mfzovitor
drive technology

EN

Operating Instructions
RS 400 Gate Controls

1. Contents

2. Information in this document

Original operating instructions

– Copyright.
– No part of these instructions may be reproduced without our prior approval.
– Subject to alterations in the interest of technical progress.
– All dimensions given in mm.
– The diagrams in this manual are not to scale.

Key to symbols

⚠ DANGER!

Indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

⚠ WARNING!

Indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

⚠ CAUTION!

Indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

⚠ ATTENTION!

Indicates an imminent danger of damage or destruction.

☑ CHECK

Indicates a check to be performed.

ⓘ REFERENCE

Reference to separate documents which must be complied with.

☞ Action request

– List, itemisation

➔ Reference to other sections of this document

3. General safety instructions

⚠ DANGER!

Failure to comply with the documentation could result in life-threatening danger!

☞ Be sure to follow all the safety instructions in this document.

Warranty

The function and safety of the equipment is only guaranteed if the warning and safety instructions included in these operating instructions are adhered to.
MFZ Antriebe GmbH + Co.KG is not liable for personal injury or damage to property if these occur as a result of the warnings and safety advice being disregarded.
MFZ does not accept any liability or warranty for damage due to the use of non-approved spare parts and accessories.

Use for the intended purpose

The RS 400 controller is designed for door systems with mechanical or electronic limit position systems and loading bridges with hinged lips or extendable lips.

Target group

Only qualified and trained electricians may connect, programme and service the control.
Qualified and trained electricians must meet the following requirements:

– Knowledge of the general and specific safety and accident prevention regulations
– Knowledge of the relevant electrical regulations
– Training in the use and care of appropriate safety equipment
– Capable of recognising the dangers associated with electricity

Instructions regarding installation, connection and maintenance

– The system must be disconnected from the electricity supply before carrying out any electrical work. It must be ensured that the electricity supply remains disconnected for the duration of the work.
– Local protective regulations must be complied with.
– Mains cables and control cables must be routed separately.
– Consult the manufacturer before carrying out modifications or replacing the mains connection cable.

Observe the valid standards and regulations!

General safety instructions

Information concerning operation

– Unauthorised persons (particularly children) should not be allowed to play with permanently installed adjusting or control devices.
– Keep remote controls beyond the reach of children.

4. Product overview

4.1 Product description

The RS 400 controller can be used in conjunction with drives with electronic limit switches or with mechanical limit switches with or without brake.
Loading bridges with extendable or hinged lips with hydraulic power units and up to 3 solenoid valves can be used.

4.2 Versions

Circuit board variant:

– Variant with contactor for door sealing

Housing variant:

– Housing with OPEN – STOP – CLOSE buttons for the door
– Housing with OPEN button and auto-return button for the hinged lip
– Housing with OPEN, lip in, lip out and auto-return buttons for the extendable lip

Options

– Housing with green/red indicator lamps
– Housing with ON/OFF key switch
– Housing with main switch
– Housing with emergency stop
– Housing with selector switch for door sealing

The operating instructions describe the connection options and variants of the RS 400 controller.

4.3 Housing overview

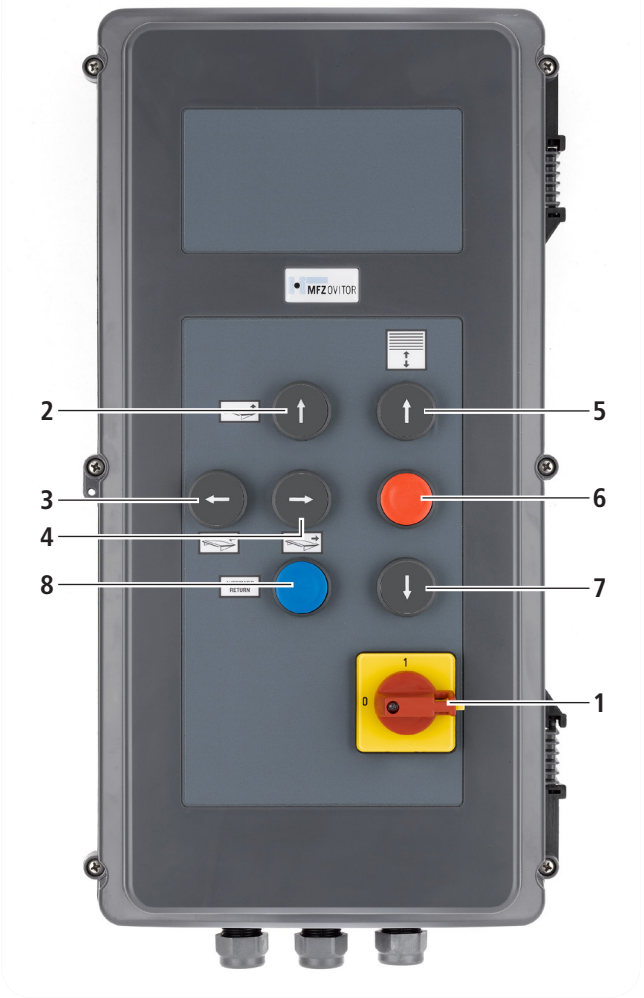
Legend:

1. Main switch
2. Lift loading bridge
3. Extend lip (only extendable lip version)
4. Retract lip (only extendable lip version)
5. Door OPEN
6. Door STOPP
7. Door CLOSE
8. Auto-return

Options nor shown:

9. Traffic light interior (LED) red (optional)
10. Traffic light interior (LED) green (optional)
11. Door sealing selector switch (option)
12. Display

4.3 / 1



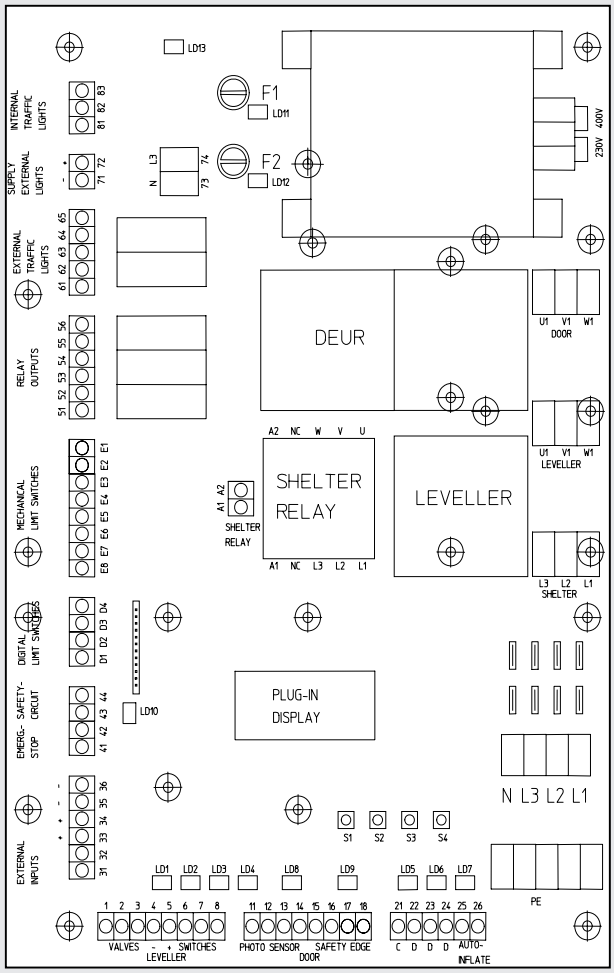
Product overview

4.4 Circuit board overview

Legend:

Terminals 1 - 8:
– Loading bridge valves und positioning switches
Terminals 11- 18:
– DOOR safety sensors
Terminals 21- 26:
– Wheel block, selector switch for shelter
Terminals 31-36:
– Free inputs and 24 V DC for external consumers
Terminals 41 – 44:
– Drive safety circuit and emergency stop
Terminals 51 – 56:
– Relay outputs (potential free)
Terminals 61 – 65:
– External traffic light style indicator
Terminals 71 - 74:
– Power supply for external traffic light style indicator
Terminals 81 – 83:
– Internal traffic light style indicator
Terminals D1 - D4:
– Electronic limit switch (AWG), door
Terminals E1 – E8:
– Mechanical limit switch, door
LEVELLER terminals:
– Loading bridge hydraulic power unit
DOOR terminals:
– Door motor
SHELTER terminals:
– Shelter voltage (via shelter relay)
L1, L2, L3, N terminals:
– Mains supply 400V 3~N or 230 V 3~N.
(preset 400V)
400/230V terminals:
– Mains voltage selection
PE terminals:
– Protective conductor connection
Plug-in display:
– Plug-in base for the display
Button:
– Plug-in base for the pushbutton
Buttons S1- S4:
– Maintenance button
Fuses
– F1: Fine fuse, external traffic light style lamp 230 V
– F2: Fine fuse, external traffic light style lamp 24 V

4.4 / 1



5. Start-up

5.1 General

The following points must be correct to guarantee fault-free functioning:

- The door and the loading ramp are fitted and functional.
- The command and safety devices are fitted and functional.
- The control housing with the RS 400 controller is fitted.
- All motor connections are properly connected on the motor side and the controller side.

