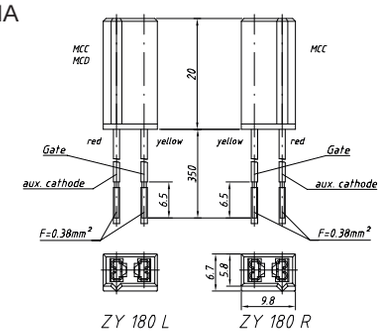
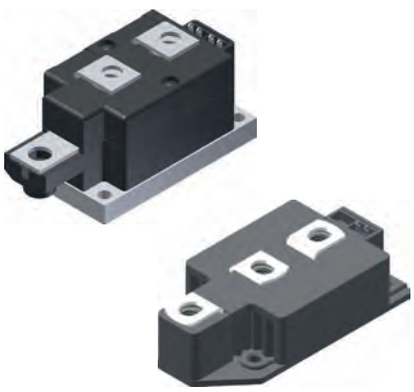
# Optional Accessories for Thyristor / Diode Modules

For module types MCC/MCD/MCO/MCMA/MCNA 132, 161 up to 700 (for MCD/MCO only L-type):
Keyed Gate Cathode twin plugs
with wire length = 350 / 480 mm
gate = white, cathode = red

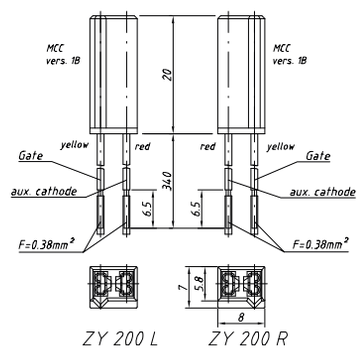
Type **ZY 180 L** (L = Left for pin pair 4/5)
Type **ZY 180 R** (R = Right for pin pair 6/7)



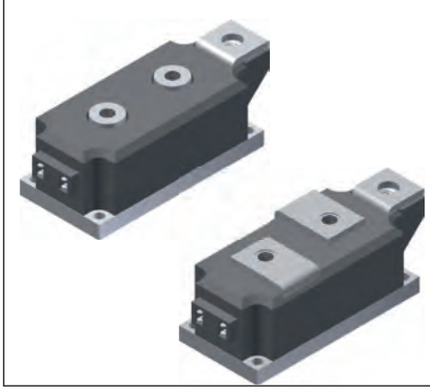



For module-type TO-240 package MCC/MCD/ MCMA/MCNA 19 up to120 and 140 (version 1):
Keyed Gate Cathode twin plugs with wire length = 340 / 460 mm;
gate = white, cathode = red

Type **ZY 200 L** (L = Left for pin pair 4/5)
Type **ZY 200 R** (R = Right for pin pair 6/7)



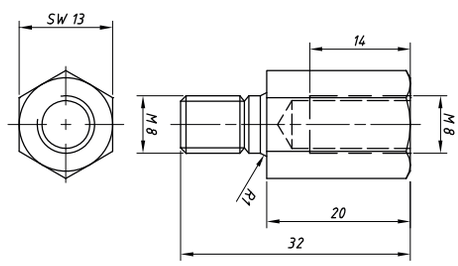

For ZY 180 and ZY 200: UL 758 Style 3751



For module types MCC/MCD/MDD 310
Threaded spacer for higher Anode / Cathode construction:

Type **ZY 250** (material brass)

**Not for new design**




# Design Information

## For Thyristors, Diodes, Thyristor / Diode Modules and Rectifier Bridges

***Surge current***

The 60 Hz value of $I_{TSM}$ is 10% higher than the 50 Hz value
The $I_{TSM}$ value at $T_{VJM}$ is 10% to 15% lower than the 45°C value

***Limiting I²t***

50 Hz: $I^2t$ [$A^2s$] = $I_{TSM}$ [A] • $I_{TSM}$ [A] • 0.005 [s]; use rated $I_{TSM}$ value (10 ms)
60 Hz: $I^2t$ [$A^2s$] = $I_{TSM}$ [A] • $I_{TSM}$ [A] • 0.0042 [s]; use 60-Hz-value of $I_{TSM}$

***Forward current***

The average current ratings in tables are mostly specified for temperature conditions of: $T_A$ = 45°C, $T_C$ = 85°C or $T_C$ = 100°C.
For other temperature conditions the current ratings can be calculated using the following formulas applicable up to 400 Hz.

$$I_{TAV} = \frac{-V_{T0} + \sqrt{V_{T0}^2 + 4 \cdot k^2 \cdot r_T \cdot P}}{2 \cdot k^2 \cdot r_T}$$ where $$P = \frac{T_{VJM} - T_C}{R_{thJC}}$$ or $$P = \frac{T_{VJM} - T_A}{R_{thJA}}$$

$I_{TAV}$ [A], P [W]; $V_{T0}$ [V]; $r_T$ [Ω], $T_{VJM}$ [°C], $T_C$ [°C], $T_A$ [°C], $R_{thJC}$ [K/W], $R_{thJA}$ [K/W]

$k^2$ = 1 for DC current
$k^2$ = 2.5 for sinusoidal half wave current
$k^2$ = 3 for 120° rectangular current
$k^2$ = 6 for 60° rectangular current

The average forward current is limited by the RMS current value $I_{T(RMS)}$.
When the **calculated** value $I_{TAV}$ is higher than $I_{T(RMS)}$ / k, replace it by $I_{TAV} = I_{T(RMS)}$ / k.