
Operating instructions and spare parts list

OptiMove CR06

Axes control unit

TW
Gema



Documentation OptiMove CR06 Axes control unit

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General safety regulations

This chapter sets out the fundamental safety regulations that must be followed by the user and third parties using the OptiMove CR06 Axes control unit.

These safety regulations must be read and understood before the OptiMove CR06 Axes control unit is used.

Safety symbols (pictograms)

The following warnings with their meanings can be found in the ITW Gema operating instructions. The general safety precautions must also be followed as well as the regulations in the operating instructions.

**DANGER!**

Danger due to live electricity or moving parts. Possible consequences: Death or serious injury

**WARNING!**

Improper use of the equipment could damage the machine or cause it to malfunction. Possible consequences: minor injuries or damage to equipment

**INFORMATION!**



Useful tips and other information

Conformity of use

1. The OptiMove CR06 Axes control unit is built to the latest specification and conforms to the recognized technical safety regulations. It is designed for the normal application of powder coating.
2. Any other use is considered as non-conform. The manufacturer is not responsible for damage resulting from improper use of this equipment; the end-user alone is responsible. If the OptiMove CR06 Axes control unit is to be used for other purposes or other substances outside of our guidelines then ITW Gema AG should be consulted.
3. Observance of the operating, service and maintenance instructions specified by the manufacturer is also part of conformity of

use. The OptiMove CR06 Axes control unit should only be used, maintained and started up by trained personnel, who are informed about and are familiar with the possible hazards involved.

4. Start-up (i.e. the execution of a particular operation) is forbidden until it has been established that the OptiMove CR06 Axes control unit has been set up and wired according to the guidelines for machinery (98/37 EG). EN 60204-1 (machine safety) must also be observed.
5. Unauthorized modifications to OptiMove CR06 Axes control unit exempts the manufacturer from any liability from resulting damage.
6. The relevant accident prevention regulations, as well as other generally recognized safety regulations, occupational health and structural regulations are to be observed.
7. Furthermore the country-specific safety regulations must be observed.

Explosion protection	Protection type	Temperature class
  0102 II (2) D	IP54	T6 (zone 21) T4 (zone 22)

Technical safety regulations for stationary electrostatic powder spraying equipment

General information

The powder spraying equipment from ITW Gema is designed with safety in mind and is built according to the latest technological specifications. This equipment can be dangerous if it is not used for its specified purpose. Consequently it should be noted that there exists a danger to life and limb of the user or third party, a danger of damage to the equipment and other machinery belonging to the user and a hazard to the efficient operation of the equipment.

1. The powder spraying equipment should only be started up and used once the operating instructions have been carefully studied. Improper use of the controlling device can lead to accidents, malfunction or damage to the control itself.
2. Before every start-up check the equipment for operational safety (regular servicing is essential)!
3. Safety regulations BGI 764 and VDE regulations DIN VDE 0147, Part 1, must be observed for safe operation.
4. Safety precautions specified by local legislation must be observed.
5. The plug must be disconnected before the machine is opened for repair.
6. The plug and socket connection between the powder spraying equipment and the mains network should only be taken out when the power is switched off.
7. The connecting cable between the controlling device and the spray gun must be set up so that it cannot be damaged during

operation. Safety precautions specified by local legislation must be observed!

8. Only original ITW-Gema spare parts should be used, because the explosion protection will also be preserved that way. Damage caused by other parts is not covered by guarantee.
9. If ITW-Gema powder spraying equipment is used in conjunction with machinery from other manufacturers then their safety regulations must also be taken into account.
10. Before starting work familiarize yourself with all installations and operating elements, as well as with their functions! Familiarization during operation is too late!
11. Caution must be exercised when working with a powder/air mixture! A powder/air mixture in the right concentration is flammable! Smoking is forbidden in the entire plant area!
12. As a general rule for all powder spraying installations, persons with pacemakers should never enter high voltage areas or areas with electromagnetic fields. Persons with pacemakers should not enter areas with powder spraying installations!



WARNING!

We emphasize that the customer himself is responsible for the safe operation of equipment. ITW-Gema is in no way responsible for any resulting damages!

Safety conscious working

Each person responsible for the assembly, start-up, operation, service and repair of powder spraying equipment must have read and understood the operating instructions and the "Safety regulations"-chapter. The operator must ensure that the user has had the appropriate training for powder spraying equipment and is aware of the possible sources of danger.

The control devices for the spray guns must only be set up and used in zone 22. Only the spray gun should be used in zone 21.

The powder spraying equipment should only be used by trained and authorized personnel. This applies to modifications to the electrical equipment, which should only be carried out by a specialist.

The operating instructions and the necessary closing down procedures must be followed before any work is carried out concerning the set-up, start-up, operation, modification, operating conditions, mode of operation, servicing, inspection or repairs.

The powder spray equipment can be turned off by using the main switch or failing that, the emergency shut-down. Individual components can be turned off during operation by using the appropriate switches.

Individual safety regulations for the operating firm and/or operating personnel

1. Any operating method which will negatively influence the technical safety of the powder spraying equipment is to be avoided.
2. The operator should care about no non-authorized personnel works on the powder spraying equipment (e.g. this also includes using the equipment for non-conform work).

3. For dangerous materials, the employer has to provide an operating instructions manual for specifying the dangers arising for humans and environment by handling dangerous materials, as well as the necessary preventive measures and behavior rules. The operating instructions manual has to be written in an understandable form and in the language of the persons employed, and has to be announced in a suitable place in the working area.
4. The operator is under obligation to check the powder spraying equipment at least once every shift for signs of external damage, defects or changes (including the operating characteristics) which could influence safety and to report them immediately.
5. The operator is obliged to check that the powder spraying equipment is only operated when in satisfactory condition.
6. As far as it is necessary, the operating firm must ensure that the operating personnel wear protective clothing (e.g. facemasks).
7. The operating firm must guarantee cleanliness and an overview of the workplace with suitable instructions and checks in and around the powder spraying equipment.
8. No safety devices should be dismantled or put out of operation. If the dismantling of a safety device for set-up, repair or servicing is necessary, reassembly of the safety devices must take place immediately after the maintenance or repair work is finished. The powder spraying device must be turned off while servicing is carried out. The operator must train and commit the responsible personnel to this.
9. Activities such as checking powder fluidization or checking the high-voltage spray gun etc. must be carried out with the powder spraying equipment switched on.

Notes on special types of hazard

Power

It is necessary to refer once more to the danger of life from high-voltage current if the shut-down procedures are not observed. High voltage equipment must not be opened - the plug must first be taken out - otherwise there is danger of electric shock.

Powder

Powder/air mixtures can be ignited by sparks. There must be sufficient ventilation in the powder coating booth. Powder lying on the floor around the powder spraying device is a potentially dangerous source of slipping.

Static charges

Static charges can have the following consequences: Charges to people, electric shocks, sparking. Charging of objects must be avoided - see "Earthing".

Grounding/Earthing

All electricity conducting parts and machinery found in the workplace (according to DIN VDE 0745, part 102) must be earthed 1.5 meters either side and 2.5 meters around each booth opening. The earthing resistance must amount to maximally 1 MOhm. The resistance must be tested on a regular basis. The condition of the machinery surroundings as well as the

suspension gear must ensure that the machinery remains earthed. If the earthing of the machinery includes the suspension arrangements, then these must constantly be kept clean in order to guarantee the necessary conductivity. The appropriate measuring devices must be kept ready in the workplace in order to check the earthing.

Compressed air

When there are longer pauses or stand-still times between working, the powder spraying equipment should be drained of compressed air. There is a danger of injury when pneumatic hoses are damaged and from the uncontrolled release and improper use of compressed air.

Crushing and cutting

During operation, moving parts may automatically start to move in the operating area. It must be ensured that only instructed and trained personnel go near these parts. The operator should ensure that barriers comply with the local security regulations.

Access under exceptional circumstances

The operating firm must ensure that local conditions are met when repairs are made to the electronic parts or when the equipment is restarted so that there are additional measures such as barriers to prevent unauthorized access.

Prohibition of unauthorized conversions and modifications to machines

All unauthorized conversions and modifications to electrostatic spraying equipment are forbidden for safety reasons.

The powder spraying equipment should not be used if damaged, the faulty part must be immediately replaced or repaired. Only original ITW-Gema replacement parts should be used. Damage caused by other parts is not covered by guarantee.

Repairs must only be carried out by specialists or in ITW-Gema workshops. Unauthorized conversions and modifications may lead to injury or damage to machinery. The ITW Gema AG guarantee would no longer be valid.

Safety requirements for electrostatic powder coating

1. This equipment is dangerous if the instructions in this operating manual are not followed.
2. All electrostatic conductive parts, in particular the machinery within 5 meters of the coating equipment, must be earthed.
3. The floor of the coating area must conduct electricity (normal concrete is generally conductive).
4. The operating personnel must wear electricity conducting footwear (e.g. leather soles).
5. The operating personnel should hold the gun with bare hands. If gloves are worn, these must also conduct electricity.
6. The supplied earthing cable (green/yellow) must be connected to the earthing screw of the electrostatic powder spraying hand appliance. The earthing cable must have a good metallic connec-

tion with the coating booth, the recovery unit and the conveyor chain and with the suspension arrangement of the objects.

