

Operating instructions



TSM-11 hopper call-up control

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Information and explanations

Target group

These operating instructions will help you to use the described product safely and as intended.– **They are directed toward qualified skilled personnel***.





Qualified personnel are people who have been authorized by persons responsible for the safety of the system to execute the required activities and are able to recognize potential dangers and avoid them based on their training, experience and instruction, as well as their knowledge of standards, regulations, accident prevention regulations and operating conditions (definition of skilled personnel according to IEC 364).



- Read these operating instructions before you install the device, use it or carry out work on it.
- Also pass on these operating instructions to other users.

Definition of the warnings and symbols

Warnings are indicated by danger symbols and signal words. The table shows what hazards and possible consequences the symbols, signal words and colours indicate.

Signal word	Definition	Consequences
 GEFAHR	Directly threatening danger	Death or extremely serious injuries
 WARNUNG	Dangerous situation	Potential death or extremely serious injuries
 VORSICHT	Dangerous situation	Minor to moderately serious injuries
ATTENTION	Risk of property damage	Damage to the machine, its environment and the product
	Warnings can also have other warning signs: Example: Warning of electrical current! These symbols indicate the type of hazard.	

Term definitions

Term	Definition
User	Persons who use the device installed by the manufacturer in its ready-to-use version.
EMC	Electromagnetic compatibility with electrical and electromagnetic influences.
Skilled personnel	Qualified personnel with the appropriate education, training and experience.
Device	Designation for the hopper control TSM-11 in these operating instructions.
Machine manufacturer	Persons who install the device in the intended construction (machine) and who manufacture the ready-to-use version.

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1 Product overview

1.1 Scope of delivery

- TSM-11 hopper control
- Operating instructions

1.2 Properties

1.2.1 General

- Mains switch
- Consumer output for 230 V AC condenser motor
- Setting the parameters via DIP switches and trimmers
- All connections have a pluggable design.
- Type of protection IP54

1.2.2 Output data

- Consumer output 230 V AC, max. 3 A
- PNP output (hopper filling level check) 24 V DC
- Potential-free output (malfunction) 230 V AC / 6 A

1.2.3 Inputs

- Sensor input, level sensor
- Sensor input, filling level check, hopper
- Potential-free input, control disable

Safety information

1.3 Intended use

The TSM-11 device is a piece of electrical equipment intended for use in supply mechanisms or automation systems. The device is designed for regulating and controlling hopper systems.



The electrical components listed here are called "devices" in the industrial parlance, but are not devices which can be used or connected or machines in the sense of the "Device safety law", the "EMC law" or the "EC Machinery Directive", but components. Only when these components are integrated in the construction of the machine manufacturer is the ultimate mode of operation defined.

The machine manufacturer is responsible for making sure that the construction meets the existing legal regulations.

1.4 Basic safety information

The following warnings both serve for the personal safety of the user as well as the safety of the described products and the devices connected to them.

Non-observance can lead to death, serious bodily injury or property damage.

 DANGER	<p>Life-threatening danger due to electric shock!</p> <ul style="list-style-type: none"> – Disconnect the device from the supply voltage before any intervention. – Before opening the device, wait for at least 30 seconds until the residual voltage has dissipated. – Check to make sure there is no voltage before any intervention.
	

- Only skilled electricians may work on electrical equipment.
- Before commissioning, make sure that the voltage supply agrees with the nominal values of the device.
- Check the electrical equipment of the machine regularly. Deficiencies, such as loose connections, damaged or scorched lines, must be fixed immediately.
- Observe the valid accident prevention and safety regulations for your application.
- In particular, observe both the general and the regional installation and safety regulations for working with dangerous voltages (e.g. EN 50178) as well as the regulations having to do with the proper use of tools and the use of personal safety equipment.
- The Emergency Stop mechanisms must remain in effect in all operating modes. Unlocking the Emergency Stop mechanisms must not result in uncontrolled reactivation.

1.4.1 Transport and storage

Problem-free and safe operation of this device require proper transport, storage, setup and installation, as well as careful operation and maintenance.

The device must be protected against mechanical impacts and vibrations during transport and storage. Protection against moisture, water and impermissible temperatures (see chapter 4 Technical data) must also be guaranteed.

2 Installation

ATTENTION

If the device is not correctly connected, this can lead to the failure or complete destruction of the device (and the connected load).

