Assembly and Commissioning Instructions

according to Machinery Directive 2006/42/EC (annex VI)

FV - FVR - FVB - Locking Drive for Windows
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Abbreviations

These abbreviations are used consistently throughout these assembly & operating instructions. Unless stated differently, all dimensions indicated in this document are in mm. General tolerances in accordance with DIN ISO 2768-m.

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>A</td>
<td>drive</td>
</tr>
<tr>
<td>AK</td>
<td>connection cable / drive cable</td>
</tr>
<tr>
<td>AP</td>
<td>cover cap</td>
</tr>
<tr>
<td>BD</td>
<td>hinge</td>
</tr>
<tr>
<td>Fxxx</td>
<td>casement bracket</td>
</tr>
<tr>
<td>FAB</td>
<td>overall width of casement</td>
</tr>
<tr>
<td>FAH</td>
<td>overall height of casement</td>
</tr>
<tr>
<td>FG</td>
<td>casement weight</td>
</tr>
<tr>
<td>FL</td>
<td>casement</td>
</tr>
<tr>
<td>FÜ</td>
<td>casement overlap</td>
</tr>
<tr>
<td>HSK</td>
<td>main closing edge</td>
</tr>
<tr>
<td>Kxxx</td>
<td>frame bracket</td>
</tr>
<tr>
<td>L</td>
<td>construction length of drive</td>
</tr>
<tr>
<td>MB</td>
<td>central hinge</td>
</tr>
<tr>
<td>NSK</td>
<td>side closing edge</td>
</tr>
<tr>
<td>RA</td>
<td>frame</td>
</tr>
<tr>
<td>RAB</td>
<td>overall width of frame</td>
</tr>
<tr>
<td>RAH</td>
<td>overall height of frame</td>
</tr>
<tr>
<td>SL</td>
<td>snow load</td>
</tr>
<tr>
<td></td>
<td>opening direction</td>
</tr>
</tbody>
</table>

Warning and Safety Symbols in these Instructions:

The symbols used in the instructions shall be strictly observed and have the following meaning:

- **Danger**
  - Failure to comply with the warning notes results in irreversible injuries or death.

- **Warning**
  - Failure to comply with the warning notes can result in irreversible injuries or death.

- **Caution**
  - Failure to comply with the warning notes can result in minor or moderate (reversible) injuries.

- **Note**
  - Failure to comply with the warning notes can lead to damage to property.

Target Group

These instructions are intended for trained personnel and operators of systems for natural smoke ventilation (NRA / SHEV) (natural smoke exhaust system / smoke and heat exhaust system) and natural ventilation via windows, who are knowledgeable of operating modes as well as the remaining risks of the system.

- **Warning**
  - This device is not intended for use by persons (including children) with physical, sensory or mental limitations or lacking experience and / or knowledge, unless they are supervised by a person who is responsible for the safety or were instructed by him on the usage of this equipment. Children should be supervised to ensure that they are not playing with this device. Cleaning and operator’s maintenance may not be performed by children without supervision.
**Preliminary remark**

By attaching a drive to a movable element of the window a so-called “power-operated window” is created which, according to the Machinery Directive 2006 / 42 / EG, represents a machine.

**Warning**

Pay attention to possible hazards on tilting or rotating windows, whose secondary closing edges are located at less than 2,5 m installation height above the floor, under consideration of the Control Unit and usage!

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**Intended use according**

The drive is intended for stationary installation and electrical connection at the window as part of a building.

The drive is in combination with an external Control Unit (e.g. from Aumüller) released for its proper use at a power-operated window for the following use:

- Application for natural ventilation
  - with an installation height of the drive and the bottom side of sash of at least 2,5 m above the floor, or
  - with an opening width at the HSK of the driven part of < 200 mm by a simultaneous speed of < 15 mm/s at the HSK in closing direction.
- Application as NSHEV (natural smoke and heat exhaust ventilator(s) for ventilation without dual purpose for ventilation in accordance with EN12101-2.

The manufacturer of the power-operated window has to carry out a risk assessment for all other applications independently - at the installation-site of the window.

We as manufacturers are well aware of our duties and responsibilities regarding the development, manufacturing and placing of safe window drives on the market and consistently implement them. Ultimately, however, we have no direct influence on the usage of our drives. Therefore, as a precaution, we point out the following:

- The constructor or his agent (architect, specialist planner) are obligated to evaluate the hazards to persons, outgoing from the usage, installation position, opening parameters and from the external Control Unit of the power operated window, already in the planning phase and to establish necessary protective measures.
- The constructor / manufacturer of the machine “power-operated window” must implement the planned protective measures at the installation-site or, if not yet established, determine them by its own responsibility and detect or minimize possible remaining risks.

The need for a risk assessment at the installation-site due to the reasonably foreseeable misuse.

A risk assessment in accordance with the Machinery Directive 2006 / 42 / EG for the usage of the power-operated window for natural ventilation is absolutely necessary under the following conditions:

- the installation height of the drive and lower edge of casement < 2,5 m above the floor
- and one of the following conditions:
  - the opening width at the HSK > 200 mm, or
  - the opening speed at the HSK is > 50 mm/s, or
  - the closing force at the HSK is > 150 N

The following flow chart can be applied, which also includes the protective measures in accordance with EN 60335-2-103/2016-05.
Casement data
Facade: bottom-hung window, top-hung-window, side-hung window.
Roof: roof window / sky light.
Opening direction: inward opening, outward opening.
Profile material: aluminum, steel, plastic or wood.

When inspecting the drives for conformity with on-site requirements the following items must be observed:

- total weight of casement (glass + frame),
- casement size (FAB x FAH),
- driving force and stroke,
- mounting site at the window frame and casement frame.
SAFETY INSTRUCTIONS

It is important to follow these instructions for the safety of persons. These instructions shall be kept in a safe place for the entire service life of the products.

Risk of crushing and entrapment! Window can close automatically!
The integrated load cut-off stops the opening-drive during closing and opening when the drive is overloaded.
The compressive force is absolutely sufficient to crush fingers in case of carelessness.

Area of application
The drive shall only be used according to its intended use. For additional applications consult the manufacturer or his authorized dealer.

Do not misuse the drive for other applications! Do not allow children to play with this drive or its regulating and/or control units, including the remote control!

Always check whether the system complies with current legal regulations. Special attention must be paid to the opening width, the opening area, the opening time and the opening speed of the window, the temperature range of the drives/external devices and cables as well as the cross section of the connecting cables as function of the cable length and power consumption.

All devices must be permanently protected from dirt and moisture, if the drive is not explicitly suitable for use in wet areas (see technical data).

Installation
These instructions address expert and safety-conscious electricians and/or qualified personnel knowledgeable in electrical and mechanical drive installation.

The safe operation, avoidance of injury to persons and damage to property, as well as risks, is only guaranteed by proper installation and setting according to these installation instructions.

All specifications for installation must be checked independently and, if necessary, adjusted at the installation-site. The connection assignment, the electrical supply data (see machine plate) and performance limits (see technical data) as well as the mounting and installation instructions of the drive must be strictly observed and adhered to!

Never connect 24 V DC drives to 230 V AC mains voltage! Danger to life!

Do not reach into the window rabbet or the operating element (chain or spindle) during installation and operation! Ensure that, based on the installation position and the opening movement of the casement, persons cannot be trapped between the driven part of the window and surrounding fixed components (e.g. wall).

Mounting material
The required mounting material must fit with the drive and occurring load and, if necessary, supplemented.

Before installing the drive, check whether the casement is in good mechanical condition, the weight in balance and whether it opens and closes easily!
**Crush and shear points**

To avoid injuries, **crushing and shear points** between casement and frame must be secured **against entrapment up to an installation height of 2,5 meters above the floor** with appropriate measures. This can be achieved e.g. by using contact-based or contactless protective devices against entrapment, which stop the motion through contact or through interruption by a person. At a force higher than 150 N at the main closing edge the motion must stop within 20 mm. A warning symbol at the opening element must indicate this clearly.

**Unintentional or independent opening or falling**

Casements are to be hinged or secured such way that in case one of the mounting elements fails it will not crash / slam down or move in an uncontrolled manner by e.g. using double suspensions, safety scissors, casement stays. Tilting windows shall be equipped with safety scissors or similar devices to avoid damages and risks of injury for persons through improper installation and operation. The safety scissors must be adjusted to the opening stroke of the drive (see technical data) to avoid blocking. The opening width of the safety scissors must be bigger than the drive stroke.

The movable casement must be secured against unintentional or independent opening as well as falling down.

**Routing cables and electrical connection**

Routing or installing of electrical cables and connections may be performed only by specialist companies. Never operate drives, control units, operating elements and sensors at operating voltages and connections contrary to the specifications of the manufacturer.

All relevant instructions shall be observed for the installation, specifically:
- VDE 0100 Setting up high-voltage systems up to 1000 V
- VDE 0815 Wiring cables
- Specimen Guideline on Conduits German designation (MLAR).

