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ED 09

Manufactured by Eurotherm Automation S.A.

ENG

HA175385ENG

MC3001

Driver unit for control of three phase thyristors

CE

EUROTHERM

Installation and operating instructions

Driver for Three Phase High Current Thyristor Units

MC3001

Control for all types of three phase load

Installation and operating instructions

CONTENTS

Wiring safety

Important!

For details of safety measures to be observed during the wiring of MC3001 control units please also refer to the User Manual for the TC3001 Three Phase Thyristor Units (ref: HA 174834ENG)

DANGER

Wiring must only be carried out by personnel who are qualified to work in a low voltage industrial environment.

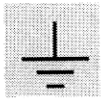
It is the user's responsibility to wire and protect the installation (power control unit and thyristor block) in accordance with current professional standards.

A suitable device ensuring electrical isolation between the equipment and the supply must be installed in order to permit safe operation.

Before any connection or disconnection, ensure that power and control cables or leads are isolated from voltage sources.

For safety reasons, the safety earthing cable must be connected before any other connection is made during wiring and it should be the last cable to be disconnected.

The safety earth on the MC3001 unit is connected to the M5 screw (4mm hex socket screw) located on the upper right-hand side of the unit and denoted by the symbol:



External thyristor protection

Thyristor protection high-speed fuses must be connected

- either by a fuse per controlled phase (three fuses)
- or in series with each thyristor (six fuses).

CE EUROPEAN DIRECTIVES

SAFETY

For safety reasons, MC3001 products installed and used in compliance with these Instructions meet the essential requirements of the European Low Voltage Directive 73/23/EC of 19/2/73 (amended by the Directive 93/68/EC of 22/7/93).

CE MARKING

MC3001 products carry the CE mark in compliance with the essential requirements of the European Low Voltage Directive.

The tests carried out on MC3001 products are listed in a Technical Construction File validated by the LCIE (Central Laboratory for the Electrical Industries), a recognised authority.

DECLARATION OF CE CONFORMITY

A declaration of CE conformity is available on request. For further details on the application of the CE mark, please contact your nearest Eurotherm Office.

ELECTROMAGNETIC COMPATIBILITY (EMC)

For an industrial environment only, must not be used in domestic environments

MC3001 products are considered to be components without any direct function in the sense of the EMC Directive. It is the system into which they are incorporated which must comply with the essential requirements of the EMC Directive.

Nevertheless, Eurotherm certifies that MC3001 products, installed and used in compliance with these Instructions, meet the following EMC standards and enable the system which incorporates them to comply with the EMC Directive.

EMC STANDARDS

	Tests	EMC Standards	
Immunity	Electrostatic discharge	EN 61000-4-2	(06/1995)
	Rapid transients (bursts)	EN 61000-4-4*	(01/1995)
	Electromagnetic fields and RF	prEN61000-4-3	(1984)
Emission	Radiated and Conducted	EN 55011	(1991)

* With capacitive filters between the thyristor block power terminals (phases and loads) and Earth (see page 10).

VALIDATION BY COMPETENT BODY

In order to guarantee the best service, Eurotherm has validated the compliance of MC3001 products with EMC standards through product design and laboratory testing. This is listed in a Technical Construction File validated by the LCIE (Central Laboratory for the Electrical Industries), a competent body.

EMC GUIDE

In order to help you reduce the effects of electromagnetic interference depending on the product installation, Eurotherm can supply you with the 'Electromagnetic Compatibility' Installation Guide (ref: HA025464).

This guide lists the rules generally applicable for EMC.

SCOPE OF MANUAL

These MC3001 Installation and Operating Instructions (ref: HA175385ENG) are intended for use with the MC3001 power thyristor control units manufactured from September 1996.

The MC3001 wiring instructions (ref: HA 174388ENG) is valid for units manufactured before this date.

Note!

Safety instructions, operation and configuration of the MC3001 power control unit are given in the Eurotherm TC3001 User Manual (ref: HA 174834ENG).

INDEPENDENT ALARM

Given the value of the equipment and product controlled by MC3001 products it is the responsibility of the user, and it is highly recommended, that an independent safety device (alarm) should be installed. This alarm must be tested regularly. Eurotherm can supply suitable equipment.

FURTHER INFORMATION

For any further information, or if in doubt, please contact your nearest Eurotherm Office where qualified staff are available to advise or assist you with the commissioning of your installation.

