



ALTER ELETTRONICA S.R.L.  
CASALE MONFERRATO (Italy)

SINGLE PHASE THYRISTOR  
CONVERTER  
DC MOTOR 1 QUADRANT  
DRIVE

**4C**

## GENERAL FEATURES

The drivers type 4C have a thyristors, single-phase conversion bridge that control the d.c. motors only in the first quadrant.

They are available in two releases:

- without insulation between power and control circuits
- with insulation between power and control circuits.

All the 4C drivers can inside receive:

- single-phase Graetz bridge to supply the motor field.
- optional cards by request.

## TECHNICAL FEATURES

- Modular structure.
- IP00 Protection rating.
- Only one supply for power and service.
- Supply voltage: 220Va.c.  $\pm 10\%$  (output: 170Vd.c. max)  
380Va.c.  $\pm 10\%$  (output: 290Vd.c. max)
- Supply frequency: 50/60 Hz.
- Output rated currents (continuous duty): 15A and 30Ad.c. max.
- Single-phase half-controlled thyristor bridge for the armature supply.
- Single-phase Graetz bridge for the field supply (OPTIONAL)  
input: 380Va.c.  $\pm 10\%$  max. - Output: 330Vd.c. max. 0,2 to 4A.
- Releases: with or without insulation between power and control circuits.
- Different terminal boards for power and service.
- Natural ventilation
- Operating temperature: 0 to +45°C (32 to 113°F)
- Storage temperature: -20 to +60°C (-4 to 140°F)  
(relative humidity 95% max without condensation)
- Maximum altitude: 1000m. (3280 feet) a.s.l.
- Speed control by:
  - Tachometer
  - Armature voltage with speed droop compensation.
- Acceleration/deceleration linear ramp.
- Working mode presetted by switches.
- Tachometer voltage range presetted by jumpers.
- Regulation feature: constant torque
- Control loops: current/speed
- Speed reference differential input stage:  
(+10V max. - input resistance 100K $\Omega$ )
- Output reference supply: + 10V  $\pm 5\%$  - 5mA max.
- Output supply: 24Vd.c. - 100mA max.
- Optocoupled logic controls: 15 to 30Vd.c. - 10mA
- Controls and faults monitoring leds:
  - Tachometer signal failure or reversed polarity.
  - Field current failure (OPTIONAL)
- "DRIVE OK" output contact (breaking capacity 110Va.c. max - 200mA max.)

## SETTING AT WORK

**Read carefully this instruction book.**

Check that:

- The driver underwent no damage while the transport or the set up.
- The supply voltage correspond to the rating plate value (220V/380V)
- The connections should be proper.
- Avoid to form closed loops with the ground connections.
- Mount some spykes suppressors in parallel to the A.C. coils such as: relays, selenoid valves, remote control switches, clutches, A.C. motors.
- Let an enough room for a good vertical air circulation.

Then proceeding following these instructions:

- Set, by switches, the working mode:  
Armature voltage or tachometer feedback.  
Acceleration and deceleration ramps.
- Set, by jumpers, the tachometer voltage range. (tachometer feedback only)
- Set "MAX SPEED", "AR.CO." and "RAMP" trimmers in counterclockwise end-stroke.
- Supply the driver (don't give the "CO.EN." control)  
and check that only the "DRIVE O.K." led is switched ON.
- Set on "CU.LT." test point (by the correspondant trimmer) the voltage correspondant to the maximum armature current.
- Enable the driver with the "CO.EN." control ("CO.EN." led switched ON)
- Give to the driver the maximum speed reference and adjust the maximum motor speed by the "MAX SPEED" trimmer.  
(If the motor shaft rotation is wrong, remove all supplies and reverse the armature or field connections).
- Check that the motor armature voltage is not more than that rated one.
- Adjust the acceleration/deceleration time by the "RAMP" trimmer.  
(Only if the switches "RAMP 1" or "RAMP 2" are setted ON).
- Reduce the speed droop by "AR.CO." trimmer.  
(with armature voltage feedback operation only)
- Adjust the motor response quickness by "STAB" trimmer.
- Stop the motor shaft, with zero speed reference, by "SPEED OFFSET" trimmer.

