

3FMD - DC Motor Drive USER MANUAL



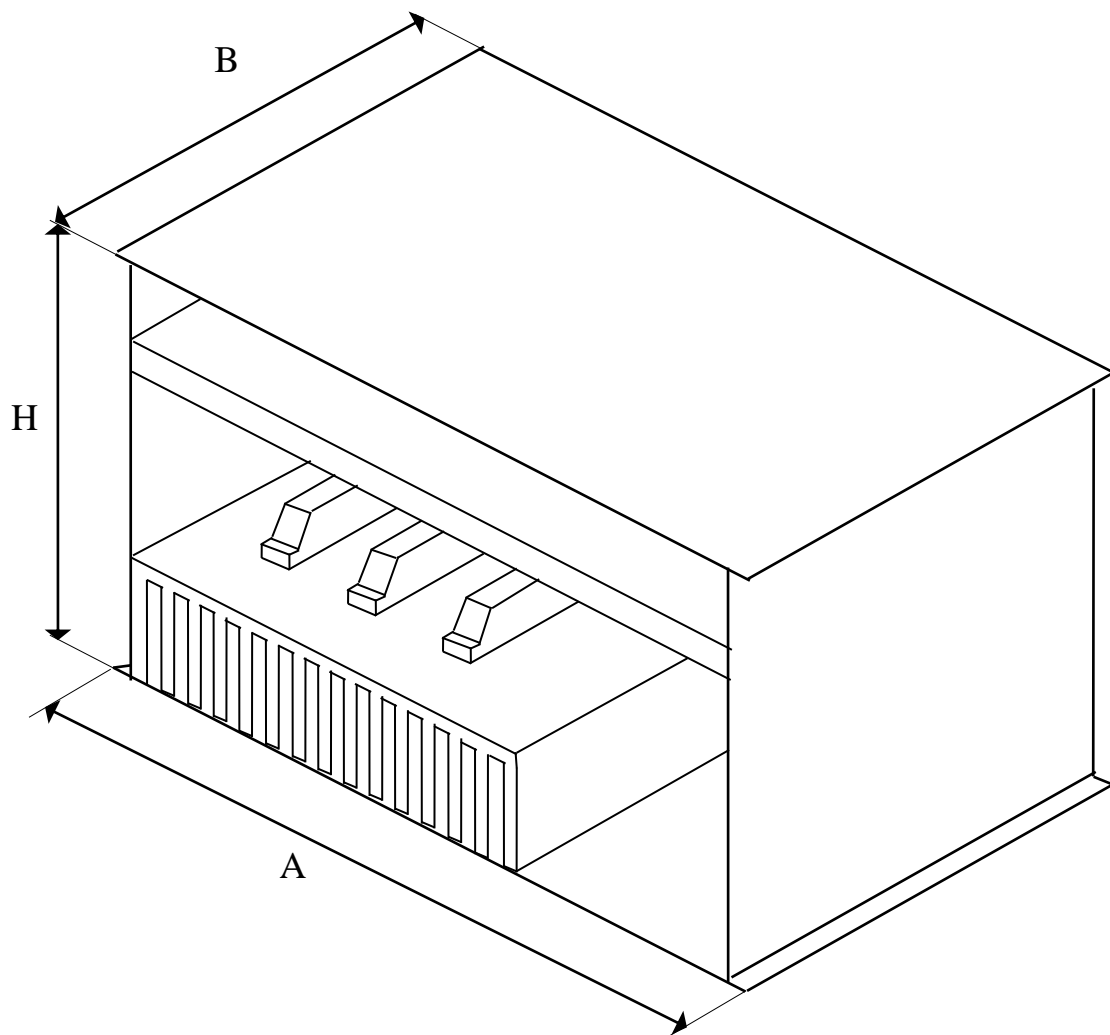
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General characteristics

Mechanical characteristics:



Available size:

DRIVE TYPE	I nominal (Ampere)	Vdc max motor (Volt)	HP	Power supply Vac $\pm 10\%$	Filter EMI	Physical dimension AxBxH
20-3FMD	20	260/440	6/10	220/380 V	832030V	315x245x210
30-3FMD	30	260/440	9/15	220/380 V	832030V	315x245x210
40-3FMD	40	260/440	12/20	220/380 V	832050V	315x245x210
50-3FMD	50	260/440	15/25	220/380 V	832050V	315x245x210

60-3FMD	60	260/440	18/30	220/380 V	832080V	315x245x210
80-3FMD	80	260/440	24/40	220/380 V	832080V	315x245x210
100-3FMD	100	260/440	30/50	220/380 V	832100V	315x245x210
120-3FMD	120	260/440	36/60	220/380 V	832150V	315x245x210
150-3FMD	150	260/440	45/75	220/380 V	832150V	315x285x210
200-3FMD	200	260/440	60/100	220/380 V	832200V	315x285x210
300-3FMD	300	260/440	90/150	220/380 V	832360V	315x285x210
400-3FMD	400	260/440	120/200	220/380 V	832500V	450x250x310
500-3FMD	500	260/440	150/250	220/380 V	832500V	450x250x310
700-3FMD	700	260/440	210/350	220/380 V	-	550x350x310
1000-3FMD	1000	260/440	300/500	220/380 V	-	550x350x310

* It's possible to have custom drives on specific features.

Electrical characteristics:

- Two quadrant three phase thyristor bridge
- Thyristor drive by means of pulse transformer
- Current loop, feedback by current transformer
- Speed loop, feedback by tacho generator or by armature voltage (with R_xI compensation)
- Ramp circuit for deceleration and acceleration
- Protection circuit for over current, phase less, tacho less, overload, field less
- The field supply bridge is on the board
- Speed regulation by potentiometer or by a voltage source 0-10V

Protections:

- **Over current:** Is caused by an internal or external shortcircuit
- **Phase less:** Is caused by a phase failure on the control board
- **Tacho less:** Is caused by a tacho generator fault
- **Overload:** is caused by an high current flow for a long time (prevent motor damaged)
- **Field less:** Is caused by a field current fault

LED

- **Power supply -15:-** 15V power supply is present
- **Power supply +15:+**15V power supply is present
- **Current erogation:** The drive give an output power
- **Phase less:** The phase less protection is active

- **Tacho less:** The tacho less protection is active
- **Overload:** The overload protection is active
- **Field less:** The field less protection is active

Terminal description

Control function box:

1. R phase
2. -
3. S phase
4. -
5. T phase
6. -
7. 0 V
8. Ramp circuit input
9. Positive power supply +10
10. Negative power supply -24
11. Negative power supply -15
12. Positive power supply +24
13. Positive power supply +15
14. Ramp circuit output
15. Speed reference input
16. Aux speed reference input
17. Speed loop output
18. Current loop input
19. 0 V
20. Current signal
21. Enable switch input
22. 0 V
23. -
24. Tacho generator input

Relays junction box

1. Fault output relay
2. Fault output relay
3. Minimum speed relay
4. Minimum speed relay

Power junction box

1. R phase
2. S phase
3. T phase
4. Motor armature (+)
5. Motor armature (-)
6. Field supply (220/380 VAC)
7. Field supply (220/380 VAC)

- 8. Field output (+)
- 9. Field output (-)

