

Operating Instructions

MAGNETIC

High Door Pedestrian Barrier

Type MPH 112



Table of contents

1.	Safety	5
1.1	General safety instructions.....	5
1.2	Proper use.....	5
1.3	Symbols in these instructions.....	6
1.4	Work safety.....	7
1.5	User safety.....	8
1.6	User restrictions.....	8
1.7	Scope of supply.....	8
1.8	Type code.....	9
1.9	Line configurations.....	10
2.	Technical data	11
3.	Product description	12
3.1	General.....	12
3.2	Housing and lane widths.....	12
3.3	Glass wing heights.....	13
4.	Assembly and installation	14
4.1	Foundations.....	14
4.2	Access to the housing.....	18
4.2.1	Remove end housing.....	20
4.2.2	Replace end housing.....	20
4.3	Securing to the foundations.....	21
4.4	Flap mounting when first commissioning.....	22
4.4.1	Fitting the anti-climb panel.....	23
4.4.2	Fitting the glass wing.....	24
5.	Electrical connections	26
5.1	Connection of the mains power supply.....	26
5.2	Connections between housing pairs.....	27
5.3	Fitting the end housing.....	29
5.4	Making connections to the end housing.....	29
5.5	Installing access-control devices.....	30
5.6	Connecting customer's control wiring.....	31
6.	Commissioning	32
6.1	General.....	32
6.2	Initial commissioning.....	33
6.2.1	Wiring the customer's digital inputs and outputs.....	33
6.2.2	Setting the required functions using DIP switches.....	34
7.	Overview of electrical equipment	35
7.1	Overview of logic controller MBC-110.....	36
7.1.1	Customer's connections.....	37
7.1.2	Connecting an emergency input.....	38
7.1.3	Hardware for digital inputs.....	40
7.1.4	Hardware for relay outputs.....	41
7.1.5	Hardware for internal inputs and outputs.....	41

7.2	Overview of motor controller MMC-120.....	42
7.3	Overview of transformer power supply.....	43
7.4	Overview of gate end display (GED).....	44
7.5	Overview of motor MHTM ®.....	45
8.	Overview of infrared photocells.....	46
8.1	Arrangement of photocells.....	46
9.	Description of MBC-110 functions.....	47
9.1	Functions of digital inputs.....	47
9.2	Functions of digital outputs.....	49
9.3	Functions of the diagnosis display.....	51
9.4	Function and parameter settings.....	52
9.4.1	DIP switch block S1.....	52
9.4.1	DIP switch block S2.....	52
9.4.2	DIP switch S1.1: Opening pulse storage.....	53
9.4.3	DIP switch S1.2: Buzzer.....	53
9.4.4	DIP switches S1.3 and S1.4: Safety closing delay.....	53
9.4.5	DIP switches S1.5 and S1.6: Hold-open time.....	54
9.4.6	DIP switch S1.7: Query software version status.....	54
9.4.7	DIP switch S1.8: Reserved.....	54
9.4.8	DIP switches S2.1 and S2.2: Program mode.....	55
9.4.9	DIP switches S2.3 and S2.4: Permitted direction of passage.....	55
9.4.10	DIP switch S2.5: Reversal during closure.....	56
9.4.11	DIP switches S2.6 and S2.7: Reserved.....	56
9.4.12	DIP switch S2.8: Behaviour when impact detected.....	56
10.	Description of program mode MPH.....	57
10.1	Unauthorised access attempts.....	58
10.1.1	Attempted unauthorised following (tailgating).....	58
10.1.2	Unauthorised access in the blocked direction.....	58
10.1.3	Unauthorised presence of a person.....	58
10.2	Selection of the operating mode.....	59
10.2.1	Operating mode: Emergency.....	60
10.2.2	Operating mode: Out-of-service mode.....	60
10.2.3	Operating mode: Controlled entry mode.....	61
10.2.4	Operating mode: Controlled exit mode.....	61
10.2.5	Operating mode: Bidirectional.....	62
10.2.6	Operating mode: Free entry mode.....	63
10.2.7	Operating mode: Free exit mode.....	63
10.2.8	Operating mode: Free entry, controlled exit mode.....	64
10.2.9	Operating mode: Free exit, controlled entry mode.....	64
10.2.10	Operating mode: Fully free mode.....	65
10.3	Normal operation.....	66
10.3.1	Power-off state.....	66
10.3.2	Reference run (homing).....	66
10.3.3	Normal operation without pulse storage.....	66
10.3.4	Normal operation with pulse storage.....	67
10.4	Special cases.....	67
10.4.1	Impact detection.....	67
10.4.2	Attempted break-in.....	67
10.4.3	Emergency situation.....	67
11.	CAN bus addressing and termination.....	68
12.	Troubleshooting.....	70
12.1	LEDs at inputs and outputs of the MBC-110.....	70
12.2	Display of error codes at the MBC-110.....	70
12.3	Display of error codes at the MMC-120.....	73

12.4	Fault diagnosis	74
12.5	Diagnosis program MBC_Diag	76
13.	Wiring diagrams	76
14.	Repair work	77
14.1	Removing the glass wing	77
14.2	Removing the anti-climb panel	83
14.3	Installing the anti-climb panel	84
14.4	Installing the glass wing	84
14.5	Installing cover strip on MPH Standard	85
14.6	Changing the motor	89
15.	Downloading software (updates)	92
16.	Technical support.....	93
17.	Spare parts and accessories.....	93
18.	Guarantee.....	93
19.	Taking out of service.....	94
20.	List of illustrations	95

1. Safety

1.1 General safety instructions

The design of MAGNETIC MPH pedestrian barriers complies with the state of the art and they are manufactured and tested to ensure safe, reliable operation and that they leave our works in perfect condition. Nevertheless, the system can give rise to dangers to persons and goods if it is improperly used. The operating instructions must therefore be read completely and the safety instructions observed.

In the event of improper use, the manufacturer is absolved from any liability and will refuse guarantee claims.

1.2 Proper use

A MAGNETIC MPH pedestrian barrier may only be used to provide controlled access for pedestrians who wish to enter a restricted-access zone which is normally under surveillance.

Only controllers MBC and MMC may be used to control operation of the pedestrian barrier. Changes and modifications to the products or controllers require the manufacturer's approval.

Only original spare parts and accessories from MAGNETIC may be used.



IMPORTANT NOTE!

MAGNETIC is not responsible for any type of material damage, injury to persons, or other faults or accidents that arise from failing to observe the conditions for proper use!

1.3 Symbols in these instructions

The following warning and instruction symbols indicate either situations which could give rise to potential hazards for persons or goods, or important instructions relating to operation of the barrier.

The text passages to which these symbols relate must be read and observed without fail.

Components from suppliers may have their own safety regulations and instructions for use. These must also be observed.



CAUTION!

This symbol accompanied by the word "CAUTION" indicates a situation which could entail a danger to life and limb.

The measures stated to avoid this hazard must be strictly observed.



ATTENTION!

This symbol accompanied by the word "ATTENTION" indicates a situation in which there could be a danger of material damage.

The measures given to avoid this hazard must be strictly observed.



IMPORTANT NOTE!

This symbol accompanied by the words "IMPORTANT NOTE" indicates text containing important information,

These sections contain specific instructions on installation, application, and maintenance.



RECYCLING!

When the barrier is taken out of service at the end of its useful life, it must be disposed of in accordance with local laws and regulations.

The materials used must be sorted and disposed of separately.

Similarly, the regulations concerning the disposal of lubricants (oil and grease) and other auxiliary materials must be observed.

1.4 Work safety

- When working on the barrier, all external command units (remote controls, control panel etc.) must be switched off.
- Before commissioning, make sure the barrier is adequately fastened to a secure foundation.
- A main circuit breaker must be installed in accordance with VDE requirements.
- These operating instructions and all other accompanying documents must be stored so that they are accessible for operating and maintenance personnel at any time.
- Before commissioning, all electrical and mechanical functions must be checked.
- The electrical installation must be carried out in accordance with the accompanying circuit diagrams.
- The electrical installation must be carried out by trained specialist personnel.
- Covers on mains plugs, power supplies, and electric wiring may only be removed by trained specialist personnel.
- Before maintenance work or troubleshooting for electrical faults, the main switch must be turned off without fail.
- When the unit is switched on, or when power returns after a power failure, the barrier automatically becomes operative again.

1.5 User safety

The following functions ensure the safety of users:

- Monitoring of the safety zone in the region of the glass wings by infrared photoelectric cells.
- Closing force limited to comply with the requirements of the relevant door and gate standards.
- Impact detection with a choice of reactions.

1.6 User restrictions

In normal operation, the pedestrian barrier MPH-112 is not suitable for the passage of large or unwieldy pieces of luggage.

For safety reasons, children should only use the barrier under supervision, and small children only when accompanied by an adult.

1.7 Scope of supply

1 x pedestrian barrier (quantity and module variants depending on configuration)

6 x express anchors with accessories

2 x door keys

1 x documentation

Access-control devices, such as a card reader, are not part of the scope of supply.

1.8 Type code

M P H - 1 1 2 A - A 1 0 0 - XXXXX

Options

Customer or project code, etc.
 XX**** = customer/project
 No code = standard glass wing travel 235 or 430mm
 MF001 = glass wing travel 205mm
 MF002 = glass wing travel 402.5mm
 MF003 = glass wing travel 205+402.5mm (E/F module)
 MF004 = glass wing travel 235+402.5mm (E/F module)
 MF005 = glass wing travel 205+430mm (E/F module)

Cover

0 = without front panel
 1 = with front panel

Material

0 = powder-coated
 1 = stainless steel 1.4301
 2 = stainless steel 1.4571
 3 = stainless chromium steel

Housing width / mm

1 = 300
 2 = 520
 9 = customer-specific

Voltage

A = 230V 50Hz
 C = 115V 60Hz

Version

A = basic module
B = end module
C = intermediate module
E = transition module standard / wide
E = transition module wide / standard

Drive type

2 = standard drive motor
 4 = other drive variants

Size

1 = short housing
 2 = long housing

Generation

Product type

H = high door (horizontal sliding gate)

Product group

P = pedestrian

Product classification

M = Magnetic product

1.9 Line configurations

Drawings apply for housing widths:

300 mm
520 mm

Drawings apply for housing widths:

300 mm
to
520 mm

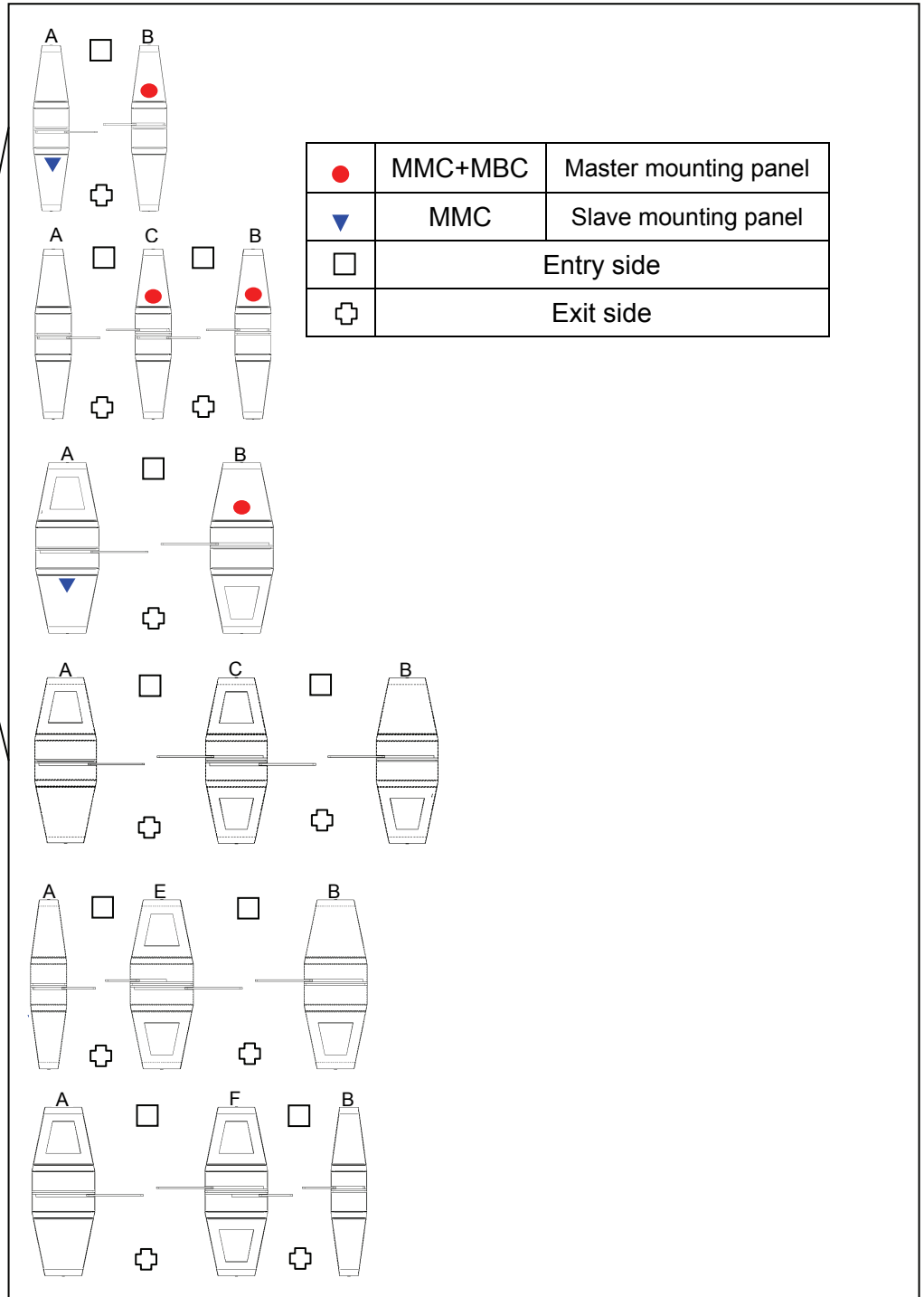


Fig. 1-1 Line configurations

2. Technical data

TECHNICAL DATA	UNIT	MODEL		
		MPH-112*-*1**	MPH-112*-*2**	
Voltage	VAC	110-240	110-240	
Frequency	Hz	50-60	50-60	
Barrier open power / current draw	W / A			
Barrier closed power / current draw	W / A			
Duty cycle	%	100	100	
Degree of protection	IP	32	32	
Opening / closing time	ms	0.6 – 1.2 s	1.0 – 1.4 s	
Length	mm	1300	1300	
Width	mm	300	520	
Height	mm	1200/1500/1800	1200/1500/1800	

Fig. 2-1 Table of technical data

The data given in the table may change as a result of technical changes! All current values relate to a mains voltage of 240 V.

3. Product description

3.1 General

Pedestrian barrier MPH-112 is a user-friendly personnel barrier which has been developed to permit the rapid checking of pedestrians entering, for example, public buildings, hotels, companies, or museums. With suitable roofing, it can be used out of doors, e.g. in sports stadiums.

The modular system permits numerous different lines and versions.

Basically, the pedestrian barrier can be used in both directions. In multi-lane installations with high throughput rates, the entry and exit lanes can also be configured for one-way passage.

In its normal state, the pedestrian barrier is closed. The glass wings only open after authorisation from an external command unit, such as a card reader.

Attempted cheating by unauthorised persons, e.g. passage in the wrong direction, or an attempt by a second person to follow without authorisation (tailgating) are recognised and activate the alarm system. Recognition in such cases is by several infrared photocells.

The drive unit is a patented MHTM® direct drive (MAGNETIC High Torque Motor) in combination with a sine-wave linkage system. These components guarantee a high-performance drive and maximum availability.

With MHTM direct drive technology, the glass wings can be blocked in any position, e.g. by hand. No slipping clutches or similar devices are required.

In the event of a power failure, the glass wings are opened automatically by springs.

3.2 Housing and lane widths

Two different housing widths are available, 300mm and 520 mm. The standard lane widths are 520 mm or 910 mm.

For special applications, other lane widths can be provided. Please discuss your requirements with MAGNETIC.

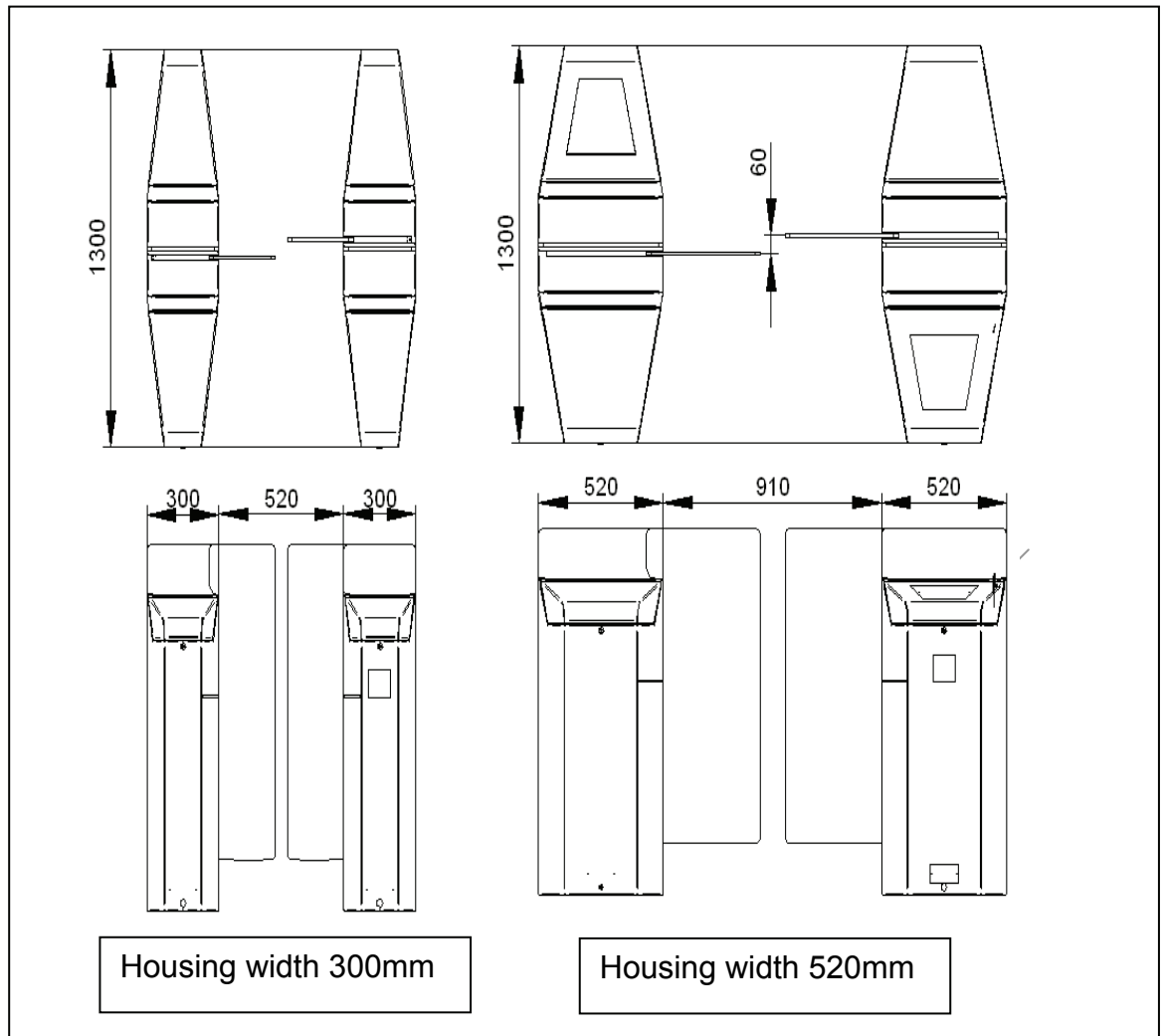


Fig. 3-1 Installation examples, available housing widths

Definition of lane width (LW):



IMPORTANT NOTE!

The lane width (LW) is calculated as follows:

$$LW = (2 \times \text{extended glass wing width}) + (\text{gap between glass wings})$$

3.3 Glass wing heights

Type MPH-112 pedestrian barriers are designed for glass wing heights of 1200 mm, 1500 mm, or 1800 mm. The program that must be loaded into the MBC-110 controller is specific to the glass wing height.

4. Assembly and installation

The assembly and installation of the housing is described in the following five sections:

1. Foundations
2. Securing to the foundations
3. Access to the housing
4. Flap mounting when first commissioning
5. Electrical connection

When all the operations described in these sections have been carried out, you can continue with commissioning – see Section 6.

4.1 Foundations

A level concrete surface or a level floor is necessary for assembling the housing.

The requirements for concrete foundations can be seen in Fig. 4-1 to Fig. 4-3. Between each pair of housings, 2 empty conduits are required. Wiring must be carried out according to the circuit diagram and the schematics. Any additional wiring, for example for access-control equipment must be planned by the customer. Make sure that cables laid in the conduits have sufficient length projecting out of the concrete floor. During planning, the position of the control system must be taken into account.

Consult MAGNETIC if there are any points you are not clear about.