**All-pole disconnecting devices** shall be installed in the permanent electrical installation or external Control Unit for the drive. The mains supply lines 230 V / 400 V AC shall be protected separately!

24V DC drives may only be connected to power supply sources that comply with SELV specifications.

In the case of tandem / multiple operation of drives connected in series, the cross-section of the connection cable must be checked autonomously, depending on the total current consumption of the drive system.

Damaged mains supply lines of drives with plug connectors may only be replaced by the manufacturer or qualified service / maintenance personnel!

Power cables which are fixed to the drive casing cannot be replaced. If the cable is damaged the device must be scrapped!

The types of cable, cable lengths and cross-sections shall be selected in accordance with the manufacturer’s technical data. If necessary, the cable types shall be coordinated with the competent local authorities and energy supply companies. Low-voltage lines (24 V DC) shall be routed separate from the high-voltage lines. Flexible cables may not be flush-mounted. Freely suspended cables shall be equipped with strain reliefs.

Cables must be laid such way that they cannot be sheared off, twisted or bent during operation. Drive cables laid inside window profiles must be protected by insulating tubes with a sufficient temperature resistance. Through holes shall be equipped with cable sleeves!

Clamping points shall be checked for tightness of threaded connections and cable ends. Access to junction boxes, clamping points and external drive control boxes shall be ensured for maintenance work.
**Commissioning, operation and maintenance**

After the installation and after each modification in the set up all functions shall be checked with a trial run. It shall be ensured that drive and casement are set correctly and that security systems, if available, are functioning properly. **After the installation of the system is completed the end-user shall be introduced to all important operating steps. If necessary, he must be advised of all remaining risks / dangers.**

The end-user shall be specifically instructed that no additional forces, except pushing and pulling forces in the opening and closing direction of the casement, may be applied to the spindle, chain or lever of the drive.

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**Note**

Post warning signs!

During cleaning and maintenance works and while exchanging parts, all poles of the drive must be disconnected from the power supply and secured against unintentional reactivation.

Other persons must be kept away from the casement when a hold-to-run switch (push button) is operated or when a window, which has been opened by a smoke and heat exhaust system, is closing!

The operating element of hold-to-run switches must be installed within direct view from the window, but apart from moving elements. If the switch is not a key-operated switch it must be installed at a minimum height of 1,5 m and inaccessible to the public!

Do not allow children to play with permanently mounted control devices and keep remote controls out of reach for children!

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**Caution**

During cleaning, maintenance work and while exchanging parts the drive must be completely disconnected from the power supply and secured against unintentional reactivation.

Do not actuate the drive or the casement when repair or re-setting works are performed!

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**Replacement parts, fasteners and controls**

The drive shall only be operated with control devices from the same manufacturer. There is no liability, warranty or customer service if third-party parts are used. Exclusively original replacement parts of the manufacturer shall be used for mounting elements or expansions.

**Ambient conditions**

The product may not be subjected to impacts or falls, or to vibrations, moisture, aggressive vapors or other harmful environments, unless the manufacturer released it for one or more of these environmental conditions.

- **Operation:**
  - Ambient temperature: -5°C … +60°C
  - Relative humidity:  < 90% less 20°C;
  - < 50% less 40°C;
  - no formation of condensation

**Note**

Observe temperature range during installation!

- **Transport / Storage:**
  - Storage temperature: -5°C … +40°C
  - Relative humidity:  < 60%

**Accident prevention regulations and workmen’s compensation insurance guidelines**

For work on or in a building or building part the provisions and instructions of the respective accident prevention regulations (local workmen’s compensation insurance guidelines) shall be observed and adhered to.

**Declaration of Conformity and of Incorporation**

The drive is manufactured and inspected in accordance with European guidelines. The respective Declaration of Conformity and of Incorporation is on hand.

**In case that the use of the drive differs from the intended use, a risk evaluation for the power operated window shall be performed and a Declaration of Conformity according Machinery Directive 2006 / 42 / EG issued.**
**Application:** natural ventilation, SHEV, ferralux®-NSHEV

**Surface mounting on the window frame/casement profiles of the main/side closing edge (HSK / NSK) of in-/outward opening windows. Locking bracket mounted on the casement.**

**Required mounting space 35 mm**

**Usable without locking bar**

**Options**

- Mounting plate for installation on the window frame profile (RM) of outward opening windows or on the casement profile (FM) of inward opening windows
- Slim locking bracket 18 mm for small mounting space on the window frame profiles

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**FV1**

- Without internal cut-off switch and sequence control, for use in RWA hardware systems with USKM module

**FV3**

- With internal load dependent cut-off switch and sequence control for drives  
  PL6 S1 / PL10 S1 (I_{A} = 0,8 A)

**FV4**

- M-COM suitable internal load dependent cut-off switch and sequence control for drives S3 /S12
- Star wiring
- Current of the drives does not run over FV4
- Sequence control via communication wire

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**TECHNICAL DATA**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>U_{R} (Rated voltage)</td>
<td>24V DC (19 V ... 28 V)</td>
</tr>
<tr>
<td>I_{R} (Rated current)</td>
<td>0,6 A</td>
</tr>
<tr>
<td>I_{0} (Quiescent current)</td>
<td>~ 30 mA</td>
</tr>
<tr>
<td>P_{R} (Rated power)</td>
<td>20 W</td>
</tr>
</tbody>
</table>
| I_{D} (Current of connected drives) | FV1: USKM  
  FV3: 0,8 A (PL 6/10 S1)  
  FV4: 3 A, S3 / S12 non relevant |
| DC (Duty cycle)            | 5 cycles (ED 30 % - ON: 3 min. / OFF: 7 min.) |
| Protection rating          | IP 32                              |
| Ambient temperature range  | ~ -5 °C ... + 60°C                  |
| F (Pushing / Pulling force max.) | ~ 600 N            |
| t (Runtime)                | ~ 5,0 s                            |
| Connecting cable           | FV1: non-halogen, grey 2 x 0,75 mm², ~ 3 m  
  FV3: non-halogen, grey 2 x 0,75 mm², ~ 3 m  
  FV4: non-halogen, grey 3 x 0,50 mm², ~ 3 m |
| Housing                    | aluminium 35 x 35 mm               |
| L (Length)                 | see order data                     |
| Versions                   | FV1: 1x R/L, 2x R, 3x R  
  FV3: 1x R/L, 2x R, 3x R  
  FV4: 1x R/L, 2x R |
| Version name               | 1x = 1 locking point  
  2x = 2 locking points  
  3x = 3 locking points  
  R = right hand version  
  L = left hand version |
| Sound pressure level       | ≤ 70 dB (A)                        |
### ORDER DATA

<table>
<thead>
<tr>
<th>Type</th>
<th>L [mm]</th>
<th>Version</th>
<th>Finish</th>
<th>PU / pcs.</th>
<th>Part.-No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single right hand</td>
<td>420</td>
<td>FV1 R (1x)</td>
<td>E6/C-0</td>
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<td>515103</td>
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<tr>
<td></td>
<td></td>
<td>FV3 R (1x)</td>
<td></td>
<td>1</td>
<td>515102</td>
</tr>
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<td></td>
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<td>FV4 R (1x)</td>
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<td></td>
<td></td>
<td>FV3 L (1x)</td>
<td></td>
<td>1</td>
<td>515105</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FV4 L (1x)</td>
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<td>1</td>
<td>515130</td>
</tr>
<tr>
<td>Double right hand</td>
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<td>FV1 R (2x)</td>
<td>E6/C-0</td>
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<td></td>
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<td>FV3 R (2x)</td>
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<td>1</td>
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<td>FV4 R (2x)</td>
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<td>E6/C-0</td>
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<td>515113</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FV3 R (2x)</td>
<td></td>
<td>1</td>
<td>515112</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FV4 R (2x)</td>
<td></td>
<td>1</td>
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</tr>
<tr>
<td>Triple right hand</td>
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<td>FV1 R (3x)</td>
<td>E6/C-0</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>FV3 R (3x)</td>
<td></td>
<td>1</td>
<td>515114</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FV4 R (3x)</td>
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<td>1</td>
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<table>
<thead>
<tr>
<th>Special model</th>
<th>PU / pcs.</th>
<th>Part.-No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive housing painted/powder coated in other RAL colours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lump sum for coating</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specify at order stage:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 – 20</td>
<td>516004</td>
<td></td>
</tr>
<tr>
<td>21 – 50</td>
<td>516004</td>
<td></td>
</tr>
<tr>
<td>51 – 100</td>
<td>516004</td>
<td></td>
</tr>
<tr>
<td>up 101</td>
<td>516004</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Extra length connecting cable:</th>
<th>PU / pcs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 m – non-halogen grey – 2 x 0,75 mm²</td>
<td>501024</td>
</tr>
<tr>
<td>10 m – non-halogen, grey – 2 x 0,75 mm²</td>
<td>501026</td>
</tr>
<tr>
<td>5 m – non-halogen, grey – 3 x 0,50 mm²</td>
<td>501034</td>
</tr>
<tr>
<td>10 m – non-halogen, grey – 3 x 0,50 mm²</td>
<td>501036</td>
</tr>
</tbody>
</table>

| Microprocessor programming S12 | |
| Programming drives 24V / 230V S12 | 524180 |

