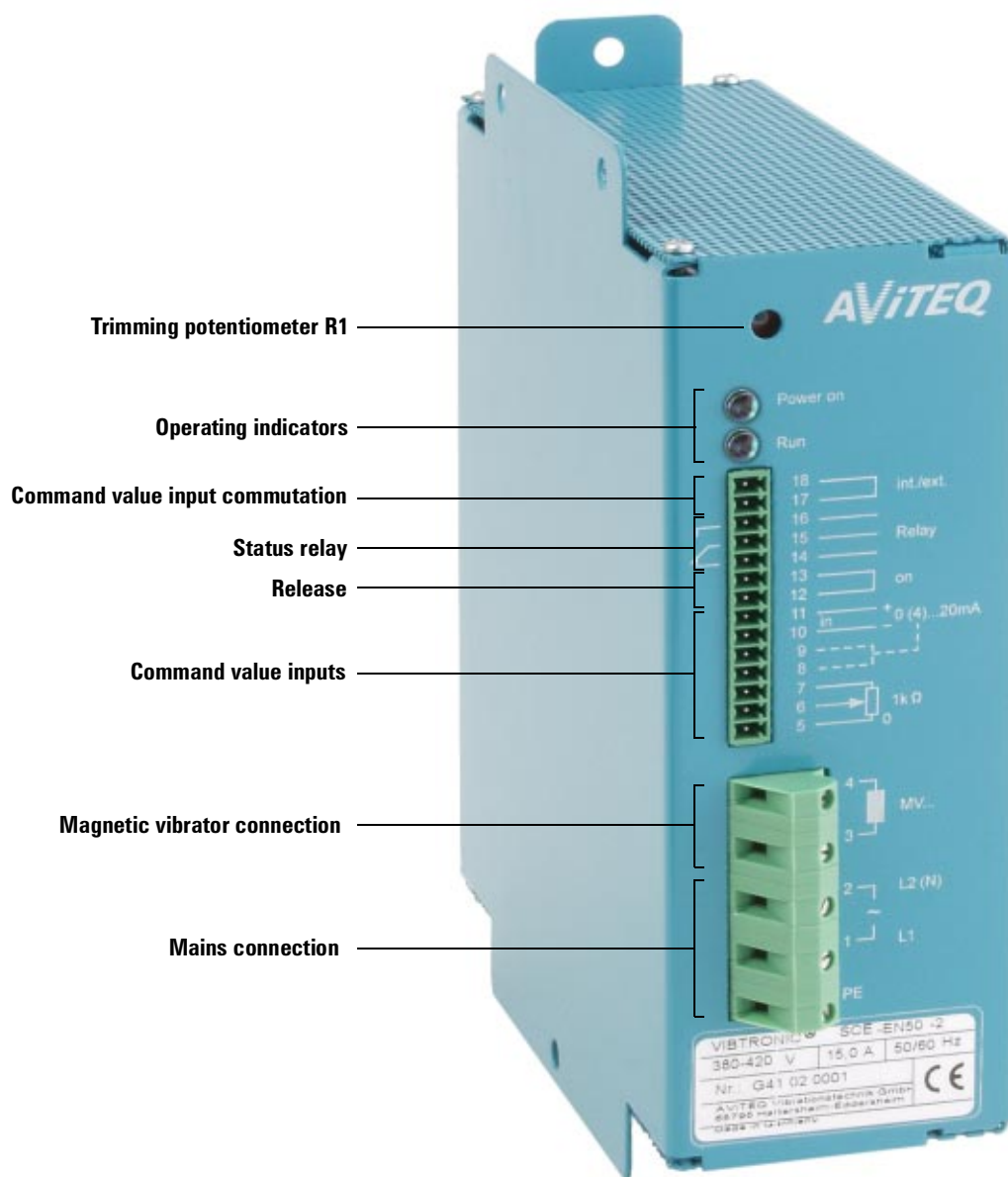




Operating manual VIBTRONIC[®] Controller for magnetic vibrators

Type SC(E)...-2
in panel mounting and cabinet unit

Connections and display elements



Intended use

The VIBTRONIC SC...-2 and SCE...-2 type controllers are designed and constructed as alternating voltage regulators for controlling magnetic vibrators; they operate on the voltage regulation principle (phase regulation).

The controllers have been designed for use with mains networks having a frequency of either 50 or 60 Hz and a sinusoidal voltage.

Do not use the controllers in environments with explosion hazards (explosives, gassy environments)! Observe the information regarding the intended uses given in Chapter 1.3!

For your safety

You will find three different types of symbols in this operating manual which are intended to point out important information:



The DANGER warning describes procedures or conditions which could have dangerous or even life-threatening consequences for the person installing or using the equipment.



You will find this information with procedures in which a danger of damage to equipment exists. However, this may also result in personal injury (e.g. in case of fire).



Notes provide information about individual procedures. Notes explain circumstances, clarify terminology or provide tips for simplifying processes or procedures.

Although we developed the VIBTRONIC controllers taking into account all safety measures, operational error cannot be completely eliminated. In the interest of your safety and that of your colleagues, observe the following information:



When connected to mains, dangerously high voltages are present inside the controller. Touching electrically live components can be lethal! Before switching on mains power, ensure that no live parts can be touched.



Explosions can be life threatening and result in great damage to equipment. Do not use the controller in environments with explosion hazards. The controller of type SC(E)...-2 is not designed for environments with explosion hazards or firedamp environments and must not be used in such without first taking appropriate measures.



Unsuitable controllers, operation with the incorrect mains voltage/frequency could result in damage to the magnetic vibrator. Make sure that the connection values are correct and compare them with the device-type plates!

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This operating manual supports the intended use and appropriate deployment of VIBTRONIC controllers. For this purpose, the operating manual describes details that are significant for the product's operation. In particular, the operating manual provides no claim or guarantee of characteristics in the sense specified by §§ 434, 634 BGB (German civil code) or for the success of specific applications.

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The *General Conditions of Delivery Domestic and Abroad* of AViTEQ Vibrationstechnik GmbH apply in their current version.

Do you have questions? Or problems with installation and commissioning?
Give us a call! We'll be glad to help you!

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Hattersheim-Eddersheim (Germany), 28. January 2003

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1 We are Partners

1.1 About this operating manual

For whom?

This operating manual is intended for the

- installation technician who installs and commissions the magnetic vibrator.
- electrician or engineer who carries out the installation of the controller, the electrical connection to the mains network and the connection to the magnetic vibrator.

All work on the controller must be carried out by qualified personnel (electricians or persons trained in electrical engineering according to IEC 364 and DIN EN 60204-1).

Additional Publications

Supplements to this Operating Manual:

- Connection diagram and dimension sheet for the controller

Definitions

- *Magnetic vibrator*: electromagnetic-mechanical unit for operating a vibration conveyor device
- *Vibration conveyor device*: unit consisting of the magnetic vibrator and working unit (trough, tube, helix, screen etc.)
- *Controller*: the separately delivered electronic control unit assigned to the magnetic vibrator for connecting to the mains network
- *Cabinet unit*: controller in compact housing for wall or frame mounting (type SC...-2)
- *Panel mounting unit*: controller for installation in the switching cabinet or in an enclosed control location (type SCE...-2)



This operating manual applies to the panel mounting unit. Variations specific to the cabinet unit are indicated at the appropriate points.

Date of Revision

On the bottom in the right-hand-side pages of this operating manual, the version number tells you the date when the page was last updated.

Special symbols in this operating manual

Earlier in this manual, you should have learned how we indicate safety notices. If you have any questions about safe work practices regarding controllers and their environment, you should give us a call! We do not want you to endanger yourself or others just because the possible dangers were not clear to you!

For your convenience and orientation, we use the following special indicators in this Operating Manual:

- A round bullet indicates a listing of characteristics and conditions.
- 👉 Upward pointing thumbs indicate that you should check something.
- ☞ The pointing finger marks operation steps that you have to carry out.

1.2 Product Liability and Warranty

The controllers correspond to the current State of Engineering and have been tested for each of its guaranteed functions prior to delivery. AViTEQ Vibrationstechnik GmbH carries out product and market research to aid further development and continuous improvement. Should malfunctions or failures occur despite these preventative measures, please contact our service department! We guarantee that appropriate measures for the repair of the defect will be taken immediately.

Conditions of Warranty

The
General Conditions of Delivery
Domestic and Abroad
of AViTEQ Vibrationstechnik
GmbH apply in their current
version.

We guarantee that the product is free of defects within the scope of the technical product specifications published by AViTEQ Vibrationstechnik GmbH as well as technical specifications provided in this operating manual. No declarations of other product features or claims regarding additional characteristics are provided. AViTEQ Vibrationstechnik GmbH is not liable for the economic efficiency of the product or proper functionality when used for applications other than the purpose defined for the product as specified on the first, right-hand inner page (page 0-1) in the front of this operating manual.

