

TA-05/C

Instruction and Operation Manual

valid for art.-no.: 10091 F-TA-05/C-ISO

(start at modification No. 1601)

valid for art.-no.: 10092 F-TA-05/C-Sh

(start at modification No. 1601)

CAUTION:

As with any form of electrical equipment, there is always a risk involved in the handling of electrical machinery. The greatest care must always be exercised during installation and maintenance, and it is recommended that service is performed by authorized personnel only.

NOTE:

After production all units are subjected to a quality control and an extensive functional test, including a continuous operation for 200 hours. Before delivery all units are again tested for their correct functioning.

These extensive tests will assure that all supplied units are in perfect functional condition. If these units are installed, adjusted and operated according to the instructions of this manual malfunctions are not to be expected.

Should despite of our preliminary tests any problems arise, please contact the manufacturer or one of his subsidiaries.

About this Instruction Manual

If you look for some definite topic you can use the table of contents at the beginning of these instruction and operation manual. In these instructions is a row of symbols which shall provide you with a fast orientation and show the importants.



This symbol stands for notes and useful informations which shall make the operation easier for you.



Note, disregard can damage or destruct the device.



Note, disregard means a danger for the operator.

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1. Instructions of safety



Before you put the device into operation, please read this instruction and operation manual completely. The operation should only be done by qualified personal. The precautions and warnings below must be observed at the operation of the device.

1.1 Instructions and Rules

These guidelines for installation have been compiled with regard to the following standards

DIN VDE 0100	Erection of power installations with nominal voltage up to 1000 V
VDE 0113	Electrical equipment for machines
VDE 0160	Electronic equipment to be used in electrical power installations
VDE 0470 Part 1	Protection by frame

1.2 Safety



Caution - Danger !

Disconnect device from mains before making any repairs. After the installation make sure that the device is properly grounded in order to avoid electrical hazards!



As with any form of electrical equipment, there is always a risk involved in the handling of electrical machinery. The greatest care must always be exercised during installation and maintenance. It is recommended that service is performed by authorized personnel only.

2. Technical data

Dimensions	refer to drawing chapter 10
Line Voltage	230VAC - 50/60Hz
Power	0,7 kW
Armature Voltage	180V
Armature Current	max. 6 Ampere eff.
Field Voltage	210V
Field Current	max. 0,5 A
Ambient temperature	0-40°C
Speed Accuracy	with armature feedback 3% with tachometer feedback 1%

2.1 Equipment

- | | |
|---|---|
| <input type="checkbox"/> Semi-controlled single phase bridge | <input type="checkbox"/> Inner loop current regulator |
| <input type="checkbox"/> Acceleration/Deceleration integrator | <input type="checkbox"/> Torque control |



The electronic circuit is galvanically separated from the line supply on units with a current-transformer for armature-current detection and tachometer control. If armature-voltage control is used the electronic circuit is at line potential.

3. Connection of unit (refer to Connection diagram TA-05 C chapter 8.)

2dz - 6dz	Line supply refer to Type-Marking -	230V AC 50/60Hz 2dz = Phase (L1) 6dz = MP (N, neutral)
10dz - 14dz	Armature connection	10dz = A+ 14dz = A-
18dz - 16dz	Field connection	18dz = F+ 16dz = F-
28d - 26d	Drive release by relay contact. Jumper III "internal" refer to layout chapter 9.	
26d - 12d	Drive release by SPS (free potential). Jumper III "external" refer to layout chapter 9.	

24z	Reference value input without acceleration (positive). Input voltage 10 V dc, Input current approx. 1,0 mA at maximum speed. If input terminal 24z is used, the centre must be disconnected from terminal 28z and terminal 28z must be connected to common ground, e.g. terminal 20dz.
24d - 22dz	DC-Tachometer input (22dz=T+ (common) / 24d=T-). Potentiometer P4 and R35 (refer to chapter 6.2 Tachometer feedback control) is used to adapt tachometer to circuit.
30z - 28z - 26z	Speed potentiometer. With this potentiometer the speed of the motor is infinite variable from minimum to maximum speed. Potentiometer connections: start = 26z center = 28z end = 30z
30d	Current reference signal input.
32d	Current reference signal output. For speed control terminals 30d and 32d must be jumpered.
32z	Terminal for connection of TAE blocking protection B-200 (Nr.20003 F) or B202 (Nr. 20163 F).