7. The electricity and powder supply to the hand guns must be set up so that they are fully protected against heat and chemical damage.
8. The powder coating device may only be switched on once the booth has been started up. If the booth cuts out then the powder coating device must be switched off.
9. The earthing of all electricity conducting devices (e.g. hooks, conveyor chains) must be checked on a weekly basis. The earthing resistance must amount to maximally 1 MOhm.
10. The control device must be switched off if the hand gun is cleaned or the nozzle is changed.
11. When working with cleaning agents there may be a risk of hazardous fumes. The manufacturers instructions must be observed when using such cleaning agents.
12. The manufacturers instructions and the applicable environmental requirements must be observed when disposing of powder lacquer and cleaning agents.
13. If any part of the spray gun is damaged (broken parts, tears) or missing then it should not be used.
14. For your own safety, only use accessories and attachments listed in the operating instructions. The use of other parts can lead to risk of injury. Only original ITW-Gema replacement parts should be used.
15. Repairs must only be carried out by specialists and under no circumstances should they be carried out in the operating area. The former protection must not be reduced.
16. Conditions leading to dangerous levels of dust concentration in the powder spraying booths or in the powder spraying areas must be avoided. There must be sufficient technical ventilation available, to prevent a dust concentration of more than 50% of the lower explosion limit (UEG) (UEG = max. permissible powder/air concentration). If the UEG is not known then a value of 10 g/m³ should be used.

A summary of the rules and regulations

The following is a list of relevant rules and regulations which are to be observed:

Guidelines and regulations, German professional association

BGV A1	General regulations
BGV A2	Electrical equipment and material
BGI 764	Electrostatic coating
BGR 132	Guidelines for the avoidance of the dangers of ignition due to electrostatic charging (Guideline "Static Electricity")

VDMA 24371	Guidelines for electrostatic coating with synthetic powder ¹⁾ - Part 1 General requirements - Part 2 Examples of use
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Leaflets

ZH 1/310	Leaflet for the use of tools in locations where there is danger of explosion ¹⁾
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EN European standards

RL94/9/EC	The approximation of the laws of the Member States relating to apparatus and safety systems for their intended use in potentially explosive atmospheres
EN 292-1 EN 292-2	Machine safety ²⁾
EN 50 014 to EN 50 020, identical: DIN VDE 0170/0171	Electrical equipment for locations where there is danger of explosion ³⁾
EN 50 050	Electrical apparatus for potentially explosive atmospheres - Electrostatic hand-held spraying equipment ²⁾
EN 50 053, part 2	Requirements for the selection, installation and use of electrostatic spraying equipment for flammable materials - Hand-held electrostatic powder spray guns ²⁾
EN 50 177	Stationary electrostatic spraying equipment for flammable coating powder ²⁾
PR EN 12981	Coating plants - Spray booths for application of organic powder coating material - Safety requirements
EN 60 529, identical: DIN 40050	IP-Type protection: contact, foreign bodies and water protection for electrical equipment ²⁾
EN 60 204 identical: DIN VDE 0113	VDE regulations for the setting up of high-voltage electrical machine tools and processing machines with mains voltages up to 1000 V ³⁾

VDE (Association of German Engineers) Regulations

DIN VDE 0100	Regulations for setting-up high voltage equipment with mains voltages up to 1000 V ⁴⁾
DIN VDE 0105 part 1 part 4	VDE regulations for the operation of high voltage equipment ⁴⁾ General regulations Supplementary definitions for stationary electrical spraying equipment
DIN VDE 0147 part 1	Setting up stationary electrostatic spraying equipment ⁴⁾
DIN VDE 0165	Setting up electrical equipment in locations in areas with danger of explosion ⁴⁾

*Sources:

¹⁾ Carl Heymanns Verlag KG, Luxemburger Strasse 449, 5000 Köln 41, or from the appropriate employers association

²⁾ Beuth Verlag GmbH, Burggrafenstrasse 4, 1000 Berlin 30

³⁾ General secretariat, Rue Bréderode 2, B-1000 Bruxelles, or the appropriate national committee

⁴⁾ VDE Verlag GmbH, Bismarckstrasse 33, 1000 Berlin 12

Product specific security measures

- The installation work, to be done by the customer, must be carried out according to local regulations
- Before starting up the plant a check must be made that no foreign objects are in the booth or in the ducting (input and exhaust air)
- It must be observed, that all components are grounded according to the local regulations, before start-up

Special security measures

1. It must be ensured that all components are earthed according to the local regulations before start-up.
2. The OptiMove CR06 Axes control unit should only be switched on and operated after carefully reading these operating instructions. Incorrect operation of the axes control unit can lead to accidents, malfunctions or damage to the plant.
3. **WARNING!** The force of the reciprocator/axes is much greater than that of humans!
All axes must be secured against access during operation (see local regulations).
Never stand under the Z-carriage when the reciprocator is not operating!
4. The installation work to be done by the customer must be carried out according to local regulations.
5. The plug-in connections between the OptiMove CR06 Axes control unit and the power section of the ZA04 Reciprocator may only be removed when the power supply is switched off.
6. The connecting cables between the control unit and the reciprocator/axes must be installed in such a way that they cannot be damaged during axes operation. Safety precautions specified by local legislation must be observed!
7. The **maximum upper stroke limit** of the reciprocator must always be set with reference to the **maximum height of the booth gun slots**. If an incorrect (too high) stroke limit is set, this can lead to the **damage** of the reciprocator and/or the booth!



Attention:

During a test run, it must be guaranteed that the unit is not damaged by the test! In particular, the limitations of the travel field have to be observed (for more details, please refer to section "System parameter P1 - setting the upper stroke limit")!

8. The voltage supply of the reciprocator is guaranteed by the OptiMove CR06 Axes control unit. The supply voltage amounts to 230 VAC and must always be conducted via the emergency stop circuit. In case of an emergency, the voltage supply to the motor may be interrupted with the emergency stop key.

9. When repairing the reciprocator, both the axes control equipment and the reciprocator must be disconnected from the mains according to the local safety regulations!
10. Repairs may be made only by authorized ITW Gema service centers. Unauthorized conversions and modifications may lead to injury or damage to machinery. The ITW Gema AG guarantee would no longer be valid.
11. We emphasize that the customer himself is responsible for the safe operation of equipment. ITW Gema AG will not be responsible for any resulting damage!

About this manual

General information

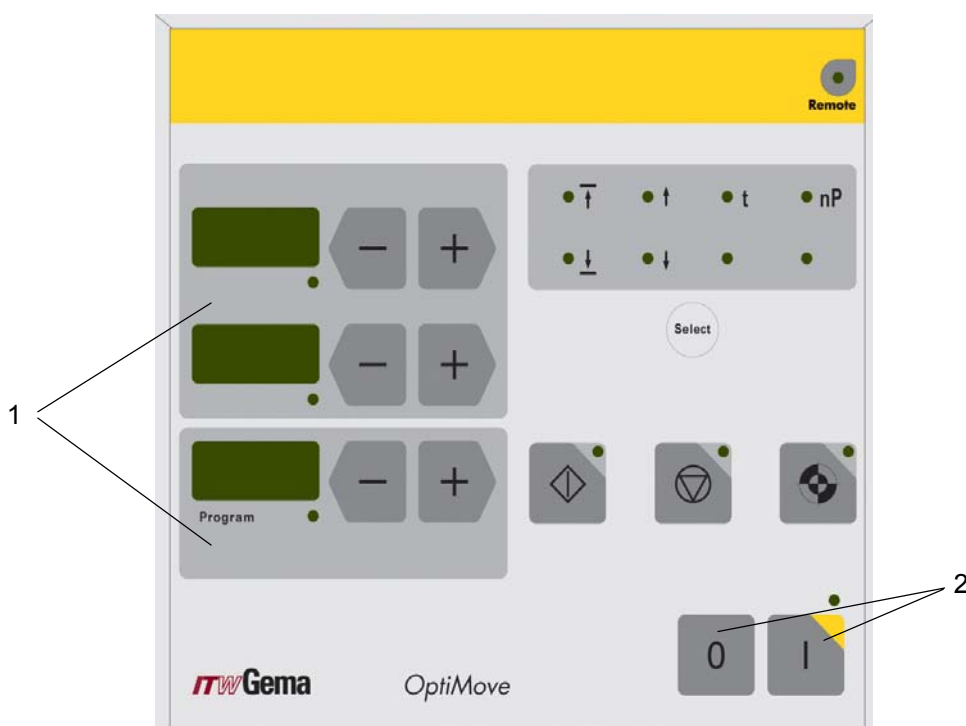
This operating manual contains all important information which you require for the working with the OptiMove CR06 Axes control unit. It will safely guide you through the start-up process and give you references and tips for the optimal use of your new powder coating system.

Information about the function mode of the individual system components - reciprocators, booths, powder gun controls, powder guns etc. - should be referenced to their corresponding documents.

Device description

Important device instructions

Operating panel



OptiMove CR06 - operating panel

- 1 Operating and display elements
- 2 Power switch ON/OFF

Field of application

The OptiMove CR06 Axes control unit is designed exclusively for operating one electrically driven reciprocator in electrostatic powder coating plants. Any other use beyond this is not intended. The manufacturer is not responsible for any damage resulting from this; the risk for this is carried by the user alone!

The start-up (i.e. the start of intended operation) is forbidden until it is determined that the control and the reciprocator are installed and connected according to the machine guideline (98/37/EC). EN 60204-1 (machine safety) must also be observed!

For a better understanding of the relationships in powder coating it is recommended to read the operating instructions of other components, thoroughly, so as to be familiar with their functions also.

Technical Data

OptiMove CR06 Axes control unit

General information

OptiMove CR06	
Number of axes per control unit	1
Maximum available programs	255
Max. stroke height (theoretical)	5 m
Maximum speed	0.6 m/s
Minimum speed	0.08 m/s
Acceleration	0.1 - 2.0 m/s ²

Electrical data

OptiMove CR06	
Nominal input voltage	230 VAC
Tolerance	+10% / -10%
Frequency	50/60 Hz
Rated output of the solenoid valve	24 VDC
Fuse F1	10 AT
Power consumption	1.1 kW
Protection type	IP54
Operating temperature	0°C - +40°C (+32°F - +104°F)
Storing temperature	-20°C - +70°C (-4°F - +158°F)

Dimensions

OptiMove CR06	
Width	244 mm
Depth	221 mm
Height	177 mm
Weight	3.5 kg

Design and function

OptiMove CR06 Axes control unit - structure

The OptiMove CR06 Axes control unit is available as an enclosure version for building into an AS03/AS04 control system.

