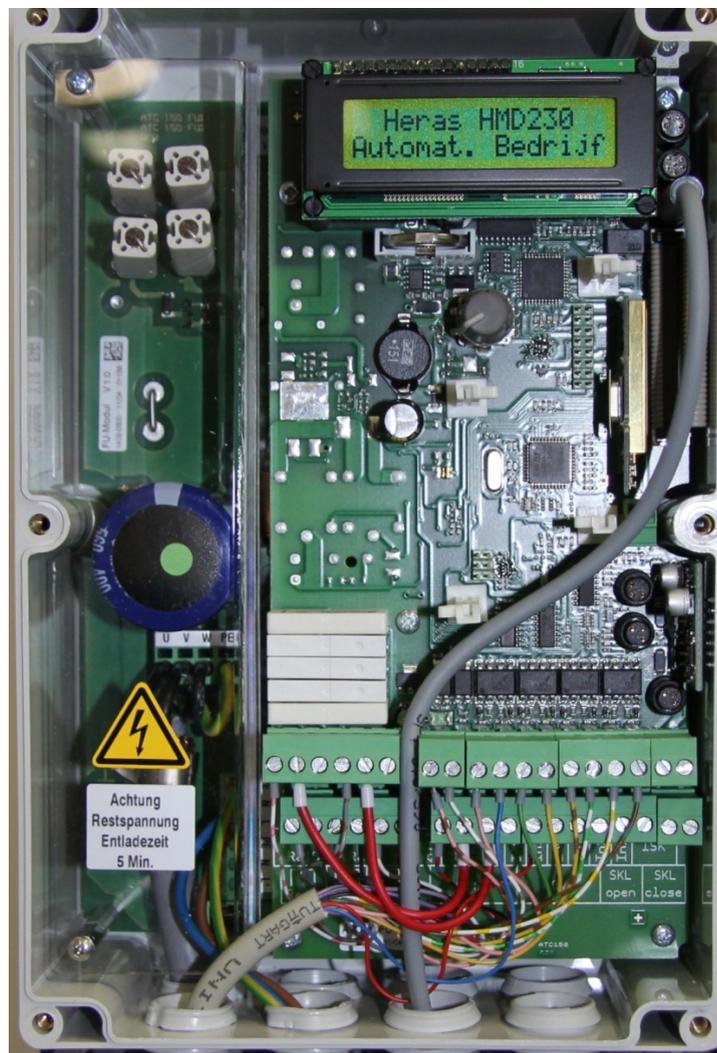




Installers manual

HMD230 motor drive



 English

Version: 1.1 February 2013

Translation of the Original Installers manual

Contents

1	GENERAL	6
1.1	EXPLANATION OF THE SYMBOLS	6
1.2	LISTING OF CHANGES.....	6
1.3	TERMINOLOGY, DEFINITIONS AND ABBREVIATIONS	7
1.4	LIST OF ILLUSTRATIONS	8
2	SAFETY INSTRUCTIONS	9
3	FUNCTION DESCRIPTION AND CONNECTIONS	10
3.1	CONDITIONS	10
3.2	TECHNICAL SPECIFICATIONS	10
3.3	COMPLETE VIEW OF THE HERAS MOTOR DRIVE	11
3.4	OPERATING MODES: FUNCTIONS AND OPERATION.....	12
3.4.1	<i>Dead man's operation</i>	12
3.4.2	<i>Automatic mode</i>	13
3.4.3	<i>Emergency operation</i>	13
3.4.4	<i>Automatically changing operating modes</i>	14
3.5	ACCESSORIES THAT CAN BE CONNECTED	15
4	INSTALLATION	16
4.1	ASSEMBLING THE MOTOR DRIVE.....	16
4.2	ELECTRICAL CONNECTION	17
4.2.1	<i>Connecting the supply voltage and the drive motor</i>	17
4.2.2	<i>Instructions for EMC installation</i>	18
4.3	CONNECTING THE INPUTS.....	18
4.3.1	<i>Power supply for external devices</i>	19
4.3.2	<i>Connecting the controls</i>	19
4.4	STATIONARY ANTI-CRUSHING SAFETY PROTECTION DEVICES	20
4.4.1	<i>Connecting the ISK system</i>	20
4.4.2	<i>Connecting a photocell</i>	21
4.4.3	<i>Wiring diagram for the inputs on the terminal block</i>	22
4.4.4	<i>Incremental encoder</i>	22
4.5	RELAY OUTPUT CONNECTIONS.....	23
4.5.1	<i>Relay output with 24 V_{DC}</i>	24
4.5.2	<i>Relay output with 230 V_{DC}</i>	24
4.6	CONNECTING THE RADIO-FREQUENCY RECEIVER.....	25
5	CONTROL UNIT AND DISPLAY READINGS	26
5.1	TWIST AND SELECTOR SWITCH	26
5.2	LCD SCREEN.....	26
5.2.1	<i>Display of operating modes</i>	27
5.2.2	<i>Date and time display</i>	28
5.2.3	<i>LCD sensor display</i>	28
5.2.4	<i>Selecting the menu system</i>	29
5.3	7-SEGMENT LED DISPLAYS.....	29
5.3.1	<i>Displaying operating modes with 7-segment LED displays</i>	30

5.3.2	LED sensor display	30
5.4	MENU DISPLAY INSTRUCTIONS	31
5.5	MENU STRUCTURE AND TEXTS THAT ARE DISPLAYED	32
6	PARAMETER SETTINGS	36
6.1	GENERAL PROGRAMMING INSTRUCTIONS	36
6.1.1	Navigating the menu	36
6.2	INSTALLING THE GATE AND MAKING SETTINGS	37
6.2.1	Installing the dead man's keys	37
6.2.2	Changing the direction of rotation of the drive	37
6.2.3	Programming stationary anti-crushing safety protection devices (SKL)	37
6.2.4	Programming the moving anti-crushing safety protection devices (ISK)	38
6.2.5	'Teaching' the end positions of the gate	38
6.3	FURTHER OPERATING PARAMETERS	39
6.3.1	Setting the language	39
6.3.2	Changing the operating mode: Dead man's operation / Automatic mode	39
6.3.3	OPEN, CLOSE and STOP controls	39
6.3.4	Toggle impulse key	40
6.3.5	Installing/Setting a part open function	40
6.3.6	Installing/Setting an emergency stop input	40
6.3.7	Setting a photocell	40
6.3.8	Connecting a flashing light	41
6.3.9	Setting a lamp (yard lighting)	41
6.3.10	Connecting the status display of a gate	42
6.3.11	Programming service intervals	42
6.3.12	Setting an external heating	43
6.3.13	Setting the emergency situation function	43
6.3.14	Setting the traffic light	44
6.4	TIMER-CONTROLLED GATE MOVEMENTS	44
6.4.1	Setting automatic closing (open dwell time)	44
6.4.2	Time to close from Part OPEN position	45
6.4.3	Time to close the gate from interim positions	45
6.4.4	Setting a short closing time	45
6.4.5	Activating warning time and flashing light	45
6.5	SAVING PARAMETERS TO THE MEMORY	46
6.5.1	Saving the parameter settings	46
6.5.2	Restoring parameter settings	46
6.6	SAVING PARAMETERS TO CHIPCARD	46
6.6.1	Saving the parameter settings to card	47
6.6.2	Reading the parameter values from the card	47
6.7	SUPPORT DURING DIAGNOSIS	47
6.7.1	Version display	47
6.7.2	Movement commands at start-up	48
6.7.3	Gate status	48
6.7.4	Sensor statuses	49
6.7.5	Temperatures	49
6.7.6	Integrated log systems	50
6.8	REMOTE CONTROL	50
6.8.1	Displaying the number of hand transmitters	51

6.8.2	Teaching hand transmitters	51
6.8.3	Teaching hand transmitter buttons	52
6.8.4	Deleting transmitters from the memory	52
6.8.5	Deleting hand transmitter function	52
6.8.6	Deleting all transmitters from the memory	53
6.9	INTEGRATED REAL-TIME CLOCK	53
6.9.1	Display date/time	53
6.9.2	Setting the clock	53
6.10	CALENDAR FUNCTIONS OF THE MOTOR DRIVE	53
6.10.1	Activating the calendar	54
6.10.2	Displaying the weekly calendar	54
6.10.3	Adding and changing entries in the weekly calendar	55
6.10.4	Copying a day in the weekly calendar	56
6.10.5	Deleting individual entries	56
6.10.6	Deleting a week day	57
6.10.7	Deleting the entire weekly calendar	57
6.10.8	Displaying the yearly calendar	57
6.10.9	Adding and changing entries in the yearly calendar	58
6.10.10	Copying a day in the yearly calendar	59
6.10.11	Deleting individual entries	59
6.10.12	Deleting a day	60
6.10.13	Deleting the entire yearly calendar	60
6.11	PARAMETER REFERENCE AND/OR FAULT NUMBERS	60
8	MAINTENANCE INSTRUCTIONS	63
9	DECOMMISSIONING AND REMOVAL	63
10	TECHNICAL DATA	64
11	APPENDIX A SPARE PARTS	65
12	APPENDIX B ACCESSORIES	65
13	APPENDIX C DECLARATION OF CONFORMITY	66

1 GENERAL

The release of this publication invalidates all prior versions.
The information given in this document is subject to change at any time without notice.

This user manual is aimed specifically at the person who installs and sets up the HMD230 gate motor drive. The motor drive must be commissioned exclusively by accredited, trained electrical engineers, who are familiar with the safety standards governing the electrical drive and computerisation technology. The safety regulations must be taken into consideration absolutely.

This manual demonstrates only a few control functions. You can find information of further functions, descriptions of special functions and more accurate specifications of the motor drive in additional descriptions.

1.1 EXPLANATION OF THE SYMBOLS



Caution!: To prevent personal injury, you must observe the safety instructions below.



Attention! : To prevent material damage, you must observe the safety instructions below.



Information: This is followed by further information or by a reference to other documents.

1.2 LISTING OF CHANGES

The changes incorporated in this document, the reason of the change in question and the date of the change are described in the table.

Any material changes as to the contents of this document must be first agreed within the project management team. This does not apply to formal changes such as spelling errors and amendments.

The entire document is given a new publication status and is completely redistributed after every change. Every change to this document must be submitted by the configuration manager. The configuration manager is responsible for coordination within the project and for distributing the new release.

Revision	Date	Description, reason of change
1.0	01-05-2012	First issue (EF/ER)
1.1	02-2013	Changes to the program version 1.10.10.24

1.3 TERMINOLOGY, DEFINITIONS AND ABBREVIATIONS

AC.....	Alternating Current
FER	Fire Emergency Room
B.I.S.T.....	Built In Self Test
CRC16	16-bit Cyclic Redundancy Check
DC	Direct Current
DIN	<i>Deutsches Institut für Normung</i>
EEPROM.....	Electrical Erasable Programmable Read Only Memory
EMC.....	Electromagnetic Compatibility
EN.....	European standard
FI.....	Fault Interrupter (residual current circuit breaker)
FU.....	frequency converter
GND	ground
HW.....	hardware
IP.....	Intrusion Protection against foreign substances and water
ISK.....	inductive cable transfer system supplied by ASO, replacing the travelling cable for the moving anti-crushing safety protection devices
ISO	International Organization for Standardization
LCD.....	Liquid Crystal Display
MMI	Man Machine Interface
PWM.....	Pulse width modulation
RAM	Random Access Memory
ROM	Read Only Memory
RTC	real-time clock
SKL	anti-crushing safety protection devices
SW.....	software
TÜV	<i>Technischer Überwachungsverein</i> , Notified Body
VCC.....	Voltage of Common Collector (operating voltage)

1.4 LIST OF ILLUSTRATIONS

Illustration 1: Complete view	11
Illustration 2: Summary of operating modes	12
Illustration 3: Schedule of options to switch over between operating modes	14
Illustration 4: Mechanical dimensions	16
Illustration 5: Electrical connection.....	17
Illustration 6: Connecting external devices	18
Illustration 7: Electrical connection of controls.....	19
Illustration 8: Electrical connection of anti-crushing safety protection devices and ISK.....	20
Illustration 9: Electrical connection of a one-way photocell	21
Illustration 10: Electrical connection of a reflective photocell.....	21
Illustration 11: Installation of inputs incl. photocell.....	22
Illustration 12: Electrical connection of incremental encoder.....	22
Illustration 13: Electrical connection of 24 V _{DC} relay	24
Illustration 14: Electrical connection of 230V relay	24
Illustration 15: Electrical connection of radio-frequency receiver module.....	25
Illustration 16: Twist and selector switch.....	26
Illustration 17: Information on the LCD screen	26
Illustration 18: Date and time display	28
Illustration 19: Display of main menu on the LCD screen.....	29
Illustration 20: Layout and meanings of 7-segment LED displays.....	29
Illustration 21: Chipcard reader.....	46

2 SAFETY INSTRUCTIONS



- Carefully read the User Manual before commissioning the HMD230 gate motor drive.
- The motor drive must only be installed and commissioned by trained professionals who have acquainted themselves with this User Manual and the applicable instructions on work safety and accident prevention. Always observe and respect the instructions contained in this manual.
- The User Manual must always be available at the location where the motor drive is used. All staff who operate and maintain the motor drive must read this manual thoroughly and apply it.
- After it has been commissioned, the user of the gate system or its representative must be given an explanation of how to operate the system.
- Only professional electrical engineers are allowed to carry out work on electrical systems!
- Always comply with the applicable electro-technical safety instructions, as well as the safety instructions provided by industrial associations, insurers etc. if relevant.
- It is the responsibility of the manufacturer and the user of the system / machine on which the motor drive is used to coordinate and observe all applicable safety instructions and rules.
- The instructions in this manual must be observed in order to comply with the warranty conditions as regards operation and safety. Ignoring warnings may lead to physical injury and material damage. The manufacturer does not accept any liability for damage that is the consequence of any failure to comply with the instructions.
- There are no user-serviceable parts inside the motor drive. Any adjustments and/or repairs made by the user without the manufacturer's approval will invalidate all warranty claims and the manufacturer's liability, if any.
- Prior to performing connection activities, the drive system must always be disconnected from the power supply. Make sure that the power supply continues to be interrupted while the connection activities are being performed.
- All pulse generators and control facilities of the gate must be installed such that they are visible from the gate and at a safe distance from the moving parts of the gate. Observe a minimum installation height of 1.5 metres.
- Do not enable or allow children to play with the gate motor drive.
- Before moving the gate, check that there are no people or objects in the danger zone of the gate.
- All available emergency controls must be checked prior to commissioning the system.
- Never insert anything in a running gate or in its moving parts.
- Be alert to locations at gate systems where limbs may be crushed or which may cause abrasion injury or damage and make these locations safe.
- The motor drive guarantees functional safety, but it does not guarantee the safety of the entire system. Therefore, prior to using the motor drive, a safety assessment must be performed for the entire system, according to DIN EN 13241-1 "Gates – product standard".
- The system must be inspected at regular intervals by experts for its proper functioning in order to ensure that the safety system complies to the DIN EN 12453 standard "Safety in use of power-operated doors and gates". This inspection must be documented such that it can be verified.



