MOSCA®
ELEKTRONIK UND ANTRIEBSTECHNIK GMBH

# Operating instructions

# SP01075
## Control unit for vibratory conveyors


| | |
|---|---|
| Technical documentation | SP01075 |
| Document | B0023_EN.docx |
| Version | V2.02 |
| Edition | 30.10.2023 |

# 1. General

**Original Version**
The original operating instructions is the German edition.
This is legally binding in all legal matters.

**Equipment**
When you bought your machine, you chose a model with individual features.
These operating instructions also describe optional equipment and selected optional accessories offered by Mosca Elektronik.
Please understand that equipment variants are also described that you may not have selected.

**Topicality**
Mosca Elektronik's high level of safety and quality is guaranteed by continuous development of the design, equipment and accessories.
This may result in possible deviations between these operating instructions and your unit. Mosca Elektronik cannot exclude the possibility of errors.
Therefore, no claims can be derived from the information, illustrations and descriptions.

## 1.1 Brief description

**NEWS:**

- **Automatic search for the resonance frequency of** the connected vibration feeder
- **Adjustment of amplitude and frequency** during operation without interruption.
- **Master/slave operation:** A slave unit can be coupled to a master unit with adjustable phase angle.

- Frequency converter for vibratory conveyors
- Output frequency independent of the mains frequency
- Tuning of the mechanical spring system is not necessary
- Can be used worldwide without switching due to multi-voltage input
- Quiet conveying behaviour and reduced noise development of the conveyor (any output voltage curve shape can be stored)
- Constant delivery rate during mains voltage fluctuations
- Operation via display and keys
- Start/stop buttons for the conveyor in the operating display
- All settings possible without opening the housing
- Logic functions: Level control, sorting air control,
  Universal control module USM (e.g. Bunker control)
- Adjustable overload protection
- Setpoint setting: 0...10 (24)V, 0 (4)...20mA, potentiometer 10kΩ
- 2-pole mains switch
- High protection class IP54 for field installation
- Interface RS485

## 1.2 Scope of delivery

Included in the scope of delivery:

- One control unit SP01075

After receipt of the delivery, check immediately whether the scope of delivery corresponds to the accompanying documents. The manufacturer does not accept any warranty for defects that are claimed subsequently.

## 1.3 Accessories

The following accessories are required for parameterising and monitoring the SP01075 control unit (see also chap. 10):

- PC with "ParaDesk" software. You can download ParaDesk free of charge at http://www.paradesk.de.
- Interface converter SP01056
- Mating connector, vibration sensor, cables, etc.

## 1.4 Proper use

- The SP01075 control unit is designed to be mounted on a machine for setting up a vibratory conveyor system.
- Vibratory conveyor systems with the SP01075 control unit, installed according to the specifications of the CE-typical directives, comply with the EC directive EMC
- The CE-typical systems with this control unit are intended
  - for operation on public and non-public networks
  - for use in the industrial sector.
- The control unit is not a household appliance, but is intended for setting up vibratory conveyor systems for commercial use.
- The control unit itself is not a machine in the sense of the EC Machinery Directive.

Only operate the control unit under the operating conditions prescribed in these operating instructions.

Observe the instructions in these operating instructions. This means:
Read the operating instructions carefully before starting work. Keep the operating instructions near the control unit.

## 1.5 Legal provisions

**Liability**
The information, data and notes given in these operating instructions were up to date at the time of printing. No claims can be made based on the information, illustrations and descriptions in these operating instructions for control units of the SP01075 series that have already been delivered.

The procedural notes and circuit sections shown in these operating instructions are suggestions whose transferability to the respective application must be checked. Mosca Elektronik und Antriebstechnik GmbH accepts no liability for the suitability of the procedures and circuit suggestions given.
No liability is accepted for damage and operational disruptions caused by:

- Disregarding these operating instructions
- Unauthorised modifications to the control unit
- Operating errors
- Improper work on and with the control unit

**Warranty**
Report warranty claims to the manufacturer immediately after the defect has been detected. The warranty expires in the event of:

- improper use of the control unit
- improper work on and with the control unit

## 1.6 Definition of terms used

**Qualified staff**
Qualified personnel are persons who, due to their training, experience, instruction as well as knowledge of relevant standards and regulations, accident prevention regulations and operating conditions, have been authorised by the person responsible for the safety of the installation to carry out the respectively required activities and who are able to recognise and avoid possible dangers.
(Definition for skilled workers according to IEC 364)

**Operator**
Operator is any natural or legal person who uses the control unit or on whose behalf the control unit is used.

# 2. Safety instructions

## 2.1 Operating instructions

These operating instructions are intended for safe working on and with the control unit. They contain safety instructions that must be observed.

In addition to the basic safety instructions in this chapter, the safety instructions in the continuous text must also be observed.
These safety instructions do not claim to be complete. If you have any questions or problems, please contact the manufacturer.

All persons working on and with the control unit must have the operating instructions available when carrying out their work and must observe the information and notes relevant to them.
The operating instructions must always be complete and in a perfectly legible condition.

## 2.2 Symbolism

In this manual, important explanations are highlighted with the following symbols:

Caution: This statement indicates hazards that may result in personal injury or property damage.

Attention required / Check: Please pay special attention to the situation described.

Information: Here you can find further information about the product.

## 2.3 General safety instructions

The control unit corresponds to the state of the art at the time of delivery and is generally considered to be safe to operate. The control unit may be dangerous if:

- unqualified personnel work on and with the control unit,
- the control unit is used improperly.

Then there is danger for:

- People
- the control unit
- other tangible assets of the operator.

The control units must be designed in such a way that they fulfil their functions and do not cause any danger to persons when properly installed and used for their intended purpose in fault-free operation. This also applies to the interaction of the control unit with the overall system.

Take additional measures to limit the consequences of malfunctions that may cause danger to persons:

- other independent devices which safeguard against possible malfunctions of the control unit.

- Electrical or non-electrical protective devices (e.g. interlocking or mechanical locks)
- system-wide measures

Take appropriate measures to ensure that no material damage occurs in the event of faults in the control unit.

### 2.4 Duties of the operator

The operator or his safety representative is obliged to:

- monitor compliance with all relevant regulations, notices and laws,
- ensure that only qualified personnel work on and with the control unit,
- ensure that personnel have the operating instructions available for all relevant work; and
- prohibit unqualified personnel from working on and with the control unit.

### 2.5 Staff

Only qualified personnel may work on and with the control unit.

### 2.6 Control unit

Only operate the control unit when it is in perfect condition. The permissible operating conditions and performance limits must be observed.

Retrofitting, modifications or conversions of the control unit are generally prohibited. In any case, they require consultation with the manufacturer.

The control unit is a piece of equipment for use in industrial systems. During operation, this equipment has dangerous, live parts. During operation, all covers must therefore be in place to ensure protection against accidental contact.

### 2.7 Operation

The control unit generates heat during operation. Depending on the operating conditions, there may be a risk of burns if the housing is touched. Keep a sufficient safety distance from combustible materials.

# 3. Technical data

## 3.1 Technical data

| Electrical parameter | Unit | Value |
|---|---|---|
| Input voltage | $V_{AC}$ | 100...240 +-10% |
| Input current at 110/230VAC and 10A output current *1 | $A_{AC}$ | 5 / 2,5 |
| Output frequency | Hz | 5 ... 300 |
| Output continuous current *2 | $A_{AC}$ | 10 |
| Output power | VA | 2200 |
| Analog inputs | | 2 units, level configurable, Can also be used as digital input |
| Digital inputs | | 3 units |
| Digital outputs | | 4 units + switching |
| Power supply for ext. consumer | | 24V / 100mA |
| Ambient temperature | °C | 0...70 (power reduction of 2%/K) |
| Storage temperature | °C | -10 ... 80 |
| Humidity | % | max. 80, non-condensing |
| Protection class | | IP20, IP54 depending on version |
| Installation height | m | 1,000m (>1,000m power reduction of 1% /100m) |

*1 Input current is smaller than the output current because of the inductive load. A large part of the output power is reactive power.

*2 The unit is rated at 10A, depending on the cooling surface, ambient temperature and installation height, the current must be reduced. See also Chap. 3.3

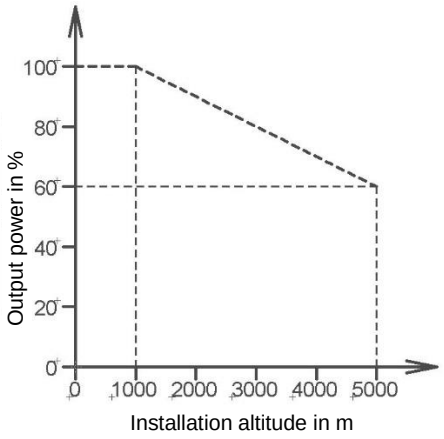
## 3.2 Ratio of input voltage to output voltage

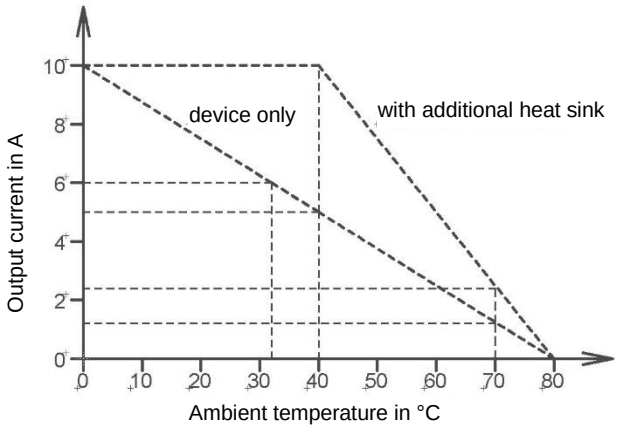
There is no PFC unit in the device. This means that the possible output voltage depends on the input voltage.
In addition, output voltage depends on the selected waveform. Below is a table for a better overview:

| Input voltage | Output voltage | |
|---|---|---|
| 110 $V_{AC}$ / 60 Hz | Sine wave: | 103 $V_{AC}$ |
| | Sine with 3rd harmonic: | 118 $V_{AC}$ |
| 230 $V_{AC}$ / 50 Hz | Sine wave: | 208 $V_{AC}$ |
| | Sine with 3rd harmonic: | 239 $V_{AC}$ |

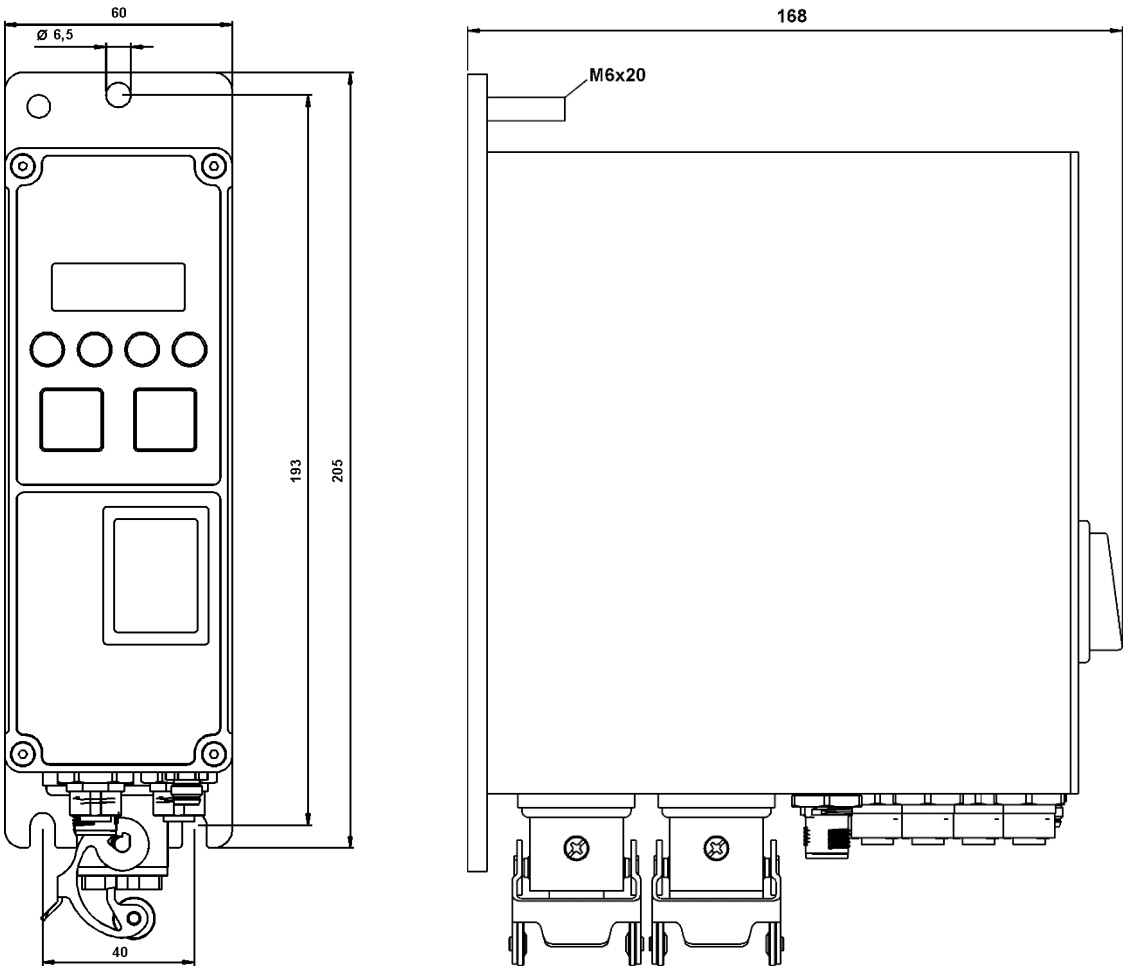
## 3.3 Operating conditions

At installation altitudes above 1000m or at high temperatures, reduce the output power of the unit according to the diagrams below.
The characteristic curve refers to the unit with free-standing base plate.
If the unit is mounted with the base plate on a heat dissipating surface, the characteristic curve shifts upwards (see additional heat sink).
The max. continuous current is limited to 10A.

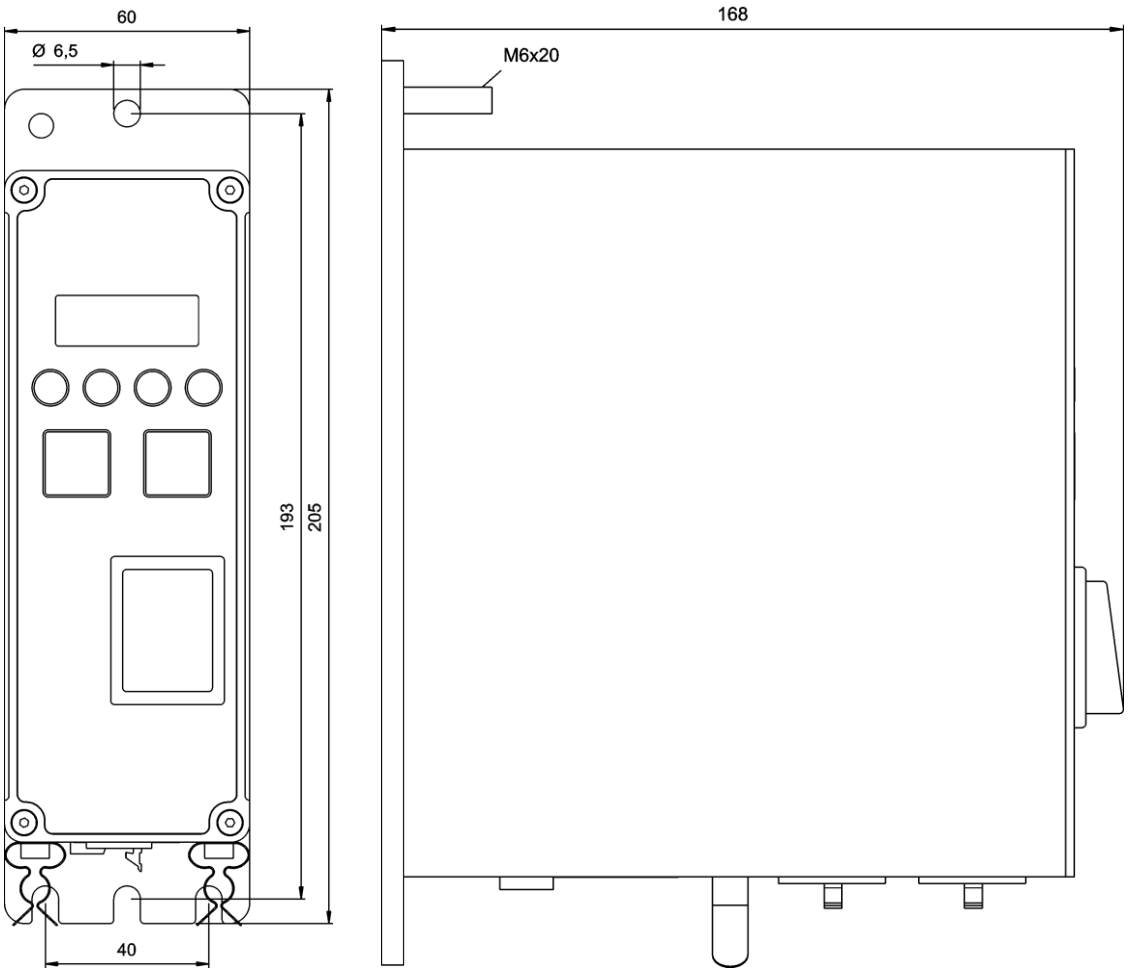



## 3.4 Dimensional drawing IP54

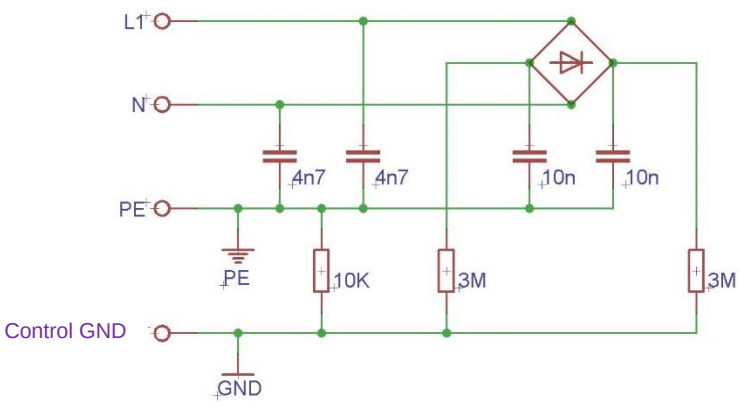


## 3.5 Dimensional drawing IP20




## 3.6 Note on measuring the leakage current

The total leakage current is composed of the leakage current of the Y-capacitors and a resistor between UZK and GND, cf. the following sketch.



