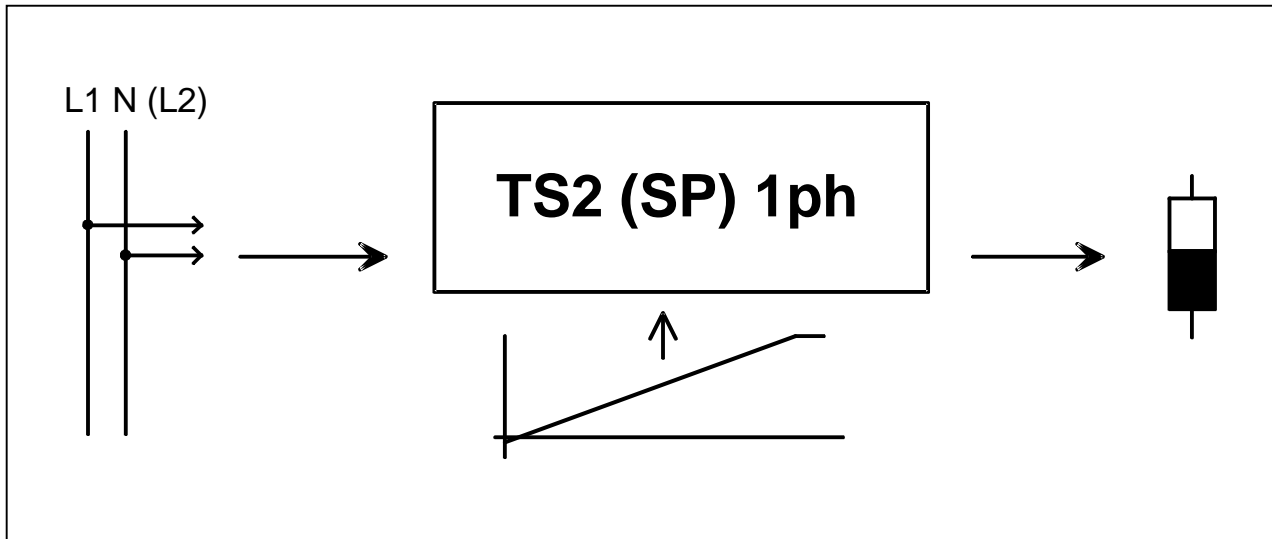


Power Thyristor TS2 (SP) 1ph

Instruction for installation

**Contents:****Page:**

1.	General descriptions	2
2.	Set-up of power thyristor TS2 (SP) 1ph	3
3.	Installation	4
4.	Terminal connections	5
5.	Technical features of control- and monitoring board	6
6.	Basic circuit	7
7.	Control and monitoring pring	8
8.	Analogue module	9
9.	Types	10
10.	Technical data	11

1. General Descriptions

Thyristors are more and more used where increased resistive and inductive loads have to be controlled. By means of the modular and compact construction as well as the control by a continuous action control signal, these Power Thyristors are becoming a perfect actuator for industrial power control.

The power unit of the Thyristor is made of two anti-parallel connected Thyristors, the insulated heat sink and the control electronics.

Explanation of types:

TS2 1ph Regulator with phase angle control for single-phase systems

TS2 SP 1ph Regulator with oscillation package single-phase systems
(Oscillation package)

Current limiting (option):

With phase angle control the load current can be adjusted in the range of 5 – 100% by means of a potentiometer. The effective value of the load current is limited.

Power Supply:

Different mains voltages are adjusted to maximum of power without causing any on-load voltage problems

Construction:

The power thyristors correspond to the VDE 0558 Part 1 and VDE 0160 Table 4.

The power thyristor TS2 (SP) 1ph is modularly constructed. It consists of 3 basic components:

- a) **Power Unit** including heat sink and thyristor wiring
- b) **Control unit** with starter and control electronics (diagnostic display, control outputs etc.)
- c) **Function Module** determines the analogue control

2. Set-up of Power Thyristor TS2 (SP) 1ph

A sufficient cooling (e.g. forced-air cooling) is of paramount importance. Temperature is not allowed to exceed 50°C. The device has to be mounted on a vertical area, so that a sufficient air circulation is guaranteed. Moreover, the Thyristor has to be installed in dry rooms.

