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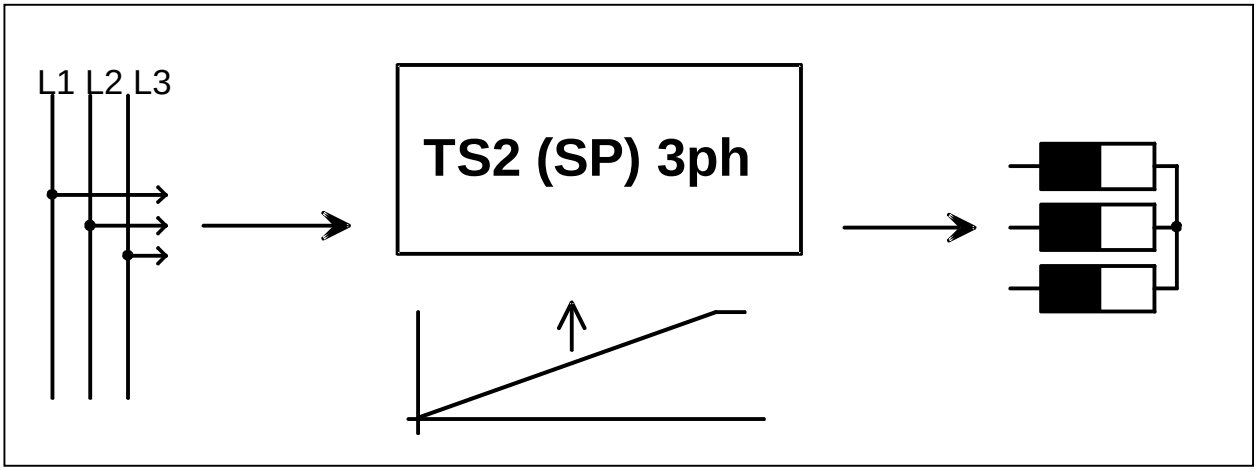
POWER THYRISTOR TS2 (SP) 3ph

Installation Guide



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1. General Description

Power Thyristors are more and more used where increased resistive and inductive loads have to be controlled (e.g. industry furnace construction, plastics processing and so on). By means of the modular and compact construction as well as the controly 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 up of two anti-parallel connected Thyristors, the insulated heat snik and the control electronics. Due to the use of function modules, the adaption to any application is one of the biggest advantages of these types.

Explanation of Types:

TS2 3ph	Andiductor, phase angle control for three-phase systems
TS2 SP 3ph	Andiductor in pulse group operation (Osciallation package)

Current Limiting (Option):

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

Power Supply:

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

Construction:

The Thyristors correspond to the VDE 0558 Part 1 and VDE 0160 Table 4.
The Power Thyristor type TS2... is constructed modularly. It is built up of three basic components.

a) **Power Unit** with heat sink and Thyristor wiring

b) **Control Unit** with starter and control electronic (Diagnosis display, control outputs etc.)

c) **Function Module** determining the analog control

2. Set-up of Power Thyristor TS2 (SP) 3ph

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 surface, so that a sufficient air circulation is guaranteed. Moreover, the Thyristor has to be mounted in dry rooms.

Further on-site conditions:

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

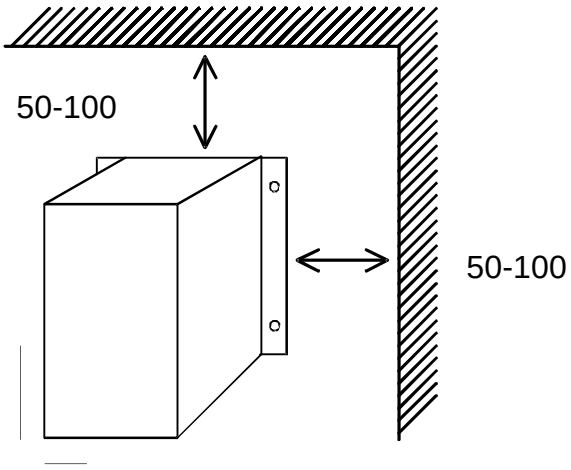
In order to avoid any intereferences of the cooling, no further components should be installed around the Thyristor within a distance from 50 to 100mm.

