TA-15/6P...200/6P

Instruction and Operation Manual

Caution:

There is always a risk involved in the handling of electrical machinery!

Therefore mounting and maintenance should only be done by authorized personnel.

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http://www.tae-antriebstechnik.de TA_BA TA-15-200_6P_EN.PDF

The German text applies in cases of doubt

Read these instructions carefully before installation, adjustment and operation of the drive control.

1. Technical Data

Drive Type	TA-15/6P		TA-40/6P		TA-60/6P		TA-100/6P		TA-200/6P	
Line Voltage	230VAC	400VAC	230VAC	400VAC	230VAC	400VAC	230VAC	400VAC	230VAC	400VAC
Power	10KW	15KW	24KW	40KW	35KW	60KW	60KW	100KW	120KW	200KW
Armature Voltage	240V	440V	240V	440V	240V	440V	240V	440V	240V	440V
Armature Current	45A	45A	100A	100A	180A	180A	280A	280A	560A	560A
Field Voltage	155V	270V	155V	270V	155V	270V	155V	270V	155V	270V
Field Current max	4A	4A	4A	4A	10A	10A	10A	10A	10A	10A
Ambient Temp.	0 - 40 °C									
Speed Accuracy	Armature feedback controlled 3% - Tachometer feedback controlled a.c 2% ; d.c 0,5%									

- ❒ Full controlled three phase bridge
- ❒ Field Current control
- ❒ Phase control
- ❒ Blocking control
- ❒ Current Output Impulse controlled
- ❒ Motor-Zero Speed Indicator
- ❒ Current Limit control
- ❒ Tachometer Signal control
- ❒ Electronic circuit galvanically seperated from line when tachometer feedback is utilized

2. Connection of the drive control (refer to connection diagram TA-15/6P...200/6P)

Ensure that your line voltage corresponds to the voltage indicated on the type marking of the unit.

2.1 Terminal Strip KL. 3 (at TA-15/6P KL.3 = KL.1)

L1 - L2 - L3 Three phase a.c. line input and voltage according to type marking on unit. Frequency see the selector switch on the upper printed circuit board.

A+ A- Armature

2.2 Terminal Strip KL. 1

F+ F- Field

Terminal 1 and 9 Drive ON - (Closing contact) (Drive remains switched on until contacts open)

Terminal 4 and 9 Jog Speed ON - (Closing contact) (Drive remains switched on until contacts open)

Terminal 7 and 8 Terminals for contacts of all malfunction signals. (Contacts open in event of fault)

Terminal 2, 5, 6 Speed potentiometer
With this potentiometer the speed is infinite variable from minimum to maximum speed.

Poti-connect: KL. 5 = Beginning
KL. 6 = End
KL. 2 = Connect center

Terminal 13 Current reference signal output

Terminal 18 Current reference signal input

Terminal 13 and 18 For speed control these terminals must be jumpered

Terminal 17 Reference signal (negative) 0-max. 200V
depending on value of resistor R83
General input voltage 0-10V

Terminal 19 and 20 Terminals for connection of a.c. tachometer
Output voltage of tachometer approximately 100-150V at rated motor speed.

- ❒ When tachometer feedback is utilized jumpers I and VII and resistor R82 must be removed.
- ❒ Jumpers IX and X must be installed and jumper VIII must be removed.
- ❒ The adaption of the tachometer signal is achived by changing the value of resistor R91.

Terminal 11 and 20 Terminals for connection of d.c. tachometer

KL. 11 = Negative

KL. 20 = Positive

- ❒ Jumpers IX and X must be removed and jumper VIII must be installed.
- ❒ The adaption of the tachometer signal is achieved by changing the value of resistor R91.

  R91 is calculated as follows:

  R91 in kOhm = tachometer voltage at rated motor speed minus 50

Terminal 22 and 23 Relay contacts (normally open, no potential)
(for operation of auxiliary armature solenoid.)