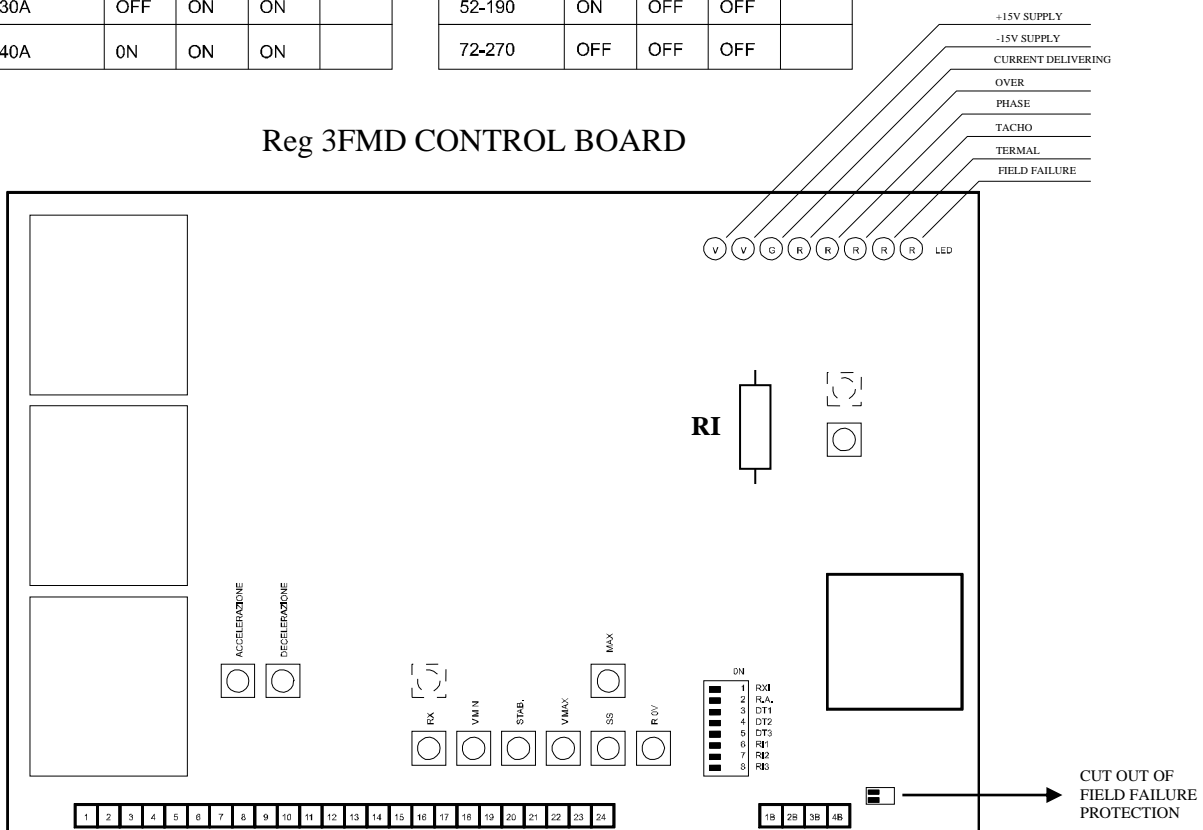
Drive front view

For driver with current upper to 40A, the size of driver is definite by dip-switch selection.
 For driver over 40A the maximum current is setted by resistor RI with dip-switch 6-7-8 on.
 It is possible decrease the current of 10-20-30 A opening switch 6-7-8.

CURRENT SELECTION				
SWITCH	6	7	8	
10A	OFF	OFF	OFF	
20A	OFF	OFF	ON	
30A	OFF	ON	ON	
40A	ON	ON	ON	

TACHO VOLTAGE SELECTION				
SWITCH	3	4	5	
10-47	ON	ON	ON	
34-130	ON	ON	OFF	
52-190	ON	OFF	OFF	
72-270	OFF	OFF	OFF	

DIP-SWITCH	
ARM FEEDBACK	1-2 ON
TACHO FEEDBACK	1-2 OFF



Regulations

Trimmers

- **Acceleration:** Set the ascending ramp of the drive
- **Deceleration:** Set the descending ramp of the drive
- **RxI:** Set the RxI compensation in armature feedback
- **V.MIN.:** Set the minimum speed of the motor
- **STAB:** Set the gain of the speed control loop
- **V.MAX:** Set the maximum speed of the motor
- **SSI:** Set the over current threshold
- **IMAX:** Set the maximum output current
- **R.OV.:** Set the minimum speed relay threshold
- **I²T:** Set the overload threshold

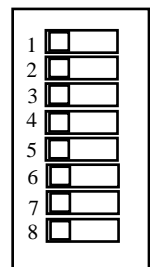
Dip switch:

There are eight dip switch for the setting of the drive.