Wiring:

Power supply (L1, L2, L3) must be produced via a fail-save 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, L2, L3, T1 (U), T2 (V), T3 (W).

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.

Protections:

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.

General Information:
Thyristor TS2 (SP) 3ph for phase angle control is designed for the control of resistive and inductive loads. As a standard the control is made via the analog signal (0…10V or 0…20mA). The phase angle control respectively the on and off timing relation of the oscillation package control (pulse group operation) is continously corrected by the controlc electronics, in order to reach a sufficient proportionality between the Power Thyristor control and the output
(T1, T2, T3).

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4. Meaning of Terminal Connectors

Terminal Connections on the Function Board:

These connections are found on the function board by the following numbers:

Activating of Power Thyristor:

Activating:

1, 2	Activated:	closed
	Readiness:	opened
3, 4	Setpoint signal 0-10 V or 0-20 mA	

Special Function:

5, 6	Locking of power unit:	closed
5, 6	Operation:	opened
	(The red LED is lighting when clamps 5 and 6 are open)	

Terminal Connections on Control and Monitor Print

L1, N	Connection of 230V/AC (Option: Any control voltages can be realized according to customers' request)
14, 15, 16	Switch output S1 Voltage on output clamps
17, 18, 19	Switch output S2 Adjustment to maximum of power (100% U_{aus})
20, 21, 22	Switch output fault message
23, 24	Help input: e.g. for PTC-sensor according to DIN 44081 or for any other applications (23 - 24 open = lock, 23 - 24 closed = operation)
7	Power supply potentiometer control (on the function module: „Analog Control")

5. Technical Features of Control and Monitor Board

The control board of the Power Thyristor contains different control and protection functions. The board is supplied via clamps L1 and N, in the standard version by 230V/AC.
On the control board (Euro format) the changeable function board is placed (100 x 75 mm) determining the control and regulating manner of the device.

Functions of LEDs on the Control and Function Board:

LED 1 (rt) "Excess temperature of heat sink respectively of the power unit"

Reason: Overload, too high current, too high switch frequency
The cutoff treshold is lying with 75° C.

LED 2 (rt) "Phase failure"

Reason: Some or one phase have no connection to the network connectors L1, L2 and L3
(Verify if all phases are fit!)

LED 3 (rt) "Ecess temperature of the motor (PTC)"

Reason: Overstress of the motor (see motor data)

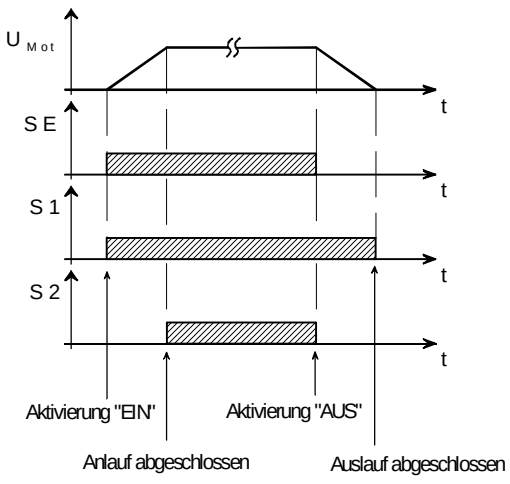
LED 4 (gn) "Help voltage fit closely" (device in standby mode)

By activation (e.g. closing of contacts 1 - 2) all red LEDs have to , if no of the aforementioned malfunctions occurred. (Reset procedure)