4. Adjustments

Minimum speed	P1 Adjustment of minimum speed during operation. (set speed potentiometer fully counter clockwise).
Deceleration	P2 Adjustment of the time for the linear deceleration of the rate motor from maximum to minimum speed (adjustable from 2 sec to 20 sec). Turning this control clockwise will decrease the deceleration time.
Acceleration	P3 Adjustment of the time for the linear acceleration of the rate motor from minimum to maximum speed (adjustable from 2 sec to 20 sec). Turning this control clockwise will decrease the acceleration time.
Maximum speed	P4 Adjustment of maximum speed during operation (set speed potentiometer fully clockwise).
IxR Compensation	P5 This potentiometer enables to compensate for the voltage drop in the armature and in the supply line when armature feedback control is utilized. For tachometer feedback control this potentiometer must be set fully counter clockwise.
Stability	P6 Adjustment for the dynamical adaption to the load.
Current limit	P8 Adjustment for the requested armature current (adjust for rated motor current).

5. Indicators

The following functions are indicated with LED´s:

LED 1	green	Line Supply
LED 2	clear	Thyristor triggering
LED 3	yellow	Drive release
LED 4	red	Current limit, Over-speed

6. Functional tests and adjustments before operation



Caution !

**Do not use any megohmmeter, buzzer or similar test instrument !
Measuring instruments must be galvanically separated from line voltage.**

6.1 Armature-voltage control (UA-control)

- 1) Check all connections with an ohmmeter for short circuits to ground.
- 2) Check line supply voltage with reference to the Type Marking.
- 3) Set jumpers I, II, III (refer to layout chapter 9).
- 4) Measure the resistance between terminal 18dz and 16dz with an ohmmeter. The resistance has to be least 400 ohms (220 V connection). If necessary change the polarity of the ohmmeter.
- 5) Potentiometer P2 Deceleration-time, set in centre position.
Potentiometer P3 Acceleration-time, set in centre position.
Potentiometer P5 IxR compensation, set fully counter clockwise.
Potentiometer P6 Stability, set fully clockwise and turn back 30%.
Potentiometer P1 Minimum speed, set fully counter clockwise.
- 6) Switch on line voltage. The green LED 1 must now light up.
- 7) Measure field voltage between terminals 18dz (F+) and 16dz (F-) with a multimeter (moving coil instrument, min 333 Ohm/V). The field voltage must read 200 V at 230 V line voltage. Measure potentiometer voltage between terminals 30z - 26z. If the potentiometer is turned clockwise the armature voltage (motor speed) will increase. Set speed potentiometer P4 (max. speed) fully clockwise and adjust the armature voltage (motor speed) for the requested maximum speed. Set speed potentiometer fully counter clockwise (output voltage must now return to 0 V) and adjust with P1 (min. speed) the requested minimum speed.

- 8) Adjustment of the I x R compensation (P5). Check for an approximate equal speed with and without motor load in the lower speed range. Turning the potentiometer clockwise will increase the speed under load. **Note: if the compensation potentiometer is set too high, the drive will become unstable.**
- 9) Current limit. In order to check the current limit, the field must be disconnected and the motor must be blocked. Switch on drive, pre-select speed and adjust potentiometer P8 for the requested current (during this procedure the red LED 4 must light up). The adjustment must be performed within 10 sec, otherwise damage to the commutator is possible.
- 12) Acceleration time. Adjust the requested acceleration time with potentiometer P3.
- 13) Deceleration time. Set speed potentiometer to 0 and adjust the requested deceleration time with potentiometer P2. Note: the deceleration time cannot be less than the coasting time of the machine since the drive control operates in the first Quadrant only ! The deceleration is only effective if the reference value is changed.