Warranty Exclusions

Customers and third parties must consult with AViTEQ Vibrationstechnik GmbH and obtain our prior written consent before undertaking work inside or otherwise interfering with the product subject to the contract. Otherwise, liability for devices, persons and other consequential damages of any type to the product specified in the contract and other legal assets is precluded, provided AViTEQ Vibrationstechnik GmbH is not co-responsible. Entering into or interfering with the equipment also renders any warranty null and void.

AViTEQ Vibrationstechnik GmbH does not accept liability beyond the warranty entitlements stated in our terms of business on which the contract is based. This applies in particular to claims arising from loss of profit or other damage to purchaser/customer assets. This liability limitation does not apply unless the damage was intentional or caused through gross negligence and unless liability for loss of life or limb or loss of health is mandatory. This also does not apply when the purchaser/customer makes a claim for damages based on an incorrect claim of a characteristic or an agreed-upon characteristic. In the event of culpable violation of principle contractual obligations, AViTEQ Vibrationstechnik GmbH is also liable

for criminal intent and gross negligence on the part of non-managing employees and for mild negligence. In the latter case, this is limited to the contract-typical, judicious, predictable damages.

Warranty is excluded in particular when the units are used in environments, for purposes, or connected to power supplies or to control systems that are not suitable for the controllers or that do not represent the common state of technology. In particular, no warranty is provided for damages caused by unsuitable or incorrect use, incorrect mounting or commissioning by the purchaser/customer or third parties, natural wear, faulty or careless handling or unsuitable operating materials. The same applies for replacement parts, chemical, electrochemical or electrical influences provided they cannot be attributed to AViTEQ Vibrationstechnik GmbH and its employees. Claims made for damages to objects other than that which is specified in the contract, so-called deficiency losses, are limited. In this case, AViTEQ Vibrationstechnik GmbH is liable, regardless of the legal basis, only in the cases of intent, gross negligence on the part of the owner/of its management or managing employee in the event of culpable loss of life or limb or health, in the event of deficiencies which are fraudulently concealed or the absence of which AViTEQ guaranteed, in the event of deficiencies of the delivered object, provided liability is provided in accordance with the product liability law for injury to persons and damages to materials or other special legal requirements.

Likewise, no warranty is provided for damages to conveyance and automation systems which are the result of a malfunction of the product or a textual error in the operating manual. The warranty excludes damages which are the result of accessories not supplied or certified by AViTEQ Vibrationstechnik GmbH. AViTEQ Vibrationstechnik GmbH is not responsible for the violation of patent rights and other titles of third parties outside of the Federal Republic of Germany.

We would like to point out that we are not liable for damage to the product subject to the contract, or for consequential damage to other property, if the damage is caused by non-observation of safety regulations and/or warning notices.

When entering the contract, the purchaser/customer is obliged to point out explicitly if the product is intended for private use and will be used by the purchaser/customer predominantly for this purpose.

The VIBTRONIC controllers described in this operating manual must not be operated without consultation and corresponding release by AViTEQ Vibrationstechnik GmbH in the United States of America and other countries where US American laws are applicable.

1.3 Areas of Application

VIBTRONIC controllers of type SC...-2 and SCE...-2 – hereafter abbreviated with SC(E)...-2 – make possible the stepless adjustment of the working stroke on the magnetic vibrator and, thus, of the conveyor rate of vibration conveyor devices.

The controllers must be used together only with AVITEQ magnetic vibrators or equivalent magnetic vibrators produced by other manufacturers in accordance with their intended use. Information in the vibration conveyor device and the magnetic vibrator operating manuals is also to be observed!

The controllers must only be operated with magnetic vibrators produced from third party manufacturers when their connection specifications are identical to those of the AVITEQ magnetic vibrators. For more information, see Chapter 5.2!

The controllers are not intended for any other purposes.

Never use in the following cases:

- *Do not use* for operation in environments subject to explosion risk or firedamp (explosives, (pit-) gas, risk of dust explosion)! The units are not explosion-protected!
- *Do not use* at ambient temperatures below -5 and over +40 °C (cabinet unit) and +50 °C (panel mounting unit), or in tropical climates or areas where dew or condensation could form! The units are designed for operation in moderate climatic environments!
- *Do not use* together with magnetic vibrators which are not compatible with the controllers!
- *Do not use* mains networks and mains frequencies other than those for which the controllers were designed!
- *Do not use* at elevations above 1,000 m above sea level without first consulting AVITEQ Vibrationstechnik GmbH!

Connecting to mains and magnetic drives

Only AVITEQ controllers connected to a sinusoidal mains network may be used for operating the AVITEQ magnetic drives. For each AVITEQ magnetic drive model there is a corresponding controller.

Other control and connection options are not included.



If a magnetic vibrator is directly connected to mains or an inappropriate controller is used, the magnetic vibrator may be destroyed. Only use the appropriate controller!

1.4 Installation and Operating Personnel

Prior to installation and/or commissioning, you should familiarise yourself with all details of the controller and with the connection options of the magnetic vibrator. For more information, see the chapter in the operating manual on connecting the magnetic vibrators.

Persons involved with installation, commissioning, assembly, disassembly, adjustment or maintenance must have read and understood this operating manual in its entirety; in particular the safety notes. If you have any questions, we would be glad to help you!

All work on the controller must be carried out by qualified personnel (electricians or persons trained in electrical engineering according to IEC 364 and DIN EN 60204-1).

The controllers may only be serviced by personnel trained and authorised by AViTEQ Vibrationstechnik GmbH, D-65795 Hattersheim-Eddersheim. AViTEQ Vibrationstechnik GmbH, Hattersheim-Eddersheim, is not liable for injuries or damage to property if this is not observed. This does not apply if liability for loss of life or limb or loss of health is mandatory.

2 Transport, Storage

- Delivery: we ship controllers and accessories in purpose-built packaging to ensure that they reach their destination without damage.



If the packing is visibly damaged in a way that indicates damage to the contents, contact the forwarding agent! In further proceedings, take notice of the General Conditions of Business of the forwarding agent in order not to risk your claim for damages by improperly filled out forms!

- ☞ Storage: unless special agreements concerning packing and storage have been made, the units, either packed or unpacked, must be stored and transported under "normal" conditions. This means in enclosed rooms with temperatures between -25 and +65 °C, relative humidity not to exceed 80 % (no dew or condensation), and no mechanical shocks or vibrations.



Transporting and storing the units under inappropriate conditions may cause permanent damage. Such damage may not be detectable from the outside. AVITEQ Vibrationstechnik GmbH does not cover this case in its warranty and is not liable for any consequential damage.

2.1 Extent of Delivery

- ☞ After unpacking, compare all parts against the bill of delivery and accompanying documents to ensure that all have arrived and are free of damage. This includes the controller in the installation or enclosed model itself, the circuit diagram packed together with the controller and, with installation models, separate potentiometer with rotary-type knob and scale for setting the working stroke.
- ☞ Compare the data on the magnetic vibrator and controller type labels with the delivery invoice and order documents!
- ☞ Check to see that the magnetic vibrator and controller match by referring to chapter 3.4 of this operating manual! Before using magnetic vibrators produced by other manufacturers, you must first make certain that the specifications are suitable for operation with the VIBTRONIC controller (see chapter 5.2)! If in doubt, contact us! We'll be glad to help you!



Unauthorised combinations may result in destruction of the magnetic vibrator or controller! Mains voltage, mains frequency and vibration frequency must be identical! The nominal current of the controller must be the same or greater than the peak current of the magnetic vibrator. Only connect compatible devices!

2.2 Disposal

2.2.1 Packing Materials

The following materials are used by us for the shipping of controllers, depending on the mode of transport:

- Polyethylene foil (PE) for device protection
- Corrugated cardboard for outer and inner packing
- Wooden cases for outer packing
- Paper shavings for filler material
- Styrofoam (Flo-Pack) for filler and damping material

All packing materials should be disposed of in accordance with local regulations of the delivery destination.



Cardboard containers and paper packing tapes can be recycled within the RESY Disposal and Re-utilisation System. Where used, packaging foil, packing tapes, and foam foils are made from polyethylene (PE), the CFC-free cushions are usually made from polystyrene foam (PS). These packing materials consist of pure hydrocarbons and can thus be recycled.

In special cases, we use steel packing bands and wooden cases free of chemical treatment.

2.2.2 Returning the Device

AVITEQ Vibrationstechnik GmbH takes back without charge controllers of type SC(E)...-2 delivered in 2002 or later when delivered shipping paid to AVITEQ Vibrationstechnik GmbH, D-65795 Hattersheim-Eddersheim.

2.2.3 Materials Used in the Units

In case of disposal by the customer, and when exchanging components, the current local waste and disposal regulations apply and should be observed. We accept no responsibility for improperly disposed of parts and components!

- For the disposal of the controllers, the regulations for the disposal of electronic parts and components apply.
- The power semiconductors used (thyristor and diode module) do not contain beryllium and thus may be disposed of as electronic waste.



NOTE

Detailed information concerning the used materials is available from us upon request. In case of doubt, take advantage of our disposal offer!