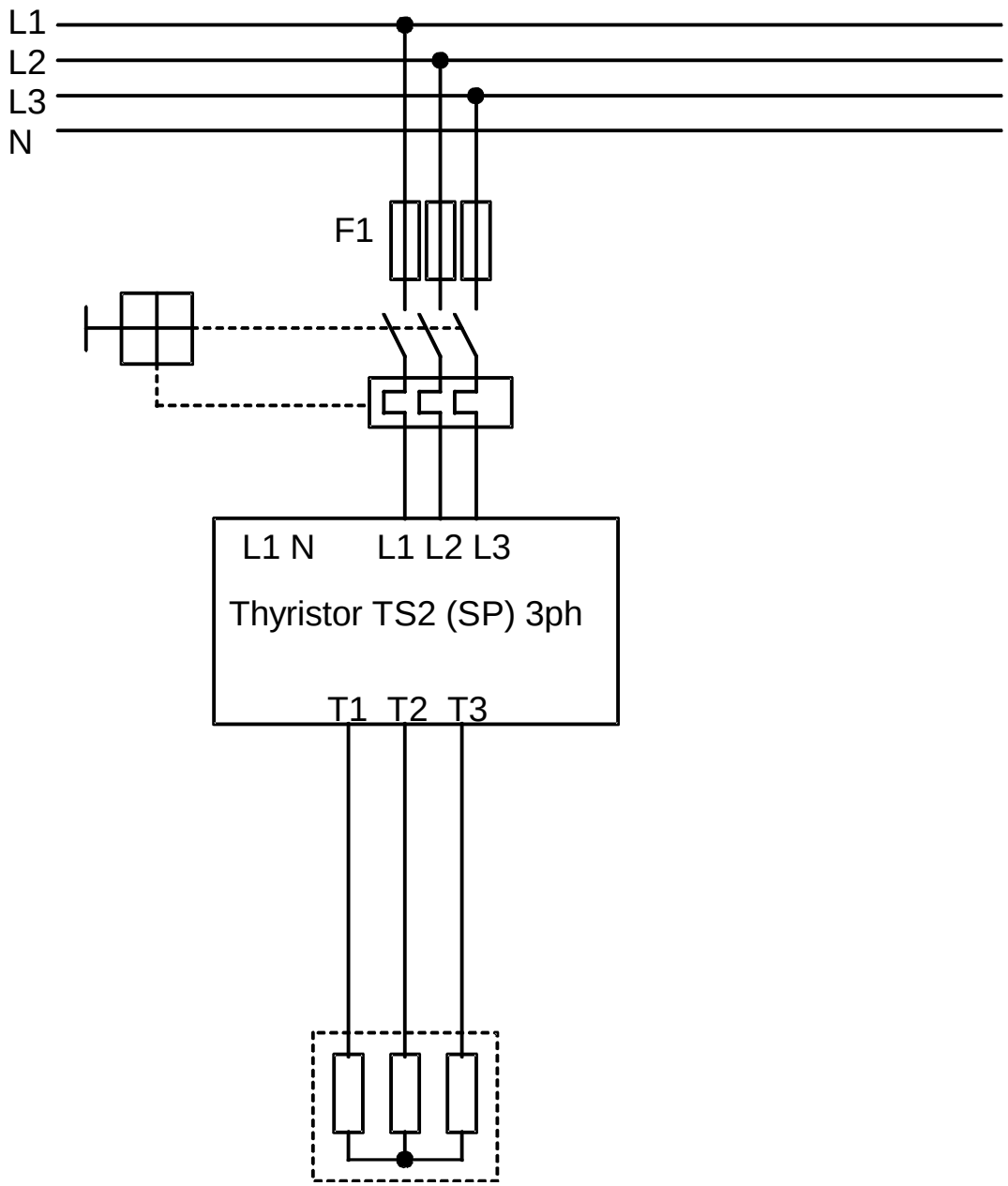
LED: "SE" Activation

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

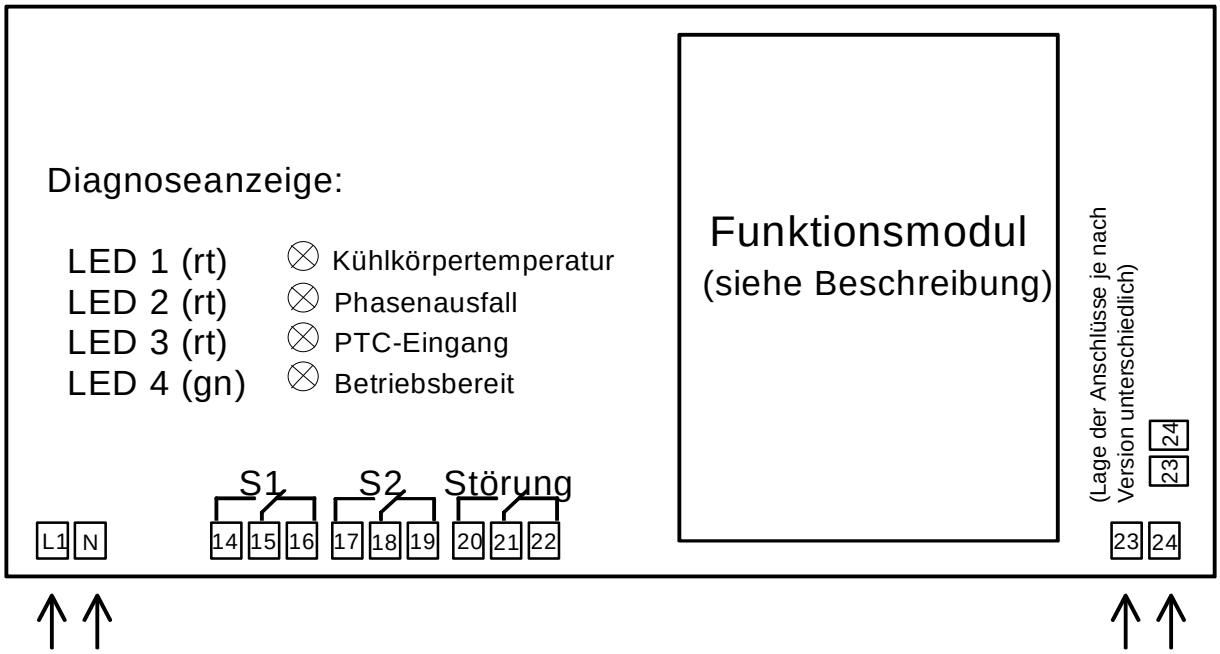
LED: "S2" Switch function S2 is carried out (contacts S2 and LED S2 are activated at the same time)



6. Basic Circuit



7. Control and Monitor Print



Help voltage,
Input e.g. for 230 V/50-60Hz
(not necessary)

Temperature sensor
(for any application)
PTC-connection according to
DIN 44081/44082

Meaning of LEDs:

LED 1: Excess temperature of heat sink
