LEROY SOMER

3921 en - 02.2006 / a





CE

This manual is to be given to the end user

UNIDRIVE SP

Lifting solution

Installation and commissioning manual

UNIDRIVE SP
Universal speed drive

The LEROY-SOMER offer

Operation of 4 quadrants

- Brake resistors

RFI filters - Line mains supply

UNIDRIVE SP



Control

- Additional input/output module
- Decentralised inputs/outputs
- Modbus RTU serial link in standard mode
- Field bus module :
  - Profibus DP,
  - Interbus S,
  - Devicenet,
  - CANopen,
  - CTNet

Operator interfaces

- LED display
- LCD display
- LS Soft parameter-setting software
- Man-Machine interfaces

Applications Solutions

- Positioning
- Lifting
- Synchronisation
- Winding - Unwinding
- Length cut
- Programmable PLC module

Other integrable modules

- Second encoder input
- Resolver

Reducers

standard or reduced

- Axial output
  - Helical gears



- Orthogonal output
  - Helical gears and conical torque,
  - Worm



Output mains supply - Ferrites Power cables and encoder

Motors

- Asynchronous
  - LS
  - FLS



- Asynchronous adapted to the variable speed
  - LSMV
  - FLSMV



- Servo
  - SMV UM



Options

- Forced ventilation
- Hand brake or dynamic brake

Motor transducers

- Incremental, absoluted encoders : 'EnDat" or SSI, sincos ...
- Resolvers

Other motor options

- Forced ventilation
- Hand brake or dynamic brake

Options

- Forced ventilation
- Hand brake

UNIDRIVE SP
Safety instructions

NOTE

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

CAUTION

For the user's safety, this speed drive must be connected to a proper earthing. (terminal).

If the accidental starting of the installation is likely to cause a risk to the personnel or to the machines being driven, it is necessary to supply with power the equipment by means of an isolating switch and of a circuit-breaking device (power contactor) controlled by an external safety chain (emergency stop, detection of anomalies on installation).

The speed drive is fitted with safety devices which in case of a fault may control its stopping and consequently the motor stopping. This motor itself can be also subject to stopping as result of the mechanical blocking. Finally, the voltage fluctuations, in particular the power cuts, may also cause the motor to stop.

The removal of the shutdown causes can lead to a restart which may be dangerous for certain machines or installations, especially for those which must comply with appendix 1 of decree 92.767 of 29th July, 1992 on safety.
In such cases, it is important for the user to take the appropriate precautions against the motor restarting in case of an unscheduled motor stopping.

The variable speed drive is designed to be able to supply with power a motor and the driven machine above its rated speed.
If the motor or the machine are not mechanically designed to withstand such speeds, the user may be exposed to a serious risk due to their mechanical deterioration.
It is important for the user to check, before setting a high speed, if the installation can withstand it.

The speed drive making the object of this manual is a component designed to be integrated into an installation or an electrical machine and it can under no circumstances be considered to be a safety device. It is therefore the responsibility of the machine manufacturer, the installation designer or the user to take the necessary precautions in order to ensure that the installation complies with the standards in force and to provide any devices required to ensure the safety of the equipment and personnel.

Use of the drive for lifting : the implementation of this application imposes the observance of the particular instructions given in a specific manual, on demand. The user is the one who must require it from its usual interlocutor LEROY-SOMER.

LEROY-SOMER declines all responsibility in case the above-mentioned recommendations are not observed.

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Manual corresponding to the software versions higher or equal to 1.07.01

UNIDRIVE SP
Safety instructions

SAFETY AND OPERATING INSTRUCTIONS RELATED TO SPEED DRIVES
(According to the low voltage directive 73/23/CEE amended by 93/68/CEE)

• Throughout this manual the symbol warns of the consequences arising from the misuse of the variable speed drive, since the electrical risks may lead to material damages or to body injuries, as well as to fire hazards.

1 - General
Depending on their degree of protection, the variable speed drives may contain live parts which are powered up, which may be moving or rotating, as well as hot surfaces, during their operation.
The improper removal of the protection devices, an inadequate use, a faulty installation or an inappropriate handling could represent a serious risk to the equipment and personnel.
For further information, read this documentation.
All the works related to the transportation, installation, commissioning and maintenance must be performed by a qualified and authorised personnel (see CEI 364 or CENELEC HD 384, or DIN VDE 0100, as well as the national provisions regarding the installation and the accident prevention).
Within the scope of these basic safety instructions, qualified personnel means persons having competence as regards the installation, the assembling, the commissioning and the product exploitation, and possessing the relevant qualifications.

2 - Use
The variable speed drives are components designed for integration into the installations or the electrical machines.
In case of incorporation into a machine, their commissioning is forbidden if the compliance of the machine with the provisions of the Directive 89/392/CEE (machine directive) has not been checked. It is also necessary to observe the EN 60204 standard stipulating mainly that the electrical actuators (which include the variable speed drives) cannot be considered as circuit-breaking devices and certainty not as isolating switches.
Their commissioning is not allowed if the provisions of the Electromagnetic Compatibility Directive (89/336/CEE, amended by 92/31/CEE) are not observed.
The variable speed drives meet the requirements of the Low Voltage Directive 73/23/CEE, amended by 93/68/CEE. The harmonised standards of the DIN VDE 0160 series along with the VDE 0660 standard, part 500 and EN 60146/VDE 0558 are applicable to them.
The technical characteristics and the instructions concerning the connection conditions specified on the nameplate and in the documentation provided, must be observed.

3 - Transportation, storage
All the instructions concerning the correct transportation, storage and handling must be observed.
The climatic conditions specified in the technical manual must be observed.

4 - Installation
The equipment installation and cooling must comply with the provisions of the documentation supplied with the product.
The variable speed drives must be protected against any excessive stress. In particular, the parts must not be damaged and/or the clearances between components must not be changed during the transportation and the handling.
Do not touch the electronic components and the contact parts.
The variable speed drives contain parts which are sensitive to the electrostatic stresses and may be easily damaged in case of an inadequate handling. The electrical components must not be exposed mechanical damage or destruction (otherwise, your health is at risk!).

5 - Electrical connection
When works are performed on variable speed drives which are powered up, the national provisions related to the prevention of accidents must be observed.
The electrical installation must be executed according to the applicable provisions (for example, conductor section, protection by fused short-circuit, connection of the protection conductor). More detailed information is given in the manual.
The documentation accompanying the variable speed drives contains the instructions for an installation which meets the electromagnetic compatibility requirements, such as screening, earthing, presence of filters and adequate insertion of cables and conductors. These instructions must be observed in all cases, even if the variable speed drive carries the CE mark. The observation of the limit values imposed by the legislation on CEM is the responsibility of the manufacturer of the installation or the machine.

6 - Operation
The installations with built-in speed drives must be fitted with additional protection and monitoring devices as laid down in the safety provisions in force, such as the law on technical equipment, the provisions on accident prevention, etc. The modification of the variable speed drives by means of the control software are permitted.
The active parts of the device and the live power connections must not be touched immediately after the the variable speed drive in powered down, as the capacitors may still be loaded. In this regard the warnings attached to the variable speed drives must be observed.
During the operation, all the doors and protective devices must be kept closed.

7 - Servicing and maintenance
Refer to the manufacturer's documentation

This manual is to be given to the end user.

UNIDRIVE SP
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General information

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UNIDRIVE SP
General information

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UNIDRIVE SP
General information

A1 - General principle

The module SM-LVG (Lifting programmable application module) integrated into an UNIDRIVE SP speed drive is used to configure the variable speed drive in the Lifting application. This function may be applied in closed loop or in open loop, and it must be associated to a self-driven asynchronous or synchronous motor (brushless).

The electromechanical brake control is managed by the variable speed drive. If the end of stroke management is necessary, an additional SM-I/O input/output module must be added, depending on the number of inputs/outputs necessary for the application.

Manual for use with Lvg software versions equal to or greater than 12000417

A2 - Operating conditions

The UNIDRIVE SP continuous output current and the transient maximum current depend on the operating conditions.

Maximum overload : To obtain the maximum available overload, the continuous output current (I_{sp}) is limited. In this case, the maximum transient current of the variable speed drive (Transient I_{max}) is of 150 % I_{sp} in open loop or 175 % I_{sp} in closed loop or servo.
I_{sp} is available for all the speed range.
Maximum transient overload

$$= \frac{I_{sp}}{I_{N\ motor}} \times 1.5 \times 100.$$

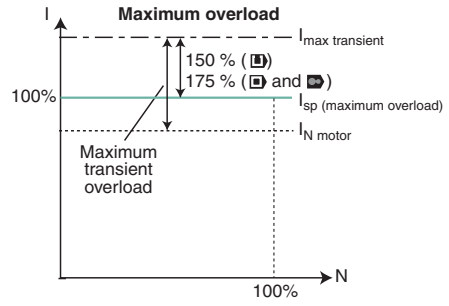
Maximum transient overload and

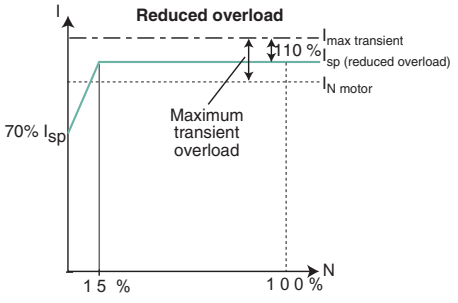
$$= \frac{I_{sp}}{I_{N\ motor}} \times 1.75 \times 100.$$

Example :
- Motor LS MV 132 SM - 4 poles - 5.5 kW - 400V Y
$I_{N\ motor}$ = 10.4A.
- Constant torque application - open loop vector control - maximum overload.
- Variable speed drive selection --> **UNIDRIVE SP 8T**, I_{sp} with maximum overload : 13A
Maximum transient overload $= \left(\frac{13}{10.4}\right) \times 1.5 \times 100 = 187.5\ \%$.

Reduced overload : If the operating conditions are a little more severe, the output current may be increased and may allow driving a higher power motor. In counterpart, the maximum transient current is limited to 110 % I_{sp}.
Below 15 % of the rated speed, the continuous output current is reduced as indicated in the curve below.
Maximum transient overload $= \frac{I_{sp}}{I_{N\ motor}} \times 1.1 \times 100.$

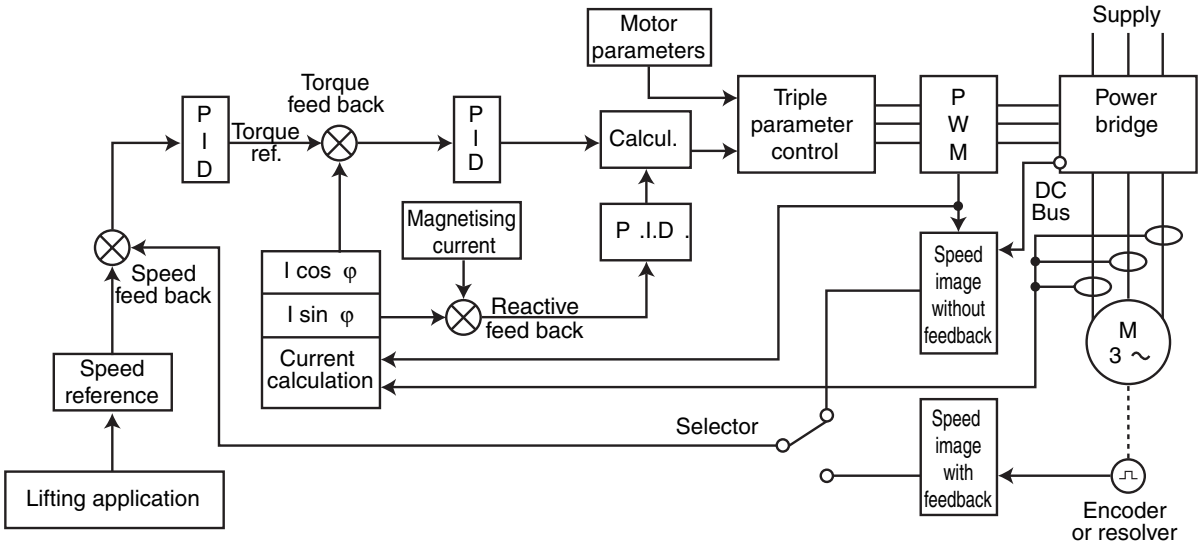
Example :
- Motor LS MV 132 SM - 4 poles - 5.5 kW - 400V Y
$I_{N\ motor}$ = 10,4 A.
- Constant torque application - open loop vector control - reduced overload and minimum speed > 15 % rated speed.
- Variable speed drive selection --> **UNIDRIVE SP 5.5T**, I_{sp} with reduced overload : 11A
Maximum transient overload $= \left(\frac{11}{10.4}\right) \times 1.1 \times 100 = 116\ \%$.





UNIDRIVE SP
General information

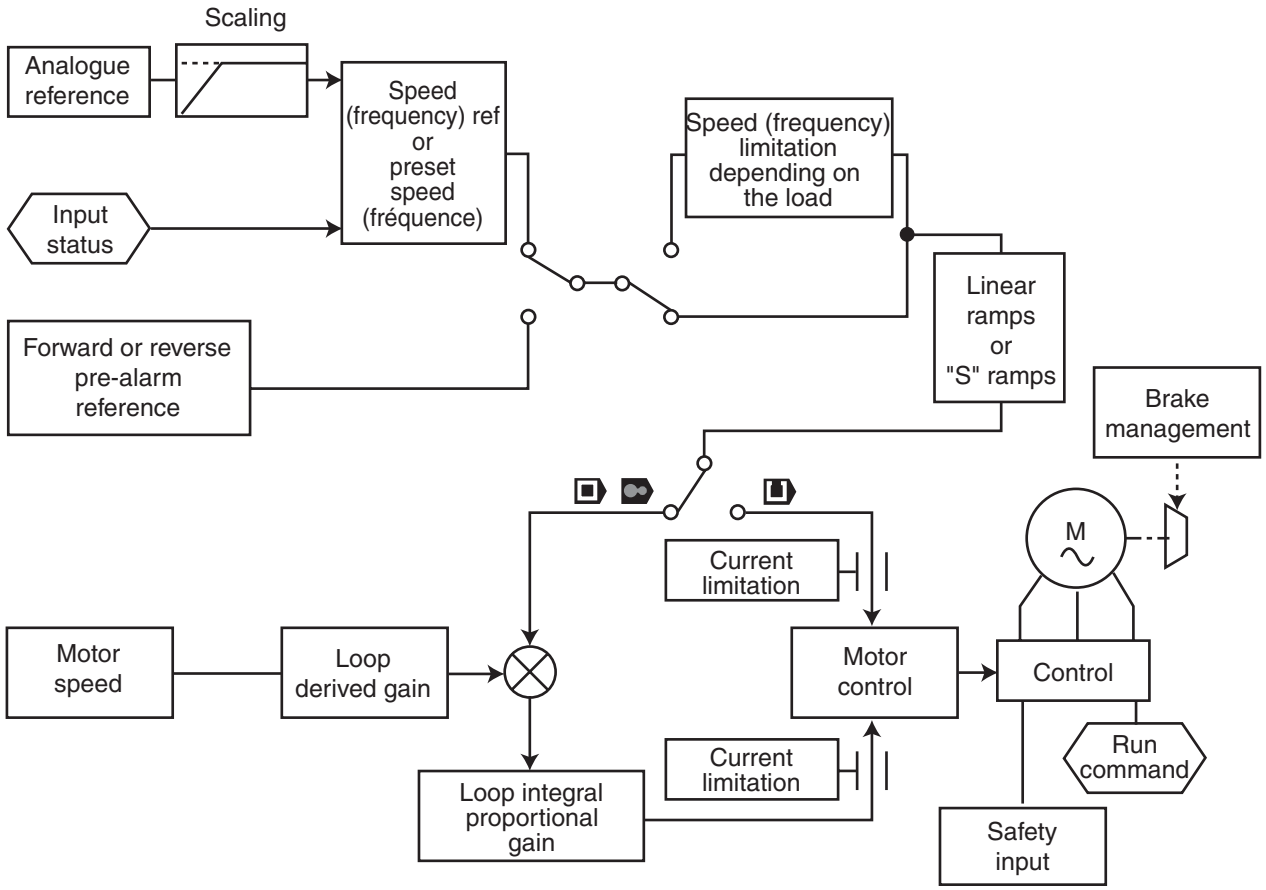
A3 - Control principle



UNIDRIVE SP
General information

A4 - Operating principle

The system operates in open loop ( ) and in closed loop (or), for the asynchronous or synchronous motors with or without encoder.
The principle consists in the management of the brake enabling after having established the motor torque so that the load may not be backdriven.



A4.1 - Reference set up
The program is used to generate an analogue reference and up to seven preset references.

A4.2 - Speed limitation depending on the load (weight)
The program allows transfer gains by the speed adjustment depending on the load. The weight scaling is independent forward and reverse in order to take into account the efficiencies.

A4.3 - End of stroke management
The program manages a pre-alarm input and two alarms allowing a low speed before the stop.

A4.4 - Security management
A4.4.1 - Speed control
In open loop, the control of the distance between the after ramp reference and the motor speed, parameter-setting threshold. In closed loop, the torque control in relation to a parameter-setting threshold.

A4.4.2 - Transmission interruption detection
Made by the measurement of the difference between the motor speed and the speed of the encoder mounted on the slow shaft.

A4.4.3 - Backdriving
Control of the direction of rotation when releasing the brake.

A4.4.4 - Lack of phase
This security is obtained by controlling the motor magnetising current.

A4.4.5 - Brake feedback
Control of brake feedback: contactor or brake micro-contact.

UNIDRIVE SP
General information

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UNIDRIVE SP
General characteristics

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UNIDRIVE SP
General characteristics

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UNIDRIVE SP
General characteristics

B1 - Environmental characteristics

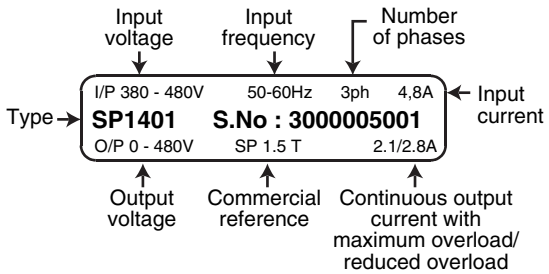
• The variable speed drives are destined to be installed in a cabinet to protect them against the conductive dusts and the condensation. The access of the unauthorised persons is not permitted.

Characteristics	Level
Protection	IP20 with installed cable bushing and gland.
Storage temperature	-40°C to +50°C, maximum 12 months (after this period, follow the maintenance instructions described at section M).
Operating temperature	0°C to +50°C. The characteristics of the variable speed drive are given at +40°C. Beyond 40°C, the continuous output current must be derated. Refer to the characteristics of section B3.3.
Relative humidity	≤ 95 % without condensation.
Altitude	≤ 1000 m without derating. The maximum altitude authorised is of 3000 m, but after 1000m, the continuous output current must be subject to a derating of 1 % for each block of 100m above the said 1000m (ex.: for an altitude of 3000m, derate with 20 %).
Vibration	According to the IEC 68-2-64 and IEC 60068-2-6 standards.
Shocks	According to IEC 60068-2-29 standard.

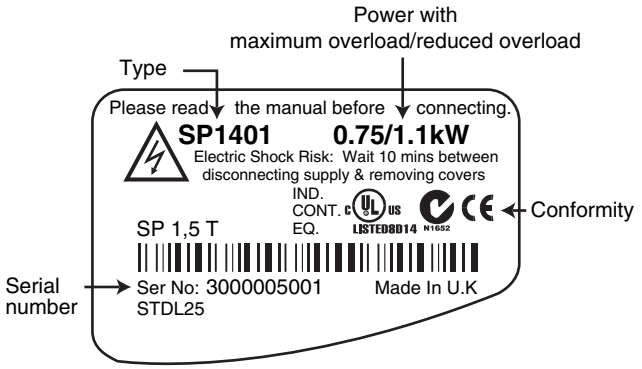
B2 - Product designation

Unidrive SP = Range.
2.5 = rating in kVA with maximum overload.
TL = three-phase power supply 200 to 240V ±10 %,
or
T = three-phase power supply 380 to 480V ±10 %,
or
TM = three-phase power supply 500 to 575V ±10 %,
or
TH = three-phase power supply 500 to 690V ±10 %.

Label on the front side:



- Label under the display (on the top side of the cover) :



Logo	Conformity	
CE	CE	Europe
N1652	C Tick	Australia
c UL us	UL / cUL	USA & Canada

UNIDRIVE SP
General characteristics

B3 - Electrical characteristics

B3.1 - General information

Characteristics	Level
Phase voltage imbalance	< 3 %
Maximum numbers of power-ups per hour	≤ 20
Input frequency	48 to 65 Hz
Maximum short-circuit current	5 kA excepting 50T to 60T, 50TH and 60TH : 10 kA and size 6 : 15 kA
Inrush current limitation during the power-up	Rating TL : T1 = 18A, T2 = 12A, T3= 8A, T4 = 73A, Rating T : T1 = 35A, T2 = 24A, T3= 14A, T4 (40T) = 37A, T4 (50T and 60T) = 73A, T5 = 110A Rating TM : T3 = 18A Rating TH : T4 = 35A, T5 = 70A
Length between the power-up and the "rdy" status (ready speed drive)	4s
Output frequency/speed range	: 0 to 3000 Hz and : 0 to 40000 min^{-1}

B3.2 - Electrical characteristics at 40°C and 3 kHz cutout frequency

CAUTION :
• In its factory settings, the variable speed drive operates with a carrier frequency of 3 kHz for an ambient temperature of 40°C. If a higher carrier frequency or a higher temperature is selected, the output current must be derated. (see section B3.3).
• In servo mode, in order to obtain optimum functions, a carrier frequency of 12 kHz must be chosen.

I_{sp} : Continuous output current
P_{mot} : Motor power.

200V to 240V ± 10 % three-phase mains supply

UNIDRIVE SP			Maximum overload		Reduced overload	
Size	LS	CT	P_{mot} at 220V (kW)	I_{sp} (A)	P_{mot} at 220V (kW)	I_{sp} (A)
1	1.5TL	1201	0.75	4.3	1.1	5.2
	2TL	1202	1.1	5.8	1.5	6.8
	2.5TL	1203	1.5	7.5	2.2	9.6
	3.5TL	1204	2.2	10.6	3	11
2	4.5TL	2201	3	12.6	4	15.5
	5.5TL	2202	4	17	5.5	22
	8TL	2203	5.5	25	7.5	28
3	11TL	3201	7.5	31	11	42
	16TL	3202	11	42	15	54
4	22TL	4201	15	56	18.5	68
	27TL	4202	18.5	68	22	80
	33TL	4203	22	80	30	104

500V to 575V ± 10 % three-phase mains supply

UNIDRIVE SP			Maximum overload		Reduced overload	
Size	LS	CT	P_{mot} at 575V (kW)	I_{sp} (A)	P_{mot} at 575V (kW)	I_{sp} (A)
3	3.5TM	3501	2..2	4.1	3	5.4
	4.5TM	3502	3	5.4	4	6.1
	5..5TM	3503	4	6.1	5.5	8.4
	8TM	3504	5.5	9.5	7.5	11
	11TM	3505	7.5	12	11	16
	16TM	3506	11	18	15	22
	22TM	3507	15	22	18.5	27
4	33TH	4603	18.5	27	22	36
	40TH	4604	22	36	30	43
	50TH	4605	30	43	37	52
	60TH	4606	37	52	45	62
5	75TH	5601	45	62	55	84
	100TH	5602	55	84	75	99
6	120TH	6601	75	100	90	125
	150TH	6602	90	125	110	144

380V to 480V ± 10 % three-phase mains supply

UNIDRIVE SP			Maximum overload		Reduced overload	
Size	LS	CT	P_{mot} at 400V (kW)	I_{sp} (A)	P_{mot} at 400V (kW)	I_{sp} (A)
1	1.5T	1401	0.75	2.1	1.1	2.8
	2T	1402	1.1	3	1.5	3.8
	2.5T	1403	1.5	4.2	2.2	5
	3.5T	1404	2.2	5.8	3	6.9
	4.5T	1405	3	7.6	4	8.8
	5.5T	1406	4	9.5	5..5	11
2	8T	2401	5.5	13	7.5	15.3
	11T	2402	7.5	16.5	11	21
	16T	2403	11	25	15	29
3	22T	3401	15	32	18.5	35
	27T	3402	18.5	40	22	43
	33T	3403	22	46	30	56
4	40T	4401	30	60	37	68
	50T	4402	37	74	45	83
	60T	4403	45	96	55	104
5	75T	5401	55	124	75	138
	100T	5402	75	156	90	168
6	120T	6401	90	180	110	202
	150T	6402	110	210	132	236

500V to 690V ± 10 % three-phase mains supply

UNIDRIVE SP			Maximum overload		Reduced overload	
Size	LS	CT	P_{mot} at 690V (kW)	I_{sp} (A)	P_{mot} at 690V (kW)	I_{sp} (A)
4	22TH	4601	15	19	18.5	22
	27TH	4602	18.5	22	22	27
	33TH	4603	22	27	30	36
	40TH	4604	30	36	37	43
	50TH	4605	37	43	45	52
	60TH	4606	45	52	55	62
5	75TH	5601	55	62	75	84
	100TH	5602	75	84	90	99
6	120TH	6601	90	100	110	125
	150TH	6602	110	125	132	144

UNIDRIVE SP
General characteristics

B3.3 - Degrading according to the temperature and the cutout frequency

UNIDRIVE SP			Temp.	Three-phase permanent output current below 220V at a cutout frequency ≥ 3 kHz											
Size	LS	CT		Maximum overload						Reduced overload					
				3 kHz	4 kHz	6 kHz	8 kHz	12 kHz	16 kHz	3 kHz	4 kHz	6 kHz	8 kHz	12 kHz	16 kHz
1	1,5TL	1201	40°C	**4,3**						**5,2**					
			50°C	4,3						5,2					
	2TL	1202	40°C	**5,8**						**6,8**					
			50°C	5,8						6,8					
	2,5TL	1203	40°C	**7,5**						**9,6**					
			50°C	7,5						9,6					9
	3,5TL	1204	40°C	**10,6**						**11**					
			50°C	10,6				9,5	8,3	11			10,9	9,5	8,3
2	4,5TL	2201	40°C	**12,6**						**15,5**					
			50°C	12,6					11,4	15,5				13,5	11,5
	5,5TL	2202	40°C	**17**						**22**					
			50°C	17			15,7	13,4	11,4	19,7	18,9	17,3	15,9	13,5	11,5
	8TL	2203	40°C	**25**		24,2	22,5	19,6	17,2	**28**			27,9	24,8	21,8
			50°C	19,2	18,4	17	15,7	13,3	11,4	19,5	18,6	17,2	15,8	13,4	11,5
3	11TL	3201	40°C	**31**					x	**42**					x
			50°C	31					x	42				38,2	x
	16TL	3202	40°C	**42**				41,3	x	**54**				48,5	x
			50°C	42				37,2	x	54		52,8	47	38,2	x
4	22TL	4201	40°C	**56**				x	x	**68**				x	x
			50°C	56				x	x	68				x	x
	27TL	4202	40°C	**68**				x	x	**80**				x	x
			50°C	68				x	x	80				x	x
	33TL	4203	40°C	**80**				x	x	**104**				x	x
			50°C	80				x	x	87				x	x

UNIDRIVE SP			Temp.	Three-phase permanent output current below 400V at a cutout frequency ≥ 3 kHz											
Size	LS	CT		Maximum overload						Reduced overload					
				3 kHz	4 kHz	6 kHz	8 kHz	12 kHz	16 kHz	3 kHz	4 kHz	6 kHz	8 kHz	12 kHz	16 kHz
1	1.5T	1401	40°C	**2.1**						**2.8**					
			50°C	2.1						2.8					
	2T	1402	40°C	**3**						**3.8**					
			50°C	3						3.8					
	2.5T	1403	40°C	**4.2**						**5**					
			50°C	4.2					3.8	5					3.9
	3.5T	1404	40°C	**5.8**				5.4	4.3	**6.9**					5.9
			50°C	5.8				4.8	3.7	6.9				5.1	3.9
	4.5T	1405	40°C	**7.6**				5.6	4.4	**8.8**				7.4	5.7
			50°C	7..6		7.2	6	4.2	3.1	8.8		7.3	6	4.2	3.1
	5.5T	1406	40°C	**9.5**		9.2	7.7	5.6	4.4	**11**			10	7.4	5.7
			50°C	9.5	9	7.2	6	4.2	3.1	10.1	9	7.3	6	4.2	3.1
2	8T	2401	40°C	**13**			12.6	9.6	7.6	**15.3**				12.7	10.1
			50°C	13		11.7	9.9	7.3	5.5	15.3	14.2	11.8	10	7.3	5.5
	11T	2402	40°C	**16.5**		14.9	12.6	9.6	7.6	**21**		19.5	16.7	12.7	10
			50°C	15.5	14.1	11.7	9.9	7.3	5.5	15.7	14.2	11.8	10	7.3	5.5
	16T	2403	40°C	**25**	23.7	19.9	16.9	12.8	10.1	**29**	27.2	23.2	20	15	11.8
			50°C	16.7	15	12.2	10.1	7.1	5.1	16.8	15	12.2	10.1	7.1	x
3	22T	3401	40°C	**32**			28.9	22	17.5	**35**			34.5	26.3	21
			50°C	32		30.7	26.1	19.7	15.4	35		33.5	28.5	21.5	16.9
	27T	3402	40°C	**40**		38.3	32.5	24.5	19.2	**43**			37.9	28.6	22.5
			50°C	40		34.1	28.4	20.7	16	43	41.5	34.2	28.7	21	16
	33T	3403	40°C	**46**	45.9	38.5	32.5	24.4	x	**56**	53.4	44.6	37.9	28.6	x
			50°C	46	41.5	33.6	28.3	20.8	x	46	41.5	34.2	28.7	21	x
4	40T	4401	40°C	**60**		52	42	x	x	**68**			62	x	x
			50°C	60		47	38	x	x	68		67	55	x	x
	50T	4402	40°C	**74**	65	51	42	x	x	**83**		74	61	x	x
			50°C	68	59	46	38	x	x	83	82	67	52	x	x
	60T	4403	40°C	**96**	84	67	55	x	x	**104**		95	79	x	x
			50°C	86	75	60	50	x	x	87	86	71	60	x	x
5	75T	5401	40°C	**124**	107	82	67	x	x	**138**		118	97	x	x
			50°C	113	96	75	60	x	x	138		106	87	x	x
	100T	5402	40°C	**156**	137	109	91	x	x	**168**	158	129	107	x	x
			50°C	140	123	99	82	x	x	141	140	112	92	x	x
6	120T	6401	40°C	**180**	174	134	x	x	x	**202**		164	x	x	x
			50°C	180	158	121	x	x	x	191	190	148	x	x	x
	150T	6402	40°C	**210**	175	130	x	x	x	**236**	210	158	x	x	x
			50°C	190	158	116	x	x	x	198	181	138	x	x	x

UNIDRIVE SP
General characteristics

UNIDRIVE SP			Temp.	Three-phase permanent output current below 575V at a cutout frequency ≥ 3 kHz											
Size	LS	CT		Maximum overload						Reduced overload					
				3 kHz	4 kHz	6 kHz	8 kHz	12 kHz	16 kHz	3 kHz	4 kHz	6 kHz	8 kHz	12 kHz	16 kHz
3	3.5TM	3501	40°C	**4.1**				x	x	**5.4**				x	x
			50°C	4.1				x	x	5.4				x	x
	4.5TM	3502	40°C	**5.4**				x	x	**6.1**				x	x
			50°C	5.4				x	x	6.1				x	x
	5.5TM	3503	40°C	**6.1**				x	x	**8.4**				x	x
			50°C	6.1				x	x	8.4				x	x
	8TM	3504	40°C	**9.5**				x	x	**11**				x	x
			50°C	9.5				x	x	11				x	x
	11TM	3505	40°C	**12**				x	x	**16**				x	x
			50°C	12				x	x	16			14.7	x	x
	16TM	3506	40°C	**18**			15.5	x	x	**22**		21.6	18.2	x	x
			50°C	18		16.8	13.9	x	x	22		17.8	14.7	x	x
	22TM	3507	40°C	**22**		18.4	15.5	x	x	**27**	26	21.6	18.1	x	x
			50°C	22	20.4	16.7	13.9	x	x	24.6	22	17.8	14.7	x	x

UNIDRIVE SP			Temp.	Three-phase permanent output current below 575V/690V at a cutout frequency ≥ 3 kHz											
Size	LS	CT		Maximum overload						Reduced overload					
				3 kHz	4 kHz	6 kHz	8 kHz	12 kHz	16 kHz	3 kHz	4 kHz	6 kHz	8 kHz	12 kHz	16 kHz
4	22TH	4601	40°C	**19**				x	x	**22**				x	x
			50°C	19				x	x	22				x	x
	27TH	4602	40°C	**22**				x	x	**27**				x	x
			50°C	22				x	x	27			25	x	x
	33TH	4603	40°C	**27**				x	x	**36**			34	x	x
			50°C	27				x	x	36		31	25	x	x
	40TH	4604	40°C	**36**			34	x	x	**43**		41	34	x	x
			50°C	36		31	25	x	x	43	40	31	25	x	x
	50TH	4605	40°C	**43**		41	34	x	x	**52**		41	34	x	x
			50°C	46	40	31	25	x	x	43	40	31	25	x	x
	60TH	4606	40°C	**52**		45	36	x	x	**62**	61	48	40	x	x
			50°C	52	45	35	28	x	x	52	45	35	28	x	x
5	75TH	5601	40°C	**62**				x	x	**84**				x	x
			50°C					x	x					x	x
	100TH	5602	40°C	**84**				x	x	**99**				x	x
			50°C					x	x					x	x
6	120TH	6601	40°C	**100**			x	x	x	**125**			x	x	x
			50°C				x	x	x				x	x	x
	150TH	6602	40°C	**125**			x	x	x	**144**			x	x	x
			50°C				x	x	x				x	x	x

B4 - Electromagnetic compatibility (CEM)

B4.1 - Compatibility table

CAUTION:
The conformity of the variable speed drive is observed when the mechanical and the electrical installation instructions described in this manual are adhered to:

Immunity

Standard	Description	Application	Conformity
IEC 61000-4-2 EN 61000-4-2	Electrostatic discharge	Product casing	Level 3 (industrial)
IEC 61000-4-3 EN 61000-4-3	Immunity standards for radiated radio-frequency	Product casing	Lavel 3 (industrail)
IEC 61000-4-4 EN 61000-4-4	Fast transient burst	Control lines	Level 4 (industrial harsh)
		Power lines	Level 3 (industrial)
IEC 61000-4-5 EN 61000-4-5	Surges	Mains supply lines: phase to earth	Level 4
		Mains supply lines between phases	Level 3
		Signal ports to earth	Level 2
IEC 61000-4-6 EN 61000-4-6	Generic immunity standards for conduscted radio-frequency	Control and power cables	Level 3 (industrial)
EN 50082-1 IEC 61000-6-1 EN 61000-6-1	Generic immunity standards for residential, commercial ans light industrial environments	-	Conformity
EN 50082-2 IEC 61000-6-2 EN 61000-6-2	Generic immunity standards for the the industrial environment	-	Conformity
EN 61800-3 IEC 61800-3 EN 61000-3	Variable speed drive standards	Conformity with the first and second environment	

Emission

Standard	Description	Field of application	Conformity conditions						
			Length of motor/ drive cables	RFI filter					
				Size 1	Size 2	Size 3	Size 4	Size 5	Size 6
EN 61800-3	Variable speed drive standards	Second environment with unrestricted distribution **(E2U)**	≤ 4 m	int. filter, fd=3 kHz	int. filter andferrite *, fd≤6	int. filter andferrite *, fd=3 kHz			
			≤ 10 m	Int. filter and ferrite*,	int. filter andferrite *, fd=3				
			≤ 100 m	ext. filter	ext. filter	ext. filter			
		Second environment with restricted distribution **(E2R)**	≤ 4 m	int. filter, fd≤16kHz		int. filter, fd≤12kHz			
			≤ 10 m	int. filter andferrite *, fd≤16	int. filter, fd≤16 kHz				
			≤ 100 m						
		First vironment with unrestricted distribution **(R)**	≤ 20 m	ext. filter, fd≤6kHz		ext. filter, fd=3 kHz			
		First environment with restricted distribution **(I)**	≤ 20 m	ext. filter, fd≤16kHz		filtre ext., fd≤12 kHz			
			≤ 75 m	ext. filter, fd≤8kHz		ext. filter, fd≤8 kHz			
			≤ 100 m	ext. filter, fd≤4 kHz	ext. filter, fd=3 kHz				
EN 50081-1 EN61000-6-3	Generic emission standsrds for residual, commercial and light industrial environments	A.C. mains supply (EN50081-1)	≤ 20 m	ext. filter, fd≤6kHz		ext. filter, fd=3 kHz			
EN 50081-2 (I) EN 61000-6-4	Generic emission standards for the industrial environment	A.C. mains supply (EN50081-2)	≤ 100 m	ext. filter, fd≤4 kHz	ext. filter, fd=3 kHz				

* For more information regarding the ferrite, see section L4. For the sizes 2 and 3, the ferrite is delivered in standard version (accessoires). Place the ferrite on the drive output and run the cables U, V, W through the ferrite (without shielding).

UNIDRIVE SP
General characteristics

• The second environment comprises low voltage power supplied industrial network, not supplying with power the dwelling buildings. The operation of a variable speed drive without a RFI filter in such an environment may generate interference on certain electronic apparatuses located near the variable speed drive and, in consequence, the immunity level will not be compatible with the industrial environment. If the filtration of the disturbed element is impossible, add an external filter to the variable speed drive.

B4.2 - Internal RFI filter

This filter is connected, in the standard version, inside the variable speed drive. It reduces the radio-frequency emissions on the mains supply.

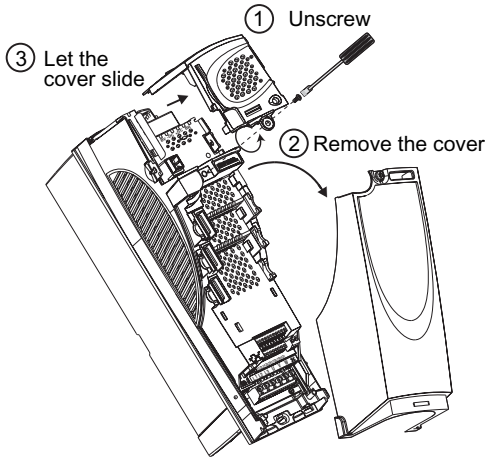
CAUTION:

Dismantle the filter:

- when the leakage current must be lower than 28mA AC at 400V - 50 Hz or 30µA DC (10 MΩ) (without the internal filter, the leakage current of the variable speed drive is lower than 1mA),

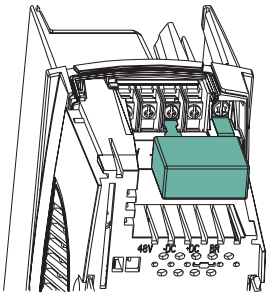
- on a variable speed drive size 3 - 6 connected to a mains supply with IT conditions. If an external RFI filter or an additional motor earth protection is used, it is not necessary to remove the internal RFI filter.

• Access to terminal block

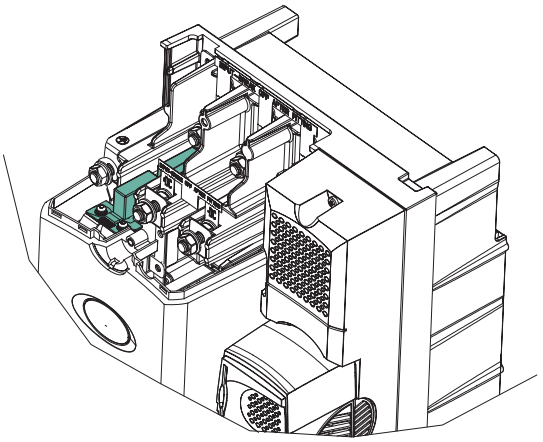


• Location

- If the size is comprised between 1 and 3 :



- If the size is comprised between 4 and 6 :



B5 - UL conformity

• For the UL conformity, the operating temperature must not exceed 50°C.

• Motor overload protection

The variable speed drive has a motor overload protection. The overload level is of 150 % of the drive full load current in open loop ( ), and of 175 % in closed loop ( ) or servo ( ) vector mode.

It is therefore necessary to set the current correctly to parameter **0.46** to ensure that the protection is effective (the level of protection may be set below 150% if necessary).

• Motor thermal protection

The variable speed drive has a built-in motor thermal protection.

• Overspeed protection

The variable speed drive has a built-in overspeed protection. However, this protection may not provide a level equivalent to an independent high integrity overspeed protection circuit.

UNIDRIVE SP
Mechanical installation

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Notes

UNIDRIVE SP
Mechanical installation

C1 - Warning

• It is the responsibility of the owner or of the user to check that the installation, operation and maintenance of the variable speed drive and of its options comply with the legislation relating to the safety of equipment and personnel and with the current regulations of the country of use.

• UNIDRIVE SP must be installed in an environment without conductive dusts, smoke, gas, corrosive fluids and condensation (for instance class 2 according to UL 840 et IEC 664.1). The speed drive must not be installed in hazardous areas unless it is in an appropriate enclosure. In this case, the installation must be approved.

• In an atmosphere subject to condensation, install a heating system that operates when the variable speed drive is not used and switched off when the drive is operating. It is recommended to automatically control the reheating system.

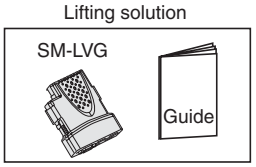
• The UNIDRIVE SP casing is inflammable; if necessary, use a fire protected cabinet.

• To comply with the UL conformity, the variable speed drive must be installed inside a cabinet of minimum type 1, as defined by the UL50 standard.

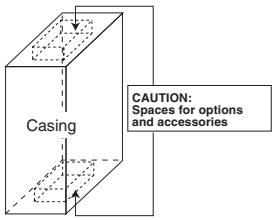
C2 - Checks upon reception

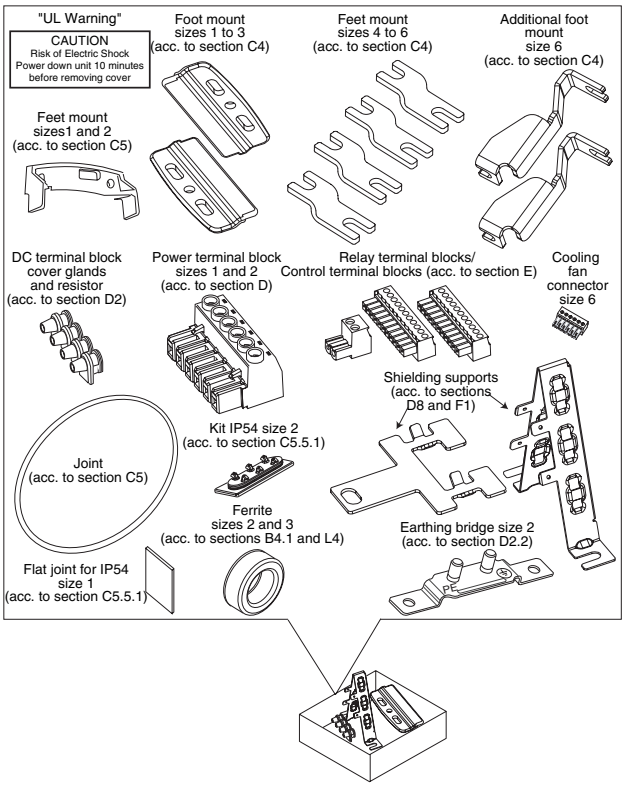
Before proceeding to the installation of the variable speed drive, check that :
- the variable speed drive was not damaged during the transport,
- the accessories, the general manual and the CD Rom are included in the variable speed drive package,
- the nameplate corresponds to the mains supply.











C3 - Mounting types

The variable speed drive may be mounted in 2 ways:

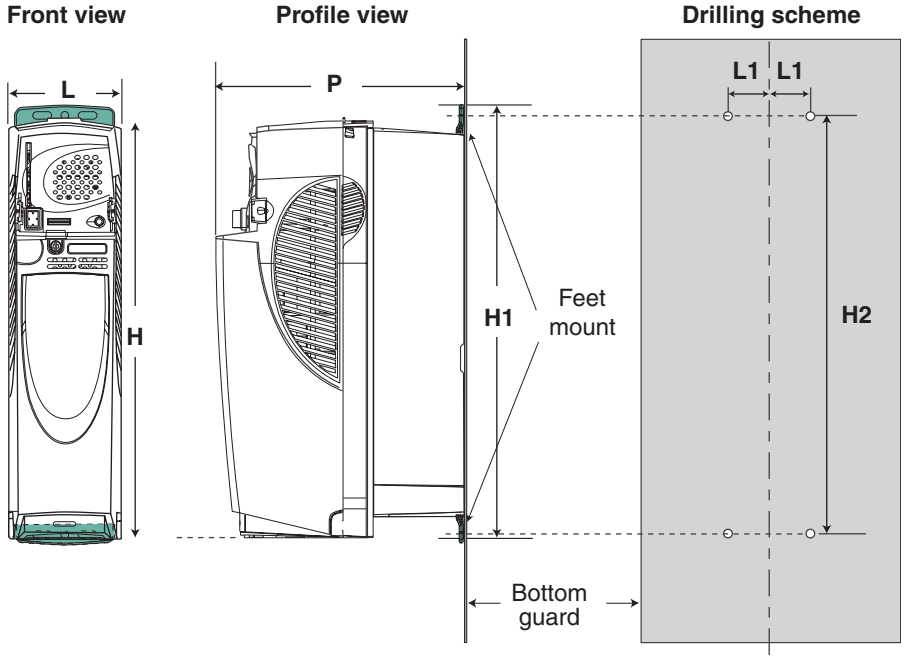
- Heater inside the cabinet:
In this configuration, it is necessary to consider the losses of the variable speed drive for cabinet sizing.