<table>
<thead>
<tr>
<th>Optional accessories</th>
<th>PU / pcs.</th>
<th>Part.-No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-COM Configuration module for synchronised multi-drive systems (for FV4)</td>
<td>1</td>
<td>524177</td>
</tr>
</tbody>
</table>
Application: natural ventilation, SHEV, ferralux®-NSHEV
Surface mounting on the main/side closing edge of the window frame profiles (RM) of outward or on the casement profiles (FM) of inward opening windows
Required mounting space 35 mm
Locking drive: locking bar is on site available

Options
Locking plate customizable for project-/profile-specific demands

FVR3
- With internal load dependent cut-off switch and sequence control for drives PL6 S1 / PL10 S1 (I = 0,8 A)

FVR4
- M-COM suitable internal load dependent cut-off switch and sequence control for drives S3 /S12
- Star wiring
- Current of the drives does not run over FVR4
- Sequence control via communication wire

TECHNICAL DATA

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>( U_n )</td>
<td>Rated voltage</td>
<td>24V DC (19 V ... 28 V)</td>
</tr>
<tr>
<td>( I_n )</td>
<td>Rated current</td>
<td>0,6 A</td>
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<tr>
<td>( I_0 )</td>
<td>Quiescent current</td>
<td>~ 30 mA</td>
</tr>
<tr>
<td>( P_n )</td>
<td>Rated power</td>
<td>20 W</td>
</tr>
<tr>
<td>( I_D )</td>
<td>Current of connected drives FVR3: 0,8 A (PL 6/10 S1) FVR4: 3 A, S3 / S12 non relevant</td>
<td></td>
</tr>
<tr>
<td>DC</td>
<td>Duty cycle</td>
<td>5 cycles (ED 30 % - ON: 3 min. / OFF: 7 min.)</td>
</tr>
<tr>
<td>Protection rating</td>
<td>IP 32</td>
<td></td>
</tr>
<tr>
<td>Ambient temperature range</td>
<td>-5 °C ... +60 °C</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>Pushing / Pulling force max.</td>
<td>~ 600 N</td>
</tr>
<tr>
<td>t</td>
<td>Runtime</td>
<td>~ 5,0 s</td>
</tr>
<tr>
<td>s</td>
<td>Stroke</td>
<td>~ 18 mm (± 1)</td>
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<tr>
<td>Connecting cable</td>
<td>FVR3: non-halogen, grey 2 x 0,75 mm², ~ 3 m FVR4: non-halogen, grey 3 x 0,50 mm², ~ 3 m</td>
<td></td>
</tr>
<tr>
<td>Coupling adapter</td>
<td>stainless steel</td>
<td></td>
</tr>
<tr>
<td>Housing</td>
<td>aluminium (E6/C-O), 420 x 35 x 35 mm</td>
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</tr>
<tr>
<td>L</td>
<td>Length</td>
<td>420 mm</td>
</tr>
<tr>
<td>Sound pressure level</td>
<td>( \leq 70 \text{ dB (A)} )</td>
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ORDER DATA

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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<th></th>
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</tr>
</thead>
<tbody>
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<td>E6/C-0</td>
<td>1</td>
<td>514029</td>
</tr>
</tbody>
</table>
**Application:** natural ventilation, SHEV, ferralux®-NSHEV

**Surface mounting on the main/side closing edge of the window frame profiles (RM) of outward or on the casement profiles (FM) of inward opening windows**

**Required mounting space 35 mm**

**Locking drive:** locking bar is on site available

**Options**

**Locking plate customizable for project-/profile-specific demands**

---

**FVB3**

- With internal load dependent cut-off switch and sequence control for drives
  - PL6 S1 / PL10 S1 (I = 0.8 A)

**FVB4**

- M-COM suitable internal load dependent cut-off switch and sequence control for drives S3 / S12
- Star wiring
- Current of the drives does not run over FVB4
- Sequence control via communication wire

---

### TECHNICAL DATA

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>U_N</strong></td>
<td>Rated voltage</td>
</tr>
<tr>
<td><strong>I_N</strong></td>
<td>Rated current</td>
</tr>
<tr>
<td><strong>I_Q</strong></td>
<td>Quiescent current</td>
</tr>
<tr>
<td><strong>P_N</strong></td>
<td>Rated power</td>
</tr>
<tr>
<td><strong>I_D</strong></td>
<td>Current of connected drives</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>DC</strong></td>
<td>Duty cycle</td>
</tr>
<tr>
<td><strong>Protection rating</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Ambient temperature range</strong></td>
<td></td>
</tr>
<tr>
<td><strong>F</strong></td>
<td>Pushing / Pulling force max max.</td>
</tr>
<tr>
<td><strong>t</strong></td>
<td>Runtime</td>
</tr>
<tr>
<td><strong>s</strong></td>
<td>Stroke</td>
</tr>
<tr>
<td><strong>Connecting cable</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Coupling adapter</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Housing</strong></td>
<td></td>
</tr>
<tr>
<td><strong>L</strong></td>
<td>Length</td>
</tr>
</tbody>
</table>
| **Versions**    | FVB 3 / FVB 4 – 16:
  - Coupling adapter length 19 mm
  - Coupling adapter length 25 mm |
| **Sound pressure level** |                    | ≤ 70 dB (A)              |
## ORDER DATA

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
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<tbody>
<tr>
<td>16</td>
<td>420</td>
<td>FVB3 16</td>
<td>E6/C-0</td>
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<td>513921</td>
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<tr>
<td>22</td>
<td>420</td>
<td>FVB3 22</td>
<td>E6/C-0</td>
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<td>420</td>
<td>FVB4 16</td>
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<td>22</td>
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<td>FVB4 22</td>
<td>E6/C-0</td>
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<td>513934</td>
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</tbody>
</table>

## OPTIONEN

### Special model

<table>
<thead>
<tr>
<th>PU / pcs.</th>
<th>Part.-No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive housing painted/powder coated in other RAL colours</td>
<td></td>
</tr>
<tr>
<td>Lump sum for coating</td>
<td></td>
</tr>
<tr>
<td>1 – 20</td>
<td>516004</td>
</tr>
<tr>
<td>21 – 50</td>
<td>516004</td>
</tr>
<tr>
<td>51 – 100</td>
<td>516004</td>
</tr>
<tr>
<td>up 101</td>
<td>516004</td>
</tr>
</tbody>
</table>

### Extra length connecting cable:

| 5 m – non-halogen, grey – 2 x 0,75 mm² | 501024 |
| 10 m – non-halogen, grey – 2 x 0,75 mm² | 501026 |
| 5 m – non-halogen, grey – 3 x 0,50 mm² | 501034 |
| 10 m – non-halogen, grey – 3 x 0,50 mm² | 501036 |

### Microprocessor programming S12

| Programming drives 24V / 230V S12 | 524180 |

### Optional accessories

<table>
<thead>
<tr>
<th>PU / pcs.</th>
<th>Part.-No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-COM Configuration module for synchronised multi-drive systems (for FV4)</td>
<td>1</td>
</tr>
</tbody>
</table>

## EXPLANATIONS ON THE PRODUCT LABEL

The product label informs about:

- manufacturer’s address
- article reference number and name
- technical characteristics
- date of manufacturing with firmware version
- certifications
- serial number

**Note** Never install and operate damaged products.

In the event of any complaints, please indicate the product serial number (SN) (see product label).
DETERMINATION OF LOCKING POINTS

The number of locking points depends on:
- object-specific requirements
- processing guidelines and authorized ranges of application of the manufacturer
- EN 12102-2 NRWG (depending of profile group and wind load classification WL)
- EN 12207 Air permeability
- EN 12208 Driving rain tightness
- EN 12210 Resistance to wind load
- EN 1627 Burglar resistance
- EN 14351-1 Window or door standard
- DIN 1991-1-3 Snow loads
- DIN 1991-1-4 Wind loads

Only the worst case with secured values and application ranges must serve as a basis.

Locking points are centers / axes of the following components: casement hinges / stays (BD), sealing points of the locking system, application points of directly actuating drives (force transmission axes at 90° to the casement profile, with closed window).

Drives used in SHEV mounting devices such as: RWA 1000, RWA 1050, RWA 1100 are not included in the locking points.

Free profile lengths are effective distances between two locking points. Corner and edge distances shall be calculated as straight lines.

Tools required
- marker,
- grains,
- hammer,
- knife,
- screwdriver (cross, Torx),
- hexagonal wrench,
- torque wrench,
- power drill,
- threadlock adhesive,
- possibly a tool for blind rivet nuts.

