REO
ELEKTRONIK

Operating Instructions

REOVIB MTS 597

Single Phase Power Controller for Vibratory Feeders

REOVIB
FOR VIBRATORY FEEDER SYSTEMS

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Technical Safety Information for the User

This description contains the necessary information for the correct application of the product described below. It is intended for use by technically qualified personal.

Qualified personnel are persons who, because of their training, experience and position as well as their knowledge of appropriate standards, regulations, health and safety requirements and working conditions, are authorised to be responsible for the safety of the equipment, at all times, whilst carrying out their normal duties and are therefore aware of, and can report, possible hazards (Definition of qualified employees according to IEC 364)

Safety Instructions

The following instructions are provided for the personal safety of operators and also for the protection of the described product and connected equipment.

Warning!
Hazardous Voltage
Failure to observe can kill, cause serious injury or damage

- Isolate from mains before installation or dismantling work, as well as for fuse changes or post installation modifications.
- Observe the prescribed accident prevention and safety rules for the specific application.
- Before putting into operation check if the rated voltage for the unit conforms with the local supply voltage.
- Emergency stop devices must be provided for all applications. Operation of the emergency stop must inhibit any further uncontrolled operation.
- **Electrical connections must be covered**
- **The earth connection must be checked, for correct function, after installation.**
- **After switching off the unit, some internal components will still be charged due to capacitance.**
- **Before opening the unit wait at least five minutes to allow capacitors to discharge.**

Specified Use

The units described herein are electrical controllers for installation in industrial plant.
They are designed for power adjustment on vibratory feed equipment.

The units conform to the directive 89/336/EWG EMC-Directive CE

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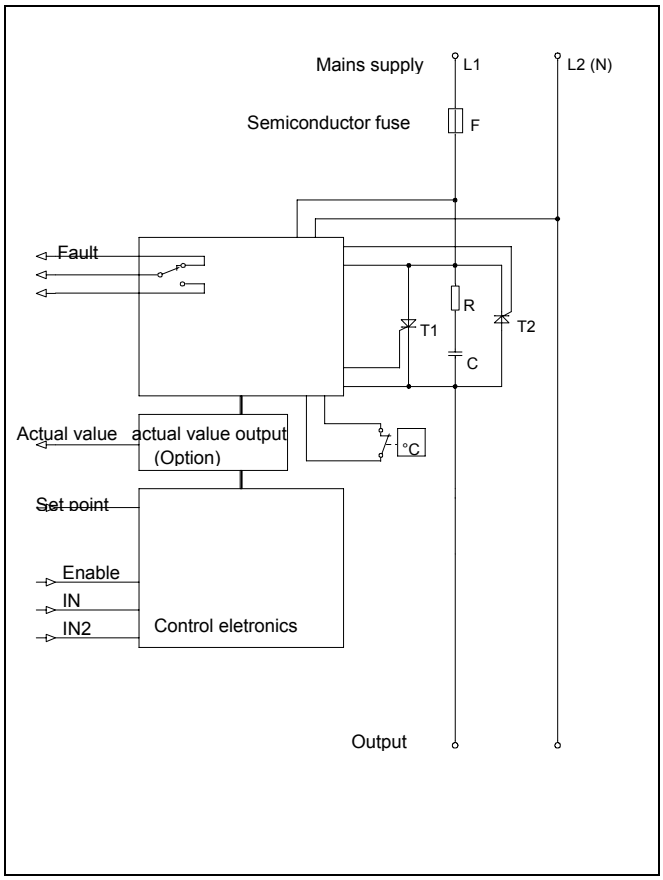
1.0 General

The range of REOVIB MTS 597 thyristor controllers are microprocessor based units for controlling the power to vibratory feeder drives. In essence the units comprise inverse parallel connected power semidconductors (thyristors) and the control and regulation electronics. The units have a regulated AC-output. The inverse parallel connected thyristors operate using the phase angle control principle.
Normally, the units operate as a voltage regulator, i.e. the mean value of the output voltage is internally fed back, compared with the set point, and the output regulated accordingly. Mains variations in the range of +/- 10 %, in a way, have no influence on the feeder throughput (+/- 2 %). Though, it is also possible to operate the unit with an amplitude sensor or accelerometer, which enables to detect variations in the supply voltage as well as changes of the mass ratio in the feeder and to control these deviations from the regulator.