3 Function Description

3.1 Sizes

AVITEQ magnetic vibrators must be operated with the appropriate VIBTRONIC controllers. Depending on the application and the size of the magnetic drive, AVITEQ Vibrationstechnik GmbH delivers controllers of series SC(E)...-2 in sizes "CN", "DN", "EN", or "ES" as either cabinet or panel mounting unit.

3.2 Principles of Operation and Oscillation Rates

Oscillation Rates and Mains Frequency

Type SC(E)...-2 controllers are alternating voltage regulators and they operate on the voltage regulation principle (phase regulation).

- Controllers for vibration conveyor devices with an oscillation rate of
 $1,500 \text{ min}^{-1}$ (25 Hz) at a mains frequency of 50 Hz and
 $1,800 \text{ min}^{-1}$ (30 Hz) at a mains frequency of 60 Hz
 trigger every fourth mains half-wave.
- Controllers for vibration conveyor devices with an oscillation rate of
 $3,000 \text{ min}^{-1}$ (50 Hz) at a mains frequency of 50 Hz and
 $3,600 \text{ min}^{-1}$ (60 Hz) at a mains frequency of 60 Hz
 trigger every second mains half-wave.

The mechanical vibration frequency (25, 30, 50 or 60 Hz) is set at the factory prior to delivery and is encoded in the type designation.



NOTE

This new generation of controllers was designed with the EMC directive (89/336/EWG) in mind and meets the requirements of EN 50081-2 and EN 50082-2.



NOTE

Oscillation rates are given in " min^{-1} " and the vibration frequency in "Hz".

3.3 Scope of Operation

3.3.1 Regulation Types

The VIBTRONIC Controllers of type SC(E)...-2 are designed for voltage regulation. Mains voltage fluctuations over a wide range ($\pm 10\%$) have no noteworthy effect on the working stroke and, therefore, no effect on the conveyor rate.

3.3.2 Command Value Preset

The command value for the working stroke can optionally be preset by means of

- a vibration-width adjuster (potentiometer) or
- an external control input (0 ... 10 V DC, 4 ... 20 mA or 0 ... 20 mA)



NOTE

The working stroke changes proportionally with the command value, i.e.: the larger the command value, the larger the working stroke.

3.3.3 External Release

The controller can be switched by the electronic release and, therefore, activated by means of, for example, a PLC (programmable logic controller). This external release can be made by means of

- a potential free contact, or
- a voltage signal of +24 V DC, or
- an optical coupler.

If an external release is not planned, the appropriate terminals are short-circuited with a plug-in bridge.



NOTE

The terminal assignments for the individual connection options are explained in chapter 4.2.



ATTENTION!

A plug-in bridge is mounted at the factory which absolutely must be removed in the case of an external release. The controller may otherwise be destroyed!

3.3.4 Operating Messages

For displaying operating states, the units are provided with two LEDs at the top of the front panel.

The operating condition displays are explained in Figure 3.1.



LEDs light up, if ...		
Operation (green)	 Power on	mains voltage is present.
	 Run	vibrator voltage is present at terminals 3 and 4.

Figure 3.1 Display of operational states by LEDs

3.4 Models

The controllers are deliverable in sizes "CN", "DN", "EN", and "ES" in the following models:

- Cabinet unit SC... (*IP 55*): closed compact housing for wall or frame mounting. Vibration-width adjuster and mains switch are installed on the front side of the housing.
- Panel mounting unit SCE... (*IP 20*): controller for installing in switching cabinets or in closed control locations

The corresponding technical data are located in Table 3.2:

	SC(E)-C...-2	SC(E)-D...-2	SC(E)-E...-2
Mains frequencies	50 or 60 Hz		
Vibration frequencies with 50 Hz mains	25 or 50 Hz		
Vibration frequencies with 60 Hz mains	30 or 60 Hz		
Nominal voltages with 50 Hz mains and 60 Hz mains	220 ... 240 V 380 ... 420 V 440 ... 480 V 500 ... 520 V		
Nominal current	15 A		
Maximum power loss in switching cabinet	45 W		

Table 3.2 Technical data for type SC(E)...-2 controllers



NOTE

The permissible tolerances are, for the mains voltage, $\pm 10.0\%$ and, for the mains frequency, $\pm 0.5\%$.

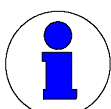
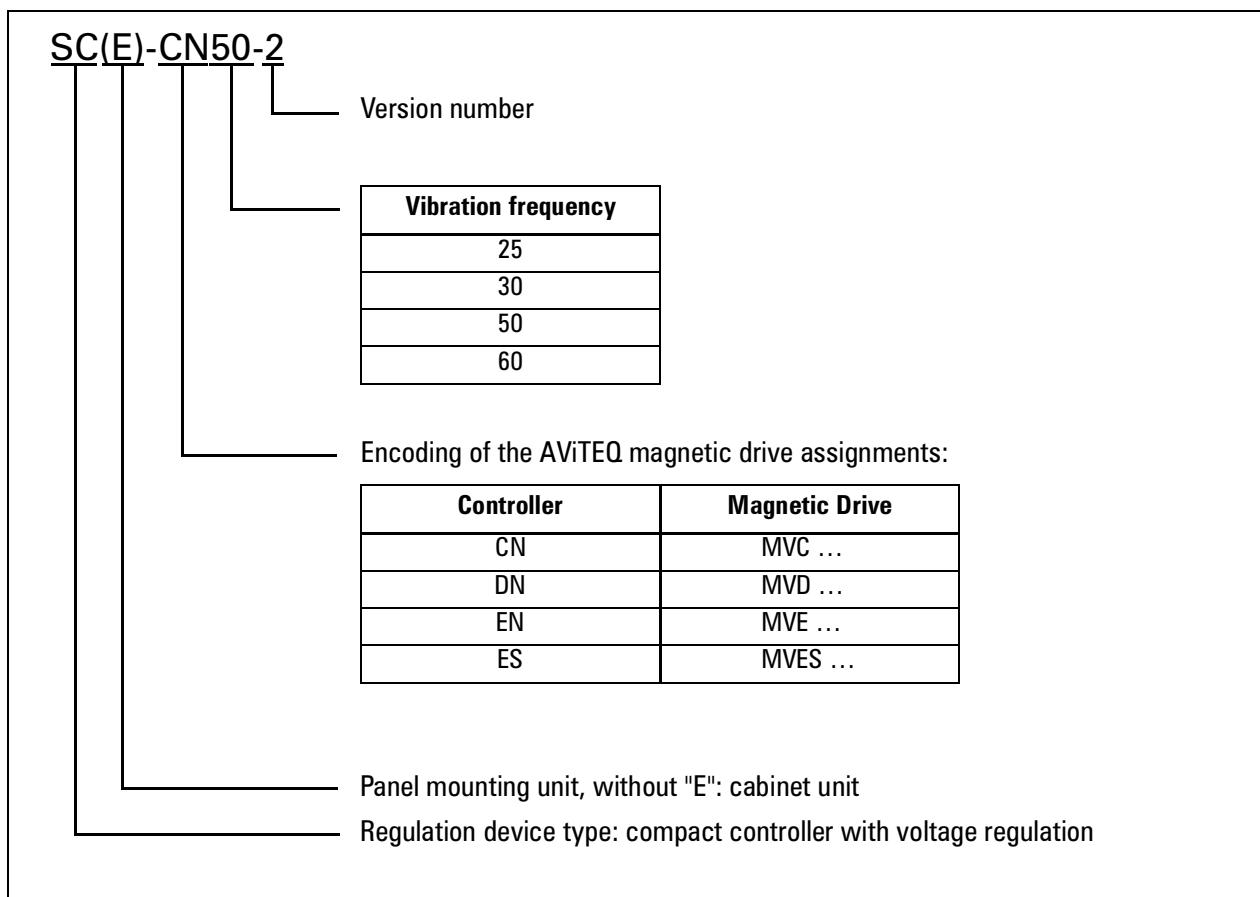


NOTE

The vibration frequency is set by the model version and cannot be changed by the customer.

3.4.1 Type Designation

Explanation of the type designation of the VIBTRONIC controllers of type SC(E)...-2:



NOTE

As shown in Table 3.2 (Technical Data), the controllers are designed for various voltage ranges. Please see the type label for the voltage range of the connector set.

4 Installation

4.1 Mechanical Installation

The installation steps for the two versions are described in the following sections:

- Panel mounting unit, in Chapter 4.1.1 and
- Cabinet unit, in Chapter 4.1.2

4.1.1 Panel Mounting Unit

The controllers are available as panel mounting units (IP 20 in accordance with EN 60529) for vertical installation in switching cabinets or control cases. They consist of:

- the (closed) panel mounting unit,
- the potentiometer with rotary-type knob and scale (delivered loose) and
- the documentation (operating manual, German¹)



Prior to installation: before opening the switching cabinet or control case, switch off the current supply, check that no voltages are present, and protect against unintentional reconnection!

☞ Use the hole pattern to orient yourself, see figure 4.1 on the following page.



