

TC2000 TC2001

MODELS



Two Phase Solid State Relays

Specification Sheet

- **Current range from 25A to 1650A at 40°C**
- **Voltage up to 500V (690V for TC2001)**
- **Logic and analogue inputs**
- **Phase angle, burst firing, soft start and single cycle firing available**

Compact, two phase thyristor power switches for electrical heating applications from 100 to 690 volts, 60 to 1200 amps. Higher current ranges available with separate MC2001 driver and thyristor units.

Economic three phase power control

The TC2000 and TC2001 use two thyristor pairs to switch the supply to two legs of a three phase, three wire star or delta load. They can also control two independent single phase loads. The TC2000 and TC2001 work with logic or analogue inputs and deliver whole supply cycles to the load for minimum electrical interference.

Compact size and low power dissipation

These units give space-efficient power control for three phase loads. Switching only two phases reduces by 33% the power dissipated by the thyristors. The compact size and lower dissipation mean that the control cubicle too can be more compact and less expensive.

Better temperature control than contactors

For a reasonable lifetime, mechanical contactors cannot be switched too frequently. The resulting long cycle times cause temperature fluctuation. Shorter cycle times possible with thyristors mean power can be delivered exactly as it is needed to maintain a constant temperature. When used with analogue inputs the TC2000 and TC2001 also compensate for supply variations to hold load power constant and further reduce temperature changes.

Low maintenance costs

Mechanical contactors in electrical heating applications can switch millions of times every year, resulting in relatively short lifetimes. The TC2000 and TC2001 have no moving contacts so will last almost indefinitely.

Additional savings

The short on/off cycle times cause less heater expansion and contraction and reduce breakage due to fatigue and thermo-mechanical stress. Overall savings include reduced costs of new heaters, contacts, installation and lost production. The reduction of scrap also provides a positive benefit.

TC2000

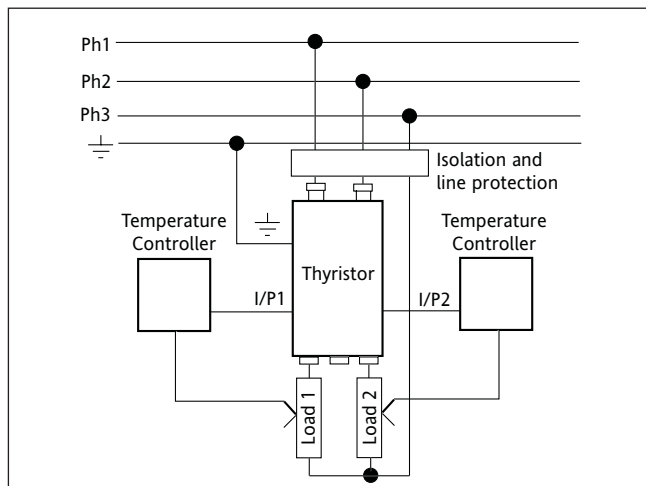
The TC2000 is suitable for controlling Resistive loads with low temperature coefficient. The firing mode is either Burst Firing for analogue inputs or Logic Firing for logic inputs.

TC2001

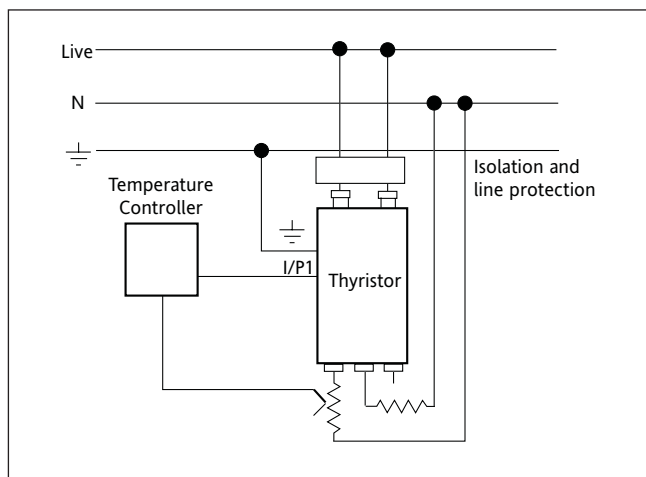
The TC2001 is suitable for controlling Inductive loads including three phase transformers as well as Resistive loads with low temperature coefficient. The firing mode is either Burst Firing with adjustable delayed firing angle on first Cycle or Logic Firing.

