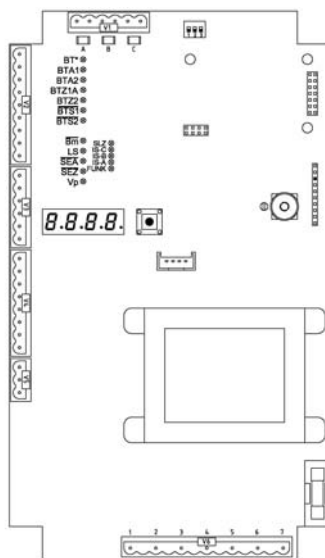# Installation and operating instructions

Barriers ES 25 – ES 80
Part 2
Controller MO 64

ELKA

Translation of original installation and operating instructions

Index of contents

1   Preface

1.1   General notes

These operating instructions must be available on site at all times. It should be read thoroughly by all persons who use, or service the appliances. Improper usage or servicing or ignoring the operating instructions can be a source of danger for persons, or result in material damage. If the meaning of any part of these instructions isn't clear, then please contact ELKA-Torantriebe GmbH u. Co. Betriebs KG before you use the appliance.

This applies to all setup procedures, fault finding, disposal of material, care and servicing of the appliance. The accident prevention regulations and applicable technical regulations (e.g. safety or electrical) and environment protection regulations of the country in which the appliance is used also apply.

All repairs on the appliances must be carried out by qualified persons. ELKA-Torantriebe GmbH u. Co. Betriebs KG accepts no liability for damage which is caused by using the appliance for purposes other than those for which it is built.

ELKA-Torantriebe GmbH u. Co. Betriebs KG cannot recognise every possible source of danger in advance. If the appliance is used other than in the recommended manner, the user must ascertain that no danger for himself or others will result from this use. He should also ascertain that the planned use will have no detrimental effect on the appliance itself. The appliance should only be used when all safety equipment is available and in working order. All faults which could be a source of danger to the user or to third persons must be eliminated immediately. All warning and safety notices on the appliances must be kept legible.

All electrical periphery equipment which is connected to the appliance must have a CE Mark, which ensures that it conforms to the relevant EEC regulations. Neither mechanical nor electrical alterations to the appliance, without explicit agreement of the manufacturer, are allowed. All alterations or extensions to the appliance must be carried out with parts which ELKA-Torantriebe GmbH u. Co. Betriebs KG have defined as suitable for such alterations, and be carried out by qualified personnel. Please note that with any alteration of the product, no matter whether mechanical or electrical, the warranty expires and the conformity is revoked. Only the use of ELKA accessories and original ELKA spare parts is allowed. In case of any contravention ELKA disclaims liability of any kind.

INFORMATION!
The operation of the system within CEN countries must also be conformant with the European safety-relevant directives and standards.

We reserve the right to make technical improvements without prior notice.

1.1.1 Symbol explanation

Remarks regarding the safety of persons and the gate opener itself are marked by special symbols. These remarks have to be absolutely observed in order to avoid accidents and material damage.

	DANGER!
⚠	**…points to an imminent dangerous situation, which can cause death or serious injuries if it is not avoided.**

	WARNING!
⚠	**…points to a potentially dangerous situation, which can cause death or serious injuries if it is not avoided.**

	ATTENTION!
⚠	**…points to a potentially dangerous situation, which can cause minor or slight injuries if it is not avoided.**

	ATTENTION!
⚠	**…points to a potentially dangerous situation, which can cause property damage if it is not avoided.**

	REMARK!
i	**Important notice for installation or functioning.**

1.2 Copyright

The operating manual and the contained text, drawings, pictures, and other depictions are protected by copyright. Reproduction of any kind – even in extracts – as well as the utilization and/or communication of the content without written release certificate are prohibited. Violators will be held liable for damages. We reserve the right to make further claims.

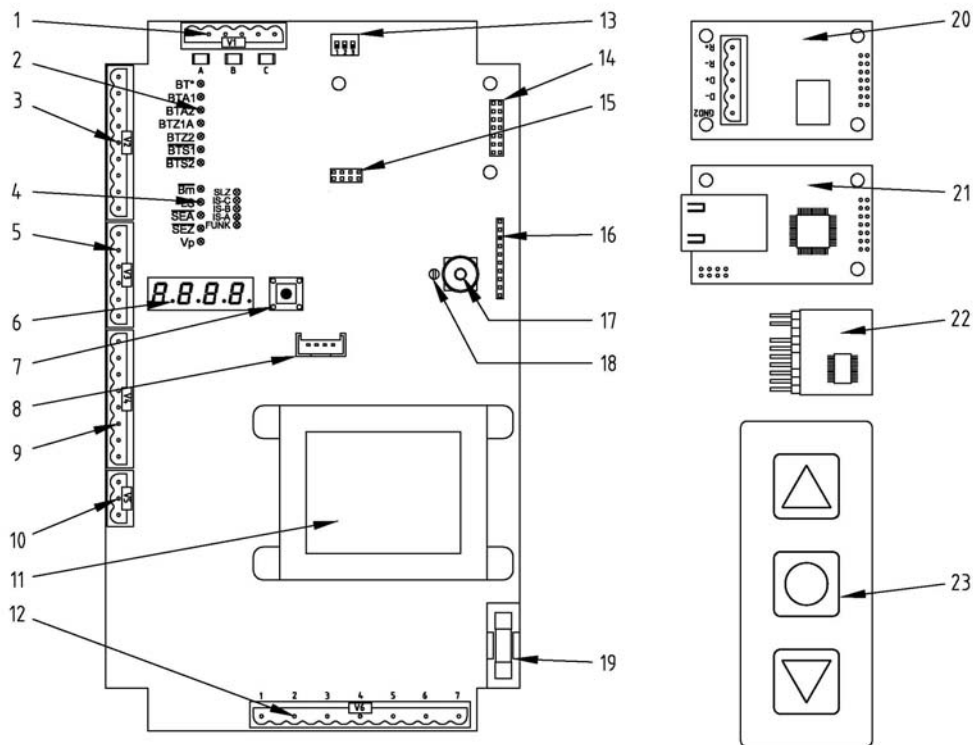## 1.3 Information regarding installation instruction

This document is to be used as installation instruction for partly completed machinery (according to machinery directive 2006/42/EG, article 13, (2)).

2 Controller MO 64

2.1 Connections der MO 64

2.1.1 Connection diagram 64

The following drawing shows an overview of the controller.

Drawing 1

1	Connection induction loops	13	DIP-switches frequency change induction loops
2	LED for push button	14	Socket 1 for additional board
3	Connection push button	15	Socket 2 for additional board
4	LED limit switches etc.	16	Socket for radio remote control receiver
5	Connection limit switches etc.	17	Antenna socket for coaxial plug
6	4x7 display	18	Antenna socket for 2.8mm blade terminal
7	Joystick	19	Microfuse T6,3A
8	Socket for foil keypad	20	Additional board for RS485 (optional)
9	Connection multi-functional relays	21	Additional board for TCP/IP (optional)
10	Connection DC power supply	22	Radio remote control receiver(optional)
11	Transformer	23	Foil keypad (optional)
12	Connection motor, mains etc.		

2.1.2   Inputs

Input	Contact	Function
BT BTA3 BTZ1B	n.o.	**Configurable input: BT or BTA3 or BTZ1B.** Preset is BT. **Configured as BT:** BT with sequential logic. The operating sequence of BT depends on the operating mode of the automatic closure and the counting function. When automatic closure is activated or when the counting function is deactivated, then BT closes the barrier when it is fully open. Otherwise it will be opened. When automatic closure is locked and the counting function is activated, then BT only opens and the counter of the counting function is incremented. Closing by BT is not possible. **Configured as BTA3:**same function as BTA1 and BTA2. **Configured as BTZ1B:**same function as BTZ1A.
BTA1	n.o.	**Push button OPEN 1 and 2 (when configured also BTA3).** The inputs BTA1, BTA2 and if applicable BTA3 are being evaluated independently of each another. An OPEN-command (flank) is triggered when one of the contacts is being closed. As long as one of the contacts is closed, the barrier cannot be closed (stay-open function). The stay-open time of the automatic closure is not triggered a new via BTA1 to BTA3.
BTA2	n.o.	
BTZ1A	n.o.	**Push button CLOSE 1A and if configured also BTZ1B**. The two inputs BTZ1A and BTZ1B are evaluated independent of each other. A CLOSE command (rising edge) is issued, when one of the contacts is being closed. When the barrier is completely closed and at least one of the contacts BTZ1A or BTZ1B is closed, then the barrier cannot be opened (locking function).
BTZ2	n.c.	**Push button CLOSE 2**. A CLOSE-command (rising edge) is issued, when the contact is opened. BTZ2 has no locking function in end position CLOSED.
BTS1	n.c.	**Push button Stop 1**. (e.g. desk-top panel). Evaluated is the contact status. When the contact is open the barrier stops. Stored commands are deleted. Automatic closure is locked until the next operating command.
BTS2	n.c.	**Push button Stop 2**. (e.g. emergency release). Evaluated is the contact status. When the contact is open the barrier stops. Stored commands are deleted. Automatic closure is locked until the next operating command.
Bm.	n.c.	The **Boom-missing contact** opens, when the barrier boom brakes off. When the contact is open the barrier shows the error message $E.r.0\,1$ on the display. Via bus system it can be configured if the barrier stops as long as boom-missing is reported or if only the error

Input	Contact	Function
		message is issued.
LS	n.c.	A system of up to six photoelectric barriers (LS), whose contacts are connected in series. The contact opens when the photoelectric barrier detects an obstacle. The LS is not monitored during opening. When LS reports an obstacle the barrier cannot be closed. The stay-open time of the automatic closure is not started a new (retriggering). Further functions: - photoelectric barrier testing (see page 27) - photoelectric barrier closing automatic (see page 26)
SEA SEZ	n.c.	Limit switches OPEN and CLOSED. The contact of the limit switch opens at the corresponding end position.
SLZ	8,2kOhm	Safety contact profile (SLZ) with 8.2kOhm resistor to secure the closing movement. When SLZ reports, closing is not possible. When SLZ reports during closing, stop and opening follows. SLZ is tested before every closing movement. When the test fails, closing is not possible. An error message is issued.
Antenna		An antenna with coaxial plug or blade terminal (2.8mm) can be connected.