Overview

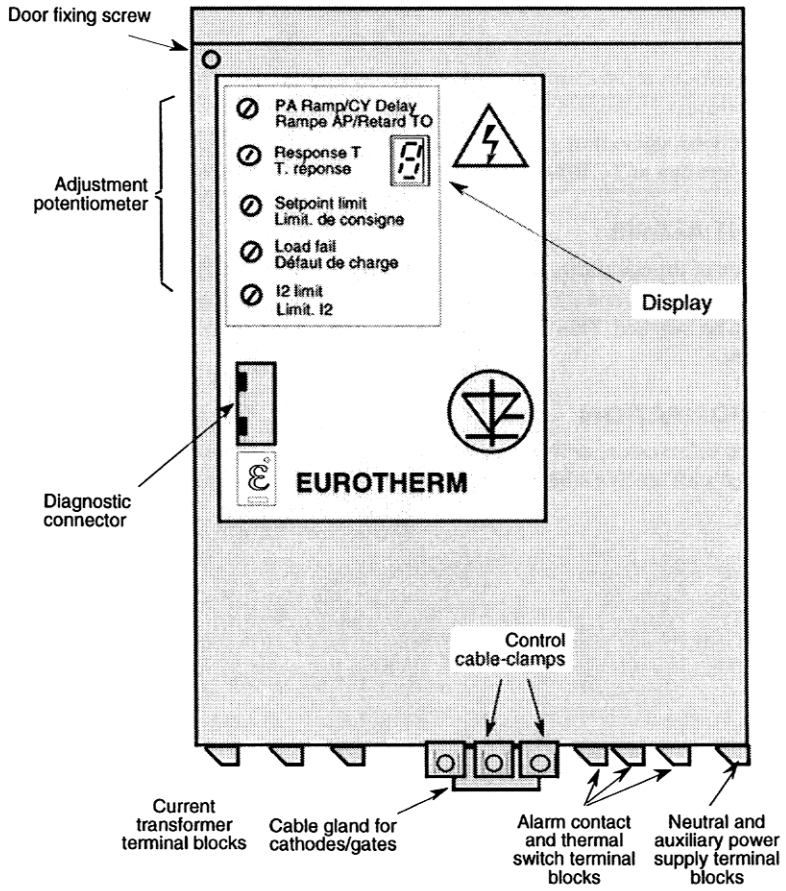


Figure 1 Overview of the MC3001control unit

Mounting details

MC3001 control units are designed to be panel mounted by means of fixing points located on the rear of the units.

Mounting details and dimensions for the MC3001 control units are given in Figures 2 and 3.