- Heater outside the cabinet:
The mounting of the heater outside the cabinet allows the dissipation of most of the heat losses. In consequence, the sizes of the cabinet may be considerably reduced.
If necessary, the variable speed drive may be modified in order to preserve the IP54 protection of heater outside the cabinet (see section C5.5).

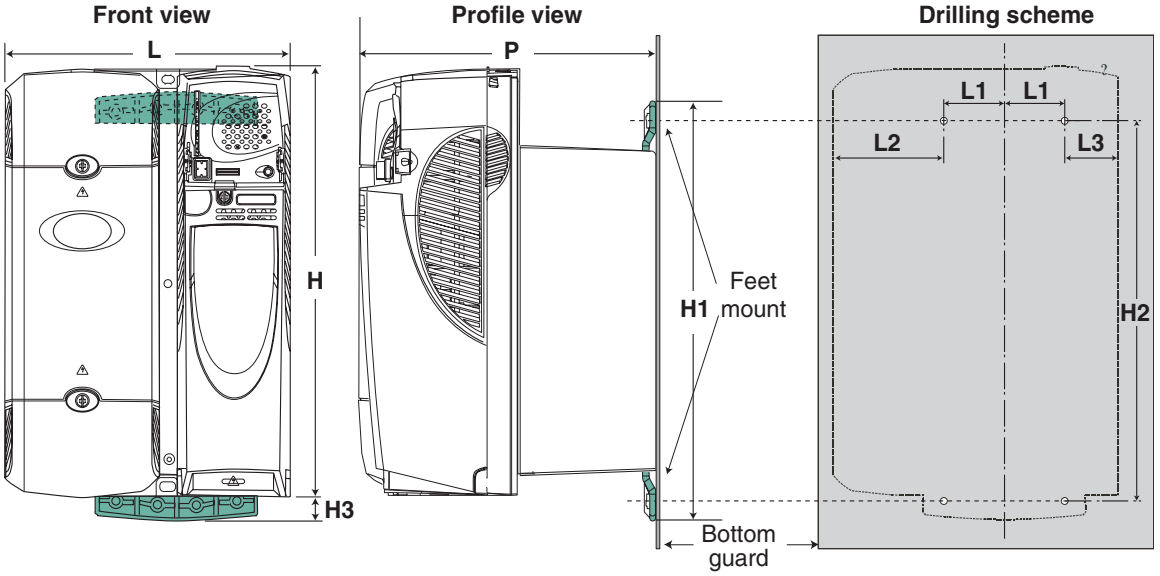
C4 - Mounting of the heater inside the cabinet

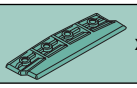
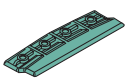
C4.1 - Sizes and weights

• Rating 1.5TL to 3.5TL / 1.5T to 5.5T (Size 1)



• Rating 4.5TL to 16TL / 8T to 33T / 3.5TM to 22TM (Size 2 and 3)

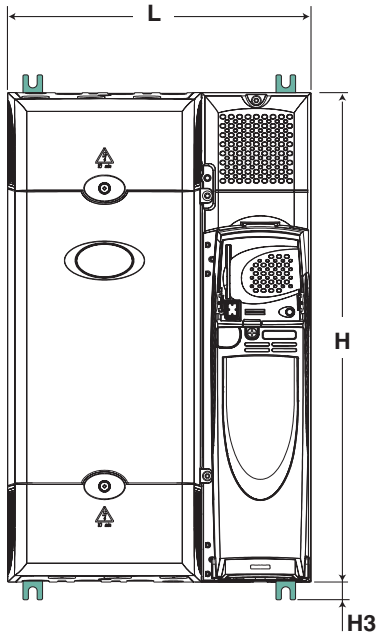


UNIDRIVE SP		Dimensions (mm)									Screw (mm)	Weight (kg)	Mounting
Size	Type	L	L1	L2	L3	H	H1	H2	H3	P			
1	1.5TL to 3.5TL 1.5T to 5.5T	100	20 ± 2.5	-	-	368	386	370 ± 1	-	219	4 x Ø6.5	5 (4.5T & 5.5T : 5.8)	 x 2
2	4.5TL to 8TL 8T to 16T	155	53 ± 0.5	24.5	24.5	368	371.6	337.5 ± 1	21	219	4 x Ø6.5	7	 x 2
3	11TL and 16TL 22T to 33T 3.5TM to 22TM	250	53 ± 0.5	97	47	368	361	327 ± 1	21	260	4 x Ø6.5	15	 x 2

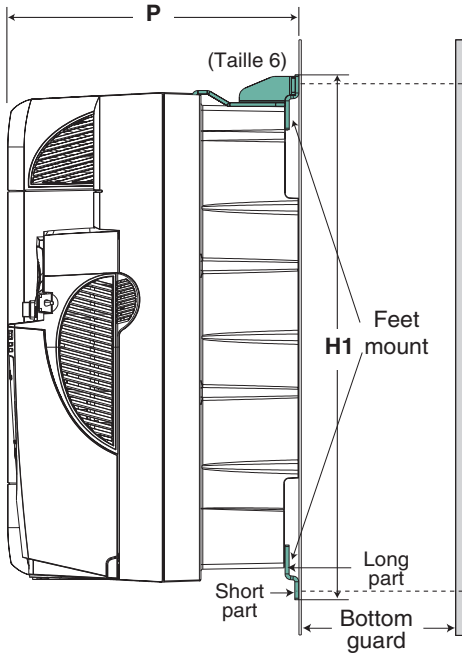
UNIDRIVE SP
Mechanical installation

• **Rating 22TL to 33TL / 40T to 150T / 22TH to 150TH (Sizes 4 to 6)**

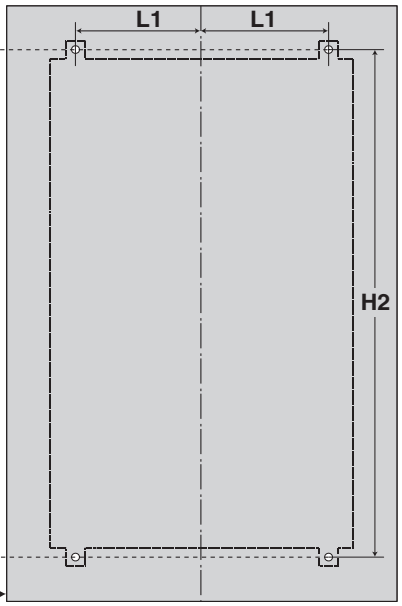
Front view

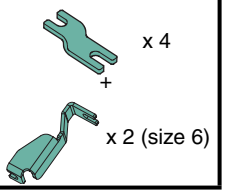


Profile view



Drilling scheme



UNIDRIVE SP		Dimensions (mm)							Screw (mm)	Weight (kg)	Mounting
Size	Type	L	L1	H	H1	H2	H3	P			
4	22TL to 33TL 40T to 60T 22TH to 60TH	310	129.3 ± 0.25	510	546.8	528.8 ± 0.5	18.4	298	4 x ØM8	30	
5	75T and 100T 75TH and100TH	310	129.3 ± 0.25	820	857.3	839.3 ± 0.5	18.4	298	4 x ØM8	55	
6	120T and 150T 120TH and 150TH	310	129.3 ± 0.25	1131	1168.8	1150.8 ± 0.5	18.9	298	4 x ØM8	75	

C4.2 - Losses inside the cabinet

The table below indicates the maximum value of the variable speed drive losses at the rated current, depending on the carrier frequency. The values correspond to a normal operation for ambient temperatures of 40°C and 50°C.

UNIDRIVE SP		Temp.	Losses (W)											
			Maximum overload						Reduced overload					
Size	Type		3 kHz	4 kHz	6 kHz	8 kHz	12 kHz	16 kHz	3 kHz	4 kHz	6 kHz	8 kHz	12 kHz	16 kHz
1	1.5TL	40°C	**27**	29	32	35	41	47	**33**	35	38	42	49	56
		50°C	27	29	32	35	41	47	33	35	38	42	49	56
	2TL	40°C	**38**	40	43	47	55	62	**45**	47	51	56	64	73
		50°C	38	40	43	47	55	62	45	47	51	56	64	73
	2.5TL	40°C	**51**	53	58	62	71	81	**67**	70	76	81	92	104
		50°C	51	53	58	62	71	81	67	70	76	81	92	97
	3.5TL	40°C	**75**	78	86	94	109	124	**78**	82	89	97	113	129
		50°C	75	78	86	94	97		78	82	89	97		
2	4.5TL	40°C	**133**	139	150	160	182	203	**155**	161	173	186	210	235
		50°C	133	139	150	160	182	190	155	161	173	186	190	
	5.5TL	40°C	**170**	176	190	203	229	256	**210**	218	234	250	282	314
		50°C	170	176	190				190					
	8TL	40°C	**245**	254	263	261	259	258	**272**	282	302	320		315
		50°C	190						190					
3	11TL	40°C	**260**	272	297	321	370	x	**331**	347	380	412	477	x
		50°C	260	272	297	289	273	x	331	347	380	412	436	x
	16TL	40°C	**349**	365	398	430	486	x	**431**	451	492	532	551	x
		50°C	306	315	300	289	273	x	431	451	480	463	439	x
4	22TL	40°C	**428**	448	488	528	x	x	**517**	541	589	637	x	x
		50°C	428	448	488	528	x	x	517	541	589	637	x	x
	27TL	40°C	**517**	541	589	637	x	x	**611**	639	694	750	x	x
		50°C	517	541	589	637	x	x	611	639	694	750	x	x
	33TL	40°C	**611**	639	694	750	x	x	**810**	845	916	987	x	x
		50°C	611	639	694	750	x	x	671	701	761	821	x	x

UNIDRIVE SP
Mechanical installation

UNIDRIVE SP		Temp.	Losses (W)											
			Maximum overload						Reduced overload					
Size	Type		3 kHz	4 kHz	6 kHz	8 kHz	12 kHz	16 kHz	3 kHz	4 kHz	6 kHz	8 kHz	12 kHz	16 kHz
1	1.5T	40°C	**20**	24	30	37	51	64	**26**	29	37	45	61	76
		50°C	20	24	30	37	51	64	26	29	37	45	61	76
	2T	40°C	**27**	31	39	48	64	80	**34**	38	48	57	76	95
		50°C	27	31	39	48	64	80	34	38	48	57	76	95
	2.5T	40°C	**37**	42	52	62	82	102	**44**	50	61	72	95	117
		50°C	37	42	52	62	82	95	44	50	61	72	95	97
	3.5T	40°C	**52**	58	70	83	101	104	**62**	69	83	97	126	134
		50°C	52	58	70	83	92		62	69	83		97	
	4.5T	40°C	**72**	82	101	121	123	125	**83**	94	117	139	156	157
		50°C	72	82	97				83	94	97			
	5.5T	40°C	**91**	103	123			125	**106**	120	147	158	156	157
		50°C	91	97					97					
2	8T	40°C	**164**	178	206	229		231	**186**	202	234	266	283	282
		50°C	164	178	190				186	190				
	11T	40°C	**201**	218	230	229		231	**248**	269	291	286	283	281
		50°C	190						190					
	16T	40°C	**272**	282	279	278	279	282	**313**	320			315	316
		50°C	190						190					x
3	22T	40°C	**337**	363	415	424	408	401	**364**	392	449	499	477	465
		50°C	337	363	399	387	373	364	364	392	430	417	399	389
	27T	40°C	**411**	443	485	469	452	444	**437**	471	540	538	514	501
		50°C	411	443	435	417	396	388	437	455	435	418	399	388
	33T	40°C	**474**	509	485	469	452	x	**567**	580	552	533	510	x
		50°C	474	459	429	415	397	x	474	459	429	415	397	x
4	40T	40°C	**629**	689	704	674	x	x	**714**	781	914	956	x	x
		50°C	629	689	638	617	x	x	714	781	898	852	x	x
	50T	40°C	**780**	745	690	663	x	x	**882**	961	995	941	x	x
		50°C	716	673	629	607	x	x	882	944	894	814	x	x
	60T	40°C	**976**	920	854	821	x	x	**1070**	1158	1217	1144	x	x
		50°C	876	820	775	750	x	x	877	949	912	875	x	x
5	75T	40°C	**1311**	1236	1150	1112	x	x	**1471**	1618	1640	1560	x	x
		50°C	1186	1118	1047	1009	x	x	1471	1616	1462	1411	x	x
	100T	40°C	**1681**	1600	1508	1464	x	x	**1830**	1881	1781	1717	x	x
		50°C	1500	1434	1366	1333	x	x	1500	1644	1543	1480	x	x
6	120T	40°C	**1817**	1935	1772	x	x	x	**2058**	2259	2153	x	x	x
		50°C	1817	1747	1610	x	x	x	1942	2118	1939	x	x	x
	150T	40°C	**2192**	2042	1888	x	x	x	**2477**	2455	2255	x	x	x
		50°C	1979	1851	1715	x	x	x	2068	2108	1997	x	x	x

UNIDRIVE SP		Temp.	Losses (W)											
			Maximum overload						Reduced overload					
Size	Type		3 kHz	4 kHz	6 kHz	8 kHz	12 kHz	16 kHz	3 kHz	4 kHz	6 kHz	8 kHz	12 kHz	16 kHz
3	3.5TM	40°C	**112**	124	148	172	x	x	**127**	141	168	196	x	x
		50°C	112	124	148	172	x	x	127	141	168	196	x	x
	4.5TM	40°C	**127**	141	168	196	x	x	**135**	150	180	209	x	x
		50°C	127	141	168	196	x	x	135	150	180	209	x	x
	5.5TM	40°C	**135**	150	180	209	x	x	**163**	181	218	254	x	x
		50°C	135	150	180	209	x	x	163	181	218	254	x	x
	8TM	40°C	**178**	198	237	276	x	x	**197**	219	263	306	x	x
		50°C	178	198	237	242	x	x	197	219	263	306	x	x
	11TM	40°C	**212**	235	281	328	x	x	**267**	296	354	412	x	x
		50°C	212	235	246	242	x	x	267	296	354	383	x	x
	16TM	40°C	**300**	332	396	405	x	x	**362**	399	475	471	x	x
		50°C	257	253	246	242	x	x	362	399	390	384	x	x
	22TM	40°C	**365**	403	406	405	x	x	**448**	486	477	471	x	x
		50°C	257	253	246	242	x	x	405	399	390	384	x	x

UNIDRIVE SP		Temp.	Losses (W)											
			Maximum overload						Reduced overload					
Size	Type		3 kHz	4 kHz	6 kHz	8 kHz	12 kHz	16 kHz	3 kHz	4 kHz	6 kHz	8 kHz	12 kHz	16 kHz
4	22TH	40°C	360	413	519	625	x	x	**409**	470	590	711	x	x
		50°C	360	413	619	625	x	x	409	470	590	711	x	x
	27TH	40°C	**409**	470	590	711	x	x	**496**	568	712	857	x	x
		50°C	409	470	590	711	x	x	496	568	712	789	x	x
	33TH	40°C	**496**	568	712	857	x	x	**660**	754	941	1063	x	x
		50°C	496	568	712	789	x	x	660	754	805	789	x	x
	40TH	40°C	**660**	754	941	1063	x	x	**798**	908	1083	1058	x	x
		50°C	660	754	805	789	x	x	798	831	805	789	x	x
	50TH	40°C	**798**	908	1083	1058	x	x	**985**	1115	1080	1058	x	x
		50°C	798	831	805	789	x	x	850	831	805	789	x	x
	60TH	40°C	**873**	987	1042	1023	x	x	**1060**	1179	1130	1105	x	x
		50°C	871	848	816	797	x	x	871	848	816	797	x	x
5	75TH	40°C					x	x					x	x
		50°C					x	x					x	x
	100TH	40°C					x	x					x	x
		50°C					x	x					x	x
6	120TH	40°C				x	x	x				x	x	x
		50°C				x	x	x				x	x	x
	150TH	40°C				x	x	x				x	x	x
		50°C				x	x	x				x	x	x

C4.3 - Ventilation

• The variable speed drive is ventilated by an internally mounted two-speed forced ventilation (low speed/high speed).
UNIDRIVE SP controls the passage from one speed to another.

• High speed air flow:

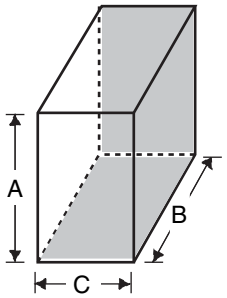
UNIDRIVE SP	Flow (m^3/h)
Size 1	75
Size 2	85
Size 3	200
Size 4	200
Size 5	Consult LEROY-SOMER
Size 6	

• Sound levels:

UNIDRIVE SP	High speed (DBA)	Low speed (DBA)
Size 1	48	28
Size 2	54	35
Size 3	56	43
Size 4	Consult LEROY-SOMER	
Size 5		
Size 6		

C4.4 - Calculation of the cabinet volume

The installation of a variable speed drive inside the cabinet demandsspecific calculation of the volume. Check that the thermal dissipation is sufficient.
By taking the most constraining example:
cabinet IP54 (without forced ventilation). The bottom and the side below the bottom in contact with other surfaces.



The minimum surface of heating exchange required is :

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

where :
Pi = loss of all the elements producing heat (ex. : 400 W).
Tj = maximum operating internal ambient temperature: (ex : 40°C).
Tamb = Maximum external ambient temperature (ex : 25°C).
k = coefficient of thermal transmission (ex : 5.5).
S = 4.85 m^2.
The exchange surfaces are as follows : 2(AB) + AC + BC = S.
Taking the following values for A and B:
A = 2.2 m (height),
B = 0.6 m (depth).
==> C = 0.8 m.

In case of a ventilated cabinet, the volume may be diminished.
Taking the same example, the flow of V.F. is calculated according to the following formula :

$$V = \frac{3kp}{Tj - Tamb} = 83\ m^3/h$$

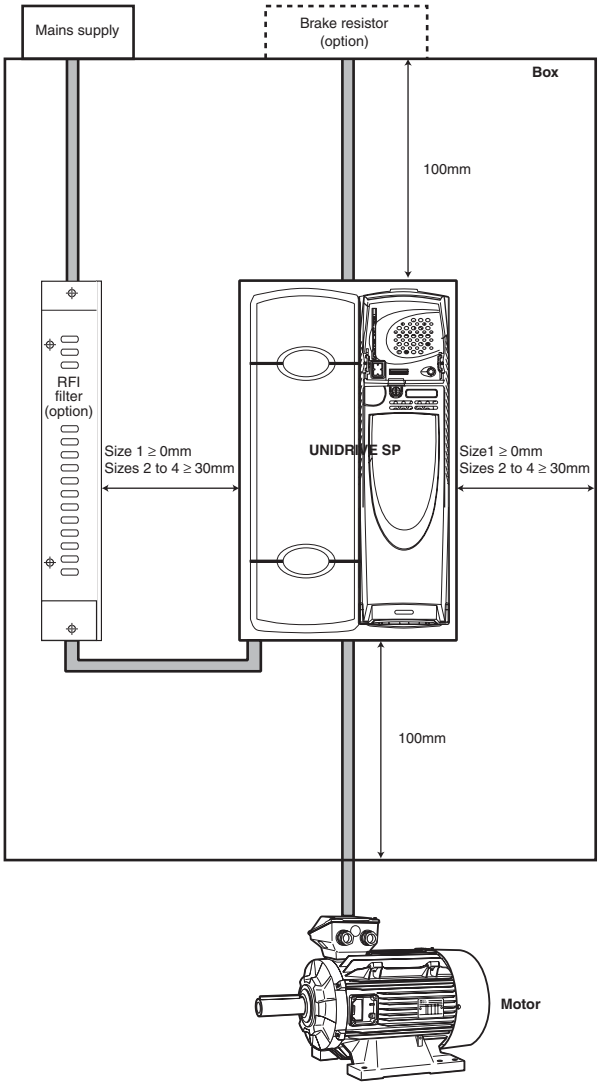
with :
kp : $\frac{P_0}{P_1}$

P_0 : Atmospheric pressure at sea level.
P_1 : Atmospheric pressure of the installation.

(Generally, $\frac{P_0}{P_1}$ corresponds to a coefficient from 1.2 to 1.3).

C4.5 - Advice on installation inside a cabinet

Mount the variable speed drive vertically providing the spacing necessary between the variable speed drive and the other options or equipment described below.



• Check that the air flow necessary to the variable speed drive and to the external optional RFI filter circulates normally.
• The external optional RFI filter must be placed as close as possible to the variable speed drive, in compliance with the minimum spacing required (on the variable speed drive side or under the variable speed drive).
• The external optional brake resistor must be placed outside, as close as possible or on the cabinet.
• Do not place on a heat source or on another variable speed drive.
• Do not obstruct the variable speed drive ventilation outlets.

UNIDRIVE SP
Mechanical installation

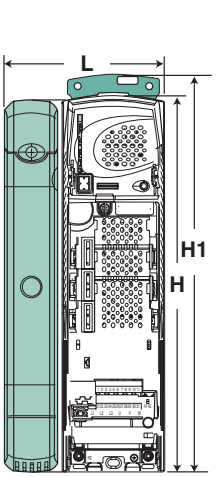
C5 - Mounting of the heater outside the cabinet

C

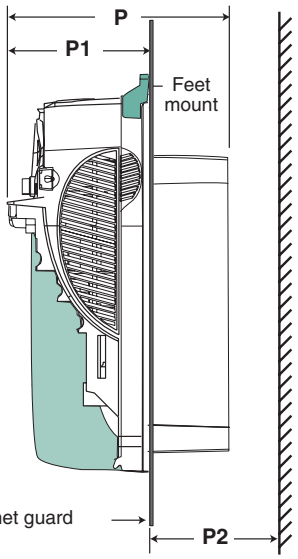
C5.1 - Sizes and weights

• Rating 1.5TL to 8TL / 1.5T to 16T (Sizes 1 and 2)

Front view

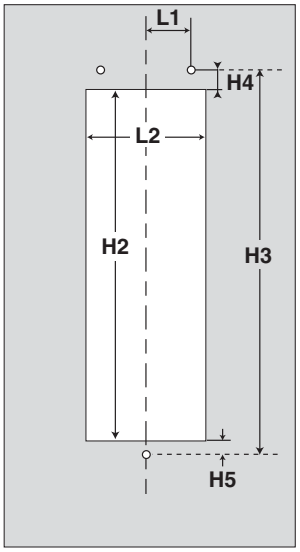


Profile view

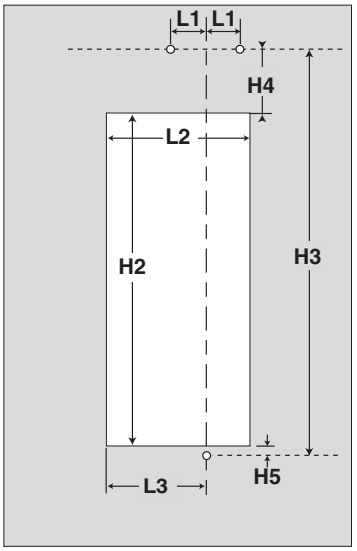


Drilling schemes

Size 1

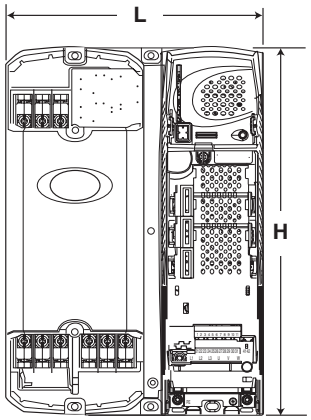


Size 2

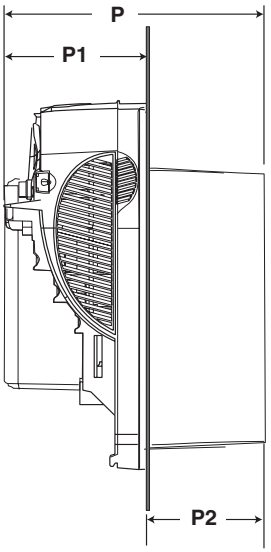


• Rating 11TL and 16TL / 22T to 33T / 3.5TM to 22TM (Size 3)

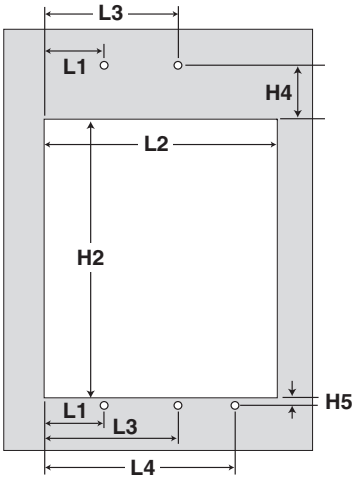
Front view



Profile view



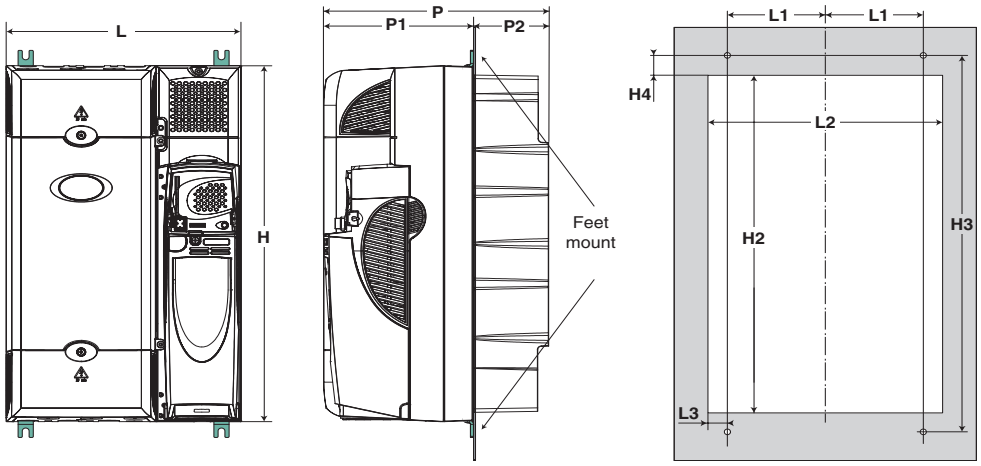
Drilling scheme



UNIDRIVE SP		Dimensions (mm)														Screw	Weight	Mounting
Size	Type	L	L1	L2	L3	L4	H	H1	H2	H3	H4	H5	P	P1	P2	(mm)	(kg)	
1	1.5TL to 3.5TL 1.5T to 5.5T	100	35 ±0.15	93 ±0.5	-	-	368	391	343 ±0.5	368 ±1	15.6 ±0.5	9.4 ±0.75	219	139	80	3 x Ø6.5	5 (4.5T & 5.5T : 5.8)	x 1
2	4.5TL to 8TL 8T to 16T	155	35 ±0.15	148 ±0.5	101.5 ±0.5	-	368	391	294 ±0.5	368 ±1	64.6 ±0.5	9.3 ±0.5	219	139	80	3 x Ø6.5	7	x 1
3	11TLand16TL 22T to 33T 3.5 TM to 22TM	250	60.5 ±0.5	236 ±0.5	135.5 ±0.5	193 ±0.5	368	-	287 ±0.5	-	56 ±0.5	8 ±0.3	260	140	120	5 x Ø6.5	15	internal

UNIDRIVE SP
Mechanical installation

• Rating 22TL to 33TL / 40T to 150T / 22TH to 150TH (Sizes 4 to 6)



UNIDRIVE SP		Dimensions (mm)												Screw (mm)	Weight (kg)	Mounting
Size	Type	L	L1	L2	L3	H	H1	H2	H3	H4	P	P1	P2			
4	22TL to 33TL 40T to 60T 22TH to 60TH	310	129.3 ±0.25	286 ±0.5	14.2 ±0.5	510	-	487 ±0.5	540.3 ±0.5	26.65 ±0.5	298	200	98	4 x ØM8	30	x 4
5	75T and 100T 75TH and 100TH	310	129.3 ±0.25	286 ±0.5	14.2 ±0.5	820	-	797.5 ±0.5	852.6 ±0.5	26.7 ±0.5	298	200	98	4 x ØM8	55	
6	120T and 150T 120TH and 150TH	310	129.3 ±0.25	286 ±0.5	13.7 ±0.5	1131	-	1107 ±0.5	1161.2 ±0.5	27.1 ±0.5	298	200	98	4 x ØM8	75	

C5.2 - Mounting instructions

- Make a cutout and a drilling in the rear panel of the cabinet. If an optional resistor is integrated into the variable speed drive (see section L8), take into account the cutouts represented in the previous section C5.4, necessary for the cable run.
- Unscrew the front screws of the variable speed drive to remove the cover of the control terminal block. For the variable speed drives size 3, unscrew also the upper and the lower covers of the powered up side (if necessary, see section D2.3) in order to reach the mounting holes.
- Place on the flange the sealing joint delivered together with the variable speed drive.

Note : For the sizes 4-6, assemble the foot mount as follows :
- Insert the long part of the left upper and lower feet, then belt together,
- Insert the long part of the right higher and lower feet. Do not screw, the feet remain held by compression (internal to the variable speed drive).

- Introduce the variable speed drive into the cutout of the rear panel and fix it by upper and lower holding elements.
- Put back the cover(s) of the variable speed drive.

CAUTION
Make sure there is sufficient air flow at the rear of the cabinet.

C5.3 - Losses inside the cabinet

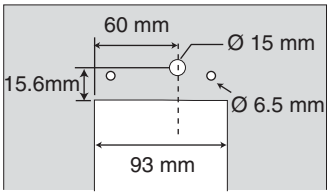
The main power-related losses being dissipated outside the cabinet, only the losses from the control card or from the integral option modules must be considered.

UNIDRIVE SP	Losses (without heater losses)
SIze 1	≤ 50 W
SIze 2	≤ 75 W
SIze 3	≤ 100 W
SIze 4	≤ 204 W
SIze 5	≤ 347 W
SIze 6	

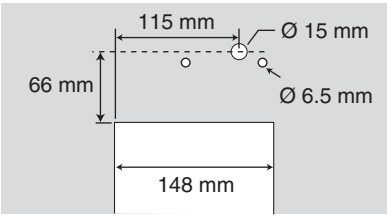
C5.4 - Cutout for integral resistors

For the ratings sizes 1 and 2, optional brake resistors may be integrated directly into the heater of the variable speed drive.
For an assembling with the heater outside the cabinet, an additional cutout for the resistor cable running must be done. (For more details on this type of resistor, see section L8).

Size 1



Size 2



C

C5.5 - IP54 protection of the heater

When the variable speed drive is mounted inside the IP54 cabinet with the heater mounted outside, the heater has a IP20 protection. For the variable speed drives sizes 1 and 2, the heater protection index may reach IP54.

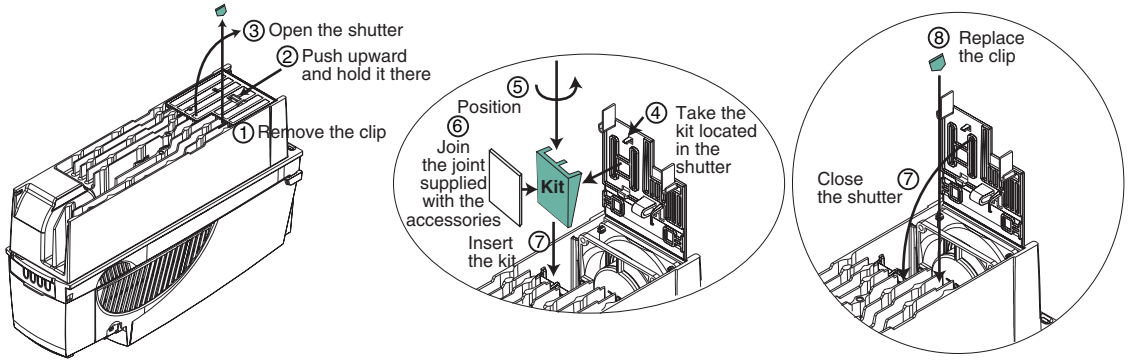
CAUTION :

• A regular cleaning of the heater and of the ventilation is necessary in this case.

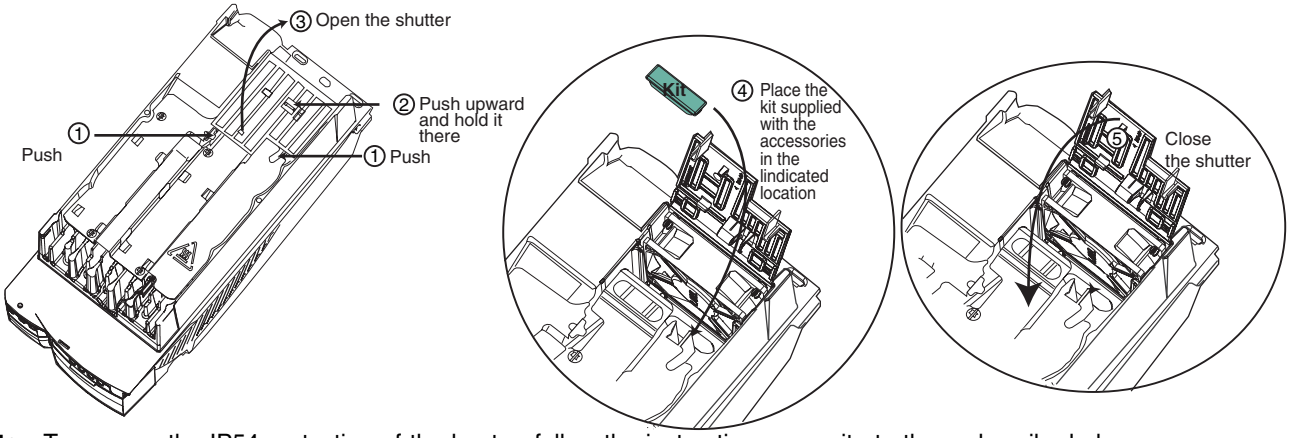
• In an environment needing an IP54 protection, the standard ventilation may be preserved, but its length of life will be reduced in relation to a standard use. In order to increase the ventilation reliability, replace it by an equivalent but IP54 protection (for the mounting references and instructions, contact your usual LEROY-SOMER representative).

Mounting instructions

• Size 1



• Size 2



Note : To remove the IP54 protection of the heater, follow the instructions opposite to those described above.

C5.5.1 - Derating of the continuous output current

• The installation of the IP54 kit requires a derating of the current capacity.

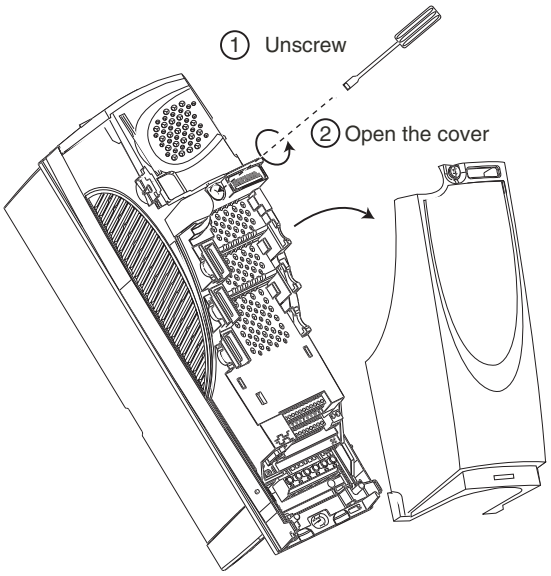
UNIDRIVE SP	Continuous output current with IP54 kit (standard ventilation) at 40 °C											
	Maximum overload						Reduced overload					
	3 kHz	4 kHz	6 kHz	8 kHz	12 kHz	16 kHz	3 kHz	4 kHz	6 kHz	8 kHz	12 kHz	16 kHz
1.5TL	4.3						5.2					
2TL	5.8						6.8					
2.5TL	7.5					7.3	9.6			9.3	8.2	7.3
3.5TL	10.6	10.5	9.7	9	7.7	6.6	11	10.6	9.7	9	7.7	6.6
4.5TL	12.6						15.5					
5.5TL	17					15.5	22			20.7	18	15.7
8TL	24.2	23.4	21.8	20.3	17.7	15.5	24.5	23.7	22	20.5	17.9	15.6
1.5T	2.1						2.8					
2T	3					2.9	3.8					2.9
2.5T	4.2				3.9	2.9	5				3.9	2.9
3.5T	5.8			5.4	3.9	2.9	6.9		6.5	5.4	3.9	2.9
4.5T	7.6	7.3	5.8	4.7	3.2	2.3	8.3	7.3	5.8	4.7	3.2	2.3
5.5T	8.2	7.3	5.8	4.7	3.2	2.3	8.3	7.3	5.8	4.7	3.2	2.3
8T	13			12.6	9.4	7.3	15.3			13.3	10.1	7.9
11T	16.5		14.9	12.3	9.3	7.2	20.1	18.4	15.6	13.4	10.1	7.9
16T	21.6	19.6	16.4	13.8	10.2	7.7	21.7	19.7	16.4	13.9	10.2	7.7

C6 - Installation of SM modules

C6.1 - Access to locations

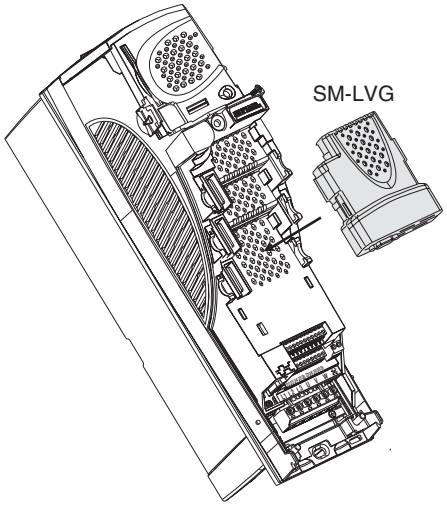
• To insert a module, power down the variable speed drive (including the power supply of +24V and +48V), and wait for 10 min. Otherwise, the module can be damaged.

• Check the condition of the option: a damaged module must not be inserted into the variable speed drive.



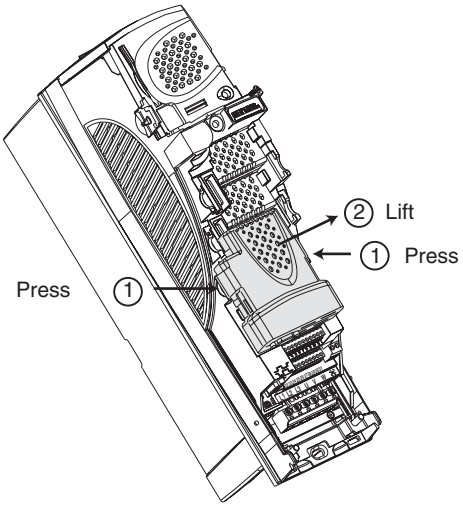
C6.2 - Installation of modules in the drive

First of all, install the SM-LVG module in the lowest location and press gently on the module, until hearing a click.



Note : If the application needs an additional module (e.g.: SM-Universal Encoder Plus or SM-I/O Plus module), install it in the available higher location.

If it is necessary to dismantle a module, follow the instructions below.



Notes

UNIDRIVE SP
Power connection

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Notes

UNIDRIVE SP
Power connection

D1 - Warning

• All power connections must be performed in accordance with the laws in force in the country where the variable speed drive is installed. This includes the earthing or the grounding to ensure that no component can be at the mains voltage or at any other voltage which may be dangerous.

• The voltages existing on the cables or on the connections of the mains supply, of the motor, of the braking resistor or of the filter may cause fatal electric shocks. Contact must be avoided in all circumstances.

• The variable speed drive must be supplied via a circuit-breaking device so that it can be powered down safely.

• The variable speed drive power supply must be protected against the overvoltage and the short-circuits

• The drive stop function does not protect against the high voltages existing on terminals.

• The drive contains capacitors with high voltage charge even after power is disconnected.

• After powering down the variable speed drive, wait for 10min before removing the protection cover protection. For the UL conformity, place the label "Risk of electric shock power down unit 10 minutes before removing cover" (delivered with the relates accessories), so that it may be seen by the maintenance personnel.

• Check that the DC bus voltage is below 40V before carrying out any work.

• Check up the variable speed drive, the motor and the mains supply compatibility as regards the voltage and the current.

• After the variable speed drive operation, the heater may be very hot; therefore avoid touching it;

• Pay a special attention to a variable speed drive installed in an equipment connected to the mains supply by quick release connectors. The variable speed drive mains supply terminals are connected to the internal capacitors by a diode bridge, this not providing in this case a sufficient insulation. It is thus necessary to add an automatic insulation system of the fast-on connectors when they are not connected to each other.

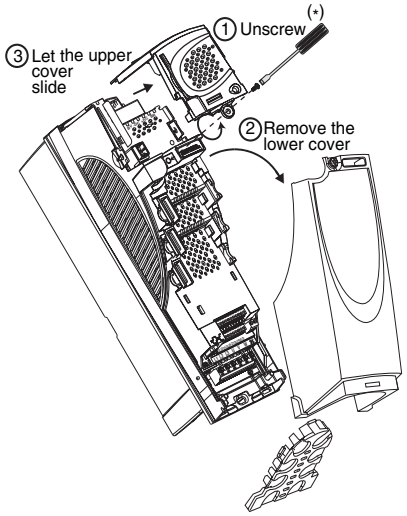
• For the UL conformity and for avoiding the fire risk, the terminal torques indicated in this section must be observed.

For the option connection, refer to section L.

D2 - Terminal block location

D2.1 - Variable speed drives size 1

• Access to terminal blocks



(*) For tighten, observe the 1 N.m terminal torque.

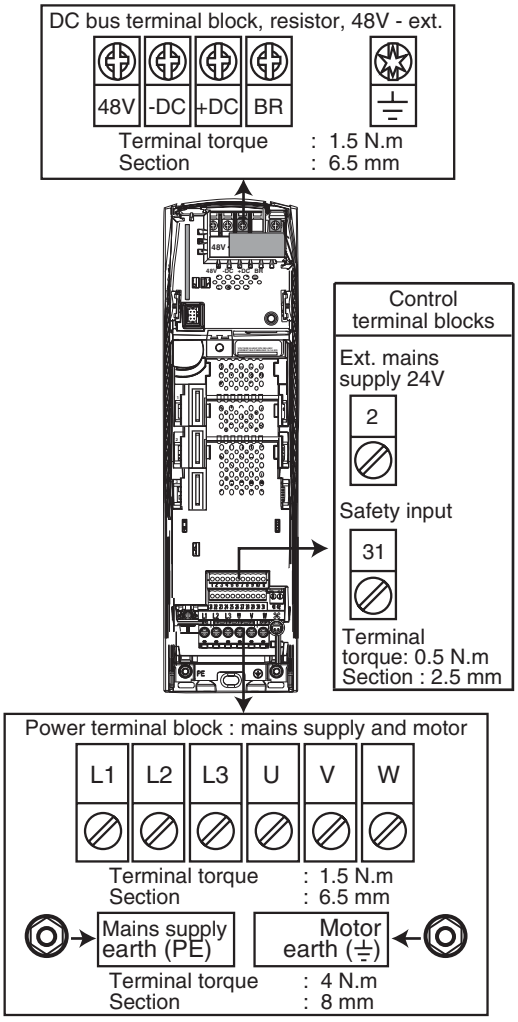
• Installation of terminal blocks

Insert the quick release terminal blocks supplied together with the variable speed drive :
- 1 power terminal block (L1, L2, L3, U, V, W),
- 1 control terminal block (1 to11 terminals),
- 1 control terminal block (21 to 31 terminals),
- 1 relay terminal block (41 and 42 terminals).

Installation of run cables and glands

- Remove the washers of the cable run plate for running the power and control cables (lower terminal blocks).
- If necessary, install the gland for the cable run of the brake resistor or of the mains supply of 48V.

• Location

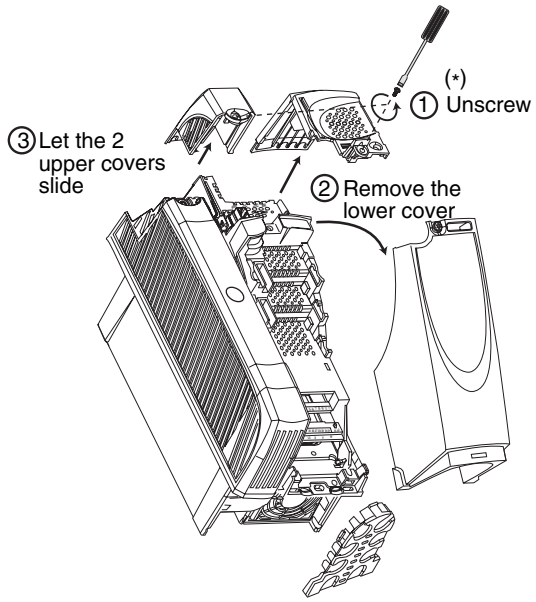


UNIDRIVE SP
Power connection

D

D2.2 - Variable speed drives size 2

• Access to terminal blocks



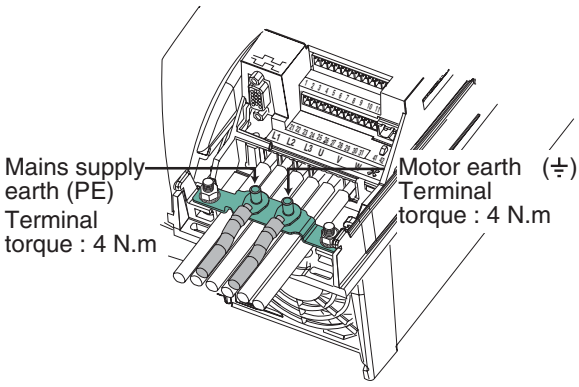
(*) To tighten, observe the 1 N.m terminal torque.