Table1

2.1.3 Outputs

Output	Function
Motor	230Vac, max. 7A
Uext 24V	24Vdc, stabilized, short-circuit proof, monitored. Max. 500mA (in total with Uext 12V max. 700mA).
Uext 12V	12Vdc, stabilized, short-circuit proof, monitored. Max. 500mA (in total with Uext 24V max. 700mA).
Multi1 Multi2 Multi3 Multi4	The multi-functional relays Multi1 to Multi4 are potential-free contacts. With these contacts max. 24V / 1A can be switched. The relay-contacts are n.o. contacts. During power failure the contacts are open. For each relay the operating mode can be set individually. See page 22
Multi5	The multi-functional relay Multi5 can switch 230Vac / max. 120W. It is not potential-free. The function of the red traffic light is configurable – preset is the operating mode "red traffic light". See page 22
Multi6	The multi-functional relay Multi5 can switch 230Vac / max. 120W. It is not potential-free. The function of the red traffic light is configurable – preset is the operating mode "red traffic light". See page22

Table 2

2.1.4 LED display

Mark	Colour	Function
BT*	green	Is lit, when contact BT-BTA3-BTZ1B is closed.
BTA1	green	Is lit, when contact BTA1 is closed.
BTA2	green	Is lit, when contact BTA2 is closed.
BTZ1A	green	Is lit, when contact BTZ1A is closed.
BTZ2	green	Is lit, when contact BTZ2 is closed.
BTS1	green	Is lit, when contact BTS1 is closed.
BTS2	green	Is lit, when contact BTS2 is closed.
Bm.	green	Is lit, when contact boom missing is closed.
LS	green	Is lit, when contact LS is opened.
SEA	green	Is lit, when contact SEA is closed.
SEZ	green	Is lit, when contact SEZ is closed.
Vp	yellow	Is lit, when the operating voltage is switched on.
SLZ	red	Is lit, when the safety contact profile is activated.
IS-A IS-B IS-C	red	Is lit, when the corresponding induction loop is occupied.
Funk	red	Is lit, when the learned radio remote control code is received.
Display	red	Serves to set operating modes, parameters and displays error messages.

Table 3

2.1.5   Power supply

Teminal	Function
N	Neutral conductor, mains connection 230V, 50Hz
L1	Phase L1, mains connection 230V, 50Hz

Table 4

2.1.6   Connection for RS485-system

| Connecting terminal	Function
R+	Bus terminal resistor for lead D+
R-	Bus terminal resistor for lead D-
D+	Data line D+
D-	Data line D-
Gnd*	Ground connection / bus cable shielding

Table 5

The bus interface is galvanically isolated from the controller.

2.1.7   Connection for TCP/IP-module

Alternatively, instead of the RS485 bus system a TCP/IP module can be plugged on. The module then has an RJ45-socket.

2.2 Learning sequence
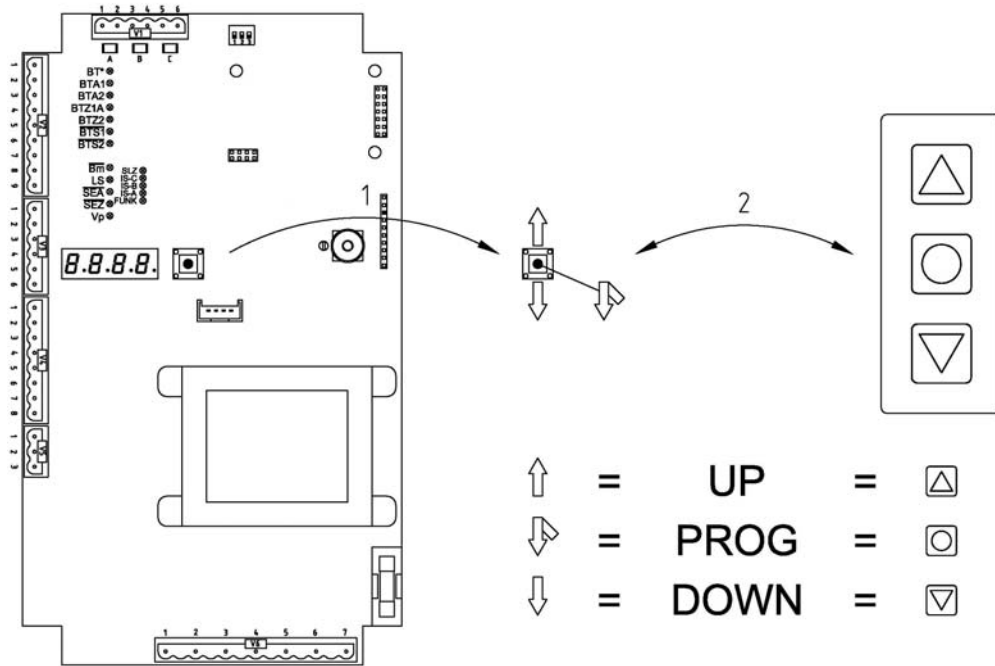
Drawing 2

To program the controller and to set the operating parameters a four-digit 7-segment-display and a joystick (1) are available on the control board. The joystick has the functions UP, DOWN, and PROG.

> A foil keypad (2) with three keys can be connected optionally. The three keys of the foil keypad correspond to the joystick-functions UP, DOWN, and PROG.

In the following description the writing format below will be used:

| UP	Push the joystick upwards or press the upper key of the foil keypad.
DOWN	Push the joystick downwards or press the lower key of the foil keypad.
PROG	Push the joystick down in the middle or press the central key of the foil keypad.

The Learning Sequence consists of the Main Sequence and the Sub-Sequences.

During normal operation the display is switched off. Only the decimal point of the units digit flashes as stand-by indicator and the decimal point of the thousands digit is lit, when a TCP-socket connection is established.

Navigation in the Learning Sequence using the joystick and the foil keypad

The Main Sequence is activated when **PROG** is pushed for a period of approx. 2s. The display then shows $P\ 100$. You may navigate within the Main Sequence using the functions **UP** and **DOWN**. When the required Main Sequence point is selected use **PROG** for activation. Now you can reach the

Sub-Sequence points e.g. P101. Using the functions **UP** and **DOWN** you may navigate within the Sub-Sequence. When the required Sub- Sequence point is selected use **PROG** for activation. Here the selected parameter can be set now. Using function **PROG** you reach the next Sub-Sequence point. In order to leave the Sub-Sequence, use **UP** or **DOWN** to navigate to the exit e.g. P1PP and push **PROG**. Now you automatically get to the next sequence point of the Main Sequence. In order to leave the Main Sequence, use **UP** or **DOWN** to navigate to the exit of the Main Sequence PPPP. Using **PROG** saves the data in the EEPROM and ends the learning sequence.
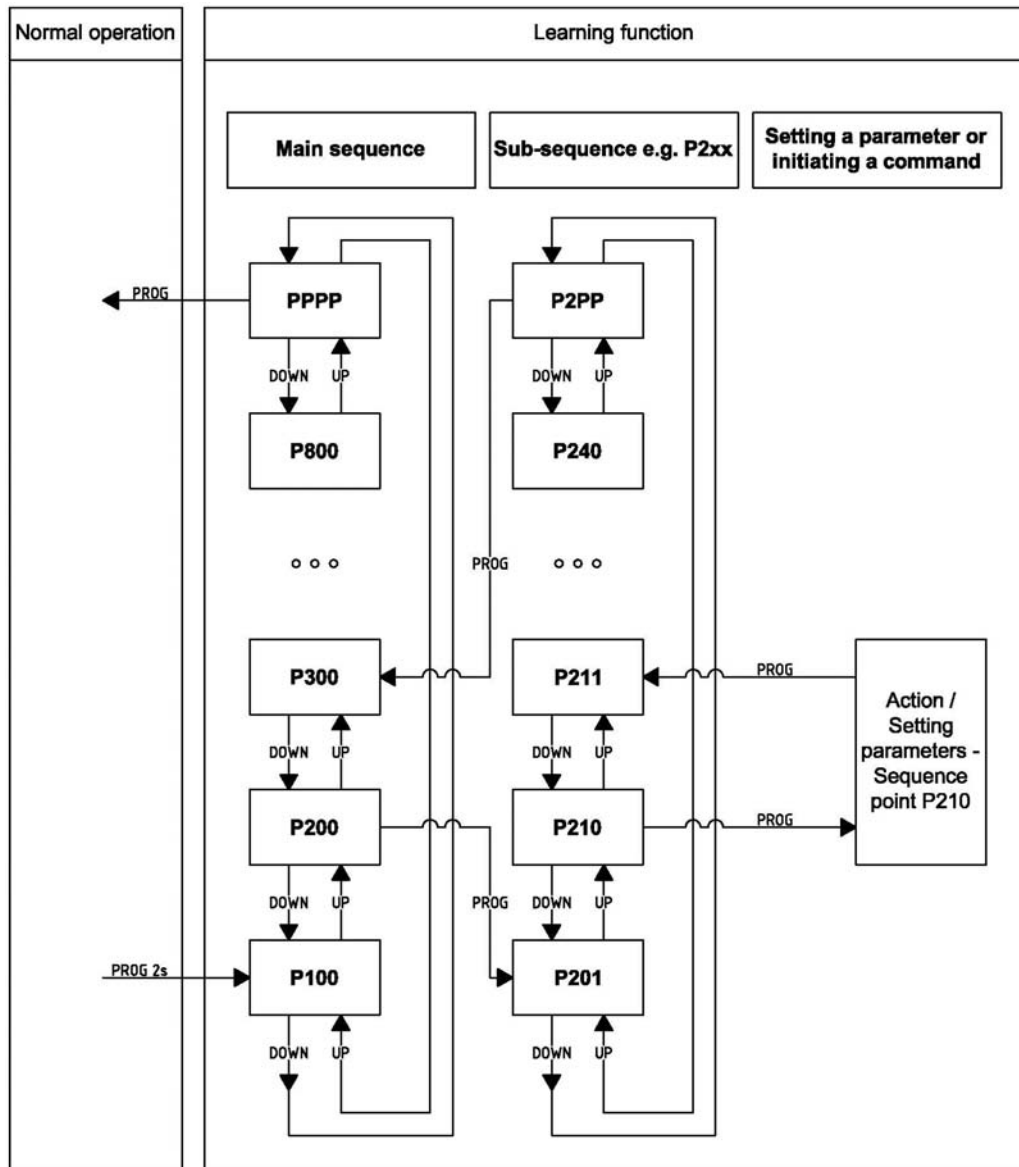
Drawing 3

Setting a number

The input of a number in the menu is always carried out the same way and therefore is only described at this point.

