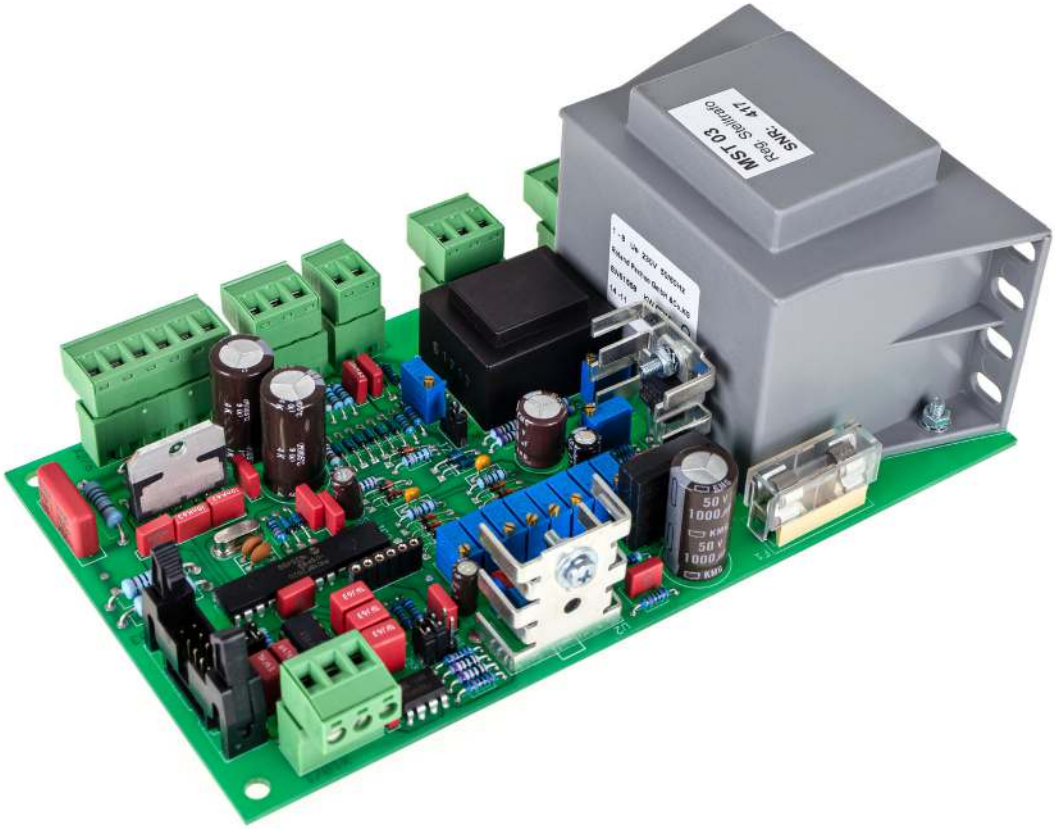
Microprocessor-controlled motor Controller
For precise control of motor-driven variable transformers with DC motors up to 30 W

Datasheet
Variable Transformer Control Unit MST03

Art.-Nr.: 9578



1. Special Features

The motor controller MST03 can process either AC voltage feedback values (sine wave) or DC voltage feedback values. Switching between the two is done by setting jumper J2 and additionally via a software configuration. AC voltage sensing is performed using a measuring transformer (galvanically isolated). Fine adjustment of the AC feedback detection is done via potentiometer R26. DC voltage sensing for 0–10 V is performed without galvanic isolation or rectification. Fine adjustment of the DC feedback detection is done via potentiometer R23.

The speed and direction of the connected actuator motor are controlled via an H-bridge. Maximum current: I_peak = 5 A. The supply voltage for the DC actuator motor can be either 24 VDC or 12 VDC.

The setpoint can be specified via PC using an RS232 interface or via an external 10 kΩ potentiometer (0–10 V input) connected to X5.

The motor controller includes end-position switch detection, which is connected to the limit switches of the variac (variable transformer).