LED 2: Phase failure
LED 3: Excess temperature of motor

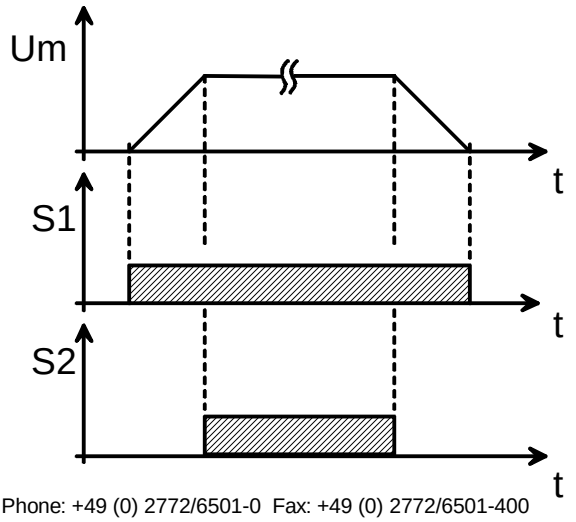
If one of the above failures occures, the same is stored and the fault message is activated. (Clamps 20-21-22)

LED 4: Help voltage fits closely

Help Contacts S1 and S2:

Change-over contact useable at will (5A/230V) activated with the following switch status

U: Output voltage of Thyristor at T1, T2, T3
S1: Switch status with current "Output voltage"
S2: "100 % output voltage reached"