When activating a Sequence point where a number shall be set, the currently selected numerical value is shown in the display. Using **UP** the number can

be increased (+1). Using **DOWN** the number can be decreased (+1). The number can "scroll through", when **UP** or **DOWN** is kept actuated.

- When **UP** is kept actuated, after a delay of 1.3s the number will be increased by 10 every 0.3s.
- When **UP** is kept actuated further, after another delay of 3s the number will be increased by 100 every 0.4s.
- When **UP** is kept actuated further, after another delay of 4s the number will be increased by 1000 every 0.5s.

If the permissible maximum value is exceeded, the numeric value is set to the permissible maximum value.
If the displayed number has a decimal place, then this will be ("scrolled through") set to zero during automatic increasing of the number.
The decreasing using **DOWN** happens in the same manner.

When the required number is set, leave the Sequence point using **PROG**.

Main sequence	Sub-sequence	Starting page	Function
P100			Basic functions
	P101	16	Learning the running time, force, photoelectric barriers
	P102	17	Radio remote control code
	P1PP		Return to main sequence to P200
P200			Configuring the bus system
	P201	18	RS485 barrier address
	P210	18	IP address Byte 1
	P211	18	IP address Byte 2
	P212	18	IP address Byte 3
	P213	18	IP address Byte 4
	P220	18	Gateway address Byte 1
	P221	18	Gateway address Byte 2
	P222	18	Gateway address Byte 3
	P223	18	Gateway address Byte 4
	P230	18	Subnet mask Byte 1
	P231	18	Subnet mask Byte 2
	P232	18	Subnet mask Byte 3
	P233	18	Subnet mask Byte 4
	P240	18	Socket port number *ten thousands digit, thousands digit*
	P241	18	Socket port number *hundreds digit, tens digit, units digit*

Main sequence	Sub-sequence	Starting page	Function
	P2PP		Return to main sequence to P300
P300			Setting time
	P301	20	Setting stay-open time and switching automatic closure on/off.
	P302	20	Setting pre-warning before opening
	P303	20	Setting pre-warning before closing
	P3PP		Return to main sequence to P400
P400			Setting of counters
	P401	21	Setting maintenance interval
	P402	21	Display/erase service counter
	P410	21	Counting function, setting lower limit
	P411	21	Counting function, setting upper limit
	P4PP		Return to main sequence to P500
P500			Various operating modes
	P501	22	Operating mode for multi-functional relay 1 (Multi 1)
	P502	22	Operating mode for multi-functional relay 2 (Multi 2)
	P503	22	Operating mode for multi-functional relay 3 (Multi 3)
	P504	22	Operating mode for multi-functional relay 4 (Multi 4)
	P505	22	Operating mode for multi-functional relay 5 (Multi 5)
	P506	22	Operating mode for multi-functional relay 6 (Multi 6)
	P510	23	Red traffic light (RtApl) in end position CLOSED
	P511	23	Red traffic light (RtApl) at pre-warning before opening
	P512	23	Red traffic light (RtApl) at pre-warning before closing
	P513	23	Red traffic light (RtApl) during opening
	P514	23	Red traffic light (RtApl) during closing
	P515	23	Red traffic light (RtApl) at intermediate stop
	P516	23	Red traffic light (RtApl) in end position OPEN

Main sequence	Sub-sequence	Starting page	Function
	P520	24	Green traffic light (GnApl) in end position CLOSED
	P521	24	Green traffic light (GnApl) at pre-warning before opening
	P522	24	Green traffic light (GnApl) at pre-warning before closing
	P523	24	Green traffic light (GnApl) during opening
	P524	24	Green traffic light (GnApl) during closing
	P525	24	Green traffic light (GnApl) at intermediate stop
	P526	24	Green traffic light (GnApl) in end position OPEN
	P530	25	Warning light in end position CLOSED
	P531	25	Warning light at pre-warning before opening
	P532	25	Warning light at pre-warning before closing
	P533	25	Warning light during opening
	P534	25	Warning light during closing
	P535	25	Warning light at intermediate stop
	P536	25	Warning light in end position OPEN
	P540	25	Selection push button function BT-BTA3-BTZ1B
	P541		
	P542	26	Photoelectric barrier mode
	P543	26	Photoelectric barrier closing automatic
	P544	27	Photoelectric barrier testing
	P545	29	Induction loops – safety mode
	P546	29	Immediate closing
	P547	29	Dead man's mode
	P548	30	Interlocking after running time limitation
	P549	30	Boom-missing function
	P550		
	P5PP		Return to main sequence to P600
P600			Induction loops – basic settings
	P601	32	Sensitivity stage Loop A
	P602	32	Sensitivity stage Loop B

Main sequence	Sub-sequence	Starting page	Function
	P603	32	Sensitivity stage Loop C
	P610	33	Hold time Loop A
	P611	33	Hold time Loop B
	P612	33	Hold time Loop C
	P620	33	Loop readjustment counter Loop A
	P621	33	Loop readjustment counter Loop B
	P622	33	Loop readjustment counter Loop C
	P630	33	ELKA induction loop mode
	P6PP		Return to main sequence to P700
P700			Setting induction loop functions manually
	P701	35	Loop A: switching on / off
	P702	35	Loop A: function during entering the loop (safety)
	P703	35	Loop A: function when leaving the loop
	P704	35	Loop A: presence
	P711	35	Loop B: switching on / off
	P712	35	Loop B: function during entering the loop (safety)
	P713	35	Loop B: function when leaving the loop
	P714	35	Loop B: presence
	P721	35	Loop C: switching on / off
	P722	35	Loop C: function during entering the loop (safety)
	P723	35	Loop C: function when leaving the loop
	P724	35	Loop C: presence
	P730	35	Directional logic 1: input selection
	P731	35	Directional logic 1: opening and closing when passing from the left
	P732	35	Directional logic 1: opening and closing when passing from the right
	P733	35	Directional logic 1: vehicle counting when passing from the left
	P734	35	Directional logic 1: vehicle counting when passing from the right
	P735	35	Directional logic 1: opening and closing when entering the loop from the left
	P736	35	Directional logic 1: opening and closing

Main sequence	Sub-sequence	Starting page	Function
			when entering the loop from the right
	P737	35	Directional logic 1: reporting presence or blocking presence when entering the loopfrom the left
	P738	35	Directional logic 1: reporting presence or blocking presence when entering the loopfrom the right
	P740	35	Directional logic 2: input selection
	P741	35	Directional logic 2: opening and closing when passing from the left
	P742	35	Directional logic 2: opening and closing when passing from the right
	P743	35	Directional logic 2: vehicle counting when passing from the left
	P744	35	Directional logic 2: vehicle counting when passing from the right
	P745	35	Directional logic 2: opening and closing when entering the loop from the left
	P746	35	Directional logic 2: opening and closing when entering the loop from the right
	P747	35	Directional logic 2: reporting presence or blocking presence when entering the loop from the left
	P748	35	Directional logic 2: reporting presence or blocking presence when entering the loop from the right
	P7PP		Return to main sequence to P800
P800			Reset
	P801	38	Reset to ELKA factory settings
	P802	38	Reset to client's factory settings
	P8PP		Return to main sequence to PPPP
PPPP			Storing the data and exiting the learning sequence

Table 6

2.2.1 Sequence P100 – Basic functions

⚠	**WARNING!** **During programming of sequence point P101, the motor - and thus ALL moving parts – starts moving INDEPENDENTLY.** Rotating and/or linear movable components can cause serious injuries. ➢ Do not reach into moving parts or handle any moving components during operation.

ℹ	The following LEDs must light up during operational readyness of the barrier: • LED **BTS2** (emergency release) • LED **Bm.** (boom-missing contact) • LED **SEA** or **SEZ** (limit switch OPEN or limit switch CLOSED or both LEDs, during an intermediate position) • LED **Vp** (supply voltage)

2.2.1.1 P101 – Learning the barrier running time, force, photoelectric barrierfunction

When activating this sequence point the display shows $L \, r \, n \, 1$ and the following points are carried out:

- When photoelectric barrier testing is activated, the number of photoelectric barriers connected is learned.
- The barrier closes.
- The barrier opens and learns the running time to open.
- The barrier closes and learns the running time to close and the force required.

Now this point is completed and you return to sequence point P102.

ℹ	In sequence point P101 various errors can occur which might lead to a cancellation. In order to start the sequence point again, press **PROG** briefly. To cancel the function and to return to the main sequence press and hold **PROG** for approx. 5s.

Display	Corresponds to:
$L \, r \, n \, 1$	Learning in progress. OR When learning the running time the barrier only moves once in direction OPEN or CLOSED and then stops. Possible reasons: The motor is faulty or one of the motor leads (OPEN, CLOSE, or N) is not connected correctly.
$L \, r \, n \, 2$	An error occurred during learning of the photoelectric barriers (LS). Check the connection of the photoelectric barriers – see page 27.
$L \, r \, n \, 3$	The photoelectric barrier or the safety contact profile report an obstacle.
$L \, r \, n \, 4$	A stop-command was issued during learning of the barrier running time.
$L \, r \, n \, 5$	During each movement of the motor the motor capacitor voltage is

	monitored. When an error is detected the learning of the barrier running time is terminated and $L\,r\,n\,5$ is displayed. Possible reasons: The motor is faulty or one of the motor leads (OPEN, CLOSE, or N) is not connected correctly.