It is possible to produce fix vibrating frequencies of 100, 50, 33 1/3, 25, 20, 16 2/3, 14 2/7 and 12 ½ Hz (see table on page 8). The different frequencies are generated by extracting the mains half waves. The vibrating frequency is adjusted using DIP switches in the front panel.

2.0 Function description



The required feeder throughput of the feeder is externally given over a set point. This can be provided by a potentiometer, a signal voltage 0-10 V,DC or a control current 0-20 mA (4-20 mA). This set point signal can be evaluated by a trimming potentiometer so that it will be adapted to the operation characteristics of the feeder (minimum/maximum feeder throughput). Now this processed set point signal is compared with the actual value signal fed back (output voltage or amplitude signal), and a corresponding difference is produced. This difference signal (regulating deviation) is used to determine the point of time for firing the thyristors.
The firing pulses generated in this way, are, galvanically separated, conducted to the thyristors over a firing transducer.
An enable input is provided for power-free ON/OFF switching of the unit. For applications involving excessive switching (stepping or regulating operations) this method is recommended instead of switching mains. This enable input must be linked if it is not used. Thermal switches are provided for thermal overload protection of the units which are steadily switched off in case of excessive temperature. In case of trouble, ie. overtemperature an error message is given from an internal relay (relay switches in case of trouble). With an option, the actual value of the feeder throughput, for example for a monitoring measuring instrument, can be edited (0-10 V, DC).
A semiconductor fuse is provided for short-circuit protection of the unit output during the controlled phase.

2.1 Control Inputs and Outputs

Control Inputs

Setpoint Input	0(4)...20 mA, 0-10V DC or Potentiometer 10kΩ
Enable	12-24V DC or contacts
Actual value input	Input for an accelerometer eg. REOVIB SW 02 fixed on vibratory feeder

Outputs:

Actual value	0-10V DC corresponding to 0-100% (Option)
Fault Indication	Relay Contact 250V/1A (Change over)

Setpoint Input

The value of the output voltage is determined by the setpoint input. The setpoint can be provided in the form of 0-10 V, 0-20mA, (4-20 mA) DC or with a 10kΩ potentiometer. A +10V reference voltage is provided for potentiometer operation.

Fault Indication

Relay changeover contacts are provided for indicating that there has been a unit fault.
The following fault conditions energise the relay and cause the unit to switch off:

Over temperature of the power unit
Mains synchronisation not possible

A fault condition must be cancelled with the RESET push button.

3.0 Construction

The thyristor regulator unit is a completely wired, function tested, compact unit. The unit is designed for panel mounting. The connections for the mains supply and load are brought out to screw terminals and the control signals to plug-in screw terminals. The unit front panel incorporates the adjustment components (trimmers, switch and light diodes) to display and control the operating conditions.
The fuses for protecting the semiconductors is built into the front panel are accessed by removing the front panel. (for units up to 10 A, fuse holders are mounted in the front panel).

4.0 Settings

The following parameters can be adjusted on the unit:-

Umax - Maximum Output Voltage Umin - Minimum Output Voltage

Amax - Maximum Amplitude Amin - Minimum Amplitude

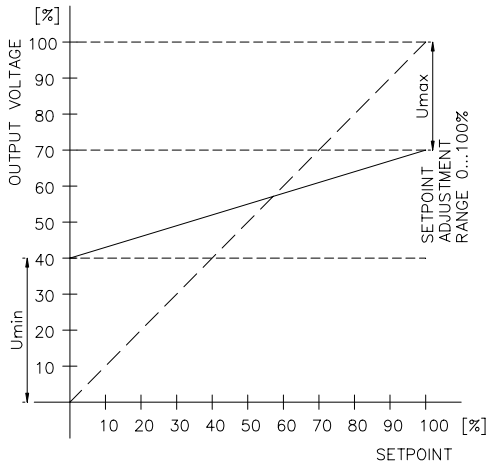
Ramp up time Ramp down time

P - Characteristic of the Regulator

The trimmers are adjustable through the front panel.