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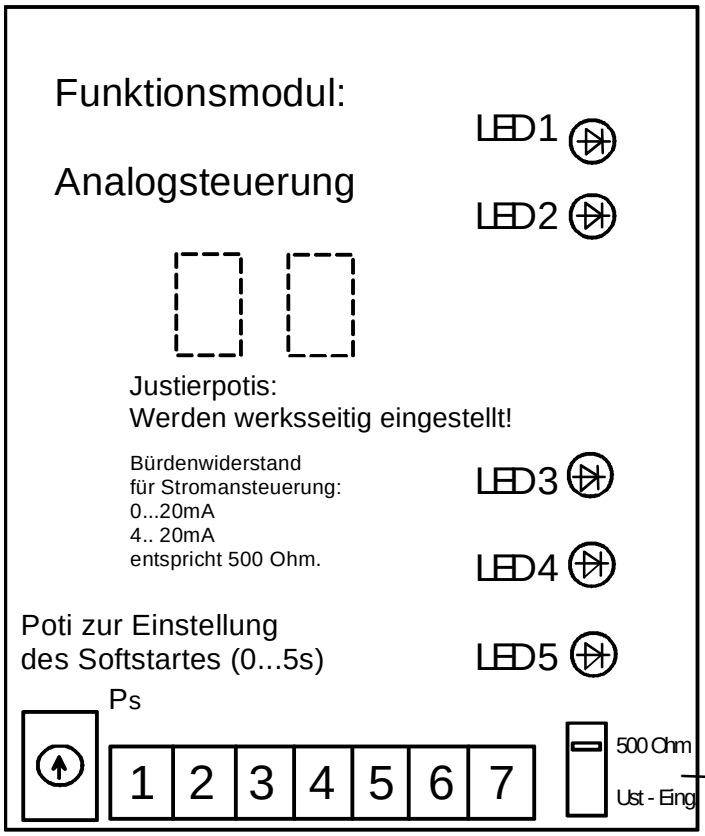
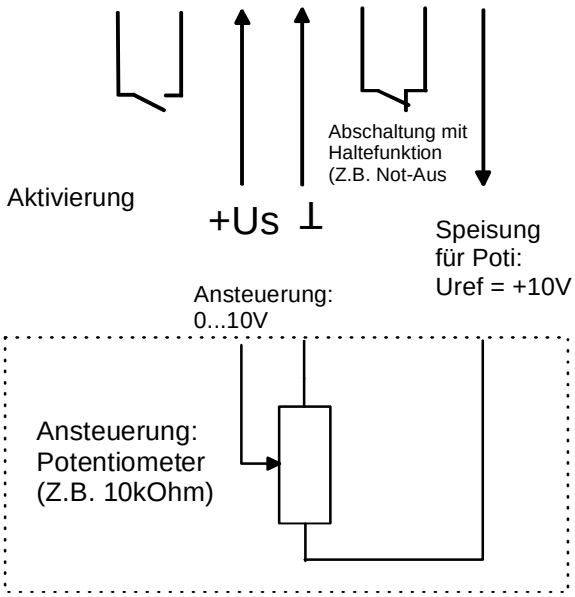
8. Analog Module (Version 2)

(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.

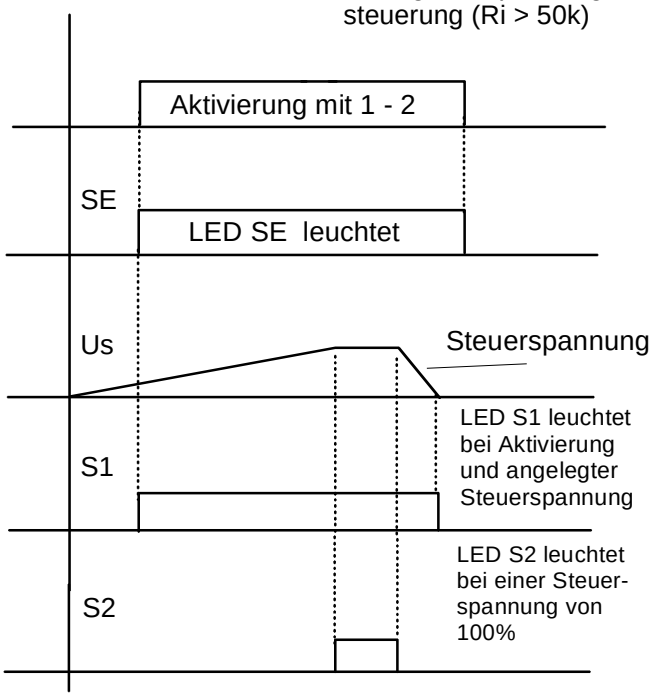
Schalteingang: SE (LED 3)
Leuchtet bei Aktivierung;