Terminal 24 and 25 Terminals for quick-stop (normally closed)

Terminal L1 and N Terminals for connection of fan 230V VAC, 50/60Hz at TA-60/6P

2.3 Terminal Strip KL. 2 (Only at TA-40/6P available)

Terminal 3 and 4 Terminals for connection of fan 230V VAC, 50/60Hz

3. Drive control adjustments

Phase ballance	**P1**	Adjustments of the triggering angeles of the individual Thyristors in order to obtain equal currents for all Thyristors. ***Do not adjust.*** (This potentiometer is adjusted and sealed by the manufacturer)
Acceleration rate	**P2**	Adjustment of the linear acceleration time of the motor from min. to max. speed (2-15 sec.)
IxR Compensation	**P3**	This potentiometer enables to compensate for the voltage drop in the armature and in the supply line when armature feedback is utilized. ***When tachometer feedback is used set this potentiometer fully counter clockwise.***
Deceleration	**P4**	Adjustment of the linear deceleration time of the motor (provided: positive torque) from max. to min. speed (adjustable from 2-15 sec.) This potentiometer is only operative when jumper VI is installed or when the reference speed is changed.
Current limit	**P5**	Adjustment of the requested max. armature current. (adjust the nominal motor current)
Minimum Speed	**P6**	Adjustment of min. speed during operation. (set potentiometer fully counter clockwise)
Jog speed	**P7**	Speed adjustment for jog speed
Stability	**P8**	Adjustment for the dynamical adaption to the load.
Maximum speed	**P9**	Adjustment of max. speed during operation. (set potentiometer fully counter clockwise)
Delay time	**P10**	Adjustment of the control relay from approx. 2-10sec. (other delay times on request)

4. Indicators

LED 1	*clear*	Thyristor triggering
LED 2	*green*	Power supply -15V
LED 3	*red*	Indication of malfunction of field, Blocking protection, Phase control, current output control
LED 4	*red*	Triggering pulse fault, Current output control
LED 5	*green*	Power supply +15V
LED 6	*red*	Current limit/Over-speed
LED 7	*yellow*	Jog speed, relay d2
LED 8	*green*	Line voltage
LED 9	*green*	D.C supply ON, drive release
LED 10	*yellow*	Speed control indication (from 10 to 100%), operative only if jumper VI is installed.
LED 11	*yellow*	Operation, relay d1

5. Functional tests and preliminary adjustments before operation

Caution!
Do not use **any** Mega-Ohm-meter, buzzer or similar test instruments.
Test instruments must be galvanically seperated from a.c. line.

5.1 Armature feedback control (UA-controlled)

1) Jumper VI must be installed if a controlled decelaration at drive stop is requested. For **Emergency off** the connection between terminals 24 and 25 must be opened (Quick-stop). The drive will be locked immidiately.

2) Check all connections with an Ohm-meter for grounds.

3) Install jumpers I and VII and also resistor R82 (22 KOhm).

4) Check if line voltage corresponds with voltage indicated on the type marking. Select applicable frequency, 50 Hz or 60 Hz with frequency-switch.

5) Switch on line voltage. The following LED must light up:

   LED 8 *green* Line on

   LED 5 *green* +15V

   LED 2 *green* -15V

   The diodes LED 4 (red) and the six diodes LED 1 (clear) will only light up briefly.

6) Measure field voltage at terminal F+ and F- with a Multimeter (moving coil meter with at least 330 Ohm/Volt) 270V at 400V or 155V at 230V line-voltage. Measure voltage at potentiometer (terminal 5- and 6+) 10 V d.c. Set min. speed potentiometer during this measurement fully counter clockwise.

7) Potentiometer P4 Acceleration time, set in center position

   Potentiometer P2 Deceleration time, set in center position

   Potentiometer P3 IxR Compensation, set fully counter clockwise

   Potentiometer P8 Stability, set in center position

   Potentiometer P7 Jog speed, set fully counter clockwise

   Potentiometer P10 Delay time, set fully clockwise

8) Switch on the drive, LED 11 yellow (Drive on) and LED 9, green (drive release) will light up. When the speed potentiometer is turned in clockwise direction, the armature voltage and the motor speed respectively, will increase. This causes the six clear diodes LED 1 (Thyristor triggering) to light up. Adjust potentiometer P9 (max. speed) for the requested armature voltage/motor speed. Now set speed potentiometer fully counter clockwise, the output voltage must drop back to 0V. Now adjust potentiometer P6 for the requested minimum speed.