The HMD230 is a frequency converter. Since dangerous live voltage may still be present after switching off the HMD230, you must observe a 3 to 5 minute waiting time to make sure that all power has discharged. Working on a live frequency converter PCB involves a risk of fatal injury!

If the HMD230 must be fused with a residual current circuit breaker (FI switch), only the FI switch type B, that is sensitive to all types of current, may be applied.

3 FUNCTION DESCRIPTION AND CONNECTIONS

This document is a description of the HMD230 electrical gate motor drive manufactured by ASO. It describes how to install, use, maintain, repair, decommission and remove the motor drive.

The HMD230 is an electronic control unit with safety functions that is intended for use as a motor drive to operate sliding gates, rolling gates and vertical bar gates, swing and folding gates and barriers in industrial environments.

The HMD230 is also a frequency converter that can operate a three-phase motor with max. 0.75kW on a 1-phase grid. The frequency converter offers the options of 'soft starting' and 'soft stopping' the gate, as well as several different gate speeds.

3.1 CONDITIONS

The motor drive is only fully functional if installed in a gate system that is ready for use. This may require extra external components such as:

- drive (electric motor and transmission)
- controls (switches / buttons)
- signal elements (flashing lights / horns)
- sensor elements (safety strips / anti-crushing safety protection devices / photocells)

They are not enclosed with the motor drive.

3.2 TECHNICAL SPECIFICATIONS

The HMD230 has the following characteristics:

- automatic configuration and many pre-programmed features for standard gate systems
- an extensive programming system for dedicated inputs: front OPEN, STOP, CLOSE, TOGGLE
- two freely programmable inputs
- three dedicated output relays (clearing relays) for flashing light, OPEN position and CLOSED position
- two freely programmable relays (alternating relays)
- alternatively, the ISK and SKL can also be connected with M8 connectors and screw terminals
- separate photocell input
- 7-segment display for status messages
- LCD display for diagnosis and for programming via menus
- operation and configuration via rotary and selector switches
- real-time clock with a spare battery for timed functions and calendar actions
- optional radio-frequency remote control receiver

3.3 COMPLETE VIEW OF THE HERAS MOTOR DRIVE



Illustration 1: Complete view

Designations of the numbered parts:

1. LCD text display (removable)
2. 7-segment display (under the LCD display)
3. Serial interface
4. Input for incremental encoder
5. Battery for real-time clock
6. Twist and selector switch for making settings
7. Communication module slot (optional)
8. External radio-frequency receiver (optional)
9. Connection for external antenna
10. ISK7
11. ISK connection
12. SKL connection for both running directions
13. Fuse for external loads (230V)
14. Connection for further 230V AC/ 50Hz loads
15. Motor connection
16. 230V AC/ 50 Hz power supply
17. Relay outputs
18. Input connections for safety and operating

3.4 OPERATING MODES: FUNCTIONS AND OPERATION

The control software is divided into separate function modules and is available to users in three possible operating modes (dead man's operation, automatic mode and emergency operation):

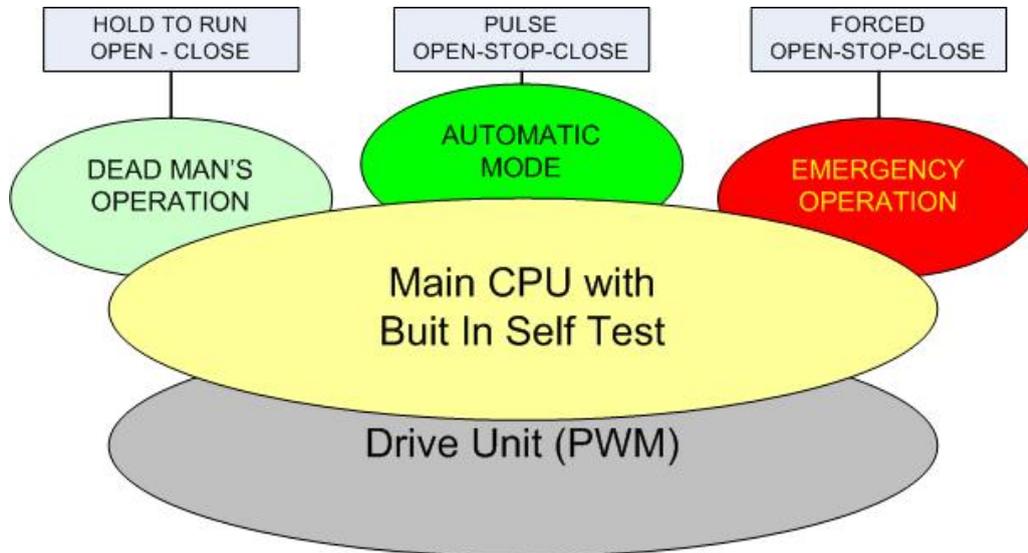


Illustration 2: Summary of operating modes

3.4.1 Dead man's operation

The gate motor drive can be operated in dead man's mode with limited comfort. In dead man's mode, the gate can only be moved using the OPEN and CLOSE keys that are connected to the In8 and In7 inputs specifically for this purpose. In this mode, the gate does not require anti-crushing safety protection devices. The gate will only move for as long as an OPEN or CLOSE key is pressed. Dead man's operation is only permitted if the operator can see the gate system.

If the safety facilities on the gate do not allow automatic operation (e.g. due to a faulty anti-crushing safety protection device), the motor drive will automatically switch into this mode from automatic mode. In this event, and to alert the operator, the gate movement will not start until after the command key (OPEN or CLOSE) has been pressed for a prolonged time and after a two-second delay.

When employing dead man's operation, in addition to the OPEN and CLOSE keys, there is also a STOP key. If this key is not connected, a wire must be connected from the + 24 volt to the corresponding input

3.4.2 Automatic mode

If the safety facilities have been installed completely, the motor drive will usually work in the automatic mode. The user can only use all motor drive functions in automatic mode. Total safety of the gate is guaranteed here by the activated safety facilities.

Opening or closing the gate can be initiated in automatic mode by:

- a command key (OPEN, CLOSE, PARTIALLY OPEN)
- an impulse key with toggle function (OPEN, STOP, CLOSE, STOP)
- OPEN, CLOSE, STOP commands via the remote control

Every movement command causes the full action that has been selected to be performed (open gate, close gate etc.). Every action is stopped immediately by a stop command or a signal from the safety facilities.

Activating the anti-crushing safety protection devices causes the gate to immediately move in the opposite direction. If a photocell is interrupted while the gate is closing, this will cause the gate to be opened as far as the point where the closing movement started (OPEN or PARTLY OPEN).

A movement command for the opposite direction will gradually decelerate the gate and then cause it to move in opposite direction.



Automatic mode if the gate has not installed fully yet:

If the gate has not been fully installed yet, or if motor drive programming has not been completed (e.g.: the end positions of the gate have not been defined yet), the motor drive will work in a special safety mode.

The gate will then only run at dead man's mode speed. Only after the end positions for the OPEN and CLOSED positions have been set and after a measuring run at dead man's mode speed has been performed, will the system switch over to the automatic mode speed.

If the power supply to the drive has been interrupted, the gate will also only run at dead man's mode speed until the first time when an end position has been reached.

3.4.3 Emergency operation

The gate motor drive can switch over automatically from automatic mode to emergency operation. This automatic switch-over can only take place after a "Function emergency situation" input signal which is generated by a fire emergency room. Only the one movement (OPEN or CLOSE, depending on programming) that is requested will be performed at dead man's mode speed in this operating mode. The safety facilities are also activated during this movement. The movement can be interrupted by pressing and holding the STOP key or by a safety device being triggered. When this interruption no longer applies, the gate will immediately continue to move. At the end of the emergency movement and after the signal ("Function emergency situation") has been reset, the software of the motor drive will initiate a restart to enable safe switch-over to automatic mode.

Any static active OPEN or PARTLY OPEN signals are ignored by the motor drive in this operating mode.

Just as the command triggered by an OPEN or CLOSE command key being pressed cannot be performed when a program is started, a static active "Emergency situation" input signal will also not be carried out when switching on the motor drive.

3.4.4 Automatically changing operating modes

The gate motor drive can switch over from automatic mode to emergency operation if it has been programmed to allow this and the HMD230 recognises a corresponding "emergency situation" signal from a fire emergency room. This operating mode will then be performed until the motor drive is restarted. The restart will take place automatically when the "emergency situation" signal is reset (is no longer active) and the required gate position (OPEN or CLOSED) has been reached. Restarting causes the motor drive to resume automatic operation and wait for the first movement command.

If electronic safety facilities on the gate are out of operation (e.g. a faulty photocell), the motor drive can automatically switch over from automatic mode to dead man's operation. This automatic switch-over will take place only for the individual motor movement that has been started and only if the key provided for dead man's operation is pressed. After this, the motor drive will switch over to automatic mode again, but if a new fault occurs or if the fault is not remedied, the system can switch over to dead man's operation again for the next movement.

Changing between operating modes is possible in the following directions:

- Automatic mode → Dead man's operation mode
- Dead man's mode → Automatic mode (if safety's have been restored)
- Automatic mode → Emergency operation
- Emergency operation → Automatic mode (if no emergency situation signal is active anymore and after restarting the control software)

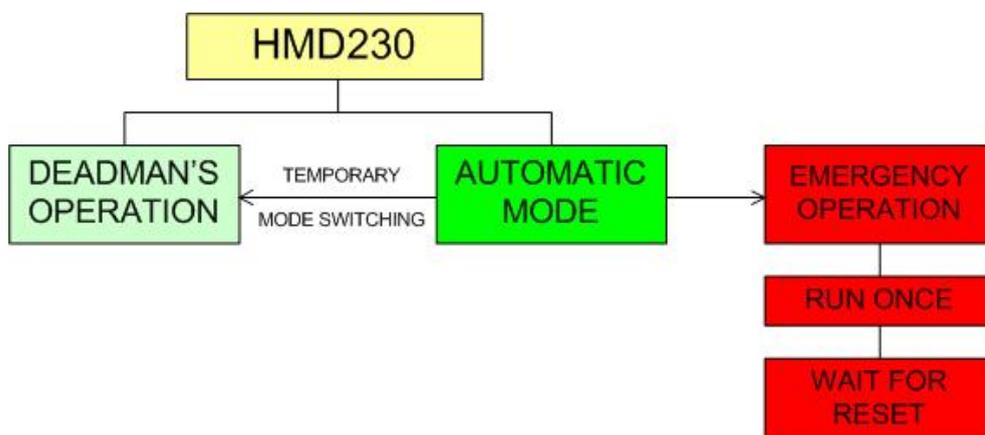


Illustration 3: Schedule of options to switch over between operating modes

3.5 ACCESSORIES THAT CAN BE CONNECTED

The HMD230 gate motor drive can be combined with one or several of the components listed below:

Anti-crushing safety protection devices

Anti-crushing safety protection devices with an 8.2 kOhm terminating resistance for the opening and closing directions can be connected directly to the HMD230 using M8 connectors or terminals.

ISK system

The HMD230 has already been fitted with the drive and analysis logic for the ISK inductive safety system to monitor the moving anti-crushing safety protection devices. The ISK7 is connected to the HMD230 for this purpose. The stationary SPK55 core can also be connected directly via an M8 connector or a terminal.

Photocells

One-way photocells or reflective photocells can be connected to a separate input.

Incremental encoder

The incremental encoder of the drive motor, detecting the running direction and the speed of the motor drive motor can be connected via a four-pole M8 connector.

Radio-frequency receiver

The HMD230 can be fitted with a FM radio-frequency receiver for hand transmitters. The receiver operates on 868-MHz. An externally installed antenna can be connected to this receiver.

4 INSTALLATION

This chapter is about commissioning the HMD230.

4.1 ASSEMBLING THE MOTOR DRIVE



Attention!

- Check the motor drive for possible damage, including transport damage, prior to assembly.
- Do not touch any electronic parts, in particular processor circuit components. Electronic parts and components may be damaged or become faulty due to electrostatic discharge.
- Switch off the power supply to the system before installing the motor drive.
- The motor drive must be installed such that it is free from mechanical strain.
- Cable entries that are not used must be replaced by closed stepped nipples to ensure that the housing is safe.
- The cables must be free from mechanical pull strain.
- If the motor drive is mounted on a conducting surface it must be connected to an effective ground on the PE. The cooling body of the motor drive does not have such a connection.

