

PWM DC DRIVERS FOR DIRECT CURRENT MOTORS

serie: **ITE-CH.**

models: **Ch25, Ch50, Ch100**

INSTALLATION MANUAL

ITE REFERENCE CODE : **CH50-M1G.DOC (paper)**

CH50-M1G.PDF (digital)

ISSUE DATE : **JUNE 06, 1998**

NR. / DATE LAST REVISION : **REV.1.0 / JUNE 19, 1998**

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This manual consisting of 11 pages (this one included).

1 - PRODUCT DESCRIPTION:

Ch drivers are designed to allow speed regulation of permanent magnet direct current motors.

Ch drivers are designed, made and sell as a component that must be installed only in industrial apparates, only by professional manufacturers or personnel familiar with technical qualification necessary for the correct installation of these products.

This documentation is the only valid guide for the installation and operation of ITE-Ch drivers.

ITE give to Manufacturers and its personnel this manual to allow to reach, relatively and within certain limits regardings only ITE-Ch driver, previsions described in 89/336/EEC Dirctive (about ELECTOMAGNETIC COMPATIBILITY) and installing in compliance with EN60204-1 Standards.

The Manufacturer of devices/apparate that mounts Ch drivers is the only responsible of the final performances regarding electromagnetic compatibility (also in depending from the European Directives applies to its apparates); then the Manufacturer can decides to find other methods using alternative solutions to install Ch drivers in compliance with above mentioned Standards and Directive.

Informations in this manual are valid only for ITE Ch25, Ch50, Ch100 drivers and are valid, if not differently specified, for each size of driver.

2 - IMPORTANT NOTICE REGARDING RECALL TO SAFETY INSTRUCTION :

FOLLOWING SYMBOLS OF WARNING USED IN THIS MANUAL INDICATES INSTRUCTIONS THAT MUST BE READ WITH ATTENTION FOR YOUR SAFETY.

Symbol:



Indicates informations about presence of dangerous voltages that can cause serious damages or even death.

Symbol:



Indicates generic warnings or very important notices for correct usage of drivers.

3 - GENERAL SPECIFICATIONS:

Mains voltage:	Single phase (line to neutral) - 220V / 50 Hz.
Limits:	Voltage from 198 up to 264 V. Frequency from 42 up to 60 Hz.
Output voltage:	Armature: from 0 up to 220 Volt.
Self-protection:	Against overvoltage ("Zenamic", 440 Volt peak). Against overcurrent (ultra-fast protection against short circuits between A1-A2 terminals).
Type of regulation:	Pulse Width Modulation. Frequency 15 kHz. Armature feedback as standard.
Speed variation:	with linear potentiometer 5 kOhm / 2 Watt. enable input for start/stop operations (motor stop "type 2" as previsions of EN 60204-1 standard)
Speed range:	Up to 30/1 (armature feedback) Up to 100/1 (tacho-generator feedback, only on request).
Displays:	LED1: Dangerous voltage on DC-rail. LED2: Overcurrent trip.
Ambient temperature:	from 0° up to 40°C during operation(100% rated current). from -25° up to 55°C during storage (limit: 70°C - 24hrs max)
Permissible humidity:	95% max. relative, no condensation.
Altitude:	max. 1000m on sea level (100% rated current).
Deratings:	-3% each °C from 40° up to 50°C max. -5% above 1000m each 1000m up (on sea level).
Degree of protection:	IP00
Optionals (on request):	IP20 Enclosure. Tacho feedback arrangement. Trip relay.

Table 1: **PRODUCT SPECIFICATIONS (SIZE DIFFERENCES):**

	Ch25	Ch50	Ch100
Models (sizes):	Ch25	Ch50	Ch100
Reorder code:	ICH25	ICH50	ICH100
Motor Power [kW]:	0,18	0,37	0,70
Armature voltage arranged as standard [V] :	180	180	180
Current arranged as standard [A]:	2,5	4,0	5,0
Current range (arranged on request) [A]:	0,5 ÷ 3	1 ÷ 4	2 ÷ 6
Field voltage:	no	no	no
Protection Fuses (ref. fig.3):	T6A	T10A	T12A
Size of protection switch (alternative):	No.10	No.12	No.16
<i>Code of optionals:</i> <i>for size :</i> →	Ch25	Ch50	Ch100
Potentiometer	IPOT5K-C	IPOT5K-C	IPOT5K-C
External trip signalling	ICH25-BLR	ICH50-BLR	ICH100-BLR
Tacho feedback	no	ICH50-DT	ICH100-DT
External trip signalling + Tacho feedback	no	ICH50-BDT	ICH100-BDT
IP20 enclosure	ICH-E	ICH-E	ICH-E