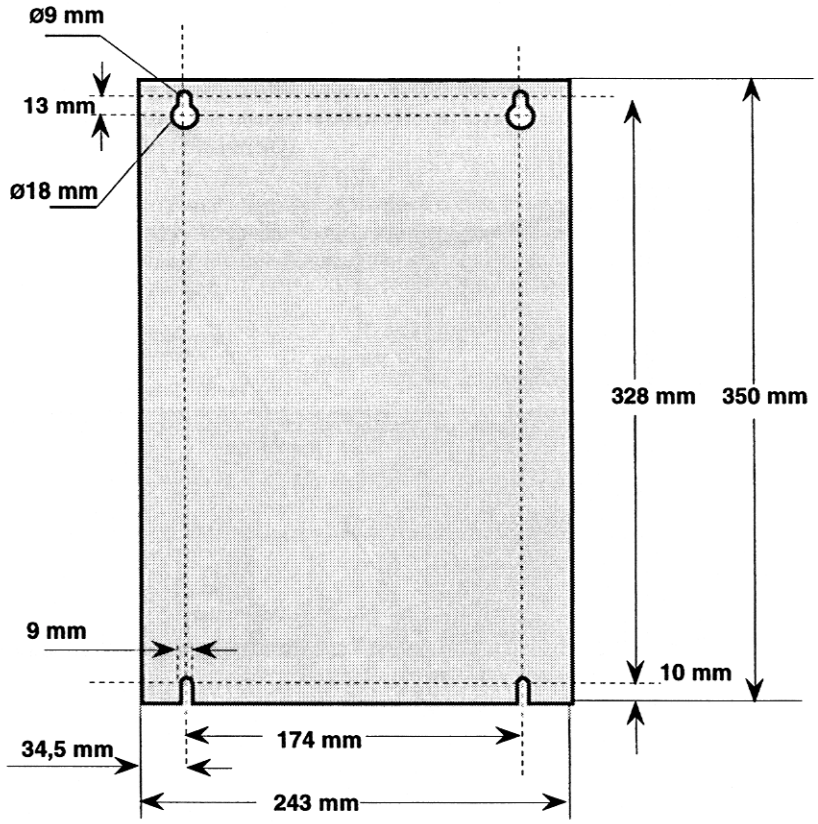
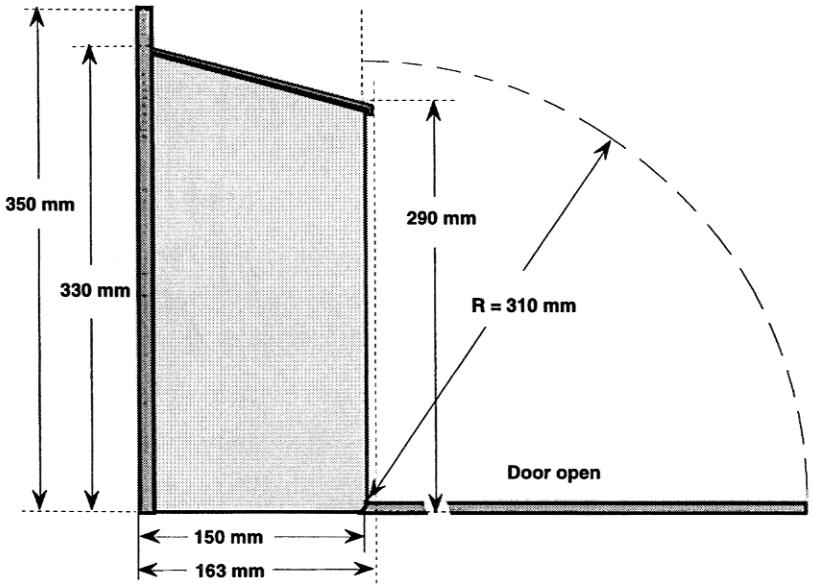


Figure 2 Mounting details and overall dimensions (front view)



Figre 3 Overall dimensions (side view)

User terminal blocks

Cathode and gate leads are connected using wiring looms between the two units (thyristor block and MC3001 Driver).

The wiring of the current transformers, auxiliary power supply, reference neutral (for star with neutral installation), and the alarm contacts is made using the plug-in user terminal blocks located on the base of the MC3001 unit (external terminal blocks). The position of these blocks is shown in figure 4.

Wiring of the control inputs, enable signals, re-transmission and alarm latching / acknowledgement is made using the internal terminal blocks located on the driver board (see TC3001 User Manual, ref: HA174834ENG).

These leads must be grouped together in shielded cables passing through the cable-clamps located beneath the unit. To facilitate the earthing of the cable shield and to ensure maximum immunity to electromagnetic interference, the metal cable-clamps are bonded directly to the ground of the MC3001 unit.

