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Programming

b5 = 1
b9 = 1
b20 = 0
b50 = 1

C3 — +10V
C2 — Frequency reference
RP
C1 — 0V

C6 — 0V
C7 — External trip
C8 — Reset
C10 — Forward
C12 — Reverse
B8 —
B9 — KA1
B10 —
SB4

A1
A2 — Minimum frequency

B1 — Analogue outputs
B2 —

FMV 2107/FMV 2307
Digital frequency inverters for induction motors
Installation and maintenance

Frequency inverters
FMV 2107
FMV 2307

NOTE

LEROY-SOMER reserves the right to modify its product characteristics at any time to incorporate the latest technological developments. The information contained in this document may therefore be changed without prior warning.

LEROY-SOMER gives no contractual guarantee whatsoever concerning the information published in this document and cannot be held responsible for any errors it may contain, nor for any damage arising from its use.

CAUTION

For the user's own safety, this frequency inverter must be connected to an approved earth ($\perp$ terminal).

Power electronic equipment such as speed controllers, frequency inverters, soft starters, and inverters cannot be used as circuit-breaking or isolating devices as specified in standard EN 60204 - 1, section 5.
If an accidental start of the installation represents a risk for personnel or the machinery to be driven, it is imperative to supply the equipment via an isolating device and a circuit-breaking device (power contactor) controllable by an external safety system (emergency stop, fault detector).

The frequency inverter is fitted with safety devices which can stop the frequency inverter in the event of faults or even stop the motor. The motor itself can be jammed by mechanical means. Finally, voltage fluctuations, and particularly power cuts, can also cause the starter to switch off.
The removal of the cause of the shutdown can lead to restarting, with consequent hazard for certain machines or installations.
In such cases, it is essential that the user takes appropriate precautions against restarting when the motor makes an unscheduled stop.

This equipment meets with existing construction standards. Nonetheless it may cause interference, and the user is responsible for carrying out the appropriate action to eliminate such interference.

The frequency inverter is designed to power a motor over and above its rated speed (up to 19 times with some settings).
If the motor is not mechanically capable of operating at such speeds, the user risks serious damage arising from mechanical deterioration of the motor.
Before programming a high speed, it is essential that the user ensures that the motor can tolerate it.

LEROY-SOMER declines all responsibility in the event of the above recommendations not being observed.

....

DANGER

IMPORTANT

Before any intervention, whether to do with the electrics or the mechanics of the installation or machine :
- ensure that the power to the inverter has been switched off (fused isolator or circuit-breaker) and locked manually.
- wait 7 minutes before working on the associated frequency inverter,
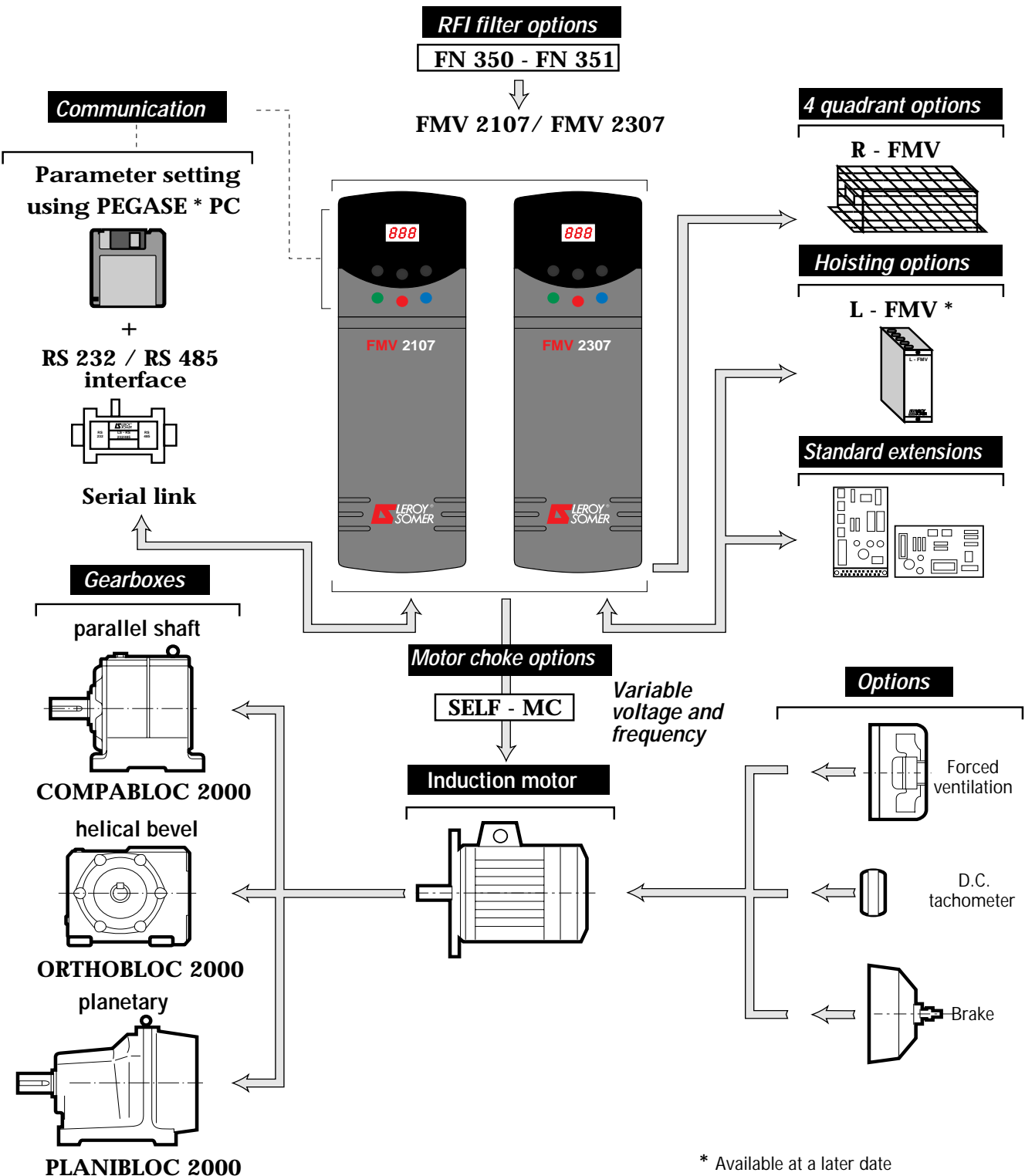- indicates sections in this manual relating to the safety of workers.

Frequency inverters
FMV 2107
FMV 2307

PREFACE

This manual describes how to commission **FMV 2107 and FMV 2307** digital technology frequency inverters. It gives details of all the procedures which should be adopted when working on the inverter and shows extension options.

> **FMV 2107** refers to frequency inverters - **Power supply 200 to 240V single phase, range 1.5M to 3.5M**.
> **FMV 2307** refers to frequency inverters - **Power supply 200 to 240V 3-phase, range 1.5TL to 3.5TL,**
>   - **Power supply 380 to 480V 3-phase, range 1.5T to 5.5T.**

RFI filter options

FN 350 - FN 351

FMV 2107/ FMV 2307

Communication

Parameter setting using PEGASE * PC

+

RS 232 / RS 485 interface

Serial link

4 quadrant options

R - FMV

Hoisting options

L - FMV *

Standard extensions

Gearboxes

parallel shaft

COMPABLOC 2000

helical bevel

ORTHOBLOC 2000

planetary

PLANIBLOC 2000

Motor choke options

SELF - MC

Variable voltage and frequency

Induction motor

Options

Forced ventilation

D.C. tachometer

Brake

FMV 2107

FMV 2307

* Available at a later date

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Frequency inverters
FMV 2107
FMV 2307

CONTENTS

1 - GENERAL INFORMATION

1.1 - General operating principle

The synchronous speed (min^{-1}) of a cage induction motor is a function of the number of poles (P) it has and the frequency (F) of its power supply. These values are related by the equation :

$$N = \frac{120 \times F}{P}$$

Thus, changing the frequency (F) also changes the synchronous speed (N) of a given motor.

However, changing the frequency without changing the supply voltage varies the density of magnetic flux in the motor. **FMV 2107 / FMV 2307 inverters** cause the output VOLTAGE and FREQUENCY to vary simultaneously. This allows optimisation of the motor torque curve and prevents overheating.

FMV 2107 / FMV 2307 inverters power the motor by means of a voltage generated from a steady internal D.C. voltage. Voltage modulation is achieved using the principle of pulse width modulation (P.W.M.).

This provides the motor with a current close to a sine wave with few harmonics.

LS MV motors are designed for use with a frequency inverter. Their magnetic circuits and windings have been adapted for use with **FMV 2107 / FMV 2307 inverters.** Thus the motor-inverter unit provides guaranteed torque performances in all types of operating conditions (please consult LEROY-SOMER).

1.1.1 - Functional description of the variable speed controller

The variable speed controller comprises :

• **A rectifier** for the mains supply voltage, along with a **smoothing capacitor** to provide a steady D.C. voltage which depends on the mains supply voltage.

• **An inverter :** this D.C. voltage supplies power to the 6-transistor inverter (IGBT). The inverter converts the D.C. voltage to an A.C. voltage which is modulated in voltage and frequency.

• **Three internal current measurements** for the D.C. bus, the inverter output and the braking transistor.

• **An electronic control board**

comprising : the microprocessor, the ASIC circuit which generates PWM and the circuits which amplify the power control signals.

• **A console** for entering parameters, reading data and controlling the inverter.

1.1.2 - Operating diagrams
- FMV 2107
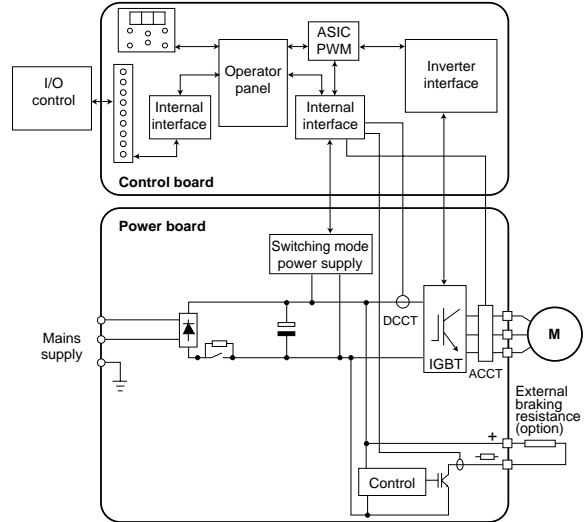
- FMV 2307

1.2 - Product designation

Examples : **FMV 2107 - 1.5M, FMV 2307 - 1.5TL and FMV 2307 - 1.5T**

FMV 2107 : frequency inverter for general applications and single phase 200V/240V supply.

FMV 2307 : frequency inverter for general applications and 3-phase supply

1.5 = Rating in kVA.

M = Single phase supply.

TL = 3-phase 200V/240V supply.

T = 3-phase 380V/440V supply.

This designation is shown on the identification plate.

LEROY SOMER ® FMV 2107 1.5 M
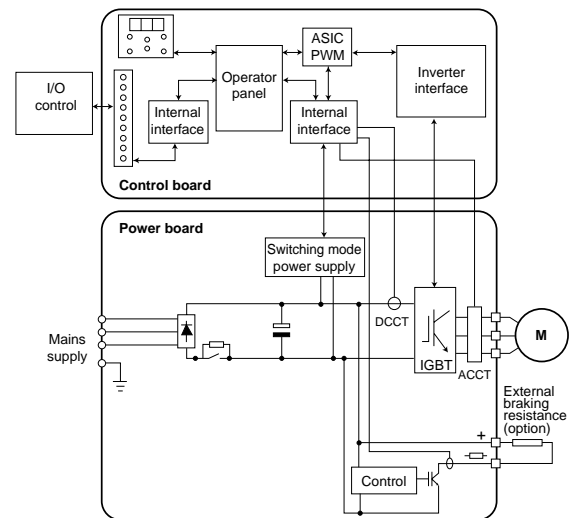
Il est indispensable de lire la notice avant de raccorder cet appareil

It is essential to read the instructions before connecting the inverter

ENTRÉE / INPUT	SORTIE / OUTPUT	
1 Ph. 200 - 240 V	3 Ph. 0 - 240 V	
50 - 60 Hz	0.75 KW	
	4,3 A	

Serial N° : XXXXXX

Date : XX/XX/XX

Après mise hors tension, attendre 5 minutes pour toute intervention dans l'appareil

After switching off the inverter, wait 5 minutes before performing maintenance or inspection

LEROY SOMER ® FMV 2307 1.5 TL

Il est indispensable de lire la notice avant de raccorder cet appareil

It is essential to read the instructions before connecting the inverter

ENTRÉE / INPUT	SORTIE / OUTPUT
3 Ph. 200 - 240 V	3 Ph. 0 - 240 V
50 - 60 Hz	0.75 KW
	4,3 A

Serial N° : XXXXXX

Date : XX/XX/XX

Après mise hors tension, attendre 5 minutes pour toute intervention dans l'appareil

After switching off the inverter, wait 5 minutes before performing maintenance or inspection

LEROY SOMER ® FMV 2307 1.5 T

Il est indispensable de lire la notice avant de raccorder cet appareil

It is essential to read the instructions before connecting the inverter

ENTRÉE / INPUT	SORTIE / OUTPUT
3 Ph. 50Hz 380-440V	3 Ph. 0 - 480 V
3 Ph. 60Hz 380-480V	0.75 KW
	2,1 A

Serial N° : XXXXXX

Date : XX/XX/XX

Après mise hors tension, attendre 5 minutes pour toute intervention dans l'appareil

After switching off the inverter, wait 5 minutes before performing maintenance or inspection

1.3 - Characteristics
1.3.1 - Electrical characteristics

Characteristics	FMV 2107 1.5M to 3.5M			FMV 2307 1.5TL to 3.5TL			FMV 2307 1.5T to 5.5T					
Power supply	single phase 200 to 240V to ±10% 48 to 62 Hz			3-phase 200 to 240V to ±10% 48 to 62 Hz			3-phase 380 to 440V ±10% 48 to 56 Hz 380 to 480V ±10% 58 to 62 Hz					
Rating	1.5M	2.5M	3.5M	1.5TL	2.5TL	3.5TL	1.5T	2T	2.5T	3.5T	4.5T	5.5T
Supply current	7	14	18	5	10	13	3,5	4,5	5,5	9	11	13
Output current	4,3	7	10	4,3	7	10	2,1	2,8	3,8	5,6	7,6	9,5
Motor power	0,75	1,5	2,2	0,75	1,5	2,2	0,75	1,1	1,5	2,2	3	4
Output voltage	from 0V to supply voltage			from 0V to supply voltage			from 0V to supply voltage					
Max nbr of power-ups per hour	20			20			20					
Continuous braking current	6			6			6					
Peak braking current	15			15			15					

1.3.2 - Characteristics and functions

CHARACTERISTICS	
Regulation mode	Voltage/Frequency characteristic
Regulation	Frequency reference. " Torque " reference : current regulation in the motor.
Ratio : Voltage (U) / Frequency (f)	U/f ratio may be adjusted by the base frequency. Fixed U/f ratio : constant torque, or dynamic U/f ratio : variable torque according to the load.
Switching frequency	

Switching frequency (kHz)	2,9	5,9	8,8	11,7
Maximum output frequency (Hz)	120	240	480	960

Frequency accuracy	± 0.01 % of the maximum adjusted range for a digital reference (preset speed or serial link).
Frequency resolution	- Reference via serial link : 0.001 Hz. - Digital reference * < 100 : 0.1 Hz. - Digital reference * ≥ 100 : 1 Hz. - 10 bit resolution - 8 bit accuracy.
Incrementation of parameters	P2 and P3 : proportional to the display. P0, P1, P7, P10 to P15 and P20 to P27 : 0.1 Hz for LFm < 480 Hz, 0.3 Hz for LFm > 480 Hz and 0.5 Hz for LFm = 960 Hz.
Display resolution	0.1 Hz from 0 to 100, 1 from 101 to 999.
Slip compensation	

Maximum output frequency (Hz)	120	240	480	960
Compensation range (Hz)	0 to 5	0 to 10	0 to 20	0 to 25

Overload capacity	150 % In for 60s.
Braking	Hypersynchronous braking : - inverter alone, - with options R - FMV. D.C. injection braking.
Torque at low frequency (Boost)	- Fixed by programming. - Automatically adjusted according to the load.

CONTROL	
Inverter control	Via operator panel. Via terminal block. Via serial link.
Frequency reference	Analogue reference : - voltage : 0 to +10V or ±10V (input impedance 110 kΩ), - current : 4 to 20mA, 20 to 4mA, 0 to 20mA (impedance 100Ω). Digital reference : - via preset speed, - via command on operator panel, - via serial link.
Torque reference	Analogue reference : 0 to +10V D.C. (impedance 27 kΩ). Digital reference : programmable via serial link.
Torque limitation	Via analogue reference (impedance 27 kΩ).
Local/Remote Frequency reference changeover	Via terminal C11 - Local : voltage, terminal C2, - Remote : current, terminal C5, following b11.
Fwd/Rev operation	Via the terminal block, terminal C10 Forward Operation, terminal C12 Reverse Operation. Via the operator panel Via the serial link.

* Digital reference : via preset speed or operator panel.

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1.3.2 - Characteristics and functions (continued)

OPERATION	
Acceleration/deceleration ramps	Separate adjustments from 0.2 to 600 s : linear characteristics.
Preset speeds	Either : 3 programmable speeds (plus the reference) + jog (inch) function. Or : 7 programmable speeds (plus the reference).
Acceleration/deceleration ramps with preset speeds	Selection : - analogue reference ramps, - special independent ramps
Frequency limitation Minimum/Maximum	Variation of the reference between 2 limits.
Frequency skipping	3 frequency skips with adjustable skip band, to prevent mechanical resonance phenomena.
Jogging	Adjustable frequency : 0 to 15 Hz. Separate acceleration and deceleration ramps : 0.2 to 600s.
Stopping mode	Freewheel stop : instantaneous brake of motor supply. Braking in ramp (2 modes). D.C. injection braking.
D.C. injection braking	Braking torque : 40 to 150 % In. Braking until motor stop and holding torque for 1 second.
Automatic reset	- 1 to 5 attempts to restart, - adjustment from 1 to 5 seconds between 2 attempts, - the external fault " Et " is not involved.
Catch spinning motor	Possibility of starting the inverter when the motor is rotating.
Protection	Access to parameters limited by an access code.
TRIPS	
Loss of current reference (4-20 / 20 - 4 mA)	Reference value < 3 mA. The function can be disabled by b26.
CPU fault	Internal inverter fault at power up.
External trip	Trip forced by the terminal block or via the serial link.
Overload (I x t)	Electronic thermal relay.
Overheated inverter	Protection of the inverter by thermal probes on the cooling unit.
Overheated motor	PTC probe : - tripping with PTC resistance > 3 kΩ (motor too hot), - reset with PTC resistance = 1.8 kΩ. PTO probe.
Overcurrent	185 % of the rated current.
Short-circuit Phase - phase Phase - Earth	Protection against short-circuits between phases and earths at the inverter output.
Phase loss/ phase imbalance	Supply cut Supply voltage drop : - < 170V for FMV 2107, - < 300V for FMV 2307.
Undervoltage	D.C. bus voltage below its operating range.
Overvoltage	For an inappropriate deceleration time or for too high a voltage on the mains supply.
Internal supply fault	Monitoring of inverter internal power supplies.
Reset	Trip reset : " STOP/RESET " key on the operator panel or terminal C8 on the terminal block, depending on the control mode.

INDICATIONS	
Display	On the operator panel : - output frequency in Hz, or - output current as a % of the rated current In.
Status relay	240 V.A.C. relay - 6A (resistive load). Activated when : the inverter is healthy or the frequency is higher than the minimum frequency (P0).
Inverter status output	Open collector : 24V internal source, 100 mA. Activated when : the inverter is running or the frequency is higher than the minimum frequency.
Frequency : analogue output	- 0 to ±10V, 5mA, precision ±2 % : 0V = zero frequency, 10V = max. adjusted frequency. - 4 to 20 mA precision ± 2 % : 4 mA = zero frequency, 20 mA = max. adjusted frequency.
Motor load : analogue output	- 0 to ± 10V, 5 mA, precision ± 10 % for F > 15 Hz, 0V = zero current, 10V = 1.5 In - 4 to 20mA, precision ± 10 % for F > 15 Hz, 4mA = zero current, 20mA = 1.5 In.
Motor current reached logic output	- 0V : current less than P5 - 10V : P5 reached
Diagnostic	The last 10 trip codes are stored.
SERIAL LINK	Communication : PLC, PC, etc. RS 485 and RS 422, protocol ANSI x 3.28 - 2.5 - A4.
OPTIONS	
RFI filter	- FMV 2107 : FN 350-8-29 and FN 350-20-29 - FMV 2307 : FN 351-8-29 and FN 351-16-29
Leakage current attenuation chokes	SELF - MC 3.5T and 11T
Braking resistors (4 quadrants) R - FMV	- FMV 2107 : R-FMV 140M and R-FMV 320M - FMV 2307 : R-FMV 320T to R-FMV 2000T
Hoisting module	- FMV 2307 T : L - FMV *
Control and supervision software	PEGASE

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1.4 - Environmental characteristics

1.4.1 - General

Characteristics	Level
Ingress protection	IP31
Storage temperature	- 40°C to + 50°C, 12 months maximum.
Operating temperature	- 10°C to + 50°C.
Altitude	• ≤ 1000 m without derating. • Derating : 1 % of I$_N$ per 100 m above 1000m up to 4000 maximum.
Humidity	Non condensing.
Vibration	According to IEC 68-2-34 (0.01g^2/Hz acceleration)
Shocks	According to IEC 68-2-27 (50g peak acceleration)
Immunity	According to : - IEC 801-2 Level 3 - IEC 801-3 Level 3 - IEC 801-4 Level 3
Emissions conducted	According to : - EN 50081-1 (VDE 875 N) with : 2.9 kHz switching frequency and supply filter - EN 50081-2 (VDE 875 G) with supply filter
radiated	According to EN 50081-2

1.4.2 - Installation in a cubicle

Installing the inverter in a cubicle calls for special precautions with regard to the size of the enclosure. It is important to check that there is sufficient heat dissipation.

a - Table of losses in Watts (W)

Switching	FMV 2107			FMV 2307			FMV 2307					
frequency	1.5M	2.5M	3.5M	1.5TL	2.5TL	3.5TL	1.5T	2T	2.5T	3.5T	4.5T	5.5T
2.9 kHz	64	67	82	52	62	81	41	46	55	75	90	110
5.9 kHz	70	73	115	61	72	93	44	57	67	89	105	120
8.8 kHz	88	93	131	67	80	108	49	65	73	97	120	135
11.7 kHz	90	114	140	71	85	124	61	72	89	119	138	148

- Table of flow rates for forced ventilation (m^3 min)

Forced	FMV 2107			FMV 2307			FMV 2307					
ventilation	1.5M	2.5M	3.5M	1.5TL	2.5TL	3.5TL	1.5T	2T	2.5T	3.5T	4.5T	5.5T
Flow rate (m^3 min)	-	0,72	0,72	-	0,72	0,72	-	-	0,72	0,72	0,72	0,72

b - Installation in a non-ventilated cubicle

The minimum required surface area for heat exchange is calculated from the following equation :

$$S = \frac{Pj}{k\,(Tj - Tamb)}$$

where :
Pj = loss from all heat-producing equipment (W).
Tj = maximum permissible ambient operating temperature (°C).
Tamb = maximum ambient external temperature (°C).
k = thermal transmission cœfficient.
S = heat exchange area (m^2).
k = 5.5 for 2mm thick sheet steel.