4 - INSTALLATION INSTRUCTIONS:



Ch driver must be mounted only vertically on a firm, flat surface, alone or together with other machine-related electrical equipments, with recommended components for EMC protection into electrical enclosures which have characteristics in compliance with predictions about "enclosure" description of EN 60204-1 standards. If this is not possible it is strongly recommended to use enclosure made by ITE (option code ICH-E) that can ensure at least an IP20 degree of protection.



Excepted the operations with appropriated tools (screwdrivers) on terminal wirings (beware: driver must be powered off and "LD1" led must be turned-off!), not any other operation is requested or allowed on to any part of Ch driver. Specially is not allowed to divide print circuit board from heat-sink and is not allowed to tamp, modify, replace or remove any electronic component mounted on the driver.



WARNING! - RISK OF ELETTRIC SHOCK: The internal parts of the motor and driver can be at line potential whether the equipment is functioning or not. Before it is safe to touch any internal component (or remove Ch-E cover), both incoming A.C. power cables must be disconnected and LD1 led (on Ch p.c.b.) must be completely light-out.

From the instant when main supply is out some internal parts of Ch driver can remain at a voltage greater than 60 Vdc for a time of about 60 seconds.

5 - MECHANICAL INSTALLATION (ref. fig. 1, page 10):

Mount Ch driver only with heat-sink in vertical position for the best heat dissipation.

Fix the heat sink to the panel using screws provided as standard with the driver:

<i>size:</i>	<i>items provided as standard:</i>
Ch25	M5x20 "tce" (Nr.2)
Ch50	M5x30 "tces" (Nr.2)
Ch100	M5x55 "tces" (Nr.2)

Leave at least 50 mm of free space above and below terminals as in figure.

Be ensure that there is not any obstacles for air flow around the heat-sink.

If cooling air arrive from external ambient and is contaminated with smoke, any type of dust, corrosive gas or grease Ch driver can to be damaged. In these cases, must be adopted appropriate measures: filters in the air passages, periodical cleaning and all the other operations that is consider good to prevent dirt accumulation on p.c.b., terminal blocks or heat-sink.

6 - ELECTRICAL INSTALLATION (ref. figures 3 and 4, page 11):**Power:**

<i>point of wiring:</i>	<i>terminal::</i>	<i>function:</i>
CN1 TERMINAL	AC	AC supply
	AC	AC supply
	A2	Armature (+)
	A1	Armature (-)
"Faston" on heat-sink	PE	PE Connection (to PE bar)

Controls:

CN2 TERMINAL	P1	0V reference potentiometer
	P2	Central point of potent. (input 0-5V)
	P3	+V ref. potentiometer (output 5V)
	DT	Tacho feedback in (if provided)
	0V	negative/common Tacho/Enable
	AB	Enable (closed on 0V=Enabled)

Wirings to optional p.c.b. for external trip signalling:

CN3 TERMINAL (optional)	4	Trip relay contact
	3	Trip relay contact
	2	24Vdc Reset input (-)
	1	24Vdc Reset input (+)

Notice: Size and types of power connection cables must be appropriated to the rated current of motor.

7 - GUIDELINES FOR ELECTRICAL INSTALLATION (ref. fig. 3 and 4):**Galvanic insulation:**

Warning: electronic circuits of Ch driver is not insulated from AC supply. In the case this characteristic is required mains must be separed using an insulation or safety trafo (Recommended: 230/230 Vac).

Power of trafo must be calculated using this formula:

$$P \text{ [VA]} = V_{\text{supply}} \times I_{\text{motor}} \times 1,1$$

where: V_{supply} = Secondary voltage of trafo
(tipically = 220, 230 or 240 V).

