



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

SINGLE PHASE THYRISTOR  
CONVERTER  
DC MOTOR 4 QUADRANT  
DRIVER

**4AXC**

## GENERAL FEATURES

The drivers type 4AXC have a single-phase, thyristors totalcontrolled conversion bridge that control the d.c. motor in the 4 quadrants.

Their utilize is advised for applications with an high response quickness and no "dead zone" in speed control.

They permit to the motor to work as a brake, also for a long time, with energy recovery to the mains.

The power is supplied by a single-phase transformer with central-tap secondary winding.

It's possible to connect more drivers to the same transformer.

If are utilized many drivers, is advisable subdivide the power supply on 3 single-phase transformers (delta connected) to the three-phase mains or only one three-phase transformer (delta connection on primary windings and double star with central-tap connection on secondary windings).

All 4AXC drivers can inside receive:

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

## TECHNICAL FEATURES

- Modular structure.
- IP00 Protection rating.
- Different terminal boards for power and services.
- Power supply voltage: 2x220Va.c.±10% (output: 160Vd.c. max)  
2x300Va.c.±10% (output: 220Vd.c. max)
- Service supply voltage: 110/220Va.c.±10% 100/50mA
- Supply frequency: 50/60Hz
- Output rated currents (continuous duty): 15A and 30A d.c.max.
- Single-phase totalcontrolled thyristor bridge for the armature supply.
- Single-phase Graetz bridge for the field supply (OPTIONAL)  
Input: 380Va.c.±10% max. - Output: 330Vd.c. max. 0.2 to 4A
- Different terminal boards for power and controls.
- 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 condensate).
- Maximum altitude: 1000m (3280 feet) a.s.l.
- Speed control by:
  - Tachometer
  - Armature voltage with speed droop compensation.
- Acceleration/deceleration linear ramp.
- Operation 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 100KΩ)
- Output reference supplies: +10V and -10V ±5% - 5mA max.
- Output supply: 24Vd.c. - 100mA max.
- Optocoupled logic controls: 15 to 30Vd.c. - 10mA
- Controls and faults monitoring leds:
  - Converter enable
  - Service supply fault
  - Power failure.
  - 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 drive underwent no damage while the transport or the set up.
- The supply voltage mustn't be more than the driver rated voltage.
- The connections of power, armature and tachometer 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 the service voltage (110/220Va.c.) by the voltage changer located on the inferior card (terminal board side).
- Set, by switches, the working mode: (see on page 4)
  - Acceleration and deceleration ramp.
  - Armature voltage or tachometer feedback operation.
  - Mains frequency (50/60Hz)
  - Disable of the field current sensing
- Set, by jumpers, the tachometer voltage range (see on page 4)
- Set "MAX SPEED" "AR.CO." and "RAMP" trimmers in counterclockwise end-stroke.
- Supply service and power (don't give the "CO.EN." control) and check that only the "DRIVE OK" led is switched ON.
- Set on "CU.LT." test point (by the correspondant trimmer) the voltage correspondant to the maximum armature current (see on page 3)
- Enable the driver by "CO.EN" control ("CO.EN." led switched ON)
- Give to the driver the maximum speed reference and adjust the maximum motor speed by "MAX SPEED" trimmer.
  - (If the motor shaft rotation is wrong, remove all supplies and reverse the armature or field connections).
  - (If the "TACH FAULT" led is switched ON see on page 3)
- Check that the armature voltage is not more than that rated one.
- Adjust the acceleration/deceleration time by "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

<b>CO.EN.</b>	(Green) Converter enable.
<b>DRIVE OK</b>	(Green) No alarm in the drive. This led is switched OFF when the service supply is OFF or other alarm leds (red) are switched ON.
<b>POWER. OFF</b>	(Red) Power failure. If this led is switched ON check: - The Ultra Fast power fuses. - The voltage between AC1, AC2 and 00 terminals NOTE: When this led is switched ON, the "DRIVE OK" led is switched OFF only if the driver is enabled.
<b>TACH. FAULT</b>	(Red) Tachometer signal failure or reversed polarity. The alarm is stored and the reset happen when the service supply is OFF. If this led is switched ON check: - The motor and tachometer connections - The coupling between motor and tachometer.
<b>FIELD FAULT</b>	(Red) Field current failure. If this led is switched ON check the voltage between ACF1 and ACF2 terminals and the motor field connections.