Assembly and installation

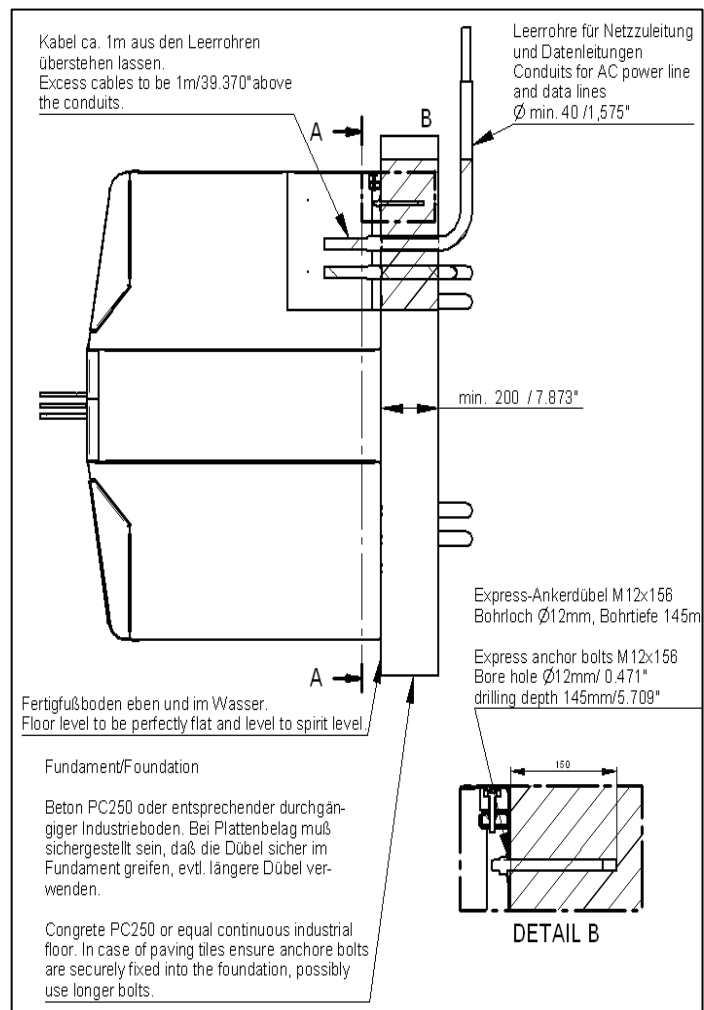


Fig. 4-1 Foundation, side view

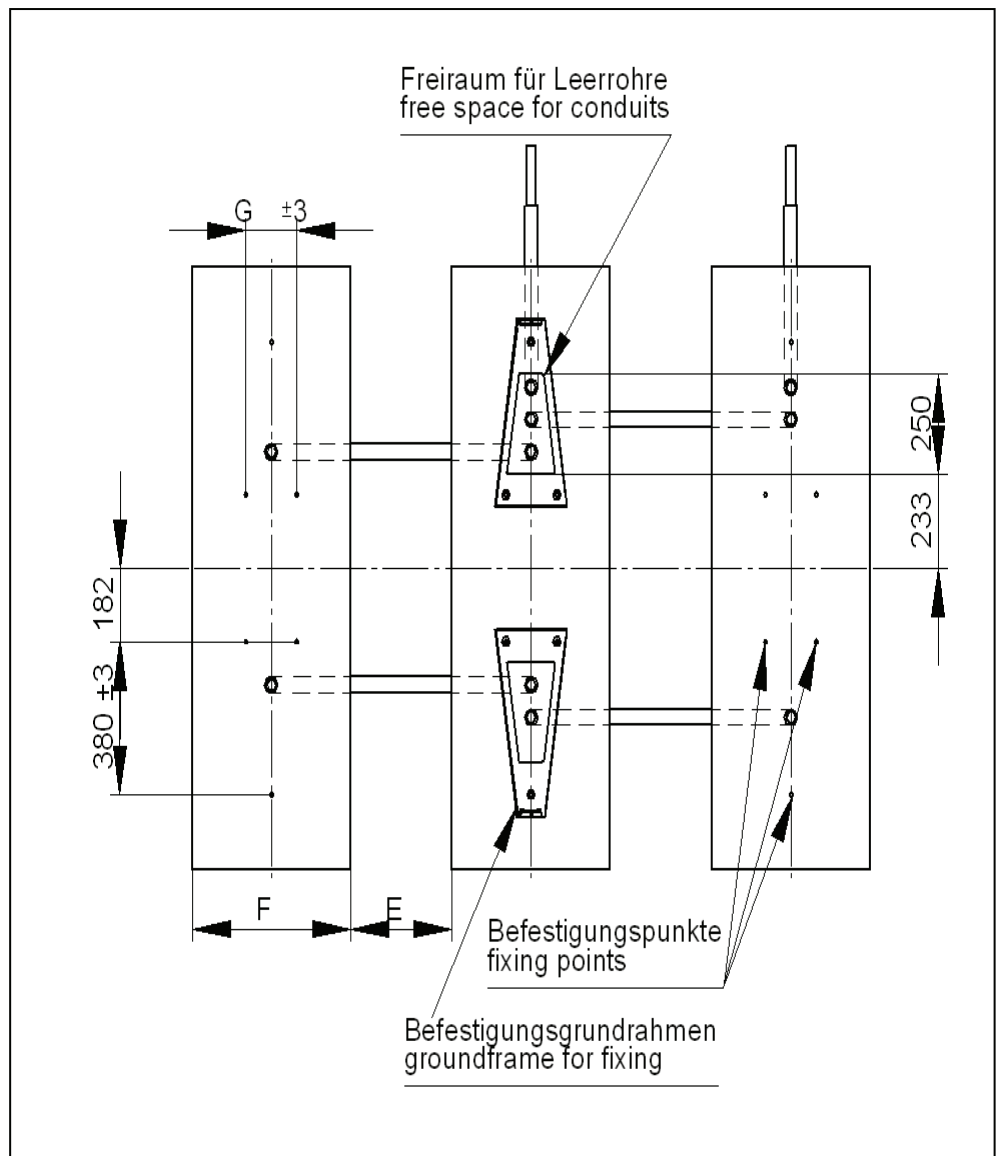


Fig. 4-2 Foundation drawing – empty conduits

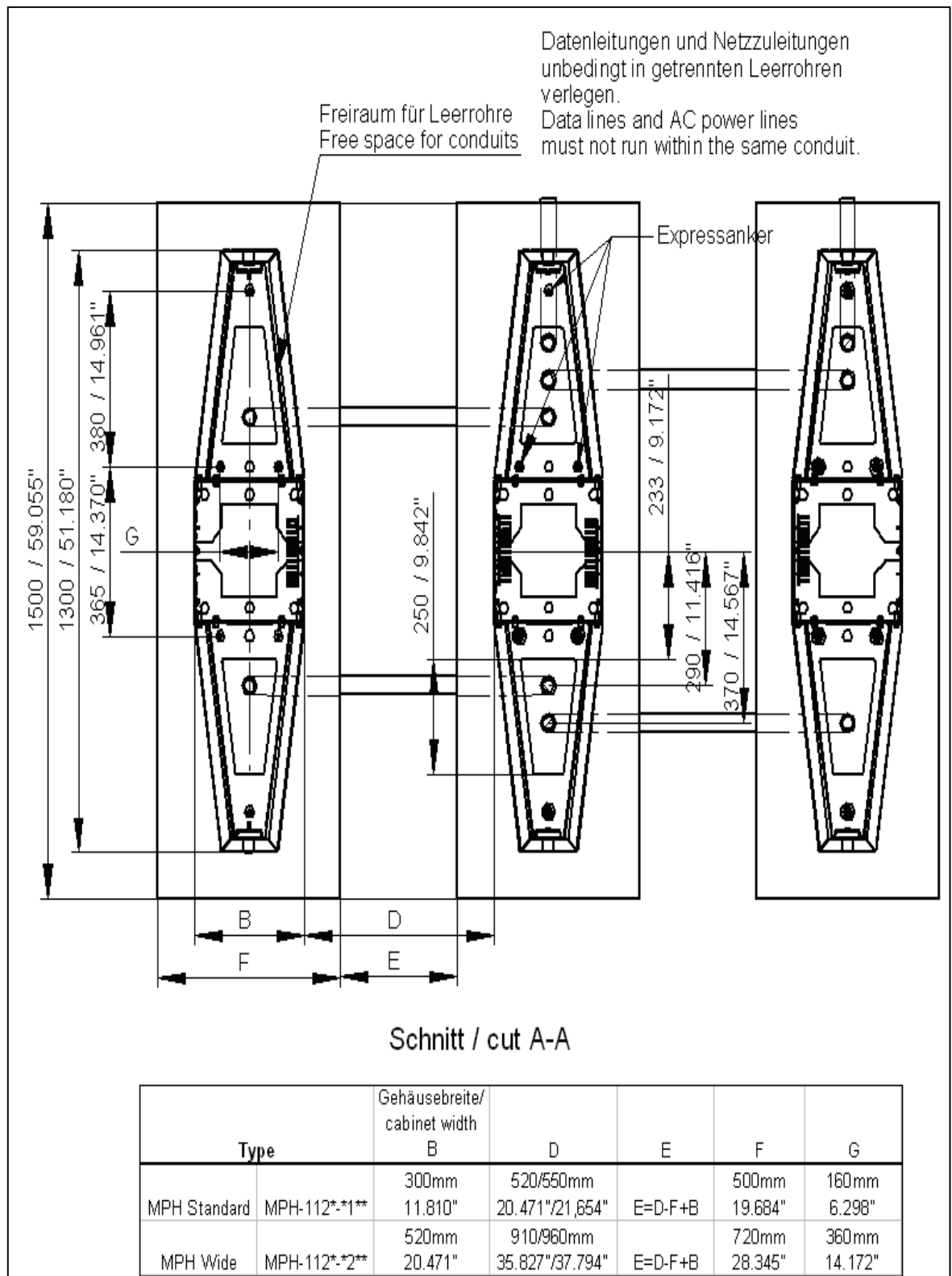


Fig. 4-3 Plan view of foundations

4.2 Access to the housing

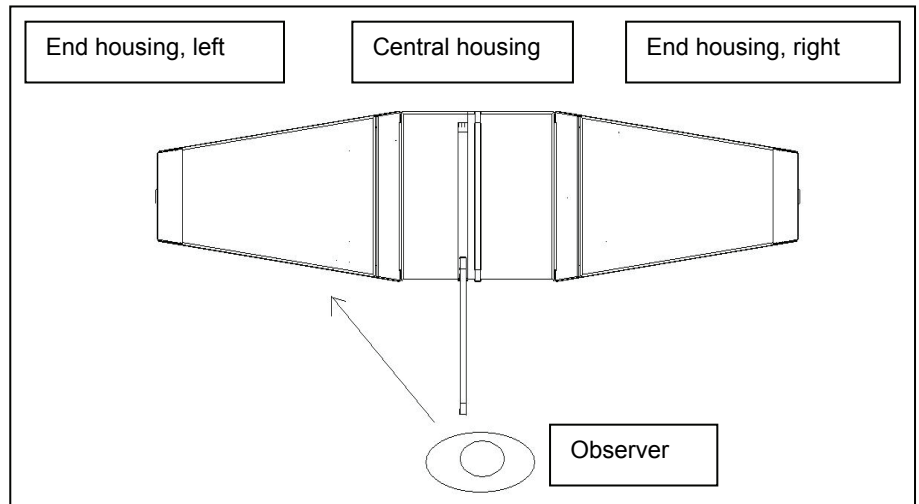


Fig. 4-4 Housing definitions

Before the housing can be secured to the foundations, the end housings must be removed from the central housing – see Fig. 4-4. As delivered, the end housings are fitted to the central housing. After the end housings have been removed, the base frame is accessible for fastening to the foundations.

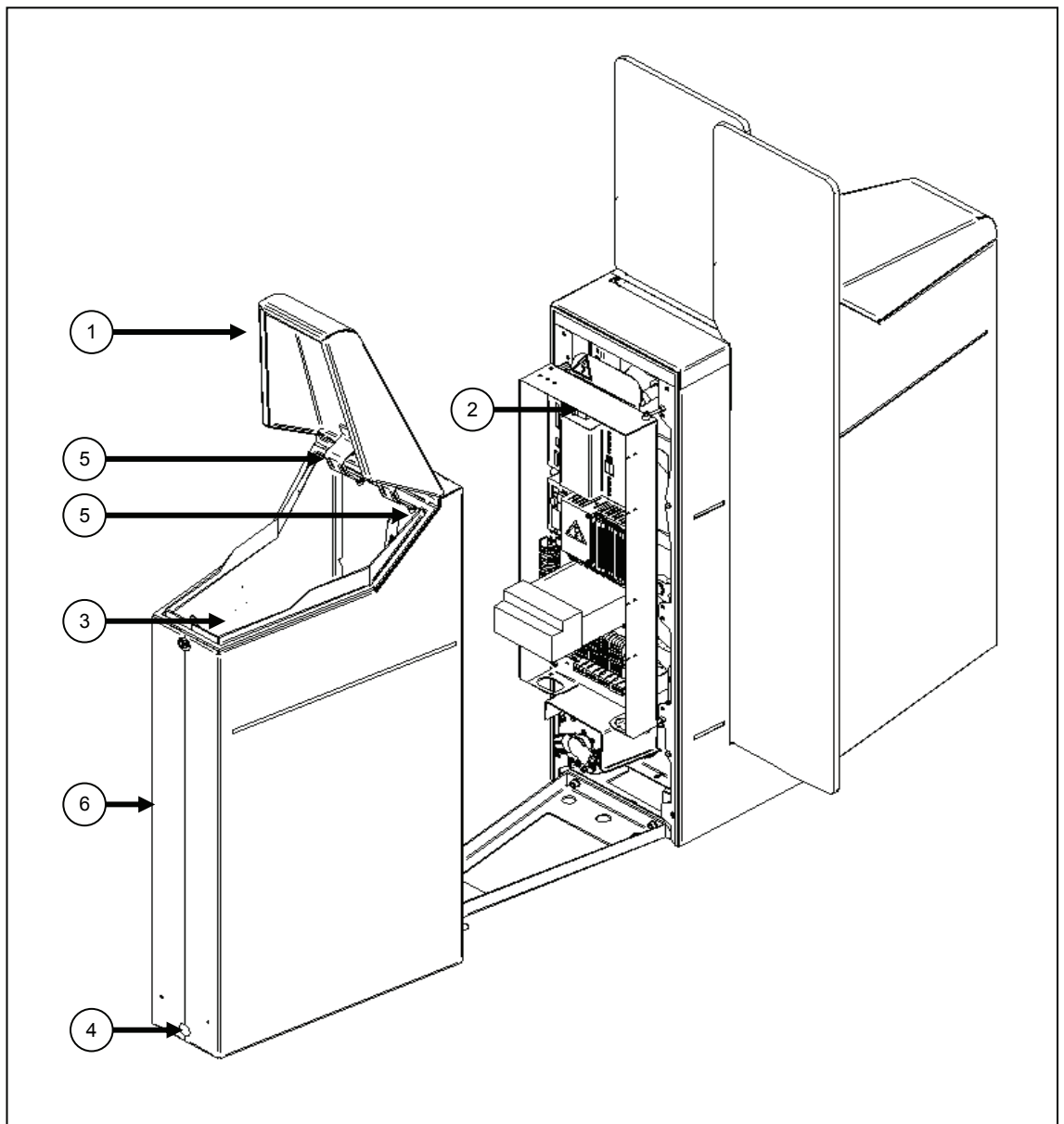


Fig. 4-5 Access to motor, drive, and control unit

4.2.1 Remove end housing

Proceed as indicated in Fig. 4-5.

Open cover (1).

Switch off main switch (2), disconnect connector plug (3) for photo-cells.

Remove cap and undo socket cap screw – both at (4).

In the two upper corners of the end housing there is an M6 socket cap screw (5), undo and remove them.

Now the end housing (6) can be removed as shown in Fig. 4-5.

4.2.2 Replace end housing

When replacing the end housings, proceed in the reverse order.

Before fitting an end housing, make sure that wiring and connectors are not pinched.

Push the end housing carefully on to the central housing. Take care that the locating pins on the end housing locate in their holes in the central housing.

Insert and tighten the socket cap screws (4) and (5) in the end housing. Replace the cover (4).

Now refit the connector plugs (3) for the photocells and gate end display.

4.3 Securing to the foundations

Secure as shown in Fig. 4-6 and Fig. 4-7. The MPH housing must be screwed to the foundations with six express anchors through the base frame – see Fig. 4-6.

The fasteners are included in the scope of supply.

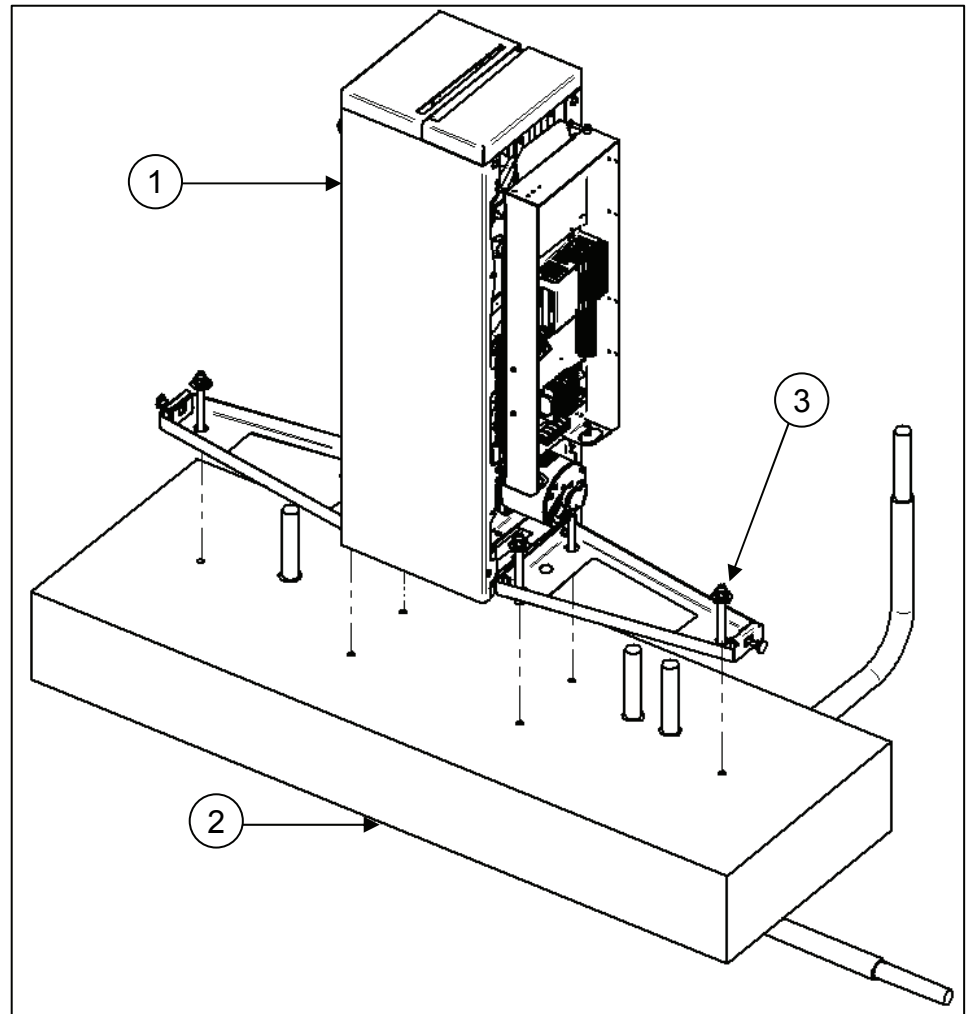


Fig. 4-6 Securing MPH to foundation with express anchors

1 – MPH housing

2 – Foundation

3 – 6x nut, spring washer, plain washer, express anchor

Fig. 4-7 Shows the hole pattern in the foundations.

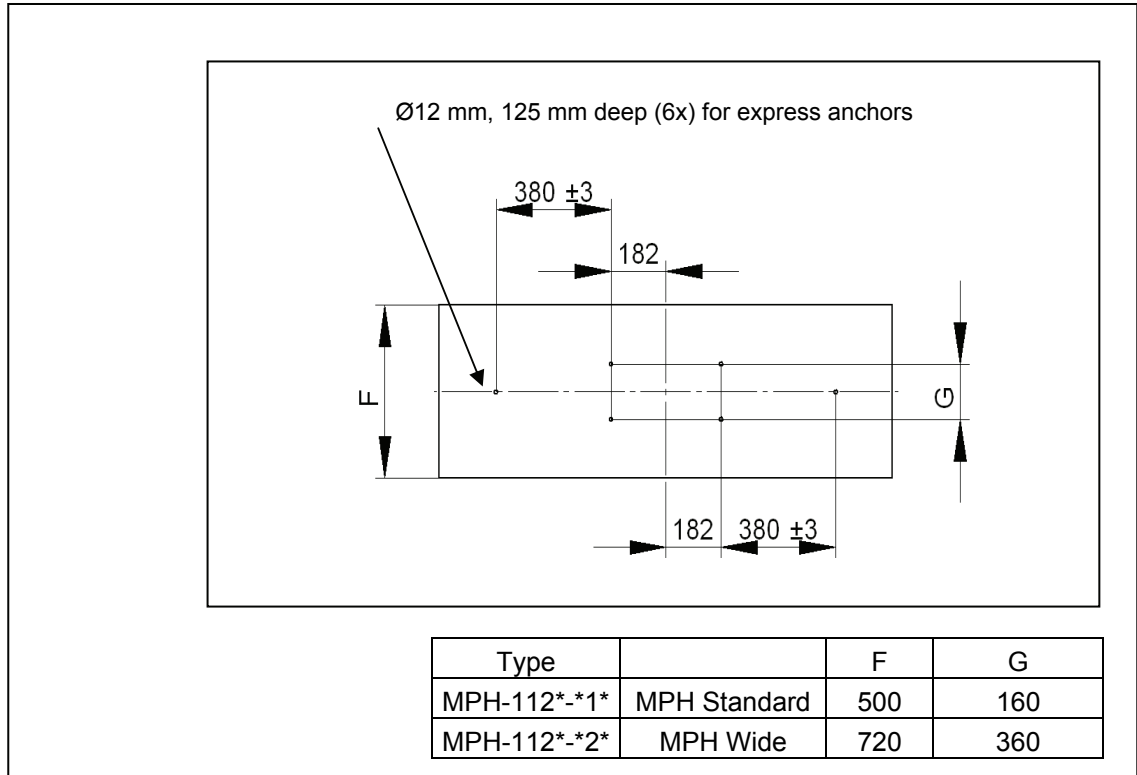


Fig. 4-7 Hole pattern for express anchors in foundations

4.4 Flap mounting when first commissioning

As soon as the barrier housings have been secured to their foundations, you can proceed with installing the glass wings.



IMPORTANT NOTE!

It is important that the glass wings are installed in the sequence given. The glass wings must be fitted before the end housing is replaced.

The anti-climb panel must be mounted first, followed by the glass wing. If you don't keep to the correct sequence, fitting is more difficult because the mounting screws are behind the glass wing.

4.4.1 Fitting the anti-climb panel

Proceed as indicated in Fig. 4-8.

Loosen the four hexagon-head screws (1), two on each side, but do not remove them.

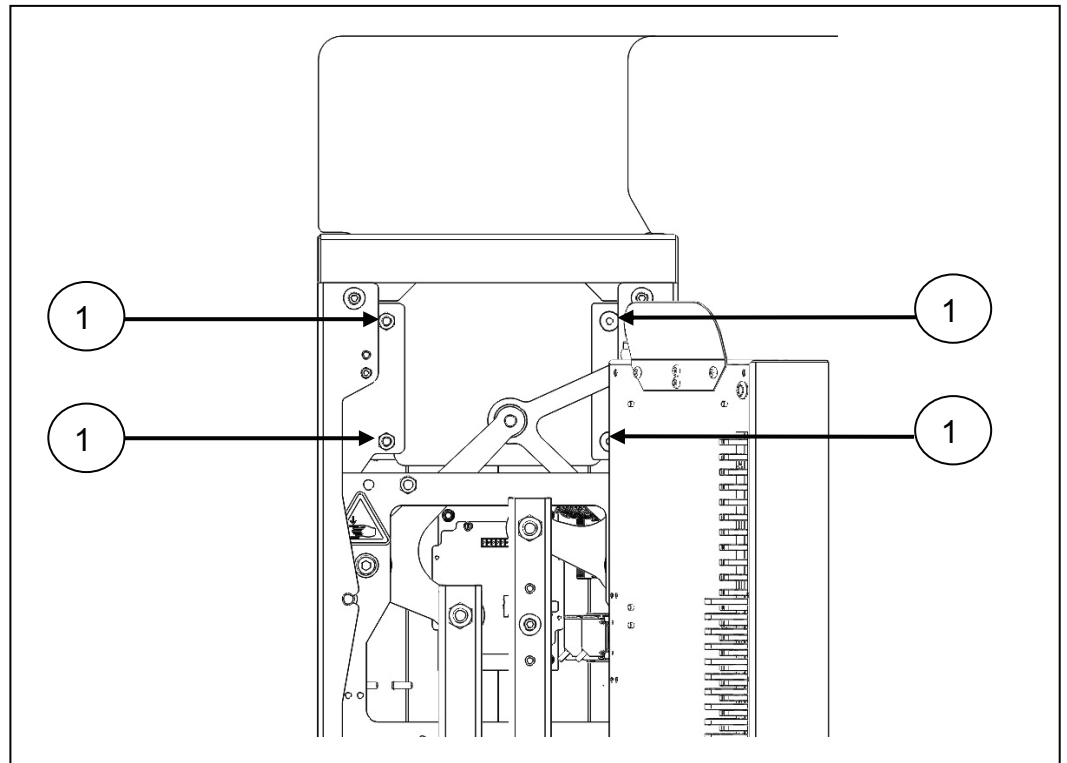


Fig. 4-8 View of central housing with mounting panel swung to the side



ATTENTION!