I_{motor} = Motor rated current.

Electrical protections:

FUSES (FS) - (see Table 1: "Product specifications (size differences)").

Instead of fuses it can be used a protection switch choosen in proper size.



Warning: at the power-on, peak current due to charge of condenser can cause the intervention of electrical protection not correctly sized. Respect notice of Table 1 regarding the correct size of protection switches.

8 - EMC PROTECTION.

List and order-code of external components necessary : (ref. fig.3, page 11)

Component:	Driver size :	Ch25	Ch50	Ch100
RCL = Mains filter		IRC1*	IRC1*	IRC11
HI = Mains choke		HI-M2A	HI-M4A	HI-M6A
TRD=Ferrite toroid		ITRD-30/10	ITRD-30/10	ITRD-30/10

()= Commercial filter "single cell" type. Provide the minimum protection necessary. A best protection EMC is obtainable using different filter ("double cell" type), re-order code "IRC05".*

Positioning filter nearly Ch driver. If incoming power cables (connected to "AC" terminals of the driver) are longer than 10cm or if cables are not kept separated from other cables or if cables cross any other wiring is necessary to use screened cables of appropriate size. Only mains cable must be kept into the screen. Power cables must be kept separated from signal cables.

Using line inductor (as detailed in figure 3, page 11) is strongly recommended.

If an insulation trafo is installed as from previous instructions (see "Galvanic insulation", paragraph 7) is good also for a best EMC protection (against emissions).

Never break screening of connections between driver and motor. The screen of motor cables must have into only motor-supply cables. If an external circuit for motor field supply is provided the screen of motor cables can keep also field supply wirings. All power connections must be grounded. Ground must be external and run side by side to motor screened wirings.

Ferrite toroids must be putted around the cable in the driver side and must cover the part of cable not covered from screen. Anyway, the part of cable not screened must be kept as short as possible.

For signals must be used only screened wirings (insulating wires-screen must be at least 1500V) as indicated in figure 3, page 11. Is not allowed any break of the screen. Connect the screen of potentiometer wirings to earth-connector ("faston") on the heat-sink; only this side must be earthed. Connect the screen of enable contact to earth-connector ("faston") on the heat-sink; only this side must be earthed. **Never connect in any case "P1" e "0V" to earth.** Never put signals wirings (even if shielded) in the same canalizations containing power cables. Parts of cables not protected by shield near terminal contacts must be ever kept as short as possible.

Using a Ch driver with "BLR" option, for a external indication of trip condition, wirings to "1" and "2" contacts (external reset function) must be do only using screened cable. Other cautions must be the same to the ones used for other signal wirings as detailed above.

9 - REMOVAL OF DRIVER:



WARNING: "LD1" LED LIGHTING-ON INDICATES PRESENCE OF DANGEROUS VOLTAGE ON THE DC CONDENSER, ALSO WITH MAINS SWITCHED-OFF.

Remaining valid all warnings and informations about installation as above (specially the "INSTALLATION INSTRUCTIONS", in paragraph 4), remember that the removing of driver from installation or putting-off of CH-E cover from driver are forbidden after the complete switched-off of LD1 led.

10 - ADJUSTMENT:

WARNING: Adjustments as standard for Ch25, Ch50 and Ch100 make these drivers suitable for general purpose in coupling with motors which have power range as shown in Table 1. There is no necessary operations by trimmers on to p.c.b.

However any operation must be carried out only by qualified personnel who have to follow operation instructions provided from the Firma (ITE) only on request.

Adjustments or special settings (included the arrangement for run using tacho feedback) must be ordered exclusively to ITE, that will provides driver suitably setted.

The following are some informations about trimmers functions.

TR1 (Rlcomp) = Armature voltage compensation. At low speed (until 30% of rated speed) this settings allows to maintain unchanged motor speed when the load at the shaft goes from empty to full load. This adjustment, using some motors, can cause an increasement of speed when an load growth occurs. This condition si not regular and often cause instability in the speed control. Please contact our technical services if this trouble occurs.

TR2 (Vmax) = Maximum speed setting. Trim allows an excursion of maximum speed from 80 up to 220 Volt when reference potentiometer is setted to 100% .