# 4. Installation

- Do not exceed the permissible range of the operating ambient temperature ( see Chap. 3.2)
- The control unit contains electrostatically sensitive components. Before carrying out assembly and service work in the area of the connection terminals, the personnel must free themselves from electrostatic charges. Discharge can be achieved by first touching an earthed metal surface.
- The appropriate line protection fuse is required to protect the supply line
- Setpoint inputs must be routed with shielded cables.
- Generously dimension the cable cross-sections accordingly!
- Observe the locally applicable safety provisions

## 4.1 EMC - compliant wiring

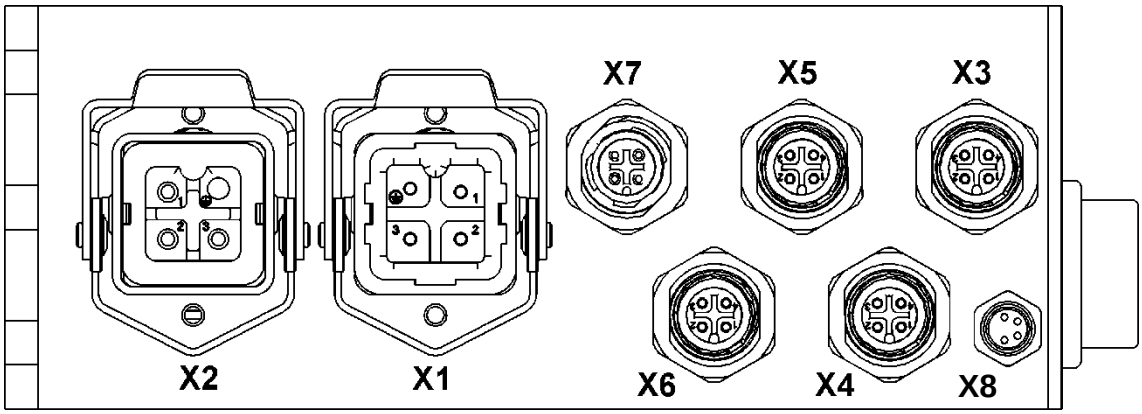
To ensure electromagnetic compatibility (EMC) in your control cabinets in electrically harsh environments, the following EMC rules must be observed during design and assembly:

- All metallic parts of the control cabinet must be connected to each other over a wide area and with good conductivity. (Not lacquer on lacquer!) If necessary, use contact or scratch washers. The cabinet door must be connected to the cabinet via the earth straps (top, middle, bottom) as short as possible.
- Signal lines and power cables must be laid spatially separated from each other to avoid coupling distances. Minimum distance: 20 cm.
- If possible, only run signal lines from one level into the cabinet. Non-shielded lines of the same circuit (outgoing and return conductors) should be twisted if possible.
- Contactors, relays and solenoid valves in the cabinet, if necessary in neighbouring cabinets, are to be wired with extinguishing combinations; e.g. with RC elements, varistors, diodes.
- The shields of shielded cables must be connected to earth[1] on both sides (source and destination), over a large area and with good conductivity. In case of poor equipotential bonding between the shield connections, an additional compensating conductor of at least 10 $mm^2$ must be laid parallel to the shield to reduce the shield current.
- Do not lay wiring freely in the cabinet, but route it as close as possible to the cabinet housing or to mounting plates. This also applies to reserve cables. These must be earthed at least at one end, better at both ends (additional shielding effect).
- Unnecessary cable lengths are to be avoided. Coupling capacitances and inductances are thus kept small.
- The shielding of supply lines must be connected to enclosure ground. In the area where cables are routed into the enclosure, the insulation must be removed to expose the shielding braid. The shielding braid must not be damaged when uncovering. The cable must be routed at the exposed point through terminals or clamping yokes connected to earth.
- Use high quality cables with low shield capacitance.
- Lay shielded cables without interruption. Avoid unnecessary clamping points and connectors. Make sure that there is a continuous shield even with plug-in connectors.

[1]Earth is generally defined as all metallically conductive parts that can be connected to a protective earth conductor. e.g. cabinet housing, motor housing, foundation earth, etc.

## 4.2 Electrical connection

### 4.2.1 Terminal assignment IP54




| Overview I/O | |
|---|---|
| **Function** | **Connector pin** |
| IN1 | X3-4 |
| IN2 | X4-4 |
| IN3/OUT3 | X5-4 |
| IN4 | X3-2 |
| IN5 | X4-2 |
| OUT1 | X6-4 |
| OUT2 | X6-2 |
| OUT4 | X5-2, X7 |

| X1 compatible with HAN3A 3+PE pin insert (M) | | |
|---|---|---|
| **Pin** | **Function** | **Comment** |
| 1 | L | Mains input |
| 2 | N | Mains input |
| 3 | NC | |
| PE | PE | Mains input |

| X2 compatible with HAN3A 3+PE socket insert (F) | | |
|---|---|---|
| **Pin** | **Function** | **Comment** |
| 1 | Magnet AC1 | Magnet connection |
| 2 | Magnet AC2 | Magnet connection |
| 3 | NC | |
| PE | PE | Magnet connection |

| X3 M12 socket 4-pin A-coded | | |
|---|---|---|
| **Pin** | **Function** | **Comment** |
| 1 | 24V | Supply |
| 2 | IN4 | Signal input |
| 3 | GND | Supply |
| 4 | IN1 | Signal input |

| X4 M12 socket 4-pin A-coded | | |
|---|---|---|
| **Pin** | **Function** | **Comment** |
| 1 | 24V | Supply |
| 2 | IN5 | Signal input |
| 3 | GND | Supply |
| 4 | IN2 | Signal input |

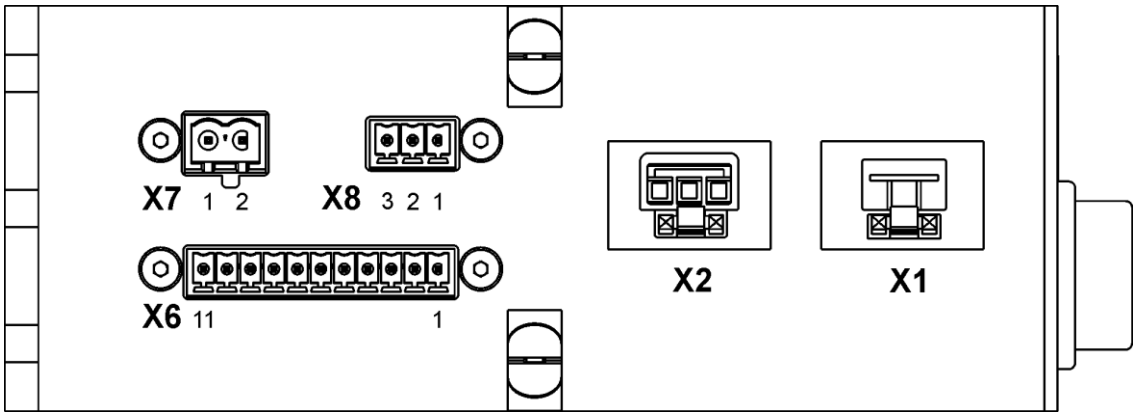
| X5 M12 socket 4-pin A-coded | | |
|---|---|---|
| **Pin** | **Function** | **Comment** |
| 1 | 24V | Supply |
| 2 | OUT4 | Signal output |
| 3 | GND | Supply |
| 4 | IN3, OUT3 | Signal input, signal output |

| X6 M12 socket 4-pin A-coded | | |
|---|---|---|
| **Pin** | **Function** | **Comment** |
| 1 | 24V | Supply |
| 2 | OUT2 | Signal output |
| 3 | GND | Supply |
| 4 | OUT1 | Signal output |

| X7 M12 connector 4-pin A-coded | | |
|---|---|---|
| **Pin** | **Function** | **Comment** |
| 1 | COM | Relay contact OUT4 |
| 2 | - | |
| 3 | - | |
| 4 | NO | Relay contact OUT4 |

| X8 M8 connector 4pol. | | |
|---|---|---|
| **Pin** | **Function** | **Comment** |
| 1 | - | |
| 2 | GND | RS485 |
| 3 | A | RS485 |
| 4 | B | RS485 |

### 4.2.2 Terminal assignment IP20




| Connector X1 | | |
|---|---|---|
| **Pin** | **Function** | **Comment** |
| L | L | Mains input |
| N | N | Mains input |
| PE | PE | Mains input |

| Connector X2 | | |
|---|---|---|
| **Pin** | **Function** | **Comment** |
| 1 | Magnet AC1 | Magnet connection |
| 2 | Magnet AC2 | Magnet connection |
| PE | PE | Magnet connection |

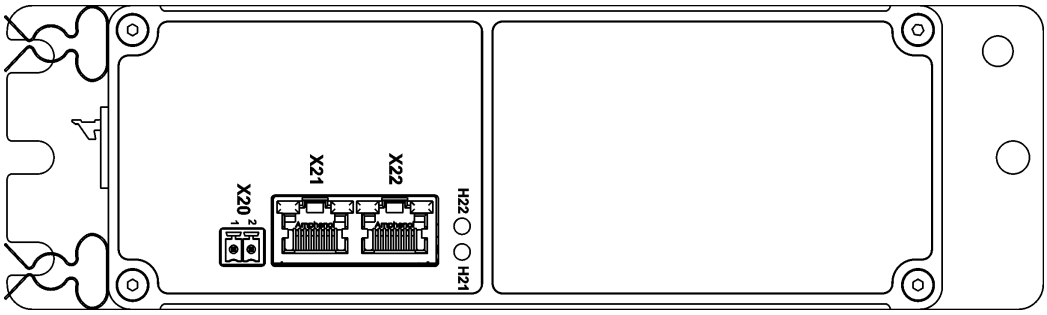
| Connector X6 | | |
|---|---|---|
| **Pin** | **Function** | **Comment** |
| 1 | GND | Power supply Reference |
| 2 | IN1 | Signal input |
| 3 | IN2 | Signal input |
| 4 | IN3 | Signal input |
| 5 | IN4 | Signal input |
| 6 | IN5 | Signal input |
| 7 | OUT1 | Signal output |
| 8 | OUT2 | Signal output |
| 9 | OUT3 | Signal output |
| 10 | OUT4 | Signal output |
| 11 | 24V | Power supply |

| Connector X7 | | |
|---|---|---|
| **Pin** | **Function** | **Comment** |
| 1 | COM | Relay contact OUT4 |
| 2 | NO | Relay contact OUT4 |

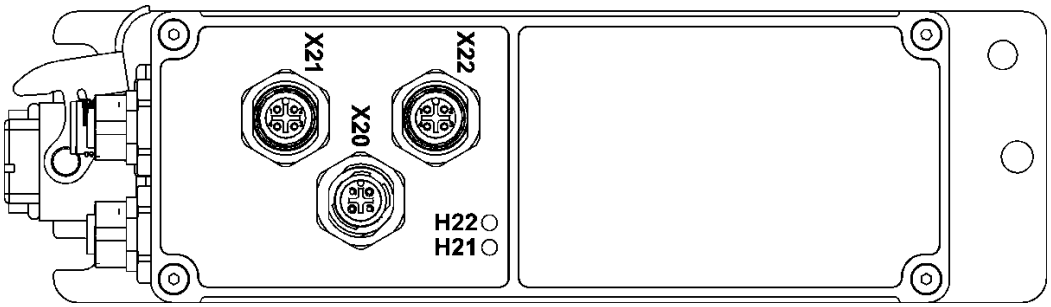
| Connector X8 | | |
|---|---|---|
| **Pin** | **Function** | **Comment** |
| 1 | A | RS485 |
| 2 | B | RS485 |
| 3 | GND | RS485 |

### 4.2.3 Pin assignment Profinet, Ethernet IP

*4.2.3.1 Front view IP20*




*4.2.3.2 Front view IP54*




*4.2.3.3 Technical data:*

| Parameter | Unit | Value |
|---|---|---|
| Supply voltage | VDC | 18...30 |
| Current consumption | mADC | 100 |
| Isolation | | The bus interface is to the unit<br>Potentially isolated |
| Bus connection IP20 | | RJ45 sockets |
| Bus connection IP54 | | M12 socket 4-pin D-coded |

*4.2.3.1 X20 Bus supply voltage:*

| Function | Pin Terminal strip | Pin M12 Plug A-coded |
|---|---|---|
| 24V bus | 2 | 1 |
| GND Bus | 1 | 3 |

*4.2.3.2 X21 Port1, X22 Port2*

| Signal | Pin RJ45 | Pin M12 |
|---|---|---|
| TD+ | 1 | 1 |
| TD- | 2 | 3 |
| RD+ | 3 | 2 |
| RD- | 6 | 4 |

*4.2.3.3 LEDs:*

| Ref. | Function | Comment |
|---|---|---|
| H21<br>H22 | Link/Traffic Port 1<br>Link/Traffic Port 2 | OFF=no connection to the bus<br>ON= Connection to the bus<br>FLASHES=Data packets are sent/received |

### 4.2.4 Function inputs and outputs

#### *4.2.4.1 Possible function assignments*

The function outputs or inputs can be assigned either as analog input, digital input or digital output, depending on the parameter setting (cf. chapter 6).
Not every function output or input can have all three variants. The following overview shows the different assignment options:

| Designation | Analog IN (AIN) | Digital IN (DIN) | Digital OUT (DOUT) |
|---|---|---|---|
| IN1 | | X | |
| IN2 | | X | |
| IN3 | | X | |
| IN4 | X | X | |
| IN5 | X | X | |
| OUT1 | | | X |
| OUT2 | | | X |
| OUT3 | | | X |
| OUT4 | | | X |

Note: If the connections IN4 and IN5 are used as DIN, they are still read in analog and digitised with switching thresholds for HIGH and LOW.

#### *4.2.4.2 Electrical level definition of the digital inputs (IN1 to IN3):*

| Parameter | Value | Unit |
|---|---|---|
| $V_{in,low}$ | < 5 | V |
| $V_{in,high}$ | > 15 | V |
| Input impedance | 4 | kΩ |

#### *4.2.4.3 Electrical level definition of the analog inputs (IN4 and IN5):*

| Parameter | Value | Unit |
|---|---|---|
| $V_{in,low}$ | < 5 | V |
| $V_{in,high}$ | > 15 | V |
| Analog input voltage range | 0...24 | V |
| Input impedance | 100k/500 | Ω |

#### *4.2.4.4 Electrical level definition of the outputs (OUT1...OUT4):*

| Parameter | Value | Unit |
|---|---|---|
| min. $V_{out,high}$ with 24V supply | >23(at 1.000mA) | V |
| Low | open | |

The outputs are conditionally short-circuit proof.

The internal 24V power supply delivers max. 100mA. If more current is to be drawn from the outputs in total, the power supply must be supported externally. The external voltage can be connected to the 24V and GND terminals. Attention! Total current max. 2A, provide appropriate fuse protection on the external power supply.

#### *4.2.4.5 Level definition output OUT4 on X7*

| Parameter | Value | Unit |
|---|---|---|
| Active | COM - NO connected | - |
| max. switching voltage DC | 30 | V |
| max. switching voltage AC | 250 | V |
| Max. switching current with resistive load | 2 | A |
| Max. switching current with inductive load | 1,5 | A |

#### *4.2.4.6 Terminal functions*

- Input terminal functions that are not used (configured) are passive.
  The input functions can be assigned to several terminals simultaneously. The terminals are then OR-linked.
- All digital input functions can be inverted.
- Output terminal functions can be assigned to several terminals simultaneously to increase the max. current.
- The output terminal functions can be inverted.

# 5. Display menu

➔ The pin assignment is described in Chap. 4.2.

Caution: When commissioning the machine for the first time, it must be ensured that faulty vibration start-up is possible due to installation or parameterisation errors. Measures must be taken against this to exclude hazardous situations (e.g. mechanically disconnect vibration from the machine).
Please familiarise yourself with chap. 5 "Display menu" and/or chap. 6 "Settings via ParaDesk software" before operating a unit for the first time.

## 5.1 Status messages in the display

The display shows the current status of the unit, or error messages (cf. Chap. 7):

| Display | Description |
|---|---|
| Status Nready | Not Ready |
| Status Lock | Not Ready |
| Status Ready | Ready |
| Status Run | Enabled |
| Status Scan | Resonance search |
| Status UV | F1 Undervoltage |
| Status OV | F2 Overvoltage |
| Status OT | F3 Overtemperature |
| Status OC | F4 Overcurrent |
| Status Outstage | F5 power amplifier |
| Status Timeout | F6 Timeout |
| Status SNES | F7 Vibration sensor |
| Status Scanfail | F8 Scan error |
| Status Bus module | F9 Bus module |
| Status f Fail | F10 Frequency monitoring |

## 5.2 Explanation of the key functions

Use the menu buttons to navigate through the structure of the display menu and make changes.


Display indicator

**Enter**
Call up menu; call up submenu items; save parameters

**ESC**
(abort, return)

⊖ Key
Navigation through the menu;
Adjusting parameters

⊕ Key
Navigation through the menu;
Adjusting parameters

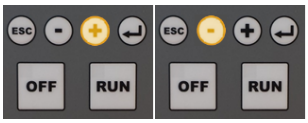
**OFF**
Cancel release,
Stopping the vibratory feeder

**ON**
Release,
Starting the vibratory feeder

## 5.3 Key operation in the menu structure

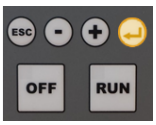
Pressing the Enter key opens the menu.


With ⊕ and ⊖ one of the submenu items can now be selected.

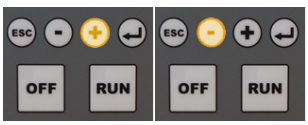



To open the selected submenu, press the Enter key.


To change settings in the submenu, select the Enter key, then the changeable value flashes



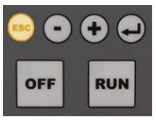

Change the values or the setting using the ⊕ and ⊖ button



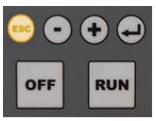

NOTE: When a parameter is flashing, the values are changed live, the unit operates with the set values.

Confirm the change with the Enter key


or discard the change with the ESC key.




To go from the submenu to a higher-level menu, select the ESC key.




Quick jump to the menu:
In order to be able to call up frequently required parameters quickly, a direct jump to freely selectable menu items can be made on the ⊕ and ⊖ keys with the help of the ParaDesk software. Cf. chap. 6.9.8
Pressing the ⊕ or ⊖ key in the status level switches directly to this parameter in the menu structure.
From here, the operation is as described above.
By default, the ⊕ key is pre-assigned with the quick jump function to "Sens Ref" (setpoint for the swing amplitude in gss). By default, the ⊖ -key has no preassignment.

## 5.4 Control mode

Note: This additional function can only be used if your control unit has this software function.

When control mode is activated, the amplitude as well as the resonance frequency is constantly measured and readjusted without interrupting the control mode.
Cf. also Chap. **Fehler! Verweisquelle konnte nicht gefunden werden.**

***Only one parameter (Sens.Ref) must be set to adjust the flow rate. The controller determines all other values independently.***

To find the right amplitude (Sens.Ref), 20gss is suitable at the beginning. If after two to three minutes the material is ejected too quickly, you can reduce the amplitude accordingly (or increase it in the other case).

Note: A vibration sensor is required for control operation.
This must be connected to an analog input (often X3, cf. chap. 4.2). The parameter group Sensor settings is already set for the vibration sensor SP01144. If you are using a different vibration sensor, adjust the values accordingly via the ParaDesk software, cf. Chap.6.5).

This ensures that the vibratory feeder always operates exactly at the resonance point with a constant vibration amplitude, regardless of the mass of the vibratory feeder or the quantity of parts to be conveyed.
The advantage of this control is the efficient energy absorption and thus low heat generation in the magnet. Due to the constant readjustment of the system, only the smallest possible amount of energy is required to operate the vibratory feeder. In addition, this ensures very low-noise and gentle operation.

The unit can also be parameterised so that the vibration amplitude only works via voltage readjustment without frequency readjustment.
Purely manual controlled operation is also possible.
The operating modes of the controller may only be changed when the controller is switched off (OFF):


| Display | Keys | Description |
|---|---|---|
| Status<br>Ready | ↵ | Open menu structure |
| CONTROL | + + +<br>↵ | scroll to CONTROL<br>and open |
| Control<br>ON | ↵ | Check whether control mode is switched on, otherwise switch over and confirm. |
| Sens.Ref<br>xx.xg | +<br>↵ | turn over to Sens.Ref<br>and select (value flashes) |
| Sens.Ref<br>15.0g | + / −<br>↵ | Select and confirm the desired amplitude (internal setpoint) with plus and minus. |
| Status<br>Ready | ESC ESC | back to the top |

### 5.4.1 Switch automatic resonance search off / on

When starting the vibratory feeder, the resonance search determines the natural frequency of the unknown system. A "gong" sounds and the vibratory feeder starts with the determined natural frequency.
Since the last output frequency is saved in the event of an abort, you can switch off the automatic resonance search after successful commissioning. When restarting, you can therefore restart directly with the last frequency without resonance search.