REFERENCE

The instructions from the respective manufacturer must be observed for the installation of the loading bridge door and the command and safety devices.

5.2 Mains connection

Prerequisites

The following points must be correct to guarantee the function of the controller:

- The mains voltage must correspond with the information on the type plate.
- The mains voltage must correspond with the voltage of the drive.
- In the case of three-phase power, this must have a clockwise rotating field.
- With a fixed connection, an all-pole main switch must be used.
- With three-phase power, only triple block circuit breakers (10 A) shall be used.

ATTENTION!

Malfunctions due to improper installation of the controller!

Before switching on the controller for the first time but after all of the wiring has been completed, it is necessary to check all motor connections on the motor and controller sides. All control voltage inputs are galvanically separated form the supply.

Mains voltage selection

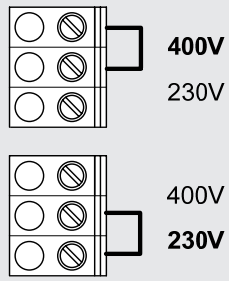
ATTENTION!

Risk of destruction due to improper adjustment of the mains supply!

Incorrect adjustment of the mains supply can lead to a controller fault.

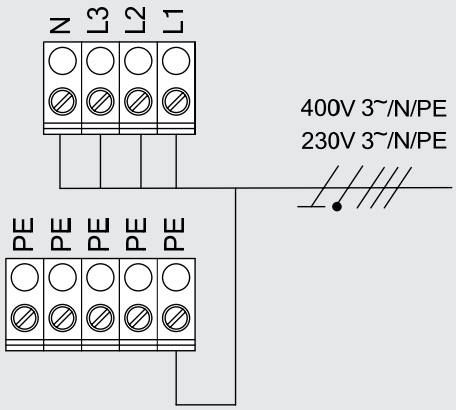
☞ Ensure that the mains voltage is set correctly (preset 400V).

5.2 / 1



Mains connection

5.2 / 2

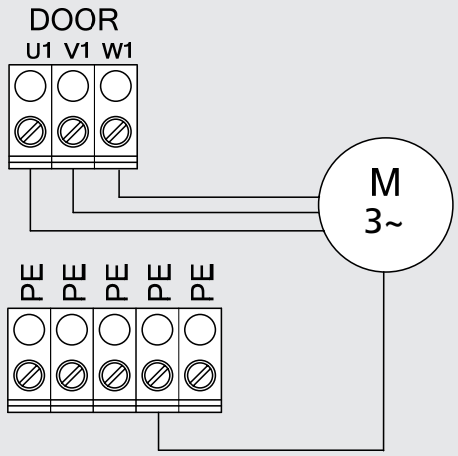


N is only required if a 230V external traffic light style lamp is used. In the case of three-phase power, this must have a clockwise rotating field.

Start-up

Door motor connection

5.2 / 3

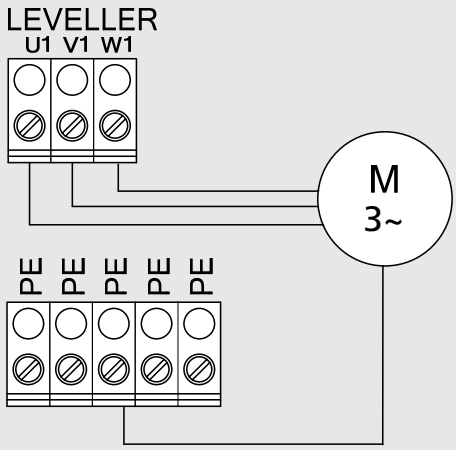


Please note:
Relay 3 must be adjusted in the case of drives with active switched brake:

– MOD10: Closed current principle
– MOD11: Load current principle

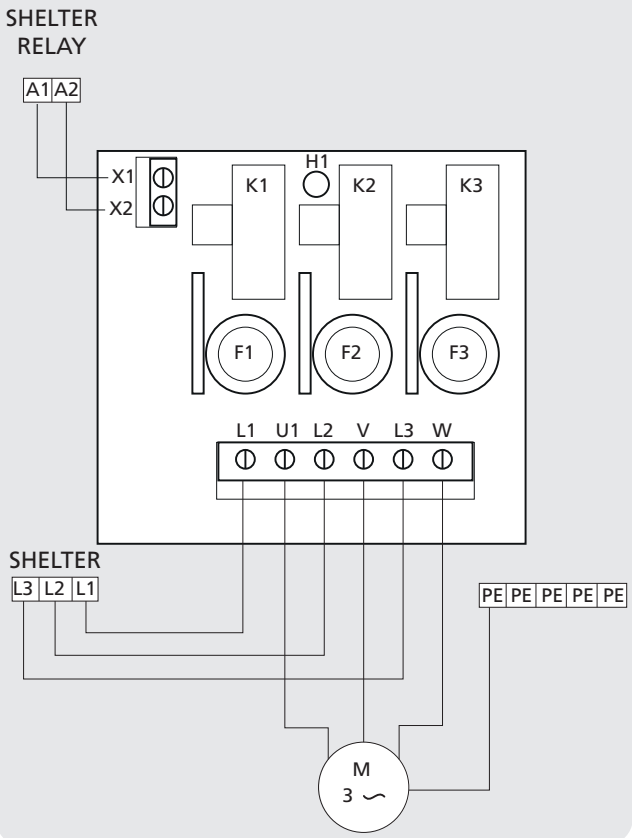
Hydraulic pump connection

5.2 / 4



Door sealing connection (OPTION)

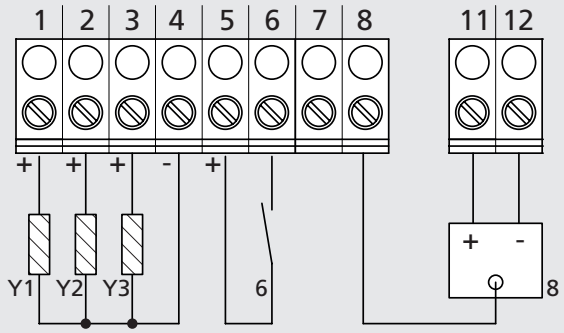
5.2 / 5



5.3 Loading bridge

Extendable lip version

5.3 / 1



Valves:

1: STOP (LD1) - Y1
2: LIP OUT - Y2
3: LIP IN - Y3
4: GND

Position switch:

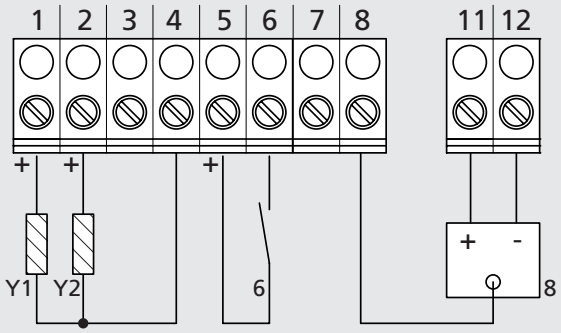
5: Common contact
6: Home limit switch N.O. (LD2) *
7: Not used
8: TRUCK sensor PNP (LD4)

11: 24 VDC
12: GND

* Closed when home position reached.