The number of locking points or the free profile length between two locking points are described into the respective system documents of the window profile. This information must be adhered. The requirements for the tightness of the windows according to EN 14359-1 must be observed!
INSTALLATION STEP 1: INSPECTION BEFORE THE INSTALLATION

Important instructions for a safe installation. Observe all instructions, wrong installation may result in serious injury!

There must not be any chamber gear in the fitting!

Storage of drives at the construction-site
Protective measures against damages, dust, moisture or contamination shall be taken. Store drives intermittently only in dry and well ventilated rooms.

Inspection of drives before installation
Check drives and window before installation for good mechanical condition and completeness. The chains / spindles of the drives must be extendable or retractable easily. The casement must run smoothly and the weight must be in balance.

We recommend the use of our test kit for the inspection of drives with the rated voltage 24V/~/230V~/~ (see table below). Damaged products may not be operated under any circumstance.

Note

The test procedure of drives may only be performed on a non-slip and secured mat or a test fixture. During the test run the test element must not be interfered with. The test may only be conducted by or under the supervision of expert personnel.

Inspection of the intended use
The planned use of the drive must be checked for compliance with its intended use. If used otherwise the liability and warranty claim expires.

Predictable misuse
It is imperative that foreseeable misuse of drives is avoided! Here are a few examples:

- do not connect 24 V DC drives to a 230 V AC mains voltage,
- observe synchronous run and sequence control by drives with multiple interconnection,
- use drives only indoors,
- avoid additional force influences, e.g. transverse forces.

Testing mechanical requirements
Prior to the start of the installation check whether:

- the support surface and the profile static for the load transmission is sufficient,
- a support construction for the secure fastening of the drives is required,
- cold bridges (thermal separation) are avoidable at action points,
- possibly there is sufficient space for the swivel movement of the drive.

If not, counter measures must be taken!

WARNING

The support surface of the frame brackets or casement brackets must rest completely on the window or frame profile. There must be no tilting of the fastening elements during extension and retraction of the drives. A safe and solid fastening must be ensured at the window profile.

CAUTION

It is imperative that the sufficiently mechanical stiffness of the fastener type as well as of the swivel range of the drive is observed.

If this is not guaranteed another type of fastening or another type of drive must be selected.


**Installation Step 2: Installation Prerequisite and Installation Preparation**

The following conditions must be fulfilled for the installation of the drives so they can be properly assembled with other parts and constructed to a complete machine at the window without impairing the safety and health of persons:

1. The design of the drive must fulfill the requirements.
2. The fastening accessories (casement brackets or frame brackets) must fit the window profile; the profile-dependent hole lay-out must be complied with.
3. The space required for the installation of the drive on the frame and casement profile must be sufficient.
4. The window must be in perfect mechanical condition before the installation. It should open and close easily.
5. The fastening material for the installation of the drive must fit the window material (see table).

### Scope of delivery:
Prior to assembly, check that delivered products are complete.

<table>
<thead>
<tr>
<th>Accessories for locking drive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assembly and Commissioning Instructions</td>
</tr>
<tr>
<td><img src="image" alt="" /></td>
</tr>
<tr>
<td>FV - Locking angle is not mounted</td>
</tr>
<tr>
<td>Warning sign sticker</td>
</tr>
<tr>
<td>„Risk of entrapment“ (1x)</td>
</tr>
</tbody>
</table>

### Installation Step 3: Assembly Opening Drive

- Mount opening drive (see separate „Assembly and Commissioning Instructions“ for each window-drive).
- Make the connection for the control voltage to the opening drive (see chapter: „Electric Connection“).

#### FV1

DIP switches in the USKM set in accordance with the electronic cut-off switch.

- Without internal cut-off switch and sequence control, for use in RWA hardware systems with USKM module.
- For drives with software S1.

#### FV3 / FVR3 / FVB3

The opening drives must not have an integrated disconnection and / or an electronic overload disconnection.

- With internal load dependent cut-off switch and sequence control for drives PL6 S1 / PL10 S1 (I₀ = 0.8 A).
- For drives with software S1.

#### FV4 / FVR4 / FVB4

The opening drives must have an integrated disconnection and / or an electronic overload disconnection.

- M-COM suitable internal load dependent cut-off switch and sequence control. For drives with internal load dependent cut-off switch S3 / S12.

---

**Check window data on site**

- Measure FAB and FAH.
- Check / calculate weight of casement.
  If unknown, it can be determined approximately with the following formula:

\[ G \text{ (Casement weight) } [\text{kg}] = FAB \times FAH \times \text{Glass thickness} \times \frac{2.5 \times 1.1}{\text{glass density}} \]

- Check / calculate the required drive force and compare with drive data. If unknown, it can be determined approximately with the following formula:

\[ F [\text{N}] = \frac{5.4 \times G [\text{kg}] \times s [\text{m}]}{a [\text{m}]} \]

\[ F [\text{N}] = \frac{5.4 \times G [\text{kg}] \times FAH [\text{m}]}{a [\text{m}]} \]

- \( a \) = Distance of action point to hinges
- \( F \) = Drive force
- \( s \) = Stroke

---

**Table:**

<table>
<thead>
<tr>
<th>Material</th>
<th>Accessory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wood windows</td>
<td>Wood screws: i.e. DIN 96, DIN 7996, DIN 571</td>
</tr>
<tr>
<td></td>
<td>round head with slot, round head with cross, hex head, special type</td>
</tr>
<tr>
<td>Steel, stainless steel, aluminum windows</td>
<td>Self-tapping screws, thread screws, sheet-metal screws: i.e. ISO 4762, ISO 4017, ISO 7049, ISO 7085, DIN 7500 cylinder head with hex socket, internal serration (Torx), Phillips head or external hex head, blind rivet nut</td>
</tr>
<tr>
<td>Plastic windows</td>
<td>Screws for plastic: i.e. DIN 95606, DIN 95607, ISO 7049, ISO 7085, DIN 7500 round head with cross, external hex head, Torx</td>
</tr>
</tbody>
</table>

**Recommendation:** if possible, screw through two cavity webs.
**Installation step 4a:** Test run before assembly

Assembly with M-COM

The opening drive and the not mounted locking drive FV4 / FVR4 / FVB4 must be tested separately.

**Test run: Opening drive**
- Switch on the control voltage at the opening drive.
- Move opening drive in CLOSE direction.
- Move opening drive in OPEN direction and ensure the ease of movement of casement.

- Unhinge the opening drive.
- Switch off the control voltage from the opening drive.

**Test run: Locking drive**
- Make the connection for the control voltage to the not mounted locking drive FV4 / FVR4 / FVB4 (see chapter: „Electric connection - Installation step 12a“).

During start-up of locking drives FV4/FVR4/FVB4 the 24 V-control voltage may be switched on only:
- with opened casement
- unhinged opening drive

**Installation step 4b:** Test run before assembly

Assembly of a preprogrammed set

The opening drive and the not mounted locking drive FV3 / FVR3 / FVB3 must be tested together.

**Note**

Drives from the factory preprogrammed sets do not work individually!

- Unhinge the opening drive and open the casement manually.

**Test run: Locking drive**
- Make the connection for the control voltage to the not mounted locking drive FV3 / FVR3 / FVB3 (see chapter: „Electric connection - Installation step 12b“).

During start-up of locking drives FV3/FVR3/FVB3 the 24 V-control voltage may be switched on only:
- with opened casement
- unhinged opening drive

**Switch on the control voltage** at locking drive FV3 / FVR3 / FVB3 - in CLOSE direction.

First the opening drive moves in CLOSE direction, then the locking drive FV3 / FVR3 / FVB3 begins to start.

- Check whether the traverse path of the locking drive FV3 / FVR3 / FVB3 with the traverse path of the on-site locking bar moves synchronously.
- If necessary, correct the locking stroke - with the DIP switches (see chapter: „Connecting cable and DIP Switch“).
- Switch off the control voltage from the locking drive FV3 / FVR3 / FVB3.
- Assembly the locking drives FV3 / FVR3 / FVB4 - according to installation step 5 - 10.

