

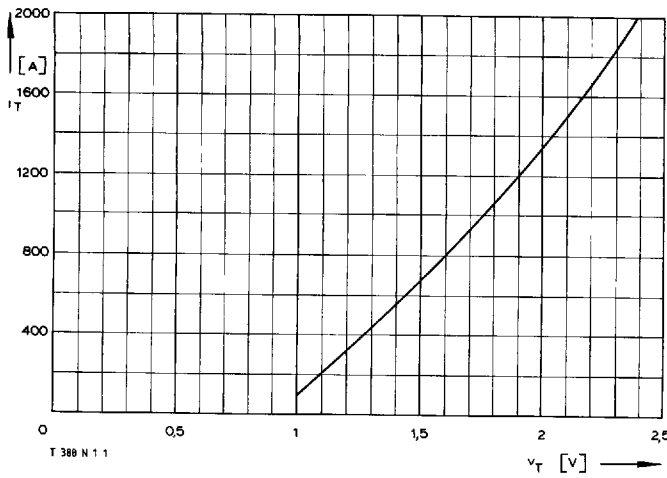
T 388 N

T-25-19

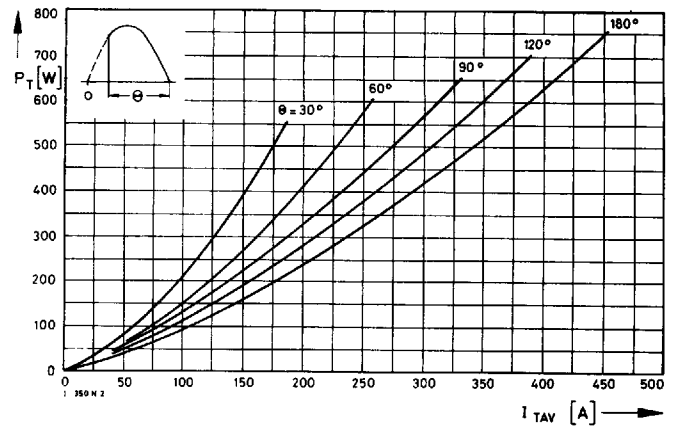
Typenreihe/Type range	T 388 N	400*	600	800	1000	1100	1200	1400	1600	1800*
Elektrische Eigenschaften		Electrical properties								
<u>Höchstzulässige Werte</u>		<u>Maximum permissible values</u>								
V_{DRM}, V_{RRM}	Periodische Vorwärts- und Rückwärts-Sperrspannung								400...1800	V
I_{TRMSM}	Effektiver Durchlaßstrom								730	A
I_{TAVM}	Dauergrenzstrom								388	A
									465	A
I_{TRM}	Periodischer Spitzenstrom								4400	A
I_{TSM}	Stoßstrom-Grenzwert								7200	A
$\int i^2 dt$	Grenzlastintegral								6400	A
									260000	A ² s
									205000	A ² s
$(di/dt)_{cr}$	Kritische Stromsteilheit								600	A/ μ s
									120	A/ μ s
$(dv/dt)_{cr}$	Kritische Spannungssteilheit								400	V/ μ s
									1000	V/ μ s
<u>Charakteristische Werte</u>		<u>Characteristic values</u>								
V_T	Obere Durchlaßspannung								2,1	V
$V_{(TO)}$	Schleusenspannung								0,9	V
r_T	Ersatzwiderstand								0,75	m Ω
V_{GT}	Obere Zündspannung								2	V
I_{GT}	Oberer Zündstrom								200	mA
	Unterer Zündstrom								10	mA
I_H	Oberer Haltestrom								300	mA
I_L	Oberer Einraststrom								1,2	A
I_D, I_R	Oberer Vorwärts- und Rückwärts-Sperrstrom								50	mA
t_{gd}	Oberer Zündverzög								4	μ s
t_q	Typische Freiwerdezeit								220	μ s
C_{null}	Typische Nullkapazität								4	nF
Thermische Eigenschaften		Thermal properties								
R_{thJC}	Innerer Wärmewiderstand für beidseitige Kühlung								$\theta = 180^\circ\text{el, sinus}$	$\leq 0,068^\circ\text{C/W}$
									DC	$\leq 0,065^\circ\text{C/W}$
$R_{thJC(A)}$	für anodenseitige Kühlung								$\theta = 180^\circ\text{el, sinus}$	$\leq 0,113^\circ\text{C/W}$
									DC	$\leq 0,11^\circ\text{C/W}$
$R_{thJC(K)}$	für kathodenseitige Kühlung								$\theta = 180^\circ\text{el, sinus}$	$\leq 0,159^\circ\text{C/W}$
									DC	$\leq 0,156^\circ\text{C/W}$
R_{thCK}	Wärmewiderstand für einen Übergang zwischen Gehäuse und Kühlkörper									0,02 $^\circ\text{C/W}$
$t_{vj\ max}$	Höchstzul. Sperrschichttemperatur									125 $^\circ\text{C}$
$t_{vj\ op}$	Betriebstemperatur									- 40 $^\circ\text{C}$...+125 $^\circ\text{C}$
t_{stg}	Lagertemperatur									- 40 $^\circ\text{C}$...+140 $^\circ\text{C}$
Mechanische Eigenschaften		Mechanical properties								
G	Gewicht									100 g
F	Anpreßkraft									5,5...8 kN
	Maßbild								DIN 41814-152 A 4	Seite/page 240
	Kriechstrecke									17 mm
	Feuchteklasse								DIN 40040	C
	Schüttelfestigkeit								f = 50 Hz	5x9,81 m/s ²

* Für größere Stückzahlen bitte Liefertermin erfragen/Delivery for larger quantities on request

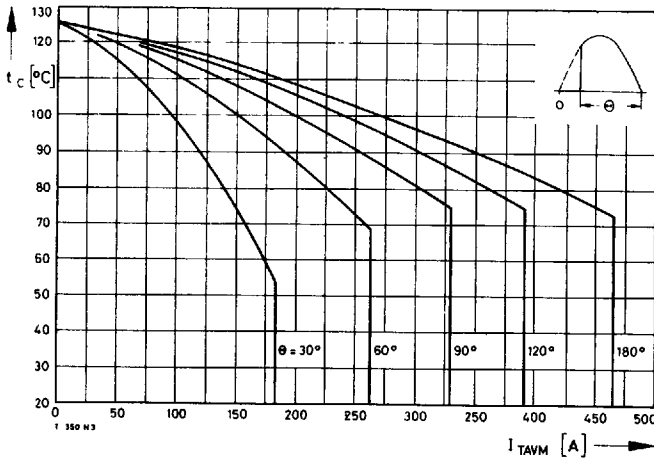
T-25-19



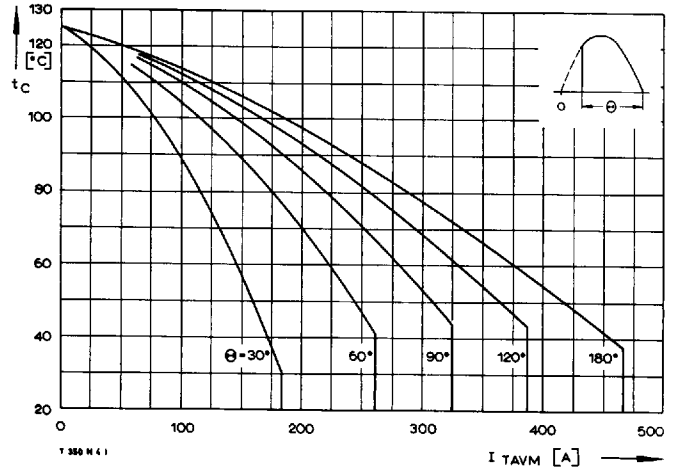
Bild/Fig. 1
Grenzdurchlaßkennlinie bei $t_{vj \max}$
Max. on-state characteristic at $t_{vj \max}$