Hinged lip version

5.3 / 2



Valves:

1: STOP (LD1) - Y1
2: LIP OUT - Y2
3: Not used
4: GND

Position switch:

5: Common contact
6: Home limit switch N.O. (LD2) *
7: Not used
8: TRUCK sensor PNP (LD4)

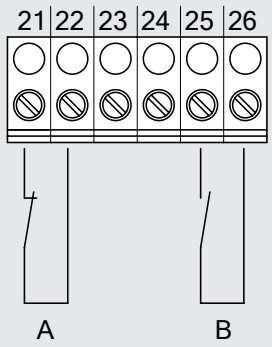
11: 24 VDC
12: GND

* Closed when home position reached.

Start-up

Enabling switch

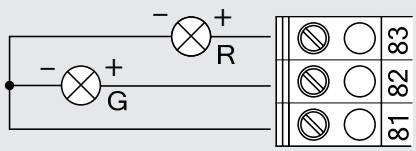
5.3 / 3



A: 21/22 – Wheel block enable contact (LD5)
If no wheel block is used, the input must be bridged.
B: 25/26 – Shelter selector switch (LD7)

INTERNAL traffic light style indicator

5.3 / 4



83: Internal traffic light style indicator, red
82: Internal traffic light style indicator, green
81: GND

G: Green
R: Red

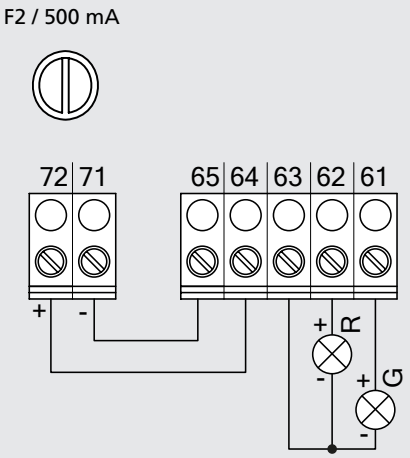
Use only 24 V LED traffic light style indicators
(TYPE Siemens 3SB3400).

EXTERNAL traffic light style indicator

Either 24 VDC or 230 VAC (only with mains voltage with N) can be used.

24 V DC max. 12W

5.3 / 5

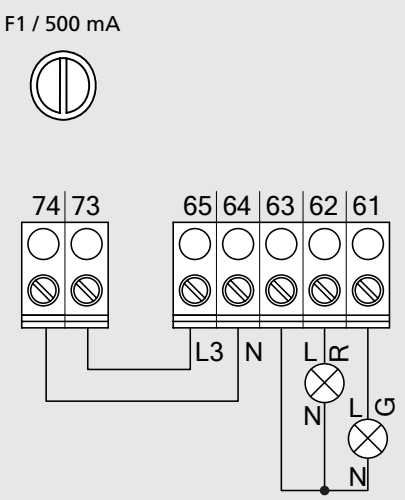


61: Green traffic light style indicator
62: Red traffic light style indicator
63: GND
64: Voltage, traffic light style indicator
65: Voltage, traffic light style indicator
71: 0 V DC
72: 24 V DC (500mA).
F2: Fine fuse 24VDC/500mA

G: Green
R: Red

230 V AC

5.3 / 6



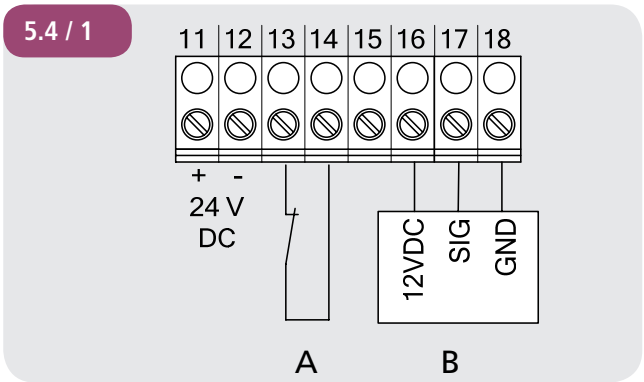
61: Green traffic light style indicator
62: Red traffic light style indicator
63: GND
64: Voltage, traffic light style indicator
65: Voltage, traffic light style indicator
73: 230 V, N
74: 230 V, L3
F1: Fine fuse L3/500 mA

G: Green
R: Red

5.4 Door

Sensors, optical switching strip

5.4 / 1



A Door light barrier
B Photosensor

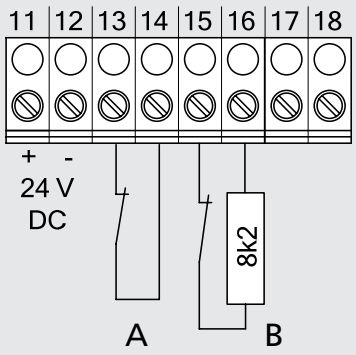
Light barrier
11: 24 VDC
12: GND
13/14: Light barrier, door (LD8)*

Optical switching strip
15: Not used
16: 12 V DC (brown)
17: Signal (green – LD9)
18: GND (white)

Start-up

Sensors electrical/pneumatic** switching strip

5.4 / 2



A Door light barrier
B Closing edge safeguard

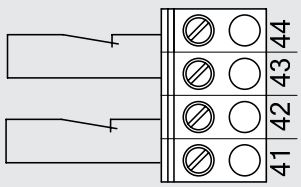
Light barrier
11: 24 VDC
12: GND
13/14: Light barrier, door (LD8)*

Electrical/pneumatic switching strip
15: Switching strip input (LD9)
16: 12 VDC
17: Free
18: Free

* If a light barrier is not used, the function must be switched off in the software or bridged.
** With pneumatic switching strips, the SKS-Test function must be activated in the software!

STOP safety circuit

5.4 / 3

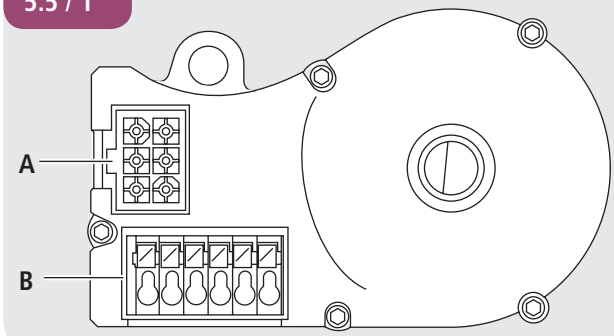


44/43: Safety circuit, drive thermo-switch (LD10), emergency actuation
42/41: EMERGENCY STOP (external – LD10)

If an emergency stop switch is not used, the EMERGENCY STOP input must be bridged.

5.5 Terminal assignment, absolute value encoder (connector strip X11)

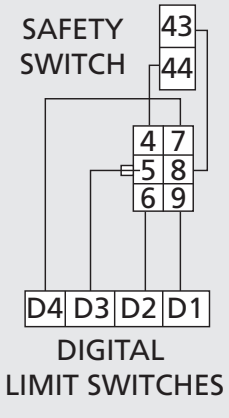
5.5 / 1



A: Absolute value encoder plug
B: Absolute value encoder plug-in terminals

Connector strip X11 (on connector A)

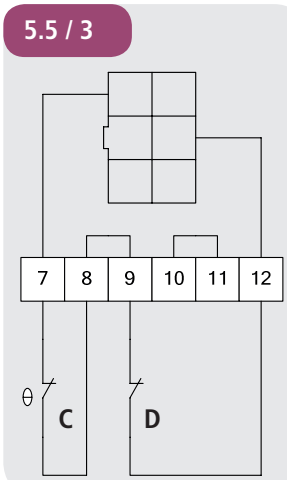
5.5 / 2



The numbers on the plug are also the wire core numbers:
4: Safety chain input
5: RS 485 B
6: GND
7: RS485 A
8: Safety chain output
9: 12V DC

Connector strip B (only absolute value encoder)

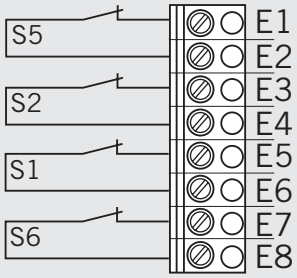
5.5 / 3



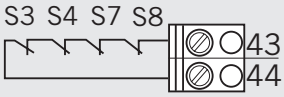
C: Thermal element in the drive
D: Emergency manual actuation (Emergency crank or emergency chain)

5.6 Mechanical limit switch connection

5.6 / 1



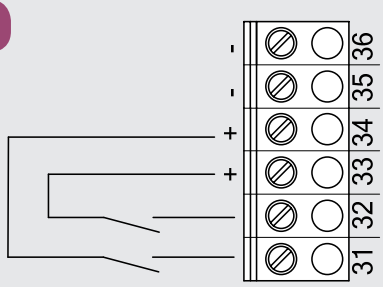
5.6 / 2



S1 Add-on limit switch OPEN
S2 Limit switch OPEN
S3 Safety limit switch OPEN
S4 Safety limit switch CLOSE
S5 Limit switch CLOSE
S6 Add-on limit switch CLOSE
S7 Motor thermal protection
S8 Emergency operation (NC - contact)

5.7 Terminal assignment, free inputs

5.7 / 1



31: Free input 1
32: Free input 2
33: +24 VDC
34: +24 VDC
35: GND
36: GND

The free inputs must be switched to 24 V.
This means, either a switch (NC/NO) to 24 V DC or a PNP output can be connected here.