Example : installation of an FMV in a non-ventilated IP 54 cubicle (cubicle placed against a wall).
Pj = 114W (FMV 2107 2,5M) for switching F = 11.7kHz.
Tj = 40°C.
Tamb = 30 °C for example.
k = 5.5.
The calculated heat exchange area is S = 2.07m^2 and
S = 2 (AB) + AC + BC.

Taking the following values for A and B :
A = 1.8 m (height) - B = 0.6 m (depth),
the minimum calculation for C = 0.39 m.
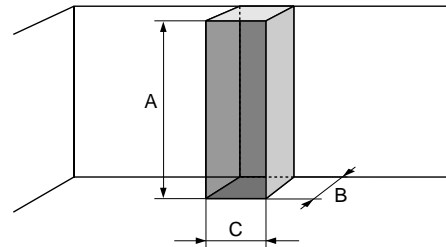
c - Installation in a ventilated cubicle

If it is possible to use forced ventilation (FV) the size of the cubicle can be reduced. A minimum space of 100 mm should be left around the inverter.
The flow rate of FV in m^3/h is calculated using the formula

$$V = \frac{3.1\,Pj}{Ti - Tamb} = 35{,}3 \ m^3/h$$

for the previous example.

1.5 - Weight and dimensions
1.5.1 - Weight

FMV 2107	Weight (kg)
1.5M	3,05
2.5M	3,25
3.5M	3,35

FMV 2307	Weight (kg)
1.5TL	3,05
2.5TL	3,25
3.5TL	3,35

FMV 2307	Weight (kg)
1.5T	3.05
2T	3.10
2.5T	3.10
3.5T	3.10
4.5T	3.40
5.5T	3.40

1.5.2 - Dimensions
These are identical for inverters :
- **FMV 2107 1.5M to 3.5M**
- **FMV 2307 1.5TL to 3.5TL**
- **FMV 2307 1.5T to 5.5T**

Overall dimensions
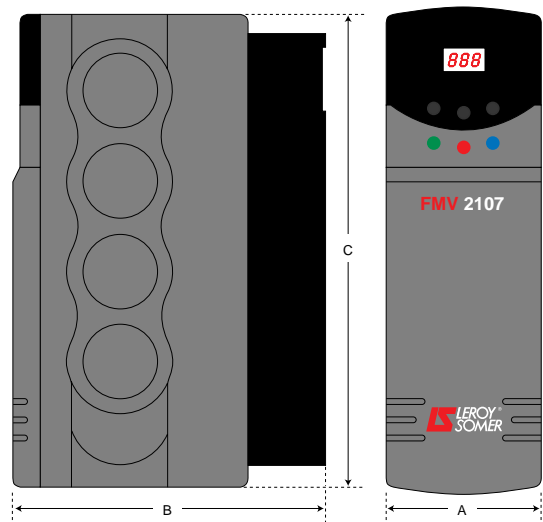
Label	A	B	C
Dimensions (mm)	91	200	293

2 - MECHANICAL INSTALLATION ⚠

2.1 - Checks on receipt

Before installing the inverter, ensure that :

- the inverter has not been damaged in transit,

- the fixing accessories are included,

- the identification plate corresponds to the power supply and the motor.

2.2 - Installation precautions

FMV 2107 and **FMV 2307** inverters must be installed in a risk-free atmosphere, away from conductive dust, corrosive gases and water leaks.

If this is not the case, it is recommended that they are installed in an enclosure or a cubicle. (See section 1.4.2 for cubicle dimensions).

Mount the inverter upright, allowing 100 mm above and below.

To prevent overheating problems, install the inverters side by side and not on top of each other.

2.3 - Installing the inverter

2.3.1 - General

The installation is identical for the following inverters FMV 2107 1.5M to 3.5M, FMV 2307 1.5TL to 3.5TL and FMV 2307 1.5T to 5.5T.

Depending on the fixing accessories used, the inverter can be installed in 3 different ways :

- on DIN rail,

- on a frame,

- cooling unit outside the cubicle.

2.3.2 - DIN rail mounting
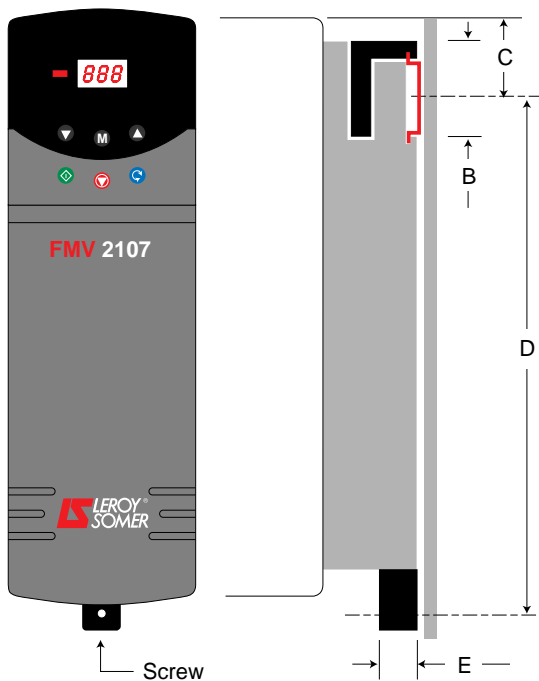
Label	B	C	D	E	Screw
Dimensions (mm)	35	37,5	258	15	M5

1) Fix the DIN rail support above the cooling unit using the M5 screw supplied.

2) Suspend the inverter on the DIN rail by inclining the top towards the back.

3) Insert the foot mounting into the groove at the base of the cooling unit.

4) Fix the foot mounting to the chassis using an M5 screw.

2.3.3 - Mounting on frame
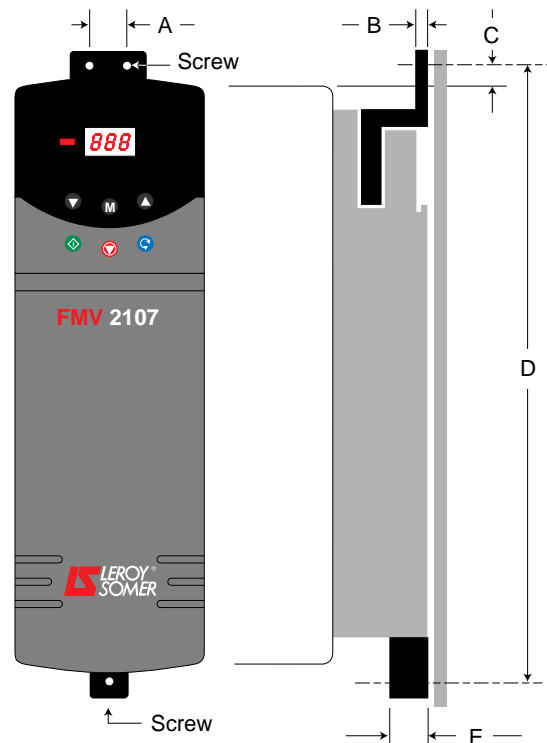
Label	A	B	C	D	E	Screw
Dimensions (mm)	16	6,5	7,5	303	15	M5

1) Fix the support above the cooling unit using the M5 screw supplied.

2) Fix the inverter to the frame using 2 x M5 screws.

3) Insert the foot mounting into the groove at the base of the cooling unit.

4) Fix the foot mounting to the frame using an M5 screw.

2.4 - Through-panel mounting
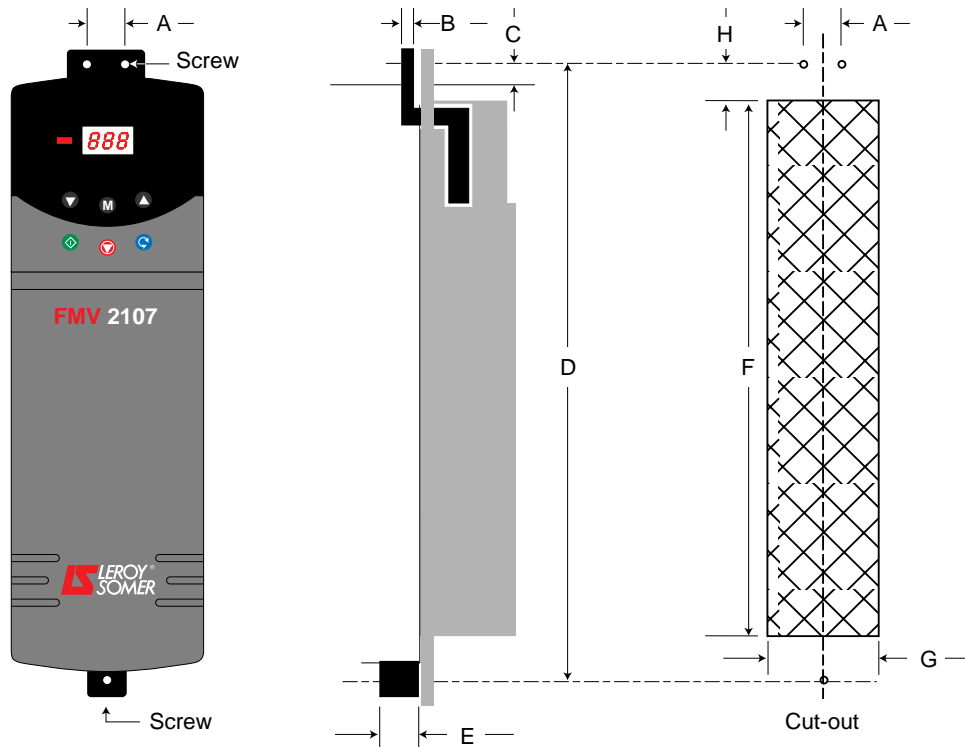
Label	A	B	C	D	E	F	G	H	Screw
Dimensions (mm)	16	6,5	7,5	303	15	269	78	20	M5

1) Cut out and drill the rear panel of the cubicle.
2) Fix the Z shaped support above the cooling unit.
3) Insert the inverter in the cut-out of the rear panel and fix it in place using 2 M5 screws.
4) Insert the foot mounting in the aperture at the bottom of the unit.
5) Fix the foot mounting to the rear panel of the cubicle.

Caution : Ensure that the air flow rate at the back of the cubicle is sufficient.

3 - CONNECTIONS

Connection of the control terminal blocks is identical for inverters :
- **FMV 2107 1.5M to 3.5M,**
- **FMV 2307 1.5TL to 3.5TL,**
- **FMV 2307 1.5T to 5.5T.**

Connection of the power terminal blocks differs according to the type and rating of the inverter.

To gain access to the control and power terminal blocks, remove the bottom cover and lift it through the cable way, see illustration below.
Front panel of inverter

3.1 - Power terminal blocks
3.1.1 - FMV 2107 1.5M to 3.5M
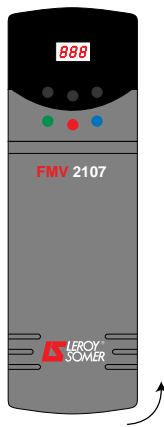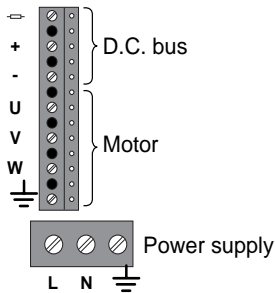The power supply terminal block is located at the base of the product, the motor and D.C. bus terminal blocks are located to the left and above.

Label	Function
L - N	Inverter single phase supply
⏚	Earthing connection to power supply
⏝ +	Connection of optional R - FMV resistance
-	- D.C. bus
U - V - W	Motor power supply (see section 3.1.3)
⏚	Earthing connection to motor

Caution :
- never connect a circuit such as a bank of capacitors between the inverter output and the motor,
- never connect the A.C. supply to the inverter U - V - W terminals,

- It is essential to protect the R - FMV optional braking resistors by a thermal relay rated at the rms current of the resistor.

3.1.2 - FMV 2307 1.5TL to 3.5TL - FMV 2307 1.5T to 5.5T
The power supply terminal block is located at the base of the product, the motor and D.C. bus terminal blocks are located to the left and above.
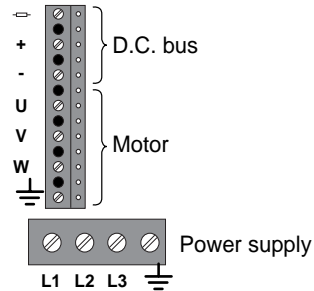
Label	Function
L1 - L2 - L3	Inverter 3-phase supply
⏚	Earthing connection to power supply
⏝ +	Connection of the R - FMV optional resistance (min. value 33 Ω)
-	- D.C. bus
U - V - W	Motor power supply (see section 3.1.3)
⏚	Earthing connection to the motor

Caution :
- never connect a circuit such as a bank of capacitors between the inverter output and the motor,
- never connect the A.C. supply to the inverter U - V - W terminals,
- It is essential to protect R - FMV optional braking resistors, by a thermal relay rated at the rms current of the resistor.

3.1.3 - Motor connection
Motors with a 230V/400V power supply are connected as follows :

Inverter	Motor connection
FMV 2107 1.5M to 3.5M	Δ
FMV 2307 1.5TL to 3.5TL	Δ
FMV 2307 1.5T to 5.5T	Y

3.2 - Control terminal blocks

These are located at the top of the product and above to the right.

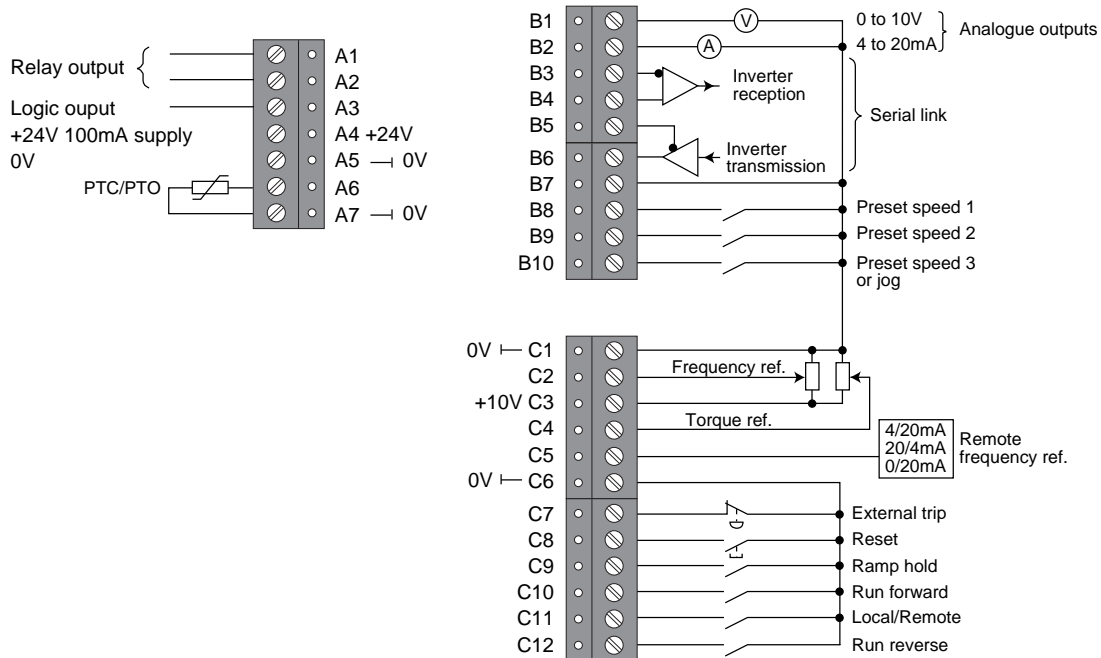| Terminal	Function	Type	Electrical characteristics
A1 A2	Programmable relay contacts	Relay output	240VAC - 6A resistive load Contact closed when : - the inverter is switched on and not tripped (b50 = 0), - the inverter is not faulty and the frequency is above P0 (b50 = 1).
A3	Programmable output	Logic output	24VDC - 100 mA open colleter Output at 0V when : - the inverter is running (b53 = 0), - when the frequency is at a minimum (b53 = 1). Connect a 24VDC relay between A3 and A4.
A4	Power supply	Internal source	+24VDC, ±10 %, 100mA
A5	0V common to terminals A7, B7, C1, C6	-	0V floating
A6	Motor probe feedback (type PTC or PTO) If no other motor probe is used, connect A6 to A7 (0V)	Analogue input	U output < 2.5V Trip threshold 3 kΩ ±15 % Reset threshold 1.8 kΩ ±15 %
A7	0V common to terminals A5, B7, C1, C6		0V floating
B1	Image proportional to the frequency Image proportional to the load Load reached	Analogue output Analogue output Logic output	Voltage : 0 to +10V if b24 = 0 and b25 = 0 0 to +10V if b24 = 0 and b25 = 1 0 or +10V if b24 = 1 and b25 = 0 or b24 = 1 and b25 = 1
B2	Signal proportional to the load Signal proportional to the frequency	Analogue output Analogue output	Current : 4 to 20mA if b24 = 0 or 1 and b25 = 0 4 to 20mA if b24 = 0 or 1 and b25 = 1
B3	Serial link, $\overline{RX}$ reception	Logic input	Non isolated inputs Input impedance 3.7 kΩ
B4	Serial link RX reception	Logic input	High logic level (RX - $\overline{RX}$ > 0.2V) Low logic level (RX - $\overline{RX}$ < -0.2V)

Note : Analogue outputs B1 and B2 are only indications and cannot be used for control.

Terminals	Function	Type	Electrical characteristics
B5	Serial link, $\overline{TX}$ Transmission	Logic output	Non isolated outputs 0 to 5VDC, ± 60mA
B6	Serial link, TX Transmission	Logic output	High logic level ($\overline{TX}$ = +5V TX = 0V) Low logic level ($\overline{TX}$ = 0V TX = 5V)
B7	0V common to terminals A5, A7, C1 and C6	-	0V floating
B8 B9	Selection of preset speeds	Logic input	Selection via a binary combination, (b20 = 0) of 3 preset speeds plus the reference.
B10	Inching (JOG) or extension for preset speeds	Logic input	If b20 = 0 --> Inching (JOG), If b20 = 1 --> Selection via a binary combination with B8 and B9 of 7 preset speeds plus the reference.
C1	0V common to terminals A5, A7, B7 and C6	-	0V floating
C2	Voltage frequency reference	Analogue input	Input impedance = 94 kΩ - 0 to +10VDC - voltage source or potentiometer 10 kΩ, - ±10VDC - external voltage source.
C3	Power supply for the reference, frequency and torque potentiometers.	Analogue output	+10VDC, ±2 %, 5mA maximum
C4	Torque reference or torque limitation	Analogue input	Input impedance = 27 kΩ 0 to 10VDC = voltage source or 10 kΩ potentiometer
C5 *	Current frequency reference	Analogue input	Input impedance = 100 Ω Current signal = 4 to 20mA, 20 to 4mA, 0 to 20mA Enable with terminal C11, select with b11
C6	0V common to terminals A5, A7, B7 and C1	-	0V floating
C7	External trip	Logic input	0V interrupt = external trip
C8	Reset	Logic input	0V pulse = reset
C9	Ramp hold	Logic input	Connection to 0V = ramp fixed
C10	Forward operation/stop	Logic input	Connection to 0V = Forward Operation Not connected = Stop Terminals C10 and C12 to 0V = Stop
C11	Selection of frequency reference Local/Remote	Logic input	Connection to 0V = Remote frequency reference Not connected = Local frequency reference
C12	Forward operation/stop	Logic input	Connection to 0V = Reverse Operation Not connected = Stop Terminals C10 and C12 to 0V = Stop

Caution : in positive logic (b5 = 0) the logic inputs are enabled by the +24V.

* For the simultaneous reference of 2 inverters, the 0V must not be commons.

3.3 - Electrical and electromagnetic phenomena associated with frequency inverters

3.3.1 - General

The power structure of frequency inverters leads to the occurrence of two types of phenomenon :
- low frequency harmonic feedback on the power supply,
- emission of radio frequency signals which may interfere with the operation of other equipment.

These are separate phenomena, which have different consequences on the electrical environment.