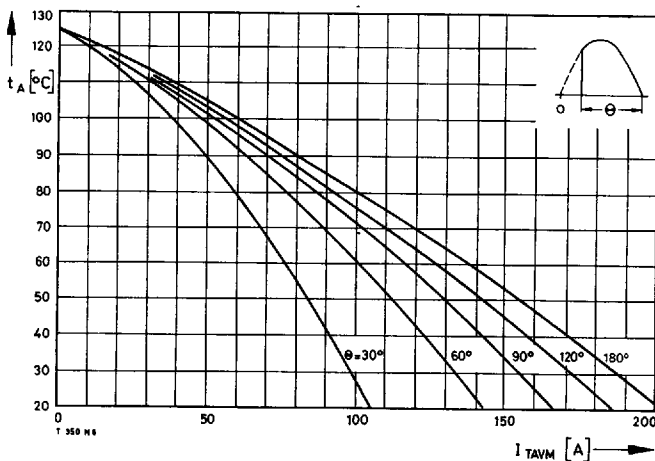
Bild/Fig. 2
Durchlaßverlustleistung P_T /On-state power loss P_T
Parameter: Stromflußwinkel Θ /current conduction angle Θ



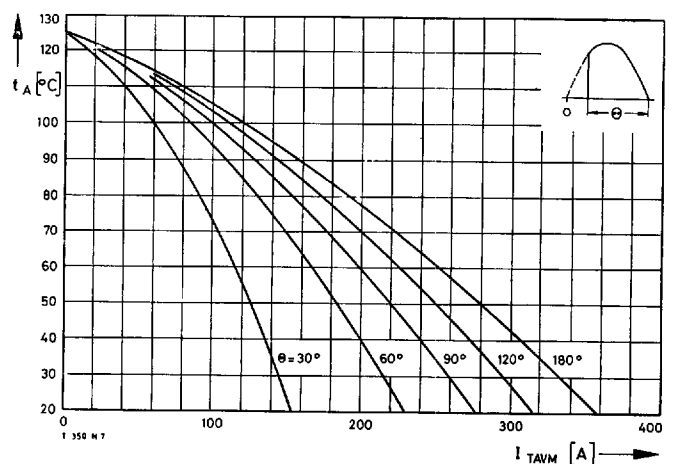
Bild/Fig. 3
Höchstzulässige Gehäusetemperatur t_c bei **beidseitiger** Kühlung
Maximum allowable case temperature t_c at **two-sided** cooling



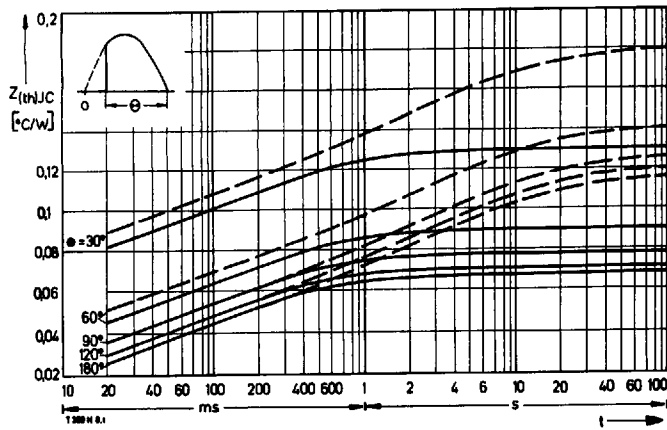
Bild/Fig. 4
Höchstzulässige Gehäusetemperatur t_c bei **anodenseitiger** Kühlung
Maximum allowable case temperature t_c at **anode sided** cooling



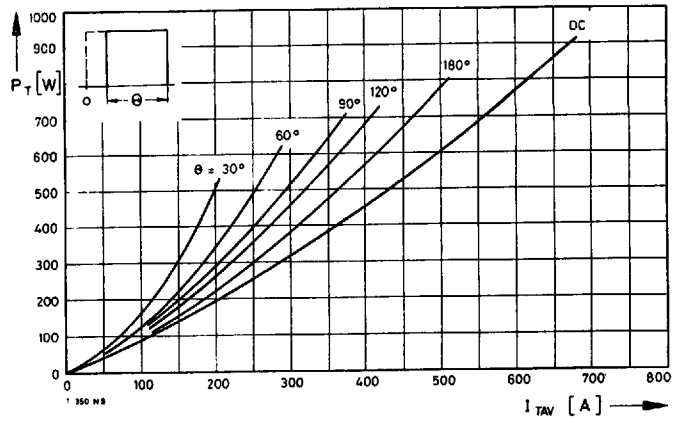
Bild/Fig. 5
Höchstzulässige Kühlmitteltemperatur t_A bei beidseitiger **Luftselbst**kühlung, Kühlkörper **K0.36 S**.
Maximum allowable cooling medium temperature t_A at **natural** two-sided cooling, heatsink type **K0.36 S**.



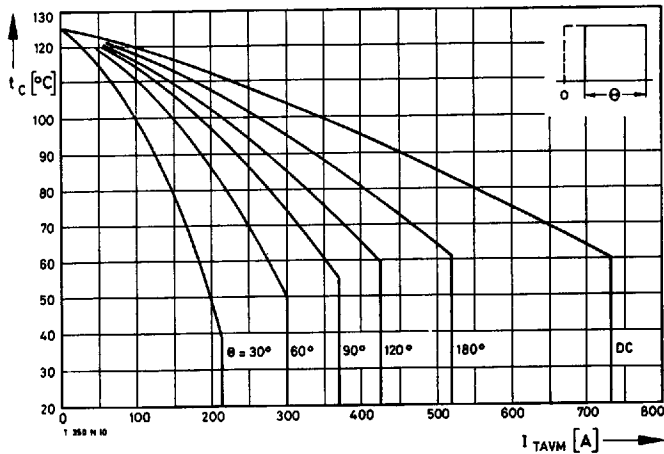
Bild/Fig. 6
Höchstzulässige Kühlmitteltemperatur t_A bei **verstärkter** beidseitiger Luftkühlung, Kühlkörper **K0.12 F**, $V_L = 50$ l/s.
Maximum allowable cooling medium temperature t_A at **forced** two-sided cooling, heatsink type **K0.12 F**, $V_L = 50$ l/s.



