door acceleration on closing	I 5	75				8 to 97
Beginning of door deceleration on closing	I 6	30				6 to 95
End of door deceleration on closing	I 7	13				4 to 93
Beginning of run-in speed on closing		2	Not adjustable			
Beginning of closing force monitoring range on closing	I 5	75				8 to 97
End of closing force monitoring range on closing	II 3	36				5 to 99
Torque, to keep door closed	A 0	60				1 to 90
Torque on opening in release range	A 1	60				1 to 90
Torque by acceleration and deceleration	A 2	50				1 to 90
Torque by rapid opening	A 3	50				1 to 90
Torque on approaching the open position	A 4	51				1 to 90
Torque by acceleration and deceleration	A 5	51				1 to 90
Torque on rapid closing	A 6	50				1 to 90
Torque on approaching the closed position	A 7	60				1 to 90
Torque during learning run	A 8	60				1 to 90
Reduced torque	A 9	30				1 to 90
Theoretical speed in the closed position	U 0	10				2 to 25
Speed on release of the blade	U 1	14				2 to 32
High speed on opening the door	U 2	70				2 to 99
Speed on approaching the door open position	U 3	8				2 to 32
Theoretical speed in the open position	U 4	10				2 to 25
High speed on closing the door	U 5	50				2 to 75
Speed on approaching the door closed position	U 6	6				2 to 32
Speed during the learning run and by nudging	U 7	25				2 to 49

Normal mode	- 1 00	Output relay parameter	II 1 xx	Basic torque	- 9 xx
Manual mode	- 1 01	Displays door position in % of door width	- 0 00	Braking time of DC injection brake on closing from position (I 7)	II 4 xx
Automatic mode	- 1 02	Displays door position in number of pulses from shaft encoder	- 0 01	Braking time of DC injection brake on opening from position (I 4)	II 5 xx