Further on-site conditions:

- Protection against dust and humidity
- Protection against aggressive atmosphere
- Free of vibrations

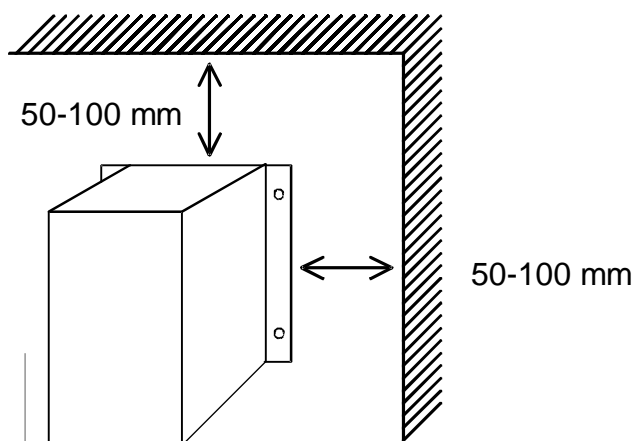
In order to avoid any interferences of the cooling, no further components should be installed around the Thyristor within a distance from 50 to 100mm.

Wiring:

Power supply (L1, N(L2)) must be produced via a fail-safe circuit breaker with the common backups.

The wiring for the power supply and the control unit must be done in separate channels or protection tube.

During the electrical installation procedure, the general VDE-regulations (VDE 0100, VDE 0113, VDE 160) must be observed, accordingly



3. Installation

First of all, all electrical connections should be set-up, according to the attached circuit diagrams: L1, N(L2), T1, T2.

According to the VDE-regulations, the Thyristors must be connected to the supply net in that way, that they can be separated from the net by means of corresponding clearing instruments (e.g. main switch, contactor, protective power-switch).

Cabling:

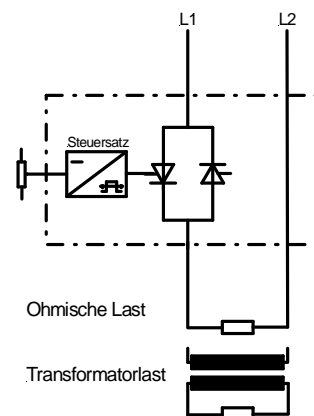
The net and consumer lead wires as well as the control circuit must be lead in separate cables.

In order to avoid any interferences, it is advisable to wire the electronic signal lines separated from the load leads and/or the contactor control circuit and to twist the coming and going wires of the signal line.

Protection:

The net protection depends on the recommended respectively the used conductor cross section and must be made according to DIN 57100 Part 430/VDE 0100 Part 430/6.81.

Example for wiring of a single-phase
Power Thyristor:



4. Terminal Connections

Terminal connections of basic board

These connections are on the function module having the following numbering:

Activation of Power Thyristor:

Activation:

1 – 2	activated:	closed
	readiness:	opened
3 – 4	set point signal 0-10 V or 0-20 mA	

Special Function:

5 – 6	Locking of power thyristor:	opened
	Operation:	closed
	(red LED flashes if clamps 5 and 6 are opened)	
7	Reference voltage (10V), e.g. for supply of a potentiometer	

Terminal connections on the control and monitoring print:

L1 – N	230V AC/50Hz Optional: on request any control voltage can be realised
14 – 15 – 16	Switch output S1 (upon activation: 14 and 15 closed)
17 – 18 – 19	Switch output S2 (upon activation: 17 and 18 closed)
20 – 21 – 22	Switch output failure message (upon activation: 20 and 21 closed)
23 – 24	Ancillary input: e.g. for PTC-sensor accord. to DIN 44081 or for other applications (23 – 24 open = locked, 23 – 24 closed = operation)

5. Technical features of control and monitoring board

The control board of the power thyristor includes several control and protection functions.

This board is supplied via the clamps L1 and N in the standard type, so to produce an internal DC voltage of 15 Volt DC.

On the control board (Euroformat) the changeable function board is positioned (100x 75mm), which determines the control or regulating behaviour of the device.

Functions of LED's on the control board:

LED 1 (red) "Thermal temperature of heat sink respect. of power thyristor"

Reason: Overload, too high current, too much switching frequency.

The switch-off treshold amounts to approx. 80° C.

LED 2 (red) "Phase accident"

Reason: Several or one phase has no connection to the main supply L1, N(L2).
(Verification if all phases are fed!)