The motor drive is installed using fillister head screws with a diameter of 4 mm. The motor drive is intended for vertical installation.

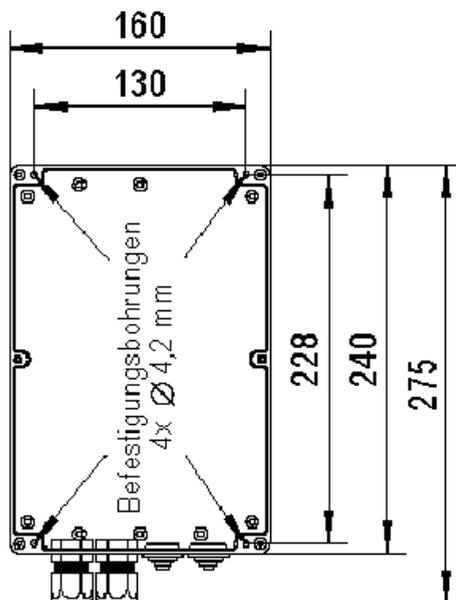


Illustration 4: Mechanical dimensions

Tip: As the cooling body of the HMD230 heats up during operation, you must pay attention that the thermal coupling of the cooling body is sufficient. Ideally there is a perfectly fitting connection between the cooling body and a metal surface which dissipates the heat. Insufficient heat dissipation may affect the functioning of the motor drive.

Never mount the motor drive on a flammable surface such as wood. When mounted on surfaces that do not efficiently dissipate heat, the motor drive must be mounted on distance pieces. If this is done, a convection gap of at least 10 cm must be left above and below.

In continuous operation the cooling body may become as hot as 65 °C.

Note: at higher temperatures the frequency converter will no longer be driven.

4.2 ELECTRICAL CONNECTION



Caution! In principle, and for safety reasons, the electrical system must be connected by a qualified electrical engineer. Work on the motor drive is only permitted if the power supply is fully interrupted. To fully interrupt the power supply, an isolator switch or mains plug must be installed and used. The isolator switch or mains plug must be within easy reach.

Observe the instructions in the chapter on Safety instructions. Avoid parallel signal and energy leads and cables where possible. The dimensions of all leads and cables must be adjusted to the power consumption.

The stepped nipples used in the housing must only be opened so far that the protection against water and foreign objects penetrating is still compliant with the IP classification after introducing the leads and cables.

And damaged stepped nipples must immediately be replaced by undamaged nipples.

4.2.1 Connecting the supply voltage and the drive motor

When connecting the motors, follow the wiring diagrams as supplied by the motor manufacturer.

The HMD230 has been designed for 230V_{AC} single-phase input voltage: it generates a rotary field of 3 x 230V_{AC}.

Connect the motor drive as shown in the illustrations below:



Illustration 5: Electrical connection

Make sure that the earth lead and the motor connection cable shield are connected correctly. While commissioning, check the direction of rotation of the motor, so that the gate will move in the required direction when the OPEN key is pressed. If necessary, switch connections V and W or change the direction of rotation by means of the configuration in the menu.

4.2.2 Instructions for EMC installation



Attention: If the installation does not comply with EMC requirements, other equipment in the direct vicinity of the motor drive may be disturbed.

The HMD230 is a motor drive which includes a frequency converter. The switching technology inherent in frequency converters may lead to disturbances in their direct vicinity.

A shielded cable must always be used for the motor cable. Connect the shield to the motor using an EMC screw connection and connect it in the motor drive using the PE terminal provided for this purpose.

If the system has to comply with the requirements of EN 61000-6-3, the power supply lead and all control leads must have ferrite cores.

4.3 CONNECTING THE INPUTS

The HMD230 has two terminal blocks next to each other for connecting external devices. The left-hand block is intended for outputs, whereas controls or sensors can be connected to the right-hand block.



Illustration 6: Connecting external devices

The inputs of the HMD230 have the following input functions.

IN1	Open
IN2	Stop
In3	Close
In4	Toggle
In5	Freely programmable
In6	Freely programmable
In7	Close in dead man's operation
In8	Open in dead man's operation

After entering a password, the service engineer can connect the following functions to the inputs In5 and In6:

- Part open
- Emergency stop
- Emergency

4.3.1 Power supply for external devices

To supply power to the external sensors and controls, the HMD230 features a 24 V_{DC} power supply with potential separation and voltage stabilisation which can supply a maximum current of 500 mA. The supply voltage is fused with an automatically resetting fuse on the PCB. A separate 24V $\bar{|_|_}$ power supply output is available for the emergency stop and emergency situation functions. The supply voltage of the motor drive is switched on and off in a controlled manner on this power supply output during rest phases. This enables the motor drive to identify the safe operation of the controls on its inputs.

External loads of 230V_{AC} can be connected to a fused power output on the HMD230 PCB (Illustration 1: Complete View; pos. 14 in the illustration).

4.3.2 Connecting the controls

The controls (keys) for the open, close, toggle and part open functions are connected through a make contact. Switches with a static make contact (e.g. timer) are also allowed for the open and part open functions.

Only controls with a break contact are used for the stop, emergency stop and emergency situation functions.



ATTENTION: The power supply to the controls must go through the synchronised 24V $\bar{|_|_}$ output for the **emergency stop** and **emergency situation** functions.

Several break contacts can be switched in series in the form of a stop chain for the stop and emergency stop inputs.

To comply with the special requirements set on dead man's operation, an OPEN key is always configured on input In8 and a CLOSED key on input In7. These settings cannot be changed while programming.

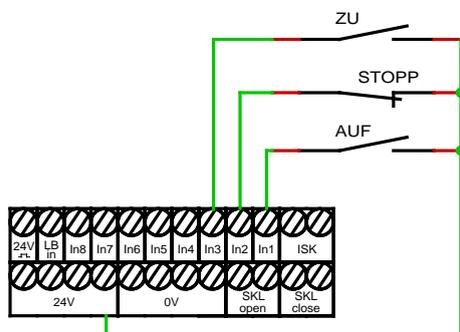


Illustration 7: Electrical connection of controls

4.4 STATIONARY ANTI-CRUSHING SAFETY PROTECTION DEVICES

The stationary anti-crushing safety protection devices can be connected directly to the buses marked "open" and "close" on the PCB, using M8 connectors. If relevant, the anti-crushing safety protection devices can also be connected to the plug-in terminals in the lower right-hand corner of the input terminal block.



Illustration 8: Electrical connection of anti-crushing safety protection devices and ISK



Attention: A single input (SKL open; SKL close) may only be used to connect the M8 connector or the input terminal, but they cannot both be connected to the same input terminal. This would result in a parallel connection of the anti-crushing safety protection device, leading to failures.

4.4.1 Connecting the ISK system

The ASO ISK system has already been integrated with the HMD230. A stationary SPK55 core can be connected to the lower of three 3-pole M8 buses. If relevant, the core can also be connected to the plug-in terminal in the upper right-hand corner of the input terminal block.



Attention: Connecting the M8 connector and the input terminal to one and the same input at the same time is not allowed here either. This would result in a parallel connection of the anti-crushing safety protection device, leading to failures.

4.4.2 Connecting a photocell

Both one-way and reflective photocells of a 24V operating voltage can be connected to the HMD230.

One-way photocell:

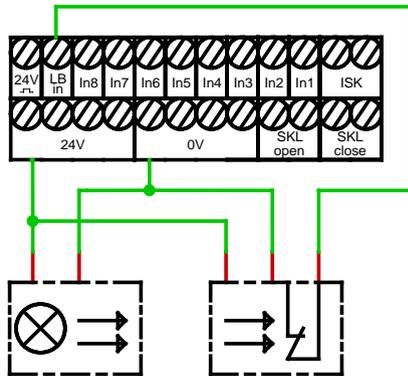


Illustration 9: Electrical connection of a one-way photocell

Reflective photocell:

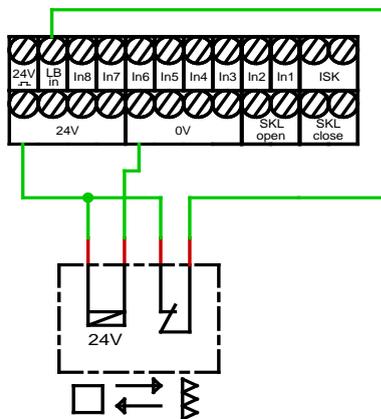


Illustration 10: Electrical connection of a reflective photocell

4.4.3 Wiring diagram for the inputs on the terminal block

By default, the following sensors and controls have been installed on the gate:

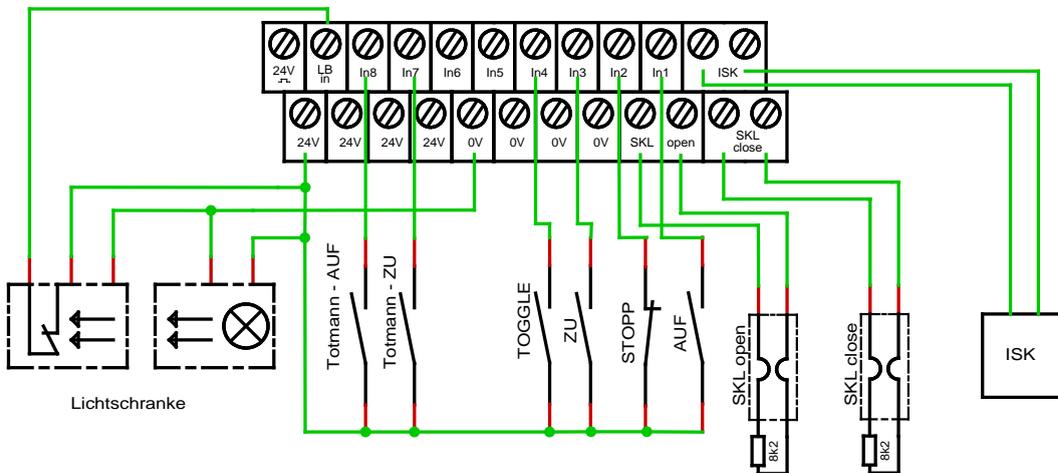


Illustration 11: Installation of inputs incl. photocell

4.4.4 Incremental encoder

An incremental encoder is connected to the HMD230 to determine the gate's movement direction, speed and end positions. This incremental encoder has been installed in the motor and supplies two square-wave signals in opposite directions which the program uses to derive the necessary information. The type of incremental encoder applied is determined by the manufacturer. Incremental encoders that have not been approved for use must not be connected. The incremental encoder is connected to the lower 4-pole M8 bus to the right of the display (Illustration 1: Complete View: pos. 4 in the illustration).

The 4-pole M8 bus is configured as follows:

Connection	SIGNAL	Wire colour
Pin 1	TSIG2	white
Pin 2	+5V	black
Pin 3	TSIG1	blue
Pin 4	GND	brown

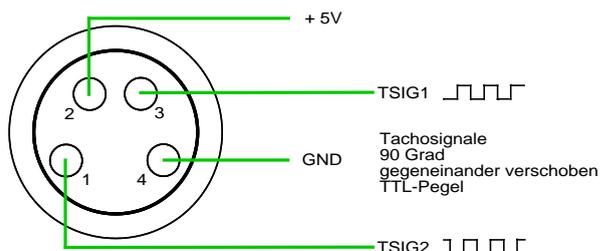


Illustration 12: Electrical connection of incremental encoder



Attention: If the gate is disengaged from the motor drive and moved to another position by hand, the closed position of the gate **must** be redefined in the program before using the motor drive again.

4.5 RELAY OUTPUT CONNECTIONS

The HMD230 has five relays available for signalling and lighting purposes (see illustration 6). Relays Rel1 to Rel3 are make contacts, the other two relays (Rel4, Rel5) are make-and-break contacts. The switch contacts are potential free and are capable of ohmic loads of up to 250 W.

A fused 230V output is available to connect AC loads to the power supply of the HMD230 (Illustration 1: Complete view: pos. 14 in the illustration). The wiring from this output to the relevant relay must be installed by a professional.

The following functions have already been set on the relays:

Rel1	Flashing light
Rel2	Gate OPEN status display
Rel3	Gate CLOSED status display
Rel4	Freely programmable
Rel5	Freely programmable

The output of Rel1 is switched on at the start of the warning time and permanently during the movement. The flashing function must be performed by the connected lamp.

The service engineer can assign one of the following functions to the relays Rel4 and Rel5:

- Lighting (yard lighting) with deactivation relay after a gate movement has ended
- Traffic light function red/green
- Maintenance signal (maintenance necessary)
- Extra electrical heating in case of frost



Attention: When assigning functions to individual relays make sure not to configure any outputs twice.

4.5.1 Relay output with 24 V_{DC}

24V indicator lamps can be connected as follows:

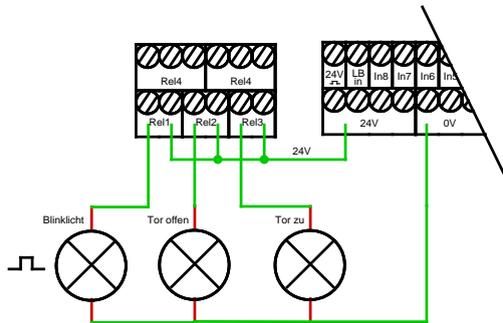


Illustration 13: Electrical connection of 24 VDC relay



Attention: Take the motor drive's maximum current load capacity of 500 mA into account when connecting the external 24V power supply.