Danger of breaking the panel if it is twisted!

Push the anti-climb panel from above into the housing between the mountings taking care it does not jam. Tighten the clamping screws (1) progressively and diagonally to a torque of 20 Nm.

4.4.2 Fitting the glass wing



ATTENTION!

When carrying out assembly work on the drive unit, it is essential that it is blocked. Otherwise, there is a danger of serious injury from moving parts.

Bring the drive unit to the blocking point. Block the drive unit with fixing screw (1). Make sure that the screw is aligned with the hole in the bell-crank and engages. Then secure the screw with a locknut so that the drive unit is blocked with a minimum of play.

Loosen the screws (2) on the clamping strip, but do not remove them.

Loosen the nuts (3) for the cover strip carrier.

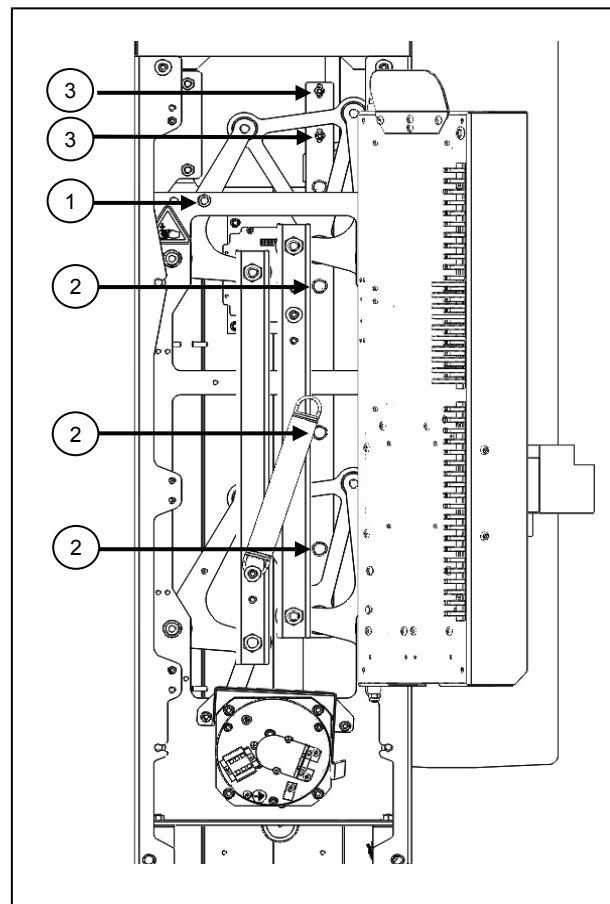


Fig. 4-9 View of drive unit with mounting panel swung to the side

Insert the glass wing carefully between the clamping strips without twisting it.



IMPORTANT NOTE!

To position the glass wing, adjust the dimension between the housing and the glass wing edge to 160 mm for MPH Standard, and to 190 mm for MPH Wide. Tighten the clamping screws (2) progressively and alternately to a torque of ca. 20 Nm.

Due to manufacturing tolerances, there may be differences; it is therefore recommended that you release the drive unit from its blocked state, move it to the open position, and then check that the glass wing end is flush with the housing. If it is not, repeat the adjustment so as to correct the difference you have observed.

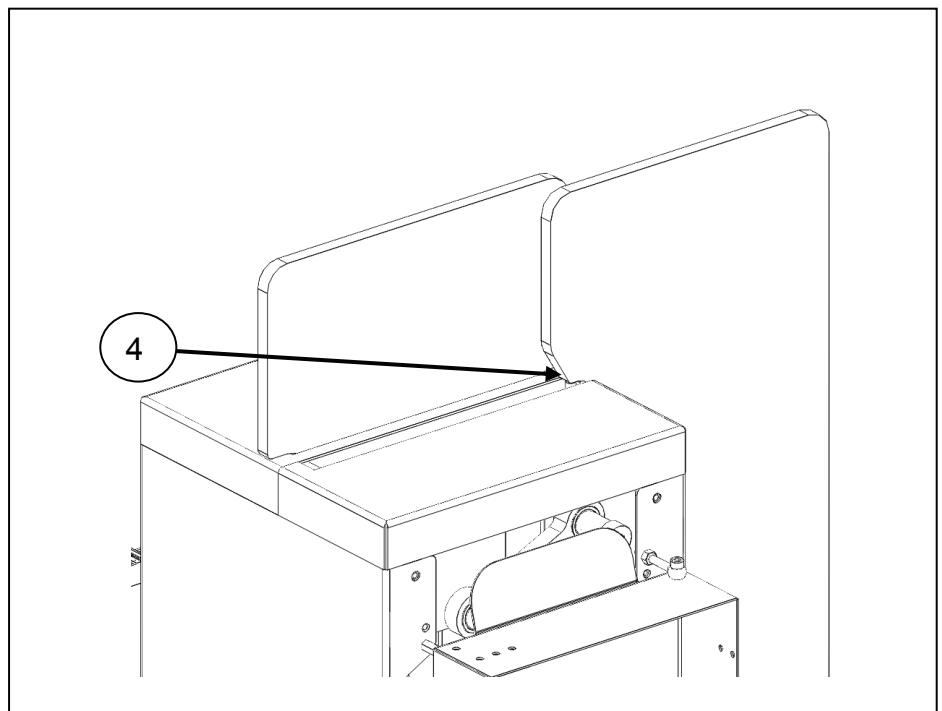


Fig. 4-10 View of central housing showing slot cover

Engage the cover strip (4) with the carrier and push the latter upwards as far as it will go, so that the cylindrical pin contacts the edge towards the panel. When tightening the nuts to secure it, take care that the carrier is in contact with the glass wing edge. Unblock the drive unit.

Before fitting the end housing to the central housing, continue with Section 5.

5. Electrical connections

After securing the individual central housings of an access line to their foundations, the connecting wiring between the two central housings and the mains power supply must be connected before fitting the end housings.

Where necessary additional wiring must be connected to the MBC-110 controller to control the pedestrian barrier and to evaluate feedback.



CAUTION!

Connections of electrical wiring, in particular mains connections, may only be carried out by a trained and qualified electrician.

5.1 Connection of the mains power supply

The mains power supply is connected to the mounting panel at the terminals marked L1, N and PE.

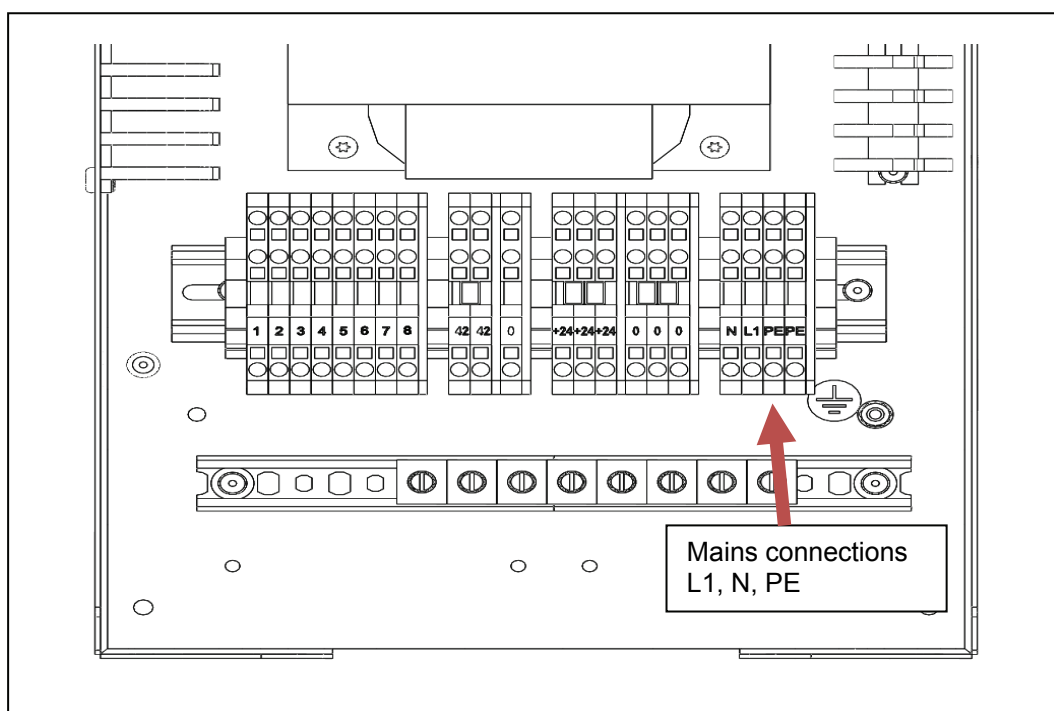


Fig. 5-1 Connection of mains power supply

5.2 Connections between housing pairs

The wiring between the two housings of the pair for an access lane is connected to the mounting panel on the slave side at the marked terminals.

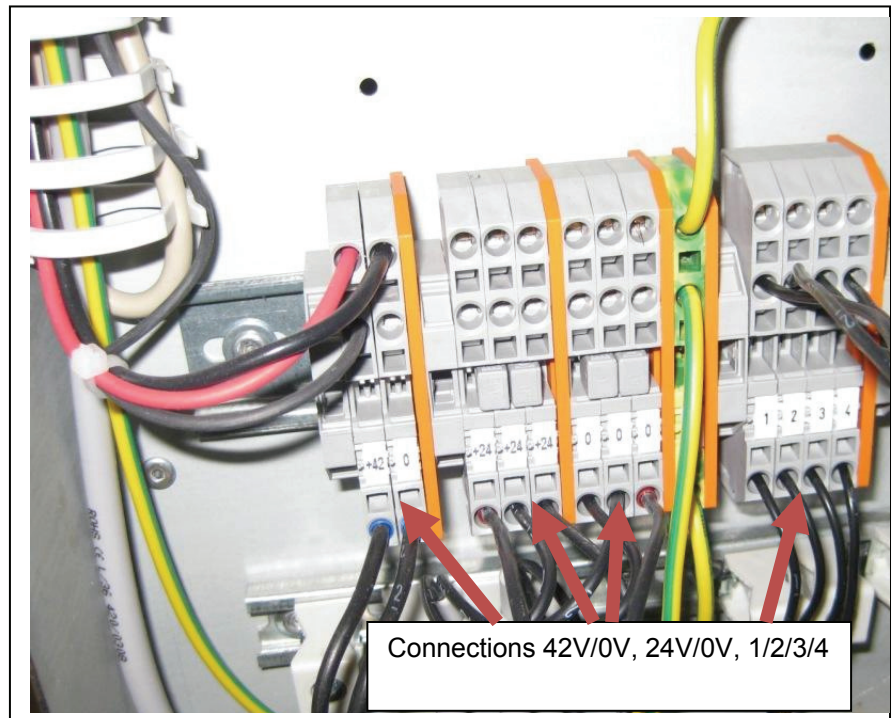


Fig. 5-2 Connection of wiring between a pair of housings

Electrical connections

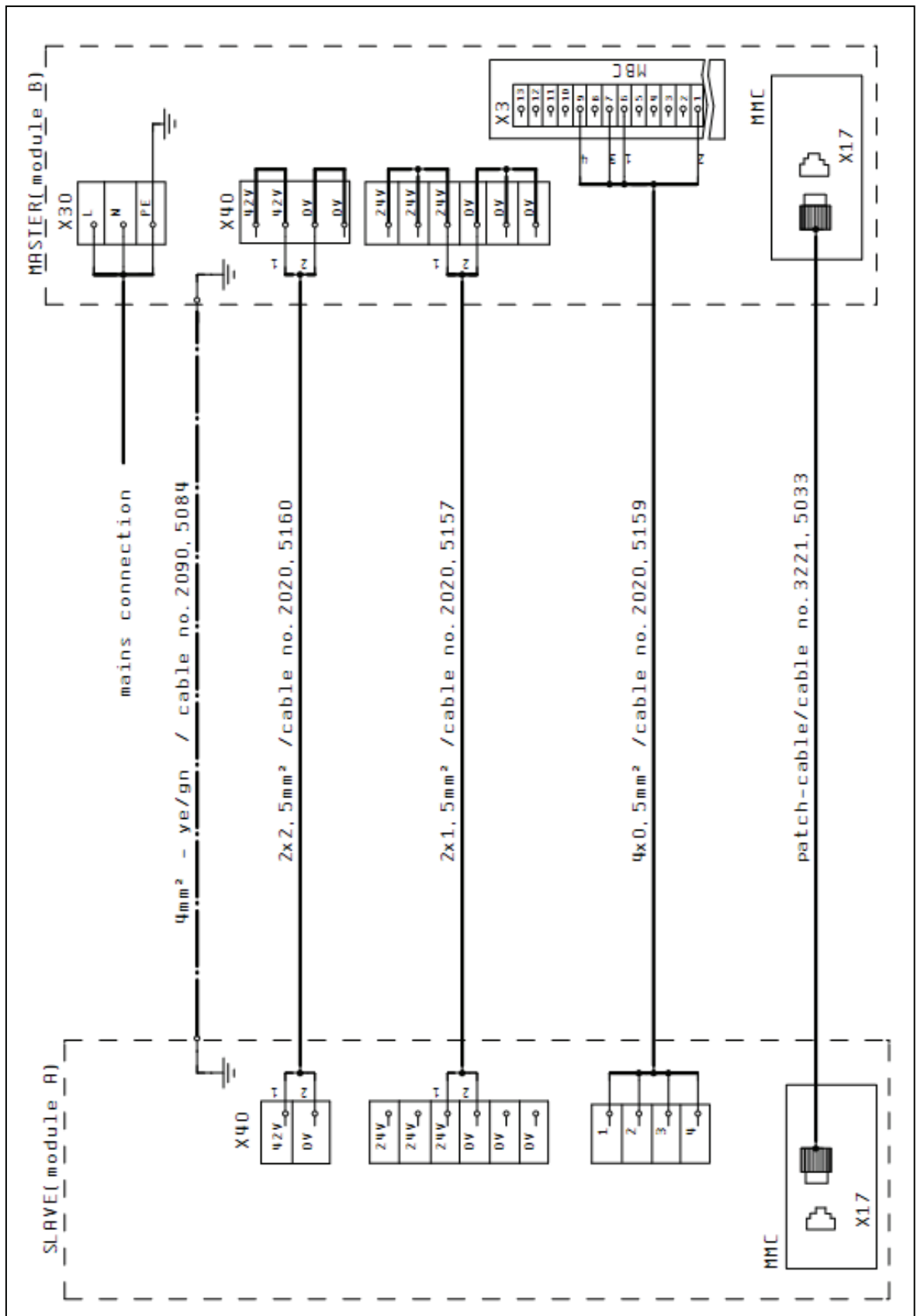


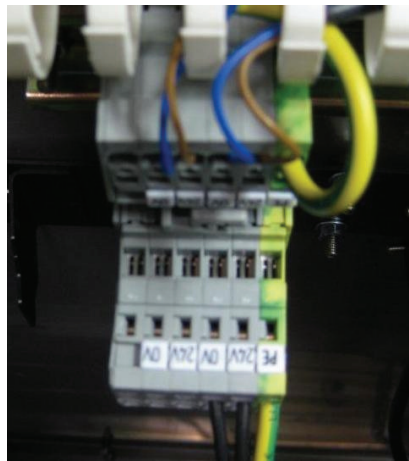
Fig. 5-3 Connections for mains supply and between a pair of housings

5.3 Fitting the end housing

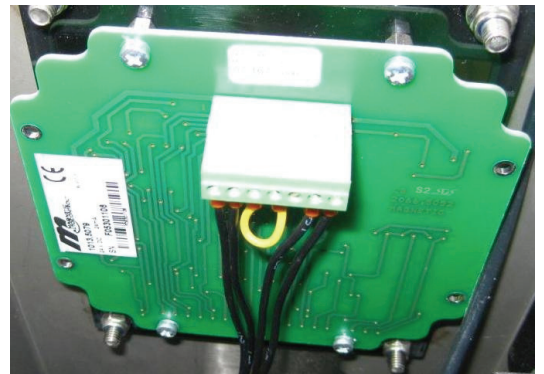
After making all connections, the end housing must be replaced on the central housing – see Section 4.2.2.

5.4 Making connections to the end housing

After securing the end housing, the connection leads from the central part must be plugged in.



Insert connectors ST1 to ST4
(different numbers of poles)



Plug in connectors to both Gate End
Displays

Fig. 5-4 Plugging in connection leads to the end housing

5.5 Installing access-control devices

When installing access-control devices, the installation dimensions shown below must be taken into account.

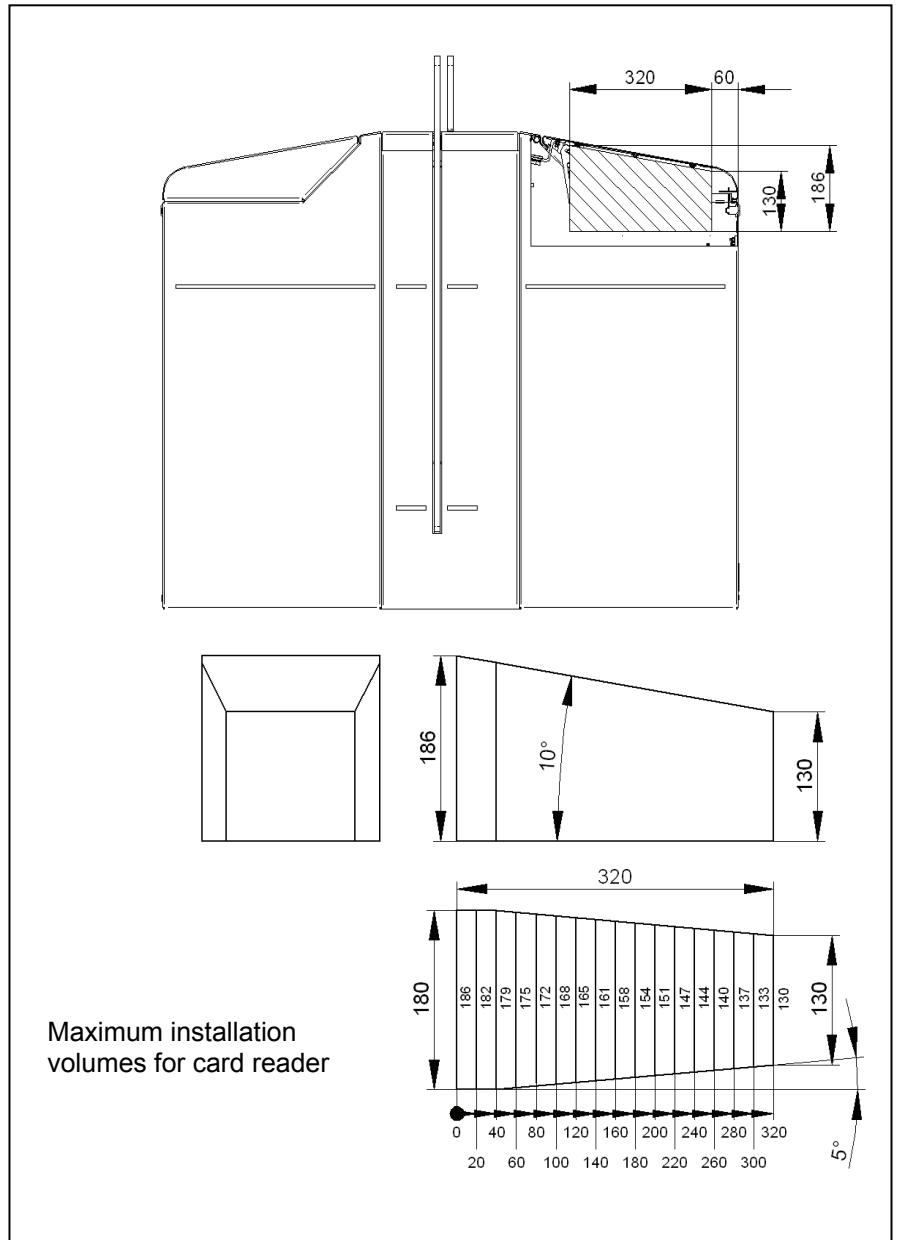


Fig. 5-5 Installation information for access-control devices

5.6 Connecting customer's control wiring

Depending on how the pedestrian barrier is to be controlled, or on which feedback signals should be evaluated, it may be necessary for the customer to connect control wiring to the MBC-110 logic controller – see also Section 7.1.1.

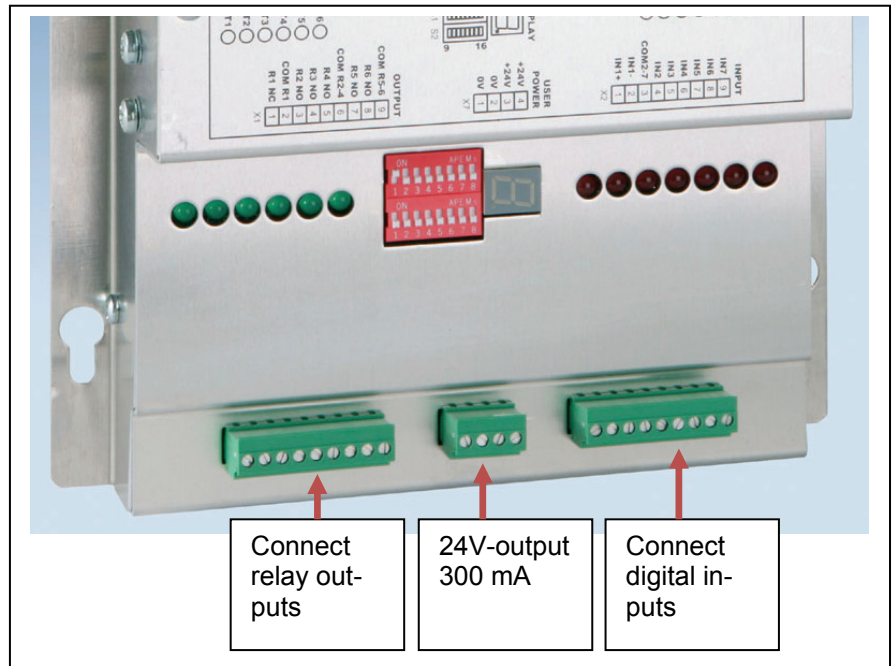


Fig. 5-6 Customer connections to MBC-110

6. Commissioning

6.1 General

On completion of the mechanical and electrical installation, the pedestrian barrier can be taken into service.



CAUTION!

Before commissioning for the first time, make sure that all assembly and installation instructions have been followed and that the electrical connections have been correctly made.

Faulty installation or connections can cause malfunctions which could result in injuries.

The notes on assembly and installation in these operating instructions must be strictly observed.

Make sure that, when the power supply is switched on, there are no obstructions to operation of the barrier. (The access lane must be clear).

- Every time the power is switched on, the glass wings go to the closed position. The first closure takes place at reduced speed and serves as a reference run for the system to learn the end positions.
- There are three exceptions:
 - o if an opening impulse is present.
 - o when the input "Emergency" to controller MBC-110 is interrupted.
 - o if the safety photocells are not clear.