LED 3 (red) "Thermal temperature of PTC - input"

Reason: PTC has triggered or open bridge 23 - 34

LED 4 (green) "Ancillary voltage fed" (device in stand-by)

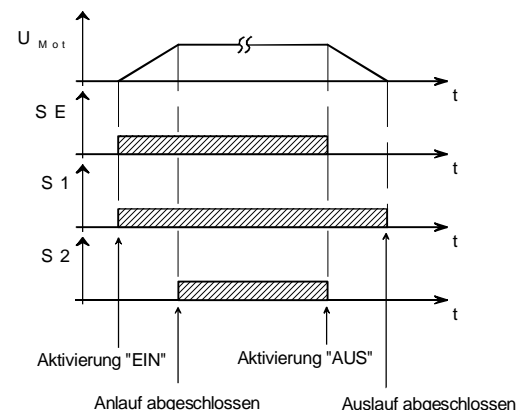
Upon activation (e.g. making of contacts 1-2) all red LEDs must fade if no of the mentioned of the above mentioned failures exists. (Reset)

Functions of LED's function board:

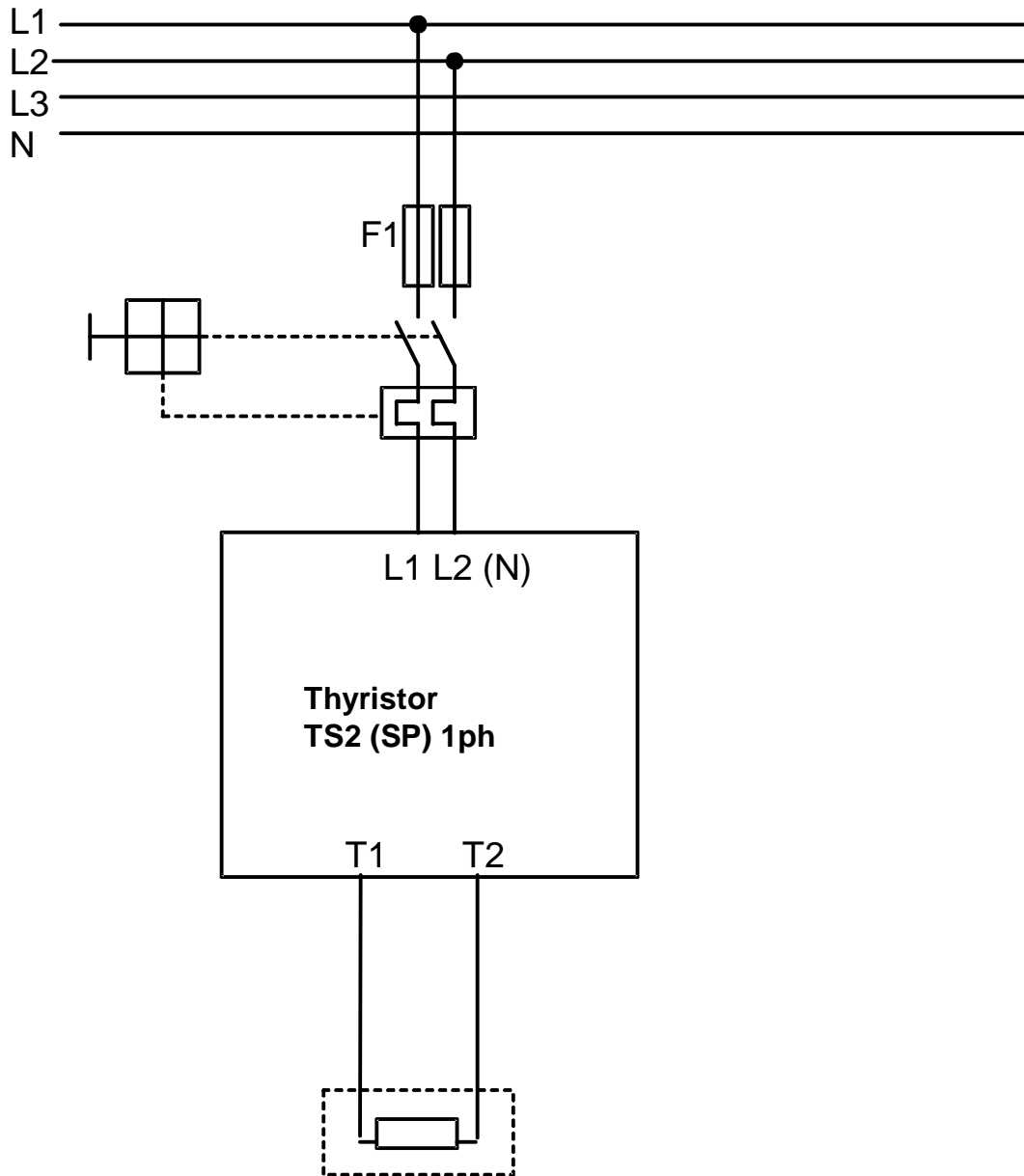
LED: "SE" Activation

LED: "S1" Switch function S1 is executed
(contacts S1 and LED S1 are activated at the same time)