Note: For the resonance search, the parameter of the max. magnetic current must be set according to its data sheet. Cf. chap. 5.7

| Display | Keys | Description |
|---|---|---|
| Status<br>Ready | ↵ | Open menu structure |
| CONTROL | + + +<br>↵ | scroll to CONTROL<br>and open |
| SCAN<br>ON | −<br>↵ | Scroll backwards to scan<br>Select (text flashes) |
| SCAN<br>OFF | + / −<br>↵ | Use Plus or Minus to switch the scan search function on or off.<br>and confirm |
| Status<br>Ready | ESC ESC | back to the top |

## 5.5 Open loop operation

Open loop controlled operation is also possible with this unit.

The operating modes of the controller may only be changed when the controller is switched off (OFF):


| Display | Keys | Description |
|---|---|---|
| Status<br>Ready | ↵ | Open menu structure |
| CONTROL | ⊕ ⊕ ⊕<br>↵ | continue browsing<br>Open CONTROL |
| Control<br>OFF | ↵<br>⊕ | check whether the controller function is switched off, otherwise<br>open for editing with ↵ and switch over with. ⊕ |
| Control<br>OFF | ↵ | confirm with Enter. |
| Status<br>Ready | ESC ESC | back to the top |

Now select the desired output frequency and voltage for open loop operation.

| Display | Keys | Description |
|---|---|---|
| Status<br>Ready | ↵ | Open menu structure |
| POWEROUT | ↵ | Open POWEROUT |
| Vout int<br>xxxV | ↵<br>⊕ / ⊖ | Select (value flashes)<br>Select the desired output voltage with plus and minus. |
| Vout int<br>101.5V | ↵ | confirm the selected output voltage |
| Freq.<br>xxxHz | ⊕<br>↵ | Scroll to the output frequency<br>Select (value flashes) |
| Freq.<br>50.5Hz | ⊕ / ⊖<br>↵ | Use plus and minus to select the desired output frequency<br>Confirm with Enter |
| Status<br>Ready | ESC ESC | back to the top |

## 5.6 Output voltage waveform

The sine waveform with 3rd harmonic is preset. If you want a different output waveform of the voltage, you can select sine waveform or create your own (tab). Please contact the manufacturer for this.

| Display | Keys | Description |
|---|---|---|
| Status<br>Ready | ↵ | Open menu structure |
| POWEROUT | ↵ | Open POWEROUT |
| Curve | ⊕ ⊕<br>↵ | continue browsing<br>Open curve for editing (text flashes) |
| Curve<br>SIN 3.OW | ⊕<br>↵ | Select desired waveform (e.g. sine with 3rd harmonic)<br>and confirm |
| Status<br>Ready | ESC ESC | back to the top |

## 5.7 Continuous current of the magnet output

The continuous current of the magnet output "Current" corresponds to the effective continuous current of the vibration feeder output.

To ensure overloading of the vibrating magnet, the maximum continuous output current for the magnet is set in the "Current" parameter. 6A is used as the default value. If the magnet you are using has a different max. rated current, you can adjust it accordingly in this parameter.

| Display | Keys | Description |
|---|---|---|
| Status<br>Ready | ↵ | Open menu structure |
| POWEROUT | ↵ | Open POWEROUT |
| Current | ⊕ ⊕ ⊕<br>↵ | continue browsing<br>Open Current |
| Current<br>6,00A | ⊕ / ⊖<br>↵ | Select the desired output current<br>and confirmed |
| Status<br>Ready | ESC ESC | back to the top |

## 5.8 Level control

Note: This additional function can only be used if your control unit has this software function.

### 5.8.1 Level control with one sensor

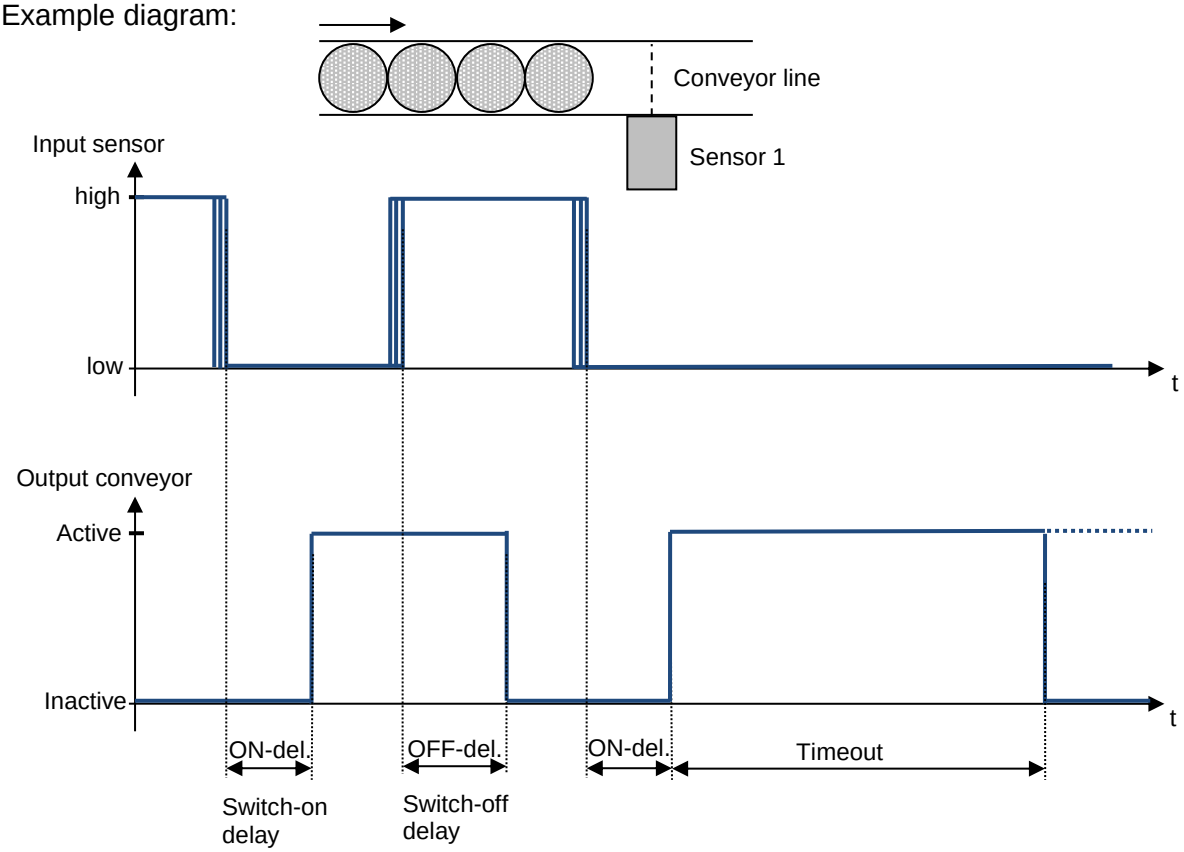
It is possible to realise a level control via the input Sensor1 as well as the switch-on and switch-off delay of the conveyor.
The conveyor is switched on when the sensor is passive and the switch-on delay has expired. The conveyor is switched off when the sensor is active and the switch-off delay has expired. Thus, the level of the conveyed material oscillates around the sensor. Level changes during the delay times reset them to 0.

Note: A release must be active. The enable can be activated either by pressing "RUN" on the unit or by an external input, if parameterised.
In the display menu, the operating mode of Level Control (LC) must be set to "1 sensor on/off" ("1S 0-1"):

| Display | Keys | Description |
|---|---|---|
| Status<br>Ready | ↵ | Open menu structure |
| LC | ⊕<br>↵ | continue browsing<br>Open LC (Level Control) |
| Mode<br>OFF | ↵ | Open for editing (text flashes) |
| Mode<br>1S 0-1 | ⊕<br>↵ | Select operating mode 1 sensor on/off<br>and confirm |
| ON-del.<br>xxxms | ⊕<br>↵ | turn over to ON-del. (ON-delay)<br>and open |
| ON-del.<br>30ms | ⊕ / ⊖<br>↵ | Select the desired switch-on delay<br>and confirm |
| OFF-del.<br>xxxms | ⊕<br>↵ | turn over to OFF-del. (OFF-delay)<br>and open |
| OFF-del.<br>30ms | ⊕ / ⊖<br>↵ | Select the desired switch-off delay<br>and confirm |
| Timeout<br>0ms | ⊕<br>↵ | turn over to Timeout<br>and open |
| Timeout<br>20ms | ⊕ / ⊖<br>↵ | If necessary, select the desired time step Timeout<br>and confirm |
| Status<br>Ready | ESC ESC | back to the top |

The max. switch-on time of the conveyor can be monitored via a separate time stage Timeout.
If this function is activated, the conveyor switches off after this time has elapsed. This function can also be parameterised to a signal output.
A parameter value of zero switches off the monitoring.

Example diagram:



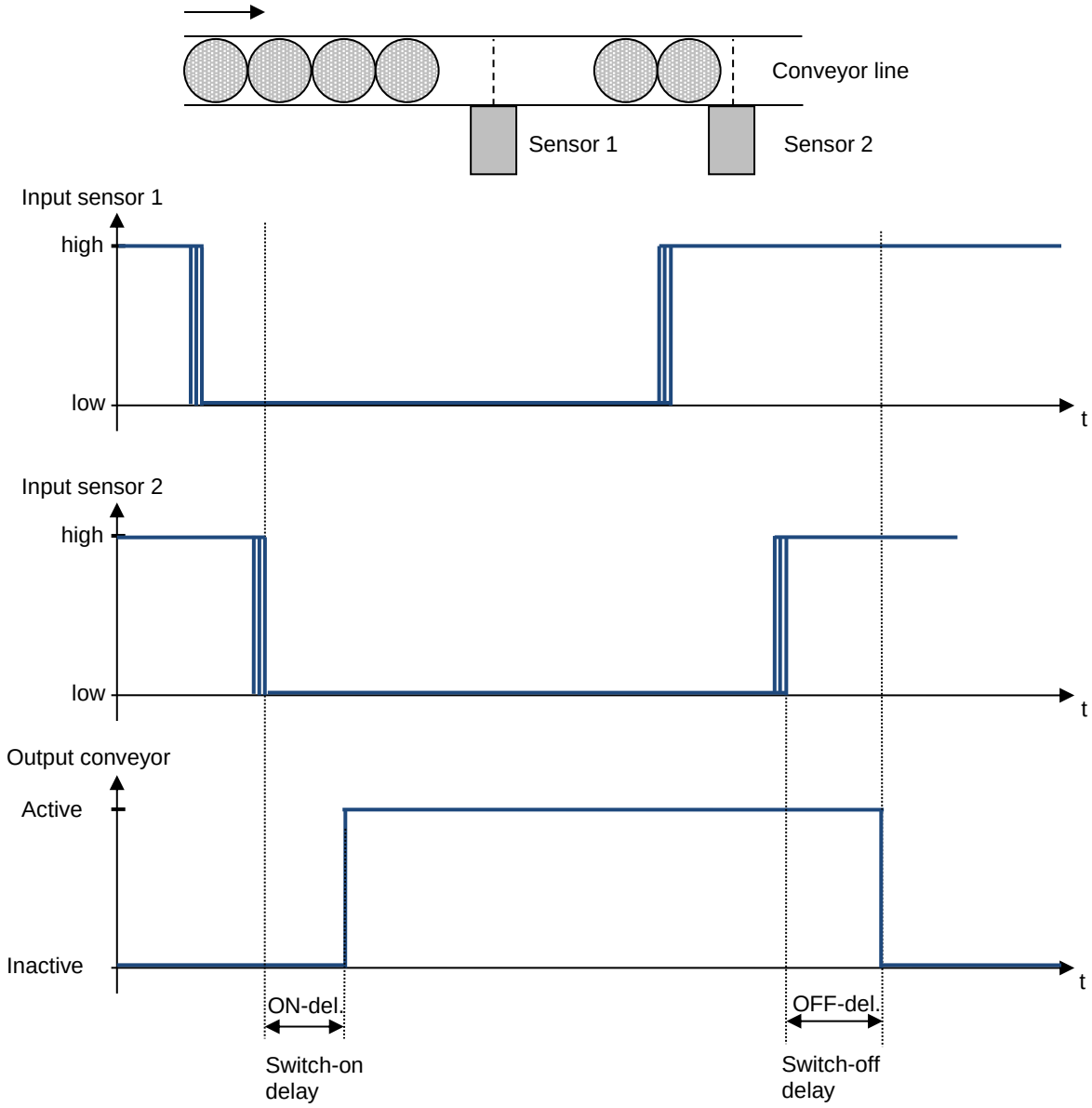
### 5.8.2 Level control with two sensors

In conjunction with two material sensors, a material level is stored within a filling section. The conveyor is only switched on after the switch-on delay when both sensors are low (no material being conveyed).
If both sensors are high (material present), the conveyor is switched off after the switch-off delay.

Note: A release must be active. The enable can be activated either by pressing "RUN" on the unit or by an external input, if parameterised.
For this purpose, the operating mode "2 sensor on/off" must be activated in the parameter group "FSS".

| Display | Keys | Description |
|---|---|---|
| Status<br>Ready | ↵ | Open menu structure |
| LC | +<br>↵ | continue browsing<br>Open LC (Level Control) |
| Mode<br>OFF | ↵ | Open for editing (text flashes) |
| Mode<br>2S 0-1 | + +<br>↵ | Select operating mode 2 sensor on/off<br>and confirm |
| ON-del.<br>xxxms | +<br>↵ | turn over to ON-del. (ON-delay)<br>and select (value flashes) |
| ON-del.<br>30ms | + / −<br>↵ | Select the desired switch-on delay<br>and confirm |
| OFF-del.<br>xxxms | +<br>↵ | turn over to OFF-del. (OFF-delay)<br>and select (value flashes) |
| OFF-del.<br>30ms | + / −<br>↵ | Select the desired switch-off delay<br>and confirm |
| Timeout<br>0ms | + | scroll to Timeout and check if value is zero (change accordingly if necessary) |
| Status<br>Ready | ESC ESC | back to the top |

Example diagram:



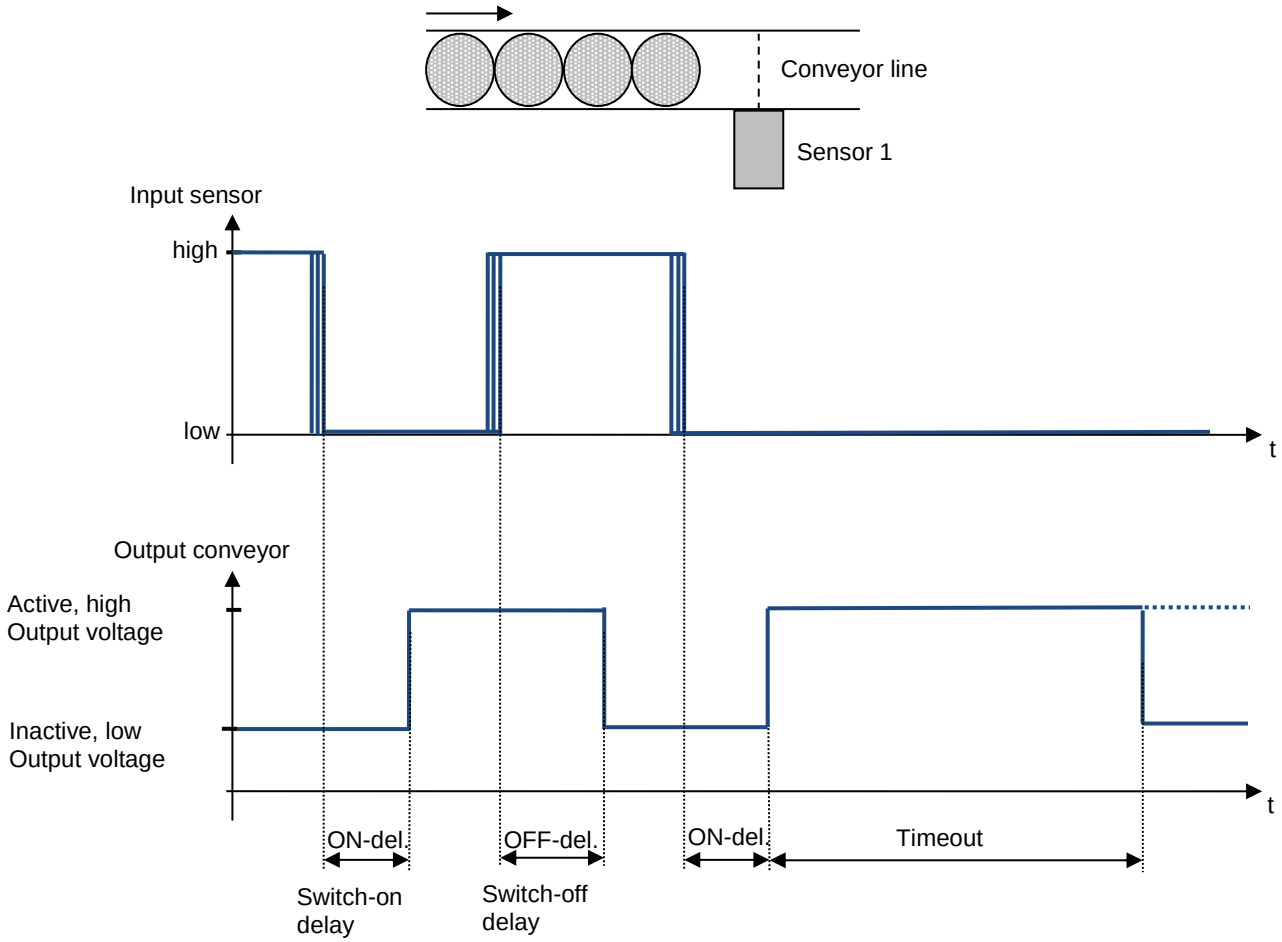
### 5.8.3 Operation with two setpoints

Instead of controlling the fill level by switching the conveyor on or off, the output voltage of the conveyor can alternatively be switched between two values in open loop operation. The conveyor is then always active, only the output voltage is changed depending on the state of the level logic.

