

Operating instructions



Thyristor control device TSL-26 for vibratory conveyor

Art. no.: 90.0110.60



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In your own interest:

Please read these instructions and keep them in a safe place.
Please observe and follow the safety information.

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1 General

In this manual, you will find all important information regarding the mounting, connection, setting and operation of your TSL-26 device.

In addition, you will find information as well as important warnings for your safety.

Please observe:





Devices of the TSL-26 series are specially adapted phase angle controls for the actuation of vibratory conveyors.

1.1 The product

- Phase angle control with output voltage stabilization
- Umin and Umax limits can be separately set independently of one another
- Soft start / soft stop can be adjusted separately
- Analog setpoint setting
- Setpoint can be determined
- Control can be deactivated
- Selectable vibration frequency, full-wave/half-wave
- Switchable via control signal of PLC or with a sensor or potential-free contact

1.2 Guide for these instructions

Used signal words and symbols

Symbol	Signal word	Meaning
	Danger	Warning of potentially serious to fatal injuries The lightning symbol warns against dangers due to electrical current.
	Warning	Warning of potentially minor injuries or potential damage to property
	Caution	Warning of potential defects / destruction of the device
	Important note Important tip	Here, important information or a tip is given concerning the function.

1.3 Safety-related information for the user

These instructions contain the required information for the intended use of the device described herein. They are directed toward technically qualified 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 relevant standards, regulations, accident prevention regulations and operating conditions (definition of skilled personnel according to IEC 364).



Caution: Danger due to electric voltage.
Non-observance can lead to death, serious bodily injury or property damage.

The following safety information is for your protection, the protection of third parties as well as the protection of the device. You should therefore observe it under all circumstances.

- Disconnect the power supply before installation or dismantling work, as well as when

- changing a fuse or making changes to the setup.
- Observe the valid accident prevention and safety regulations for your specific application.
- Before commissioning, check whether the nominal voltage of the device agrees with the local mains voltage.
- Emergency Stop mechanisms must remain active in all operating modes. Unlocking the Emergency Stop mechanisms must not result in uncontrolled reactivation.
The electrical connections must be covered.
Protective conductor connections must be checked for perfect function after installation.

Operating environment

- The device must not come into direct contact with water.
- When changing from cold to warm environments, allow the device to temper for a few hours before putting it into operation; otherwise, damage could occur due to condensation water.
- Do not install the control device near devices which generate strong electromagnetic fields. The function could be disturbed as a result.
- Also avoid environments which are very hot, cold or wet.

Power supply

- Only connect the device to a grounded mains socket with a mains voltage of 230 V~/50 Hz; 230 V~/60 Hz.
- If you notice malfunctions, disconnect the device from the mains. Have the device checked by qualified, skilled personnel, and repaired if necessary.

The device

- For safety and licensing reasons (CE), it is not permitted to convert and/or modify the device without authorization.
- The device meets the valid low-voltage and EMC directive.

Operation

- The control device only functions correctly when it is correctly installed and operated. In the event of malfunctions or unclear operating states, you should check the device and remedy the malfunction (see "Error list" chapter) or have them remedied.
- To avoid the risk of injury, do not allow uninstructed personnel or other vulnerable or endangered personnel to operate the device without supervision.



Warning: For applications requiring constant switching ON and OFF of the vibratory conveyor device (e.g., accumulation shutdown, hopper control, etc.), the control input intended for this must be used.

If the load current circuit is interrupted via a switch or relay, the control device could be damaged.

If the control device is switched on, the device plug on the operated vibratory conveyor device may never be plugged in or unplugged. The control device can be damaged as a result.

1.4 Intended use

The device described here is an electrical piece of equipment for use in industrial systems. It is designed to control vibratory conveyors.

A use other than the one described above is improper and can result in injuries as well as property damage.

(Further information about this topic can be found in the "Safety information" chapter).

2 Application

The electronic control device TSL-26 is used for the infinitely variable control of inductive loads, such as spiral conveyors, linear conveyors and hoppers.