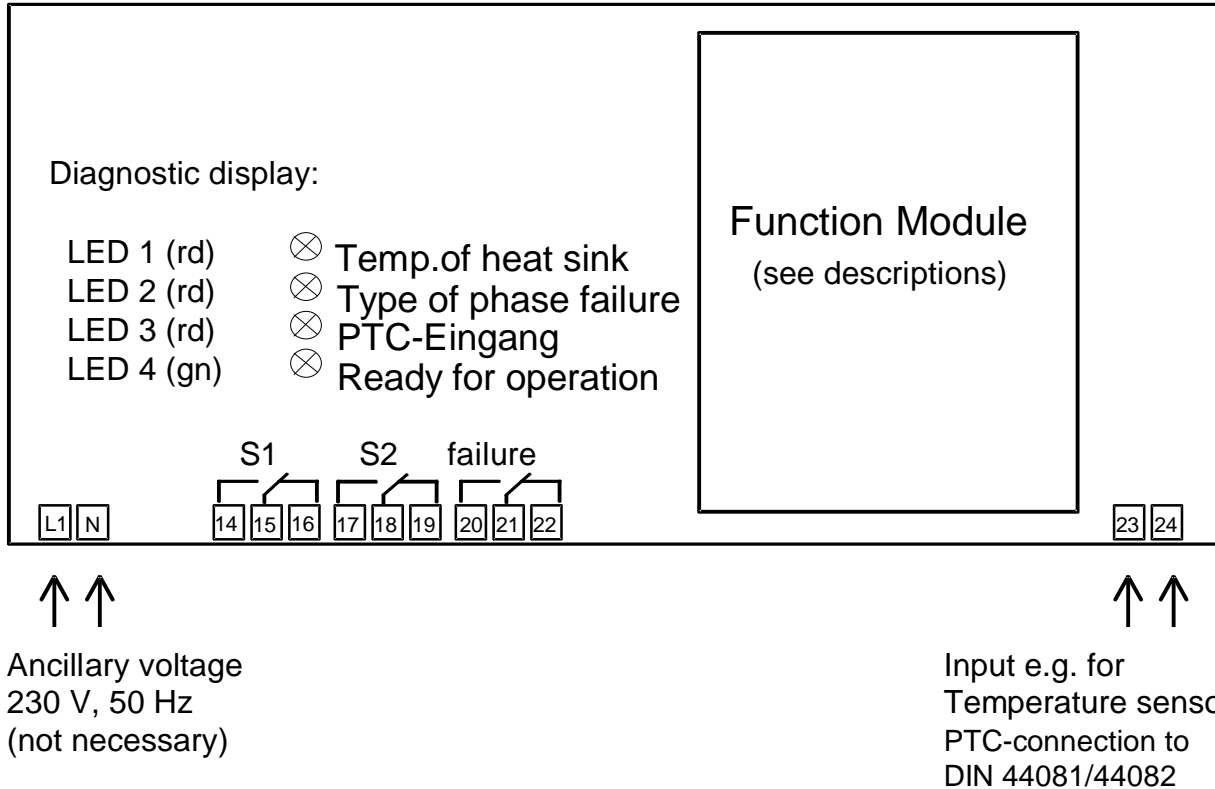
LED: "S2" Switch function S2 is executed
(contacts S2 and LED S2 are activated at the same time)



6. Basic Circuit



7. Control- and Monitoring Print



Meaning of LED display:

- LED 1: Terminal temperature of heat sink
- LED 2: Phase failure
- LED 3: Pilot output with opened clamps 23-24 or high impedance