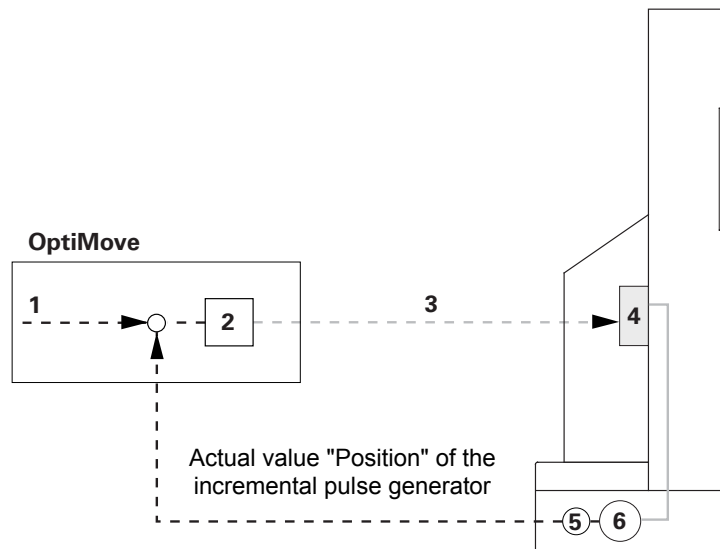
Function description

The OptiMove CR06 Axes control unit is used in axis control systems. A complete axis control system consists of an OptiMove control unit, a frequency converter and a reciprocator with AC motor. The frequency converter receives the supply voltage and control signal directly from the OptiMove Axes control unit.

The OptiMove CR06 Axes control unit, which contains the regulation, visualization and input unit, is responsible for the exact positioning adjustment of the carriage by evaluating the signal from the reciprocator incremental pulse generator in the reciprocator.

The drive motor is equipped with an electrical holding brake. When the axis control unit holds an axis position (axis standstill), the holding brake will be activated and the frequency transformer released with a time delay (motor without current).

Configuration



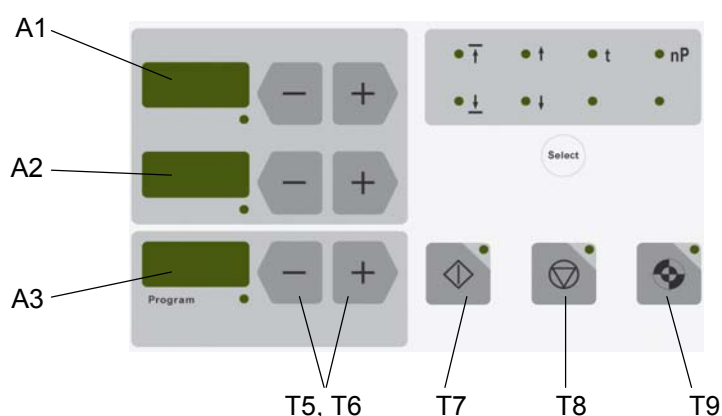
OptiMove CR06 Axes control unit - configuration

- | | |
|----------------------------|-------------------------------|
| 1 Desired value "Position" | 4 Frequency converter |
| 2 Regulator | 5 Incremental pulse generator |
| 3 Desired value "Speed" | 6 AC motor |

Operating and display elements, operating modes

Display and input buttons

The control device is operated via a membrane keypad with input and display elements. All displays (**A1-A3**) are 7-segment displays, and the LEDs are all green. In the manual operation mode, all operating functions can be carried out by the membrane keypad. In the remote operation mode, only visualization functions are available.

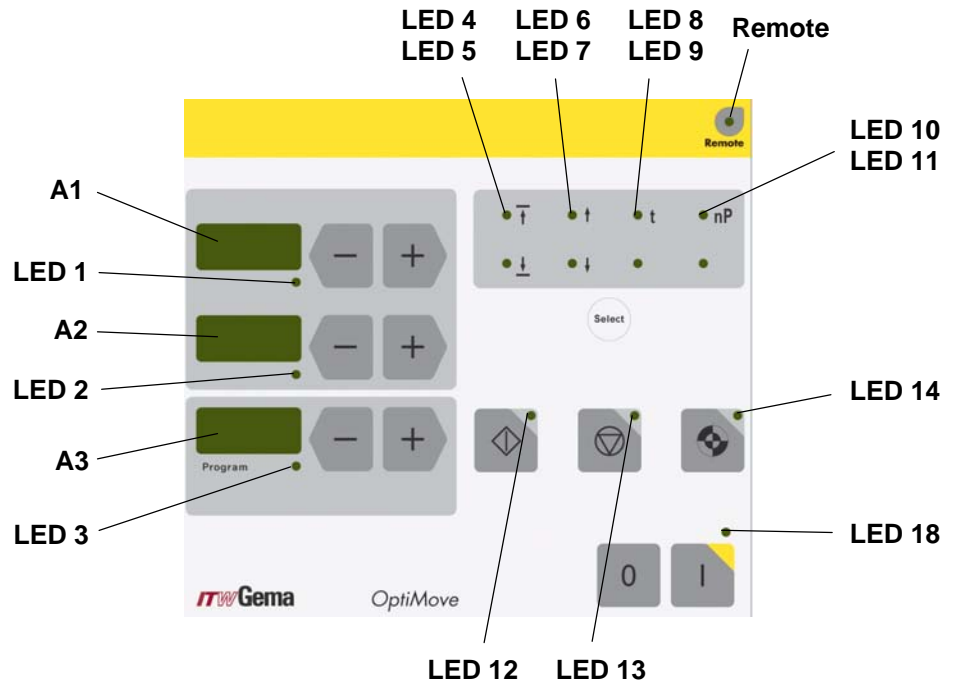


Attention:

The keys of the input field should only be pressed with fingertips and under no circumstances with fingernails or hard objects!

Display	Description
A1	Actual value display (axis position) Desired value input (position above, speed upwards, dwell time, program address)
A2	Actual value display (axis speed) Desired value input (position below, speed downwards)
A3	Displays the selected program number or the error code

Key	Description
	Start axis (T7)
	Stop axis (T8) press for 5 seconds = system parameter
	Start reference point travel (T9)
	Input keys for desired values and system parameters (increase value)
	Input keys for desired values and system parameters (decrease value)
T5, T6	Input keys for program number, error acknowledgment
Select	Activate display mode (select desired value input LED 4 - LED 11)



LED	Description
1 2 3	Desired/actual value mode (dark = actual value mode / green = desired value mode)
4-11	Parameter selection display
12	Axis started
13	Axis stopped
14	Axis referencing
Remote	Remote, semiautomatic, keyboard lock
18	Power switch ON

Operating modes

Generally

The following operating modes can be selected on the OptiMove CR06 control:

- Manual
- Remote
- Semiautomatic
- Keyboard lock

255 programs can be created simply with the OptiMove CR06 Axes control unit by using the necessary parameters.

Manual operating mode

Manual operation permits the selection and start of the travel program by the operator on the panel. In addition, the operator has the possibility to change the program number or directly modify the running program.

In this operating mode the following display and operating functions are possible through the operating panel:

- Select program number
- Select input mode / display mode
- Setting of desired value in input mode (only in pendulum operation)
- Start/Stop
- Acknowledgement of fault messages
- System parameter selection

Remote operating mode

In the remote operating mode, the control unit is controlled by CAN bus or DigitalBus.

Only limited operation is possible via the control panel, namely:

- Choice of input mode / display mode (visualization of the desired values and actual values)
- Acknowledgement of fault messages

The remote mode is displayed on the control panel by the illumination of the green **Remote** LED.

In remote operating mode, the start and stop keys are out of function.

Keyboard lock

In the keyboard lock mode, the control panel of the control device is locked. For this to happen, the **system parameter P9** must already have been correctly set **P9=1** (for more on this, see "Setting the system parameters"). If the systems parameter P9=1 is set, then the keyboard locking function can be activated by the digital input. This is displayed on the control panel by the lighting-up of the green **Remote** LED.

Only limited operation is then possible by control panel, namely:

- Start, stop, referencing axes
- Choice of input mode / display mode (visualization of the desired values and actual values)
- Acknowledgement of error messages

Start-up

Connections on the rear side



OptiMove CR06 - connections on the rear side

- 2.1 Mains connection
- 2.2 Power supply - reciprocator
- 2.3 Control signals - reciprocator
- 2.4 DigitalBus parallel interface
- 2.5 CAN bus - Input
- 2.6 CAN bus - Output

The cable connections have different plugs and cannot be wrongly connected on assembly!



Attention:

Before disconnecting the cables from the sockets always switch off the equipment and disconnect the mains cable!

Initial start-up

Measures before initial start-up

All axis are adjusted and marked on delivery (station-, axis- and address definition), can however be adapted according to clients plant specifications.



Note:

All values that are changed, by all means have to be entered into the parameter table - see appendix!

Electrical wiring and screening concept

All CAN bus users are to be wired in accordance with enclosed electrical diagrams.



Attention:

The control unit must be connected to the EMERGENCY STOP power circuit, i.e. with a possible EMERGENCY STOP the brake on the reciprocator is activated and the control unit power is switched off!

- Assembly and fitting of electric devices may only be done by an electronics specialist
- For trouble-free operation with high data transmission rates a clear grounding concept is mandatory. A uniform grounding potential is a prerequisite for this
- Screened cables are to be used exclusively for the wiring. The cable shield is to be connected at both ends with a large cross-section to the ground






Attention:




Both ends of the cable shield must be generally or as often as possible connected to the ground, otherwise malfunctions can occur. Due to this the reliability of the unit and the normal process sequence could be reduced!