The TC2000 and TC2001 thyristor units can either be used to drive either a single three phase 3 wire load or two independent single phase loads.

Example of three phase load being controlled by a TC2000 or TC2001. Load connection "02" in ordering code.



Example of two single phase loads being controlled by TC2000 or TC2001. Load connection "21" in ordering code.



SPECIFICATION

Current:	60A to 1650A per channel (500A max. for TC2000)
Voltage:	120V to 500V per channel (+10%, -15%)
Supply frequency:	50Hz to 60Hz
Auxiliary supply	TC2000: 100V to 240V (+10%, -15%). No auxiliary supply for 60A and 75A logic input units without PLU option. Rating 5VA + fans TC2001: Up to 500A none (self supply), 750A to 1200A-115 or 230VAC fan supply
Environment:	Pollution degree 2 (IEC 664)
Altitude:	Maximum altitude 2000m
Storage temperature:	-10°C to 70°C
Operating temperature:	0°C to 50°C with unit mounted vertically. (40°C for 500A units)

Cooling:	Natural cooling up to 75A Two fans for 100A and 250A, (additional auxiliary supply consumption 25VA per fan) Three fans from 300A to 500A, (additional auxiliary supply consumption 25VA per fan)
TC2001 only:	750A to 1200A one fan 230V 115W (auxiliary supply) Over temperature shut down for fan cooled units
Power dissipation:	Allow for 2Watts per amp per switched phase (includes thyristors and fuses)
Humidity:	5% to 95% RH non condensing
Enclosure protection:	IP20 (IEC 529)
Electrical safety:	Complies with EEC Low Voltage Directive 73/23/EEC dated 19/2/73 amended by directive 93/68/EEC dated 22/7/93 EN 61010 installation category 3 (voltage transients must not exceed 4.0KV)
Electrical protection:	RC snubber network and varistor Built in high speed fuses for thyristor protection only. Line protection to be provided separately
Load	
Load types	TC2000: Resistive load TC2001: Any three phase constant resistance or inductive load
Load configuration:	3 wire star, 3 wire delta
Control type:	Two phases of a three phase system
Phase rotation:	Phase rotation insensitive - connect phases in any order (except when PLU selected on TC2001)
Operation	
Firing modes	TC2000 Burst: Power level determined by analogue input Cycle time 600ms at 500% power Logic: Cycle time defined by logic input Switches on zero crossing in both of the above firing modes TC2001 Burst: Fast cycle 600ms or slow cycle 20s Logic: Cycle time defined by logic input Switches on at zero voltage for resistive loads, at zero current for inductive loads (adjusted by pot. on unit) Setpoint ramp after reset
Power ramps:	
Control	
Analogue input:	TC2000 DC voltage: 0-5V, 1-5V, 0-10V, 2-10V Input impedance 68k DC current: 0-20mA, 4-20mA Input impedance 250Ω TC2001 DC voltage: 0-5V, 1-5V, 0-10V, 2-10V Input impedance 100k DC current: 0-20mA, 4-20mA Input impedance 50ohmΩ
Second input:	Same input ranges as first input - lowest used
Logic input:	Range selected from analogue input. >5V =ON, <1V=OFF
Control mode:	Open loop, V ² 12 or W
Linearity:	Burst firing ±2% for all feedback modes
Stability:	Burst firing ±2% for +10% to -15% supply variation, for 0°C to 50°C ambient temperature
Enable/inhibit:	Logic input of +10V enables operation
Alarm	Loss of any supply phase, under voltage - below 70% or 50%, over voltage above 20% of nominal, frequency error, external measurement signal failure. Thermal switch operation. Any of these will give an alarm
Options	
Partial load unbalance:	Detects 10% unbalance of line currents, fuse failure or short circuit of one thyristor Only with three phase loads
Fuse blown microswitches	