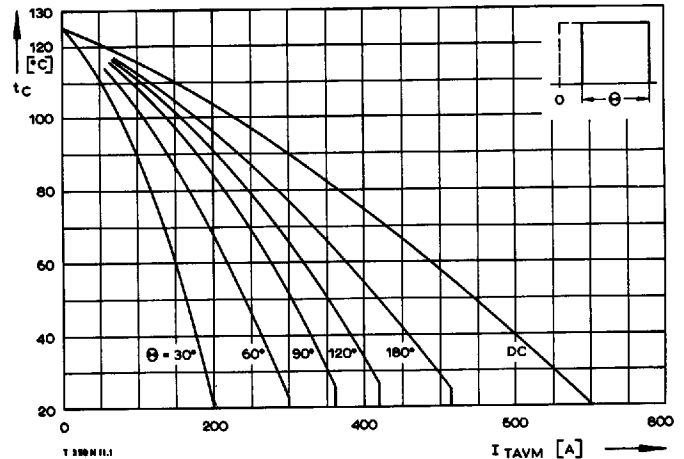
Bild/Fig. 7
 Transienter innerer Wärmewiderstand $Z_{th(JC)}$
 Transient thermal impedance, junction to case, $Z_{th(JC)}$
 - - - - - anodenseitige Kühlung/anode sided cooling
 ————— beidseitige Kühlung/two-sided cooling



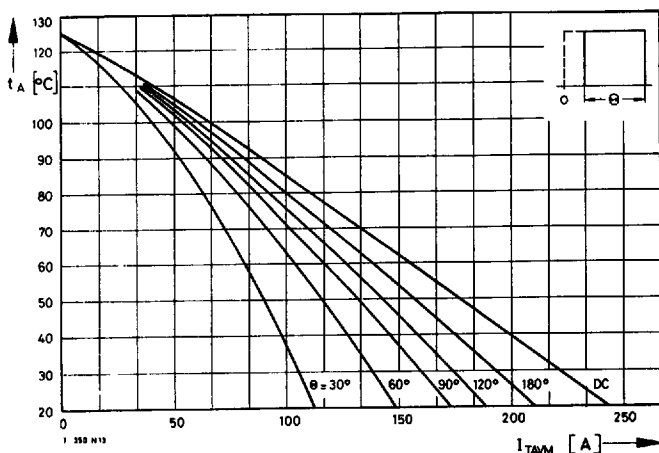
Bild/Fig. 8
 Durchlaßverlustleistung P_T /On-state power loss P_T
 Parameter: Stromflußwinkel Θ /current conduction angle Θ



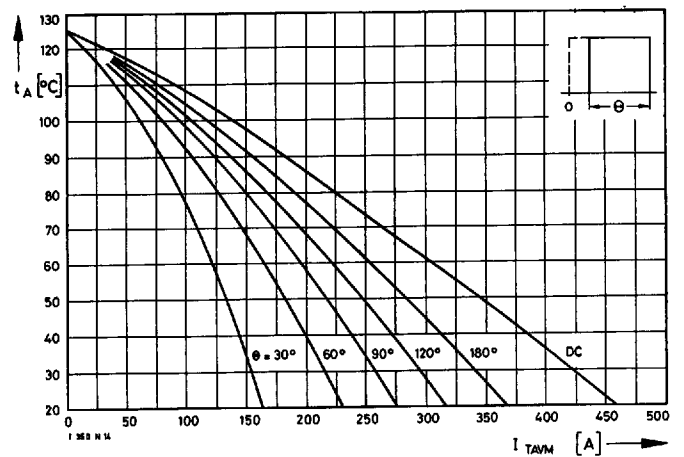
Bild/Fig. 9
 Höchstzulässige Gehäusetemperatur t_c bei beidseitiger Kühlung
 Maximum allowable case temperature t_c at two-sided cooling



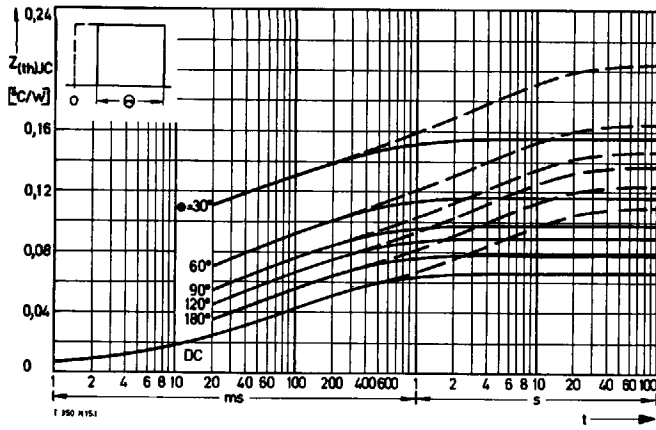
Bild/Fig. 10
 Höchstzulässige Gehäusetemperatur t_c bei anodenseitiger Kühlung
 Maximum allowable case temperature t_c at anode sided cooling



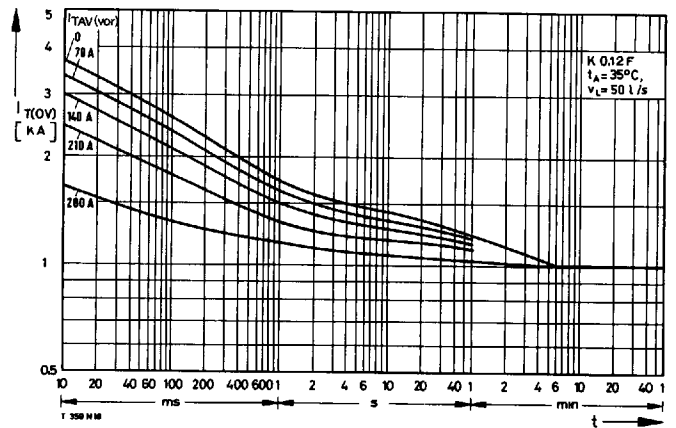
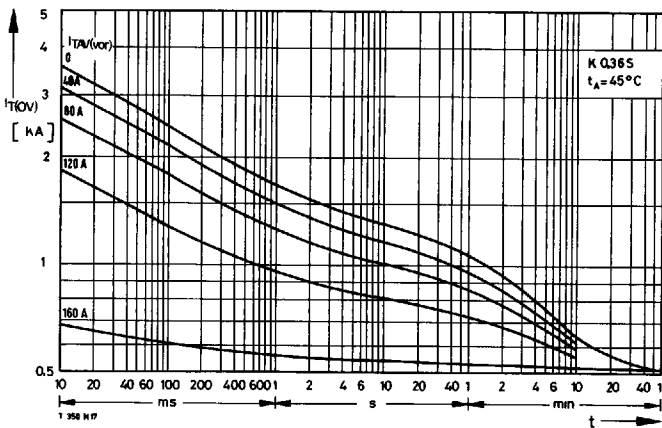
Bild/Fig. 11
 Höchstzulässige Kühlmitteltemperatur t_A bei beidseitiger Luftselbstkühlung,
 Kühlkörper K0,36 S.
 Maximum allowable cooling medium temperature t_A at natural two-sided cooling,
 heatsink type K0.36 S.