Setting the system parameters

The OptiMove CR06 Axes control is adapted to the type of reciprocator, and plant specific characteristics with the system parameters.

In order to set the system parameters, proceed as follows:

1. Switch to the system parameter mode by pressing the key  for approximately 5 seconds.
The LEDs **L1-L3** illuminate
2. Select the desired parameters **P1-P12** on the display **A1** using the  and  keys

3. Set the corresponding parameter values on the display **A2** using the  and  keys
4. Press  in order to exit the system parameter mode

System parameter	Selection	Description
P1: max. travel position	0.00 - 5.00 [m] Default value 0.30 m	Upper stroke limit
P2: Axes operating mode	1: Pendulum operation 2: Sequence program 3: Semiautomatic pendulum operation 4: X-GunClean sequence program	
P3: Acceleration	0.1 - 2.00 [m/s ²] Default value Z-axis 1.50	X axis: 0.10
P4: max. speed	0.08 - 0.60 [m/s] Default value 0.60	X axis: 0.10
P5: Loop gain	10 - 100 default value 40	
P6: Incremental pulse generator adjustment	10 - 1500 [Impulse/cm] Default value Z-axis 750	X axis: 1012 (displayed as .0.1.2)
P7: Compensation of holding brake delay time [ms]	0 - 500 [ms] Default value 100	
P8: Communication	0: DigitalBus module 1: CANOpen	Communication type
P9: Keyboard lock	0: Keyboard lock inactive 1: Keyboard lock active	Activates the keyboard lock function through Remote input = high (the signal must be present) Except during: Start, stop, axis referencing, fault message acknowledgement, displaying of desired value
P10: Referencing mode	0: with proximity switch 1: running into the end buffer	
P11: CAN Baud rate	0 - 7 3 = 125 k Baud	
P12: CAN address	1: 1-127 CAN Node ID	

Bold: Default values

The system parameters are set to default values at the factory. In the case of a RAM-Reset, the system parameters are reloaded with default values.



Attention:

If an incorrect system parameter is set, this can lead to damages to the axes and/or the booth!

System parameter P1 - setting the upper stroke limit






If the axes control unit drives an ITW Gema reciprocator, all the system parameters are already set to the values for this axis.

The only system parameter which must be set is the upper stroke limit.

The maximum stroke height (max. travel) is limited by the upper stroke limit. The maximum stroke height is limited by the corresponding height of the used reciprocator or by the maximum height of the gun slots in the booth.

The upper stroke limit of the OptiMove CR06 Axes control unit is always set at 0.30 m by factory.


In order to set the upper stroke limit (system parameter 1), proceed as follows:

1. Switch to the system parameter mode by pressing the key  for approximately 5 seconds.
The LEDs **L1-L3** illuminate
2. Select the parameter **P1** on the display **A1** using the  and  keys
3. Set the upper stroke limit value on the display **A2** using the  and  keys



Attention:

Always pay attention to the gun positions and the maximum height of the gun slots in the booth! If an incorrect (too high) stroke limit is set, this can lead to damages to the reciprocator and/or the booth!


4. Press  in order to exit the system parameter mode

Operation

Operating the axes control

Up to 255 programs can be input and/or called up by the OptiMove CR06 Axes control unit. Each program contains data about the speeds and about the positions of the axis movements.

Switching on/off the axes control unit

1. Press 
The LED above the key lights up

When the equipment is switched on for the first time, the preset factory settings are displayed:

- xxx** on the display **A1** = value for position
- xxx** on the display **A2** = value for speed
- xxx** on the display **A3** = program number

2. Press 
The equipment is switched off

After switching the equipment off (also when the equipment is disconnected from the Mains) the actual settings are retained.





Travel to reference point

So that the OptiMove CR06 control can enter the position of the axis as accurately as possible during operation, the triggered axis must first travel to the reference point each time it is switching on. The prerequisite for this is that the reference point is already set correctly - see also the corresponding instructions in the respective axes operating instructions.




Note:

The axis must also be referenced again after each axis-specific error (H01, H02, H03, H04)! If the axis is referenced, then it can not be referenced a second time, unless the above conditions are met!

1. Press .
The OptiMove control unit is switched on.
The blinking LED of the key  indicates that reference point travel has not been carried out yet
2. Press .
The control starts reference travel
3. At the end of reference travel the key diode  expires, when the axis is referenced





Note:

If the axis collides somewhere or the guns are incorrectly mounted or the lower reversing point is situated too low, the axis can be stopped by pressing ! By pressing the key again the reference travel will continue!

The procedure described above relates to the reference point traveling in manual operation. In automatic operation, the reference point traveling is triggered by ID no. 7 with the DigitalBus and by the corresponding command with the CAN bus.

Start/stop the reciprocator



1. Switch on the axes control unit (see also "Switching on/off the axes control unit")
2. If necessary, change to another program (see also "Program change")
3. Press .
The reciprocator is started, and the selected program is activated. The corresponding LED lights up
4. Press .
The reciprocator is stopped
 - The display **A1** shows the actual axis position. The corresponding LED remains dark

Program change

Program switching can be carried out by the keypad (manually) or by the external control signals. In addition, a program change can be made either during operation or at a still stand. In both cases, the modifications are stored in the program memory, i.e. after renewed starting of the OptiMove CR06 Axes control, the last input axis programs are again available.





If a program change is made during operation, the axis travels to the end of the old command, which it has in the memory and takes over the new program (positions or speed) only at the next cycle change!

1. Select the desired program number in the keyboard **Program** using  and 
 - The LED lights up for 3 seconds and goes out afterwards, i.e. the switching of programs has been accepted. The new program number is shown on the display **A3**
 - The display **A1** shows the axis position. The corresponding LED remains unlit
 - The display **A2** shows the axis speed. The corresponding LED remains unlit

Display of the cycle time

(Only possible in pendulum mode/semiautomatic mode)

1. Start axis (see also "Start/stop the reciprocator")
2. Press  or  in display field **A2** and keep it pressed. The display **A2** shows the cycle time of the actual program sequence in seconds (00.0 to 99.9). If the axis is restarted, then the cycle time 00.0 seconds is displayed. Only when a cycle (whole pendulum movement) has been started is the measured cycle time shown and then updated after each further cycle (pendulum movement)
3. Read off the cycle time and use in the program for the calculation of the optimal sine curve

Program editing

In the program mode **Edit**, the input parameter values can be selected or changed.



Note:

All program data must be determined. For this, use the program tables in the appendix of this operating manual!

The programs can be edited during operation and also at a still stand.



Note:

If the system parameter P2 is set to "2" or "4", the editing is only possible when at a standstill!

The modifications in both cases are stored in the program memory, i.e. after renewed starting of the OptiMove CR06 Axes control unit, the last input program values are again available.



Note:

If a program is edited during operation, the axis runs until the old command, which is still in the memory, is finished and takes over the new program values (positions or speed) only with the next cycle change!



Note:

The input mode is locked in the remote operating mode!

Axes operating modes

Generally

The control unit OptiMove is universally used for all ITW Gema axes. To be ideally equipped for all conditions, the operating mode can be set in the system parameter mode P2. The following axes operating modes can be selected:

- Pendulum operation
- Sequence program
- Semiautomatic pendulum operation
- X_GunClean sequence program

In the following chapters, these different axis operating modes are described in detail.

Pendulum operation mode

In the pendulum operating mode, the axis executes a continuous stroke movement according to the set parameters. The different values as well as the start and stop functions can be set in a user-friendly way by keyboard. The operator can see the set and current data directly on the display. To be equipped for all operating processes, up to 255 different programs can be stored.











Note:

The system parameter P2 has to be set to 1 (pendulum operation)!

The appliance is operated via the display. The display offers the following possibilities:

- Reference axes
- Start/Stop
- Program editing
- Program switch over
- Selection input mode/display mode
- Acknowledgement of error messages









Editing/setting

1. In the program keyboard, select the desired program number using  and  (see also "Program change")
The display A3 shows the program number
2. Press the **Select** key:
The LEDs in the display area **A1** and **A2**, and the LEDs  and  illuminate green
3. Input the desired value for the upper reversing point on the display **A1** using the keys  and 
4. Input the desired value for the lower reversing point on the display **A2** using the keys  and 



Note:

If the same value is selected for the input of the upper and lower positions, this results in a positioning command, i.e. the axis stops in this position!

5. Press the **Select** key again:
LEDs  and  illuminate green
6. Input the desired value for the speed upwards on the display **A1** using the keys  and 
7. Input the desired value for the speed downwards on the display **A2** using the keys  and 
8. Press the **Select** key again, or press  or , in order to exit the **Program editing** mode

Sequence program

A sequence program is created by joining a number of individual program steps. The program steps are then processed in a certain order. A sequence program can consist of a single program step when only one position is to be approached, i.e. when positioning the X axis.



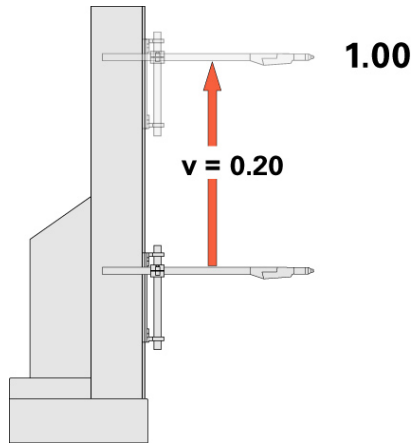
The prerequisite for the programming of sequence programs is that the system parameter P2 is already set correctly P2=2 (see also "Setting the system parameters")!