5.0 Adjustment Instructions

Preparatory Steps
Connect unit according to connection drawing, disconnect the enable and adjust set point to zero. The unit will now operate with the basic factory settings. The setpoint control curve can be determined by using trimmers Umin/Umax and Imin/Imax ie the setpoint control range. At this stage, it is also possible, to make permanent adjustments, without external setpoints.
The range minimum always extends from zero to the adjusted range maximum. The maximum value must be set first.



Adjustment of the MAX – Throughput Power without accelerometer (Umax)

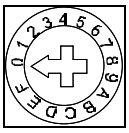
Hint: If the output voltage is to be regulated at the maximum set point, then the maximum output voltage must be limited at a value which reduces the regulation range.
Switch on the mains voltage and enable the unit. Now increase the voltage set point until the required output voltage level is reached. If the set point source is not yet at maximum, then the output voltage must be reduced again by using trimmer Umax and then the voltage set point can be further increased until the maximum value of the voltage set point is achieved. If there is no risk of damaging the load with an over voltage then the output voltage can be set by using trimmer Umax with the set point turned fully up. Anticlockwise adjustment increases the output voltage.

Adjustment of the MAX – Throughput Power with accelerometer (Amax)

Switch on the mains voltage and enable the unit. Now increase the setpoint until the required amplitude is reached. If the set point source is not yet at maximum, the amplitude must be reduced again by using trimmer Amax and then the voltage setpoint can be further increased unitl the maximum value of the setpoint is achieved. If there is no risk of damaging the load with mechanical buffering then the required amplitude can be set by using trimmer Amax with the setpoint turned fully up.
Anticlockwise adjustment increases the amplitude.

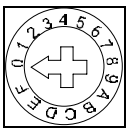
Adjustment of the MIN - Throughput Power without accelerometer (Umin)

Trimmers P1 and P2 are used to adjust the MIN value, however these trimmers are used for various other functions. Below is the recommended adjustment procedure.



Set rotary switch 'S2' on the front panel to position '1' and press the RESET button. Next adjust the trimmers P1 (coarse) and P2 (fine) to the required minimum voltage and afterwards press the SETUP button. Now further adjustments can be made eg. ramp-up time, or put the rotary switch 'S2' back to '0' and press the RESET button.

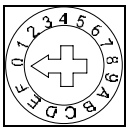
Adjustment of the MIN - Throughput Power with accelerometer (Amin)



This adjustment is also carried out by using trimmers P1 and P2. Set rotary switch 'S2' on the front panel to position '1' and press the RESET button. Next adjust the trimmers P1 (coarse) and P2 (fine) to the required minimum amplitude and afterwards press the SETUP button. Now further adjustments can be made eg. ramp-up time, or put the rotary switch 'S2' back to '0' and press the RESET button.

Ramp up /down times

The ramp up time for when the unit is switched on, using the enable input (set point 100%) or when the set point suddenly rises, giving 0 to 100% of the maximum output value, and also the run down time to reach an output value for a set point change in the direction of zero.
This adjustment is similarly achieved using the trimmer P1 for Ramp up and P2 for Ramp down times.
With the voltage set point at zero and the current set point at maximum.



Set rotary switch 'S2' on the front panel to position '3' and press the RESET button. Next set the required ramp time using trimmer P1 and test for a set point change from zero to 100%; afterwards set the ramp down time with trimmer P2 and again test by changing the set point. When the required values have been chosen, once again press the "SETUP" button, return rotary switch 'S2' back to '0' and press the RESET button.

P-Part Regulator (P3)

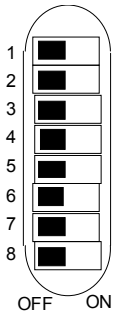
The speed of regulation (sensitivity) of the voltage resp. amplitude to regulator. Adjust, the actual load, using trimmer P3.

