



## ENERGY RECOVERY CHOPPER TYPE “PULSAR-R”

Technology improvements have led to the development of always more complex and functional drive equipment. The control unit type Pulsar-R represents the synthesis of performances and features that a chopper should have. The high level of design technology and the compactness underline the modern concept characterizing these units that offer high operating reliability and do not require special maintenance. The use of regenerative braking with energy recovery (10% in optimal conditions) has allowed a strong operation dynamic, limiting at the same time internal stresses. This line is therefore particularly suitable to drive very fast electrical vehicles (electrical cars) and high performance and productivity lift trucks equipped with series excited DC motors with four terminals.

The choppers type Pulsar-R are provided with a static switch of the motor-generator function enabling a regenerative braking without dead times and strictly controlled up to the total stop of the vehicle. For those models equipped with braking by running control reversal, braking intensity depends on the pedal position, whereas for those models with release braking it is possible to carry out a soft braking that is adjustable and can become stronger acting on the mechanical brake pedal (optional).

The Pulsar-R chopper is made up of a logic unit, two SCR power parts, a current transducer (galvanically insulated) and a thermal sensor.

The control logic unit is equipped with a safety circuit (Fail-Safe) that makes these choppers particularly safe and in conformity with the EEC directive 86-663 of 22-12-86. The safety circuit can be automatically reset enabling a running control and its efficiency can be directly checked by the operator without any danger (see paragraph 9.7.3.5.5 of the EEC directive 86-663). The logic is the same for all power sizes and for battery voltages of 48-80V DC. The scrupulous test carried out by a computer aided system (ATE - Automatic Test Equipment) guarantees optimal stability and long-time reliability. The logic unit is provided with regulators that can be inspected from the outside acting on acceleration, standard braking, recovery braking and second speed (or bypass) current.

Acting on a special circuit, the acceleration regulator enables the vehicle to gradually reach the max. speed. The logic unit includes two kinds of limitation for the second

speed function. The first prevents the current of “second speed” (whose enabling occurs after about 1" from total conduction of the main thyristor) to exceed the value set by the truck constructor by means of the bypass current regulator. Other speeds are controlled by external additional modules. The second, of thermal kind, limits the current supplied by the chopper when the temperature reaches dangerous values (above 85°C).

The system PULSAR-R is equipped with two types of braking:

- recovery braking that can be modified by running pedal in a range included between a max. value set by the recovery brake regulator and a min. value pre-set in the logic circuit and depending on different factors

- standard braking (adjustable by the standard brake regulator) that acts when the vehicle has to make small movements at a very low speed and therefore energy to save is very few.

The current transducer, pre-set in the factory according to the max. capacity of the chopper (400-550-1000 Amp.), detects the real current that circulates in the motor both during translation and recovery braking, enabling a constant control of the motor independently from its features (resistance-inductance-temperature) and from the battery charge state. The control unit can be replaced without causing important changes in the current adjustment values.

The high performance of power circuits obtained thanks to a scrupulous selection of components along with the efficiency of the logic unit makes the bypass function of no use, this would only hinder the exploitation of the electrodynamic features of the system.

The control units with energy recovery type PULSAR-R should be installed in spaces that even if closed enable ventilation by special intakes protected against dust and water sprays. Moreover they should be placed in contact with metal surfaces of adequate thickness.

The Pulsar-R choppers are available with a rated current of 400-550-700-1000 Amp. per minute, with operating voltages of 48-80 VDC (96 VDC for the model R70) and can operate at voltages ranging from 60% to 110% of the battery rated voltage.