The controller can be secured either on the rear or bottom side. When mounting, ensure that the connection terminals are accessible and the specified minimum clearances to adjacent devices are adhered to in accordance with Figure 4.1!

- ☞ Fasten the unit to a vibration-free vertical support wall or installation plate in the closeable switching cabinet (control location); hand-tighten the screws and use only the intended holes.
- ☞ Install the supplied potentiometer for working stroke adjustment with scale, rotary-type knob, pointer, and knob cover at a suitable location (e.g. switching cabinet door or front of control case).

¹Standard, other languages are provided depending on the destination of delivery

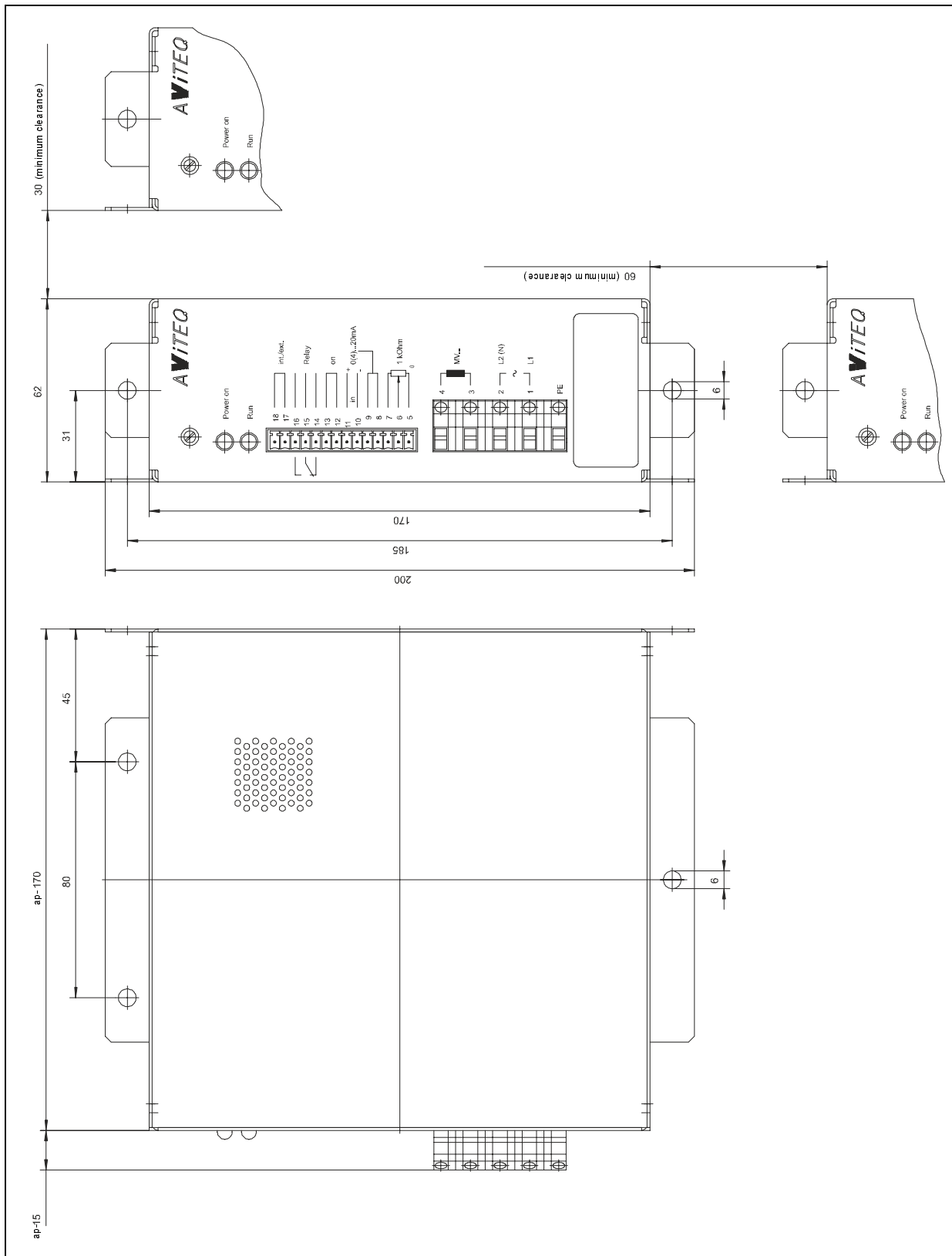


Figure 4.1 Panel mounting unit type SCE...-2: protection class IP20, weight approx. 2.2 kg, dimensions and hole pattern for securing to vertical vibration-free switching cabinet walls or installation plates



ATTENTION!

Controllers are temperature sensitive! Make certain that the units are not installed near external heat sources, such as direct sunshine or radiators. The ambient temperature must not exceed +50 °C during operation!

4.1.2 Cabinet Unit

The controllers are delivered in a closed housing (IP 55 acc. to EN 60529). The cabinet unit is suitable for mounting to vertical walls or frames.

Carry out the installation as follows:

- ☞ Screw the mounting plates (delivered loose) onto the housing as shown in figure 4.2.
- ☞ Use the hole pattern shown in figure 4.2 to drill the necessary holes for the fastening screws.
- ☞ Hand-fasten the mounting plates to a vibration-free vertical wall or frame.



ATTENTION!

Controllers are vibration sensitive! Do not install on vibrating components, and under no circumstances to the vibration conveyor device itself!



ATTENTION!

Controllers are temperature sensitive! Make certain that the units are not installed near external heat sources, such as direct sunshine or radiators. The ambient temperature must not exceed +40 °C during operation!

4

4.2 Terminal Assignment

The following chapters explain the terminal assignment on the controllers as well as the available options. Read these sections before you begin wiring, and observe the information regarding electromagnetic compatibility!

4.2.1 Minimum Terminal Assignment

The minimum terminal assignment for operating a magnetic vibrator for voltage-regulated mode and without external control input is shown in Figure 4.3. Terminals 12 and 13 must be connected by a bridge. The bridge is mounted at the factory.

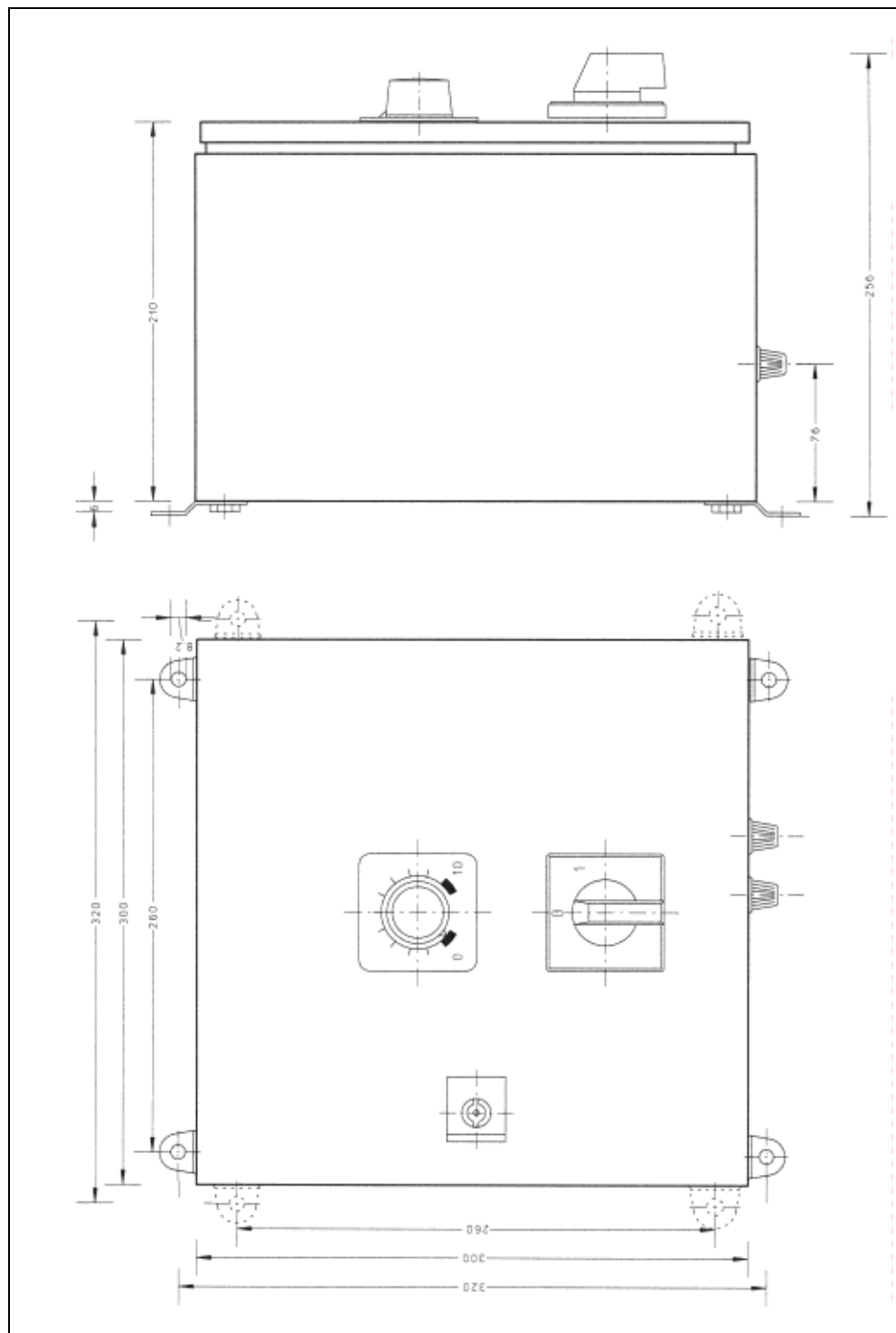


Figure 4.2 Cabinet unit type SCE...-2: protection class IP55, weight approx. 6 kg, dimensions and hole pattern for securing to vertical vibration-free walls or frames