IMPORTANT NOTE!

Remember that the safety photocells are activated during a system start. The glass wings can only close when the safety photocells are clear.

6.2 Initial commissioning

During initial commissioning, the following points must without fail, be observed or checked. This ensures quick and trouble-free commissioning.

You will find details for the various points under the cross-references quoted.

6.2.1 Wiring the customer's digital inputs and outputs

Point 1: Check wiring of Emergency input IN1

Check if inputs IN1+ and IN1- on controller MBC-110 are correctly wired.

Normally these two inputs are set to a fixed potential in our works prior to delivery so that the barrier can be taken into service (IN1+ to +24 V, IN1- to 0V).

If the emergency input is connected to an external protective device, see Section 7.1.2.

For further details, see the circuit diagrams supplied with the barrier.

Point 2: Connection of digital inputs IN2 and IN3

If an access-control system, e.g. a card reader, was not installed prior to delivery, the two inputs IN2 and IN3 must be connected to open the pedestrian barrier.

For further details please see Section 7.1.1 and the table Fig. 10-2.

Point 3: Connecting the outputs of relays 1 to 6

Depending on the desired feedback, the outputs of relays 1 to 6 must be connected.

For further details please see Section 7.1.1 and the table Fig. 10-2.

6.2.2 Setting the required functions using DIP switches



IMPORTANT NOTE!

Changes to DIP switch settings only become effective after the power supply to the pedestrian barrier has been switched off and then on again.

In particular the following functions must be determined respectively checked at initial commissioning:

Point 1: Selection of program mode 2 = MPH

Set program mode 2 using the two DIP switches S2.1 and S2.2 – see Section 9.4.8.



CAUTION!

Setting the wrong program mode can result in the pedestrian barrier operating incorrectly! Before commissioning the pedestrian barrier, you must therefore ensure that the correct program mode is set at DIP switches S2.1 and S2.2.

Point 2: Determining the permitted direction of passage

Determine the direction of passage using DIP switches S2.3 and S2.4 - see Section 9.4.9 and Fig. 10-2.

Point 3: Reversal during closure

Set the safety photocell behaviour after the closing operation has started using DIP switch S2.5 – see Section 9.4.10. Observe the safety instructions given there!

Point 4: Behaviour following impact detection

Set pedestrian barrier behaviour after impact detection using DIP switch S2.8 – see Section 9.4.12.

Point 5: Checking CAN bus termination and addressing

You must check that the DIP switches for CAN bus termination and addressing are correctly set on all three controllers – see Section 11.

7. Overview of electrical equipment

The block diagram below gives an overview of the electrical system of the pedestrian barrier.

Two motor controllers are connected by a CAN bus to the MBC-110 logic controller.

A total of 8 infrared photocells and two gate end displays are connected to digital inputs and outputs.

For the customer, there are digital inputs to open the pedestrian barrier, e.g. for a card reader, and an emergency input. From relay outputs various feedback messages are available for the customer.

The power supply for the controllers is provided by a transformer power supply with two output voltages, 30 VDC and 42 VDC.

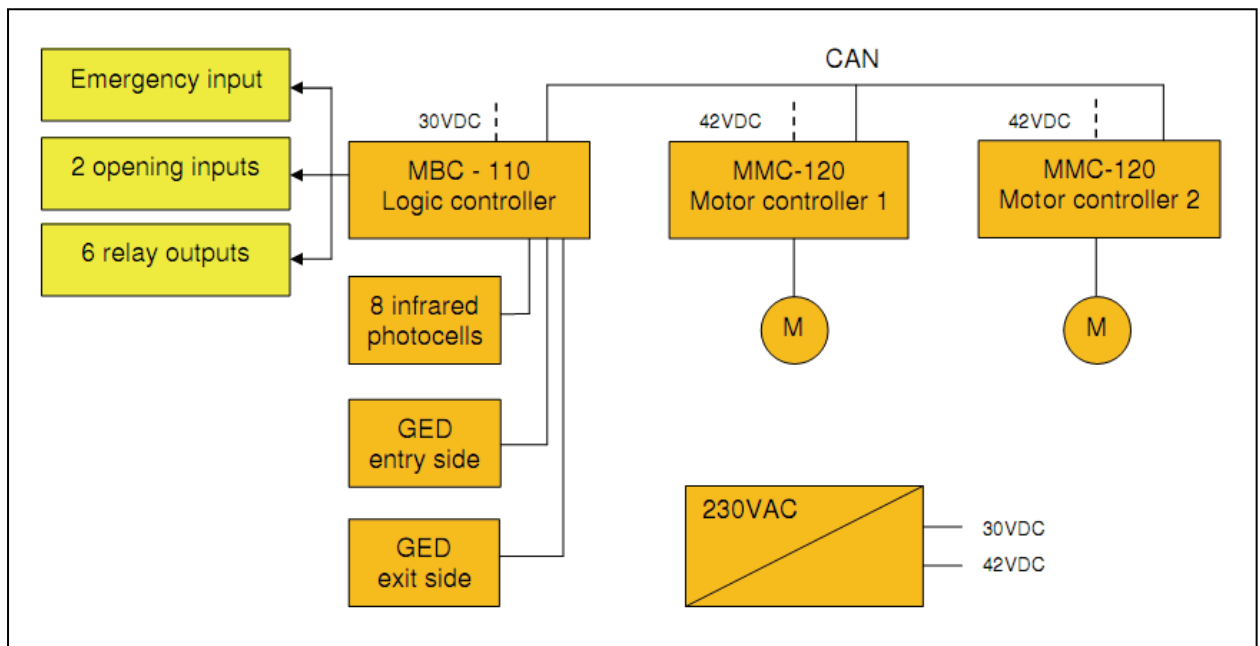


Fig. 7-1 Block diagram for control system

7.1.1 Customer's connections

Three digital inputs are available to the customer for controlling the pedestrian barrier, and a further 6 relay outputs are provided for evaluating information.

The display showing the status of the inputs and outputs employs LEDs. In addition, there is a 7-segment display which shows the operating status and the error status.



IMPORTANT NOTE!

The maximum output current at connector X7 is limited to 300 mA by a self-resetting fuse.

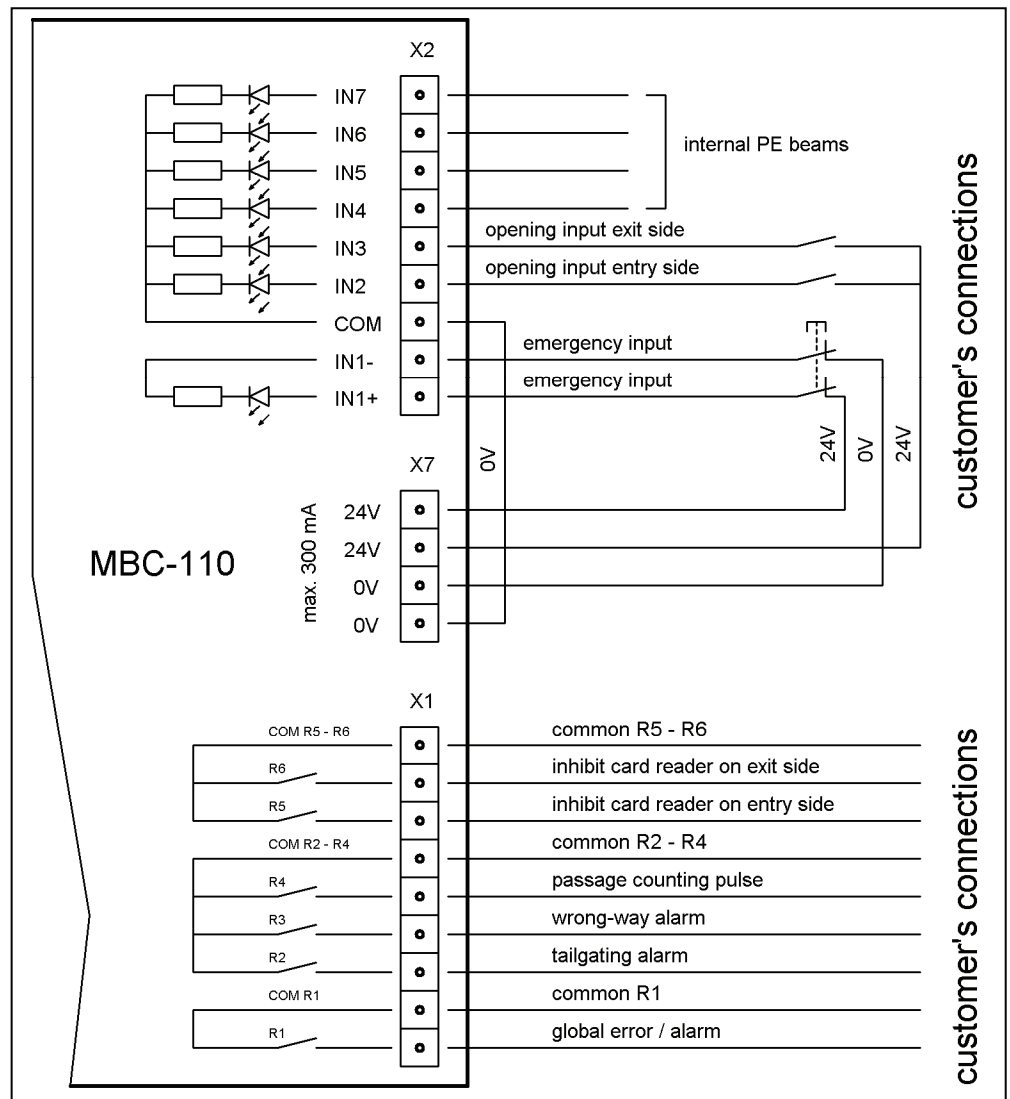


Fig. 7-3 Customer's connections to MBC-110

If an access-control device, e.g. a card reader, is installed, the two inputs for opening the pedestrian barrier from either side are connected to it in our works. No external wiring is then required.

On the other hand, the relay outputs must always be connected by the customer.

Because an emergency-stop switch is not required in all installations, input IN1 is connected to 24V / 0V potential in our works. When an external emergency-stop switch (2-pole) is installed, these two wire jumpers must be removed.

7.1.2 Connecting an emergency input

When several pedestrian barriers are to be interrupted in parallel by a common emergency-stop switch, then an additional, external 2-pole relay must be fitted to each barrier to cut off the internal 24V supply individually.

An additional, external 24V power supply is then required to control the relay.

Overview of electrical equipment

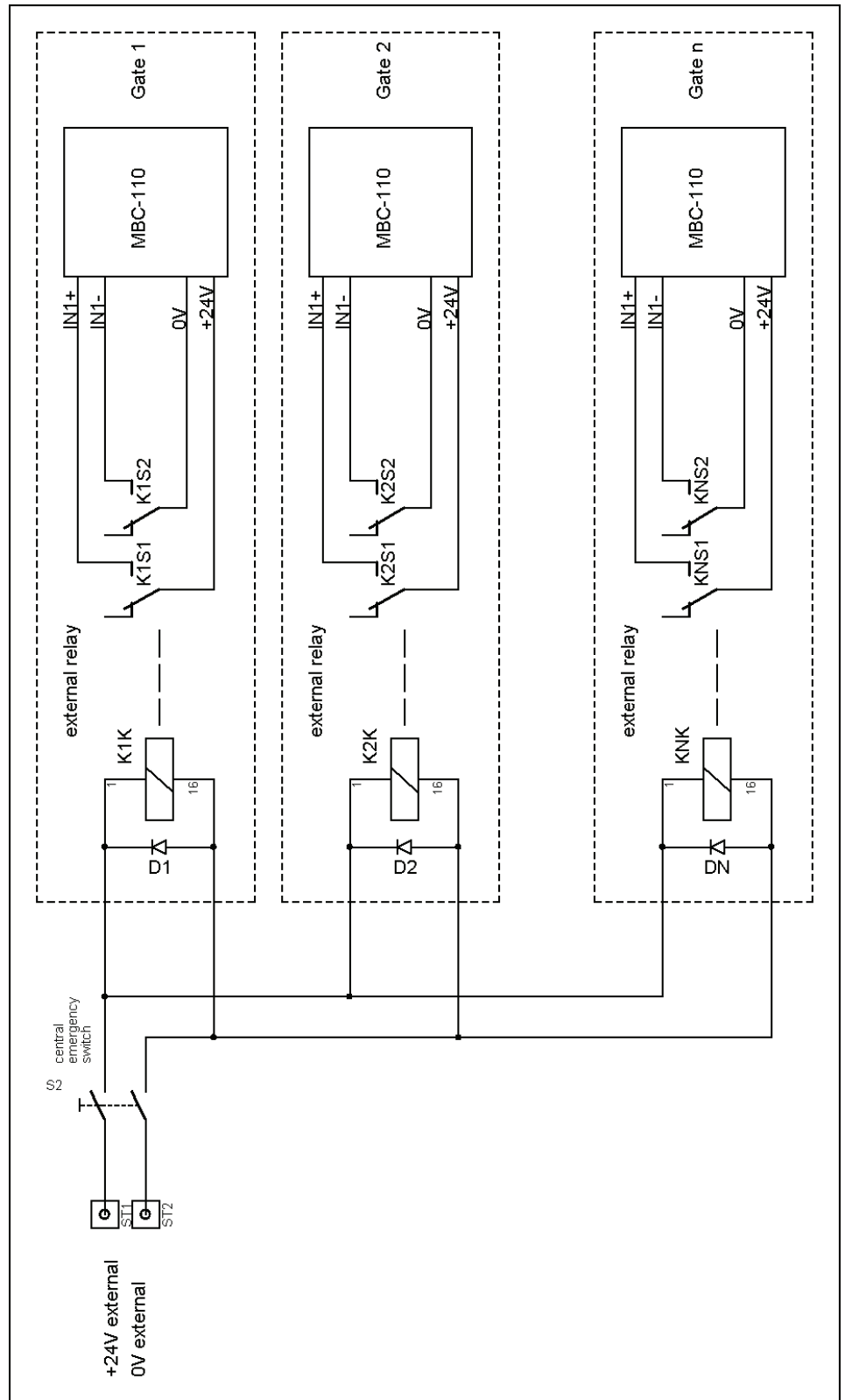


Fig. 7-4 Connecting an emergency input

7.1.3 Hardware for digital inputs

Digital inputs 1 to 7, galvanically isolated by an optoelectronic coupler, are connected at a common terminal block. Inputs 2 to 7 have a common connection, COM2-7, which is connected to 0 V in our works.

Input 1 has 2 poles; it is thus independent of the other inputs and can be connected to an external potential.

The input is connected to the safety input of the motor controller. This controls the end stage of the motor amplifier directly and interrupts the power supply to the motor if there is no signal.

It is also possible to operate several barriers in parallel by supplying a common external signal to Input 1 of them all (e.g. a central emergency-stop switch).

In this case the inputs must be decoupled from each other by an external relay for each barrier unit to ensure that the voltage potentials are properly separated (see previous Section).

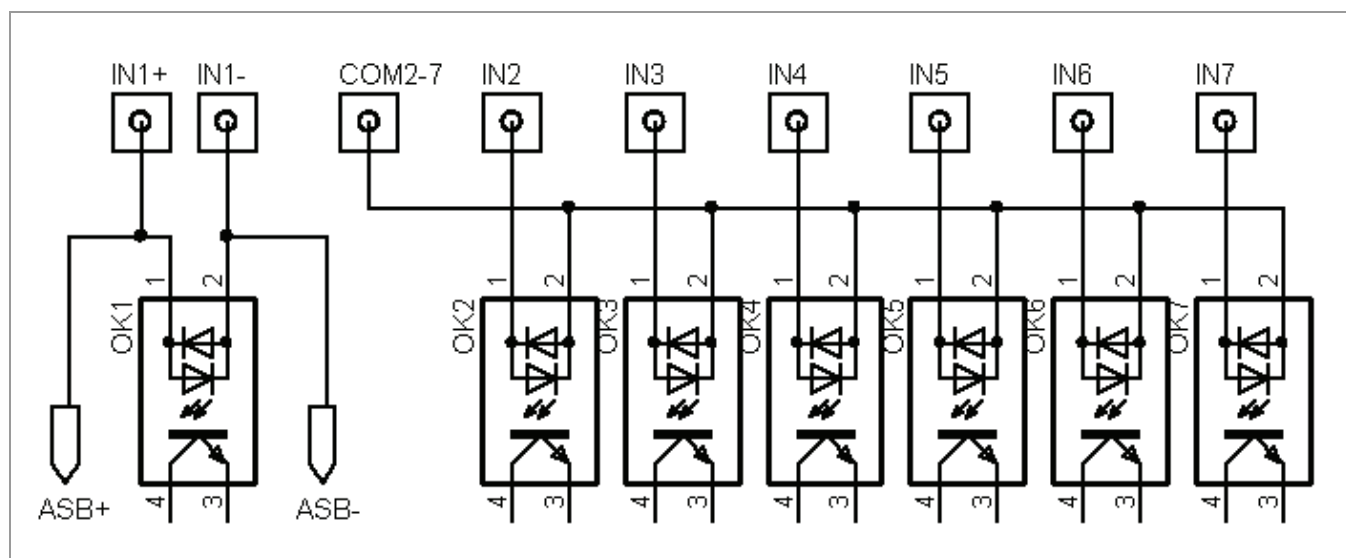


Fig. 7-5 Connection of inputs (simplified drawing)

7.1.4 Hardware for relay outputs

Relay outputs 1 to 6 are connected at a common terminal block. Some of these outputs are grouped together.

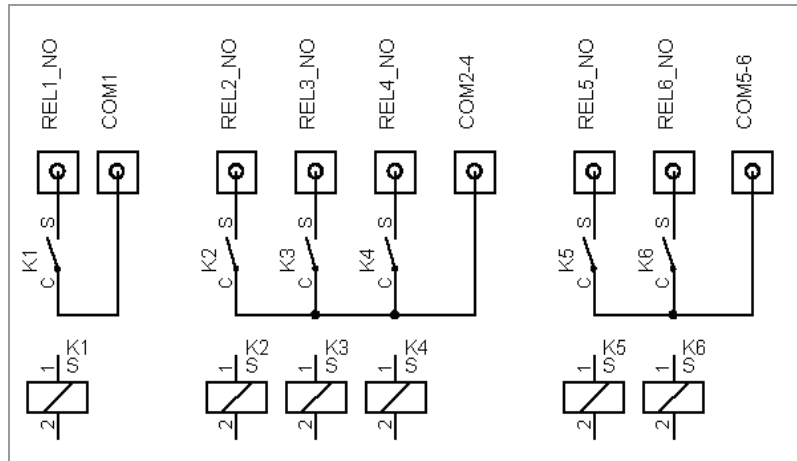


Fig. 7-6 Relay output connections (simplified drawing)

7.1.5 Hardware for internal inputs and outputs

The outputs are MOSFET drivers and the inputs are optically decoupled. One side of both inputs and outputs is at GND potential. There is a separate voltage regulator for each of the 4 outputs.

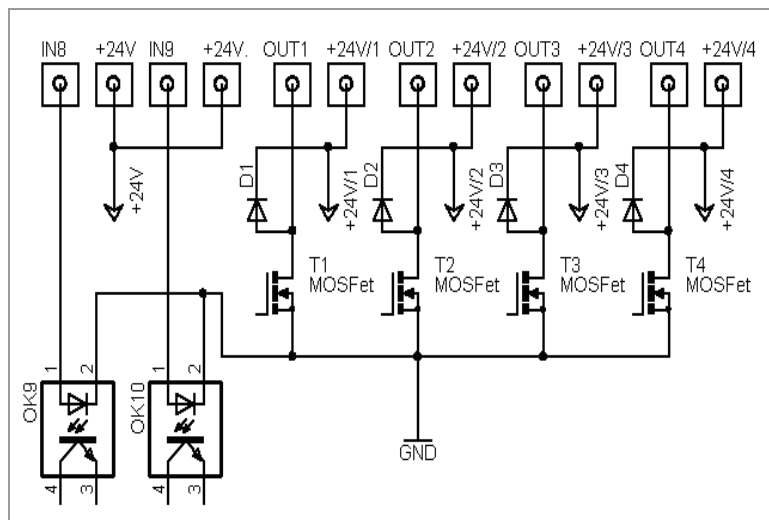


Fig. 7-7 Connections for additional inputs and outputs (simplified drawing)

7.2 Overview of motor controller MMC-120

Each of the two MMC-120 motor controllers controls one motor. Commands for both motor controllers come from the logic controller MBC-110 via a CAN-bus connection.

The two controllers are wired up and adjusted in our works so that they are ready for use. There are no setting possibilities here for the customer.

The four DIP switches are for CAN-bus termination and addressing – their settings must not be changed.

The replacement of an MMC-120 controller (e.g. during repairs) must always be coordinated with our works and requires our approval. In the event of replacement without approval from our works the guarantee is invalidated and no claims for goodwill will be entertained.



Fig. 7-8 Motor controller MMC-120

7.3 Overview of transformer power supply

The power supply for the controllers and motors is provided by a transformer power supply with two output voltages, 42 VDC and 30 VDC.

The wiring for the power supply is connected in our works. Normally there will be no need for changes by the customer.

It may, however, be necessary to adapt the primary voltage of the transformer to suit the local supply; if required, this is done by moving the jumpers.

Possible primary voltages are:

110V, 115V, 127V, 220V, 230V, 242V, 254V



Fig. 7-9 Transformer power supply

7.4 Overview of gate end display (GED)

To indicate in which direction the pedestrian barrier can be passed, there are displays on the end face of each end housing (known as Gate End Displays).

When passage is permitted, a green arrow is displayed, and when it is blocked a red cross.

In the operating mode "Bidirectional", the two displays switch during operation. On the side at which there is a valid request signal, a green arrow is displayed, and on the other side a red cross. When the pedestrian barrier is closed in bidirectional mode, both displays show a green arrow.

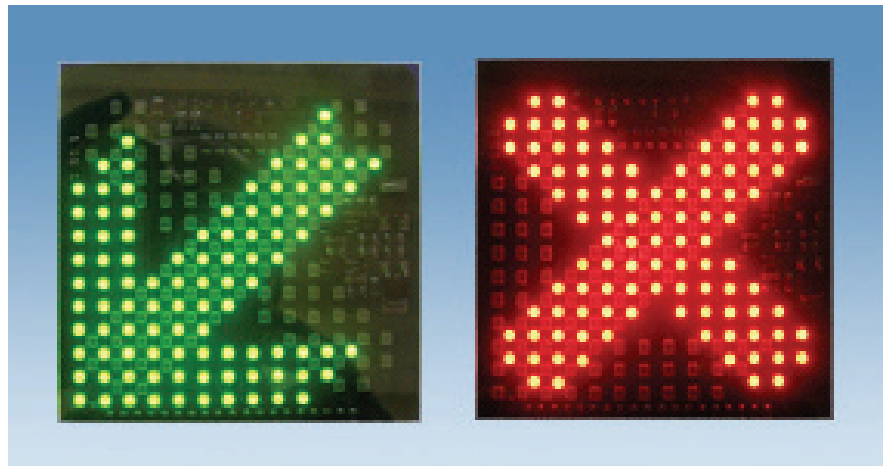


Fig. 7-10 Gate end display (GED)

7.5 Overview of motor MHTM ®

The extremely reliable Magnetic direct drive system with the MHTM® (Magnetic High Torque) motor provides almost silent operation.

