

TC2000 TC2001



**EUROTHERM
CONTROLS**

Two phase thyristor power switches



CE

**Product
data**

TC2000 TC2001

Thyristor power switches

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.

Economical three phase power control - The TC2000 and TC2001 use two thyristor pairs to switch the supply to two limbs 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

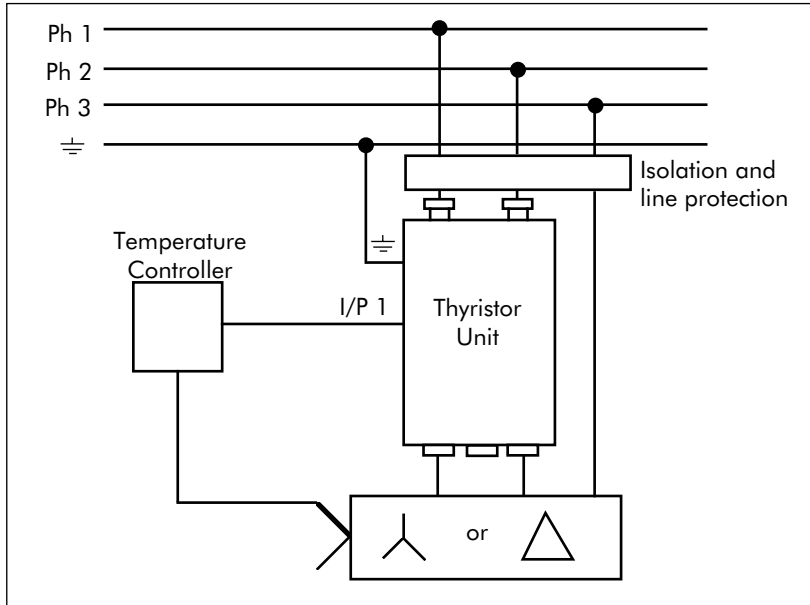
The TC2000 is suitable for controlling **Resistive** loads with low temperature coefficient. The firing mode is either Burst Firing for analogue inputs or Logic Firing for logic inputs.

TC2001

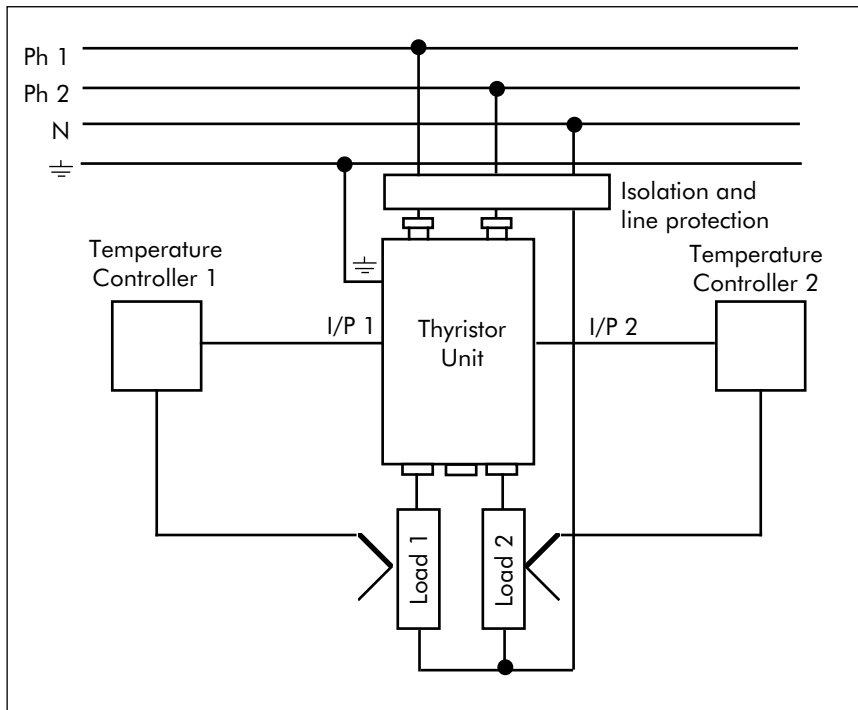
The TC2001 is suitable for controlling **Inductive** loads including three phase transformers as well as **Resistive** loads with low temperature coefficient. The firing mode is either Burst Firing with adjustable delayed firing angle on first Cycle or Logic Firing.