Actual value fault value (Pu)

This value is relevant only in the operating mode with accelerometer. This trimmer is used to adjust the throughput power used to operate the feeder system in case of missing feedback signal (eg. broken wire, sensor failure etc.)

Hint
To return the unit to the factory settings, the procedure is as follows:-
Rotate selector switch "S2" to position "F" and press the RESET button. Afterwards press the SETUP button and return selector switch "S2" to position "0" and press the RESET button once more. The factory settings are now reinstated.

Selector Switch S1 (Operating Mode)



S1/1
S1/2 | Vibrating frequency
S1/3
S1/4 Reserved
S1/5 ON = Setpoint signal 4...20mA OFF = 0 - 20 mA/ OFF = Poti 10 kΩ/ OFF = 0 - 10 V, DC
S1/6 ON = Amplitude Feedback OFF = Voltage feedback
S1/7 Reserved
S1/8 ON = INTERBUS-S-Interface OFF = without interface

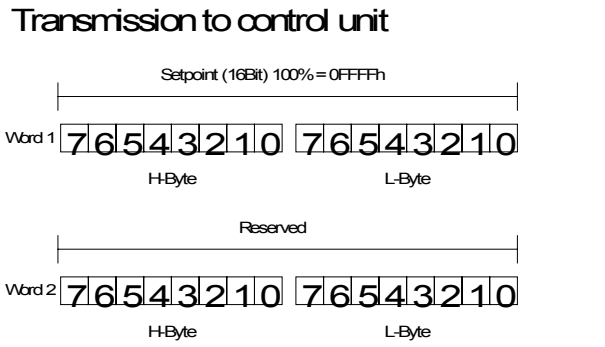
The RESET button must be pressed before a change of the switch settings.

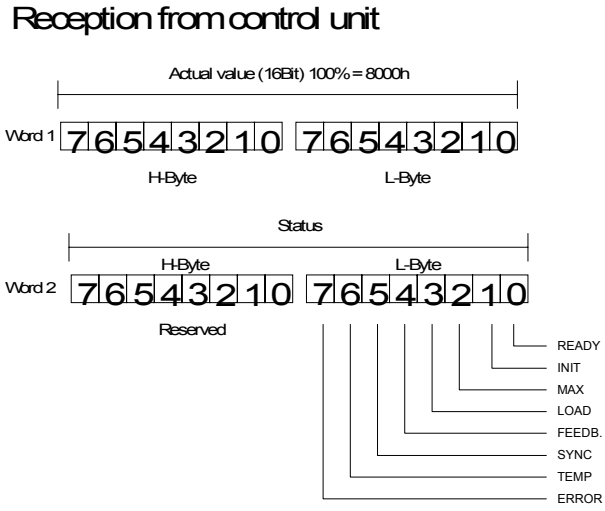
6.0 INTERBUS-S-Interface (Option)

To activate the INTERBUS-S Interface the switch S1/8 must be in position „ON“. The RESET button must be pressed before a change of the switch settings.

Hints on programming

The file words hold within a SPC two successive words:





7.0 Guidelines on Electromagnetic Interference

INTERBUS-S is a serial data transfer system which was conceived for applications in an industrial environment. When correctly installed, INTERBUS-S complies with all the requirements specified in the standard IEC 801 for data transfer systems in a harsh industrial environment. When the interface module is used in an electromagnetic, interference prone, area, then the possible sources of interference should be suppressed.
Interference can be due, in particular, to:

- Contactors
- Switching of inductive loads
- Solenoid valves

RC networks and varistors suppress interference. Manufacturers supply correctly sized components for suppressing solenoid coils.
Electrical spikes, which can affect bus cables in an industrial environment, can be suppressed by a correctly fitted screen. The following measures provide the best screening results:

- Cover fixing screws of bus cable plugs and conductors at equal potentials.
- Only use connectors with a metal or metalised housing.
- Spread out the screen in connectors.
- Put screen on both sides.
- Strap screen with low impedance to an equal potential.