Position feedback by means of a resolver allows the motor to move to any position with high precision and to stop there.

When no power is applied to the motor, it can be moved freely. Because there are no gears, the drive has no play and almost no wear.

The drive is designed for a useful life of more than 30 million cycles or at least 10 years.

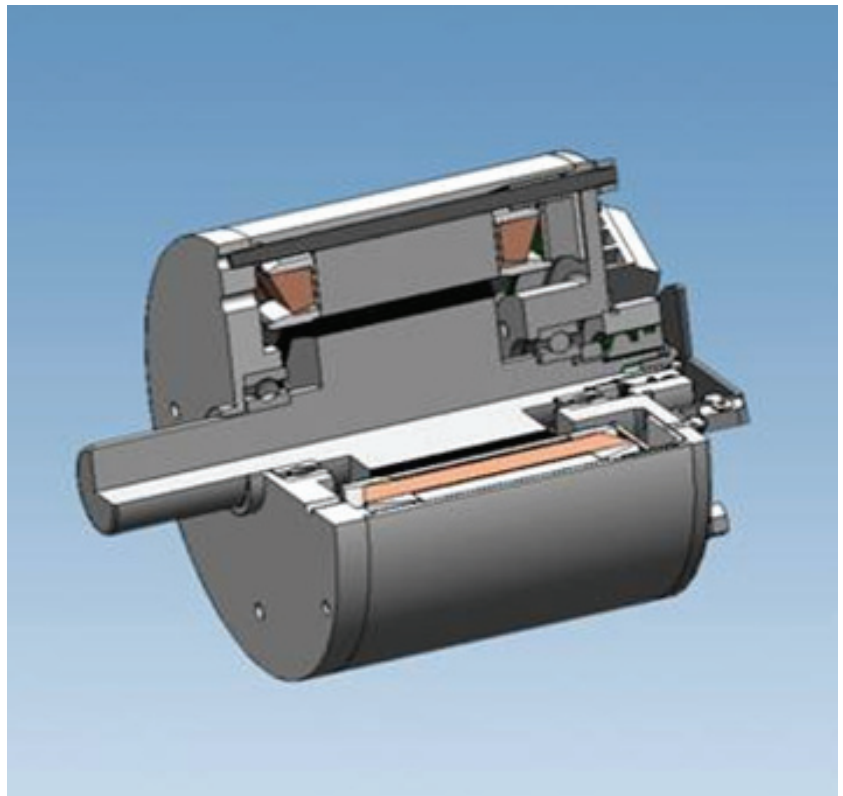


Fig. 7-11 Motor MHTM

8. Overview of infrared photocells

The pedestrian barrier is fitted with a total of 8 infrared photocells which ensure the safety of users and control access.

All photocells are designed to be fail-safe, i.e. their output is active when the light beam is not interrupted. If there is a wire breakage or other defect in a photocell, the control system "sees" an interrupted light beam.



Each photocell receiver has two switches for configuration setting. One switch must be set to "L", the other to "max.".

In addition, each photocell is monitored by a timer for 30 seconds. If a photocell is continuously obstructed for longer than 30 seconds, the system assumes a defect or a soiled lens and gives an alarm.

8.1 Arrangement of photocells

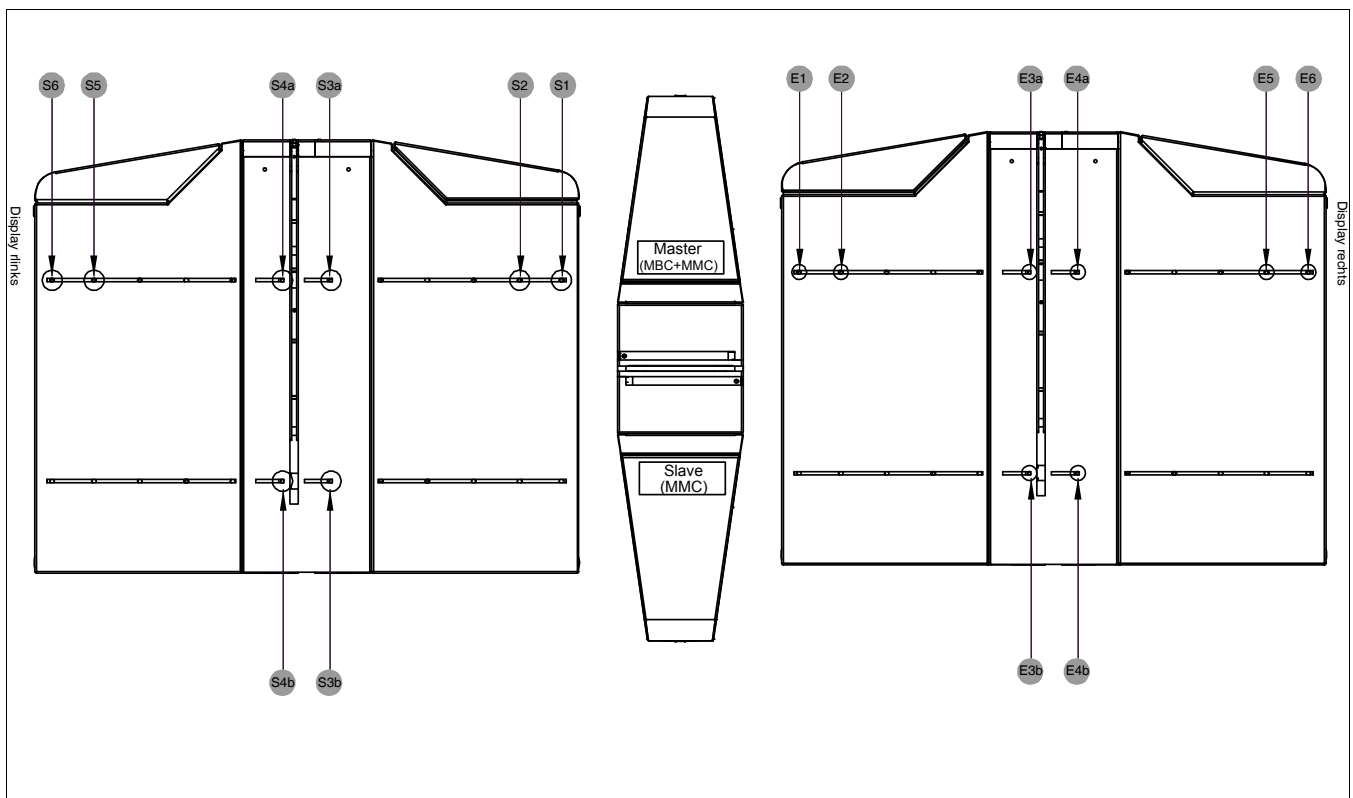


Fig. 8-1 Arrangement of photocells

Sx = sender x, Ex = receiver x

9. Description of MBC-110 functions

9.1 Functions of digital inputs

Input	Function
Input 1	Emergency input
Input 2	Opening input entry side
Input 3	Opening input exit side
Input 4	PE beam 1
Input 5	PE beam 2
Input 6	PE beam 5
Input 7	PE beam 6
Input 8	Safety PE beams 3A and 3B
Input 9	Safety PE beams 4A and 4B

Input 1 = Emergency input

This input permits free passage through the barrier in both directions in an emergency situation. The input is fail-safe, i.e. the pedestrian barrier is only operative when a continuous signal is present.

When the continuous signal fails, power to the motors is cut off, the glass wings are opened by springs, and the lane is completely clear for passage in both directions.

The input operates via a second channel directly on the end stage of the motor amplifier. It is assigned a higher ranking than all other inputs.

When several pedestrian barriers are to be opened in parallel by an external emergency-stop switch, the inputs must be galvanically isolated by an additional relay to prevent voltage coupling between the individual barriers.

Input 2 = Opening input entry side

At this input, the barrier can be opened by a card reader, for example, indicating a valid passage on the entry side.

Input 3 = Opening input exit side

At this input, the barrier can be opened by a card reader, for example, indicating a valid passage on the exit side.

Input 4 = Photocell LS 1 entry side

Function as LS2

Input 5 = Photocell LS 2 entry side

The two photocells LS1 and LS2 are evaluated together to permit direction detection of a passage. They are in front of the card reader on the entry side of the pedestrian barrier.

Input 6 = Photocell LS 5 exit side

Function as LS6

Input 7 = Photocell LS 6 exit side

The two photocells LS5 and LS6 are evaluated together to permit direction detection of a passage. They are in front of the card reader on the exit side of the pedestrian barrier.

Input 8 = Safety photocells LS 3a and LS 3b

The photocells LS3a and LS3b work in parallel. They provide a security monitor close to the glass wings. In combination with safety photocells LS4a and LS4b, they also serve to detect a completed passage with ensuing closure of the glass wings.

Input 9 = Safety photocells LS 4a and LS 4b

The photocells LS4a and LS4b work in parallel. They provide a security monitor close to the glass wings. In combination with safety photocells LS3a and LS3b, they also serve to detect a completed passage with ensuing closure of the glass wings.

9.2 Functions of digital outputs

Output	Default function
Relay 1	Global error / alarm output
Relay 2	Alarm: Tailgating alarm output
Relay 3	Alarm: Wrong-way alarm output
Relay 4	Passage counting pulse
Relay 5	Inhibit card reader on entry side
Relay 6	Inhibit card reader on exit side
MOSFet output 1	Gate End Display red cross on entry side
MOSFet output 2	Gate End Display green arrow on entry side
MOSFet output 3	Gate End Display red cross on exit side
MOSFet output 4	Gate End Display green arrow on exit side

Relay 1 = Global error / alarm output

When certain errors occur, an alarm is given at this output; it continues as long as the error persists.

Possible errors are:

- Impact detected
- Emergency input is interrupted
- CAN communication with end stage is impaired
- Hardware fault in end stage
- Software error in end stage
- Power failure
- Wire breakage in alarm line



IMPORTANT NOTE!

Relay 1 operation is fail-safe, i.e. a power failure or a wire breakage at the relay output is also indicated at the global error output. This means that the relay contact pair is closed as long as there is no error. As soon as the global error described above occurs, the relay contacts open.

Relay 2 = Tailgating alarm output

At this output, a continuous signal is given if tailgating (more than one object in the entry/exit lane) is detected. The signal remains active until there is only one object in the lane.

Relay 3 = Wrong way alarm output

An alarm is given at this output if the lane is entered from the wrong direction. This warning is also given when an object is in the entry zone without clearance for too long with the pedestrian barrier closed. The signal is cancelled as soon as the zone is cleared, or after 15 seconds.

Relay 4 = Passage counting pulse

When a passage is detected, a counting pulse ca. 400 ms long is given at this output. This also applies when there is continuous access clearance. Pulses resulting from both directions are counted.

Relay 5 = Inhibit card reader on input side

At this output, a card reader on the entry side can be blocked if a passage is requested from the exit side.

Relay 6 = Inhibit card reader on exit side

At this output, a card reader on the exit side can be blocked if a passage is requested from the entry side.

MOSFet output 1 = Gate End Display red cross on entry side

This output controls the red cross in the Gate End Display on the entry side.

MOSFet output 2 = Gate End Display green arrow on entry side

This output controls the green arrow in the Gate End Display on the entry side.

MOSFet output 3 = Gate End Display red cross on exit side

This output controls the red cross in the Gate End Display on the exit side.

MOSFet output 4 = Gate End Display green arrow on exit side

This output controls the green arrow in the Gate End Display on the exit side.

9.3 Functions of the diagnosis display

There is a 7-segment display for diagnosis purposes. It shows various operating states and errors.

Normal operation

The dot blinks continually at 0.5 Hz.

Display of software version status

First the letter "u" is displayed, then the first figure (with decimal point), then the second figure, followed by a pause. Then the cycle begins again. The display time for each state is 2 s.

Example: version status 1.4

u1.4, pause, u1.4, pause, etc.

Display of error codes

First the letter "E" (Error) is displayed, then the first figure of the error code, then the second figure (with decimal point), followed by a pause. Then the cycle begins again. The display time for each state is 2 s.

Example: Error code 05

E05., pause, E05., pause, E05., etc.

The list of possible errors that can be displayed is in Section 12.2.

9.4 Function and parameter settings

Several functions and parameters of the pedestrian barrier can be set at the two blocks of 8 DIP switches.

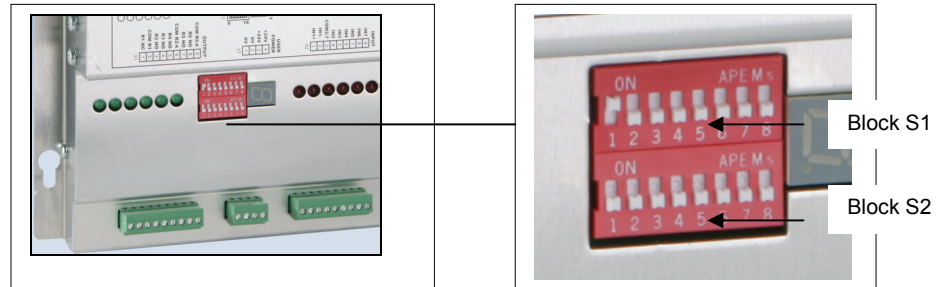


Fig. 9-1 DIP switches for setting parameters



IMPORTANT NOTE!

Changes to DIP switch settings only become effective after power supply has been switched off and on again (S1.7 is the exception).

9.4.1 DIP switch block S1

DIP S1.x	Function
1	Opening pulse storage
2	Buzzer
3	Safety delay time
4	Safety delay time
5	Hold-open time
6	Hold-open time
7	Display software version
8	Reserved

9.4.1 DIP switch block S2

DIP S2.x	Function
1	Program mode
2	Program mode
3	Permitted direction of passage
4	Permitted direction of passage
5	Reversal during closure
6	Reserved
7	Reserved
8	Behaviour when impact detected

9.4.2 DIP switch S1.1: Opening pulse storage

When pulse storage is switched off, the barrier can be opened by a pulse at one of the two opening inputs. If further opening pulses are received while the barrier is still open, they are ignored.

With opening pulse storage activated, several opening pulses can be stored. The barrier then remains open until the number of stored pulses is again zero. With each passage, the number of stored pulses is reduced by one.

DIP S1.1	Opening pulse storage
OFF	No pulse stored
ON	Up to 5 opening pulses can be stored

9.4.3 DIP switch S1.2: Buzzer

When it is activated, the buzzer gives a warning in certain situations:

Continuous tone: during a reference run (homing) or when there is a global error

Tone at rapid intervals: on "tailgating" by a second person

Tone at slow intervals: for unauthorised access or the unauthorised presence of a person in the photocell zone

DIP S1.2	Buzzer
OFF	Buzzer switched off
ON	Buzzer switched on

9.4.4 DIP switches S1.3 and S1.4: Safety closing delay

The safety delay time is the maximum time for which the lane remains open after all safety photocells have been cleared. On expiry of the safety delay time, the barrier closes.

The safety delay time has four possible settings:

DIP S1.3	DIP S1.4	Safety delay time
OFF	OFF	0 s
ON	OFF	1 s
OFF	ON	2 s
ON	ON	3 s

9.4.5 DIP switches S1.5 and S1.6: Hold-open time

The hold-open time is the maximum time for which the lane remains open after an opening signal if there is no one in the lane. On expiry of the hold-open time, the barrier closes if no one has passed through.

The hold-open time has four possible settings:

DIP S1.5	DIP S1.6	Hold-open time
OFF	OFF	2 s
ON	OFF	4 s
OFF	ON	6 s
ON	ON	12 s

9.4.6 DIP switch S1.7: Query software version status

If this function is activated during operation, the version status of the software is displayed cyclically on the 7-segment display.

DIP S1.7	Query software version status
OFF	Normal operating display
ON	Version status of software is displayed

9.4.7 DIP switch S1.8: Reserved

This DIP switch is available for future extensions.

DIP S1.8	Reserved
OFF	Not used
ON	Not used

9.4.8 DIP switches S2.1 and S2.2: Program mode

The program mode determines which control program is used when power to the barrier is switched on.

DIP S2.1	DIP S2.2	Program mode
OFF	OFF	Mode 1 = not valid
ON	OFF	Mode 2 = MPH
OFF	ON	Mode 3 = KPH
ON	ON	Mode 4 = not valid



IMPORTANT NOTE!

In these operating instructions, only Program Mode 2 = MPH is described!

For Mode 3 = KPH (Kit Set), there are separate operating instructions.

Program modes 1 and 4 are not valid for operation of the pedestrian barrier.

9.4.9 DIP switches S2.3 and S2.4: Permitted direction of passage

Using DIP switches S2.3 and S2.4, you can determine in which direction the pedestrian barrier may be used.

DIP S2.3	DIP S2.4	Permitted direction of passage
OFF	OFF	Passage is not possible in either direction
ON	OFF	Passage only permitted in the entry direction
OFF	ON	Passage only permitted in the exit direction
ON	ON	Passage permitted in both directions

These two DIP switches are used together with digital inputs IN1 to IN3 of the MBC-110 to select the operating mode of the pedestrian barrier – see Section 10.2.

9.4.10 DIP switch S2.5: Reversal during closure

This DIP switch determines whether the safety photocells are active or not after closure has started.

DIP S2.5	Reversal during closure if a safety photocell is interrupted again
OFF	Flaps continue to close. Reversal does not take place.
ON	Flaps open immediately and close again when the safety photocells are clear again.



CAUTION!

Switching off DIP switch S2.5 may result in persons being struck by the glass wings after closure has started! MAGNETIC therefore recommends that DIP switch S2.5 is always set to ON.

9.4.11 DIP switches S2.6 and S2.7: Reserved

These DIP switches are available for future extensions.

DIP S2.6/S2.7	Reserved
OFF	Not used
ON	Not used

9.4.12 DIP switch S2.8: Behaviour when impact detected

This DIP switch determines the behaviour of the barrier after a glass wing has contacted a person or a piece of luggage.

DIP S2.8	Behaviour when impact detected
OFF	Flaps continue to press, but with reduced force
ON	Flaps open immediately and close again at reduced speed depending on the status of the photocells

10. Description of program mode MPH

Mode 2 is the MPH program mode with a total of 8 photocells.

Two of the photocells are located on each side of the glass wings and provide a safety monitor. As long as one of the photocells is interrupted, the glass wings cannot close.

These photocells also detect whether a person has passed through and so trigger closure of the glass wings.

There are two photocells in the entry, and two in the exit zone of the pedestrian barrier, near the card reader.

They have several functions: if free passage is selected, they open the pedestrian barrier when a person passes the photocells on the enabled side. They also serve to detect unauthorised access.

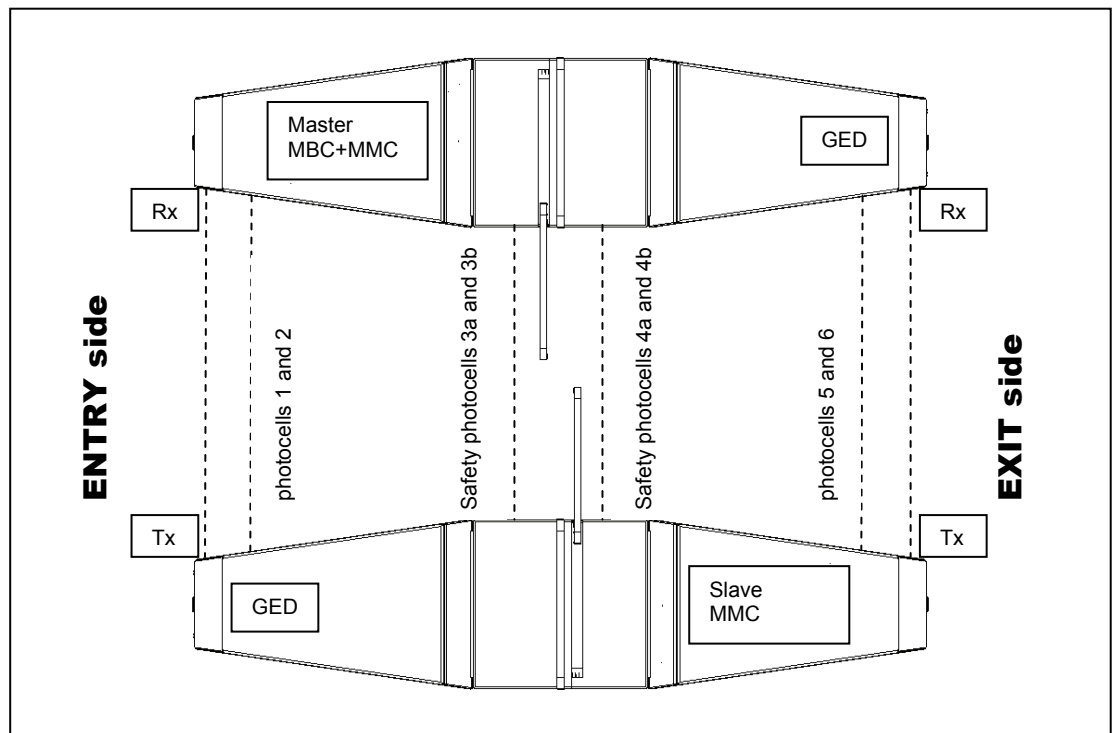


Fig. 10-1 Functions of photocells

10.1 Unauthorised access attempts

10.1.1 Attempted unauthorised following (tailgating)

When an unauthorised person (without a ticket) attempts to follow an authorised person (known as "tailgating"), an alarm is triggered at relay output 2 and the buzzer sounds an alarm (rapid tone interval).

Detection of a second person is controlled by a timer setting. It is therefore possible that items of luggage are assumed to be a following person and trigger an alarm.

10.1.2 Unauthorised access in the blocked direction

If a person tries to enter the lane from the blocked direction, an alarm is triggered at relay output 3 and the buzzer sounds an alarm (slow tone interval). The alarm is cancelled immediately or after a delay time if the person steps back out of the pedestrian barrier lane.

If the glass wings are already open, they will try to close. Opening pulses that are already stored are retained, but will only be processed again after the unauthorised person has stepped back out of the pedestrian barrier lane.

10.1.3 Unauthorised presence of a person

If a person has entered the pedestrian barrier from the permitted side, but has not triggered an opening signal within 5 seconds (e.g. at a card reader), then an alarm is triggered at relay output 3 and the buzzer sounds an alarm (slow tone interval).

The alarm is cancelled immediately or after a delay time if the person steps back out of the pedestrian barrier lane, or if an opening pulse is generated.

10.2 Selection of the operating mode

In total there are ten operating modes which can be selected at digital inputs IN1 to IN3 and DIP switches S2.3 and S2.4.



IMPORTANT NOTE!

The pedestrian barrier is always closed when no opening pulse is being processed.

The two DIP switches S2.3 and S2.4 are used to select the direction of passage through the pedestrian barrier.

It is important to differentiate between free passage and controlled access, e.g. by a card reader.

When a continuous signal is present at an opening input, then free passage is activated for this direction.