4.5.2 Relay output with 230 V_{DC}

The HMD230 PCB features a 230V output which is fused by a glass fuse (6.3A slow-acting). 230V loads can also be switched with this power supply output and the relays. A relevant indicator lamp or flashing light can be connected as follows:

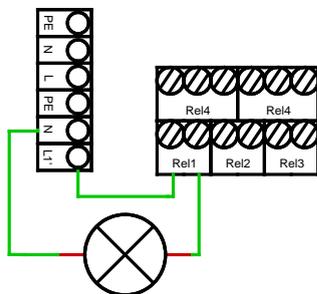


Illustration 14: Electrical connection of 230V relay



Attention: When connecting, take the maximum current load capacity of the power supply output into account. Furthermore, every individual relay is restricted to a maximum load of 250 W.

Only replace the fuse (6.3A, slow-acting) by a fuse of the same rating.



Caution: In accordance with the standards, the relay outputs have been separated from the low safety voltage on the motor drive. However, since the individual relay connections do not comply with this condition,

Connecting the relays inside the HMD230 with 230 V_{AC} and is not allowed. Combining 230 V_{AC} and 24 V_{DC} on the relays of the external backplane is.

4.6 CONNECTING THE RADIO-FREQUENCY RECEIVER

The HMD230 can optionally be fitted with a radio-frequency receiver for hand transmitters. The radio-frequency receiver works with 868 MHz and FM modulation. The radio-frequency receiver is factory-fitted to the right of the slot for the communication interface on the bus terminal strip.



The receiver can also be retrofitted or replaced. This receiver can also be combined with an external antenna to be connected to the plug-in terminal directly under the module.

The internal core of the coax cable of the antenna is connected to the right-hand terminal, near the housing side. The antenna shield is connected to the left-hand terminal.

Illustration 15: Electrical connection of radio-frequency receiver module



Information: Only hand transmitters whose use has been approved by the manufacture can be 'taught' (programmed automatically) to the motor drive.

5 CONTROL UNIT AND DISPLAY READINGS

Information is inputted in the integrated software of the HMD230 by means of a modern control unit that consists of one switch/button: the twist and selector switch. Visual feedback from the program to the operator is provided through the LCD screen and the 7-segment LED display.

5.1 TWIST AND SELECTOR SWITCH

The twist and selector switch, located under the battery for the clock, enables the information displayed by the HMD230 to be influenced. This twist and selector switch can also be used to control the manual programming of the motor drive using the integrated menu system.



Illustration 16: Twist and selector switch

5.2 LCD SCREEN

A loose LCD screen with two lines of 16 characters each has been provided to display more motor drive control information. This shows the active operating mode of the motor drive or the movement status of the motor in legible text.

The background of the display is lit for as long as input is entered into it. 20 seconds after the last entry is made, the light is switched off. It can be switched on again at any moment by turning the selector switch.

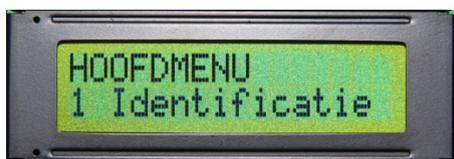


Illustration 17: Information on the LCD screen



Information: After resetting or after switching on the power, the display light will blink for a few seconds. This indicates that the processor is booting; it is not a fault condition.

When the gate, prior to a reset, is in the Open position or Partially open position and "automatically close" is programmed, the following is shown on the display:
 "Auto.Close ON"
 "-----"

This indicates that the automatic timer must be restarted by pressing a key. Without this command, the drive will not run automatically after it has been turned on (reset).

5.2.1 Display of operating modes

The following options are available as regards displaying operating modes on the LCD screen:

Display reading	Meaning
HMD230 Pe: x.xx	Start indication of the periphery controller (wait for information from the motor controller)
Init/ClearEEPROM WAIT: 120 sec.	Clear and initialize the parameter memory
Load Parameter	Request to load/save parameters
Heras HMD230 Automatic mode	Automatic operating mode, the gate is now in the idle position
Automatic mode Open	Automatic mode; gate opening active
Automatic mode Close	Automatic mode; gate closing active
Automatic mode Stop immediately	Automatic mode; STOP active
Automatic mode Close: xx	Automatic mode; the gate closes automatically after XX seconds
Heras HMD230 Dead man's operation	Idle position for dead man's operation
Dead man's operation Open	Open gate in dead man's operation mode active
Dead man's operation Close	Close gate in dead man's operation mode active
Dead man's operation Stop immediately	Dead man's operation STOP active
Heras HMD230 Emergency operation	Idle position for emergency operation
Emergency operation Open	Emergency operation; gate opening active
Emergency operation Close	Emergency operation; gate closing active
Emergency operation Stop immediately	Emergency operation; STOP active

5.2.2 Date and time display

You can permanently display the current time on the screen of the operating mode display by briefly pressing the twist and selector switch once. The clock date is shown in the top line, using the "year.month.day" format. The lower line shows the time in the 24-hour "hours:minutes:seconds" format. The selected operating mode is shown again 20 seconds after operating the twist switch.



Illustration 18: Date and time display

5.2.3 LCD sensor display

The display also provides detailed information on the sensors that have been configured. Pressing the twist and selector switch again displays the current state of the sensors that have been set. Turning the switch displays the individual sensors one by one. The sensor from the parameter list is always listed in the first line. The second line shows the current sensor state. Here a "1" stands for an active sensor and a "0" for an inactive sensor. This information is constantly updated to facilitate trouble-shooting. Again, the operating mode is shown again 20 seconds after operating the twist switch.

Display reading	Meaning
No sensors set	Is shown if no sensors have been programmed
Sensors Begin	Turn the selector switch in a counter-clockwise direction to access the first entry in the sensor table
Pulse generator value: xxxxxxxxxx	Current value of the incremental encoder
Stat.prot. OPEN Value: 1 => x	Stationary anti-crushing safety protection device for the OPEN direction of the gate
Stat.prot. CLOSE Value: 1 => x	Stationary anti-crushing safety protection device for the CLOSING direction of the gate
Mov.prot. OPEN Value: 1 => x	Moving anti-crushing safety protection device for the OPEN direction (ISK)
Mov.prot. CLOSED Value: 1 => x	Moving anti-crushing safety protection device for the CLOSING direction (ISK)
Vehicle prot. Value: 1 => x	Photocell status
Loop detector A Value: 0 => x	Status of traffic loop A
Loop detector B Value: 0 => x	Status of traffic loop B
Sensors End	Turn the selector switch in a clockwise direction to access the last entry in the sensor table

5.2.4 Selecting the menu system

The HMD230 menu system is accessed by pressing the twist and selector switch for approx. 2 seconds while the operating mode is displayed. The display then shows the text "Main menu".



Illustration 19: Display of main menu on the LCD screen

Turn the selector switch to select the individual menu options and then press the switch to activate the selected option. The first menu option in a menu level always brings you back one level. The "Exit main menu" option in the main menu closes the menu display and restarts the control software.

5.3 7-SEGMENT LED DISPLAYS

The basic PCB of the HMD230 has two 7-segment LED displays next to each other. They are used to display the operating mode or the state of the connected sensors.

You can switch between the operating mode and sensor display modes by briefly pressing the twist and selector switch.

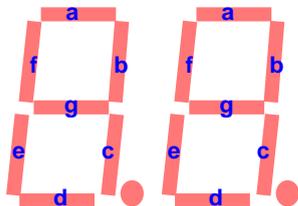


Illustration 20: Layout and meanings of 7-segment LED displays

5.3.1 Displaying operating modes with 7-segment LED displays

The following options are possible in the operating mode display:

Display reading	Meaning
.-.	Start indication of the peripheral controller (wait for synchronisation between the controllers)
oo	Clear and initialize the parameter memory
Ld	Request to load/save parameters
Au	Idle position in automatic mode
dE	Idle position for dead man's operation
Ey	Idle position for emergency operation
OP	Gate opening active
CL	Gate closing active
pc.	STOP active
99 - 1	Seconds - count down when an automatic closing movement is active

5.3.2 LED sensor display

The individual LED segments display the possibly connected anti-crushing safety protection devices and photocells in sensor display mode (briefly press the twist and selector switch). The allocation of the segments to the connected input sensors is shown in the list below:

Left-hand display

- Segment a: PHOTOCELL
- Segment f: SKL for "Closing" direction
- Segment e: ISK for "Closing" direction

Right-hand display

- Segment a: PHOTOCELL
- Segment b: SKL for "Opening" direction
- Segment c: ISK for "Opening" direction

The relevant segment lights up if the sensor input that has been assigned to it is not active. The relevant segment is switched off when the sensor is activated.

The following is displayed if all sensors are connected and have not been activated:



5.4 MENU DISPLAY INSTRUCTIONS

The menu system of the HMD230 can only be called up if the display has been fitted. You can use the twist and selector switch to select submenus. This offers the following possibilities:

Menu:

1. Identification:

- | | |
|-------------------------|---------------------------------------|
| ▪ Master version: | Motor drive software version |
| ▪ Gate profile: | Motor drive version |
| ▪ Serial number | Serial number of motor drive |
| ▪ Motor controller: | Motor controller software version |
| ▪ Periphery controller: | Periphery controller software version |
| ▪ Parameter Set | Software version parameter set |
| ▪ Bootloader Mot | Software version Bootloader motor |
| ▪ Bootloader Per | Software version Bootloader periphery |

2. Service:

- | | |
|-----------------------------------|---|
| • Password entry: | Access (password) for authorised people and activating extra functions. |
| • Language: | Language settings |
| • Direction of rotation of motor: | Anti-clockwise/clockwise |
| • Calendar selection: | Activate week/year calendar |
| • Emergency current parameters: | Setting for emergency current |

3. Diagnostics:

- | | |
|------------------|--|
| ▪ Gate status: | Motor drive condition, as well as maintenance information (errors / input and output states / temperature / gate cycles / movement times, etc.). |
| ▪ Sensor status: | Status of connected sensors |
| ▪ System logbook | Logbook of all occurrences |
| ▪ Event logbook | Logbook of events |
| ▪ Measured Temp | Temperature of CPU & Frequency controller |

4. Settings:

- | | |
|-----------------------|---|
| ▪ Timer settings: | Time settings for automatic closing and light timer. |
| ▪ End positions: | Setting the end position of the gate (incremental encoder). |
| ▪ Assign input: | Activation for flashing light, yard lighting, gate status display, extra electrical brake, maintenance designation. |
| ▪ Protection devices: | Activating vehicle protection device |
| ▪ Special parameters: | Setting parameters for service intervals and heating output |
| ▪ Operating mode: | Setting the type of operating mode |
| ▪ Parameter backup: | Saving and restoring settings (e.g. factory settings) |

5. Clock/Calendar:

Date/Time and calendar functions.

6. RF remote control:

Settings for the remote control

7. Traffic light:

Traffic light control functions

5.5 MENU STRUCTURE AND TEXTS THAT ARE DISPLAYED

Selecting the menu brings you to the main menu level where you can choose from a number of submenus. The first menu option "Exit" lets you exit the menu system after which a restart or reset brings you back in the active operating mode of the motor drive. How many submenu levels are available depends on the password that is entered. First-level submenus can lead to second-level submenus.

Menu	Mainmenu	Menu level 1	Menu level 2
------	----------	--------------	--------------

Quit Menu

1 Identification	
	<ul style="list-style-type: none"> Menu back 1 Master Version 2 Gate type 3 Serialnumber 4 Motor Controller 5 Peri. Controller 6 Parameter Set 7 Bootloader Mot 8 Bootloader Per

2 Service Menu		
	<ul style="list-style-type: none"> Menu back 1 Password Input 2 Language 	
		<ul style="list-style-type: none"> Menu back 1 Dutch 2 English 3 French
	<ul style="list-style-type: none"> 3 Mot. Rotations 4 Calendar Choice 5 Emergency Para 	

3 Diagnosis		
	<ul style="list-style-type: none"> Menu back 1 Gate State 	
		<ul style="list-style-type: none"> Menu back 1 Gate Situation 2 Input: 876543 3 Output: 54321 4 Completed Cycles 5 Motor runtime 6 Last Service

	7 RESET Service
2 Sensor state	Start of sensors LimitSwitch OPEN LimitSwitch. DICHT Part Open Switch Incr. Encoder Stat. Edge OPEN Stat. Edge DICHT Mov. Edge OPEN Mov. Edge DICHT Lightbarriert Loopdetector A Loopdetector B End of sensors
3 System Logbook	
4 Event Logbook	
5 Measured Temp.	Menu back 1 CPU Temperature 2 FR Temperature 3 Reset Min./Max.

4 Instellingen	
Menu back	
1 Set Timer	Menu back 1 Lighting (s) 2 TMR keep open 3 TMR keep part op 4 TMR Autom. Close 5 Secondary Time 6 Light Output 7 Flashlight Premon
2 Gatelimits	Menu back 1 Set Close Limit 2 Set Part Open 3 Set Open Limit 4 RESET Positions
3 Assign Inputs	Menu back 1 Partial Open 2 Emergency stop 3 EMERGENCY (CIE)

4 Safeties	Menu back
	1 Lightbarrier
5 Spec.Parameter	Menu back
	1 Cycles To Servi
	2 RuntimeToService
	3 Serv.Interv. M
	4 Service Output
	5 Heater Output
6 Operation Mode	Menu back
	1 Hold to run Mo
	2 Automatic Mode
7 Param. Backup	Menu back
	1 Restore
	2 Save
	3 Writ Card

5 Clock/Calendar	Menu back
	1 Display Clock
	2 Set Date/Time
	Menu back
	Year
	Month
	Day
	Hour
	Minute
	Second
	Daylight Saving
	Now daylight?
	3 Cal. Activation*
	4 Disp.Week Cal.*
	5 Edit Week Cal.*
	Menu back
	1 Set weekdays*
	2 Delete Week*
	6 Disp.Year Cal.*
	7 Edit Year Cal.*
	Menu back
	1 Set day*
	2 Del. Year Cal.*

6	RF Remote CTRL.	
		Menu back
		1 Active Transmi
		2 Prog. transmi
		3 Prog.Key OPEN
		4 Prog.Key CLOSE
		5 Prog.Part.OPEN
		6 Prog.Key TOGG
		7 Delete Transmi
		8 Delete PlaceNo
		9 Delete All

7	Traffic Light	
		Menu back
		1 Outp.TrafficLi

Legend:

light green:	visible for user and technician
dark green:	visible + adjustable for user and technician
light blue:	visible (with password) for technician
dark blue:	visible + adjustable (with password) for technician

* only visible if "Calendar Choice" is activated

6 Parameter settings

6.1 GENERAL PROGRAMMING INSTRUCTIONS

Many control functions of the HMD230 are achieved through parameters that are stored in the device and that can be changed. These parameters are loaded into the motor drive during the manufacturing process and they provide the specific behaviour of a defined gate. The user or installer of the gate motor drive can access many of these parameters via the menu system.