Note: A release must be active. The enable can be activated either by pressing "RUN" on the unit or by an external input, if parameterised.
For this purpose, the operating mode "1 sensor low/high" or "2 sensor low/high" must be activated in the parameter group "FSS".

| Display | Keys | Description |
|---|---|---|
| Status<br>Ready | ↵ | Open menu structure |
| LC | +<br>↵ | continue browsing<br>Open LC (Level Control) |
| Mode<br>OFF | ↵ | Open for editing (text flashes) |
| Mode<br>1S L-H | + + +<br>↵ | Select operating mode 1 sensor low/high (or for sensors S2 L-H)<br>and confirm |
| V min<br>xxxV | + + + +<br>↵ | Go to Voltage setpoint low<br>and open |
| V min<br>50.0V | + / −<br>↵ | select the desired value for the voltage setpoint low<br>and confirm |
| V max<br>xxxV | +<br>↵ | Go to Voltage setpoint high<br>and open |
| V max<br>100.0V | + / −<br>↵ | select the desired value for the voltage setpoint high<br>and confirm |
| CONTROL | ESC<br>+ + | Go from the submenu<br>and scroll to Control |
| Control<br>OFF | ↵ | open and check whether control mode is switched off, otherwise<br>switch over and confirm |
| Status<br>Ready | ESC ESC | back to the top |

Example diagram:



## 5.9 Output air valve for sorting air

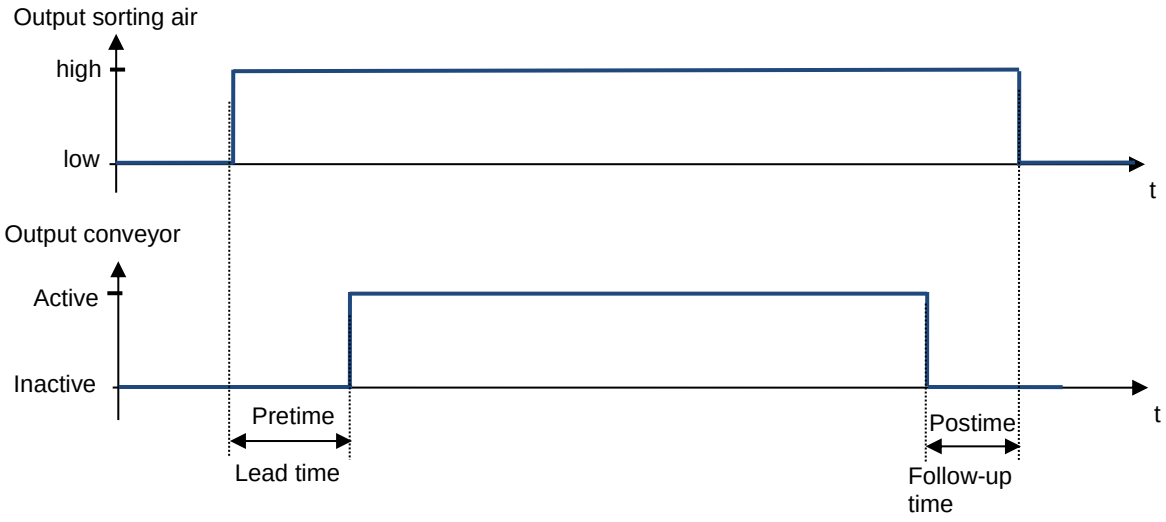
Note: This additional function can only be used if your control unit has this software function.

To support part transport by air, the "Air" output can be used to control an air valve.
When the conveyor is released, the "Air" output is switched on first and the output voltage of the conveyor is ramped up with a time delay.
The "Air" output remains active for a follow-up time after the conveyor has been switched off.
The run-up and run-down times can be set separately.

Note: To activate the sorting air, an output must be assigned with the function "Air".

| Display | Keys | Description |
|---|---|---|
| Status<br>Ready | ↵ | Open menu structure |
| AIR | ⊕ ⊕<br>↵ | continue browsing<br>Open „AIR“ |
| Pretime<br>xxxms | ↵ | Open Pretime |
| Pretime<br>30ms | ⊕ / ⊖<br>↵ | Select the desired sorting air lead time<br>and confirm |
| Postime<br>xxxms | ⊕<br>↵ | turn over to Postime (overrun time)<br>and open |
| Postime<br>30ms | ⊕ / ⊖<br>↵ | Select the desired overrun time<br>and confirm |
| Status<br>Ready | ESC ESC | back to the top |

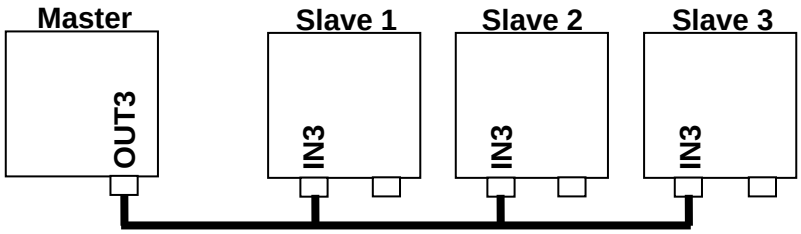
Example diagram:



## 5.10 Master/Slave

Note: This additional function can only be used if your control unit has this software function.

It is possible to operate several control units in a network. For this purpose, e.g. one control unit can be parameterised as master and many other units as slaves. The master unit sets the frequency for the slave units via synchronous pulses.




A unit parameterised as a slave will only switch on (RUN) when synchronous pulses from the master are applied to its slave pulse input.
If there are no more synchronous pulses (master off), the unit switches back to STOP after a short delay.

Attention: A maximum of 10 units can be operated by one master on one bus.

Note: If a unit is parameterised as a slave, it can only be operated with amplitude control, but not with frequency control. The frequency is fixed by the master.
The master, however, can perform amplitude and frequency control.

Attention: If the unit is configured for master/slave operation, the output OUT3 or the input IN3 is permanently required for this operation. It is not possible to use the two IOs for other functions in this mode.

### 5.10.1 Master device settings

You can order the master unit directly as a master or you can select the function for output OUT3 with the help of the ParaDesk software (cf. Chap. 6.18.16.18).

### 5.10.2 Slave unit settings

The slave function can be switched on and off via the display menu. You can set a deviation of the phase position to the master unit via the ParaDesk software (cf. Chap. 6.18.2)

| Display | Keys | Description |
|---|---|---|
| Status<br>Ready | ↵ | Open menu structure |
| CONTROL | + + +<br>↵ | continue browsing<br>Open CONTROL |
| Slave<br>OFF | − −<br>↵ | turn back<br>and open slave |
| Slave<br>ON | + / −<br>↵ | Switch on slave function<br>and confirm |
| Status<br>Ready | ESC ESC | back to the top |

## 5.11 RS485 address

The address of the controller on the RS485 bus can be changed. This makes it possible to connect a PC with several units during commissioning and to select the units accordingly via the ParaDesk software. Cf. chap. 6.1

Note: After this value is changed, communication with ParaDesk will stop and must be re-established with the new address.

| Display | Keys | Description |
|---|---|---|
| Status<br>Ready | ↵ | Open menu structure |
| SETTINGS | − −<br>↵ | turn back<br>Open SETTINGS |
| RS485 Ad<br>1 | +<br>↵ | continue browsing<br>and RS485 Ad open |
| RS485 Ad<br>1 | + / −<br>↵ | Possibly change the number of the address<br>and confirm |
| Status<br>Ready | ESC ESC | back to the top |

## 5.12 Display contrast

The brightness of the display can be adjusted variably.

| Display | Keys | Description |
|---|---|---|
| Status<br>Ready | ↵ | Open menu structure |
| SETTINGS | − −<br>↵ | turn back<br>Open SETTINGS |
| Contrast<br>3000 | + +<br>↵ | continue browsing<br>and open Contrast |
| Contrast<br>2500 | + / −<br>↵ | Change contrast as desired<br>and confirm |
| Status<br>Ready | ESC ESC | back to the top |

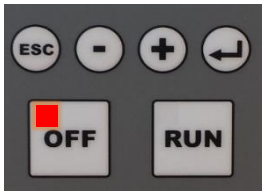
## 5.13 Switch off RUN and OFF buttons

If, after commissioning, the control unit is enabled via a corresponding input, it is possible to switch off the function of the RUN and OFF buttons.

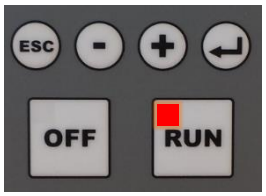
| Display | Keys | Description |
|---|---|---|
| Status<br>Ready | ↵ | Open menu structure |
| SETTINGS | −−<br>↵ | turn back<br>Open SETTINGS |
| RUN/OFF<br>Pon OFF | +++<br>↵ | continue browsing<br>and open RUN//OFF |
| RUN/OFF<br>OFF | −<br>↵ | Select OFF<br>and confirm |
| Status<br>Ready | ESC ESC | back to the top |

## 5.14 Controller status when switched on

The default setting is that the output signal for the vibrating magnet is switched off after starting the unit. Cf. chap. 6.9.9
Pon OFF (with "Power on" the output is "OFF"):




This state can also be reversed so that the output signal is already switched on after starting the unit. Cf. chap. 6.9.9
Pon ON (with "Power on" the output is "ON"):




Note: For this state, the RUN/OFF buttons cannot be switched passively.

| Display | Keys | Description |
|---|---|---|
| Status<br>Ready | ↵ | Open menu structure |
| SETTINGS | −−<br>↵ | turn back<br>Open SETTINGS |
| RUN/OFF<br>Pon OFF | +++<br>↵ | continue browsing<br>and open RUN/OFF |
| RUN/OFF<br>Pon ON | +<br>↵ | Select Pon ON<br>and confirm |
| Status<br>Ready | ESC ESC | back to the top |

## 5.15 Service

The Service submenu displays various parameters, states and information about the unit.

| Display<br>Display | Keys | Description |
|---|---|---|
| Status<br>Ready | ↵ | Open menu structure |
| SERVICE | −<br>↵ | turn back<br>Open service |
| Vout act<br>x.xV | + | Displays the current output voltage |
| Ixt<br>x.xxA | + | the output current is calculated with a time constant. If the value exceeds the continuous current limit, the unit switches off. |
| Sens act<br>x.xg | + | the actual value of the vibration sensor shows the current measured value of the vibration sensor |
| Temp<br>xx.x °C | + | Temperature at the bottom of the unit. If a critical limit temperature is exceeded, the unit switches off. |
| VDC Link<br>xxx.xV | + | Load voltage in the DC link is continuously monitored. In the event of a fault, the output stage is locked, the control unit switches off and an overvoltage or undervoltage fault is generated. |
| Input<br>xxxxx | + | Show the logical status of the inputs or outputs. If an analog function is parameterised, an "A" is displayed. The display counts from right to left (i.e. IN1 or OUT1 is on the right). |
| Output<br>xxxx | + | |
| ON-Time<br>xxxh | + | Total operating hours counter. Counts the operating time of the unit. It is active as soon as the unit is connected to the mains voltage and switched on. |
| RUN-Time<br>xxxh | + | Operating hours in conveying mode. This only counts the effective running time of the conveyor. |
| FW<br>xx.xx | + | Firmware version |
| HW<br>xx.xx | + | Hardware version |
| Freq.act<br>xx.xHz | + | Displays the current output frequency |
| Status<br>Ready | ESC ESC | back to the top |

## 5.16 PI controller behaviour

The behaviour of the PI controller is optimally set for the most common applications when it is delivered.
For very special applications, an adjustment of the controller behaviour may be useful. In such cases, please contact the manufacturer.

| Display | Keys | Description |
|---|---|---|
| Status<br>Ready | ↵ | Open menu structure |
| CONTROL | ⊕ ⊕ ⊕<br>↵ | continue browsing<br>Open CONTROL |
| Cont. P<br>10 | ⊕ ⊕ | continue browsing<br>Proportional behaviour of the controller (default value: 10) |
| Cont. I<br>1000 | ⊕ | continue browsing<br>Integral behaviour of the controller (default value: 1000) |
| Status<br>Ready | ESC ESC | back to the top |

## 5.17 Function settings of the inputs En. Ex 1...5

The setting of the enables En. Ex 1...5 (enable external) overwrite the current function. Only the input functions "no function" [OFF] and "enable 1...5" [ON] can be selected via the display menu. Other terminal functions can only be selected with the ParaDesk software.
It is imperative to note that settings are lost when changing preset functions (e.g. the vibration sensor). These must be restored via the operating software.
We therefore recommend that these settings be made via the ParaDesk software if possible. Cf. chap. 6

| Display | Keys | Description |
|---|---|---|
| Status<br>Ready | ↵ | Open menu structure |
| SETTINGS | ⊖ ⊖<br>↵ | continue browsing<br>Open SETTINGS |
| En. Ex 1<br>OFF | ⊕ ⊕ ⊕<br>↵ | turn over to EN. EX 1 ... 5<br>and open |
| Cont. I<br>1000 | ⊕<br>↵ | Select OFF or ON<br>and confirm |
| Status<br>Ready | ESC ESC | back to the top |

## 5.18 Functions for special service cases

There are three parameters that are only needed in special service cases.

| Display Display | Keys | Description |
|---|---|---|
| Status Ready | ↵ | Open menu structure |
| SETTINGS | − − ↵ | turn back<br>Open SETTINGS |
| Para 50 | − | turn back |
| Para no. | − | turn back |
| Pro.Mode | − | turn back |
| Status Ready | ESC ESC | back to the top |

# 6. Settings via ParaDesk software

The "ParaDesk" operating software is required to parameterise and monitor the SP01075 control unit.
The latest version can be downloaded free of charge from the homepage http://www.paradesk.de.

Note: Please refer to the ParaDesk operating instructions for installation and operation of the software. These can also be found at the above Internet address.

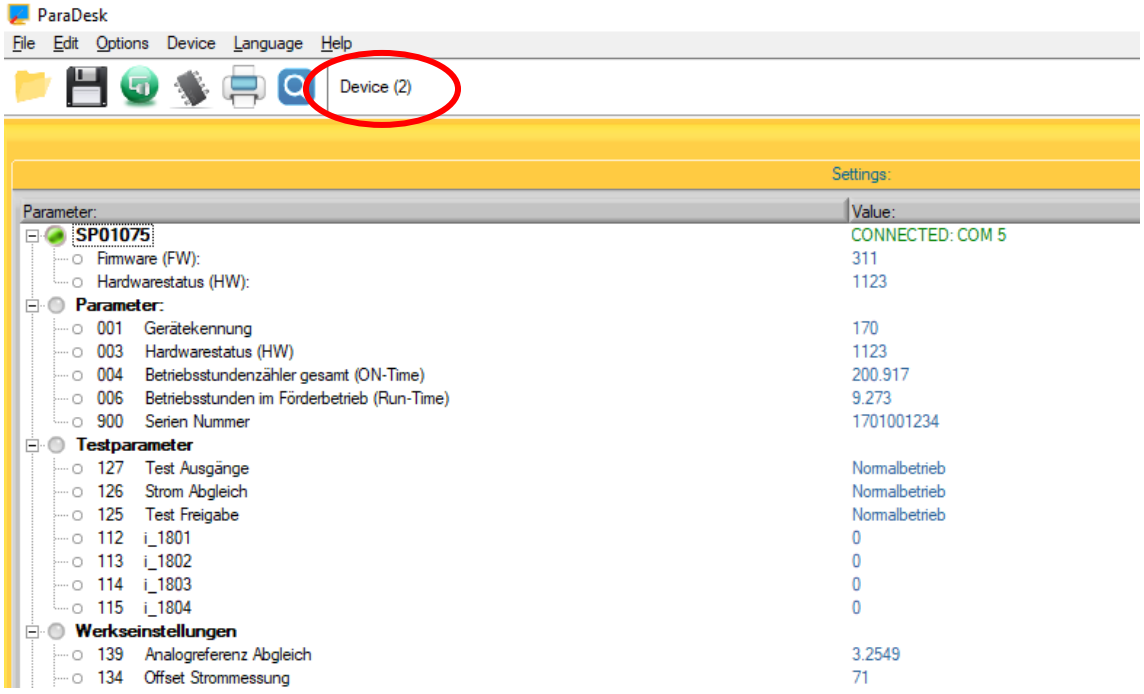
## 6.1 Simultaneous commissioning of several units

The address of the controller on the RS485 bus can be changed. This makes it possible to connect a PC with several units during commissioning and to select the units accordingly via the ParaDesk software.

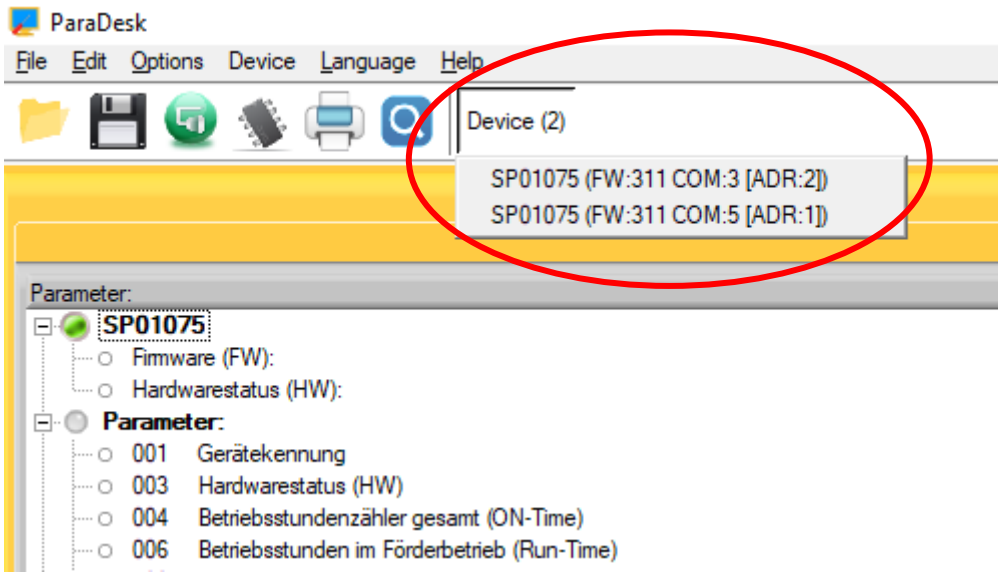
| Parameter | Value | Unit | |
|---|---|---|---|
| **General device parameters** | | | |
| **110 RS485 address (RS485 Ad)** | 2 | | 2 |

Note: After this value is changed, communication with ParaDesk will stop and must be re-established with the new address.

After ParaDesk has been rebuilt with the new address, the number of connected devices appears in ParaDesk:




When you click on Device (x), the connected devices appear for selection for further processing:

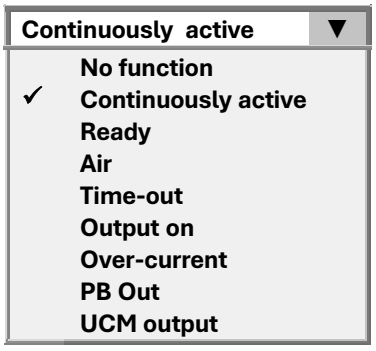



To check which number the respective unit has, you can call up the RS485 address via the display menu. Cf. chap. 0

## 6.2 Permanently active outputs for commissioning

The outputs can be set to "permanently active". This serves as an aid during commissioning.
Here at the example of OUT1:

| Parameter | Value | Unit |
|---|---|---|
| **Output functions** | | |
| **106 Output OUT1 Function** | **Continuously active** | |

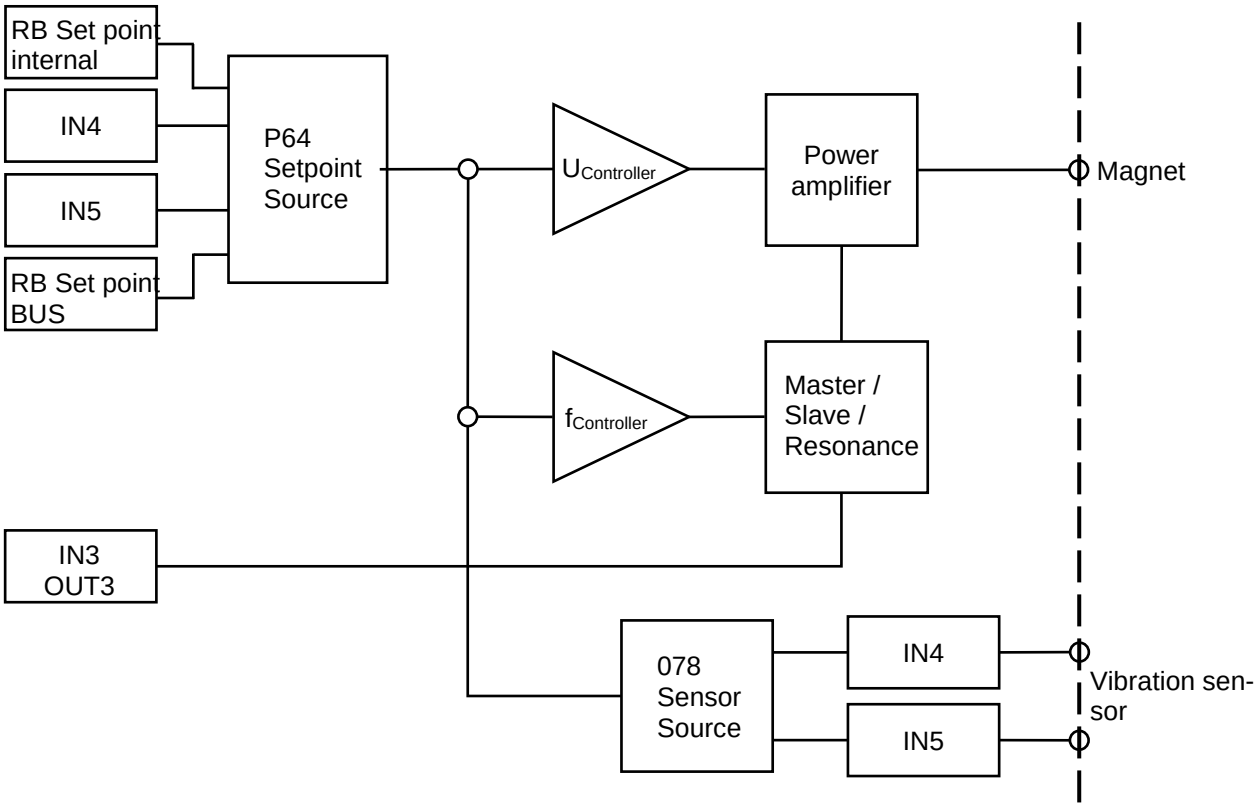


## 6.3 Control mode

Note: This additional function can only be used if your control unit has this software function.