3.3.2 - Low frequency harmonics

As the diode bridge at the head of the frequency inverter rectifies the supply voltage it generates a non-sinusoidal A.C. line current.
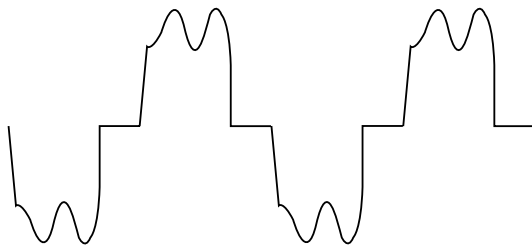
Mains supply line current drawn by a diode bridge.

This current carries harmonics $6n \pm 1$.

The amplitude of these harmonics decreases as their frequency increases.

Harmonics 5, 7, 11, and 13 are 250 Hz, 350 Hz, 550 Hz, 650 Hz respectively for a supply frequency of 50 Hz, and are the most significant.

Their amplitudes depend on the impedance of the mains supply upstream of the rectifier bridge, and the structure of the D.C. bus downstream of the rectifier bridge.

The more inductive the mains supply and the D.C. bus, the more these harmonics are reduced.

They have virtually no effect on the level of electrical energy consumption. Temperature rises associated with these harmonics in transformers and motors connected directly to the mains supply are negligible.

These low frequency harmonics never cause interference on sensitive equipment.

They may affect the energy distributor due to the fluctuating resonances which may be present in the meshed system, and the additional losses in the supply cables. However these are minor consequences. They only have a significant effect on loads on frequency inverters of several hundred kVA and where these loads are more than a quarter of the total on-site load.

3.3.3 - Radio frequency interference

Frequency inverters use high-speed switches (transistors, semi-conductors) for switching high voltages (around 550V) and high frequency currents (several kHz). This provides a high level of efficiency and a low level of motor noise.

This results in the generation of radio frequency signals which may disturb the operation of other equipment or distort sensor measurements :
- due to high frequency leakage currents which escape to earth via the inverter/motor cable leakage capacitance

and the leakage capacitance of the motor across the metal structures which support the motor.
- by conduction or feedback of radio frequency signals on the supply cable,
- by direct radiation close to the power supply cable or the inverter/motor cable.

These phenomena have direct consequences for the user.

The frequency range concerned (radio frequency) does not cause interference for the energy distributor.
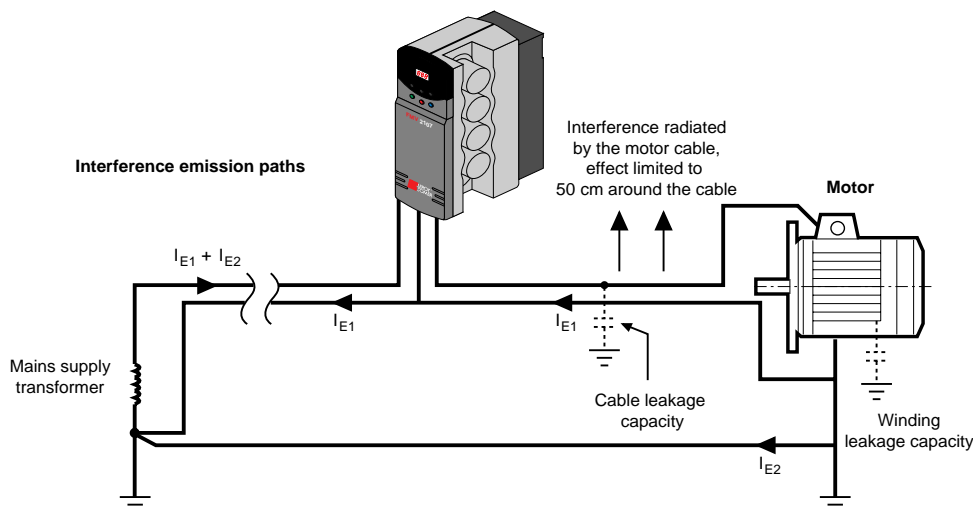
I_{E1} = leakage current fed back to the inverter caused by the cable and motor leakage capacitances.

I_{E2} = leakage current escaping via metal structures.

3.3.4 - Standards
a) Low frequency harmonics
There is no standard for current harmonics
Current harmonics introduce voltage harmonics on the mains supply. The amplitude of these harmonics depends on the impedance of the mains supply.
The power distributor who is affected by these phenomena in the case of **high power installations (see 3.3.2)**, will have his own **recommendations** on the level of voltage harmonics :

- 0.6 % on even harmonic numbers,
- 1 % on uneven harmonic numbers,
- 1.6 % on whole harmonic distortion.
This applies to the power distributor connection point, and not to each harmonic generator.

Reduction of harmonics fed back to the mains supply.
The impedance upstream of the rectifier must be increased by adding mains supply chokes.

b) Radio frequency interference
To prevent interference to sensitive equipment, European standards EN 50081 and EN 50082 stipulate the following :
- interference levels below which sensitive equipment is not affected : the following interference immunity :
EN 50082.1 for domestic equipment,
EN 50082.2 for industrial equipment.
- the maximum levels of interference fed back to the supply, or radiated by power cables :
EN 50081.1 for domestic equipment,
EN 50081.2 for industrial equipment.

Interference immunity
FMV 2107 and FMV 2307 inverters conform to standards EN 50082.2, these standards are based on IEC 801.

Radio frequency emission
FMV 2107 and FMV 2307 inverters fitted with RFI (Radio-Frequency Interference) filters (optional) conform to standard EN 50081 which is based essentially on standard VDE 875.

	Domestic environment	Industrial environment
	EN 50081.1 **VDE 875 N**	**EN 50081.2** **VDE 875 G**
FMV 2107 1.5M to 3.5M	**Conforms** with filter FN 350-8-29 or 20-29 switching frequency = 2.9 kHz	**Conforms** with filter FN 350-8-29 or 20-29 switching frequency = 2.9 to 11.7 kHz
FMV 2307 1.5TL to 3.5TL	**Conforms** with filter FN 351-8-29 or 16-29 switching frequency = 2.9 kHz	**Conforms** with filter FN 351-8-29 or 16-29 switching frequency = 2.9 to 11.7 kHz
FMV 2307 1.5T to 5.5T	**Conforms** with filter FN 350-8-29 or 16-29 switching frequency = 2.9 kHz	**Conforms** with filter FN 351-8-29 or 16-29 switching frequency = 2.9 to 11.7 kHz

Note on leakage currents
High frequency leakage currents occur as interference currents on the inverter power supply.
They may reach values above the isolation controller trip threshold.
Previous standards which set the maximum leakage current levels for the supply of motors connected directly to the 50 Hz supply can no longer be observed when a frequency inverter is used.
In the absence of any specific standard, European manufacturers use standard EN 60950 which allows the leakage current to rise to 5 % of the load current per phase.

3.4 - Wiring instructions
3.4.1 - Earthing (⏚)
The earth conductor should have as large an area as possible. The inverter(s) should preferably be placed in a metal cubicle, mounted on a chassis or conductive metal frame (unpainted).
Flat braid cables should be used to connect the various devices to the chassis.
The motor body should be connected directly to the inverter earth terminal by a standard cross-section earth cable.
If a shielded connection cable is used between the inverter and the motor to prevent radiation, the shielding must be connected at both ends (motor body and inverter earth terminal)
If the cross-section of the shielding is insufficient, it can be doubled by a cable running the length of the shielded cable, outside the shielding. This cable can be connected to the same two ends as the shielding. This cable prevents the circulation of high currents in the shielding.
The quality of the earth connections must be checked periodically, as with other power connections.

3.4.2 - Wiring inside cubicles
Do not place power cables and cables carrying signals next to one another in the same cable trough, even if the latter are shielded (distance > 0.5m).
Do not place inverter power supply cables next to motor cables, especially if the inverter is fitted with an RFI filter, as this would significantly reduce the efficiency of the filter.

Keep the power supply terminal blocks separate from the motor power terminal blocks and the signal terminal blocks.

Shield sensitive circuits. The shielded cable must be good quality, with flexible copper wire shielding, and very tight meshing. Connect the shielding to both ends.

Connect the various devices in a star configuration directly to the cubicle general earth, as specified in the safety standards.

Remote control : the remote control relays and contactors should be fitted with RC circuits.

Control cables

These should be copper, shielded and of a minimum cross-section of 0.5 mm^2.

3.4.3 - Wiring external to cubicles

Power cables should preferably be in steel cableways to reduce radiation.

If the inverter/motor cable is long (> 20m), it is advisable to install a suitable choke at the inverter output (SELF - MC) to reduce high frequency leakage currents, caused by the cable leakage capacity. This depends on the length of the cable. The choke should be installed as close as possible to the inverter (see 7.4).

Power cables

These should be copper multistrand cables with 600V insulation for A.C. voltages and 1000V for D.C. voltages.

3.4.4 - Installation in a domestic environment

The loads are generally fairly low.

The mains supply is shared by several users.

Other users of the supply may be affected by radio frequency interference fed back by the inverter to the mains.

Equipment most sensitive to interference includes : radio receivers, computers, etc.

A series of steps can be taken to solve the interference problems on a site. It may not be necessary to perform them all, as there is no need to continue once the phenomena have disappeared.

1 - Observe the wiring instructions.

2 - Connect the inverter to the general earth of the building using a good quality connection : flat cable, as short as possible.

3 - Make it a priority to install the frequency inverter close to the motor.

4 - Fit an R.F.I. filter to the inverter to reduce radio frequency feedback to the mains to a level acceptable to the standards.

5 - Connect the motor to the frequency inverter using a shielded cable with the screening connected at both ends : motor body and inverter earth.

3.4.5 - Installation in an industrial environment

In an industrial environment, it is unlikely that one user will cause interference to another.

Installing RFI filters at the inverter input, which is often costly, especially for high power ratings, is not always the solution.

An in-depth analysis of the problems encountered in an installation which is currently being used (or an evaluation of the risks for a future installation) is essential in order to implement the best technical and financial solution.

A series of operations can be performed to solve the interference problems in an installation. It may not be necessary to perform them all, as there is no need to continue once the pheneomena have disappeared.

1 - Observe the wiring precautions.

2 - Interference suppression on probes.

Measurement probes are sensitive devices which may be affected by interference.

Most problems can be solved by installing small bypass capacitors (0.1 to 0.5 μF) on the probe feedback signals. This solution is only possible for D.C. voltage signals (12, 24 or 48V) or 50 Hz A.C. voltage up to 220V.

3 - Protective devices for sensitive equipment.

If the inverter power rating is significantly higher than that of sensitive equipment connected to the mains supply, it is more economical to install an RFI filter on the supply to the lower rated equipment than to install an RFI filter on the inverter input. The installation precautions are the same : filter close to the device, earth the device using a short connection, keep the filter input and output wires separate.

4 - 3-phase chokes at the inverter output.

Downstream interference, high frequency leakage currents are effectively suppressed by installing a suitable 3-phase choke as close as possible to the inverter output.

5 - R.F.I. filters

If points 2 and 3 do not solve the problems associated with interference fed back to the mains supply, an RFI filter should be installed at the frequency inverter input.

6 - Shielded motor cable

The efficiency of this is comparable with standard cables running through metal cable ducts.

This will significantly limit interference radiated by the motor cables.

7 - Additional cable on the shielding of the control electronics.

If these connections have to run through areas where there is a high degree of interference, it may be necessary to double the shielding by using an additional cable connected at both ends in the same way as the shielding. The circulating currents are thus concentrated in this cable and not in the shielding of low level connections.

3.5 - Definition of cables and protective devices

Protection of FMV 2107 1.5M to 3.5M inverters

FMV 2107 Rating	Motor rating (kW)	Current			gI fuses		Power cable cross-section ** (mm²)			
		motor (A)	mains (A)	D.C. bus (A)	mains (A)	D.C. bus * (A)	motor	mains	bus C.C.	⏚
1.5M	0,75	3,5	7	2,5	16	4	1,5	2,5	1,5	1,5
2.5M	1,5	6,1	14	5	32	8	1,5	4	1,5	1,5
3.5M	2,2	8,8	18	7,3	40	12	2,5	6	2,5	2,5

Protection of FMV 2307 1.5TL to 3.5TL inverters

FMV 2307 Rating	Motor rating (kW)	Current			gI fuses		Power cable cross-section ** (mm²)			
		motor (A)	mains (A)	D.C. bus (A)	mains (A)	D.C. bus * (A)	motor	mains	D.C. bus	⏚
1.5TL	0,75	3,5	5	2,5	12	4	1,5	2,5	1,5	1,5
2.5TL	1,5	6,1	10	5	16	8	1,5	4	1,5	1,5
3.5TL	2,2	8,8	13	7,3	20	12	1,5	6	1,5	1,5

Protection of FMV 2307 1.5T to 5.5T inverters

FMV 2307 Rating	Motor rating (kW)	Current			gI fuses		Power cable cross-section ** (mm²)			
		motor (A)	mains (A)	D.C. bus (A)	mains (A)	D.C. bus * (A)	motor	mains	D.C. bus	⏚
1.5T	0,75	2	3,5	1,7	6	4	1,5	1,5	1,5	1,5
2T	1,1	2,7	4,5	2,4	6	4	1,5	1,5	1,5	1,5
2.5T	1,5	3,5	5,5	3,3	10	6	1,5	1,5	1,5	1,5
3.5T	2,2	5,1	9	4,9	12	8	1,5	1,5	1,5	1,5
4.5T	3	7,2	11	6,6	16	10	1,5	1,5	1,5	1,5
5.5T	4	9,1	13	8,7	16	12	1,5	1,5	1,5	1,5

* See section 3.6.5 : parallel D.C. bus connection of motors.
** The recommended cross-sections are those for electrical cubicles and do not take account of line voltage drops due to the length of the cables.

Note : The supply current values are typical values which depend on the supply impedance. The higher the impedance, the weaker the current.

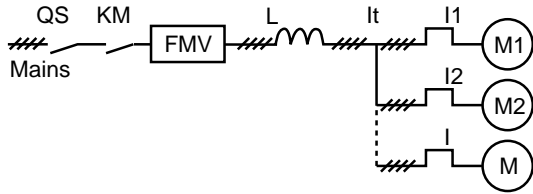**THESE TABLES IN NO WAY REPLACE THE CURRENT STANDARDS.** ⚠

3.6 - Special connections
3.6.1 - Combination of motors in parallel

Several motors with different power ratings can be supplied by a single frequency inverter. Each motor must be protected by a thermal relay

Calculation of the inverter rating :

$$I_N \text{ Inverter} > I1 + I2 + \ldots + I$$

The specific choke L depends on the inverter rating and the total cable length to the motors.

Please consult LEROY-SOMER.

3.6.2 - Connecting the motor directly to the mains supply (by-pass)
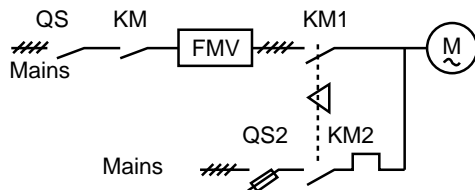
Sequence to follow :
- KM1 must be activated before KM,
- mechanical locking between KM1 and KM2.

The time T2 = 1.5s must be strictly adhered to. This corresponds to demagnetisation of the motor.
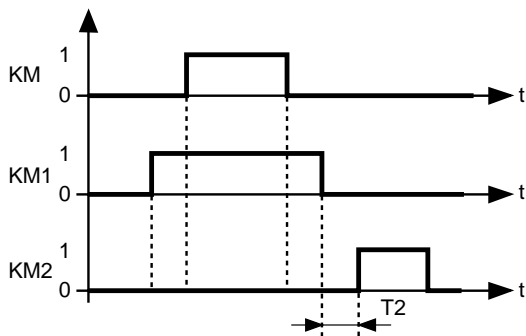
3.6.3 - Opening of the motor contactor at stop

Sequence to follow :
- KM1 must not open until the motor has stopped (detected by the inverter),
- the run command must only be given once KM1 is energised.
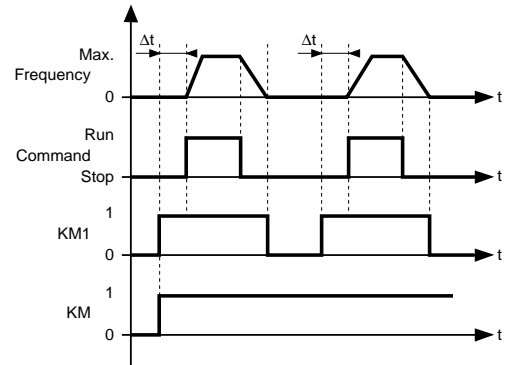
3.6.4 - Connecting the earths of several inverters

Incorrect connection   Correct connection
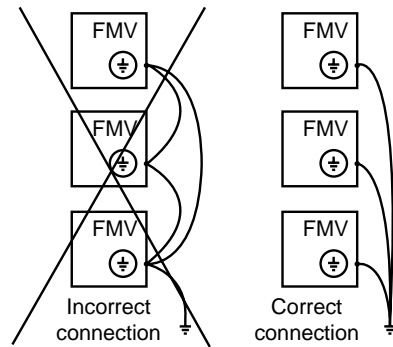
3.6.5 - Parallel D.C. bus connection of inverters
3.6.5.1 - General

Inverters which are connected in parallel should have the **same rating** and should be switched on simultaneously.

The D.C. bus of each inverter should be fitted with fuses. (See section 3.5).

It avoids the need to use or limits the number of optional braking units when the motive energy is greater than the energy fed back.

3.6.5.2 - Connection diagram for FMV 2307

3.7 - Connection of the serial link
3.7.1 - General
The protocol used is ANSI x 3.28.2.5 A4.

This serial link can be set up using RS 485 and RS 422 standards which provide differential data transmission and reception using 5-wire cable.

As the output on most PCs is RS 232 standard, an RS 232/RS 422 or RS 232/RS 485 interface must be added as close as possible to the PC.

Caution :

Since the inverter serial link is not isolated, it is important that the user takes all the necessary precautions to prevent damage which may be caused by a PC or inverter failure (isolator for example).

3.7.2 - Standard RS 485/RS 422 connection
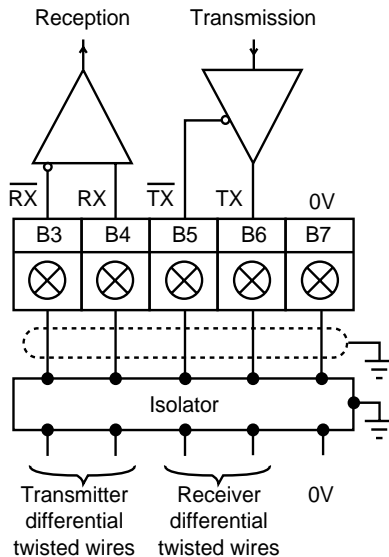
• RS 485 : 2 pairs of twisted shielded wires + 0V wire,
- characteristic impedance = 120 Ω,
- impedance matching resistance = 120 Ω between terminals B3 and B4,
- maximum cable length = 1200 m.

• RS 422 : 2 pairs of twisted shielded wires + 0V wire,
- characteristic impedance = 100 Ω,
- impedance matching resistance = 100 Ω between terminals B3 and B4,
- maximum cable length = 1200 m.

Note : With the RS 485 standard, it is possible to communicate with up to 32 inverters connected on the same line from a single PC (or PLC). Each inverter has a unique serial address.

RS 485 serial link with 32 inverters per port
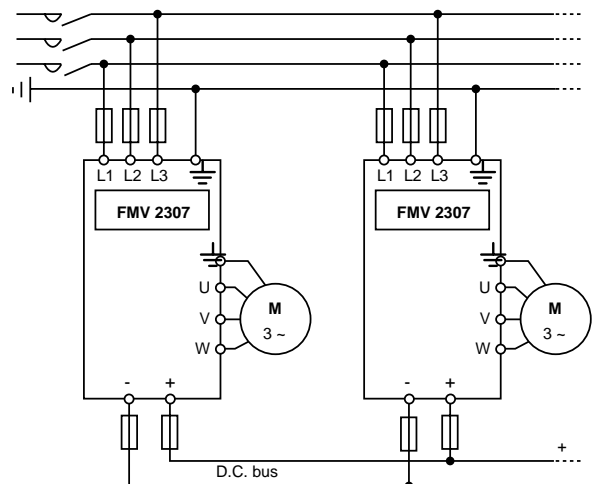

R : receiver input
T : transmitter output
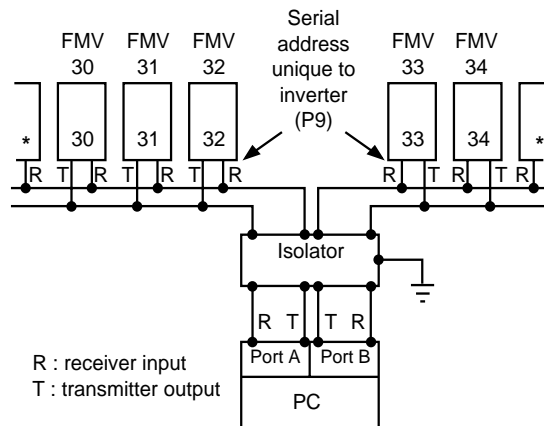
* Impedance matching resistances are installed on the furthest inverter, directly between terminals B3 and B4.

3.7.3 - Configuration of the FMV 2107 and FMV 2307
• Program :
- P09 : serial address,
- b12 : Baud rate selector,
• Wire :
- terminal C7, external trip (at 0V),
from this moment the inverter parameters can be accessed in read,
- terminal C11, remote control (at 0V).
• Access level :
- if b6 = 0 : read only parameters,
- if b6 = 1 and remote control : read and write parameters,
- b9 = 1 : control via the terminal block.

Note : The serial link is **even parity only.**

3.8 - Connection diagrams
3.8.1 - Controlled via operator panel

The number of power ups is limited to 20 per hour

R - FMV   Option

Protection of optional resistors via thermal relay is essential.