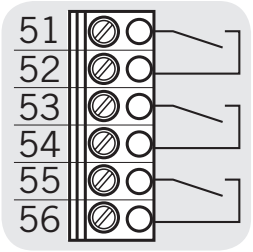
The function of the free inputs can be programmed in the software.

5.8 Terminal assignment, relay outputs

There are four potential-free relay outputs available, which can be programmed with a variety of types of function.
➔ "10.2 Input operating mode"

Terminal strip X5

- Relay 1
- Relay 2
- Relay 3



Internal relay switch contacts

There are three potential-free relay outputs able to take a max. load of 4A at 230 V/1~.

The type of function depends on the parameter setting for the respective relay output in the INPUT operating mode.

6. Functional description

6.1 Operation of the loading bridge

The door is opened with the Door OPEN switch.
If the shelter function is activated, the shelter time runs before it drives open so that this is completely inflated before the door drives up. If the door has reached the limit switches, the ramp can be driven on.
The loading bridge can be raised with the lift pushbutton in 'dead-man' mode.
After reaching the desired position, the button can be released. The loading bridge remains in the adjustment position for 5 seconds. The lip should be positioned during this period. If no buttons are actuated, the loading bridge drops back to the standby position.
The lip can be driven forwards via the lip button in 'dead-man' mode. It is essential that the home limit switch is left as otherwise the auto-return is not possible! After releasing the button, the loading bridge lowers to the loading position (floating position).
If the position of the lip is corrected during the loading process, the loading bridge must initially be raised for this. Then the position of the lip can be readjusted. Then the bridge drops back to the floating position automatically.

6.2 Automatic Return (AR)

After the loading process is complete, the loading bridge returns to the standby position by means of the AR button. The procedure is carried out automatically.
If the home position has been reached again (contact closed), the door is automatically closed. A prerequisite for this is that the closing edge (SKS) is functioning properly. After the CLOSED has been reached, the shelter time starts to run down again (if activated).

6.3 Start-up interlocking

The RS 400 controller has integrated start-up interlocking. If the power supply is interrupted or if an emergency stop signal is issued whilst the loading bridge is being actuated, after renewed release or reactivation of the power supply, the stop valve Y1 is switched off thus locking the bridge.
The bridge can be moved again or shifted to the floating position, only once the lift button or the AR button has been actuated.

7. Setting the limit positions

7.1 Setting the electronic limit position system via the LCD monitor

⚠ ATTENTION!

Improper assembly will cause damage or destruction!

The monitor must be plugged in whilst de-energised. Only an LCD monitor from MFZ (article number 206023) may be used.

Change to adjustment mode

☞ Press the (P) button until ADJUSTMENT appears.

Setting the OPEN limit position

☞ Drive the door to the desired OPEN limit position with the (+/–) buttons.
"MAN UP" appears in the display during the movement.

☞ Save limit position by pressing the (P) button and the (+) button.
"STORE UP" appears in the display.

Setting the CLOSE limit position

☞ Drive the door to the desired CLOSED limit position with the (+/–) buttons.
"MAN DOWN" appears in the display during the movement.

☞ Save limit position by pressing the (P) button and the (-) button.
"STORE DOWN" appears in the display.

☞ Exit adjustment mode again by pressing the (P) button.

Note

– The system does not exit adjustment mode automatically. Exit adjustment mode by pressing the (P) button in order to change to normal mode.
– Normal operation is not possible until both limit positions have been learned through the initial calibration.
– If a limit position is to be corrected, the ADJUSTMENT mode can be exited by pressing the (P) button after learning the special limit position.

7.2 Setting the intermediate positions of the electronic limit position system via the LCD monitor

Drive the door to the desired position in automatic mode

☞ Drive the door to the desired intermediate positions (PRE LIM.OP. or PRE LIM.CL.) with the (+/–) buttons.

Change to ADJUSTMENT mode

☞ Press the (P) button until ADJUSTMENT appears.

☞ Reading out the current AWG value
(Shown at the top right of the display).

Change to input mode

☞ Press the (P) button until INPUT appears.

☞ Press the buttons (+) and (–) simultaneously for more than 2 seconds. The first parameter appears in the second line of the display.

Save the intermediate OPEN (PRE LIM.OP.) or CLOSE (PRE LIM.CL.) position

☞ Press the (+/–) buttons until the PRE LIM.OP. or PRE LIM.CL. parameter appears.

☞ Press the (P) button until a flashing cursor appears in the display.

☞ Entering the current AWG value.

☞ Save the intermediate position by pressing the (P) button again.

Exit Input operating mode

☞ Press the buttons (+) and (–) simultaneously for more than 1 second.
Input is exited.

Change to automatic mode

☞ Press the (P) button until AUTOMATIC appears.

Note

– Both intermediate positions can be read out and further processed via the relay outputs.
– Only the PRE LIM.OP. position can be used as partial opening.

➔ "10.2 Input operating mode"

Setting the limit positions

7.3 Checking the drive/travel direction

Change to adjustment mode

☞ Press the (P) button until ADJUSTMENT appears in the display.

Checking the drive direction

☞ Press the (+) button. The door must open.
☞ Press the (-) button. The door must close.
If this is correct, proceed to setting the limit positions.
Otherwise, change the direction of travel.

Changing the direction of travel

If the drive direction must be changed, proceed as follows.
☞ Disconnect the power supply.
☞ Transpose any two of the drive phases.
☞ Switch on the power supply again.
Any limit positions that were saved will have been deleted.
☞ Proceed with the setting the limit positions.

7.4 RESET

The RESET function can be used to reset all control parameters to the factory settings.
☞ Disconnect the power supply.
☞ Press the (+) and (–) buttons simultaneously.
☞ Switch on the power supply again.
☞ Press the buttons (+) and (–) simultaneously for ca. 5 seconds.
ADJUSTMENT appears in the LCD monitor display.
➜ The system is in adjustment mode.
☞ Release the (+) and (-) buttons.

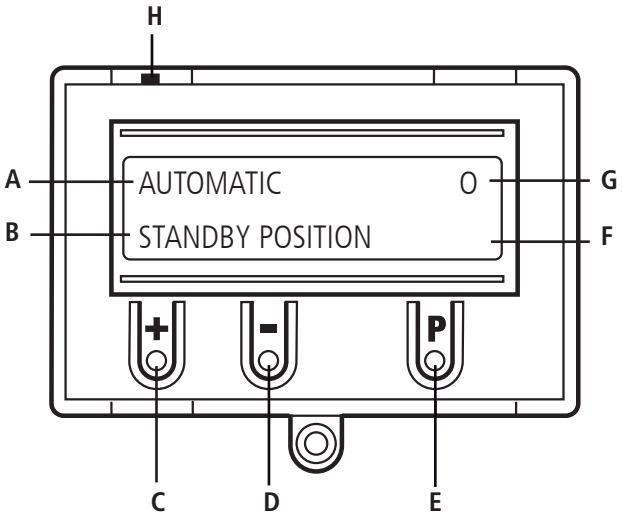
After the RESET, the limit positions are cleared and must be set anew.
All parameters have been reset to factory settings.

8. Programming

8.1 Overview of the LCD monitor

⚠ ATTENTION!

Property damage due to improper installation!
The display must be plugged in whilst de-energised. Only a display from MFZ (article number 206023) may be used.



Explanation:

A: Operating mode / diagnostics info
B: Parameters / diagnostics info
C: (+) button
D: (–) button
E: (P) button
F: Value/status
G: Value/status
H: Jumper

If the jumper H is removed, the (+), (–) and (P) buttons no longer function.
The display continues to function.