The control device works according to the phase angle principle; the conveying capacity is adjusted by setting the magnet voltage via the setpoint potentiometer built into the housing cover, or alternatively selectable via 0-10 V DC, 4-20 mA or an external 10 kOhm potentiometer. The control curve of the voltage setpoint can be restricted by two trimming potentiometers, U_{min} and U_{max} , on the board such that the complete range of the setpoint can always be exploited.

The ignition pulses can be shifted infinitely variably in the range of the positive/negative mains voltage half-wave by the voltage setpoint adjustable with the setpoint, whereby the voltage/time area of the output voltage is set. For feeder devices with 6000 vibrations/min vibration frequency, both (positive and negative) mains voltage half-waves are controlled; for feeder devices with 3000 vibrations/min vibration frequency, only one mains voltage half-wave is controlled. Switching between the full-wave and half-wave operation is done as standard with a slide switch on the board (see connection options).

After switching on the operating voltage, the integrated, adjustable soft start is started and ensures the output voltage starts up jerk-free up to the set voltage value. Potential switch-on peaks are eliminated this way. Furthermore, both the soft start as well as the soft stop when the output voltage is switched on/off are activated via the control input and are for increasing and decreasing the conveying capacity with time control so that ordered bulk material does not change its position again. Both times can be adjusted separately.

The control input allows the device to be switched on and off by another system (PLC, initiator, sensors, etc.). The control device therefore provides its own supply voltage of +24 V DC. Switching on or off via an external voltage of + 24 V DC is also possible. The input acts internally on the ignition pulses.



Note

By determining the output voltage (arithmetic value measurement), changes to this are registered immediately and compensated for by a controller stage. This way, the bulk material is guaranteed to run smoothly.



Tip

On the control device, very small magnets can also be safely operated.

3 Installation

An bore and elongated hole, externally accessible, are available for fastening the control device. These are separated from the housing interior.



Important note

Fasten to a vibration-free surface.



Caution:

- Please make sure that the ribbon cable is not pinched against the housing in the interior. Pinching can cause short circuits and the destruction of the device.



Warning:

Procedure for high voltage test:

- L and N must be connected with each other.
- Test voltage may not be higher than 1000 V AC.
- Every device must be tested separately.

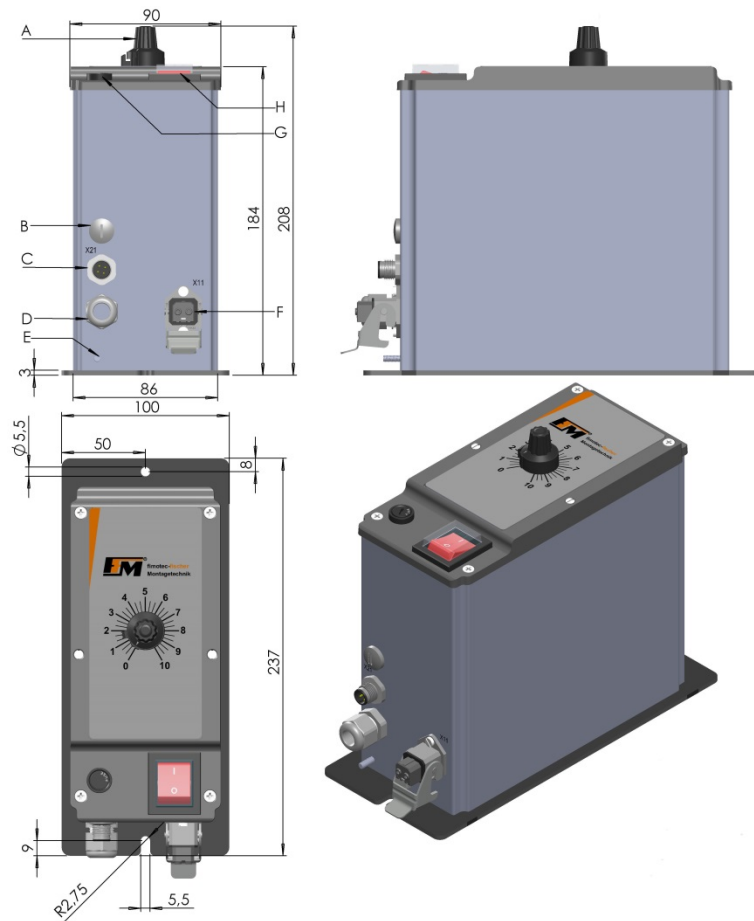
If the above criteria are not complied with, the device could be damaged and the warranty will be void.