## 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.)
<b>+ 15 V</b>	Stabilized supply +15V.
<b>CU.LT.</b>	Reference to armature current limitation circuit. (adjustment by the "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.



Common of supplies and test points.

## 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 motor load variation. 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.

## PRESETTING SWITCHES

<b>RAMP 1</b>	Enable of the acceleration/deceleration ramp. (Range 0.4 to 4 sec. Adjustment by the "RAMP" trimmer)
<b>RAMP 2</b>	Enable of the acceleration/deceleration ramp. (Range 3.5 to 40 sec. Adjustment by the "RAMP" trimmer)
<b>ARM</b>	Armature voltage feedback. (Set OFF for Tachometer feedback)
<b>50 Hz</b>	Mains frequency 50Hz (Set OFF for 60Hz)
<b>FIELD FAULT DISABLE</b>	Disable of field current sensing. (Set ON if the field bridge is not built-in)

## TACHOMETER VOLTAGE RANGE SELECTION JUMPERS

### Only with tachometer feedback

- Calculate the maximum tachometer voltage  
(multiplying the tachometer voltage constant 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.

<b>DRIVE OK</b> 1-2	Closed contact when the "DRIVE OK" led is switched ON.
<b>ZERO</b>	Common of the external logic controls supply.
<b>+ 24 V</b>	External logic controls supply (24Vd.c. - 100mA max.).
<b>CO.EN.</b>	Converter enable (the control is displayed by the "CO.EN." led). NOTE: The driver is working only if also the "DRIVE OK" led is switched ON.
<b>LO.CO.</b>	Common of the logic controls.