The TC2000 and TC2001 thyristor units can each 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.



TC2000 TECHNICAL SPECIFICATION

Current	60A to 500A per channel
Voltage	120V to 500V per channel (+10%, -15%)
Supply frequency	50Hz to 60Hz
Auxiliary supply	100V to 240V (+10%, -15%). No auxiliary supply for 60A and 75A logic input units without PLU option. Rating 5VA + fans
Pollution	Degree 2 (IEC 664)
Storage temperature	-10°C to 70°C
Operating temperature	0°C to 50°C with unit mounted vertically. (40°C for 500A units)
Cooling	Convection cooling up to 75 amps Fan cooled from 100 amps with thermal switch for over temperature shutdown 100A and 150A: one fan 35VA 250A to 500A: two fans 70VA total
Power dissipation	Allow for 2Watts per amp per switched phase
Environment	Max. altitude 2000m Atmosphere: Non explosive, non-corrosive and non-conductive Humidity 5% to 95% RH non condensing.
Safety	TC2000 meets the essential protection requirements of European Low Voltage Directive 73/23/EEC dated 19/02/73 amended by directive 93/68/EEC dated 22/07/93. EN61010 installation category 3 (voltage transients must not exceed 4Kv)
Electrical protection	RC snubber network and varistor Built in high speed fuses for thyristor protection only. Line protection to be provided separately IP20 rated mechanical protection (front fascia)
EMC standards	Immunity Generic standard : EN 50082-2 Test standards : EN 61000-4-2, EN 61000-4-4 Emissions Generic standard : EN 50081-2 Test standards : EN 55011 Product standard : IEC 1800-3 The choice of the Conducted Emission applicable standard depends on the applications EN 50081-2 : with internal standard filter for 60A and 75A nominal with internal optional filter (FILT option) for 100A and 150A nominal IEC 1800-3 : without filter. Applies for the second environment (industrial environment)
EMC filter	To reduce the conducted emissions that occur when using thyristor units, the EMC internal filter is added (standard for 60A and 75A; optional for 100A and 150A).
Load	
Load type	Constant resistance
Load configuration	Two leg control of three phase, three wire star or delta Dual independent single phase line-to-neutral or line-to line loads
Phase rotation	Phase rotation insensitive (except when PLU option fitted)
Operation	
Firing modes	Burst: Power level determined by analogue input. Cycle time 600ms at 50% power Logic: Cycle time defined by logic input Switches on zero crossing in both of the above firing modes
Control mode	Compensation for supply voltage compensation with burst firing only
Analogue input	DC voltage range: 0-5V; 1-5V; 0-10V; 2-10V Input impedance 68kΩ DC current range: 0-20mA; 4-20mA Input impedance 250Ω
Manual input	Using external 5kΩ potentiometer input configured for 0-5V
Logic input	DC voltage: ON>5V, OFF<1V (Max 25V), impedance 390 ohms AC voltage: ON>85V, OFF<10V (Max 264V), impedance 10k ohms (50Hz)
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

Basic Product	Load Config.	Current	Voltage	Auxiliary Supply	Input 1	Input 2	Options
TC 2000							96/00

Load Configuration	Code	Input 1	Code	Options	Code
Three phase loads	02	0-5 volts	0V5	Fuse fail microswitch	FUMS
Two single phase loads	21	1-5 volts	1V5	Partial load unbalance (open in alarm)	PLU
Current		0-10 volts	0V10	Partial load unbalance (closed in alarm)	IPU
60 amps	60A	2-10 volts	2V10	Internal EMC filter (100A and 150A)	FILT
75 amps	75A	0-20mA	0mA20	(Standard on 60A and 70A)	
100 amps *	100A	4-20mA	4mA20	Note: PLU and IPU only available for 3 Phase with analogue or DC logic input	
150 amps *	150A	Logic dc input, 0-10V	LGC		
250 amps*	250A	Logic input, 0-240Vac	ACL		
300 amps *	300A	Input 2			
400 amps *	400A	Three phase loads	000	SPARE FUSES	
500 amps *	500A	0-5 volt	0V5	Unit current	Fuse part no.
* Fan cooled		1-5 volts	1V5	60A	LA172468U080
Voltage		0-10 volts	0V10	75A	LA172468U100
120 volts	120V	2-10 volts	2V10	100A	LA172468U125
240 volts	240V	0-20mA	0mA20	150A	LA172468U200
277 volts	277V	4-20mA	4mA20	250A	LA172468U315
440 volts	440V	Logic dc input, 0-10V	LGC	300A	LA172468U400
480 volts	480V			400A	LA172468U500
500 volts	500V			500A	LA172468U630
Auxiliary Supply					
None †	000				
100 volts	100V				
110 volts	110V				
115 volts	115V				
120 volts	120V				
200 volts	200V				
230 volts	230V				
240 volts	240V				