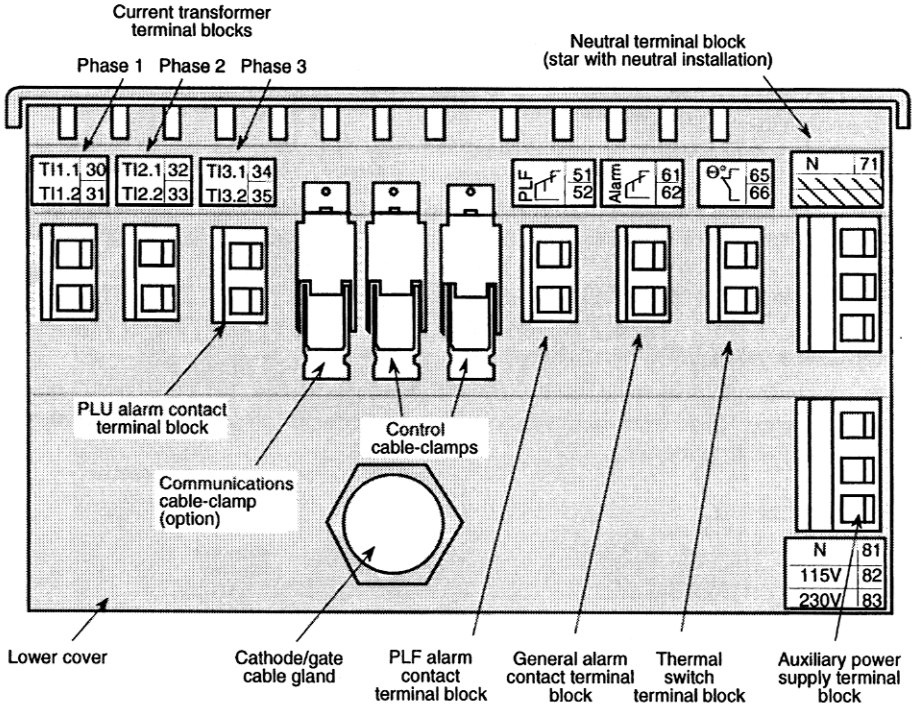


Figure 4 Layout of external user terminal blocks (view of unit from below)

Electrical connections

Electrical connections need to be made between the MC3001 Driver, the thyristor block and the current transformers.

Electrical connections are shown in Figure 5 in bold. For correct operation, please ensure that you follow this diagram closely.

If thyristor protection fuses have 'fuse blown' contacts, these, as well as other safety contacts (or enabling contacts) should be wired in series with the MC3001 unit enable input (see wiring of driver board, TC3001 User Manual ref HA174834ENG).

Thyristor gates / cathodes

Thyristor cathodes / gates are connected by means of 'fast-ons'.

In accordance with current professional practice, leads going to thyristor gates and cathodes must be protected by fuses.

Eurotherm can supply a kit comprising looms, fast-ons, fuses and fuse-holders ref:
LA 174389 (one kit per phase, to be ordered separately).

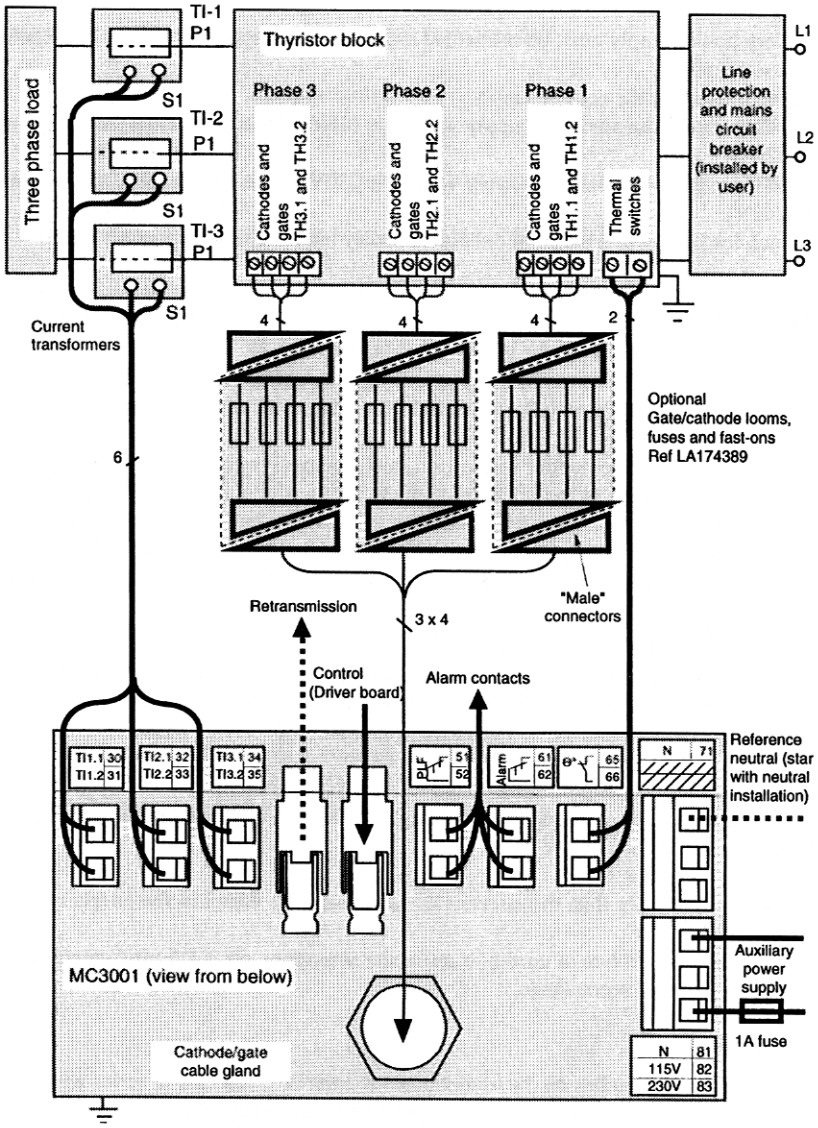
The LA174389 kit contains four 1A 660V fuses (ref: CS174291U1AO) and four sectioned fuse-holders (ref: CP174293).
Fuse-holder dimensions: 63 x 15 x 52 (mm).