FR

+

QS   RFI Filter option **   KM1

Mains

L1   L
L2   N
L3
FMV 2307   FMV 2107

A6   PTC probe *
        (or PTO)
A7   0V

888

Remote power supply   Fu1   Programmable relay   A1
                                                      A2

FR

SB1

SB2   KM1

KM1

C6   0V
C7   External trip

Programming

b9 = 0
b5 = 1
b51 = 1

B1   } Analogue outputs
B2

A3   Logic outputs

(24V, 100mA) A4   Supply

U   V   W   ⏚

SELF - MC **
option

M
3 ~

QS : Fused isolator.
SB1 : Power off button.
SB2 : Power on button.
KM1 : Line contactor.
FR : Thermal relay for optional resistances.
* No PTC or PTO probe : link A6 and A7.
** See section 3.3.

Note : - The contactor coil should be fitted with an RC circuit.
- The reference is adjusted by the keys : ▲ and ▼

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3.8.2 - Controlled via terminal block : - operation with controlled stop,
- jog.

⚠️

The number of power ups is limited to 20 per hour

R - FMV   Option

FR

Protection of optional resistors via thermal relay is essential.

Programming

b5 = 1
b9 = 1
b20 = 0
b50 = 1
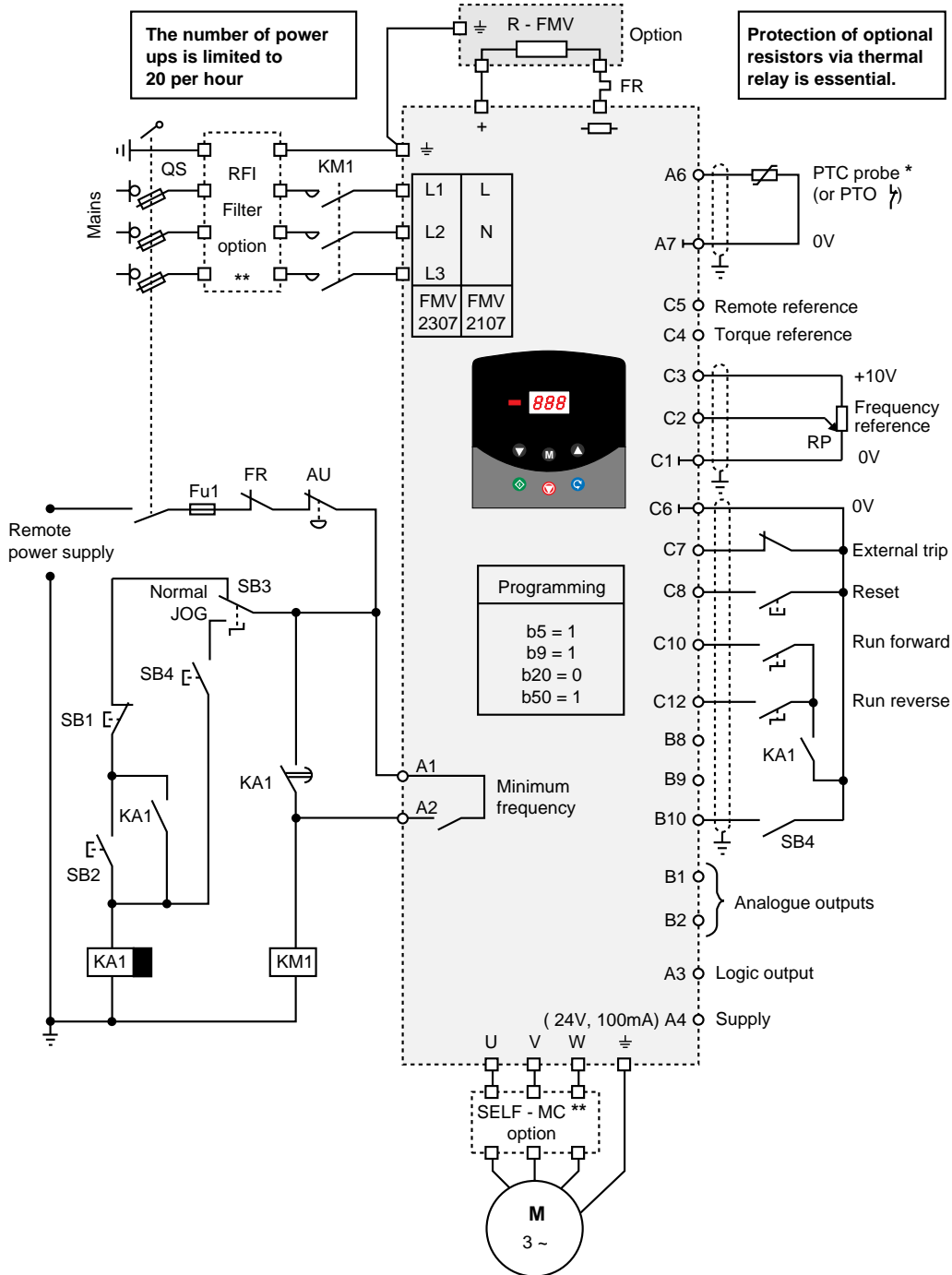
QS : Fused isolator.
AU : Emergency stop button.
SB1 : Power off button.
SB2 : Power on button.
SB3 : Normal/JOG changeover switch.
SB4 : Second JOG operation button.
KA1 : Auxiliary relay.
FR : Thermal relay for optional resistances.

KM1 : Line contactor.
RP : 10 kΩ potentiometer.
* No PTC or PTO probe : link A6 and A7.
** See section 3.3.

Note : The relay and contactor coils should be fitted with an RC circuit.

3.8.3 - Controlled via terminal block : - operation : 7 preset speeds + reference,
  - brake control.

⚠️

| The number of power ups is limited to 20 per hour |
| Protection of optional resistors via thermal relay is essential. |

R - FMV   Option

Programming

b5 = 1
b9 = 1
b20 = 1
b50 = 1

PTC probe * (or PTO)
0V
Remote reference
Torque reference
+10V
Frequency reference
0V
0V
External trip
Reset
Run forward
Run reverse
7 preset speeds
Analogue outputs
Logic output
Power supply

(24V, 100mA)

Minimum frequency

SELF - MC ** option

Brake power supply

M 3 ~
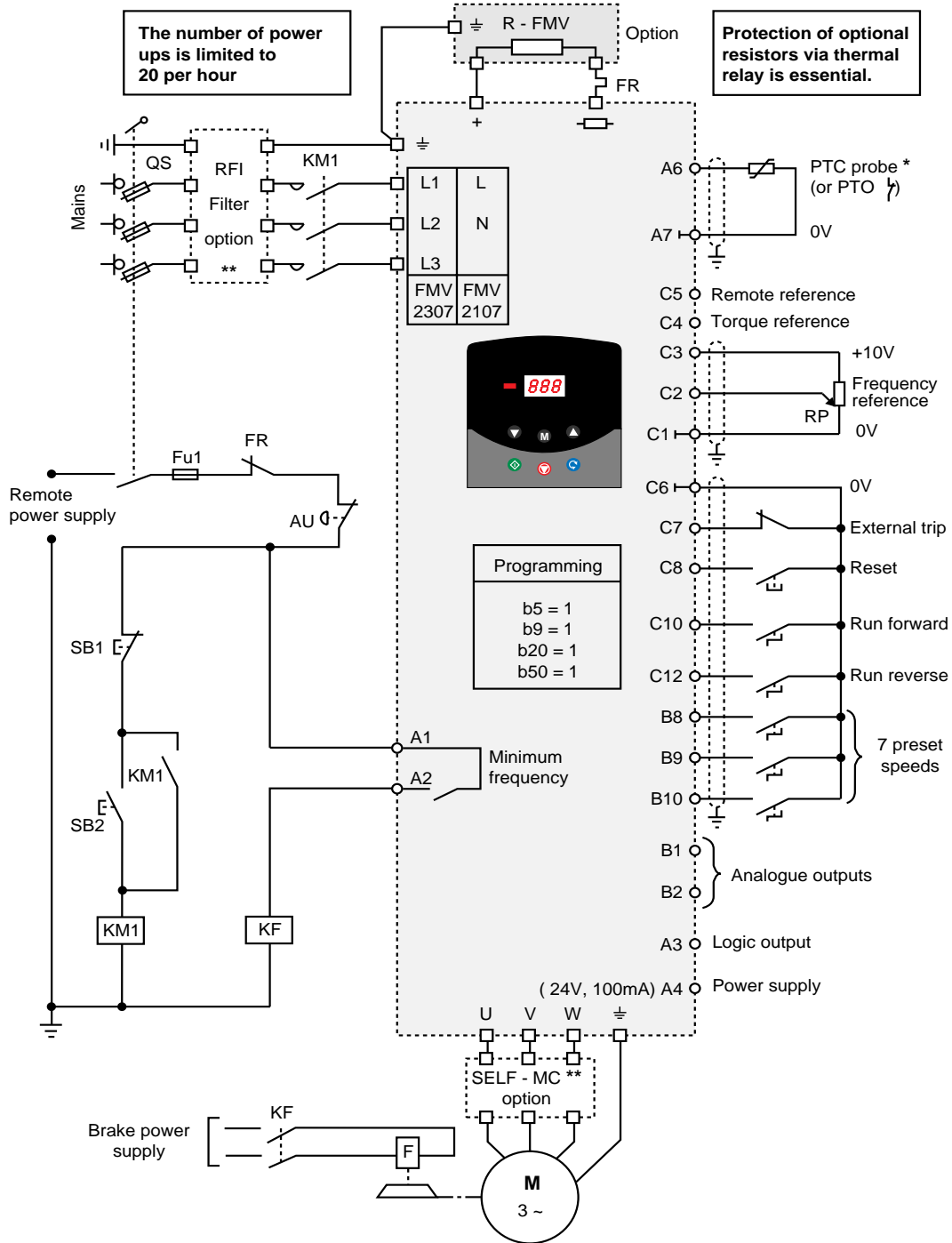
QS : Fused isolator.
AU : Emergency stop button.
SB1 : Power off button.
SB2 : Power on button.
RP : 10 kΩ potentiometer.
KM1 : Line contactor.
FR : Thermal relay for optional resistances.

KF : Braking contactor.
F : Brake coil.
* No PTC or PTO probe : link A6 and A7.
** See section 3.3.

Note : The relay and contactor coils should be fitted with RC circuits.

LEROY SOMER

3.8.4 - Controlled via terminal block : - faster/slower reference via pushbutton,
- 2 running directions.

⚠

The number of power ups is limited to 20 per hour

R - FMV Option

Protection of optional resistors via thermal relay is essential.
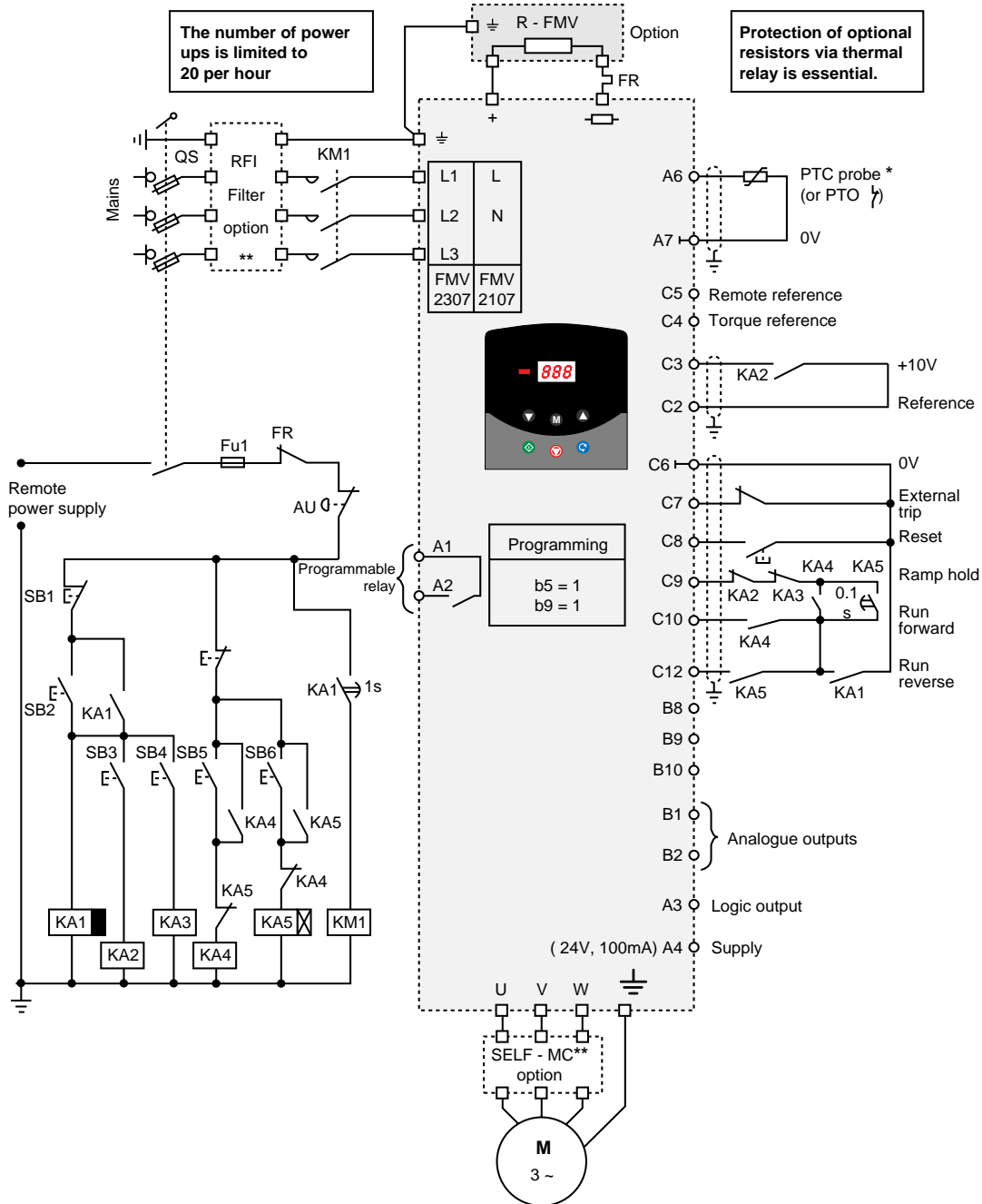
QS : Fused isolator.
AU : Emergency stop button.
SB1 : Power off button.
SB2 : Power on button.
SB3 : Faster pushbutton.
SB4 : Slower pushbutton.
SB5 : FWD pushbutton.
SB6 : REV pushbutton.
KA1 : Auxiliary relay.
KA2 : Faster relay.

KA3 : Slower relay.
KA4 : FWD relay.
KA5 : REV relay.
KM1 : Line contactor.
FR : Thermal relay for optional resistances.
* No PTC or PTO : link A6 and A7.
** See section 3.3.

Note :
- The relay and contactor coils should be fitted with RC circuits.
- See section 4.3.

4 - COMMISSIONING

4.1 - Procedure for using the operator panel
4.1.1 - Presentation of the operator panel
All inverter operator panels are similar, and provide access to adjustment parameters and control of the inverter.

4.1.1.1 - Description
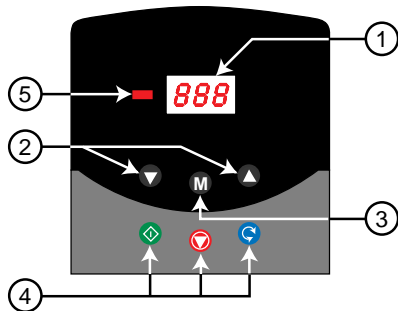
1. Three 7-segment displays showing : parameters, inverter status or the output frequency/current measurement.

2. 2 keys ▲ ▼ for scrolling parameters and modifying their value.

3. 1 mode M key.

4. 3 keys ◈ ◯ ⟳ initiating the commands : Run, Stop/Reset and reversal of motor direction.

5. 1 minus indicator LED.

• Display indication
The indications supplied by the display depend on the inverter status and the control mode.

Inverter status	Control mode	
	Operator panel	Terminal block
Stopped	"**r dY** " <--> " **0** " : inverter ready signal " **rdY** " displayed alternately with the frequency reference " **0** ".	" **rdY** " : inverter ready.
Running	- either output frequency (Hz), - or output current (% I$_N$). *	Frequency reference
Tripped	"Trip code" flashing alternately with the frequency reference.	Trip code flashing

* Whichever value is displayed, the other can be seen by pressing the keys ▲ ▼ simultaneously when control is via the terminal block.

4.1.2 - Adjustment parameters
The inverter is configured for a given application by programming the parameters. This is performed either via the operator panel or via the serial link.
There are two types of parameter :
- numerical parameters ("P X X") which are used to adjust the current and frequency, etc. Apart from Pc, they can be modified while the inverter is running.
- logic or bit parameters (" b Y Y ") which are used to select or enable functions. They can only be modified if the inverter output is not active (no run command).

4.1.1.2 - Parameter organisation
Access to the main parameters is gained simply by using keys ▲ and ▼
Specific parameters (organised into 6 groups) can be accessed by programming 10, 20, 30, 40, 50 and 60 in the Pd parameter.

LEROY SOMER
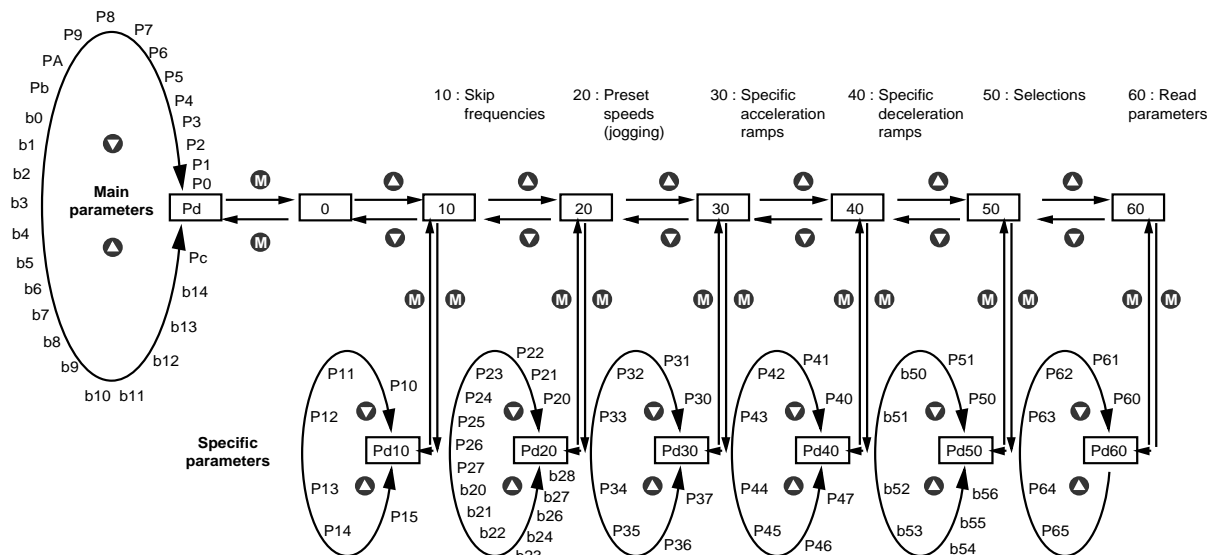
4.1.3 - Using the parameters
4.1.3.1 - Modification of a main parameter (Ex : b9)
1) Switch the inverter on : " **rdY** " is displayed.

2) Press the Ⓜ mode key : the display will indicate **P0** (the parameter) and **0** (its value) alternately.

3) Press the ▼ or ▲ key until **b9** is reached. The display will indicate **b9** and **1** alternately.

4) Press the Ⓜ key : the display will indicate **1**.

5) Press the ▼ key : the display will indicate **0**. The inverter is therefore controlled via the operator panel.

Note :
- If more than 8 seconds of time elapse between 2 steps, the inverter returns to the initial state.
- Pressing the Ⓜ key returns the display to the last parameter selected.
- When b10 = 1, the display remains fixed provided no keys are pressed.

4.1.3.2 - Modification of a specific parameter (eg. : P26)
1) Switch the inverter on : " rdY " is displayed.

2) Press the Ⓜ key : the display indicates **P0** and **0** alternately.

3) Press the ▼ key once : the display indicates **Pd** and **0** alternately.

4) Press the Ⓜ key : the display indicates **0**.

5) Press the ▲ key twice : the display indicates **P20** and **its value**.

6) Press the Ⓜ key : the display indicates **P20** and **its value** alternately.

7) Press the ▲ or ▼ key until P26 is reached : the display indicates **P26** and **0** alternately.

8) Press the Ⓜ key : the display indicates **0**.

9) Press the ▲ or ▼ key to adjust the reference of preset speed 7 to the required value.

Note :
- When the adjustment limit has been reached, the display flashes this limit.
- To program a negative reference, press the ↻ key after step 9.

4.1.3.3 - Return to factory settings
1) Switch on the inverter : " **rdY** " is displayed.

2) Press the Ⓜ key : the display indicates **P0** and **its value** alternately.

3) Press the ▲ or ▼ key until b13 is reached : the display indicates **b13** and **0** alternately.

4) Press the Ⓜ key : the display indicates **0**.

5) Press the ▲ key : the display indicates **1**.

6) Press the Ⓜ key : the display indicates **b13** and **0** alternately. All parameters, except b5 take the value that they had when the inverter was first switched on.

4.1.3.4 - Programming a security code
1) Switch on the inverter : " **rdY** " is displayed.

2) Press the Ⓜ key : the display indicates **P0** and **its value** alternately.

3) Press the ▲ or ▼ key until Pb is reached : the display indicates **Pb** and **0** alternately.

4) Press the Ⓜ key : the display indicates **0**.

5) Press the ▲ key to enter a code between 100 and 255.

6) Switch the inverter off.

Note :
- The security code can be chosen from between 1 and 255 when programmed via the serial link.
- The presence of a security code enables the parameters to be read but not modified.