† No auxiliary supply required for 60A and 75A logic fired units without PLU

Please note that replacement fuses are marked with a higher current rating than the thyristors. This allows correct operation at elevated temperature and does not imply that higher current is permissible.

TC2000

TC2001 TECHNICAL SPECIFICATION

Current	60A to 1200A
Voltage	100V to 690V, line to line (+10%, -15%)
Supply frequency	50Hz to 60Hz
Auxiliary supply	Up to 500A none (self supply), 750A to 1200A-115 or 230VAC fan supply
Pollution	Degree 2 (IEC 664)
Storage temperature	-10°C to +70°C
Operating temperature	0°C to 50°C with unit mounted vertically. (40°C for 500A units)
Cooling	Convection cooled up to 75 amps Fan cooled from 100 amps with thermal switch for over temperature shutdown. 100A and 150A: one fan (24VDC 5w) 250A to 500A: two fans (24VDC 5w each) 750A to 1200A one fan 230V 115w (auxiliary supply)
Power dissipation	Allow for 2Watts per amp per switched phase
Environment	Max. altitude 2000m Atmospheres: Non explosive, non-corrosive and non-conductive Humidity 5% to 95% RH non condensing
Safety	TC2001 meets the essential protection requirements of European Low Voltage Directive 73/23/EEC dated 19/02/73 amended by directive 93/68/EEC dated 22/07/93. EN61010 installation category 3 (voltage transients must not exceed 4Kv)
Electrical protection	RC snubber network and varistor Built in high speed fuses for thyristor protection only. Line protection to be provided separately IP20 rated mechanical protection (front fascia)
EMC standards	Immunity Generic standard : EN50082-2 Test standards : EN 61000-4-2, EN 61000-4-4 Emissions Generic standard : EN 50081-2 Test standards : EN 55011 Product standard : IEC 1800-3 The choice of the Conducted Emission applicable standard depends on the applications EN 50081-2 : when used with correctly installed external filter IEC 1800-3 : without filter. Applies for the second environment (industrial environment)
EMC filter - external	

Nominal current of TC2001 product	Series filter Eurotherm part no.	
	Two-phase control of a three phase load	Control of two single-phase loads (2 filters)
60A	FILTER/TRI/63A/00	FILTER/MON/63A/00
75A and 100A	FILTER/TRI/100A/00	FILTER/MON/100A/00

For currents above 150A please contact Eurotherm

Diagnostics Connector for model 260 diagnostic unit for adjustment and monitoring of operating parameters

Load

Load type	Inductive, transformer or constant resistance load
Load configuration	Two leg control of three phase, three wire star or delta Dual independent single phase line-to-neutral or line-to line loads
Phase rotation	Phase rotation insensitive

Operation

Firing modes	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)
Control mode	Supply voltage compensation with burst firing only on standard unit. Power, I ² or V ² feedback with control board option
Analogue input	DC voltage range: 0-5V; 1-5V; 0-10V; 2-10V Input impedance 100k DC current range: 0-20mA; 4-20mA Input impedance 50ohm
Manual input	Using external 4.7k to 10k potentiometer
Logic input	DC ranges as for analogue input

Options

CTE	Current measurement option for use with:
Bar graph	Indicates level of controlled parameter and is used for setting firing delay for inductive loads
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	