Table 7

2.2.1.2   P102 – Learning and deleting the radio remote control code

When activating this sequence point the display first shows if a radio remote control code is learned (display $HHHH$ / no code display $----$).

Learning the radio remote control code

Push **PROG** briefly. The display shows $5End$. Send the desired radio remote control code by activating the coded transmitter. When a code is received $oooo$ is displayed. Now you return to the main sequence (P1PP).

Deleting the radio remote control code

Push and hold **PROG**. The display shows $5End$. After 5s the display changes to $----$. Now release **PROG**. The radio remote control code is deleted. Now you return to the main sequence (P1PP).

Cancellation without changing the radio remote control code

Push **PROG** briefly. The display shows $5End$. Push **PROG** briefly onceagain. Now you return to the main sequence (P1PP).

2.2.2   Sequence P200 – Configuration the bus system

2.2.2.1   P201 – RS485 Barrier address

Here the RS485 bus address is set decimally. Allowed are the addresses **16** = 0x10 to **254** = 0xFE.

Factory setting: 16

2.2.2.2   P210-P213 – IP address

The 4 bytes of the IP address are set in decimal format under P210 to P213.

Example: for 192.168.0.200 perform the following settings:

- P210 = 192
- P211 = 168
- P212 = 0
- P213 = 200

Factory setting: 192.168.0.200.

2.2.2.3   P220-P223 – Gateway address

The 4 bytes of the gateway address are set in decimal format under P220 to P223.

Example: for 192.168.0.1 perform the following settings:

- P220 = 192
- P221 = 168
- P222 = 0
- P223 = 1

Factory setting: 192.168.0.1.

2.2.2.4   P230-P233 – Subnet mask

The 4 bytes of the subnet mask are set in decimal format under P230 to P233.

Example: for 255.255.255.0 perform the following settings:

- P230 = 255
- P231 = 255
- P232 = 255
- P233 = 0

Factory setting: 255.255.255.0.

2.2.2.5   P240-P241 – Socket port number

The socket port number is a 16-bit number with a range of 0 to 65535. The port number is divided into ten thousands and thousands digit, as well as hundreds, tens, and units digit. The ten thousands and thousands digit is set under P240. The hundreds, tens, and units digit is set under P241.

Example: for 52719 perform the following settings:

- P240 = 52
- P241 = 719

	When under P240 the number 65 is set, then only values from 000 to 535 can be set under P241. When under P241 a number > 535 is set, then only values from 00 to 64 can be set under 240. *Alternatively:* Under P240 you can select any number from 00 to 65 and under P241 any number from 000 to 999. When storing P240 the value in P241 is checked and if necessary automatically corrected and when storing P241 the value in P240is checked and if necessary automatically corrected, so that for the port number altogether a number within the range of 00000 to 65535 is set.

Factory setting: 52719 (=0xcdef)

2.2.3   Sequence P300 – Setting time

2.2.3.1   P301 – Stay-open time / Automatic closure

The barrier can close automatically. When automatic closure is selected, the learned stay-open time starts to run as soon as the barrier has reached the end position OPEN. The barrier closes automatically when the stay-open time has elapsed. The stay-open time for automatic closure can be set under P301 with a range of 0.0s to 655.0s. With a value of 0.0s the automatic closure is deactivated.

Factory setting: 0.0s = no automatic closure

i	When the barrier is open and a stop command is given, the automatic closure is locked. The automatic closure will only be unlocked again when a new command is given.
i	After power up or after completion of the learning, a completely open barrier with automatic closure selected closes after the stay-open time has elapsed.
i	The stay-open time of the automatic closure is not retriggered via BTA1 to BTA3.

2.2.3.2   P302 – Pre-warning time (opening)

Under sequence point P302 pre-warning time before opening can be set within the range of 0.0s to 655.0s. With a value of 0.0s the pre-warning time before opening is deactivated.

Factory setting: 0.0s = no pre-warning time before opening

2.2.3.3   P303 – Pre-warning time (closing)

Under sequence point P303 pre-warning time before closing can be set within the range of 0.0s to 655.0s. With a value of 0.0s the pre-warning time before closing is deactivated.

Factory setting: 0.0s = no pre-warning time before closing

2.2.4 Sequence P400 – Setting of counters

2.2.4.1 P401 – Maintenance interval

With each barrier movement the service counter is incremented (+1). A maintenance signal is issued when the service counter value is higher than the set maintenance interval. The maintenance message can be signalled e.g. through a multi-functional relay. The setting range is 1000 to 9999000 inmultiples of 1,000.

Factory setting: 250 (corresponds to 250,000)

> **i** The controller features an operating hour counter. Readout is possible via the bus system.

2.2.4.2 P402 – Service counter

Under sequence point P402 the value of the service counter can be displayed and deleted. With each barrier movement the service counter is incremented (+1). The service counter is displayed in multiples of 1,000 only.

Example: The display 3456 stands for more than 3,456,000 and less than 3,457,000 movements.

To leave this sequence point push **PROG** briefly. To delete the service counter and leave the sequence point push **PROG** for 5s.

2.2.4.3 P410-P411 – Upper and lower limit of the counting function

The barrier is controlled by a command counter. Each OPEN-command increments the counter (+1), each CLOSE-command decrements the counter (-1). The switching of the program counter from 0 to 1 actuates the opening, the switching of the program counter from 1 to 0 actuates the closing of the barrier.
The counter can be incremented to the upper limit and can be decremented to the lower limit. The adjustment range for the lower limit is -9 to 0 and for the upper limit 1 to 9.
Example: lower limit = 0, upper limit = 3
With 3 consecutive OPEN-commands the counter is set as follows: 0 – 1 – 2 – 3. The barrier opens once and remains in position OPEN.
With 2 consecutive CLOSE-commands the counter is set as follows: 3 – 2 – 1.The barrier remains in position OPEN. The switching from 1 to 0 and thus the closing of the barrier occurs only after another CLOSE-command.

Factory setting: upper limit = 1
Factory setting: lower limit = 0

2.2.5   Sequence P500 – Various operating modes

2.2.5.1   P501-P506 – Operating modes for multi-functional relay 1 to multifunctionalrelay 6

The controller features four potential-free multi-functional relays (Multi1 to Multi4) which can switch 24V/1A, as well as two multi-functional relays (Multi5 and Multi6) which can switch 230V/120W.

The operating mode of the six multi-functional relays can be selected according to the following table:

Display	Operating mode / Function
0	The multi-functional relay is deactivated.
1	Error: The multi-functional relay is activated when an error message is displayed on the controller.
2	Maintenance: The multi-functional relay is activated when the service counter value is higher than the set maintenance interval.
3	Boom-missing-message: The multi-functional relay is activated when the "boom-missing" contact is opened.
4	Tandem operation: The multi-functional relay is activated when the barrier is not in end position CLOSED. It is already active during pre-warning before opening.
5	Red traffic light: configuration see P510-P516 – Operating modes for red traffic light
6	Green traffic light: configuration see P520-P526 – Operating modes for red traffic light
7	Warning light: configuration see P530-P536 – Operating modes for warning light
8	LED boom lighting: The multi-functional relay is activated in end position CLOSED. In end position OPEN it is deactivated. In between the positions it flashes.
9	End position OPEN: The multi-functional relay is activated when the barrier is open. During pre-warning before closing (clearance time) the relay is already deactivated.
10	End position CLOSED / electromagnet: The multi-functional relay is activated when the barrier is closed. During pre-warning before opening the relay is already deactivated. REMARK: for the use with an electromagnet, additionally the prewarning time before opening has to be set to min. 1.5 seconds (P302).
11	Bus relay: the multi-functional relay is activated via the bus (switching on and off, 1-second-pulse).
12	Photoelectric barrier testing: the multi-functional relay activates the supply for the photoelectric barrier transmitters during photoelectric barrier testing (see 27).
13	Presence: The multi-functional relay is activated when the induction loop detection reports "presence".

Display	Operating mode / Function
14	Presence: The multi-functional relay is activated when the induction loop detection reports "presence".
15	Occupied message loop A - static: The multi-functional relay is activated when loop A is occupied.
16	Status message loop A: The multi-functional relay is activated when loop A is activated, is not faulty and not occupied.
17	Occupied message loop A - impulse: the multi-functional relay issues a pulse when loop A is being occupied.
18	Clearing message loop A - impulse: the multi-functional relay issues a pulse when loop A is being cleared.
19	Occupied message loop B - static: The multi-functional relay is activated when loop B is occupied.
20	Status message loop B: The multi-functional relay is activated when loop B is activated, is not faulty and not occupied.
21	Occupied message loop B – impulse: the multi-functional relay issues a pulse when loop B is being occupied.
22	Clearing message loop B – impulse: the multi-functional relay issues a pulse when loop B is being cleared.
23	Occupied message loop C - static: The multi-functional relay is activated when loop C is occupied.
24	Status message loop C: The multi-functional relay is activated, when loop C is activated, is not faulty and not occupied.
25	Occupied message loop C – impulse: the multi-functional relay issues a pulse when loop C is being occupied.
26	Clearing message loop C – impulse: the multi-functional relay issues a pulse when loop C is being cleared.

Table 8

> The multi-functional relays work independent from each other. Therefore it is possible to select the same function for more than one relay.

2.2.5.2   P510-P516 – Operating modes for red traffic light

The controller features two multi-functional relays for 230V. The multifunctional relay 6 is provided for a red traffic light but can also be used otherwise - see P501-P506 – Operating modes for multi-functional relay 1 to multifunctionalrelay 6.
The following table shows the possible operating modes for the red traffic light.

Sequencepoint	Function	Display	Operating mode	factory setting
P510	Red traffic light in end position CLOSED	0 1 2	off on flashing	on
P511	Red traffic light at prewarning before	0 1	off on	flashing

		2	flashing	
P512	Red traffic light at prewarning before closing	0 1 2	off on flashing	flashing
P513	Red traffic light during opening	0 1 2	off on flashing	on
P514	Red traffic light during closing	0 1 2	off on flashing	on
P515	Red traffic light during intermediate stop	0 1 2	off on flashing	on
P516	Red traffic light in end position OPEN	0 1 2	off on flashing	off

Table 9

2.2.5.3   P520-P526 – Operating modes for red traffic light

The controller features two multi-functional relays for 230V. The
multifunctionalrelay 5 is provided for a green traffic light but can also be
usedotherwise - see P501-P506 – Operating modes for multi-functional relay
1 to multifunctionalrelay 6.
The following table shows the possible operating modes for the green
trafficlight.