Structure of a program step (procedure step)

Display	Input parameter	Input range
	Procedure position [m]	0.00 - P_max. (P_max. is fixed with system parameter P1)
	Speed [m/s]	0.08 - V_max. (P_max. is set with system parameter P4)
	Dwell time in the procedure position [sec.]	0-5.00
	Following program address	0-255
Display A3	Program number	1-255

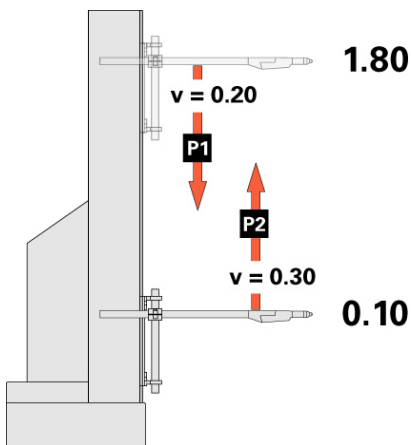
- In the keypad Program, select the desired program number using and (see also "Program change")
The display A3 shows the program number
- Press the **Select** key:
LED illuminates green. The LED in the display area **A1** illuminates green too. The display **A2** is completely dark.
- Input the desired value for the desired position on the display **A1** using the keys and
- Press the **Select** key again:
LED illuminates green
- Input the desired value for the desired speed on the display **A1** using the keys and
- Press the **Select** key again:
LED illuminates green
- Input the desired value for the desired dwell time on the display **A1** using the keys and
- Press the **Select** key again:
LED illuminates green
- Input the address of the following program on the display **A1** using the keys and
0 = no following program step
- Press the **Select** key again, or press or , in order to exit the **Program editing** mode

Programming example - positioning



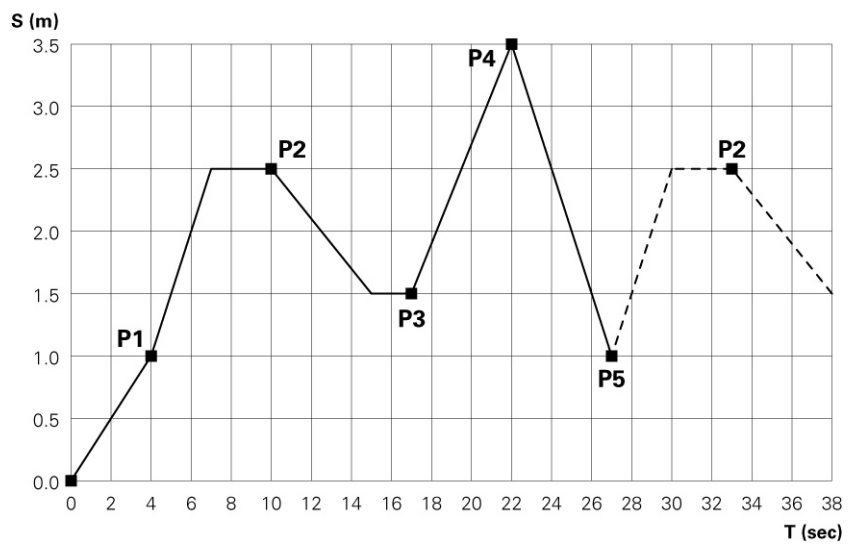
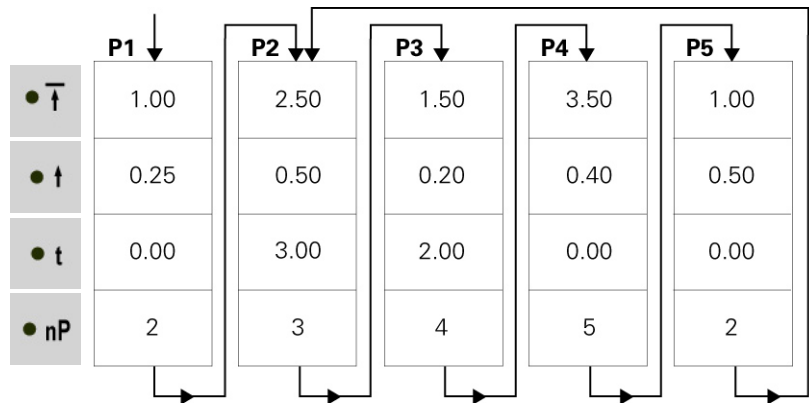
Program no. 1	
Display	Input value
● $\bar{\uparrow}$	1.00 m
● \uparrow	0.20 m/s
● t	0 s
● nP	0

Programming example - pendulum movement



Display	Program no. 1	Program no. 2
	Input value	Input value
● $\bar{\uparrow}$	0.10 m	1.80 m
● \uparrow	0.20 m/s	0.30 m/s
● t	0 s	0 s
● nP	2	1

Programming example with path-time diagram



Semiautomatic pendulum operation mode

Basically, the **semiautomatic pendulum operating mode** operates in the same way as the standard pendulum program. However, the axis can be started or stopped via a control signal. In this operating mode, the pendulum movement is completely executed and the travel is stopped at the lower reversing point. As a result, a sequence control with object recognition and "axis start/stop" can be realized in a simple way.



Note:

The system parameter P2 must be set to 3 (pendulum operation semi-automatic), the Remote LED blinks!

The start is released via pin 3 at plug 2.1 "Mains connection" or the parallel interface at plug 2.4 (for more details, please refer to "Pin allocation"). During an operation, the axis can not be stopped with the stop key.

Only limited operation is possible via the control panel, namely:

- Reference axes
- program editing when the axis is moving
- program switch when the axis is moving
- choice of input mode / display mode (visualization of the desired values and actual values)
- Acknowledgement of error messages

The program editing requires the same procedures as in standard semi-automatic.

Sequence program X_GunClean

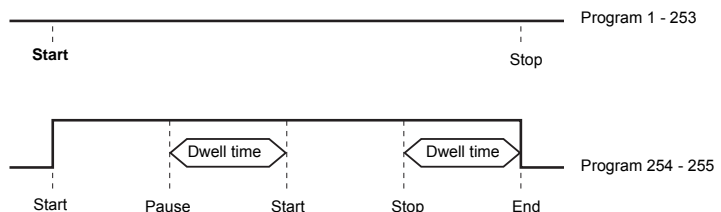
In terms of function and operation, the operating mode sequence program X_GunClean is based on the sequence program. This program is used to execute a gun cleaning with the X axis. The programs 1-253 allow travel to different positions. For this program application, the digital output 2 always remains on **low**. The programs 254 and 255 actuate the digital output 2 (see graph). With these two programmed positions, the operator has the possibility to trigger a gun cleaning.



Note:

The system parameter P2 has to be set to 4 (X_GunClean sequence program)!

P2 = 4 X-GunClean sequence program















The program editing requires the same procedures as in the sequence program.










Setup

If an object is hanging in the cabin, it is very advantageous if the upper and lower reversing point (or travel positions in sequence programs) can be directly taken from the object to be coated in a Teach-In procedure. The program parameters of the present program can be set, and the axis travels with the change. It is also possible to select the program number.

Setup mode via keyboard (pendulum mode / semiautomatic)

1. Press the **Select** and  keys simultaneously.
The corresponding LED blinks
2. Press  or  in the display area **A1**, in order to start the axis
 - **LED 1** blinks
 - Axis travels to the upper reversing point
3. Adjust the upper reversing point on display **A1** using the keys  and 
 - Axis travels with the change
 - The position of the upper reversing point is programmed
4. Press  or  in the display area **A2** to start the axis
 - **LED 2** blinks
 - Axis travels to the lower reversing point
5. Adjust the lower reversing point on display **A2** using the keys  and 
 - Axis travels with the change
 - The position of the lower reversing point is programmed
6. Select the desired program number in the keyboard **Program** using  and 
The display **A3** shows the program number
7. Press , in order to exit the system parameter mode






Setup mode via keyboard (sequence program)

1. Press the **Select** and  keys simultaneously.
The corresponding LED blinks
2. Press  or  in the display area **A1**, in order to start the axis
 - Axis travels to the position of the first program step
3. On the display **A1**, adjust the position using the keys  and 
 - **LED 1** blinks
 - Axis travels with the change
 - The position of the first program step is programmed
4. Press  to select the next program step
 - Display **A3** shows - - -
5. Select the desired program number in the keyboard **Program** using  and 
The display **A3** shows the program number
6. Repeat steps 2-5 for other programs
7. Press  to exit the setup mode

RAM reset

On a RAM reset all programs and the system parameters are loaded with default values.