6.1.1 Navigating the menu

How to select menu options and how to navigate for entering the password are demonstrated here, starting from the operating modes display. The display initially shows "Automatic mode" and after the twist and selector switch is pressed for two seconds and released again the menu display changes. The following will then be displayed:

Main menu 1 Identification

Turning the selector one position further in a clockwise direction displays the following information:

Main menu 2 Service Menu

Press the selector switch to activate this menu option and go down one level in the service menu:

Service Menu 1 Enter passw.

Press the switch to activate this menu option and to access the field where you can enter the password:

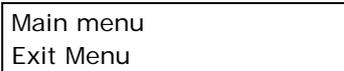
Enter passw. Value: 33333

Turn the switch to change the preset value shown. The faster you turn, the faster the values will change. Press the switch to store the value that you have set and to display the previous menu option again:

Service Menu 1 Enter passw.

If the password has been entered correctly, you can immediately select the password-protected menu options and entry possibilities. The password will be valid for 10 minutes and will then be reset automatically to the value 33333 if no further entry is made.

By pressing and holding the selector switches for two seconds, you can immediately select the main menu option "Exit main menu":



When this menu option is selected, the motor drive will restart the program (reset) and the active operating mode will be switched on again (here: "Automatic mode").

6.2 INSTALLING THE GATE AND MAKING SETTINGS

Before commissioning the HMD230 and making the gate settings, several things have to be installed and set first.

6.2.1 Installing the dead man's keys

You cannot put a gate into operation until at least one OPEN and one CLOSED key have been connected for dead man's operation. Since you cannot set the end positions without these keys, you have to perform the following actions in the sequence described below.

- Switch off the power supply to the motor drive.
- Connect the keys to the 24V power supply.
- Connect the key for OPEN [dead man's key] to input terminal In8 (make contact).
- Connect the key for CLOSED [dead man's key] to input terminal In7 (make contact).
- Switch on the power supply of the motor drive.
- Check that the keys work.

6.2.2 Changing the direction of rotation of the drive

If, when using the motor for the first time, you find that the gate is moving in the wrong direction, you can reverse the direction of rotation of the motor by switching the two phases of the motor connection. However, you can also change the direction of rotation by changing a software setting. Proceed as follows to make the relevant change:

- Menu: "Service Menu", "Enter passw.": enter the password.
- Menu: "Service Menu", "Motor dir.of rot.": change the value to "1".
- Double-check that the gate moves in the right direction!

6.2.3 Programming stationary anti-crushing safety protection devices (SKL)

The stationary anti-crushing safety protection devices (SKL) are always delivered pre-activated.

- Switch off the power supply to the motor drive.
- Connect the anti-crushing safety protection device(s) for the OPEN direction to the SKL open connection.
- Connect the anti-crushing safety protection device(s) for the CLOSING direction to the SKL close connection.
- Switch on the power supply of the motor drive.
- Check that the safety protection devices have been connected correctly and check the reaction of the gate in the relevant movement direction in automatic mode!

6.2.4 Programming the moving anti-crushing safety protection devices (ISK)

The moving anti-crushing safety protection devices, connected via the ISK, are always delivered pre-activated.

- Switch off the power supply to the motor drive.
- Connect the ISK system to the ISK connection.
- Switch on the power supply of the motor drive.
- Check that the safety protection devices have been connected correctly and check the reaction of the gate in the relevant movement direction in automatic mode.

6.2.5 'Teaching' the end positions of the gate

The motors of the Heras drive have an incremental encoder module. No further limit switches are required on the gate. When installing and setting the gate and the drive, the end positions of the gate are laid down as follows:

- Switch off the power supply to the motor drive.
- Connect the incremental encoder to the 4-pole bus.
- Connect the OPEN key [dead man's key] to input terminal In8 (make contact).
- Connect the CLOSE key [dead man's key] to input terminal In7 (make contact).
- Switch on the power supply of the motor drive.
- Menu: "Service Menu", "Enter passw.": enter the password.
- Move the gate into the CLOSED position.
- Press "Settings", "End positions", "Set CLOSED pos.". The motor drive performs a reset.
- Use the dead man's keys to move the gate to its part open position.
- Press "Settings", "End positions", "Set part OPEN". The motor drive performs a reset.
- Use the dead man's keys to move the gate to its open position.
- Press "Settings", "End positions", "Set OPEN pos.". The motor drive performs a reset.
- Press the CLOSED button. The motor drive determines the maximum motor running time and saves it.

A reference run is now performed to lay down the maximum motor running times for moving from one end position to the other end position. The reference run consists of the gate moving automatically all the way from the OPEN position to the CLOSED position at low speed once. The motor drive measures the time that elapses during this reference run and save this time to its memory. The motor drive is ready for use now.

- Check that both end positions are reached and that the motor stops when these end positions have been reached.
- If values have been 'taught' incorrectly, all values can be cleared at once by selecting "Settings", "End positions", "RESET pos.". The total teaching procedure has to be repeated then.



Attention: Teaching the end positions must **always** start by teaching the CLOSED position. Other entry sequences will not be accepted.



Attention: If the gate has been disconnected from the motor drive control system and has been moved by hand, the gate position will no longer be defined in the software. You must then manually move the gate to its CLOSED position and set the position again.

Attention: If there is a power failure while the gate is being moved, it may no longer be possible to save the gate position. This is indicated by the fact that the gate can no longer be moved in automatic mode. You must then also manually move the gate to its CLOSED position and set the position again.

Procedure:

- Move the gate into the CLOSED position.
- Press "Settings", "End positions", "Set CLOSED pos.". The motor drive performs a reset.
- Check that both end positions are reached and that the motor stops when these end positions have been reached.

Alternatively:

Press the "OPEN" and "CLOSE" buttons on the backplane simultaneously for more than 8 seconds. The current position of the gate is now the (new) CLOSED position.

6.3 FURTHER OPERATING PARAMETERS

The settings from chapter 6.2 ensure that the gate can be used safely. Many more installations and motor drive configurations are possible. All configurations and display options that are only accessible to trained engineers are password-protected.

6.3.1 Setting the language

After entering the password, the engineer can change the menu interface language. Three different languages can be chosen.

- Menu: "Service Menu", "Enter passw.": enter the password.
- Menu: "Service Menu", "Language": select the language.
- The display uses the new selected language as soon as a new language has been selected.

6.3.2 Changing the operating mode: Dead man's operation / Automatic mode

The technician can deliberately switch the motor drive, which as a rule works in automatic mode, to dead man's operation so that the gate can only be driven at a low speed, using the connected dead man's keys. All safety facilities are deactivated then.

- Menu: "Service Menu", "Enter passw.": enter the password.
- Menu: "Settings", "Operating mode": select the operating mode.
- Check the operation.

6.3.3 OPEN, CLOSE and STOP controls

OPEN, CLOSE and STOP keys can be connected to drive the gate by hand. The inputs referred to below have already been factory-configured for the relevant functions and do not require any further settings to be made.

Proceed as follows to connect the keys:

- Switch off the power supply to the motor drive.
- Connect the keys to the 24V power supply.
- Connect the OPEN key to input terminal In1 (make contact).
- Connect the STOP key to input terminal In2 (break contact).
- Connect the CLOSE key to input terminal In3 (make contact).
- Switch on the power supply of the motor drive.
- Check that the keys work.

6.3.4 Toggle impulse key

How to connect a key to input "In4" and configure it is described below. Whenever this key is pressed, an impulse is generated for the toggle functions OPEN, STOP, CLOSE, STOP. Here, the input "In4" has already been factory-configured for the relevant function.

- Switch off the power supply to the motor drive.
- Connect the key to the 24V power supply.
- Connect the key for the toggle impulse to input terminal In4 (make contact).
- Switch on the power supply of the motor drive.
- Check that the key works.

6.3.5 Installing/Setting a part open function

To set a part open function, a pushbutton or switch contact (make contact) is connected to inputs In5 or In6. In this example we describe the installation and setting procedures for In5.

- Switch off the power supply to the motor drive.
- Connect the key/switch to the 24V power supply.
- Connect the key/switch to input In5.
- Switch on the power supply of the motor drive.
- Menu: "Service Menu", "Enter passw.": enter the password.
- Menu: "Settings", "Assign input", "Part open": set to "In5".
- Exit the menu.
- Move the gate into the part open position.
- Press "Settings", "End positions", "Set part OPEN". The motor drive performs a reset.
- Check that the part open function of the gate works.

6.3.6 Installing/Setting an emergency stop input

An emergency stop input can be connected to the HMD230. The stop contact or stop circuit must be a break contact. Examples of items that have to be connected like this are emergency stop switches and motor protection contacts. The function can be activated on inputs In5 or In6.

As the software permanently monitors the functioning of the emergency stop input, power can only be supplied via the "24V $\bar{|_|\bar{}}$ " test output. If a failure is detected, the motor drive cannot be operated anymore. The display then shows a corresponding error text. The motor drive performs a restart (reset) as soon as the emergency stop input is active again.

- Switch off the power supply to the motor drive.
- Connect the power supply of the make contact to the 24V $\bar{|_|\bar{}}$ test output.
- Connect the make contact to input In6.
- Switch on the power supply of the motor drive.
- Menu: "Service Menu", "Enter passw.": enter the password.
- Menu: "Settings", "Assign input", "Emergency stop": set to "In6".
- Exit the menu.
- Check the functioning of the emergency stop.

6.3.7 Setting a photocell

The photocell input is only active when the gate is moving in its CLOSING direction. If the photocell is interrupted, the gate will move to its OPEN end position.

Photocell with make contact

The photocell is always factory-set with a make contact. This is connected as follows:

- Switch off the power supply to the motor drive.
- Connect the power supply of the photocell to +24 V and 0 V.
- Connect the photocell signal to the input terminal LB_{in} (break contact).
- Switch on the power supply of the motor drive.
- Check the photocell functioning while moving the gate in its CLOSING direction.

If no photocell has been installed, this function can be deactivated:

- Menu: "Service Menu", "Enter passw.": enter the password.
- Menu: "Settings", "Safety devices", "Vehicle prot.": set to "0".

Photocell with make contact

If only one photocell with a make contact is available, it can be used with the following parameters.

- Switch off the power supply to the motor drive.
- Connect the power supply of the photocell to +24 V and 0 V.
- Connect the photocell signal to the input terminal LB_{in} (make contact).
- Switch on the power supply of the motor drive.
- Menu: "Service Menu", "Enter passw.": enter the password.
- Menu: "Settings", "Safety devices", "Vehicle prot.": set to "3".
- Exit the menu.
- Check the photocell functioning while moving the gate in its CLOSING direction.

6.3.8 Connecting a flashing light

The output of relay 'Rel1' is factory-set for flashing light operation.

An automatic 24V flashing light is connected to relay 'Rel1' as follows.

- Switch off the power supply to the motor drive.
- Connect the 24V power supply to output relay 'Rel1'.
- Connect the flashing light to the output relay 'Rel1' and to GND.
- Switch on the power supply of the motor drive.

The flashing light is switched on by the HMD230 as soon as a movement command is detected. The motor is driven three seconds after this. This warning time can be activated or deactivated as follows.

- Menu: "Service Menu", "Enter passw.": enter the password.
- Menu: "Settings", "Set timer", ""Flash l. warn.""
- Value 0: warning time off
- Value 1: warning time on

6.3.9 Setting a lamp (yard lighting)

The HMD230 can drive a lamp, e.g. to automatically light the zone around the gate when the gate is moving. The function can be installed on Rel4 or Rel5. In this example we describe the installation and setting procedures for Rel4.

- Switch off the power supply to the motor drive.
- Connect the lamp to the output relay Rel4.
- Switch on the power supply of the motor drive.
- Menu: "Service Menu", "Enter passw.": enter the password.
- Menu: "Settings", "Set timer", "Light sw. output": set to "Rel4".

- Menu: "Settings", "Set timer", "Lighting (s)": set at the required time (in seconds).

The lamp connected to "Rel4" is now switched on by the motor drive as soon as a movement command is detected. After the motor is switched off, the lamp will continue to be lit for the time as set (1 to 1800 seconds).

This parameter "Lighting (s)" can be changed by the customer without the need to enter a password.

6.3.10 Connecting the status display of a gate

The HMD230 can indicate two different gate statuses and a fault status by means of relays. The output relay "Rel2" is factory-set such that it is closed when the gate has reached its OPEN position. The output relay "Rel3" has been set such that it is closed when the "gate CLOSED" position has been reached.

No further settings are required.

6.3.11 Programming service intervals

To make sure that the gate is maintained at regular intervals, a service interval can be defined. Three different activation possibilities are available for this:

1. Maintenance after a certain number of gate movements
2. Maintenance after a preset number of motor running hours
3. Maintenance after a defined time interval since the last maintenance

Combinations of these three pre-sets are also possible, with the event that occurs the first resulting in the maintenance reminder signal being generated. If the maintenance reminder is active, the display shows the "< MAINTENANCE > necessary" message.