Further adjustments can be made using potentiometers R60–R67:

- Define the control zone size
- Voltage deviation (hysteresis)
- Motor speeds inside and outside the control zone
- Define the control amplitude
- Adjustable limit for maximum voltage
- A jitter pulse to prevent the wiper contacts from sticking
- Wire break protection: variac moves to either 0 V or maximum voltage

All settings can be monitored via the display.

2. Technical Data

2.1 Input Parameters

Supply voltage	230 V~ ± 10%
Frequency	50…60 Hz
Current consumption	≈ 300 mA
Reference values for voltage	0…10,0 V
AC feedback value	max. 400 V~ (galvanically isolated)
DC feedback value	0 - 10 V (not galvanically isolated)
Limit switch detection	
RS232 interface	Connection to PC interface Configuration of all key parameters via software

2.2 Output Parameters

Motor connection X2.5 + and X2.6 -	12 VDC or 24 VDC max. 30 W Ipeak = 5 A
RS232 interface	HyperTerminal protocol Factory setting: 9600 baud

2.3 Physical Data

W × D × H	180 x 100 x 65 mm (without mounting bolts) 180 x 100 x 80 mm (with mounting bolts)
Mounting	M4×15 mounting bolts on circuit board or on transformer (slotted holes)
Weight	1350 g
Ambient temperature	0° C... + 55° C

3. Electrical Function

3.1 General Information

The following adjustment options are available:

- **R23** = Adjustment of DC voltage feedback value (calibration)
- **R26** = Adjustment of AC voltage feedback value (calibration)

The following values can be read on the display under the “Potis” menu:

- **R65** = Motor speed faster and slower (high-speed mode)

Different motor speeds within the control zone (actual value range around the setpoint) are possible:

- **R60** = Upward speed within the hysteresis.
- **R61** = Downward speed within the hysteresis.
- **R62** = Voltage deviation (hysteresis)
  (Outside this zone, the motor runs at full speed; between hysteresis and control zone, at normal speed)
- **R63** = Control zone (range around the setpoint considered acceptable; within this range, the system attempts to maintain the value precisely using jitter pulses))
- **R64** = Maximum variac voltage (sets the upper voltage limit)

To prevent the variac’s contacts from sticking due to current, the motor controller periodically emits a small jitter pulse.

This jitter pulse can also be disabled (set to 0) using the potentiometers:.

- **R66** = Jitter pulse power (pulse strength)
- **R67** = Jitter pulse frequency (repetition rate)

230 V~ power supply connects to X1

For AC regulation, connect the AC feedback signal to X3.1 and X3.3; set J2 to AC

For DC regulation, connect the DC feedback signal to X4.1 (+) and X4.2 (GND); set J2 to DC

The AC/DC mode must also be changed in the software via PC.

PC is connected to the RS232 interface, or if manual control is desired, a 10 kΩ potentiometer can be connected to X5.1 (10.00 V reference) and X5.3 (GND), with the wiper connected to X5.2 (control input).

The upper limit switch is connected to X2.1 and X2.2.
The lower limit switch is connected to X2.3 and X2.4.

The actuator motor (DC motor) is connected to X2.5 + and X2.6 GND.

3.2 Function

The motor controller MST03 creates several zones within the control system:

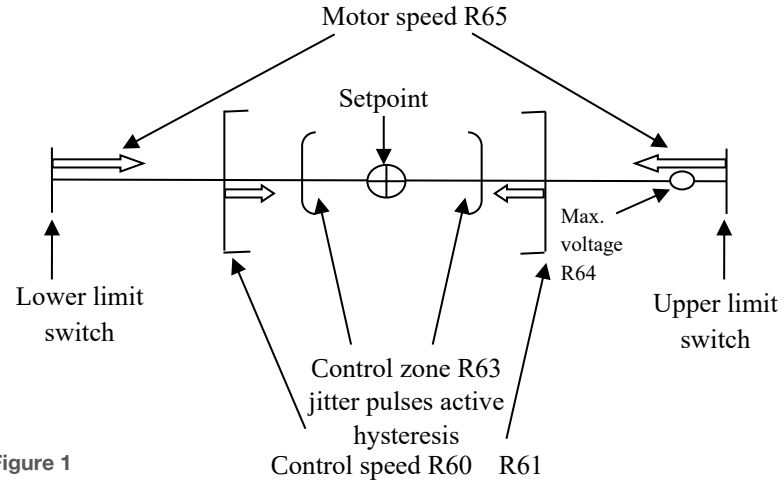


Figure 1

Commissioning:

Since R63, R60, and R61 are set to the far left at delivery, the motor does not rotate when a setpoint is applied.

After setting the maximum setpoint voltage at X5 using potentiometer R4 to 10.00 V (see above), the high-speed mode should be adjusted to the desired speed. This speed applies outside the zone set by potentiometer R63 (currently ±0 V) around the setpoint.

Next, the maximum actual value voltage should be set. Potentiometer R64 (Umax) should remain at cw = 100%, so that the corresponding maximum actual voltage at the variac can be set using R26 for AC feedback values (range from approx. 90 V~ at cw to approx. 400 V~ at ccw). For DC feedback values, adjustment is similar using potentiometer R23. For DC feedback measurement, jumper J2 must be set to DC.

To set the control speed, use potentiometers R60 (forward) and R61 (reverse), and set the hysteresis around the setpoint to maximum.

If the control speed is greater than the high-speed setting, the control speed will also be used outside the zone. With potentiometer R63 turned fully clockwise, the control zone around the setpoint is set to approx. ±2.0 V.

The hysteresis is adjusted using R62. A deviation from 0 V at ccw to XX V at cw is possible.

Jitter pulse:

The jitter pulse consists of a pulse chain and can be adjusted in its power (pulse width) via potentiometer R66 and in its frequency (pause between pulse chains) via potentiometer R67.

The frequency is highest, meaning the time is shortest, when potentiometer R67 is turned fully counterclockwise (approx. 500 ms between pulse chains). In the opposite direction (clockwise), times of >1 min are achieved.

The pulse power is adjusted via potentiometer R66 from ccw clockwise so that the actuator arm moves minimally (adapted to the motor). If the pulse power is too high, the actuator arm moves too far and repeatedly overshoots the setpoint.

This setting should be made at the shortest pulse pause time (R67 ccw). Then increase the pause time so that after regulation, the jitter pulse prevents the contacts between actuator arm and winding from sticking.

RS-232 interface:

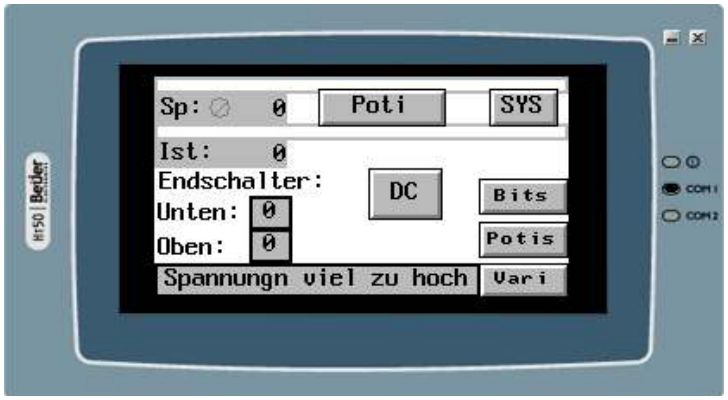
At socket X50, an RS-232 connection with Modbus protocol can be established via a plug adapter (10-pin connector to 9-pin D-sub).

- 8 data bits
- 1 stop bit
- no parity check
- baud rate 19200

The RS-232 interface operates without hardware handshake.

A corresponding HMI panel can be purchased separately.

The three menu screens of the HMI:



Status display in the terminal

Window “Bits”: The framed bits can be set or cleared by clicking on them.

Window Potis: Here, the values of the corresponding potentiometers can be displayed and thus easily and transparently adjusted.