• Installation of the terminal blocks

Insert the quick release terminal blocks supplied together with the variable speed drive :
- 1 power terminal block (L1, L2, L3, U, V, W),
- 1 control terminal block (1 to11 terminals),
- 1 control terminal block (21 to 31 terminals),
- 1 relay terminal block (41 and 42 terminals).

• Earth connection

An earting bridge is supplied together with the variable speed drive. It allows the run of the earth cables through the openings of the cable run plate.
Screw the earth bridge supplied together with the variable speed drive.



Note :

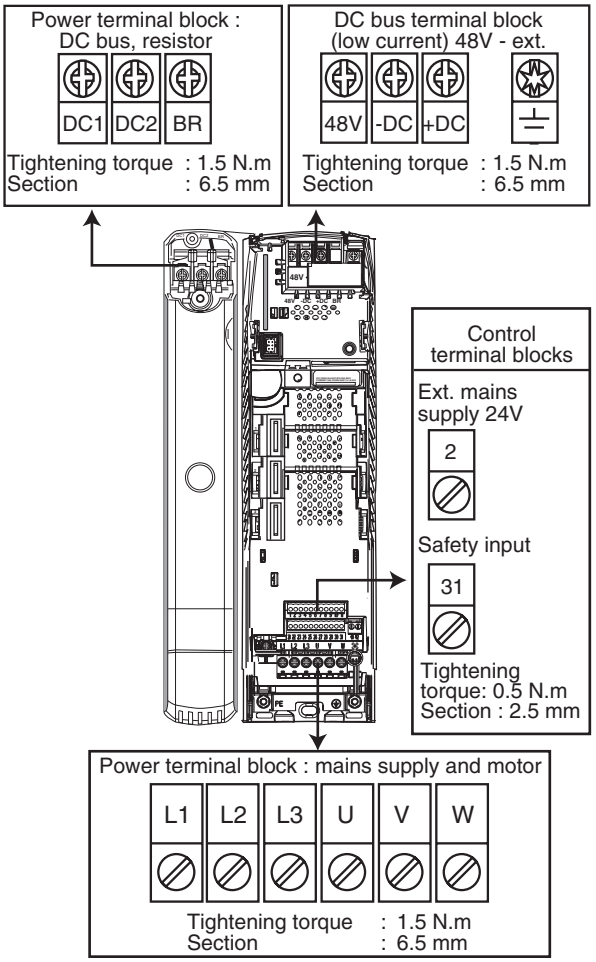
• In order to avoid the additional handling, place the shielding support (described in sections E3 and F), then the bridge , on the two earth terminals of the variable speed drive.

• Depending on the size and numebr of the earth cables used, the bridge may not be necessary and the connection may be made directly of the terminals of the variable speed drive.

• Installation of cable runs and glands

- Remove the washers of the cable run plate for running the power and control cables (lower terminal blocks).
- If necessary, install the gland for the cable run of the brake resistor or of the mains supply of 48V.

• Location of terminal blocks



CAUTION :

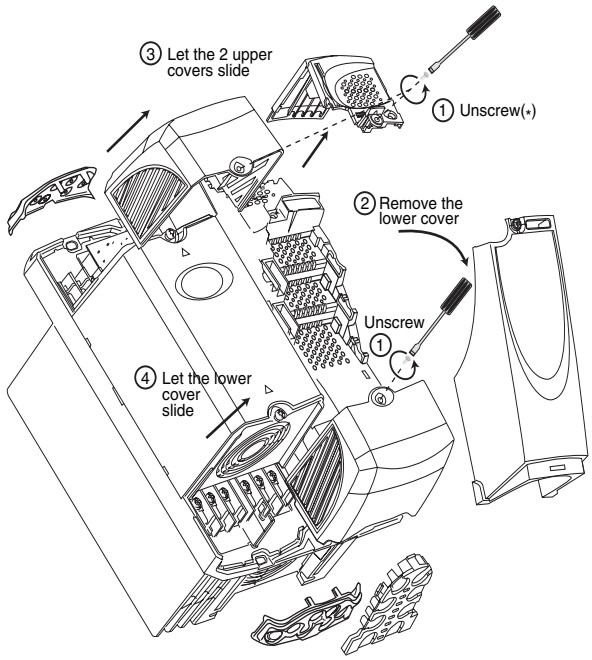
Use the CC bus power terminal block for the connection of a brake resistor (DC2 and BR), the variable speed drive mains supply with continuous current, or for the connection in parallel of the CC bus of many variable speed drives (DC1, DC2).

Do not use the low current CC bus terminal block (terminal blocks of 48V, -DC, +DC) otherwise than for the connection of the integral RFI filter (supplied together with the variable speed drive) or for the safety mains supply at 48V.

UNIDRIVE SP
Power connection

D2.3 - Variable speed drive size 3

• Access to terminal blocks



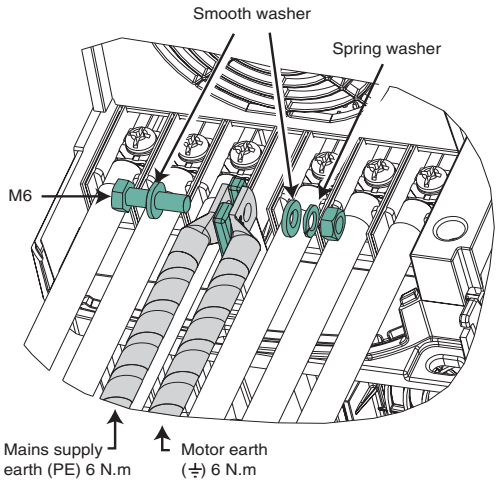
(*) Eo tighten, observe the 1 N.m terminal torque.

• Installation of the terminal blocks

Insert the quick release terminal blocks supplied together with the variable speed drive :
- 1 control terminal block (1 to11 terminals),
- 1 control terminal block (21 to 31 terminals),
- 1 relay terminal block (41 and 42 terminals).

• Earth connection

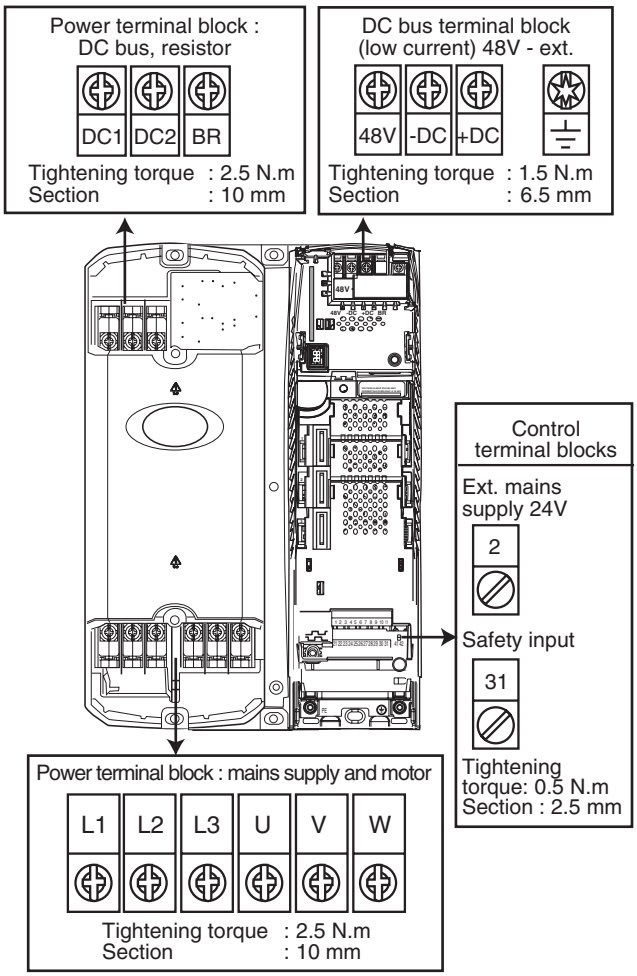
Connect the the mains supply earth cables (PE) and motor earth cables (⏚) on the heater, as indicated.



• Installation of cable runs and glands

- Remove the washers of the cable run plate for running the brake, power and control resistor cables (lower and upper left terminal blocks).
- If necessary, install the gland for the cable run of the brake resistor or of the mains supply of 48V.

• Location



CAUTION :

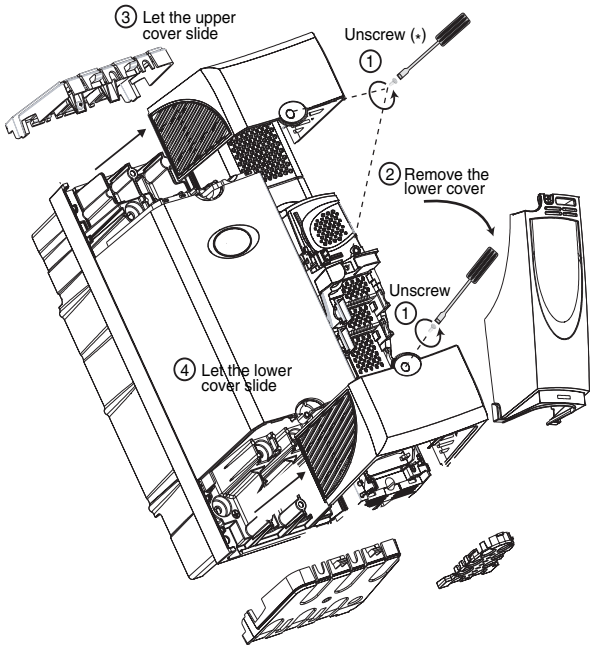
Use the CC bus power terminal block for the connection of a brake resistor (DC2 and BR), the variable speed drive mains supply with continuous current, or for the connection in parallel of the CC bus of many variable speed drives (DC1, DC2).

Do not use the low current CC bus terminal block (terminal blocks of 48V, -DC, +DC) otherwise than for the connection of the integrable RFI filter (supplied together with the variable speed drive) or for the safety mains supply at 48V.

UNIDRIVE SP
Power connection

D2.4 - Variable speed drives sizes 4 to 6

• Access to terminal blocks



(*) To tighten, observe the 1 N.m terminal torque.

• Installation of the terminal blocks

Insert the quick release terminal blocks supplied together with the variable speed drive :
- 1 control terminal block (1 to11 terminals),
- 1 control terminal block (21 to 31 terminals),
- 1 relay terminal block (41 and 42 terminals).

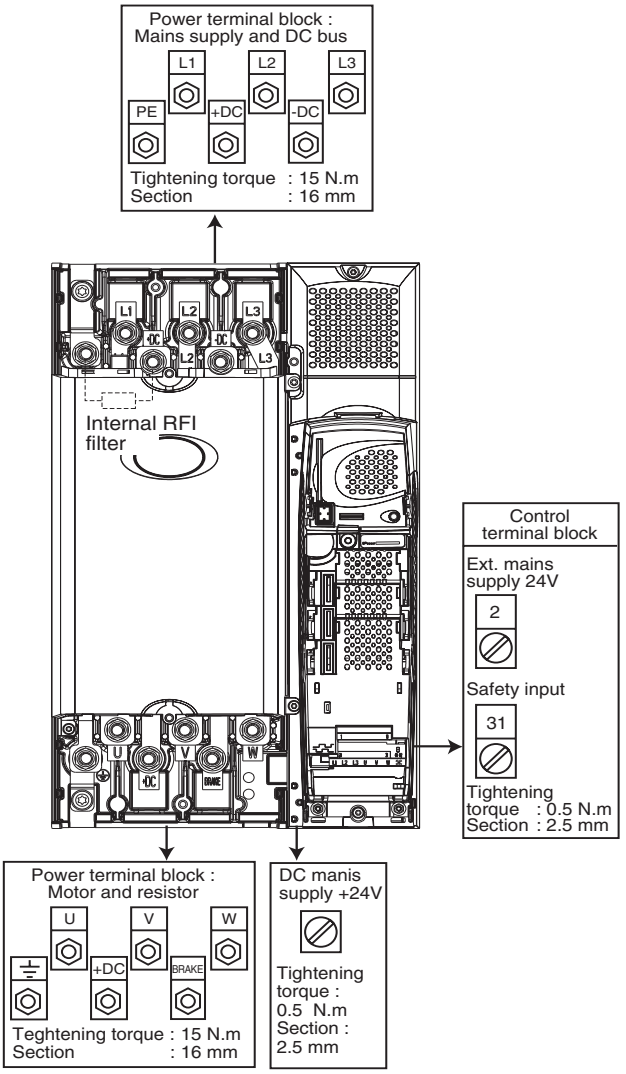
• Earth connection

The mains supply earth terminal (PE) and the motor earth terminal (⏚) are internally connected by a copper conductor (section 19.2 mm^2).
This internal link is sufficient if the phase mains supply cables have a cross-section lower than or equal to 38,4 mm^2 (according to the standard 60204-1 / EN60204-1) and if the dimensioning of the mains supply protection system is lower than or equal to 200A (NFPA 79 standard). Beside these conditions, it shall be necessary to make an additional connection between the mains supply esrt and the motor earth.

• Installation of cable runs and glands

- Remove the washers of the cable run plate for running the eventual brake, power and control resistor cables (lower and upper left terminal blocks).

• Location



D3 - Power diagram

D3.1 - Safety input

This input, when opene, allows the drive to run. Independent of the microrpocessor, it acts on several levels of control from the power bridge. It is set so that with no torque on the motor shaft there is a very high level of integrity, even in case of failure of one or more components.
Certified by European independent organisms, this year, this input was recognised according to the safty standard EN 954-1 category 3 mentioned in the machine-related directive.
In consequence, it may be used as a safety element and it may substitute to an electromechanical contractor or to a safety relay.
Depending on the safety category with which the installation must comply, it will be recommended to observe the power connection diagram described in the following paragraphs.

• The safety input is a safety component which must be incorporated into the complete system dedicated to the machine safety. As for any installation, the complete machine must be the object of a risk analysis by the integrator which will determine the safety category with which the installation must comply.

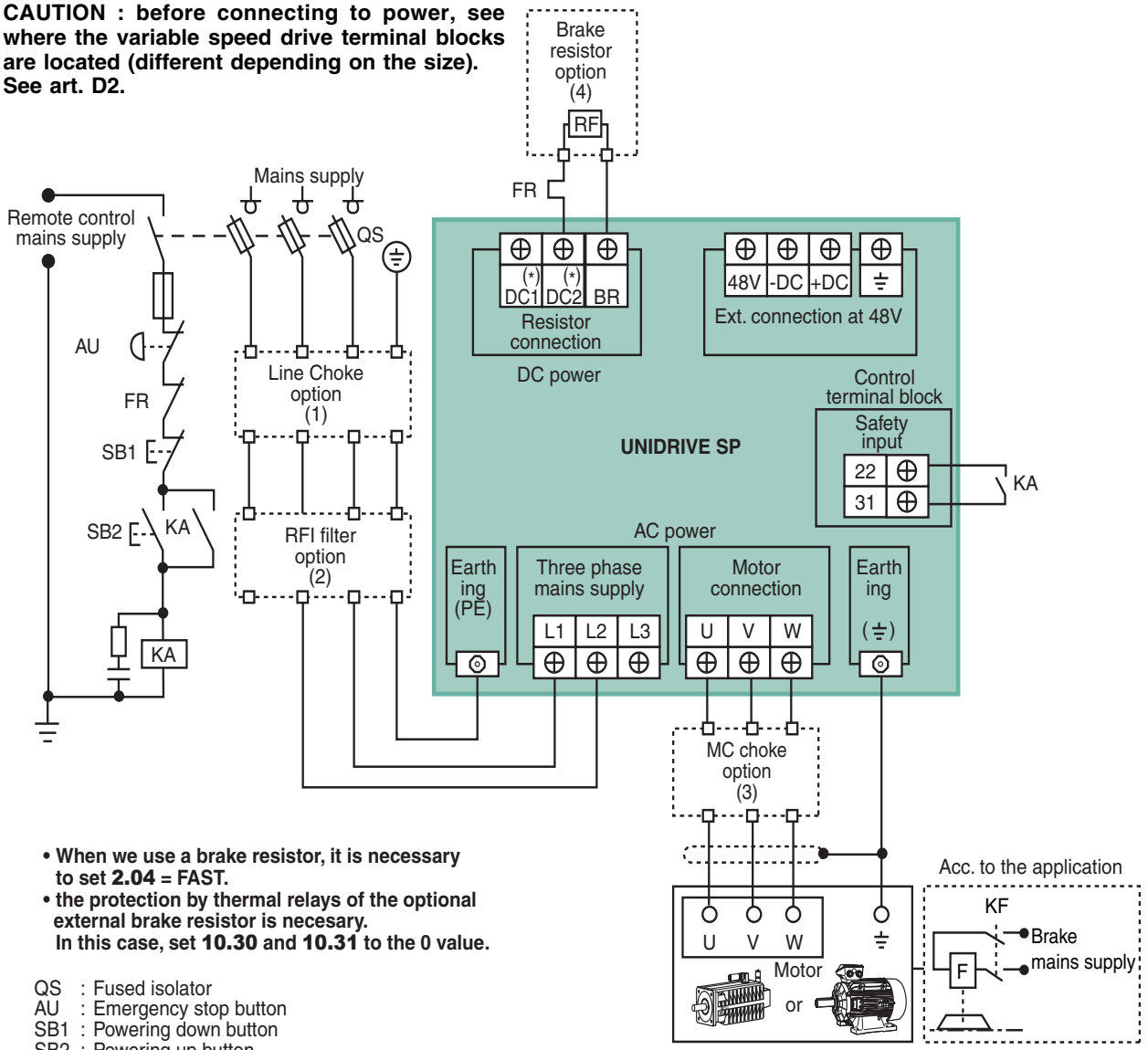
• The safety input, when opened, locks the drive, meaning that the dynamic braking function is no longer available. If a braking function is required before the drive safety disabling, a time-delayed safety relay should be installed to automatically activate the locking after the end of the braking.
If braking needs to be a machine safety function, it should be provided by an electromechanical solution since the dynamic braking by the drive function is not considered to be a safety function.

• The safety input does not provide the electrical isolation function. Before carrying out any work, the power supply must be removed by a certified isolating system (isolator, switch ...).

UNIDRIVE SP
Power connection

D3.2 - Three-phase AC power supply in accordance with the safety standard EN 954-1 - category B or 1

CAUTION : before connecting to power, see where the variable speed drive terminal blocks are located (different depending on the size). See art. D2.



- **When we use a brake resistor, it is necessary to set 2.04 = FAST.**
- **the protection by thermal relays of the optional external brake resistor is necesary. In this case, set 10.30 and 10.31 to the 0 value.**

QS : Fused isolator
AU : Emergency stop button
SB1 : Powering down button
SB2 : Powering up button
KA : Remote control relay
FR : Thermal relay of the external brake resistor (unnecessary for the heater bult-in resistors)
KF : Brake relay (for the brake management, see section H3.21)

(1) Line choke :
Option allowing the reduction of the mains supply harmonics amplitude and at the same time the reduction of the tansient interferences of the mains supply to the variable speed drive. See section L7.

(2) " RFI " filter:
Option allowing the reduction of the electromagnetic emmissions of the variable speed drives and the compliance with the standard EN 61800-3 in certain cases. See section L3.

(3) " MC " choke:
Option allowing the diminution of the leakage currents as well as of the interferences generated by the variable speed drive. See section L5.

(4) Brake resistor
Option allowing the dissipation of the active power returned by the motor onto the variable speed drive continuous bus in case of a driving machine. See section L8.

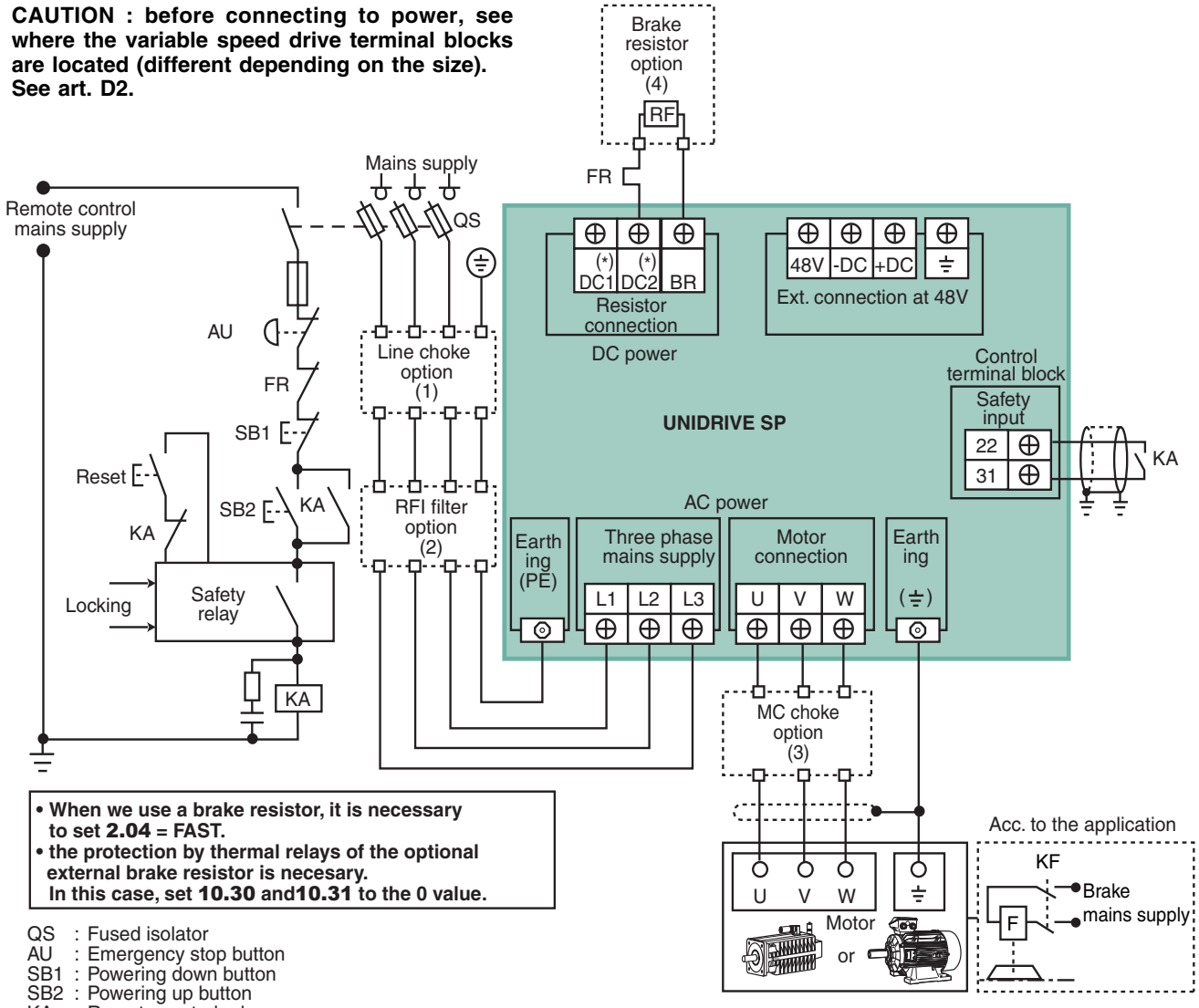
(*) For the variable speed drives size 1, the DC1 terminal is replaced by -DC, and the DC2 terminal is replaced by + DC (there is no risk of confusion, due to the fact that there is only a continuous bus terminal for the sizes 1).

UNIDRIVE SP
Power connection

D3.3 - Three-phase AC power supply in accordance with the safety standard EN 954-1 - category 2 or 3

D3.3.1 - Use of a special cable on the safety input

CAUTION : before connecting to power, see where the variable speed drive terminal blocks are located (different depending on the size). See art. D2.



- **When we use a brake resistor, it is necessary to set 2.04 = FAST.**
- **the protection by thermal relays of the optional external brake resistor is necesary. In this case, set 10.30 and10.31 to the 0 value.**

QS : Fused isolator
AU : Emergency stop button
SB1 : Powering down button
SB2 : Powering up button
KA : Remote control relay
FR : Thermal relay of the external brake resistor (unnecessary for the heater bult-in resistors)
KF : Brake relay

(1) Line mains supply :
Option allowing the reduction of the mains supply harmonics amplitude and at the same time the reduction of the tansient interferences of the mains supply to the variable speed drive. See section L7.

(2) " RFI " filter:
Option allowing the reduction of the electromagnetic emmissions of the variable speed drives and the compliance with the standard EN 61800-3 in certain cases. See section L3.

(3) " MC " choke:
Option allowing the diminution of the leakage currents as well as of the interferences generated by the variable speed drive. See section L5.

(4) Brake resistor
Option allowing the dissipation of the active power returned by the motor onto the variable speed drive continuous bus in case of a driving machine. See section L8.

CAUTION :
In this case, the cable used for the connection of the safety input must be isolated from other cables, either by running it towards a metallic duct or an independent pipe or by the use of a shielded cable destined for this function.

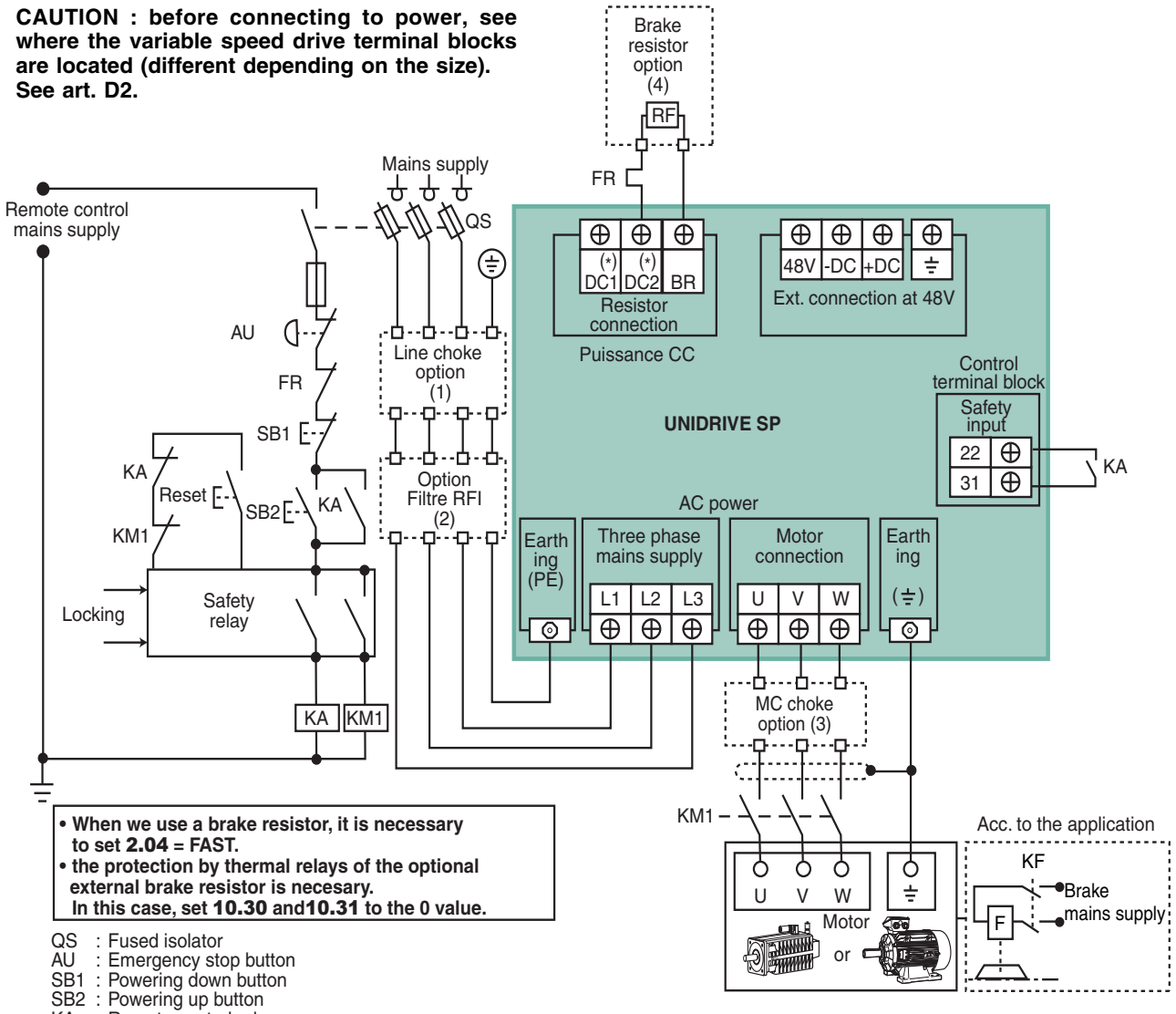
(*) For the variable speed drives size 1, the DC1 terminal is replaced by -DC, and the DC2 terminal is replaced by + DC (there is no risk of confusion, due to the fact that there is only a continuous bus terminal for the sizes 1).

UNIDRIVE SP
Power connection

D3.3.2 - Use of a contactor

If a cable dedicated to the safety input may not be used, add a contactor.

CAUTION : before connecting to power, see where the variable speed drive terminal blocks are located (different depending on the size). See art. D2.



- **When we use a brake resistor, it is necessary to set 2.04 = FAST.**
- **the protection by thermal relays of the optional external brake resistor is necesary. In this case, set 10.30 and10.31 to the 0 value.**

QS : Fused isolator
AU : Emergency stop button
SB1 : Powering down button
SB2 : Powering up button
KA : Remote control relay
FR : Thermal relay of the external brake resistor (unnecessary for the heater bult-in resistors)
KF : Brake relay

(1) Line mains supply :
Option allowing the reduction of the mains supply harmonics amplitude and at the same time the reduction of the tansient interferences of the mains supply to the variable speed drive. See section L7.

(2) " RFI " filter:
Option allowing the reduction of the electromagnetic emmissions of the variable speed drives and the compliance with the standard EN 61800-3 in certain cases. See section L3.

(3) " MC " choke:
Option allowing the diminution of the leakage currents as well as of the interferences generated by the variable speed drive. See section L5.

(4) Brake resistor
Option allowing the dissipation of the active power returned by the motor onto the variable speed drive continuous bus in case of a driving machine. See section L8.

•If a contactor is connected between the variable speed drive and the motor (recommended type: AC3), check that the variable speed drive is locked during the contactor opening or closing.

(*) For the variable speed drives size 1, the DC1 terminal is replaced by -DC, and the DC2 terminal is replaced by + DC (there is no risk of confusion, due to the fact that there is only a continuous bus terminal for the sizes 1).

UNIDRIVE SP
Power connection

D4 - Cables and fuses

• It is the responsibility of the user to connect and provide protection for UNIDRIVE SP in accordance with the current legislation and regulations of the country of use. This is particularly important as regards the size of the cables, the type and the rating of fuses, the earth or ground connection, the powering down, the acknowledging faults, the insulation and the protection against overcurrents.

• These tables are given for information only, and must under no circumstances be used instead of the current standards.

• The ratings and the characteristics correspond to a maximum overload. For a reduced overload, see the adequate motor current.

• Sizes 1 to 3

UNIDRIVE SP	Mains supply						Motor									
	I_{rated} (Reduced overload)	I_{max}	Fuses		Cable section* & **		I_{sp} *	Cable section* & **		Motor cable max. length (m)					
			IEC (gG)	USA	EN60204	UL508C		EN60204	UL508C						
	(A)	(A)	(A)	(A)	(mm^2)	(AWG)	(A)	(mm^2)	(AWG)	3kHz	4kHz	6kHz	8kHz	12kHz	16kHz
1,5TL	7,1	9,5	10		1,5	14	4,3	1	18	65				50	37
2TL	9,2	11,3	12	15	1,5	14	5,8	1	16	100			75	50	37
2,5TL	12,5	16,4	20		4	12	7,5	1	14	130		100	75	50	37
3,5TL	15,4	19,1	20		4	12	10,6	1,5	14	200	150	100	75	50	37
4,5TL	13,4	18,1	20		4	12	12,6	2,5	14	200	150	100	75	50	37
5,5TL	18,2	22,6	25		4	10	17	4	10	200	150	100	75	50	37
8TL	24,2	28,3	32	30	6	8	25	6	8	200	150	100	75	50	37
11TL	35,4	43,1	50	45	16	6	31	16	6	200	150	100	75	50	x
16TL	46,8	54,3	63	60	25	4	42	25	4	200	150	100	75	50	x
1,5T	4,1	4,8	6		1	18	2,1	1	22	65				50	37
2T	5,1	5,8	6		1	16	3	1	20	100			75	50	37
2,5T	6,8	7,4	8	10	1	16	4,2	1	18	130		100	75	50	37
3,5T	9,3	10,6	12	15	1,5	14	5,8	1	16	200	150	100	75	50	37
4,5T	10	11	12	15	1,5	14	7,6	1	14	200	150	100	75	50	37
5,5T	12,6	13,4	16	15	2,5	14	9,5	1,5	14	200	150	100	75	50	37
8T	15,7	17	20		4	12	13	2,5	14	200	150	100	75	50	37
11T	20,2	21,4	25		4	10	16,5	4	10	200	150	100	75	50	37
16T	26,6	27,6	32	30	6	8	25	6	8	200	150	100	75	50	37
22T	34,2	36,2	40		10	6	32	10	6	200	150	100	75	50	37
27T	40,2	42,7	50	45	16	6	40	16	6	200	150	100	75	50	37
33T	51,3	53,5	63	60	25	4	46	25	4	200	150	100	75	50	x
3,5TM	5	6,7	8	10	1	16	4,1	1	18	200	150	100	75	50	x
4,5TM	6	8,2	10		1	16	5,4	1	16	200	150	100	75	50	x
5,5TM	7,8	11,1	12	15	1,5	14	6,1	1	14	200	150	100	75	50	x
8TM	9,9	14,4	16	15	2,5	14	9,5	1,5	14	200	150	100	75	50	x
11TM	13,8	18,1	20		4	12	12	2,5	14	200	150	100	75	50	x
16TM	18,2	22,2	25		4	10	18	4	10	200	150	100	75	50	x
22TM	22,2	26	32	30	6	8	22	6	8	200	150	100	75	50	x

• Sizes 4 to 6

UNIDRIVE SP	Mains supply							Motor								
	I_{rated} (Reduced overload)	I_{max}	Option 1: fuse IEC (gR)	Option 2 : fuse serial semiconductor with HRC fuse or circuit breaker		Cable section * & **		I_{sp} *	Cable section * & **		Motor cable max. length (m)					
				HRC UL (clas. J) IEC (gG)	Semi-conductor IEC (aR)	EN60204	UL508C		EN60204	UL508C						
	(A)	(A)	(A)	(A)	(A)	(mm^2)	(AWG)	(A)	(mm^2)	(AWG)	3kHz	4kHz	6kH	8kHz	12kHz	16kHz
22TL	62.1	68.9	90	90	160	25	3	56	25	3	250	185	125	90	x	x
27TL	72.1	78.1	100	100	160	35	3	68	35	3						
33TL	94.5	99.9	125	125	200	50	1	80	70	1						
40T	61.2	62.3	80	80	160	25	3	60	25	3	250	185	125	90	x	x
50T	76.3	79.6	110	100	200	35	2	74	35	2						
60T	94.1	97.2	125	125	200	50	1	96	70	1						
75T	125	131	175	160	200	95	2/0	124	95	2/0						
100T	150	156	225	200	250	120	4/0	139	120	4/0						
120T	205.8	214.9	250			2 x 70	2 x 2/0	180	2 x 70	2 x 2/0	250	185	125	x	x	x
150T	247.2	257.9	315			2 x 120	2 x 4/0	210	2 x 120	2 x 4/0						
22TH	23	26.5	63	32	125	4	10	18	4	10	250	185	125	90	x	x
27TH	26.1	28.8	63	35	125	6	8	22	6	8						
33TH	32.9	35.1	63	50	125	10	8	27	10	8						
40TH	39	41	63	50	125	16	6	36	16	6						
50TH	46.2	47.9	63	63	125	16	6	43	16	6						
60TH	55.2	56.9	80	80	125	25	4	52	25	4						
75TH	76	83	100	90	160	35	2	62	35	2						
100TH	89	95	110	125	160	50	1	84	50	1						
120TH	119	123.1	200			2 x 50	2 x 1	100	2 x 50	2 x 1	250	185	125	x	x	x
150TH	140	146.3	200			2 x 50	2 x 1	125	2 x 50	2 x 1						

* and ** : see the following page.

* The value of the continuous output current and the motor cable cross-sections are given for information only. Knowing that the motor rated current admissible by the variable speed drive varies depending on the carrier frequency, on the temperature and on the overload, see section B3.3 for more details.
** The recommended cross-sections are established for the single-wire cable having a length of maximum 10m, beyond this, taking into account the line drops due to the length.

Note :
• The value of the mains supply current is a typical value that depends on the source impedance. Higher the impedance, lower the current.
• In factory settings, the carrier frequency is of 3 kHz (excepting the Servo operating mode : 6 kHz).
• To determine the earth cable section (according to the standard EN 60204) :
- if the phase cable cross-section ≤ 16 mm^2 : use an earth cable with the same cross-section,
- if 16 mm^2 < the phase cable cross-section ≤ 35 mm^2 : the earth cable cross-section is of 16 mm^2,
- if the phase cable cross-section > 35 mm^2 : the earth cable cross-section must be half of the phase cable cross-section (select the equal or higher existing cross-section).
• Circuit breakers may replace the fuses belonging to gG class. They must be of the C type and they must be sizes as the fuses (for the sizes 4 - 6, they must be connected in serial link to the R class fuses).

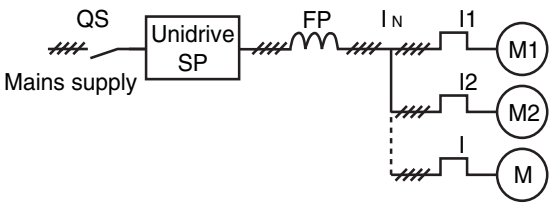
CAUTION :
• To limit the leakage currents, it is recommended to use cables with a capacity lower than 260 pF/m. If the use of higher capacity cables is necessary, reduce by half the maximum motor cable length specified in the table presented on the previous page.

D5 - Particular applications

D5.1 - Motor insulation

In the following cases :
- the mains supply voltage is higher than 500 Vca or 670Vcc,
- the variable speed drive of 400V is used for very frequent braking applications, is connected to a motor cable length higher than 10m, it is recommended to use a motor adapted to the frequency variation (LSMV). The isolation of these motors is able to withstand repeated voltage drops.
With a standard motor, it is recommended to install an output choke (FP type choke) with a reactance of about 2%.

D5.2 - Association of motors in parallel in U/F mode



The variable speed drive control mode must be open loop mode (**0.48** = Open.LP(1)) with U/F control (**0.07** = Fd(2) or SrE(5)).
The total length of the motor cables (cable length M1 + cable length M2 + ...) must not exceed the maximum length indicated in D4 section depending on the variable speed drive rating and on the carrier frequency.
It is possible to supply with power many different power motors by means of a single variable speed drive. Each motor must be protected by a thermal relay.
Determination of the variable speed drive rating:

IN variable speed drive > I1 + I2 + … + I

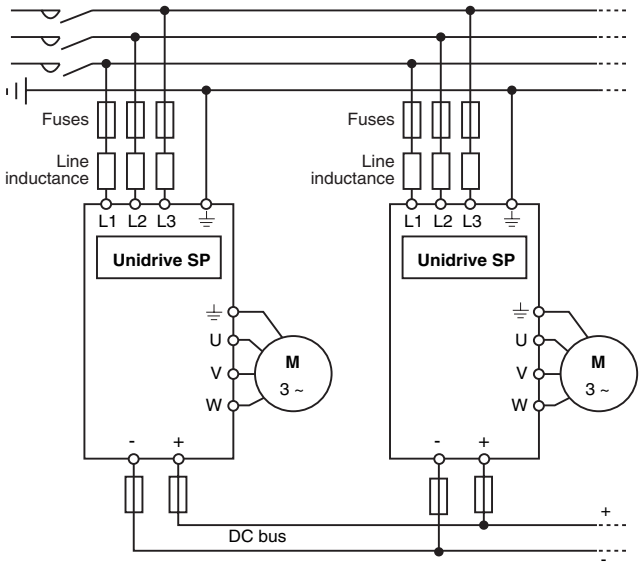
To avoid the untimely starting of the thermal relays, a specific choke of Faibles Pertes (FP) type may be proposed as an option (see section L). The determination of this choke depends on the variable speed drive rating and on the length of the cable between the variable speed drive and the motor. Consult LEROY-SOMER.

D5.3 - Coupling in parallel of the variable speed drives by using the dc bus

• General information
The coupling in parallel of many variable speed drives by using the dc bus allows the limitation of the brake resistor number and power. We may even remove the brake resistors if the sum of the energies to be returned is lower than the expulsive energy.
This mounting is also interesting if the mains supply is lost, if we want to stop at the same time many motors loaded with different inertias.
If the variable speed drives have the same or similar ratings, their powering up may be made simultaneously. If the ratings are very different, in order to avoid that the low rating variable speed drive changes all buses, we should either delay its powering up (1 second) or delay the coupling of its bus by bus contactor that will close 1 second after the powering up.
In order to assure an adequate distribution of the network current at the input of the variable speed drives, it is recommended to install in series with each drive, a line inductance selected according to the drive rating (see section L7 for details).
Besides, the dc bus of each modulator will be fitted with fuses (see section D4).

UNIDRIVE SP
Power connection

• Example of connection diagram



D

D6 - Safety power supply at 48V

Unidrive SP has the possibility to connect to a 48Vdc fail safe supply.
This operating mode may be used only motors have stopped after a loss of the mains supply. In this case, the voltage available being lower than the operating rated voltage, the system performance will be limited to the following values.
- Asynchronous motor: constant torque up to 4 Hz and defluxed
- Servo motors: the maximum speed of the motor depends on its Ke factor.
Example :
for a motor of 3000 min^{-1} with a Ke of 98V/$kmin^{-1}$, the maximum speed will be of 347 min^{-1}.

Note : the level of voltage of the safety mains supply must be set at ***. The level of default voltage starting corresponds to 1.45 x **6.46** (V), and the brake transistor driving voltage corresponds to 1.325 x **6.46** (V).

• The operation when connected to 48Vdc imposes the strict compliance with the cabling and sequencing rules. For any additional information, contact your usual interlocutor LEROY-SOMER.

• Characteristics

Characteristics	Level
Minimum operation continuous voltage	36 V
Rated operation voltage	Size 1 : 48 V Sizes 2 to 6 : 48 to 72V
Minimum starting mains supply voltage	40 V
Maximum brake transistor driving voltage	63.6 V
Maximum default overvoltage threshold	69.6 V
Current	2 x I_{sp} with maximum overload

D7 - UL conformity

D7.1 - Mains supply specification
The variable speed drive can be incorporated into an installation that can supply a maximum of 5000A rms for the sizes 1 to 3, 10000A rms for the sizes 4 and 5 and 15000A rms for the sizes 6. at a voltage of maximum 264Vca rms for the variable speed drives of 200V (TL) and of maximum 528Vca rms for the variable speed drives of 400V (T), or of maximum 632Vca maximum for the variable speed drives of 575V (TM) and 690V (TH).

D7.2 - Cables
Use only copper cables belonging to class 1 60/75°C (140/167° F).

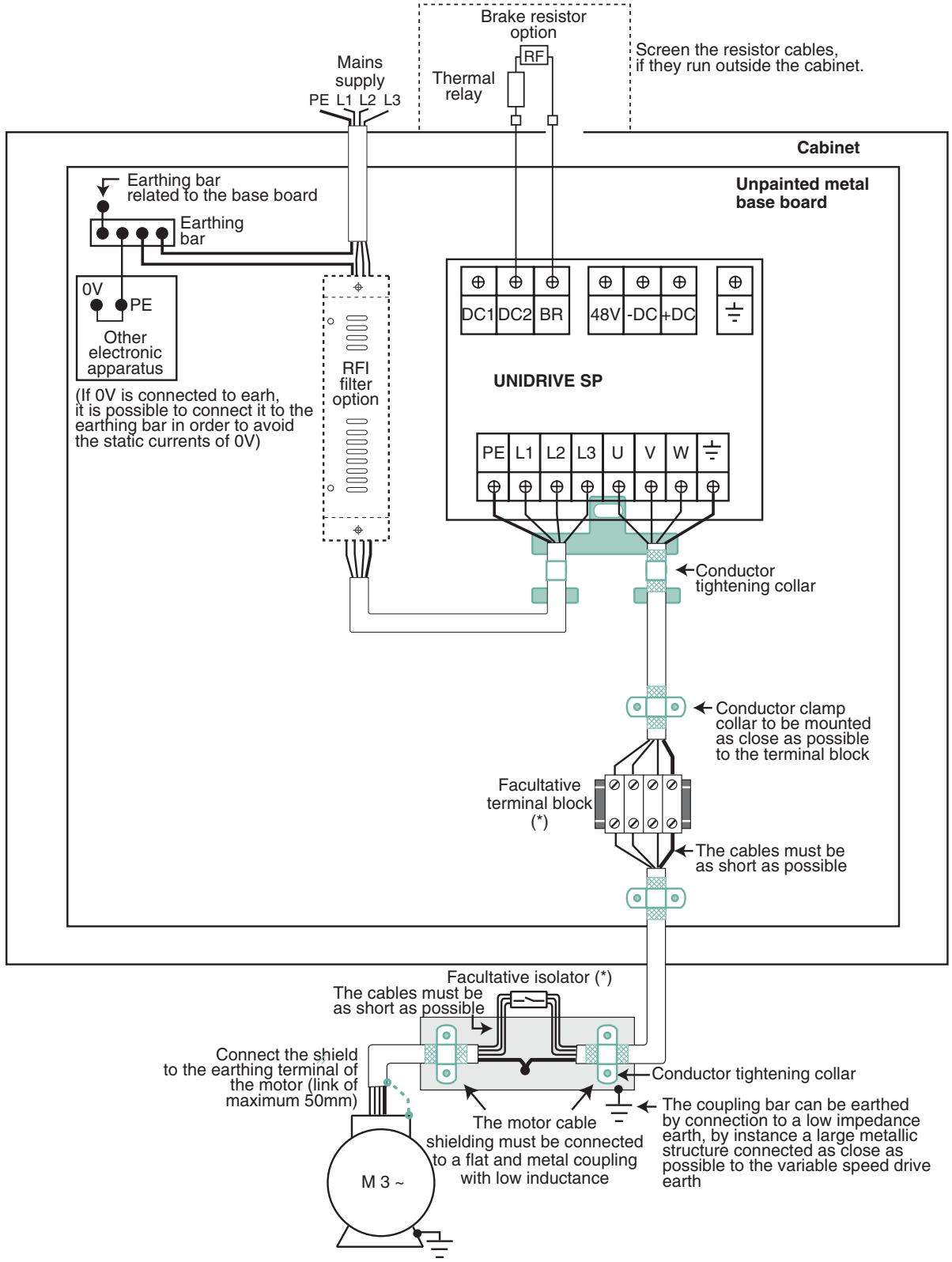
D7.3 - Fuses
The UL conformity is observed if all the fuses used are UL listed fast-blow fuses (DC class up to 30A and class J thereafter) and, if the symmetrical short-circuit current does not exceed 5 kA up to rating 16TL, 33T and 22TM.
Example of fast-blow fuses:
- Limitron KTK from Bussman,
- Amp - trap ATM from Gould.