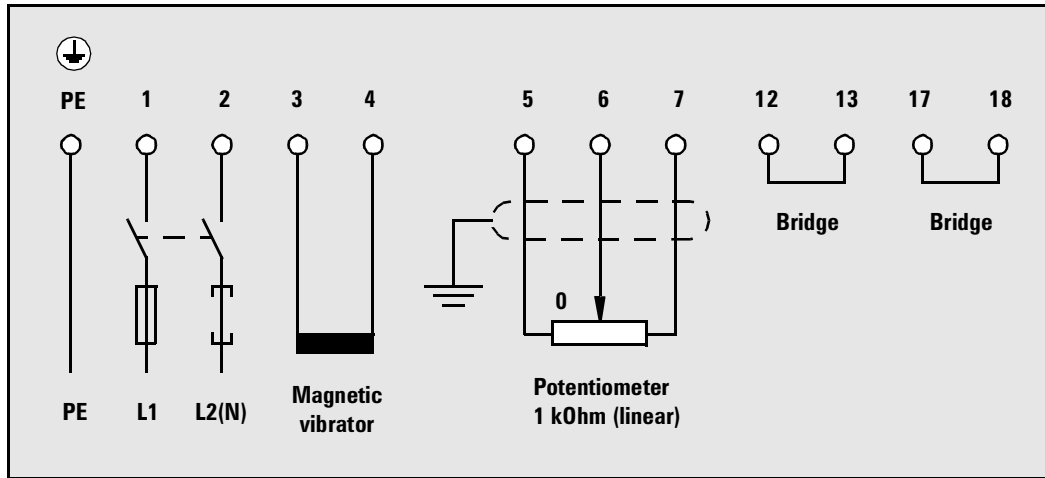


Figure 4.3 Standard terminal assignment with mains input (terminals PE, 1 and 2), magnetic vibrator (terminals 3 and 4) and vibration-width adjuster (terminals 5, 6 and 7)



Make certain that the fuse protection is in accordance with connection diagram. Install at least one fuse – but in any case, F1 in accordance with connection diagram Figure 4.9 – as a super-fast-acting safety fuse for safeguarding the thyristor in the controller.



Use only a potentiometer (limit value 1 kOhm) with linear characteristics for the vibration-width adjuster. Shield the signal lines to guarantee electromagnetic compatibility if the lines exceed five metres in length!



For magnetic vibrator operation without external release circuit, terminals 12 and 13 must be connected by a wire bridge. If the bridge is missing, the vibrator voltage at terminals 3 and 4 is zero; the magnetic vibrator does not function.

4.2.2 Status Relay

The controller is equipped with a status relay according to the following illustration:

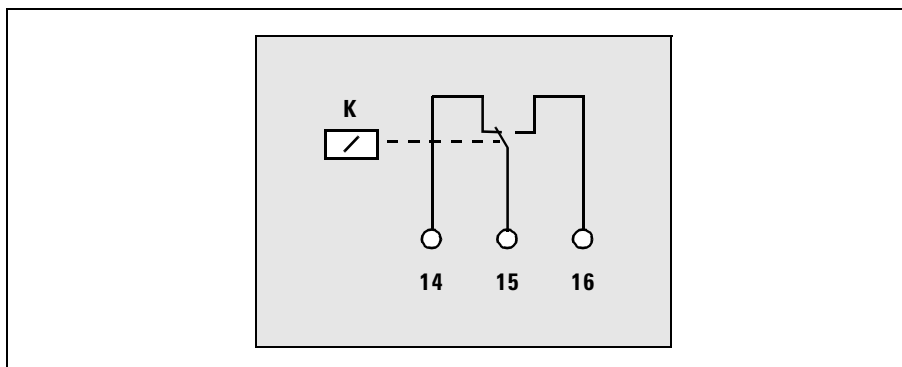


Figure 4.4 Status relay

The following switching states can be analysed:

Terminals 14 and 15	Terminals 15 and 16	Case
open	closed	Mains voltage (term. 1 and 2) is present; a start signal is triggered simultaneously (term. (5), 12 and 13).
closed	open	Mains voltage (term. 1 and 2) is not present or, if mains voltage is present <u>no</u> start signal is triggered (term. (5), 12 and 13).

Figure 4.5 Switching states of the status relay



The load rating of the status relay is maximum 30 V DC for direct current and maximum 125 V AC for alternating current with a maximum of 0.3 A in both cases. Destruction of the operational transmitting relay and possibly of the controller! When dimensioning, note the permissible values given above for the load of the operational transmitting relay.

4.2.3 Coarse and fine Fill Rates

When using the controller for dosing and filling processes, we recommend a circuit as shown in Figure 4.6. In this circuit the two relays K1/K2 function as follows:

- K2 initiates the filling process.
- K1 switches at 95% full weight.
- At 100% fill weight, both relays return to their rest positions.

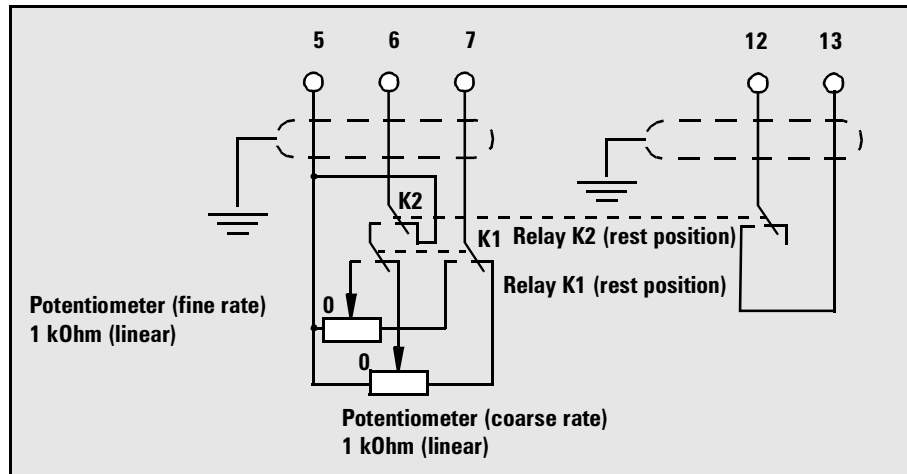


Figure 4.6 Coarse and fine fill rates circuit (terminals 5, 6 and 7, as well as 12 and 13)



To prevent switching faults, use only gold-plated or hermetically sealed contacts.



Use only a potentiometer (limit value 1 kOhm) with linear characteristics for the vibration-width adjuster. Shield the signal lines to guarantee electromagnetic compatibility if the lines exceed five metres in length!

4.2.4 External Control Input

The controllers may be operated with an external command value entry (external control input). The following external command values can be used for setting the working stroke:

- 0...10 V DC, resistor approx. 200 kOhm
- 4...20 mA DC, working resistance 250 Ohm
- 0...20 mA DC, working resistance 250 Ohm



If necessary, you can switch between external control inputs by means of a switch or relay or between command value presettings by means of a vibration-width adjuster (potentiometer).



To prevent switching faults, use only gold-plated or hermetically sealed contacts.

Figure 4.7 shows the various options and terminal assignments for presetting external command values.