Emergency IN1	Opening (IN2).	Opening (IN3).	DIP S2.3	DIP S2.4	Resulting operating mode
Interrupted	x	x	x	x	Emergency mode
+24V	x	x	OFF	OFF	Out-of-service mode
+24V	PULSE	x	ON	OFF	Controlled entry mode
+24V	x	PULSE	OFF	ON	Controlled exit mode
+24V	PULSE	PULSE	ON	ON	Bidirectional mode
+24V	CONTINUOUS SIGNAL	x	ON	OFF	Free entry mode
+24V	x	CONTINUOUS SIGNAL	OFF	ON	Free exit mode
+24V	CONTINUOUS SIGNAL	PULSE	ON	ON	Free entry, controlled exit mode
+24V	PULSE	CONTINUOUS SIGNAL	ON	ON	Free exit, controlled entry mode
+24V	CONTINUOUS SIGNAL	CONTINUOUS SIGNAL	ON	ON	Fully-free mode

Fig. 10-2 Table of operating modes

10.2.1 Operating mode: Emergency

Power to the motors is cut off, the glass wings are opened by springs, and the lane is completely clear for passage in both directions.

Entry side:

- Gate End Display: green arrow
- Opening input IN2: is ignored
- Photocells in front of card reader: are ignored
- Output: inhibit card reader: is active

There is no way of cheating. Free passage is possible.

Exit side:

- Gate End Display: green arrow
- Opening input IN3: is ignored
- Photocells in front of card reader: are ignored
- Output: inhibit card reader: is active

There is no way of cheating. Free passage is possible.

10.2.2 Operating mode: Out-of-service mode

The pedestrian barrier is completely blocked for passage in either direction, i.e. the glass wings are closed and opening signals are not accepted.

Entry side:

- Gate End Display: red cross
- Opening input IN2: is ignored
- Photocells in front of card reader: are evaluated
- Output: inhibit card reader: is active

Unauthorised access attempts are detected.

Exit side:

- Gate End Display: red cross
- Opening input IN3: is ignored
- Photocells in front of card reader: are evaluated
- Output: inhibit card reader: is active

Unauthorised access attempts are detected.

10.2.3 Operating mode: Controlled entry mode

The pedestrian barrier is only enabled for passage from the entry direction. Passage from the exit direction is forbidden.

Entry side:

- Gate End Display: green arrow
- Opening input IN2: pulses are evaluated
- Photocells in front of card reader: are evaluated
- Output: inhibit card reader: is switched off

Unauthorised tailgating and the unauthorised presence of a person are detected.

Exit side:

- Gate End Display: red cross
- Opening input IN3: is ignored
- Photocells in front of card reader: are evaluated
- Output: inhibit card reader: is active

The unauthorised entry of a person is detected.

10.2.4 Operating mode: Controlled exit mode

The pedestrian barrier is only enabled for passage from the exit direction. Passage from the entry side is forbidden.

Entry side:

- Gate End Display: red cross
- Opening input IN2: is ignored
- Photocells in front of card reader: are evaluated
- Output: inhibit card reader: is active

The unauthorised entry of a person is detected.

Exit side:

- Gate End Display: green arrow
- Opening input IN3: pulses are evaluated
- Photocells in front of card reader: are evaluated
- Output: inhibit card reader: is switched off

Unauthorised tailgating and the unauthorised presence of a person are detected.

10.2.5 Operating mode: Bidirectional

The pedestrian barrier is enabled for passage from either side.

Entry side:

- Gate End Display: green arrow
- Opening input IN2: pulses are evaluated
- Photocells in front of card reader: are evaluated
- Output: inhibit card reader: is addressed

Unauthorised tailgating, unauthorised entry, and the unauthorised presence of a person are detected.

Exit side:

- Gate End Display: green arrow
- Opening input IN3: pulses are evaluated
- Photocells in front of card reader: are evaluated
- Output: inhibit card reader: is addressed

Unauthorised tailgating, unauthorised entry, and the unauthorised presence of a person are detected.

If a valid opening signal is detected on one side of the pedestrian barrier the operating mode temporarily switches to "Controlled entry mode" or "Controlled exit mode".

The Gate End Display on the other side then switches to "red cross" and access from the other side is blocked. The appropriate output to inhibit the card reader on the other side is set.

10.2.6 Operating mode: Free entry mode

The pedestrian barrier is only enabled for free passage from the entry side. The pedestrian barrier is normally closed. When a person enters the photocells on the entry side, the pedestrian barrier opens the lane for free passage.

Passage from the exit side is forbidden.

Entry side:

- Gate End Display: green arrow
- Opening input IN2: a continuous signal is present
- Photocells in front of card reader: open the lane
- Output: inhibit card reader: is switched off

There is no way to cheat in this direction.

Exit side:

- Gate End Display: red cross
- Opening input IN3: is ignored
- Photocells in front of card reader: are evaluated
- Output: inhibit card reader: is active

The unauthorised entry of a person is detected.

10.2.7 Operating mode: Free exit mode

The pedestrian barrier is only enabled for free passage from the exit side. The pedestrian barrier is normally closed. When a person enters the photocells on the exit side, the pedestrian barrier opens the lane for free passage.

Passage from the entry side is forbidden.

Entry side:

- Gate End Display: red cross
- Opening input IN2: is ignored
- Photocells in front of card reader: are evaluated
- Output: inhibit card reader: is active

The unauthorised entry of a person is detected.

Exit side:

- Gate End Display: green arrow
- Opening input IN3: a continuous signal is present
- Photocells in front of card reader: open the lane
- Output: inhibit card reader: is switched off

There is no way to cheat in this direction.

10.2.8 Operating mode: Free entry, controlled exit mode

The pedestrian barrier is enabled for free passage from the entry side. In the exit direction, access is controlled by an access-control device (e.g. card reader).

Entry side:

- Gate End Display: green arrow
- Opening input IN2: a continuous signal is present
- Photocells in front of card reader: open the lane
- Output: inhibit card reader: is addressed

There is no way to cheat in this direction.

Exit side:

- Gate End Display: green arrow
- Opening input IN3: pulses are evaluated
- Photocells in front of card reader: are evaluated
- Output: inhibit card reader: is addressed

The unauthorised entry of a person is detected.

After the lane has been opened from one side, the Gate End Display on the other side then switches to "red cross" and access from that side is blocked.

10.2.9 Operating mode: Free exit, controlled entry mode

The pedestrian barrier is enabled for free passage from the exit side. In the entry direction, access is controlled by an access-control device (e.g. card reader).

Entry side:

- Gate End Display: green arrow
- Opening input IN2: pulses are evaluated
- Photocells in front of card reader: are evaluated
- Output: inhibit card reader: is addressed

There is no way to cheat in this direction.

Exit side:

- Gate End Display: green arrow
- Opening input IN3: a continuous signal is present
- Photocells in front of card reader: open the lane
- Output: inhibit card reader: is addressed

The unauthorised entry of a person is detected.

After the lane has been opened from one side, the Gate End Display on the other side then switches to "red cross" and access from that side is blocked.

10.2.10 Operating mode: Fully free mode

The pedestrian barrier is free for passage from both directions, the glass wings are open, but, in contrast to the emergency mode, the motors are switched on. Additionally, passage counting pulses are given in this mode.

Entry side:

- Gate End Display: green arrow
- Opening input IN2: a continuous signal is present
- Photocells in front of card reader: are evaluated
- Output: inhibit card reader: is active

There is no way of cheating. Free passage is possible.

Exit side:

- Gate End Display: green arrow
- Opening input IN3: a continuous signal is present
- Photocells in front of card reader: are evaluated
- Output: inhibit card reader: is active

There is no way of cheating. Free passage is possible.

10.3 Normal operation

10.3.1 Power-off state

When the power is off, the motors have no voltage and the lane is free.

10.3.2 Reference run (homing)

When the power supply is switched on, the glass wings carry out a reference run. This teaches the system the two end positions. The first closing motion is carried out at reduced speed. From the next closing motion, the glass wings move at normal speed.

Because it can happen that there is an object between the glass wings during the first closing motion, the outer limit position is taken as a reference point only when a certain minimum angle between the inner and outer stop positions is exceeded. If the minimum angle is not achieved, the control system goes out of service and gives an alarm. A service technician on site must switch the power off and then on again.

10.3.3 Normal operation without pulse storage

At the opening inputs, the lane can be enabled for one passage at each input. On receipt of an opening pulse, the hold-open time starts to expire.

If a passage does not start within the hold-open time, the lane is blocked again. The associated opening signal is then cancelled.

If a passage has started, the system will wait until both safety photocells are interrupted simultaneously for a short time. In this case the hold-open time is immediately cleared, but the barrier does not yet close. Only when both safety photocells are clear again does the barrier close immediately, unless a safety delay is active. If a safety delay has been set, it will only start to expire when at least one safety photocell has been interrupted. Only on expiry of the safety delay time, does the barrier close.

Depending on the setting of DIP switch S2.5, the barrier either opens again, or closes if one safety photocell is interrupted again during closure.

Without pulse storage, a request for a further passage is ignored as long as an already recognised clearance has not been completed. Only when the barrier has closed again, or the hold-open time has expired, can a new opening pulse be processed.

10.3.4 Normal operation with pulse storage

In this operating mode, up to 5 opening pulses can be stored and processed sequentially in the order in which they occur (only in bidirectional mode).

When at least one request pulse has been stored, the hold-open time starts to expire immediately. As soon as a passage has been completed, the hold-open time restarts if a pulse is still stored.

The pedestrian barrier remains open until the last opening pulse has been processed.

10.4 Special cases

10.4.1 Impact detection

Normally, a person in the safety zone is protected by the safety photocells. It is, however, possible that there is an object (e.g. a suitcase) in the safety zone when the glass wings close which, due to its form, is not recognised by the safety photocells. In this case the glass wings may impact the object.

The behaviour of the barrier when an impact is detected depends on how DIP switch S2.8 is set.

10.4.2 Attempted break-in

When the glass wings are in their closed end position, they are blocked (linkage at top-dead-centre). However, should someone succeed in pulling the glass wings out of their end position, an alarm is given.

10.4.3 Emergency situation

If the input "emergency" is interrupted during operation, the pedestrian barrier goes immediately to a safe condition, i.e. power to the motors is cut off and springs pull the glass wings to the open position. The lane is thus free for passage in both directions.

The control system returns to operation when there is again voltage at the input "emergency".

11. CAN bus addressing and termination

The MBC-110 logic controller and the two MMC-120 motor controllers exchange data on a CAN bus line. Each of the three controllers must therefore have a fixed CAN address assigned to it.

In addition, a termination resistor must be activated at both ends of the bus to prevent interference.

The termination resistors can be set at the three controllers using DIP switch 1 on the 4-DIP-switch block in each case.

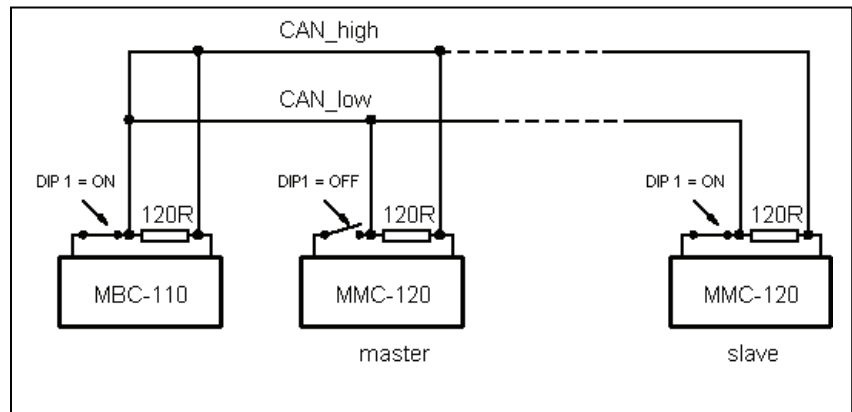


Fig. 11-1 CAN bus termination

The CAN addresses are set using three DIP switches on each of the three controllers. DIP switches 2 to 4 on the 4-DIP-switch block are used in each case.

The correct DIP switch settings are shown below:

		MBC-110 Master	MMC-120 Master	MMC-120 Slave
Termination	DIP 1	ON	OFF	ON
CAN address	DIP 2	OFF	OFF	ON
CAN address	DIP 3	OFF	OFF	ON
CAN address	DIP 4	OFF	OFF	ON

Fig. 11-2 CAN address DIP switch settings

CAN bus addressing and termination

If a controller is replaced, e.g. during repairs, take care that the four DIP switches correctly are reset on each of the three controllers.

In particular, wrongly set termination DIP switches can result in faults during operation which are often hard to locate and occur only intermittently.

If two controllers accidentally have the same address, or if one has an inadmissible address, operation is not possible. In these cases an error code is displayed at MBC-110.

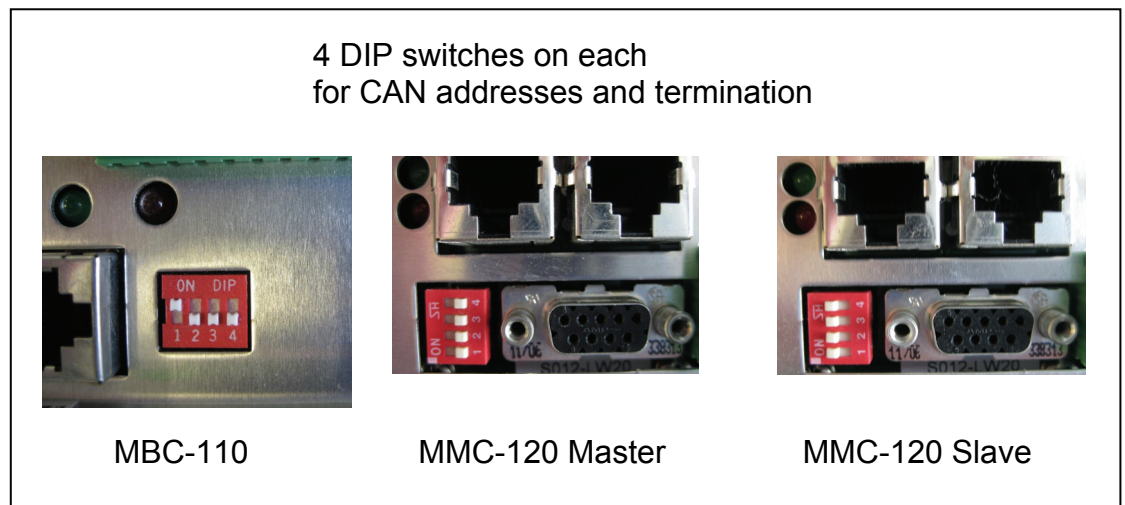


Fig. 11-3 Locations of DIP switches for CAN addresses and termination

12. Troubleshooting

To simplify troubleshooting on the pedestrian barrier, there are several diagnosis functions.

12.1 LEDs at inputs and outputs of the MBC-110

The customer interface inputs and outputs of the MBC-110 have light-emitting diodes (LEDs) to indicate their switching status.

You can see when an input is activated. The associated red LED is illuminated.

Please note that the Emergency input IN1 must be activated for normal operation, i.e. its red LED must be illuminated.

Similarly the switching status of the relay outputs can be checked. When the relay is activated (contacts closed), the associated green LED is illuminated.

Please note that the global error relay is activated in normal operation. Only when there is an error is the relay switched off and the green LED extinguished.

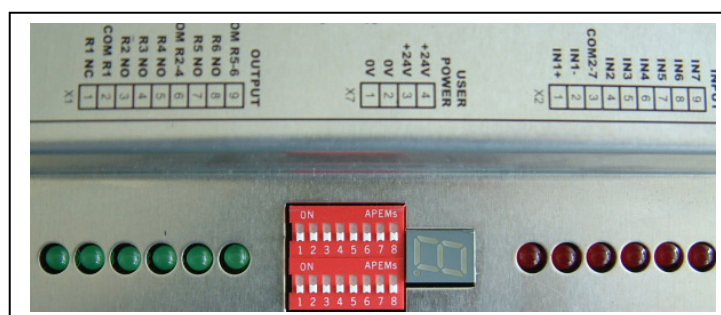


Fig. 12-1 LEDs at inputs and outputs of the MBC-110

12.2 Display of error codes at the MBC-110

Error codes can be shown in the 7-segment display of the MBC-110.

First the letter "E" (Error) is displayed, then the first figure of the error code, then the second figure (with decimal point), followed by a pause, and so on.

Example: Error code 05

E05., pause, E05., pause, E05., etc.

Error codes for the pedestrian barrier are as follows:

Error code MBC-110	Error description and corrective measures	Self-resetting?
02	Emergency input IN1 is interrupted: the signal at IN1+ or IN1- has been interrupted, e.g. by an external emergency-stop switch.	Yes, when signal is restored at IN1+ and IN1-
03	Safety photocell interrupted during reference run: the reference run cannot be carried out because at least one safety photocell is covered.	Yes
04	Attempted break-in: someone has attempted to force one or both glass wings out of its closed end position.	Yes
05	Impact detection: an impact has been detected.	Yes
06	Unauthorised access: someone has attempted to pass through the barrier in the wrong direction, or a person has stayed too long in the entry zone without generating an opening signal.	Yes
07	MBC-110 reset by Watchdog: the MBC-110 has detected a program sequence error and has been restarted by Watchdog.	Yes
09	Following by a second person (tailgating) detected: an unauthorised person has been detected attempting to follow an authorised person. This error can also occur when, for example, a large piece of luggage is detected as a following person,	Yes
20	Checksum error in program memory: it has been found that the program in the memory no longer agrees with the checksum. → try to reprogram the unit, or → send the unit to MAGNETIC for repair.	No
21	MMC-120 detected with wrong software: at least one MMC-120 has been found to have the wrong application software. → Download MBC-110 to MMC-120 required	No
22	MMC-120 detected with wrong software version: at least one MMC-120 has been found to have the wrong application software version. → Download MBC-110 to MMC-120 required	No
30	Error downloading from MBC-110 to MMC-120: software in the MMC-120 could not be deleted. → Repeat download several times if necessary	No
31	Error downloading from MBC-110 to MMC-120: no communication with MMC-120 bootloader. → Repeat download several times if necessary	No
32	Error downloading from MBC-110 to MMC-120: re-programming of MMC-120 does not work. → Repeat download several times if necessary	No
33	Error downloading from MBC-110 to MMC-120: error activating new MMC-120 software. → Repeat download several times if necessary	No

Troubleshooting

40	Minimum angle not achieved on reference run: during a reference run (homing), the glass wing mechanism must move through a minimum angle, otherwise the reference run cannot be completed. → Check whether the glass wings have been blocked by an obstacle.	No
41	Invalid program mode set: DIP switches S2.1 and S2.2 are set to an invalid program mode.	No
42	MMC-120 cannot be activated when starting: at least one MMC-120 cannot be activated by the CAN bus during a program start. → CAN communication between MBC-110 and MMC-120 is malfunctioning, error at MMC-120	No
43	Error in MMC-120 detected during operation: at least one MMC-120 has detected an internal error. → Read error code on MMC-120 LEDs and look for cause.	No
60	Error when initialising CAN protocol stack: internal software error in MBC-110	No
61	Error when initialising CAN bus: CAN bus is blocked, e.g. by a short circuit in the CAN cable.	No
62	No communication with MMC-120 in operation: possible causes: CAN cable broken or plug not correctly inserted, wrong CAN address set, termination resistors not correctly set, old firmware on MMC-120 (-> download MBC-110 to MMC-120 required)	No
64	MMC-120 does not answer during operation: see Error 62 for possible causes	No
65	EEPROM error in MBC-110: the EEPROM memory in MBC-110 could not be read or written in. → Possibly hardware error in MBC-110	No
66	Checksum error in parameter memory: it has been found that the program in the parameter memory no longer agrees with the checksum. → Hardware defect, send the unit to MAGNETIC for repair.	No
70	Error in photocell LS 1: photocell covered for longer than 30 seconds. → Dirty or defective?	Yes
71	Error in photocell LS 2 (>30 seconds covered)	Yes
72	Error in photocell LS 3A/B (>30 seconds covered)	Yes
73	Error in photocell LS 4A/B (>30 seconds covered)	Yes
74	Error in photocell LS 5 (>30 seconds covered)	Yes
75	Error in photocell LS 6 (>30 seconds covered)	Yes

Self-resetting errors are shown for not more than 10 seconds after elimination of the error. However as long as the error persists, the error code will be displayed.







When there is a non-self-resetting error, the pedestrian barrier will go out of service. The error code will be displayed permanently until it is eliminated.

12.3 Display of error codes at the MMC-120

On each MMC-120 motor controller, there is one green and one red LED to indicate operating and error states.

The green LED shows the status of the power supply and the safety input (IN1 of MBC-110 is internally connected to the motor controllers via the CAN cable).

When the green LED blinks, the safety input signal is missing, i.e. the motor controllers will not operate. The fault can be a missing signal at emergency input IN1 of MBC-110, or a defective CAN connection between MBC-110 and MMC-120.

	OFF	No power supply
	Flashes	Power supply is present, safety input signal missing
	ON	Normal operation
	OFF	No error code
	ON	External error with emergency stop
	Flashes	Error, number of blink impulses = error code

The red LED is for error diagnosis. The number of blink impulses gives the error code (e.g. red LED blinks twice = error code 2).

Possible error codes at the MMC-120:

No.	Brief description	Possible causes
2	Resolver error	Plug not properly inserted, short circuit
4	Motor phase error	Motor cable not connected, broken wire
5	Lifeguarding CAN	CAN communication with MBC-110 interrupted
6	Short circuit to ground	Short circuit between motor phase and ground
7	Motor phases shorted	Short circuit between two motor phases
8	Overvoltage DC bus	DC bus voltage too high, > 56 V
9	Undervoltage DC bus	DC bus voltage too low, < 17 V
11	Over-temperature end-stage	Heatsink temperature too high, > 80°C
20	I ² t surveillance motor	Motor overloaded

12.4 Fault diagnosis

Description of fault	Check	Corrective measures
The glass wings move too slowly	Motor is overheated I ² t surveillance has reduced speed to protect the motor	As soon as the motor has cooled down, the speed will return to normal.
One or both glass wings do not move	Check if there is a mechanical obstruction	Switch off the power supply to the barrier and check that the glass wings can be moved by hand.
	Check that the green LEDs on both MMC-120s are continuously illuminated	Green LED is switched off: - check that there is +42V between terminals DC+ and DC-. If not, check the wiring and power supply. Green LED blinks: - Safety input signal is missing: Check that there is 24V at input IN1 of MBC-110 (red LED on IN1 must be illuminated). - Check that the CAN cable between the two MMC-120s and the MBC-110 is not damaged. - Check that the CAN addresses on both MMC-120s are correctly set. - Check that the termination resistors on all three controllers are correctly set.
	Check if one or both MMC-120s are showing an error	The error code will be shown on the red LED: - Count the number of blink impulses and look up the error code in the table.
	Check if the MBC-110 display is showing an error	Read the error code in the display: - Look up the error code in the table.
	Check if there is a signal at emergency input IN1 of MBC-110.	Check if the red LED at IN1 of MBC-110 is illuminated. If not, check if the emergency input has been interrupted.
	Check if the safety photocells are clear	

Troubleshooting

Description of fault	Check	Corrective measures
One or more photocells do not operate	Check the supply voltage LEDs and status LED (only on receiver side).	<ul style="list-style-type: none"> - Orange supply voltage LEDs must be illuminated on transmitter and receiver. - Green status LED on receiver must change state when the light beam is interrupted by passing your hand through it. - The status of photocells LS 1, LS2, LS5 and LS6 can also be checked at the appropriate red LEDs at inputs IN4 to IN7 of controller MBC-110.
Gate End Display does not work:		Check cable and connectors for Gate End Display.