Note: if a circuit breaker is used instead of fuses, the UL conformity is no longer observed.

UNIDRIVE SP
Power connection

D8 - Recommendations for the CEM conformity

D8.1 - Diagram



(*) It is recommended to use an uninterrupted shielded motor cable. However, if a motor cable must be connected to a terminal block built-in into the variable speed drive cabinet or if motor isolator must be installed, provide the shielding continuity as indicated above.

D8.2 - Recommendations

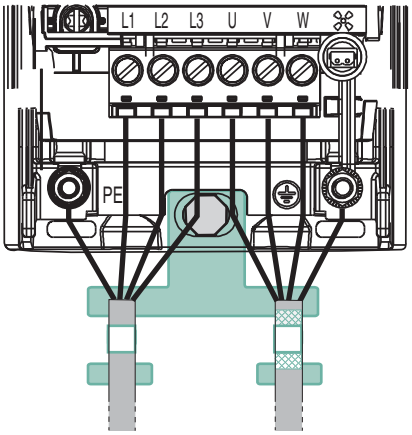
• The earth loop must be in compliance with the recommendations regarding the local regulation.
• The earth connections must be regularly tested and inspected.

CAUTION :
• Bare the wires under the clamp so that a good contact is made with the shielding.
• Threaded screws must be used to mount the variable speed drives on the base so that to obtain a direct electrical connection to earth.
• Do not place sensitive (un-shielded) circuits at less than 300mm around the variable speed drive, the motor cables, the RFI filter cables (optional) and the brake resistor cables (optional).
• Place the mains supply cables and the earth cables at least 100 mm from the variable speed drive power module and the motor cable (excepting the the cables connecting the RFI filter towards the drive).

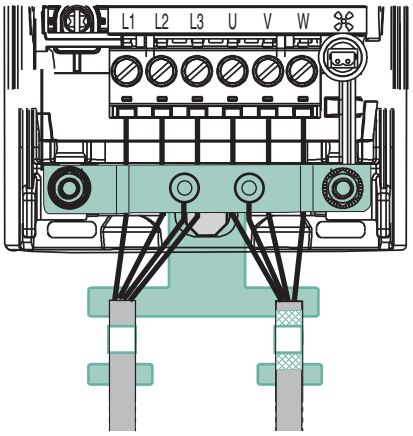
The mains supply earth (PE) must be connected to an earthing bar (or a low impedance earth terminal) in the IEC. This bar must connect to a common bar of all the IEC components. Besides, if the earth connection of the mains supply (PE) is made by a separate cable, it must run in parallel with the other mains supply cables in the IEC (the emission risk is diminished).

D8.3 - Details on the shielding supports (power)

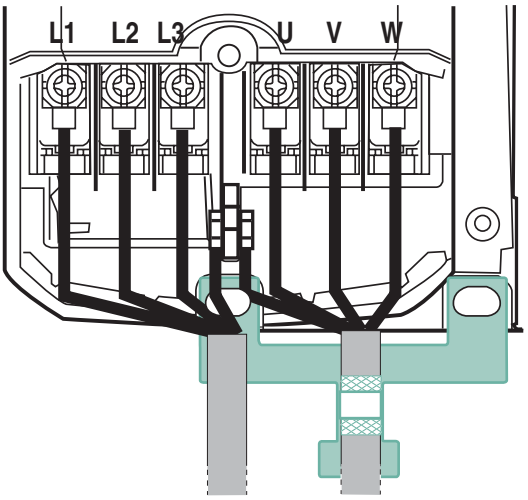
• Size 1



• Size 2



• Size 3



D9 - Mains supply types

The variable speed drives must be used in any neutral circuit, such as TN-S, TN-C-S, TT, IT.

The variable speed drives have been designed to be used with mains supply belonging to category III or to a lower rank category, according to the standard IEC60664-1. In case of a higher rank category mains supply, provide adapted overload suppresing devices, upstream from the variable speed drive.

For the sizes 3 and for the higher sizes, when the variable speed drive is used with an IT condition mains supply, the internal RFI filter must be disconnected, excepting the case when an external filter or an additional motor earth protection is used.

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Notes

UNIDRIVE SP
Control connections

E1 - Warning

• For the factory settings, UNIDRIVE SP is configured in positive logic. The association of a variable speed drive with a different control logic may cause inadvertant starting of the motor

• In the speed drive, the control circuits are insulated from the power circuits by a simple insulation (CEI 664-1). The installer must check that the external control circuits are insulated against any human contact.

• If the control circuits must be connected to circuits complying with the SELV safety requirements, an additional insulation must be integrated in order to maintain the SELV classification.

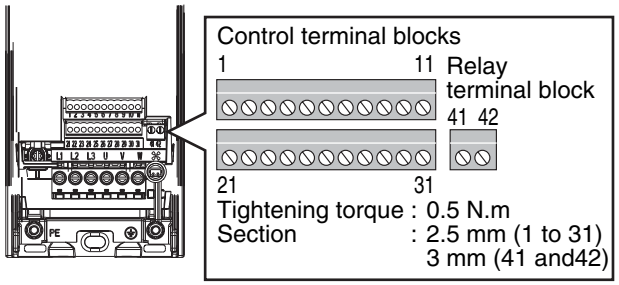
• The software integrated into the SM-LVG module automatically configures the drive and the modules according to "Lifting" application requirements (see the following paragraphs).

E

E2 - Location and characteristics

E2.1 - Variable speed drive terminal blocks

E2.1.1 - Location



E2.1.2 - Terminals characteristics

1	0V Common

2	+24V for the external mains supply of the variable speed drive control circuit	
Rated voltage		+24 Vdc
Minimum operating voltage		+19,2 Vdc
Maximum operating voltage		+30 Vdc
Minimum starting power supply voltage		+21,6 Vdc
Recommended power supply		60 W, 24V rated dc
Recommended fuse		4A Gg, 50Vdc
• This 24V power supply can be used as a fail safe supply which protects against overload, for instance, during the simultaneous use of many SM modules. (SM-Universal-Encoder Plus module, SM-Encoder Plus mosule and SM-I/O Plus module). If the internal 24V is overloaded, the drive defaults with " PS.24V ". • It may be used as a fail safe supply of the control card, in case of loss of the mains supply, this allowing the programmable modules (with or without field bus) or the encoder module to continue their operation. For the UL conformity, the external mains supply must be class 2 UL.		

3	0V Common

4	+10V analogue internal source	
Voltage tolerance		± 1 %
Rated output current		10 mA
Protection		Overload and thermal (trip at 30mA)

5	Analogue input 1	Brake feedback
6	Analogue input 1	Connected to 0V
Characteristics		Operation in common mode
Resolution		16 bits plus sign
Maximum offset		70 µV
Sampling		250 µs for a speed reference in closed loop, 4ms for other functions
Full scale voltage range		±9.8 V ±1 %
Maximum voltage in common mode		±13 V/0V
Maximum absolute voltage		±36 V/0V
Imput impedance		100 kΩ, ± 1 %

7	Analogue input 2	Analogue speed indiction
Characteristics		Bipolar analogue voltage (common mode) or unipolar current
Resolution		10 bits + sign
Sampling		250µs for a speed reference connected to voltage, or a torque reference in closed loop, 4ms for other functions
Voltage input		
Full scale voltage range		± 9.8V ±3 %
Maximum offset		± 30 mV
Maximum absolute voltage		± 36Vdc/0V
Input impedance		>100 kΩ
Current input		
Current range		0-20mA ±5 % 20-0mA ±5 % 4-20mA ±5 % 20-4mA ±5 %
Maximum offset		250 µA
Maximum absolute voltage		- 36 Vmax
Maximum absolute current		70 mA
Input impedance		≤ 200 Ω at 20 mA

UNIDRIVE SP
Control connections

E

8	Analogue input 3	Motor thermal probe
Characteristics		Bipolar analogue voltage (common mode), unipolar current or motor probe input
Resolution		10 bits + sign
Sampling		250µs for a speed reference connected to voltage 4ms for another function
Voltage input		
Full scale voltage range		± 9.8V ±3 %
Maximum offset		± 30 mV
Maximum absolute voltage		± 36 Vdc/0V
Input impedance		>100 kΩ
Current input		
Current range		0-20mA ±5 % 20-0mA ±5 % 4-20mA ±5 % 20-4mA ±5 %
Maximum offset		250 µA
Maximum absolute voltage		- 36 Vmax
Maximum absolute current		70 mA
Input impedance		≤ 200 Ω at 20 mA
Motor probe input		
Internal voltage		< 5V
Default start threshold		3.3kΩ ± 10 %
Default deletion threshold		1.8kΩ ± 10 %
Short-circuit detection		50Ω ± 30 %

CAUTION :
Terminal 8 is internally connected to pin 15 of connector HD-15. When the motor probe is connected to pin 15, terminal 8 is not available.

9	Analogue output 1	Allocatable
10	Analogue output 2	
Characteristics		Bipolar analogue voltage (common mode) or unipolar current
Resolution		10 bits (+ sign under voltage)
Refresh		4ms
Sampling		250 µs if the output has a source **4.02** or **4.17** or **3.02** or **5.03** in closed loop 4 ms in the other cases
Voltage output		
Voltage range		± 9.6Vdc ±5 %, ±10mA max
Maximum offset		100 mV
Load resistor		1 kΩ minimum
Protection		Short-circuit (35mA max)
Current output		
Current ranges		0-20mA ±10 % 4-20mA ±10 %
Maximum offset		600 µA
Open circuit maximum voltage		+15V
Maximum load resistor		500Ω

11	Common 0V
21	Common 0V

22	+24V internal source
Output current	200mA (including all the digital inputs/outputs)
Overload current	240mA (including all the digital inputs/outputs)
Protection	Current limitation and stop

23	Common 0V

24	Digital input	Reference selection I3
25		Default deletion
26		Run up/Stop
Characteristics		Digital input in positive or negative logic, or outputs in negative logic open commutator or push-pull
Thresholds		Positive logic : 0 : < 5V 1 : >15V Negative logic : 1 : < 5V 0 : > 15V
Voltage range		0 to +24V
Sampling/Refresh		200µs if the output has as source **6.35** or **6.36**, 4ms in the other cases
Digital input		
Maximum absolute voltage		±30V
Load		> 2mA at 15Vdc
Input threshold		10.0V ± 0.8V
Digital output		
Maximum output current		200mA (totally, all digital outputs + terminal 22)
Overload current		240mA (totally, all digital outputs + terminal 22)

27	Digital inputs	Run down/Stop
28		Reference selection I1
29		Refrence selection I2
Characteristics		Positive or negative logic inputs
Thresholds		Positive logic : 0 : < 5V 1 : >15V Negative logic : 1 : < 5V 0 : > 15V
Sampling/Refresh		200µs if the output has as source **6.35** or **6.36**, 4ms in the other cases
Voltage range		0 to +24V
Maximum absolute voltage		±30V
Load		> 2mA at 15Vdc
Input threshold		10.0V ± 0.8V

30	0V common

UNIDRIVE SP
Control connections

31	Safety input/variable speed drive locking (see section D3)
Characteristics	Positive logic input
Sampling period	Drive disable (Hardware) : < 100 µs Drive enable (software) : 4 ms
Voltage range	0 to +24V
Maximum absolute voltage	±30V
Thresholds	18.5V ± 0.5V

41 42	Relay output	Brake contactor control (KF)
Characteristics	240Vac	
Refresh period	4ms	
Maximum contact current	• 2A ac 240V • 4A ac 30V resistive load • 0.5A ac 30V inductive load (L/R = 40ms)	
Minimum recommended contact	12V/100mA	
Configuration	Closed contact : active brake control	
	Open contact : rest brake	

Note :

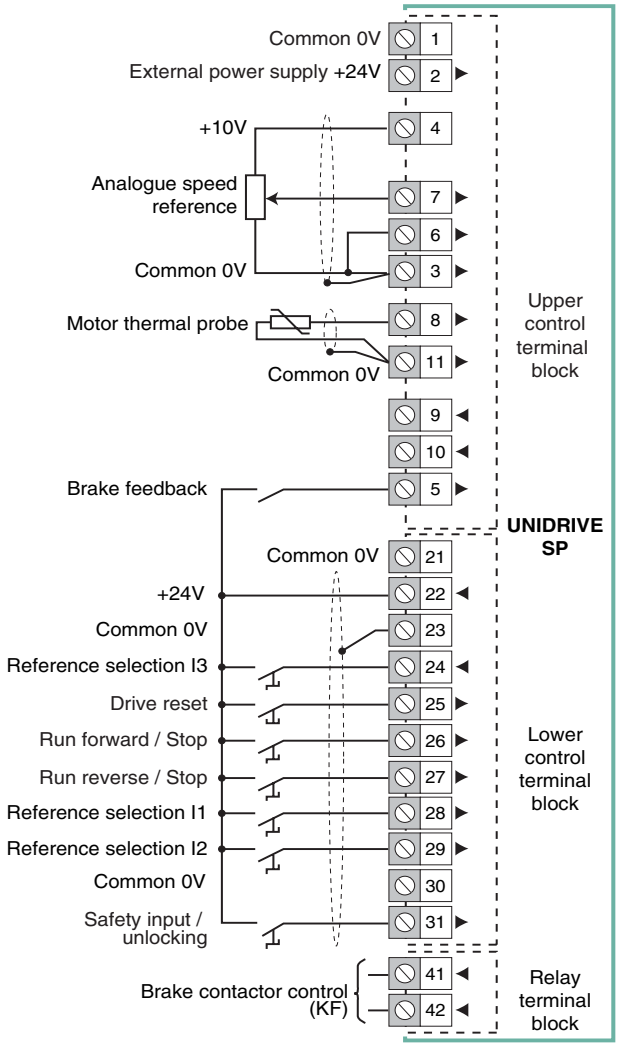
• According to the safety standards EN954-1 for the categories 2 or 3, the safety input must be isolated from other cables, either by running it into the metallic duct, or by being cabled by means of a shielded cable.

• The cables of the digital circuits can be shielded or not, depending on the variable speed drive environment and of the communication interfaces used (see section E3).

UNIDRIVE SP
Control connections

E3 - Cabling diagrams

E3.1 - Variable speed drive connection



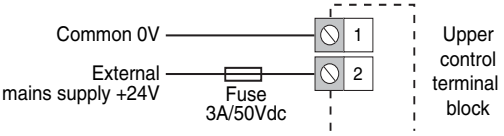
CAUTION :
If the motor probe is connected to pin 15 of the connector HD-15 (see encoder connection section F), terminal 8 of the variable speed drive is no longer available.

Legend:

x ▶ : input

x ◀ : output

E3.2 - External mains supply connection of +24V



E3.3 - Connection in negative logic

For negative logic, connect the commons to 0V (except the safety input).
Note : To configure the variable speed drive in negative logic, modify the parameter-setting (see section H, menu 8).

• Eor the factory settings, UNIDRIVE SP is configured in positive logic. The association of a variable speed drive with a different control logic can cause inadvertant starting of the motor.

E3.4 - Use of a field bus

If SM-Field bus module is used (SM-PROFIBUS DP, SM-DeviceNet, SM-INTERBUS or SM-CANopen), see section I for the connection specific to the field bus, available on CD Rom supplied together with the variable speed drive (documentation).

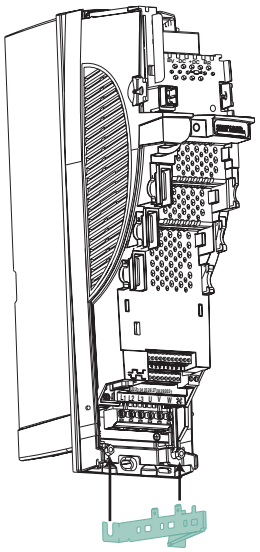
E4 - CEM electromagnetic compatibility

E4.1 - Precautions for control cables outside the cabinet

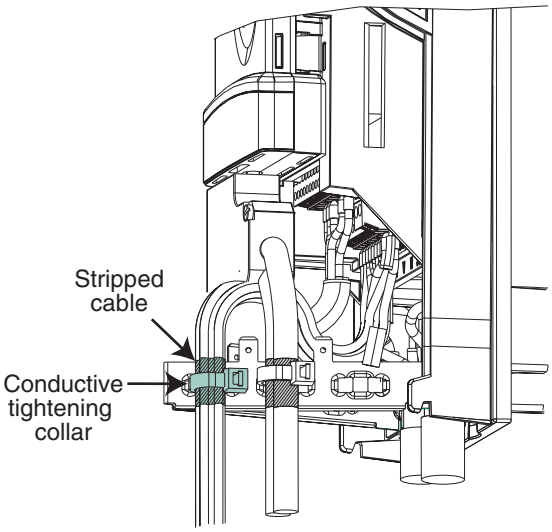
If the control cables must be run outside the cabinet, use the shielded cables and connect the shielding to the variable speed drive shielding support.

• Installation of the shielding support (control)

Screw the support on the 2 earth terminals.



• Shielding connection

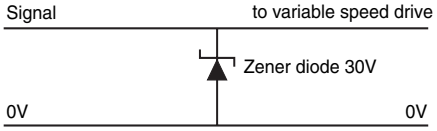


E4.2 - Immunity to overvoltage

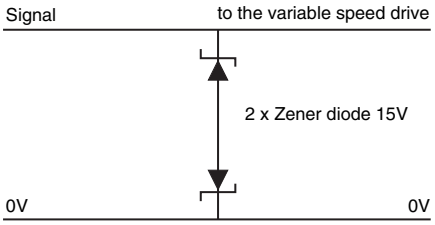
Immunity to the overvoltage of the control circuits or high length of cables and connection outside a building.

The different input and output circuits of the variable speed drive are in compliance with the overvoltage standard EN61000-6-2 (1kV).
There are exceptional cases when the installation can be exposed to overvoltage peaks that exceed the levels established by the standard. This may be the case of lightening or of earthing faults associated with high length of cables (>30 m). In order to limit the risk of damaging the variable speed drive, the following precautions must be taken into account :
- galvanic isolation of the inputs/outputs. In this case, check that 0V is not connected to earth and avoid the loops,
- double the cable shielding and use an earth wire of 10mm^2 minimum. The cable shielding and the earth wire must be connected alltogether at each end and they must be connected to the ground by the shortest possible connection. This method allows the high currents to pass through the earth wire, rather than through the shielding,
- Increase the protection of the digital and analogue inputs/ outputs by adding a zener diode or a peak limiter.

Suppression of the unipolar digital input/output overvoltage



Suppression of the bipolar analogue input/output overvoltage



These circuits are available in modules (rail mounting), for ex. at Phoenix Contact (unipolar : TT UKK5 D/24 DC, bipolar: TT UKK5 D/24 AC).
These circuits are not fit for encoder signals or for fast digital data networks, because the diodes can affect the signal. Most of the encoders have a galvanic isolation between the motor casing and the encoder circuit, and in this case, no precaution is necessary. For data networks, follow the network-specific recommendations.
If a digital input is subject to high overvoltage, the variable speed dive defaults " O.Ld1 ".

Notes

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Encoder connections

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UNIDRIVE SP
Encoder connections

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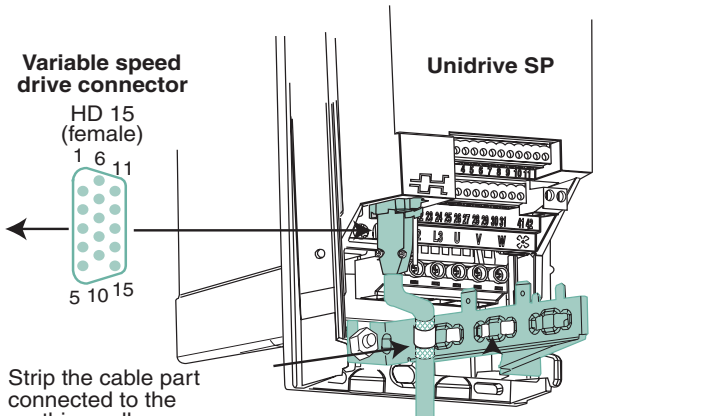
F

UNIDRIVE SP
Encoder connections

F1 - Incremental encoders

• Variable speed drive side

Ref. HD-15	Mode		
		(1)	
1	-	B or F	A or F
2	-	B\ or F\	A\ or F\
3	-	A or D or R	B or D or R
4	-	A\ or D\ or R	B\ or D\ R\
5	-	C or O or Z	
6	-	C\ or O\ or Z\	
7	A_{out} or F_{out}	-	U
8	A_{out}\ or F_{out}\	-	U\
9	B_{out} or D_{out}	-	V
10	B_{out}\ or D_{out}\	-	V\
11	-	-	W
12	-	-	W\
13	-	+5V or +8V or +15V	
14	-	0V	
15	-	Motor thermal probe (2) **CAUTION: Pin 15 is internally connected to terminal 8 of the control terminal block**	



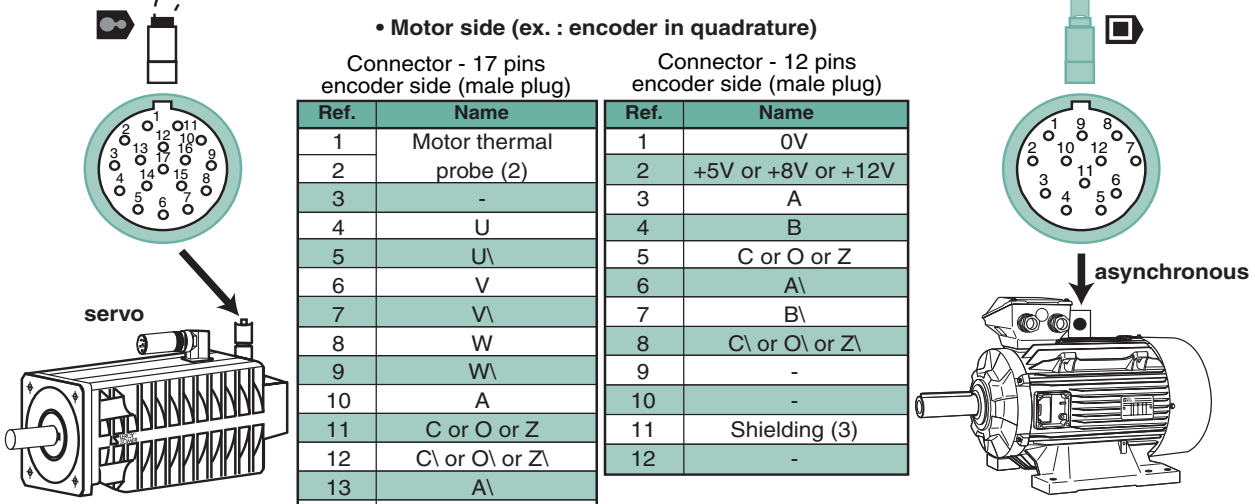
• Motor side (ex. : encoder in quadrature)

Connector - 17 pins encoder side (male plug)

Ref.	Name
1	Motor thermal probe (2)
2	
3	-
4	U
5	U\
6	V
7	V\
8	W
9	W\
10	A
11	C or O or Z
12	C\ or O\ or Z\
13	A\
14	B
15	B\
16	+5V or +8V or +15V
17	0V
	Shielding (3)

Connector - 12 pins encoder side (male plug)

Ref.	Name
1	0V
2	+5V or +8V or +12V
3	A
4	B
5	C or O or Z
6	A\
7	B\
8	C\ or O\ or Z\
9	-
10	-
11	Shielding (3)
12	-



Note : To facilitate the encoder connection, a INTERCOD 15 interface is proposed optionally (see section L10).

Connect or disconnect the drive encoder plug, only when powered off.

CAUTION: feeding en encoder with an excessive voltage can damage it. Follow the start menu or see menu 3 section H.

(1) Certains types of self-ventilated asynchronous motors with encoder in quadrature belonging to the LEROY-SOMER range (motors LS or LSMV) have a connection noiticeably different. Starting with the types 160M, L or LU and 180MT, path B must be connected to pin 2, and path B to pin 1 of the HD-15 connector of the variable speed drive, OR two motor phases must be crossed.

(2) To validate the probe control, change the parameter **7.15**. See section H, menu 7. When the thermal probe is not connected to the encoder connector, but it is connected inside the motor terminal box, connect the probe to terminal 8 of the variable speed drive terminal block.

(3) Depending on the encoder supplier, the shielding may be otherwise than indicated in the table. If there is no shielding terminal available, connect the shielding at 360° at the connector level.

UNIDRIVE SP
Encoder connections

F2 - Other encoders

• Connections to the variable speed drive

Pins HD-15	All encoders	Encoders				
		SinCos	SinCos with U, V, W paths	SinCos with Hiperface link (*)	SinCos with EnDat or SSI link	EnDat or SSI
		and		and	and	and
1	-	Cos		Cos	Cos	-
2	-	CosRef		CosRef	CosRef	-
3	-	Sin		Sin	Sin	-
4	-	SinRef		SinRef	SinRef	-
5	-	-	C or O or Z	Data	Data	Data
6	-	-	C\ or O\ or Z\	Data\	Data\	Data\
7	A_{out}, F_{out}	-	U	-	-	-
8	A_{out}\, F_{out}\	-	U\	-	-	-
9	B_{out}, D_{out}	-	V	-	-	-
10	B_{out}\, D_{out}\	-	V\	-	-	-
11	-	-	W	-	$Clock_{out}$	$Clock_{out}$
12	-	-	W\	-	$Clock_{out}$\	$Clock_{out}$\
13	+5V or +8V or +15V					
14	0V					
15	Motor thermal probe (to validate the probe control, see section H) **CAUTION :** **Pin 15 is connected internally to terminal 8 of the control terminal block**					

Note : to facilitate the encoder connection, an INTERCOD 15 interface is proposed as an option (see section L10).

Connect or disconnect the encoder plug only when powered off.

CAUTION : feeding an encoder with excessive voltage can damage it. Follow the quick start or refer to menu 3 section H.

(*) Are managed by the variable speed drive, types SCS/M60/70, SRS/M50/60, SHS170, LINCODER, SCS-KIT101, SKS/M36.

• Motor connections (standard LEROY-SOMER)

Encoder Switch Pin	Sincos encoder with Hiperface link		Sincos encoder with Endat link ECN413/EQN425 ( )
	SCM70 ( )	SRS/M50/60 SKS/M36 ( )	
1	CosRef	CosRef	-
2	Data	Data	-
3	-	Data\	-
4	-	Cos	-
5	Sin	Sin	-
6	SinRef	SinRef	-
7	Data\	CTP	+5V
8	Cos	CTP	Clock
9	-	Shielding	Clock\
10	0V	0V	0V
11	-	-	Shielding
12	+8V	+V	SinRef
13	-		Sin
14	-		Data
15	-		CosRef
16	-		Cos
17	-		Data\

Note : For the connection of any other encoder type (motor side), contact the encoder supplier, or your usual interlocutor LEROY-SOMER.

UNIDRIVE SP
Encoder connections

F3 - Encoder input/output characteristics

• Incremental encoders in en quadrature, Frequency/ Direction, Forward/Reverse
• Sincos encoders only terminal 5 to 12

1	Path B or F ( ) ; path A or F ( )
2	Path B\ or F\ ( ) ; voie A\ or F\ ( )
3	Path A, D or R ( ) ; voie B, D or R ( )
4	Path A\ , D\ or R\ ( ) ; voie B\, D\ or R\ ( )
5	Path Z or 0 or C (,)
6	Path Z\ or 0\ or C\ (,)
7	Path U ( )
8	Path U\ ( )
9	Path V ( )
10	Path V\ ( )
11	Path W ( )
12	Path W\ ( )

Characteristics	RS485 differential voltage
Maximum input frequency	410 kHz for the terminals 1 to 4 512 kHz for the terminals 5 to 12
Line load	< 2 drives for the terminals 1 to 4 32drives for the terminals 5 and 6 1 drive for the terminals 7 to 12
Input impedance	120 Ω
Operating range	-7 to +12V
Maximum absolute voltage	± 25V/0V for the terminals 1 to 4 -9 to 14V/0V for the terminals 5 to 12
Maximum absolute differential voltage	± 25V for the terminals 1 to 4 -9 to 14V/0V for the terminals 5 to 12

• Absolute SinCos, SinCos encoders with Hiperface link ans EnDat link.

1	Cos path
2	Cosref path
3	Sin path
4	Sinref path

Characteristics	Differential voltage
Maximum signal	1.25V edge to edge (Sin/SinRef or Cos/Cos Ref)
Maximum input frequency	115 KHZ
Maximum differential voltage	± 4V

• Absolute SinCos encoders with Hyperface link, SSI or EnDat, EnDat and SSI encoders

5	Data
6	Data\

Characteristics	RS 485 differential voltage
Maximum input frequency	2 MHz
Line load	32 variable speed drives
Operating range	-7 to +12V
Maximum absolute voltage	± 14V/0V
Maximum absolute differential voltage	± 14V

• Absolute EnDat, SinCos encoders with EnDat or SSI link and SSI encoders

11	Clock
12	Clock\

Characteristics	RS 485 differential voltage
Maximum input frequency	2 MHz
Line load	1 variable speed drives
Operating range	-7 to +12V
Maximum absolute voltage	± 14V/0V
Maximum absolute differential voltage	± 14V

7	A_{out} or F_{out} path output ( )
8	A_{out}\ ou F_{out}\ path output ( )
9	B_{out} ou D_{out} path output ( )
10	B_{out}\ ou D_{out}\ path output ( )

Characteristics	RS 485 differential voltage
Maximum input frequency	512 kHz
Line load	± 14V / 0V
Operating range	± 14V

13	Encoder power supply
Power supply voltage	5.15V ± 2 %, 8V ± 5 %, or 15V ± 5 %
Maximum output current	300 mA for 5V and 8V 200 mA for 15V
CAUTION : **Feeding an encoder with excessive voltage can damage it.**	

14	0V common

15	Motor probe input
Management of the motor thermal probe	

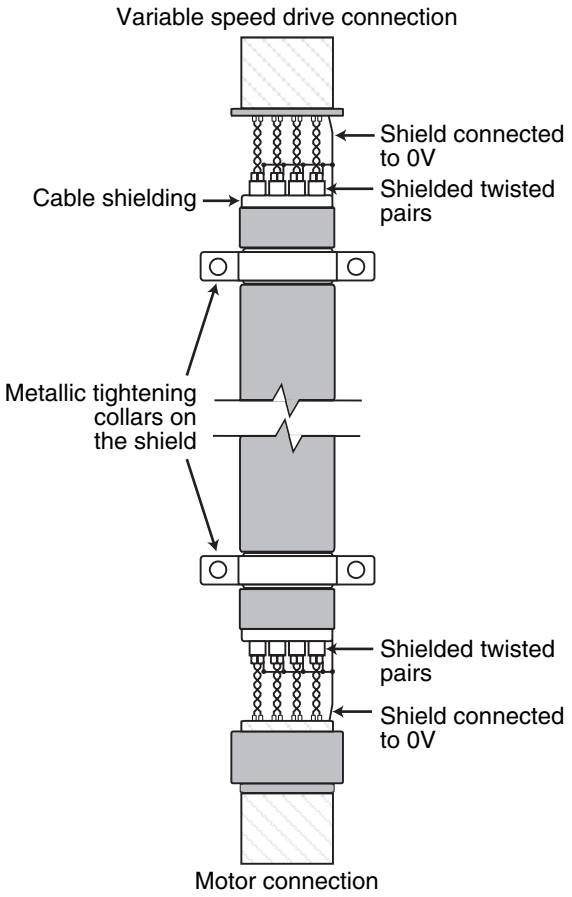
Note: On the HD15 switch of the variable speed drive, pin 15 is internally connected to terminal 8 of the variable speed drive (control terminal block).

F

UNIDRIVE SP
Encoder connections

F4 - CEM recommendations for the encoder cabling

The sensor cable shielding is important due to the high volatges and currents present at the output of the variable speed drive. If the LEROY-SOMER cables are not used, it is recommneded to comply with the following rules:



It is recommended not to make additional connection on the encoder cable. If this can not be avoided, check that the shielding connections are the shortest possible (use preferably metallic tightening collars, directly on the shield at the cable end).
Connect the shield directly to the encoder terminal block and to the variable speed drive shielding encoder.

UNIDRIVE SP
Parameter-setting

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Notes

UNIDRIVE SP
Parameter-setting

G1 - Warning

• The variable speed drive uses a software which is adjusted by parameters. The level of performance depends on the parameters set. Inadequate adjustments may have serious consequences for the personnel and on the machine.

• The parameter-setting of the drives must be effected only by qualified and certified personnel.

• Before the powering up of the variable speed drive, check that the power connections (mains supply and motor) are correct and that the parts in movement are mechanically protected.

• A special attention is recommended to the variable speed drive users in order to avoid the untimely starts.

• In case of use of brake resistors, check that they are adequately connected between the terminals DC2 (or +DC for size 1) and BR, and protected by an adequately sized thermal relay for the external resistors.

• The values of the motor parameters affect the motor protection and the system security. The parameter set values must be registered on the nameplate of the motor used.

• For security, if there is a brake, disconnect the brake coil during the parameter-setting phase.

G2 - General information

• Structure

To configure the variable speed drive for a given application, you should modify the parameters organised in menus, where each menu corresponds to a function linked group of parameters.

Example :

02.04

Menu number : 2 - Ramps

Number of parameter in the menu 04 - Deceleration mode

• Types of parameters

- The parameters are numerical or binary and they are accessible when reading and writing.
- Certain parameters are accessible only when reading, and they give indications on the variable speed drive operating status.

• Commissioning at 3 levels

- Quick commissioning with the factory settings of the variable speed drive :
allows the operation of the variable speed drive with minimum parameter-settings.

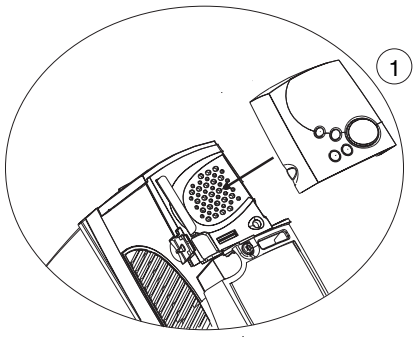
- Simplified commissioning starting with 0 menu (user menu) :
group of parameters used to simply adapt of the variable speed drive to the application, by modifying only the most current adjustments.

- Advanced commissioning by using the menus 1 to 22 (menu diagram) :
allows the configuration of the variable speed drive according to the variable speed drive needs, by accessing all the variable speed drive functions.
If necessary, detailed explanations about each parameter are grouped in the manual Explanation of parameters ref. 3655, available on CD ROM supplied with the drive.

G3 - Installation of LED display

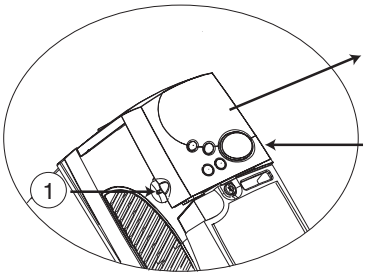
CAUTION :
The display can be mounted or dismantled when the variable speed drive is powered up, except when the Run and Stop commands are supplied from the keyboard.

- Display installation



1 Position the display parallel to the variable speed drive and press until obtaining a click

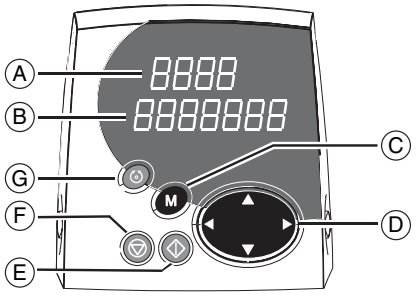
- Display dismantling



2 Open the display

1 Press the buttons located on each side of the display

G4 - Use of LED display

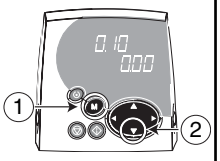
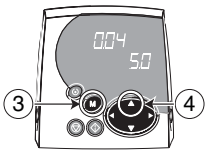
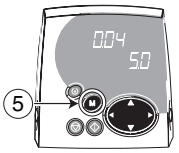
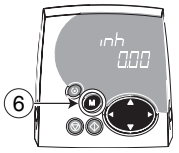


Command	Ref.	Function
8888	A	Upper display consists of 4 digits 7 segments allow the display of: - the variable speed drive operating status, - the adjustment parameters, made of menu and of parameters
8888888	B	Lower display consists of 7 digits 7 segments allowing the display of: - the operating mode, - the parameter content, - the default code.
M	C	Touch Mode allowing to switch from the normal mode to the paramer-setting mode.
	D	The 2 arrows allow the movement on the displays of the 7 segments of the lower display in order to modify its value or to switch from one menu to another. The 2 arrows allow to scroll up or down through the parameters and their values value.
	E	In keyboard mode, these keys allow the foll. commands: - Run,
	F	- Stop, fault reset,
	G	- Reversal of the movement direction.

G5 - Selection and modification of a parameter

This procedure describes the use of the Unidrive SP LED display.
CAUTION :
• This procedure has been drawn up for initial commissioning.
• If the variable speed drive is already powered up, the first parameter displayed may not be 0.10. Simply select the parameter to be displayed or modified using the or key.

Note : In parameter-seting mode, if there is no operator action for 4 minutes, the display stops flashing and returns automatically to the initial variable speed drive status.

Action	Comment
	Power-up Disabled variable speed drive (terminal 31 opened) (initial status)
	(1) : Access to the parameter-setting mode. Parameter **0.10** flashes on display. (2) : The and keys are used to access the parameter to be modified. For instance, slect parameter **0.04**.
	(3) : Access to parameter modification. The parameter number does not flash. Its value is indicated in the lower display (the lowest weight digit flashes). (4) : Press and hold down the key, to quickly scroll through the parameter value. The final setting is made by short preses on same key. For speed, you can modify the other digits by or .
	(5) : The new value of **0.04** is memorised Press the or key to select a new parameter to be modified.
	(6) : Return to the initial variable speed drive status.

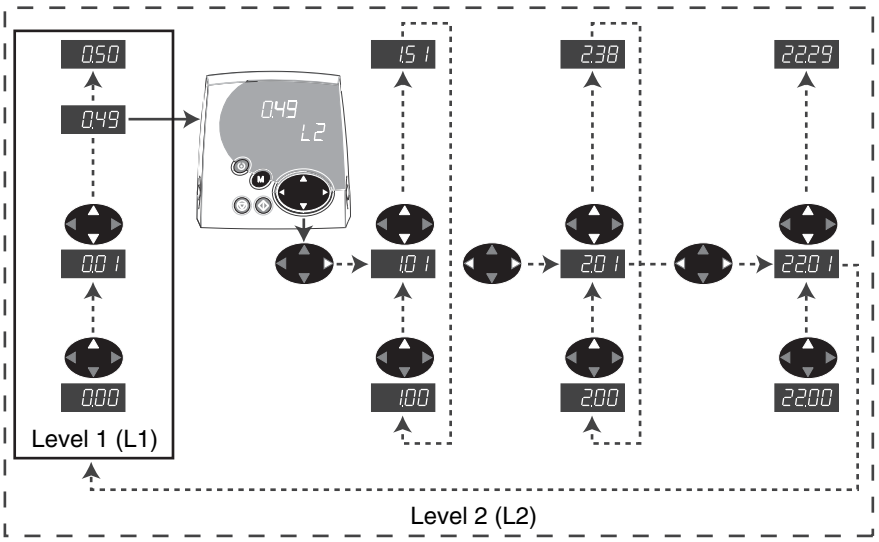
G6 - Control of the drive by means of the keyboard

Connect a holding contact to the safety/enable input (terminal 31) and +24V (terminal 22) of the variable speed drive control terminal block (if necessary, see section E).
• Power up the variable speed drive, the display displays " inh ".
• Set the parameter **0.05** to Pad (4) (speed reference selection by keyboard).
• Display the parameter **0.10** to see the speed value.
• Power down the contact of terminal 31, the display displays " rdy ".
• press the key to start.
• Press the key to increase the speed.
• Press the key to decrease the motor speed.
• Press the key to stop the motor, the display displays " rdy " or " stop " for the servo mode.

UNIDRIVE SP
Parameter-setting

G7 - Access level

In factory settings, only the 0 menu is accessible by the user.
To access other menus, you should:
• select the parameter **0.49** : its value is at " L1 "
• modify the value of **0.49** at " L2 "
The left and right arrows are enabled at present and the menus 1 to 21 are accessible.



G8 - Storing

Parameter	Setting	Description	Validation
xx.00 (parameter 0 of any menu)	**1000**	Storing of the parameters modified in the menus 1 to 22	Press the Reset key

• The modification of the 0 menu parameters are not stored automatically by the variable speed drive.
• The modification of the 1 to 22 menu parameters are not stored automatically, the opposite procedure must be followed.
Note : If the drive is " UU " powered up by default or if the variable speed drive operates by the 48V fail safe supply, enter 1001 in **xx.00** to store the parameters.

G9 - Return to factory settings

Parameter	Setting	Description	Validation
0.00	**1233** or **1244**	Configuration in European factory settings or Configuration in USA factory settings	Press the Reset key

⚠ **• Before following this procedure, check that the motor is stopped and that the system is safe.**

Note : This procedure is also valid if we use the 0 parameter of another menu, for instance **1.00** or **4.00**.
Besides, it does not modify the operating mode (OPEn.LP, CLVECt, SErVO).

G10 - Modification of the operating mode

Parameter	Setting	Description	Validation
0.00	**1253** **or** **1254**	Europe configuration 50 Hz mains supply or USA configuration, 60 Hz mains supply	Press the Reset key
0.48	**OPEn LP (1)** **or** **CL VECt (2)** **or** **SErVO (3)** **or** **rEgEn (4)**	**Open loop (factory settings)** or Vector control in closed loop or Servo mode with Brushless motor or Regenerative mode (not used)	

⚠ **• This procedure of modification of the operating mode restores the factory parameter settings of the parameters corresponding to the new mode, including the motor parameters (it is necessary to set the motor parameters before starting). The modification of the operating mode must be made with the variable speed drive stopped or disabled.**

• Before following this procedure, check that the system is safe.

G11 - List of modified parameters

Parameter	Setting	Description
xx.00 (parameter 0 of any menu)	**12000**	All the parameters remained in factory settings are no loger accessible, only the modified parameters are visible

During the parameter-setting, it is sometimes useful to know which factory settings differ from the parameters of the drive. To display only these parameters, follow this procedure.
Note : to disable this function, enter the 0 value in a parameter **xx.00**.

G12 - List of destination parameters

Parameter	Setting	Description
xx.00 (parameter 0 of any menu)	**12001**	Only the destination parameters are visible

If the parameter-setting of menus 1 to 22 has been modified, this procedure allows the presentation of the destination parameters of the variable speed drive. This type of parameter allows the user to transfer a function output to another parameter. (See details at section H3.2).
To display only these parameters, follow this procedure.
Note : to disable this function, enter the 0 value in a parameter **xx.00**.

G13 - Safety code

In certain cases, it is necessary to inhibit the modification of the variable speed drive parameters, while being able to read them.

• Disabling of settings by the security code

Parameter	Settings	Description	Validation
0.34	**Enter a value between 1 and 999**	Selection of the security code	-
0.49	**Loc (0)**	Enabling of the security code	Press the Reset key
The parameter **0.49** returns automatically to the value "L1" : all the parameters of the 0 menu are visible but they can not be modified. Only the parameter **0.49** can be modified for reading the parameters of another menus. The value **0.34** returns automatically to 0.			

• Access to settings with security code
Select the parameter to be modified.
Press the M key, the display shows "CodE".
By means of the arrows, enter the security code, then press again M .
- Correct code : the parameter is in parameter-setting mode, ready to be modified.
- Incorrect code: the parameter remains only in read mode, as all the other parameters.

To return to the read mode, select **0.49** and enter the value "Loc", then press the Reset key.
The security code is enabled again.

• Suppression of a security code
Select a parameter.
Press the M key, the display displays "CodE".
By means of ther arrows, enter the security code, then press again M .
Select **0.34**, enter the 0 value and press again M .

• Recovery of a security code
If the user forgets the security code (variable speed drive inhibited read only), contact your usual LEROY-SOMER agent.