## CONTROLS AND ALARMS SIGNALING LEDs

**CO.EN.** (green) Converter enable.

**DRIVE O.K.** (green) No alarm in the driver.  
This led is switched OFF when the supply is OFF or other alarm leds (red) are switched ON.

**FIELD FAULT** (red) Field current failure.  
If this led is switched ON check the voltage between ACF1 and ACF2 terminals and the motor field connections.

**TACH. FAULT** (red) Tachometer signal failure or reversed polarity.  
The alarm is stored and the reset happen when the supply go OFF.  
If this led is switched ON check:  

- The motor and tachometer connections
- The coupling between motor and tachometer

## TEST POINTS

<b>TACH.</b>	Tachometer voltage
<b>SP.RE.</b>	Speed reference
<b>AR.VO.</b>	Voltage proportional to the motor armature voltage (50V armature voltage correspond to 1V on T.P.)
<b>AR.CU.</b>	Voltage proportional to the motor armature current (The rated current correspond to 1V on T.P.)



	Common of supplies and test points.
<b>+ 15 V</b>	Stabilized supply + 15V.
<b>CU.LT.</b>	Reference to armature current limitation circuit. (Adjustment by "CU.LT." trimmer) (10V on T.P. correspond to the rated current).
<b>+ 24 V</b>	Non stabilized supply + 24V.
<b>- 15 V</b>	Stabilized supply - 15V.

## ADJUSTMENT TRIMMERS

Note: The clockwise rotation increase the quantity adjusted.

<b>RAMP</b>	Motor acceleration and deceleration time. Time range: 0.4 to 4 sec. "RAMP 1" switched ON 3.5 to 40 sec. "RAMP 2" switched ON
<b>MAX SPEED</b>	Maximum motor speed
<b>CU.LT.</b>	Reference to the armature current limitation circuit. (The voltage setted is measured on correspondant T.P.)
<b>AR.CO.</b>	Speed droop reduction. (With armature voltage feedback operation only).
<b>STAB.</b>	Response quickness to the speed reference and load variations. The counterclockwise rotation improve the quickness. NOTE: An excess of adjustment can give some speed oscillations.
<b>SPEED OFFSET</b>	Stop of the motor shaft with zero speed reference. NOTE: This trimmer can be used also for: - Set a minimum motor speed with zero speed reference. - Permit the shaft rotation only if the speed reference is more than the value setted.

## PRESETTING SWITCHES

- RAMP 1**            Enable of the acceleration/deceleration ramp.  
                      (Range: 0.4 to 4 sec. Adjustment by "RAMP" trimmer)
- RAMP 2**            Enable of the acceleration/deceleration ramp.  
                      (Range: 3.5 to 40 sec. Adjustment by "RAMP" trimmer)
- ARM 1-2**           Armature voltage feedback.  
                      (Set OFF with tachometer feedback).

## TACHOMETER VOLTAGE RANGE SELECTION JUMPERS

**Only with tachometer feedback.**

- Calculate the maximum tachometer voltage  
  (multiplying the constant tachometer voltage by the maximum working speed).
- Cut all jumpers having the voltage value lower than that calculated before.

## LOGIC INPUTS/OUTPUTS

Note: To use them follow the connection diagrams.

**DRIVE OK** 1-2    Closed contact when the "DRIVE OK" led is switched ON.

- ZERO**            Common of the external logic controls supply.
- + 24 V**           External logic controls supply (24V d.c. - 100mA max.)
- CO.EN.**           Converter enable. (The control is displayed by "CO.EN."led)  
                      NOTE: The driver is working only if also the "DRIVE OK" led  
                      is switched ON.
- LO.CO.**           Common of the logic controls.

## ANALOG INPUTS/OUTPUTS

NOTE: To use them follow the connection diagrams.

- AN.CO.**           Common of the analogue signals.
- REF.L.**           Cold input for speed reference.
- REF.H.**           Hot input for speed reference.
- + 10 V**           Supply for the speed potentiometer or other circuits  
                      (+ 10V  $\pm$ 5% - 5mA max.).
- TACH.**            Tachometer input signal.  
                      (connected only with tachometer feedback).