12.5 Diagnosis program MBC_Diag

For further diagnosis options, the diagnosis program MBC_Diag is available. By connecting a PC at the RS232 interface of the MBC-110, the error statuses of the three controllers can be read out.

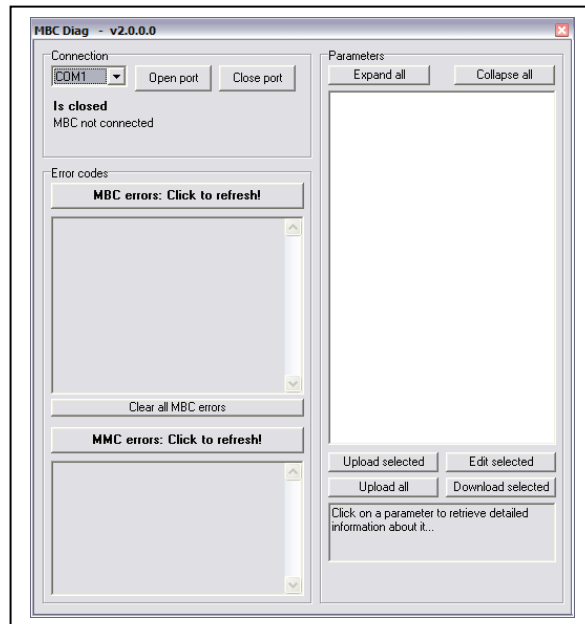


Fig. 12-2 LEDs at inputs and outputs of the MBC-110

13. Wiring diagrams

The wiring diagrams for the pedestrian barrier are supplied as a separate document.

14. Repair work



CAUTION!

Before carrying out any maintenance or repair work, disconnect the power supply at the main switch.

If there are several barriers in an installation, make sure you have switched off the correct lane.



ATTENTION!

When carrying out assembly work on the drive unit, it is essential that it is blocked. Otherwise, there is a danger of serious injury from moving parts.

14.1 Removing the glass wing

To gain access to the motor, and the drive and control units, you must remove the end housing. The first thing to do is to switch the pedestrian barrier off. The main switch is on the B-module or the C-module, on the master mounting panel – see Fig. 1-1.

Separate the left end housing from the central housing. (The left end housing is on your left when you stand in the lane looking towards the glass wing – see Fig. 14-1.)

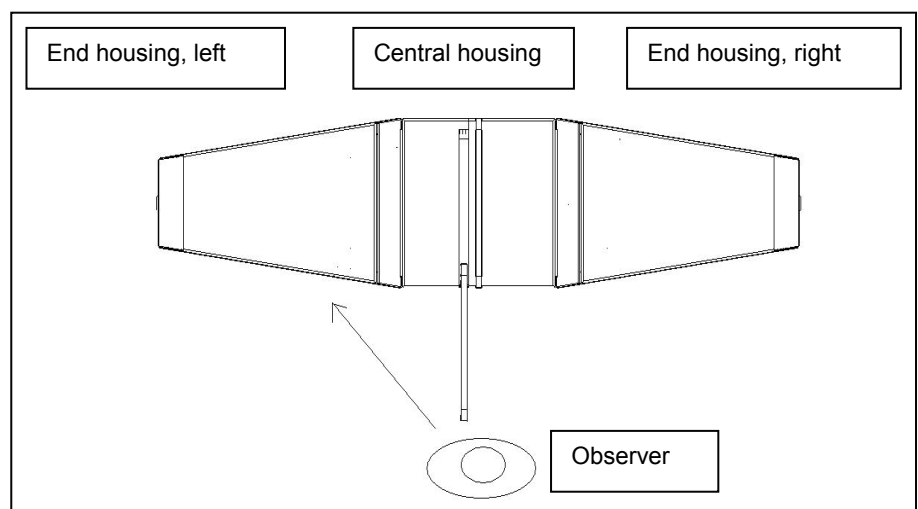


Fig. 14-1 End housing definition: the left end housing is on your left when you stand in the lane looking towards the glass wing.

Open the cover of the left end housing (1) and switch off the unit at the main switch.

Undo the connecting screws (2) in the two upper corners.

Remove cap and undo the lower central screw – both at (3).

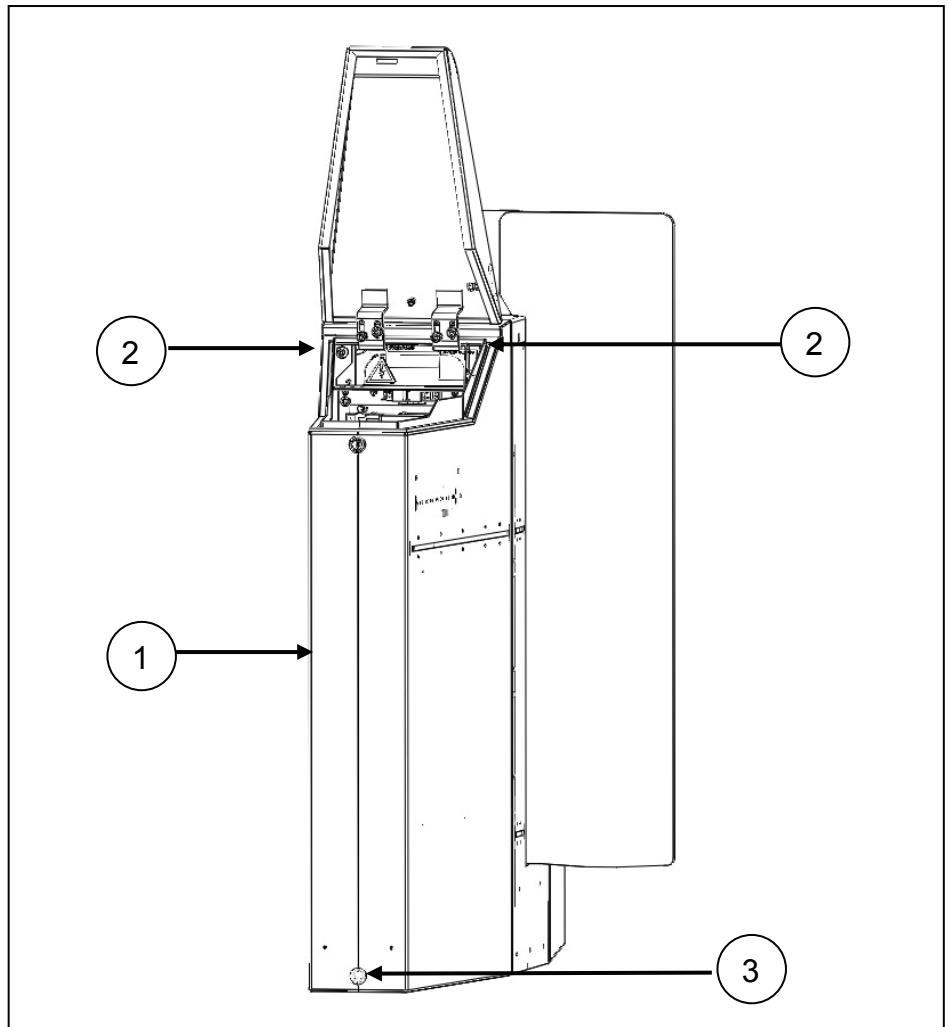


Fig. 14-2 View of left end housing

Repair work

Disconnect the plug (4) for the photocells, and, if present, the plug from GED.

Now the end housing can be removed from the central housing.

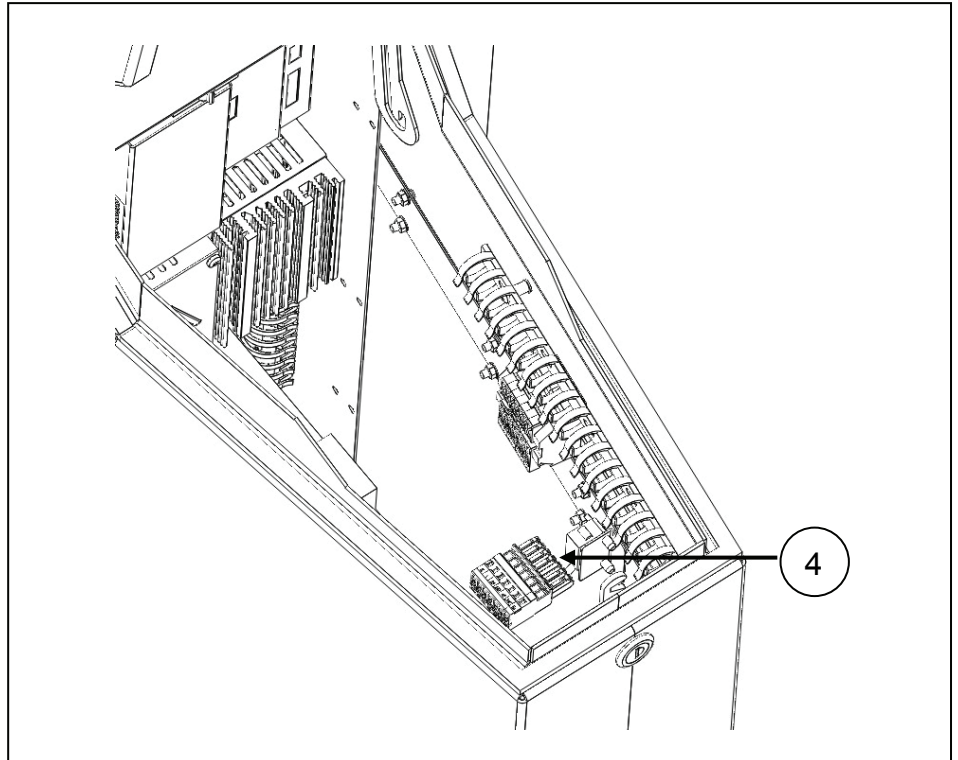


Fig. 14-3 View of end housing with cover open

Swing mounting panel (5) to the side, so that the drive unit is accessible.

To do this, undo the screws (6) holding the mounting panel and swing it to the side.

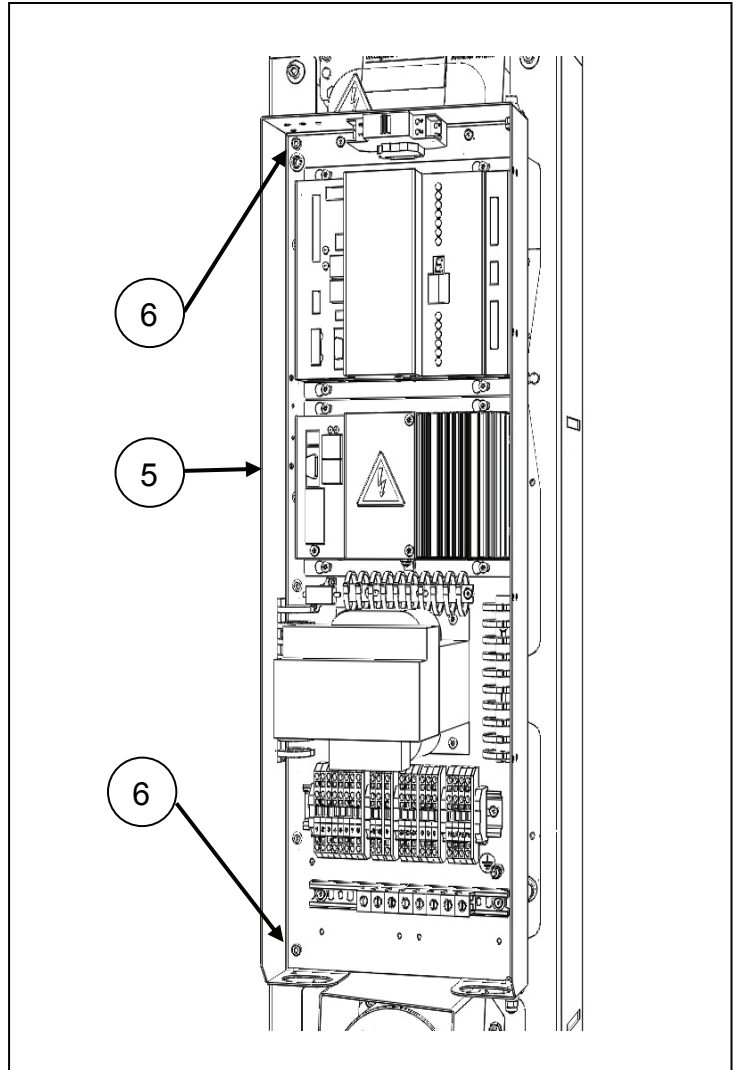


Fig. 14-4 View of mounting panel with end housing removed

Repair work

Block the drive unit with fixing screw (7). Make sure that the screw is aligned with the hole in the bell-crank and engages. Then secure the screw with a locknut so that the drive unit is blocked with a minimum of play.

Loosen the nuts (8) for the cover strip carrier, but do not remove them.

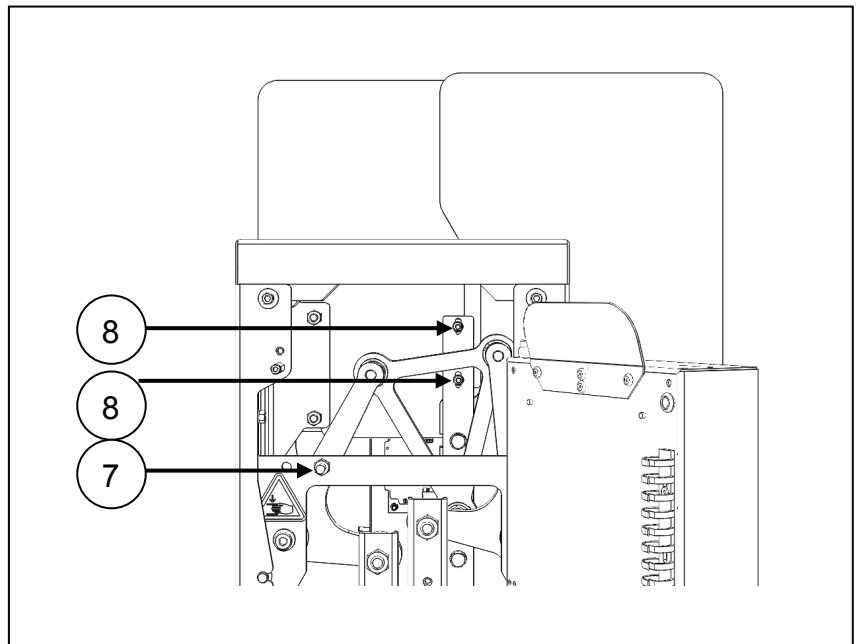


Fig. 14-5 View of drive unit with mounting panel swung to the side

Loosen the screws (9) on the clamping strip starting at the bottom and working upwards, but do not remove them.



ATTENTION!

During dismantling, secure the glass wing against falling – danger of breakage!

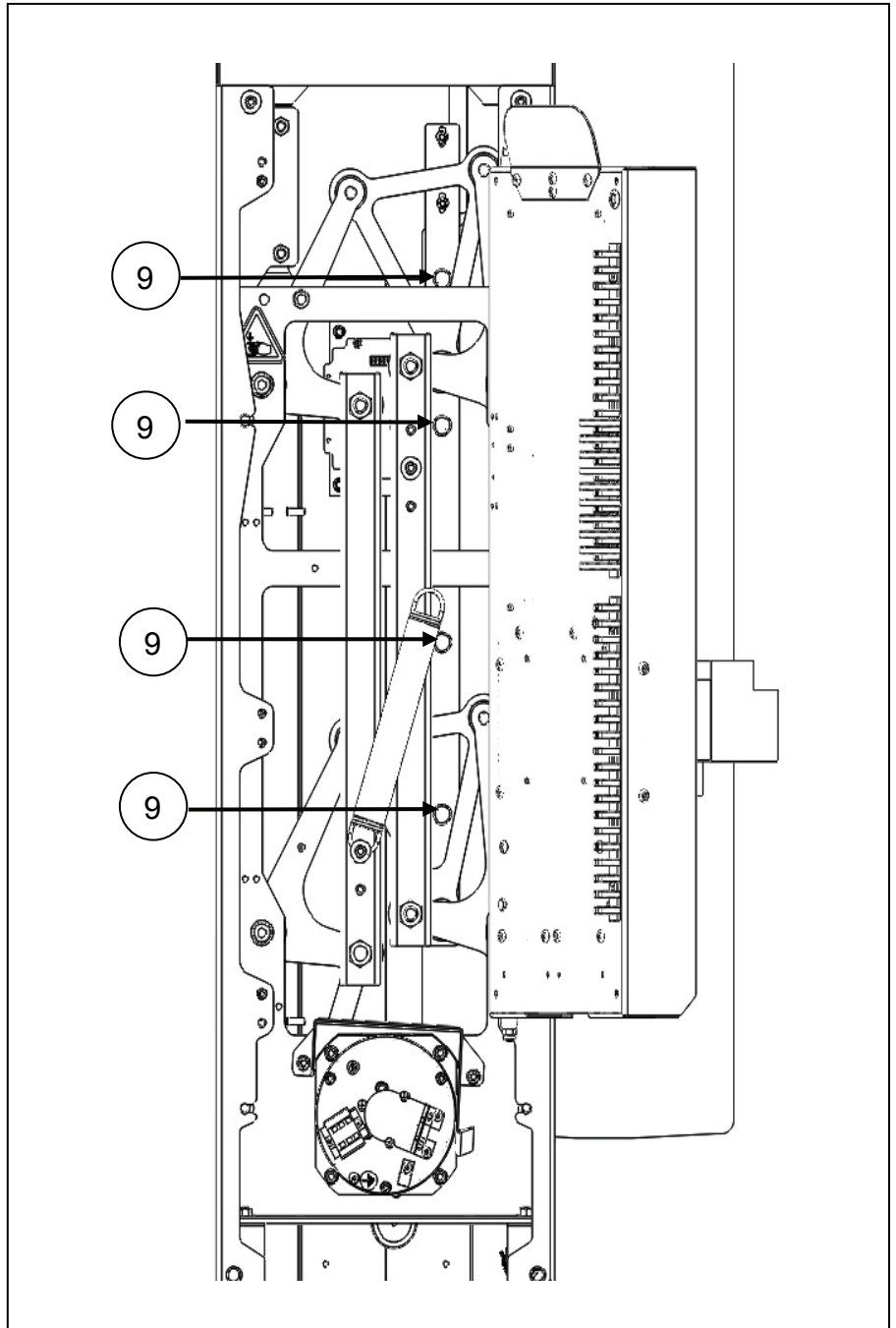


Fig. 14-6 View of drive unit, clamping screws for glass wing

14.2 Removing the anti-climb panel

For better access to the screws (11) holding the anti-climb panel (10), it is recommended that you remove both end housings.

Loosen the four hexagon-head screws (11), two on each side, but do not remove them. Lift the anti-climb panel (10) carefully upwards out of the housing to remove it, without canting or twisting it (danger of breakage).



ATTENTION!

If the anti-climb panel is canted or twisted, there is a danger of it breaking.

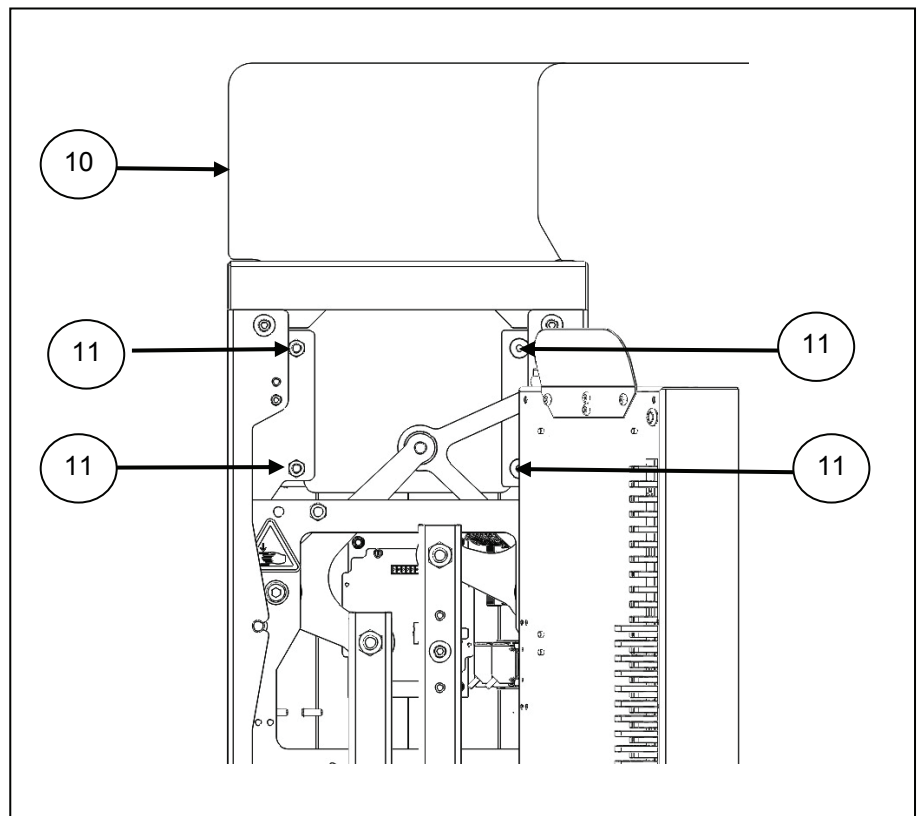


Fig. 14-7 View of central housing with mounting panel swung to the side

14.3 Installing the anti-climb panel

Proceed in the reverse order to that described above for removal. Tighten the clamping screws progressively and diagonally to a torque of 20 Nm.

14.4 Installing the glass wing

Proceed in the reverse order to that described above for removal.



IMPORTANT NOTE!

To position the glass wing, adjust the dimension between the housing and the glass wing edge to 160 mm for MPH Standard and to 190 mm for MPH Wide. Tighten the clamping screws progressively and alternately to a torque of ca. 20 Nm.

Due to manufacturing tolerances, there may be differences; it is therefore recommended that you release the drive unit from its blocked state, move it to the open position, and then check that the glass wing end is flush with the housing. If it is not, repeat the adjustment so as to correct the difference you have observed.

Then the drive unit must be blocked again and screws (9) (see Fig. 14-12) must be tightened. Take care that the cover strip carrier is in contact with the rear face of the glass.

14.5 Installing cover strip on MPH Standard

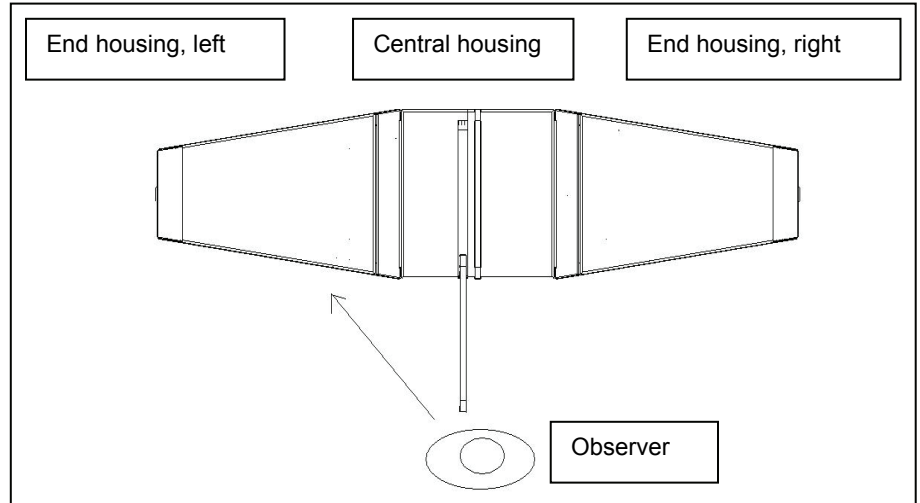


Fig. 14-8 Plan view looking towards glass wing, end housing, left

Remove the left-hand end housing (1) from the central housing (2). (The left end housing is on your left when you stand in the lane looking towards the glass wing.)