6.2 Tachometer feedback control

- 1) Check all connections with an ohmmeter for grounds.
- 2) Install jumpers I, II, III according to lay-out drawing at page 8.
- 3) It might be necessary to adapt resistor R35 to the tachometer.

The calculation of R35 is as follows :

$$R_{35} = \frac{\text{tachometer voltage by nominal speed (volts)}}{0,001A} - 30000 \text{ Ohm}$$

- 4) For all further adjustments refer to the adjustments as previously described for the armature feedback control, however disregard points 1, 3 and 8, and set potentiometer P5 (I x R compensation) fully counter clockwise.

7. Troubleshooting

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

- Check drive for:
- a) Intermittent or loose connections
 - b) Defective insulation of connecting leads
 - c) Defective motor (brushes etc.)

○ Fault location

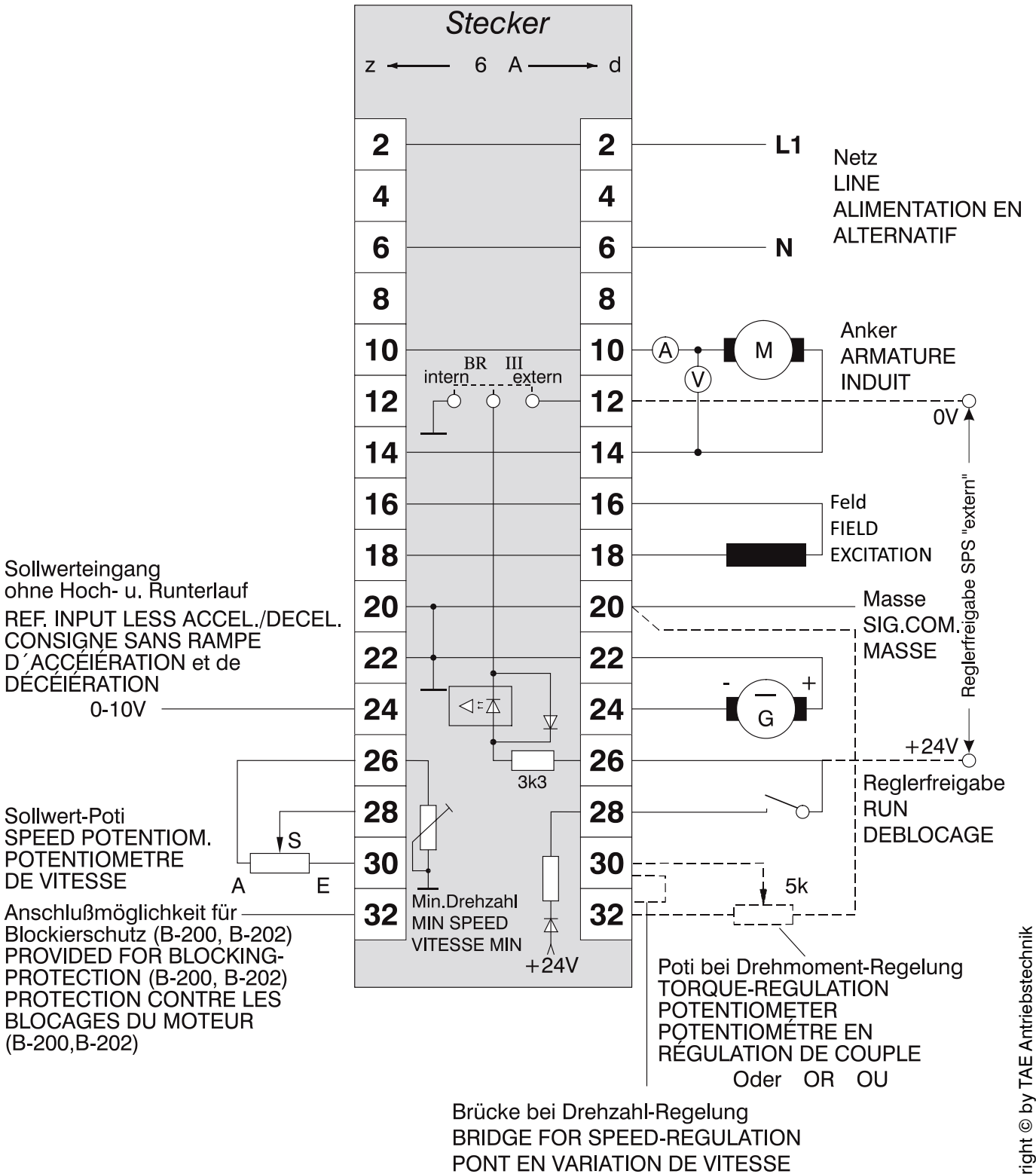
Symptom	Possible causes
Yellow LED 3 does not light up.	<ul style="list-style-type: none"> a) Check supply connections (Drive-release, Terminals 26c-28c). b) Control voltage + 24V missing, check supply, LED 1 does not light up.
Output voltage does not increase when speedcontrol is turned up.	<ul style="list-style-type: none"> a) Motor load is too high. Drive operates at current limit. LED 4 current limit lights up. b) Defective speed potentiometer. c) Adjustment of current limit is set too low.
Drive runs unstable.	<ul style="list-style-type: none"> a) I x R compensation is set too high (when armature feedback control is used). b) Improper adjustment of stability potentiometer P6. c) Defective tachometer or tachometer leads. d) Wrong connection of auxiliary motor winding. e) Defective SCR bridge.
Speed varies without change of speed potentiometer.	<ul style="list-style-type: none"> a) Current limit is set too low, LED 4 (current limit) lights up. b) Motor is overloaded (mechanical defect), LED 4 current limit, lights up.