8.0 Technical Data

Type	Rated voltage	Output voltage[1)]	Output current
REOVIB MTS 10/230	230V +6% -10%	0-230 V	10 A
REOVIB MTS 10/400	400V +6% -10%	0-400 V	10 A
REOVIB MTS 20/230	230V +6% -10%	0-230 V	20 A
REOVIB MTS 20/400	400V +6% -10%	0-400 V	20 A
REOVIB MTS 50/230	230V +6% -10%	0-230 V	50 A
REOVIB MTS 50/400	400V +6% -10%	0-400 V	50 A

Set point source 10 kΩ Potentiometer
0-10 V, DC
0-20 mA (4-20 mA)
Enable 12-24 V, DC
Switch
Fault relays 1 change-over contacter 250 V, 1 A
Max. ambient temperature 0-45 °C

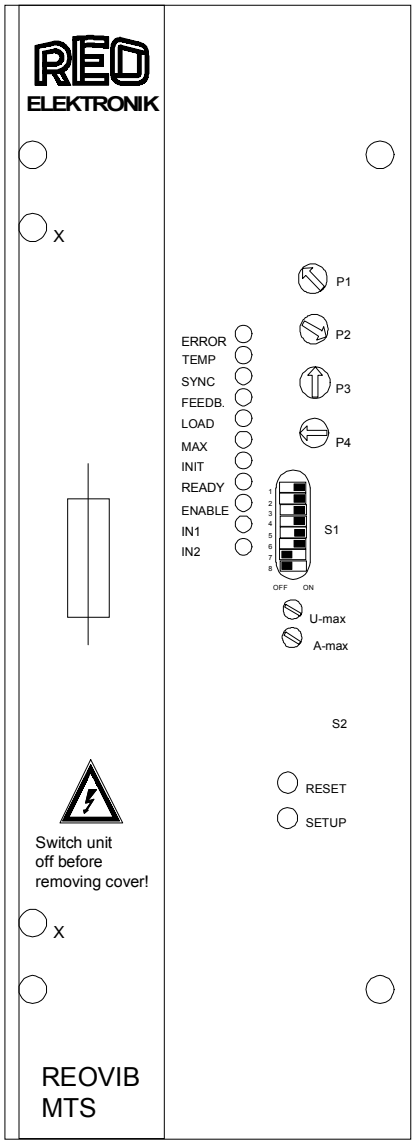
1) As consequence of different vibrating frequencies and inductancies of the consumers, the output voltage depends on load.

9.0 Ordering codes

REOVIB MTS 10/230	ID-Number 5975
REOVIB MTS 10/400	ID-Number 5974
REOVIB MTS 20/230	ID-Number 5972
REOVIB MTS 20/400	ID-Number 5971
REOVIB MTS 50/230	ID-Number 5977
REOVIB MTS 50/400	ID-Number 5976

10.0 Operating elements

Front panel view



S2	S2=1	S2=1	S2=3
P1 = Umin/coarse		Amin/coarse	ramp-up time
P2 = Umin/fine		Amin/fine	ramp-down time
P3 = P-portion regulator			
P4 = Actual value fault value			

Selector switch S1

S1/1 -
S1/2 - Vibrating frequency
S1/3 -
S1/4 - Reserved
S1/5 - Set point 4...20mA S1/5 =ON
S1/6 - Voltage / amplitude feedback
S1/7 - Reserved
S1/8 - INTERBUS-S (Option)

S1/6-OFF=U/ON=A

S1

1	2	3	Hz
OFF	OFF	OFF	100
ON	OFF	OFF	50
OFF	ON	OFF	33 1/3
ON	ON	OFF	25
OFF	OFF	ON	20
ON	OFF	ON	16 2/3
OFF	ON	ON	14 2/7
ON	ON	ON	12 1/2

Selector switch S2
0 = Normal operation (Regulator)
1 = Adjustment Umin/Amin
2 = Reserved
3 = Adjustment ramp up/down times
4 = Reserved
5 = Uncontrolled operation (no regulation/no current limiting)
6-E = Reserved
F = Reinstate factory settings

Fuse change

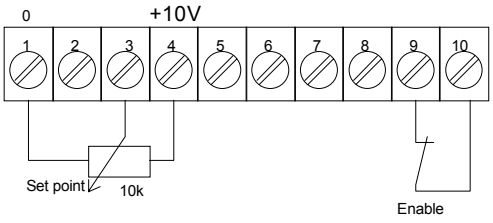
Switch unit off before changing fuse!