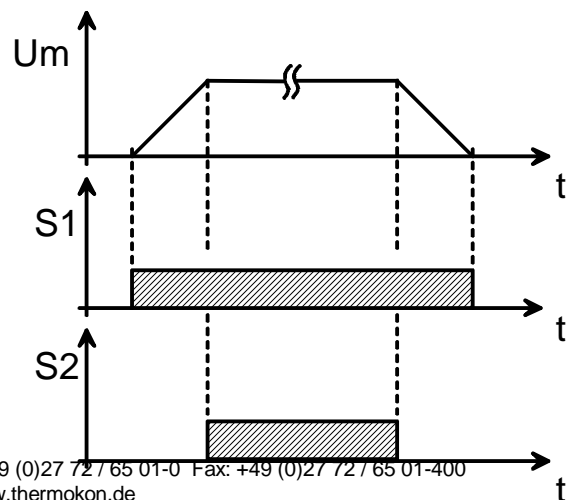
If one of the mentioned failures occurs, the same is saved and the failure message is activated. (Clamps 20-21-22)

LED 4: Ancillary voltage fed

Ancillary contacts S1 and S2:

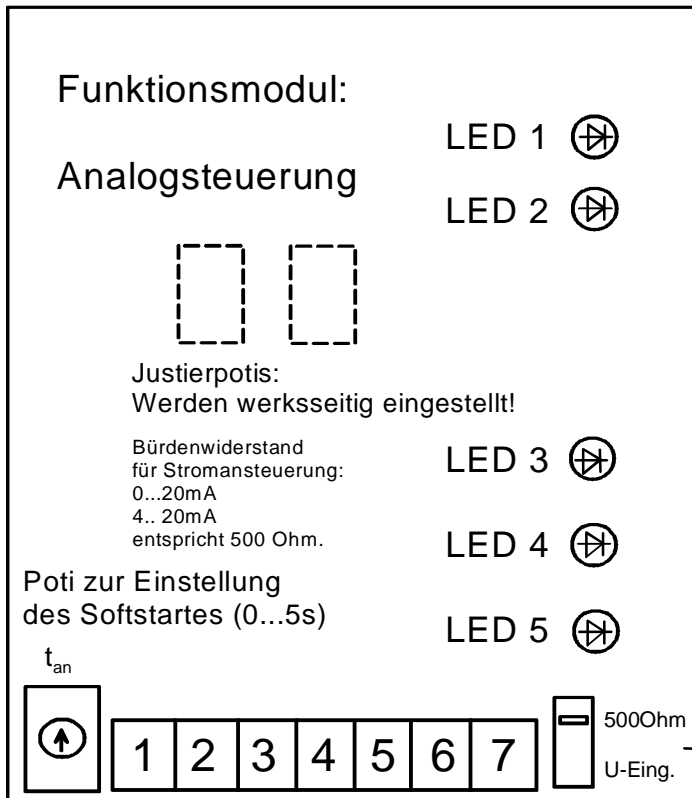
Change-over contacts that can be used upon demand (5A,230V/AC), which are activated with the following switch status:

- U: Output voltage of T-actuator to T1, T2
- S1: Switch status with existing "output voltage"
- S2: "100 % output voltage reached"



8. Analog Module (Version 2)

(Triggering of Thyristor Module)



Bedeutung der LED's:

Die Leuchtintensität der Anzeige ist abhängig von der Höhe der Ansteuerung (LED 1).

Bei geöffnetem Kontakt 5 - 6 leuchtet die LED 2. Ebenso zeigt diese LED Störungen von der Hauptplatine an.

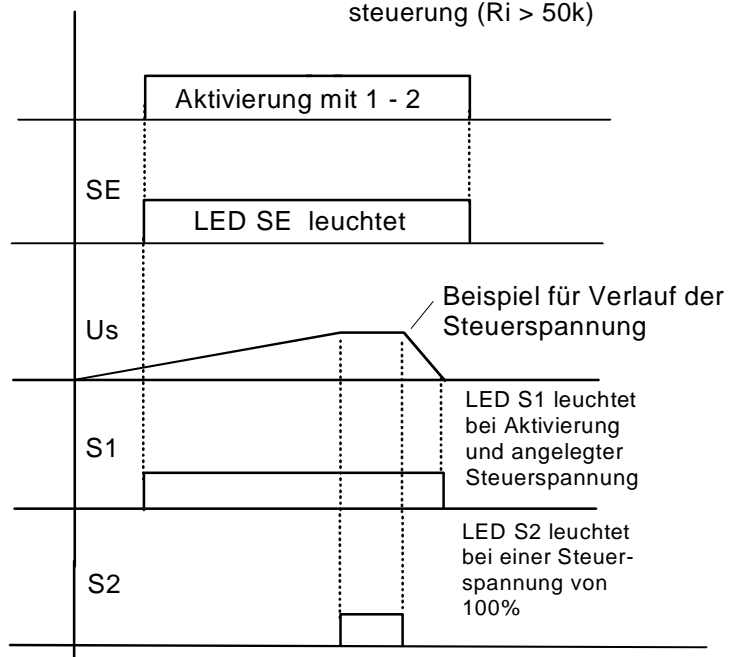
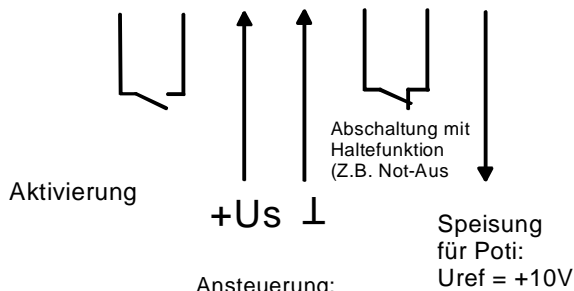
Schalteingang: SE (LED 3)
Leuchtet bei Aktivierung;