Type of feedback

By means of the dip switch 1 and 2 is possible to select the type of speed feedback.

	Dip switch 1	Dip switch 2
Armature feedback	ON	ON
Tacho feedback	OFF	OFF



Tacho feedback

By means of the dip switch 3-4-5 is possible to select the range for the tacho generator, to have the fine adjustment use the VMAX trimmer:

	Dip switch 3	Dip switch 4	Dip switch 5
10-47	ON	ON	ON
34-130	ON	ON	OFF
52-190	ON	OFF	OFF
72-270	OFF	OFF	OFF

Output current

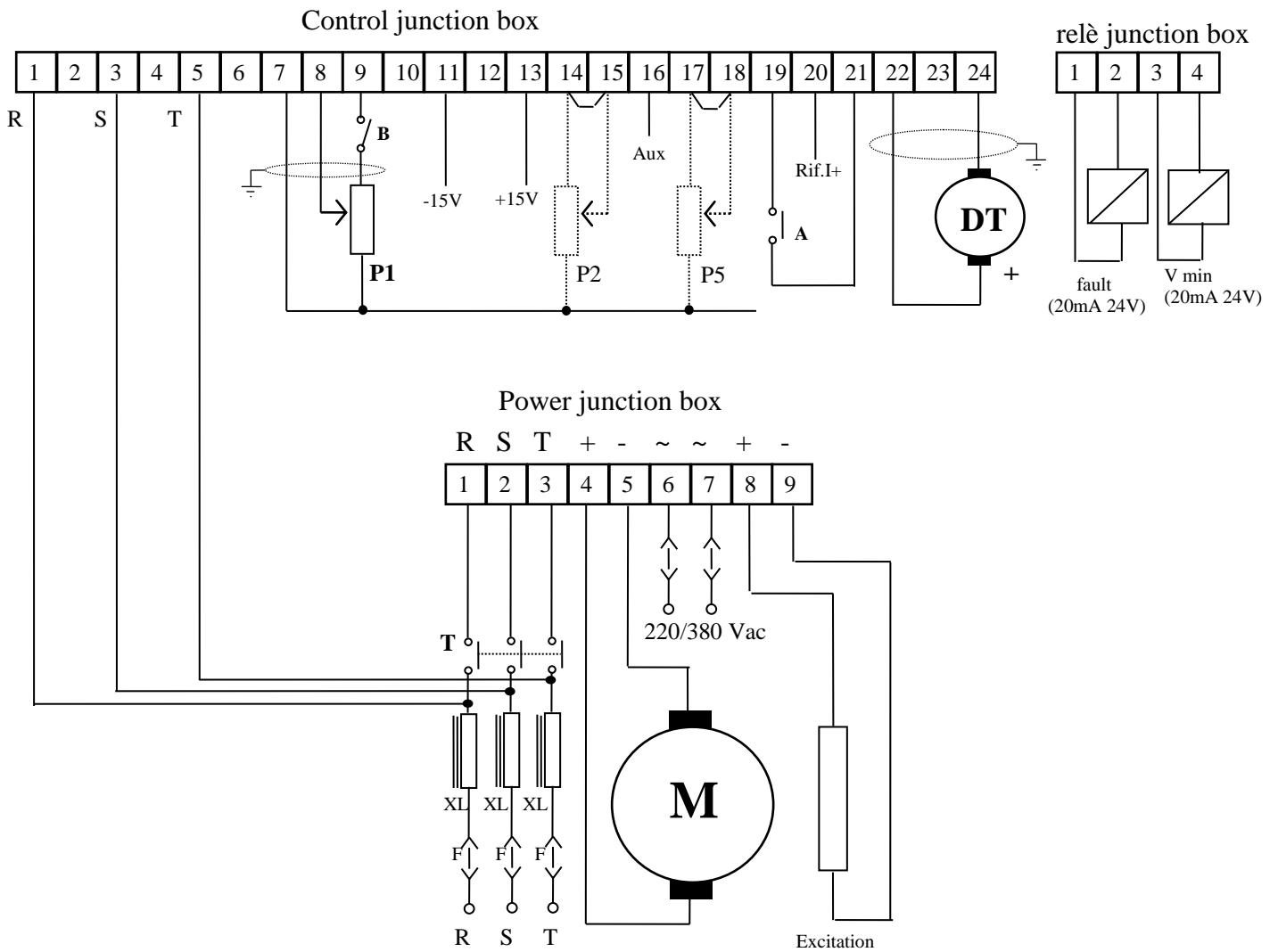
By means of dip switch 6-7-8 is possible to select the maximum output current, in the table are shown The current for a drive of 40A, if the size of the drive is higher each dip switch increment the current of 10A:

	Dip switch 6	Dip switch 7	Dip switch 8
10A	OFF	OFF	OFF
20A	OFF	OFF	ON
30A	OFF	ON	ON
40A	ON	ON	ON

There is another double dip switch to disable the field less protection.

Connections

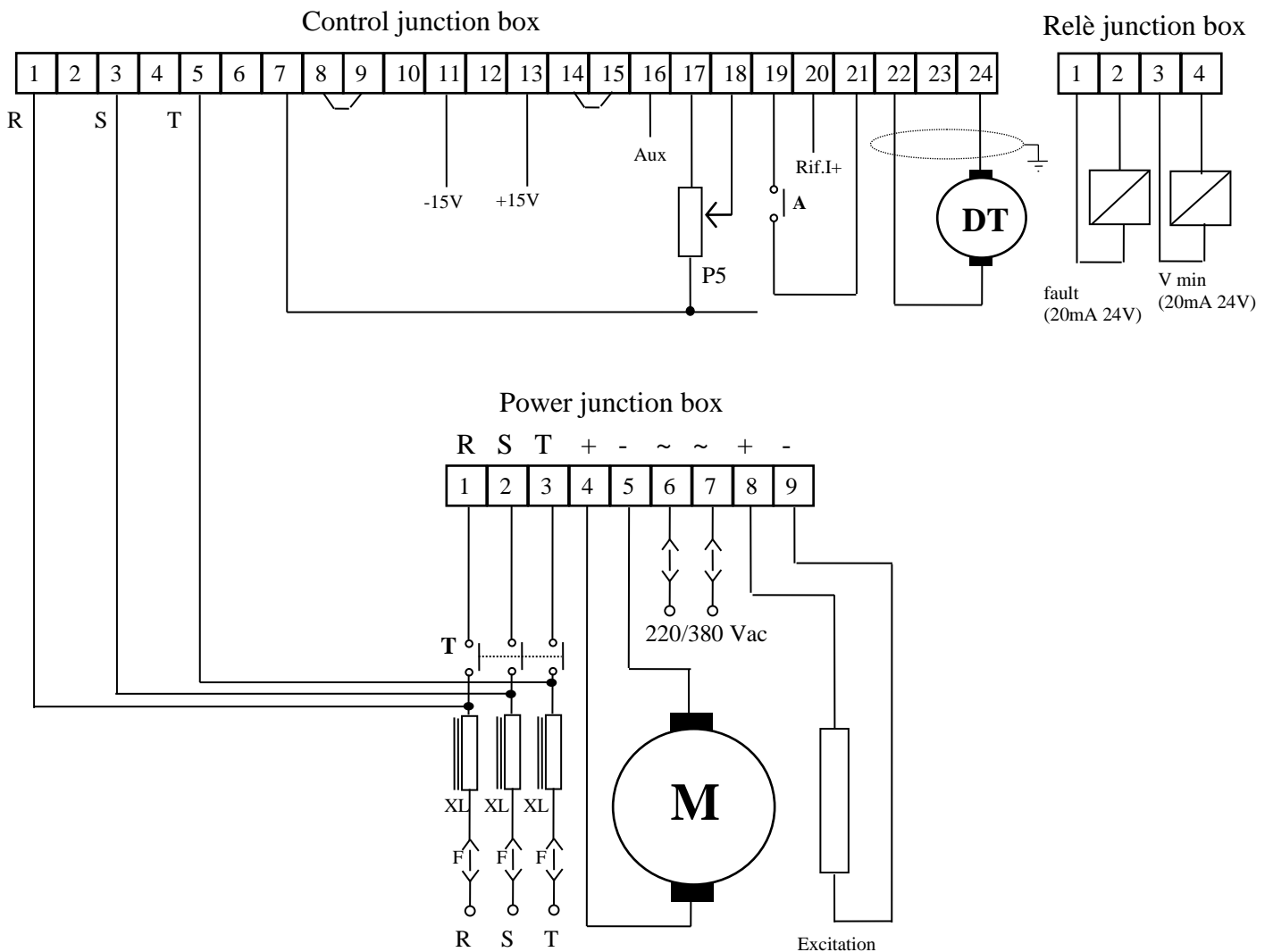
Connections with speed reference from potentiometer:



T: Power contactors
A: Drive enable switch
B: motor stop
P1: Speed potentiometer

P2: Speed potentiometer
P5: Torque potentiometer.
XL: Line Inductances
F: extrarapid fuses

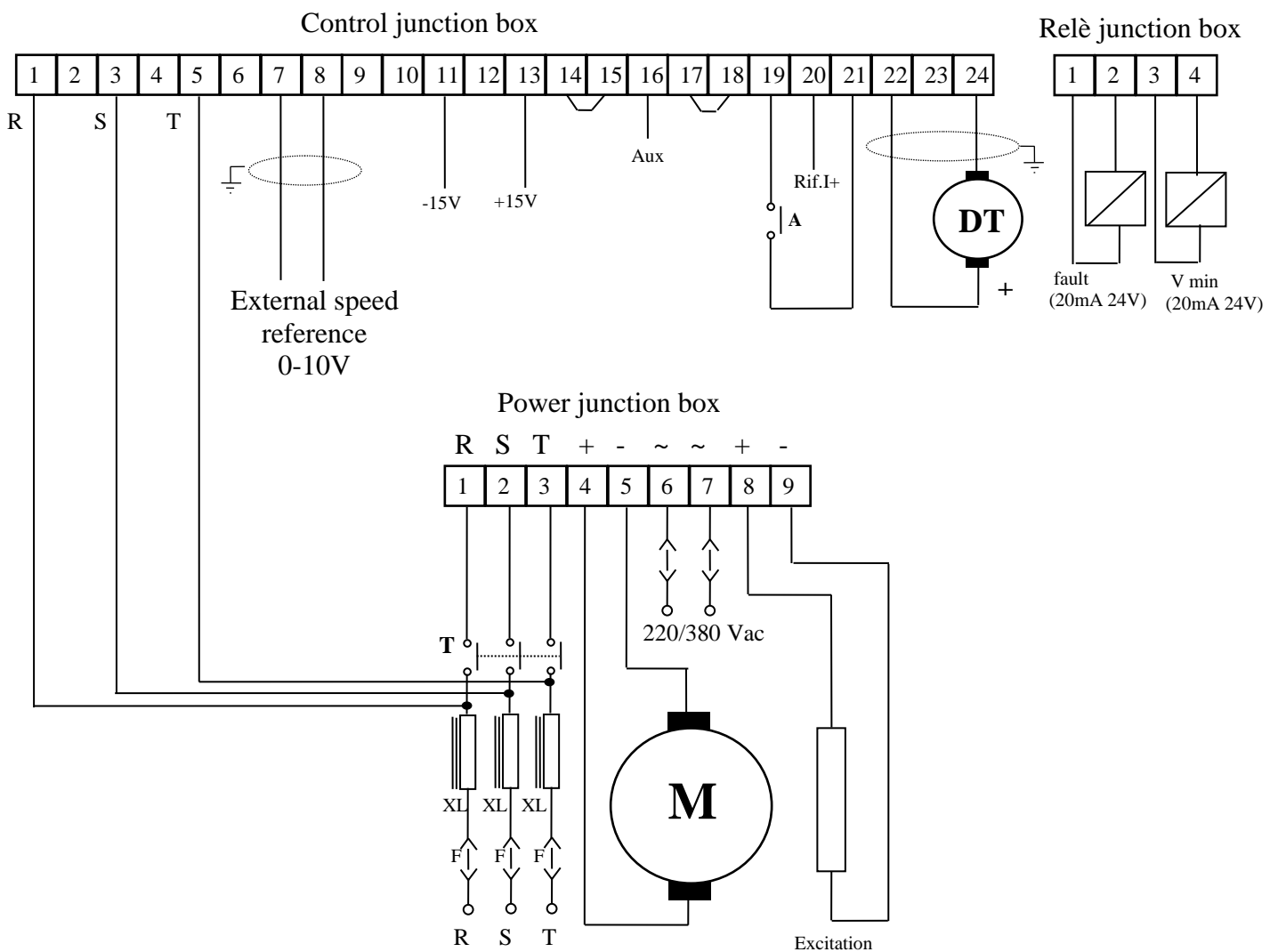
Connections for current regulations:



T: Power contactors
A: Drive enable switch
XL: Line Inductances
P1: Speed potentiometer

P2: Speed potentiometer
P5: Torque potentiometer.
F: extrarapid fuses

Connections with speed reference from a voltage source (N.C.):



T: Power contactors
XL: Line Inductances

A: Drive enable switch
F: extrarapid fuses

Troubleshooting

Failure	Reason	Solutions
<ul style="list-style-type: none"> The fuses burn just the power supply go high or when enable switch is on The drive give an over current protection when the enable switch is on 	<ul style="list-style-type: none"> Thyristor is damaged Fuses too small Thyristor damage External short-circuit 	<ul style="list-style-type: none"> Replace the damaged thyristor Place the right fuses Replace the damaged thyristor
The drive give a phase less protection	<ul style="list-style-type: none"> A supply phase is not connected A supply transformer is damaged 	<ul style="list-style-type: none"> Remove the short-circuit Connect all the supply phase Replace the damaged transformer
<ul style="list-style-type: none"> The motor go at the maximum speed and the drive give the tacho less protection 	<ul style="list-style-type: none"> The connection between the drive and the tacho generator are omitted The tacho generator is damage 	<ul style="list-style-type: none"> Make the right connections Replace the tacho generator
<ul style="list-style-type: none"> The drive give an I²T protection 	<ul style="list-style-type: none"> Overload of the motor or I²T threshold too low 	<ul style="list-style-type: none"> Control the load conditions or increment the I²T threshold
<ul style="list-style-type: none"> The drive give a field less protection The speed is ondulated 	<ul style="list-style-type: none"> There is not field current The gain of the speed loop is to high 	<ul style="list-style-type: none"> Control the functionality of the field circuit Give a lower gain to the drive by means of the stab trimmer
<ul style="list-style-type: none"> The speed precision of the drive is insufficient 	<ul style="list-style-type: none"> The gain of the speed loop is too low 	<ul style="list-style-type: none"> Give a higher gain to the drive by means of the stab trimmer.