Notes

UNIDRIVE SP
Commissioning

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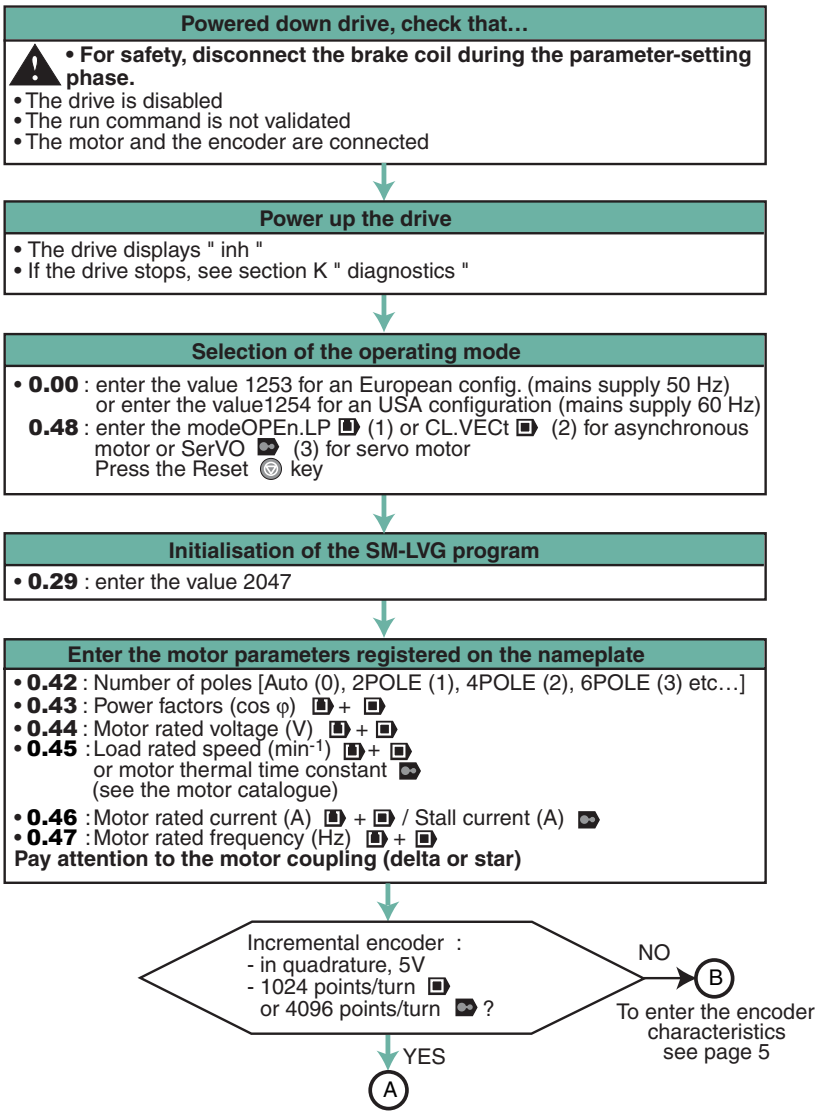
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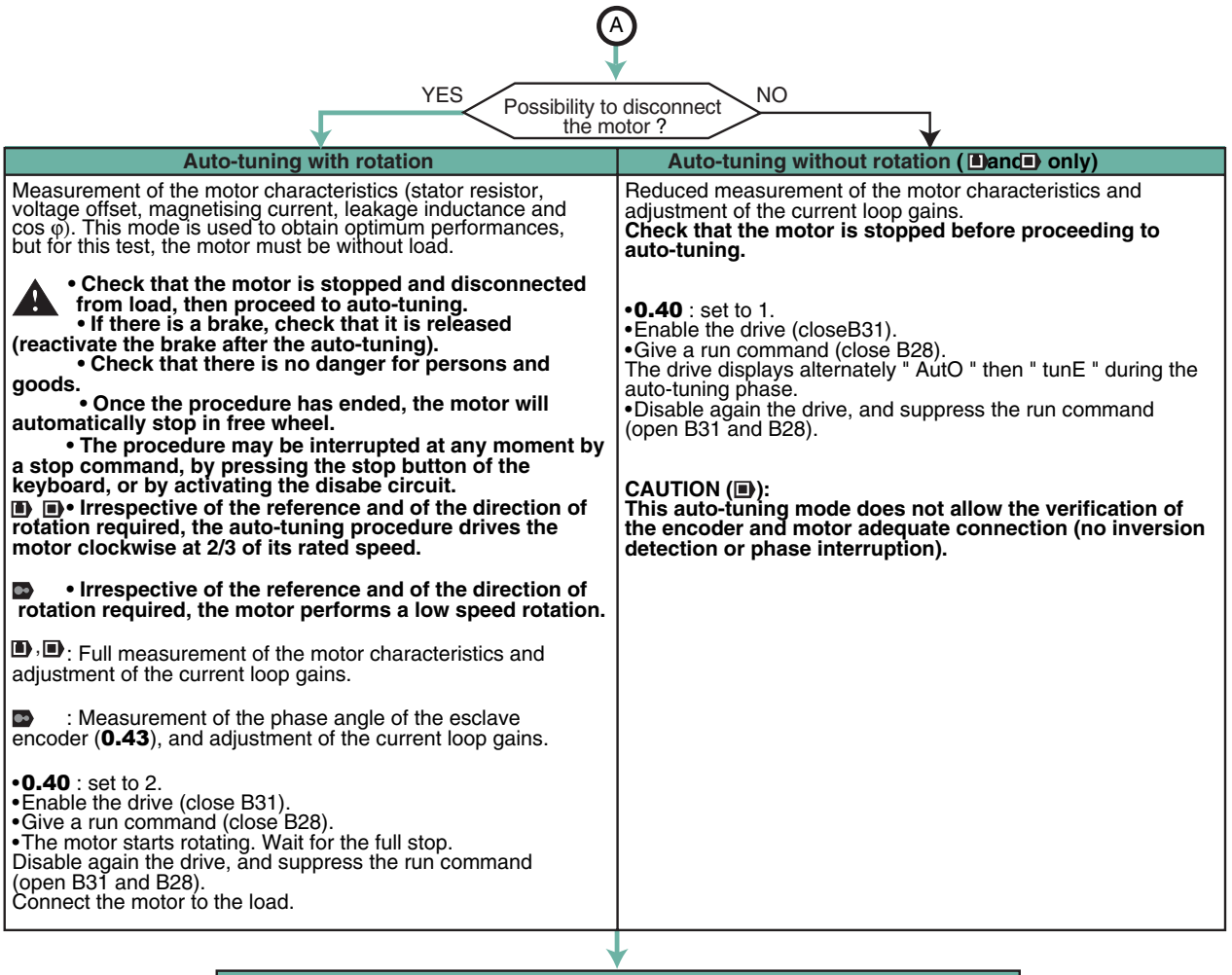
H1 - Quick start

Before proceeding to the commissioning, read chapter G1 Warning.

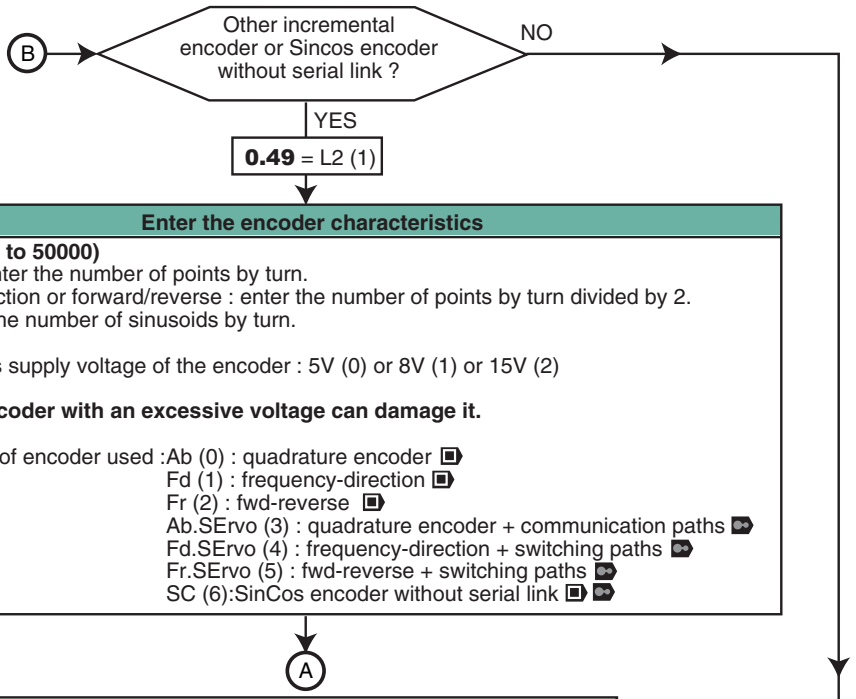


Note : Factory settings, the variable speed drive is configured in positive logic. To charge the variable speed drive to negative logic, set the parameter **8.29** to On (1) for the drive logic, and eventually **16.29** to On (1) for the logic og the SM-I/O Plus module, if used.

UNIDRIVE SP
Commissioning



If the encoder is not a standard LEROY-SOMER incremental encoder, follow the indications below :



Enter the encoder characteristics

- **3.34** : **ELPR (0 to 50000)**
  Quadrature : enter the number of points by turn.
  Frequency/direction or forward/reverse : enter the number of points by turn divided by 2.
  Sincos : enter the number of sinusoids by turn.
- **3.36** : **Voltage**
  Enter the mains supply voltage of the encoder : 5V (0) or 8V (1) or 15V (2)
  CAUTION:
  Feeding an encoder with an excessive voltage can damage it.
- **3.38** : **Type**
  Entrer the type of encoder used :Ab (0) : quadrature encoder
  Fd (1) : frequency-direction
  Fr (2) : fwd-reverse
  Ab.SErvo (3) : quadrature encoder + communication paths
  Fd.SErvo (4) : frequency-direction + switching paths
  Fr.SErvo (5) : fwd-reverse + switching paths
  SC (6):SinCos encoder without serial link

A
In order to proceed to commissioning, resume it at page 4

0.49 = L2

Enter the encoder characteristics

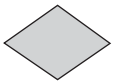
SinCos encoder with serial link Hiperface or EndAt or EnDat encoder	Sincos encoder with SSI link or SSI encoder
• **3.41** : **Auto-configuration** Enter the value On (1) for an auto-configuration of the encoder parameters when powering up (**3.33**, **3.34** and **3.35**). • **3.36** : **Voltage** Enter the encoder mains supply voltage: 5V (0) or 8V (1) or 15V (2). **CAUTION:** **Feeding an encoder with an excessive voltage can damage it.** • **3.37** : **Transmission speed** Enter the speed of the serial link (excepting the SinCos encoder with Hiperface link) : 100 kbauds (0), 200 kbauds (1), 300 kbauds (2), 400 kbauds (3), 500 kbauds (4), 1000 kbauds (5), 1500 kbauds (6), 2000 kbauds (7), 4000 kbauds (8). • **3.38** : **Type** Enter the type of encoder used: SC.Hiper (7) : SinCos with Hiperface, EndAt (8) : EndAt, SC.EndAt (9) : SinCos with EnDat link.	• **3.41** : **Selection of SSI format** Enter the value OFF (0) to select the Gray SSIcode format. Enter the value On (1) to select the SSI binary format. • **3.33** : **number of turns (number of bits)** Enter the maximum number of encoder turns Ex. : if **3.33** = 5, the number of maximum turns will be 2^5. • **3.34** : **Number of increments/turn (ELPR)** SinCos encoder only. Enter the number of sinusoids by turn. • **3.35** : **Resolution (number of bits)** Enter the resolution of the serial link (number of bits used to represent an encoder turn). • **3.36** : **Voltage** Enter the encoder mains supply voltage : 5V (0) or 8V (1) or 15V (2). **CAUTION:** **Feeding an encoder with an excessive voltage can damage it.** • **3.37** : **Transmission speed** Enter the linking speed : 100 kbauds (0), 200 kbauds (1), 300 kbauds (2), 400 kbauds (3), 500 kbauds (4), 1000 kbauds (5), 1500 kbauds (6), 2000 kbauds (7), 4000 kbauds (8). • **3.38** : **Type** Enter the type of encoder used : SSI (10) : SSI encoder, SC.SSI (11) : SinCos with SSI link.

A
In order to proceed to commissioning, resume it at page 4

H2 - Menu 0 : User menu

H2.1 - List of parameters

The menu 0 is used to group together the most used parameters for a simplified commissioning.
Each parameter of menu 0 is the image of a parameter contained in another menu (menu 1 to 22). The correspondance of the parameters of menu 0 is indicated in the " address " column of the table below.

 : LS = Reading parameter

 : L-E = Reading and writing parameter

EUR : 50 Hz mains supply
USA : 60 Hz mains supply

: Open loop vector control
: Closed loop vector control
: Servo

Parameter	Description	Address	Type	Mode	Variation range	Factory settings
0.00	• Storing • Factory settings • Operating mode selection • List of parameters	-	L-E		0 to 32767	0
0.01	Frequency limit or or minimum speed	**1.07**	L-E		± 3000.0 Hz	0
					± LIM N MAX *	0
0.02	Frequency limit or maximum speed	**1.06**	L-E		0 to 3000.0 Hz	50.0 Hz (EUR) 60.0 Hz (USA)
					0 to LIM N MAX *	1500.0 min^{-1} (EUR) 1800.0 min^{-1} (USA)
						3000.0 min^{-1}
0.03	Acceleration ramp reading	**2.11**	LS		0 to 3200.0 s/100 Hz	-
					0 to 3200.000 s/1000min^{-1}	-
0.04	Deceleration ramp reading	**2.21**	LS		0 to 3200.0 s/100 Hz	-
					0 to 3200.000 s/1000min^{-1}	-
0.05	Reference selection	**1.14**	L-E		A1.A2 (0), A1.Pr (1), A2.Pr (2), Pr (3), Pad (4), Prc (5)	A1.A2 (0)
0.06	Current limitation	**4.07**	L-E		0 to LIM IM1 MAX (%) *	165.0 %
					0 to LIM IM1 MAX (%) *	175.0 %
0.07	Control mode	**5.14**	L-E		Ur_S (0), Ur (1), Fd (2), Ur_Auto (3), Ur_I (4), SrE (5)	Ur_I (4)
	Proportional gain of the speed loop	**3.10**	L-E		0 to 6.5535 (1/$rads^{-1}$)	0.0100 (1/$rads^{-1}$)
0.08	Boost	**5.15**	L-E		0 to 25.0 % de U_N moteur	3.0 %
	Integral gain of the speed loop	**3.11**	L-E		0 to 655.35 (1/rad)	1.00 (1/rad)
0.09	Dynamic U/F selection	**5.13**	L-E		OFF (0) or On (1)	OFF (0)
	Derived gain of the speed loop	**3.12**	L-E		0 to 0.65535 (s)	0
0.10	Calculated motor speed	**5.04**	LS		± 180000 min^{-1}	-
	Measured motor speed	**3.02**	LS		± N MAX (min^{-1}) *	-
0.11	Motor frequency	**5.01**	LS		± REF MAX (Hz) *	-
	Encoder position	**3.29**	LS		0 to 65535 ($1/2^{16}$ turn)	-

* For explaining the parameter range, see section H3.5.

Parameter	Description	Address	Type	Mode	Variation range	Factory settings
0.12	Total motor current	**4.01**	LS		0 to I_{MAX} VAR (A) *	-
0.13	Current level on brake enabling	**12.42**	L-E		0 to 200 %	50 %
0.14	Current level on brake disabling	**12.43**	L-E		0 to 200 %	10 %
0.15	Frequency threshold on brake enabling	**12.44**	L-E		1.0 to 20.0 Hz	1.0 Hz
0.16	Frequency threshold on brake disabling	**12.45**	L-E		0.0 to 20.0 Hz	2.0 Hz
	Speed threshold on brake disabling				0 to 200 min^{-1}	5 min^{-1}
0.17	Magnetising time delay before enabling	**12.46**	L-E		0.0 to 25.0 s	1.0 s
	Speed threshold time delay					
0.18	Brake enabling time delay	**12.47**	L-E		0.0 to 25.0 s	1.0
0.19	Brake disabling time delay	**12.48**	L-E		0.0 to 25.0 s	1.0
0.20	Brake release	**12.40**	LS		OFF (0) or On (1)	-
0.21	Analogue reference scaling	**18.19**	L-E		0 to 200 Hz	100 Hz
					0 to 6000 min^{-1}	3000 min^{-1}
0.22	Preset reference 1	**19.17**	L-E		0 to 200 Hz	15 Hz
					0 to 6000 min^{-1}	500 min^{-1}
0.23	Preset reference 2	**19.18**	L-E		0 to 200 Hz	30 Hz
					0 to 6000 min^{-1}	1000 min^{-1}
0.24	Preset reference 3	**19.19**	L-E		0 to 200 Hz	50 Hz
					0 to 6000 min^{-1}	1500 min^{-1}
0.25	Preset reference 4	**19.20**	L-E		0 to 200 Hz	60 Hz
					0 to 6000 min^{-1}	2000 min^{-1}
0.26	Limitation validation of the load function reference	**19.11**	L-E		OFF (0) or On (1)	0 (OFF)
0.27	Reverse weighing scaling	**19.15**	L-E		30 % to 80 %	80 %
0.28	Forward weighing scaling	**19.16**	L-E		50 % to 100 %	100 %
0.29	Return to factory settings and lifting parameter cloning	**20.01**	L-E		0 to 32765	0

* For explaining the parameter range, see section H3.5.

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Parameter	Description	Address	Type	Mode	Variation range	Factory settings
0.30	Parameter cloning	**11.42**	L-E		nonE (0), rEAd (1), Prog (2), AutO (3), boot (4)	nonE (0)
0.31	Acceleration ramp	**18.18**	L-E		1 to 3200 1/10s pour 100Hz	20
					1 to 3200 1/10s pour 1000min^{-1}	10
0.32	Deceleration ramp	**18.17**	L-E		1 to 3200 1/10s pour 100Hz	20
					1 to 3200 1/10s pour 1000min^{-1}	10
0.33	Full resumption	**6.09**	L-E		0 to 3	0
	Auto-tuned rated speed	**5.16**	L-E		0 to 2	0
0.34	User security code	**11.30**	L-E		0 to 999	0
0.35	Communication type	**11.24**	L-E		AnSI (0), rtU (1), Lcd (2)	rtU (1)
0.36	Serial link transmission speed	**11.25**	L-E		300(0), 600(1), 1200(2), 2400(3), 4800(4), 9600(5), 19200(6), 38400(7), 57600(8), 115200(9)	19200 (6)
0.37	Serial link address	**11.23**	L-E		0 to 247	1
0.38	Proportional gain current loop	**4.13**	L-E		0 to 30000	20
					0 to 30000	Drive 200V(TL) : 75 Drive 400V(T) : 150 Drive 575V(TM) : 180 Drive 690V(TH) : 215
0.39	Integration gain current loop	**4.14**	L-E		0 to 30000	40
					0 to 30000	Drive 200V(TL) : 1000 Drive 400V(T) : 2000 Drive 575V(TM) : 2400 Drive 690V(TH) : 3000
0.40	Auto-tuning, measurements and calculations	**5.12**	L-E		0 to 2	0
					0 to 4	
					0 to 6	
0.41	Carrier frequency	**5.18**	L-E		3(0), 4(1), 6(2), 8(3), 12(4), 16(5) kHz (16 kHz non disponible pour les tailles 3)	3 (0) kHz
					3(0), 4(1), 6(2), 8(3), 12(4), 16(5) kHz (16 kHz non disponible pour les tailles 3)	6 (2) kHz
0.42	Motor pole number	**5.11**	L-E		Auto (0) to 120 POLE (60)	Auto (0)
						6 POLE (3)
0.43	Cos φ	**5.10**	L-E		0 to 1,000	0.850
	Encoder dephasing	**3.25**	L-E		0 to 359.9°	0

* For explaining the parameter range, see section H3.5.

Parameter	Description	Address	Type	Mode	Variation range	Factory settings
0.44	Motor rated voltage	**5.09**	L-E		0 to U_{AC} MOT MAX (V) *	Variateur 200V(TL) : 230V Variateur 400V(T) : 400V (EUR), 460V (USA) Variateur 575V(TM) : 575V Variateur 690V(TH) : 690V
0.45	Motor with load rated speed	**5.08**	L-E		0 to 180000 min^{-1}	1500 min^{-1} (EUR) 1800 min^{-1} (USA)
					0 to 40000.00 min^{-1}	1450.00 min^{-1} (EUR) 1770.00 min^{-1} (USA)
	Motor thermal time constant	**4.15**	L-E		0 to 400.0	20.0
0.46	Motor rated current	**5.07**	L-E		0 to I_N MAX (A) *	I_{NOM} VAR (**11.32**)
	Stall current					
0.47	Motor rated frequency	**5.06**	L-E		0 to 3000.0 Hz	50.0 Hz (EUR) 60.0 Hz (USA)
					0 to 1250.0 Hz	50.0 Hz (EUR) 60.0 Hz (USA)
0.48	Operating mode selectiont	**11.31**	L-E		OPEn LP (1), CL VECt (2), SErVO (3), REgEn (4)	OPEn LP (1)
0.49	Access to level 2 and Security code storing	**11.44**	L-E		L1 (0), L2 (1), Loc (2)	L1 (0)
0.50	Software version	**11.29**	LS		1.00 to 99.99	-
0.51	Position loop validation	**12.49**	L-E		OFF (0) or On (1)	OFF (0)
0.52	Proportional gain of the position loop	**13.09**	L-E		0 to 100 $rads^{-1}$/rad	25$rads^{-1}$/rad
0.53	Maximum braking length of the brake resistors	**10.30**	L-E		0 to 400.00 s	0.02s
0.54	Maximum braking cycle of the resistors	**10.31**	L-E		0.0 to 1500.0 s	2.0 s
0.55	Run/Stop command	**1.11**	LS		OFF (0) or On (1)	-
0.56	Variable speed drive output activated	**10.02**	LS		OFF (0) or On (1)	-
0.57	Alarm and prealarm validation	**20.16**	L-E		00000 to 11111	111
0.58	Default validation	**20.40**	L-E		00000000 to 1111111	11111

* For explaining the parameter range, see section H3.5.

H2.2 - Parameter explanation

0.00 **: Storing parameter, return to European and USA factory settings, modification of the operating mode, list of parameters**

Variation range : 0 to 9999
Factory settings : 0
1000 : storing,
1001 : storing, even in safety power supply mode,
1070 : Reset of option modules,
1233 : return to European factory settings,
1244 : return to USA factory settings,
1253 : selection of the operating mode with return to European factory settings,
1254 : selection of the operating mode with return to USA factory settings,
12000 : selection of all the parameters the value of which if different from the factory settings.
12001 : selection of all the destination parameters.
Press the Reset key to validate the settings.

0.01 **: Frequency limit or minimum speed**

It is the lowest operating speed or frequency (established for two directions of rotation). With a minimum reference, it is the output frequency or speed.
Note : This parameter is not considered during the pulse operation.

CAUTION :
0.01 is a rated value. The sliding compensation and the current limitation may generate a slightly different output frequency.

0.02 **: Frequency limit or maximum speed**

It is the highest operating speed or frequency (established for two directions of rotation). With a maximum reference, it is the output frequency or speed.
Note : The drive integrates an overspeed protection.

CAUTION :
0.02 is a rated value. The sliding compensation and the current limitation may generate a slightly different output frequency.

0.03 **: Reading of the acceleration ramp value**

0.04 **: Reading of the deceleration ramp value**

0.05 **: Reference selection**

It is the speed reference selection.
A1.A2 (0) : reference selection by voltage (A1) analogue input 1 or by the voltage (A2) analogue input 2, and pulse operation, by terminals 28 and 29.
A1.Pr (1) : reference selection by voltage (A1) analogue input 1 or 3 preset references, by terminals 28 and 29.
A2.Pr (2) : reference selection by voltage (A2) analogue input 2 or 3 preset references, by terminals 28 and 29.
Pr (3) : preset reference selection, by terminals 28 and 29.
Pad (4) : reference selection by keyboard (arrows and).
Prc (5) : precision speed reference (not used in menu 0).
Note : The terminals 28 and 29 are automatically configured depending on the value of **0.05**.
(See the control diagrams - section E2.3 and E2.4).

0.06 **: Current limitation**

Set the maximum active current (percentage of the rated active current) supplied by the variable speed drive during the motor or the generator operation.
The output speed or frequency is limited in order to maintain the active current lower or equal to the limit set by **0.06**.

0.07 : **Control mode**
Proportional gain of the speed loop
and

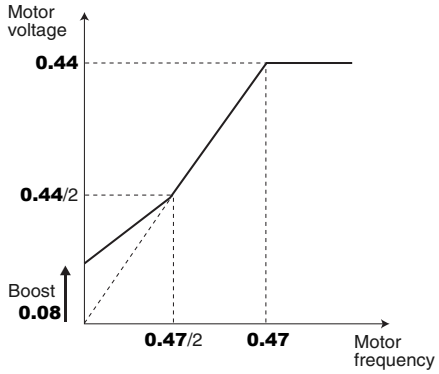
:

The difference between these modes is the method used for the identification of the motor parameters, especially of the stator resistor. These parameters vary depending on the motor temperature, that is depending on its use cycle.
To obtain optimum performances in vector mode, it is necessary that cos φ (**0.43**), the stator resistor and the voltage offset be precisely set.

Ur_S (0) : the stator resistor and the voltage offset are measured each time th variable speed drive receives a run command.
These measurements are valid only if the machine is stopped, totally out of flow. The measurements are not effected if the run command is given quicker than one second after the previous stop.
This is the most high-performance vector control. However, the operating cycle must be compatible with the second necessary between a run command and a new run command.

Ur (1) : the stator resistor and the voltage offset are not measured.
This mode is the less high-performance. We will use it only when the other modes are incompatible with the operating cycle.
In such a case, during the commissioning, we will proceed to an auto-tuning without rotation (voir **0.40**), and then we will use the Ur mode in normal operation.

Fd (2) : Voltage frequency law with low speed fixed boost (boost adjusted by parameter **0.08**).



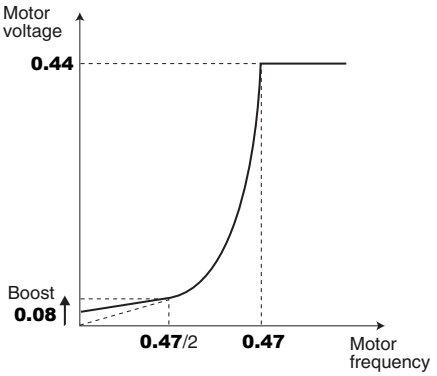
This mode is generally used to drive various motors from the same variable speed drive.

Ur_Auto (3) : the stator resistor and the voltage offset are measured only during the first power up, after a run command. In this case, the stator resistor and the voltage offset are stored. Then, **0.07** takes the " Ur " value.
CAUTION :
If the measurement fails, the stator resistor and the voltage offset are not registered, but 0.07 remains at the Ur_Auto value and we may try again on the following power up.

Ur_I (4) : the stator resistor and the voltage offset are measured on each power up of variable speed drive, after a run command.
These measurements are valid only if the machine is stopped on the power up.

• In Ur I mode, a voltage is briefly applied to the motor. The security must be assured so that no electrical circuit may be accessible once the variable speed drive is powered up.

SrE (5) : this mode is used for centrifugal applications (fans, pumps…) with low speed fixed boost (boost adjusted by parameter **0.08**).



and **:**

Adjust the motor speed stability on reference brutal variations.
Increase the proportional gain until obtaining vibrations within the motor, then decrease the value from 20 to 30 %, checking that the motor stability is adequate on the speed reference brutal variations, with load or without load.

0.08 : **Boost**
Integral gain of the speed loop **and**

:

For the operation in U/F (**0.07** = Fd (2) or SrE (5)) mode, the parameter **0.08** is used to overflow the low speed motor so that it may supply more torque when starting.
This is a percentage of the motor rated voltage **0.44**.
(See the diagrams of **0.07**).

and **:**

Adjust the motor stability on a load impact.
Increase the integral gain in order to obtain the same speed with load and without load on the load impact.

0.09 : **Dynamic U/F selection** (▮)
Derivative gain of the speed loop (▮) **and** (▮)
(▮) :
OFF (0) : the U/F report is fixed and it is set by the base frequency (0.47).
On (1) : dynamic U/F law.
Generates a voltage/frequency characteristic varying depending on the load. We will use it in quadratic torque applications (pumps/fans/compressors). We may use it in low dynamic constant toque applications to reduce the motor noises.

(▮) **and** (▮) :
Adjust the motor speed stability on reference quick variations or load power cut. Reduced overshoot.
Generally, let the setting at 0.

0.10 : **Calculated motor speed** (▮)
Measured motor speed (▮) **and** (▮)
(▮) :
The motor speed is calculated based on the after ramp frequency reference (in Hz) or on the final frequency reference when we use it in frequency servo-control (reference signal on encoder input).

(▮) **and** (▮) :
This parameter is used to read the motor real speed, resulting from the speed sensor (incremental encoder, by instance).

0.11 : **Motor frequency** (▮) **and** (▮)
Encoder position (▮)
(▮) **and** (▮) :
It is the variable speed drive carrier frequency. This is the sum of the after ramp reference and the sliding compensation.

(▮) :
Indicate the encoder position in a turn. An encoder turn is divided into 65536 increments.

0.12 : **Total motor current**
Efficient current reading during each variable speed drive output phase.
This is the result of the magnetising current and the active current vector sum.

0.13 : **Current level on brake enabling** (▮)
It is used to adjust the current threshold at which the brake will be controlled. This current level must provide a sufficient torque when enabling the brake.
This is a percentage of **0.46**.

0.14 : **Current level on brake disabling** (▮)
It is used to adjust the current threshold below which the brake will be controlled. It must be adjusted so that the motor power supply loss be detected.
This is a percentage of **0.46**.

0.15 : **Frequency threshold on brake enabling** (▮)
It is used to adjust the frequency threshold at which the brake will be controlled. This frequency level must allow the supply of of a sufficient torque for driving the load to the adequate direction, when enabling the brake. Generally this threshold is adjusted at a value slightly higher than the frequency corresponding to the full load motor sliding.
Example :
- 1500 min^{-1} = 50 Hz,
- load rated speed = 1470 min^{-1},
- sliding = 1500 - 1470 = 30 min^{-1},
- sliding frequency = 30/1500 x 50 = 1 Hz.

0.16 : **Frequency threshold on brake disabling** (▮)
Speed threshold on brake disabling (▮) **and** (▮)
It is used to adjust the frequency or speed threshold at which the brake control will be disabled. This threshold allows the application of brake before the zero speed in order to avoid the load backdriving during the brake disabling. If the frequency or the speed falls below this threshold when the stop is not commanded (inversion of the direction of rotation), the brake will be maintained enabled. This exception will allow the avoidance of the brake spring the passage by the zero speed.

0.17 : **Magnetising time delay before enabling** (▮)
Speed threshold time delay (▮) **and** (▮)
This period is used to allow the motor torque to reach a sufficient level before the brake release.
(▮) : This time delay starts when all the brake enabling conditions are observed. It is used to reach, within the motor, a sufficient magnetising current level and for the full enabling of the sliding compensation function. At the end of the time delay, the brake control is validated, **0.20** = On (1).
During the whole time delay, the ramp applied to the reference is blocked.

(▮) and (▮) : This time delay allows the delay of the brake spring control in relation to the passing below the minimum speed threshold (**0.16**). It is useful for the avoidance of the brake repeated beating during the use around the zero speed.

0.18 : **Brake enabling time delay**
It allows some time for the brake to enable before unlocking the ramp applied to the reference.

0.19 : **Brake disabling time delay** (▮) **and** (▮)
This time delay is used to hold the torque stopped during the brake disabling. At the end of the time delay, the variable speed drive output is disabled.

0.20 : Brake release

Indicates the brake position. This parameter can be used as a digital output source parameter for the brake control.
0 : braking.
1 : brake release.

0.21 : Analogue reference scaling

Defines the speed corresponding to the analogue input value of 10V.
:
For instance, if we want 100 Hz for 10V of reference, we set **0.21** at 100.
and :
For instance, if we want 3000 min^{-1} for 10V of reference, we set **0.21** at 3000.

0.22 : Preset reference 1

It is used to define the preset reference RP1.

0.23 : Preset reference 2

It is used to define the preset reference RP2.

0.24 : Preset reference 3

It is used to define the preset reference RP3.

0.25 : Preset reference 4

It is used to define the preset reference RP4.

0.26 : Validation of the reference limitation function depending on the load

0 : No.
1 : Yes.

0.27 : Decreased weighing scaling

It is the ratio in % of the current consumed by the motor with a maximum decreased load on the motor rated current.

0.28 : Increased weighing scaling

It is the ratio of the current consumed by the motor with a maximum increased load on the motor rated current.
Note : The increase corresponds to a positive speed.

0.29 : Return to factory settings and lifting parameter cloning

• Return to lifting parameter settings
This parameter starts an automatic procedure of return to factory settings specific to the lifting application.
To validate the return to factory settings, follow the procedure below :

Parameter	Setting	Description	Validation
0.00	**1233** **or** **1244**	European factory settings configuration (50 Hz) or USA factory settings configuration (60 Hz)	Pres the Reset key
0.29	**2047**	**LVG software initialisation**	

• Check that the motor is stopped and that the system safety is engaged.

• Lifting parameter cloning
This parameter is used to save or to load the LVG parameters of menus 20, 70 and 71 by using SMARTCARD.

Parmeter	Setting	Description
0.29	**3333**	Saving of menus 20, 70 and 71 in SMARTCARD
0.29	**6666**	Loading of menus 20, 70 and 71 of SMARTCARD in the drive

0.30 : Parameter cloning

0.30	Action
nonE (0)	None
rEAd (1) +	Transfer of parameters stored in the SMARTCARD towards the drive
Prog (2) +	Transfer of the drive parameters towards the SMARTCARD
Auto (3) +	Transfer drive parameters towards the SMARTCARD. Then, all modification of the menu 0 parameter is automatically saved in the SMARTCARD
boot (4) +	If when powering up, a SMARTCARD is present, the SMARTCARD parameters are automatically transferred and stored in the drive.

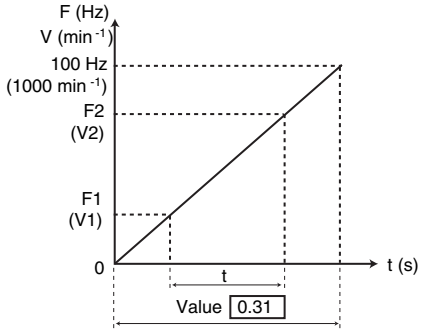
See the procedures of section J.

0.31 : Acceleration ramp

:
Time setting for accelerating from 0 to 100 Hz.
and :
Time setting for accelerating from 0 to 1000 min^{-1}.
Note : The value of **0.31** applies to 2 directions of rotation.

Value of **0.31** (s) = $\frac{0.1 \times t(s) \times 100\ Hz}{(F2-F1)\ Hz}$

Value of **0.31** (s) = $\frac{0.1 \times t(s) \times 1000\ min^{-1}}{(V2-V1)\ min^{-1}}$



0.32 : **Deceleration ramp**

:

Time setting for decelerating from100 Hz to 0.

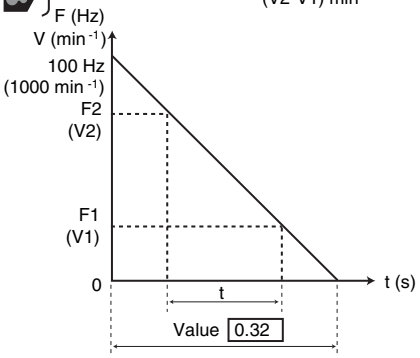
and :

Time setting for decelerating from 1000 min^{-1} to 0.

Note : The value of **0.32** applies to 2 directions of rotation.

Value of **0.32** (s) = $\frac{0.1 \times t(s) \times 100\ Hz}{(F2-F1)\ Hz}$

Value of **0.32** (s) = $\frac{0.1 \times t(s) \times 1000\ min^{-1}}{(V2-V1)\ min^{-1}}$



0.33 : **Quick resumption**

Automatic optimisation of the auto-tuned rated speed

:

If this parameter is validated (**0.33** = 1 to 3), the variable speed drive on run command or after a mains supply failure executes a procedure in order to calculate the motor frequency and direction of rotation. It will automatically diminish the output frequency on the measured value and will accelerate the motor until reaching the reference frequency.

0 : Unvalidation of the quick resumption of a revolving motor.

1 : validation of the quick resumption of a clockwise or counterclockwise rotation motor.

2 : validation of the quick resumption of a clockwise rotation motor.

3 : validation of the quick resumption of a counterclockwise rotation motor.

:

The motor slip is calculated based on the load rated speed **0.45**, and the motor rated frequency **0.47**.

However, as the slip varies depending on the temperature, the variable speed drive calculation based on **0.45** and **0.47** may be incorrect.

Parameter **0.33** at level 1 or 2 allows the automatic optimisation of the load rated speed.

0 : no optimisation.

1 : optimisation at level 1.

2 : Higher optimisation (gain x 16).

To preserve the new value of **0.45**, proceed to the parameter storing (**0.00** = 1000 + Reset).

This optimisation is active only if the speed is higher than 12.5% of the rated speed and when the motor load becomes higher than 62.5% on the rated load. The optimisation is no longer active when the load becomes lower than 50% of the rated load.

0.34 : **User safety code**

This parameter allows the introduction of a personal security code that locks all parameter modification (except **0.49**).

The reading of the personal code can be effected only during its editing.

Do not choose the zero code.

To vaidate or to use a code, follow the procedure described at section G12.

0.35 : **Communication type**

AnSI (0) : ANSI protocol used

RtU (1) : Modbus RTU protocol used

Defines the communication protocol used by the port RS485 of the variable speed drive.

This parameter may be modified by means of the keyboard, by a SM option or by the serial link itself. If the modification is sent by serial link, the response to the command will be transmitted by using the starting protocol. The master will have to wait 20ms before sending a new command in the new protocol.

Note : ANSI uses 7 data bits, 1 stop bit and 1 parity bit.

Modbus RTU uses 8 data bits, 2 stop bits and no parity bit.

Lcd (2) : specific protocol for locking the use of a " client " console.

0.36 : **Serial link transmission speed**

Used for selecting the transmission speed of the protocol used.

Note : The speeds 57600 and 115200 are used only for Modbus RTU.

This parameter may be modified by means of the keyboard, by a SM option or by the serial link itself. If the modification is sent by serial link, the response to the command will be transmitted by using the starting protocol. The master will have to wait 20ms before sending a new command in the new protocol.

0.37 : **Serial link address**

Used for defining the variable speed drive address, this is always slave.

Modbus RTU :

For this protocol, the addresses 0 to 247 may be used. The address 0 is used to communicate with all the mains supply slaves (Broadcast), that is why this address must not be entered in this parameter.

ANSI :

For this protocol, the first digit corresponds to the group, and the second to the variable speed drive address in the group. The maximum number od groups is of 9, and the maximum number of addresses in the group is of 9. Therefore, the value of **0.37** is limited to 99. Besides, the address 0 is used to communicate with all the mains supply slaves, and the addresses x0 are used for the slaves of group x, that is why the addresses must not be entered in this parameter.

0.38 : **Current loop proportional gain**

0.39 : **Current loop integral gain**

Determines a number of internal variable speed drive factors, as in the following :
- Frequency adjustment with current limitation related to rated frequency and on the load impacts.
- Torque adjustment on the low load machines and related to the rated speed.
- Supply failure or on controlled deceleration ramp when the continuous current bus adjustment is required.

To reduce these oscillations, it is recommended :
- to increase the proportional gain **0.38**,
- to decrease the integral gain **0.39**.

Note : The gains are automatically set by auto-tuning according to the selected procedure (see **0.40**).

0.40 : **Auto-tuning, measures and calculations**

• Check that the auto-tuning with rotation does not present a safety risk and check that the motor is stopped before starting the procedure.

• After the modification of the operating mode or of the motor parameters, renew the auto-tuning.

0 : no auto-tuning.

1 :
and :

Characteristics measurements, stationary motor :
- voltage offset ,
- stator resistance and ,
- current loop gains ,
- transient inductance .

Choose this mode when the load cannot be disconnected from the motor.

Procedure :
- check that the motor parameters have been set and that the motor is stopped,
- enable the variable speed drive (close terminal 31),
- give run command (close terminal 26 or 27).

The display indicates alternately "Auto" and "tunE". Wait until the display stabilises at "0.00".
Open terminal 31 and terminal 26 or 27.
The motor is then ready for normal operation.
The parameter **0.40** reaches again 0 after the end of the auto-tuning.

:

Measurement of the encoder phase angle. The motor must be disconnected.

Procedure :
- check that the motor parameters have been set and that the motor is stopped
- enable the variable speed drive (close the terminal 31),
- give a run command (close the terminal 26 or 27).
- The motor turns about 2 times in reverse direction, at a very low speed, then it stops. The display indicates alternately "Auto" and "tunE". Wait until the display stabilises at "0.00".

Open the terminal 31 and the terminal 26 or 27.
The motor is then ready for normal operation.
The parameter **0.40** reach again 0 after the end of the auto-tuning.

2 :
and :

Measurements of the rotating motor characteristics :
- voltage offset ,
- stator resistance and ,
- transient inductance ,
- cos φ and ,
- curtrent loop gains ,

This mode obtains the optimum performances, but the motor must be without load during the procedure.

Procedure :
-check that the motor parameters have been set and that the motor is stopped
- enable the variable speed drive (close the terminal 31),
- give a run command (close the terminal 26 or 27).

The motor accelerates up to 2/3 of the rated speed, then it stops in free wheel. During the auto-tuning, the display indicates alternately "Auto" and "tunE". Wait until the display stabilises at "0.00".
Open the terminal 31 and the terminal 26 or 27.
The motor is then ready for normal operation.
The parameter **0.40** reach again 0 after the end of the auto-tuning.

:

Measurement of the encoder phase angle, stator resistance, transient inductance, and automatic parameter-setting of the current loop gains.
The motor must be disconnected.

Procedure :
- check that the motor parameters have been set and that the motor is stopped
- enable the variable speed drive (close the terminal 31),
- give a run command (close the terminal 26 or 27).

The motor turns about two times in reverse direction, at a very low speed, then it stops.
The display indicates alternately "Auto" and "tunE". Wait until the display stabilises at "0.00".
Open the terminal 31 and the terminal 26 or 27.
The motor is then ready for normal operation.
The parameter **0.40** reaches again 0 after the end of the auto-tuning.

3 :
and :

Measurement of the total inertia (load and motor). The load may remain connected to the motor during the measurement, excepting the case when the load is not linear or if it increases with the speed (erroneous measurement).

Procedure :
- check that the motor parameters have been set and that the motor is stopped
- enable the variable speed drive (close the terminal 31),
- give a run command (close the terminal 26 or 27).

The motor turns several times (3/4 of the loiad rated speed), then it stops. During the auto-tuning, the display indicates alternately "Auto" and "tunE". Wait until the display stabilises at "0.00".
Open the terminal 31 and the terminal 26 or 27.
The motor is then ready for normal operation.
The parameter **0.40** reaches again 0 after the end of the auto-tuning.

4 :
:
Calculation of the current loop gains.
The transient inductance and the stator resistance must be set before validating the gain calculation. For this, proceed to an auto-tuning **0.40** = 1 or 2 (if the motor may be disconnected or not) before validating the gain calculations.
Note : When the gain is calculated **0.40** pass from 4 to 0.

:
Characteristics measurements, stationary motor :
- stator resistance,
- stator resistance,
- loop gains of the current loop.

Procedure :
- check that the motor parameters and the encoder phasing out **0.43** have been set and that the motor is stopped
- enable the variable speed drive (close the terminal 31),
- give a run command (close the terminal 26 or 27).

The display indicates alternately "Auto" and "tunE". Wait until the display stabilises at "0.00".
Open the terminal 31 and the terminal 26 or 27.
The motor is then ready for normal operation.
The parameter **0.40** reaches again 0 after the end of the auto-tuning.

5 :
Measurement of the encoder phase angle **0.43** with low rotation.
Low current pulses are applied to the motor in order to produce a motor movement, then it is restored in its initial position.
If this procedure fails, if is automatically renewed 2 times (however, if the measurement is still unsatisfactory, the variable speed drive passes to - "tunE2").
Then, the variable speed drive check that the direction of rotation of the position sensor is correct.
The phase angle **0.43** is then updated and stored.
This test is correctly carried out with an inertia load, taking into account the fact that the motor must not be of low power and the friction must be acceptable, the motor must not be highly loaded for this test (inertia lower than 0.715 x C_{nom}/5.38 kgm^2).
This test can not be used with sensors fitted with a single serial link, it is recommended to use an auto-tuning mode for the types Ab.servo and Fr.servo.

6 :
:
Calculation of the current loop gains.
This mode is not used for the simple applications of menu 0. For more information, see the Parameter manual ref. 3655.
Note : This value is not visible on the display that passes from 5 to 0. The return of **0.40** to 0 shows that the gains are calculated.

0.41 : Carrier frequency
Adjust the cutout frequency of PWM. Sampling frequency of digital and analogue inputs.
CAUTION :
• According to the carrier frequency and the UNIDRIVE SP rating, it may be necessary to make a derating of the output current. See section B3.3.
• A high carrier frequency reduces the magnetic noise and increases the variable speed drive losses, in exchange, it increases the motor heating and the level of emission of radio-frequency interference and reduces the start torque.
• If 0.41 is set to a value higher than 3 kHz, and when the junction temperature of the IGBT transistors reaches a certain alarm threshold, the carrier frequency is automatically reduced (0.41 remains at the value set by the user). When the variable speed drive cannot reduce further the carrier frequency, it passes to "O.ht1".
The variable speed drive restore the carrier frequency set as soon as the IGBT temperature drops under the alarm threshold.