9) Switch off drive, Jog speed switch on.(LED 7 and LED 9 will light up). Adjust the requested jog speed with potentiometer P7 (Jog speed).

10) Adjust I x R compensation. Check for an apoprox equal speed with and without motor load in the lower speed range. If the potentiometer is turned in clockwise direction the speed under load will increase.
    If the compensation potentiometer is set too high, the drive will become unstable.

11) Current limit: In order to check the current limit the field must be disconnected, the motor must be blocked and the field control (jumper XI) must be jumpered. Switch on drive and preselect speed and adjust the requested current with P5 (current limit). The red LED 6 (current limit) must light up. This adjustment should be performed with in 10 sec., otherwise the blocking control will become effective. If the adjustment takes longer than 10 sec. and the bolcking control is actuated, press the key TA to confirm the blocking. The drive will then immidiately operate at the current limit.

12) Zero-speed control: If a controlled deceleration after normal switch-off (provided the machine operates with positive torque) is required, jumper VI must be installed to make the zero speed control operative. (zero speed control is effective above approximately 10% of the speed.)

13) Stability potentiometer P8. This potentiometer must be adjusted so that the drive operates without overshoot in the presset speeds.

5.2 Tachometer feedback control:

1) Check all connections with an Ohm-meter for grounds

2) Install required jumpers for tachometer feedback control (depending if a.c. or d.c. tachometer is used (see page 2) terminals 19 and 20 or 11 and 20 respectively.

3) Remove resistor R82 and also remove jumpers VII and I . The electronic circuit is now without any potential.

4) For all further adjustments refer to the adjustments as previously described for the armature feedback control, however, **I x R compensation (P3) must be set fully counter clockwise.**

6. Troubleshooting

For fast and effective troubleshooting and for the location of defective components proceed as follows.

Check the drive for:

a) Intermittent or loose connections

b) Defective insulation of the connection leads

c) Defective motor (brushes etc.)

Caution!
Do not use **any** Mega-Ohm-meter, buzzer or similar test instruments.
Test instruments must be galvanically seperated from a.c. line. The electronic circuit carries a voltage potential against ground when the drive is armature feedback controlled (UA-controlled).