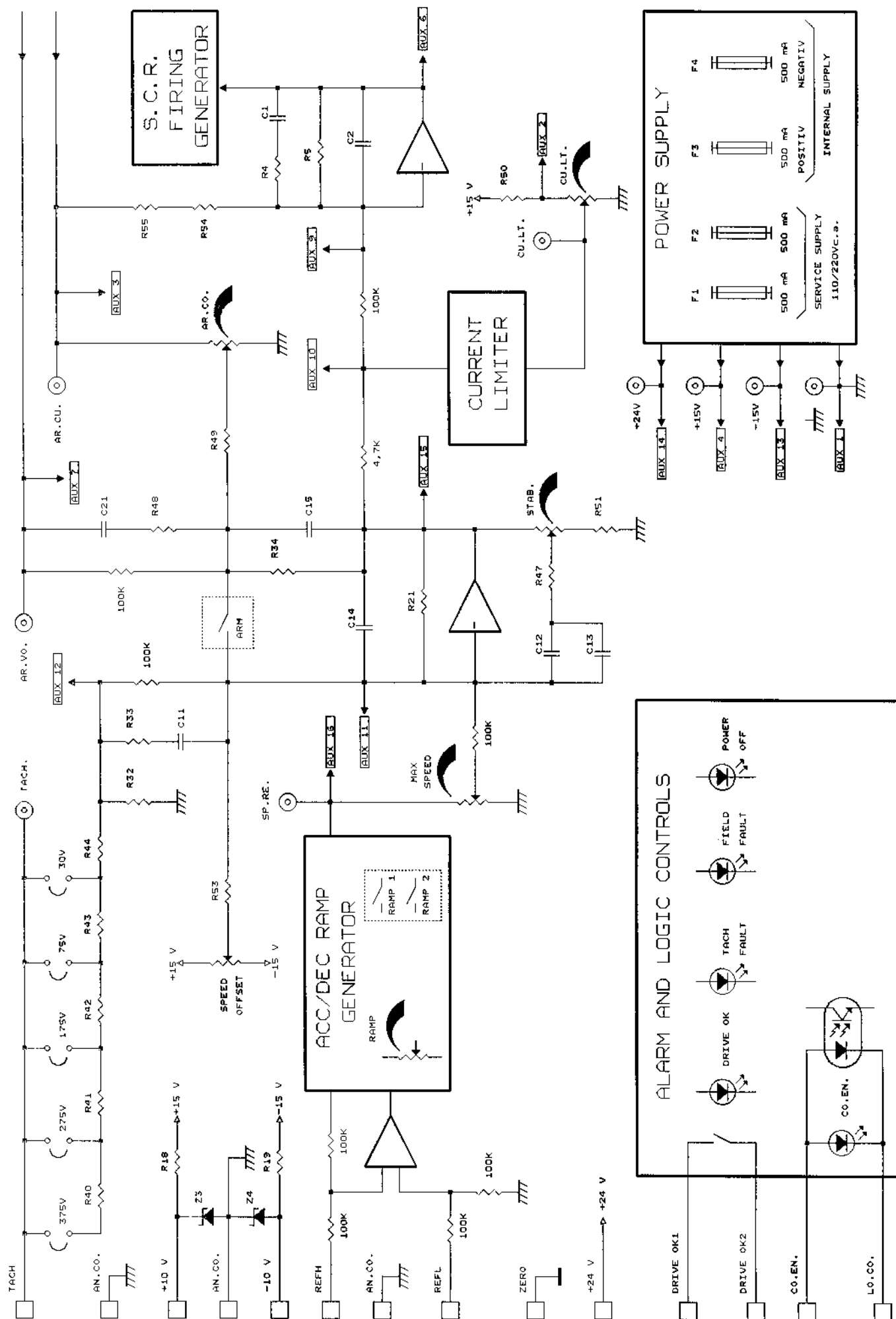
## ANALOG INPUTS/OUTPUTS

NOTE: To use them follow the connection diagrams.