0.42 : Motor number of poles
and :
Enter the motor number of poles.
Ex.: **2P (1) :** 2 pole motor (3000 min^{-1}),
4P (2) : 4 pole motor (1500 min^{-1}),
6P (3) : 6 pole motor (1000 min^{-1})….etc.
In factory settings, the value of **0.42** is set to "**Auto (0)**", and the variable speed drive calculates automatically the number of poles depending on the rated frequency (**0.47**) and on the load rated speed (**0.45**).

:
Enter the number of poles indicated on the motor plate.
In factory settings, the value of **0.42** is set to "**6 POLES (3)**".

0.43 : Cos φ and
Encoder phase angle
and :
Cos φ is automatically measured during the rotation auto-tuning phase (**0.40** = 2), and it is set to this parameter. If this procedure can not be effected, enter the value of cos φ set on the motor nameplate.
Note : After an auto-tuning **0.40** = 2 in closed loop, the value of cos φ may not be manually modified.

:
In order to correctly control a servo motor, the phasing out between the rotor flow and the encoder position must be set. This phase angle is automatically set during an auto-tuning **0.40** = 1 or 2.
This parameter may be modified at any moment, and it is immediately taken into account by the variable speed drive.
Note :
• After a return to factory settings, the value of **0.43** is not modified.
• For a UNIMOTOR motor fabricated starting with 2002, the encoders are stalled in factory (**0.43** = 0).

0.44 : **Motor rated voltage**
It is the rated voltage registered on the nameplate.

0.45 : **Loaded motor rated speed** and **Motor thermal time constant** and :
This is the loaded motor speed marked on the nameplate.
Note : The slip compensation is nor active if **0.45** is at 0 or at the value of the synchronous speed.

:
This parameter allows the setting of the motor thermal protection.
For the UNIMOTOR, set the thermal time constant of the coil (table B2.2 of the technical catalogue ref. 3863) in 0.45.

0.46 : **Motor rated current** and **Stall current** and :
This is the value of the motor rated current marked on the motor nameplate. The overload starts from this value.

:
This is the value of the stall current registered on the motor nameplate.
CAUTION :
If there is an ambient temperature of 50°C, check that the value of 0.46 does not exceed the value of the table section B3.3.
• To avoid the fire risks if the motor is overloaded, 0.46 must be correctly set.

0.47 : **Motor rated frequency** and
This is the point when the motor operation passes from constant torque to constant power.
In standard operation, it is the frequency marked on the motor nameplate.

0.48 : **Selection of the operating mode**
Allows the selection of the operating mode.
To modify the operating mode, follow the procedure described at section G9.
The factory drive settings are automatically adjusted depending on the selected operating mode.
OPEN.LP (1) : operation in open loop in vector control or in U/F.
CL.VECt (2) : operation in vector control in closed loop with encoder.
SerVO (3) : operation in Servo mode with autosynchronous motor (servo).
REgEn (4) : regenerative mode : for this mode, consult LEROY-SOMER.
Note :
• Returning to the factory settings does not modify the operating mode.
• The modification of the operating mode may be effected only when the variable speed drive is stopped.

0.49 : **Access to level 2 and storing of the security code**
L1 (0) : access to level 1. Only the parameters of menu 0 (**0.00** to **0.50**) are accessible from the keyboard.
L2 (1) : access to level 2. The parameters of all menus are accessible from the keyboard.
Loc (2) : used to store or to reactivate a security code (see the procedure described at section G12).

0.50 : **Software version**
Indicates the 2 first digits of the software version installed in the variable speed drive.

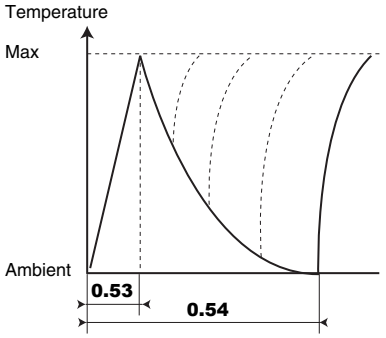
0.51 : **Validation of the position loop (and)**
When the parameter is set to 1, the position loop is validated (**13.10** = 1) and the local position reference is selected (**13.04** = 4 (LocAL)).

0.52 : **Proportional gain of the position loop**
This parameter is used to define the proportional gain of the position loop, in order to correct the position-related errors.

0.53 : **Resistor maximum braking length**
This parameter defines the length during which the brake resistor may resist to the maximum braking voltage without damages. It is used to determine the length before the stop on braking overload.
CAUTION :
If this parameter is set to 0, there will be no protection of the brake resistor.

Drive voltage	Maximum braking voltage
200V	390V
400V	780V
575V	930V
690V	1120V

0.54 : **Resistor maximum braking cycle**
This parameter defines the tine interval that must elapse between two consecutive periods of full power braking as described by the parameter **0.53**. It is used to set the thermal time constant of the resistor used.
CAUTION :
If this parameter is set to 0, there will be no protection of the brake resistor.



0.55 : **Run/Stop command**

This indicator is used to control the validation of the run command.
0.55 = 0 : stop.
0.55 = 1 : run.

0.56 : **Enabled variable speed drive output**

This parameter is set to 1 when the variable speed drive output is enabled.

0.57 : **Validation of alarms and pre-alarms**

Value of **0.57**

0	0	0	0	1	1	1

	Function
0 or 1	Not used
0 or 1	Not used
0 or 1	Not used
0 or 1	Not used
0 or **1**	Reverse alarm validation
0 or **1**	Forward alarm validation
0 or **1**	Forward and reverse pre-alarm validation

0 : invalidated surveillance.
1 : validated surveillance.
Note : In factory settings, the forward and reverse alarms and the forward and reverse pre-alarms are validated : **0.57** = 111.

0.58 : **Default validation**

Value of **0.58**

0	0	1	1	1	1	1

	Function
0 or 1	Not used
0 or 1	Not used
0 or **1**	"Transmission interruption"default validation
0 or **1**	Phase absence surveillance validation
0 or **1**	Direction of rotation surveillance validation
0 or **1**	Speed error surveillance validation
0 or **1**	Brake feedback surveillance validation

Validation of the brake feedback surveillance
0 : invalidated function.
1 : if the brake enabling information feedback does not correspond to the variable speed drive output command, the variable speed drive will be set to Tr88.

Validation of the speed error surveillance
0 : invalidated surveillance.
1 : validated surveillance.

: when the level is higher than **18.14**, the drive is stopped.

: when the difference between the reference and the feedback is higher than 15 %, the drive is stopped.

Validation of direction of rotation surveillance
0 : invalidated surveillance.
1 : validated surveillance.
Surveillance of the conformity between the required direction of rotation and the measured direction of rotation. If there is no compliance, the variable speed drive is stopped.

Validation surveillance absence de phase
0 : invalidated surveillance.
1 : validated surveillance.

Default validation - " transmission interruption "
0 : the " transmission interruption " is invalidated. The terminal 24 is automatically configured in preset reference selection input.
1 : the " transmission interruption " is validated. The terminal 24 is automatically configured in " transmission interruption " default output.

Note : In factory settings, the detection of the "transmission interruption" and the surveillance of the phase absence, direction of rotation, speed error and brake feedback are validated : **0.58** = 11111.

H3 - Other menus

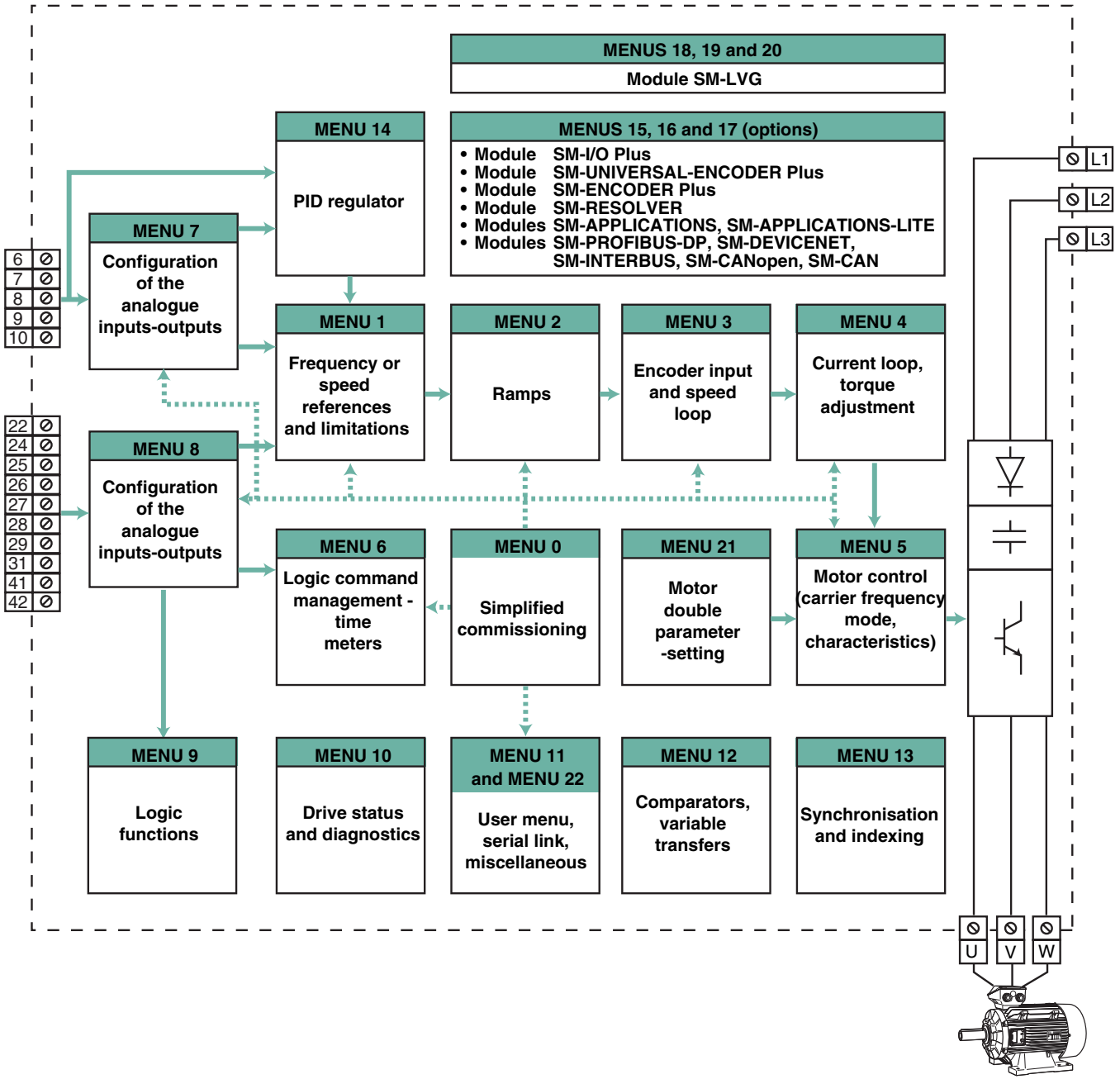
• Before attempting to adjust the variable speed drive using the help diagrams, it is essential to hahe respected the instructions for installation connection and comissioning described in the previous chapters.

Besides, in order to ensure product and personal safety, precautions must be taken when setting the parameters marked by the symbol .

For more details, see the document ref. 3655 available in software version on the CD ROM supplied with the drive.

H3.1 - Menus

According to the application, it is sometimes necessary to optimise the parameter-setting of the variable speed drive in addition to that accessible by menu 0.
For this reason, all the variable speed drive functions have been grouped into menus (22 menus).
For the Lifting application, the user disposes of parameter-setting diagrams, as well as of explanations of parameters of menus 18, 19 and 20 related to the application.
However, all the basic functions of the variable speed drive and of the SM modules remain accessible by the menus 1 to 17, 21 and 22 (Diagrams).



H3.2 - Types of parameters

For each menu, there is a schematic diagram of the parameter menu functions.
The variation ranges which are not able to be drawn are integrated into a table below each diagram.
Symbols :
1.06 : A number in bold referes to a parameter.

2 / ⊘ : Refers to an input or output terminal of the variable speed drive.

• Reading/writing parameters

1.21 : The parameters contained in a rectangle or identified L-E are Read and Write parameters.
They may be assigned as :
- digital inputs for bit parameters,
- analogue inputs for non-bit parameters,
- internal function outputs (comparators, logic operation, arithmetic operation ...).

• Read parameters

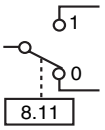
1.01 : The parameters contained in a diamond or identified LS are Read only parameters.
They are used to give information regarding the operation of the variable speed drive and they may be assigned as :
- digital inputs for bit parameters,
- analogue inputs for non-bit parameters,
- internal function outputs (comparators, logic operation, arithmetic operation ...).

• Read / Assign parameters

1.41 : The parameters contained in a hexagon or identified L-A are parameters that may not be allotted to digital inputs (for the bit parameters) or to analogue inputs (for the non-bit parameters).
This type of parameter may not be directly modified.

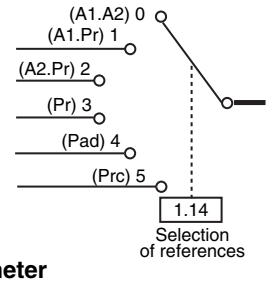
• Binary parameters

On the keyboard, they take the value " OFF " when they are disabled, and " On " when they are enabled.
By serial link, they take the value " 0 " when they are disabled, and "1" when they are enabled.
For a simplified reading of the diagrams, these parameters are represented by contacts, the position of which corresponds to the factory settings.



• Decimal parameters

On the keyboard, they take a mnemonic value (ex.: A1.A2, Pr…), and by serial link, they take the value 0, 1, 2, 3 etc…
For a simplified reading of the diagrams, these parameters are represented by contacts, the position of which corresponds to the factory settings.



•Numeric parameter

A numeric parameter is used to :
- set a value that will be taken into account in the variable speed drive calculations (ex. : Irated name **5.09**),
- give indications on the variable speed drive operation (ex. : before ramp reference **1.03**).

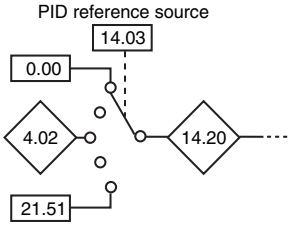
The maximum value of certain parameters may be variable depending on the type of variable speed drive and on the operating mode used, or depending on the influence of other parameters.
To simplify, the maximum values of these parameters are expressed by the mnemonics the explanation of which is detailed at section H3.5.
Examples : REF. MAX, I MAX UTIL, U_{AC} MOT MAX ETC…

• " Source " parameters

A source parameter gives the possibility to the user to allocate a parameter as a function input. After the modification of a source, press the Reset ⊘ key to register with the variable speed drive (or store by **0.00** = 1000 + ⊘).
The source value corresponds to :

$$\frac{\text{Input value x 100 \%}}{\text{Max. value of the source parameter}}$$

Example :



14.20 = 100 % when **4.02** is equal to its maximum theoretical value.

• " Destination " parameter

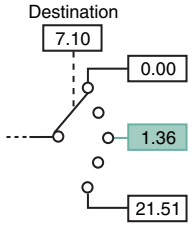
A destination parameter gives the possibility to the user to allocate a parameter as a function output. After the modification of a destination, press the Reset key to register with the variable speed drive **0.00** = 1000 +).

The destination value corresponds to :

- 0 or 1 if a binary parameter is allocated as destination,
- $\frac{\text{Output value x max. value of the destination parameter}}{100\%}$

if a non binary parameter is allocated as a destination.

Example:



When the function output is of 100 %, **1.36** reaches its maximum theoretical value, REF MAX.

Note : If a protected parameter is allocated as a destination, this allocation will not be registered.

H3.3 - Factory settings

The operation of the variable speed drive in factory settings is represented by a green line.

For the source and destinations, the parameters allocated in factory settings are represented with green.

H3.4 - Use

• Allocations :

- Unknown parameter :

In an unknown parameter is allocated to a source or in a destination, then the value 0 will be considered by the variable speed drive.

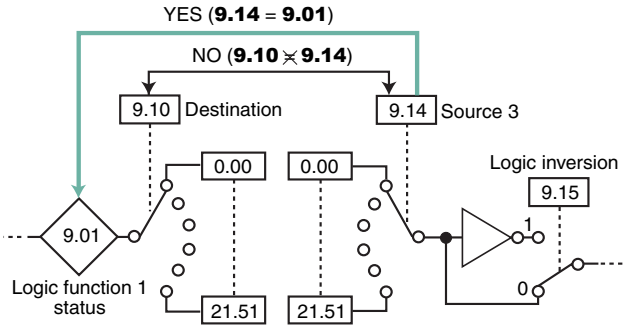
- Double affectation:

A parameter can not be allocated 2 times as a destination. In case of involuntary double allocation, the variable speed drive starts "dESt" by default, and it persists until the settling of the allocation-related problem (excepting the menus 15 , 16 and 17).

Note : It may be necessary to check the parameters already allocated in factory settings, represented with green on the diagrams.

- Association :

Do not allocate a destination parameter in a source parameter.



• After the modification of a destination, the former destination parameter returns to the zero value, except in the case of a return to factory settings where the former parameter finds its factory value. In case of a transfer by SMARTCARD to the variable speed drive, the former destination parameter preserves its former value, unless its value is modified by SMARTCARD.

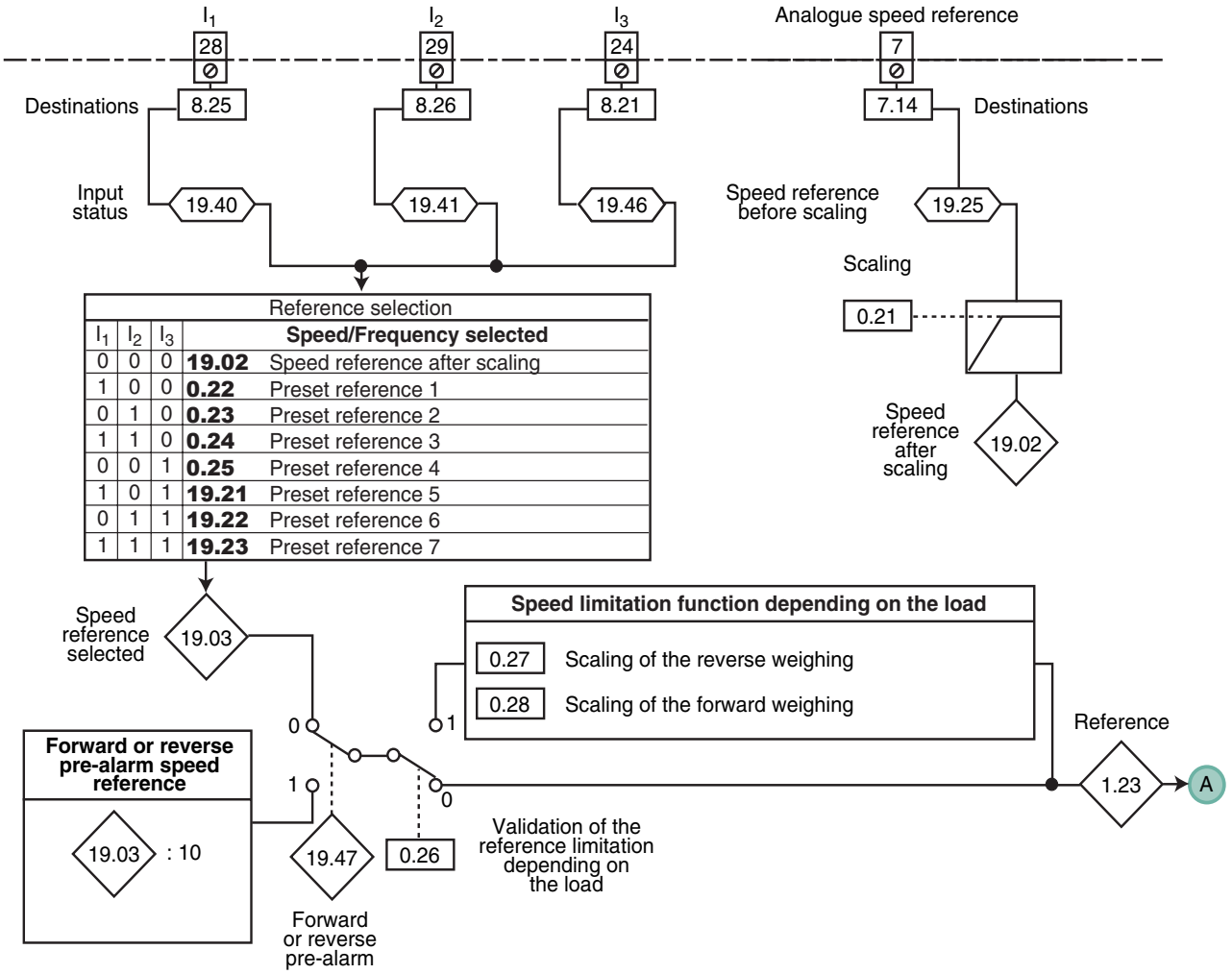
H3.5 - Definitions of maximum value

Range	Definition
REF MAX : 3000.0 Hz and : 40000.0 min^{-1}	**Maximum frequencyy reference ( ) or maximum speed reference (and)** • If **1.08** = 0 : REF MAX = **1.06** • If **1.08** = 1 : REF MAX = **1.06** or - (**1.07**) If the second motor is seleceted, the limits correspond to **21.01** (instead of **1.06**) and **21.02** (instead of **1.07**).
LIM N MAX 40000.0 min^{-1}	**Maximum speed reference limit** A maximum limit may be applied to the speed reference so that the encoder frequency does not exceed 500 kHz. The maximum is defined by : LIM N MAX (min^{-1}) = 410kHz x 60 / ELPR = 2.46 x 10^7 / ELPR ELPR quadrature encoder : number of points by turn ELPR frequency encoder / direction : number of points by turn / 2 ELPR resolver : resolution / 4 ELPR SinCos : number of sinusoidal waves per turn ELPR serial link encoder : resolution / 4
N MAX 40000.0 min^{-1}	**Maximum speed** This maximum is used for certain speed-related parameters of menu 3. N MAX = 2 x REF MAX
I_N MAX 9999.99 A	**Maximum motor rated current** I_N MAX ≤ 1.36 x Maximum variable speed drive rated current (**11.32**).
I_{MAX} VAR 9999.99 A	**Maximum variable speed drive current** The maximum variable speed drive current corresponds to the level "OIAC" overvoltage default start, such as : I_{MAX} VAR = Maximum variable speed drive rated current (**11.32**) / 0.45
LIM IM1 MAX 1000.0 %	**Maximum current limit set by motor 1** and : $\text{LIM IM1 MAX} = \left[\sqrt{\left[\left[\frac{I_{MAX}}{\mathbf{5.07}} \right]^2 + \cos\varphi^2 - 1 \right]} \Big/ \cos\varphi \right] \times 100\ \%$ **Note :** I_{MAX} corresponds to 1.75 x (I_{sp} with maximum overload) if the current set in **5.07** is lower or equal to the maximum value of the current with maximum overload given in **11.32**, otherwise I_{MAX} corresponds to 1.1 x (I_{sp} with reduced overload). Cos φ = **5.10** : $\text{LIM IM1 MAX} = \frac{I_{MAX}}{\mathbf{5.07}} \times 100\ \%$ **Note** : I_{MAX} corresponds to the variable speed diverated current (**11.32**) x 1.75.
LIM IM2 MAX 1000.0 %	**Maximum current limit set for motor 2** $\text{LIM IM2 MAX} = \left[\sqrt{\left[\left[\frac{I_{MAX}}{\mathbf{21.07}} \right]^2 + \cos\varphi^2 - 1 \right]} \Big/ \cos\varphi \right] \times 100\ \%$ **Note :** I_{MAX} corresponds to 1.75 x (I_{sp} with maximum overload) if the current set in **21.07** is lower or equal to the maximum value of the current with maximum overload given in **11.32** otherwise I_{MAX} corresponds to 1.1 x (I_{sp} with reduced overload). Cos φ = **21.10** : $\text{LIM IM1 MAX} = \frac{I_{MAX}}{\mathbf{21.07}} \times 100\ \%$ **Note** : I_{MAX} corresponds the variable speed drive rated current (**11.32**) x 1.75.
I_{ACTIF} MAX 1000.0 %	It is the value of LIM IM1 MAX or LIM IM2 MAX depending on the settings used (motor 1 or 2).
I_{MAX} UTIL 1000.0 %	**Limitation of the current parameters by user (4.24)** The user may select a maximum for **4.08** (torque reference) and **4.20** (load percentage) to scale the analogue inputs / outputs with **4.24**. This maximum is limited by LIM IM1 MAX or LIM IM2 MAX depending on the selected motor.

Definitions of the maximum values (to be continued)

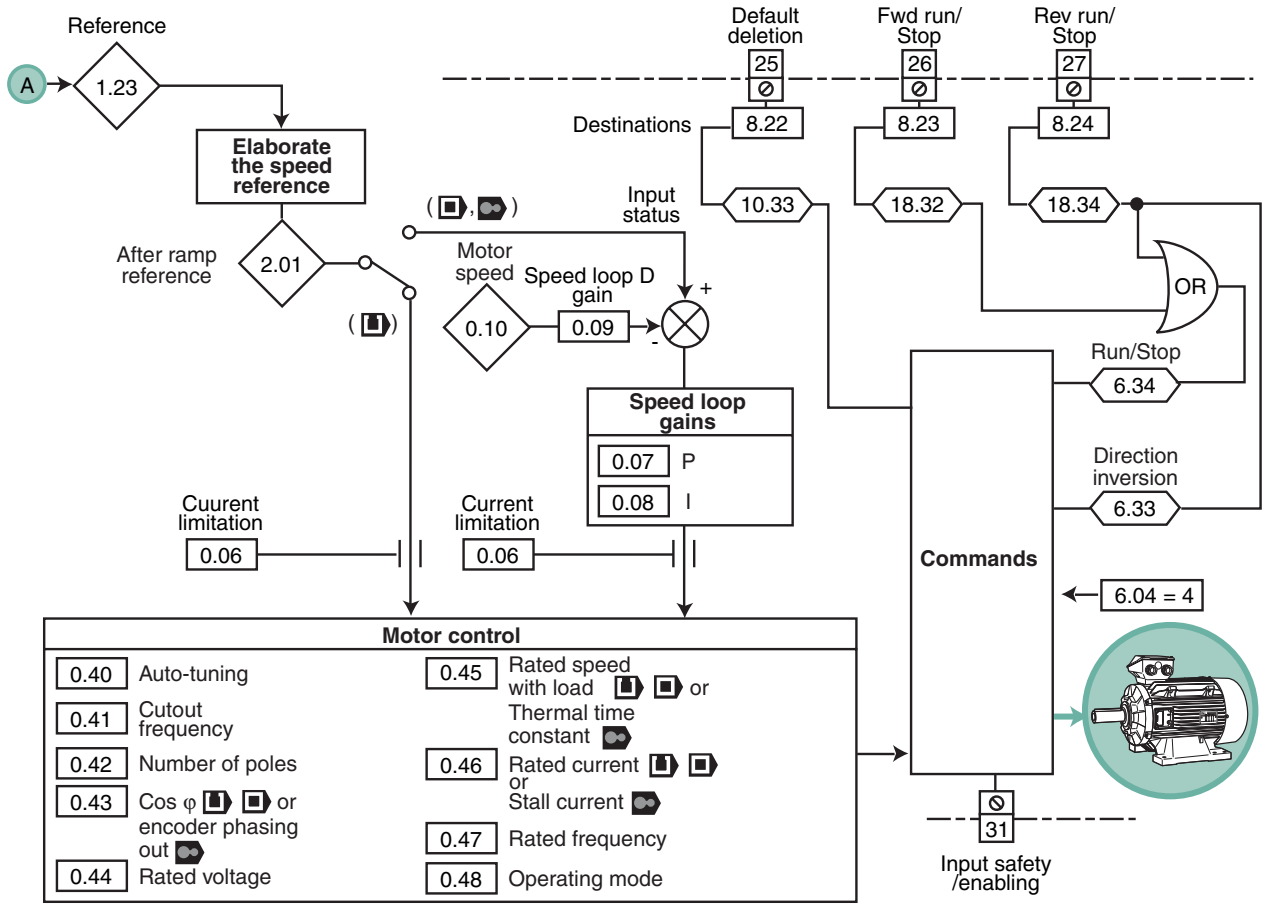
Range	Definition
U_{AC} MOT MAX 690V	**Maximum output voltage** It is the maximum motor voltage taht may be used : TL: 240 V T : 480 V TM : 575V TH : 690V
U_{AC} OUT MAX 930 V	**Maximum output voltage** This value corresponds to the maximum voltage produced by the variable speed drive, including the operation in quasi-squared modulation : U_{AC} OUT MAX = 0.78 x U_{DC} MAX TL: 325 V T : 650 V TM : 780V TH : 930V
THRESHOLD U_{CC} MAX 1150 V	**DC voltage threshold** TL: 400 V T : 800 V TM : 950V TH : 1150V
U_{CC} MAX 1190 V	**Maximum DC bus voltage** It is the maximum voltage of the DC bus TL: 415 V T : 830 V TM : 995V TH : 1190V
P MAX 9999.99 kW	**Maximum power in kW** It is the maximum power at U_{AC} OUT maximum, maximum current controlled and power factor equal to 1. P MAX = $\sqrt{3}$ x U_{AC} OUT MAX x I_N MAX x 1.75

H4 - Lifting diagrams



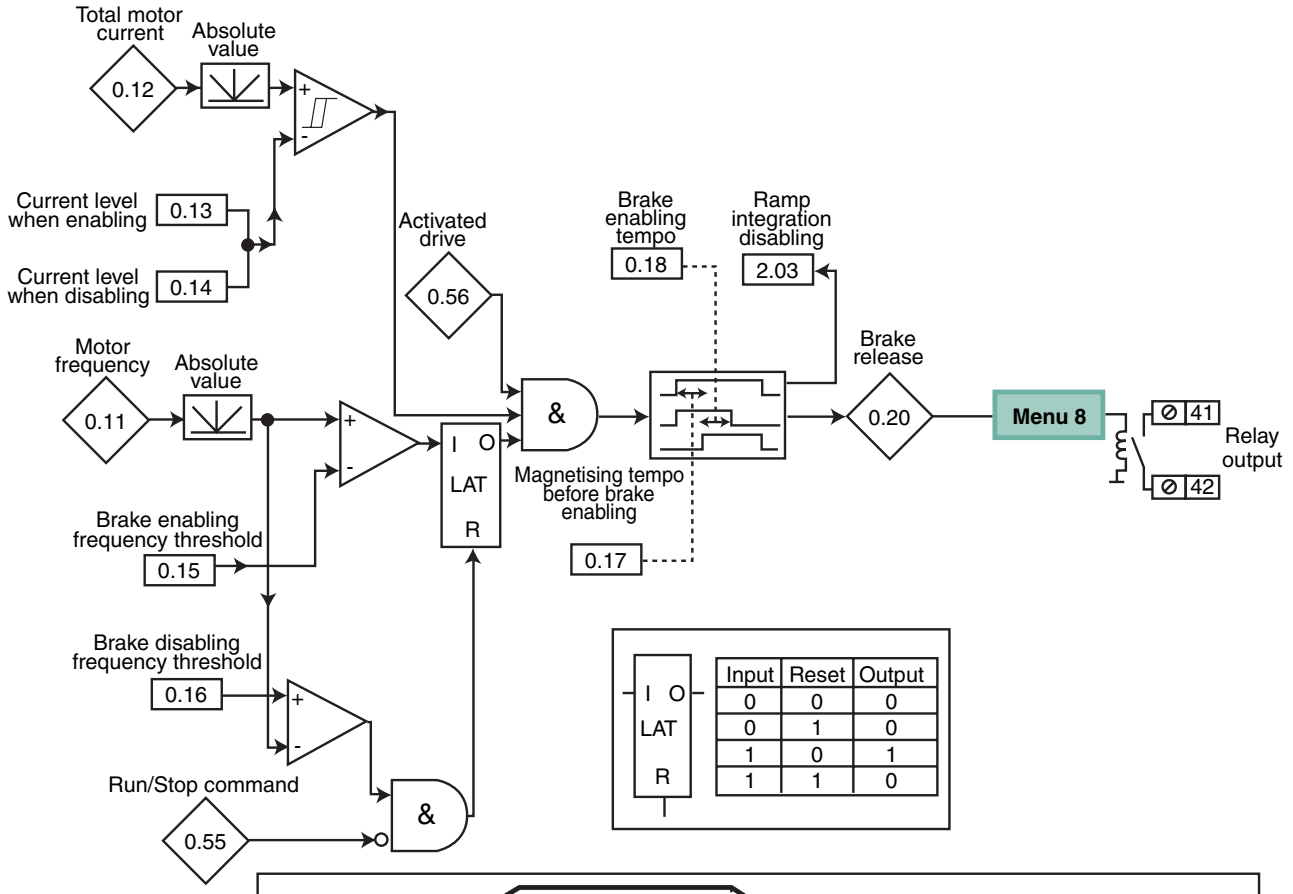
Parameters	Variation range			Factory settings		
0.21	0 to 200 Hz	0 to 6000min^{-1}		50 Hz	1500 min^{-1}	
0.22	0 to 200 Hz	0 to 6000min^{-1}		15 Hz	500 min^{-1}	
0.23	0 to 200 Hz	0 to 6000min^{-1}		30 Hz	1000 min^{-1}	
0.24	0 to 200 Hz	0 to 6000min^{-1}		50 Hz	1500 min^{-1}	
0.25	0 to 200 Hz	0 to 6000min^{-1}		60 Hz	2000 min^{-1}	
1.23 - 19.02 - 19.03	0 to 200 Hz	0 to 6000min^{-1}		-		
0.27	30 % to 80 %			80 %		
0.28	50 % to 100 %			100 %		
7.14	**0.00** to **21.51**			**1.37**		
8.21	**0.00** to **21.51**			**10.03**		
8.25	**0.00** to **21.51**			**1.41**		
8.26	**0.00** to **21.51**			**6.31**		
19.21	0 to 200 Hz	0 to 6000 min^{-1}		70 Hz	2100 min^{-1}	
19.22	0 to 200 Hz	0 to 6000 min^{-1}		80 Hz	2500 min^{-1}	
19.23	0 to 200 Hz	0 to 6000 min^{-1}		100 Hz	3000 min^{-1}	
19.25	0 to 32765			-		
19.40 - 19.41 - 19.46	OFF (0) or On (1)			-		

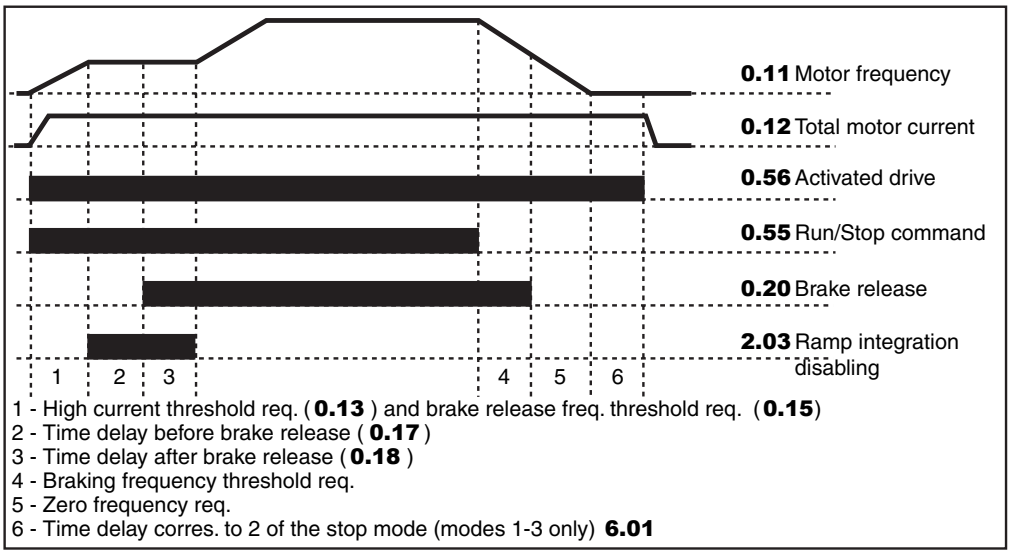
UNIDRIVE SP
Commissioning



Parameters	Variation range			Factory settings		
0.06	0 to LIM IM1 MAX (%)			165.0 %	175.0 %	
0.07	-	0 to 6.5535 (1/rads^{-1})		-	0.0100 (1/rads^{-1})	
0.08	-	0 to 655.35 (1/rad)		-	1.00 (1/rad)	
0.09	OFF (0) or On (1)	0 to 0.65336 (s)		OFF (0)	0	
0.10	±N MAX (min^{-1})			-		
0.40	0 to 2	0 to 3		0		
0.41	3 (1), 4 (2), 6 (3), 8 (4), 12 (5), 16 (6) kHz 16 kHz not available for size 3			3 kHz		6 kHz
0.42	Auto (0) to 120POLE (60)			Auto (0)		6POLE (3)
0.43	0 to 1.000		0 to 359.9°	0.850		-
0.44	0 to Uac MOT MAX (V)			TL : 230V T : 400V (EUR)/400V (USA) TM : 575V		
0.45	0 to 180000 min^{-1}	0 to 40000.00 min^{-1}	0 to 400.0	1500 min^{-1} (EUR) 1800 min^{-1} (USA)	0 to 40000.00 min^{-1}	0 to 400.0
0.46	0 to In MAX (A)			Inom VAR (**11.32**)		
0.47	0 to 3000.0 Hz	0 to 1250.0 Hz		50.0 Hz (EUR) 60.0 HZ (USA)		
0.48	OPEn LP (1), CL VECt (2), SerV (3), REgEn (4)			OPEn LP (1)		
1.23	± REF. MAX			0		
2.01	± REF. MAX			-		
6.33 - 6.34 - 10.33 18.32 - 18.34	OFF (0) or On (1)			OFF (0)		
8.22	**0.00** to **21.51**			**10.33**		
8.23	**0.00** to **21.51**			**18.32**		
8.24	**0.00** to **21.51**			**18.34**		

• **Brake command in open loop**

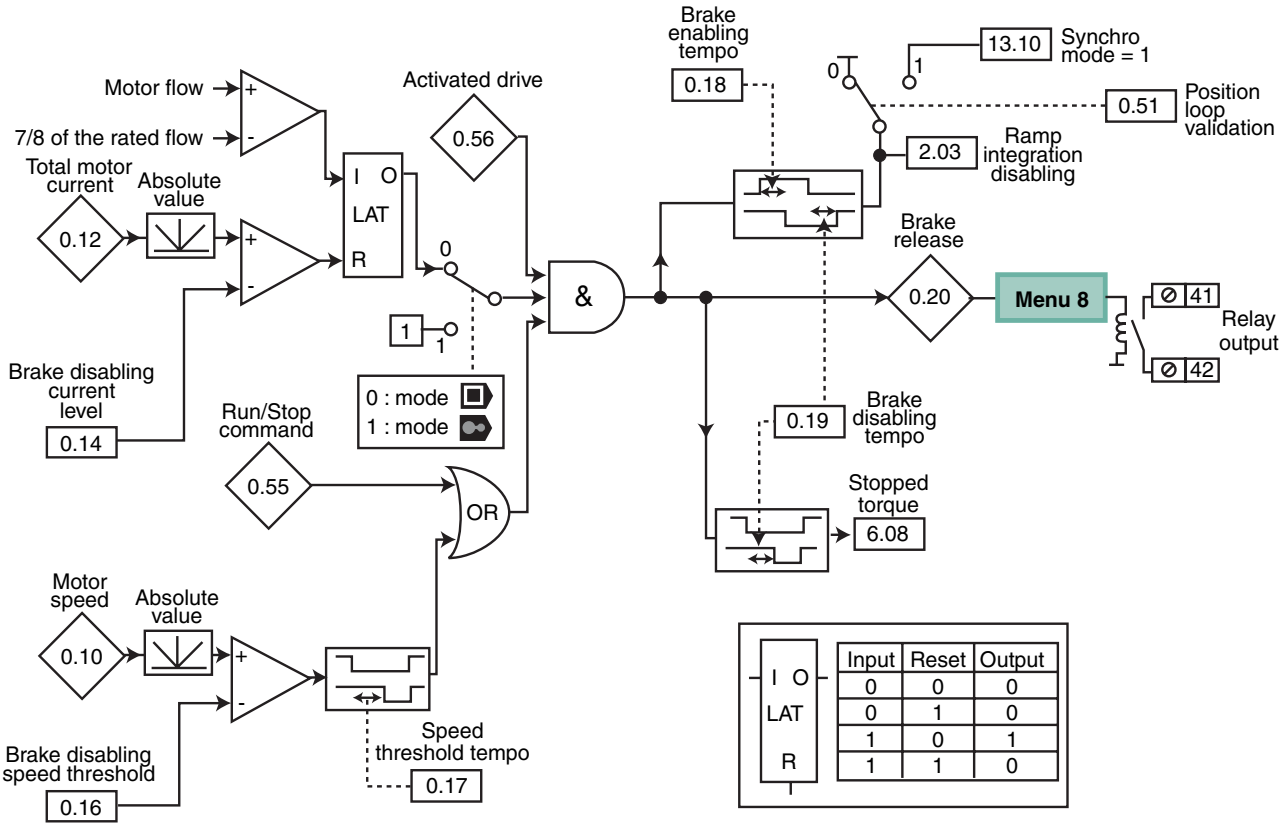


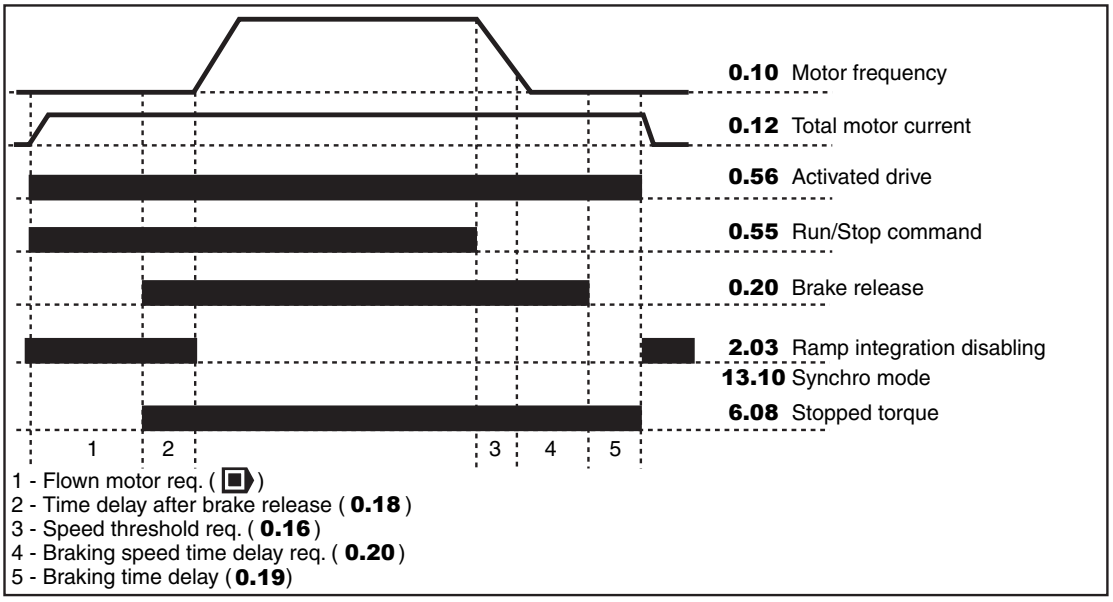


1 - High current threshold req. (**0.13**) and brake release freq. threshold req. (**0.15**)
2 - Time delay before brake release (**0.17**)
3 - Time delay after brake release (**0.18**)
4 - Braking frequency threshold req.
5 - Zero frequency req.
6 - Time delay corres. to 2 of the stop mode (modes 1-3 only) **6.01**

Parameters	Variation range	Factory settings
0.11	± REF. MAX (Hz)	-
0.12	± I MAX VAR (A)	-
0.13	0 to 200 %	50 %
0.14	0 to 200 %	10 %
0.15	1 to 20.0 Hz	1.0 Hz
0.16	0 to 20.0 Hz	2.0 Hz
0.17 - **0.18**	0 to 25.0 s	1.0 s
0.20 - **0.55** - **0.56**	OFF (0) or On (1)	-
2.03	OFF (0) or On (1)	OFF (0)

• Brake command in closed loop

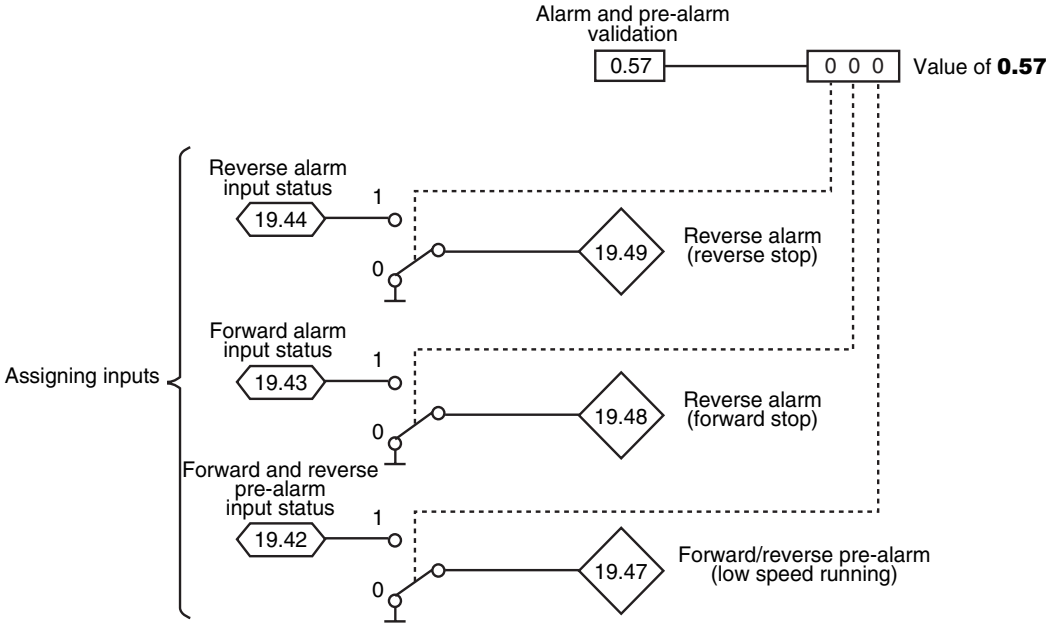




1 - Flown motor req. ( )
2 - Time delay after brake release (**0.18**)
3 - Speed threshold req. (**0.16**)
4 - Braking speed time delay req. (**0.20**)
5 - Braking time delay (**0.19**)

Parameters	Variation range		Factory settings	
0.10	± REF. MAX (Hz)		-	
0.12	± I MAX VAR (A)		-	
0.14	0 to 200 %		10 %	
0.16	0 to 200 min^{-1}		5 min^{-1}	
0.17 - 0.18 - 0.19	0.0 to 25.0 s		1.0 s	
0.20 - 0.55 - 0.56	OFF (0) or On (1)		-	
0.51	OFF (0) or On (1)		0	
2.03 - 6.08	OFF (0) or On (1)		OFF (0)	

• Management of alarms and pre-alarms

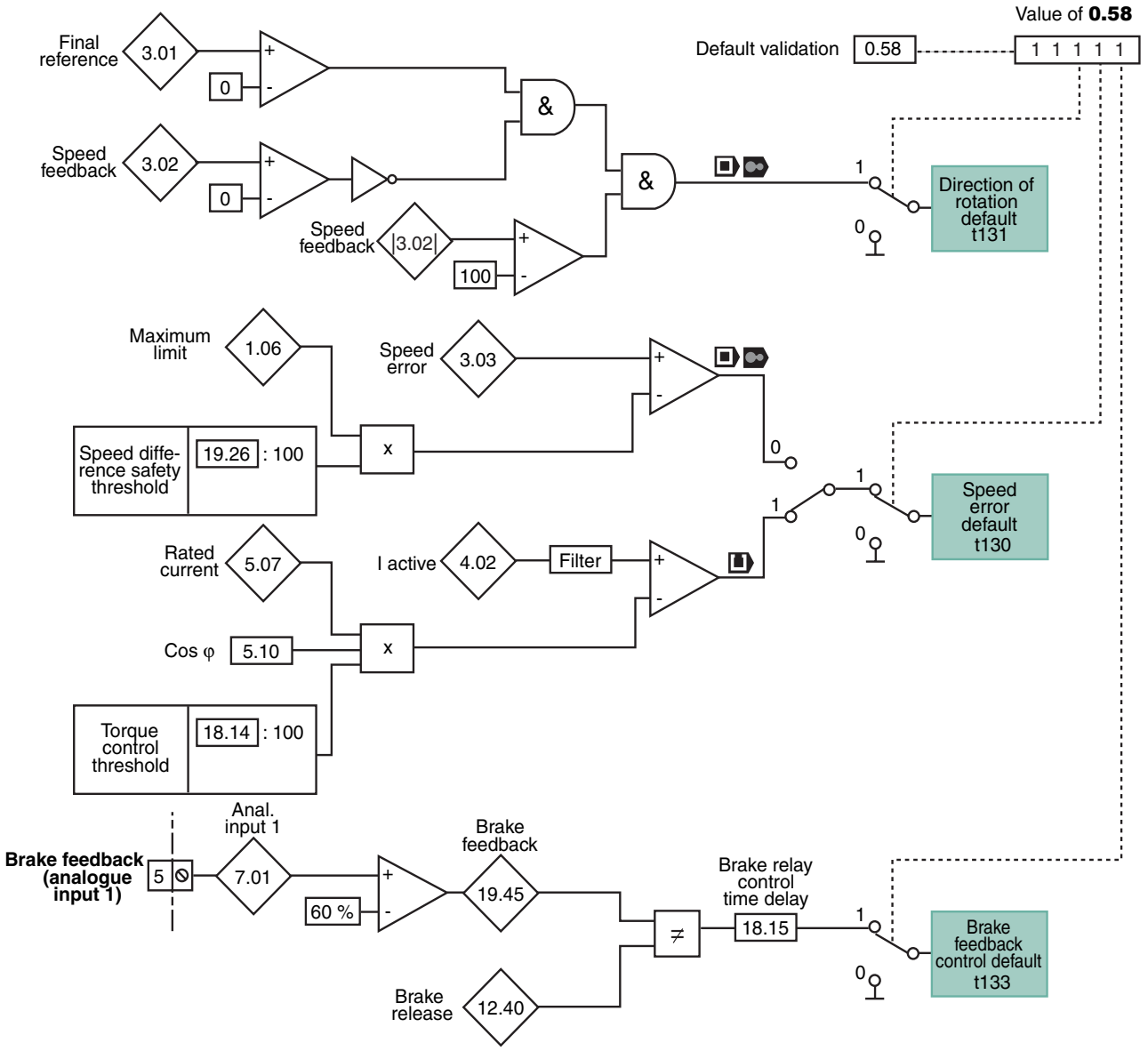


Note : The parameters **19.42** to **19.44** may be allocated to additional digital inputs (SM-I/O Plus module) or may be managed directly by the field bus (SM-PROFIBUS module, SM-INTERBUS module, etc…). In case of presence of a SM-I/O Plus, the program allocates automatically the terminal 8 SM-I/O Plus to the management of the reverse alarm (**19.44**), the terminal 7 SM-I/O Plus to the management of the forward alarm (**19.43**) and the terminal 6 SM-I/O Plus to the management of the forward and reverse pre-alarm (**19.42**).