Caution:

The cover of the device is made of plastic. Screwing on the cover with the 6 countersunk screws must not be done with force, since otherwise there is a risk of the plastic cracking. Screw in screws with a commercially available screwdriver by hand until the screw is flush with the recess and the cover lies on the profile.

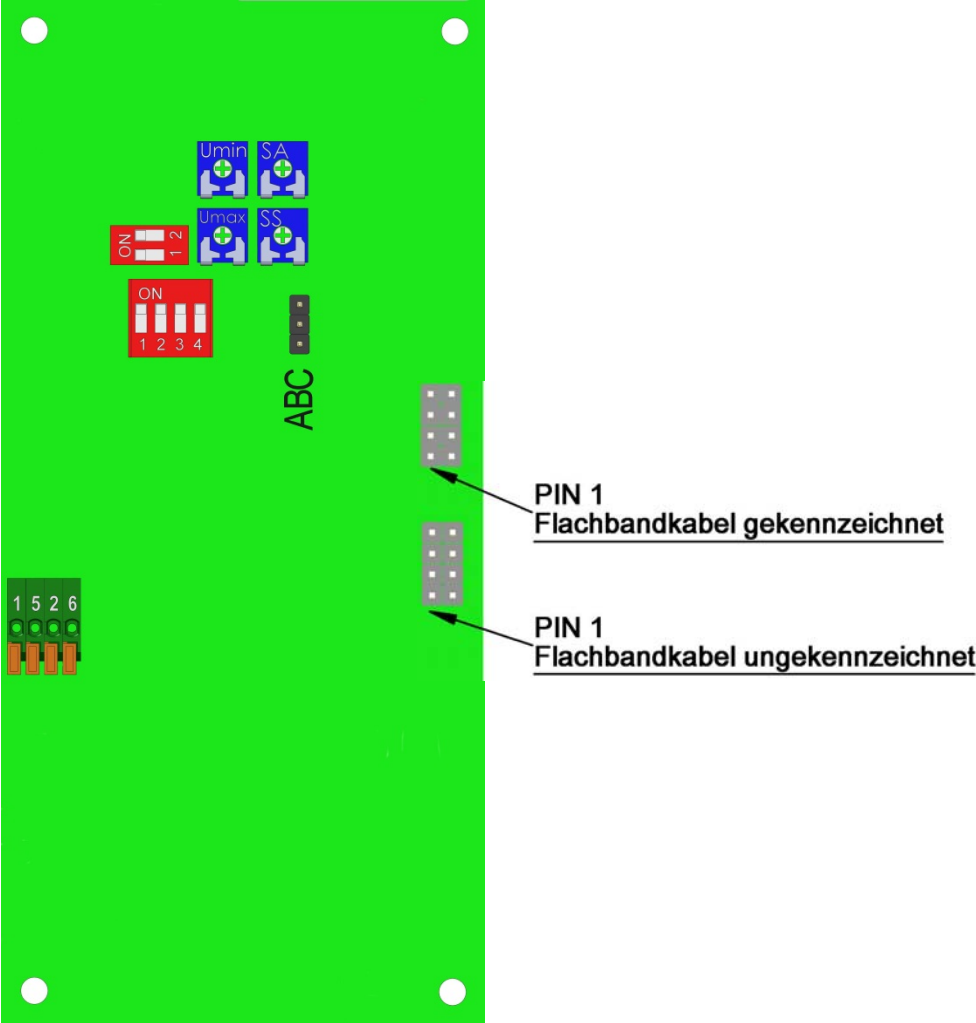
3.1 Overview and dimensions



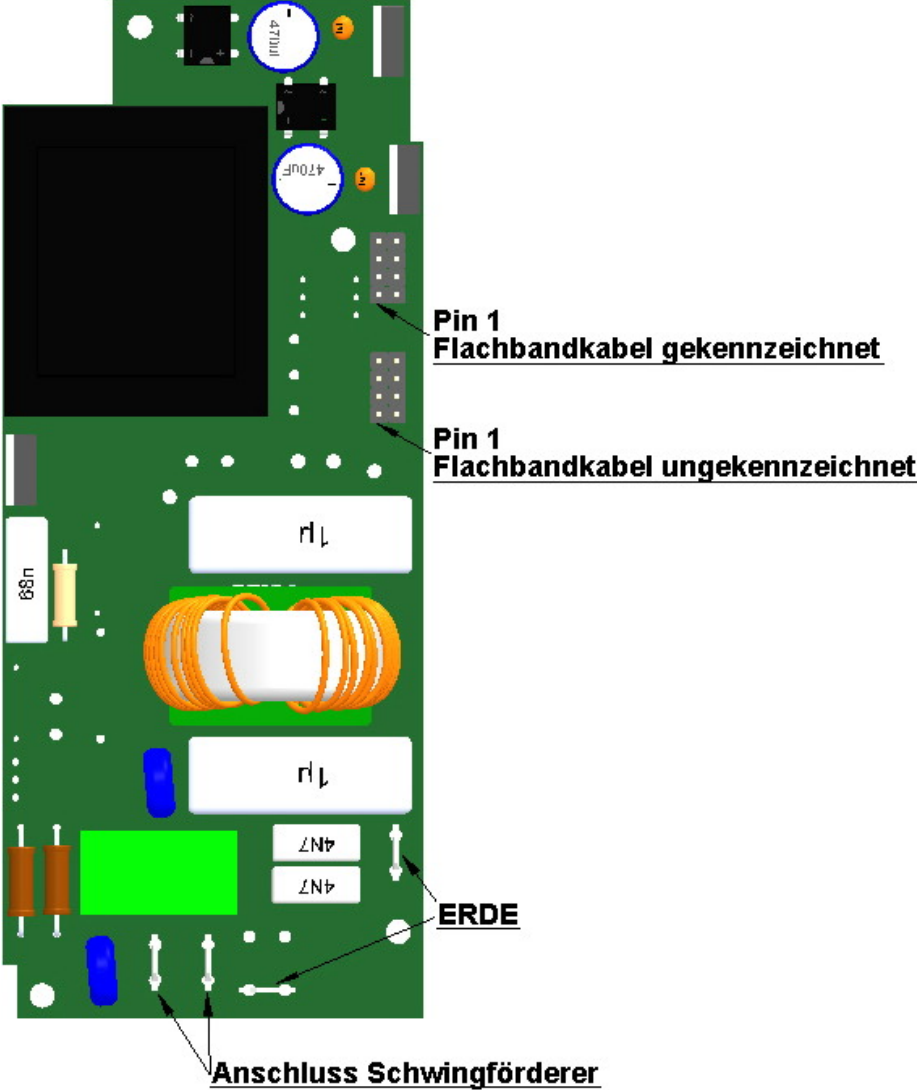
- A - Locking knob for setpoint potentiometer
- B - M12x1.5 Blind plug
- C - M12 plug, 4-pin, for enable input connection – X21
- D - Mains supply line
- S - Grounding bolt
- F - Vibratory conveyor connection 2+PE STAKEI 20
- G - Fuse
- H - Mains switch