2.1 Hardware installation

The TSM-11 is a device for installation outside of a control cabinet and has IP54 protection.

The device can be installed in any position.

Mains connection

The mains must be connected according to the valid regulations.

The connection is made via terminal "X10".

The pin assignments are as follows:

Pin 1 230 V AC

Pin 2 N Neutral conductor

PE Connection for the ground protection conductor

Here, make sure that L, N and PE are correctly allocated, since otherwise, the main voltage could be connected to touchable parts of the circuit (for a connection diagram, see chapter 6 "Pin assignments") or the device could be destroyed.

All touchable, electrically conductive housing parts must be grounded according to the valid regulations.

The connection must be made with at least a 0.75 mm² line cross-section.

2.2 Motor connection

The connection is made via the Hirschmann GDM3011 plug, which projects out of the X11 screw connection.

The pin assignments are as follows:

1 N

2 L

3 N via condenser

PE Connection for the ground protection conductor

The 230 V AC motor is connected to this connection.

2.3 Fuse protection

The fuse protection on the primary side depends on the line cross-section. However, it must be designed to have a B10 line protection switch at minimum.

The devices are also protected with internal fuses.

Consumer output 3.15 A, slow-blow

Control electronics 200 mA, slow-blow

Caution!:

Leakage currents against PE might occur due to EMC-related suppressor components. These are harmless, however, when an industry-standard RCD switch is used with a tripping current of 0.3 A.

3 Operation

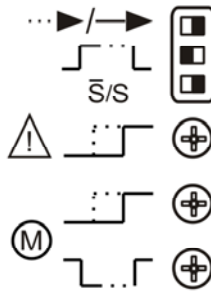
The device is set via DIP switches and trimmers. These are located directly under the front cover.

3.1 Hopper belt

General

The workpiece in the area around the oscillating shell is detected via a sensor. If no workpiece is detected by the sensor, the hopper control switches the drive on for the hopper belt.

Various functions are available for the drive:



Symbol	Function	Designation
...▶/▶	Drive mode	DIP switch, left: Drive runs continuously. DIP switch, right: Drive runs on and off in a cycle.
□	Drive switch-on time	DIP switch, left: Drive (clock mode) switch-on time 1 s. DIP switch, right: Drive (clock mode) switch-on time 2.5 s.
⚠/□	Sensor input	DIP switch, left: Sensor input signal (level sensor) N.O. not inverted DIP switch, right: Sensor input signal (level sensor) N.C. inverted
⚠/□	Malfunction $t_{\text{malfunction}}$	Trimmer: Switch-on delay malfunction 35...180 s.
Ⓜ/□	Switch-on delay	Trimmer: Switch-on delay sensor signal (level sensor) 0...45 s.
Ⓜ/□	Drive pause	Trimmer: Pause drive (clock mode) 0.5...15 s.

Drive runs continuously:

The level sensor does not detect a workpiece in the subsequent machine and switches the drive on after the time t_{belt} has elapsed.

The drive runs until the level sensor detects a workpiece and switches off the drive.

Drive runs cyclically:

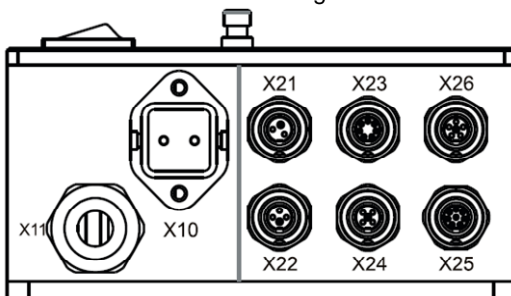
The level sensor does not detect a workpiece in the subsequent machine and switches the drive on after the time t_{belt} has elapsed.

Drive switch-on time 1 s or 2.5 s, pause time t_{pause} 0.5...15 s.

Malfunction:

After the switch-on delay t_{belt} has elapsed, the switch-on delay of the malfunction $t_{\text{malfunction}}$ starts. If the level sensor is not actuated by a workpiece, $t_{\text{malfunction}}$ runs off and the drive is switched off. The potential-free contact for the malfunction is actuated.

The malfunction is acknowledged with the reset button on the front panel.





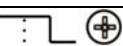
Plug connection	Designation
X22	Level sensor 1: +24 V DC 2: 0 V 3: Signal
X21	Control disable 1:+24 V DC 2:Signal
X23	Malfunction 1: Changer 2: N.C. 7: N.O.