**Switch on the control voltage** at locking drive FV4 / FVR4 / FVB4 in CLOSE direction.

- Check whether the traverse path of the locking drive FVR4 / FVB4 with the traverse path of the on-site locking bar moves synchronously.
- If necessary, correct the locking stroke - with the DIP switches (see chapter: „Connecting cable and DIP Switch“).
- Switch off the control voltage from the locking drive FV4 / FVR4 / FVB4.
- Assembly the locking drives FV4 / FVR4 / FVB4 - according to installation step 5 - 10.
**Installation Step 5a: Hole Layouts for FV**

<table>
<thead>
<tr>
<th>Application examples</th>
<th>Bottom-hung inward opening Frame assembly</th>
<th>Bottom-hung inward opening Casement assembly</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong></td>
<td><img src="#" alt="Diagram A" /></td>
<td><img src="#" alt="Diagram A" /></td>
</tr>
<tr>
<td>View on aluminium window</td>
<td><img src="#" alt="View on aluminium window" /></td>
<td><img src="#" alt="View on aluminium window" /></td>
</tr>
<tr>
<td><strong>Bottom-hung inward opening Casement assembly</strong></td>
<td><img src="#" alt="Diagram A" /></td>
<td><img src="#" alt="Diagram A" /></td>
</tr>
<tr>
<td>View on aluminium window</td>
<td><img src="#" alt="View on aluminium window" /></td>
<td><img src="#" alt="View on aluminium window" /></td>
</tr>
<tr>
<td><strong>Top-hung outward opening Frame assembly</strong></td>
<td><img src="#" alt="Diagram B" /></td>
<td><img src="#" alt="Diagram B" /></td>
</tr>
<tr>
<td>View on PVC window</td>
<td><img src="#" alt="View on PVC window" /></td>
<td><img src="#" alt="View on aluminium window" /></td>
</tr>
<tr>
<td><strong>Top-hung outward opening Frame assembly</strong></td>
<td><img src="#" alt="Diagram B" /></td>
<td><img src="#" alt="Diagram B" /></td>
</tr>
<tr>
<td>View on aluminium window</td>
<td><img src="#" alt="View on aluminium window" /></td>
<td><img src="#" alt="View on aluminium window" /></td>
</tr>
</tbody>
</table>

**Diagram A**

- **RA** and **FL** reference edges
- FU = 0 - 10 FV
- Min. 38 mm

**Diagram B**

- **RA** and **FL** reference edges
- FU = 10.5 - 20 FV
- Min. 50 mm

**Notes:**
- Installations steps for locking drive.
- Dimensions and tolerances vary depending on specific window type and configuration.
- Always consult the latest installation manual for specific details and recommendations.
**INSTALLATION STEP 5A: HOLE LAYOUTS FOR LOCKING DRIVE FV**

**Frame assembly - inward opening windows - hole layout FV1 / FV3 / FV4 - single, right-hand, length = 420 mm**

**A** See: INSTALLATION STEP 8A

**Window versions**  
- Bottom-hung - outward opening  
- Top-hung - inward opening  
- Side-hung - inward opening  
- Horizontal + vertical pivot

**Drive**

**NSK**

**Locking angle**

**B18**

**FAB = min. 450**

max. 1000 (for PVC)  
max. 1500 (for wood and aluminium)

**Frame assembly - inward opening windows - hole layout FV1 / FV3 / FV4 - double, length = 1200 mm**

**A** See: INSTALLATION STEP 8A

**Window versions**  
- Bottom-hung - inward opening  
- Top-hung - inward opening  
- Side-hung - inward opening  
- Horizontal + vertical pivot

**Drive**

**NSK**

**Locking angle**

**B18**

**FAB = min. 1200**

max. 2000 (for PVC)  
max. 3000 (for wood and aluminium)
Frame assembly - inward opening windows - hole layout FV1 / FV3 / FV4 - double, length = 2000 mm

See: Installation step 8A

Window versions
- Bottom-hung - inward opening
- Top-hung - inward opening
- Side-hung - inward opening
- Horizontal + vertical pivot

Frame assembly - inward opening windows - hole layout FV1 / FV3 - triple, length = 2000 mm

See: Installation step 8A

Window versions
- Bottom-hung - inward opening
- Top-hung - inward opening
- Side-hung - inward opening
- Horizontal + vertical pivot

HOLE LAYOUTS FOR LOCKING DRIVE FV

Assembly Instruction
FV / FVR / FVB
Frame assembly - outward opening windows - hole layout FV1 / FV3 / FV4 - single, right-hand, length = 420 mm

See: INSTALLATION STEP 8b

Window versions
- Bottom-hung - outward opening
- Top-hung - outward opening
- Side-hung - outward opening

Frame assembly - outward opening windows - hole layout FV1 / FV3 / FV4 - double, length = 1200 mm

See: INSTALLATION STEP 8b

Window versions
- Bottom-hung - outward opening
- Top-hung - outward opening
- Side-hung - outward opening

FAB = min. 450 / max. 1300

FAB = min. 1200 / max. 2500

Reference edge
Frame assembly - outward opening windows - hole layout FV1 / FV3 / FV4 - double, length = 2000 mm

See: INSTALLATION STEP 8b

Frame assembly - outward opening windows - hole layout FV1 / FV3 - triple, length = 2000 mm

See: INSTALLATION STEP 8b
### Installation Step 5b: Hole Layouts for FVR

#### Application Examples

<table>
<thead>
<tr>
<th>Bottom-hung Inward Opening Casement Assembly</th>
<th>Bottom-hung Inward Opening Casement Assembly</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="example1.png" alt="Diagram C" /></td>
<td><img src="example2.png" alt="Diagram C" /></td>
</tr>
</tbody>
</table>

**View on Aluminium Window**

**View on PVC Window**

<table>
<thead>
<tr>
<th>Friction Hinged Outward Opening Frame Assembly</th>
<th>Top-hung Outward Opening Frame Assembly</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="example3.png" alt="Diagram D" /></td>
<td><img src="example4.png" alt="Diagram D" /></td>
</tr>
</tbody>
</table>

**View on Aluminium Window**

**View on Aluminium Window**

- **Locking Bar Fitting**: Site-supplied
- **Reference Edge**: Highlighted in the diagrams

---

*FV / FVR / FVB*
**INSTALLATION STEP 5B: HOLE LAYOUTS FOR LOCKING DRIVE FVR**

**Casement assembly - hole layout FVR3 / FVR4 - inward opening windows**

- **Window versions**
  - Bottom-hung - inward opening
  - Top-hung - inward opening
  - Side-hung - inward opening
  - Horizontal + vertical pivot

**Frame assembly - hole layout FVR3 / FVR4 - outward opening windows**

- **Window versions**
  - Bottom-hung - outward opening
  - Top-hung - outward opening
  - Side-hung - outward opening
  - Friction hinged - outward opening
**INSTALLATION STEP 5C: HOLE LAYOUTS FOR FVB**

<table>
<thead>
<tr>
<th>Application examples</th>
<th>Bottom-hung inward opening Frame assembly</th>
<th>Bottom-hung inward opening Frame assembly</th>
<th>Bottom-hung inward opening Frame assembly</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><img src="image1.png" alt="Diagram 1" /></td>
<td><img src="image2.png" alt="Diagram 2" /></td>
<td><img src="image3.png" alt="Diagram 3" /></td>
</tr>
<tr>
<td></td>
<td>View on aluminium window</td>
<td>View on PVC window</td>
<td>View on wood window</td>
</tr>
</tbody>
</table>

**Frame assembly - hole layout FVB3 / FVB4 - inward opening windows**

- See: INSTALLATION STEP 8D

- **Window versions**
  - Bottom-hung
  - Top-hung
  - Side-hung
  - Inward opening
  - Horizontal + vertical pivot

- **Dimensions**
  - Ø 5.5 x 4 mm
  - s = 18 mm
  - Ø 10 for AK only if AK is laid into frame profile

- **Parts**
  - locking bar fitting
  - site-supplied
  - drive
  - locking point
  - NSK
  - HSK
  - AK
  - RA
  - FL
  - FVB
  - DB
  - FAB
  - FAH
  - Reference edge

- **Notes**
  - Min. 3 mm
  - Countersink on site
**INSTALLATION STEP 6: DRILL HOLES ACCORDING TO MOUNTING VARIANTS**

- Determine fastenings.
- Produce drill holes with appropriate cross-section. For the mounting dimensions please refer to the above-mentioned hole layout drawings (see chapter "INSTALLATION STEP 5" or project-specific documents and drawings).

> Carefully clear away drilling swarf to prevent seals from being damaged. Avoid surface scratches, for example by using masking tape.

- Secure fasteners against loosening; e.g. by applying removable thread-locking compound such as “Loctite”.

**INSTALLATION STEP 7: REMOVE THE END CAPS FROM THE LOCKING DRIVE**

- Loosen the screws 1 and remove the end caps 2 from the locking drive FVx / FVRx / FVBx. Remove connection cable (AK) for easier handling.

- If necessary, prepare end cap 2 for another cable. Use screwdriver to pierce the closed drill hole. Remove the burrs. Possibly slightly enlarge drill hole.
- Feeding the cable through the new hole carefully. Provide strain relief 3.
Installation Step 8a: FV1/FV3/FV4 Frame Assembly - Inward Opening Windows

- Screw locking drive FVx onto casement frame (M5) - if necessary with base plate.
  
  Make sure they are parallel to casement edge. The drive body must lie completely flush on the window frame surface.

- Connect the connecting cable (AK) to terminal strip 4 (see chapter “Connecting Cable and DIP Switch”).
- Check the locking position on DIP switch. Observe the locking direction (see chapter “Connecting Cable and DIP Switch”).

  Clamp the connecting cable!
  Check position from DIP switch! (see: “Connecting Cable and DIP Switch”)

- Screw locking angle 5 - according to site condition.
- The locking pin 6 must be centered in the mounting slot of the locking drives FVx.