Parameters	Variation range			Factory settings		
19.42 - **19.43** - **19.44** **19.47** - **19.48** - **19.49**	OFF (0) or On (1)			OFF (0)		

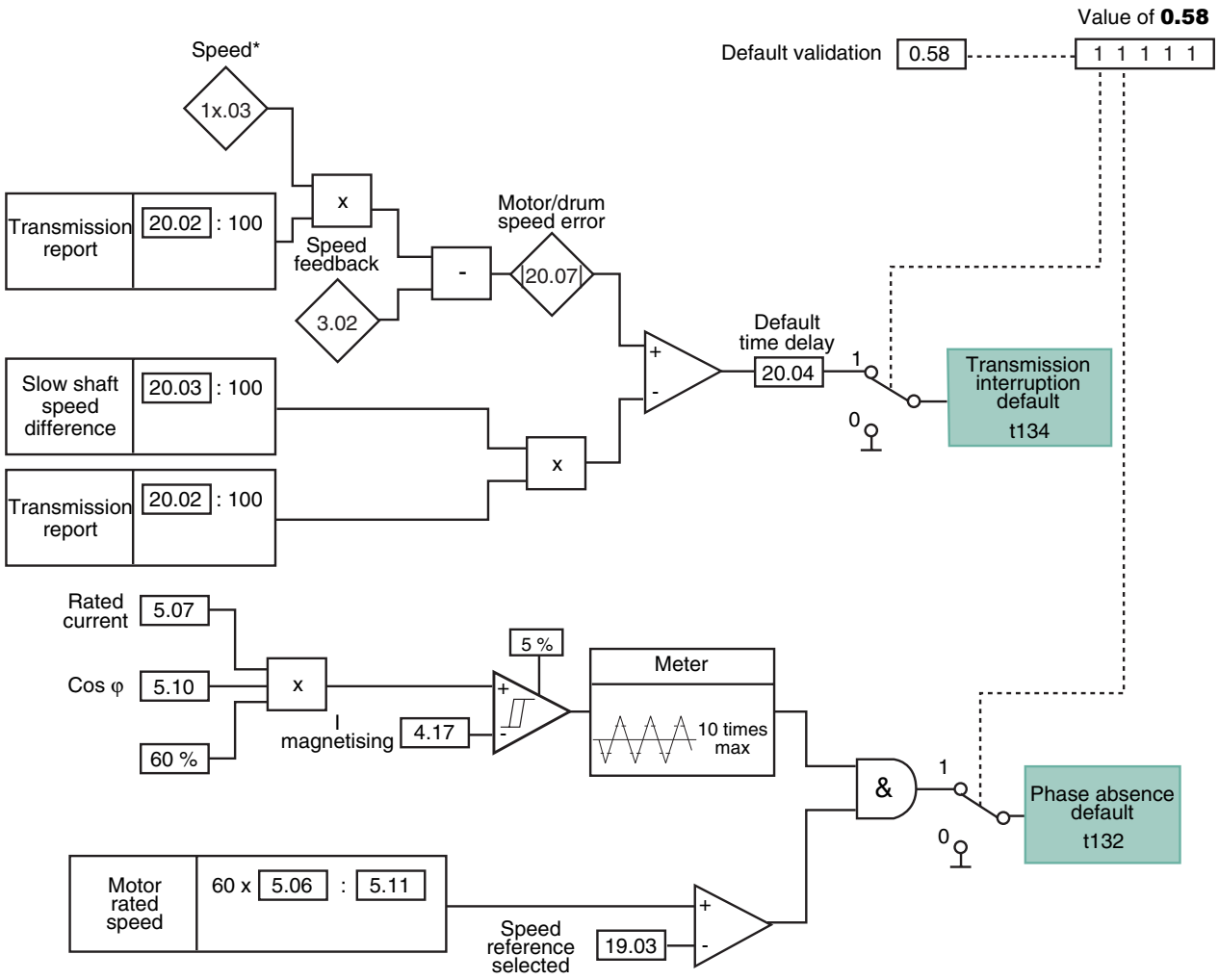
Notes

• **Default management**



Parameters	Variation range			Factory settings		
1.06	0 to 3000.0 Hz	± REF. MAX		Eur : 50 Hz USA : 60 Hz	Eur : 1500.0 min^{-1} USA : 1800.0 min^{-1}	3000.0 min^{-1}
3.01	± 1000.0 Hz	± REF. MAX		-		
3.02 - 3.03		± REF. MAX			-	
4.02	± I_{MAX} VAR (A)			-		
5.07	0 to I_N MAX (A)			-		
5.10	0 to 1.000		-	0.850		-
7.01	± 100.00 %			-		
12.40 - 19.45	OFF (0) or On (1)			-		
18.14	100 to 150			150		
18.15	100 to 2000 ms			500 ms		
19.26		3 to 30 %			15 %	

• Default management (to be continued)



* : SM-ENCODER Plus or SM-UNIVERSAL ENCODER Plus

Parameters	Variation range			Factory settings		
3.02	± REF. MAX			-		
4.17	± I_{MAX} VAR (A)			-		
5.06	0 to 3000 Hz	0 to 1250.0 Hz	-	Eur : 50.0 Hz / USA : 60 Hz		-
5.07	0 to I_N MAX (A)			I_{NOM} VAR (**11.32**)		
5.10	0 to 1.000		-	0.850		-
5.11	Auto to 120 POLE (0 to 60)			Auto (0)		6 POLE (3)
1x.03	± 40000.0 min^{-1}			-		
19.03	0 to 200 Hz	0 to 6000 min^{-1}		-		
20.02	100 to 32000			100		
20.03	0 to 10000			100		
20.04	20 to 2000 ms			100 ms		
20.07	± 32000			-		

H5 - Explanation of the lifting parameters

H5.1 - Explanations of the parameters of menu 18

18.01 to **18.13** : **Not used**

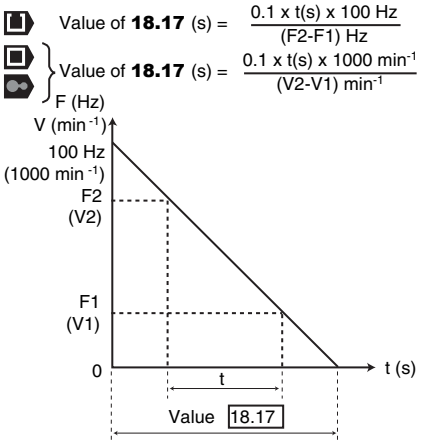
18.14 : **Torque surveillance threshold ( )**
We watch the torque that gets stabilised and we compare it to the torque level regulated in **18.14**. When the level is higher than **18.14** for more than 100 ms, the variable speed drive is stopped.

18.15 : **Brake relay surveillance time delay (,)**
It is the time comprised between the brake enabling command by the variable speed drive and the brake effective enabling information feedback (brake limit, for instance).

18.16 : **Not used**

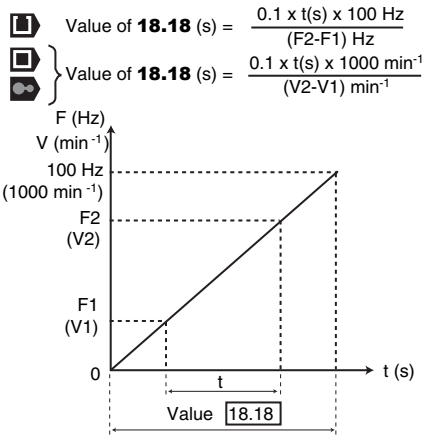
18.17 : **Deceleration ramp**

Time setting for decelerating from 100 Hz to 0.
and :
Time setting for decelerating from 1000 min^{-1} to 0.
Note : The value of **18.17** applies to 2 directions of rotation.



18.18 : **Acceleration ramp**

:
Time setting for accelerating from 0 to 100 Hz.
and :
Time setting for accelerating from 0 to 1000 min^{-1}.
Note : The value of **18.18** applies to 2 directions of rotation.



18.19 : **Analogue reference scaling**
Defines the speed corresponding to the value 10V of the analogue input.

:
For instance, if we want 100 Hz for 10V of reference, we set **18.19** at 100.

:
For instance, if we want 3000 min^{-1} for 10V of reference, we set **18.19** at 3000.

18.20 to **18.23** : **Not used**

18.24 : **Static torque ( )**
The static torque is the torque reference applied when stopped.

18.25 to **18.28** : **Not used**

18.29 : **Bus control word**
Control of the variable speed drive by the field bus. It is used to address commands to the variable speed drive by a single parameter. If necessary, see section I.

N° Bit	18.29 =	Enabled parameter	Description
Bit 0	1	**10.33**	Default deletion
Bit 1	2	**18.32**	Forward/stop command
Bit 2	4	**18.34**	Reverse/stop command
Bit 3	8	**19.40**	I1 reference selection
Bit 4	16	**19.41**	I2 reference selection
Bit 5	32	**19.46**	I3 reference selection

18.30 : **Bus status word**

Control of the variable speed drive by the field bus. It is used to obtain information of the variable speed drive status by a single parameter. If necessary, see section I.

N° Bit	18.30 =	Enabled parameter	Description
Bit 0	1	**10.01**	Ready variable speed drive
Bit 1	2	**10.02**	Enabled drive output
Bit 2	4	**10.03**	Zero speed or frequency
Bit 3	8	**10.06**	Reached reference
Bit 4	16	**10.14**	Reverse rotation
Bit 5	32	**10.10**	Dynamic braking
Bit 6	64	**10.11**	Braking on resistor
Bit 7	128	**12.40**	Brake command status
Bit 8	256	**19.47**	Forward/reverse pre-alarm
Bit 9	512	**19.48**	Forward alarm
Bit 10	1024	**19.49**	Reverse alarm

18.31 : **Not used**

18.32 : **Status of the forward command**

This parameter is set to 1 when the forward command is enabled.

18.33 : **Validation of the S ramp**

When the parameter is set to 1, the S ramps are validated.

18.34 : **Reverse command status**

This parameter is set to 1 when the reverse command is enabled.

18.35 to **18.50** : **Not used**

H5.2 - Explanation of the parameters of menu 19

19.01 : **Not used**

19.02 : **Speed reference after scaling**

19.03 : **Speed reference selected**

The speed reference selected is as follows :

Status of term.24 (bit 2)	Status of term.29 (bit 1)	Status of term.28 (bit 0)	19.03
0	0	0	**19.02** (Analogue input)
0	0	1	**19.17** (RP1)
0	1	0	**19.18** (RP2)
0	1	1	**19.19** (RP3)
1	0	0	**19.20** (RP4)
1	0	1	**19.21** (RP5)
1	1	0	**19.22** (RP6)
1	1	1	**19.23** (RP7)

19.04 to **19.10** : **Not used**

19.11 : **Validation of the reference limitation function depending on the load**
0 : No.
1 : Yes.

19.12 : **Not used**

19.13 : **Measurement time delay (weighing)**
Time of holding of the frequency or speed to the rated value.

19.14 : **Value of the ramp in S before measurement**

19.15 : **Reverse weighing scaling**
It is the ratio in % of the current consumed by the motor with a decreased maximum load on the motor rated current.

19.16 : **Forward weighing scaling**
It is the ratio of the current consumed by the motor with a increased maximum load on the motor rated current.
Note : The increase correspond to a positive speed.

19.17 : **Preset reference 1**
It is used to define the preset reference RP1.

19.18 : **Preset reference 2**
It is used to define the preset reference RP2.

19.19 : **Preset reference 3**
It is used to define the preset reference RP3.

19.20 : **Preset reference 4**
It is used to define the preset reference RP4.

19.21 : **Preset reference 5**
It is used to define the preset reference RP5.

19.22 : **Preset reference 6**
It is used to define the preset reference RP6.

19.23 : **Preset reference 7**
It is used to define the preset reference RP7.

19.24 : **Not used**

19.25 : **Speed reference before scaling**

19.26 : **Speed difference safety threshold (and)**
It is the speed difference safety threshold in % of the maximum speed (beside this threshold, the variable speed drive passes to t085).

19.27 to **19.39** : **Not used**

19.40 : **Status of the preset reference selection input of terminal 26**

19.41 : **Status of the preset reference selection input of terminal 29**

19.42 : **Status of the forward and reverse pre-alarm input of terminal 6 SM-I/O Plus**

19.43 : **Status of the forward alarm input of terminal borne 7 SM-I/O Plus in factory settings**

19.44 : **Status of the reverse alarm input of terminal 8 SM-I/O Plus in factory settings**

19.45 : **Status of the brake feedback input of terminal 5**

19.46 : **Status of the preset reference selection input of terminal 24**

19.47 : **Status of the forward or reverse pre-alarm input**

19.48 : **Forward alarm**

19.49 : **Reverse alarm**

19.50 : **Not used**

H5.3 - Explanation of the parameters of menu 20

20.01 : Return to factory settings and cloning of the lifting parameters

• Return to lifting parameter settings

This parameter starts an automatic procedure of return to the factory settings specific to the lifting application.
To validate the return to factory settings, follow the procedure below :

Parameter	Setting	Description	Validation
0.00	**1233** or **1244**	European factory settings configuration (50 Hz) or USA factory settings configuration (60 Hz)	Press the Reset key
20.01	**2047**	**LVG software initialisation**	

• Check that the motor is stopped and that there is no problem related to the system security.

• Lifting parameter cloning

This parameter is used to save or to load the LVG parameters of menus 20, 70 and 71 by using SMARTCARD.

Parameter	Setting	Description
20.01	**3333**	Saving of menus 20, 70 and 71 in SMARTCARD
20.01	**6666**	Loading of menus 20, 70 and 71 of SMARTCARD in the drive

20.02 : Transmission report

Defines the report of transmission between the allow shaft and the quick shaft.

20.03 : Slow shift speed difference

Defines the authorised difference between the motor speeds and the slow shaft before generating the t134 default - " transmission interruption ".

20.04 : Default time delay

It is used to delay the start of t134 default.

20.05 : Number of drum encoder points

Enter the number of points by slow shaft encoder turn.

20.06 : Not used

20.07 : Motor/drum speed error

Indicates the speed error between the motor speed and the slow shaft speed (restored in the reduction report).

20.08 to 20.15 : Not used

20.16 : Validation of alarms and pre-alarms

Value of **20.16**

0	0	0	0	1	1	1

	Function
0 or 1	Not used
0 or 1	Not used
0 or 1	Not used
0 or 1	Not used
0 or **1**	Reverse alarm validation
0 or **1**	Forward alarm validation
0 or **1**	Forward and reverse pre-alarm validation

0 : not validated surveillance.
1 : validated surveillance.
Note : In factory settings, the forward and reverse alarms, and the forward and reverse pre-alarms are validated : **0.57** = 111.

20.17 and 20.18 : Not used

20.19 : **Bus control word mask**

The mask is used to validate the bits of the command word (**18.29**) and thus to mix the command by field bus or by digital inputs.
Example :
20.19 = 15 = 0000 0000 0000 1111
bit 1 = 1 : validation of **18.32** forward/stop command by command word.
bit 2 = 1 : validation of **18.34** reverse/stop command by command word.
bit 3 = 1 : validation of I_1 **19.40** reference selection by command word.
bit 4 = 1 : validation of I_2 **19.41** reference selection by command word..
bit 5 = 1 : validation of I_3 **19.46** reference selection by command word.
Remark : check whether the destination of the digital inputs corresponds or not to the bit commanded by the field bus.
Example :
8.23 = **18.32** (forward/stop command).
If **8.23** = **0.00**, the digital input of terminal 26 is not used to control the forward/stop command.

20.20 to **20.39** : **Not used**

20.40 : **Default validation**

Value of **20.40**

0	0	1	1	1	1	1

	Function
0 or 1	Not used
0 or 1	Not used
0 or **1**	"Transmission interruption"default validation
0 or **1**	Phase absence surveillance validation
0 or **1**	Direction of rotation surveillance validation
0 or **1**	Speed error surveillance validation
0 or **1**	Brake feedback surveillance validation

Validation of brake feedback surveillance
0 : invalidated function.
1 : if the brake enabling information feedback does not correspond to the variable speed drive output command, the variable speed drive will be set to Tr88 default.

Validation of speed error surveillance
0 : invalidated surveillance.
1 : validated surveillance.

: when the level is higher than 8.14, the variable speed drive is stopped.

: if the difference between the reference and the feedback is higher than 15 %, the variable speed drive is stopped.

Validation of the direction of rotation surveillance
0 : invalidated surveillance.
1 : validated surveillance.
Surveillance of the compliance of the required direction of rotation with the measured direction of rotation. In care of non compliance, the variable speed drive is stopped.
Validation of phase absence surveillance
0 : invalidated surveillance.
1 : validated surveillance.

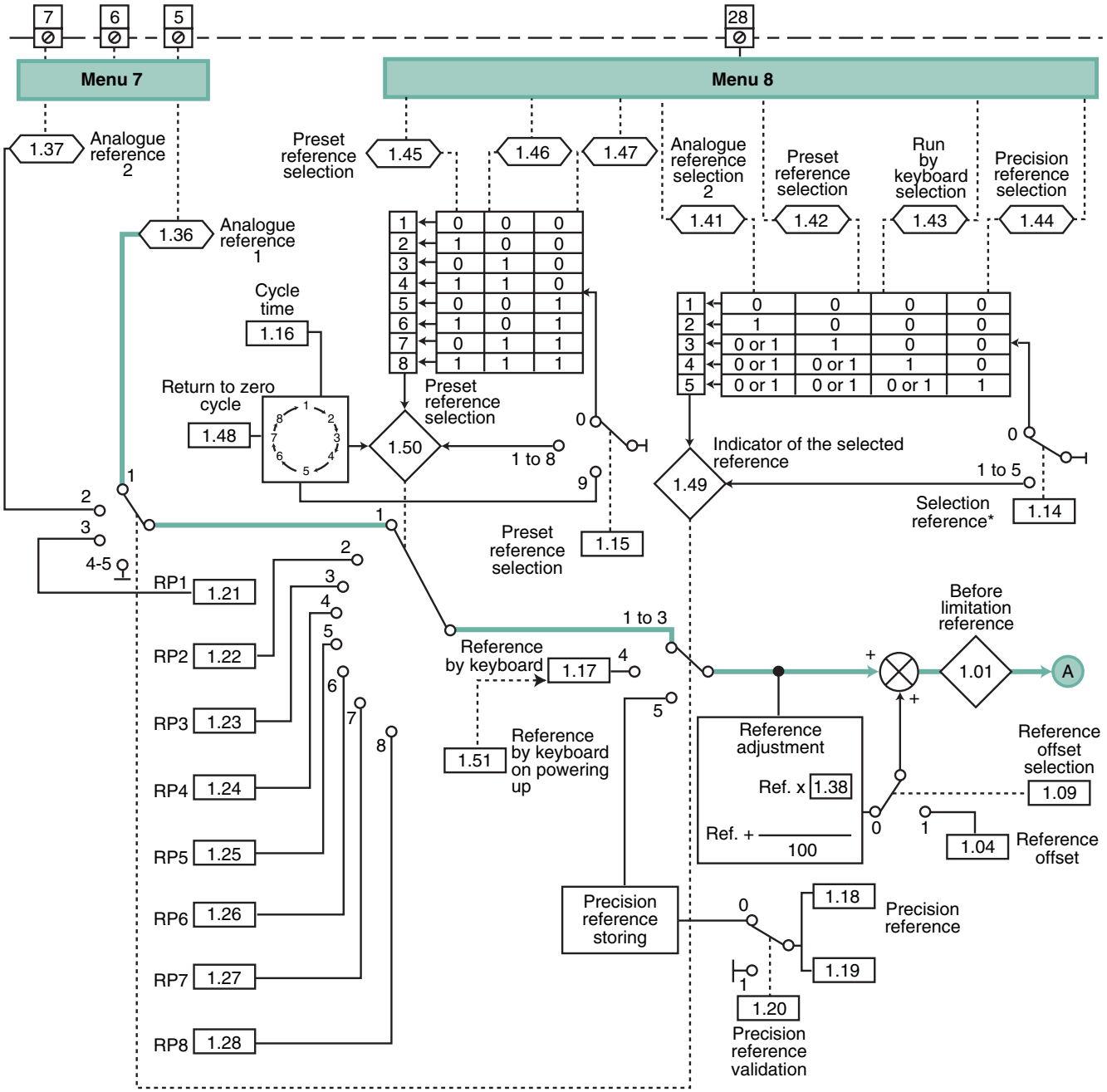
Default validation " transmission interruption "
0 : the " transmission interruption " surveillance is invalidated. The terminal 24 is automatically configured in preset speed selection input.
1 : the " transmission interruption " surveillance is enabled. The terminal 24 is automatically configured in variable speed drive default output and " transmission interruption " default.

20.41 to **20.50** : **Not used**

Notes

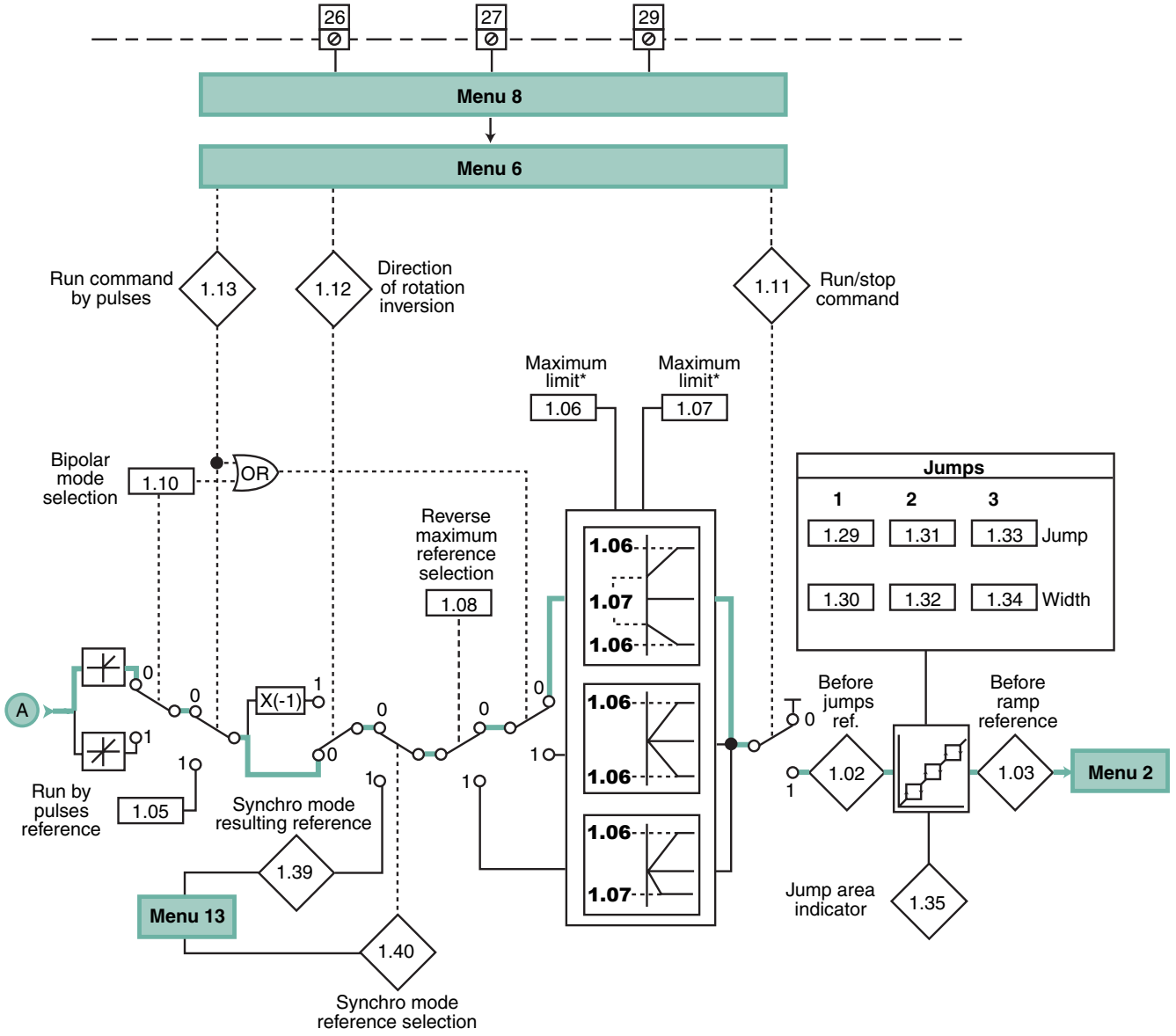
H6 - Base menu diagrams

H6.1 - Menu 1 : Frequency or speed reference (selection - limitats - or filters)



Parameters	Variation range			Factory settings		
1.01	± REF. MAX			-		
1.04	± 3000.0 Hz	± 40000.0 min^{-1}		0		
1.14	A1.A2 (0), A1.Pr (1), A2.Pr (2), Pr (3), Pad (4), Prc (5)			A1.A2 (0)		
1.16	0 to 400.0 s			10.0 s		
1.17 - **1.18** - **1.36** - **1.37** **1.21** to **1.28**	± REF. MAX			0		
1.19	0 to 0.099 Hz	0 to 0.099 min^{-1}		0		
1.38	± 100.00 %			0		
1.48	OFF (0) or On (1)			OFF (0)		
1.51	rESEt (0), LASt (1), PrS1 (2)			rESEt (0)		

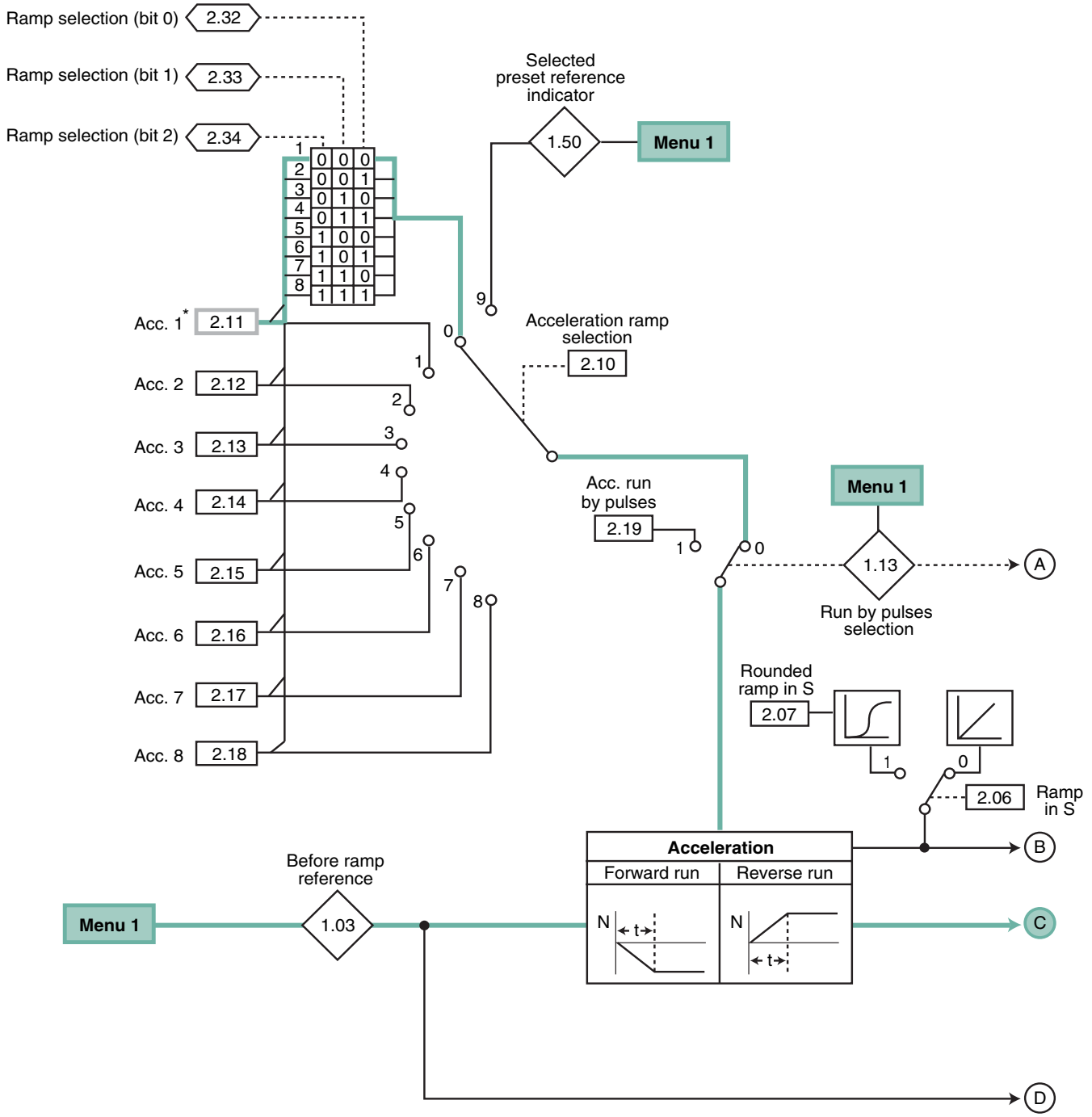
Menu 1 (to be continued)



* When motor 2 is selected (**11.45** = On (1)), these parameters are no longer actives and they are replaced by the parameters of menu 21.

Parameters	Variation range			Factory settings		
1.02 - **1.03**	± REF. MAX			-		
1.05	0 to 400.0 Hz	0 to 4000.0 min^{-1}		0		
1.06	0 to 3000.0 Hz	± LIN N. MAX		EUR : 50 Hz USA : 60 Hz	EUR : 1500.0 min^{-1} USA : 1800.0 min^{-1}	3000.0 min^{-1}
1.07	± 3000.0 Hz	± REF. MAX		0		
1.29 - **1.31** - **1.33**	0 to 3000.0 Hz	0 to 40000 min^{-1}		0		
1.30 - **1.32** - **1.34**	0 to 25.0 Hz	0 to 250 min^{-1}		0.5 Hz	5 min^{-1}	
1.35	OFF (0) or On (1)			-		
1.39	± 3000.0 HZ	± 40000.0 min^{-1}		-		

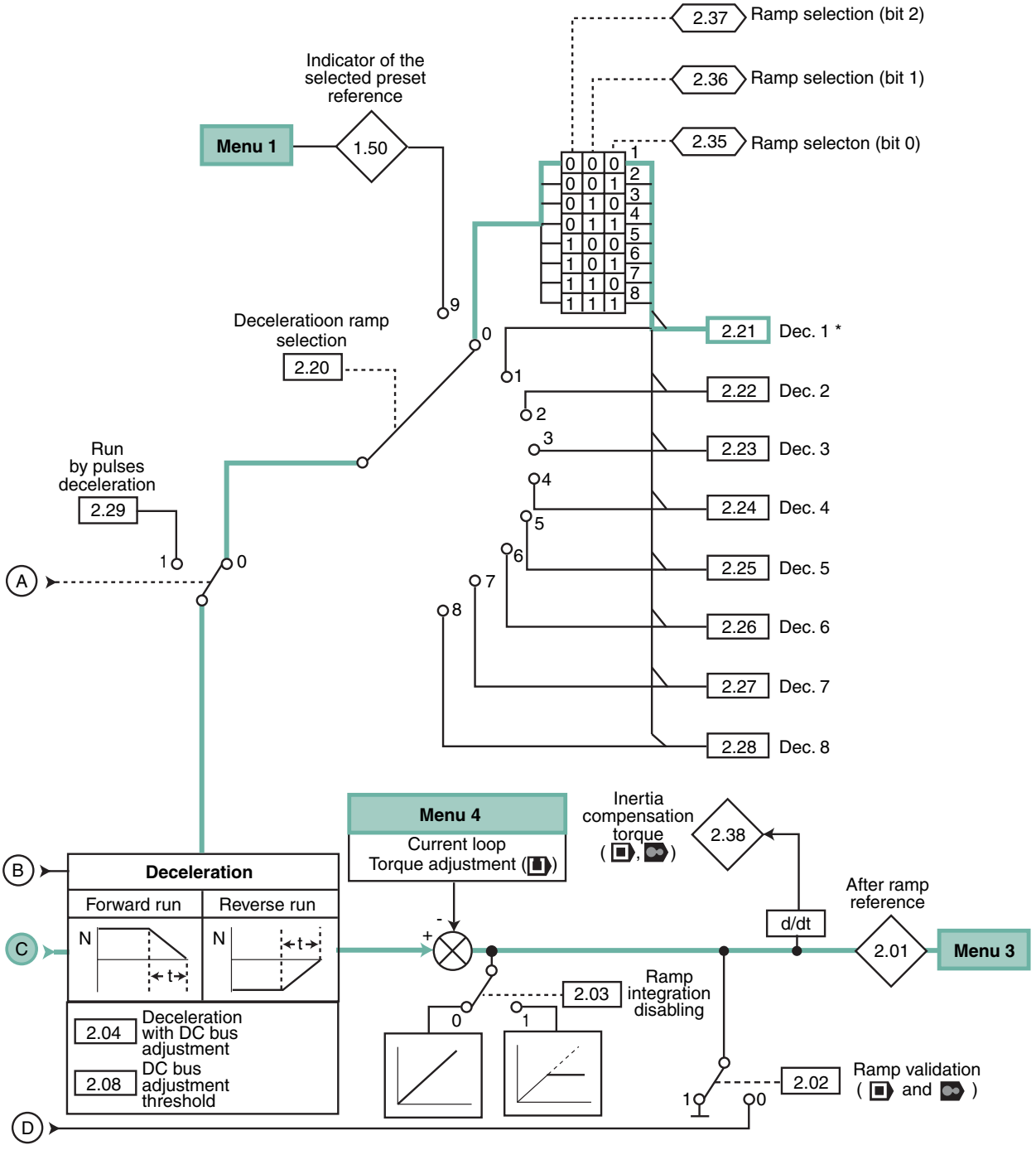
H6.2 - Menu 2 : Ramps



* When motor 2 is selected (**11.45** = On (1)), these parameters are no longer active and they are replaced by the parameters of menu 21.