Sequence point	Function	Display	Operating mode	Factory setting
P520	Green traffic light in end position CLOSED.	0 1 2	off on flashing	off
P521	Green traffic light at prewarning before opening.	0 1 2	off on flashing	off
P522	Green traffic light at prewarning before closing.	0 1 2	off on flashing	off
P523	Green traffic light during opening.	0 1 2	off on flashing	off
P524	Green traffic light during closing.	0 1 2	off on flashing	off
P525	Green traffic light during intermediate stop.	0 1 2	off on flashing	off
P526	Green traffic light in end position OPEN.	0 1	off on	on

		2	flashing	

Table 10

2.2.5.4   P530-P536 – Operating modes for warning light

No separate relay is available for the warning light. The warning light can be connected to a multi-functional relay. The multi-functional relay has to be set to the operating mode warning light – see P501-P506 – Operating modes for multi-functional relay 1 to multifunctionalrelay 6.
The following table shows the possible operating modes for the warning light.

Sequence point	Function	Display	Operating mode	Factory setting
P530	Warning light in end position CLOSED	0 1 2	off on flashing	off
P531	Warning light at prewarning before opening	0 1 2	off on flashing	on
P532	Warning light at prewarning before closing	0 1 2	off on flashing	on
P533	Warning light during opening	0 1 2	off on flashing	on
P534	Warning light during closing	0 1 2	off on flashing	on
P535	Warning light at intermediate stop	0 1 2	off on flashing	off
P536	Warning light in end position OPEN	0 1 2	off on flashing	off

Table 11

2.2.5.5   P540 – Selection push button function BT-BTA3-BTZ1B

Only a mutual input is available for the functions BT, BTA3, and BTZ1B. Under sequence point P540 can be selected which function the input has.

Display	Function
0	BT – push button with sequence logic. The operating sequence of BT depends on the operating mode of the automatic closure and the counting function.
1	BTA3 – push button OPEN The barrier opens when the contact is closed.
2	BTZ1B – push button CLOSE. The barrier closes when the contact is closed.

Table 12

2.2.5.6   **P542 – Photoelectric barrier mode**

The controller monitors the photoelectric barrier input during closing of the barrier. Under sequence point P542 can be set how the controller shall react when the photoelectric barrier reports.

Display	Function
0	Stop and immediate opening
1	Stop

Table 13

The function "… and closing after clearance of the photoelectric barrier" is realized by the use of photoelectric barrier closing automatic (P543).

2.2.5.7   **P543 – Photoelectric barrier closing automatic**

When the photoelectric barrier closing automatic is activated, the photoelectric barrier generates a closing command each time an obstacle leaves the photoelectric barrier. Under sequence point P543 the photoelectric barrier closing automatic can be activated or deactivated.

Display	Function
0	Photoelectric barrier closing automatic is deactivated.
1	Photoelectric barrier closing automatic is activated.

Table 14

2.2.5.8   P544 – Photoelectric barrier testing

In order to perform a photoelectric barrier testing it is necessary that the supply of the photoelectric barrier transmitter/s can be activated and deactivated by the controller, e.g. Multi1 switches the supply voltage (24Vdc) of the photoelectric barrier transmitter.

Also the multi-functional relays 5 or 6 can be used, when the photoelectric barrier transmitters are supplied with 230Vac.

The photoelectric barrier testing consists of two phases.
During the first phase the photoelectric barrier transmitter is deactivated and it is waited that the photoelectric barrier receiver reports an obstacle within 2.5s. During the second phase the photoelectric barrier transmitter is activated again and it is waited that the receiver reports that no obstacle is present. Only after that the closing starts.
When an error occurs during the first phase, the photoelectric barrier is faulty (error message $Er.10$).
When an error occurs during the second phase, it is assumed that an obstacle is present. The closing is interrupted. An error message is not issued.

With the controller MO 64 up to 6 photoelectric barriers can be connected and tested. Therefore all relay outputs of the receivers are connected in series.

The MO 64 has to learn how many photoelectric barriers are connected. Therefore one resistor of 1kOhm has to be connected parallel to the relay contacts of each receiver. Then the photoelectric barrier testing has to be activated and the running distance of the barrier has to be learned (P101). Now each photoelectric barrier has to be tested for correct functioning.

Function example:six photoelectric barriers are connected to the MO 64 (supply voltage 24Vdc). One 1kOhm resistor is switched parallel to the output of each photoelectric barrier. The supply voltage of the photoelectric barrier transmitters is switched via the multi-functional relay 1.
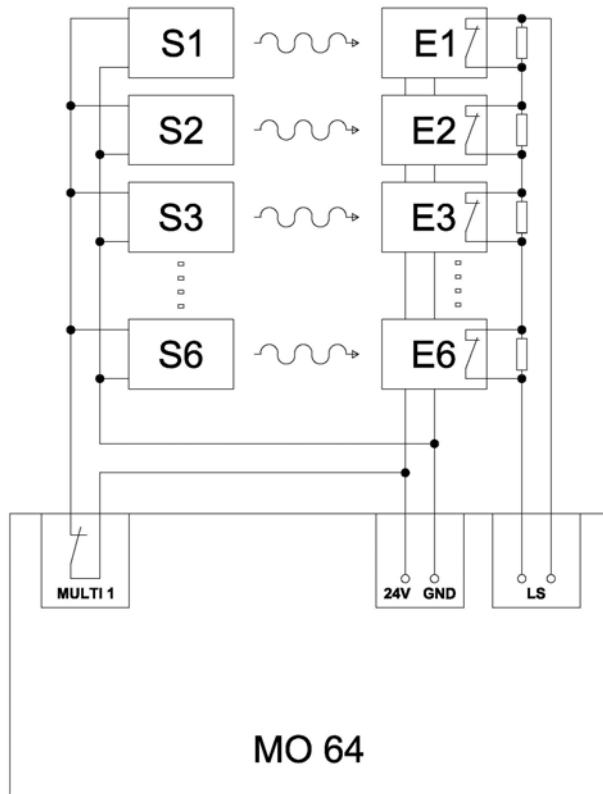
Drawing 4

| S1 – S6 | Photoelectric barrier - transmitter |
| E1 – E6 | Photoelectric barrier - receiver |

Under sequence point P544 can be selected if the photoelectric barrier testing is activated or deactivated.

Display	Function
0	Photoelectric barrier testing is deactivated.
1	Photoelectric barrier testing is activated.

Table 15

2.2.5.9   P545 – Induction loops - safety mode

One or more induction loops can have the function "safety". Under P545 is determined, which function shall be activated by the induction loop during safety mode.

Display	Function
0	Stop and immediate opening
1	Stop (="FREEZE")

Table 16

> The function "… and closing after clearance of the induction loop" is realized by activating the function "Closing when leaving the loop" at the corresponding loop.

> FREEZE: Set the parameter P545 to 1. Additionally activate the function "Closing when leaving the loop" under the parameters P703, P713, and P723 at the corresponding loop.

2.2.5.10   P546 – Immediate closing

Under sequence point P546 can be selected, how the barrier should react if a closing command is issued during the opening movement.

Display	Function
0	The closing command is stored, i.e. the barrier first opens completely and then at the end position OPEN executes the closing command.
1	The closing command is executed immediately, i.e. the barrier stops and then closes instantly.

Table 17

2.2.5.11   P547 – Dead man's mode

Under P547 is specified, if the barrier shall work in dead man's mode or in self-holding function.
In dead man's mode the barrier can only be opened andclosed by OPEN- and CLOSE-commands, **as long as the command is actually present.**
OPEN-commands are signals at the inputs: BTA1, BTA2 and BTA3,additionally the command "BUS_BA_Pegel" via the bus system.
CLOSE-commands are signals at the inputs: BTZ1A, BTZ1B und BTZ2,additionally the command "BUS_BZ_Pegel " via the bus system.

Display	Function
0	Self-holding function
1	Dead man's mode

Table 18

> The safety devices LS, SLZ, force, and safety by induction loops are active during closing and cause stop.

For the function "Dead man's mode", a bridge between 5top and 5bottom has to be set at the terminal row X1 (alternatively a switch with an n.c. contact).

2.2.5.12 P548 – Running time limitation

When a limit switch is faulty or misaligned and thus does not report that the end position has been reached, then the controller switches the motor off after 125% of the learned running time. Under P548 can be selected if the controller remains operable or if it interlocks.

Display	Function
0	No interlocking after switching-off by running time limitation.
1	Interlocking after switching-off by running time limitation.

Table 19

2.2.5.13 P549 – Boom-missing function

Under sequence point P549 can be selected, if an error message "Boommissing" is generated and the barrier stops when the boom-missing contact is interrupted or if only the error message "Boom-missing" is generated and the barrier can continue to be operated.

Display	Function
0	No stop at boom-missing message
1	Stop at boom-missing message

Table 20

2.2.6 Sequence P600 – Induction loops – basic settings

2.2.6.1 Technical data (loop detectors)

Loop inductivity	Permissible range: 30µH to 450µH Recommended range: 50µH to 300µH
Loop resistance	< 8Ohm (incl. supply line)
Protection circuitry	Galvanic isolation (1kV electrical strength)

Table 21

2.2.6.2 Induction loop detection

The induction loop detection of the MO 64 consists of three detectors, two directional logics and one vehicle counter. Numerous operating modes are possible through different combinations.

For each induction loop A, B, and C a detector is available. When a vehicle drives on the loop, the loop's inductivity drops. If thereby the switching threshold is exceeded, then the detector reports "Loop occupied".