- Make sure they are parallel to casement edge.

- Adjust the locking pin 6. It should completely move into the locking drive FVx.
- Firmly tighten the locking pin 6 - using spanner SW10.

- Fit end caps 2 with screws 1.
- Re-install strain relief 3.

  Note cable routing! (see chapter “Cable Routing”)
  Check function! (see chapter “Safety Check and Performing Test Run”).
**ASSEMBLY: FV1 / FV3 / FV4**

### INSTALLATION STEP 8B:
**FV1/FV3/FV4 FRAME ASSEMBLY - OUTWARD OPENING WINDOWS**

**Assembly variant 1:**
**Locking angle B18 with adapter plate B22 (optional)**

- Screw the adapter plate B22 1 onto the casement frame (M5).

Adapter plate B22 1 for relocation of the mounting holes of the locking bracket B18 outside the glazing bead of outward opening windows.

Is not included in the scope of delivery.

Make sure they are parallel to casement edge.

- Screw locking angle B18 4 onto adapter plate B22 1 - using the provided screws 2 and washers 3.

**NOTE**

- The locking pin 5 must be centered in the mounting slot of the mounting plate 3.
- Adjust the locking pin 5. It should completely move into the locking drive FVx.
- Firmly tighten the locking pin 5 with nut 6 and washer 7 (spanner SW10).

**Assembly variant 2:**
**Locking angle B19 (small)**

- Screw the locking angle B19 9 onto casement frame (M5).

Make sure they are parallel to casement edge.

- Screw mounting plate 8 for the locking drive FVx onto window frame (M5).

Align the mounting plate 8 depending on the design of the locking drives FVx „right-hand / left-hand“.

Make sure they are parallel to casement edge.

**NOTE**

- The locking pin 5 must be centered in the mounting slot of the mounting plate 3.
- Adjust the locking pin 5. It should completely move into the locking drive FVx.
- Firmly tighten the locking pin 5 with nut 6 and washer 7 (spanner SW10).
**Assembly: FV1 / FV3 / FV4**

**Assembly: locking drive**

- Screw locking drive FVx on mounting plate 8 (M5).
- Connect the connecting cable (AK) to terminal strip 15 (see chapter “CONNECTING CABLE AND DIP SWITCH”).
- Check the locking position on DIP switch. Observe the locking direction of the locking fitting (see chapter “CONNECTING CABLE AND DIP SWITCH”).

**Assembly**

- Screw mounting plate 3 for the locking drive FVx onto window frame (M5).
- The locking pin 10 must be centered in the mounting slot of the mounting plate 3.
- Adjust the locking pin 10. It should completely move into the locking drive FVx.
- Firmly tighten the locking pin 10 with screw 11 and washer 12 and pin holder 13 (spanner SW10).

**Note cable routing!**
(see chapter ”CABLE ROUTING”)

**Check function!**
(see chapter ”SAFETY CHECK AND PERFORMING TEST RUN”).
**INSTALLATION STEP 8c: FVR3 / FVR4 FRAME**  
**ASSEMBLY - INWARD OPENING WINDOWS**

- Determine position of locking drives FVRx on casement.  
- Determine the locking direction.  
- Ensure free space (countersink) in the area of the locking bar (catch) according to the window-profile and the actual stroke of the bar.

Ensure that the locking bar moves freely.

- Check whether the traverse path of the locking drive FVRx with the traverse path of the on-site locking bar moves synchronously.

- Adjust locking block and locking pin on site-supplied fittings.

- Screw locking drive FVRx onto casement frame (M5).

Make sure they are parallel to casement edge. The drive body must lie completely flush on the casement frame surface.

---

**Countersinken for FVR - typical applications**

**View on steel window**

**View on alumin. window**

**View on wood window**

The locking pin of locking bar must be centered in the mounting slot of the locking bar (catch) from the locking drive.
Connect the connecting cable (AK) to terminal strip 4 (see chapter "CONNECTING CABLE AND DIP SWITCH").

Check the locking position on DIP switch 5. Observe the locking direction of the locking fitting (see chapter "CONNECTING CABLE AND DIP SWITCH").

Clamp the connecting cable! Check position from DIP switch! (see: "CONNECTING CABLE AND DIP SWITCH")

Fit end caps 2 with screws 1.

Re-install strain relief 3.

Note cable routing! (see chapter "CABLE ROUTING")

Check function! (see chapter "SAFETY CHECK AND PERFORMING TEST RUN").

INSTALLATION STEP 8D: FVB3 / FVB4 FRAME ASSEMBLY - INWARD OPENING WINDOWS

Determine position of locking drives FVBx on casement.

Determine the locking direction.

Ensure free space (countersink) in the area of the locking bar (catch) according to the window-profile and the actual stroke of the bar.

Ensure that the locking bar moves freely. The locking pin of locking bar must be centered in the mounting slot of the locking bar (catch) from the locking drive.

Countersink for FVB - typical applications

View on steel window

View on alumin. window

View on PVC window

View on wood window

Determine position of locking drives FVBx on casement.
Check whether the traverse path of the locking drive FVBx with the traverse path of the on-site locking bar moves synchronously.

Adjust locking block and locking pin on site-supplied fittings.

Screw locking drive FVBx onto window frame (M5).

Make sure they are parallel to casement edge. The drive body must lie completely flush on the window frame surface.

Connect the connecting cable (AK) to terminal strip (see chapter „Connecting Cable and DIP Switch“).

Check the locking position on DIP switch. Observe the locking direction of the locking fitting (see chapter „Connecting Cable and DIP Switch“).

Clamp the connecting cable! Check position from DIP switch! (see: „Connecting Cable and DIP Switch“)

Fit end caps with screws.

Re-install strain relief.

Note cable routing! (see chapter „Cable Routing“)

Check function! (see chapter „Safety Check and Performing Test Run“).
**Installation Step 9: Connecting Cable and DIP Switch**

**FV3**

- The opening drives must not have an integrated disconnection and/or an electronic overload disconnection.
- Terminal 1: blue (feed line from control unit)
- Terminal 2: brown (feed line from control unit)
- Terminal 4: blue (+) to the opening drive
- Terminal 5: brown (+) to the opening drive

For drives with software S1

**FV4**

- The opening drives must have an integrated disconnection and/or an electronic overload disconnection.
- Terminal 1: blue
- Terminal 2: brown
- Terminal 3: white

**FVR3 / FVB3**

- The opening drives must not have an integrated disconnection and/or an electronic overload disconnection.
- Terminal 1: blue (feed line from control unit)
- Terminal 2: brown (feed line from control unit)
- Terminal 4: blue (+) to the opening drive
- Terminal 5: brown (+) to the opening drive

For drives with software S1

**FVR4 / FVB4**

- The opening drives must have an integrated disconnection and/or an electronic overload disconnection.
- Terminal 1: blue
- Terminal 2: brown
- Terminal 3: white

**DIP Switch Setting: Moving Direction**

**Configuration by M-COM**

- **FV4**
- **FVR4**
- **FVB4**

**Opening Drive with S1**

- **FV3**
- **FVR3**
- **FVB3**

The DIP switch 1 in the locking drive FVx / FVRx / FVBx are used to setting the moving direction. Set of DIP switch 1 in a voltage-free state, when the locking drive FVx / FVRx / FVBx is not mounted.

**Close (locked)**

**Open (unlock)**
**INSTALLATION STEP 10A:** ASSEMBLY WITH M-COM

### Test run: locking drive
- Close the casement manually. During the test run press the casement fixed to the frame.
- **Switch on the control voltage** at locking drive FV4 / FVR4 / FVB4 - in CLOSE direction.
- Switch the control voltage - from the locking drive FV4 / FVR4 / FVB4 in OPEN direction.
- Ensure the easy movement of the casement.
- Open the casement manually.
- **Switch off the control voltage** from the locking drive FV4 / FVR4 / FVB4.

<table>
<thead>
<tr>
<th>Sequence control:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Locking drive</strong></td>
</tr>
<tr>
<td><strong>Opening drive</strong></td>
</tr>
<tr>
<td><strong>24V DC</strong></td>
</tr>
<tr>
<td><strong>FVR4</strong></td>
</tr>
<tr>
<td><strong>FVR4</strong></td>
</tr>
</tbody>
</table>

#### Installation: M-COM
- Installing the M-COM (see separate „Installation Instructions“ for M-COM) and make the electrical connection - in accordance with chapter: „ELECTRIC CONNECTION - INSTALLATION STEP 12a“.
- Installing M-COM in a voltage-free state. The configuration is always in CLOSE direction.
- **Switch on the control voltage** at locking drive FV4 / FVR4 / FVB4 and at opening drive - in CLOSE direction.
- M-COM is configured (see LED display).
- Check sequence control.
- Ensure the easy movement of the casement.
- The locking pin must completely drive into the receptacle of the locking block.