8.2 LCD monitor operating modes

With the LCD monitor, the controller has four operating modes:
1. AUTOMATIC
2. ADJUSTMENT
3. INPUT
4. MAINTENANCE
5. DIAGNOSTICS

Operating mode 1: AUTOMATIC
The door system is driven in AUTOMATIC mode.

Display:
– Display of the function being carried out
– Display of possible faults

If the "Self-locking" parameter is set to MOD2 or MOD3 in the Input menu, the display switches from AUTOMATIC mode to MANUAL MODE.

Operating mode 2: ADJUSTMENT
The OPEN and CLOSED limit positions are set in ADJUSTMENT mode.

⚠ ATTENTION!

Risk of property damage due to improper operation of the controller!
When in ADJUSTMENT mode, there is no shutdown with the electronic limit position system (AWG) upon reaching the limit positions. The door system can be damaged by running past the limit positions.

Fine adjustment can be implemented in INPUT mode.

Display:
– Displays the limit position value

Operating mode 3: INPUT
The values of various parameters can be changed in INPUT mode.

Display:
– Displays the selected parameter
– Displays the status/value set

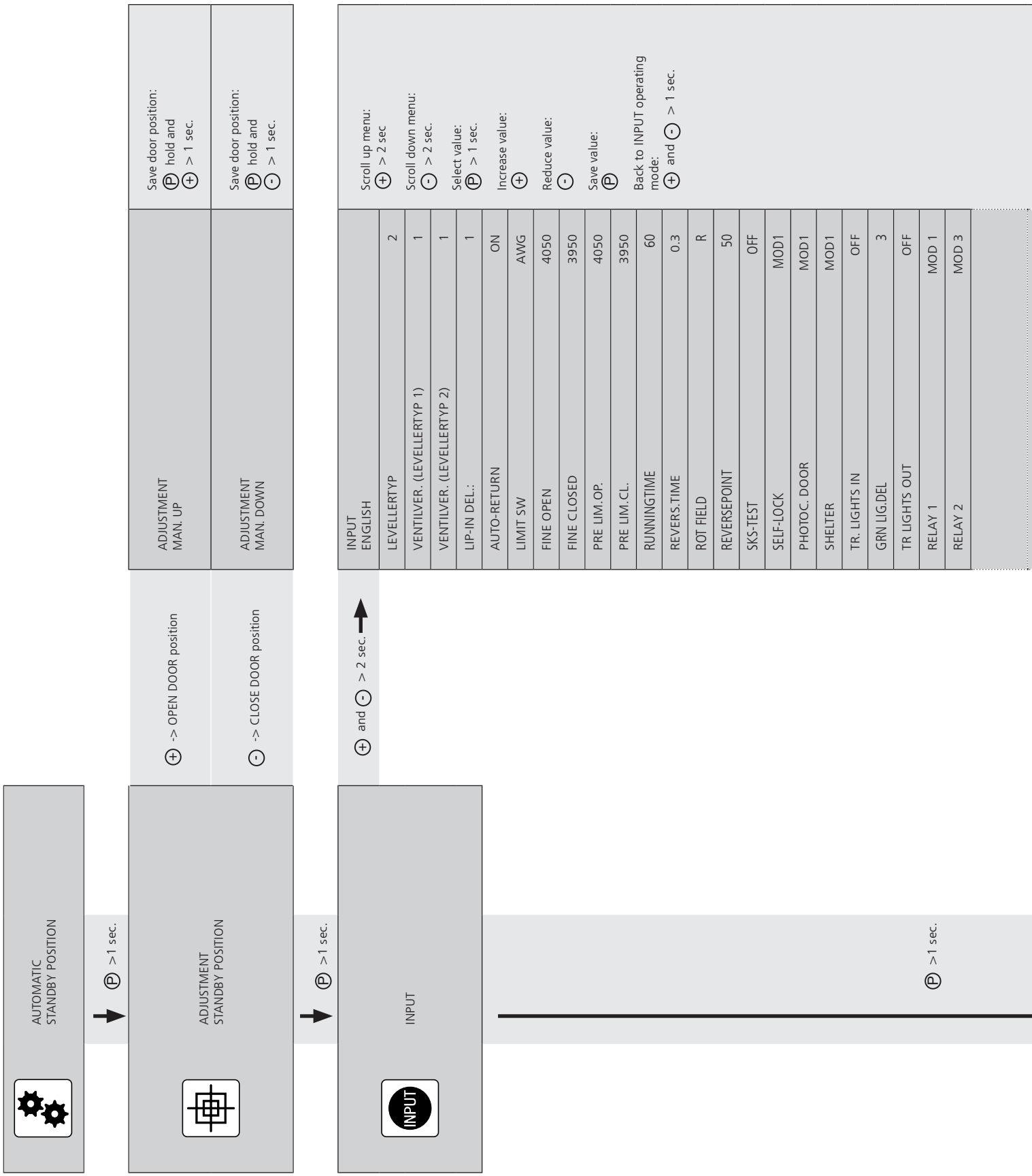
Operating mode 4: DIAGNOSTICS
Door-specific checks can be interrogated in DIAGNOSTICS mode.

Display:
– Display of the check
– Display of the check status

Operating mode 5: Maintenance
In MAINTENANCE mode the maintenance buttons (S1 - S4) and the buttons on the housing cover can be used to check the function of the bridge and the door.

Display:
– Display of the button pressed
– Display of the check status for valves

9. Navigator (only LCD monitor)



RELAY 3	MOD10
FREE IN1	MOD 1
FREE IN2	MOD 1
WH BLOCK	ON
SHELTER TIME	0
POWER	10

DIAGNOSTICS

Scroll up menu:
⊕ > 2 sec

Scroll down menu:
⊖ > 2 sec.

Back to AUTOMATIC operating mode:
Ⓟ

Only interrogation possible

UPPER SWITC LOWER SWITC	ON OFF
Pre LI. OPE Pre LI. CL.	OFF OFF
UP-BUTTON DOWN-BUTTON	OFF OFF
STOP-BUTTON SKS	OFF OFF
STOP INPUT LIGHT BAR.	ON ON
DOOR CYC : LEV CYC :	0000 0000
HOME SW LIP 450	ON ON
TRUCK SENS F- WH. BLOCK	ON ON
F- DOOR SHELTER SW	ON ON
DECK UP LIP OUT	ON ON
LIP IN AUTO-RETURN	ON ON
S1-BRIDGE S2- SHELTER	ON ON
S3-OPE DOOR S4-CLO DOOR	ON ON
F INPUT 1 F INPUT 2	ON ON
AWG VOLTAGE	XXXX XXXX

Ⓟ >1 sec.

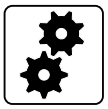
MAINTENANCE

⊕ and ⊖ > 2 sec. →

MAINTENANCE S1 BRIDGE	S1, S2, S3, S4
S2 SHELTER	
S3-OPEN DOOR	
S4-CLOSE DOOR	

10. Functional overviews

10.1 Automatic mode



Display		Description
AUTOMATIC XXXX	rU	Bottom limit position.
AUTOMATIC XXXX	u	Bottom pre-limit position.
AUTOMATIC XXXX	O	Top limit position.
AUTOMATIC XXXX	o	Top pre-limit position / partial opening.
AUTOMATIC STANDBY POSITION	xx	Door closed, ramp in standby position.
AUTOMATIC STOP	xx	STOP CIRCUIT open.
AUTOMATIC OPENING	xx	The door is currently in the opening phase.
AUTOMATIC CLOSING	xx	The door is currently in the closing phase.
AUTOMATIC OPENING PHASE	xx	The door is open, the ramp active.
AUTOMATIC AUTO RETURN	xx	Automatic movement.
AUTOMATIC TRUCK SENS <<	xx	The TRUCK SENSOR is active.
AUTOMATIC EMERGENCY STOP	xx	Emergency stop actuated, implausible ramp position.