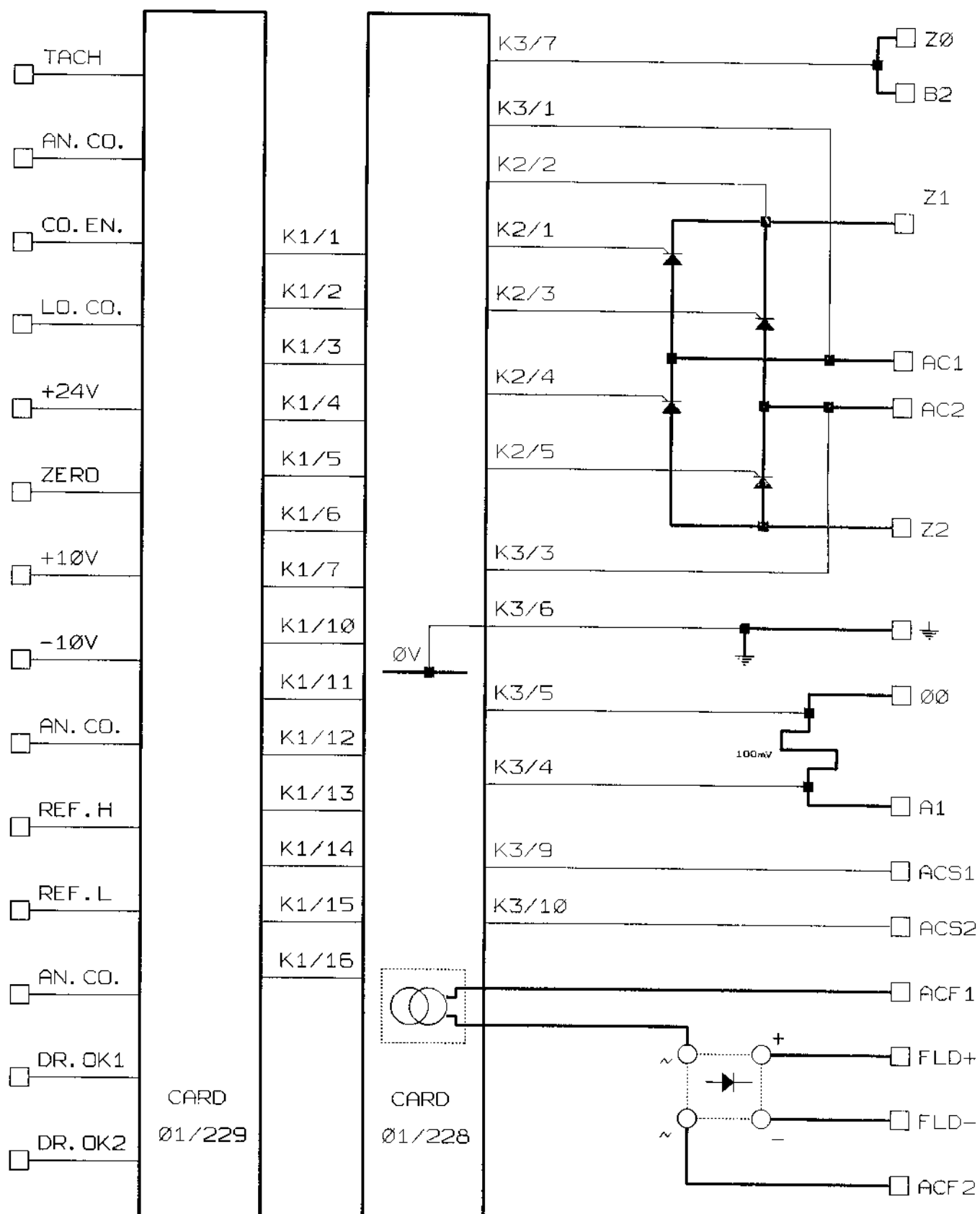
<b>AN.CO.</b>	Common of the analogue signals.
<b>REF.L.</b>	Cold input for the speed reference.
<b>REF.H.</b>	Hot input for the speed reference. (Max voltage 10V - input resistance 100K $\Omega$ )
<b>+ 10 V</b>	Supply of the speed potentiometer or other circuits. (+10V $\pm$ 5% - 5mA max.)
<b>- 10 V</b>	Supply of the speed potentiometer or other circuits. (-10V $\pm$ 5% - 5mA max.)
<b>TACH.</b>	Input tachometer signal. (Connected only with tachometer feedback)

**ALTER ELETTRONICA INDUSTRIALE S.r.l. has no responsibility for imprecisions or mistakes included in this instruction book.**