**INSTALLATION STEP 10B:** ASSEMBLY OF A PREPROGRAMMED SET

### Test run: locking drive
- Close the casement manually. During the test run press the casement fixed to the frame.
- **Switch on the control voltage** at locking drive FV3 / FVR3 / FVB3 and at the opening drive - in CLOSE direction.
- Ensure the easy movement of the casement.
- Open the casement manually.

<table>
<thead>
<tr>
<th>Sequence control:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Locking drive</strong></td>
</tr>
<tr>
<td><strong>Opening drive</strong></td>
</tr>
<tr>
<td><strong>24V DC</strong></td>
</tr>
<tr>
<td><strong>FVR3</strong></td>
</tr>
<tr>
<td><strong>FVR3</strong></td>
</tr>
</tbody>
</table>

### Test run and installation: FV3 / FVR3 / FVB3 and opening drive as a preprogrammed set
- Hinge opening drive on casement.
- Make mechanical settings in accordance with „Assembly and Commissioning Instructions“ of the drives.
- **Switch on the control voltage** at locking drive FV3 / FVR3 / FVB3 and at the opening drive - in CLOSE direction.
- Check sequence control.
- Ensure the easy movement of the casement.
- The locking pin must completely drive into the receptacle of the locking block.

#### NOTE
- When subsequent programming with UniPC the same assembly steps as in the installation must be carried out with preprogrammed set (see separate: Installation Instructions for UniPC).
**INSTALLATION STEP 11: CABLE ROUTING**

Cable routing on or in the casement:

<table>
<thead>
<tr>
<th>Cable on casement</th>
<th>Cable in glazing bead</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Diagram of cable on casement" /></td>
<td><img src="image2.png" alt="Diagram of cable in glazing bead" /></td>
</tr>
</tbody>
</table>

- **Connection cable routing on the casement:**
  - Cable must be protected against damage (shearing-off, kinking, splitting), i.e. by using bushings.
  - Upon removal of the glazing bead is the danger that the glass may fall.

- **Cable crossover without protective cable hose**
  - ![Diagram of cable crossover without protective cable hose](image3.png)

- **Cable crossover with protective cable hose**
  - ![Diagram of cable crossover with protective cable hose](image4.png)

- **Cable duct glued on** (in addition secured with countersunk screws against breaking away).

- **Drill hole in glazing bead** (cable bushing protects against damage to cable).

Cable routing on the frame:

- Route cable on the frame or mullion/transom. Cable must be protected against damage (shearing-off, kinking, splitting).

- ![Diagram of cable routing on the frame](image5.png)
**Installation Step 12: Electric Connection**

**Caution:** Make sure when establishing the connection that there is no voltage at the terminals! Unused wires must be safely insulated!

**Connection Assignment from the Opening Drive**

![Connection Diagram]

**Connection Assignment from the Locking Drive**

![Connection Diagram]

**Installation Step 12A:**

Multi-drive operation: Opening drive and locking drive with M-COM

- WH connection. Drives does not work, if not connected.

**Installation Step 12B:**

Multi-drive operation: Opening drive (master / slave) and locking drive

- WH connection. Drives does not work, if not connected.

<table>
<thead>
<tr>
<th>Wire Colour Coding</th>
<th>Direction of Travel</th>
<th>Polarity Reversal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colour</td>
<td>DIN IEC 757</td>
<td></td>
</tr>
<tr>
<td>white</td>
<td>WH</td>
<td></td>
</tr>
<tr>
<td>brown</td>
<td>BN</td>
<td></td>
</tr>
<tr>
<td>blue</td>
<td>BU</td>
<td></td>
</tr>
<tr>
<td>green</td>
<td>GN</td>
<td></td>
</tr>
<tr>
<td>violet</td>
<td>VT</td>
<td></td>
</tr>
<tr>
<td>grey</td>
<td>GY</td>
<td></td>
</tr>
</tbody>
</table>

Optional: 1 to 4 drives and max. 2 locking drives are possible.

---

V1 / VFR / VVB: Assembly Instruction

07
**M-COM (Main control unit)**

<table>
<thead>
<tr>
<th>Order number:</th>
<th>524177</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application:</td>
<td></td>
</tr>
<tr>
<td>Rated voltage:</td>
<td>24V DC +/- 20%, (max. 2 Vss)</td>
</tr>
<tr>
<td>Current consumption:</td>
<td>&lt;12 mA</td>
</tr>
<tr>
<td>Drive type:</td>
<td>S12</td>
</tr>
<tr>
<td>Protection class:</td>
<td>IP30 rubber jacket</td>
</tr>
<tr>
<td>Ambient temperature:</td>
<td>0 °C ... + 70 °C</td>
</tr>
<tr>
<td>Dimensions:</td>
<td>45 x 17 x 6 mm</td>
</tr>
<tr>
<td>Connecting wires:</td>
<td>3 wires 0,5 mm² x 50 mm</td>
</tr>
</tbody>
</table>

**Features / Equipment:**
- Printed circuit board with connecting wires for integration in site-supplied junction box.

---

**UniPC with configuration interface**

<table>
<thead>
<tr>
<th>Order number:</th>
<th>524178</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application:</td>
<td></td>
</tr>
<tr>
<td>Rated voltage:</td>
<td>24V DC +/- 20%</td>
</tr>
<tr>
<td>Parameterizable drives:</td>
<td>24V DC type MP, S3, S12, S12 V.2, 230V AC type S12, S12 V.2</td>
</tr>
<tr>
<td>Scope of delivery:</td>
<td>software UniPC (Downloadlink*), Interface &quot;ParInt&quot;, USB cable, connection cable</td>
</tr>
</tbody>
</table>
* http://www.aumueller-gmbh.de/Downloads

**Features / Equipment:**
- Power supply 24V DC is not included in the scope of delivery!
- Any extended settings require a software licence.
- Any reconfiguration of a drive is entirely at the user’s own risk and responsibility.

---

**Cable junction box (for renewal)**

<table>
<thead>
<tr>
<th>Order number:</th>
<th>513344</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application:</td>
<td>to extend a drive cable</td>
</tr>
<tr>
<td>Rated voltage:</td>
<td>only for „safety extra low voltage“ to max. 50V DC/AC</td>
</tr>
<tr>
<td>Material:</td>
<td>stainless steel (V2A)</td>
</tr>
<tr>
<td>Protection class:</td>
<td>IP 40</td>
</tr>
<tr>
<td>Dimensions:</td>
<td>25 x 27 x 150 mm</td>
</tr>
<tr>
<td>Equipment:</td>
<td>with cable gland (grey) including strain relief, with 2 loose ceramic terminals (bipolar).</td>
</tr>
</tbody>
</table>

---

**USKM**

<table>
<thead>
<tr>
<th>Order number:</th>
<th>512140</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application:</td>
<td>Control module with 3 outputs and individual settable cut-off current, monitored motion run, delayed sequence control.</td>
</tr>
<tr>
<td>Rated voltage:</td>
<td>24V DC +/- 20 %, (max. 2 Vpp)</td>
</tr>
<tr>
<td>Close circuitt current:</td>
<td>&lt; 50 mA</td>
</tr>
<tr>
<td>Max. drives:</td>
<td>max. 3 drives; s &lt; 300 mm</td>
</tr>
<tr>
<td>Drive type:</td>
<td>S1, S2, S3, S12, MP, FV1, OFV1</td>
</tr>
<tr>
<td>Protection rating:</td>
<td>IP 54</td>
</tr>
<tr>
<td>Ambient temperature range:</td>
<td>0 °C ... +70 °C</td>
</tr>
<tr>
<td>Dimensions:</td>
<td>110 x 110 x 66 mm</td>
</tr>
</tbody>
</table>

**Features / Equipment:**
- DIP switches for settings connection terminals: 2,5 mm²

**Functions:**
- External electronic cut-off switch (max. 0,9 A), motion-monitoring up to 3 drives / locking drives, max. 2 sequential controls
**Electric Connection with USKM - FV1**

**Solo or tandem operation - locking drive FV1**

DIP switches in the USKM set in accordance with the electronic cut-off switch.

Version without sequential control module
Disconnection and sequential control for the locking drive FV1 is provided by the control module USKM.

**Electric Connection - FV3 / FVR3 / FVB3**

**Solo operation - locking drive FV3 / FVR3 / FVB3**

SHEVS applications require a line monitoring (line end module) to be connected upstream of the last or the only locking drive FV1!

Version with sequential control module
By applying the 24V voltage supply on terminal 1(-) and 2 (+) the locking mechanism unlocks the casement.

After complete opening of the casement locking the opening drive on terminal 4 and 5 receives the command to move up (opening of the casement).
**ELECTRIC CONNECTION**

**ELECTRIC CONNECTION CONFIGURED WITH M-COM**

**Multi-drive operation with M-COM and locking drive - series connection**

Remove the filler plug and Aumüller-Click plug set install.

A maximum of three individual drives and one locking drive in series connection possible. Configuration is done by M-COM.

**Multi-drive operation with M-COM and locking drive - star wiring**

Options:
Programmable special functions and sequence control with locking drive. In composite can be used to four individual drives and two locking drives. Configuration is done by M-COM.