2.2.6.3 Frequency range

Using a DIP switch the loop frequency can be switched between Hi and Lo for each induction loop. The three loops of the MO 64 work in multiplex mode and do not interfere with each other. However if nearby another / external loop is operated, which coincidentally works with the same frequency, this may lead to disturbances. In this case the operating frequency of the loop of the MO 64 can be changed using the dip switch.
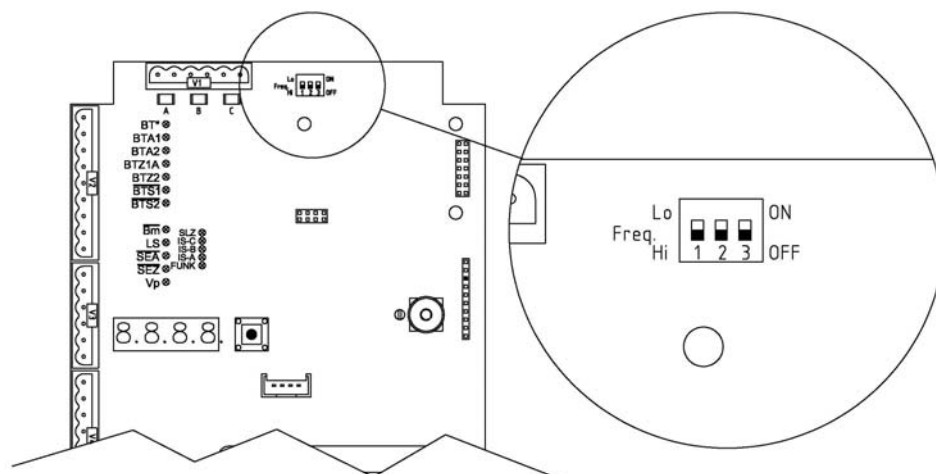
Drawing 5

DIP	Setting	Loop	Frequency
1	OFF	A	High frequency

	ON	A	Low frequency
2	OFF	B	High frequency
	ON	B	Low frequency
3	OFF	C	High frequency
	ON	C	Low frequency

Table 22

2.2.6.4   P601-P603 – Sensitivity stages of loops A, B, C

The sensitivity of the induction loops is adjustable in 8 steps. Each loop can be adjusted individually. The frequency of the induction loops is learned. When a vehicle drives over a loop the frequency changes. The more sensitive a loop detection is adjusted, the smaller the frequency changes which can be detected.
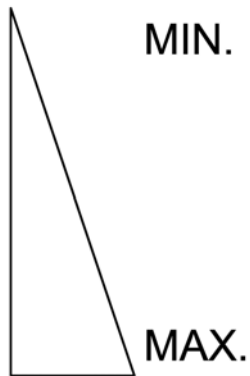
Sequency point	Loop	Setting range	
		Stage	Sensitivity
P601 P602 P603	Loop A Loop B Loop C	0	MIN. MAX.
		1	
		2	
		3	
		4	
		5	
		6	
		7	

Table 23

2.2.6.5   P610-P612 – Hold time stages of loops A, B, C

Is the barrier occupied for longer than the adjusted hold time, a readjustment of the loop is performed.
Is the hold time "infinite" („∞") selected, no readjustment is performed.

⚠	**ATTENTION!**
	If "Closing when leaving the loop" is selected under sequence point P702, P713, or P723, the barrier closes after readjustment independently.

Sequence point	Loop	Setting range	
		Stage	Hold time
P610 P611 P612	Loop A Loop B Loop C	0	5 minutes
		1	30 minutes
		2	1 hour
		3	∞

Table 24

ℹ	Is the hold time set to "infinite", then through temperature drift while the loop is occupied, the leaving of the loop cannot be detected anymore.

ℹ	Is a finite hold time selected and a vehicle stays on the loop, then after expiry of the hold time a readjustment of the loop will be executed. The loop will report "not occupied", even though a vehicle stands on the loop.

ℹ	For passenger car traffic only and a lower sensitivity stage, a longer hold time can be selected. For a very high sensitivity stage, a short hold time should be selected.

2.2.6.6   P620-P622 – Loop readjustment counter display and deletion

Each totally completed readjustment of each induction loop is counted. The counter can count up to 9999.
Sequence point P620 is for loop A, P621 is for loop B, and P622 is for loop C.

To delete the counter and leave the sequence point push **PROG** for 5s.

To leave the sequence point push **PROG** briefly.

2.2.6.7   P630 – Induction loop mode

In chapter Examples with induction loops starting on page 45 eight examples for induction loops are described. The settings of the loop logic for these examples are stored in the controller. Only the number of the mode has to be set.

Alternatively you can adjust the loop logic manually, as described in chapter Sequence P700 – Induction loop free operating mode starting onPage 35.

By activating of sequence point P630 it is checked if the current configuration of the loop logic corresponds to one of the predefined modes.
When it corresponds, the number of the mode is displayed, otherwise the number "9" is displayed.

Display	Description	See also

0	All loops deactivated	
1	Mode 1 – Safety and closing with one loop	Page 45
2	Mode 2 – Safety and closing with two loops	Page 46
3	Mode 3 – Opening, safety and closing with two loops	Page 47
4	Mode 4 – Presence, safety and closing with two loops	Page 49
5	Mode 5 – Presence, opening, safety and closing with three loops	Page 50
6	Mode 6 – Opening with directional logic, safety and closing with three loops	Page 51
7	Mode 7 – Opening, safety and closing with three loops	Page 52
8	Mode 8 – Opening, safety and closing with three loops	Page 54
9	The set operating mode does not correspond to any of the predefined loop modes. The set operating mode is not changed if the sequence is left at this point.	

Table 25

2.2.7 Sequence P700 – Induction loop free operating mode

2.2.7.1 P701-P724 – Setting the loop logic for loop A, B, or C

The following table shows which parameters can be selected for the free configuration of the loop logic for loop A, B, or C.

Description sequence point	Mode	Function	Sequence point for loop A	Sequence point for loop B	Sequence point for loop C
Activation/deactivation	0	loop deactivated	P701	P711	P721
	1	loop activated			
Function during driving on the loop/safety	0	no function	P702	P712	P722
	1	safety			
	2	opening			
	3	opening and safety			
	4	closing			
Function when leaving the loop	0	no function	P703	P713	P723
	1	closing			
Presence	0	no function	P704	P714	P724
	1	reporting presence			
	2	blocking presence			

Table 26

2.2.7.2 P730-P748 – Setting directional logic 1 and directional logic 2

The signals "Loop occupied" of two loops each can be evaluated by the directional logic (1 or 2). Thus it is identifiable if a vehicle has driven **on** the two loops from a certain direction or if a vehicle has driven **over** the two loops from a certain direction.

The following steps have to be set for a directional logic:

- Induction loops which are to be combined with a directional logic have tobe activated under 2.2.7.1 - P701-P724 – Setting the loop logic for loop A, B, or C.
- Then select under P730 or. P740 which induction loops shall be evaluated by the directional logic.
- Now it can be configured what effect these signals shall have on the controller.

The message driving on the loop can e.g. be used for the presence detection. The message passing over the loop can e.g. be used for the vehicle counting.

> ℹ️ The loops used for the directional logic may be placed max. one vehicle length apart from each other.

Description sequence point	Mode	Set-up / Function	Sequence point for directional logic 1	Sequence point for directional logic 2
Allocation of the inputs	0	deactivated	P730	P740
	1	left – loop A right – loop B		
	2	left – loop B right – loop A		
	3	left – loop A right – loop C		
	4	left – loop C right – loop A		
	5	left – loop B right – loop C		
	6	left – loop C right – loop B		
Opening or closing when passing from the left	0	no function	P731	P741
	1	opening		
	2	closing		
Opening orclosing whenpassing fromthe right	0	no function	P732	P742
	1	opening		
	2	closing		
Vehicle countingwhen passing from the left	0	no function	P733	P743
	1	increment counter (+1)		
	2	decrement counter (-1)		
Vehicle counting when passing from the right	0	no function	P734	P744
	1	increment counter (+1)		
	2	decrement counter (-1)		
Opening andclosing whenentering fromthe left	0	no function	P735	P745
	1	opening		
	2	closing		
Opening and closing when entering from the right	0	no function	P736	P746
	1	opening		
	2	closing		
Reporting or	0	no function	P737	P747

blocking presence when entering from the left	1	reporting presence		
	2	blocking presence report		37
Reporting or blocking presence when entering from the right	0	no function	P738	P748
	1	reporting presence		
	2	blocking presence report		

Table 27

2.2.8   Sequence P800 – Factory settings
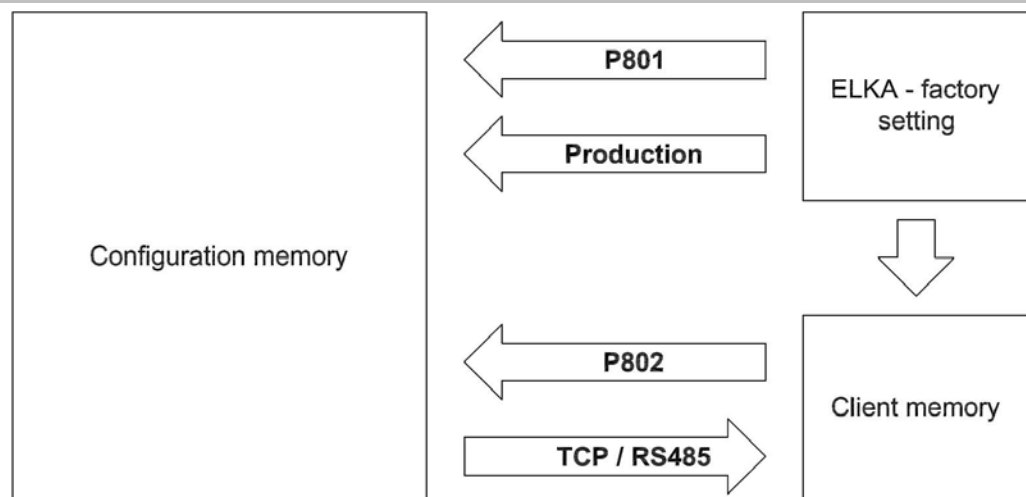
Drawing 6

When the controller is dispatched, the configuration memory and the client memory are preset with the factory setting. During operation the controller works with the parameters of the configuration memory. During learning and configuring, whether learning the running distance, configuring by display and joystick or via bus, the data in the configuration memory are changed and stored.