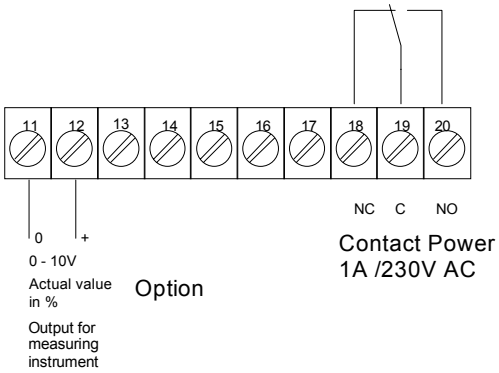
The semiconductor fuse can be found in the left hand section of the front panel.
To change the fuse the two screws marked "X" must be loosened.
The cover can then be removed by sliding it to the right.
For REOVIB 10/xxx type units the fuse holder can be found in the frontpanel.

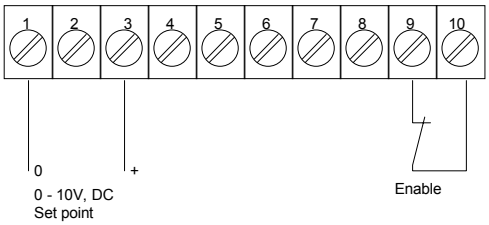
11.0 Connection Diagrams