4.1.3.5 - Access to parameters when a security code has been programmed

1) Switch the inverter on : " **rdY** " is displayed.

2) Press the Ⓜ key : the display will indicate **P0** and **its value** alternately.

3) Press the ⬆ or ⬇ key until **Pb** is reached. The display will indicate **Pb** and **0** alternately.

4) Press the Ⓜ key : the display will indicate **0**.

5) Press the ⬆ key to enter the security code.

6) Press the Ⓜ key, the display indicates **Pb** and **its value** alternately.

7) Press the ⬆ or ⬇ key to select the parameters to be modified.

Note : The value of Pb will be masked when the inverter is switched off.

4.1.3.6 - Modification of a security code

1) Switch the inverter on : " **rdY** " is displayed.

2) Press the Ⓜ key : the display indicates **P0** and **its value** alternately.

3) Press the ⬆ or ⬇ key until Pb is reached. The display indicates **Pb** and **0** alternately.

4) Press the Ⓜ key : the display indicates 0.

5) Press the ⬆ key to enter the security code.

6) Press the Ⓜ key twice, the display indicates **Pb** and **its value** alternately.

7) Press the ⬆ or ⬇ key to enter the new code.

8) Switch off the inverter.

Note : The code can be deleted if 0 is entered as the new code.

4.1.3.7 - Modification of b14 (8.8 - 480)

1) Switch the inverter on : " **rdY** " is displayed.

2) Press the Ⓜ key : the display indicates **P0** (the parameter) and **0** (its value) alternately.

3) Press the ⬆ or ⬇ key until b14 is reached : the display indicates **b14** and **2.9** alternately.

4) Press the Ⓜ key : the display indicates **2.9**.

5) Press the ⬆ key until **8.8** appears.

6) Press the Ⓜ key, the display indicates **120**.

7) Press the ⬆ key until **480** appears.

Note : Check that parameters P0, P1, P7, PC, P10 to P12 and P20 to P26 have not been modified.

4.1.3.8 - Read fault log

1) Switch the inverter on : " **rdY** " is displayed.

2) Press the Ⓜ key : the display indicates **P0** and **its value** alternately.

3) Press the ⬆ or ⬇ key until PA is reached : the display indicates **PA** and **0XX** alternately.

4) Press the Ⓜ key : the display indicates **0XX**, **0** indicating the last fault and **XX** indicating the fault in its mnemonic form (see section 5).

5) Press the ⬇ key : the display indicates : **1XX** (i.e. the second to last fault).

6) Press the ⬇ key to scroll down to the oldest fault.

Note : Each time the inverter is switched off, " UU " becomes the last fault stored and the chronological order is revised, the oldest fault being wiped from the memory.

4.2 - Setting up the motor-inverter ⚠

4.2.1 - Control via the operator panel
• Wiring the motor-inverter
Refer to the diagrams in section 3.8.1 in negative logic (b5 = 1).
• Connecting a PTC or PTO probe between terminals A6 and A7
In the absence of a probe, these two terminals are linked.
• External trip
Do not forget to link terminals C6 and C7, or the inverter will display " Et " when switched on.
• Switching the inverter on
Close the isolator and switch on using SB2. The display indicates " rdY " alternating with the parameter value P0.
• Programming
When there is no run command, program the parameters one after another.

Parameter	Remarks
b9 = 0	Control via the operator panel.
b14	Selection of the switching frequency and the upper limit frequency (ULF) depending on the desired motor frequency.
Pc	Selection of the maximum voltage frequency depending on b14.
P1	Selection of the maximum motor frequency.
P5	Adjustment of maximum continuous motor current (as % of I_N).
P4	Adjustment of maximum motor overload current (as % of I_N).
P6	Adjustment of the torque required for starting.
P2	Adjustment of acceleration ramp
P3	Adjustment of deceleration ramp
b2 and b7	Selection of stopping mode
b51 = 1	Enable via ⊙ key

• Run command
Press the ◈ key
• Adjustment of the output frequency
Press the ▲ key, the display shows the inverter output frequency.
Release the ▲ key when the desired frequency has been reached.
• Slip compensation
Load the motor and adjust P7 so that it rotates at the same speed with no load or with load.
• Stopping the motor
Press the ⊘ key
The value shown on the display decreases to 0, then it indicates " rdY " alternating with the frequency requested previously.
• Switching the inverter off
Switch off using SB1.

4.2.2 - Control via the terminal block
• Wiring the motor-inverter
See diagrams in section 3.8.2 in negative logic (b5 = 1).
• Connecting a PTC or PTO probe between terminals A6 and A7
In the absence of a probe, these two terminals are linked.
• External trip
Do not forget to link terminals C6 and C7, or the inverter will display " Et " when switched on.
• Switching the inverter on
Close the isolator and switch on using SB2. The display shows " rdY ".
• Programming
When there is no run command, program the parameters one after another.

Parameter	Remarks
b9 = 1	Control via the terminal block.
b14	Selection of the switching frequency and the upper limit frequency (ULF) depending on the desired motor frequency.
Pc	Selection of the maximum voltage frequency depending on b14.
P1	Selection of the maximum motor frequency.
P5	Adjustment of maximum continuous motor current (as % of I_N).
P4	Adjustment of maximum motor overload current (as % of I_N).
P6	Adjustment of the torque required for starting.
P2	Adjustment of acceleration ramp
P3	Adjustment of deceleration ramp
b2 and b7	Selection of stopping mode

• Run command
Enable the run command (terminal C10 or C12).
• Adjustment of the output frequency
Provide a frequency setpoint to terminal C2, the display indicates the inverter output frequency.
• Slip compensation
Load the motor and adjust P7 so that it rotates at the same speed with no load or with load.
• Stopping the motor
Disable the run command (terminal C10 or C12).
The value shown on the display decreases to 0, then it indicates " rdY ".
• Switching the inverter off
Switch off using SB1.

CAUTION ⚠
In all control modes (terminal block or operator panel), when the inverter is used in manual boost (b3 = 1), and if the RUN command is maintained with a zero frequency reference, D.C. injection occurs at standstill.
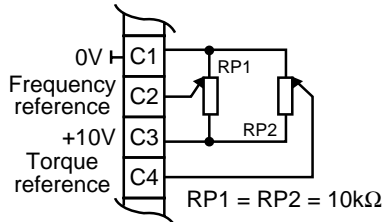**These conditions must not be maintained for more than 60 seconds in order to avoid an abnormal motor temperature rise.**

4.2.3 - Using terminal C4 : torque limitation or control

0V — C1
Frequency reference — C2
+10V — C3
Torque reference — C4
RP1
RP2
RP1 = RP2 = 10kΩ

• b0 = 1 : Torque limitation (motor current).
The inverter frequency is controlled (terminal C2) and the torque is limited to P4.
• b0 = 0 : Torque control (motor current).
The inverter is torque controlled following the reference signal at terminal C4 (10V : torque equal to P4, 0V : 10 % of P4).
The frequency reference potentiometer is no longer used and the output frequency is limited to P1, no-load motor.

4.3 - Using terminal C9 : maintain ramp
4.3.1 - Description of function
When terminal C9 is enabled, the motor speed is fixed. The frequency reference modifications are not taken into account. When terminal C9 is disabled, the motor follows the new frequency reference.

4.3.2 - Application : implementing faster/slower speed control
Connection diagrams section 3.8.4. (independant of ratings). When operating in faster/slower speed control using KA2, KA3, the direction of rotation of the motor is only reversed after the output frequency changes to zero.

4.4 - Regulation with integrated PI control loop
4.4.1 - Use
This loop is used to regulate pressure, temperature, flow rate, etc via a sensor providing data feedback (current of 0 to 20mA).

4.4.2 - Precautions
• Data feedback sensor specifications
- output 4 - 20 mA, 20 - 4 mA or 0 to 20 mA,
- power supply (if provided by the FMV 2107 or FMV 2307) : 24 VDC, 100 mA max.
• Wiring :
Use shielded cables, and do not place them next to the power cables.
4.4.3- Connection

FMV 2107 / FMV 2307	Sensor
Terminal A5	- power supply (0V)
Terminal A4	+ power supply (24V)
Terminal C5	Data feedback in current (4/20mA or 20/4mA or 0/20mA).
Terminal C11	Enable feedback terminal C5

If the sensor has an external power supply or its own power supply, only terminals A5 and C5 should be connected.

4.4.4 - Commissioning
• Wiring the motor-inverter
From the diagrams in section 3.8.2.
- 1 running direction .
- P.I. sensor as follows :

0V   0V +24V
C5 | C6   C11   A5 | A4
Feedback   Power supply
Sensor
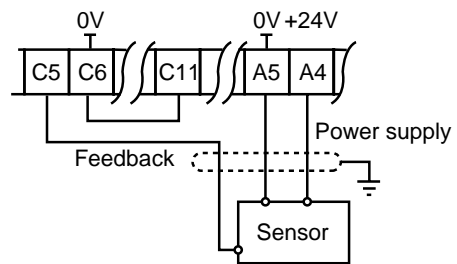
• The standard motor-inverter should be commissioned following the procedure in section 4.2.2.
• Check that the direction of rotation of the motor is correct.
• Disable the run command (terminal C10 or C12).
• Program one after the other.

Parameter	Remarks
b28 = 1	Enable the P.I. function
P25 = 1	Adjustment of proportional gain
P26 = 1	Adjustment of integral gain
b11	Selection of feedback type depending on the sensor (in mA) --> 4 - 20, 20 - 4 or 0 - 20.
P2 = 1.5	Adjustment of acceleration ramp
P3 = 1.5	Adjustment of deceleration ramp

• Enable the run command (terminal C10 or C12).
• Adjustment procedure for P25 and P26
- Set the reference of the characteristic to be adjusted (flow rate, pressure, temperature etc) to 10 % (at terminal C2).
- Slowly increase the value of P25 so that the motor starts to rotate. The speed should stabilise between 5 and 20 % of its maximum value.
- Increase the value of P25 again until the motor becomes unstable, then decrease it by 20 %.
- Increase the value of P26 until the motor becomes unstable, then decrease it by 20 %.
- Increase the reference and check that the sensor feedback signal changes linearly (use a milliammeter connected in series with terminal C5).
- If the system is unstable, decrease the proportional gain P25.
• Stopping the motor
Disable the run command.
The value shown on the display decreases to 0, then it indicates " rdY ".
• Switching the inverter off
Switch off using SB1.

4.5 - FMV 2107 and FMV 2307 parameters

Numerical parameters are preceded by " **P** ".
Logic parameters are preceded by " **b** ".
Abbreviations used :
I$_N$: rated output current,
U$_N$: rated supply voltage,
ULF : Upper Limit Frequency (see b14).

4.5.1 - Table of parameters
Main parameters (Pd = 0)

Parameter	Description	Adjustment range	Unit	Factory setting
P0	Minimum output frequency	0 to P1	Hz	0
P1	Maximum output frequency	P0 to ULF	Hz	50
P2	Acceleration ramp	0.2 to 600	s	5.0
P3	Deceleration ramp	0.2 to 600	s	10.0
P4	Maximum overload current	P5 to 150	% I$_N$	150
P5	Maximum continuous current	10 to 105 ($\leq$ P4)	% I$_N$	100
P6	Torque at low speed (BOOST)	0 to 25.5	% U$_N$	2
P7	Slip compensation	0 to 5 (ULF = 120) 0 to 10 (ULF = 240) 0 to 20 (ULF = 480) 0 to 25 (ULF = 960)	Hz	0
P8	D.C. injection brake current	40 to 150	% I$_N$	150
P9	Serial address	0 to 99	-	11
PA	Fault log	0 to 9	-	-
Pb	Security code	100 to 255 (operator panel) 0 to 255 (serial link)	- -	0
b0	Selection : " torque " or frequency reference	b0 = 0 : torque b0 = 1 : frequency	-	1
b1	Operator panel automatic starting	0 or 1	-	1
b2 b7	Stopping mode	<table><tr><td>b2</td><td>b7</td><td>Stopping mode</td></tr><tr><td>0</td><td>0</td><td>Standard</td></tr><tr><td>0</td><td>1</td><td>Freewheel</td></tr><tr><td>1</td><td>0</td><td>D.C. injection</td></tr><tr><td>1</td><td>1</td><td>On ramp</td></tr></table>	- -	0 0
b3	Automatic or manual BOOST	b3 = 0 : automatic b3 = 1 : manual	-	1
b4	Frequency reference polarity	b4 = 0 : bipolar b4 = 1 : unipolar	-	1
b5 ***	Control logic polarity	b5 = 0 : positive b5 = 1 : negative	-	1
b6	Control via serial link	b6 = 0 : control via terminal block b6 = 1 :control via serial link (with terminal C11 on 0V)	-	0
b7	See b2.	b7 = 0 or 1	-	0
b8	Display indication	b8 = 0 : frequency (Hz) b8 = 1 : current (% In) *	-	0
b9	Control mode	b9 = 0 : operator panel b9 = 1 : terminal block	-	1
b10	Display mode	b10 = 0 : auto. return b10 = 1 : fixed	-	0
b11 **	Input signal terminal C5	b11 = 4.20 : 4 to 20 b11 = 20.4 : 20 to 4 b11 = 0.20 : 0 to 20	mA	4.20
b12	Baud rate selector.	b12 = 4.8 : 4800 b12 = 9.6 : 9600	baud	4.8
b13	Return to factory settings	b13 = 0 : not active b13 = 1 : factory setting	-	0

4.5.1 - Continued

Parameter	Description	Adjustment range	Unit	Factory setting
b14	Switching frequency and ULF	Switching frequency/ULF b14 = 2.9/120 or 240 b14 = 5.9/120 or 240 or 480 b14 = 8.8/120 or 240 or 480 b14 = 11.7/120 or 240 or 480 or 960	kHz/Hz	2.9/120
Pc	Maximum voltage frequency	ULF/16 to ULF	Hz	50
Pd	Access to specific parameters	0, 10, 20, 30, 40, 50 or 60	-	0

* Only if b9 = 1 (controlled by the terminal block).
** Terminal C11 enables reference of terminal C5.
*** b5 is not affected by a return to factory settings.

⚠ **: In all control modes (terminal block or operator panel), when the inverter is used in manual boost (b3 = 1), and if the RUN command is maintained with a zero frequency reference, there is a D.C. injection on stopping.**
These conditions must not be maintained for longer than 60 seconds in order to avoid abnormal motor temperature rise.

4.5.1.2 - Specific parameters

Pd = 10 : skip frequencies.

Parameter	Description	Adjustment range	Unit	Factory setting
P10	Skip frequency threshold 1	P0 to P1	Hz	0
P11	Skip frequency threshold 2			
P12	Skip frequency threshold 3			
P13	Skip width threshold 1	± 0.5 to ± 5.0	Hz	± 0.5
P14	Skip width threshold 2			
P15	Skip width threshold 3			

Pd = 20 : preset speeds/JOG

Parameter	Description	Adjustment range	Unit	Factory setting
P20	Preset speed - 1	P0 to ± P1	Hz	0
P21	Preset speed - 2			
P22	Preset speed - 3			
P23	Preset speed - 4			
P24	Preset speed - 5			
P25	Preset speed - 6 *			
P26	Preset speed - 7 *			
P27	Jog frequency	0 to 15	Hz	1.5
b20	Preset speeds/Jog	b20 = 0 : 3 speeds + JOG, b20 = 1 : 7 speeds.	-	0
b21 b23	Standard or specific ramps.	<table><tr><td>b21</td><td>b23</td><td>Ramps</td></tr><tr><td>0</td><td>0</td><td>standard</td></tr><tr><td>1</td><td>0</td><td>specific</td></tr><tr><td>1</td><td>1</td><td>specific</td></tr><tr><td>0</td><td>1</td><td>specific</td></tr></table>	- -	0 0
b22	Not used	0 or 1	-	0
b24 b25	Information on terminals B1 and B2	<table><tr><td>b24</td><td>b25</td><td>B1</td><td>B2</td></tr><tr><td>0</td><td>0</td><td>Freq.</td><td>Load</td></tr><tr><td>0</td><td>1</td><td>Load</td><td>Frequency</td></tr><tr><td>1</td><td>0</td><td>Load reached</td><td>Load</td></tr><tr><td>1</td><td>1</td><td>Load reached</td><td>Frequency</td></tr></table>	-	0 0
b26	Disable safety cL	b26 = 0 : enabled, b26 = 1 : disabled.	-	0
b27	Specific deceleration	b27 = 0 : Standard b27 = 1 : Specific	-	0
b28	Enable P.I. control loop	b28 = 0 : disabled, b28 = 1 : enabled.	-	0

* When b28 = 1 : P25 = proportional gain, P26 = integral gain.

Pd = 30 : specific acceleration ramps

Parameter	Description	Adjustment range	Unit	Factory setting
P30	Acceleration preset speed - 1	0.2 to 600	s	5.0
P31	Acceleration preset speed - 2			
P32	Acceleration preset speed - 3			
P33	Acceleration preset speed - 4			
P34	Acceleration preset speed - 5			
P35	Acceleration preset speed - 6			
P36	Acceleration preset speed - 7			
P37	Acceleration - jog	0.2 to 600	s	0.2

Pd = 40 : specific deceleration ramps

Parameter	Description	Adjustment range	Unit	Factory setting
P40	Deceleration preset speed - 1	0.2 to 600	s	10.0
P41	Deceleration preset speed - 2			
P42	Deceleration preset speed - 3			
P43	Deceleration preset speed - 4			
P44	Deceleration preset speed - 5			
P45	Deceleration preset speed - 6			
P46	Deceleration preset speed - 7			
P47	Deceleration - jog	0.2 to 600	s	0.2

Pd = 50 : Selections

Parameter	Description	Adjustment range	Unit	Factory setting
P50	Number of automatic resets	0 to 5	-	0
P51	Delay of automatic resets	1 to 5	s	1
b50	Selection of the relay function	b50 = 0 : inverter status, b50 = 1 : minimum frequency.	-	0
b51	Enable FWD/REV key	b51 = 0 : disabled, b51 = 1 : enabled.	-	0
b52	Catch spinning motor	b52 = 0 : disabled, b52 = 1 : enabled.	-	0
b53	Selection of logic output A3	b53 = 0 : running, b53 = 1 : minimum frequency.	-	0
b54	Selection : fixed or dynamic U/f characteristic.	b54 = 0 : fixed, b54 = 1 : dynamic.	-	0
b56	Processing minor trips.	b56 = 0 : freewheel stop, b56 = 1 : stop following ramp.	-	0

Pd = 60 : Read only parameters

Parameter	Description	Adjustment range	Unit	Factory setting
P60	Inverter rating	151 to 753	-	See table
P61	Software version	000 to 255	-	-
P62	Hour counter	000 to 255	-	-
P63		000 to 999		
P64	Reserved parameters	-	-	750
P65				0
b60	Reserved parameters	0 or 1	-	0
b61		0 or 1		1
b62		0 or 1		0
b63		0 or 1		0
b64		0 or 1		1
b65		0 or 1		0

Inverter rating

Inverter	FMV 2107			FMV 2307			FMV 2307					
	1.5M	2.5M	3.5M	1.5TL	2.5TL	3.5TL	1.5T	2T	2.5T	3.5T	4.5T	5.5T
P60	751	151	221	752	152	222	753	113	153	223	303	403

4.5.2 - Explanation of parameters

P0 : Minimum output frequency.
Adjustment range : 0 to (P1) Hz.
Factory setting : 0 Hz.
Mnemonic : MN.
In increments of 0.1 Hz to 0.8 Hz depending on b14.
In increments of 1 Hz for P0 $\geq$ 100 Hz.
This is the lowest operating frequency.
When the reference is at minimum, the output frequency is equal to P0.

P1 : Maximum output frequency.
Adjustment range : (P0) to (ULF) Hz.
Factory setting : 50 Hz.
Mnemonic : MX.
In increments of 0.1 Hz to 0.8 Hz depending on b14.
In increments of 1 Hz for P1 > 100 Hz.
This is the highest operating frequency.
When the reference is at maximum, the output frequency is equal to P1, see b14 (ULF).

Note : The frequency reference can be set :
- via the operator panel mounted on the inverter,
- via the control terminal block (analogue signal, voltage 0 to 10V or current 4 to 20 mA, 20 to 4mA, 0 to 20 mA),
- via the RS 422 or RS 485 serial link.

Important   ⚠
The maximum frequency (P1) can be set as high as 960 Hz corresponding to more than 19 times the speed of a standard motor.
Check that the motor being used is capable of tolerating this value mechanically; if not use a motor with special characteristics (please consult LEROY-SOMER).

P2 : Acceleration ramp
Adjustment range : 0.2 to 600s.
Factory setting : 5.0s.
Mnemonic : AL.
In increments of 0.1s for P2 < 100.
Adjustment of time for acceleration from 0 Hz to the Upper Limit Frequency (ULF) defined by b14.
Calculation of acceleration time from frequency f1 to f2 :

$$t = (f2 - f1) \times \frac{P2}{ULF}$$
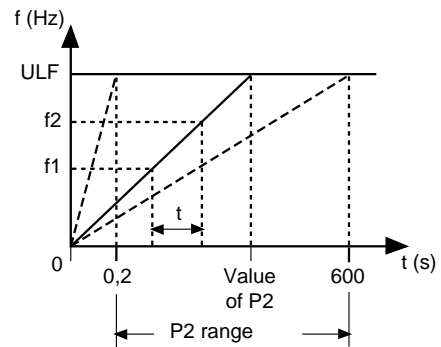
Note : The ramp time is only maintained when the inverter is not in current limitation

P3 : Deceleration ramp
Adjustment range : 0.2 to 600s.
Factory setting : 10s.
mnemonic : DL.
In increments of 0.1s for P3 < 100.
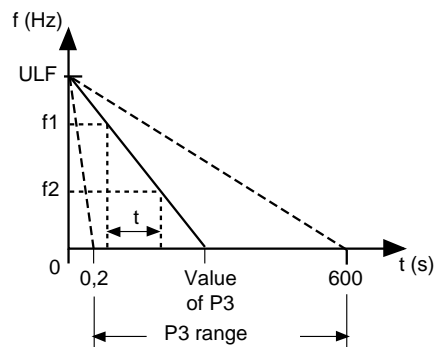Adjustment of the deceleration time from the Upper Limit Frequency (ULF) defined by b14 to 0 Hz.
Calculation of the deceleration time from frequency f1 to frequency f2 :

$$t = (f1 - f2) \times \frac{P3}{ULF}$$

Note : The ramp time is only maintained when the energy regenerated by the motor can be absorbed by the D.C. bus, otherwise the R - FMV option should be connected.