Call up RAM reset mode

1. Switch off the axes control unit by pressing  0
2. Keep  pressed and at the same time switch on the axes control unit with . Keep  pressed down for 10 seconds. The value **255** appears on the display **A3**, and the **LED L3** blinks. All other displays are not illuminated
3. Press , in order to exit the RAM reset

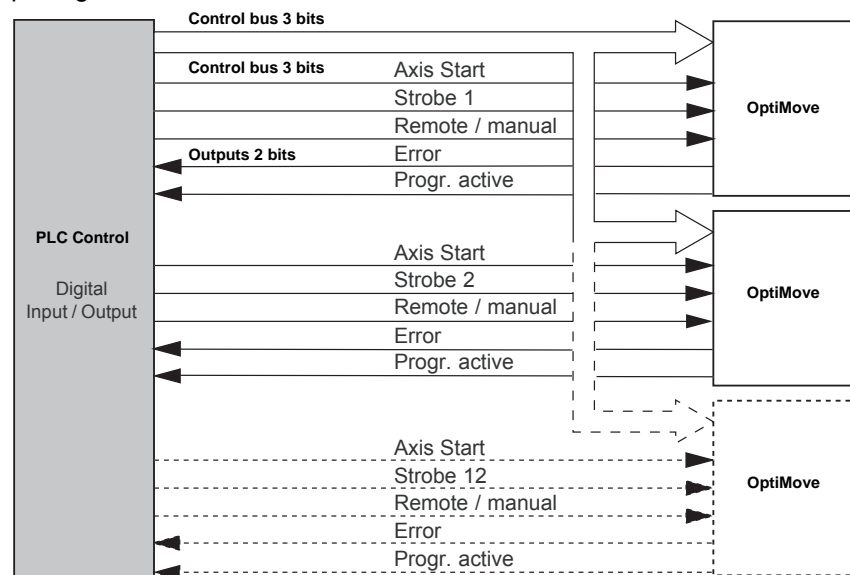
Default values after RAM reset

Designation	Default values
Desired values/control values	
Pendulum operation P2=1 or P2=3	
Upper reversing point PO [m]	0.30
Lower reversing point PU [m]	0.00
Speed - upwards [m/s]	0.20
Speed - downwards [m/s]	0.20
System parameter	
P1: Max. Travel position P_max.	0.30
P2: Operating mode	1
P3: Acceleration [m /s ²]	1.50
P4: Max. speed V_max.	0.60
P5: Loop gain	40
P6: Incremental pulse generator adjustment [pulse/cm]	750
P7: Compensation of holding brake delay time [ms]	100
P8: Communication	0
P9: Keyboard lock	0
P10: Referencing mode	1
P11: CAN Baud rate	3
P12: CAN address	1

DigitalBus parallel interface

Overview

The axes control unit is connected to a superordinated control (PLC) by the DigitalBus. The DigitalBus has a 17 bit parallel interface. The interface comprises 15 digital inputs and 2 digital outputs. The digital inputs are divided into a data bus, consisting of 12 bits and a control bus, comprising 3 bits.



DigitalBus - overview

Data bus control

The data transmission from a higher hierarchy control (PLC) to the control unit can be realized by the data bus (12 bits) and the control bus (3 bits). All the program data and program numbers can be transmitted with the first 9 bits (bit 1-9) of the data bus in binary code (value range 0-512). The identification number is transmitted in binary code (value range 0-7) with the last 3 bits (bit 10-12) of the data bus. The data reception from the data bus is initiated by a negative flank of the strobe control signal.

The Data Bus is read in for data validation 3 times, and the results compared, after every negative Strobe flank. In the event of an error, the digital output **Error** is set at **high** and the error alarm H30 is shown on display **A3**.

Control commands

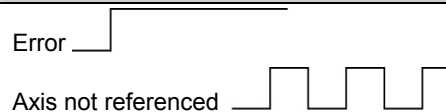
Data bus 12 bits (Input)

Bit	Function
1	Desired values, program no. Binary value 2^0 (=1)
2	Desired values, program no. Binary value 2^1 (=2)
3	Desired values, program no. Binary value 2^2 (=4)
4	Desired values, program no. Binary value 2^3 (=8)
5	Desired values, program no. Binary value 2^4 (=16)
6	Desired values, program no. Binary value 2^5 (=32)
7	Desired values, program no. Binary value 2^6 (=64)
8	Desired values, program no. Binary value 2^7 (=128)
9	Desired values, program no. Binary value 2^8 (=256)
10	A0: Identification number Binary value 2^0 (=1)
11	A1: Identification number Binary value 2^1 (=2)
12	A2: Identification number Binary value 2^2 (=4)

Control bus 3 bits (Input)

Bit	Function
13	Axis_Start / Axis_Start semiautomatic
14	Strobe (data transfer from data bus)
15	Remote, manually/keyboard lock, manually

Outputs 2 bits

Bit	Function
1	 <p>Error</p> <p>Axis not referenced</p>
2	Program_Active

Digital output 1

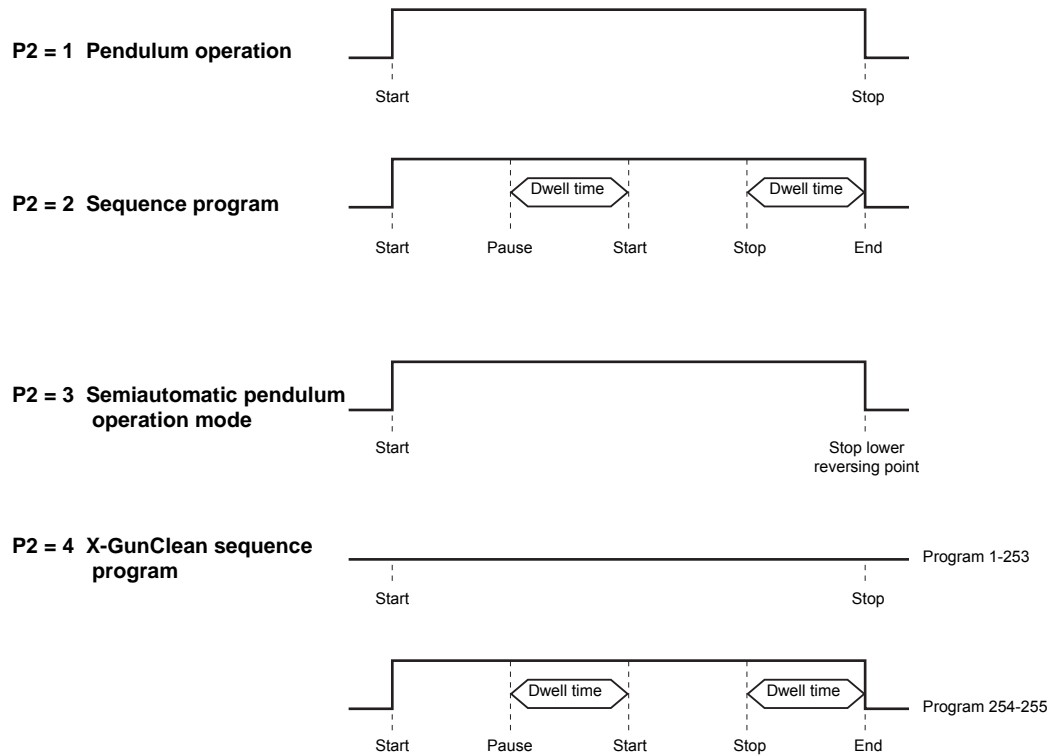
Two functions are assigned to the digital output 1:

1. After the start-up, an impulse of 0,1 s is set at output 1, i.e. the axis has to execute a reference travel.
2. The composite error message shows all errors which are present in the control unit.

Digital Output 1 = high - Composite error message

Digital output 2 - Program_Active

The digital output **Program_Active** indicates the operating status of the reciprocator. The following diagram shows how the output reacts in the different operating modes:



Note:
 When traveling to a reference point, the output always remains always on "low"!

Data transmission (bit 1-9)

Designation	Value range	Resolution	Pendulum operation P2 = 1 P2 = 3	Sequence program P2 = 2 P2 = 4
Upper reversing point (m)	0.00-5.00	0.01	X	X
Lower reversing point (m)	0.00-5.00	0.01	X	
Speed - upwards (m/s)	0.08-0.60	0.01	X	X
Speed - downwards (m/s)	0.08-0.60	0.01	X	
Dwell time (s)	0-5.00	0.01		X
Following program address nP	0-255	1		X
Program no.	1-255	1	X	X
Start travel to reference point	0-1	1	X	X

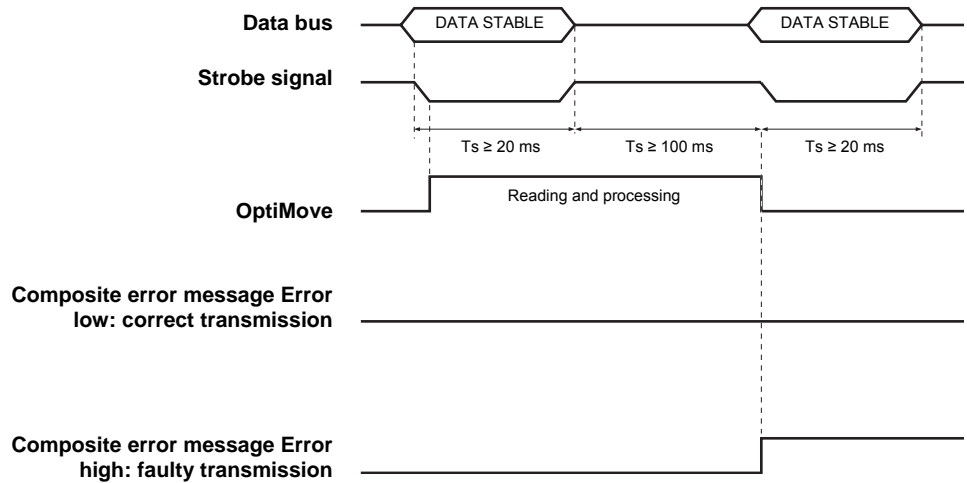
X = is used in the respective mode

Identification (bit 10-12)

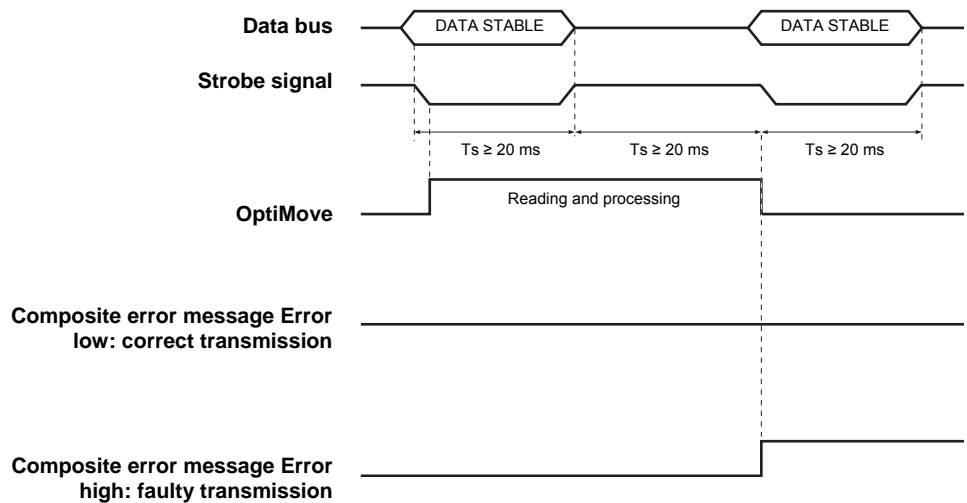
ID no.	Classification
0	Upper reversing point
1	Lower reversing point
2	Speed upwards
3	Speed downwards
4	Dwell time
5	Following program address nP
6	Program no.
7	Start travel to reference point

Control sequence - time diagram

Control sequence for switching the program number (Identification number 6)



Control sequence for program parameter (Identification numbers 0-5)



Software description

For each OptiMove axes control unit it exists one strobe signal and one error signal. The data signals and the identification number signals are used in common for all OptiMove control units. The OptiMove takes over the data with the negative flank of the strobe signal.