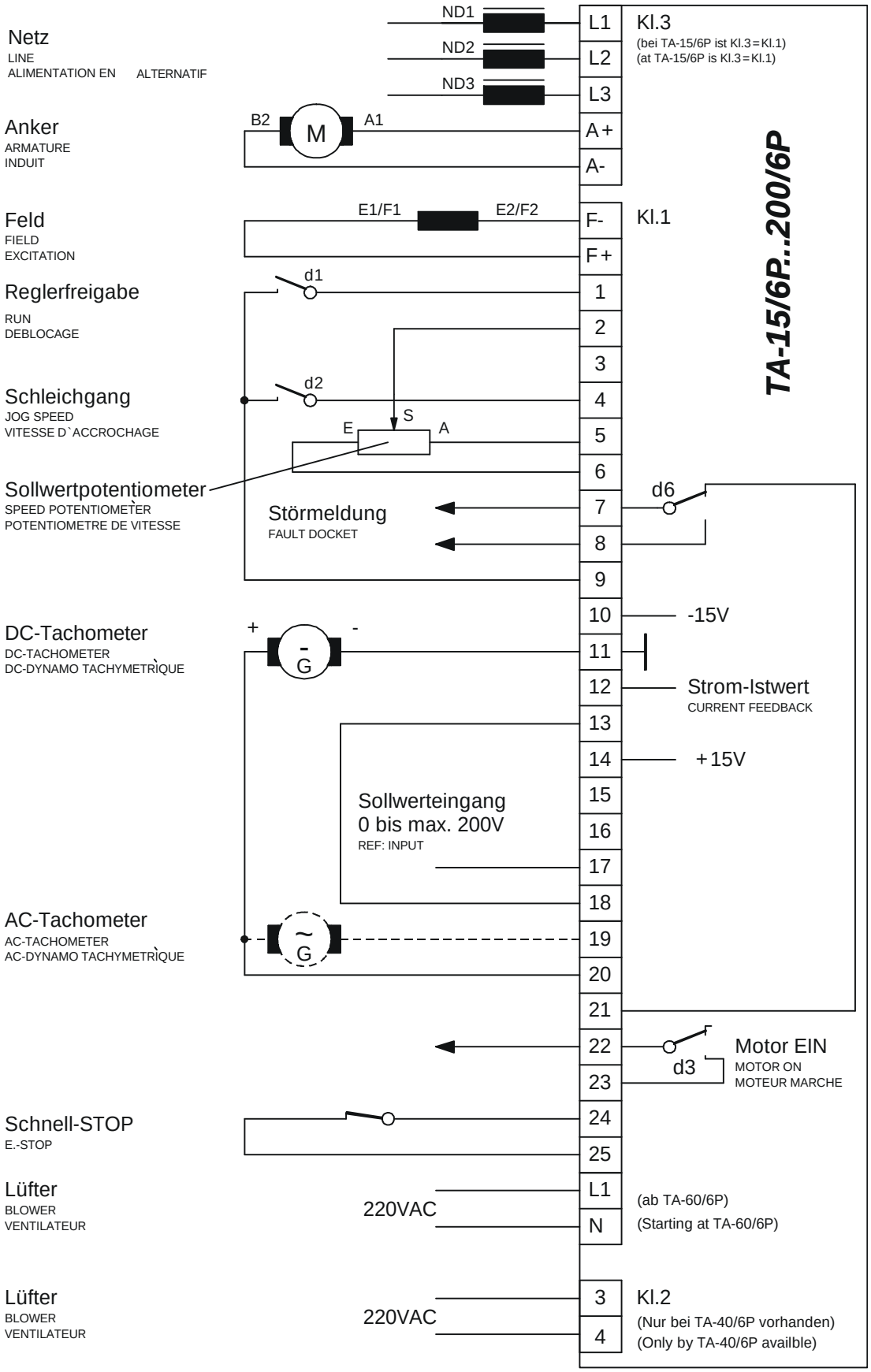
6.1 Fault location

Symptom	Possible causes
LED 8 (Power on) does not light up.	a) Defective fuse Si 1 on the upper PC-board b) One phase is missing c) No supply voltage (115V) for relays d1 and d2. Check voltage (115V) between terminals 9 and 16 d) LED 8 or D37 defect.
+/- 15V (LED 5, LED 2) does not light up.	a) One phase is missing b) Check power supply, measure +/- 24V
Drive does not run when switched to "DRIVE ON"	a) Check switch-on contact (terminals 1 and 9) b) Defective fuse Si 1 on the upper PC-board c) LED 8 (Power on) does not light up d) LED 9 does not light up however LED 11 lights up, jumper or quick-stop contacts terminals 24 and 25 not closed. e) No reference voltage (terminal 2) voltage is variable by speed potentiometer from 0 to 10V f) Relay d6 (malfunction) not energised. LED 3, red, lights up. Confirmation of malfunction is only possible if LED 4 and LED 6 do not light up and if the field control is not activated. g) Check three phase line input. h) Defective fuses Si 1, Si 2 or Si 3 on lower PC-board. i) Check field voltage and field current.
Output voltage does not increase when speed potentiometer is turned up	a) Motor load too high. b) Drive operates at the current limit, LED 6 lights up. c) Current limit is adjusted too low, drive switches off after short operation. d) Defective speed potentiometer.
Drive does not run stable	a) I x R compensation P3 is set too high. b) Defective tachometer or tachometer leads. c) Stability potentiometer P8 is wrong adjusted. d) Auxiliary winding of the d.c. motor is wrong connected e) Triggerinig of one Thyristor temporarely interrupted.

Symptom	Possible causes
Speed varies without change of the setting of the speed potentiometer	a) Too low adjustment of current limit. b) Motor is overloaded, mechanical defect on machine or motor. Check motor brushess c) Supply voltage +/- 15V for electronic circuit incorrect or missing. Reference voltage + 10V incorrect or missing. Check LED 5 and LED 2 d) Triggering of one Thyristor temporarely interrupted. Defective tachometer or tachometer leads. Defective minimum speed potentiometer. e) Defective speed potentiometer
Defective line fuse	a) Armature connections shorted or grounded. Check power Thyristors. b) Defective motor or armature. Check brushes.
Drive does not run	a) Defective power supply b) Jumper on the terminals 13-18 is missing c) Check relay and relay supply d) Defective speed potentiometer e) Defective armature fuse f) Check motor and motor brushes g) Defective fuses Si 1, Si 2 or Si 3
Drive runs at maximum speed, however speed potentiometer is set for zero speed or low speed	a) Defective tachometer or interrupted tachometer feedback, R91 missing b) Interrupted armature feedback. Check jumpers I and VII, R82 missing. c) Maximum speed potentiometer P9 intermittent. d) Minimum speed potentiometer P6 intermittent. e) Interrupted potentiometer connection from terminal 5 to start of speed-potentiometer. f) Wrong polarity +/- on d.c. tachometer connection. (Check terminal connection 11-20)