P4 **: Maximum overload current**
Adjustment range : P5 to 150 % I_N.
Factory setting : 150 % I_N.
Mnemonic : TR.
In increments of 0.1 % for P4 < 100 and of 1 % for P4 $\geq$ 100.
This is the maximum permissible output current for a period defined by P4 and P5 (I x t overload).

Note : The internal current limitation is scaled in relation to the input voltage in terminal C4 :
- 10V : limitation to P4 value,
- 0V : zero value.

P5 **: Maximum continuous current**
Adjustment range : 10 to 105 % I_N ($\leq$P4).
Factory setting : 100 % I_N.
Mnemonic : TH.
In increments of 0.1 % for P5 < 100 and of 1 % for P5 $\geq$ 100.
This is the allowed continuous current for adapting the inverter to the motor :

$$P5 = \frac{\text{nominal motor current}}{\text{nominal inverter current}} \times 100.$$

P5 adjusts the threshold over which the overload protection I x t starts to integrate the current excess. The decimal points on the display flash when this protection is activated. Should this condition persist, the inverter will trip after a period of time (t) defined as follows :

$$t = \frac{k \times P5}{(\text{output current } \% - P5)} \quad \text{where } k = 25,7.$$

I x t characteristics depending on the value of P5
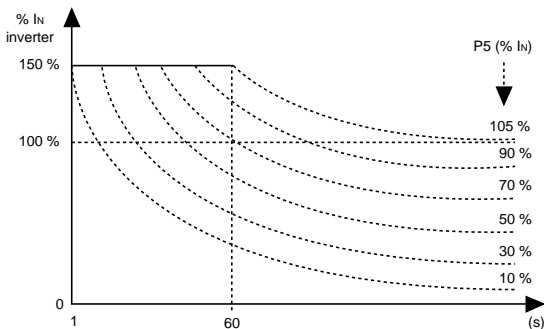
P6 **: Torque at low speed (BOOST)**
Adjustment range : 0 to 25.5 % U_N.
Factory setting : 2 % U_N.
Mnemonic : BO.
In increments of 0.4 %.
P6 adjusts the output voltage/output frequency ratio. The output voltage depends on the supply voltage. The output frequency depends on the maximum voltage frequency (PC) and the selection made in b3.

Note : It is important to increase the BOOST value gradually, to start the motor smoothly and without any delay. Too high a value can stall the motor.
See the diagrams below for the distribution of the additional voltage when b3 = 1.

P 6 = 0
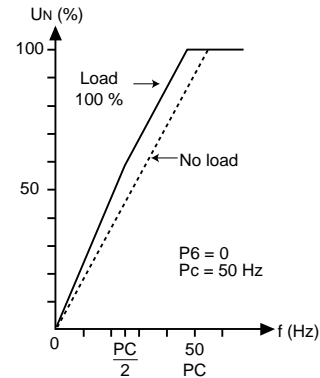
P6 = 9.8
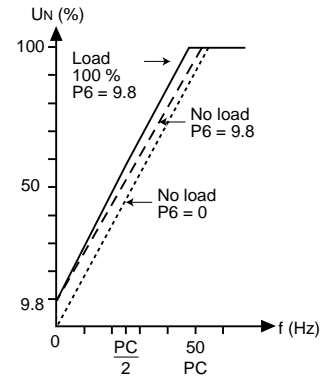
P6 = 25.5
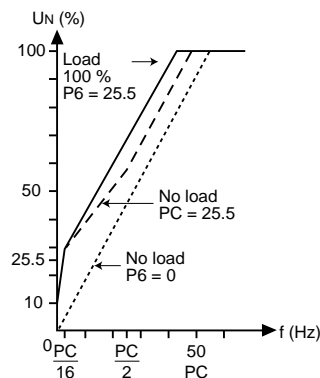
P7 : Slip compensation

Adjustment range : 0 to 5 Hz (ULF = 120 Hz)   A
　　　　　　　　　0 to 10 Hz (ULF = 240 Hz) B
　　　　　　　　　0 to 20 Hz (ULF = 480 Hz) C
　　　　　　　　　0 to 25 Hz (ULF = 960 Hz) D
Factory setting　　: 0 Hz.
Mnemonic　　　　: SL.
In increments of 0.1 Hz to 0.8 Hz depending on b14.
P7 increases the inverter output frequency above the reference point, as a function of the load. P7 can be used to minimise the difference in motor speed between a motor at no load and a motor with load.

$$\text{Compensation (Hz)} = P7 \times \frac{\text{Output current}}{P5} \%.$$

At full load, the additional frequency is the value which is set in P7.
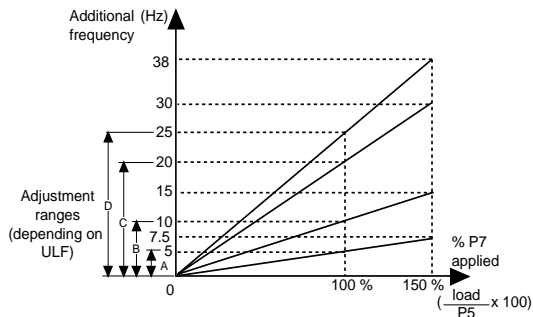
P8 : D.C. injection brake current

Adjustment range : 40 to 150 % IN.
Factory setting　　: 150 % IN.
Mnemonic　　　　: BR.
This is the adjustment of the maximum level of braking current by D.C. injection.
The braking torque is a function of the value of P8. The injection time is calculated automatically by the inverter and a holding torque is applied to the motor for one second when the motor reaches a speed close to zero. The level of the holding torque is a proportion of P8.

Note :
- This type of braking is only activated after a stop command and if : b2 = 1 and b7 = 0. (See b2, b7).

P9 : Serial address

Adjustment range : 0 to 99.
Factory setting　　: 11.
Mnemonic　　　　: SE.
This address, unique to the inverter, is used for communication between several inverters and a P.C. (or PLC) connected on the same line.

PA : Fault log

Adjustment range : 1 to 9.
Mnemonic　　　　: PA0 to PA9.
Reading, in mnemonic form, the faults stored. PA0 corresponds to the most recent fault and PA9 to the oldest fault.
See section 5 the meaning of the Mnemonics.

Pb : Security code

Adjustment range : 100 to 255 on the operator panel,
　　　　　　　　　0 to 255 by the serial link.
Factory setting　　: 0.
Mnemonic　　　　: SC.
It is possible to prevent modification of all parameters by programming a value other than 0 (or > 100).
Access to parameters is then only possible if the personalised code is entered into Pb. See section 4.1.3.

b0 : Selection - "torque" or frequency reference

Adjustment range : 0 or 1.
Factory setting　　: 1.
Mnemonic　　　　: DS 14.
b0 = 0 : the motor is "torque" controlled (the frequency reference is not active). The torque reference is provided via terminal C4 (or via the serial link if terminal C11 is connected to 0V and b6 = 1).
0V = torque equal to 10 % of P4, + 10V = torque equal to P4.
The output frequency is limited to the value of P1.
b0 = 1 : the motor is frequency controlled. The frequency reference is set via :
- the ▲ & ▼ keys on the operator panel if b9 = 0,
- the terminal block if b9 = 1,
- the serial link (if terminal C11 is connected to 0V and b6 = 1).
The torque is limited via the reference point terminal C4.

Note : If terminal C4 is not connected, the " torque " reference (b0 = 0), or the torque limitation (b0 = 1) equals : P4.

b1 : Operator panel automatic restart

Adjustment range : 0 or 1.
Factory setting　　: 1.
Mnemonic　　　　: DS 13.
b1 = 0 : when controlled via the operator panel, the run command is given automatically on power up.
b1 = 1 : it is necessary to give a run command to the inverter whatever the control mode.

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| b2 - b7 | : **Stopping mode**

Adjustment range : 0 or 1.
Factory setting : 0.
Mnemonic : DS 12 and DS7.
Four modes of stopping can be selected by using a binary combination of b2 and b7 as shown below :

b2	b7	Mode	Display (during the stopping phase)
0	0	Standard stop	Frequency or current (depending on b8).
0	1	Freewheel stop.	" **Inh** "
1	0	D.C.injection.	" **dc** ".
1	1	Stopping following ramp.	Frequency or current (depending on b8).

Note :
- Depending on the selected stopping mode, " Freewheel stopping " and " D.C. injection " modes are only active after a stop command. The two " Stopping following ramp " modes are also active when the reference is changed.
- When the braking option is used (R - FMV), the inverter can still be programmed with b2 = b7 = 0 (not following ramp) or b2 = b7 = 1 (following ramp).

Standard stop : deceleration according to the ramp (linear) set via P3 (or P30 to 36 if the specific ramps are used).
If the load has a significant inertia, resulting in the energy regenerated by the motor to the inverter increasing the D.C. bus voltage to its maximum limit, **the ramp time is prolonged** so that the inverter does not trip on overvoltage fault (" OU ").

Freewheel stopping : the inverter output is deactivated after a stop command. The motor stops in freewheel mode. 1 second after the stop command, " **rdY** " appears on the display and restarting is possible.

D.C. injection : the motor is quickly brought to a low speed by D.C. injection, then a holding current is applied for one second (restarting is only possible after this time). See also P8.

Stopping following ramp
Linear deceleration according to the ramp. If the motor inertia and its load are too high, the inverter trips and indicates " OU " as the D.C. bus voltage has reached its maximum limit.
To avoid the " OU " trip, use the **R - FMV option** which dissipates the excess D.C. bus energy.

| b3 | : **Automatic or manual BOOST**

Adjustment range : 0 or 1.
Factory setting : 1.
Mnemonic : DS 11.
b3 = 0 : automatic BOOST, for variable loads with a low starting torque, the inverter automatically applies a fraction of P6 depending on the current demand from the motor.

b3 = 1 : manual BOOST, (set by P6) for fixed loads with higher starting torque.

| b4 | : **Frequency reference polarity**

Adjustment range : 0 or 1.
Factory setting : 1.
Mnemonic : DS 10.
b4 = 0 : bipolar reference -10V to +10V.
• With terminal C10 (run forward) connected to 0V.
-10V = maximum reference (reverse),
+10V = maximum reference (forward).
• With terminal C12 connected to 0V (reverse).
-10V = maximum reference (forward),
+10V = maximum reference (reverse).
b4 = 1 : unipolar reference 0 to +10V.
The direction of rotation is controlled via terminals C10 (run forward) and C12 (run reverse).
Note : A reference < 0V is regarded as 0V.

| b5 | : **Control logic polarity**

Adjustment range : 0 or 1.
Factory setting : 1.
Mnemonic : DS 9.
b5 = 0 : positive logic, terminals are enabled by 24V.
b5 = 1 : negative logic, terminals are enabled by 0V.

Note : Power down for acceptance. This parameter is not affected by a return to factory settings.

| b6 | : **Control via serial link**

Adjustment range : 0 or 1.
Factory setting : 0.
Mnemonic : DS 8.
b6 = 0 : the inverter references are supplied by the terminal block.
b6 = 1, b9 = 1 : the inverter references are enabled and supplied by the serial link.

Note : Parameter modification via the serial link is only possible if b9 = 1.

| b7 | : **see b2**

| b8 | : **Display indication**

Adjustment range : 0 or 1.
Factory setting : 0.
Mnemonic : DS 6.
Only when controlled via terminal block (b9 = 1).
b8 = 0 : displays the frequency supplied to the motor.
b8 = 1 : displays the current supplied to the motor.
± 10 % precision above 15 Hz.

Note :
- Whichever way b8 is programmed, the alternative information can be obtained by pressing the ⏶ & ⏷ keys at the same time.
- When controlled by the operator panel only the frequency reference can be displayed.

`b9` : **Control mode**
Adjustment range : 0 or 1.
Factory setting : 1.
Mnemonic : DS 5.
b9 = 0 : the inverter is controlled via the operator panel :
- ⬆ & ⬇ give the frequency reference,
- P4 adjustment gives the torque,
- ◈ gives the run command,
- ⛔ gives the command to stop and reset,
- ◑ gives the forward/reverse command, if b51 = 1.
b9 = 1 : the inverter is controlled via the terminal block or via the serial link (see b6).

`b10` : **Display mode**
Adjustment range : 0 or 1.
Factory setting : 0.
Mnemonic : DS 4.
b10 = 0 : after 8s of no button being pressed, the inverter automatically returns to " rdY " state with no run command or indicates the inverter output frequency with a run command.
b10 = 1 : The display does not change state unless buttons are pressed.

`b11` : **Terminal C5 input signal**
Adjustment range : - 4.20 or 20.4 or 0.20.
Factory setting : 4.20.
Mnemonic : DS 2 - 3.
When controlled remotely the current frequency reference is applied to terminal C5.

b11	Reference range	Frequency range
4.20	4 to 20 mA	P0 to P1
20.4	20 to 4 mA	P0 to P1
0.20	0 to 20 mA	P0 to P1

Note : Remote references are only active if b6 = 0 and b9 = 1 and they are enabled by terminal C11.

`b12` : **Baud rate selector**
Adjustment range : 4.8 or 9.6.
Factory setting : 4.8.
Mnemonic : DS 0.
b12 = 4.8 : 4800 bauds.
b12 = 9.6 : 9600 bauds.
b12 must be correctly adjusted to the data transmission speed over the serial link of the controlling device (PC, PLC, etc).

`b13` : **Return to factory settings**
Adjustment range : 0 or 1.
Factory setting : 0.
b13 = 0 : parameters set by customer.
b13 = 1 : all parameters, **except b5**, are reset to their original value (factory settings). See section 4.1.3 for procedure.

`b14` : **Switching frequency and ULF**

	Fswitching (kHz)	ULF (Hz)
Adjustment range	2.9	120 - 240
	5.9	120 - 240 - 480
	8.8	120 - 240 - 480
	11.7	120 - 240 - 480 - 960
Factory setting	2.9	120

Mnemonic : FQ.
Switching frequency.
For applications which require high torque at low speed (high inertia, intermittent duty), selection of a low switching frequency is preferable.
Increasing the switching frequency can reduce acoustic noise in the motor.
The selected switching frequency also limits the choice of maximum possible frequency (ULF) and, in consequence, the operating range.

ULF : Upper Limit Frequency.
This is the highest possible frequency at the inverter output. Any adjustment of ULF must take into account the desired maximum operating frequency (P1).

Note :
- Changing the value of ULF may cause parameters P0, P1, P7, Pc, P10 to P12, P20 to P26 to change.
- The frequency resolution depends on the selected value of ULF.

ULF (Hz)	Resolution (Hz)
120	0,1
240	0,2
480	0,4
960	0,8

`Pc` : **Maximum voltage frequency**

Adjustment range : $\frac{ULF}{16}$ to ULF (Hz).
Mnemonic : BS.
In increments of 0.1 to 0.8 Hz according to b14 and 1 Hz for Pc ≥ 100 Hz.
This is the frequency at which the inverter output voltage reaches its maximum (U$_N$).
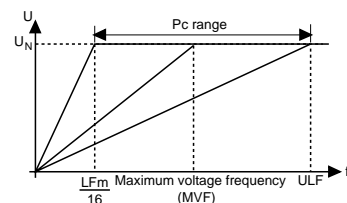
From 0 to Pc, the output voltage and the frequency increase simultaneously (operation at constant torque) then from Pc to ULF, it is the output frequency which increases (operation at constant power).

Note : Pc can be modified automatically during operation if the dynamic U/f function is selected (see b54).

Important : ⚠

Modification of the maximum voltage frequency (Pc) causes a significant variation in flux in the motor which may be over-saturated (Pc value too low) or under-saturated (Pc value too high). It may then be necessary to use a motor with special characteristics (please consult LEROY-SOMER).

Pd : Access to specific parameters

Adjustment range : 0 to 50.
Factory setting : 0.
In increments of 10.
Provides access to specific groups of parameters (see section 4.1.2 - Parameter organisation).
Pd = 0 : main parameters.
Pd = 10 : skip frequencies.
Pd = 20 : preset speeds and jog.
Pd = 30 : specific acceleration ramps.
Pd = 40 : specific deceleration ramps.
Pd = 50 : selections.
Pd = 60 : read parameters.

P10 to P12 : Skip frequency thresholds 1 to 3

Adjustment range : P0 to P1 (Hz).
Factory setting : 0 Hz.
Mnemonic : S1, S2, S3.
Incrementation depending on P0 and P1.
Allows skipping over 3 frequencies which may harm operation (noise, vibration, resonance). The skip points (1 to 3) are set via P10 to P12 respectively. They can act on the frequency rise or fall.

Note :
- If one of the set skips corresponds to P0 or P1, it is ignored.
- The skip frequencies are modified if P0 and P1 are modified.
- the skip frequencies are ignored during inching operation.

P13 to P15 : Threshold skip width 1 to 3

Adjustment range : ± 0.5 to 5.0 Hz.
Factory setting : ± 0.5 Hz.
Mnemonic : B1, B2, B3.
Incrementation depending on P0 and P1.
Each skip point, P10 to P12, has an associated skip band, set via P13 to P15 respectively. Three adjustable frequency zones can thus be avoided during operation.
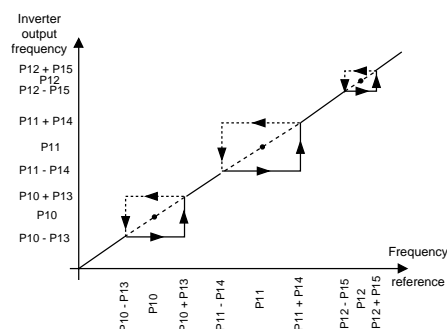
Note :
- These frequency zones can overlap, giving a greater skip band.
- The output frequency will always be within the limits defined by P0 and P1 whatever the skip frequency zone.

P20 to P26 : Preset speeds 1 to 7

Adjustment range : P0 to P1 (Hz).
Factory setting : 0 Hz.
Mnemonic : P1 to P7.
Incrementation depending on P0 and P1.
Allows selection of operating speeds which will be enabled via terminals B8, B9 and B10 during operation. The references of preset speeds 1 to 7 are set via P20 to P26 and can be positive or negative (when programming, press key ↻ to invert the reference sign). Terminal C10 gives the run command and multiplies the reference by +1. Terminal C12 gives the run command and multiplies the reference by -1.

Note :
- if b20 = 0 : 3 preset speeds are available,
- if b20 = 1 : 7 preset speeds are available,
- if b28 = 1, P25 = P.I. loop proportional gain and P26 = P.I. loop integral gain (P25 and P26 adjustment in section 4.4).

P27 : Jogging frequency

Adjustment range : 0 to 15 Hz.
Factory setting : 1.5 Hz.
Mnemonic : PJ.
Incrementation depending on P0 and P1.
The jogging reference is set by P27 (always positive). Terminal C10 gives the run command and multiplies the reference by +1. Terminal C12 gives the run command and multiplies the reference by -1. It is enabled by terminal B10 when b20 = 0.

b20 : **Preset speeds/inching (jog)**
Adjustment range : 0 or 1.
Factory setting : 0.
Mnemonic : C1-8.
b20 = 0 : preset speeds 1 to 3 can be selected via a combination of terminals B8, B9, as can the inching operation function via terminal B10.
b20 = 1 : preset speeds 1 to 7 can be selected via a combination of terminals B8, B9, B10.

Note : the inching function is enabled when b20 = 0 and terminal B10 is linked to 0V, with the direction of rotation selected by terminals C10 or C12. The motor rotates at the speed set via P27 until the link to 0V of one of terminals B10, C10 or C12 is opened.

b20	Terminals B10	B9	B8	Function available	Associated parameter
0 or 1	0	0	0	Frequency reference	-
0 or 1	0	0	1	Preset speed 1	P20
0 or 1	0	1	0	Preset speed 2	P21
0 or 1	0	1	1	Preset speed 3	P22
0	1	0	0	Inching operation	P27
1	1	0	0	Preset speed 4	P23
1	1	0	1	Preset speed 5	P24
1	1	1	0	Preset speed 6	P25
1	1	1	1	Preset speed 7	P26
1	0	0	0	Frequency reference	-

Note :
- 0 = terminal not connected to B7 (0V),
  1 = terminal connected to B7 (0V).
- Terminals B10, B9 and B8 are not active if the inverter is in " slave " mode (terminal C11 at 0V and b6 = 1, see b6).
- To obtain a negative speed, press the ↻ (FWD/REV) button on the operator panel during programming

b22 : **Not used**
Adjustment range : 0 or 1.
Factory setting : 0.
Mnemonic : C1-7.

b21 - b23 : **Standard or specific ramps**
Adjustment range : 0 or 1.
Factory setting : 0.
Mnemonic : C1-9 and C1-6.
The combination of b21 and b23 is used to select specific ramps for preset speeds or to program specific ramps for the frequency reference (using terminals B8, B9 and B10).

b21	b23	
0	0	The preset speeds use P02 and P03.
1	0	The preset speeds use P30 to P36 and P40 to P46.
1	1	The preset speeds use P30 to P36 and P40 to P46.
0	1	The analogue frequency reference uses specific ramps as follows :

B10	B9	B8	Ramps used
0	0	0	P02 and P03
0	0	1	P30 and P40
0	1	0	P31 and P41
0	1	1	P32 and P42
1	0	0	P33 and P43
1	0	1	P34 and P44
1	1	0	P35 and P45
1	1	1	P36 and P46

If b20 = 1 : all ramps in the table are available.
If b20 = 0 : only the first 4 lines are available and terminal B10 is released enabling JOG operation.

b24 - b25 : **Information on terminals B1 and B2**
Adjustment range : 0 or 1.
Factory setting : b24 = b25 = 0.
Mnemonic : C1-4 and C1-5.
The combination of b24 and b25 determines the output signals available at terminals B1 and B2.

b24	b25	Signals	
		Terminal B1	Terminal B2
0	0	Analogue voltage signal 0 to ±10VDC indication of frequency 0V = 0 Hz +10V = P1 (FWD) - 10V = P1 (REV)	Analogue current signal 4 to 20mA indication of load 20mA corresponding to 150 % motor or generator load.
0	1	Analogue voltage signal 0 to ±10VDC indication of load +10V = 150 % motor load - 10V = 150 % generator load	Analogue current signal 4 to 20mA indication of frequency 4mA = 0Hz 20mA = P1
1	0	Logic voltage signal 0 or 10V - 0V = P5 not reached 10V = P5 reached	Analogue current signal 4 to 20mA indication of load 20mA corresponding to 150 % motor or generator load.
1	1	Logic voltage signal 0 or 10V - 0V = P5 not reached 10V = P5 reached	Analogue current signal 4 to 20mA indication of frequency 4mA = 0Hz 20mA = P1

Note : In each case it indicates the output frequency of the inverter.