Schaltausgang: S1 (LED 4)
Leuchtet beim Anlegen der Steuerspannung;

Schaltausgang: S2 (LED 5)
Leuchtet, wenn 100% Aussteuerung erreicht ist;

Wahlschalter: Bürde von 500 Ohm für Stromschleife

U-Eing. für Spannungsansteuerung ($R_i > 50k$)



t_{an} = Poti zur Einstellung eines Softstartes (0...5s)

9. Types Available

Typ	Maximal Load current [A]	Recommended Semi-conductor Protection [A]	Wiring protection [A]	Recommended Cross section [mm ²]	Weight [kg]	Construction	Dimensions L x W x T [mm]
TS2 (SP) 1ph 8A	8	15	16	1,5	1,1	A	200x140x115
TS2 (SP) 1ph 15A	15	25	25	2,5	1,4	A	200x140x115
TS2 (SP) 1ph 25A	25	30	32	4,0	1,5	A	200x140x115
TS2 (SP) 1ph 35A	35	40	50	6,0	1,6	A	200x140x115
TS2 (SP) 1ph 50A	50	60	80	10	2,8	B	195x260x170
TS2 (SP) 1ph 75A	75	80	100	25	3	B	195x260x170
TS2 (SP) 1ph 100A	100	110	125	35	3	B	195x260x170
TS2 (SP) 1ph 125A	125	130	200	50	3	B	195x260x170
TS2 (SP) 1ph 200A	200	300	300	70	7,8	C	235x360x200
TS2 (SP) 1ph 300A	300	400	350	95	8,8	C	235x360x200

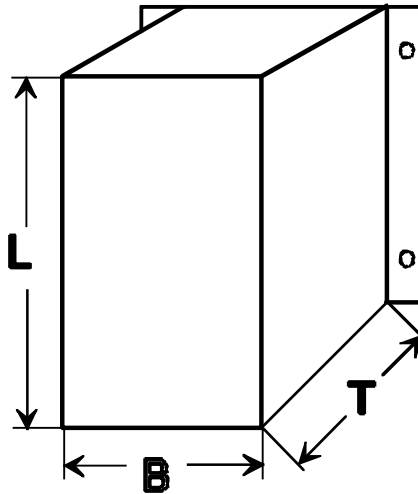
*subject to technical alteration or changes

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The devices including oscillation package (impulse group operation) have the same dimensions.

The aforementioned loading capacity values are valid for an ambient temperature of max. 40°C and an installation height of max. 1000m.

The aforementioned values are relating to a nominal voltage of 110V to 500V AC.



10. Technical Data

Mains voltage:	230V AC
Power supply:	internal production
Load circuit:	see table under 9. (resistive and inductive)
Net frequency:	48 – 62Hz
Roating field:	self-synchronising
Protection:	IP20
Humidity class:	E accord. to DIN 40040
Built-in device:	accord. to VDE 0558, Chapter 1 (IEC 146.2)
Potential separation:	accord. to VDE 0160 5,6
CE – conformity:	accord. to EMV – directive and low voltage directive
Installation:	upright, electrical connections down
Display of operation mode:	LED´s (SE, S1, S2, U _h)
Ambient temperature:	0... +45°C
Failure messages:	Phase failure, temperature of heat sink, under voltage, thyristor failure
Control signals:	0 – 10V DC 0 – 20mA Potentiometer 10kΩ