3.2 Hopper filling level check

General:

The filling level in the hopper can be monitored with the filling level check.



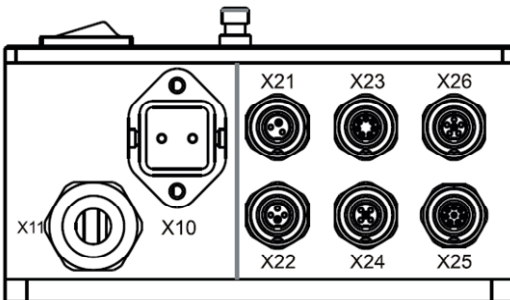
Symbol	Function	Designation
	Direction of rotation	DIP switch, left: Drive direction of rotation clockwise. DIP switch, right: Drive direction of rotation counterclockwise
\bar{S}/S	Sensor input	DIP switch, left: Sensor input signal (filling level sensor) N.O. not inverted DIP switch, right: Sensor input signal (filling level sensor) N.C. inverted
	Switch-on delay T_{on}	Trimmer: Switch-on delay, filling level 0...20 s.
	Switch-off delay t_{off}	Trimmer: Switch-off delay, filling level 0...20 s.

Switch-on delay

The filling level in the hopper is monitored with a light barrier. If a lack of workpieces is detected by the sensor, the switch-on delay t_{on} starts. After this time elapses, the lack of workpieces output is actuated.

Switch-off delay

Once the lack of workpieces in the hopper has been rectified, the output is reset via the adjustable switch-off delay t_{off} . The lack of workpieces output drops out.



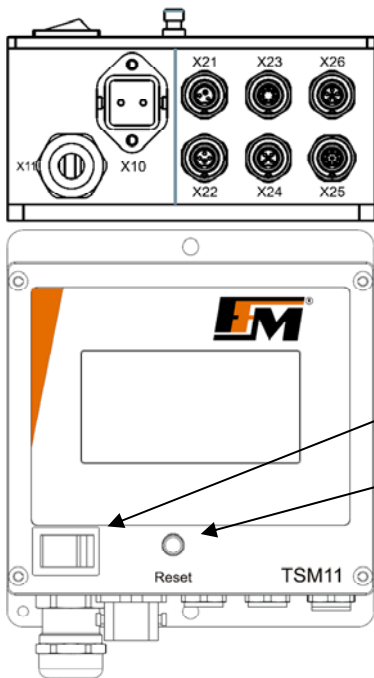
Plug connection	Designation	
X24	Filling level sensor Receiver	1: +24 V DC 2: 0 V 4: Signal
X25	Filling level sensor Transmitter	1: +24 V DC 8: 0 V
X26	Lack of workpieces	1: Signal 5: 0 V

4 Technical data

Supply voltage:	230 V AC <i>(other voltages possible after consultation)</i>
Supply voltage tolerance:	± 10 %
Mains frequency:	50 Hz <i>(other frequencies possible after consultation)</i>
Consumer output current	max 3 A
Consumer output voltage:	230 V AC
Level sensor [E]	24 V DC / 50 mA
Disable [I]	N.O. contact, potential-free contact load 24 V DC
Malfunction [O]	Changer, potential-free contact load 230 V AC / 6 A
Filling level check, light barrier [I]	24 V DC / 50 mA
Filling level check, signal lamp [O]	24 V DC / 80 mA
Lack of workpieces [A]	24 V DC / 50 mA
Type of protection:	IP54
Permissible ambient temperature	5°C to 45°C
Permissible relative humidity	max. 95 %, non-condensing.
Dimensions:	(h)115,25 mm x (w)125 mm x (d)58 mm
EMC	<p>Interference emissions and noise immunity in acc. with EN 61000-6-x</p> <p>Noise immunity in acc. with EN 61000-4-x</p> <p><i>Electrostatic discharge strength (ESD) IEC / EN 61000-4-2</i></p> <p><i>HF irradiation IEC / EN 61000-4-3</i></p> <p><i>("Burst") IEC / EN 61000-4-4</i></p> <p><i>("Surge") IEC / EN 61000-4-5</i></p> <p><i>HF current infeed IEC / EN 61000-4-6</i></p> <p><i>Voltage drop, voltage interruption IEC / EN 61000-4-11</i></p>