TR3 (Imax) = Current limit. Current provided to the motor do not excede, usually, 110% of motor rated current. In case of mechanical overload on the shaft, armature current will be limited to the value setted by this trimmer. An effect of the overload and of the intervention of current limit is the speed decrease with constant voltage on reference input, or a not increasement of motor speed with an increasement of reference voltage. There is not any attachments between this setting and "Overcurrent trip protection".

11 - OPERATION METHOD:

Presnce of condensation:

If condensation is present on the driver or into the enclosure do not give main supply.

Overspeed prevention:



WARNING: In a particular case of fault (short circuit in the final power stage) motor can goes in overspeed. If overspeed can causes an hazard must be expected the use of "BLR" option (see page 3 and page 9). This, from the instant of fault, signals the breakdown of driver and allows, by external precautions (wich must be adopted by the electrician) to stop motor making the power-off of driver.

Motor run-stop:

Is not opportune to do start-stop operations switching-off main supply. The stop of motor run switching-off mains ("category 0" stop as described in EN-60204-1 standard) is possible in case of emergency intervention.

If, for the safety of system, persons or animals, the stop of the motors must be do switching-off main supply (start/stop frequency less than 3 per minute) is necessary to respect the following sequence:

Switch on:

phase:	operation:
1	Switch-on main switch (main supply). (contact between "0V" and "AB" must be still opened).
2	Wait for 0,3 seconds (at least).
3	Close contact between "0V" and "AB".

Notice: Switch-on of main switch when contact between "0V" and "AB" already closed and with reference potentiometer not in "zero" position, imply a delay of about 0,3 seconds before motor starts.

Switch-off, suggested operation:

phase:	operation:
1	Open contact between "0V" and "AB".
2	Wait for 0,1 seconds.
3	Open main switch.

Switch-off, allowed operation:

phase:	operation:
1	Open contact between "0V" and "AB" and, at the same time, open main switch.

Motor ever goes stop for inertia; adopt right brake system if safety of the system need a fast stop.

Speed regulation:

Operate manually on speed knob of reference potentiometer (connected to P1, P2 and P3 terminals as shown in N°3 figure - page 11). WARNING: P1, P2 and P3 points are not galvanically insulated from the line.

"Overcurrent" protection intervention:

Lighting-on of LD2 led indicates the intervention of ultra-fast protection against short circuit between "A1" and "A2" terminals. This can occurs while motor runs as well as when the motor starts.

Intervention of this protection switches-off immediately controls circuit and breakdown and switches-off armature voltage so short circuit effects can not damage the power stage of driver. The only sensible effect of "overcurrent protection" intervention is simply the motor coast to rest. But beware: short circuit between A1 and A2 terminals is ever a very critical condition and is a risk for the safety of driver. Then is not allow try to do any short-circuit voluntarily and in case of accidental short-circuit is not advisable try to reset before it be removed the cause of short-circuit. Trip condition is made permanent by latch. When fault have been corrected the driver must be reset. Reset is obtainable switching-off main supply for few seconds. If the cause of short circuit have not been removed there will be another intervention of protection at the power-on.

If an external trip alarm is needed ask for "BLR" option (external trip indication and trip reset).

"Overcurrent" has not any attachment with the "current limit" adjustmant setted by ITE using "TR3" trimmer (ref. page 7).

Operations with “BLR” option (external trip indication) - see figure 4 / page11:

Trip condition is indicated by relay contact (excitated when driver is powered on and there is not overcurrent trip condition).

Current capacity of contact is 1 A (with resistive load at 250V maximum).

This option is provided as standard with contact closed in right operation mode. When short circuit occur contact became open and the same when driver is powered-off.

Giving an electric signal (Vdc 24, for a time of 100mS minimum, positive on terminal 1) is possible to reset without that it be necessary to power-off the driver.

12 - CONFORMITY TO THE STANDARDS:**“LOW VOLTAGE” EEC DIRECTIVE**

Ch drivers (size 25-50-100), used in a machine following prescriptions of this manual, allows an installation in compliance to previsions of EN60204-1 Standards and then can satisfy previsions of 73/23/EEC Directive (“Low Voltage”).