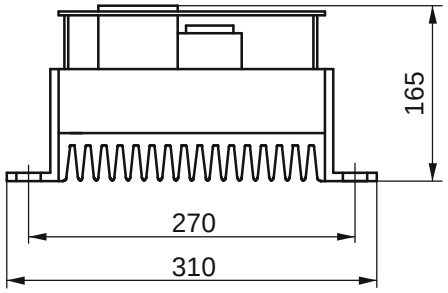
This concludes the preliminary preparation and adjustment of the Thyristor-Drive-Control Type TA-15/6P...200/6P

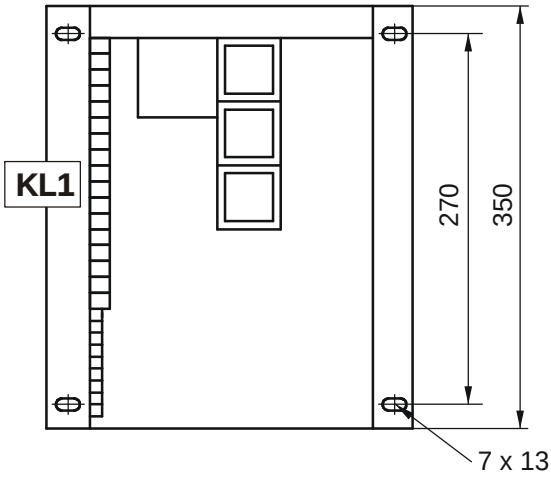
7. Connection diagram



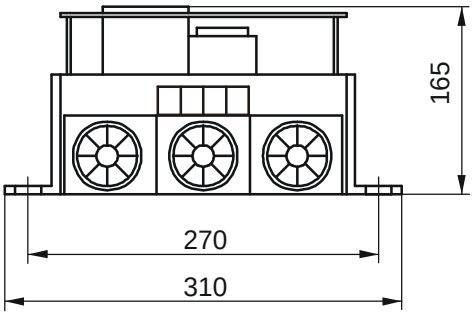
8. Mounting template

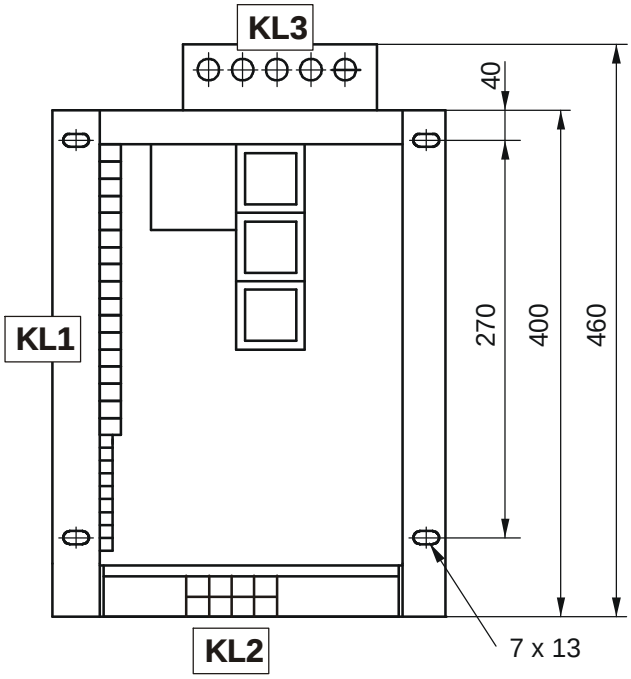
TA-15/6P





TA-40/6P





TA-60/6P...200/6P