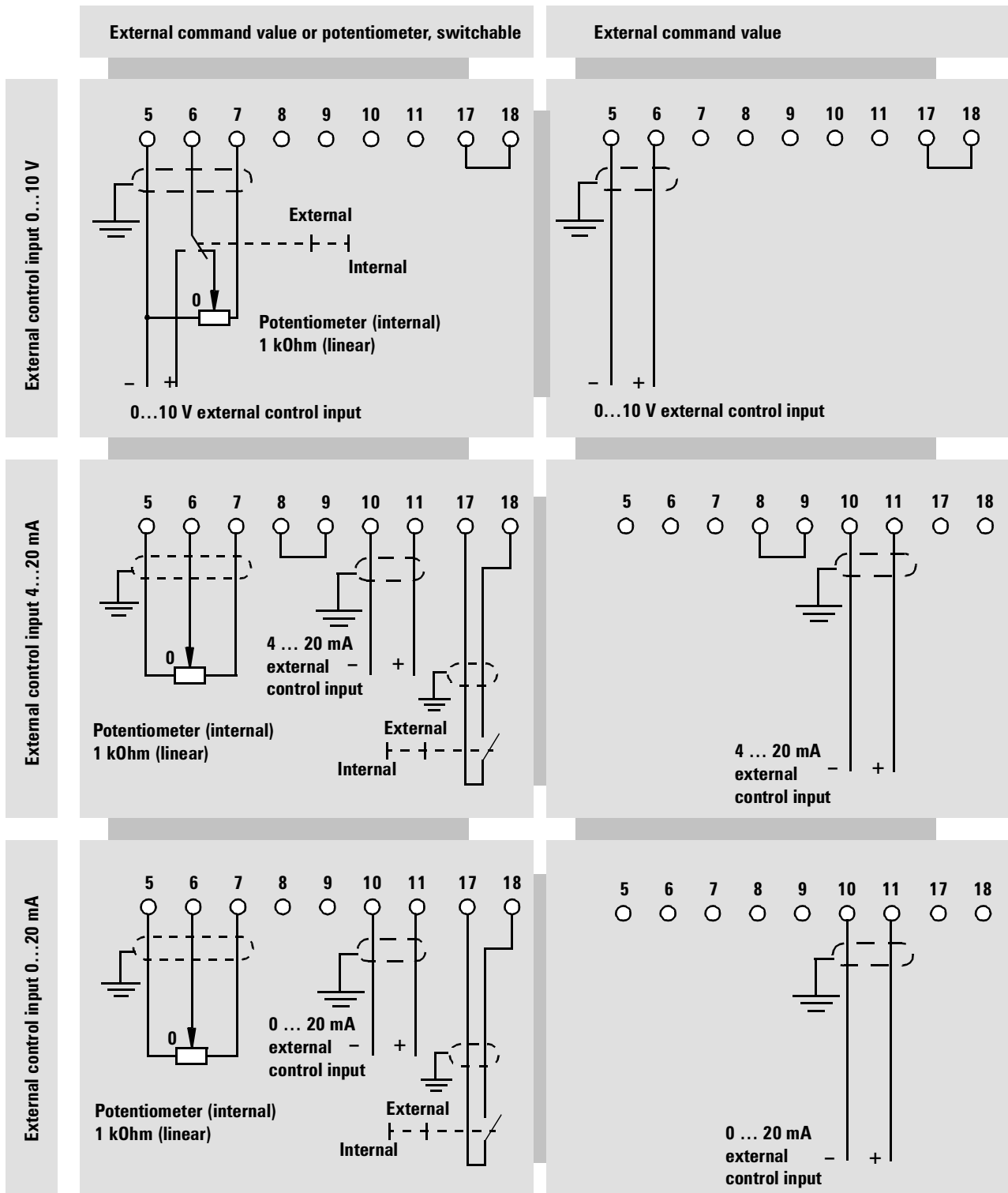


Figure 4.7 Various options for external control input



Use only a potentiometer (limit value 1 kOhm) with linear characteristics for the vibration-width adjuster. Shield the signal lines to guarantee electromagnetic compatibility if the lines exceed five metres in length!

4.2.5 Switching on/off externally

If no external connection/cut-out (release switching) is desired, terminals 12 and 13 must be connected by means of a wire bridge so that the magnetic vibrator can be controlled.

The controller can alternatively be remotely connected or cut-out by means of a switch (relay), an optical coupler or a DC signal. The corresponding terminal assignment possibilities are shown in see Figure 4.8.

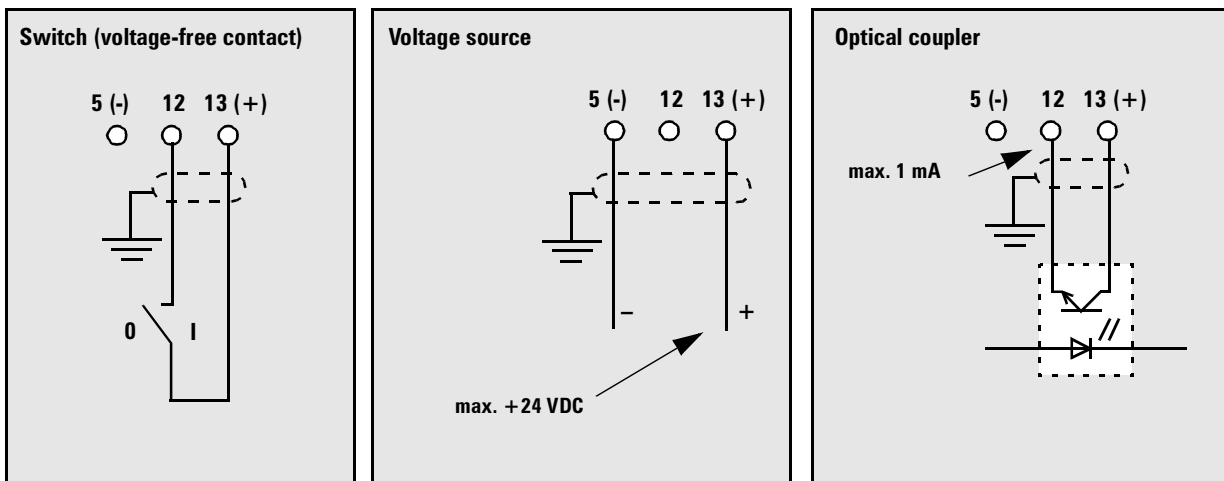


Figure 4.8 Options for switching on/off externally



*Destruction of the controller:
note the maximum permissible load of 1 mA!
Before performing a remote connection/cut-out, always remove the factory-installed bridge between terminals 12 and 13 as the controller may otherwise be destroyed!*



To prevent switching faults, use only gold-plated or hermetically sealed contacts. Shield the signal lines to guarantee electromagnetic compatibility if the lines exceed five metres in length!

4.3 Mains connection

4.3.1 Notes on electrical connection



Avoid accidents - observe regulations! VDE regulations and guidelines of your power company apply to the connection of earth, neutral line, and protective circuitry! The connection must be carried out only by trained personnel (certified electrician or electrically trained person in accordance with IEC 364 and EN 60204-1).

- ☞ Switch off the current supply.
- ☞ Verify that no voltages are present!
- ☞ Protect against unintentional reconnection!

Mains fuse

For mains protection F11 (see Figure 4.9), we recommend fuse protection appropriate for the nominal current of the connected magnetic vibrator.



Improper fuses could result in damage to the magnetic vibrator! Make certain that the fuse protection is in accordance with connection diagram. Install at least one fuse – but in any case, F1 in accordance with connection diagram Figure 4.9 – as a super-fast-acting safety fuse for safeguarding the thyristor in the controller.

Semiconductor Fuses

With the VIBTRONIC controllers in a cabinet unit, type SC...-2, the following semiconductor fuse F1 is installed (table 4-a):

Controller, type		Semiconductor fuse F1
SC...-2	220 - 240 V 380 - 420 V 440 - 480 V 500 - 520 V	16 AgR DII/E27

Table 4-a
Semiconductor fuse F1

With installation model controllers, type SCE...-2, equivalent protection is to be installed by the customer.

4.3.2 Connection Diagram

Connection diagram for the controller see Figure 4.9.

The operating manual with appropriate connection diagram is delivered with each controller.

Note the minimum terminal assignment (Figure 4.3 on Page 4-5)!