10.2 Input operating mode

Function	Description	Adjustment options	Factory setting
ENGLISH	Selection of the menu language	GERMAN ENGLISH NETHERLANDS	ENGLISH
LEVELLER-TYP	Loading bridge selection 1= Bridge with hinged lip 2= Bridge with extendible lip	1 – 2	2
VENTILVER (LEVELLER-TYP 1)	1:**1 Valve technology** Standard control	1 – 3	1

1 valve	Standard	Stop
Function	**Contactor**	**Y1**
Raise	1	1
Lower	0	1
Floating position	0	1
Emergency stop	0	0

2:**1 Valve technology** Special control

1 valve	Special	Stop
Function	**Contactor**	**Y1**
Raise	1	0
Lower	0	1
Floating position	0	1
Emergency stop	0	0

3:**2 Valve technology** Special control

1 valve	Special	Stop	
Function	**Contactor**	**Y1**	**Y2**
Raise	1	0	0
After Y1 time has passed	1	0	0
Lower	0	1	1
Floating position	0	1	1
Emergency stop	0	0	0

Functional overviews

Function	Description	Adjustment options	Factory setting
VENTILVER (LEVELLER-TYP 2)		1 – 8	1

3 valves	Standard			
MODE 1		**Stop**	**Lip extend**	**Lip back**
Function	**Contactor**	**Y1**	**Y2**	**Y3**
Raise	1	1	0	0
Lower	0	1	0	0
Lip extend	1	0	1	0
Lip back	1	0	0	1
Floating position	0	1	0	0
Emergency stop	0	0	0	0

3 valves	Special			
MODE 2		**Raise**	**Lip**	**Lower**
Function	**Contactor**	**Y1**	**Y2**	**Y3**
Raise	1	1	0	0
Lower	0	0	0	1
Lip extend	1	0	0	0
Lip back	1	0	1	1
Floating position	0	0	0	1
Emergency stop	0	0	0	0

2 valves	Standard		
MODE 3		**Stop**	**Lip**
Function	**Contactor**	**Y1**	**Y2**
Raise	1	1	0
Lower	0	1	1
Lip extend	1	0	0
Lip back	1	0	1
Floating position	0	1	1
Emergency stop	0	0	0

2 valves	HAFA		
MODE 4			
Function	**Contactor**	**Y1**	**Y2**
Raise	1	0	1
Lower	0	1	0
Lip extend	1	0	0
Lip back	1	0	1
Floating position	0	1	0
Emergency stop	0	0	0

Function	Description	Adjustment options	Factory setting

3 valves	Zuccaro			
MODE 5		Stop	Lip extend	Lip back
Function	Contactor	Y1	Y2	Y3
Raise	1	1	0	0
Lower	0	1	0	0
Lip extend	1	0	1	0
Lip back	1	0	0	1
Floating position	0	1	0	0
Standby position	0	0	0	0
Emergency stop	0	0	0	0

3 valves	LAWECO			
MODE 6		Stop	Lip extend	Lip back
Function	Contactor	Y1	Y2	Y3
Raise	1	1	0	0
Lower	0	1	0	0
Lip extend	1	0	1	0
Lip back	1	0	0	1
Floating position	0	1	0	1
Standby position	0	0	0	0
Emergency stop	0	0	0	0

3 valves	COBELUX			
MODE 7		Stop	Lip extend	Lip back
Function	Contactor	Y1	Y2	Y3
Raise	1	0	0	0
Lower	0	1	0	0
Lip extend	1	0	1	0
Lip back	1	0	0	1
Floating position	0	1	0	0
Standby position	0	1	0	0
Emergency stop	0	0	0	0

3 valves	Special		
MODE 8		Stop	Lip
Function	Contactor	Y1	Y2
Raise	1	1	0
Lower	0	1	1
Lip extend	1	0	1
Lip back	1	0	0
Floating position	0	1	1
Emergency stop	0	0	0

LIP-IN DEL.: (Levellertyp 2)	Lifting time before lip retraction in the case of auto-return function.	0 – 3 seconds	1

Functional overviews

Function	Description	Adjustment options	Factory setting
AUTO-RETURN	Activation of the auto-return function. With the **extendible lip** version, the auto-return function is provided as standard. If this button is pressed with the bridge extended, the bridge is driven back to the standby position and the door closed. With the **hinged lip** version, an additional position switch is required to indicate the position above the standby position (input 6). If this button is pressed with the bridge extended, the bridge is driven back to the standby position and the door closed.	OFF ON	ON
LIMIT SW	AWG = Absolute value encoder MES = Mechanical limit switch	AWG MES	AWG
FINE OPEN	Fine adjustment of the OPEN limit position (only AWG limit switch).	0 – 8190	4050
FINE CLOSED	Fine adjustment of the CLOSED limit position (only AWG limit switch).	0 – 8190	3950
PRE LIM.OP.	Adjustment of the OPEN pre-limit position switching point (PARTIALLY OPEN), (only AWG limit switch).	0 – 8190	4050
. PRE LIM.CL.	Adjustment of the CLOSED pre-limit position switching point (only AWG limit switch).	0 – 8190	3950
RUNNING-TIME	Monitoring of the max. runtime of an upwards or downwards movement of the door. The loading bridge has a fixed runtime of max. 30 seconds.	0 – 300 seconds	60
REVERS.TIME	Stationary time with every change in direction for the door.	0.1 – 2.0 seconds	0.3
ROT. FIELD	R: Clockwise L: Counter-clockwise This setting of the AWG may only be changed with a special drive installation!	R L	R
REVERSE POINT	Point of the reverse shut-off before the CLOSED limit position is reached. If the contact strip is actuated in this range, the door stops.	10 – 250 mm	50
SKS -TEST	ON: DW testing is active OFF: DW testing is inactive The testing of the DW switch is carried out in the CLOSED limit position. In doing so, the DW contact must be briefly actuated when the door makes contact with the floor.	OFF ON	OFF
SELF-LOCK-ING	MOD1: Automatic mode MOD2: Manual mode for OPEN + CLOSE MOD3: Manual mode for CLOSE	MOD1 MOD2 MOD3	MOD1
PHOTOC. DOOR	MOD1: Not active MOD2: Stop and reversing MOD3: Stop	MOD1 MOD2 MOD3	MOD1
SHELTER.	MOD1: The door sealing will be program controlled. It can be activated and deactivated during operation with the selector switch. MOD2: The door sealing will be manually operated. It can be activated and deactivated with the selector switch, independently of the program.	MOD1 MOD2	MOD1
TR LIGHTS IN	OFF: RED TRAFFIC LIGHT OFF MOD1: RED during drive to closed position MOD2: RED flashing during drive to closed position	OFF MOD1 MOD2	OFF
GRN LIG.DEL.	Time delay for the green inside traffic light after positioning the loading bridge.	3, 5 ,10, 15, 20 seconds	3 seconds
TR LIGHTS OUT	OFF: Off ON: RED flashing whilst the truck sensor is active, RED during door and leveller operation.	OFF ON	OFF

Function	Description	Adjustment options	Factory setting
RELAY 1	All three relays can be assigned a relay mode from 1 - 12. The contact will be closed with activation (except for MODE 8).	MOD1 – MOD12	MOD1
RELAY 2	MOD1: CLOSED limit position MOD2: CLOSED limit position negated MOD3: OPEN limit position MOD4: OPEN limit position negated	MOD1 – MOD12	MOD3
RELAY 3	MOD5: Fault message MOD6: OPEN BUTTON MOD7: CLOSE BUTTON MOD8: Contact opens with STOP button MOD9: Release on wh. block MOD10: Brake MOD 11: Brake	MOD1 – MOD12	MOD10
FREE IN1	MOD1: OFF MOD2: Not connected MOD3: Not connected MOD4: Not connected MOD5: Slack rope switch DOOR MOD6: Up alarm MOD7: Enabling switch, door up button	MOD1 – MOD7	MOD1
FREE IN2	As input 1	MOD1 – MOD7	MOD1
WH BLOCK	ON: A wheel block is connected OFF: No immobiliser used	ON OFF	ON
SHELTER TIME	The time adjustment provides the following delays: – The release of the door before the start of the loading process. – The release of the outer green traffic light after the loading process.	0 – 255 seconds	0 seconds
POWER	**Automatic power monitoring** (monitoring of rotational speed) Fault message in the event of the door being difficult to move or blocked. Adjustment of the sensitivity only for OPEN direction. A value for the force (rotational speed) will be displayed during the travel upwards. With the power monitoring active, the value must be set to a smaller value than the smallest value shown during the drive upwards. The greater the difference to the smallest displayed value, the less sensitive the reaction of the power monitoring. The power monitoring is only activated if the numeric value is set > 0.	0 – 999 Inc.	10

Functional overviews

10.3 Maintenance operating mode

Display	Meaning	Condition
MAINTENANCE S1 BRIDGE	Service button S1	
MAINTENANCE S2 SHELTER	Service button S2	
MAINTENANCE S3-OPEN DOOR	Service button S3	
MAINTENANCE S4 DOOR DOWN	Service button S4	
MAINTENANCE OPEN DOOR	Open door button	
MAINTENANCE CLOSE DOOR	Close door button	
MAINTENANCE STOP	Door stop button	
MAINTENANCE CURRENT Y3 XXXX	Lift ramp button, Valve current will be displayed	
MAINTENANCE CURRENT Y1 XXXX	EXTEND LIP button, Valve current will be displayed	
MAINTENANCE CURRENT Y2 XXXX	LIP BACK button, Valve current will be displayed	

In maintenance operating mode all buttons operate in 'dead-man' mode. For system safety, it is not possible to drive past the door limit switches. There are no runtime restrictions active.
The ramp and the DOOR are not interlocked with one another.