When control mode is activated, the amplitude as well as the resonance frequency is constantly measured and readjusted without interrupting the control mode.

The following flow chart shows how the control mode works.




***Only one parameter RB Setpoint internal (Sens.Ref) must be set to adjust the flow rate. The controller determines all other values independently.***
To find the right amplitude (RB setpoint internal), 20gss is suitable at the beginning. If after two to three minutes the material is ejected too quickly, you can reduce the amplitude accordingly (or increase it in the other case).

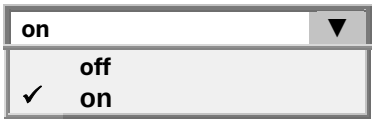
Note: A vibration sensor is required for control operation.
This must be connected to an analog input (often X3, cf. chap. 4.2). The parameter group Sensor settings is already set for the vibration sensor SP01144. If you are using a different vibration sensor, adjust the values accordingly via the ParaDesk software, cf. Chap.6.5).

This ensures that the vibratory feeder always operates exactly at the resonance point with a constant vibration amplitude, regardless of the mass of the vibratory feeder or the quantity of parts to be conveyed.
The advantage of this control is the efficient energy absorption and thus low heat generation in the magnet. Due to the constant readjustment of the system, only the smallest possible amount of energy is required to operate the vibratory feeder. In addition, this ensures very low-noise and gentle operation.

The unit can also be parameterised so that the vibration amplitude only works via voltage readjustment without frequency readjustment.
Open loop control operation is also possible.
The operating modes of the controller may only be changed when the controller is switched off (OFF):


For closed-loop operation, check whether the functions controller operation, frequency readjustment and resonance search are switched on, otherwise switch them on:

| Parameter | Value | Unit |
|---|---|---|
| Controller operation CO (CONTROL) | | |
| 083 CO on/off (Control) | on | |
| 104 Frequency control (Cont. f) | on | |
| 087 Search resonance frequency (Scan) | on | |



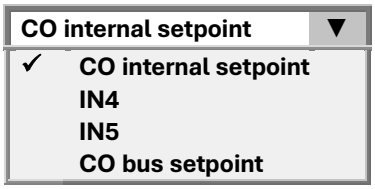

Note: For the resonance search, the parameter of the max. magnetic current must be set according to its data sheet. Cf. chap. 6.8

### 6.3.1 Source of the voltage or amplitude setpoint

The presetting for the vibration amplitude can be done via different sources.
In order to determine the appropriate amplitude (Sens.Ref), it is advisable to set it to e.g. 20gss at the beginning. If after two to three minutes the material is ejected too quickly, you can reduce the amplitude accordingly (or increase it in the other case).

#### *6.3.1.1 Vibration amplitude via internal setpoint*

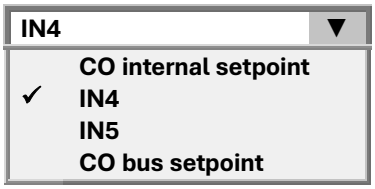
| Parameter | Value | Unit |
|---|---|---|
| Controller operation CO (CONTROL) | | |
| 064 CO Setpoint source | CO internal setpoint | |
| 086 CO Internal setpoint (Sens ref) | 20 | gss |

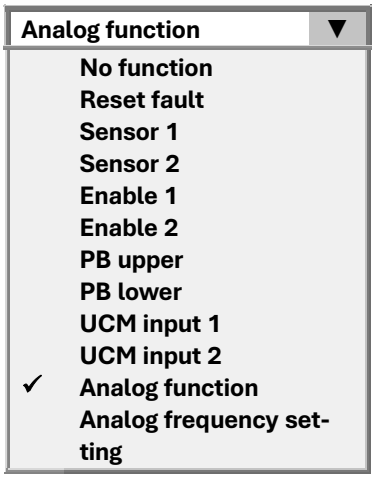



#### *6.3.1.2 Vibration amplitude over input*

Using the example of IN4:

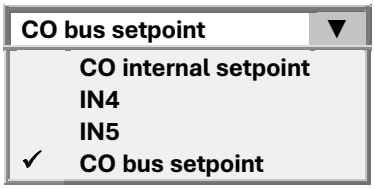
| Parameter | Value | Unit |
|---|---|---|
| ○ **Controller operation CO (CONTROL)** | | |
| ···○ **064 CO setpoint source** | **IN4** | |
| ○ **Input functions** | | |
| ···○ **055 IN4 function** | **Analog function** | |




#### *6.3.1.3 Vibration amplitude via BUS*

| Parameter | Value | Unit |
|---|---|---|
| ○ **Controller operation CO (CONTROL)** | | |
| ···○ **064 CO setpoint source** | **RB Setpoint bus** | |




### 6.3.2 Vibration amplitude CO Internal setpoint (Sens ref)

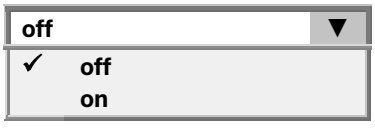
Adjusting the amplitude via the setpoint internally.

| Parameter | Value | Unit |
|---|---|---|
| ○ **Controller operation CO(CONTROL)** | | |
| ···○ **086 CO internal setpoint (Sens Ref)** | **20** | **gss** |


### 6.3.3 Control operation without frequency readjustment

For special applications, it may be useful to switch off the frequency readjustment. This way, the unit only adjusts the output voltage.

| Parameter | Value | Unit |
|---|---|---|
| ○ **Control operation CO (CONTROL)** | | |
| ···○ **104 Frequency control (Cont. f)** | **off** | |



### 6.3.4 PI controller behaviour

The behaviour of the PI controller is optimally set for the most common applications when it is delivered.
For very special applications, an adjustment of the controller behaviour may be useful. In such cases, please contact the manufacturer.

Default values:
Proportional behaviour of the controller: 10
Integral behaviour of the controller: 1000

| Parameter | Value | Unit | |
|---|---|---|---|
| **Controller operation CO (CONTROL)** | | | |
| **084 CO P-factor (Cont. P)** | **10** | | 10 |
| **085 CO I-factor (Cont. I)** | **1000** | | 1000 |

## 6.4 Resonance search

### 6.4.1 Switch automatic resonance search off/on

When starting the vibratory feeder, the resonance search determines the natural frequency of the unknown system. A "gong" sounds and the vibratory feeder starts with the determined natural frequency.
Since the last output frequency is saved in the event of an abort, you can switch off the automatic resonance search after successful commissioning. When restarting, you can therefore restart directly with the last frequency without resonance search.

| Parameter | Value | Unit | |
|---|---|---|---|
| **Controller operation CO (CONTROL)** | | | |
| **087 Search resonance frequency (Scan)** | **off** | | off ▼ |
| | | | ✓ off |
| | | | on |

### 6.4.2 Parameter settings of the resonance search

When determining the natural resonance, after the vibration conveyor has been excited (the "gong" has sounded), the "number of synchronisation periods 182" is used after the "number of transient periods 181" in order to determine the resonance frequency with these values.
The preset values are suitable for the most common applications. If it takes too long after the "gong" to reach the actual resonance frequency by constant readjustment, an adjustment of these parameters might be useful. For very special applications, please contact the manufacturer.

| Parameter | Value | Unit | |
|---|---|---|---|
| **Control operation CO (CONTROL)** | | | |
| **181 Resonance search Numbers of transient periods** | **1** | | 1 |
| **182 Resonance search Numbers of synchronization periods** | **2** | | 2 |

## 6.5 Vibration sensor

A vibration sensor is required for closed loop control operation.
This must be connected to an analog input (frequently X3, cf. chap. 4.2). The parameter group Sensor settings is already set for the vibration sensor SP01144. If you are using a different vibration sensor, the parameters can be set to the respective sensor used.

| Parameter | Value | Unit | |
|---|---|---|---|
| **Sensor settings** | | | |
| **101 Sensor monitoring lower limit** | **5** | **V** | 5 |
| **102 Sensor monitoring upper limit** | **11** | **V** | 11 |
| **162 Sensor sensitivity** | **300** | **mV/g** | 300 |

Specify the input of the vibration sensor (here using IN4 as an example):

| Parameter | Value | Unit | |
|---|---|---|---|
| **Controller operation CO (CONTROL)** | | | |
| 078 CO Vibration sensor source | **IN4** | | **IN4** ▼ |

- None
- ✓ IN4
- IN5

Note: Conversion of digits into physical acceleration g depends on the vibration sensor used and the scaling of the corresponding analog input.

Recommended values when using the SP01144 sensor on input IN4

| Parameter | Value | Unit | |
|---|---|---|---|
| **Functions inputs** | | | |
| **055 IN4 function** | **Analog function** | | **Analog function** ▼ |

- No function
- Reset fault
- Sensor 1
- Sensor 2
- Enable 1
- Enable 2
- PB upper
- PB lower
- UCM input 1
- UCM input 2
- ✓ Analog function
- Analog frequency setting

| | | | |
|---|---|---|---|
| **Analog inputs adjustment** | | | |
| **057 Offset IN4** | **0** | **V** | 0 |
| **058 Multiplier IN4** | **1** | | 1 |
| **058 Input resistance IN4** | **100 kOhm** | | **100 kOhm** ▼ |

- ✓ 100 kOhm
- 500 Ohm

## 6.6 Open loop operation

Open loop controlled operation is also possible with this unit.

The operating modes of the controller may only be changed when the controller is switched off (OFF):


| Parameter | Value | Unit | |
|---|---|---|---|
| ○ **Controller operation (CONTROL)** | | | |
| ···○ **083 CO on/off (Control)** | **off** | | **off** ▼<br>✓ **off**<br>**on** |

Select the output frequency for controlled operation.

Note: The value of the output frequency always has a crooked decimal point, as this value is calculated by the software.

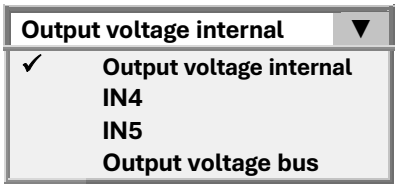
| Parameter | Value | Unit | |
|---|---|---|---|
| ○ **Output voltage (POWEROUT)** | | | |
| ···○ **069 Output frequency (Freq.)** | **61.496** | **Hz** | ▲▼ xx.xxx |

In open loop mode, the output frequency can also be set via an analog input, here in the example via IN4.

| Parameter | Value | Unit | |
|---|---|---|---|
| ○ **Input functions** | | | |
| ···○ **055 IN4 function** | **Analog frequency setting** | | **Analog frequency setting** ▼<br>**No function**<br>**Reset fault**<br>**Sensor 1**<br>**Sensor 2**<br>**Enable 1**<br>**Enable 2**<br>**PB upper**<br>**PB lower**<br>**UCM input 1**<br>**UCM input 2**<br>**Analog function**<br>✓ **Analog frequency setting** |
| ○ **Analog inputs adjustment** | | | |
| ···○ **191 Lower limit of analog frequency setting** | **40.496** | **Hz** | ▲▼ xx.xxx |
| ···○ **192 Upper limit of analog frequency setting** | **60.496** | **Hz** | ▲▼ xx.xxx |

Specify the source of the output voltage:

| Parameter | Value | Unit |
|---|---|---|
| Output voltage (POWEROUT) | | |
| 077 Output voltage source | Output voltage internal | |



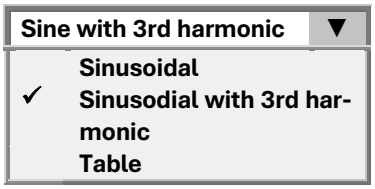

Specify the fixed value of the "Internal output voltage":

| Parameter | Value | Unit |
|---|---|---|
| Output voltage (POWEROUT) | | |
| 076 Output voltage internal (Vout int) | 100 | VAC |


## 6.7 Output voltage waveform

The sine waveform with 3rd harmonic is preset. If you want a different output waveform of the voltage, you can select sine waveform or create your own (table). Please contact the manufacturer for this.

| Parameter | Value | Unit |
|---|---|---|
| Output voltage (POWEROUT) | | |
| 066 Output voltage waveform (Curve) | Sinusoidal with 3rd harmonic | |




## 6.8 Continuous current of the magnetic output

The continuous current of the magnetic output "Current" corresponds to the effective continuous current of the vibration feeder output.

To ensure overloading of the vibrating magnet, the maximum continuous output current for the magnet is set in the "Current" parameter. 6A is used as the default value. If the magnet you are using has a different max. rated current, you can adjust it accordingly in this parameter.

| Parameter | Value | Unit |
|---|---|---|
| Output voltage (POWEROUT) | | |
| 065 Continuous output current | 6 | A |

## 6.9 General unit parameters

### 6.9.1 Time span in the event of an autoreset malfunction

After the set time, error states of the unit are reset if the cause of the error has been eliminated.

| Parameter | Value | Unit |
|---|---|---|
| General device parameters | | |
| 111 Auto reset fault | 3 | sec |


### 6.9.2 Switch off the autoreset function

If no autoreset is to take place, the value of the autoreset fault is set to zero.

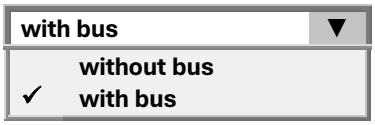
| Parameter | Value | Unit |
|---|---|---|
| General device parameters | | |
| 111 Auto reset fault | 0 | sec |


### 6.9.3 Enable via fieldbus

If the enable is made via field bus, this must be set accordingly.

Note: This additional function can only be used if your control unit has this function.

| Parameter | Value | Unit |
|---|---|---|
| General device parameters | | |
| 157 Activation bus | with bus | |




### 6.9.4 Timeout fieldbus

To check the fieldbus connection, an information change is required at regular intervals. This time period can be adjusted accordingly.

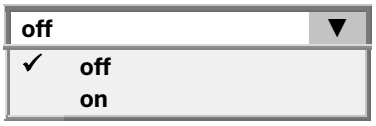
| Parameter | Value | Unit |
|---|---|---|
| General device parameters | | |
| 161 Timeout fieldbus | 5000 | ms |


### 6.9.5 Unlocking the device after a software update

After a software update, the control unit goes into device lock. In this case, the status indication in the display reads: Status
Lock

The device lock can only be cancelled via ParaDesk. In this case, please check all parameters, as new parameters may have been added.
You can then set the device lock from "on" to "off" again:

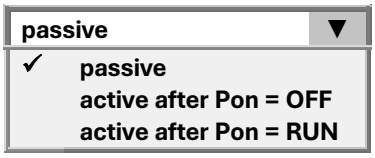
| Parameter | Value | Unit |
|---|---|---|
| General device parameters | | |
| 190 Device lock | off | |



### 6.9.6 Switch off RUN and OFF buttons

If, after commissioning, the control unit is enabled via a corresponding input, it is possible to switch off the function of the RUN and OFF buttons.

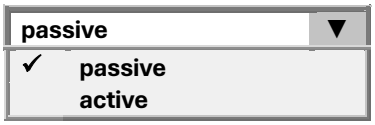
| Parameter | Value | Unit |
|---|---|---|
| General device parameters | | |
| 093 RUN/OFF keys (RUN/OFF) | passive | |




### 6.9.7 Switch off menu keys

If you want to make changes exclusively via ParaDesk and prevent changes from being made to the control, you can lock the menu buttons.
The quick jump keys are still active and the stored parameters can still be edited. Cf. chap. 6.9.8

| Parameter | Value | Unit |
|---|---|---|
| General device parameters | | |
| 116 Enable menu keys | passive | |



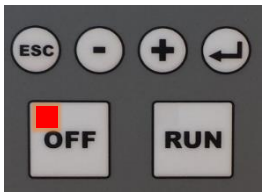

### 6.9.8 Quick jump functions of the display menu

To be able to quickly call up parameters that are often needed, a direct jump to freely selectable menu items can be made on the ⊕ and ⊖ buttons.
Pressing the ⊕ or ⊖ key in the status level switches directly to this parameter in the menu structure.
From here the operation is as described.
By default, the ⊕ key is pre-assigned with the quick jump function to "Sens Ref" (setpoint for the swing amplitude in gss). The ⊖ key does not have a default setting. Cf. chap. 5.3

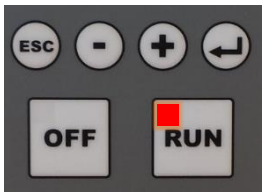
| Parameter | Value | Unit |
|---|---|---|
| General device parameters | | |
| 128 Quick jump to function Menu - key | off | |
| 129 Quick jump to function Menu + key | Sens ref | |


### 6.9.9 Controller status at switch-on

The default setting of the controller state after switching on is that the controller is OFF and the magnet is thus switched off.
Pon=OFF (i.e. with "Power on" the state is "OFF"):




This state can also be reversed so that the output signal is already switched on after starting the unit.
Pon=ON (i.e. with "Power on" the state is now "ON"):




Note: For this state, the RUN/OFF buttons cannot be switched passively.

| Parameter | Value | Unit |
|---|---|---|
| General device parameters | | |
| 093 RUN/OFF buttons (RUN/OFF) | active after Pon = OFF | |

## 6.10 Magnetic output

### 6.10.1 Start-up and shut-down ramp

When switching the vibratory feeder on and off, a ramp can be set to realise a soft start or stop.

| Parameter | Value | Unit | |
|---|---|---|---|
| **Output voltage (POWEROUT)** | | | |
| 098 Start-up ramp | 100 | ms | 100 |
| 099 Shut-down ramp | 100 | ms | 100 |

### 6.10.2 Time constant overcurrent shutdown

The current value $I^2xt$ is a monitoring function to protect the connected vibratory feeder. This value indicates the time period in which the continuous current limit may be exceeded. If this value is exceeded, the output of the unit switches off.

| Parameter | Value | Unit | |
|---|---|---|---|
| **Output voltage (POWEROUT)** | | | |
| 100 Time constant $I^2xt$ Output current | 3 | sec | 3 |

## 6.11 Frequency monitoring

Our patented frequency monitoring function is used to detect unusual frequency changes and output an error (f Fail).
This is suitable, for example, to detect a broken spring. This function is only possible in control mode. The time until error output after exceeding the frequency monitoring limits can be changed.