Bild/Fig. 12
 Höchstzulässige Kühlmitteltemperatur t_A bei verstärkter beidseitiger Luftkühlung,
 Kühlkörper K0,12 F, $V_L = 50$ l/s.
 Maximum allowable cooling medium temperature t_A at forced two-sided cooling,
 heatsink type K0.12 F, $V_L = 50$ l/s.

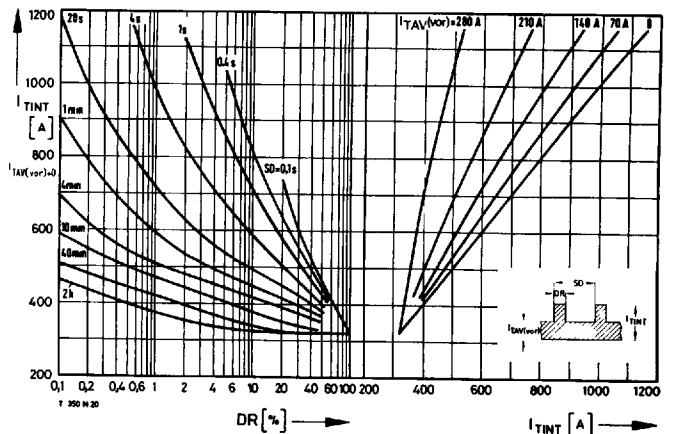
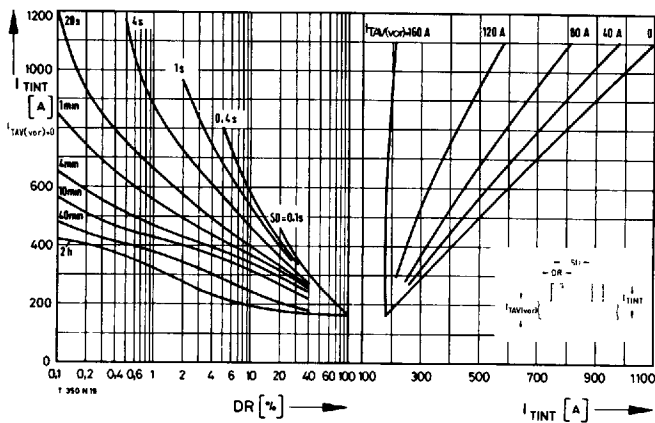


Bild/ Fig. 13
 Transienter innerer Wärmewiderstand $Z_{(th)JC}$
 Transient thermal impedance, junction to case, $Z_{(th)JC}$
 - - - - anodenseitige Kühlung/anode sided cooling
 ——— beidseitige Kühlung/two-sided cooling



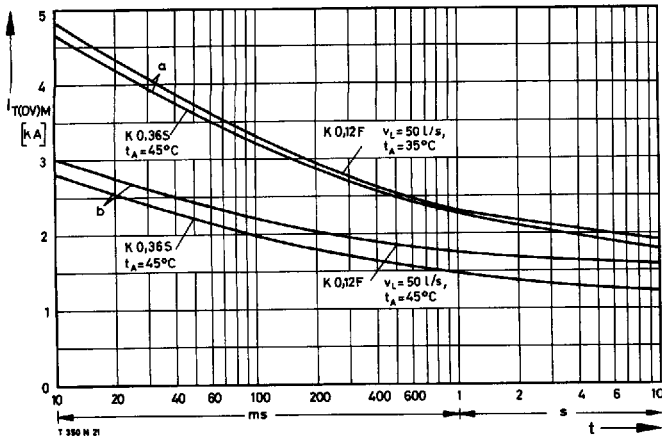
Bild/ Fig. 14
 Überstrom $I_{T(OV)}$ bei beidseitiger Luftselbstkühlung, $t_A = 45^\circ\text{C}$,
 Kühlkörper K0,36S.
 Overload on-state current $I_{T(OV)}$ at natural two-sided cooling, $t_A = 45^\circ\text{C}$,
 heatsink type K0,36S.
 Parameter: Vorlaststrom/pre-load current $I_{TAV(vor)}$

Bild/ Fig. 15
 Überstrom $I_{T(OV)}$ bei verstärkter beidseitiger Luftkühlung, $t_A = 35^\circ\text{C}$,
 Kühlkörper K0,12F, $V_L = 50 \text{ l/s}$.
 Overload on-state current $I_{T(OV)}$ at forced two-sided cooling, $t_A = 35^\circ\text{C}$,
 heatsink type K0,12F, $V_L = 50 \text{ l/s}$.
 Parameter: Vorlaststrom/pre-load current $I_{TAV(vor)}$

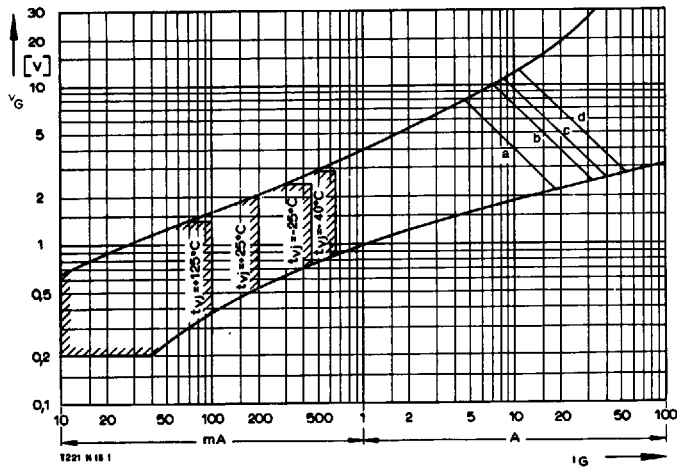


Bild/ Fig. 16
 Höchstzulässiger Durchlaßstrom I_{TINT} bei Aussetzbetrieb und beidseitiger
 Luftselbstkühlung, $t_A = 45^\circ\text{C}$, Kühlkörper K0,36S.
 Limiting on-state current I_{TINT} during intermittent operation at natural two-sided
 cooling, $t_A = 45^\circ\text{C}$, heatsink type K0,36S.
 Parameter: Spieldauer/cycle duration SD
 Vorlaststrom/pre-load current $I_{TAV(vor)}$