10.4 Diagnostics operating mode

Display	Meaning	Condition	
UPPER SWITC	OPEN limit position	OFF: ON:	Limit position reached Limit position not reached
LOWER SWITC	CLOSED limit position	OFF: ON:	Limit position reached Limit position not reached
Pre-LI. OPE	Intermediate limit switch OPEN	OFF: ON:	Intermediate position reached Intermediate position not reached
Pre-LI. CL.	Pre-limit switch CLOSED	OFF: ON:	CLOSED pre-limit switch reached CLOSED pre-limit switch reached
OPEN BUTTON	OPEN DOOR BUTTON	OFF: ON:	Button not actuated Button actuated
CLOSE BUTTON	CLOSE DOOR BUTTON	OFF: ON:	Button not actuated Button actuated
STOP BUTTON	DOOR STOP BUTTON	OFF: ON:	Button not actuated Button actuated
SKS	Switching strip	ON: OFF:	Switching strip not actuated/faulty Switching strip actuated/faulty
STOP CHAIN	Safety circuit	ON: OFF:	Circuit closed Interruption, safety circuit open
LIGHT BAR.	DOOR light barrier	ON: OFF:	No interruption/fault Interruption/fault
DOOR CYC	Door cycles 1 cycle = 1x OPEN and 1x CLOSE	:0000	
LEV CYC	Ramp cycles 1 cycle = 1 lifting	:0000	
HOME	Lip retracted position switch	OFF: ON:	Lip not completely retracted Lip completely retracted
TRUCK SENSOR	Light barrier in the shelter	OFF: ON:	No truck detected Truck detected
WHEEL BLOCK	Wheel block	OFF: ON:	Wheel block free Wheel block actuated
SHELTER SW	Door sealing	ON: OFF:	Door sealing activated (winter) Door sealing deactivated (summer)
LIFT BUTTON	Lift ramp button	OFF: ON:	Button not actuated Button actuated
EXTEND LIP	EXTEND lip button	OFF: ON:	Button not actuated Button actuated
RETRACT LIP	Retract lip button	OFF: ON:	Button not actuated Button actuated

Functional overviews

Display	Meaning	Condition
AUTO-RETURN	Auto-Return button	OFF: Button not actuated ON: Button actuated
S1 BRIDGE	Service button S1	OFF: Button not actuated ON: Button actuated
S2 SHELTER	Service button S2	OFF: Button not actuated ON: Button actuated
S3-OPEN DOOR	Service button S3	OFF: Button not actuated ON: Button actuated
S4 DOOR DOWN	Service button S4	OFF: Button not actuated ON: Button actuated
F INPUT 1	Status of free input 1	ON: Contact closed OFF: Contact open
F INPUT 2	Status of free input 1	ON: Contact closed OFF: Contact open
AWG	Current position of the door	XXXX
VOLTAGE	Operating voltage 24 VDC	XXXX

11. Fault display and remedial measures

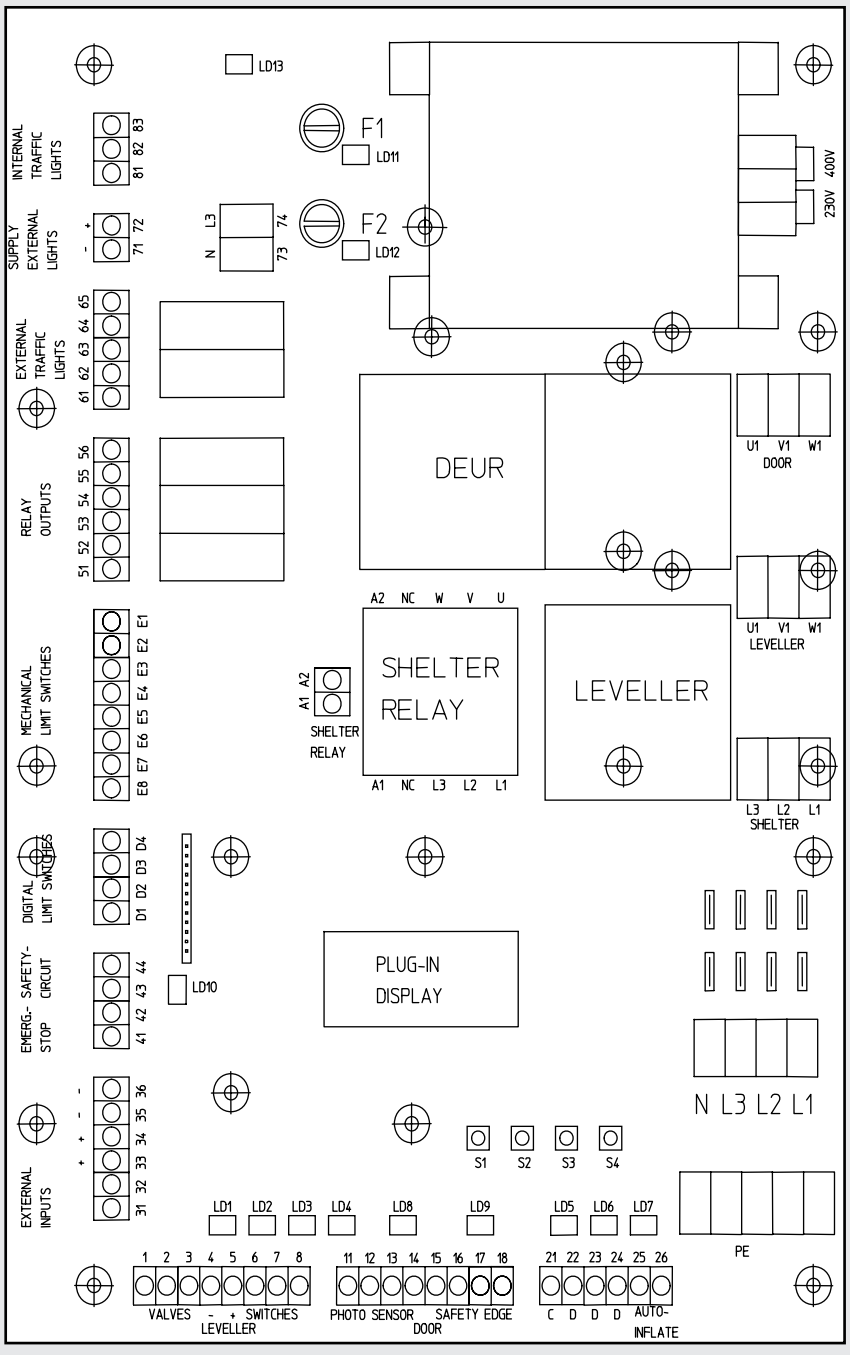
Fault / fault message	Cause	Rectification
System does not react.	– No voltage present.	– Check power supply for the drive and controller.
Door drives to the CLOSED limit position upon actuation of the OPEN button. Door drives to the OPEN limit position upon actuation of the CLOSE button.	– Rotating field has been incorrectly connected.	– Check rotating field and establish clockwise rotating field if necessary (transpose two phases on the door connection).
Loading bridge does not lift when lift button actuated although the hydraulic power unit is running.	– Rotating field has been incorrectly connected.	– Check rotating field and establish clockwise rotating field if necessary (transpose two phases on the door connection).
AUTOMATIC STOP	– Door STOP is pressed.	– Release button.
AUTOMATIC STOP CHAIN	– Stop chain at terminals 41-42 (emergency stop) or at terminals 43 – 44 (drive safety circuit) is interrupted.	– Find fault and rectify interruption.
ERROR LIMIT POSITION (AWG)	– The door is outside the limit positions. – The limit positions are not yet programmed.	– Check the programming of the limit positions and set anew if necessary.
ERROR LIMIT POSITION (MES)	– The door is outside the limit positions. – Both operational limit switches are open.	– Check the setting of the limit positions and readjust if necessary.
ERROR RUNNINGTIME	– The programed runtime has been exceeded.	– Check the path of the door. – Program runtime anew.
ERROR HY TIME	– The programed runtime (30 sec.) of the loading ramp has been exceeded.	– Check buttons and position switch.
ERROR SKS	– Closing edge protective devices faulty.	– Check closing edge protective devices and spiral cable. – Closing edge protective device has tripped. – Remove obstacle from the path of the door.
ERROR SKS-TEST	– The DW switch does not trigger in the CLOSED limit position.	– Check switching strip, spiral cable and profile. – Replace circuit board.
ERROR DW-TEST	– The DW switch does not trigger in the CLOSED limit position.	– Check DW switch, spiral cable and profile. – Check the setting of the CLOSED limit position.
ERROR ROT. FIELD	– The rotating field at the DOOR terminals is incorrect.	– Ensure that there is a clockwise rotating field present.
ERROR RS 485 (AWG)	– Communication error between limit Switches and controller.	– Check cable and connector.
AUTOMATIC FILM FAULT	– A button was actuated when the system was started.	– Check buttons.
AUTOMATIC LIP IN	– LIP IN position switch defective	– Check switch.
ROPE SWITCH	– Door slack rope switches have tripped. Free input 31 or 32.	– Check switch.