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

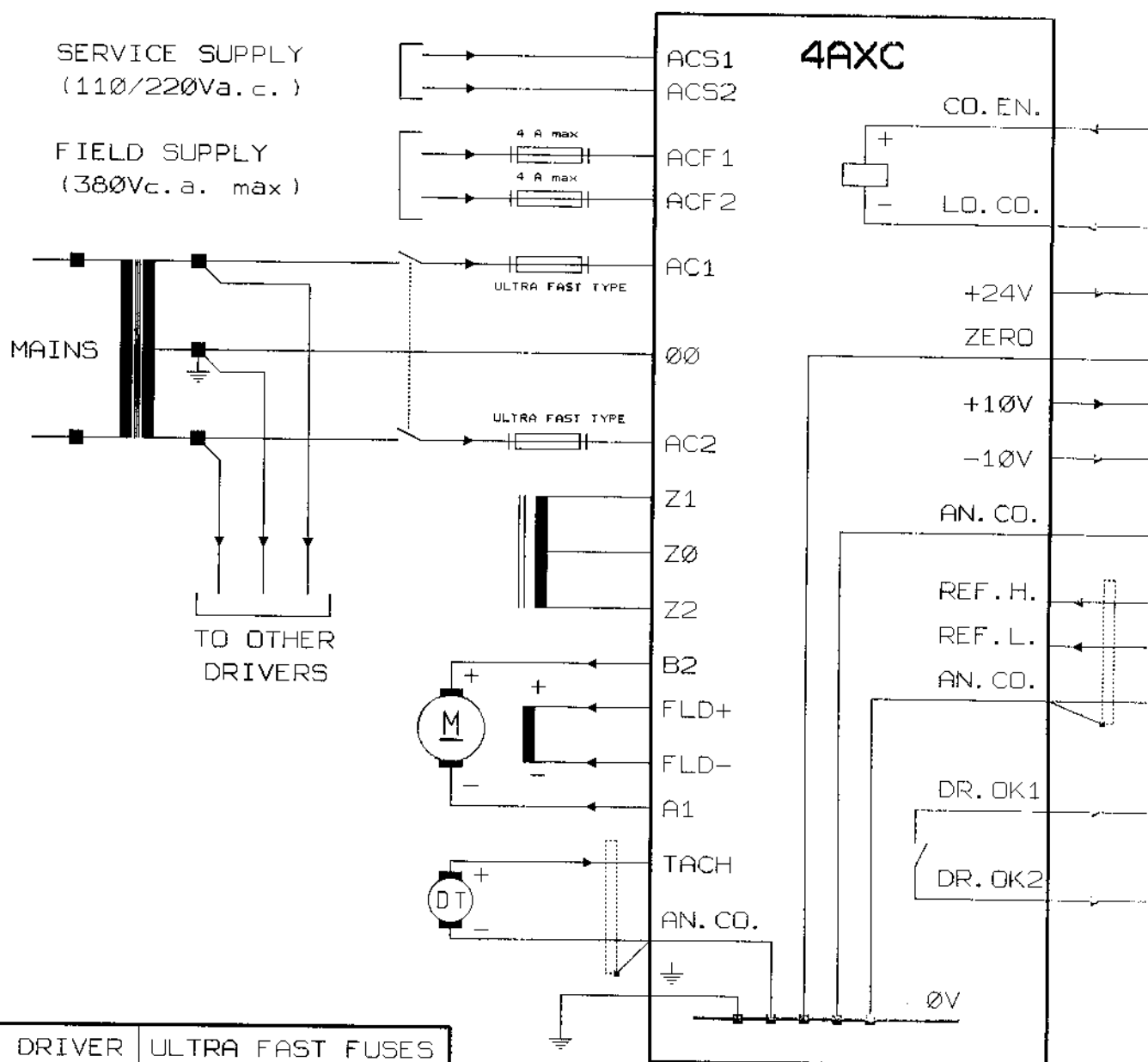


# INSIDE CONNECTIONS





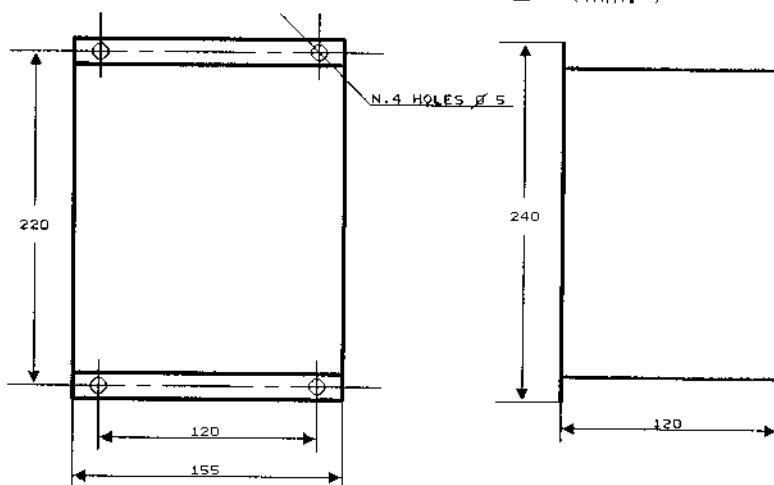
# OUTSIDE CONNECTIONS



DRIVER CURRENT	ULTRA FAST FUSES	
	RATED	$I^2t$ (max)
15 A	16 A	480 A <sup>2</sup> sec.
30 A	32 A	5000 A <sup>2</sup> sec.

DRIVER CURRENT	WEIGHT
15 A	1.25 Kg
30 A	1.75 Kg

## DIMENSIONS (mm.)



## CONNECTION EXAMPLES