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b26 : **Disable safety C-L**
Adjustment range : 0 or 1.
Factory setting : 0.
Mnemonic : C1-3.
b26 = 0 : the security operates if the reference current is less than 3mA.
b26 = 1 : the security does not operate.

b27 : **Specific braking**
Adjustment range : 0 or 1.
Factory setting : 0.
Mnemonic : C1-2.
b27 = 0 : standard deceleration. When there is a sharp decrease in the reference, if the inertia is significant and is tending to increase the D.C. bus voltage, deceleration is interrupted to avoid an overvoltage fault OU (operation identical to a stop with b2 = b7 = 0).
b27 = 1 : specific deceleration. When there is a sharp decrease in the reference, if the inertia is significant and is tending to increase the D.C. bus voltage, the inverter tries to follow the ramp even though this may cause an overvoltage fault OU (operation identical to a stop with b2 = b7 = 1).

b28 : **Enable P.I. control loop**
Adjustment range : 0 or 1.
Factory setting : 0.
Mnemonic : PI.
b28 = 0 : the P.I. loop is disabled, the frequency inverter is controlled by the frequency (or " torque ") reference in the usual way.
b28 = 1 : the P.I. loop is enabled, the frequency inverter can regulate an external measurement (flow rate, pressure, temperature, etc).
The proportional gain is set via P25.
The integral gain constant is set via P26.
The reference of the characteristic to be regulated is input terminal C2. The feedback sensor is a current signal at terminal C5 (see commissioning, section 4.4).

P30 to P36 : **Acceleration ramps for preset speeds 1 to 7**
Adjustment range : 0.2 to 600s.
Factory setting : 5.0s.
Mnemonic : A1 to A7.
In increments of 0.1s.
With b21 = 1, each preset speed, P20 to P26, has an associated acceleration ramp, set via P30 to P36 respectively.
Eg. : the acceleration ramp for reaching preset speed P22 is set via P32.
See the diagram of parameters P40 to P46.

P37 : **Acceleration ramp for jogging**
Adjustment range : 0.2s to 600s.
Factory setting : 0.2s.
Mnemonic : AJ.
In increments of 0.1s.
The jogging operation function always has an associated acceleration ramp, set via P37.

P40 to P46 : **Deceleration ramps for preset speeds 1 to 7**
Adjustment range : 0.2s to 600s.
Factory settings : 10s.
Mnemonic : D1 to D7.
In increments of 0.1s.
With b21 = 1, each preset speed, P20 to P26, has an associated deceleration ramp, set via P40 to P46 respectively.
Eg. : the deceleration ramp for reaching preset speed P26 is set via P46.

Caution
The change from a preset speed to the analogue reference (potentiometer) is carried out according to standard ramps P2 and P3.
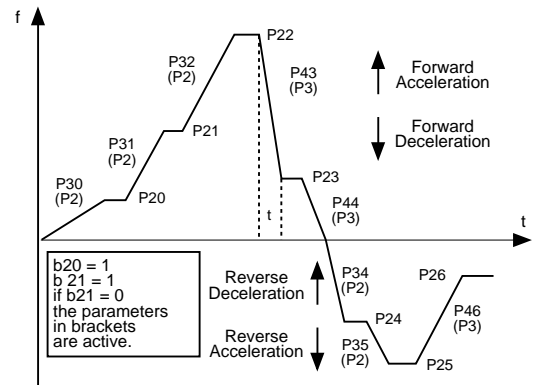
Eg. : Calculation of P43 to obtain a time t between P22
$$P43 = t \times \frac{LFm}{P22 - P23}.$$

Where t is in s and ULF, P22, P23, P43 in Hz.

P47 : **Deceleration ramp for jogging**
Adjustment range : 0.2s to 600s.
Factory setting : 0.2s.
Mnemonic : DJ.
In increments of 0.1s.
The jogging operation function always has an associated deceleration ramp, set via P47.

P50 : **Number of automatic resets**
Adjustment range : 0 to 5.
Factory setting : 0.
Mnemonic : RN.
In increments of 1.
The inverter resets automatically after a trip. If the run command is maintained, the inverter can then drive the motor with no external intervention .
P50 sets the number of resets which the inverter will perform. If P50 = 0, the function is disabled.
Each time an automatic reset is performed (P50 ≠ 0), the number of resets still available is displayed together with the trip code.

Note :

• The counter for number of remaining resets is reset to zero when :

- the cause of the trip disappears before all the reset attempts have occurred,
- the power is switched on,
- the value of P50 is modified.

• The trip is only registered in the fault log when all the attempts to reset have been performed without success.

• The external trip " Et " (terminal C7) cannot be reset by this function.

P51 : Automatic reset delay

Adjustment range : 1 to 5s.
Factory setting : 1s.
Mnemonic : RD.
In increments of 0.1s.
Allows adjustment of the time between the trip condition and its automatic reset.

b50 : Selection of the relay function

Adjustment range : 0 or 1.
Factory setting : 0.
b50 = 0 : the contact between terminals A1 and A2 is closed when the inverter is powered up and not tripped.
b50 = 1 : the contact between terminals A1 and A2 is closed when the output frequency is higher than P0 and when the inverter is not tripped.

Note : The contact is open when the modulator is powered down, see section 3.2, relay characteristics.

b51 : Enable the Fwd/Rev key

Adjustment range : 0 or 1.
Factory setting : 0.
b51 = 0 : the 🔄 key cannot change the direction of rotation of the motor if b9 = 0.
b51 = 1 : pressing the 🔄 key changes the direction of rotation of the motor if b9 = 0.

b52 : Catch spinning motor

Adjustment range : 0 or 1.
Factory setting : 0.
Mnemonic : C1-12.
b52 = 0 : the catch spinning motor function is disabled.
b52 = 1 : allows an inverter run command when the motor shaft is turning.
The inverter searches for the motor frequency from P1 to 0 Hz in both directions of rotation (" SCN " appears on the display during this operation). After synchronisation, the motor accelerates until it reaches the speed reference. Depending on the dynamic conditions of the system, this operation may take up to 5 seconds.

CAUTION ⚠️

- Do not open the line contactor during this operation.
- Systems without a mechanical load in these conditions can change speed or turn slowly in both rotational directions before starting during this operation.

The search is faster when the forward operation command is selected. For a single direction of rotation, use forward operation and cross 2 phases on the motor side for the required direction.

b53 : Selection of logic output A3

Adjustment range : 0 or 1.
Factory setting : 0.
Mnemonic : C1 - C3.
b53 = 0 : logic output A3 = 0V when the inverter receives a run command.
b53 = 1 : logic output A3 = 0V when the output frequency is higher than the minimum frequency (P0).

b54 : Selection - fixed or dynamic U/f characteristic

Adjustment range : 0 or 1.
Factory setting : 0.
Mnemonic : C1.
b54 = 0 : the U/f ratio is fixed and set via Pc.
b54 = 1 : the voltage applied to the motor is automatically reduced depending on the motor load. This enables a saving in energy and a reduction of noise with low and variable loads (eg. : centrifugal pump).
This automatic modification of the U/f characteristic will also modify the maximum voltage frequency (MVF) and the BOOST action (P6).
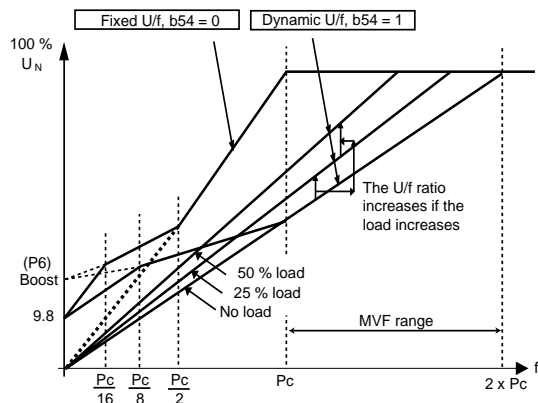
Pc value applied when b54 = 1 :

$$2 \frac{\%\ \text{load}}{0,7 \times P5} \times Pc\ \text{set}$$

Note : If the motor is at no load, the maximum voltage frequency (MVF), set via Pc, will be reached for a frequency which is twice as high.
If the load increases, the voltage increases up to the fixed U/f ratio, MVF = Pc (set).

b55 : Not used

b56 **: Processing minor trips**
Adjustment range : 0 or 1.
Factory setting   : 0.
Mnemonic   C1-0.
b56 = 0 : all trips cause an inverter freewheel stop.
b56 = 1 : minor trips (Et, cL, Oh and th) cause the deceleration of the motor following the reference ramp. If the trip disappears before the frequency reaches 0Hz, the motor accelerates following the reference ramp.

P60 **: Output power**
Read range   : 151 to 753.
Mnemonic   : DR.
This parameter is a code which corresponds to the power of the inverter output.

FMV	P60	P output (kW)
2107 1.5M	751	0,75
2107 2.5M	151	1,5
2107 3.5M	221	2,5
2307 1.5TL	752	0,75
2307 2.5TL	152	1,5
2307 3.5TL	222	2,5
2307 1.5T	753	0,75
2307 2T	113	1,1
2307 2.5T	153	1,5
2307 3.5T	223	2,5
2307 4.5T	303	3
2307 5.5T	403	4

P61 **: Software version**
Read range   : 000 to 255.
Mnemonic   : SV.
This parameter indicates the software version.

P62 and P63 **: Hour counter**
Read range   : 000 to 999.
Mnemonic   : RL and RH.
The combination of P62 and P63 indicates cumulative time that the inverter is powered up.
P62 indicates the time in hours with multiplication coefficient of 10. Eg. 56.7 = 567 hours.
P63 indicates the time in hours with multiplication coefficient of 10000. Eg. : 1.2 = 12000 hours.
The inverter has therefore been powered up :
12000 + 567 = 12567h.

P64 to P65 : Reserved parameters

b60 to b65 : Reserved parameters

4.6 - Guide to settings

This guide to settings is designed to help you customise your inverter and to highlight functions which are described in detail in section 4.5.2.

PRINCIPAL SETTINGS

Selecting inverter commands

Run, reverse, stop the motor.	•Via terminal block if b9 = 1. •Via the operator panel if b9 = 0.
Adjustment of the frequency.	• Via the terminal block if b9 = 1 : - local (voltage) : terminal C11 not connected to the 0V, - remote (mA) : terminal C11 connected to the 0V.
Adjustment of the torque.	•Via the operator panel if b9 = 0. •Via terminal C5 if b9 = 1.
Stop the motor in the event of a fault.	•Via the terminal block if b9 = 1. • Automatic restarts : number depending on P50, delay depending on P51. • Restart after reset if P50 = 0.

Starting

Adjustment of the acceleration time.	•Acceleration ramp : - via P2 for the reference - via P30 to P36 for the preset speeds
Adjustment of the acceleration torque.	•BOOST (torque optimisation at low speed) via P6. - fixed value if b3 = 1, - automatic adjustment if b3 = 0.

Running : selecting operating frequencies

Selection of the inverter frequency range.	• Selection of the maximum frequency range and the switching frequency : b14.
Selection of minimum and maximum operating speeds.	• Selection of the maximum motor frequency : P1. • Selection of the minimum motor frequency : P0.
Maintain the frequency under load.	• Slip compensation : via P7.

Running : displaying inverter operation

Display of the inverter frequency or load.	•Output frequency if b8 = 0. •Inverter load (as a % of I_N) if b8 = 1.
Display of faults.	• The last ten trips are stored in PA.

Running : optimising the quality of the drive system

Motor protection.	•Maximum overload current : P4. •Maximum continuous current : P5. •PTC motor probe connected to terminal A6, PTO motor probe connected to terminal A6 or A7.

Stopping the motor

Selection of the mode of stopping.	•4 modes available depending on b2 and b7.
Controlled stop.	•Adjustment of the deceleration ramp : P3.
Freewheel stop.	•On external trip " Et ". •On power cut.

SPECIFIC SETTINGS

Selecting inverter commands

Run, reverse, stop the motor.	• Via RS 485, RS 422 serial link : b6 = 1. • Via terminal block : b6 = 0. • Option to prohibit changing direction by pressing ⟳ key on the operator panel with b51.

Adjustment of the frequency.	• Via RS 482 or RS 422 serial link : b6 = 1.
	• Via the operator panel if b9 = 0.
	• Via the terminal if b9 = 1.
	• Selection of local or remote operation via terminal C11 :
	  - local if terminal C11 is not connected to 0V, select reference
	    polarity via b4,
	  - remote if terminal C11 is connected to 0V.

Selection of the regulation mode.	• Regulation by torque or by frequency via b0. • External limitation via C4.
Stop the motor in the event of a fault.	• Automatic restart via P50. • Time delay before restart via P51. • Flying restart if b52 = 1.
Lock programmed instructions.	• By security code in Pb.

Starting

Initiate commands.	• Via RS 485 or RS 422 serial link. • Via terminal block : run, stop, reverse. • Via the operator panel : run, stop, reverse.
Adjust the acceleration torque.	• Manually via P6, if b3 = 1. • Automatically if b3 = 0.

Running : selecting operating frequencies

Selection of the operating frequency range.	• The maximum frequency is determined by b14.

Use of the preset speeds.	• Control via terminal block :
	  - of 3 speeds plus the reference if b20 = 0,
	  - of 7 speeds plus the reference if b20 = 1.
	• Adjustment of the level via P20 to P26.
	• Selection of the acceleration and deceleration ramps :
	  - standard and common to all speeds if b21 = 0,
	  - specific to each speed if b21 = 1.

Use of inching operation.	• Enable via b20 = 0. • Adjustment of the level via P27. • Adjustment of acceleration and deceleration ramps via P37 and P47.

Running : measuring operating parameters

Selection of the type of display.	• The output frequency (in Hz) if b8 = 0. • The output current as % I_N if b8 = 1.

Analogue signals.	• Of the output frequency (in Hz) or of the load terminal B1
	  (in voltage 0/10VDC).
	• Of the output current (in % I_N) or of the load terminal B2
	  (in voltage 4/20mA).

Logic signals	• Inverter running or minimum frequency (following b53) terminal A3. • Max current reached (b24 = 1) terminal B1.

Running : optimising the inverter - motor drive system

Adjustment of the switching frequency.	• Adjust b14.
Vibration : prohibit critical frequencies.	• 3 skip frequencies programmed in P10 to P12. • Skip band adjustable via P13 to P15.
Motor protection and torque limitation.	• Adjustment of the maximum overload current via P4. • Adjustment of the maximum continuous current via P5. • Integration of I x t overload depends on P4 and P5. • External limitation of the torque via terminal C4.
Slip compensation.	• Variable depending on the load via P7.

Stopping the motor

Selection of the mode of stopping.	• Following ramp (with prolongation depending on the inertia) : b2 = 0, b7 = 0. • Freewheel : b2 = 0, b7 = 1. • With D.C. injection : b2 = 1, b7 = 0 : - level adjustable via P8. • Following ramp b2 = 1, b7 = 1.
Ramp adjustment.	• Time adjusted via P3.
Control of an electro-mechanical brake.	• Via logic output A3 with b53 = 1 or via the assignable relay with b50 = 1.

5 - FAULTS - DIAGNOSTICS

• Information about the inverter status is provided by the display.
• Faults are shown in mnemonic form flashing on the display.

The last ten faults are stored in the memory (even after a mains power break) in parameter PA.
• Information about the inverter status is also provided by the display.
• Some inverter states are provided by the logic outputs (relays and open collector transistors).

5.1 - Display indication - error messages

Display mnemonic	Reason for trip	Check points	Solution
UU	D.C. bus undervoltage	• Terminals L, N (FMV 2107) Terminals L1, L2, L3 (FMV 2307) : prolonged undervoltage on the mains supply.	• Check the power supply. • Check the power components.
OU	D.C. bus overvoltage	• Rapid deceleration (inertial load). • Terminals L, N (FMV 2107) Terminals L1, L2, L3 (FMV 2307) : Overvoltage on the mains supply.	• Program a greater deceleration time period at P3. • Check the stop mode set via b2 and b7. • Use a braking resistance (optional). • Check the mains supply.
OI	Inverter output short-circuit	• Power terminal blocks. • Wiring.	• Eliminate the cause of the fault.
It	I x t overload fault	• Motor load. • Adjustment of I x t threshold (parameters P4, P5).	• Check that the motor is not overloaded. • Check that the I x t protection is correctly set.
Et	Forced external trip	Terminal C7.	• Check that terminal C7 is conneced to 0V via the external wiring (in negative logic). • Check b5.
cL	Loss of current signal speed reference	Level of current setpoint 4 - 20 mA or 20 - 4 mA. (1)	Check that the input reference level is > 3mA. Disable the trip via b26 = 1.
PS	Supply fault on switching	Terminals +10V and +24V.	Switch the inverter off and then on again. If the fault persists, consult LEROY-SOMER
th	Triggering of motor probe	• Motor temperature too high : PTC resistance > 3 kΩ or open PTO.	• Check the motor load. • Reduce the authorised overload level. • Check the motor ventilation and the ambient temperature. • Check the probe wiring between C6 and C7.
Oh	Cooling unit overheated	• Cooling fans (for those which are equipped with them). • Ambient temperature.	• Check that : - the fans are turning, - the cooling holes are not obstructed, - the ambient temperature is lower than 50°C, - there is sufficient space around the inverter.
EE	NOV RAM error	• All parameters = factory setting.	Please consult LEROY-SOMER.
Err *	Hardware trip when unit switched on	Control card, operator panel	Reset is not active. Switch the inverter off and then on again. If the fault persists, consult LEROY-SOMER.

*
1 :   ASIC error,
2 :   EEPROM does not respond,
3 :   EEPROM fault,
4 :   processor error,
5 :   operator panel fault,
6 :   EEPROM initialisation fault,
7 :   +15V power supply imbalance,
8 :   -15V power supply imbalance,
9 :   PWM circuit initialisation fault,
10 : stack overflow.

(1) " cL " protection is not active if b11 = 0.20 (0 to 20 mA) or if b26 = 1.

Note : All trips can be cleared using reset, except " Err " which requires the power to be turned off and then back on. Thermal devices should not be triggered and reset several times in succession.

5.2 - Display indication - inverter status

Display	Description
" rdY "	Motor stopped, inverter output inactive.
" xxx "	A run command is given. The numeric value displayed is : - the output frequency (Hz) if b8 = 0, b9 = 1, - the output current (% I_N) if b8 = 1 b9 = 0, - the frequency reference (Hz) if b9 = 0.
" dc "	D.C. injection braking is active. (See b2, b7).
" Inh "	The motor will stop in freewheel mode, the inverter output is not active. (See b2, b7).
" SCN "	The inverter looks for the motor frequency to perform a flying restart. (See b52).
Flashing decimal points	The inverter is in I x t overload. (See P4, P5).

Note : The signals above do not indicate a fault status, but the inverter operating status. However, flashing decimal points are an alarm. If the inverter remains in a state of I x t overload for longer than a period defined by P4 and P5, it will trip.

5.3 - Indication via logic outputs

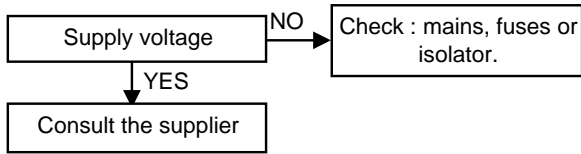| Terminal	Type of output	Information supplied	Associated parameter
A1 A2	Relay (programmable)	The inverter is not tripped or frequency ≥ P0.	b50 P0
A3	Transistor with open collector (programmable)	Inverter running or frequency ≥ P0.	b53 P0
B1	Logic 0V or +10V	Maximum current in P5 reached	b24 P5

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5.4 - Flow charts for locating malfunctions

• The inverter display does not come on

```
┌─────────────────┐  NO  ┌──────────────────┐
│ Supply voltage  ├─────►│ Check : mains,   │
│                 │      │ fuses or isolator│
└────────┬────────┘      └──────────────────┘
         │ YES
         ▼
┌─────────────────┐
│ Consult the     │
│ supplier        │
└─────────────────┘
```

• The motor will not start

```
┌─────────────────┐  YES ┌──────────────────────┐
│ The inverter    ├─────►│ Give a run command   │
│ displays "rdY"  │      │ via :                │
└────────┬────────┘      │ - the ⟳ key in       │
         │               │   operator panel mode│
         │               │   (b9 = 0),          │
         │ NO            │ - terminal C10 or C12│
         │               │   in terminal block  │
         │               │   mode (b9 = 1).     │
         │               └──────────┬───────────┘
         │                          │ YES
         │                          ▼
         │               ┌──────────────────────┐
         │               │ Set P1 to a value    │
         │               │ other than 0.        │
         │               └──────────┬───────────┘
         │                          │ YES
         ▼                          ▼
┌─────────────────┐  YES ┌──────────────────────┐
│ The inverter    ├─────►│ TERMINAL BLOCK MODE  │
│ displays " 0 "  │      │ - Is the frequency   │
└─────────────────┘      │   reference reaching │
                         │   the terminal ?     │
                         │ - Is the reference in│
                         │   voltage or in      │
                         │   current ?          │
                         │ - Are the preset     │
                         │   speed values other │
                         │   than 0 ?           │
                         └──────────┬───────────┘
                                    ▼
                         ┌──────────────────────┐
                    YES  │ KEYPAD MODE          │
                    ────►│ Increase the         │
                         │ frequency reference  │
                         │ using the ▲ key.     │
                         └──────────────────────┘
```

• Display of a trip code
See section 5.2.