3.2 Connections / operating elements of boards

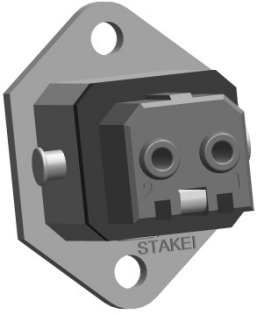

Control board



Power printed circuit board



3.3 Housing connections

	<p>Vibratory conveyor connection</p> <p>Pin 1 - Load Pin 2 – Load</p> <p>PE - Ground</p>
	<p>Connection for enable input</p> <p>Pin 1 - +24V = Pin 2 - Not Connected Pin 3 - GND Pin 4 - Control input</p> <p>The +24VDC supply is isolated with respect to the 230 V AC side.</p>

4 Commissioning

- Before connecting the control device, the mains voltage and frequency must be determined.
 - If the mains voltage and mains frequency are correct, they can be connected to.
 - The vibration frequency must be selected via DIP switch 4 of the DIP4 as required.
- OFF-6000 vibrations per minute
 ON -3000 vibrations per minute
- Check and set the DIP switch and jumpers according to the control type.
 - Connect the vibratory conveyor and control cable to the control device.
 - Stick the mains plug of the control device into the connection socket.
 - Switch on the control device.
 - Define the required output voltage range with the potentiometers Umin and Umax.
 - Via the soft start and soft stop potentiometers, define the characteristics for switching the control input on and off.

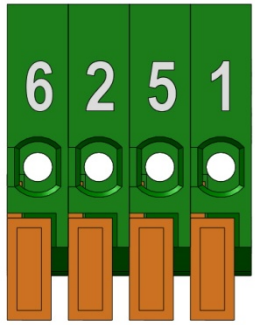


Operating note


- Before switching on, check to make sure the plug connections are correct.
- Switch on the control device with the mains switch.
- Set the setpoint via the potentiometer in the cover until the vibratory conveyor reaches the desired conveying capacity.

4.1 External setpoint specification

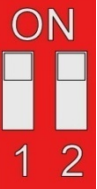
The external setpoint is available via terminals (set in factory).

	<p>Terminal 6 - +5 V DC for external potentiometer</p> <p>Terminal 2 - Current input 4-20 mA</p> <p>Terminal 5 - Voltage input 0-10 V DC or external potentiometer</p> <p>Terminal 1 - GND for current input voltage input external potentiometer</p>
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Use the jumper to select the type of external setpoint:

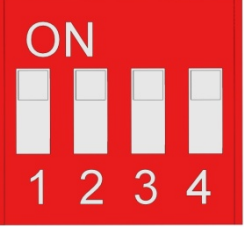
	<p>Bridge between A-B -> 0-10 V DC or potentiometer (set in factory)</p> <p>Bridge between B-C -> 4-20 mA DC</p>
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Use DIP2 to select the setpoint specification the control device should work with:

	<p>DIP2</p> <p>Dip 1,2 - Setpoint specification</p> <table border="0"> <tr> <td>1</td> <td>- OFF</td> <td>OFF</td> <td>ON</td> <td>ON</td> </tr> <tr> <td>2</td> <td>- OFF</td> <td>ON</td> <td>OFF</td> <td>ON</td> </tr> <tr> <td></td> <td>Internal</td> <td>External</td> <td>4-20 mA</td> <td>0-10 V DC</td> </tr> <tr> <td></td> <td>Potentiometer</td> <td>Potentiometer</td> <td></td> <td></td> </tr> </table> <p>(set to OFF/OFF in the factory)</p>	1	- OFF	OFF	ON	ON	2	- OFF	ON	OFF	ON		Internal	External	4-20 mA	0-10 V DC		Potentiometer	Potentiometer		
1	- OFF	OFF	ON	ON																	
2	- OFF	ON	OFF	ON																	
	Internal	External	4-20 mA	0-10 V DC																	
	Potentiometer	Potentiometer																			


4.2 Determining the setpoint function

The conveying speed set via the setpoint potentiometer can be determined using DIP4. After determination, the setpoint potentiometer has no function. After deactivation, the conveying speed is set to the value selected using the setpoint potentiometer.