The gate / cathode leads must be fully separated from the power cables. There should be a minimum distance of 10 cms between the thyristor gate / cathode leads and the power cables.

Gate / cathode leads should be formed as twisted pairs.

Complance with EMC Standards

In order to comply with standard EN61000-4-4, two capacitors (4.7nF, 275V type Y) in series must be connected between each thyristor unit power terminal (phase & load) and earth as close as possible to the unit.



See TC30001 user manual HA174834 for control and retransmission terminals

Figure 5 Wiring diagram

Auxiliary power supply

The auxiliary power supply must be connected to a 115V single-phase supply or to a 230V single-phase supply.
Terminal 41 is used for the neutral supply.
Terminal 42 is used if the auxiliary supply voltage is 115V (codes for auxiliary supply from 100V to 120V).
Terminal 43 is used if the auxiliary supply voltage is 230V (codes for auxiliary supply from 200V to 240V).
NOTE: Each lead going to a phase of the mains supply must be protected by a 1A fuse.

Reference neutral

The reference neutral for 4 wire star is connected via terminal 71.

NOTE: This connection must only be used for loads in star with neutral configuration.

In the event of failure of the neutral connection (bad electrical connection or F1 fuse blown - located on the power board of the MC3001 unit, etc.), an artificial power fail state is entered. This shuts down the unit because the control system receives a bad feedback signal.

This failure is signalled by the appearance of the letters "F" "P" on the front panel display.

Current transformers

The current transformer secondary windings are connected to the external plug-in terminal blocks, designated TI1.1 and TI1.2 (terminals 30 & 31) for phase 1, TI2.1 and TI2.2 (terminals 32 & 33) for phase 2 and TI3.1 and TI3.2 (terminals 34 & 35) for phase 3.

The current measurement is polarised.
Correct wiring polarity is ensured by connecting terminals S1 of the secondary windings to terminals 30, 32 & 34 (see Figure 5).

It is important to ensure that the current transformers are wired in the correct sense.

In order to avoid the problem of current transformer saturation, use a 2.5 mm² gauge cable to connect the transformer secondaries.

Thermal safety

The external thermal switches on the thyristor block must be connected in series with the thermal safety input (external terminal block designated Q°, terminals 65 & 66).

NOTE: As shipped from the factory, the thermal safety input is open, and thus the unit is inhibited. For correct operation of the unit, connect the thermal switches to terminals 65 & 66. If the thermal switches on the thyristor block are not used (not recommended), bridge terminals 65 & 66.

Control and re-transmission connections

Wiring for the control leads is made on the driver board for:

- connection of the control setpoint,
- retransmission of information
  - volage
  - currents
  - controlled parameter
  - alarms (see TC3001 User Manual ref: HA174834ENG)

Control terminal tightening torque: 0.7 Nm
User terminal block gauge: 0.22 mm² to 2.5 mm²

NOTE: For reasons of electromagnetic compatibility, control connections must be made using shielded cables connected to the earth (or ground) at both ends.

Separate the control cables from the power cables in the cable trays.

The connection wires must be grouped together in shielded cables passing through the cable clamps located beneath the MC3001 unit.

To facilitate the earthing of the cable shield and to ensure maximum immunity from electromagnetic interference, the metal cable-clamps are bonded directly to the ground of the MC3001 unit.

The driver board terminal blocks are accessible with the front door open. To open the door, unfasten the front screw (located on the top left-hand corner of the door), raise the door in order to release it from its slots, then pull it towards you.

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