## POWER CONNECTIONS FOR DRIVERS WITHOUT INSULATION

Follow the internal connections diagram.

The "COM" terminal permit to fix a common reference point (0V) for all analog signals.

The "COM" terminals of the various drivers must be connected together so as to reduce at the minimum the potential differences.

To get a good result are necessary:

- Minimum connections length.
- Cable section equivalent to that utilized for power connections.
- Side by side assembling.

### "COM" TERMINAL WITH MAINS INSULATED FROM THE GROUND.

It is possible to connect the "COM" terminal:

- To the ground
- To the common (0V) of other equipments.

### "COM" TERMINAL WITH MAINS CONNECTED TO THE GROUND.

It is forbidden to connect the "COM" terminal:

- To the ground (directly or by some other equipments)
- To other equipments, not insulated from the mains, and connected to the same net that supply the drivers.

It is possible to connect the "COM" terminal:

- To other equipments insulated from the mains
- To other equipments, not insulated from the mains, but connected to a different net insulated from ground.

NOTE: In these cases the other equipments aren't insulated from the mains.

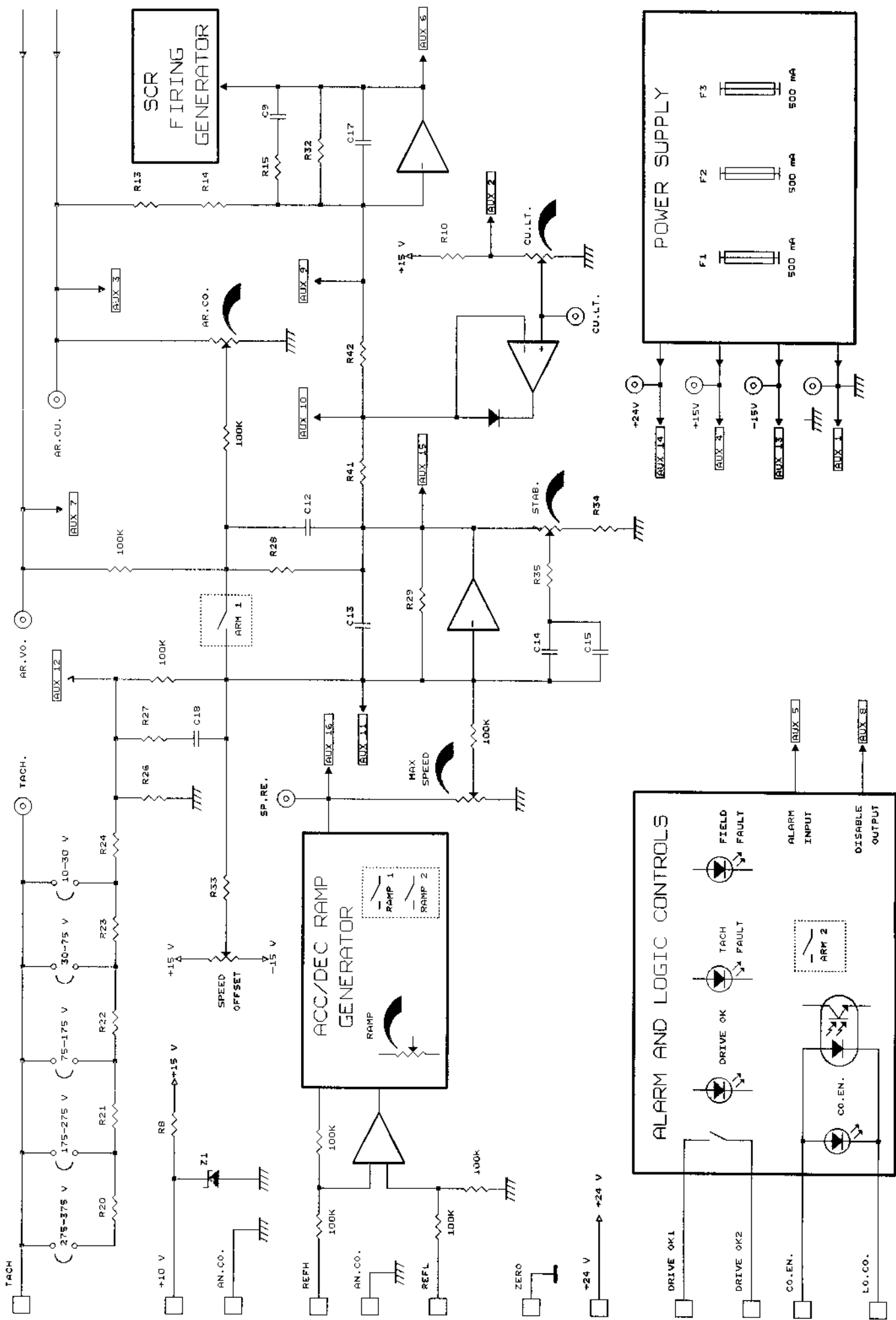
### "AC1" AND "AC2" TERMINALS

If more drivers with "COM" terminals common are connected to the same net, directly or by other equipments, the "AC1" and "AC2" terminals of the different drivers must be connected to the same phases.

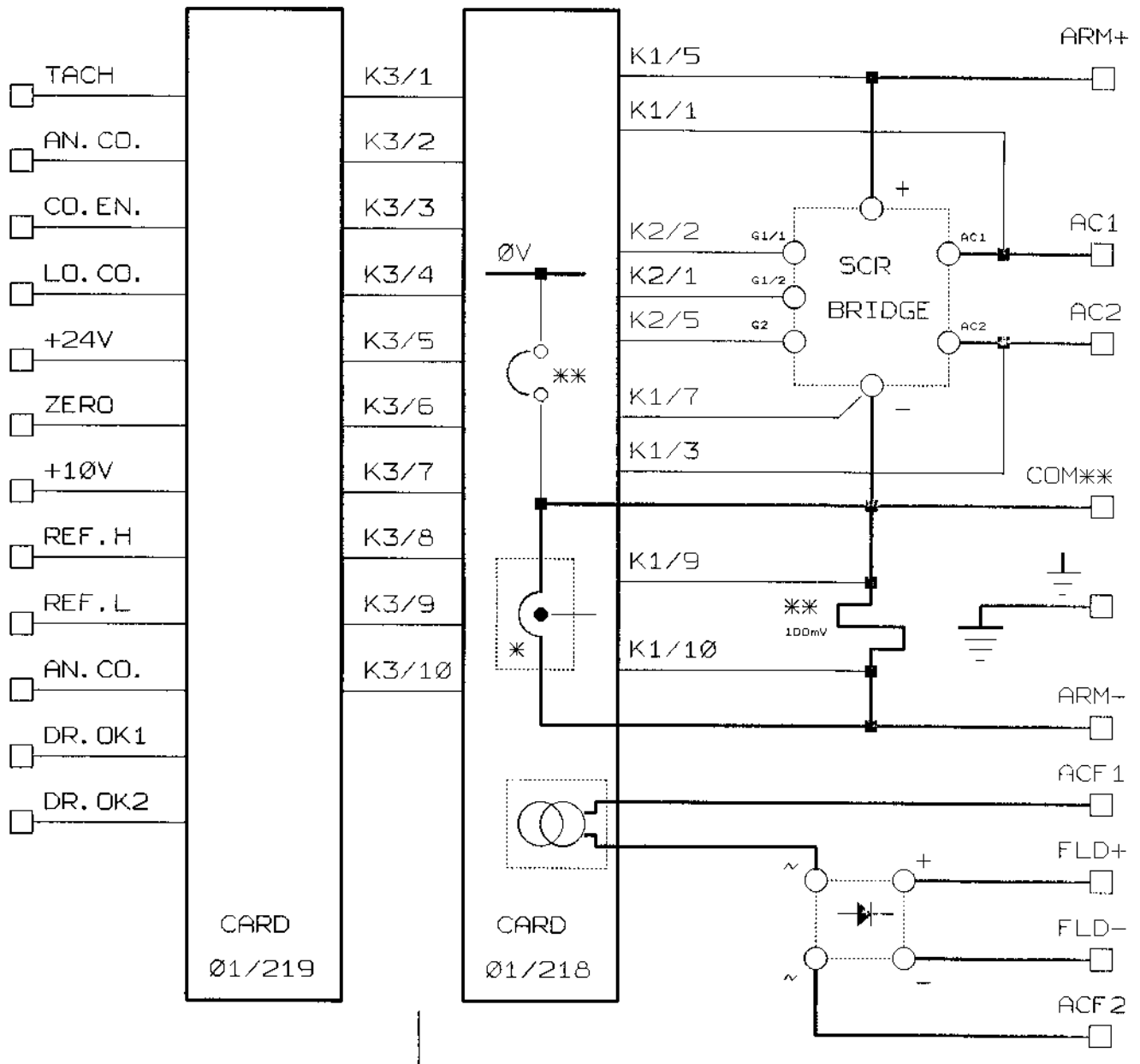
NOTE: To get the maximum flexibility of connection on advise to use drivers with insulation between power and control.