	<p>DIP4</p> <p>Dip 2 - Setpoint determined</p> <p>OFF - Setpoint potentiometer active</p> <p>ON - Setpoint potentiometer deactivated</p> <p>Value remains active in event of switch</p> <p>(set to OFF in the factory)</p>
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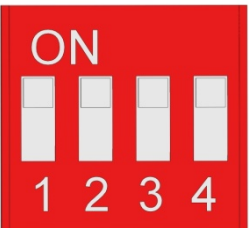
4.3 Control function

Using DIP4, the control can be deactivated via the available input. The control device then runs continuously and cannot be switched via the control input.

	<p>DIP4</p> <p>Dip 3 – Control OFF - Output reacts to control input ON - Output ON, no reaction to control input</p> <p>(set to OFF in the factory)</p>
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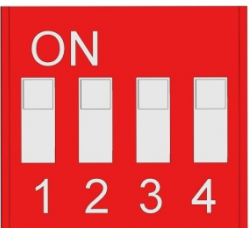
4.4 Vibration frequency function

Using DIP4, the vibration frequency of the vibratory conveyor is set.

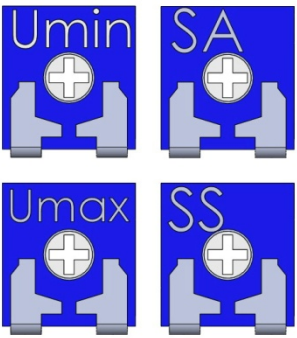
	<p>DIP4</p> <p>Dip 1 – Frequency switch, full-wave/half-wave OFF - 50 Hz (full-wave / 6000 vib/min) ON - 25 Hz (half-wave / 3000 vib/min)</p> <p>(set to OFF in the factory)</p>
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4.5 Control input inversion function

Using DIP4, the control input PNP is inverted (N.C. contact/N.O. contact)

	<p>DIP4</p> <p>Dip 4 – Input 1 OFF - N.C. contact setting ON - N.O. contact setting</p> <p>(set to ON in the factory)</p>
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4.6 Potentiometer settings

 <p>Clockwise Min - Left stop Max - Right stop</p>	<p>Umin - Lower voltage limit of the load output</p> <p>Umax - Upper voltage limit of the load output</p> <p>SA - Soft start</p> <p>SS - Soft stop</p>
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5 Technical data

Mains connection	230 V~ +/- 10%	
Output voltage	30 - 228 VAC	
Mains frequency	50 Hz	60 Hz
Output frequency switchable	Full-wave / half-wave 50 Hz / 25 Hz	Full-wave / half-wave 60 Hz / 30 Hz
Output current	0.01 - 6 A AC	
Protection class	IP 54 for suspended mounting (screw connections point to the floor)	
Fuse	6.3 A F	
Mains connection, mechanical	2 m with molded Schuko angle plug	
Vibratory conveyor connection	Axial plug system STAKEI 20	
control input	M12 plug, 4-pin +24 V- / max. 50 mA / PNP Switching level HI : 6 - 24V- Switching level LO: 0 - 4V-	
Output stabilization	Max. voltage change of 3.5 V~	
Housing	Aluminum base plate + aluminum extruded section + plastic cover	
Dimensions	237 x 100 x 208mm	
Operating temperature	0...45° C	
Storage temperature	-10...+80° C	
Installation height	1000 m, 0.5% nominal current reduction per additional 100 m	


5.1 Setting values

Parameter	Factory settings	
Vibratory conveyor		
Vibration amplitude	0...228 V~	30...228 V~
Max. control limit U _{max}	105...228 V~	228 V~
Min. control limit U _{min}	0...100 V~	30 V~
Vibration frequency	50/60 Hz 25/30 Hz	50/60 Hz
Soft start ramp SA	0.5...5 seconds	0.5 second
Soft stop ramp SS	0.1...5 seconds	0.1 s
Switching ext. setpoint	Voltage / potentiometer U/P Current I	U/P
Nominal value selection	Internal potentiometer external potentiometer Voltage 0..10 V DC Current 4..20 mA	Internal potentiometer
Fix setpoint	Variable setpoint Fixed setpoint	Variable setpoint
Control		
Invert input	PNP PNP inverted	PNP
Control	Control input active Control input inactive	Control input active

6 Error list



Danger: Life-threatening danger due to electric current! Only have repairs made to the 230V power network by a qualified professional.