Only with a command via bus system the complete contents of the configuration memory can be transferred to the client memory. Also data like motor running time will be transferred to the client memory. However data like service counter, maintenance counter, or error memory etc. will not be transferred.

> **i**   Writing on the client memory via the learning sequence is not possible.

When resetting to factory settings, it is distinguished between transferring the factory setting or the contents of the client memory into the configuration memory.

> **i**   The transferring of the client memory to the configuration memory can only be realized via the learning sequence and not via the bus system.

2.2.8.1   P801 – Reset to factory settings

To reset the controller to the factory settings, sequence point P801 is activated. The display shows ⌐ E - 0. Now press **PROG** for 5s. The display shows 0000 and the factory setting is re-established. After that the sequence point is left. Is **PROG** pushed only briefly, the sequence point is left without changing the data.

2.2.8.2   P802 – Reset to client's factory settings

To reset the controller to the client's factory settings, sequence point P802 is activated. The display shows ⌐ E - 1. Now press **PROG** for 5s. The display shows 0001 and the client's factory setting is re-established. After that the sequence point is left. Is **PROG** pushed only briefly, the sequence point is left without changing the data.

Only by command **via the bus system** the complete content of the configuration memory can be **transferred to the client memory**. Therby also data like motor running time are transferred into the client memory. Not transferred are data like service counter, maintenance counter and error memory etc.

Writing into the client memory is not possible via the learning sequence.

2.2.8.3   Factory settings

Main sequence	Sub-sequence	Factory settings
P100		
	P101	30s
	P102	- + - + - + - + -
	P1PP	
P200		
	P201	16
	P210	192
	P211	168
	P212	0
	P213	200
	P220	192
	P221	168
	P222	0
	P223	1
	P230	255
	P231	255
	P232	255
	P233	0
	P240	52
	P241	719
	P2PP	
P300		
	P301	0s
	P302	0s
	P303	0s
	P3PP	
P400		

Main sequence	Sub-sequence	Factory settings
	P401	250000
	P402	
	P410	0
	P411	1
	P4PP	
P500		
	P501	0
	P502	0
	P503	0
	P504	12
	P505	5
	P506	6
	P510	1
	P511	2
	P512	2
	P513	1
	P514	1
	P515	1
	P516	0
	P520	0
	P521	0
	P522	0
	P523	0
	P524	0
	P525	0
	P526	1
	P530	0
	P531	1
	P532	1
	P533	1
	P534	1
	P535	0
	P536	0
	P540	0
	P541	xxxx

Main sequence	Sub-sequence	Factory settings
	P542	0
	P543	0
	P544	0
	P545	0
	P546	0
	P547	0
	P548	1
	P549	0
	P550	xxxx
	P5PP	
P600		
	P601	4
	P602	4
	P603	4
	P610	3
	P611	3
	P612	3
	P620	
	P621	
	P622	
	P630	0
	P6PP	
P700		
	P701	0
	P702	0
	P703	0
	P704	0
	P711	0
	P712	0
	P713	0
	P714	0
	P721	0
	P722	0
	P723	0
	P724	0

Main sequence	Sub-sequence	Factory settings
	P730	0
	P731	0
	P732	0
	P733	0
	P734	0
	P735	0
	P736	0
	P737	0
	P738	0
	P740	0
	P741	0
	P742	0
	P743	0
	P744	0
	P745	0
	P746	0
	P747	0
	P748	0
	P7PP	
P800		
	P801	
	P802	
	P8PP	
PPPP		

Table 28

2.3 Error messages

Error messages may be acknowledged by pushing **PROG** briefly. The barrier is operational again until the next error message is issued.

The controller monitors 18 different operating parameters and if an error occurs it generates and displays an error message.

Display	Telegram description	Corresponds to
Er.01	f_baum_ab	The contact boom missing is open.
Er.02	f_fehler_sea_defekt	Limit switch OPEN is faulty / misaligned. Check the limit switch OPEN.
Er.03	f_fehler_sez_defekt	Limit switch CLOSED is faulty / shifted. Check the limit switch CLOSED.
Er.04	f_fehler_sea_sez_gleichzeitig	Both limit switches report at the same time. Check the limit switches.
Er.05	f_uext_12v_defekt	Uext 12V is not within the permitted range (overload). Check the connection.
Er.06	f_uext_24v_defekt	Uext 24V is not within the permitted range (overload). Check the connection.
Er.07	f_schleife_a_defekt	The frequency of loop A, B or C is not within the permitted range. Check the induction loop. If necessary change the frequency range.
Er.08	f_schleife_b_defekt	
Er.09	f_schleife_c_defekt	
Er.10	f_lstest_fehler	An error occurred during photoelectric barrier testing. Check the photoelectric barriers.
Er.11	f_slztest_fehler	An error occurred during safety contact profile testing. Check the safety contact profile.
Er.12	f_uc_lern_fehler	The reference value for the power reversal could not be learned. Check motor and motor capacitor.
Er.13	f_relais_defekt	An error in the power element was detected. A relay is faulty (the controller locks).
Er.14	f_triac_defekt	An error in the power element was detected. The triac is faulty (the controller locks). Remark: In case one of the motor leads OPEN or CLOSE is not connected, the controller also

		detects a fault in the power element. Please check first if the motor is connected correctly.
$Er.15$	f_fehler_registertest	An error occurred in the control logic. The controller is faulty.
$Er.16$	f_fehler_stopredundanz	An error occurred in the control logic. The controller is faulty.
$Er.17$	f_eeprom_defekt	EEPROM-error 1. The controller is faulty.
$Er.18$	f_eeprom_checksummenfehler	EEPROM-error 2. Reprogram the controller.

Table 29

i If an error occurs, its number will be displayed. If several errors occur at the same time, the numbers will be displayed successively.

i The controller has a 10-step error memory. With each change the current error status will be stored together with the operating hours counter as timestamp. The error memory can be queried and analyzed via the bus system.

2.4 Examples with induction loops

Following the examples are described for the preprogrammed induction loop functions of page 33 - P630 – Induction loop modeIt is shown how the required function can be realized by induction loop detection and directional logic. For the examples described the controller provides pre-settings which can be selected via the mode number.

2.4.1 Mode 1 – Safety and closing with one loop
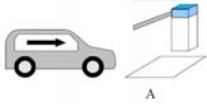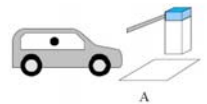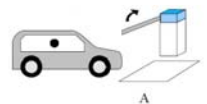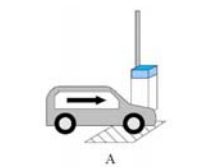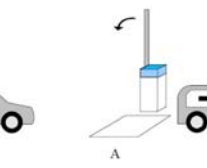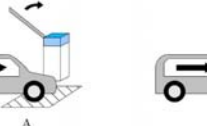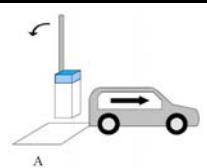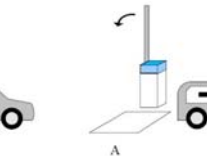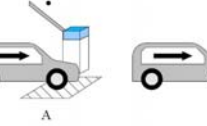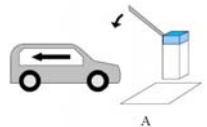
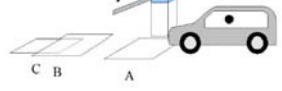|	
	The vehicle drives to the barrier.
	The vehicle stops in front of the barrier.
	The barrier is opened by an external command (push button, radio remote control, bus system etc.).
	The vehicle passes the barrier. Safety by loop A.
	After passing the barrier it closes. The closing command is issued when leaving loop A.
	Induction loops-Safety (P545 = 0) The barrier opens, when a vehicle drives on loop A during closing.
	After passing the barrier it closes. The closing command is issued when leaving loop A.
	Induction loops-Safety (P545 = 1) After passing the barrier it closes. The closing command is issued when leaving loop A.
	The barrier stops, when a vehicle drives on loop A during closing.
	After driving backwards and clearing loop A the barrier closes.

Table 30

2.4.2   Mode 2 – Safety and closing with two loops
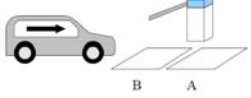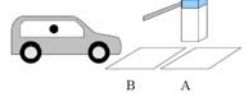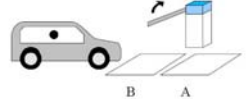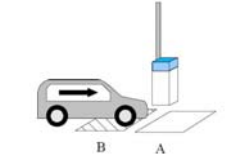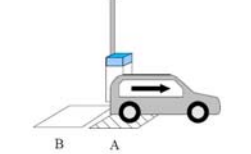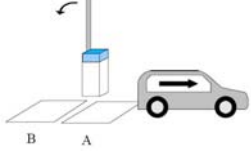
	The vehicle drives to the barrier.
	The vehicle stops.
	The barrier is opened by an external command.
	Safety by loops A and B.
	When leaving loop B a closing command is issued, but safety through loop A is active.
	When leaving loop A a closing command is issued.