### 6.11.1 Frequency monitoring with preset limit values:

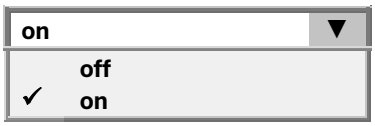
Activation of frequency monitoring with preset limit values takes place when the controller is switched off (OFF):


| Parameter | Value | Unit | |
|---|---|---|---|
| **Control operation CO (CONTROL)** | | | |
| **104 Frequency control (Cont. f)** | | on | on / off / ✓ on |
| **Frequency monitoring** | | | |
| **177 Frequency monitoring (f set)** | on | | on / off / ✓ on / set |
| **178 Error output (f Time)** | 60000 | ms | 60000 |
| **179 limit frequency range below (f min)** | 3.0043 | Hz | 3.0043 |
| **180 limit frequency range top (f max)** | 300 | Hz | 300 |

### 6.11.2 Frequency monitoring with determination of new limit values:

Activation of frequency monitoring with determination of new limit values takes place with the controller switched on (ON):


| Parameter | Value | Unit |
|---|---|---|
| **Control operation CO (CONTROL)** | | |
| **104 Frequency control (Cont. f)** | on | |




| | | |
|---|---|---|
| **Frequency monitoring** | | |
| **177 Frequency monitoring (f set)** | set | |


Note: Setting parameters to "set" is done while the unit release is active.

| Parameter | Value | Unit |
|---|---|---|
| **Frequency monitoring** | | |
| **179 limit frequency range below (f min)** | xxxx | Hz |

New limit value corresponds to the current output frequency (Freq act) -3%.

| | | |
|---|---|---|
| **180 limit frequency range top (f max)** | xxxx | Hz |

New limit value corresponds to the current output frequency (Freq act) +3%.

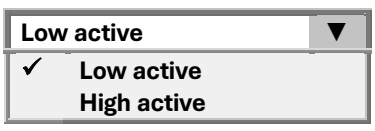
If, for example, a spring on the conveyor is broken, the frequency monitor detects the error and switches off with the error message "f Fail".
If only one spring is broken, the conveyor can possibly be operated until it is repaired. For this, however, the frequency monitoring must be set to the new limit values.

## 6.12 Functions of the inputs and outputs

### 6.12.1 Adjusting the level of the inputs

By default, the input levels correspond to positive logic, i.e. "high active", and can be changed to negative logic, i.e. "low active".
Here at the example of IN1:

| Parameter | Value | Unit |
|---|---|---|
| **Input functions** | | |
| **088 Level IN1** | Low active | |



### 6.12.2 Adjusting the level of the outputs

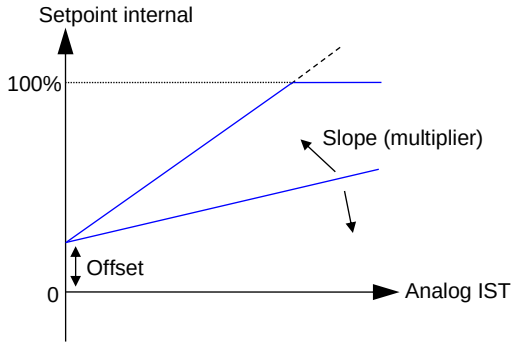
The output signals can be output "positive" as standard or vice versa, i.e. "inverted". Here at the example of OUT1:

| Parameter | Value | Unit |
|---|---|---|
| Outputs functions | | |
| 094 OUT1 level | inverted | |


### 6.12.3 Analog inputs IN4 and IN5 Adjustment

Serves to adjust the offset at the inputs. The "offset" is first added to the applied voltage on the digitised value (negative values are also possible) and the result is then multiplied by the "multiplier".

Please note: The physical input range 0 ... 24V is not increased by this. Likewise, the result remains limited to 0 ... 100%. These setting options make it possible to set different input voltage ranges, e.g. 0 ... 10V or, with a corresponding load resistor, a current loop 0 ... 20mA or 4 ... 20mA.




#### *6.12.3.1 Load resistance*

Two load resistors can be selected. This makes it possible to realise a current loop input for 0 ... 20mA or 4 ... 20mA.

#### *6.12.3.2 Calculation of offset, multiplier with analog specification of Sens ref*

$$m = \frac{S_2 - S_1}{E_2 - E_1} \cdot 0{,}29\,\frac{V}{g_{ss}}$$

$$b = E_1 - \frac{S_1}{S_2 - S_1} \cdot (E_2 - E_1)$$

with

| | |
|---|---|
| m | Multiplier |
| b | Offset in V |
| $E_1$ | Input signal initial value in V |
| $E_2$ | Input signal final value in V |
| $S_1$ | Setpoint (Sens ref) Initial value in $g_{ss}$ |
| $S_2$ | Setpoint (Sens ref) Final value in $g_{ss}$ |

Example1: Default: 0...20$g_{ss}$ , 0...10V (or 0...20mA)
Offset = 0V
Multiplier = (20$g_{ss}$ - 0$g_{ss}$ ) / (10V - 0V) · 0.29V/$g_{ss}$ = 0.58

Example 2: Default: 0...30$g_{ss}$ , 4...20mA (500Ω = 2...10V)
Offset = 2V - 0$g_{ss}$ / (...) · (...) = 2V
Multiplier = (30$g_{ss}$ - 0$g_{ss}$ ) / (10V - 2V) · 0.29V/$g_{ss}$ = 1.0875

Example 3: Default: 10...30$g_{ss}$ , 0...10V
Offset = 0V - 10$g_{ss}$ / (30$g_{ss}$ - 10$g_{ss}$ ) · (10V - 0V) = -5V
Multiplier = (30$g_{ss}$ - 10$g_{ss}$ ) / (10V - 0V) · 0.29V/$g_{ss}$ = 0.58

Settings of the parameters using the example of input IN5 according to example 2:

| Parameter | Value | Unit | |
|---|---|---|---|
| **input functons** | | | |
| 056 IN5 function | analog function | | analog function ▼<br>No function<br>Reset Fault<br>Sensor 1<br>Sensor 2<br>Enable 1<br>Enable 2<br>PB upper<br>PB lower<br>UCM input 1<br>UCM input 2<br>✓ analog function<br>Analog frequency set-ting |
| 092 Level IN5 | High active | | High active ▼<br>Low active<br>✓ High active |
| **Analog inputs Adjustment** | | | |
| 059 Offset IN5 | 2 | V | 1.998 |
| 060 Multiplier IN5 | 1.0875 | | 1.088 |
| 063 Input resistance IN5 | 500 Ohm | | 500 Ohm ▼<br>100 kOhm<br>✓ 500 Ohm |

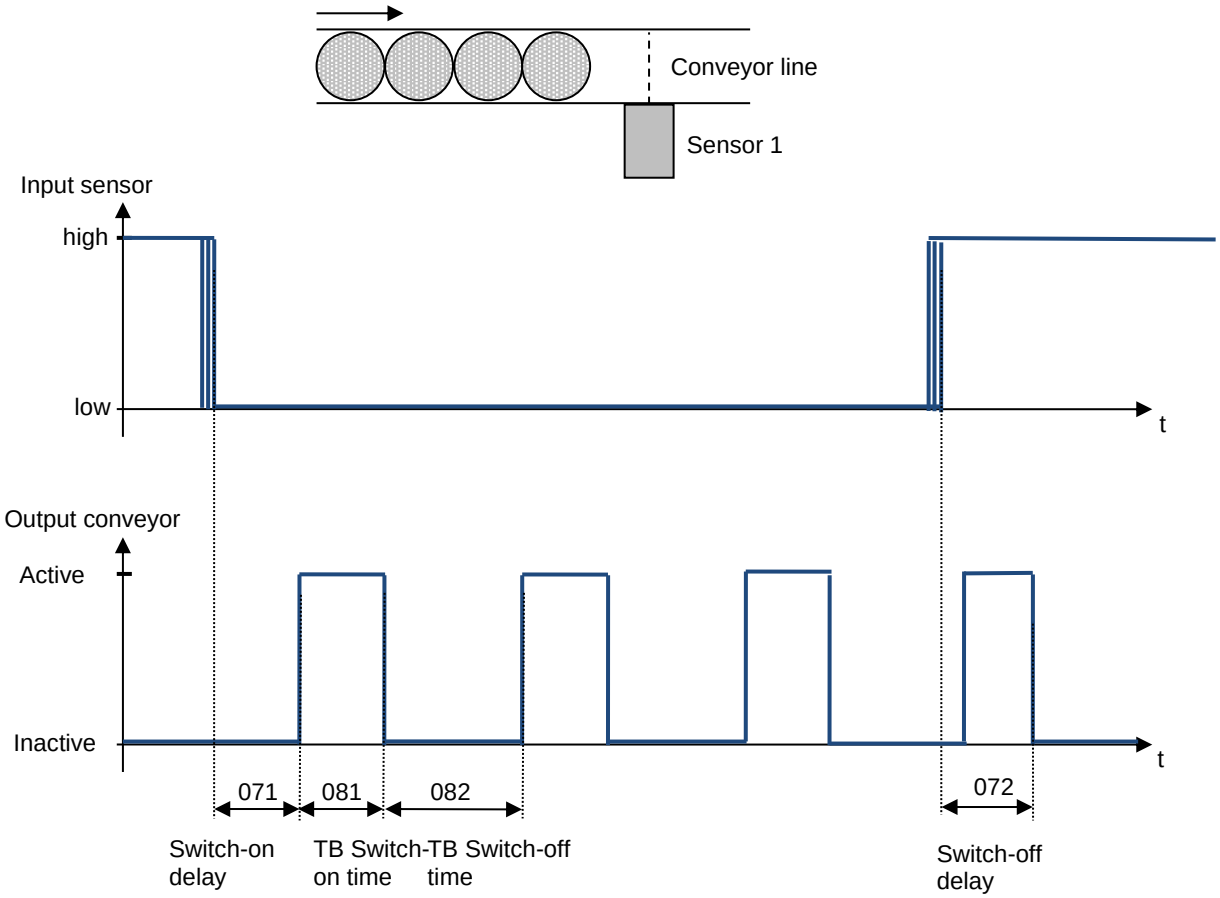
## 6.13 Output voltage range for analog input

The output voltage during operation using an analog input signal can be limited. This makes it possible to use the analog input from 0-100%. For this purpose, parameter 067 min. output voltage can be selected so that the magnet starts to oscillate and parameter 068 max. output voltage is used to enter the voltage at which the pot starts to oscillate too much.

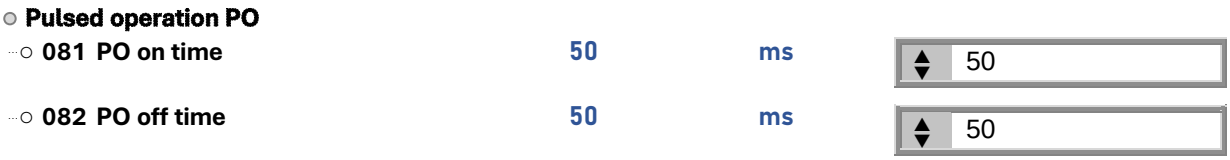
| Parameter | Value | Unit | |
|---|---|---|---|
| **Output voltage (POWEROUT)** | | | |
| **067 min. Output voltage** | 50 | V | 50 |
| **068 Max. output voltage** | 200 | V | 200 |

## 6.14 Pulsed operation

For some conveying applications it is necessary to clock the conveyor, e.g. when a pulsating partial flow is advantageous. The on/off times can be set separately.




| Parameter | Value | Unit | |
|---|---|---|---|
| **Level control ler (LC)** | | | |
| **071 LC switch-on delay (ON-del.)** | 30 | ms | 30 |
| **072 LC switch-off delay (OFF del)** | 30 | ms | 30 |




Specify the input of the sensor (here using IN1 as an example):


## 6.15 Level control

Note: This additional function can only be used if your control unit has this software function.

The level control or jam control avoids unnecessary conveying times. This reduces noise, lowers energy consumption and protects the material being conveyed (less friction and heat).

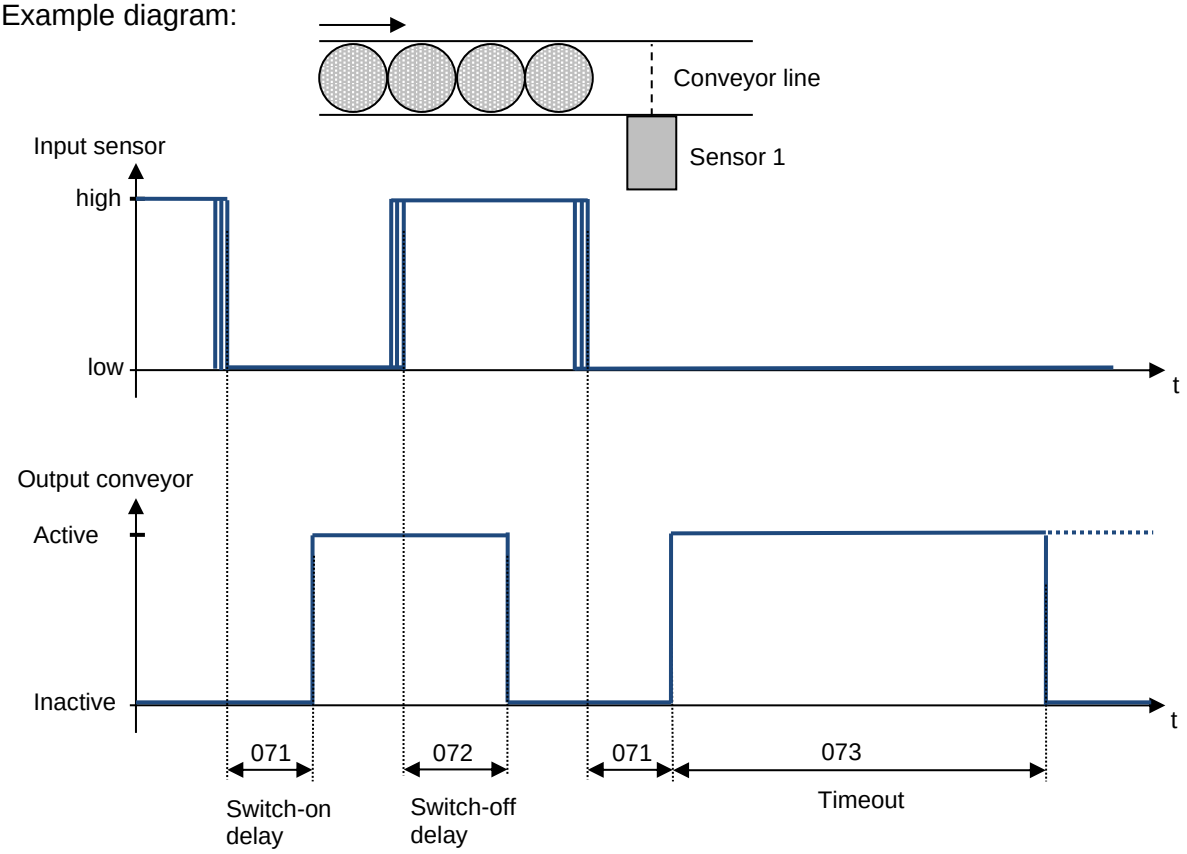
### 6.15.1 Level control with one sensor

Switching the conveyor on and off is enabled by a material sensor and controlled so that the material flow oscillates around the sensor.
The conveyor is switched on when the sensor (here in the example on IN1) is passive and the switch-on delay (071) has expired. The conveyor is switched off when the sensor is active and the switch-off delay (072) has expired. Level changes during the delay times reset them to 0.

Note: A release must be active. The enable can be activated either by pressing "RUN" on the unit or by an external input, if parameterised.
For this purpose, the operating mode "1 sensor on/off" must be activated in the parameter group "LC".

The max. switch-on time of the conveyor can be monitored via a separate time stage "073 LC Sensor Timeout".
If this function 073 is activated (i.e. greater than "zero"), the conveyor switches off after this time (error timeout). This function can also be parameterised to a message output. Cf. chap. 6.15.3
A parameter value of "zero" switches off the monitoring. There is no further monitoring of this sensor.

Example diagram:




| Parameter | Value | Unit | |
|---|---|---|---|
| **Level controller (LC)** | | | |
| **070 LC Operating mode** | 1 Sensor on/off | | off ▼<br>off<br>✓ 1 Sensor on/off<br>2 Sensor on/off<br>1 Sensor low/high<br>2 Sensor low/high |
| **071 LC switch-on delay (ON-del.)** | 30 | ms | 30 |
| **072 LC switch-off delay (OFF-del.)** | 30 | ms | 30 |
| **073 LC Sensor Timeout (Timeout)** | 0 | ms | 0 |
| **165 LC Timeout switch off** | on | | on ▼<br>✓ on<br>off |
| **074 LC Setpoint value low (V min)** | 50 | VAC | 50 |
| **075 LC Setpoint value high (V max)** | 100 | VAC | 100 |

| | | |
|---|---|---|
| **Input functions** | | |
| 052 IN1 Function | Sensor 1 | Sensor 1 ▼ |

Sensor 1 ▼
- No function
- Reset Fault
- ✓ Sensor 1
- Sensor 2
- Enable 1
- Enable 2
- PB upper
- PB lower
- UCM input 1
- UCM input 2

### 6.15.2 Level control with two sensors

In conjunction with two material sensors, a material level is stored within a filling section. The conveyor is only switched on after the switch-on delay (071) when both sensors are low (no material being conveyed).
If both sensors are high (material present), the conveyor is switched off after the switch-off delay (072).

Note: A release must be active. The enable can be activated either by pressing "RUN" on the unit or by an external input, if parameterised. Cf. chap. 6.9.3
For this purpose, the operating mode "2 sensor on/off" must be activated in the parameter group "LC".