The values for maintenance after a specific motor running time and for the time interval since the last maintenance are not factory-set. This means that by default the motor drive only considers the number of gate movements. This number has been pre-set at 7,000 movements.

You can program maintenance as follows:

- Switch on the power supply of the HMD230.
- Menu: "Service Menu", "Enter passw.": enter the password.
- Menu: "Settings", "Spec. Parameter", "Service after Cyc": set to "zzzzz"
- Menu: "Settings", "Spec. Parameter", "Service after run t.": set to "mmmmm"
- Menu: "Settings", "Spec. Parameter", "Service after Interv. M.": set to "tt"

The entry "zzzzz" defines the number of gate opening and closing cycles. The counter is increased by 1 whenever the "CLOSED" end position is reached. The motor drive will activate the maintenance reminder when the counter has reached the pre-set value of "zzzzz".

The entry "mmmmm" defines a motor running time in hours. When the counter reaches the value of "mmmmm" set for the motor running time, the motor drive will react as described above.

The entry "tt" represents an inspection interval expressed as number of months. When the period of time exceeds the number of months set (i.e. "tt"), the motor drive will react as described above.

The text "< MAINTENANCE > necessary" will continue to be displayed for as long as the maintenance reminder has not been dealt with and/or this has not been confirmed in the motor drive menu.

You can confirm maintenance as follows:

- Menu: "Service Menu", "Enter passw.": enter the password.
- Menu: "Diagnosis", "Gate status", activate "RESET maintenance"

6.3.12 Setting an external heating

The HMD230 features an internal heating device that heats the electronic system and components via the brake resistors of the frequency converter when temperatures are below zero. If very low ambient temperatures are possible, extra external heating can be activated via a relay. The relevant output is set as follows:

- Menu: "Service Menu", "Enter passw.": enter the password.
- Menu: "Settings", "Spec. Parameter", "Heating output": e.g. set to Rel4.

The temperature at which the heating is switched on has been laid down in the system.

6.3.13 Setting the emergency situation function

The emergency situation function enables the gate to be opened or closed (depending on the parameters) remotely by a fire emergency room without jeopardising safety. For this, it is necessary that the loop from the fire emergency room works like a break contact. This loop is always closed when idle; it is controlled by the HMD230.

Set the test loop on one of the inputs In5 or In6 as follows:

- Switch off the power supply to the motor drive.
- Connect the power supply of the fire emergency room loop to the 24V $\bar{|_|_}$ test output.
- Connect the fire emergency room loop to input In6.
- Switch on the power supply of the motor drive.
- Menu: "Service Menu", "Enter passw.": enter the password.
- Menu: "Settings", "Assign input", "EMERGENCY OPERATION (B)": set to "In6".

Emergency opening:

If the loop is opened by the fire emergency room, and provided that permission for opening in emergency situations has been set, the gate will open at low speed. This opening movement can be interrupted by the stop key or the safety facilities; however after the interruption action has ended the gate will continue to open. The gate then stops in its open position and no longer responds to any commands. If the loop to the fire emergency room is closed again, the motor drive will perform a reset and the gate is closed again when the next command is given.

The function is activated in the Service Menu:

- Menu: "Service Menu", "Enter passw.": enter the password.
- Menu: "Service Menu", "Emergency contr. para": set to "1".
- Exit the menu.
- Check the functioning of the emergency situation function.

Emergency closing:

If the loop is opened by the fire emergency room and emergency closing has been set, the gate will close at low speed. This closing movement can be interrupted by the stop key or the safety facilities; however after the interruption action has ended the gate will continue to close. The gate then stops in CLOSED position and no longer responds to any commands. If the loop to the fire emergency room is closed again, the motor drive will perform a reset and the gate is opened again when the next command is given.

The function is activated in the Service Menu:

- Menu: "Service Menu", "Enter passw.": enter the password.
- Menu: "Service Menu", "Emergency contr. para": set to "2".
- Exit the menu.
- Check the functioning of the emergency situation function.

6.3.14 Setting the traffic light

A simple traffic light circuit can be created using make-and-break relays Rel4 or Rel5. The red and green lights are connected to one of the two operating contacts of the make-and-break relay. Always pay attention to the maximum load capacity of the relay.

The traffic light switches to "GREEN" when the gate has reached its OPEN position, the motor has been switched off and the flashing light is not active. The traffic light switches to "RED" when the flashing light is activated (e.g. warning for automatic closing), the motor is switched on, or the gate is not in OPEN position.

The function can be set on one of the output relays Rel4 or Rel5 as follows.

- Switch off the power supply to the motor drive.
- Connect the power supply for the traffic lights to the make-and-break contact of Rel4.
- Connect the red/green traffic lights to the other two contacts of the make-and-break relay Rel4.
- Switch on the power supply of the motor drive.
- Menu: "Service Menu", "Enter passw.": enter the password.
- Menu: "Traffic light", "Traffic light output": set to "Rel4" (for example).
- Exit the menu.
- Check the traffic light operation.

6.4 TIMER-CONTROLLED GATE MOVEMENTS

Certain gate movements can be started automatically by pre-defined timer settings. These timer settings per menu must be displayed here.

6.4.1 Setting automatic closing (open dwell time)

The motor drive can close the gate automatically after a time as set (1 to 999 seconds) has elapsed after the OPEN end position was reached. This function is active only in automatic mode and after the OPEN end position has been reached.

- Menu: "Settings", "Set timer", "Keep-open TMR": set to "xxx".

Example: If the "Keep-open TMR" parameter is set at value 5, a 5-second timer is started

when the gate reaches its OPEN end position in automatic mode. This timer causes the gate to be closed automatically again after 5 seconds. If another OPEN command is given or an installed photocell is activated during this time, the timer will start to count down again.

This value can be changed by the customer without the need to enter a password.

6.4.2 Time to close from Part OPEN position

The motor drive can close the gate automatically after a set time (1 to 255 seconds) has elapsed after the Part OPEN position was reached. This function is active only in automatic mode and after the Part OPEN position has been reached.

- Menu: "Settings", "Set timer", "Keep-Part OPEN TMR": set to "xxx".

Example: If the "Keep Part OPEN TMR" parameter is set at value 5, a 5-second timer is started when the gate reaches its Part OPEN position in automatic mode. This timer causes the gate to be closed automatically again after 5 seconds. If another Part OPEN command is given or there is a static Part OPEN command during this time, the timer will start to count down again.

This value can be changed by the customer without the need to enter a password.

6.4.3 Time to close the gate from interim positions

If the gate always has to close again automatically by itself (automatic closing movement) after a set time (1 - 255 seconds), this must be set via the "TMR Auto Close" parameter. This function is only active in automatic mode and concerns all gate positions except the OPEN end position and the Part OPEN position.

- Menu: "Service Menu", "Enter passw.": enter the password.
- Menu: "Settings", "Set timer", "Auto Close TMR": set to "xxx".

Example: If the time is pre-set at 20, a 20-second timer is started as soon as the motor stops in automatic mode (other than by the STOP key being pressed) and the gate is not in the CLOSED end position. This timer causes the gate to be closed automatically again after 20 seconds.

6.4.4 Setting a short closing time

If a photocell is used you can set a shorter open dwell time after the photocell has been interrupted.

- Menu: "Service Menu", "Enter passw.": enter the password.
- Menu: "Settings", "Set timer", "Secondary time": set to "xxx".

Example: If the time is pre-set at 5, a 5-second timer is started as soon as the photocell is interrupted (signal active and inactive again) in automatic mode. This timer causes the gate to be closed automatically again after 5 seconds.

6.4.5 Activating warning time and flashing light

The output of relay 'Rel1' is factory-set for flashing light operation. The flashing light is switched on by the motor drive as soon as a movement command is detected. The motor is driven three seconds after this. This warning time can be activated or deactivated as follows.

- Menu: "Service Menu", "Enter passw.": enter the password.
- Menu: "Settings", "Set timer", "'Flash l. warn.'": Value 0: warning time off; Value 1: warning time on.

6.5 SAVING PARAMETERS TO THE MEMORY

The operating parameters can also be saved in a special section of the memory. A copy of the current parameter settings is then made and these settings as saved can be restored later, overwriting the, then, current parameters.

6.5.1 Saving the parameter settings

You can make a backup copy of the current operating parameter settings of the motor drive and save this to a separate part of the memory. If the parameter settings are changed later and found not to be OK, you can restore the previously saved parameter settings so that the parameters are correct again.

- Menu: "Service Menu", "Enter passw.": enter the password.
- Menu: "Settings", "Param Backup", activate "Save new".

6.5.2 Restoring parameter settings

You can reactivate the backup copy of the motor drive operating parameter settings that has been saved in a separate part of the memory to use these settings again as the current operating parameters. This enables the saved (operational) parameters to be restored after a faulty configuration of the HMD230.

- Menu: "Service Menu", "Enter passw.": enter the password.
- Menu: "Settings", "Param Backup", activate "Restore".
- When copying has ended, the software will automatically restart the master drive with the restored parameters.

6.6 SAVING PARAMETERS TO CHIPCARD

A chipcard reader interface can be connected to the communication slot of the motor drive. This card reader enables standard I2C chipcards to be read and to be written to. 32 and 64-kByte memory cards are supported.

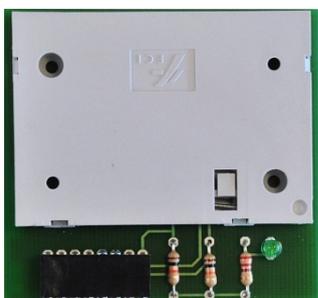


Illustration 21: Chipcard reader

6.6.1 Saving the parameter settings to card

The communication with the chipcard reader interface to write the parameter settings from the HMD230 to a card only works in combination with the installed LCD screen.

The parameters are written to the card as follows:

- Menu: "Service Menu", "Enter passw.": enter the password.
- Menu: "Settings", "Param Backup", activate "Write card".
- The text "copy CTRL->Card." is displayed; when the procedure has ended, the message "Card writing ready" is displayed.
- You can now remove the card to which data has been written and which has been checked from the card reader.



Attention! : If a chipcard reader is not connected or if errors occur during copying the following message is displayed: "Card Comm. ERROR". If such an error occurs while writing to the memory on the chipcard, the data on the card in question must not be used anymore. You can either write the data to the card again, or format the card on another writing/reading device or destroy the card.

6.6.2 Reading the parameter values from the card

The contents of chipcards can only be copied to the motor drive if a correctly written chipcard is recognised in the chipcard reader interface when switching on the motor drive (restart and/or reset).

- Switch on the power supply to the motor drive while a chipcard is inserted.
- Indication: "I2C SmartCard".
- Turn the selector switch in a clockwise direction; you will now see the message: "copy Card->CTRL"
- Press the selector switch to start copying: "copy"
- When copying is finished the following message is displayed: "copy DONE".
- Removing the card from the reader restarts the motor drive with the newly loaded parameters.



Note!: Errors that occur during copying are reported by means of "Card Comm. ERROR".

You can try to read the chipcard again by turning the selector switch and pressing it. If this does not work, all parameters will be erased by the software when the chipcard is removed. The HMD230 shows "Init/Clear EEPROM" and then "Load Parameter". The contents of a card have to be read then again. **The motor drive does not work without correct parameters.**

6.7 SUPPORT DURING DIAGNOSIS

The HMD230 has a diagnostics menu that makes putting the motor drive into use and troubleshooting easier.

6.7.1 Version display

The motor drive version can be displayed as follows:

- Menu: "Identification", "Master Version": the figures and the combination of numbers shown clearly identifies the software version used.
- Menu: "Identification", "Gate profile": the text shown is the designation of the gate for which the master drive, the software and the parameters stored have been defined.

The following version parameters are visible after entering the right password:

- Version of the motor controller program.
- Version van het periphery controller program.
- Version of the parameter table loaded.
- Version of the boot loader of the motor controller.
- Version of the boot loader of the periphery controller.

6.7.2 Movement commands at start-up

The HMD230 tests the configured inputs when it is started after a program reset or after switching on the power supply. Make contacts that have statically energized to GND, make contacts that have statically energized to 24V, and emergency stop and emergency situation inputs that are not tested cause the master drive to not start up. The display shows the input pattern as identified for approx. 5 seconds after which the master drive program initiates a restart.

OPEN/CLOSE-StartActive
Value: 00001010

E.g. the input "In4" with the toggle function was active during starting for the message shown.



Information: This function is suppressed on inputs with the functions "Part Open" and "Open" since these inputs may also receive static signals (e.g. external timer) when the unit is started.

6.7.3 Gate status

The Gate status menu summarises all information that represents the current condition of the motor drive in combination with the gate. The menu can be reached via "Diagnosis", "Gate status" and has the following options:

Menu	Display reading	Meaning
Gate Status	OPEN/CLOSED / PART OPEN / KEEP	The current status of the gate which has been recognised by the software is shown.
Input: 87654321	Value: 00000010	The logical values on the input terminals of the motor drive are displayed. The sequence matches inputs In8 to In1. An active input is indicated as "1". In the example only input In2 (stop function; break contact) is connected to 24V.

Menu	Display reading	Meaning
Output: 54321	Value: 00010	The status of the output relay is displayed together with the corresponding logical values. An energized relay is indicated as "1". The sequence matches outputs Rel5 to Rel1. The relay Rel2 is energized in the example (status display Gate open).
Cycles Run	217 / 19	The total number of movements and the number of movements since the last maintenance are displayed. One movement is one OPEN-CLOSED cycle.
Mot. Oper. Hours	35 / 3 h	The total motor running time and the run time since the last maintenance are displayed as hours.
Last Service	2011.02.24/1 mo	The date of the last maintenance is displayed, as well as the time that has elapsed which is indicated as months.