Bild/ Fig. 17
 Höchstzulässiger Durchlaßstrom I_{TINT} bei Aussetzbetrieb und verstärkter
 beidseitiger Luftkühlung, $t_A = 35^\circ\text{C}$, Kühlkörper K0,12F, $V_L = 50 \text{ l/s}$.
 Limiting on-state current I_{TINT} during intermittent operation at forced two-sided
 cooling, $t_A = 35^\circ\text{C}$, heatsink type K0,12F, $V_L = 50 \text{ l/s}$.
 Parameter: Spieldauer/cycle duration SD
 Vorlaststrom/pre-load current $I_{TAV(vor)}$

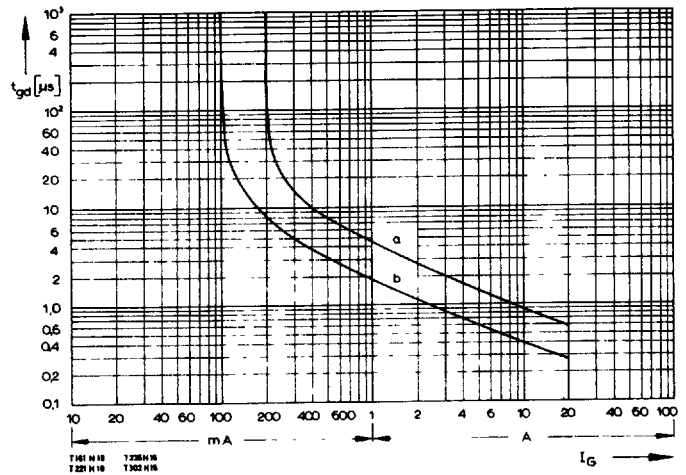


Bild/Fig. 18
 Grenzstrom $I_{T(OV)M}$ bei beidseitiger Kühlung, Kühlkörper K0,36S und K0,12F, $U_{RM} = 0,8 U_{RRM}$.
 Limiting overload on-state current $I_{T(OV)M}$ at two-sided cooling, heatsink type K0.36S and K0.12F, $U_{RM} = 0,8 U_{RRM}$.
 a – Belastung aus Leerlauf/current surge under no-load conditions
 b – Belastung nach Betrieb mit Dauergrenzstrom I_{TAVM} / current surge occurs during operation at limiting mean on-state current rating I_{TAVM}

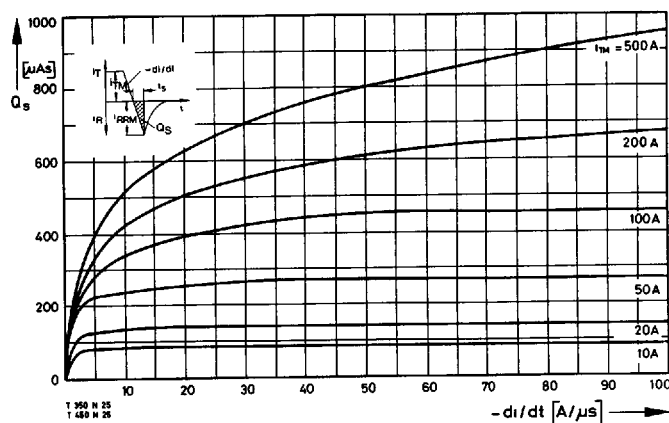


Bild/Fig. 19
 Zündbereich und Spitzensteuerleistung bei $v_D \geq 6 V$.
 Gate characteristic and peak gate power dissipation at $v_D \geq 6 V$.

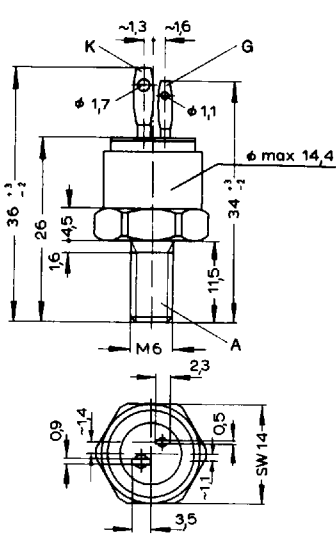
Parameter:	a	b	c	d
Steuerimpulsdauer/Pulse duration t_g [ms]	10	1	0,5	0,1
Höchstzulässige Spitzensteuerleistung/ Maximum allowable peak gate power [W]	40	80	100	150



Bild/Fig. 20
 Zündverzögerung t_{gd} bei $i_{TM} = 100 A$, $t_j = 25°C$.
 Gate controlled delay time t_{gd} at $i_{TM} = 100 A$, $t_j = 25°C$.
 a – äußerster Verlauf/limiting characteristic
 b – typischer Verlauf/typical characteristic

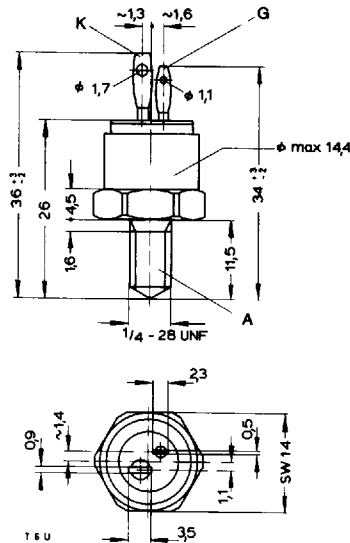


Bild/Fig. 21
 Nachlaufadung Q_s in Abhängigkeit von der abkommütierenden Stromsteilheit $-di/dt$ bei $t_j = 125°C$.
 Der angegebene Verlauf wird von 90% aller Thyristoren nicht überschritten.
 Lag charge Q_s versus the rate of decay of the forward on-state current $-di/dt$ at $t_j = 125°C$.
 These curves are valid for 90% of all thyristors.



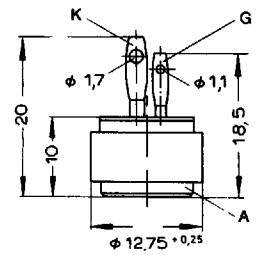
T 7 N...C
T 10 N...C
T 13 N...C

1



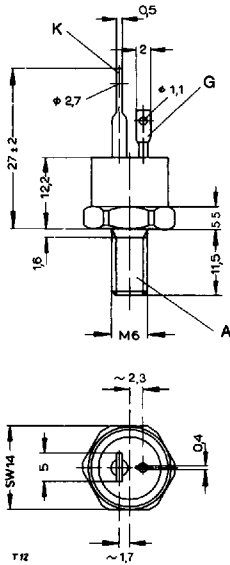
T 7 N...U
T 10 N...U
T 13 N...U

2



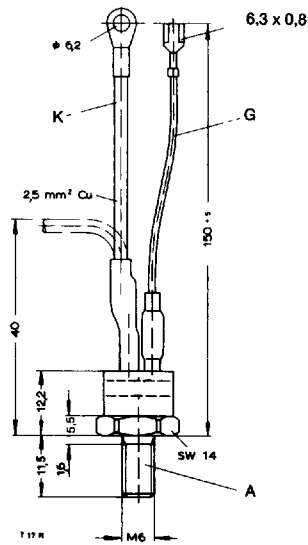
T 7 N...H
T 10 N...H
T 13 N...H

3



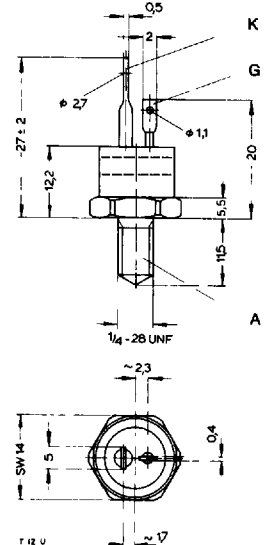
T 12 N...C
T 15.1 N...C
T 17 N...C
T 24 N...C
T 31 N...C