TC2000 Ordering code

TC2000	1	2	3	4	5	6	7	8	9	10	00
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Fuses internal

1 Load Configuration 02 Three phase loads 21 Two single phase loads 2 Current 60A 60 amps 75A 75 amps 100A 100 amps* 150A 150 amps* 250A 250 amps* 300A 300 amps* 400A 400 amps* 500A 500 amps* <i>* Fan cooled</i>	3 Line to Line Voltage 120V 120 volts 240V 240 volts 277V 277 volts 440V 440 volts 480V 480 volts 500V 500 volts 4 Auxiliary Supply ⁽¹⁾ 000 NONE 110V 110 volts 120V 120 volts 220V 220 volts 240V 240 volts <i>(1) Auxiliary supply only required for analogue inputs or units over 75A</i>	5 Input 1 0V5 0-5 volts 1V5 1-5 volts 0V10 0-10 volts 2V10 2-10 volts 0mA20 0-20mA 4mA20 4-20mA LGC Logic dc input ACL Logic ac input	6 Input 2 Three Phase loads 000 None Single Phase loads 0V5 0-5 volts 1V5 1-5 volts 0V10 0-10 volts 2V10 2-10 volts 0mA20 0-20mA 4mA20 4-20mA LGC Logic dc input ACL Logic ac input 7 Language ENG English FRA French GER German	8 Options PLU Partial Load Unbalance† (open in alarm) IPU Partial Load Unbalance† (closed in alarm) † PLU /IPU are only available for three phase applications with analogue or DC Logic Input	9 Options FUMS Fuse Fail Microswitch FUSE High Speed Fuse NOFUSE No Fuse * <i>* High speed fuses are not recommended for SWIR loads</i> 10 EMC Filter - No filter FILT Filter
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Please note that replacement fuses are marked with a higher current rating than the thyristors. This allows correct operation at elevated temperatures and does not imply that higher current is permissible.

SPARE FUSE

Current rating	Fuse rating	Fuse number
60A	80A	LA172468U080
75A	100A	LA172468U100
100A	125A	LA172468U125
150A	200A	LA172468U200
250A	315A	LA172468U315
300A	410A	LA172468U400
400A	500A	LA172468U500
500A	630A	LA172468U630

TC2001 Ordering code

TC2001	1	2	3	4	5	6	7	8	9	10	11	12	13
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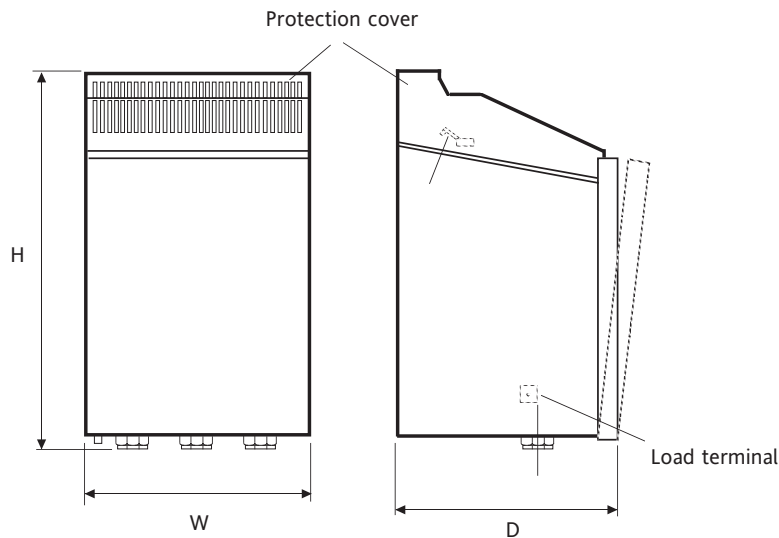
14	15	00
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Fuses included