The max. switch-on time of the conveyor can be monitored via a separate time stage "073 LC Sensor Timeout".
If this function 073 is activated (i.e. greater than "zero"), the conveyor switches off after this time (error timeout). This function can also be parameterised to a message output. Cf. chap. 6.15.3
A parameter value of "zero" switches off the monitoring. There is no further monitoring of these sensors.

| Parameter | Value | Unit | |
|---|---|---|---|
| **Level controller (LC)** | | | |
| 070 LC Operating mode | 2 Sensor on/off | | off ▼ |
| 071 LC switch-on delay (ON-del.) | 30 | ms | 30 |
| 072 LC Switch-off delay (OFF-del.) | 30 | ms | 30 |
| 073 LC Sensor Timeout (Timeout) | 0 | ms | 0 |
| 165 LC Timeout switch off | on | | on ▼ |
| 074 LC Setpoint value low (V min) | 50 | VAC | 50 |

off ▼
- off
- 1 Sensor on/off
- ✓ 2 Sensor on/off
- 1 Sensor low/high
- 2 Sensor low/high

on ▼
- ✓ on
- off

| | | | |
|---|---|---|---|
| 075 LC Setpoint value high (V max) | 100 | VAC | 100 |

**Input functions**

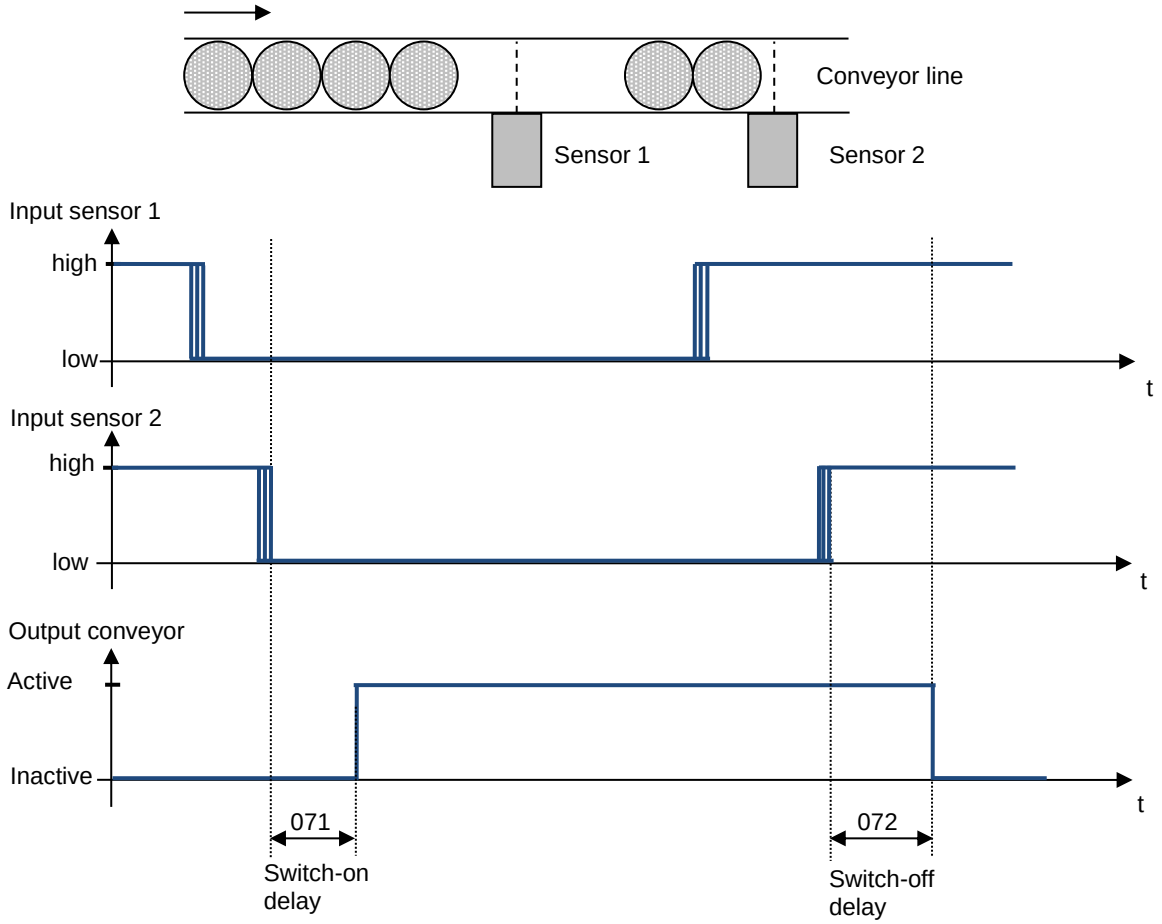
| | | |
|---|---|---|
| 052 IN1 function | Sensor 1 | Sensor 1 ▼ |

Sensor 1 ▼
- No function
- Reset Fault
- ✓ Sensor 1
- Sensor 2
- Enable 1
- Enable 2
- PB upper
- PB Lower
- UCM input 1
- UCM input 2

| | | |
|---|---|---|
| 053 IN2 Function | Sensor 2 | Sensor 2 ▼ |

Sensor 2 ▼
- No function
- Reset Fault
- Sensor 1
- ✓ Sensor 2
- Enable 1
- Enable 2
- PB upper
- PB lower
- UCM input 1
- UCM input 2

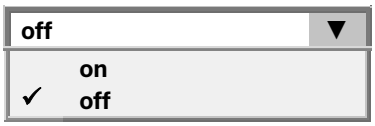
Example diagram:

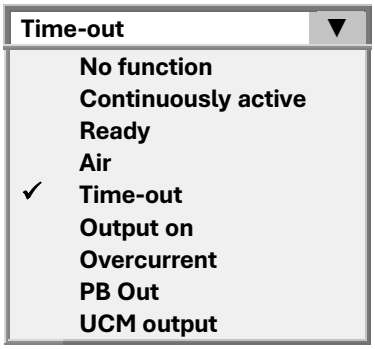


### 6.15.3 Level control with timeout function switched off

If the conveyor is not to switch off in the event of a timeout error, but instead a message is to be sent to the higher-level PLC via an output (here as an example OUT1), the timeout function can be switched off for this purpose.

| Parameter | Value | Unit |
|---|---|---|
| ○ **Level controller (LC)** | | |
| ○ **165 LC Timeout switch off** | off | |
| ○ **Output functions** | | |
| ○ **106 OUT1 Function** | Time-out | |



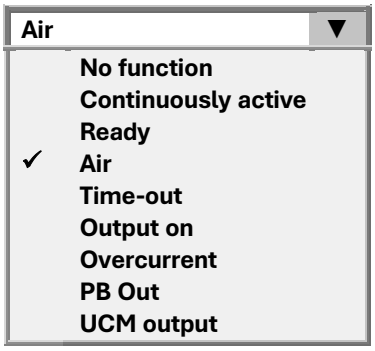

## 6.16 Output air valve for sorting air

Note: This additional function can only be used if your control unit has this software function.

To support part transport by air, the "Air" output can be used to control an air valve.
When the conveyor is released, the "Air" output is switched on first and the output voltage of the conveyor is ramped up with a time delay.
The "Air" output remains active for a follow-up time after the conveyor has been switched off.
The run-up and run-down times can be set separately.

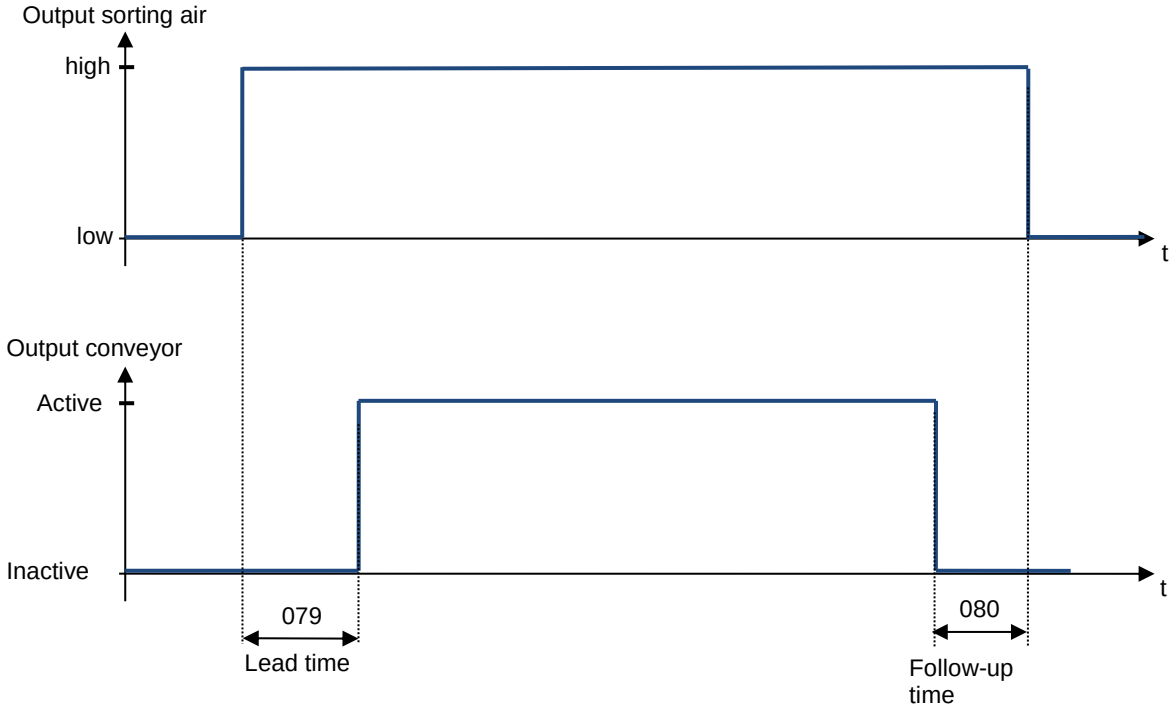
Note: To activate the sorting air, an output must be assigned the function "air" (here as an example OUT1).

| Parameter | Value | Unit |
|---|---|---|
| ○ **Output functions** | | |
| ○ **106 OUT1 Function** | Air | |
| ○ **Sorting air SA (AIR)** | | |
| ○ **079 SA pre time (Pretime)** | 30 | ms |
| ○ **080 SA post time (Postime)** | 30 | ms |





Example diagram:




## 6.17 UCM

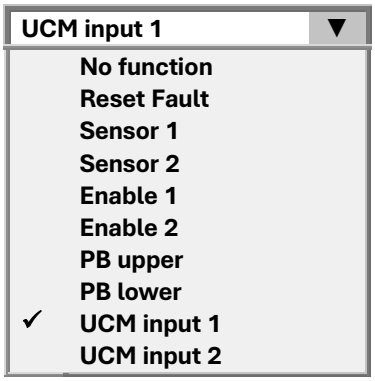
Note: This additional function can only be used if your control unit has this software function.

This control module can be used when input signals act on an output after passing through the UCM logic. Examples of this are the control of an air valve via a material sensor for sorting out incorrectly positioned parts or the control of a hopper conveyor for material replenishment.

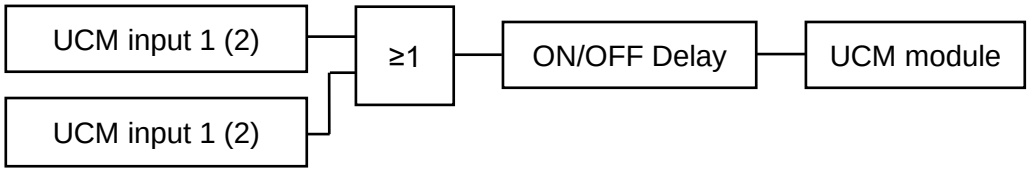
### 6.17.1 Logical linking of the input signals for UCM module

#### *6.17.1.1 one UCM input*

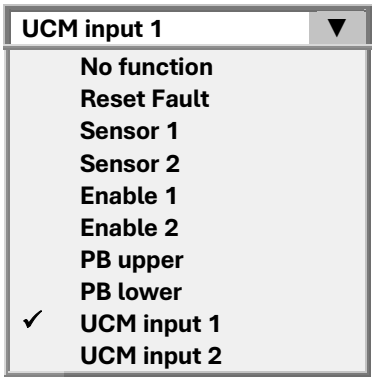

| Parameter | Value | Unit |
|---|---|---|
| **Input functions** | | |
| **052 IN1 Function** | UCM input 1 | |



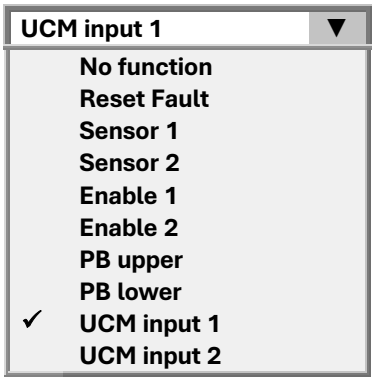
*6.17.1.2 two identical UCM inputs (inputs with OR operation)*



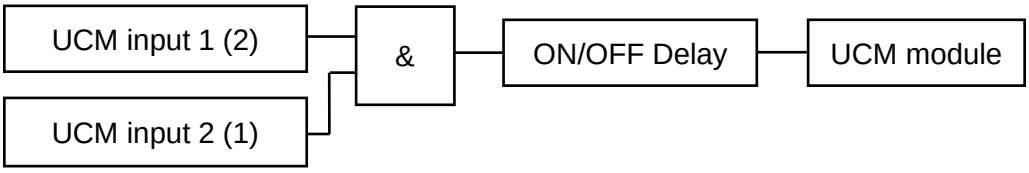

| Parameter | Value | Unit |
|---|---|---|
| **Input functions** | | |
| **052 IN1 function** | UCM input 1 | |



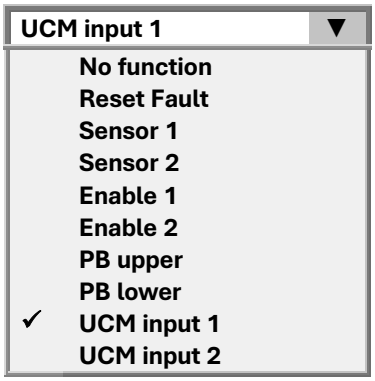

| | | |
|---|---|---|
| **053 IN2 Function** | UCM input 1 | |




*6.17.1.3 Two different UCM inputs (inputs with AND operation)*




| Parameter | Value | Unit |
|---|---|---|
| **Input functions** | | |
| **052 IN1 function** | UCM input 1 | |



| | | |
|---|---|---|
| 053 IN2 Function | UCM input 2 | |

UCM input 2
- No function
- Reset Fault
- Sensor 1
- Sensor 2
- Enable 1
- Enable 2
- PB upper
- PB lower
- UCM input 1
- ✓ UCM input 2

#### *6.17.1.4 UCM output*

Set the output signal of the universal control module accordingly (here using OUT4 as an example).

| Parameter | Value | Unit |
|---|---|---|
| Output functions | | |
| 109 OUT4 Function | UCM output | |

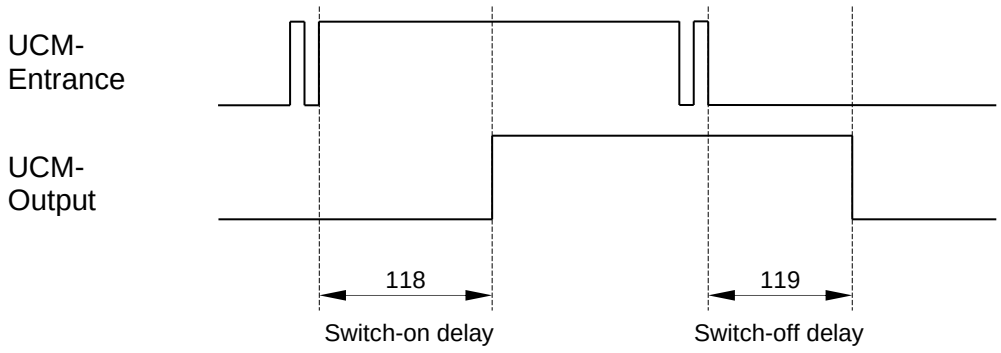
UCM output
- No function
- Continuously active
- Ready
- Air
- Time-out
- Output on
- Overcurrent
- PB Out
- ✓ UCM output

### 6.17.2 Operating mode "State

The UCM output is switched on as soon as the UCM input has been continuously active for the duration of the switch-on delay. The UCM output is switched off as soon as the input has been inactive continuously for the duration of the switch-off delay.

The max. switch-on time is monitored by the UCM time out function.

Example diagram:

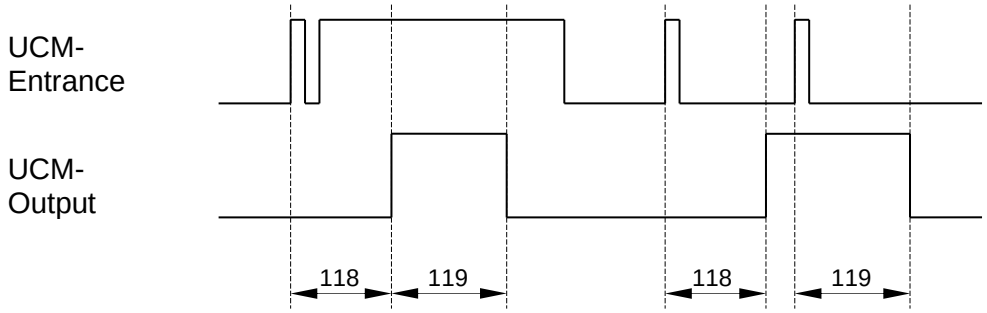


| Parameter | Value | Unit | |
|---|---|---|---|
| **Universal controller module UCM + PB** | | | |
| **117 UCM mode** | UCM state | | USM state ▼<br>off<br>✓ UCM state<br>UCM edge<br>UCM state, IN continuously active |
| **118 UCM on delay** | 30 | ms | ▲▼ xx |
| **119 UCM off delay** | 30 | ms | ▲▼ xx |

### 6.17.3 Operating mode "positive edge

The UCM output is switched on as soon as the switch-on delay has expired after a positive signal edge at the UCM input. The UCM output is switched off as soon as the switch-off delay has expired after the last positive signal edge.

Example diagram:

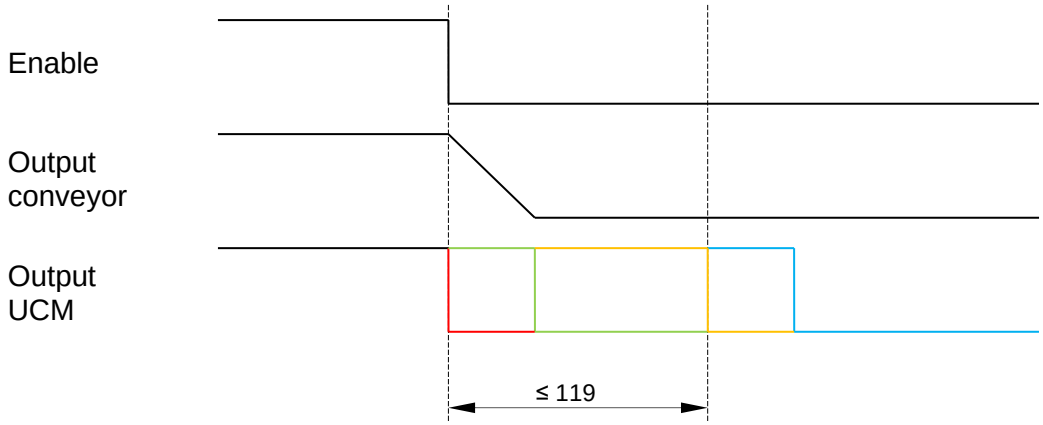



| Parameter | Value | Unit | |
|---|---|---|---|
| **Universal controller module UCM + PB** | | | |
| **117 UCM mode** | UCM edge | | UCM edge ▼<br>off<br>UCM state<br>✓ UCM edge<br>UCM state, IN continuously active |
| **118 UCM on delay** | 30 | ms | ▲▼ xx |
| **119 UCM off delay** | 30 | ms | ▲▼ xx |

### 6.17.4 Link UCM output with enable

With parameter 120, the UCM output can be blocked, depending on the enable or the operating status of the unit.