Symptom	Possible causes
Speed varies without change of speed potentiometer.	<ul style="list-style-type: none"> c) Defective supply (+/- 15V) for electronic circuit. d) Defective SCR bridge. e) Defective tachometer or tachometer leads. f) Defective speed potentiometer.
Main fuse blows.	<ul style="list-style-type: none"> a) Shorted or grounded armature or field connections. b) Defective motor or armature.
Drive does not run.	<ul style="list-style-type: none"> a) Defective power supply. b) Check relays and relay connections (drive release). c) Defective speed potentiometer. d) Check motor and brushes. e) Defective fuse F1 (10A FF).
Drive runs after control release at maximum speed however speed control is set for zero speed.	<ul style="list-style-type: none"> a) Intermittent potentiometer P1 (Minimum speed). b) Defective speed potentiometer or connection from terminal 26z to potentiometer.
Drive runs after control release at maximum speed without keeping reference speed.	<ul style="list-style-type: none"> a) Tachometer connections intermittent, defective tachometer, or wrong polarity. b) Defective potentiometer P4 (max. speed). c) Check armature connections.
Motor starts without drive release when connected to line supply.	<ul style="list-style-type: none"> a) Grounded armature wiring b) Defective SCR bridge.

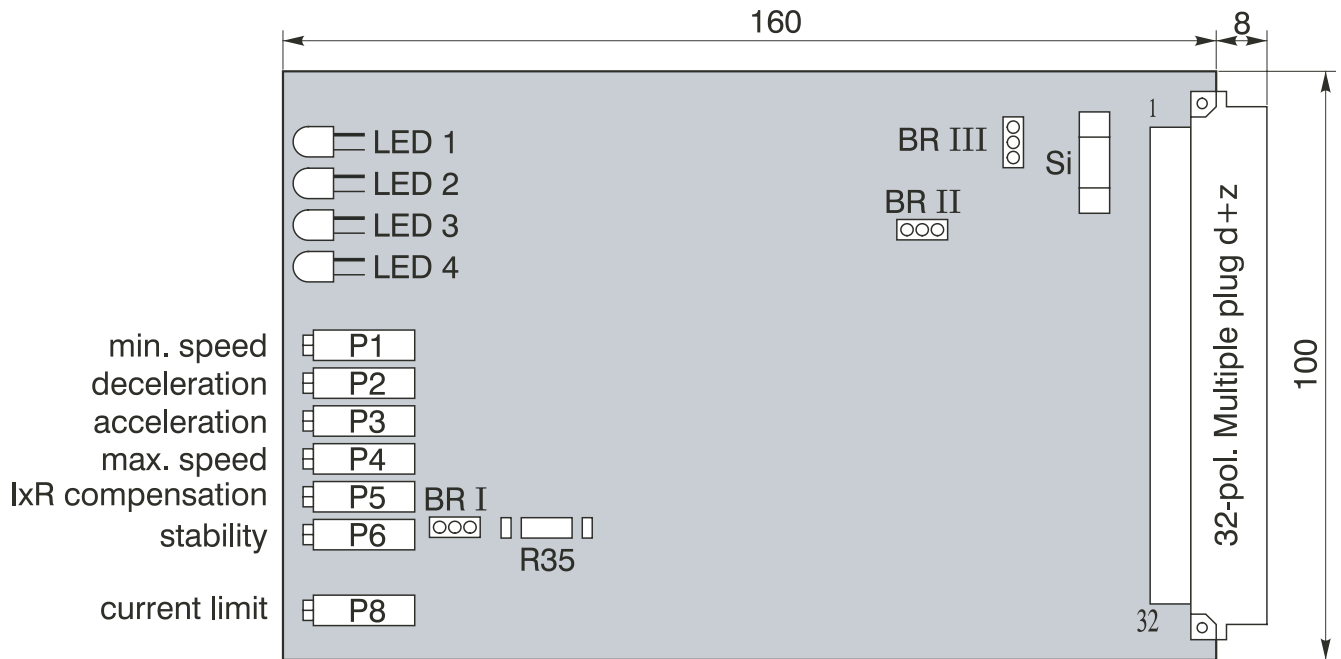


This concludes the preliminary preparations and adjustments of the Thyristor Drive Control TA-05 C.

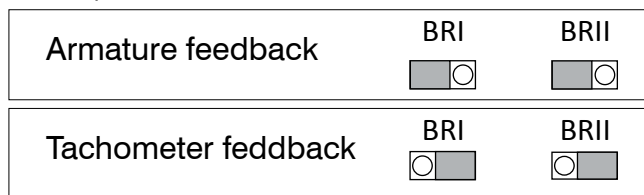
8. Connection diagram



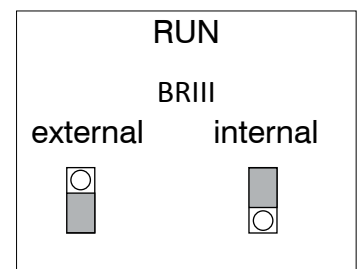
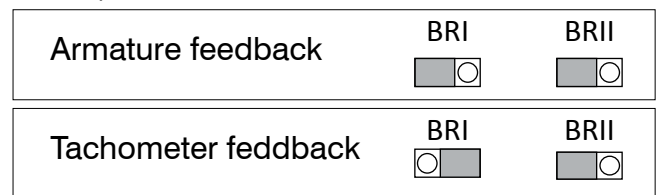
9. Layout