4



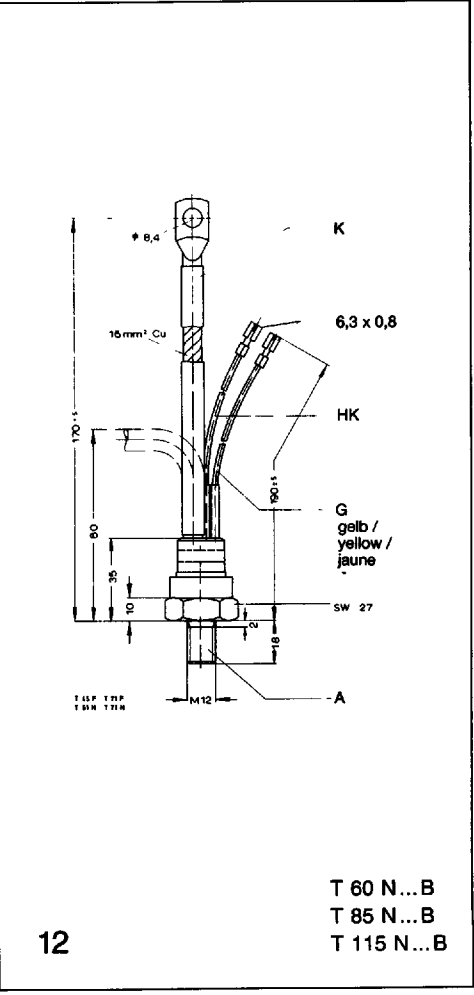
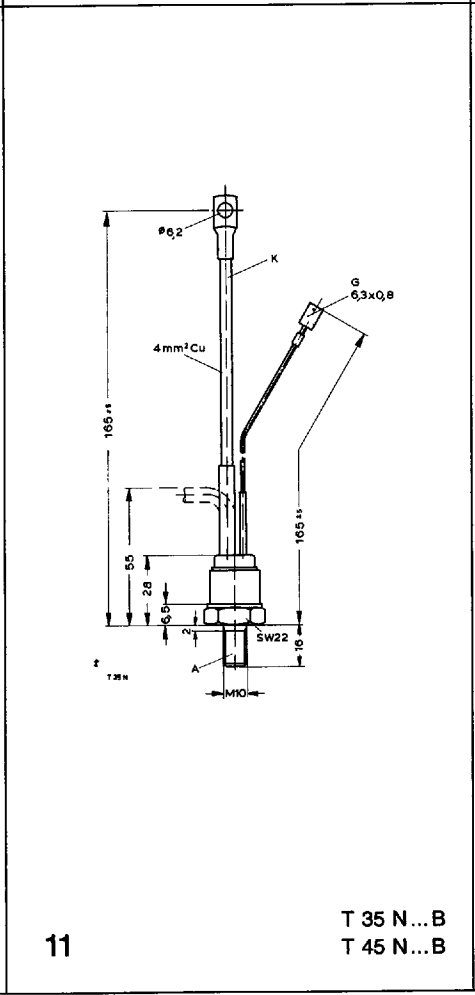
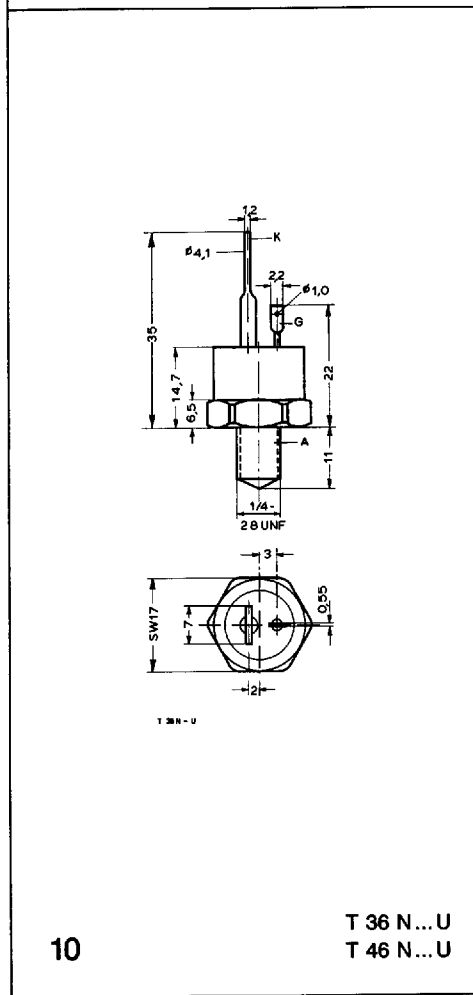
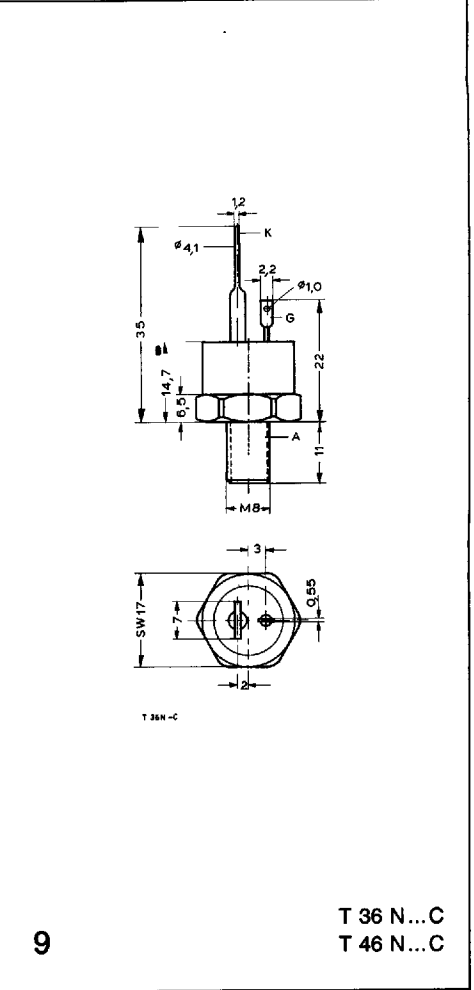
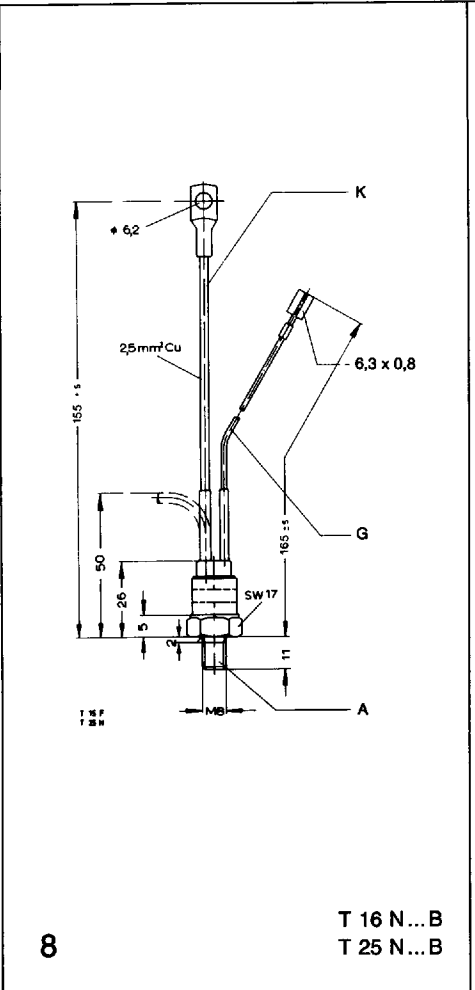
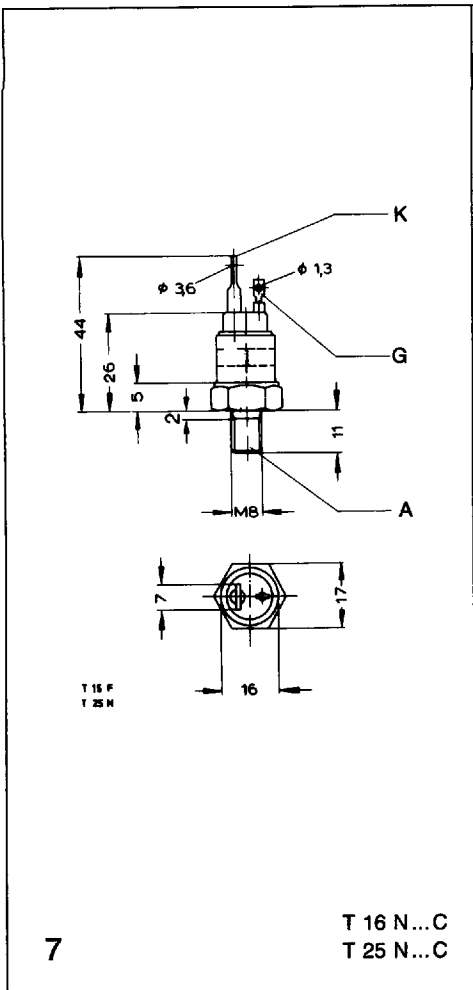
T 17 N...B
T 24 N...B
T 31 N...B