4. Connection Diagram

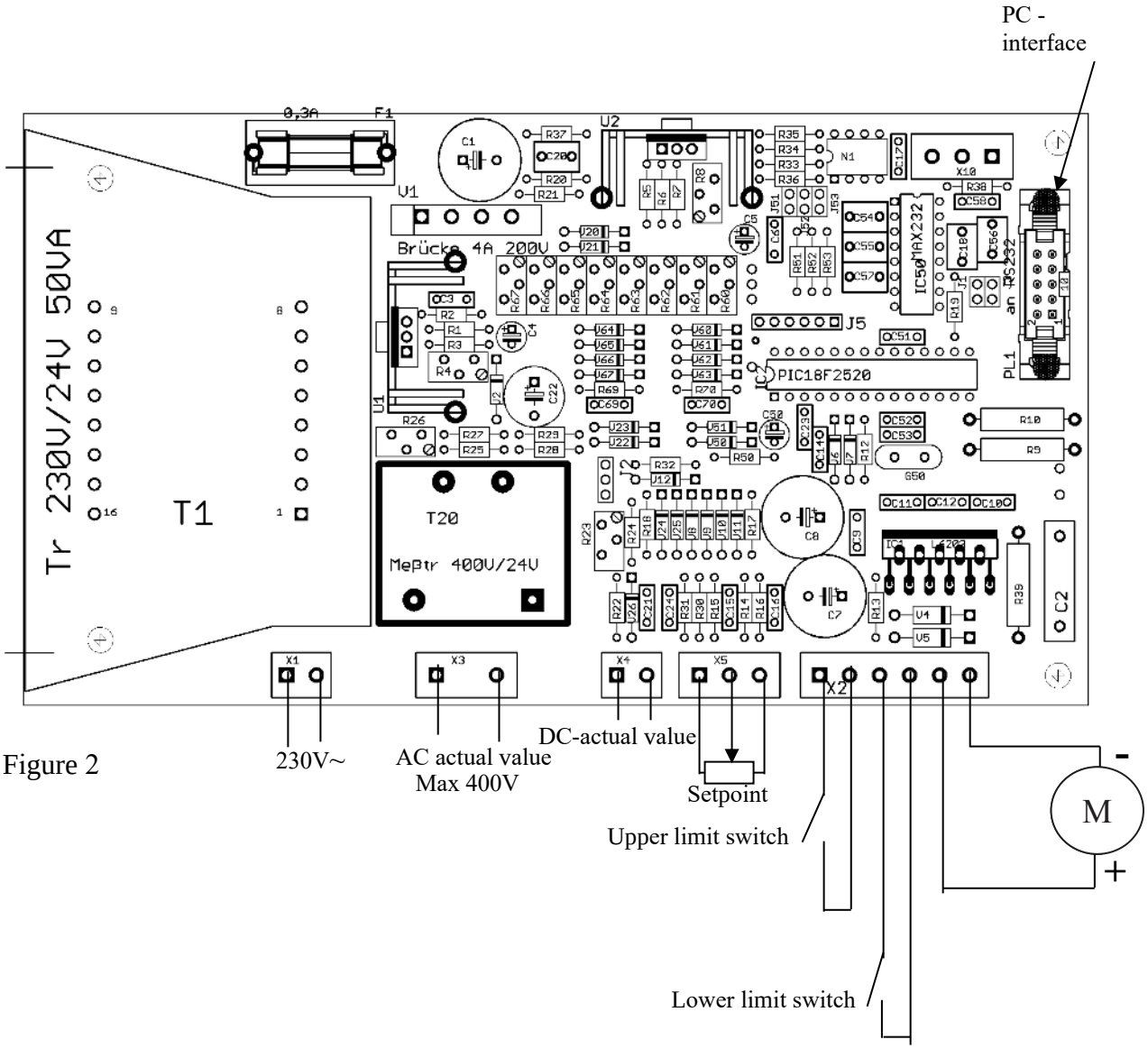


Figure 2