5 Terminal assignments

ATTENTION	If the device is not correctly connected, this can lead to the failure or complete destruction of the device (and the connected load).
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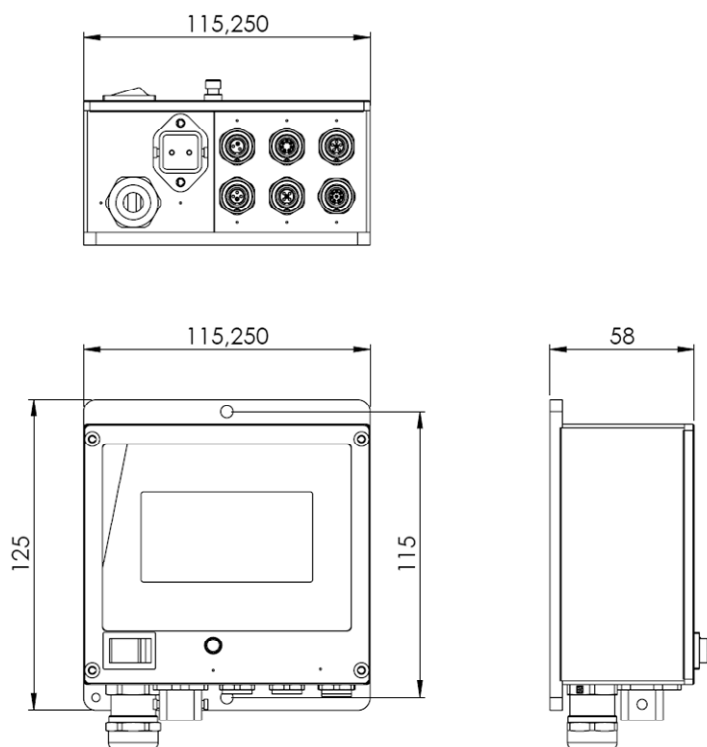


Plug connection	Designation	
X10	Mains feed	1: 230 V AC 2: N PE: Protective ground conductor
X11	Load output	1: N 2: L 3: N condenser PE: PE

Mains switch illuminated

Acknowledge malfunction reset

6 Dimensions



7 Maintenance and care

7.1 Regular tests

The devices are usually maintenance-free. The electrical equipment of the machines are still to be checked regularly by skilled electricians.

If it's dirty, clean the touchscreen with a conventional window cleaner and a soft, lint-free cloth.

7.2 Decommissioning and disposal

The device is to be decommissioned by skilled electrical personnel while complying with the valid safety regulations.

The packaging of the converter can be recycled. Please keep the packaging for later use.

Easily removable screw connections allow the device to be disassembled into its components. These individual components can be recycled. Please carry out disposal in agreement with the local regulations.



Problematic materials must not be thrown away in the normal waste!
Dispose of problematic materials properly, safely and in an environmentally-friendly manner.

8 Accessories and options

8.1 The plug connectors listed below are available as accessories:

Function	Slot	Article number
• Level sensor connection	X22	91.3300.80
• Disable connection	X21	91.3300.70
• Malfunction connection	X23	91.3301.10
• Filling level sensor, receiver connection	X24	91.3300.90
• Filling level sensor, transmitter connection	X25	91.3301.20
• Lack of workpieces connection	X26	91.3301.00
• Mains supply line connection	X10	91.3005.10

8.2 The connection lines listed below are available as accessories:

Function	Length, line	Slot	Article number
• Level sensor connection	0.6 m, straight socket	X22	91.4200.01
• Level sensor connection	0.3 m, angled socket	X22	91.4200.02
• Level sensor connection	0.6 m, angled socket	X22	91.4200.03
• Level sensor connection	0.4 m, angled socket	X22	91.4200.04
• Level sensor connection	0.8 m, angled socket	X22	91.4200.05
• Level sensor connection	1.0 m, angled socket	X22	91.4200.06
• Level sensor connection	2.0 m, angled socket	X22	91.4200.07
• Level sensor connection	5.0 m, angled socket	X22	91.4200.08
• Filling level sensor, rec. connection	0.7 m, angled socket	X24	91.4200.43
• Filling level sensor, transm. connection	0.7 m, angled socket	X25	91.4200.44
• Disable connection to FSM-137 / FS-16/18 / TD-16	3.0 m	X21	91.4280.01
• Mains supply line	3.0 m, with Schuko plug	X10	91.4290.01
• Mains supply line	3.0 m, open end of line	X10	91.4290.02