After rectifying the cause of the fault, the controller must be disconnected from the power supply!

12. LED displays

12.1 Circuit board overview

12.1 / 1



12.2 LED diagnostics circuit board

	Colour	Description		Fault diagnostics
LD1	Red	LED STOP valve (Output 3)	LED ON LED OFF	Stop valve interrupted Stop valve activated
LD2	Yellow	Home limit switch (Input 6)	LED ON LED OFF	Switch closed Switch open
LD3	Not applicable	Not applicable	Not appli-cable	Not applicable
LD4	Yellow	LED TRUCK sensor (Input 8)	LED ON LED OFF	Switch closed Switch open
LD5	Yellow	Wheel block (Input 21)	LED ON LED OFF	Wheel block actuated Wheel block free
LD6	Not applicable	Not applicable	Not applicable	Not applicable
LD7	Yellow	Door sealing LED selector switch (Input 25)	LED ON LED OFF	Switch closed Switch open
LD8	Yellow	LED door light barrier (Input 13)	LED ON LED OFF	Light barrier not actuated Light barrier actuated
LD9	Yellow	LED switching strip (Input 15/17)	LED ON LED OFF	Switching strip not actuated Switching strip actuated
LD10	Yellow	LED stop chain (Input 42/44)	LED ON LED OFF	Stop chain closed Stop chain open
LD11	Red	LED fuse F1	LED ON LED OFF	Fuse defective Fuse OK
LD12	Red	LED fuse F2	LED ON LED OFF	Fuse defective Fuse OK
LD13	Green	LED voltage 24 VDC	LED ON LED OFF	Voltage 24 VDC OK No supply voltage

12.3 LED diagnostics cover (optional)

The LED faults on the cover indicate a fault per section 11.

13. Technical data

Mechanical and electrical data

Housing dimensions:	350 x 200 x 148 mm
Mounting:	Vertically, on the wall; Min. height of 1,100 mm
Supply via	3~ 400 VAC, 50 Hz, +/- 10% 3~ 230 VAC, 50 Hz, +/- 10%
Customer-provided fuse/ breaker:	10 A K-characteristic
Controller internal consumption:	max. 250 mA
Control voltage:	24 V DC, max. 2.5 A
Control voltage fuse:	Polyfuse 4.0 A
Contactor load handling:	Door motor: Max 2.2 kW, 3.2 A Hydraulic power unit motor: Max 2.2 kW, 3.2 A Door sealing motor: Max 2.2 kW, 3.2 A
Valves:	Stop valve: 24 VDC +/- 20%, 1A / 100% EXTEND LIP, RETRACT LIP, BDC: 24 VDC +/- 20%1A / 2.2%
Relay output External traffic light style indicator:	230 V Version: maximum 115 W F1 0.5A (20x5) (230VAC) 24 V version: maximum 12 W F2 0.5A (20x5) (24VDC)
Relay outputs:	If inductive loads are to be switched (e.g. Additional relays or brakes), these must be equipped with corresponding interference suppression measures (e.g. Free-wheeling diodes, varistors, RC elements). Potential-free working contacts; min. 10 mA ; max. 230 V AC / 4A. *Contacts that have been used for power switching can no longer be used for switching low currents.*
Temperature range:	Operation: -5°C … +40°C Storage: -20°C … +85°C
Humidity:	Up to 80% non-condensing
Vibrations:	Low-vibration mounting, e.g. on a masonry wall
Protection grade:	IP 54
Weight:	ca. 5.5 kg

14. Maintenance

The RS 400 controller is maintenance free.

⚠ DANGER!

Life-threatening danger due to electric shock!

☞ The control MUST be disconnected from the power supply before carrying out any maintenance work on the control unit or door system. Take measures to ensure that the power supply remains disconnected for the duration of the work.

The following points must be taken into account when carrying out maintenance on the door system:

- Maintenance must only be carried out by authorised persons.
- Directive ASR A1.7 must be complied with.
- Worn or faulty parts must be replaced.
- Only approved parts may be installed.
- All maintenance work must be documented.
- Replaced faulty parts must be disposed of properly in accordance with the materials they contain and local regulations.

15. Manufacturer's Declaration

Declaration of incorporation

within the context of Machinery Directive 2006/42/EC for incorporation in an incomplete machine according to Appendix II, Part 1B

MFZ Antriebe GmbH & Co.KG
Neue Mühle 4
D - 48739 Legden

Declaration of conformity

within the context of the directives on Electromagnetic Compatibility 2014/30/EU and RoHS 2011/65/EU

We hereby declare that the following listed product

Product designation: **Control for loading bridges**
Typenbezeichnung : **RS 400**

as an incomplete machine specified exclusively for integration with a door system and designed, constructed, and produced in conjunction with the following directives:

Machinery Directive 2006/42/EC
Electromagnetic Compatibility Directive 2014/30/EU
RoHS Directive 2011/65/EU

Furthermore, the requirements of the Low-Voltage Directive 2014/35/EU are met according to Appendix I Part 1.5.1 of the Machinery Directive 2006/42/EC.

Applied and consulted standards:

EN 12453	Doors - Safety in use of power operated doors: Requirements and test methods
EN 12978	Industrial, commercial and garage doors and gates - Safety devices for power operated doors and gates: Requirements and test methods
EN ISO 13849-1	Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design
EN 60335-1	Household and similar electrical appliances - Safety - Part 1: General requirements
EN 60335-2-103	Household and similar electrical appliances - Safety - Part 2-103: Particular requirements for drives for gates, doors and windows
EN 61000-6-2	Electromagnetic compatibility (EMC) — Part 6-2: Generic standards - Immunity standard for industrial environments
EN 61000-6-3	Electromagnetic compatibility (EMC) — Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments

The special technical documents were created according to Appendix VII Part B of the Machinery Directive (2006/42/EC).
We are obligated to transmit these to market monitoring agencies in a timely manner upon justified request in electronic form.

Authorised representative for compiling the technical documents:
MFZ Antriebe GmbH & Co. KG - Neue Mühle 4 - 48739 Legden - Germany

Incomplete machines within the context of EC Directive 2006/42/EC are therefore only specified for incorporation with other machines or with other incomplete machines or systems or combined with them to form a machine within the contact of the directive indicated above. For this reason, this product may only be commissioned once it has been determined that the complete machine /system into which it has been incorporated corresponds with the indicated EC guidelines.

In case of changes to the product that are not confirmed by us, this declaration is void.

Legden, dated 01.07.2018

ppa.

Dirk Wesseling, General Manager