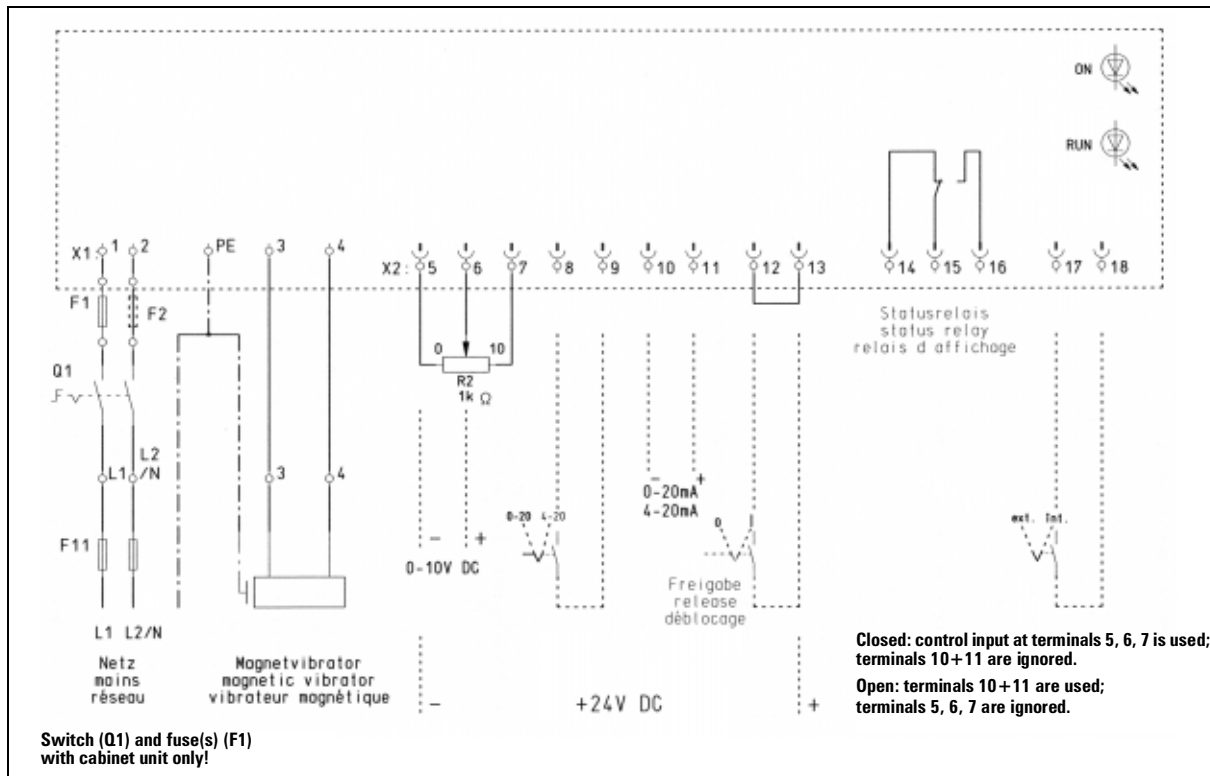


Figure 4.9 Connection Diagram for Controller VIBTRONIC SC(E)...-2

4.3.3 Vibration-Width Adjuster, Rotary-Type Knob and Scale

A linear 1 kOhm potentiometer is always included in the delivery from the factory (see Figure 4.10).

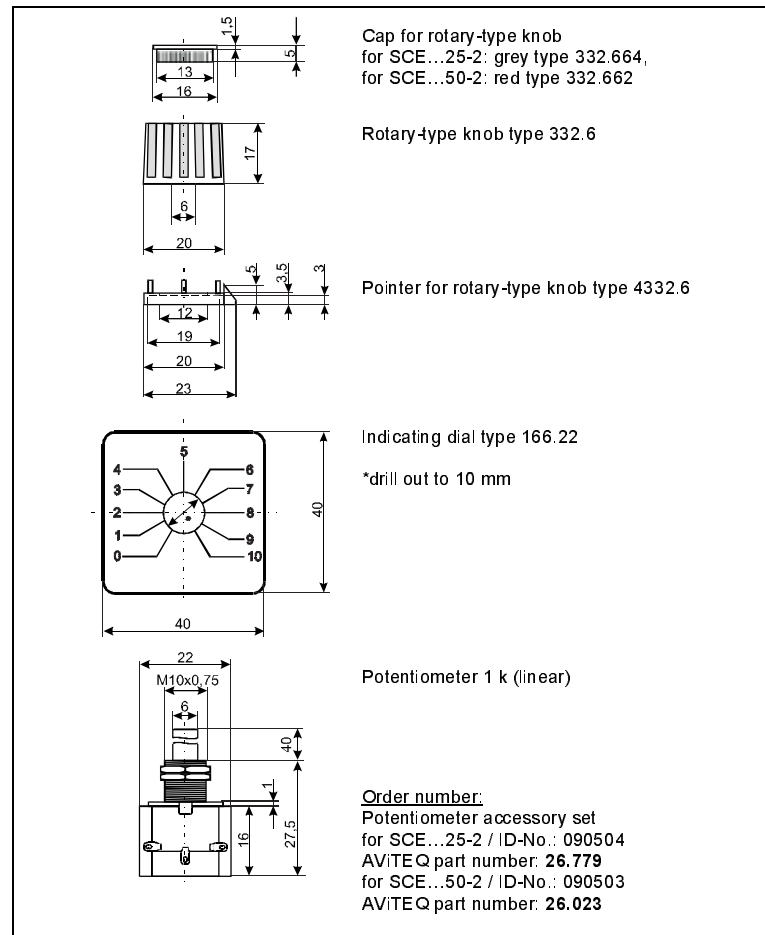


Figure 4.10 Potentiometer, rotary-type knob, scale

4.4 Electrical connection with the magnetic vibrator

An operating manual with connection diagram (part of the operating manual) is included with each VIBTRONIC controller.

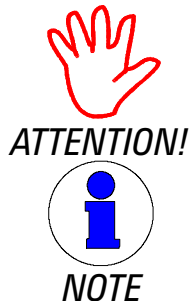
- ☞ Make all connections between mains, controller, command-value circuit and magnetic vibrator.
- ☞ Note any device-type peculiarities as they relate to the available options and observe the relevant terminal assignments shown earlier as well as the connection diagram.



When connected to mains, dangerously high voltages are present inside the controller. Touching electrically live components can be lethal! Before switching on mains power, ensure that no live parts can be touched. Close the cover of the control box or the control cabinet door(s)!

4.4.1 Electromagnetic Compatibility (EMC)

The series SC(E)...-2 controllers were developed and constructed in conformance with EMC directive 89/336/EWG. They fulfil the requirements of standards EN 50081-2 and EN 50082-2.



The controllers are designed in accordance with EN 50081-2 (RFI-emission) for industrial areas and must not be used in residential areas or business districts.

Observe the information regarding the shielding of signal lines described in the preceding chapters on terminal assignment!

4.4.2 Line lengths



NOTE

We define the line length as being the distance between vibration conveyor device and main distributor. Smaller line cross sections or longer line lengths could result in faults (see Chapter 7).

The maximum permissible *line length* is 300 m.

An appropriate *line cross section* is to be used for a given vibrator current.

- ☞ The line cross sections (based on length) are given in the operating manual for the magnetic vibrator.



NOTE

The maximum allowable voltage drop between the vibration conveyor device and main distributor must not exceed a value of 5%. The line cross sections in the operating manual for AVITEQ magnetic vibrators are dimensioned accordingly. When using a device (magnetic vibrator) produced by another manufacturer, you must mathematically recheck the line resistance.

5 Commissioning

5.1 Commissioning with AViTEQ magnetic vibrator

When commissioning with the original AViTEQ magnetic vibrator, you are advised to follow the commissioning steps provided in the respective chapter of the operating manual of the magnetic vibrator.

In the event of malfunction, refer to Chapter 7 located towards the end of this Operating Manual. Additional information can be found in the *Troubleshooting* chapter of the operating manual for the AViTEQ magnetic vibrator or for the AViTEQ vibration conveyor device.

5.2 Commissioning with vibrators from third party manufacturers

5.2.1 Setting the vibrator nominal voltage

The vibrator nominal voltage U_{VN} , which can be measured at terminals 3 and 4 of the controller, is set at the factory to a fixed value for use with original AViTEQ devices.

If a magnetic vibrator from another manufacturer is to be used, the setting must be checked prior to commissioning and, if necessary, adjusted.



The vibrator nominal voltage can be set by AViTEQ Vibrationstechnik; when ordering the controller, provide us with the actual vibrator nominal voltage of the third party device!

If you would like to set the vibrator mains voltage yourself, carry out the steps in the following commissioning description.

5.2.2 Commissioning

For the commissioning, we refer you to the commissioning instructions provided by the manufacturer of your magnetic vibrator.



Life-threatening voltages! Take appropriate measures (cover voltage-carrying components) to prevent accidents. Observe the special requirements specified by the employer's liability insurance association!

We recommend the procedure described below. This procedure should be in agreement with that provided in the manual of the third party device.

☞ Prerequisites: is the installation of the working unit and of the magnetic vibrator as well as the wiring of the controller completed?



It is beyond the scope of this operating manual to predict the behaviour of vibration devices used with magnetic vibrators and/or working units which were not supplied by AViTEQ Vibrationstechnik. If necessary, contact the third party manufacturer! AViTEQ Vibrationstechnik is not responsible for the proper function of the AViTEQ controller when used together with vibration conveyor devices produced by third party manufacturers!

☞ The commissioning must be performed with the smallest working stroke: turn the vibration-width adjuster (potentiometer) of the controller to the scale value "0". Or: with external control inputs (0...10 V, 4...20 mA or 0...20 mA) apply the smallest control input. Now switch on the controller!



Commissioning is performed using small working strokes in order to be able to detect problems in the vibration behaviour of the entire vibration conveyor device, which at this point is still unknown. Damages caused by installation errors can, therefore, be detected in good time. Example: collision of the working unit with adjacent conveyance components or collision mode.

☞ Take note of *hammering* noises! These can occur during *collision mode* and lead to the destruction of the drive.

☞ During collision mode, reduce the working stroke by reducing the nominal value specification (turn the potentiometer to the left or reduce the external extraneous desired value) until the hammering noise subsides. Turn the trimming potentiometer R1 at the top of the front plate approx. 10° counter clockwise to reduce the vibrator voltage.