To make sure that the gate is maintained at regular intervals, a maintenance interval can be defined depending on the number of gate movements.

If the maintenance reminder is active (number of movement cycles or maintenance interval reached), the display shows the "< Maintenance > necessary" message.

The maintenance reminder can be reset via the menu option "Diagnosis", "Gate status", "RESET maintenance" after entering the right password. This resets the number of movement cycles, the motor operation hours and the number of months since the last maintenance to 0. The current clock date is saved for the last maintenance.

6.7.4 Sensor statuses

The statuses of the sensors can be displayed via "Diagnosis", "Sensor Status". The menu is built up identically to the display in the operating mode, as shown under 5.2.3 LCD sensor display.

6.7.5 Temperatures

The current temperatures and the maximum and minimum temperatures that have occurred can be displayed. This display option can be reached as follows:

- Menu: "Service Menu", "Enter passw.": enter the password.
- Menu: "Diagnosis", "Temp. measured", "CPU temperature" shows the temperatures measured on the master drive PCB. The current temperature as degrees Celsius is shown first. The lowest and finally the highest temperature, separated by a slash, are shown then.
- Menu: "Diagnosis", "Temp. measured", "FC temperature" shows the temperatures measured on the power supply module of the frequency converter. Again, the current, minimum and maximum temperatures are shown.
- Menu: "Diagnosis", "Temp. measured", activate "RESET Min/Max". This sets the minimum and maximum values of the items displayed in question to the current temperature.

6.7.6 Integrated log systems

The motor drive has two different integrated log memories.

Events log:

The events log is a ring memory with a maximum of 30 memory positions. Relevant events of the control software are saved to the events log in the RAM (readily accessible memory) with a reference number and the time stamp. This log allows the latest gate actions and any failures which may have occurred to be traced back accurately in time. The events log is displayed as follows:

- Menu: "Service Menu", "Enter passw.": enter the password.
- Menu: "Diagnosis", activate "event log"

The first line shows the date and time of the entry. The second line first shows a number of a maximum of three positions which matches a reference number in the parameter table. A corresponding text that has also been saved in the parameter table then follows. You can browse through the entries in the events log, which are sorted by time. The first entry in this log is always the reference to the program initialisation due to a restart of the software.

Display reading	Meaning
Events log Start	First memory entry reached
y.mm.dd HH:MM:SS 250 ProgrammInit	Entry in log due to a motor drive reset
Event logbook End	Last memory entry reached

The RAM is re-initialized when this menu is exited (restart) and the data available until such time is lost.

System log:

The system log is also a ring memory, but then with a maximum of 254 memory positions. Contrary to the events log, this data is stored permanently and is also available after a restart or a power failure. The contents of this system log can be compared to that of the events log. Navigating in the system log is similar to navigating in the events log. No function has been provided for deleting specific individual data. The system log can only be recreated by initiating the total parameter memory.

The system log is displayed as follows:

- Menu: "Service Menu", "Enter passw.": enter the password.
- Menu: "Diagnosis", activate "system log"

6.8 REMOTE CONTROL

The motor drive features a slot for a radio-frequency receiver module. An 868 MHz receiver module with FM modulation is used and the constant share of the "Rolling Code" of the

HERAS transmitter used is analysed. A corresponding hand transmitter enables the following functions of the motor drive to be remotely controlled:

- "OPEN function" left-hand top key
- "CLOSE function" right-hand top key
- "STOP function" large bottom key

The keys can also be programmed individually, see "Teaching hand transmitters".

Editing options (like teaching the hand transmitter and deleting) are available via the menu structure of the motor drive. A maximum of 150 hand transmitters can be taught.



Information: Gate movements can only be activated by means of the remote control if the motor drive is working in automatic mode.

An external antenna must be connected to the corresponding connector of the motor drive PCB (see Illustration 1: Complete view; pos. 9 in the illustration).

The internal core of the coax cable of the antenna is connected to the right-hand terminal (near the housing side). The antenna shield is connected to the most inward left-hand terminal.

6.8.1 Displaying the number of hand transmitters

A separate storage location is reserved in the memory of the motor drive for each hand transmitter. The total number of transmitters stored can be displayed by means of the menu option "Active transmitters".

- Menu: "Remote control", activate "Active transmitters".

6.8.2 Teaching hand transmitters

Every hand transmitter which is used must be taught the commands to operate the master drive once. This is done as follows:

- Menu: "RF remote control", activate "Teach transmitter".
- Now press a key on the hand transmitter. Twenty seconds are available for this function.
- After recognizing and saving the transmission code, a numeric value is displayed for 2 seconds. This is the value of the received signal together with the storage position.
"RF# xxxx"
"Pos.: p "
- The display returns to the menu. By activating the menu again, multiple hand transmitters can be programmed.
- After activating the menu, if the program does not recognize a valid code within twenty seconds the display returns to the menu.
- Check the number of transmitters stored by means of the menu option "Active transmitters".
- Exit the menu and check the key functions that have been taught in "Automatic mode".

6.8.3 Teaching hand transmitter buttons

If the functions that are programmed as standard for the hand transmitter OPEN, CLOSE, STOP are inadequate, another four functions can be programmed. The individual buttons can be programmed using the menu below.

<i>3 Prog.But OPEN</i>	Program OPEN function
<i>4 Prog.But CLOSE</i>	Program CLOSE function
<i>5 Prog.Part.OPEN</i>	Program PART OPEN function
<i>6 Prog.But Toggle</i>	Program Toggle function OPEN – STOP – CLOSE - STOP

The programmed function overwrites the pre-programmed function if the hand transmitter has been programmed in advanced. If the hand transmitter has not yet been programmed, then only the programmed function is available.

To restore the original functions, the transmitter must be deleted in the menu "Delete transmitter" or "Delete all" and then be reprogrammed.

6.8.4 Deleting transmitters from the memory

You can delete specific individual hand transmitters from the HMD230 memory. The menu option "Delete transmitter" puts the motor drive in a mode where the next correctly received hand transmitter is deleted from the memory again.

- Menu: "RF remote control", activate "Delete transmitter".
- The first line of the display now reads: "Delete transmitter".
- Now press a key on the hand transmitter to be deleted.
- When the transmission code has been recognized, the menu is displayed again.
- Check the number of transmitters stored by means of the menu option "Active transmitters".

6.8.5 Deleting hand transmitter function

Programmed hand transmitter buttons can be individually deleted.

- Menu: "RF Remote Ctrl", activate "Del Trans pos".
- Select the desired position e.g. Pos.: 1 Op
Repeat if you want to delete multiple functions
- Confirm the following display "Delete Entry?"
- "Done" indicates that the function has been deleted.
- Turn CW to "END"
- Press and hold to leave menu.

6.8.6 Deleting all transmitters from the memory

All transmitters stored in the memory of the HMD230 can be deleted using the menu option "Delete all".

- Menu: "RF remote control", activate "Delete all".
- Check the number of transmitters stored by means of the menu option "Active transmitters".

6.9 INTEGRATED REAL-TIME CLOCK

The clock module integrated in the HMD230 can be used to move the gate automatically, on the basis of an exact time schedule.

If the power supply to the motor drive is switched off, the date and time are kept up to date for a couple of weeks. Automatic switch-over to summer or winter time take place, according to EU rules. As a result, the clock is put forward one hour at 2 a.m. CET on the last Sunday of March and it is put back one hour at 3 a.m. CET on the last Sunday of October.

6.9.1 Display date/time

Press the selector switch once to display the current date and time for 20 seconds. You can access this menu option as follows:

- Menu: "Clock/Calendar", activate "Display clock"

6.9.2 Setting the clock

The internal clock of the HMD230 has been factory-set. If this time ever differs from the actual current time, the clock can be set as follows:

- Menu: "Clock/Calendar", "Set date/time", "Year" and then set the last two figures of the current year
- Menu: "Clock/Calendar", "Set date/time", "Month": set the current month
- Menu: "Clock/Calendar", "Set date/time", "Day": set the current day
- Menu: "Clock/Calendar", "Set date/time", "Hour": set the current hour
- Menu: "Clock/Calendar", "Set date/time", "Minutes": set the current minutes
- Menu: "Clock/Calendar", "Set date/time", "Seconds": set the current seconds
- Menu: "Clock/Calendar", "Set date/time", set "Autom.summer time" to "1" in for automatic summer time switch-over according to the EU rules
- Menu: "Clock/Calendar", "Set date/time", set "Summer time now?" to "0" in winter; and set it to "1" if the summer time has started
- Check the date and time with "Display clock"

6.10 CALENDAR FUNCTIONS OF THE MOTOR DRIVE

In automatic mode, the calendar functions of the master drive can be used to influence the gate behaviour in different ways at specific times.

Some commands are available for gate actions. They can be called up at carefully defined

times. The times and commands can be repeated for the seven week days, with a weekly cycle.

However, other combinations of times and commands of a higher priority (e.g. for holidays) can be planned in a yearly calendar to suppress this weekly recurring time process. This enables the automatic gate behaviour to be defined individually in advance by making the relevant calendar entries.



Information: The calendar function in the motor drive must be enabled by the engineer once and is then available to the customer. Otherwise, the calendars will not be visible.

Possible calendar functions (actions that the motor drive can perform via a calendar)

Functions	Action
No action	No gate action (hold position)
Keep open position	Keep the gate statically in OPEN position (The gate cannot be closed)
Leave open pos.	Leave the static OPEN position of the gate (The gate can close again)
Auto.close OFF	Deactivate the automatic closing function (The keep-open time is ignored)
Auto.close ON	Activate the automatic closing function (Activate the keep-open time again)
Keep Part Open ON	Activate the keep-open function for the Part OPEN position (The gate will move only between the Part OPEN and OPEN
Keep Part Open OFF	Deactivate the Keep Part OPEN function (The gate can close again)
OPEN gate	The gate moves to the OPEN position.
CLOSE gate	The gate moves to the OPEN position (if possible)
Gate Part OPEN	The gate moves to the Part OPEN position (if possible)

6.10.1 Activating the calendar

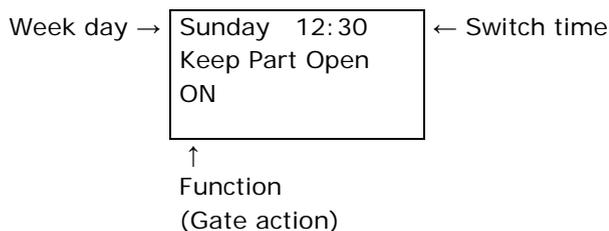
The following setting can be used to activate or deactivate the total calendar functions without you having to change the specific individual entries.

- Menu: "Clock/Calendar", "Activate cal.", 0 = all calendar functions off
1 = calendar activated

6.10.2 Displaying the weekly calendar

A maximum of 20 different switching times and the corresponding functions (gate actions) can be entered in the weekly calendar for every individual week day (Sunday through Saturday). Only the times entered are shown in the display mode for the weekly calendar. The empty memory positions are skipped. The weekly calendar can be displayed as follows:

- Menu: "Clock/Calendar", select "Display week clock"



- Turn the selector switch to browse through all entries in the calendar
- The end of all actions entered is displayed by means of "END of week clock display"
- Briefly press the switch to exit the weekly calendar

6.10.3 Adding and changing entries in the weekly calendar

Proceed as follows to add new entries to the weekly calendar or change existing entries:

- Menu: "Clock/Calendar, "Change week clock.", activate "Set week days" / A free memory position for a week day is displayed as follows:

Sunday

- Turn the selector switch in a clockwise direction to select the week day for the entry:

Monday

- Press the selector switch to call up the entry mode for the hours:

Monday **00:**

- Turn the selector switch in a clockwise direction to select the hour for the switching time:

Monday **12:**

- Press the selector switch to call up the entry mode for the minutes:

Monday 12:**00**

- Turn the selector switch in a clockwise direction to select the minutes for the switching time:

Monday 12:**30**

- Press the selector switch to call up the entry mode for the motor drive function for this switching time:

Monday 12:30
No action

- Turn the selector switch in a clockwise direction to select the function:

Monday 12:30
Keep Part OPEN

- Press the selector switch to insert the full entry into the week day on the calendar, sorted by time.

Monday

The next free memory location of the calendar is shown:

- Turn the selector switch in a clockwise direction to switch over to the end of the weekly calendar:

Set week days
End

- Now press the selector switch to exit the entry and change function of the week calendar.

6.10.4 Copying a day in the weekly calendar

All entries for a week day can be copied to another week day on the weekly calendar, provided that no entries have been made so far in the week day which the data is to be copied to.

- Menu: "Clock/Calendar, "Change week clock", activate "Set week days"

- Select the destination day to which the entry is to be copied:

Tuesday

- Press the selector switch to call up the entry mode for the hours:

Tuesday 00:

- Turn the selector switch a couple of positions in a counter-clockwise direction to select the day from which to copy the entry:

Tuesday Copy
from: Monday

- Press the selector switch to copy the entry (here: from Monday to Tuesday):

Tuesday
Ready

6.10.5 Deleting individual entries

You can delete individual entries for a week day on the weekly calendar as follows:

Menu: "Clock/Calendar, "Change week clock", activate "Set week days"

- Select the entry to be deleted:

Monday 12:30
No action

- If you turn the selector switch a few positions in a counter-clockwise direction, the following question will be displayed:

Monday
Delete input?