1 Load Configuration †† 02 Three phase loads 21 Two single phase loads 2 Current 60A 60 amps 75A 75 amps 100A 100 amps 150A 150 amps* 250A 250 amps* 300A 300 amps* 400A 400 amps* 500A 500 amps* 750A 750 amps* 900A 900 amps* 1200A 1200 amps* 1650A 1650 amps* <i>* Fan cooled</i> † Above 1200A, thyristors are external to drive using MC2001 Driver. (690V not available) †† Consult Eurotherm if driving three phase transformer loads	3 Line to Line Voltage 100V 100 volts 110V 110 volts 115V 115 volts 120V 120 volts 200V 200 volts 220V 220 volts 240V 240 volts 380V 380 volts 400V 400 volts 415V 415 volts 440V 440 volts 480V 480 volts 500V 500 volts 690V 690 volts 4 Fan Supply 00 Internal up to 1200A 115V 115 volts 230V 230 volts 5 Input 1 0V5 0-5 volts 1V5 1-5 volts 0V10 0-10 volts 2V10 2-10 volts 0mA20 0-20mA 4mA20 4-20mA	6 Input 2 000 Three phase loads Single phase loads 0V5 0-5 volts 1V5 1-5 volts 0V10 0-10 volts 2V10 2-10 volts 0mA20 0-20mA 4mA20 4-20mA 7 Firing Mode LGC Logic FC Fast cycle SC Slow cycle 8 Control Mode 00 Supply compensation V² Load voltage ² I Load current ² W Active Power 9 Language ENG English FRA French GER German	10 Frequency - 50Hz 60H 60Hz 11 Current Transducer - No current transducer CTE Current transducer fitted 12 13 Partial Load Failure PLU Relay open in alarm IPU Relay closed in alarm 14 Fuse FUSE High speed fuse FUMS High speed fuse with microswitch NOFUSE No fuse * <i>* High speed fuses are not recommended for SWIR loads</i>	15 MC Driver - No MC Driver MC MC Driver SPARE FUSE <table> <tr> <th>Current rating amps</th><th>Fuse rating amps</th><th>Fuse number</th></tr> <tr> <td>60A</td><td>80A</td><td>LA172468U080</td></tr> <tr> <td>75A</td><td>100A</td><td>LA172468U100</td></tr> <tr> <td>100A</td><td>125A</td><td>LA172468U125</td></tr> <tr> <td>150A</td><td>200A</td><td>LA172468U200</td></tr> <tr> <td>250A</td><td>315A</td><td>LA172468U315</td></tr> <tr> <td>300A</td><td>400A</td><td>LA172468U400</td></tr> <tr> <td>400A</td><td>500A</td><td>LA172468U500</td></tr> <tr> <td>500A</td><td>630A</td><td>LA172468U630</td></tr> <tr> <td>750A</td><td>630A</td><td>LA172468U630 *</td></tr> <tr> <td>900A</td><td>900A</td><td>CS175633U900 *</td></tr> <tr> <td>1200A</td><td>1000A</td><td>CS175633U1000 *</td></tr> <tr> <td>1650A</td><td>1400A</td><td>CS175633U1400 *</td></tr> </table> <i>* Two fuses are required</i> ACCESSORIES <table> <tr> <th>Code</th></tr> <tr> <td>Diagnostic 260</td></tr> <tr> <td>260-13-00</td></tr> </table>	Current rating amps	Fuse rating amps	Fuse number	60A	80A	LA172468U080	75A	100A	LA172468U100	100A	125A	LA172468U125	150A	200A	LA172468U200	250A	315A	LA172468U315	300A	400A	LA172468U400	400A	500A	LA172468U500	500A	630A	LA172468U630	750A	630A	LA172468U630 *	900A	900A	CS175633U900 *	1200A	1000A	CS175633U1000 *	1650A	1400A	CS175633U1400 *	Code	Diagnostic 260	260-13-00
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Dimensional details

TC2000 and TC2001



TC2000 and TC2001 (mm)

Unit	Height (H)	Width (W)	Depth (D)	Weight
upto 150A	480	133	268	10kg
250A	480	248	268	16kg
300-500A	570	248	268	16.5kg
<i>TC2001 only</i>				
750A	560	380	510	35kg
900-1200A	560	380	510	39kg

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