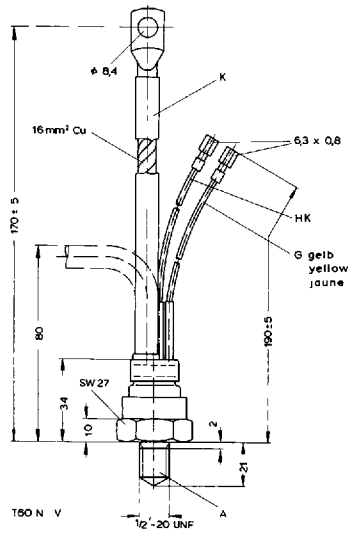
5



T 12 N...U
T 15.1 N...U
T 17 N...U
T 24 N...U
T 31 N...U

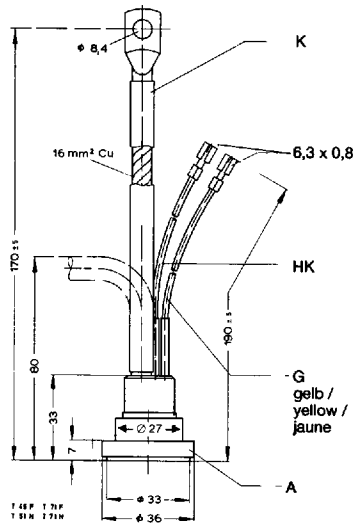
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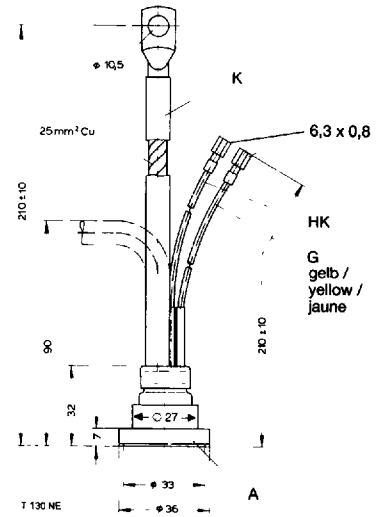
13

T 60 N...V
T 85 N...V
T 115 N...V



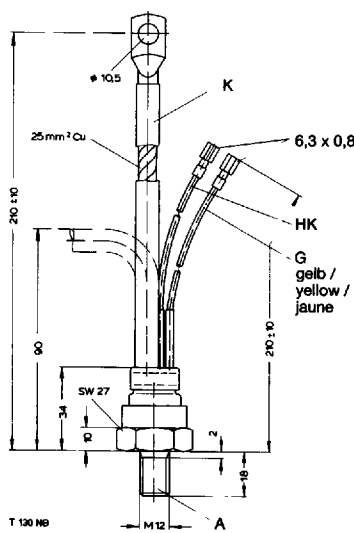
14

T 115 N...E



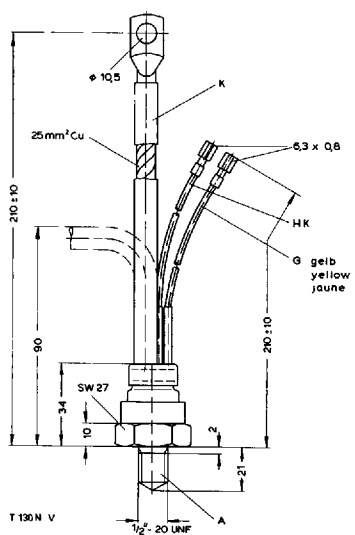
15

T 130 N...E
T 160 N...E



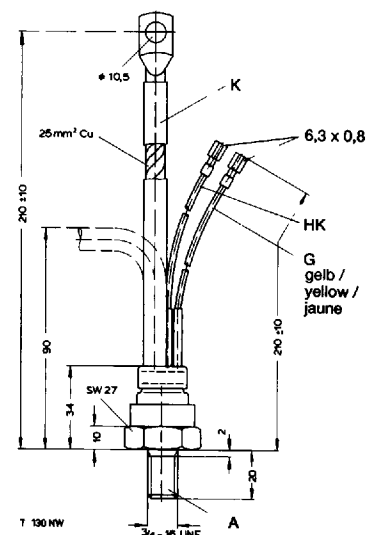
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T 130 N...B
T 160 N...B
T 210 N...B