Internal fault relay

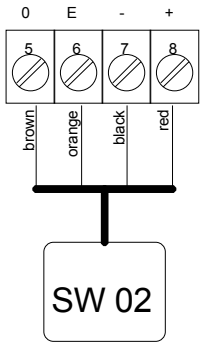
Control Terminals

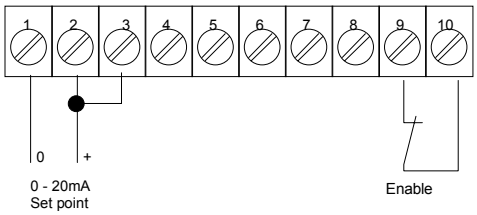




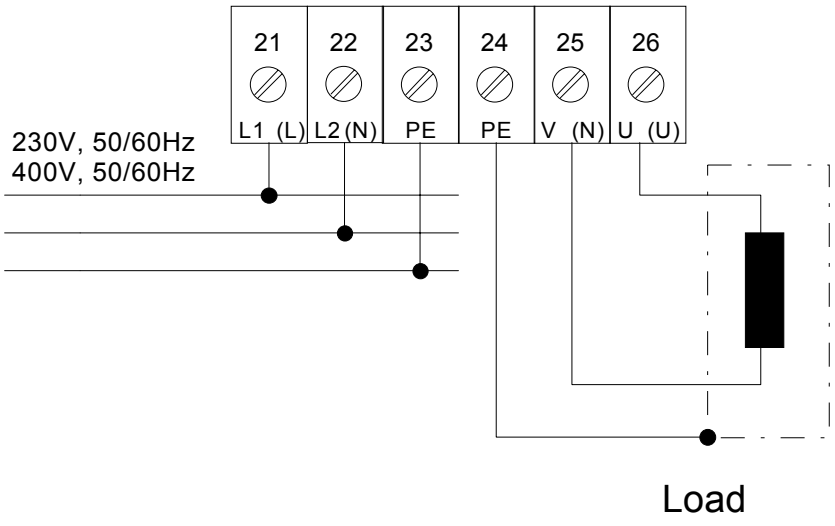


Connection of an accelerometer

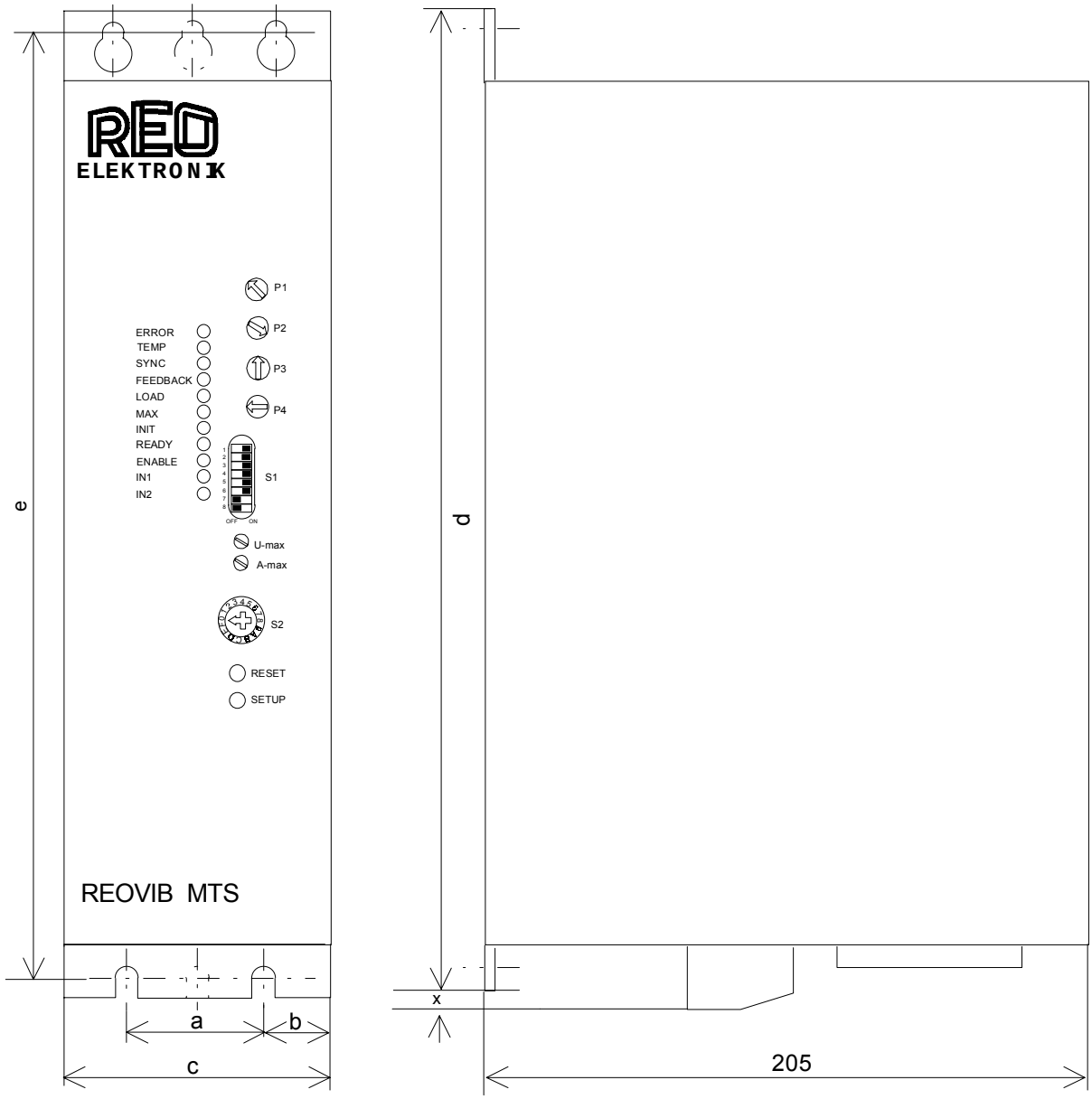




Power terminals



12.0 Dimensions



Dimensions	REOVIB MTS 10/xxx	REOVIB MTS 50/xxx
a	-	60
b	35	15
c	70	110
d	290	290
e	280	280
x	-	5