TECHNICAL FEATURES

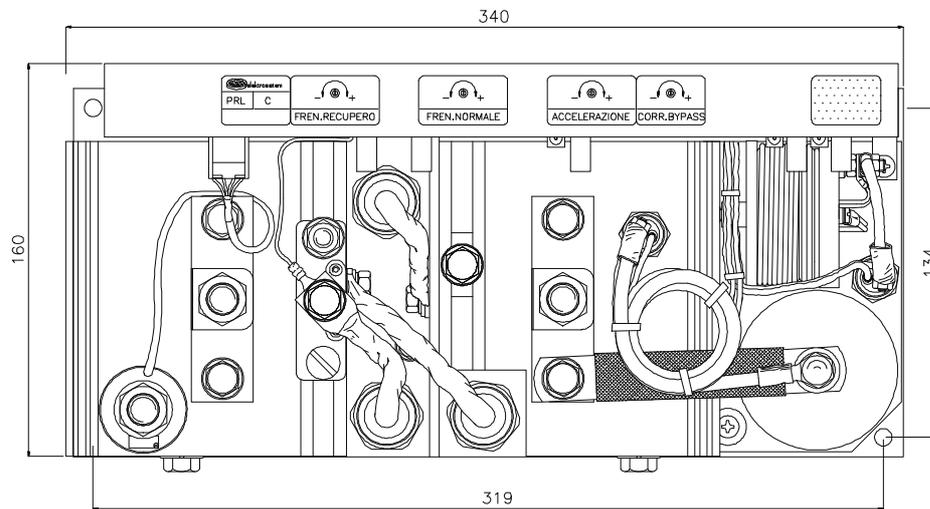
Operation frequency .....	≥250 Hz
Max. ambient temperature .....	-30 +40 °C
Max. humidity at 25 °C .....	90 %
Voltages .....	48-80 VDC
Conversion factor at 48 VDC .....	96 %
Efficiency at 48 VDC .....	94 %

Models "PULSAR-R" .....	R40	R55	R70	R100
Current for 1' .....	400A	550A	700A	1000A
Current for 1 hour .....	131A	180A	230A	325A