“ELECTROMAGNETIC COMPATIBILITY” EEC DIRECTIVE

Ch drivers (size 25-50-100) can satisfy protection requirements of 89/336/EEC about electromagnetic compatibility if installed in strict compliance with all prescriptions of this manual.

Standard references are the followings:

Generic Standard: Subject:

EN 50082-1 Generic Standard for noise immunity, residential areas, commercial premises and small business.

Basic Standard:

IEC 801-2 Electrostatic discharge

IEC 801-3 EM field

IEC 801-4 Burst on control cables

IEC 801-4 Burst on power supply cables

Limit:

6kV contact

10 V/m

severity 3

severity 3

Notice:

only with ICH-E enclosure

only with ICH-E enclosure

none

none

Generic Standard: Subject:

EN 50081-2 Generic Standard for noise emissions, industrial premises.

All trade-ups about new solutions of EMC protection and some possible new notice regarding Ch drivers will be comprised in the next periodical release of this manual.

13 - FIGURES:

figure 1: MECHANICAL INSTALLATION

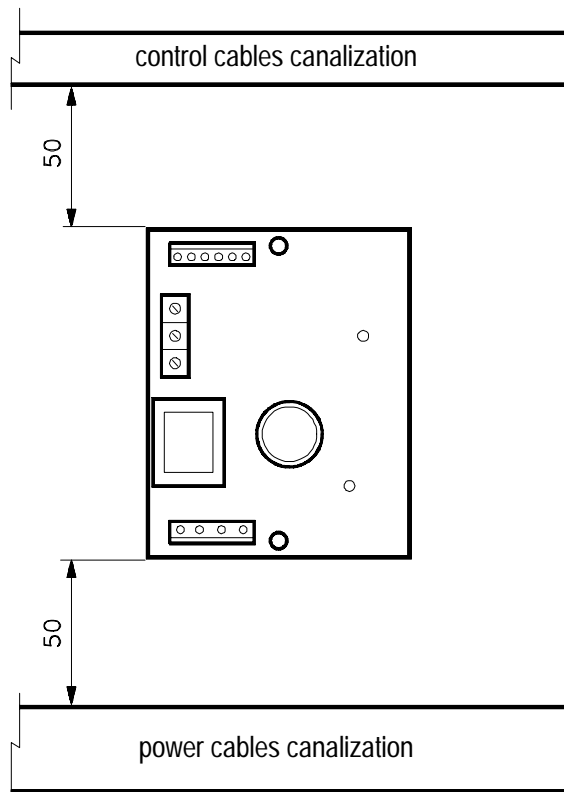
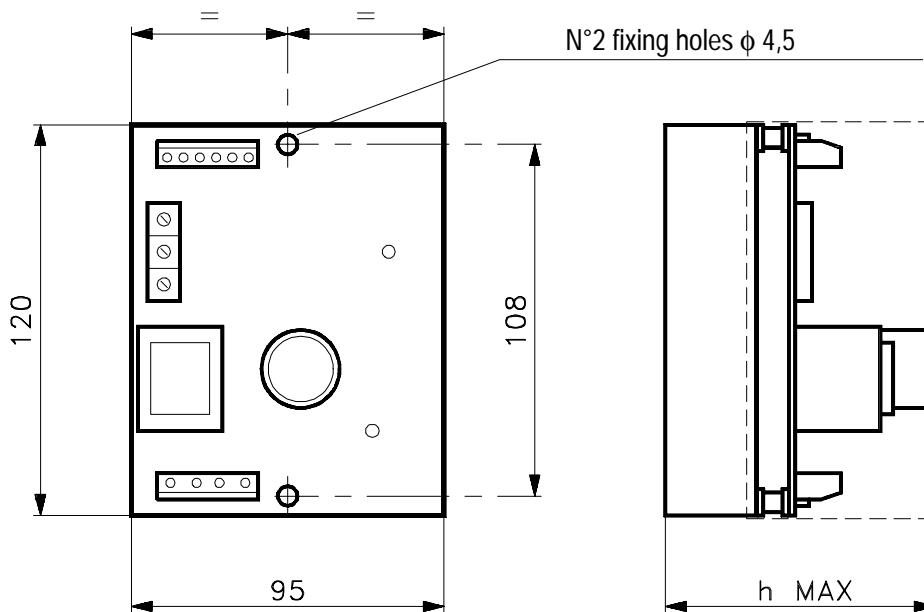
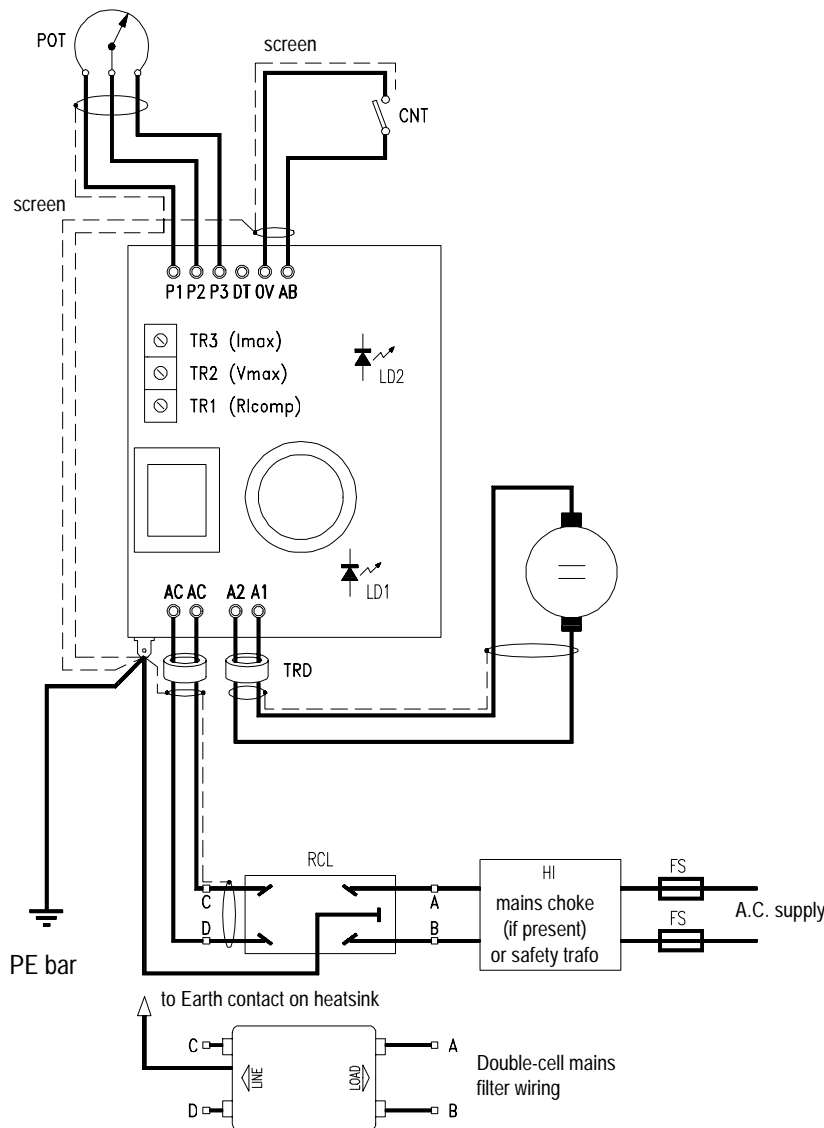


figure 2: OVER ALL DIMENSIONS



dimension "h Max" (mm)	Ch25	Ch50	Ch100
opened version (IP00)	68	88	114
with ICH-E enclosure	94	94	120

figure 3: WIRINGS



POT = Potentiometer 5kOhm/2W
(see page 3)

CNT = Enable contact
closed=RUN
(see page 8)

TRD = Ferrite Toroids
(see page 6)

RCL = Mains filter
(see page 6)

HI = Line inductor
(see page 6)

LD1 = Led signalling presence of DC rail voltage
(see page 8)

LD2 = Led signalling intervention of "OVERCURRENT" protection
(see page 8)

TR1 = Rxl compensation adjustment
TR2 = max. armature voltage adj.
TR3 = max. armature current adj.
(see page 7)

Notice: Section of earth cable from heatsink to PE bar must be kept as large as possible.

figure 4 : "BLR" OPTION