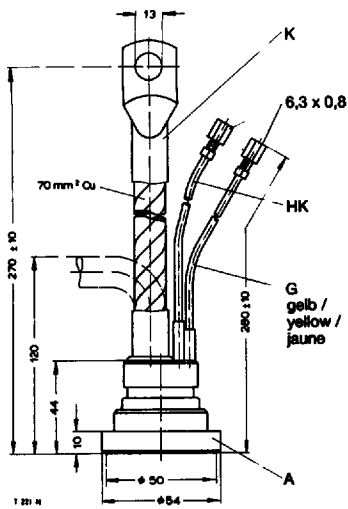
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T 130 N...V
T 160 N...V
T 210 N...V



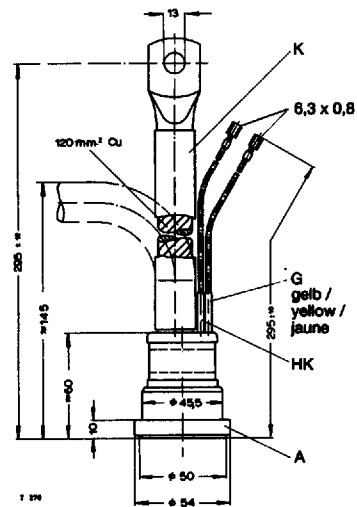
18

T 130 N...W
T 160 N...W
T 210 N...W



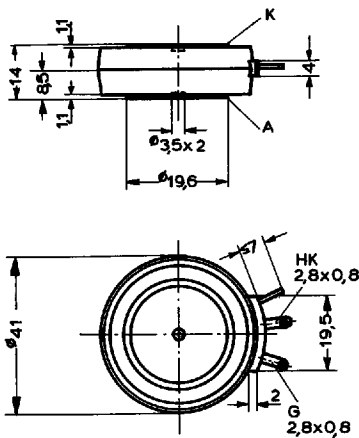
T 175 N
T 221 N
T 235 N
T 236 N
T 345 N

19



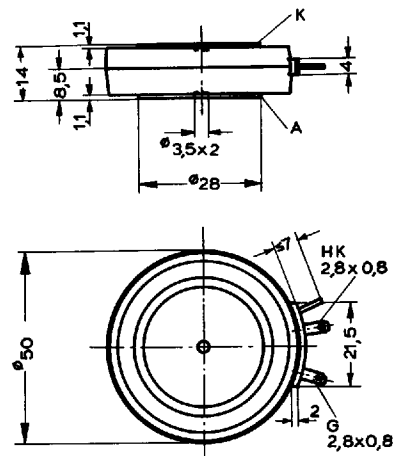
T 270 N

20



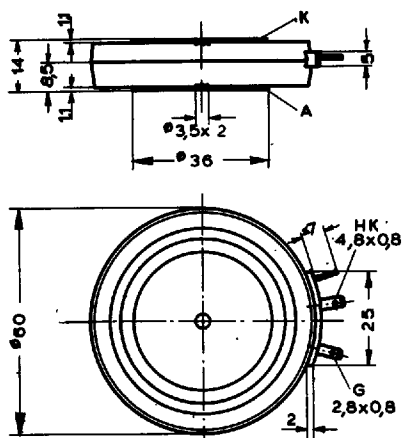
T 178 N
T 198 N
T 218 N
T 298 N
T 348 N
T 358 N
T 398 N

21



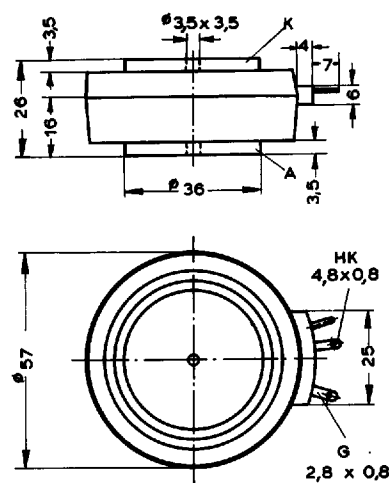
T 308 N
T 388 N
T 508 N
T 588 N
T 828 N

22



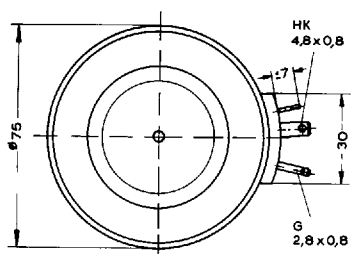
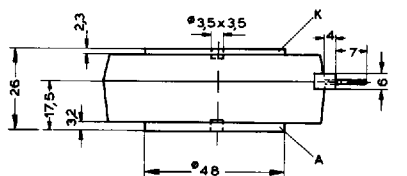
T 718 N
T 1258 N

23



T 459 N
T 509 N
T 529 N
T 719 N
T 1259 N

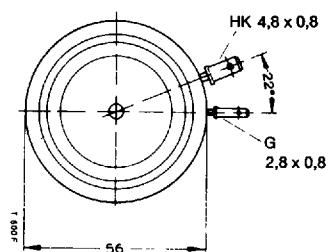
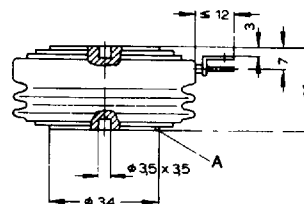
24



1700 N

25

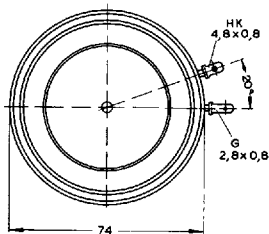
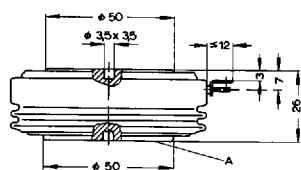
T 709 N
T 869 N
T 949 N
T 1059 N
T 1099 N
T 1209 N



1000 I

26

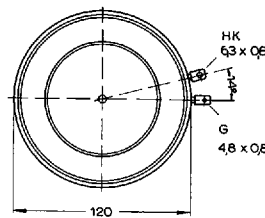
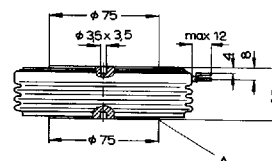
T 380 N



T 660 N

27

T 625 N
T 860 N
T 1050 N
T 1200 N



T 1370 N

28

T 1270 N
T 1580 N
T 1900 N