MECHANICAL CLEARANCE

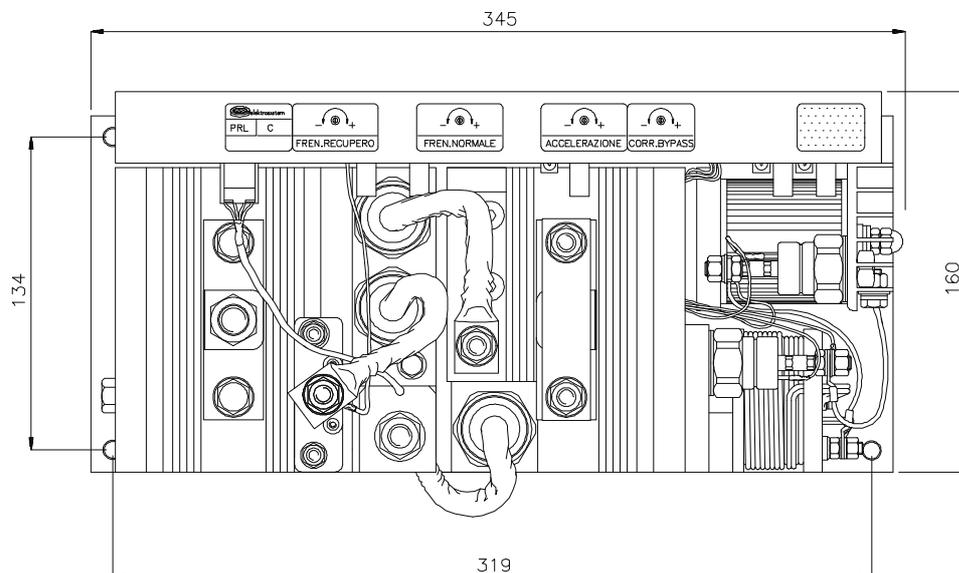
PULSAR-R 40

Control unit height= ~ 140mm



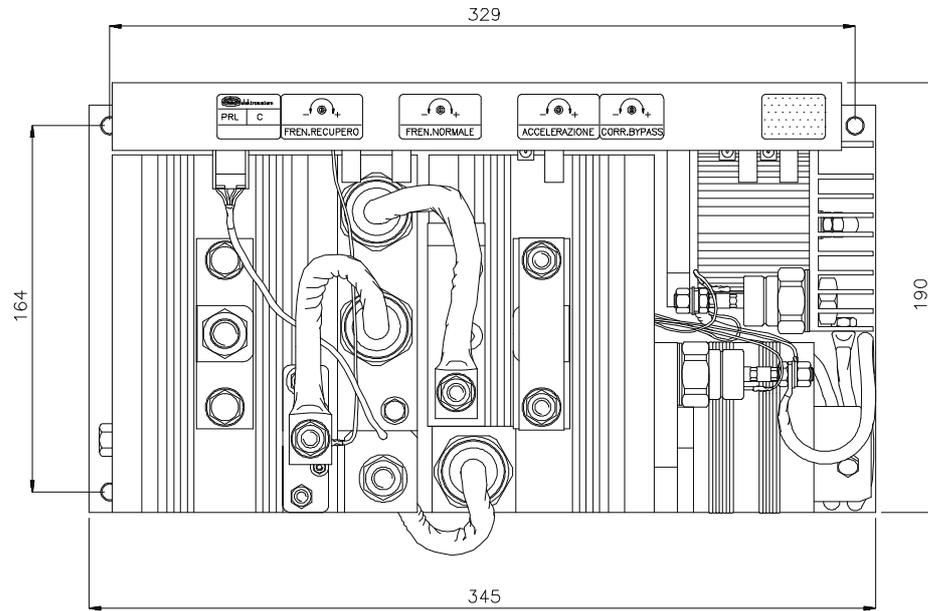
PULSAR-R 55

Control unit height= ~ 140mm



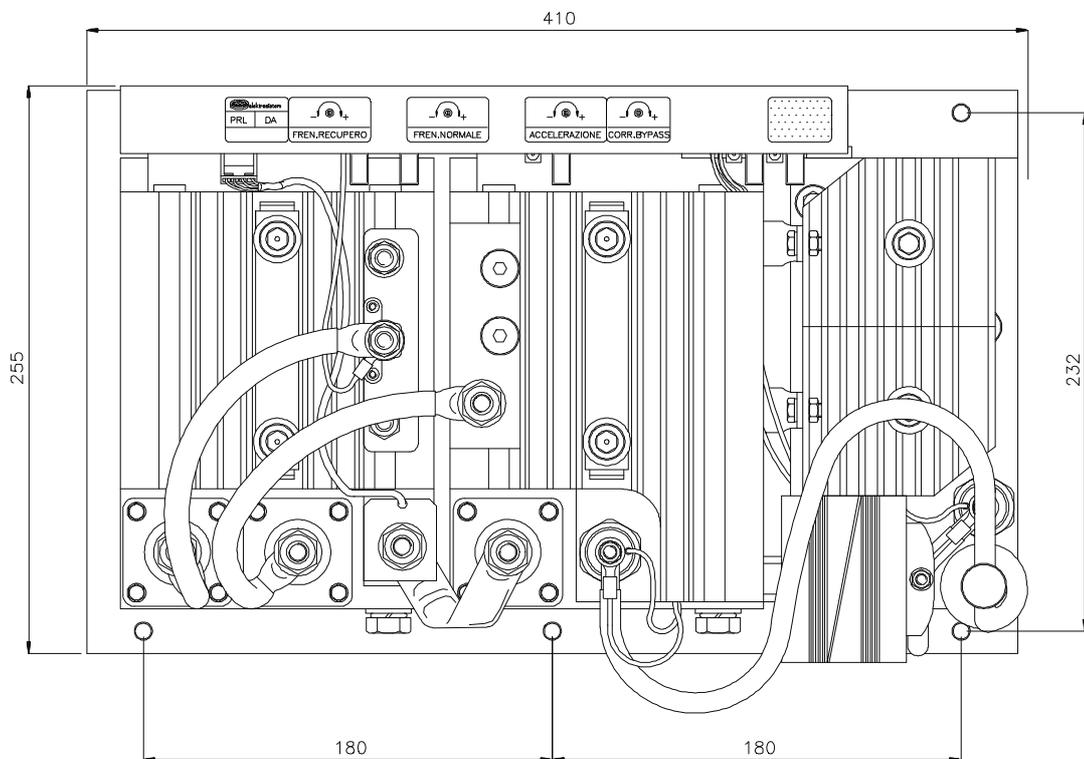
PULSAR-R 70

Control unit height= $\sim$  145mm



PULSAR-R 100

Control unit height= $\sim$  190mm



Technical data could be modified without notice.