Table 31

2.4.3 Mode 3 – Opening, safety and closing with two loops
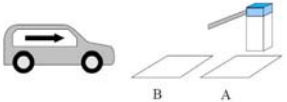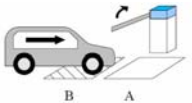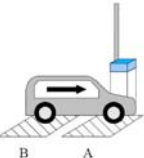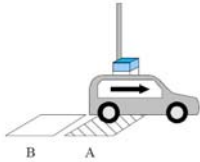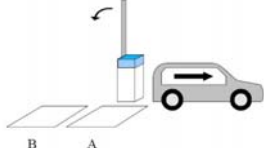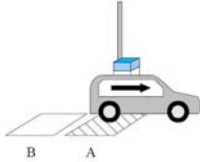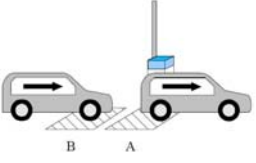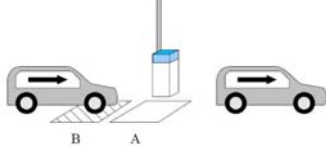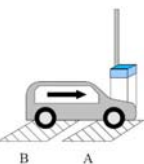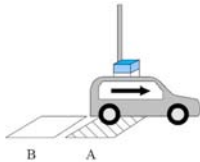
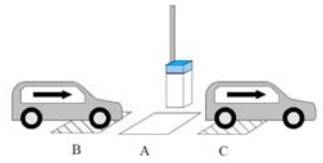|	
	The vehicle drives to the barrier.
	When driving on loop B the barrier opens.
	The distance between loop B and A has to be less than the length of the vehicle.
	When leaving loop B a closing command is issued. Yet the barrier remains open, since safety through loop A is active.
	When leaving loop A the barrier closes.

Table 32

Behaviour when a second vehicle follows:

	When leaving loop B a closing command is issued. Yet the barrier remains open, since the safety loop A is occupied.
	When the second vehicle drives on loop B an opening signal is issued. At the same time the barrier is kept open by the first vehicle on loopA.
	When the first vehicle leaves loop A a closing command is issued. In order to prevent the barrier from closing, also safety on loop B has to be activated.
	Then safety by loop A and B.
	When leaving loop B a closing command is issued. Yet the barrier remains open, since safety through loop A is active.
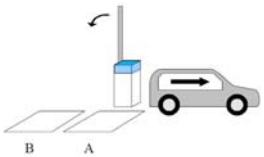
	When leaving loop A the barrier closes.

Table 33

Behaviour when a vehicle drives backwards:
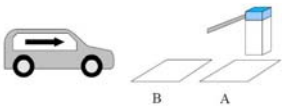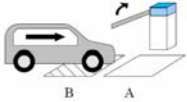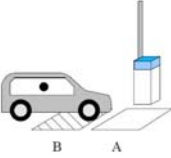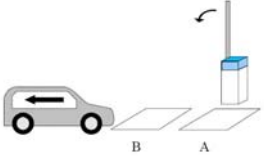
	The vehicle drives to the barrier.
	When driving on loop B the barrier opens.
	The vehicle stops. The barrier remains open.
	The vehicle drives backwards. When leaving loop B the barrier closes.

Table 34

2.4.4   Mode 4 – Presence, safety and closing with two loops
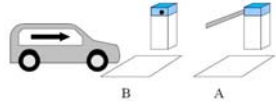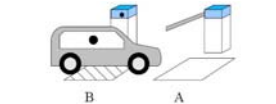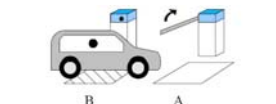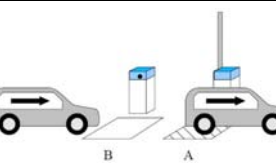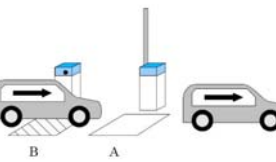
	The vehicle drives to the barrier.
	The vehicle stops on loop B. The barrier controller reports the presence to the ticket dispenser.
	The barrier is opened by an external command.
	The vehicle can pass. When leaving loop B a closing command is issued, but safety through loop A is active. The second vehicle can drive up.
	When the first vehicle leaves loop A, a closing command is issued. Loop B reports the presence to the ticket dispenser. The ticket dispenser can issue an external opening command. The barrier remains open.

Table 35

2.4.5 Mode 5 – Presence, opening, safety and closing with three loops
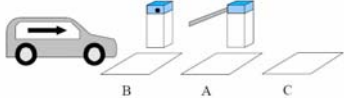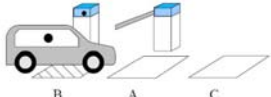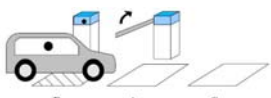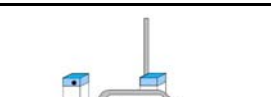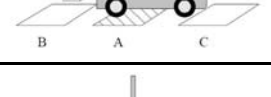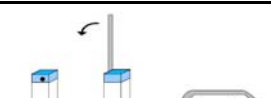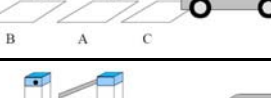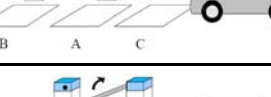
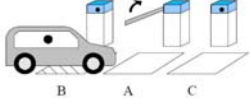|	
	The vehicle drives to the barrier.
	The vehicle stops on loop B. The barrier controller reports the presence to the ticket dispenser.
	The barrier is opened by an external command.
	When leaving loop B a closing command is issued. Safety by loop A.
	When leaving loop A a closing command is issued but is not executed, since by occupying loop C an opening command is issued and safety by loop C is active.
	Leaving of loop C closes the barrier.
	The vehicle drives to the barrier.
	When driving on loop C the barrier opens.
	When leaving loop C a closing command is issued but is not executed since safety by loop A is active.
	When leaving loop A the barrier closes. Loop B issues a presence report as long as the barrier is occupied, but has no opening or safety function.

Table 36

2.4.6 Mode 6 – Opening with directional logic, safety and closing with three loops
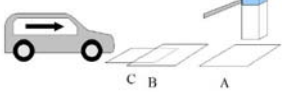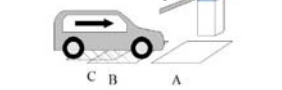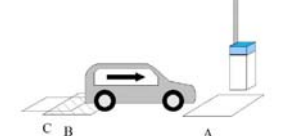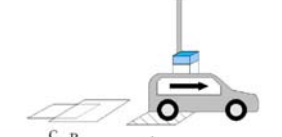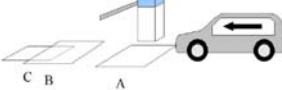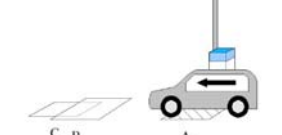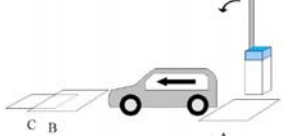
	The vehicle drives to the barrier.
	The vehicle drives on loop C. There is no opening command issued yet.
	The vehicle additionally drives on loop B. Now an opening command is issued.
	When passing loop C and B from the left side no closing command issued.
	Safety by loop A.
	Leaving loop A closes the barrier.
	The vehicle drives to the barrier.
	The barrier is opened by an external opening command.
	Safety by loop A.
	Leaving loop A closes the barrier.
	When passing loop B and C from the right side no further commands are issued.

Table 37
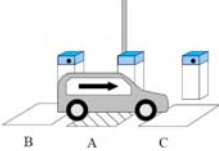
2.4.7   Mode 7 – Opening, safety and closing with three loops
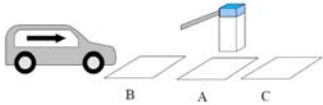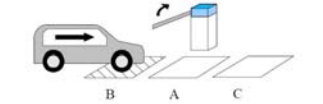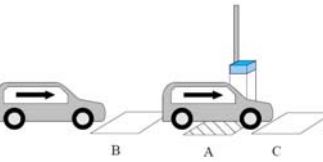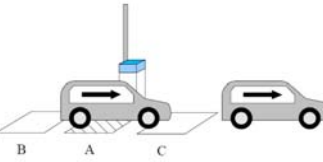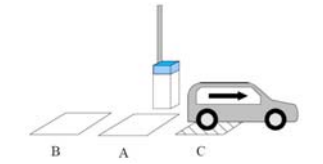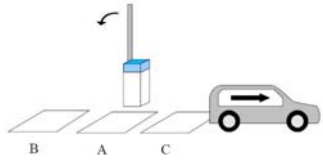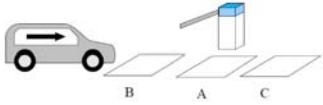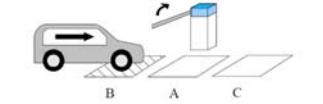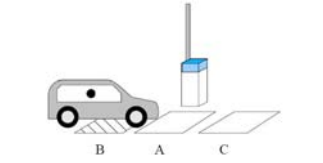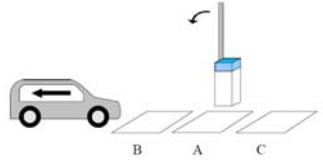
	The vehicle drives to the barrier.
	When driving on loop B the barrier opens.
	The first vehicle passes the barrier. When leaving loop B a closing command is issued. Safety by loop A.
	When the second vehicle drives on loop B an opening command is issued. Leaving loop A issues a closing command which is overwritten since safety by loop C is active.
	When leaving loop B a closing command is issued. When leaving loop C a closing command is issued. The barrier remains open since safety on loop A is active.
	When leaving loop A a closing command is issued. But since safety by loop C is active, the barrier remains open.
	When leaving loop C, the barrier closes.
	The vehicle drives to the barrier.
	When driving on loop B the barrier opens.
	The vehicle stops. Safety on loop B.
	The vehicle drives back, the barrier closes.

Table 38

The functions described above also apply to the opposite direction.

2.4.8   Mode 8 – Opening, safety and closing with three loops
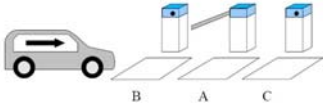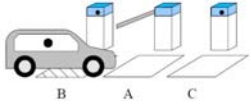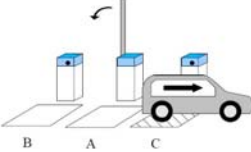
	The vehicle drives to the barrier.
	When driving on loop B presence is reported. Remark: The presence is reported to bothticket dispensers.
	The ticket dispenser issues an opening command. The barrier opens.
	The vehicle passes the barrier. Safety by loop A.
	Leaving of loop A closes the barrier.
	Loop C reports the presence. Remark: The presence is reported to both ticket dispensers.

Table 39

i	The functions described above also apply to the opposite direction.

Index