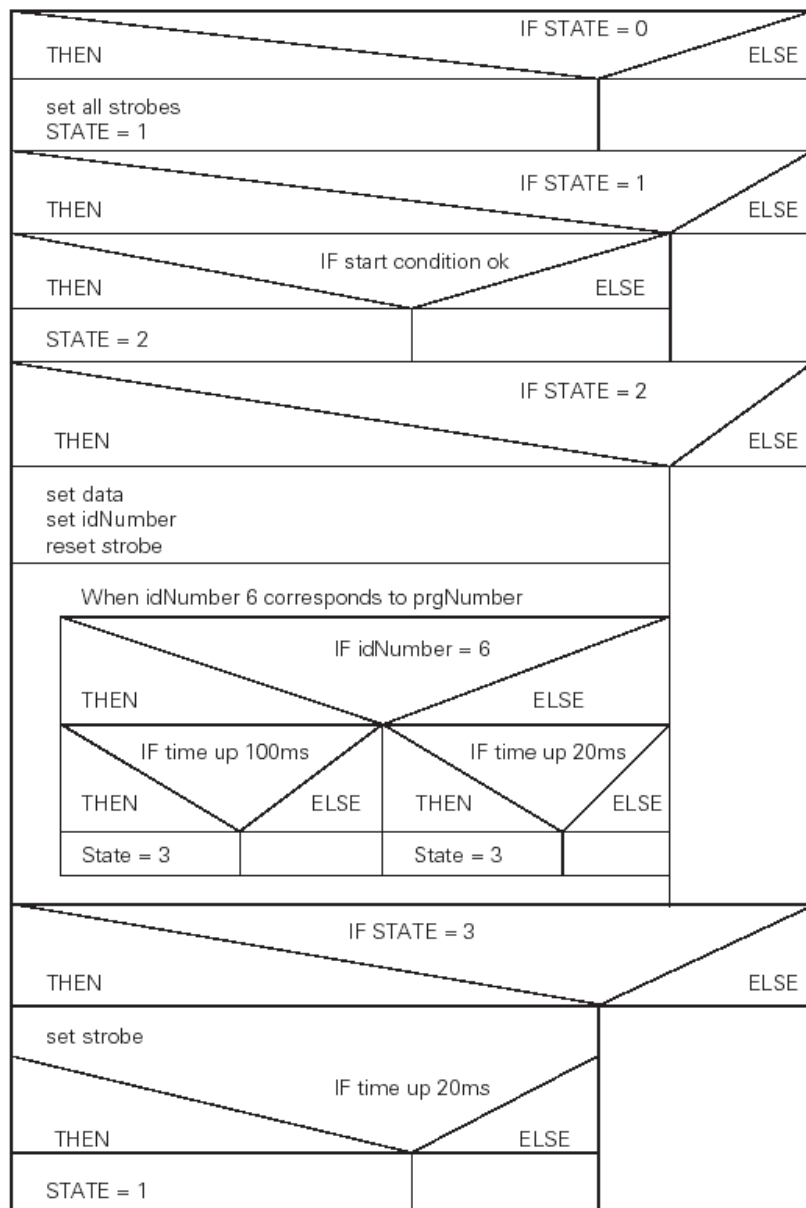
Explanation:

The simultaneous transmission of identical data to all OptiMove units only occurs at the negative flank of all strobe signals.

Example of a PLC program:

Functional block statements

BEGIN



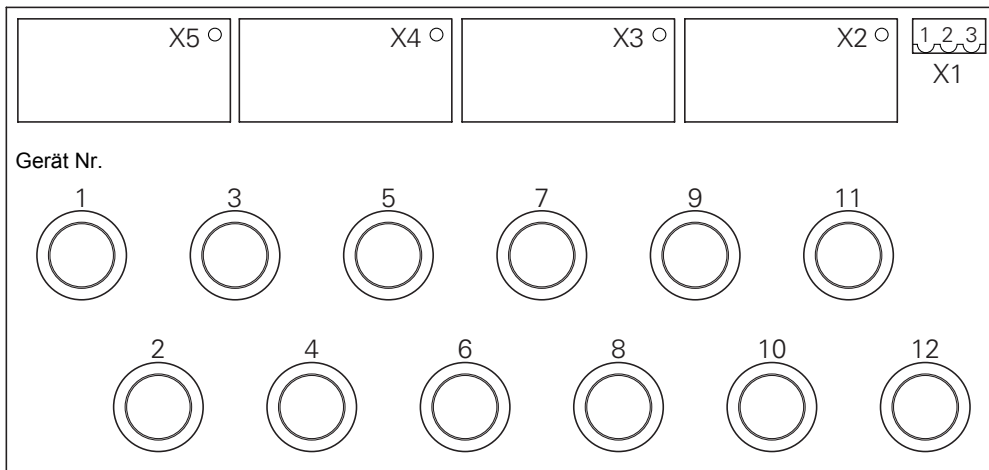
END

Digital Connector CD02 with connection designations

The interface between the OptiMove CR06 Axes control unit and the PLC is given by the Digital Connector CD02. All parallel interface signals of up to 12 devices are fed connection-friendly on plugs.

The exact plug assignment for the connection to the PLC is evident in the following illustration:

X5	X4	X3	X2	X1
1-12 Strobe	1-12 D8	1-12 Prog. active	1-8/13-20 D0-D7	1: GND
13-24 Axis Start	13-24 Remote/man.	13-24 Error/not ref.	9-11/21-23 A0-A2	2: +24 VDC
				3: PE



Digital Connector CD02

CAN bus

Description

The OptiMove CR06 Axes control unit is fitted with a CAN bus interface as standard, and can be operated as a simple CANopen slave in a network with a central control unit (Master).

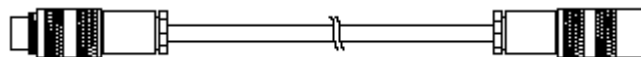
The communication between the individual users takes place in a network via CAN bus, therefore each component should be classified with a clear individual user address (Node-ID = identification number). The Baud rate setting serves for setting the transmission speed (see also "Setting Baud rate").

Hardware

The OptiMove controls are connected to one another and to the central PLC Control through a 4 pole CAN bus cable. The last bus participant is fitted with a terminal plug with a terminal resistor in order to terminate the network correctly. A maximum of up to 125 users can be connected in a network.







CAN bus cable - pin assignment

Pin	Signal	Color
1	GND	white
2	+24 VDC	brown
3	CAN H	green
4	CAN L	yellow



CAN bus cable

Setting the user address (ID number)






1. Switch to the system parameter mode by pressing the key  for approximately 5 seconds. The LEDs **L1-L3** illuminate
2. Select the parameter **P12** on the display **A1** using the  and  keys
3. Select an address between **1** und **127** on display **A2** using the keys  and 
4. Press , in order to exit the system parameter mode



Attention:


The address "0" may never be selected in the system parameter P12, the address must be unique and must not conflict with the numbers of other existing users!

Setting Baud rate

1. Switch to the system parameter mode by pressing the key  for approximately 5 seconds. The LEDs **L1-L3** illuminate
2. Select the parameter **P11** on the display **A1** using the  and  keys
3. Select a value between **0** und **7** on display **A2** using the keys  and 

Set value P11	CAN Baud rate
0	20 kBit/s
1	50 kBit/s
2	100 kBit/s
3	125 kBit/s (default)
4	250 kBit/s
5	500 kBit/s
6	800 kBit/s
7	1 Mbit/s

The Baud rate is selected with 125 kBits as default This setting permits a maximum cable length of approximately 500 meters from the first to the last CAN bus user. If longer cable lengths are used, the selected Baud rate should be lower.

4. Press , in order to exit the system parameter mode



Note:



For details on the CANOpen interface, please refer to the separate "OptiMove function specifications" operating manual!

Troubleshooting

General information

All error messages are displayed as an error code number (H01 to H99) on the seven segment display **A3** (instead of the program number).

When a fault is present in the system the cause must be eliminated before further operation is possible.

When the fault has been eliminated, it must be acknowledged by pressing the keys  or  of the **Program** display.