TC2001 ORDERING CODE

Basic Product	Load Config.	Current	Voltage	Auxiliary Supply	Input 1	Input 2	Thyristor Firing Mode	Controlled Parameter	Current Measurem	Bar Graphs	Options
TC 2001											96/00

Load Configuration	Code	Input 1	Code	Options
Three phase loads	02	0-5 volts	0V5	Current measurement for options:
Two single phase loads	21	1-5 volts	1V5	Control board
Current		0-10 volts	0V10	Bar graph
60 amps	60A	2-10 volts	2V10	PLU
75 amps	75A	0-20mA	0mA20	PLU
100 amps *	100A	4-20mA	4mA20	Bar graphs
150 amps *	150A	Input 2		Partial load unbalance (three phase only)
250 amps*	250A	Three phase loads	00	Open in alarm
300 amps *	300A	0-5 volt	0V5	Closed in alarm
400 amps *	400A	1-5 volts	1V5	Fuse fail microswitch
500 amps *	500A	0-10 volts	0V10	Note: Please specify options in order
750 amps * †	750A	2-10 volts	2V10	
900 amps * †	900A	0-20mA	0mA20	
1200 amps * †	1200A	4-20mA	4mA20	
* Fan cooled		Thyristor Firing Mode		
Voltage		Logic (on/off)	LGC	
100 volts	100V	Fast cycle burst	FC	
115 volts	115V	Slow cycle burst	SC	
120 volts	120V	Controlled Parameter		
200 volts	200V	Basic version - compensation		
220 volts	220V	for supply variations	00	
230 volts	230V	Control board (must order option CTE)		
240 volts	240V	Load current squared	I2	
277 volts	277V	Load voltage squared	V2	
380 volts	380V	Active power	W	
400 volts	400V			
415 volts	415V			
440 volts	440V			
480 volts	480V			
500 volts	500V			
690 volts	690V			
Auxiliary Supply				
Self supply (up to 500A)	00			
Fan voltage (for 750 to 1200A) †	115V			
	230V			

† Auxiliary (fan) supply required for 750 - 1200A units

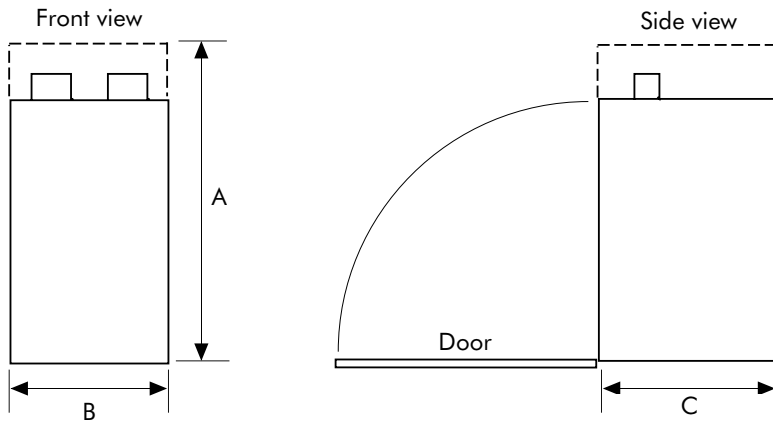
Unit current	Fuse part no.
60A	LA172468U080
75A	LA172468U100
100A	LA172468U125
150A	LA172468U200
250A	LA172468U315
300A	LA172468U400
400A	LA172468U500
500A	LA172468U630
750A ††	CS175632U630
900 ††	CS175632U800
1200 ††	CS175632U1000

†† Four fuses in total used in each TC2001 (2 fuses per leg)

Please note that replacement fuses are marked with a higher current rating than the thyristors. This allows correct operation at elevated temperature and does not imply that higher current is permissible.

TC2001

DIMENSIONAL DETAILS



Dimensions of units rated up to 500V*

	TC2000 and TC2001			TC2001 only	
	60-150A	250A	300-500A*	750A	900-1200A
A	480	480	570	560	560
B	133	248	248	380	381
C	268	268	268	510	510
Weight	10kg	16kg	16.5kg	35kg	39kg

* 690V units rated at 500amps or less have dimensions as shown for 500V, 500amp units in the table. Above 500amps, the dimensions of the 690V units are as shown in table.

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