Open the cover of the left end housing (1).



ATTENTION!

Important: switch off the barrier at the main switch (3)! If there are several barriers in an installation, make sure you have switched off the correct lane.

Undo the connecting screws (4) in the two upper corners.

Remove cap and undo the lower central screw – both at (5).

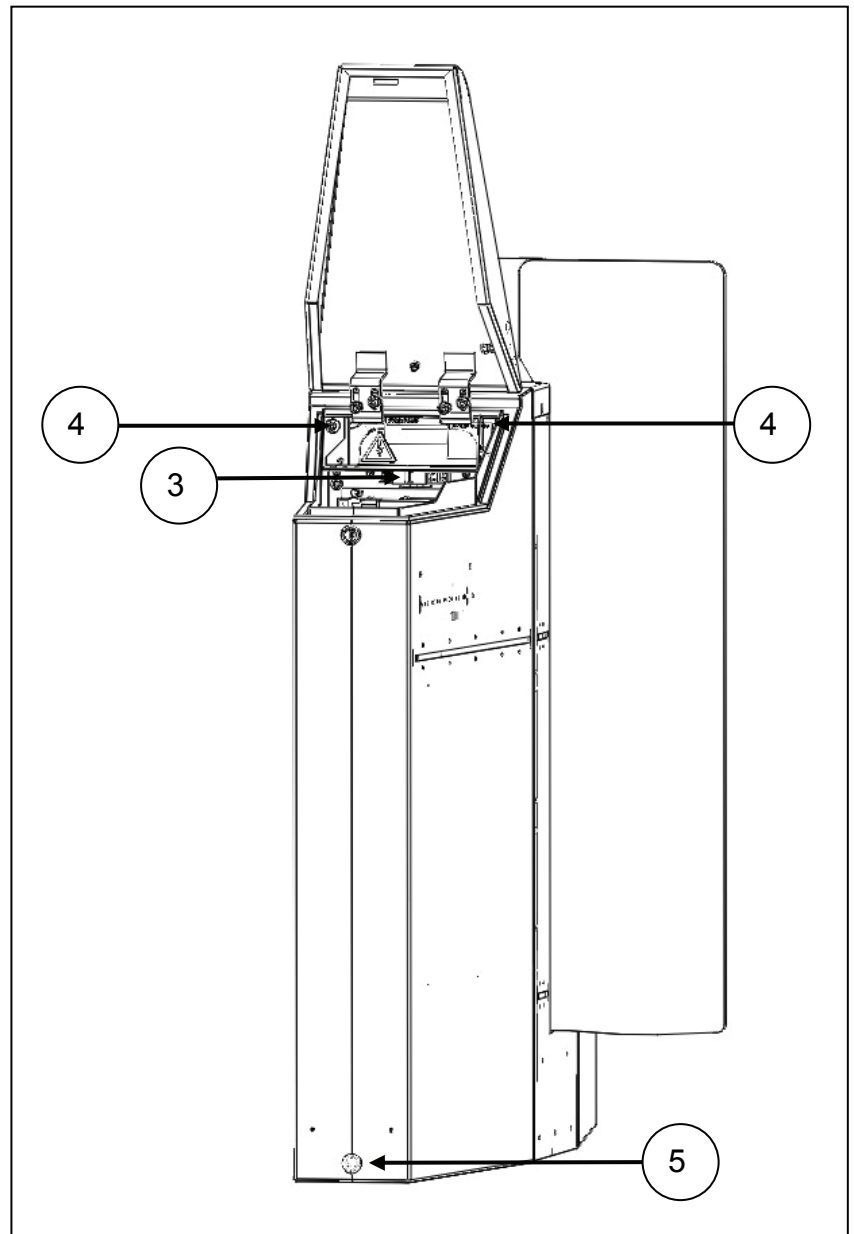


Fig. 14-9 View of end housing

Disconnect the plug (6) for the photocells, and, if present, the plug from GED.

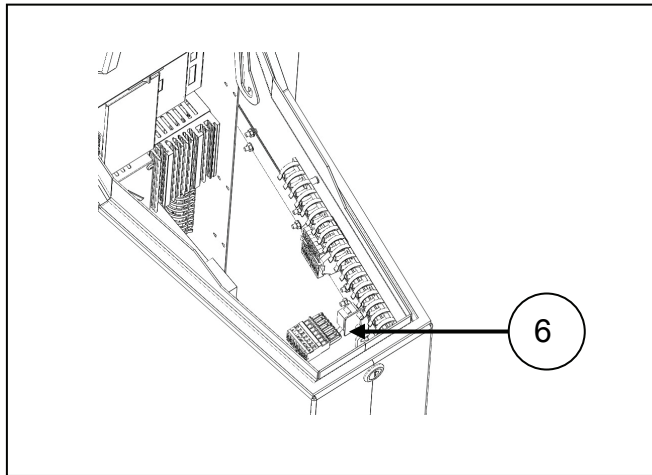


Fig. 14-10 View of end housing with cover open

Now the end housing can be removed from the central housing.

Swing mounting panel (7) to the side, so that the drive unit is accessible. To do this, undo the two screws (8) holding the mounting panel (7).

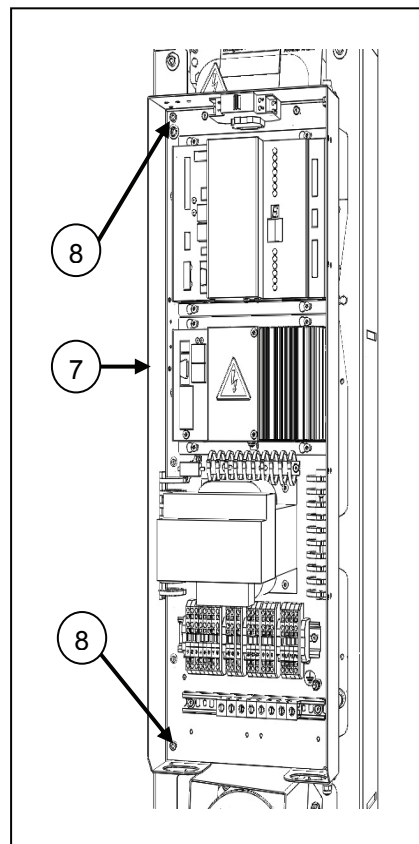


Fig. 14-11 View of mounting panel

Next, block the drive unit with fixing screw (9). Make sure that the screw is aligned with the hole in the bell-crank and engages. Then secure the screw with a locknut so that the drive unit is blocked with a minimum of play.

Loosen the nuts (10) for the cover strip carrier, but do not remove them.

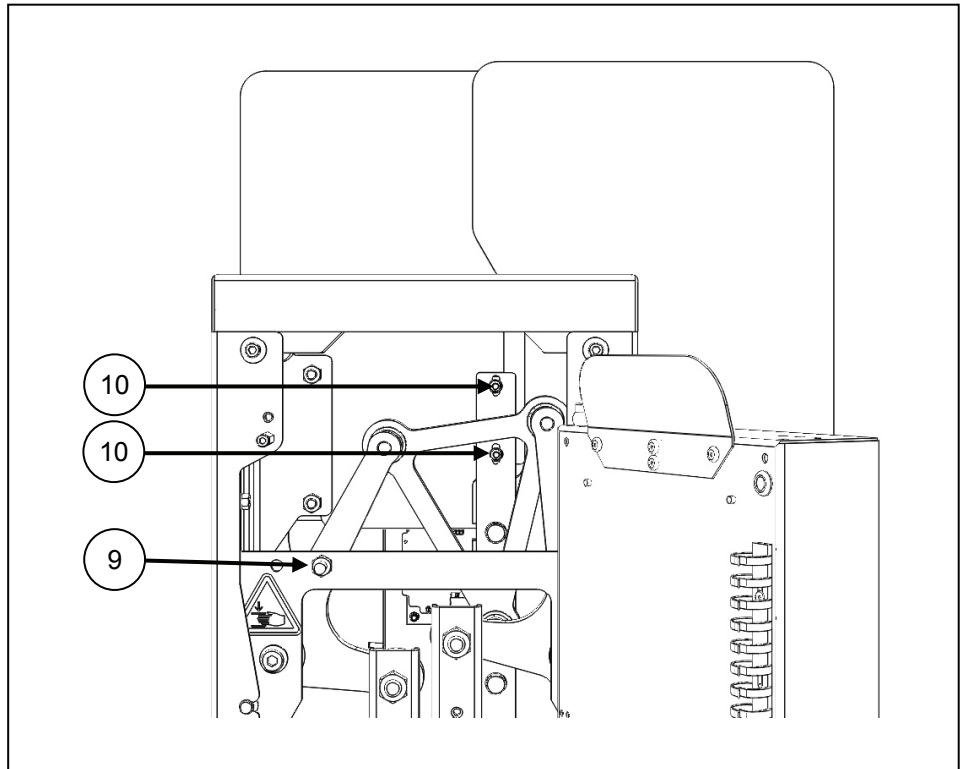


Fig. 14-12 View of central housing with mounting panel swung to the side

Pull the carrier down so that the carrier pin releases the strip.

Now the cover strip for the guide can be removed away from the glass wing path.

To install a new cover strip, proceed in the reverse order.

14.6 Changing the motor



CAUTION!

Before carrying out any maintenance or repair work, disconnect the power supply at the main switch.

When it is necessary to change the MHT motor (1) (MAGNETIC High Torque Motor), proceed as follows:

First remove the left-hand end housing and swing the mounting panel to the side as described in Section 14.1.

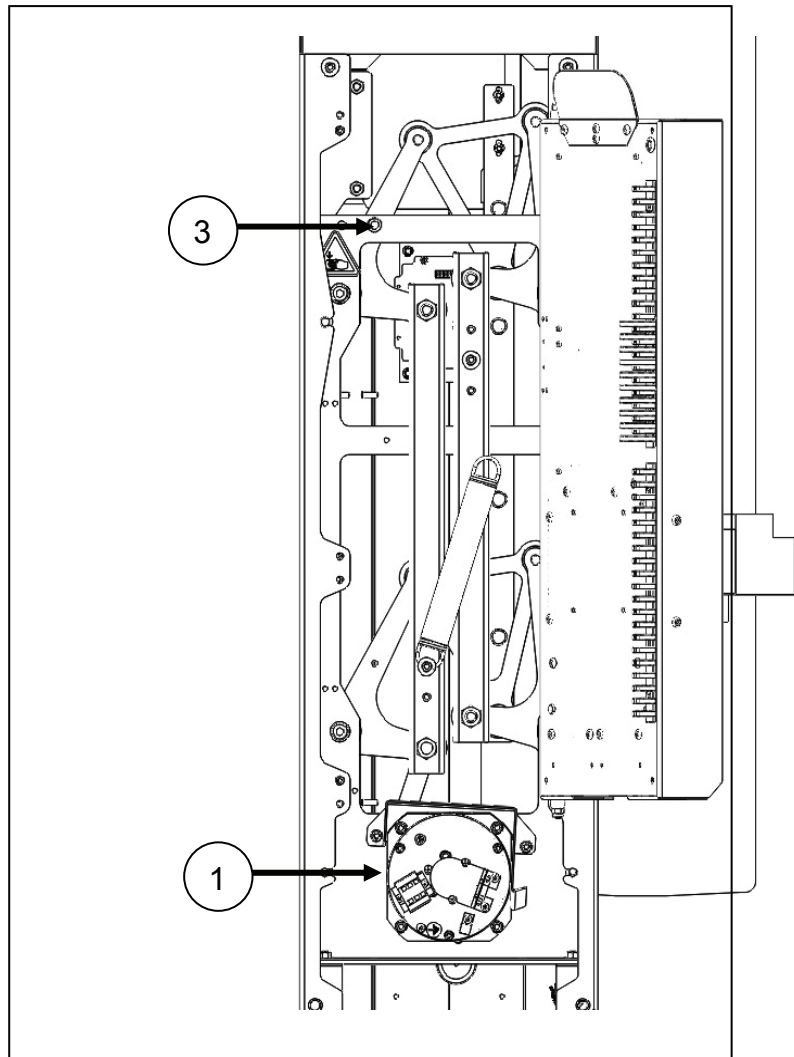


Fig. 14-13 View showing drive unit in central housing

Undo screw (2) clamping the motor lever on the motor shaft.

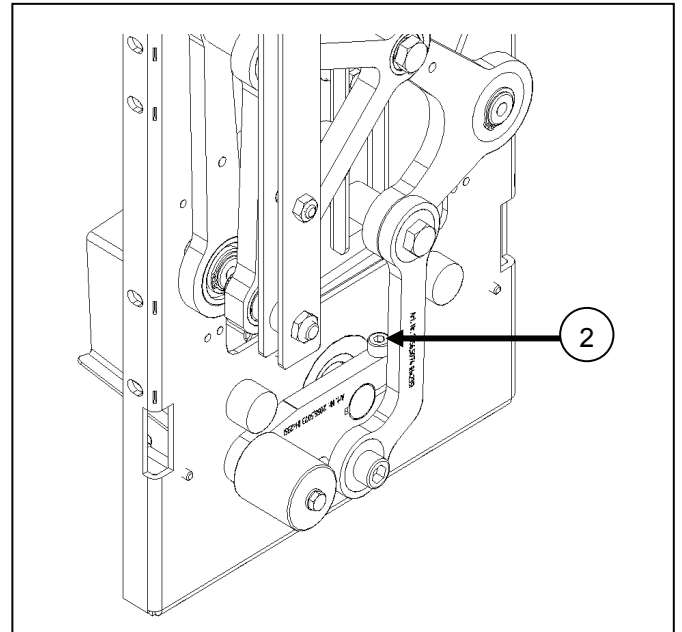


Fig. 14-14 View of drive unit showing motor lever

Block the drive unit with fixing screw (3).

Disconnect all wiring and connectors from the rear end of the motor (1).

Remove the four screws (4) holding the motor.

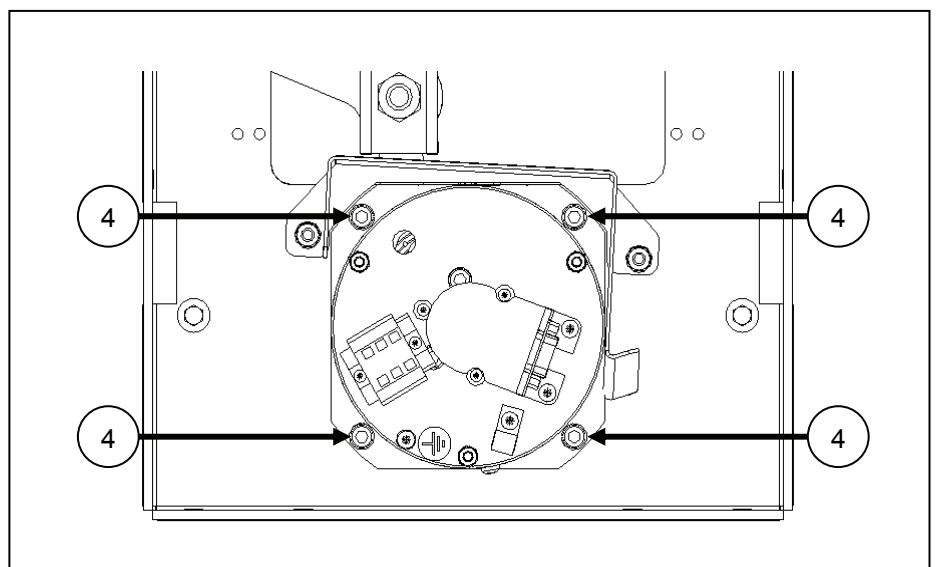


Fig. 14-15 View of rear of the drive unit, motor mounting screws

Repair work

Lift the motor out of the base frame and simultaneously release the clamping lever from the motor shaft.

When replacing the motor, proceed in the reverse order. Tighten the motor lever screw (2) to a torque of 25 Nm.



IMPORTANT NOTE!

The resolver is mounted on the rear end of the motor. It cannot be changed separately, only as a complete unit with the motor. The resolver must be specially calibrated!

15. Downloading software (updates)

The software for the MBC-110 and MMC-120 can be replaced by downloading. In this process, the existing software is overwritten by a new version.

The first step is to load the software to the MBC-110 controller, and, in a second step, it is downloaded to the MMC-120s. Thus, the software for the MBC-110 also contains the software for the MMC-120.

The Windows program MBC-Flasher is used for programming the controller.

There are separate instructions explaining how to use this program.

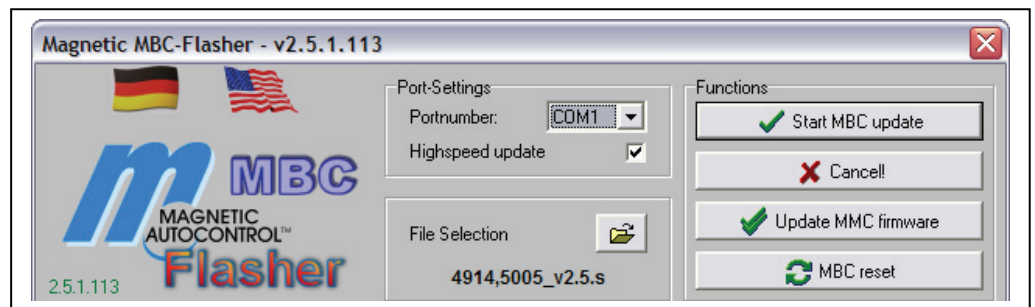


Fig. 15-1 Display of MBC-Flasher program

Errors during downloading

If a problem occurs while downloading, try again to make the download. To do this, you must switch off the power supply and start from the beginning again.

16. Technical support

If a fault occurs during operation that cannot be rectified by a qualified electrician, contact your authorised contractual partner.



IMPORTANT NOTE!

Before making a telephone call, please note the data on the type plate, such as type, serial number, version etc.

17. Spare parts and accessories

Exploded drawings with details of spare parts and their part numbers will be supplied on request.

18. Guarantee

The manufacturer reserves the right to make technical changes and modifications without prior notice.

Subject to the condition that the operating instructions are observed, and that no inadmissible operations are carried out on the technical equipment, and that the installation has suffered no mechanical damage, MAGNETIC guarantees all mechanical and electrical components for:

- 3 years after delivery
- 2 years after commissioning

19. Taking out of service



RECYCLING!

The relevant regional regulations and laws covering the disposal of substances, materials, and machine parts must be observed. Materials that can be recycled must be handed over to specialised disposal partners.

In the interests of a clean environment, you must ensure the responsible handling, use and disposal of all materials.

Packaging material

When the barrier and its accessories have been unpacked, the packaging materials must be sorted and separated for disposal.

Barrier

When disposing of a barrier or parts of a barrier, the materials must be sorted and recycled separately.

Electrical and electronic components

The materials used in electrical and electronic components must be disposed of separately. They may contain plastics and toxic substances.



IMPORTANT NOTE!

To ensure proper disposal of electrical and electronic components, you can consult MAGNETIC or a competent electrician.

Lubricants and auxiliary substances

Lubricants and auxiliary substances (e.g. oils, greases etc.) must be properly stored and must not be allowed to enter the environment in an uncontrolled fashion.



CAUTION!

It is forbidden to dispose of combustible or inflammable materials together with normal rubbish.

20. List of illustrations

Fig. 1-1	Line configurations.....	10
Fig. 2-1	Table of technical data.....	11
Fig. 3-1	Installation examples, available housing widths	13
Fig. 4-1	Foundation, side view	15
Fig. 4-2	Foundation drawing – empty conduits	16
Fig. 4-3	Plan view of foundations.....	17
Fig. 4-4	Housing definitions	18
Fig. 4-5	Access to motor, drive, and control unit.....	19
Fig. 4-6	Securing MPH to foundation with express anchors	21
Fig. 4-7	Hole pattern for express anchors in foundations	22
Fig. 4-8	View of central housing with mounting panel swung to the side.....	23
Fig. 4-9	View of drive unit with mounting panel swung to the side	24
Fig. 4-10	View of central housing showing slot cover	25
Fig. 5-1	Connection of mains power supply	26
Fig. 5-2	Connection of wiring between a pair of housings	27
Fig. 5-3	Connections for mains supply and between a pair of housings.....	28
Fig. 5-4	Plugging in connection leads to the end housing	29
Fig. 5-5	Installation information for access-control devices	30
Fig. 5-6	Customer connections to MBC-110.....	31
Fig. 7-1	Block diagram for control system.....	35
Fig. 7-2	Logic controller MBC-110	36
Fig. 7-3	Customer's connections to MBC-110	37
Fig. 7-4	Connecting an emergency input	39
Fig. 7-5	Connection of inputs (simplified drawing)	40
Fig. 7-6	Relay output connections (simplified drawing)	41
Fig. 7-7	Connections for additional inputs and outputs (simplified drawing).....	41
Fig. 7-8	Motor controller MMC-120	42
Fig. 7-9	Transformer power supply	43
Fig. 7-10	Gate end display (GED).....	44
Fig. 7-11	Motor MHTM.....	45
Fig. 8-1	Arrangement of photocells.....	46
Fig. 9-1	DIP switches for setting parameters	52
Fig. 10-1	Functions of photocells	57
Fig. 10-2	Table of operating modes	59
Fig. 11-1	CAN bus termination.....	68
Fig. 11-2	CAN address DIP switch settings	68
Fig. 11-3	Locations of DIP switches for CAN addresses and termination	69
Fig. 12-1	LEDs at inputs and outputs of the MBC-110	70
Fig. 12-2	LEDs at inputs and outputs of the MBC-110	76
Fig. 14-1	End housing definition: the left end housing is on your left when you stand in the lane looking towards the glass wing.....	77
Fig. 14-2	View of left end housing.....	78
Fig. 14-3	View of end housing with cover open	79
Fig. 14-4	View of mounting panel with end housing removed	80
Fig. 14-5	View of drive unit with mounting panel swung to the side	81

Fig. 14-6	View of drive unit, clamping screws for glass wing.....	82
Fig. 14-7	View of central housing with mounting panel swung to the side.....	83
Fig. 14-8	Plan view looking towards glass wing, end housing, left	85
Fig. 14-9	View of end housing	86
Fig. 14-10	View of end housing with cover open	87
Fig. 14-11	View of mounting panel	87
Fig. 14-12	View of central housing with mounting panel swung to the side.....	88
Fig. 14-13	View showing drive unit in central housing	89
Fig. 14-14	View of drive unit showing motor lever	90
Fig. 14-15	View of rear of the drive unit, motor mounting screws	90
Fig. 15-1	Display of MBC-Flasher program	92

MAGNETIC Autocontrol GmbH
Grienmatt 20
D - 79650 Schopfheim
Germany

Tel.: +49 7622 695 5
Fax: +49 7622 695 602
e-mail: info@ac-magnetic.com