Example diagram:




Parameter 120 = Enable off
Parameter 120 = Enable off, delay
Parameter 120 = Output off
Parameter 120 = Output off, delay

| Parameter | Value | Unit | |
|---|---|---|---|
| Universal controller module UCM + PB | | | |
| 120 UCM disable condition | Release off | | Release off ▼ |
| | | | Never |
| | | | ✓ Release off |
| | | | Release off, delay |
| | | | Output off |
| | | | Output off, delay |
| 118 UCM on delay | 30 | ms | ▲▼ xx |
| 119 UCM off delay | 30 | ms | ▲▼ xx |

### 6.17.5 UCM with timeout function switched off

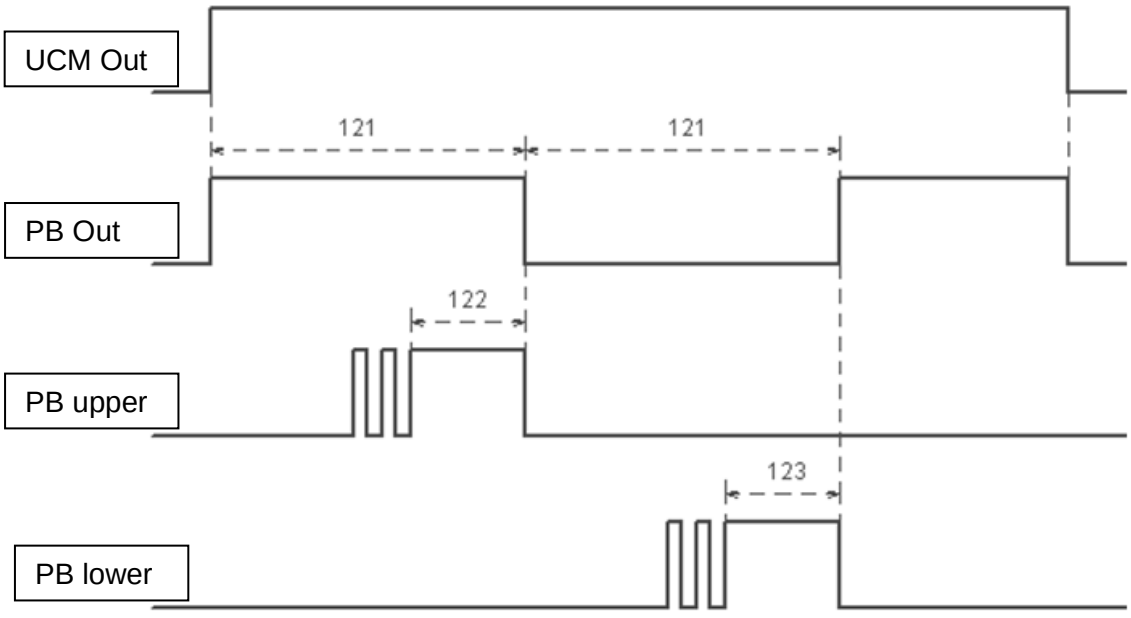
If the conveyor is not to switch off in the event of a timeout error, but instead a message is to follow to the higher-level PLC via an output (here as an example OUT2), the timeout function can be switched off for this purpose.

The max. switch-on time of the conveyor can be monitored via a separate time stage "163 UCM Timeout".
If this function is activated, the conveyor switches off after this time has elapsed. This function can also be parameterised to a signal output.
A parameter value of "zero" switches off the monitoring. There is no further monitoring of these sensors.

| Parameter | Value | Unit | |
|---|---|---|---|
| **Universal controller module UCM + PB** | | | |
| **163 UCM Timeout** | 0 | ms | Xx |
| **164 UCM timeout switch off** | off | | off / on / ✓ off |
| **Output functions** | | | |
| **107 OUT2 Function** | Time-out | | Time-out / No function / Continuously active / Ready / Air / ✓ Time-out / Output on / Overcurrent / PB Out / UCM output |

### 6.17.6 UCM + PB

To operate pneumatic hoppers, for example, the output function PB OUT can be used. If the UCM OUT function is active, the PB OUT function is also active until the PB upper input becomes active. The PB OUT function remains passive until the PB lower input becomes active.
The max. switch-on and switch-off time of the PB OUT function is monitored by the PB time out function.




The inputs (here as an example IN1 and IN2) can be evaluated with a delay. E.g. to debounce the signals or to realise a delayed switching to the other direction of the conveyor.

If both inputs (PB upper and PB lower) are active at the same time, they are switched off and a timeout error message is displayed.

One output (here as an example OUT3) is set as PB output.

| Parameter | Value | Unit | |
|---|---|---|---|
| **Universal controller module UCM + PB** | | | |
| 122 PB upper delay time | 500 | ms | Xx |
| 123 PB lower delay time | 500 | ms | Xx |
| 121 PB Timeout | 5000 | ms | Xx |
| **Input functions** | | | |
| 053 IN2 Function | PB upper | | PB upper ▼ |
| 054 IN3 Function | PB lower | | PB lower ▼ |
| **Output functions** | | | |
| 108 OUT3 Function | PB Out | | PB Out ▼ |

PB upper ▼
- No function
- Reset Fault
- Sensor 1
- Sensor 2
- Enable 1
- Enable 2
- ✓ PB upper
- PB lower
- UCM input 1
- UCM input 2

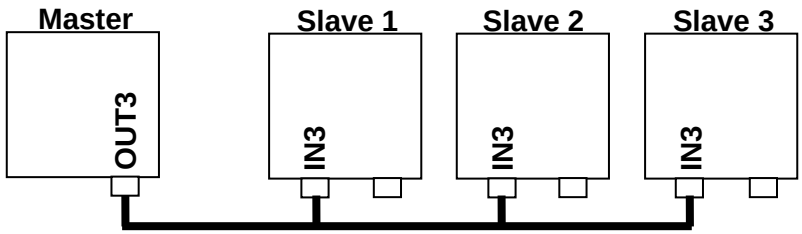
PB lower ▼
- No function
- Reset Fault
- Sensor 1
- Sensor 2
- Enable 1
- Enable 2
- PB upper
- ✓ PB lower
- UCM input 1
- UCM input 2

PB Out ▼
- No function
- Continuously active
- Ready
- Air
- Time-out
- Output on
- Overcurrent
- ✓ PB Out
- UCM output

## 6.18 Master/Slave

Note: This additional function can only be used if your control unit has this software function.

It is possible to operate several control units in a network. For this purpose, e.g. one control unit can be parameterised as master and many other units as slaves. The master unit sets the frequency for the slave units via synchronous pulses.




A unit parameterised as a slave will only switch on (RUN) when synchronous pulses from the master are applied to its slave pulse input.
If there are no more synchronous pulses (master off), the unit switches back to STOP after a short delay.

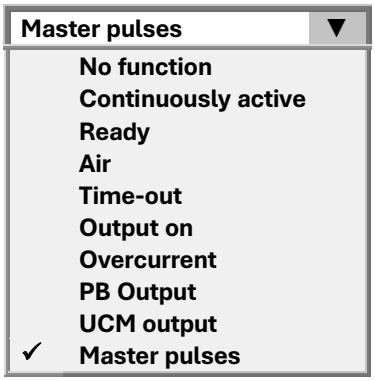
Attention: A maximum of 10 units can be operated by one master on one bus.

Note: If a unit is parameterised as a slave, it can only be operated with amplitude control, but not with frequency control. The frequency is fixed by the master.
The master, however, can perform amplitude and frequency control.

Attention: If the unit is configured for master/slave operation, the output OUT3 or the input IN3 is permanently required for this operation. In this mode, it is not possible to use the two I/Os for other functions.

### 6.18.1 Master unit settings

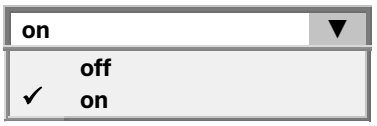
| Parameter | Value | Unit |
|---|---|---|
| **Output functions** | | |
| **108 OUT3 Function** | Master pulses | |



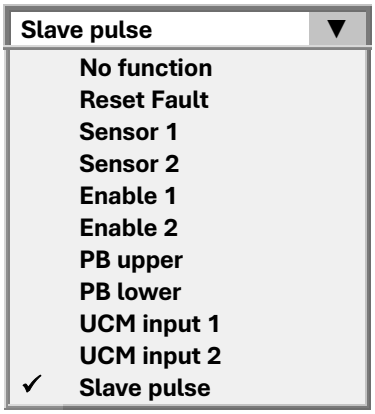
### 6.18.2 Slave unit settings

The slave function can be switched on and off and the phase position can be set in degrees to the master unit.

| Parameter | Value | Unit |
|---|---|---|
| **Master / Slave operation** | | |
| 105 Slave operation (Slave) | on | |
| 103 Phase offset slave operation | 0 | ° |
| **Input functions** | | |
| 054 IN3 Function | Slave pulse | |








## 6.19 Display contrast

The brightness of the display can be adjusted variably.

| Parameter | Value | Unit |
|---|---|---|
| **General device parameters** | | |
| 061 Display contrast (Contrast) | 3000 | |


## 6.20 Info parameter

The Parameter information area displays various information and statuses about the unit.

| Parameter | Value | Unit |
|---|---|---|
| Firmware | 3xx | |
| Hardware status (HW) | 1xx | |
| File: | xxx.apf | |

## 6.21 Measurements

In the right half, current measurement data and states of the control unit are displayed.

| Measurements: | Value | Unit |
|---|---|---|
| ○ Status | | |
| ○ Total operating hours (ON-time) | | h |
| ○ Conveyor drive operating hours (run-time) | | h |
| ○ Serial number | | |
| ○ Temperature (Temp) | | °C |
| ○ DC link voltage (VDC Link) | | V |
| ○ Status of IN1 | | |
| ○ Status of IN2 | | |
| ○ Status of IN3 | | |
| ○ Status of IN4 Level | | V |
| ○ Status of IN5 Level | | V |
| ○ Status of IN4 Function | | % |
| ○ Status of IN5 Function | | % |
| ○ Output current | | A |
| ○ Output current $I^2$ x t (Ixt) | | A |
| ○ Output voltage (Vout act) | | VAC |
| ○ Modulation Level | | % |
| ○ Actual value of vibration sensor (Sens act) | | gss |
| ○ Actual output frequency (Freq act) | | Hz |

### 6.21.1 Explanation of the measured values

#### *6.21.1.1 Status*

The unit status is displayed here (in fault-free status: operating status, otherwise: error code cf. chap.7.2 ).

Not Ready (Nready)
Ready (Ready)
Release (Run)

#### *6.21.1.2 Total operating hours (ON-Time)*

The operating hours counter counts the operating time of the unit. It is active as soon as the unit is connected to the mains voltage and switched on.

#### *6.21.1.3 Conveyor drive operating hours (run-time)*

This operating hours counter only counts the effective running time of the conveyor.

#### *6.21.1.4 Serial number*

Displays the identification number of the control unit (identical to the serial number on the type plate).

#### *6.21.1.5 Temperature (Temp)*

The temperature of the unit at the bottom of the unit. If a critical limit temperature is exceeded, the control unit switches off.

#### *6.21.1.6 DC Link voltage (VDC Link)*

The DC link voltage is continuously monitored. If there is a fault, the output stage is locked, the control unit switches off and an overvoltage or undervoltage fault is generated.

#### *6.21.1.7 Status of IN1...3*

Displays the digital status of the inputs IN1 ... IN3.

#### *6.21.1.8 Status of IN4...5 Level*

Displays the analog voltage value at the input terminal.

#### *6.21.1.9 Status of IN4...5 Function*

Shows the percentage value of the selected analog function incl. offset and multiplier setting.

#### *6.21.1.10 Output current*

The output current is continuously monitored and displayed.

#### *6.21.1.11 Output current I² x t (Ixt)*

The output current is calculated with a time constant. If the value exceeds the continuous current limit, the unit is switched off.

#### *6.21.1.12 Output voltage (Vout act)*

Instantaneous output voltage at the magnet output.

#### *6.21.1.13 Modulation Level*

Control of the pulse width modulation (PWM) at the solenoid output. If this value is 100%, then the voltage at the delivery output cannot be increased any further.
The mains input voltage is too low for the desired output voltage.

#### *6.21.1.14 Actual value of vibration sensor (Sens act)*

Displays the current measured value of the vibration sensor.

#### *6.21.1.15 Actual output frequency (Freq act)*

Current output frequency (Freq act)

# 7. Troubleshooting and fault clearance

## 7.1 Resetting fault messages

- OFF / ON of the supply voltage (Attention: before switching on again, wait >1min until the internal energy storage has been emptied (LCD off).
- Fault reset via terminal function
- Autoreset

## 7.2 Possible error causes

Some possible causes of errors are listed in the table below.

| Display Display | Error | Possible cause | Remedy |
|---|---|---|---|
| Status RUN | Vibrating solenoid does not run despite release | Vibration magnet or wiring defective,<br>Output voltage too low | Check magnet, repair if necessary,<br>Check parameters |
| Status Lock | Not ready | Device lock after update | Cf. chap. 6.9.5 |
| Status Nready | Not ready | Supply voltage missing or too low | Check voltage source, wiring and fuses |
| Status UV | F1 Undervoltage | Supply voltage (power) was too low during enable (possibly only briefly) | Check voltage source, wiring and impedance. The voltage may have dropped briefly due to a high current demand.<br>Carry out a reset (switch off, wait until the unit is completely off and switch on again) |
| Status OV | F2 Overvoltage | Supply voltage too high (possibly only briefly) | Check voltage source<br>Perform reset |
| Status OT | F3 Overtemperature | Bottom of appliance too hot | Allow to cool down, ensure sufficient ventilation, perform reset |
| Status OC | F4 Overcurrent | $I^2xt$ monitoring of the solenoid current has triggered. | Check limit value specification, check solenoid current |
| Status Outstage | F5 Output stage | Defective magnet or earth fault | Check for short circuit/earth fault, check solenoid/coil for defect |
| Status Timeout | F6 Timeout | Timeout for UCM or level control | Check sensors,<br>Check parameters |
| Status SENS | F7 Vibration sensor | No correct signal from the vibration sensor | Check vibration sensor and mounting |
| Status Scanfail | F8 Scanfail | The parameterised scan current is not reached | Check solenoid connection and rated current |
| Status Bus module | F9 Bus modul | Communication monitoring with the bus module has triggered | Check bus connection, plug, cable |
| Status f Fail | F10 Frequency monitoring | Frequency monitoring in control mode has addressed | Check limit values,<br>Check conveyor<br>(e.g. spring breakage) |

When sending the unit for inspection or repair, please specify the following:

- Type of error
- Accompanying circumstances
- own suspected cause of error
- previous unusual occurrences

# 8. Maintenance and cleaning

## 8.1 Maintenance

The control unit is maintenance-free if the prescribed operating conditions are observed (see chapter 3.2).

## 8.2 Cleaning

Do not clean the surfaces of the control unit with methylated spirits, solvents or aggressive cleaners.

# 9. Manufacturer's declaration

The manufacturer, Mosca Elektronik und Antriebstechnik GmbH, hereby declares that the SP01075 control unit described in this technical documentation is intended for installation in a machine or for assembly with other components to form a machine. The SP01075 control unit is not a machine in the sense of the Machinery Directive 2006/42/EC.

Instructions and recommendations for installation and intended operation are contained in this technical documentation.

Commissioning of the machine is prohibited until it has been established that the protection and safety requirements of the Machinery Directive 2006/42/EC have been met.

These technical documents describe measures with which the machine complies with the EMC limits. The electromagnetic compatibility of the machine depends on the type and care of the installation carried out. The responsibility for compliance with the EMC Directive 2004/108/EC in the machine application lies with the user.

**Standards and regulations considered**

- IP protection classes:
  EN 60529, 1991 edition
- Basic material for printed circuits:
  DIN IEC 60249 Part 1, Edition October 1986
- Printed circuits, printed circuit boards:
  DIN IEC 326 Part 1, March 1985 edition
- Determination of clearance and creepage distances:
  DIN VDE 0110 Part 1-2, edition October 1985
- Emitted interference:
  IEC61000-6-4:2006+A1:2010
  IEC610003-3-2:2005+A1:2008+A2:2009
  IEC61000-3-3:2013
- Immunity:
  IEC61000-6-2:2005
  IEC61000-4-2:2008
  IEC61000-4-3:2007+A1:2007+A2:2010:
  IEC61000-4-4:2012
  IEC61000-4-5:2005
  IEC61000-4-6:2008
  IEC61000-4-8:2008
  IEC61000-4-11:2004

# 10. Operating software

In order to be able to parameterise and monitor the control unit SP01075, the monitor software "ParaDesk" is required.
The latest version can be downloaded free of charge from the homepage at http://www.paradesk.de.

Note: Please refer to the ParaDesk operating instructions for installation and operation of the software. These can also be found at the above Internet address.

# 11. List of changes

## 11.1 Documentation

| Date | Change |
|---|---|
| 01/16 | Original version |
| 03/16 | Connection assignment, technical data, menu structure changed |
| 28.08.16 | Modified pin assignment, dimensional drawings added,<br>Profinet supplemented |
| 31.08.16 | Modified pin assignment, dimensional drawings added,<br>Profinet supplemented |
| 06.09.16 | Input current supplemented |
| 19.10.16 | Picture, characteristics replaced |
| 08.11.16 | Input currents corrected, parameter numbers corrected,<br>Various minor corrections, leakage current diagram, standards |
| 16.11.16 | Data relay output added |
| 06.12.16 | Assignment X7, relay contact extended by OUT4, Profinet H21, H22 exchanged |
| 14.12.16 | Additions to chap. control operation, chap. USM with Paras inserted, parameters for key lock inserted |
| 22.12.16 | Menu extended |
| 11.01.17 | Quick jump +- button added |
| 16.01.17 | Saving parameters without additional query as of FW209 |
| 31.01.17 | Designation M12 sockets and plugs extended |
| 11.10.17 | Display indications corrected |
| 19.10.17 | Various small things corrected |
| 02.12.17 | Chap. 7.1 P86, Chap. 7.2.3.5 expanded, Chap. 7.2.6.3 expanded, Chap. 7.2.12.2 expanded |
| 16.01.18 | Product image renewed |
| 05.03.18 | Chap. 1 Note on equipment and topicality inserted |
| 26.07.18 | Chap. 6.12.3.2 extended |
| 24.10.19 | Dimensional drawings updated |
| 15.11.19 | Mater/Slave operation updated |
| 14.01.20 | USM updated, device lock added, RUN/OFF buttons expanded,<br>PB extended |
| 14.02.20 | Added chapter on cleaning |
| 09.04.20 | Original version added |
| 25.05.20 | Identifier and table for IP54 RS485 added |
| 22.09.20 | Frequency monitoring inserted, error code extended |
| 26.07.22 | Instructions completely revised |

| | |
|---|---|
| 30.10.23 | Output frequency controllable via analog input added |

## 11.2 Software

| Version | Change |
|---|---|
| FW221 | Original version |
| FW222 | Extension of the selection of parameter 077 "Output voltage source" with IN5 |
| FW223 | Fieldbus query for Ethernet/IP added |
| FW300 | Addition of device lock with parameter 190 for activation after device update,<br>Extension of the display menu with submenu item "SETTINGS",<br>Adaptation of the firmware for uniform control with Profinet and Ethernet,<br>Separate timeout function for PB and USM (new parameter 163) |
| FW301 | Troubleshooting |
| FW302 | New functions for RUN and OFF button |
| FW303 | Extension of the receive and transmit enable on fieldbus module additionally now with device status NREADY |
| FW304 | USM module extended to 2 inputs and enable extended to enable 1 and 2 |
| FW305 | Change Enabling of the bus module is only accepted after a restart |
| FW306 | Frequency monitoring with the parameters f Set, f Time, f min and f max |
| FW307 | Transfer of the parameters 098 start-up ramp and 099 run-down ramp to the display menu |
| FW308 | Separate parameters 165 and 166 for timeout switch-off for FSS and USM module |
| FW309 | Number extension of the operating hours counter in the display menu |
| FW310 | Revision of the measurement evaluation for frequency tracking |
| FW311 | New variant for resonance search via parameters 181 and 182 |
| FW312 | Undervoltage identification modified for better operational safety |
| FW401 | Changeover to new fieldbus module |
| FW402 | Output frequency controllable via analog input |