• The motor does not accelerate and is noisy

```
┌─────────────────┐  YES ┌──────────────────────┐
│ BOOST too high ?├─────►│ • Reduce the value   │
│                 │      │   of P6.             │
└────────┬────────┘      │ • Try auto-BOOST     │
         │ NO            │   (b3 = 0).          │
         ▼               └──────────────────────┘
┌─────────────────┐  YES ┌──────────────────────┐
│ Significant load?├────►│ Reduce the load or   │
│                 │      │ increase the overload│
└────────┬────────┘      │ setting at P4, P5.   │
         │ NO            └──────────────────────┘
         ▼
┌─────────────────┐  YES ┌──────────────────────┐
│ Is a phase      ├─────►│ Rewire the motor     │
│ missing on the  │      │ correctly.           │
│ motor ?         │      └──────────────────────┘
└────────┬────────┘
         │ NO
         ▼
┌─────────────────┐  NO  ┌──────────────────────┐
│ Is the motor    ├─────►│ Change the connection│
│ connected       │      │ (see section 3.1.3)  │
│ correctly ?     │      └──────────────────────┘
└─────────────────┘
```
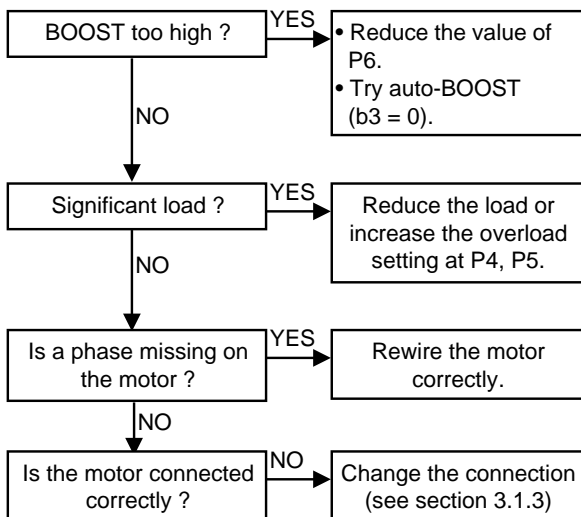
• The inverter does not react to programming instructions via the serial link

```
┌─────────────────┐  NO  ┌──────────────────────┐
│ Is the inverter ├─────►│ • Connect terminal   │
│ configured for  │      │   C11 to 0V.         │
│ control via the │      │ • Program correctly  │
│ serial link ?   │      │   parameters :       │
└────────┬────────┘      │   b6, b10, b12, P9.  │
         │               │ • Use a protocol     │
         │ YES           │   which is compatible│
         │               │   with the           │
         │               │   communication      │
         │               │   device.            │
         │               └──────────────────────┘
         ▼
┌─────────────────┐  NO  ┌──────────────────────┐
│ Is the serial   ├─────►│ • Check the          │
│ link correctly  │      │   connections        │
│ wired ?         │      │   (depending on      │
└─────────────────┘      │   protocol).         │
                         │ • Check the impedance│
                         │   matching           │
                         │   resistances.       │
                         └──────────────────────┘
```
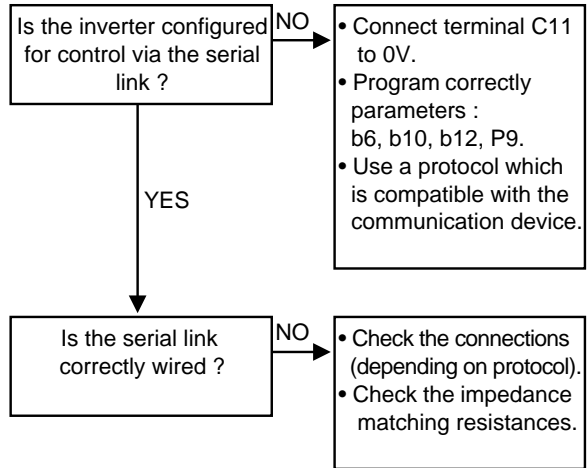
• Inverter parameters incorrectly set

```
┌─────────────────┐
│ Revert to       │
│ factory settings│
│ See section 4.1.3│
└────────┬────────┘
         │ YES
         ▼
┌─────────────────┐
│ Reprogram the   │
│ inverter as     │
│ described in    │
│ section 4.2     │
│ (commissioning).│
└─────────────────┘
```
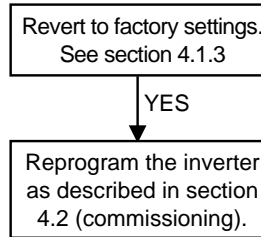
Note :
- The inverter malfunction is often due to incorrect settings. A guide to settings is given in section 4.6.
- If, after performing all the above checks, the system still does not work, contact your supplier.

6 - MAINTENANCE

6.1 - Introduction and advice
Caution

The power board printed circuit (lower circuit) is connected directly to the mains.
Do not perform any operations on the inverter without first manually opening the supply circuit of the power stages (fused isolator or circuit-breaker) **or opening the KM input contactor and manually locking** (key) **the remote control of KM.**

Note also that the smoothing capacitor can be subjected to very high voltages. Do not touch the inverter terminals without first performing or checking one of the following three operations.
a) - After switching the power off to the inverter, wait 5 minutes for the capacitors to discharge.
b) - Use a voltmeter to check that the voltage on the D.C. bus is less than 15 volts.
c) - Should it not be possible to perform the above operations due to lack of time, place a discharge resistor (30 W-500Ω) very carefully (High voltage !!!) on the D.C. bus terminals for at least 15 seconds.
FMV 2107 - FMV 2307 inverters require a minimum of maintenance and repair operations on the part of the user. Detailed below are normal maintenance operations and simple methods for checking that the inverter is operating correctly and for making an initial diagnosis of correct operation on the power stages.

6.2 - Care
For the inverter, it is important to bear in mind that all electronic equipment may be subject to problems after being exposed to excessive heat, humidity, oil, dust, or if any external matter is allowed to penetrate.
Clean the motor ventilation holes from time to time and follow any lubricating instructions for the bearings as indicated on the name plate.
Printed circuits and their components do not normally require any maintenance. Contact your retailer or nearest approved service centre if any problems occur.

DO NOT REMOVE PRINTED CIRCUIT BOARDS DURING THE GUARANTEE PERIOD, AS THIS WILL IMMEDIATELY RENDER IT NULL AND VOID.
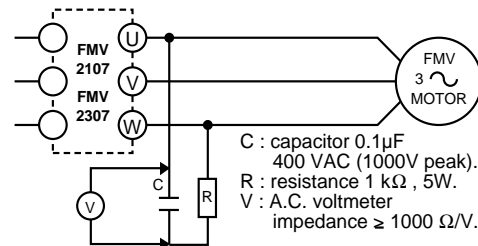
Do not touch integrated circuits or the microprocessor with your fingers or with any charged or live material. Earth yourself, as well as the bench or soldering iron before any intervention on the circuits.
Do not handle the socket-mounted integrated circuits located on the printed control circuit (risk of damage).

6.3 - Measuring voltage, current and power
6.3.1 - Measuring the voltage at the inverter output
The harmonics from the inverter mean that it is not possible to measure the voltage at the motor input correctly with an ordinary voltmeter. However, you can obtain an approximate value of the rms voltage of the fundamental wave (which has a bearing on the torque) by using a standard voltmeter and the arrangement described in the section below.

C : capacitor 0.1µF
400 VAC (1000V peak).
R : resistance 1 kΩ , 5W.
V : A.C. voltmeter
impedance ≥ 1000 Ω/V.

6.3.2 - Measuring the motor current
The current drawn by the motor and the inverter input current can be measured approximately using an ordinary moving coil ammeter.

6.3.3 - Measuring the inverter input and output power
The inverter input and output power can be measured using an electro-dynamic instrument.

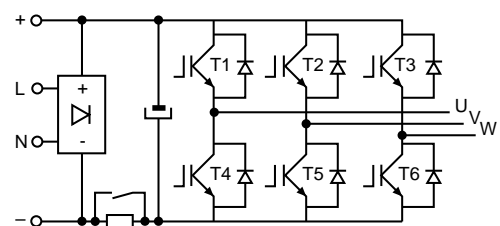### 6.4 - Testing the inverter power stages
6.4.1 - Preliminary remarks :
The tests described below are intended to **perform a qualitative test** of the state of the power stages. Use an analogue ohmmeter (moving coil) set to the 1 Ω scale and take measurements after switching off the inverter and waiting for the smoothing capacitor to discharge completely. Each measurement must last for at least 10 seconds to avoid false readings from any charge which might still be present in the inverter circuits. If there is any doubt about the power stages, make a visual check of the state of the gate drive modules which may have been damaged subsequently.

The following diagrams represent the general schematic diagram of the transistor inverter stage in the speed controller.
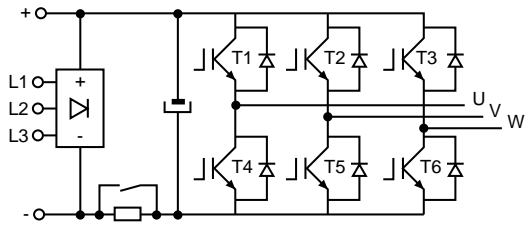- FMV 2107

- FMV 2307

Two levels of tests can be performed :

6.4.2 - Test using the terminal block
This test is fairly crude. A positive response does not necessarily mean that the power stages are accurate. However, a negative response generally indicates that they have been damaged.
- FMV 2107 1.5M to 3.5M
  FMV 2307 1.5TL to 3.5TL or FMV 2307 1.5T to 5.5T
Use the L, N or L1, L2, L3 and U, V, W, +, - terminals on the power circuit.
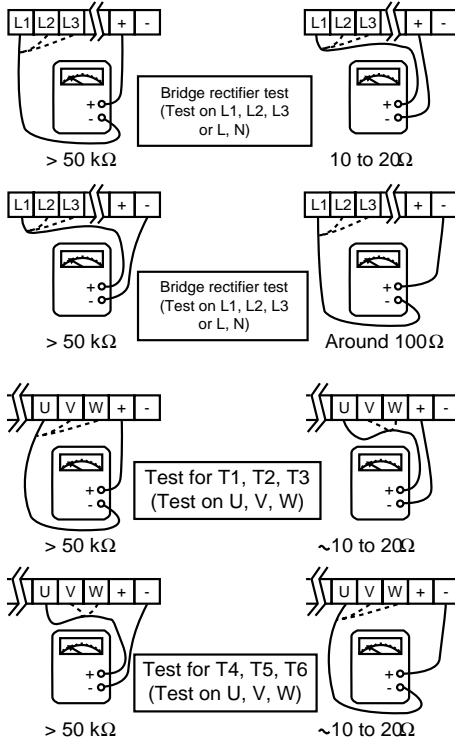
6.5 - Testing the inverter isolation and withstand voltage
### 6.5.1 - Introduction
CAUTION :

⚠

The tests described below should be performed with care. Should the power stages be destroyed as a result of a handling error or not following the instructions they would not be covered by the guarantee.
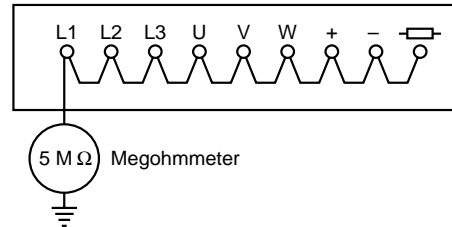
6.5.2 - Testing inverter isolation
Short-circuit all the terminals on the power terminal block, except the ⏚ terminal (earth), as shown below. Use a megohmmeter to measure the resistance between these terminals and the earth. This resistance should be at least 5 MΩ.

- FMV 2107 1.5M to 3.5M
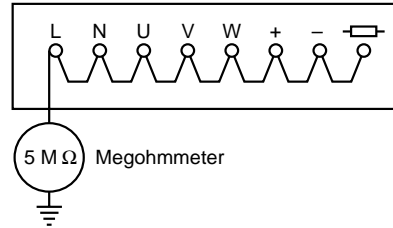
- FMV 2307 1.5TL to 3.5TL or FMV 2307 1.5T to 5.5T

DO NOT CARRY OUT ISOLATION OR WITHSTAND VOLTAGE TESTS ON ANY TERMINALS OTHER THAN THOSE SHOWN ABOVE.

6.5.3 - Testing the inverter withstand voltage
Apply an A.C. voltage of 2000V (after gradually increasing it) between the earth and the short-circuited power terminal block for one minute as described in the diagrams above.
Check that nothing abnormal happens during the test.

⚠

CAUTION :
Never carry out a withstand voltage test on any terminals other than those indicated above. Such an operation would damage the inverter and invalidate the guarantee
Reduce the voltage applied at each new test by 20 %.

6.6 - Spare parts list
Consult LEROY-SOMER

6.7 - Product exchange
CAUTION :

⚠

Products must be returned in their original packaging or at least, in antistatic packing to prevent damage to sensitive components. If this is not done, the guarantee may be invalidated.

7 - OPERATING EXTENSIONS

7.1 - R - FMV braking resistances
- R - FMV 140M and 320M for FMV 2107 M
  and FMV 2307TL
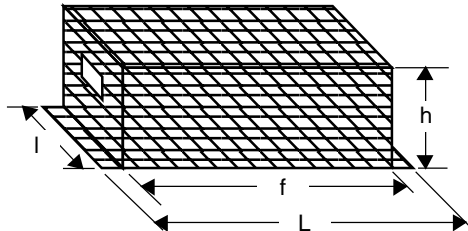- R - FMV 320T to 2000T for FMV 2307TL

Characteristics

R - FMV	140M	320M	320T	640T	1000T	2000T
Ohmic value (Ω)	47	47	180	90	68	34
Thermal power (W)	140	320	320	640	1000	2000
Peak power (W)	3000	3000	2200	4400	5800	11700
I rms (A) *	1,7	2,6	1,33	2,66	3,8	7,7
Protection index	IP00	IP20 on 5 sides, 6th side = mounting surface				

* Adjustment of thermal relay protection of R - FMV resistance.

Dimensions in mm.
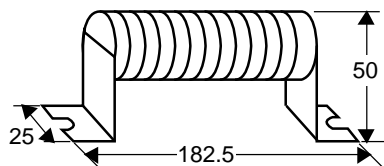
Mounting distance : 162.5 mm.
Weight : 0.135 kg.

R - FMV	320 M	320 T	640 T	1000 T	2000 T
Weight (kg)	1,5	1,5	2,1	3,6	5,1
Dimensions L x d x h (mm)	425 x 134 x 114			565 x 224 x 180	
Mounting distance f (mm)	395			535	

7.2 - L - FMV lifting interfaces for FMV 2307T *
7.2.1 - Operating principle
The L - FMV interface drives an FMV 2307T frequency inverter and manages the mechanical brake in lifting applications (cranes, hoists, traversing cranes, etc).
They take complete control of the FMV 2307T inverter using commands from the operator.
They have several control modes : analogue speed reference via potentiometer, logic command via faster/slower pushbuttons or preset speeds.

7.2.2 - Dimensions
L - FMV
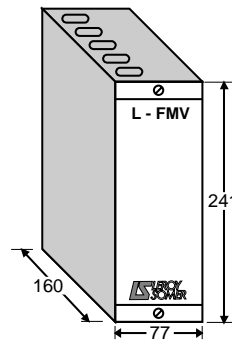
7.2.3 - Installation
L - FMV

* Available at a later date.

7.3 - Mains filters (R.F.I.)

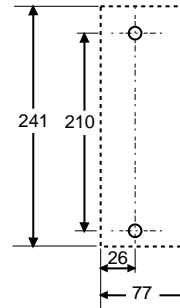These are used to reduce electro-magnetic emissions from inverters, and ensure that the inverters conform to EN50081.2 European standards across the whole available switching frequency range. (See section 3.3).

7.3.1 - FMV 2107 1.5M to 3.5M

FMV 2107 rating	Filter reference	I_N filter (A)
1.5M	FN 350-8-29	8
2.5M and 3.5M	FN 350-20-29	20

P
N   FN 350

E

FN 350-8-29 and FN 350-20-29

7.3.2 - FMV 2307 1.5TL to 3.5TL and FMV 2307 1.5T to 5.5T

## 7.4 - 3-phase motor chokes for attenuation of leakage currents : SELF - MC

These are wired directly to the inverter output (terminals U, V, W) and help reduce leakage currents and interference.

They are cylindrical in shape and are fixed via a central flange.

SELF-MC rating	FMV rating	Dimensions (mm)			Weight (kg)
		Diameter	Height	Ø hole	
3.5T	2107 - 1.5M 2307 - 1.5TL 2307 - 1.5T and 2.5T	80	50	5,1	0,5
11T	2107 - 2.5M and 3.5M 2307 - 2.5TL and 3.5TL 2307 3.5T to 5.5T	80	50	5,1	0,75

• Wiring

The SELF - MC must be wired as close as possible to the inverter and according to the diagram below.
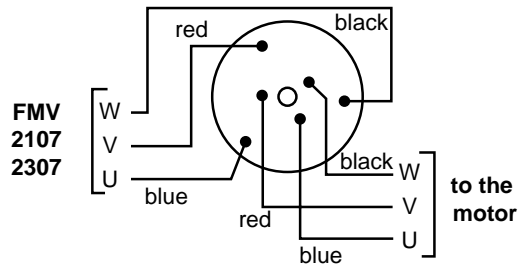
7.5 - PEGASE parameter-setting software

This software enables the serial link and an RS 232/RS 485 interface to access all FMV 2107 and FMV 2307 inverter parameters via a PC.

The software is particularly suitable for repetitive inverter programming.

Notes

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8 - SUMMARY OF SETTINGS

FMV type	Rating	Software (P61)	Serial no.	Motor type	Motor no.	Commissioning

	Parameter	Factory setting	Your setting date :	Your setting date :
P0	Minimum output frequency	0		
P1	Maximum output frequency	50		
P2	Acceleration ramp	5.0		
P3	Deceleration ramp	10.0		
P4	Maximum overload current	150		
P5	Maximum continuous current	100		
P6	Torque at low speed (BOOST)	2		
P7	Slip compensation	0		
P8	D.C. injection brake current	150		
P9	Serial address	11		
PA	Fault log	-		
Pb	Security code	0		
b0	Selection : " torque " or frequency reference	1 (frequency)		
b1	Operator panel automatic restart	1		
b2 - b7	Stopping mode b2 b7	0 (stopping following ramp or 0 prolongation of ramp)		
b3	Automatic or manual BOOST	1 (manual)		
b4	Frequency reference polarity	1 (positive)		
b5	Control logic polarity	1 (negative)		
b6	Control via serial link	0 (terminal block)		
b7	See b2	0		
b8	Display indication	0 (frequency)		
b9	Control mode	1 (terminal block)		
b10	Display mode	0 (yes)		
b11	Input signal terminal C5	4.20 (4/20 mA)		
b12	Baud rate	4.8		
b13	Return to factory settings	0 (inactive)		
b14	Switching frequency and ULF	2.9/120		
Pc	Maximum voltage frequency	50		
Pd	Access to specific parameters	0		
P10	Skip frequency threshold 1			
P11	Skip frequency threshold 2	0		
P12	Skip frequency threshold 3			
P13	Skip width threshold 1			
P14	Skip width threshold 2	± 0.5		
P15	Skip width threshold 3			
P20	Preset speed - 1			
P21	Preset speed - 2			
P22	Preset speed - 3			
P23	Preset speed - 4	0		
P24	Preset speed - 5			
P25	Preset speed - 6			
P26	Preset speed - 7			

Parameters		Factory setting	Your setting date :	Your setting date :
P27	Jog frequency	1.5		
b20	Jog/preset speeds	0 (jog)		
b21 - b23	Standard or specific ramps	0 - 0		
b24 - b25	Information on terminals B1 and B2	0 - 0		
b26	Disable safety CL	0 (enabled)		
b27	Specific deceleration	0 (standard)		
b28	Enable P.I. control loop	0 (disabled)		
P30	Acceleration preset speed - 1	5.0		
P31	Acceleration preset speed - 2			
P32	Acceleration preset speed - 3			
P33	Acceleration preset speed - 4			
P34	Acceleration preset speed - 5			
P35	Acceleration preset speed - 6			
P36	Acceleration preset speed - 7			
P37	Acceleration - jog	0.2		
P40	Deceleration preset speed - 1	10.0		
P41	Deceleration preset speed - 2			
P42	Deceleration preset speed - 3			
P43	Deceleration preset speed - 4			
P44	Deceleration preset speed - 5			
P45	Deceleration preset speed - 6			
P46	Deceleration preset speed - 7			
P47	Deceleration - jog	0.2		
P50	Number of automatic resets	0		
P51	Delay of automatic resets	1		
b50	Selection of the relay function	0 (inverter status)		
b51	Enable " FWD/REV " key.	0 (disabled)		
b52	Catch spinning motor	0 (disabled)		
b53	Selection of logic output A3	0 (running)		
b54	Selection : fixed or dynamic U/f characteristic.	0 (fixed U/f)		
b56	Processing minor faults	0 (freewheel stop)		

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Notes

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