- Press the selector switch to delete this entry from the week day on the calendar:

Monday
Ready

6.10.6 Deleting a week day

You can also delete all entries for a week day from the weekly calendar after selecting the first entry for the week day in question:

- Menu: "Clock/Calendar, "Change week clock", activate "Set week days"

- Select the first entry of the week day to be deleted:

Monday **08:00**
 Keep OPEN

- If you turn the selector switch a few positions in a counter-clockwise direction, the following question will be displayed:

Monday
Delete day?

- Press the selector switch to delete all entries for this week day from the calendar:

Monday
 Ready

6.10.7 Deleting the entire weekly calendar

You can also delete all entries for the entire weekly calendar as follows:

- Menu: "Clock/Calendar, "Change week clock", activate "Delete week"

Delete week
 Ready

6.10.8 Displaying the yearly calendar

The yearly calendar is located over the weekly calendar on the control system. The yearly calendar can store 20 different switching time and corresponding gate actions per day for a total of 40 days. If switching times have been entered in the yearly calendar for a certain date, only the relevant entry will be applied with priority on the day in question and the weekly calendar will be ignored for this day.

Only the times entered are shown in the display mode for the yearly calendar . The empty memory positions are skipped. The yearly calendar can be displayed as follows:

- Menu: "Clock/Calendar", select "Display year clock"

Switching date → 2010.09.30 12:30 ← Switch time
No action
 ↑
 Function
 (Gate action)

- Turn the selector switch to browse through all entries in the calendar
- The end of all actions entered is displayed by means of "END of year clock display"
- Briefly press the switch to exit the yearly calendar display



Information: Other gate actions planned on the weekly calendar can be suppressed specifically for one day in the year (e.g. a national holiday) by using the "No action" function.

6.10.9 Adding and changing entries in the yearly calendar

Proceed as follows to add new entries to the yearly calendar or change existing entries:

- Menu: "Clock/Calendar, "Change year clock", activate "Set day"

- An empty memory position for a date is displayed as follows:

20

- Press the selector switch to call up the entry mode for the year:

2011.

- Turn the selector switch in a clockwise direction to select the year:

2012.

- Press the selector switch to call up the entry mode for the month:

2011.01.

- Turn the selector switch in a clockwise direction to select the month:

2011.06.

- Press the selector switch to call up the entry mode for the day:

2011.06.01

- Turn the selector switch in a clockwise direction to select the day:

2011.06.17

- Press the selector switch to call up the entry mode for the hours:

2011.06.17 00:

- Turn the selector switch in a clockwise direction to select the hour for the switching time:

2011.06.17 12:

- Press the selector switch to call up the entry mode for the minutes:

2011.06.17 12:00

- Turn the selector switch in a clockwise direction to select the minutes for the switching time:

2011.06.17 12:30

- Press the selector switch to call up the entry mode for the motor drive function for this switching time:

2011.06.17 12:30
No function

- Turn the selector switch in a clockwise direction to select the function:

2011.06.17 12:30
Keep Part OPEN

- Press the selector switch to insert the full entry into the yearly calendar, sorted by time / The next memory position of the calendar will be displayed:

2011.06.17

- Turn the selector switch in a clockwise direction to switch over to the end of the yearly calendar:

Cal. week days
END

- Now press the selector switch to exit the entry and change function of the yearly calendar.



Information: Changes to the date (and not only the switching time) can only be made in the first entry for this date and always apply to all entries for this day. The yearly calendar is sorted, i.e. an older date is put before a more recent date.

6.10.10 Copying a day in the yearly calendar

All entries for a certain day can be copied to another day with a different date on the yearly calendar, However, a new date has to be entered for this.

- Menu: "Clock/Calendar, "Change year clock", activate "Set day"

- Enter a new date (as described above):

2011.12.24

- Press the selector switch to call up the entry mode for the hours:

2011.12.24 00:

- Turn the selector switch a couple of positions in a counter-clockwise direction to select the day from which to copy the entry:

2011.12.24 Copy
from: **2011.06.17**

- Press the selector switch to copy the entry (here: from 17 June 2011 to 24 December 2011):

Ready

6.10.11 Deleting individual entries

You can delete individual entries for a specific day on the yearly calendar as follows:

- Menu: "Clock/Calendar, "Change year clock", activate "Set day"

- Select the entry to be deleted:

2011.06.17 12:30
No function

- If you turn the selector switch a few positions in a counter-clockwise direction, the following question will be displayed:

2011.06.17
Delete input?

- Press the selector switch to delete this entry from the yearly calendar:

Ready

6.10.12 Deleting a day

You can also delete all entries for an individual day from the yearly calendar after selecting the first entry for the day in question:

- Menu: "Clock/Calendar, "Change year clock", activate "Set day"

- Select the first entry of the day to be deleted:

2011.06.17 07:30
Keep OPEN

- If you turn the selector switch a few positions in a counter-clockwise direction, the following question will be displayed:

2011.06.17
Delete day?

- Press the selector switch to delete all entries for this day from the calendar:

Ready

6.10.13 Deleting the entire yearly calendar

You can also delete all entries for the entire yearly calendar as follows:

- Menu: "Clock/Calendar, "Change year clock", activate "Delete year clock"

Delete year clock
Ready

6.11 PARAMETER REFERENCE AND/OR FAULT NUMBERS

A summary of the events or the errors or faults that are possible in the log systems described above is provided here:

Reference / Fault number	Text	Meaning
25	Stat.prot.dev.OPEN	Stationary anti-crushing safety protection device OPEN has been activated
26	Stat.prot.dev.CLOSE	Stationary anti-crushing safety protection device CLOSED has been activated

27	Mov.prot.dev.OPEN	Moving anti-crushing safety protection device OPEN has been activated
28	Mov.prot.dev.CLOSED	Moving anti-crushing safety protection device CLOSED has been activated
33	Emergency stop	The emergency stop function has been activated
38	EMERGENCY SITUATION (bmc)	The emergency situation function has been activated
86	Number of reversals	The maximum number of reversals for a movement direction (without the end position being reached) has been reached
155	Calendar:	A command has been carried out due to an entry in a calendar
197	BEGIN	Restart of the program
200	CPU HALT	The motor controller incurred a HALT command (serious exception/error)
201	ROM error	The motor controller detected a program memory error (serious exception/error)
202	EEPROM error	A fault occurred while accessing the EEPROM.
203	StackReg.error	The motor controller detected a stack memory error (serious exception/error)
204	Stack_error:low	The motor controller detected a stack memory error (serious exception/error)
205	Stack_error:high	The motor controller detected a stack memory error (serious exception/error)
206	WdgError:low	The motor controller detected a watchdog error (serious exception/error)
207	WdgError:high	The motor controller detected a watchdog error (serious exception/error)
208	Watchdog error	The motor controller detected a watchdog error (serious exception/error)
209	WDG reset	The motor controller was restarted by the watchdog
210	MotRunTimeError	The motor movement was stopped because the maximum motor run time for this gate movement
211	main-cntError	Main loop counter overflow of the motor controller (serious exception/error)
212	Non-def.status	The variable of the automatic status feedback unit reached an Invalid value (serious exception/error)
213	Limitsw.error	The limit switch was not cleared within the maximum time allowed (4 sec.)
214	< MAINTENANCE > necessary	One of the specified maintenance events (gate cycle, motor run time, service interval) occurred
217	EEPR.error.Txt	The display text searched was not found in the memory

218	EEPR.error.wr.	An error occurred while writing a text to the memory
219	EEPR.error.language	An error occurred with a reference address for a text in the memory
220	Motor error	The motor movement was stopped due to a motor monitoring signal
221	RS232-error.rec.	Reception error (buffer overflow) in the serial interface
225	FC Fault	Short circuit in the power supply module of the frequency converter or in the motor
226	FC temp.fault	Temperature error message from the frequency converter module
227	BREAK Cmd	The program start of the motor controller was interrupted by an external command
228	REL+error.High	The value measured by the voltage monitoring function of the enable signal was too high
229	REL+error.Low	The value measured by the voltage monitoring function of the enable signal was too low
230	REL+error.Idl	The stationary voltage value measured by the voltage monitoring function of the enable signal was too high
235	INC sensor	Unexpected values of the incremental encoder during the motor movement (obstacle affecting the gate movement)
236	AutoTeachActive	A teaching movement has been activated for the gate
237	AccessControlActive	The input for an access control facility has been activated during the motor movement
238	OPEN/CLOSE-StartActive	The program start of the motor controller was interrupted by an active movement command
239	PhotocellTstError	The test of the photocell identified a failure
240	EMERGENCY_SITUATIONtstError	The test of the input signal for the emergency situation function resulted in a fault
241	SPI BCC Error	A checksum error occurred while the controllers were communicating
242	SPI ID Error	A data error was detected while the controllers were communicating
243	ParameterError	An error occurred while writing data to the memory
244	EMERGENCY_STOPtstError	An error occurred while testing the EMERGENCY STOP input signal
247	VersionError	The parameters loaded and the program versions of the motor controller do not match
248	Param.LoadError	When transferring the parameters from the periphery controller to the motor controller an error was detected (CRC16 checksum)

249	Menu pointer error	Menu program pointer error
250	ProgramInit.	In the system log: the program has been initialized (clear and initialize the parameter memory) In the events log: the program was restarted (e.g. reset at Exit menu)
251	EMERGENCY SITUATIONactive	An EMERGENCY SITUATION movement was requested
253	Reset	The program has restarted the software

8 MAINTENANCE INSTRUCTIONS

The HMD230 motor drive does not require any maintenance. However, the battery [type CR 2032] for the integrated clock module must be replaced after 5 years. The battery can be found in a vertical holder over the twist and selector switch. Beware of causing a short circuit when using a metal implement to remove the battery.

The entire gate system must be checked regularly, in accordance with DIN EN 12453. To remind the operating company/user of this necessary maintenance,

the "< MAINTENANCE > necessary" message

is generated by the software of the motor drive.

9 DECOMMISSIONING AND REMOVAL

The products produced by ASO are only intended for business use (B2B).

At the end of their service lives the products must be disposed of in accordance with all local, regional and national rules and instructions.

ASO is also happy to take the products back and then dispose of them in an appropriate manner.

The master drive is fitted with a battery of the type CR 2032.

In some countries all consumers are legally obliged to hand in all spent batteries. Disposing of them as domestic waste is not allowed. Spent batteries can be handed in for free at the public municipal collection facilities and at all points of sale where batteries are sold. You can also return any batteries to us after use. In this way you will be making an important contribution to conserving the environment!

10 TECHNICAL DATA

HMD230 FU	
Electrical values	
Power supply	1 phase 230Vac/N/PE $\pm 10\%$ 50/60Hz
Local fuse	MAX. 10A
Power consumption (without motor and external loads)	16 W
External power supply 230V	230V _{AC} $\pm 10\%$ 50/60Hz, fused with a 6.3A slow-acting fuse on the PCB
External power supply 24V	24V _{DC} stabilized ($\pm 5\%$) max. 500mA (fused with a semiconductor fuse that resets automatically)
Control inputs	24V _{DC} / typ. 4mA < 12 V: inactive -> logical 0 > 18 V: active > logical 1 (galvanically isolated internally)
Relay outputs ¹	max. 250V _{AC} / 1A
Maximum motor power	0.75kW (short-term peak capacity of 1.5kW)
Mechanical values	
Housing	ABS with aluminium cooling body
Dimensions (W x H x D)	160 x 270 x 110 mm
Weight	2.3 kg
IP category	IP54
Temperature range	-20 °C to +55 °C
Relative humidity range	max. 99% non-condensing

¹ If inductive loads are switched, (e.g. several relays or brakes), they must have a catch diode for interference suppression.

11 APPENDIX A SPARE PARTS

HMD 230 T6A3	Fuse, slow acting 6.3A /250V
BATT 2032	Button battery CR 2032 for integrated clock

12 Appendix B Accessories

HMDONTV	Receiver module for remote control 868 MHz FM modulation
HMD230PTU	HMD230 Pulse Test Unit designed for testing pulses generated by the Heras Pulse version motors

13 Appendix C Declaration of Conformity

Hiermit erklären wir, dass das nachfolgend bezeichnete Produkt:

Torsteuerung ATC150 FU (HMD230)

(Artikelnummer: 1402-0020, Version 1.0, Format Seriennummer YYMMnnnnn)

Steuerung zum sicheren Antrieb von Schiebetoren, Sektionaltoren, Roll- und Gittertoren, Dreh- und Falttoren bzw. Schranken im industriellen Umfeld aufgrund seiner Konzipierung und Bauart sowie in der von uns in Verkehr gebrachten Ausführung, den einschlägigen grundlegenden Sicherheits- und Gesundheitsanforderungen der nachfolgenden EG-Richtlinien entspricht:

EG – Maschinenrichtlinie 2006/42/EG

EG – Niederspannungsrichtlinie 2006/95/EG

EG – EMV Richtlinie 2004/108/EG

EN ISO 13849-1:2008

EN 12453:2000

EN 60335-1:2002 +A11:2004 +A1:2004 +A12:2006 +A2:2006 +A13:2008 +A14:2010

EN 61000-6-2:2002

EN 61000-6-3:2002

EG - Baumusterbescheinigung

Notified Body 0044

TÜV NORD CERT GmbH

Langemarckstraße 20, D-45141 Essen

Zertifikat Nr.: 44 205 11 555791-001

Prüfbericht Nr.: 11 205 555791-001

Diese Konformitätserklärung entbindet den Konstrukteur/Hersteller der Maschine nicht von seiner Pflicht, die Konformität der gesamten Maschine, an der dieses Produkt angebracht wird, entsprechend der EG-Richtlinie sicherzustellen

Hersteller und Bevollmächtigter:

ASO, Antriebs- und Steuerungstechnik GmbH,

Am Garock 8, D-33154 Salzkotten

Salzkotten, den 15.04.2011

Helmut Friedrich
(Geschäftsführer und Dokumentenbevollmächtigter)