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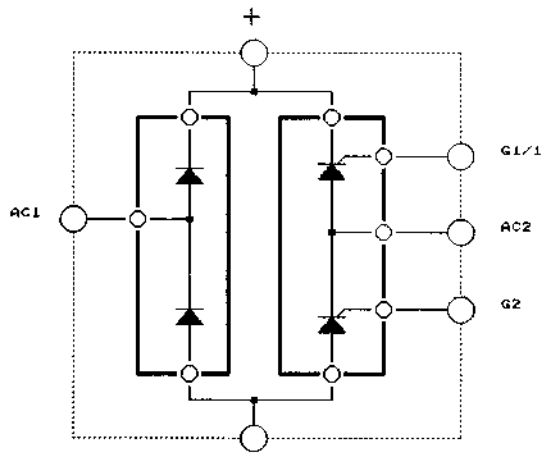
The contents of this book are subject to modifications without notice.



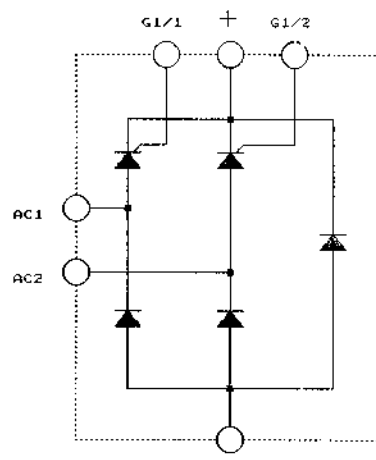
# INSIDE CONNECTIONS



30A AND 50A SCR BRIDGE



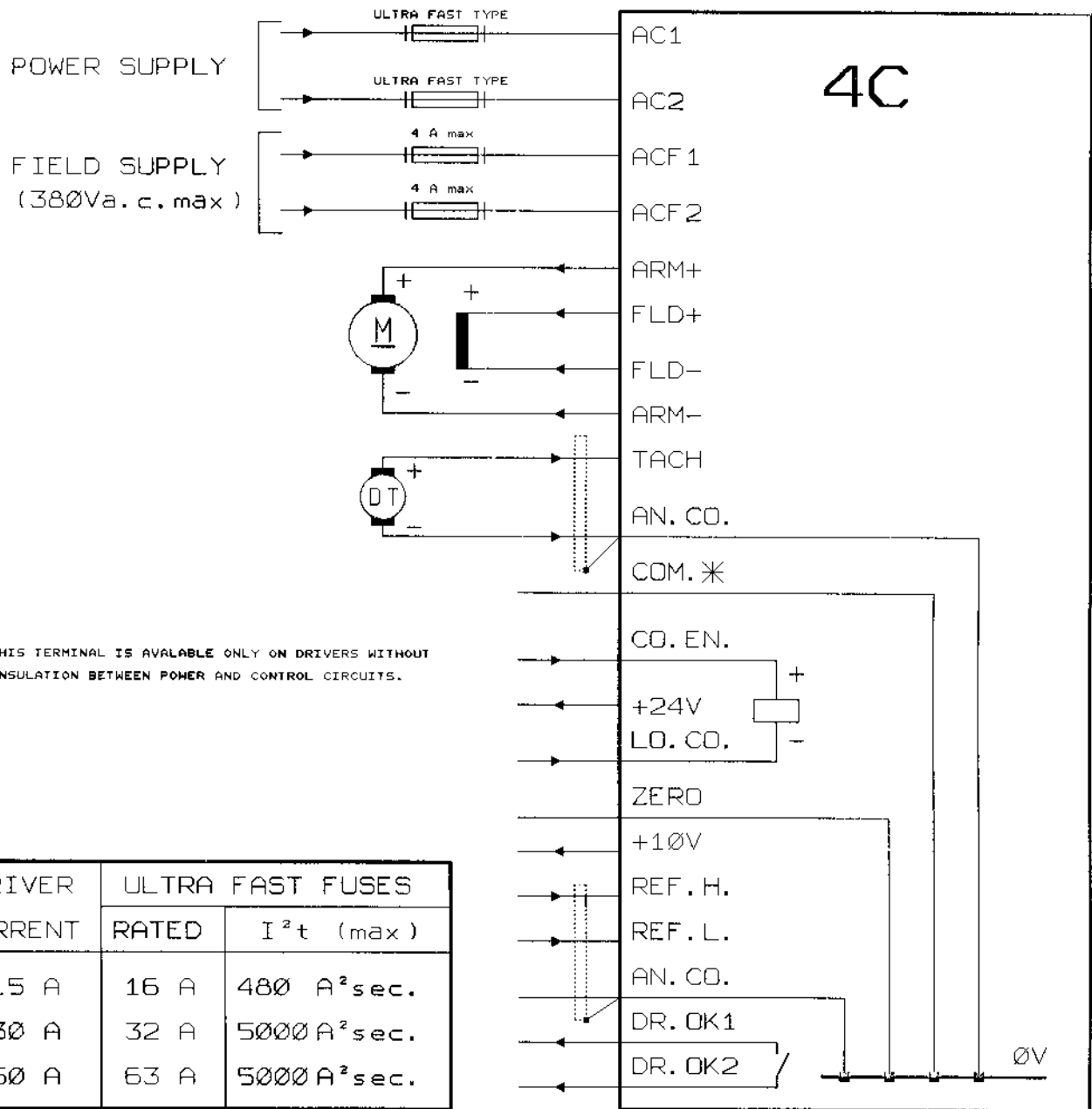