---

**Options**
Programmable special functions and sequence control with locking drive. In composite can be used to four individual drives and two locking drives. Configuration is done by M-COM.

---

**Options**
Programmable special functions and sequence control with locking drive. In composite can be used to four individual drives and two locking drives. Configuration is done by M-COM.

---

**Options**
Programmable special functions and sequence control with locking drive. In composite can be used to four individual drives and two locking drives. Configuration is done by M-COM.

---

**Individual configuration**

<table>
<thead>
<tr>
<th>BN</th>
<th>brown</th>
</tr>
</thead>
<tbody>
<tr>
<td>BU</td>
<td>blue</td>
</tr>
<tr>
<td>WH</td>
<td>white</td>
</tr>
</tbody>
</table>
**Installation step 13:**

**Supply lines of Control Unit to the Drives**

Observe current regulations and guidelines e.g. DIN 4102-12 regarding the “Fire behavior of building materials-circuit integrity maintenance of electric cable systems” (E30, E60, E90) and the “Specimen Guideline on Conduits German designation - MLAR”, and also prescribed constructional regulations!

**Recommendation**

For safety reasons a cable of the next higher wire cross section should be selected.

---

### Electric connection / Safety check

#### Installation step 14:

**Safety check and Test run**

Check the mounted system for its safety; perform test run and commissioning.

**Safety test:**
- Connect operating voltage.
- Check fastening (frame brackets, casement brackets) for firm fit or tightening.

**Test run:**
- Visual inspection of casement movements.
- Stop immediately by malfunction!
- Pay attention to collision with facade construction and correct installation, if required.

---

**Risk evaluation:**

Before operating a power-operated window to which window drives were mounted, which were sold by the manufacturer as incomplete machines according to installation declaration, the possible risk to a hazard of persons must be determined, evaluated and minimized by taking appropriate technical measures in accordance with the Machinery Directive. Separate documents for performing a risk assessment can be downloaded from the homepage of Firm Aumüller Automatic GmbH (www.aumueller-gmbh.de).

---

**Operation of the power-operated window**

When operating the power-operated window safety instructions must be observed, specifically those pertaining to commissioning, operation and maintenance.

---

**Formula to calculate**

The required wire cross-section of a supply line

\[ A \text{ mm}^2 = \frac{I_A \text{ (total)} \times L_m \text{ (length supply line)} }{2,0V \text{ (voltage drop)} \times 56 \text{ m} / (\Omega \text{ mm}^2)} \times 2 \]

**Calculation example**

Available data:
- cut-off current per drive (i.e. 2 x 4.0A) from data sheet
- length to be bridged from the last window to the control unit (i.e. 10 meters)

\[ A = \frac{2 \times 4,0A \times 10m \times 2}{2,0V \times 56m / (\Omega \times \text{mm}^2)} \]

\[ A = 1,42 \text{mm}^2 \rightarrow 1,5 \text{mm}^2 \text{ chosen} \]

---

**Laying and connecting the drive cable**

- Avoid extreme temperature differences in the installation area (danger of condensation).
- Set clamping point close to window and ensure accessibility.
- Ensure expansion possibilities of the drive and the drive cable.
- Consider the cable length and the cross sections of the drives supply lines.
HELP IN CASE OF MALFUNCTIONS, REPAIRS AND MAINTENANCE

Professional repair of a defect drive can only be performed at the manufacturer’s factory or manufacturer-certified specialist company. Unauthorized opening or manipulation of the drive terminates warranty.

1. Exchange defect drives or have them repaired by the manufacturer.
2. In case of problems during installation or normal operation the following table might be useful:

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible causes</th>
<th>Possible solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Locking drive does not start</td>
<td>• Duration of mains power supply too short</td>
<td>• Adjust supply voltage as specified in the technical documentation</td>
</tr>
<tr>
<td></td>
<td>• Drive run direction from the opening drive is not correct</td>
<td>• Check drive cables change polarity</td>
</tr>
<tr>
<td></td>
<td>• Connecting cable not connected</td>
<td>• Check all connection cables</td>
</tr>
</tbody>
</table>

MAINTENANCE AND MODIFICATION

To ensure continuous function and safety of the drive periodic maintenance by a specialist company is required at least once a year (as mandated by law for smoke and heat exhaust systems). Operational readiness must be checked regularly. Frequent inspection of the system for imbalance and signs of wear or damages of cables and fastening elements must be performed.

During maintenance contaminations must be removed from the drive. Fastenings and clamping screws must be checked for tightness. Test runs during the opening and closing procedure of the devices must be performed.

The drive itself is maintenance-free. Defect devices may only be repaired in our factory. Only replacement parts of the manufacturer may be used. When the connection cable of this device is damaged it must be replaced by the manufacturer or his customer service or a similarly qualified person to avoid endangerment.

It is recommended to conclude a maintenance contract. A sample maintenance contract can be downloaded from the homepage of Firm Aumueller Aumatic GmbH (www.aumueller-gmbh.de).

While cleaning the windows, drives may not have direct contact with water or cleaning agents. Drives must be protected from dirt and dust during the construction phase or renovations.

Maintenance process
1. Open or extend power-operated casement completely.
2. Completely disconnect the system from the mains and secure it against automatic or manual activation.
3. Check windows and fittings for damages.
4. Check all mechanical fastenings (if required, observe information on torques in installation instructions).
5. Check electric drives for damages and contaminations.
6. Check connecting cables (drive cable) for:
   - tightness of the cable screw
   - functionality of the strain relief
   - damages
7. Check the mobility of hinges and fittings and re-adjust or apply lubricant, e.g. silicone spray (observe the instructions of the manufacturer of this window system).
8. Check peripheral seal, remove contaminations or replace.
9. Perform cleaning to maintain functionality (e.g. clean extending elements of the drive, such as chains or spindles by damp wiping them with acid or lye-free agents and drying them and, if required, lubricate them with cleansing oil e.g., Ballistol).
10. Turn on operating voltage.
11. Open and close the power-operated window via the operating voltage (functional test).
12. If available, check and re-adjust protection systems of the safe guard fixture.
13. Check the intactness of the CE label at the power-operated system (e.g. SHEV/Natural smoke and heat exhaust ventilators).
14. Check the intactness of warning instructions and labels at the respective drive.
15. Perform a risk assessment in accordance with Machinery Directive 2006 / 42 / EG, if required, e.g. after modifying the machine.
**Demounting**

The drives are demounted by reversing the steps, as for the installation. The adjustments are omitted.

1. Completely disconnect the system from the power supply before demounting a drive.
2. After demounting a drive the window must be secured against independent opening.

Dispose of parts according to the locally applicable legal provisions.

**Disposal**

According to the European Directive 2012/19 / EU on Waste Electrical and Electronic Equipment (WEEE) and its transposition into national law, obsolete electrical appliances must be collected separately and sent for environmentally friendly recycling.

**Liability**

We reserve the right to change or discontinue products at any time without prior notice. Illustrations are subject to change. Although we take every care to ensure accuracy, we cannot accept liability for the content of this document.

---

**Warranty and Customer Service**

In principle apply our: „General Terms for the Supply of Products and Services of the Electrical Industry (ZVEI)“.

The warranty corresponds with legal provisions and applies to the country in which the product has been acquired.

The warranty period for delivered material is twelve months.

Warranty and liability claims for personal injuries or material damages are excluded, if caused by one or more of the following:

- No proper incoming goods inspection.
- Improper use of the product.
- Improper installation, commissioning, operation, maintenance or repair of the product.
- Operating the product by defect and improper installed or not functioning safety and protection devices.
- Ignoring instructions and installation requirements in these instructions.
- Unauthorized constructional modifications at the product or accessories.
- Disaster situations due to effects of foreign bodies and Acts of God.
- Wear and tear.

Contact persons for possible warranty claims, for spare parts or accessories are the employees of the responsible branch office or the responsible person at Firm Aumüller Automatik GmbH.

Contact data are available at our homepage (www.aumueller-gmbh.de)
CERTIFICATE AND DECLARATION OF CONFORMANCE

We declare under our sole responsibility that the product described under “Data sheet” is in conformity with the following directives:

- 2014/30/EU Directive relating to Electro-Magnetic Compatibility
- 2014/35/EU Low voltage Directive

We further declare that the drive is an incomplete machine within the meaning of the European Machinery Directive (2006/45/EG).

Technical file and declaration at firm:

AUMÜLLER AUTOMATIC GmbH
Gemeindewald 11
D-86672 Thierhaupten

Ramona Meinzer
Managing Director (Chairman)

NOTE:

The proof of the application of a quality management system is for company: AUMÜLLER AUTOMATIC GmbH according to the certification basis DIN EN 9001 as well the “Declaration of Incorporation and Conformity” can be accessed via the QR code or directly on our homepage: (www.aumueller-gmbh.de)

TRANSLATION OF THE ORIGINAL INSTRUCTIONS (GERMAN)

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