☞ Increase the working stroke by stepwise turning the vibration-width adjuster (potentiometer) or by increasing the external control input until the maximum value (right limit or scale value "10" on the vibration-width adjuster or maximum extraneous desired value) is reached.



Even if the maximum position of the potentiometer (scale end value "10") is not used later in actual operation, you should test this position as well during commissioning to ensure that the vibration conveyor device operates cleanly at its limits.

- ☞ Connect a voltmeter with suitable measuring range (recommended: 750 V AC) to terminals 3 and 4 of the controller. When using a digital voltmeter, select the maximum measuring range (750 V or 1,000 V).



Life-threatening voltages! Take appropriate measures (cover voltage-carrying components) to prevent accidents. Observe the special requirements specified by the employer's liability insurance association!



Use only an RMS responsive meter when measuring the voltage (iron-vane instrument or "True RMS"). Other measurement instruments cannot measure non-sinusoidal values correctly. When using a digital voltmeter, select a measuring range ≥ 750 V to avoid false measurements resulting from the Crest factor!

- ☞ Compare the measured vibrator voltage to the values specified by the manufacturer of the magnetic vibrator; if necessary, use the trimming potentiometer R1, located on top of the front panel.



The maximum permissible vibrator voltage is to be set while using the maximum command value. To do this, turn the vibration-width adjuster to the right-hand stop (dial value "10") or, if using an external control input, set the maximum value.

- ☞ If the specified vibrator voltage value cannot be set due to hammering noises, switch off the device and refer to Chapter 7 (Troubleshooting).



Collision mode leads to the destruction of the magnetic vibrator! Therefore, avoid long periods of operation in collision mode while setting the vibrator voltage!

- ☞ Use an iron-vane meter or one which is True-RMS in the frequency range from 0 to 500 Hz and compare the values with those specified by the manufacturer for the vibration conveyor device being used!



Use only an RMS responsive meter when measuring the current (iron-vane or "True RMS" instrument for 0-500 Hz). Other measurement instruments with a measuring range not equal to 0-500 Hz (without DC) cannot measure non-sinusoidal values correctly.



Electrically live components! Risk of lethal electrical shock while connected to mains. When carrying out the following measurements, observe the specified protective measures!

- ☞ In addition, measure the maximum working stroke and compare the value with the data provided by the manufacturer for the vibration device being used.
- ☞ The permissible values for vibrator current and voltage specified on the type plate must not be exceeded! There is otherwise a risk of the aforementioned destructive collision mode or of overheating of the magnetic system!
- ☞ If the working stroke specified by the manufacturer cannot be reached, check the natural frequency of the vibration device, if applicable.

6 Maintenance

Check for Soiling

In general, all models of the AViTEQ controllers are maintenance free. In dusty environments, however, dust can penetrate and collect. This can result in deterioration of the cooling system for the control electronics and short circuits as a result of soiled strip conductors.

We therefore recommend regularly checking for soiling and cleaning as necessary:

- ☞ Has dust penetrated? Determine the cause so that measures can be taken to avoid the problem in the future! Clean the controller by vacuuming the dust layer, e.g. with an industrial vacuum cleaner.
- ☞ Check to see if the perforated plate in the housing has been plugged with dust! Clean the controller by vacuuming the dust layer, e.g. with an industrial vacuum cleaner.
- ☞ Depending on the amount of dust in the environment surrounding the controller, a suitable cleaning interval is to be set.



NOTE



DANGER!



DANGER!

When cleaning with compressed air, note the in-house regulations regarding the raising of dust!

Raised dust can mix with air and form explosive dust-air mixtures. Take appropriate measures to eliminate the risk of explosions!

When connected to mains, dangerously high voltages are present inside the controller. Touching electrically live components can be lethal! Before cleaning the controller, switch off the current supply and protect against unintentional switching on, i.e. by colleagues! Protect yourself from accidental contact with nearby electrically live components or component groups!

7 Troubleshooting

7.1 Repairs

The controller contains no components which can be serviced or repaired by the assembler or user. Do not open the units - send them to AVITEQ Vibrationstechnik GmbH, D-65795 Hattersheim-Eddersheim if there is a fault.



When connected to mains, dangerously high voltages are present inside the controller and inside the magnetic drive. Touching electrically live components can be lethal! Before switching on mains power, ensure that no live parts can be touched.

7.2 Fault Causes and Remedy



Disassembling the controller is life-threatening and may result in damage to the device! There are no components within the device which can be maintained or repaired by the user! Do not attempt to make any repairs yourself! Never disassemble the controller, not even if the power is disconnected! In the event of device malfunction, ship the entire device to AVITEQ Vibrationstechnik, D-65795 Hattersheim-Eddersheim, Germany! We will see to the fastest repair possible!

In the following table you will find information regarding possible faults which could occur during installation or during operation. Consult us, however, prior to performing error rectification measures!



The problems listed below refer to the controller. Further faults, caused by the working unit or the magnetic vibrator, can be found in the appropriate operating manual.

	Faults	Cause(s)	Remedies
1	Vibration conveyor device does not function.	No mains voltage. No LEDs light up.	Correct fault source, check fuse(s)
		Mains fuse blown. No LEDs light up.	Replace fuse, check current consumption if necessary
		Supply line interrupted. No LEDs light up.	Determine cause and replace supply line
		Full mains voltage present at terminals 3 and 4 (identical to voltage at terminals 1 and 2). Magnetic vibrator is not connected or supply line interrupted. Thyristor short circuit, vibrator hums	Correctly connect magnetic vibrator. Have thyristor changed by AViTEQ Vibrationstechnik
		Defective component(s) in controller (thyristor, supply transformer, board or similar), no voltage at output terminals 3 and 4	Repair required send controller to AViTEQ Vibrationstechnik.
		Vibration-width adjuster (potentiometer) or its lines are defective	Replace vibration-width adjuster or its lines, consult with AViTEQ Vibrationstechnik if necessary
		Terminals 12 and 13 are not connected with a bridge.	Check switch (relay) or optical coupler, if installed, or install bridge; or connect the terminals with a switch (relay) or an optical coupler.
		Signal line(s) interrupted	Replace signal line(s)
2	Vibration conveyor capacity too low	False controller selected	Connect correct controller, check AViTEQ Vibrationstechnik delivery information
		Voltage at controller output (terminals 3 and 4) too low	Check mains voltage and controller setting. Check magnetic vibrator and controller voltage details; if necessary, increase vibrator voltage at trimming potentiometer R1 or consult with AViTEQ Vibrationstechnik.
		Voltage at vibrator input too low	Supply line too long (... high resistivity), change supply line (length, cross section), consult with AViTEQ Vibrationstechnik if necessary
		Deviation from nominal frequency at in-house current supply	Re-tuning is necessary; consult with AViTEQ Vibrationstechnik
		Potentiometer not connected (terminals 5, 6 and 7), no external control input present	Connect potentiometer or external control input
		Controller delivers false drive frequency; as a result the vibrator current I_v is too high and the fuse can blow.	Repair or readjustment necessary. Send controller to AViTEQ Vibrationstechnik.

Table 7-a
Fault Causes and Remedies

	Faults	Cause(s)	Remedies
3	Magnetic vibrator operates in collision mode (hammering noise)	Vibrator voltage too high	Check mains voltage and controller setting. Check magnetic vibrator and controller voltage details; if necessary, reduce vibrator voltage at trimming potentiometer R1 or consult with AViTEQ Vibrationstechnik.
		Deviation from nominal frequency at in-house current supply	Re-tuning is necessary; consult with AViTEQ Vibrationstechnik
		False controller selected false vibration frequency set	Connect correct controller, check AViTEQ Vibrationstechnik delivery information
4	Magnetic vibrator functions independently of potentiometer setting with max. working stroke	Signal line at terminal 5 is interrupted	Check and replace signal line
5	At potentiometer settings 0 to approx. 9, magnetic vibrator functions only with minimal working stroke	Potentiometer improperly connected (connected as series resistor)	Correctly connect potentiometer

Table 7-a (cont.)
Fault Causes and Remedies

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EU Declaration of Conformity

Manufacturer:

AViTEQ Vibrationstechnik GmbH
Im Gotthelf 16
D-65795 Hattersheim-Eddersheim

Product description:

Controllers for magnetic vibrators

Device types:

SC...-2, SCE...-2

The products of the specified type series are in conformance with the following European directives:

89/336/EWG Directive of the Council for Conformity of Legal Regulations of Member States regarding Electromagnetic Compatibility, updated by 91/263/EWG, 92/31/EWG and 93/68/EWG

The conformity of the product with the European directives is proven by the complete compliance with the following harmonised standards:

DIN EN 50081-2

DIN EN 50082-2

Full technical documentation is available. The operating manual for the devices is in hand. The CE symbol has been included.

The safety notes in the operating manual supplied must be observed!

This declaration certifies conformance with the specified standards and directives. It does not, however, include a guarantee of characteristics.

Hattersheim-Eddersheim, 01. October 2002

Legally binding signature:




Nickmann

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