Error messages

Number	Description	Action
Axis		
H01	Upper end stop (system parameter P1) overrun	Emergency stop Axis can only travel downwards Axis must be referenced again
H02	Tracking error too great	In order to prevent the greater tracking error, the speed must be reduced
H03	Encoder cable broken	Emergency stop Axis must be referenced again
H04	Wrong encoder direction of rotation	Emergency stop Axis must be referenced again
H05	Desired travel position greater then the defined software end stop (system parameter P1)	Travel position must be limited according to SP1
H06	Lower end stop overrun	Emergency stop Axis can only travel upwards Axis must be referenced again
H07	Proximity switch signal is permanent active during the reference travel	Referencing not successful
H08	No proximity switch signal during the reference travel	Referencing not successful
H09	Speed value greater then SP4	Speed must be limited according to SP4
H10	Axis position not correctly stored during switching off	Axis position = Upper end stop - axis can only travel downwards

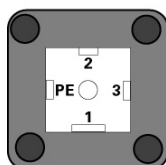
Number	Description	Action
Axis		
H11	Frequency converter error	Emergency stop
H12	Axis cannot be started, when not referenced	
H13	Axis cannot be referenced, because already referenced	
H15	Input of the parameters in the sequence program not possible, while program is running	
H16	Axis cannot be started during reference travel	
Hardware		
H20	24VDC Supply voltage too high (26.5 VDC)	Axis stops (soft stop)
H21	24VDC Supply voltage too low (20.8 VDC)	Emergency stop Store axis position, current program number and axis status System stop
H23	EEPROM content invalid	Load factory configuration
DigitalBus		
H30	Data validation fault	Data rejected
H31	Data outside the value range	Data rejected
H32	Overflow on data reception	Data rejected
CAN bus		
H40	Permanent CAN bus error (BUSOFF), i.e. no power supply or cable not connected	
H41	Too many errors during sending (ERROR_PASSIVE)	
H42	Overflow on reception	
H43	Overflow on transmission	
H44	Master failed	Axis stops (soft stop)
H45	Data outside the value range	Data rejected
H46	Invalid Node ID set	Node ID = 127

Hardware

Pin allocations

2.1

Mains connection



Plug 2.1 - Mains connection

Pin	Function
1	Neutral conductor
2	Phase (230 VAC)
3	Axis start (230 VAC)
PE	Ground

2.2

Drive supply



Plug 2.2 - Drive supply

Pin	Function
1	Neutral conductor
2	Phase
3	Not connected
PE	Ground

2.3

Drive I/O



Plug 2.3 - Drive I/O

Pin	Function
1	GND frequency converter
2	24 V frequency converter
3	Frequency converter error
4	Desired value "Speed"
5	Motor right running (UP)
6	Motor left running (DOWN)
7	Reserve
8	Reserve
9	24 VDC OptiMove
10	Motor brake

11	Proximity switch
12	Reserve
13	B+
14	B-
15	A-
16	A+
17	O+
18	O-
19	GND OptiMove
Enclosure	Shield

Plug 2.4 - DigitalBus parallel interface



Pin	Bit	Function
A	D0	Desired values, Program no. Binary value 1
B	D1	Desired values, Program no. Binary value 2
C	D2	Desired values, Program no. Binary value 3
D	D3	Desired values, Program no. Binary value 4
E	D4	Desired values, Program no. Binary value 5
F	D5	Desired values, Program no. Binary value 6
G	D6	Desired values, Program no. Binary value 7
H	D7	Desired values, Program no. Binary value 1
I	A0	Identification number Binary value 1
K	A1	Identification number Binary value 2
L	A2	Identification number Binary value 3
M	12 IN	Axis_Start
N	13 IN	Strobe (data transfer from data bus)
O	14 IN	Remote/manually
P	D8	Desired values, program no. Binary value 9
R	GND_Extern	GND
S	1 OUT	Error, axis not referenced
T	2 OUT	Program_Active
U	24VDC_Extern	24 VDC digital outputs
Enclosure	Shield	Shield

Plug 2.5 - CAN bus IN



Pin	Function
1	GND
2	24 VDC
3	CAN_H
4	CAN_L
Housing	Shield

Plug 2.6 - CAN bus OUT



Pin	Function
1	GND
2	24 VDC
3	CAN_L
4	CAN_H
Housing	Shield

Spare parts list

Ordering spare parts

When ordering spare parts for powder coating equipment, please indicate the following specifications:

- Type and serial number of your powder coating equipment
- Order number, quantity and description of each spare part

Example:

- **Type** OptiMove CR06 Axes control unit,
Serial number 1234 5678
- **Order no.** 203 386, 1 piece, Clamp - Ø 18/15 mm

When ordering cable or hose material, the required length must also be given. The spare part numbers of this yard/meter ware is always marked with an *.

The wear parts are always marked with a #.

All dimensions of plastic hoses are specified with the external and internal diameter:

Example:

Ø 8/6 mm, 8 mm outside diameter (o/d) / 6 mm inside diameter (i/d)



WARNING!

Only original ITW-Gema spare parts should be used, because the hazardous location approval will be preserved that way! The use of spare parts from other manufacturers will invalidate the ITW Gema guarantee conditions!

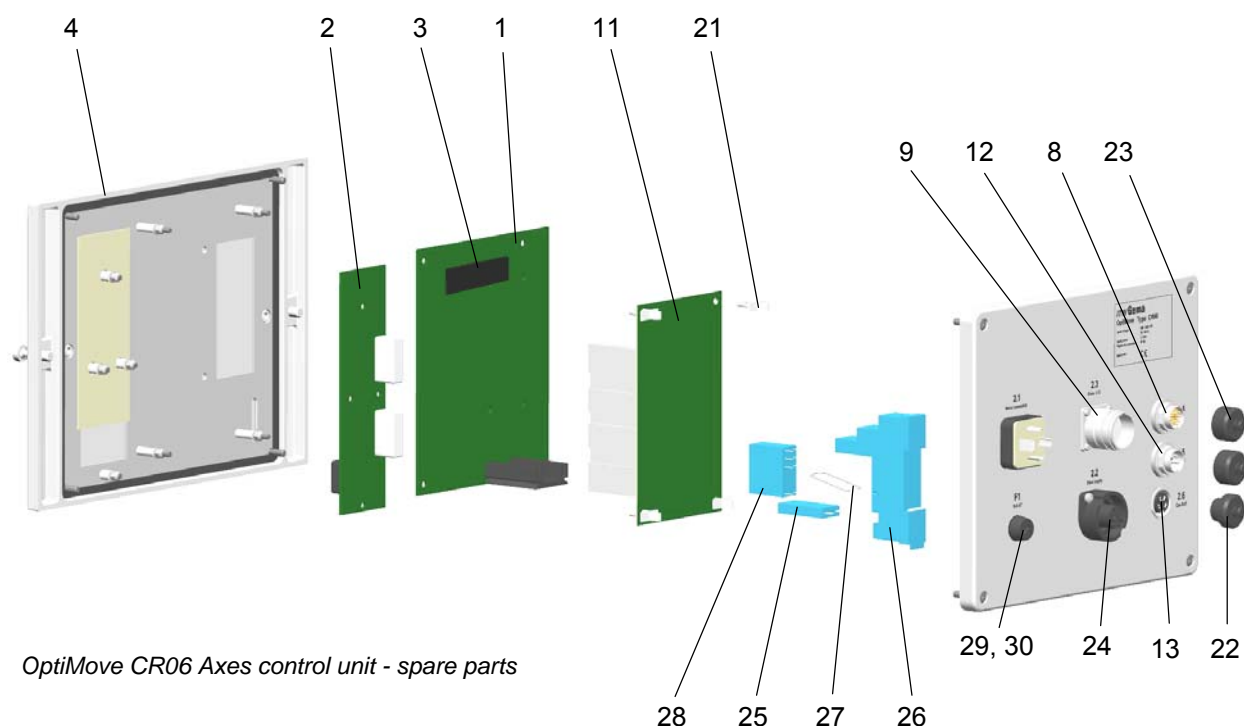
OptiMove CR06 Axes control unit - spare parts

	OptiMove CR06 Axes control unit - complete	1002 860
	Front plate - complete (incl. pos. 1, 2, 3 and 4)	1002 859
1	Main board - complete	1000 202
2	Power board - complete	1000 245
3	EPROM - program version V x.x (current software)	1000 610
4	Flat keyboard with frame - complete	1002 858
8	Connection "DigitalBus" - complete	1000 284
9	Connection "Reciprocator control signals" - complete	1000 285
11	Power pack - 24 VDC	389 277
11.1	Mini fuse - 4 AT, for pos. 11	262 897
12	Connection "CAN-Bus IN" - complete	387 541
13	Connection "CAN-Bus OUT" - complete	387 550
21	Standoff	263 508
22	Dust protection cap for housing	265 446
23	Dust protection cap for plug	265 438
24	Connection for reciprocator power supply - complete	1000 286
25	Free-wheeling diode for relay	258 075
26	Relay socket	251 135
27	Safety strap for relay socket	1001 063
28	Relay - 24 VDC 2UK	1002 915
29	Fuse - 10 AT	200 174
30	Fuse holder	200 131
	Mains cable for ZA04, length 20 m	1000 280
	ZA04 signal cable, length 20 m	1000 281

OptiMove CR06 Axes control unit - spare parts

Optional features (not shown)

Digital Connector CD02 (CR06-PLC interface)	382 825
Digital cable, 19-pin - 1.50 m	1001 500
Digital cable, 19-pin - 3.50 m	1000 933
Digital cable, 19-pin - 4.50 m	1000 934
Digital cable, 19-pin - 5.50 m	1000 935
Digital cable, 19-pin - 6.50 m	1000 936
CAN hub - complete	1001 787
CAN bus cable - 1.80 m	387 584
CAN bus cable - 4.50 m	387 592
CAN bus cable - 5.50 m	388 521
CAN bus cable - 6.50 m	388 530
CAN bus cable - 20 m	389 560
Bus Terminal resistor	387 606



Appendix - program table

Prog.-no.	Upper reversing point	Lower reversing point	V _{UP}	V _{DOWN}	t *	nP *
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