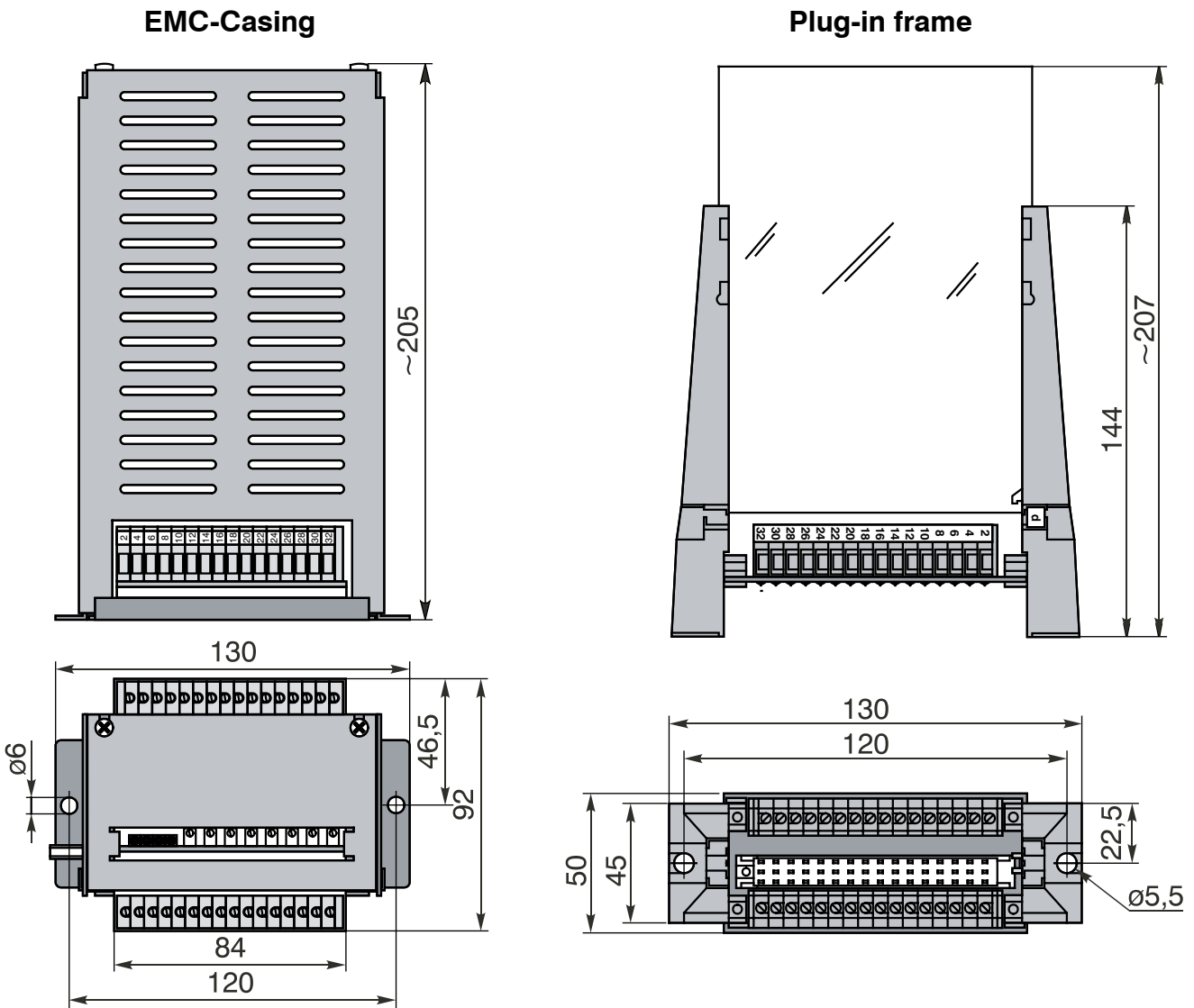
TA-05/C-ISO Art.-No. 10091 F insulated



TA-05/C-Sh Art.-No. 10092 F with Shunt



10. Dimensions EMC-Casing & Plug-in frame



11. Spare Part List

31343-00	Varistor 275 LA
33301-00	TAE firing circuit 33301
33503-00	Diode BY255
34221-00	SCR bridge 20 Amp. L413F
34459-00	Fuse 20 x 5 super fast 10,0 A
35852-A0	Multiple plug 32pol. 6 A
36360-00	Firing circuit transformer IT243
36495-C0	Current transformer CSLA1CD
58000-Q0	Transformer BV 5005 230V