Problem/error	Possible cause(s)	Remedy
Device does not work	Power failure or defective fuse The 230V mains socket is defective. The device is defective. Control input inverted	<ul style="list-style-type: none"> ➤ Check the fuses. ➤ Have the mains socket repaired by qualified, skilled personnel. ➤ Have the device checked by qualified, skilled personnel. Check whether the control input is correctly set
Vibratory conveyor is not working	Incorrect vibration frequency set Mains frequency incorrect U _{max} too low	<ul style="list-style-type: none"> ➤ Have the vibration frequency compared with the data of the vibration magnet by qualified, skilled personnel. ➤ Have the mains frequency compared with the data of the vibration magnet by qualified, skilled personnel. ➤ Check the U_{max} setting and turn the potentiometer clockwise
Vibratory conveyor vibrates too strongly, magnet knocks	U _{max} too high Incorrect vibration frequency set	<ul style="list-style-type: none"> ➤ Check the U_{max} setting and turn the potentiometer counterclockwise ➤ Have the vibration frequency compared with the data of the vibration magnet by qualified, skilled personnel.
Magnet gets hot	Magnet is operated at impermissible voltage Magnet is operated at impermissible frequency	<ul style="list-style-type: none"> ➤ Have the voltage checked by qualified, skilled personnel. ➤ Have the frequency checked by qualified, skilled personnel.
Control input does not work	Control voltage is not in correct range Control input deactivated	<ul style="list-style-type: none"> ➤ Have the voltage checked by qualified, skilled personnel. ➤ Check the DIP switch settings
 Important: Malfunctions might occur in an unfavorable electromagnetic environment.		



Caution: Danger due to improper interventions. Do not manipulate the device. Otherwise, this can result in function failures and device defects.

7 Maintenance and cleaning

The control device works maintenance-free.

The safety inspection in acc. with DIN VDE 0701-0702 is to be performed annually.

Pull out the mains plug before cleaning the housing of the device with liquids.

8 Disposal

The control device must not be disposed of in the normal household waste.



Users are obligated to bring old devices to a disposal point for old electrical and electronic devices. The separate collection and proper disposal of your old devices helps to conserve natural resources and ensures recycling, which protects human health and the environment. Information about where you can find disposal points for your old devices can be obtained from your city administration or local waste disposal facility.

9 CE conformity

The control device TSL-26 is marked with the CE marking and therefore meets the relevant European directives.

The company fimotec-fischer GmbH & Co. KG herewith confirms that this device complies with the following directives:

EN 61000-6-3 and EN 61000-6-2 in acc. with the EU directive 2004/108/EC "Electromagnetic compatibility"

The declaration of conformity is archived at the manufacturer.



10 Service

If you have any questions or problems, please contact the supplier directly.

Manufacturer: fimotec-fischer GmbH & Co.KG: Tel.: 0049-7424-884-0



Note

Please keep the following information ready, since otherwise service cannot be provided:

- Your company with address
- Your name and contact data, such as telephone number and e-mail address
- Complete designation of the device
- Serial number (FBxx-xxxx-xx or HW20xxxx)
- The direct supplier of your device or machine in which the device is integrated.

11 Accessories (not included in the scope of delivery)

Designation	Use	Article number
Connection cable	VK40-3MVZ/HFA	FFM_91430410
Connection cable	VK40-1.5MVZ/HFA	FFM_91430420
Connection cable	VK40-5MVZ/HFA	FFM_91430400
Cable plug	for X11, drive on TSxx	FFM_91330020
Cable socket M12A	for X21, disable/enable input	FFM_91321101