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

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

Wahlschalter: Bürde von 500 Ohm für Stromschleife

U-Eing. für Spannungsansteuerung (Ri > 50k)



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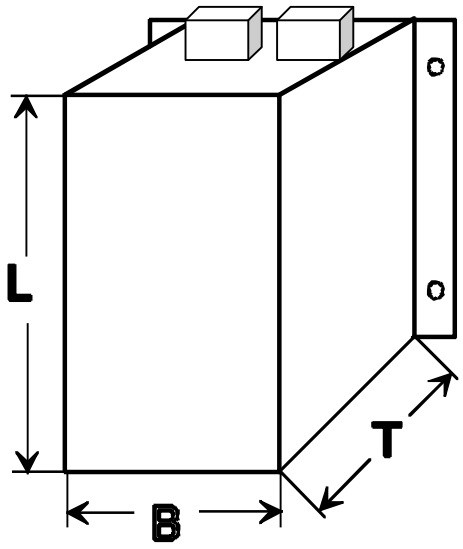
9. Zusammenstellung der einzelnen Typen:

TYP	MAXIMALER LASTSTROM [A]	EMPFOHLENE HALBLEITER-SICHERUNG [A]	LEITUNGS-SICHERUNG [A]	EMPFOHLENER QUERSCHNITT [MM²]	GEWICHT [KG]	BAU-FORM	MAßE L X B X T [MM]
TS2 (SP) 3ph 8A	8	15	16	1,5	1,3	A	200x140x115
TS2 (SP) 3ph 15A	15	25	25	2,5	1,9	B	195x260x170
TS2 (SP) 3ph 25A	25	30	32	4,0	1,9	B	195x260x170
TS2 (SP) 3ph 35A	35	40	50	6,0	2,3	B	195x260x170
TS2 (SP) 3ph 50A	50	60	80	10	2,3	B	195x260x170
TS2 (SP) 3ph 60A	60	80	100	16	2,4	B	195x260x170
TS2 (SP) 3ph 75A	75	80	100	25	3,7	C	235x360x200
TS2 (SP) 3ph 90A	90	100	125	35	3,9	C	235x360x200
TS2 (SP) 3ph 120A	120	130	200	50	3,9	C	235x360x200
TS2 (SP) 3ph 160A	160	200	250	50	4,2	C	235x360x200
TS2 (SP) 3ph 220A	220	300	300	70	8,5	D	435x360x240
TS2 (SP) 3ph 280A	280	400	350	95	8,8	D	435x360x240
TS2 (SP) 3ph 350A	350	450	400	120	9,3	D	490x360x240
TS2 (SP) 3ph 420A	420	600	500	150	9,8	D	490x360x240
TS2 (SP) 3ph 560A	560	750	630	240	18	E	545x600x346
TS2 (SP) 3ph 720A	720	900	800	300	18	E	545x600x346
TS2 (SP) 3ph 1000A	1000	1200	1200	500	18,9	E	545x600x346
TS2 (SP) 3ph 1250A	1250	1800	1500	2x300	36	F	715x850x396
TS2 (SP) 3ph 1600A	1600	2000	1600	2x500	38	F	715x850x396

*Irrtümer und technische Änderungen vorbehalten

Stand: September 2002

Die angegebenen Werte beziehen sich auf eine Nennbetriebsspannung von 400V AC.
Die angegebenen Werte für die Belastbarkeit gelten bei einer Umgebungstemperatur von max. 40°C und einer Aufstellhöhe von max. 1000m.
Nach VDE 0298 Teil 4, 1998-11



10. Technical Data:

Mains voltage:	400V AC
Supply voltage:	internal production
Load circuit:	see table under 9. (resistive and inductive)
Net frequency:	48 – 62Hz
Rotating field:	self-synchronised
Protection class:	IP20
Weathering resistance:	E accord. to DIN 40040
Built-in device:	accord. to VDE 0558
Installation:	upright, electrical connections down
Display of operation mode:	LED´s (SE, S1, S2, U_h)
Ambient temperature:	0... +45°C
Current limiting:	5... 100% of I_n
Failure messages:	Phase failure, temperature of heat sink, under voltage, thyristor failure
Control signals:	0 – 10V DC 0 – 20mA Potentiometer 10kΩ