15A SCR BRIDGE



## NOTE

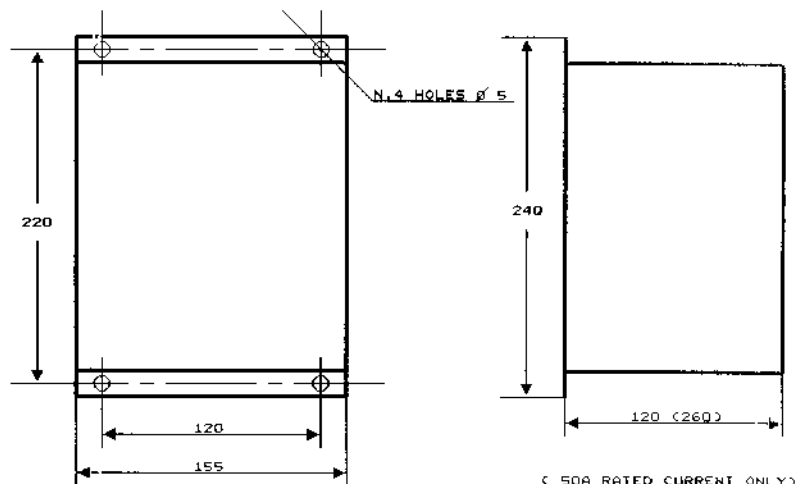
- \* INSULATED TYPES ONLY
- \*\* NOT INSULATED TYPES ONLY

## OUTSIDE CONNECTIONS



## DIMENSIONS (mm.)

DRIVER CURRENT	WEIGHT
15 A	1.250 Kg
30 A	1.750 Kg
50 A	4.100 Kg



## CONNECTION EXAMPLES