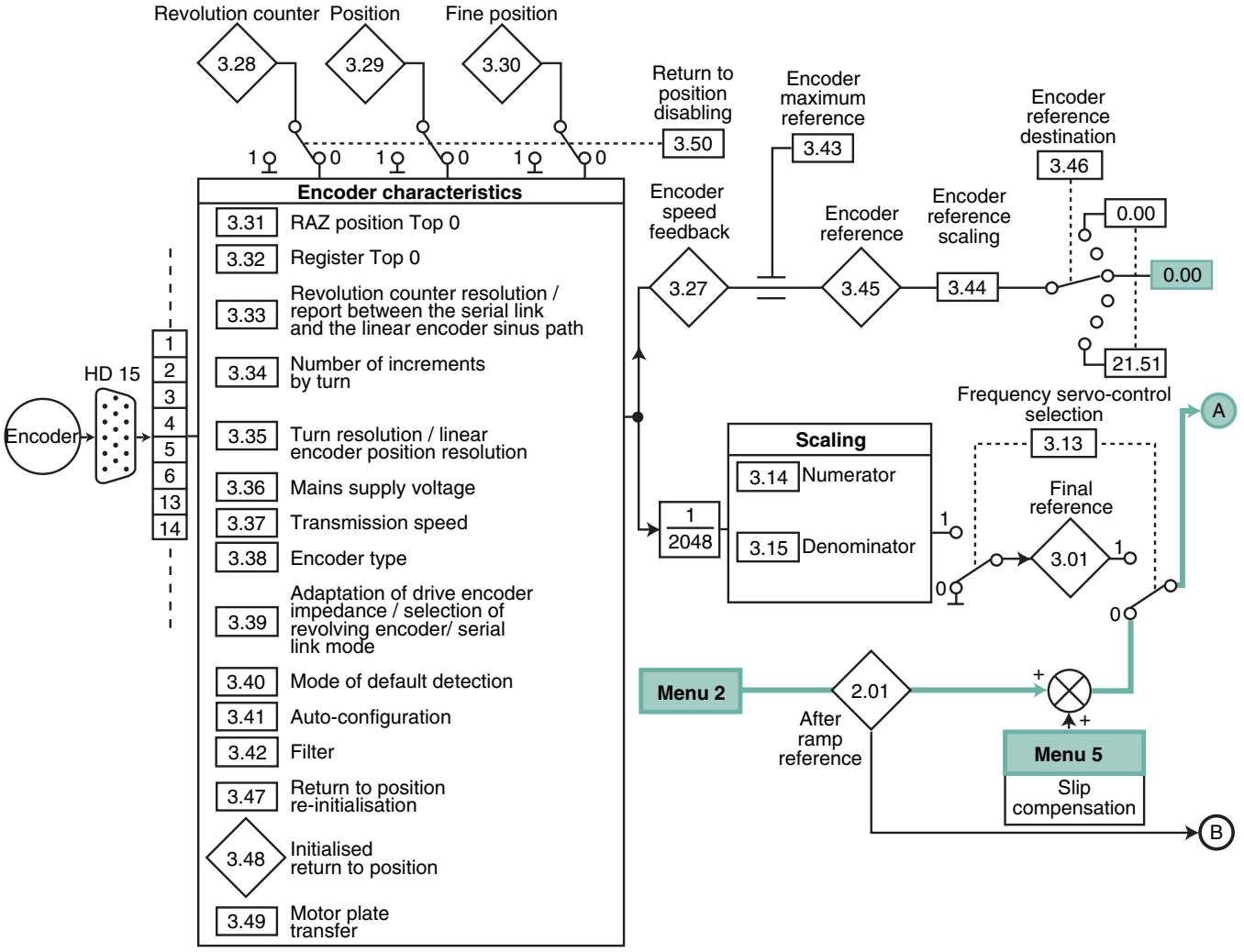
Parameters	Variation range			Factory settings		
2.07	0 to 300.0s^2 /	0 to 100.000s^2/1000min^{-1}		3.1s^2/100Hz	1.500s^2/1000min^{-1}	0.030s^2/ 1000min^{-1}
2.11 to **2.18**	0 to 3200.0s/	0 to 3200.000 s/1000 min^{-1}		5.0s/100Hz	2.000s/1000min^{-1}	0.0200s/1000min^{-1}
2.19	0 to 3200.0s/	0 to 3200.000 s/1000 min^{-1}		0.2s/100Hz	0	

Menu 2 (to be continued)



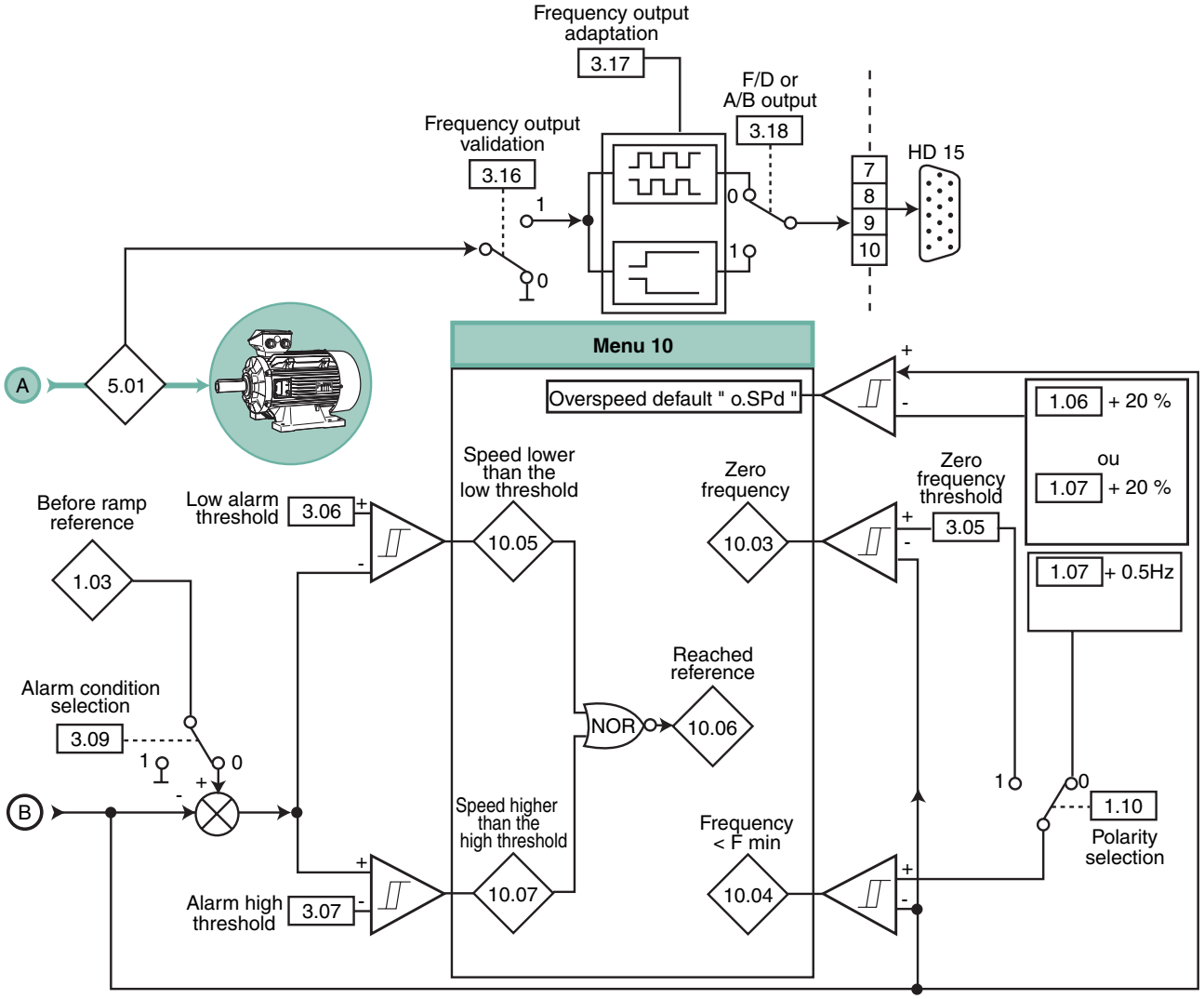
Parameters	Variation range			Factory settings		
2.01	± REF. MAX			-		
2.04	FASt (0), Std (1), Std.hV (2)	FASt (0), Std (1)		Std (1)		
2.08	0 to SEUIL U_{cc} MAX (V)			TL : 375V T : EUR = 750V / USA = 775V TM : 895V TH : 1075V		
2.21 to **2.28**	0 to 3200.0s/100Hz	0 to 3200.000s/1000min^{-1}		10.0s/100Hz	2.000s/1000min^{-1}	0.0200s/1000min^{-1}
2.29	0 to 3200.0s/100Hz	0 to 3200.000s/1000min^{-1}		0.2s/100Hz	0	
2.38	-	± 1000.0 %		-		

H6.3 - Menu 3 : Encoder input and speed loop in open loop



Parameters	Variation range	Factory settings
3.01	± 1000.0 Hz	-
3.14	0 to 1.000	1.000
3.15	0.001 to 1.000	1.000
3.27	± 40000.0 min^{-1}	-
3.28	0 to 65535 turns	-
3.29	0 to 65535 ($1/2^{16}$ by turn)	-
3.30	0 to 65535 ($1/2^{32}$ by turn)	-
3.31 - 3.32 - 3.41 3.47 - 3.49	OFF (0) or On (1)	OFF (0)
3.33	0 to 255	16
3.34	0 to 50000	1024
3.35	0 to 32 bits	0
3.36	5V (0), 8V (1), 15V (2)	5V (0)
3.37	100 (0), 200 (1), 300 (2), 400 (3), 500 (4), 1000 (5), 1500 (6), 2000 (7) K Bauds	300 (2) K Bauds
3.38	Ab (0), Fd (1), Fr (2), Ab.SErvo (3), Fd.SErvo (4), Fr.SErvo (5), SC (6), SC.Hiper (7), EndAt (8), SC.EndAt (9), SSI (10), SC.SSI (11)	Ab (0)
3.39	0 to 2	1
3.40	0 to 3	0
3.42	0 to 5 (0 to 16 ms)	0
3.43	0 to 40000 min^{-1}	1500 min^{-1}
3.44	0 to 4.000	1.000
3.45	± 100.0 %	-
3.48	OFF (0) or On (1)	-

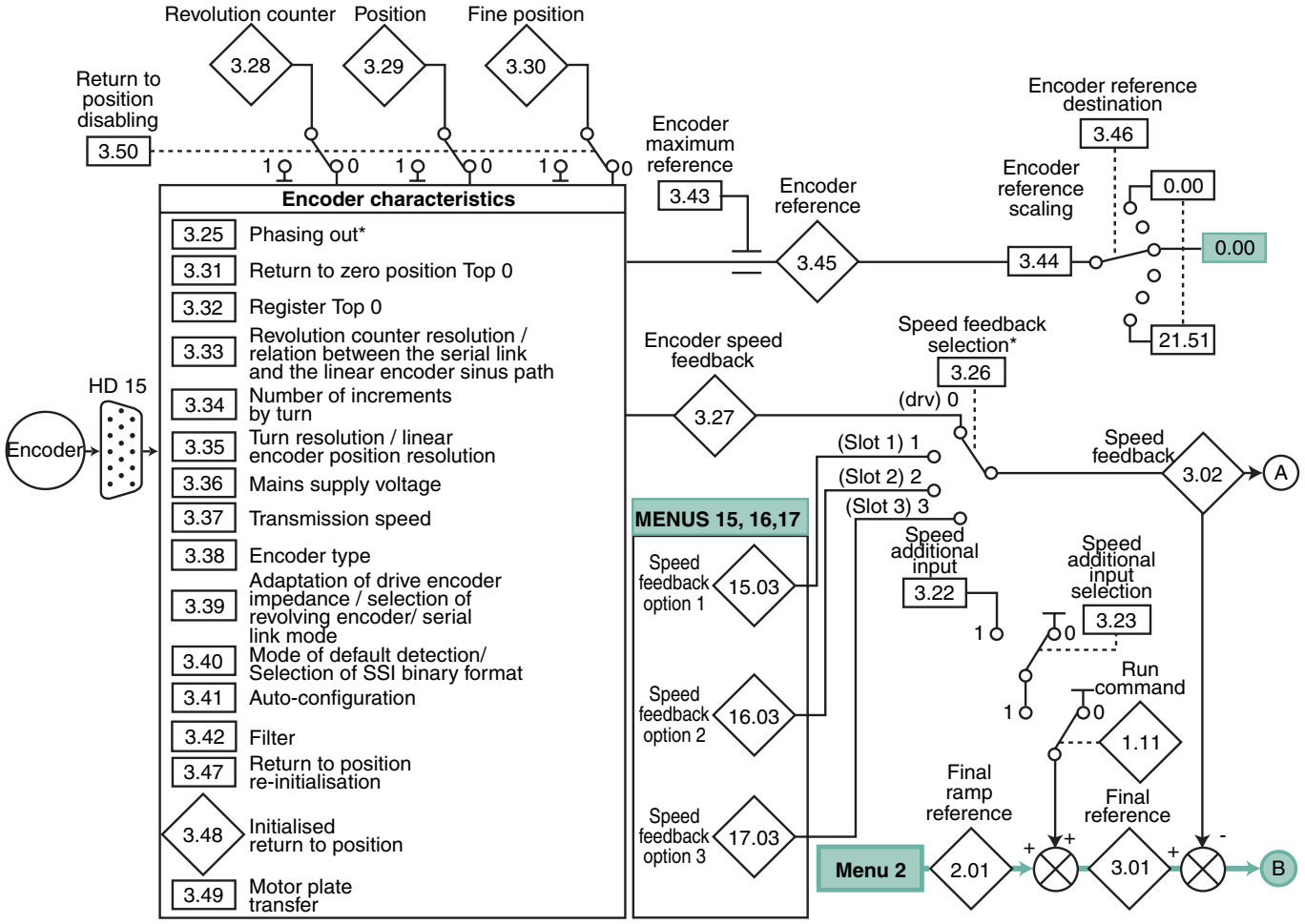
Menu 3 in open loop (to be continued)



Depending on the encoder type, set at least the parameters below		
Incremental encoder or Sincos without serial link	**SinCos encoder with Hiperface or EndAt link or EnDat encoder**	**SinCos encoder with SSI link or SSI encoder**
3.34 : ELPR (0 to 50000) **3.36** : Voltage **3.38** : Type	**3.36** : Voltage **3.37** : Transmission speed (save for the encoder with Hiperface link) **3.38** : Type **3.41** : Auto-configuration	**3.33** : Number of turns **3.34** : ELPR (only for a SinCos encoder) **3.35** : Resolution **3.36** : Voltage **3.37** : Transmission speed **3.38** : Type **3.41** : SSI format selection

Parameters	Variation range	Factory setting
3.05	0 to 20.0 Hz	1.0 Hz
3.06 - 3.07	0 to 3000.0 Hz	1.0 Hz
3.17	OFF (0) or On (1)	On (1)

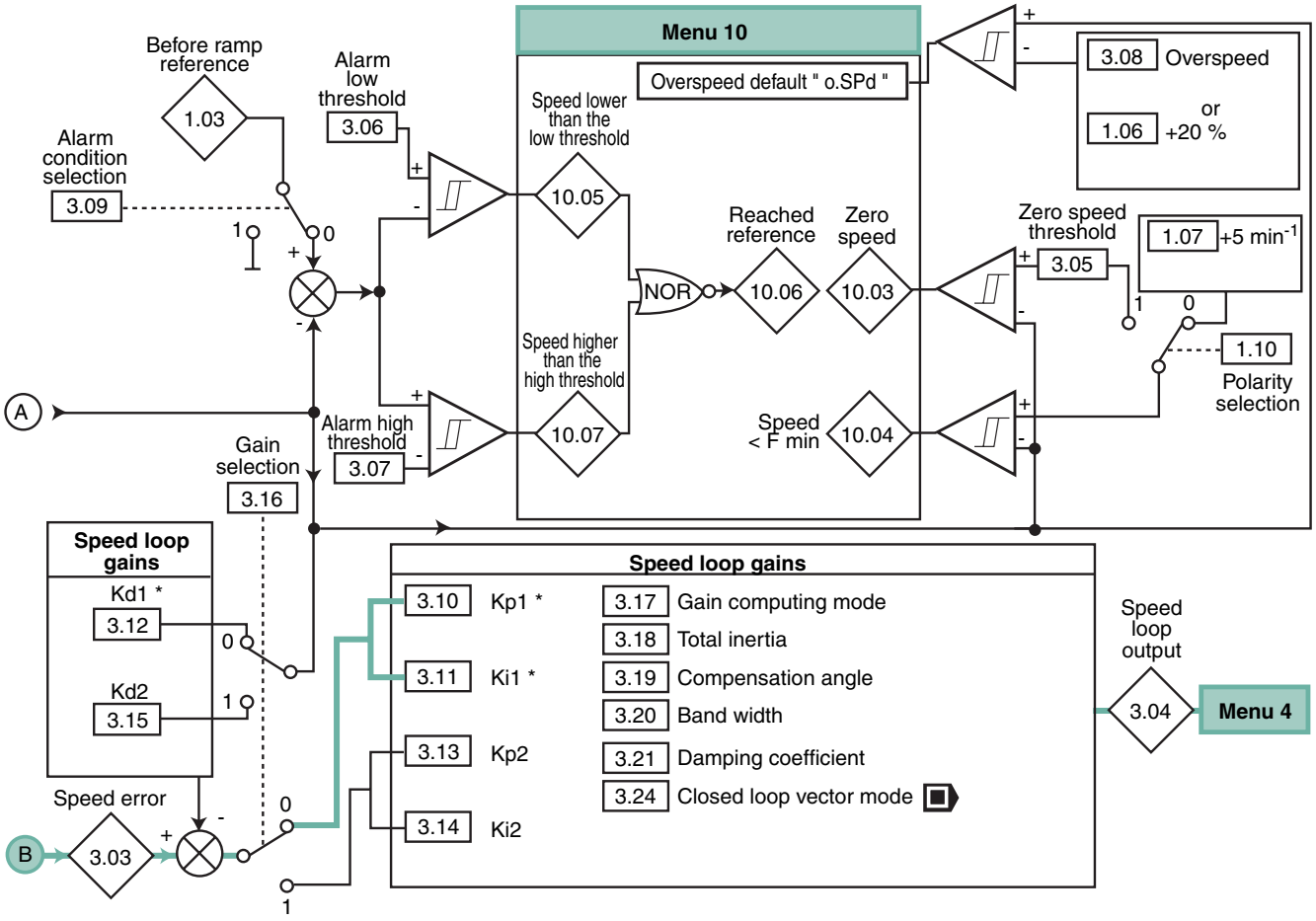
H6.4 - Menu 3 : Encoder input and speed loop in closed loop and servo ▣ and ▣



* When motor 2 is selected (**11.45** = On (1)), these parameters are no longer active and they are replaced by the parameters of menu 21.

Parameters	Variation range		Factory settings	
	▣	▣	▣	▣
3.01 - 3.02	± N MAX		-	
3.22	± REF. MAX		0	
3.25	-	0 to 359.9°	-	0
3.27	± 40000.0 min^{-1}		-	
3.28	0 to 65535 tours		-	
3.29	0 to 65535 (1/2^{16} turn)		-	
3.30	0 to 65535 (1/2^{32} turn tour)		-	
3.31 - 3.32 - 3.41 3.47 - 3.49	OFF (0) or On (1)		OFF (0)	
3.33	0 to 255		16	
3.34	0 to 50000		1024	4096
3.35	0 to 32 bits		0	
3.36	5V (0), 8V (1), 15V (2)		5V (0)	
3.37	100 (0), 200 (1), 300 (2), 400 (3), 500 (4), 1000 (5), 1500 (6), 2000 (7), 4000 (8) KBaud		300 (2) KBaud	
3.38	Ab (0), Fd (1), Fr (2), Ab.SErvo (3), Fd.SErvo (4), Fr.SErvo (5), SC (6), SC.Hiper (7), EndAt (8), SC.Endat (9), SSi (10), SC.SSi (11)		Ab (0)	Ab.SErvo (3)
3.39	0 to 2		1	
3.40	0 to 7		1	
3.42	0 to 5 (0 to 16ms)		0	
3.43	0 to 40000 min^{-1}		1500 min^{-1}	3000 min^{-1}
3.44	0 to 4.000		1.000	
3.45	± 100.0 %		-	
3.48	OFF (0) or On (1)		-	

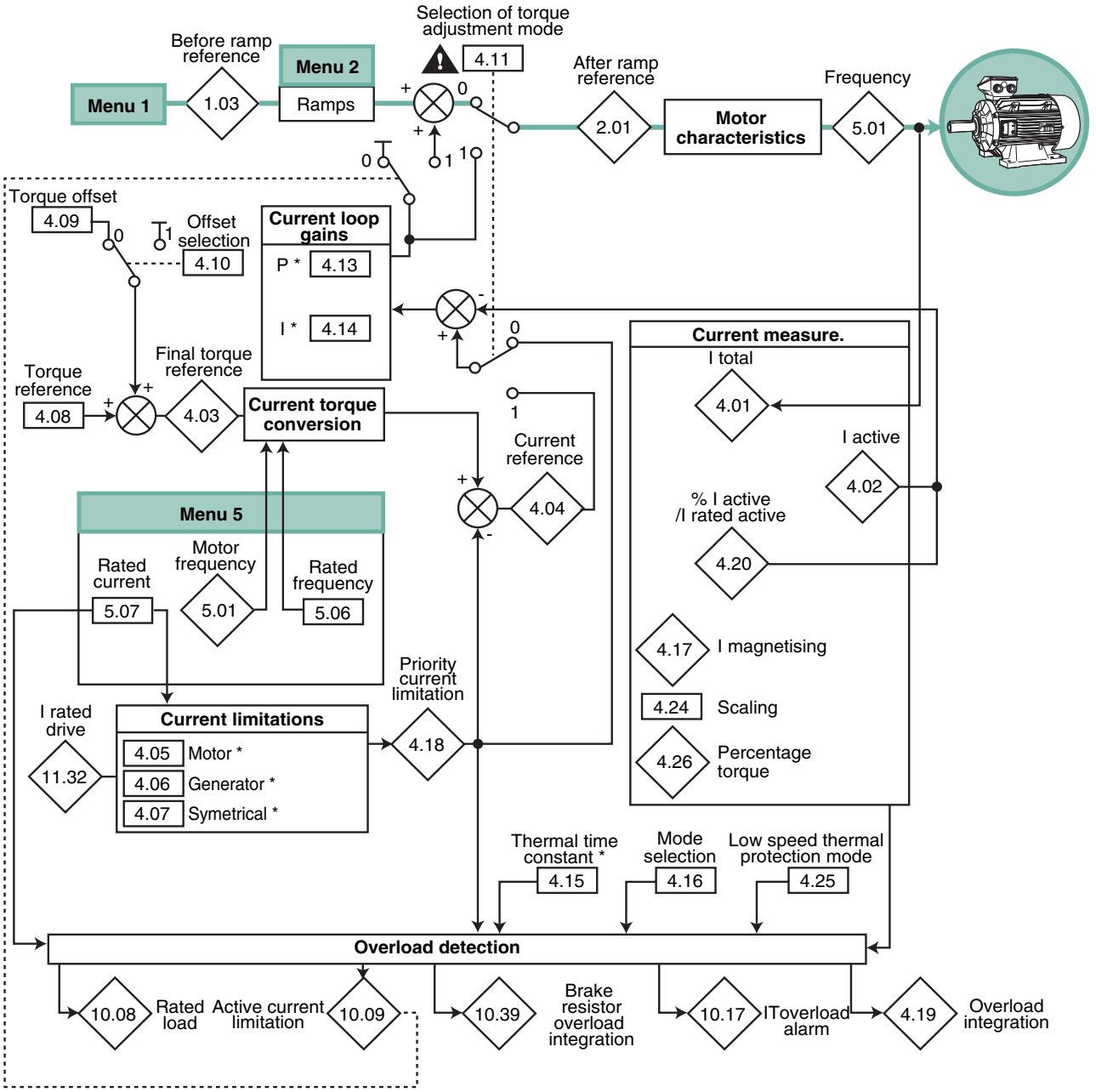
Menu 3 in closed loop and servo (to be continued)



Depending on the encoder type, set at least the parameters below		
Incremental encoder or Sincos without serial link	**SinCos encoder with Hiperface or EndAt link or EnDat encoder**	**SinCos encoder with SSI link or SSI encoder**
3.34 : ELPR (0 to 50000) **3.36** : Voltage **3.38** : Type	**3.36** : Voltage **3.37** : Transmission speed (save for the encoder with Hiperface link) **3.38** : Type **3.41** : Auto-configuration	**3.33** : Number of turns **3.34** : ELPR (only for a SinCos encoder) **3.35** : Resolution **3.36** : Voltage **3.37** : Transmission speed **3.38** : Type **3.41** : SSI format selection

Parameters	Variation range		Factory settings	
	▣	⚭	▣	⚭
3.03	± N MAX		-	
3.04	± I_{ACTIF} MAX (%)		-	
3.05	0 to 200 min^{-1}		5 min^{-1}	
3.06 - 3.07	0 to 40000 min^{-1}		5 min^{-1}	
3.08	0 to 40000 min^{-1}		0	
3.10 - 3.13	0 to 6.5535 (1/$rads^{-1}$)		0.0100 (1/$rads^{-1}$)	
3.11 - 3.14	0 to 655.35 (1/rad)		1.00 (1/rad)	
3.12 - 3.15	0 to 0.65535 (s)		0	
3.17	0 to 3		0	
3.18	0 to 100.0000 kgm^2		0	
3.19	0 to 359.9 °		4.0 °	
3.20	0 to 255 Hz		10 Hz	
3.21	0 to 10.0		1.0	
3.24	0 to 3	-	0	-

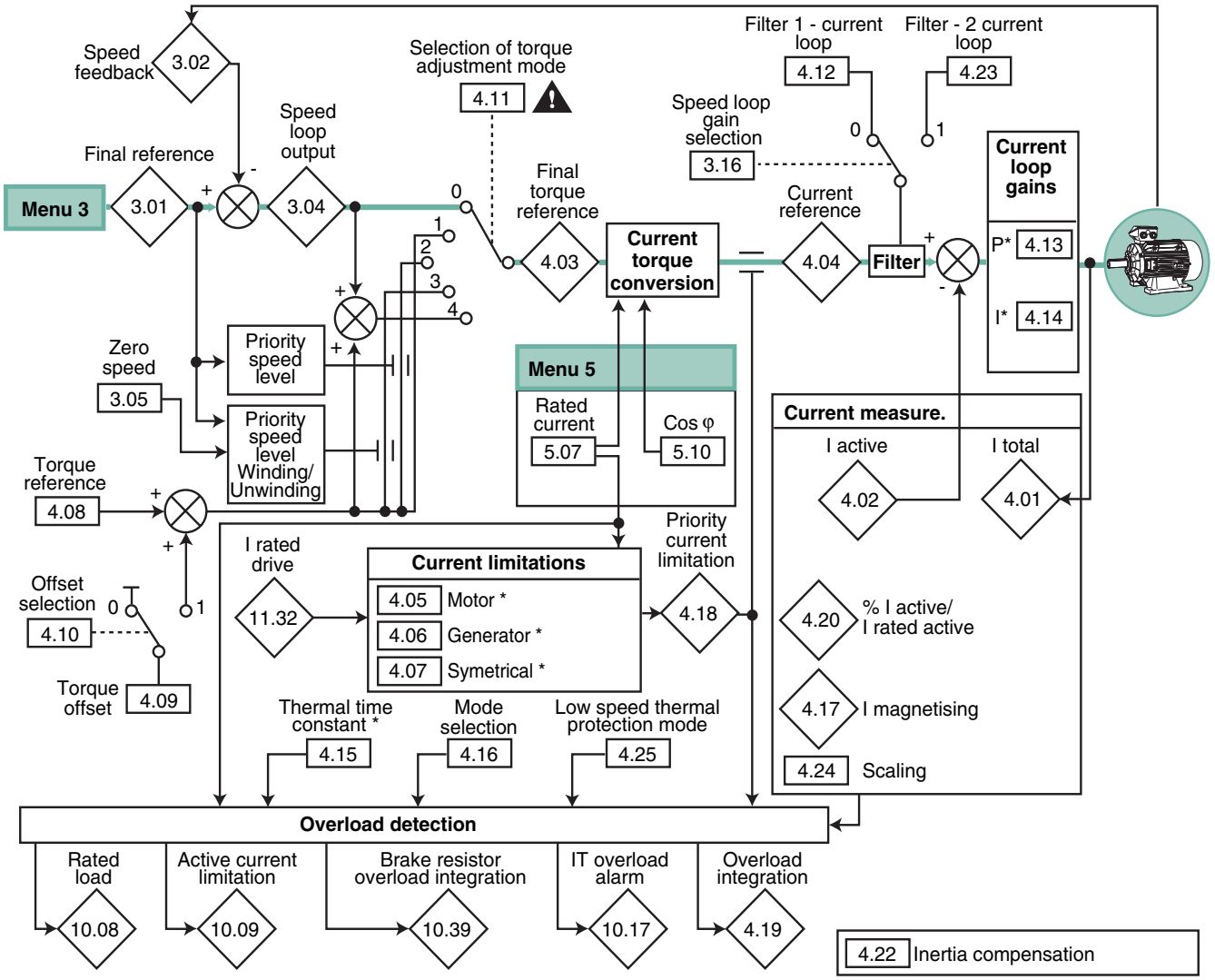
H6.5 - Menu 4 : Current loop, torque adjustment in open loop



* When motor 2 is selected (**11.45** = On (1)), these parameters are no longer active and they are replaced by the parameters of menu 21.

Parameters	Variation range	Factory settings
4.01	0 to I_{MAX} VAR (A)	-
4.02 - 4.17	± I_{MAX} VAR (A)	-
4.03 - 4.04 - 4.18	± I_{ACTIF} MAX (%)	-
4.05 - 4.06 - 4.07	0 to LIM. IM1 MAX (%)	165.0 %
4.08 - 4.09	± I_{MAX} UTIL. (%)	0
4.13	0 to 30000	20
4.14	0 to 30000	40
4.15	0 to 400.0 s	89.0 s
4.16 - 4.25	OFF (0) or On (1)	OFF (0)
4.19	0 to 100.0 %	-
4.20	± I_{MAX} UTIL. (%)	-
4.24	0 to I_{ACTIF} MAX (%)	165.0 %
4.26	± I_{MAX} UTIL. (%)	-

H6.6 - Menu 4 : Current loop, torque adjustment in closed loop

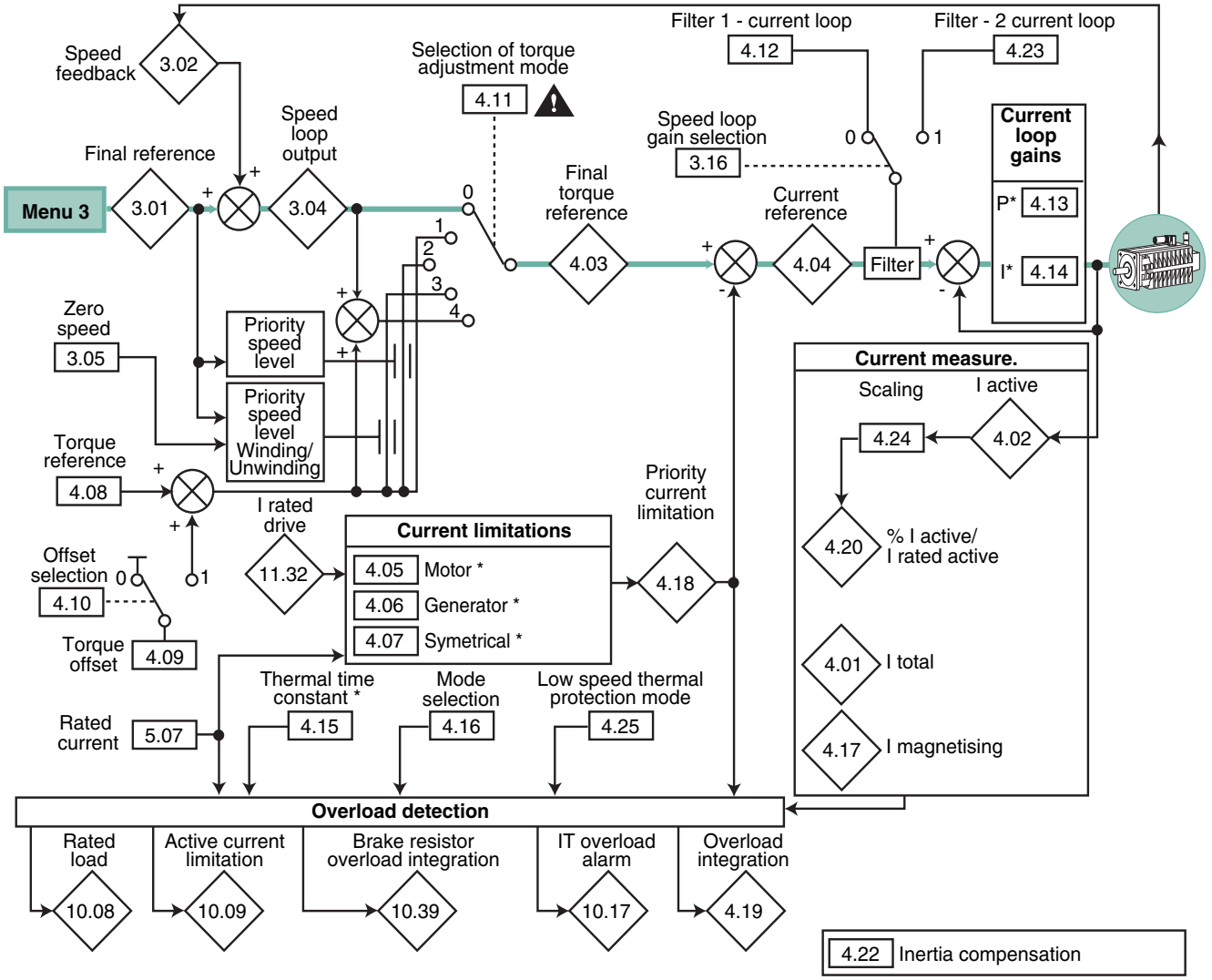


• When the torque command mode without speed control is validated (4.11 = 1) and on the zero resistant toque, the drive accelerates up to the overspeed threshold 3.08 (stop). If 3.08 is at 0, the maximum speed reached will be of 1.06 + 20 %.
• When the modes 2 or 3 are selected, the drive does not take into account the stopping mode set and generates a stop without ramp.

* When motor 2 is selected (**11.45** = On (1)), these parameters are no longer active and they are replaced by the parameters of the menu 21.

Parameters	Variation range	Factory settings
4.01	0 to I_{MAX} VAR (A)	-
4.02 - 4.17	± I_{MAX} VAR (A)	-
4.03 - 4.04 - 4.18	± IACTIF MAX (%)	-
4.05 - 4.06 - 4.07	0 to LIM. IM1 MAX (%)	175.0 %
4.08 - 4.09	± I_{MAX} UTIL. (%)	-
4.12 - 4.23	0 to 25.0 ms	0
4.13	0 to 30000	TL : 75 / T : 150 / TM : 180 / TH : 215
4.14	0 to 30000	TL : 1000 / T : 2000 / TM : 2400 / TH : 3000
4.15	0 to 400.0 s	89.0 s
4.16 - 4.22 - 4.25	OFF (0) or On (1)	OFF (0)
4.19	0 to 100 %	-
4.20	± I_{MAX} UTIL. (%)	-
4.24	± I_{ACTIF} MAX (%)	175.0 %

H6.7 - Menu 4 : Current loop, torque adjustment in servo

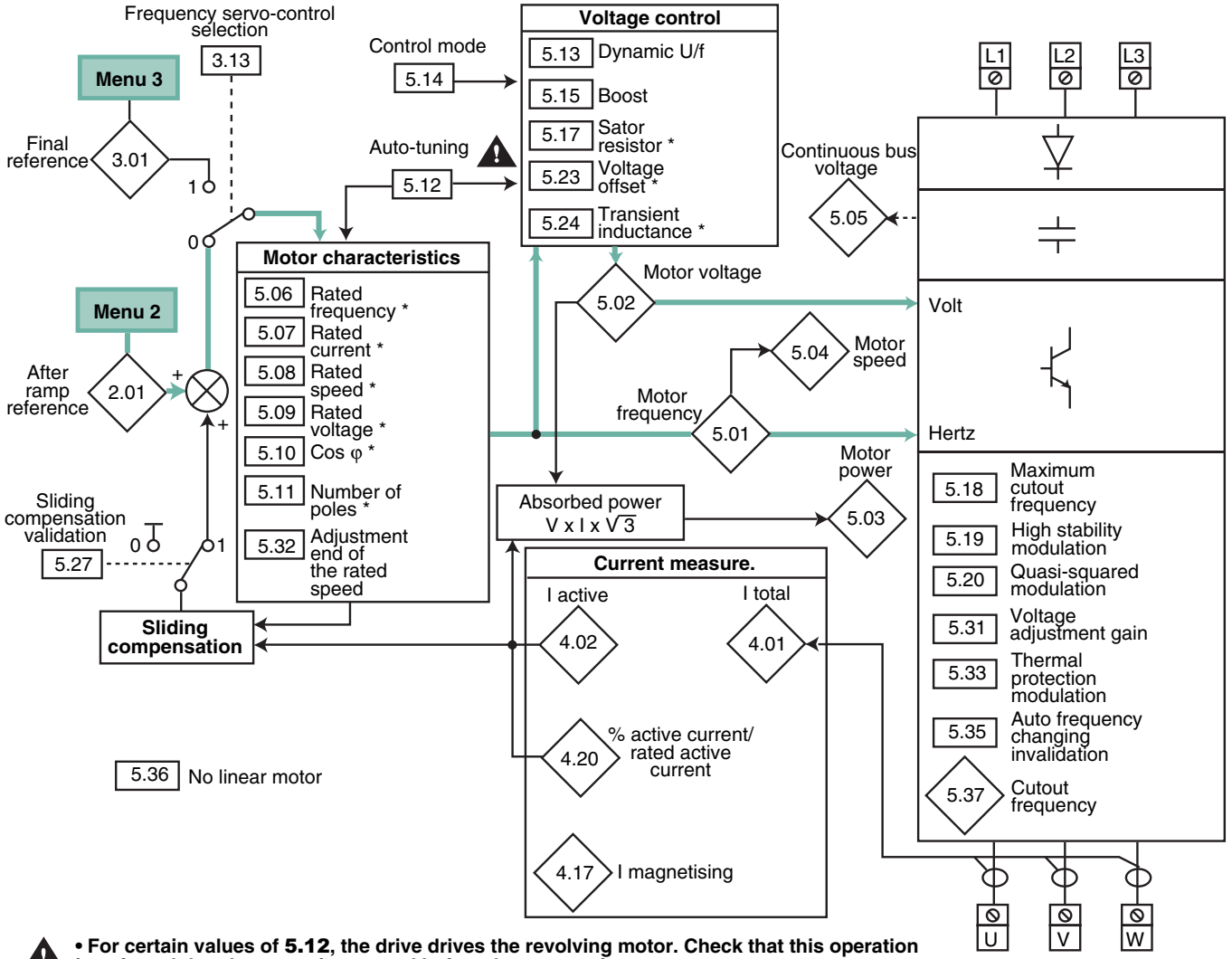


When the torque command mode without speed control is validated (4.11 = 1) and on the zero resistant toque, the drive accelerates up to the overspeed threshold 3.08 (stop). If 3.08 is at 0, the maximum speed reached will be of 1.06 + 20 %.
• When the modes 2 or 3 are selected, the drive does not take into account the stopping mode set and generates a stop without ramp.

* When motor 2 is selected (**11.45** = On (1)), these parameters are no longer active and they are replaced by the parameters of menu 21.

Parameters	Variation range	Factory settings
4.01	0 to I_{MAX} VAR (A)	-
4.02 - 4.17	± I_{MAX} VAR (A)	-
4.03 - 4.04 - 4.18	± I_{ACTIF} MAX (%)	-
4.05 - 4.06 - 4.07	0 to LIM. IM1 MAX (%)	175.0 %
4.08 - 4.09	± I_{MAX} UTIL. (%)	-
4.12 - 4.23	0 to 25.0 ms	0
4.13	0 to 30000	TL : 75 / T : 150 / TM : 180 / TH : 215
4.14	0 to 30000	TL : 1000 / T : 2000 / TM : 2400 / TH : 3000
4.15	0 to 3000.0 s	20.0 s
4.16 - 4.22 - 4.25	OFF (0) or On (1)	OFF (0)
4.19	0 to 100 %	-
4.20	± I_{MAX} UTIL. (%)	-
4.24	± I_{ACTIF} MAX (%)	175.0 %

H6.8 - Menu 5 : Motor control in open loop

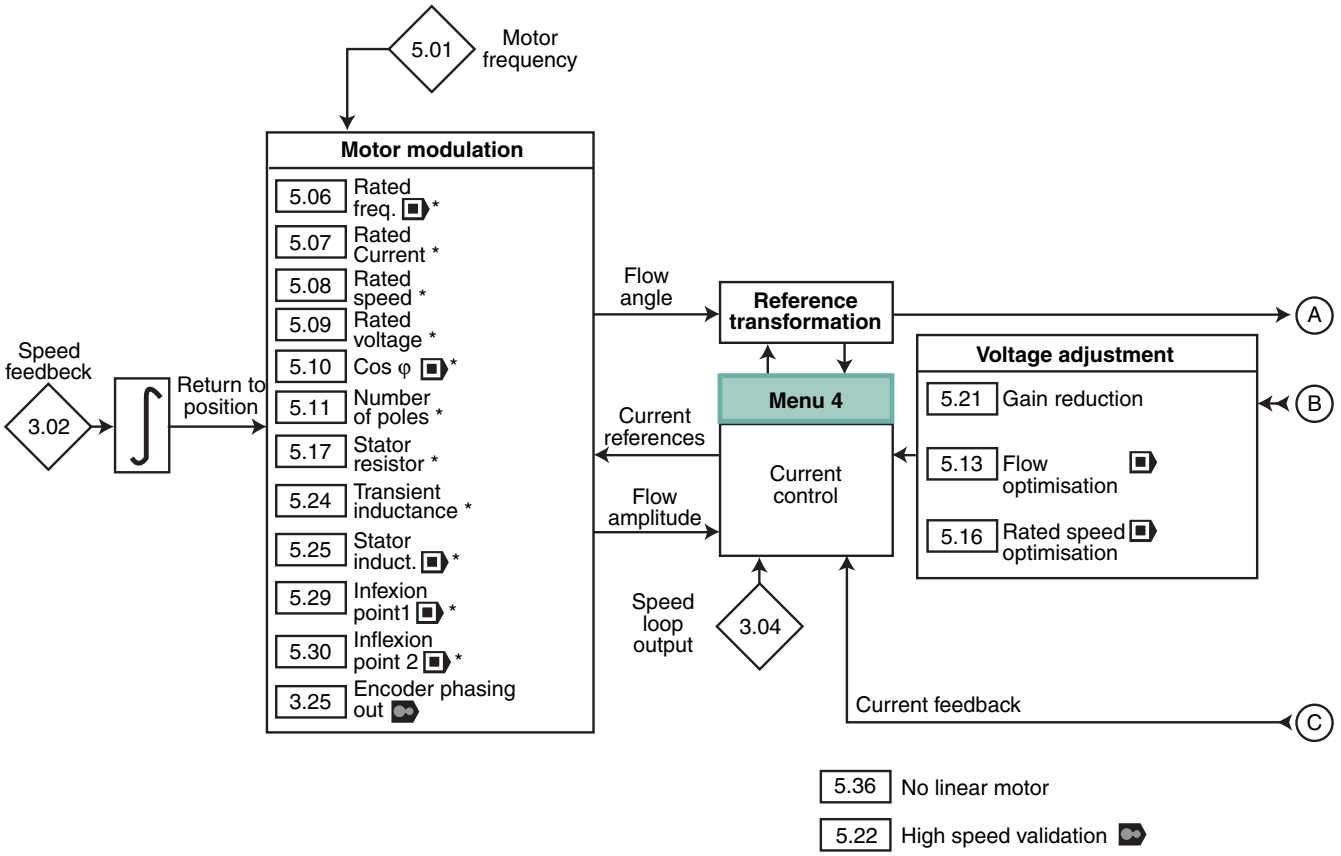


• For certain values of 5.12, the drive drives the revolving motor. Check that this operation is safe and that the motor is stopped before the auto-tuning.
• After the modification of the motor parameters, renew the auto-tuning.

* When motor 2 is selected (**11.45** = On (1)), these parameters are no longer active and they are replaced by the parameters of menu 21.

Parameters	Variation range	Factory settings
5.01	± REF. MAX (Hz)	-
5.02	0 to U_{AC} OUT MAX (V)	-
5.03	± P MAX (kW)	-
5.04	± 180000 min^{-1}	-
5.05	0 to U_{CC} MAX (V)	-
5.06	0 to 3000 Hz	EUR : 50.0 Hz / USA : 60.0 Hz
5.07	0 to I_N MAX (A)	I_{NOM} VAR (**11.32**)
5.08	0 to 180000 min^{-1}	EUR : 1500 min^{-1} / USA : 1800 min^{-1}
5.09	0 to U_{AC} MOT. MAX (V)	TL : 200V / T : EUR = 400V, USA = 480V / TM : 575V / TH : 690V
5.10	0 to 1.000	0.850
5.11	Auto to 120 Pôles (0 to 60)	Auto (0)
5.12	0 to 2	0
5.13 - 5.35 - 5.19 - 5.20	OFF (0) or On (1)	OFF (0)
5.14	Ur_S (0), Ur (1), Fd (2), Ur_Auto (3), Ur_I (4), SrE (5)	Ur_I (4)
5.15	0 to 25.0 % de U_{NOM} MOT.	3.0 %
5.17	0 to 65.000 Ω	0
5.18	3 (0), 4 (1), 6 (2), 8 (3), 12 (4), 16 (5) kHz	3 (0) kHz
5.23	0 to 25.0 V	0
5.24	0 to 500.000 mH	0
5.31	0 to 30	1
5.36	0 to 655.35 mm	0
5.37	3 (0), 4 (1), 6 (2), 8 (3), 12 (4), 16 (5), 6 rEd (6), 12 rEd (7)	-

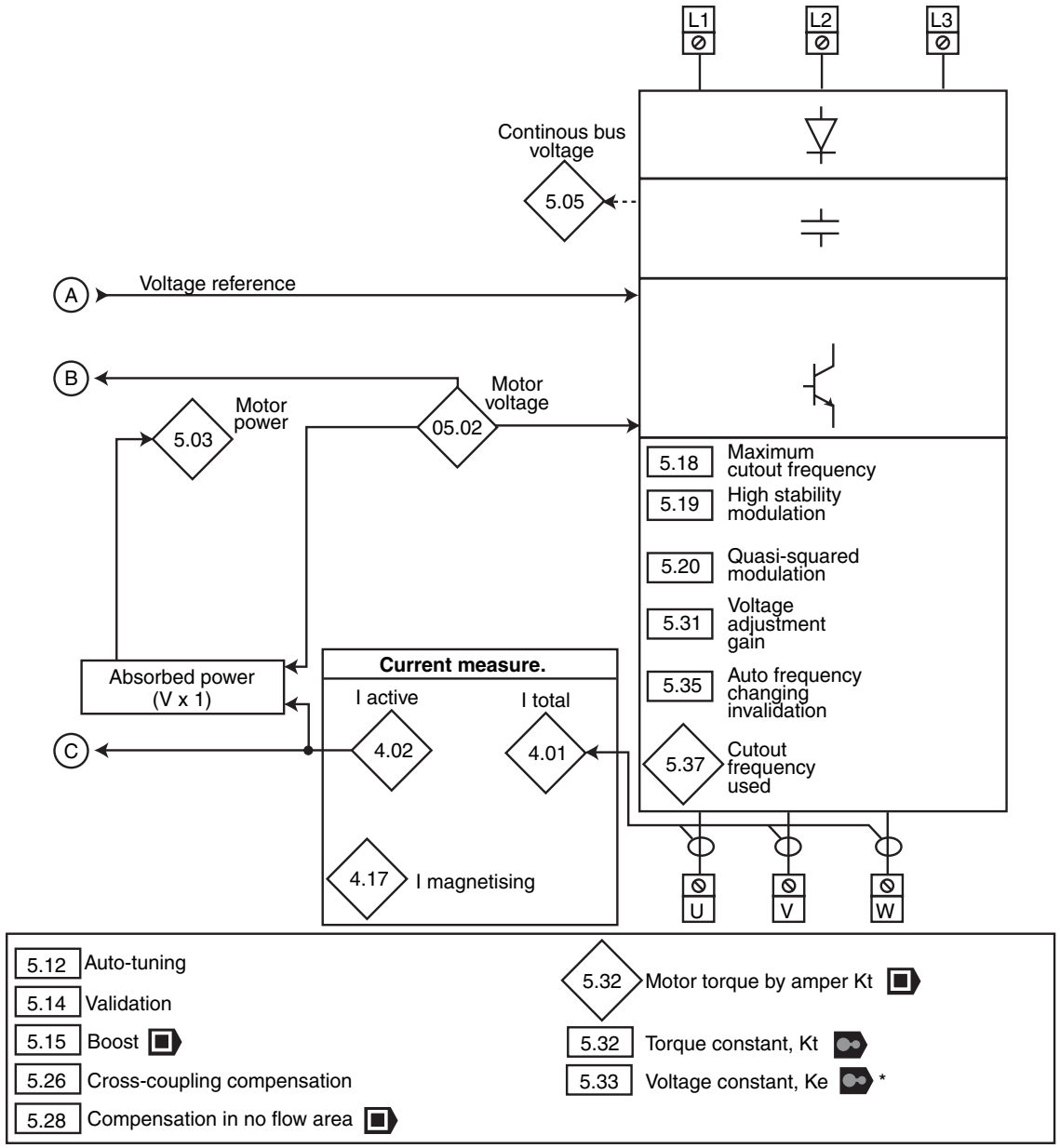
H6.9 - Menu 5 : Motor control in closed loop and servo ▣, ◆



* When motor 2 is selected (11.45 = On (1)), these parameters are no longer active and they are replaced by the parameters of menu 21.

Parameters	Variation range		Factory settings	
	▣	◆	▣	◆
5.01	.± 1250.0 Hz		-	
5.06	0 to 1250.0 Hz	-	EUR : 50.0Hz / USA : 60.0Hz	-
5.07	0 to I_N MAX (A)		I_{NOM} VAR (**11.32**)	
5.08	0 to 40000.00 min^{-1}		EUR : 1450.00 min^{-1} USA : 1770.00 min^{-1}	3000.00 min^{-1}
5.09	0 to U_{AC} MOT. MAX (V)		TL : 200V / T : EUR = 400V, USA = 480V / TM : 575V / TH : 690V	
5.10	0 to 1.000	-	0.850	-
5.11	Auto to 120POLE (0 to 60)		Auto (0)	6POLE (3)
5.13	OFF (0) or On (1)	-	OFF (0)	-
5.16	0 to 2	-	0	-
5.17	0 to 65.000 Ω		0	
5.21	OFF (0) or On (1)		OFF (0)	
5.22	-	OFF (0) or On (1)	-	OFF (0)
5.24	0 to 500000 mH		0	
5.25	0 to 5000.00 mH	-	0	-
5.29	0 to 100 % of rated flow	-	50 %	-
5.30	0 to 100 % of rated flow	-	75 %	-
5.36	0 to 655.35 mm		0	

Menu 5 in closed loop and servo (to be continued)

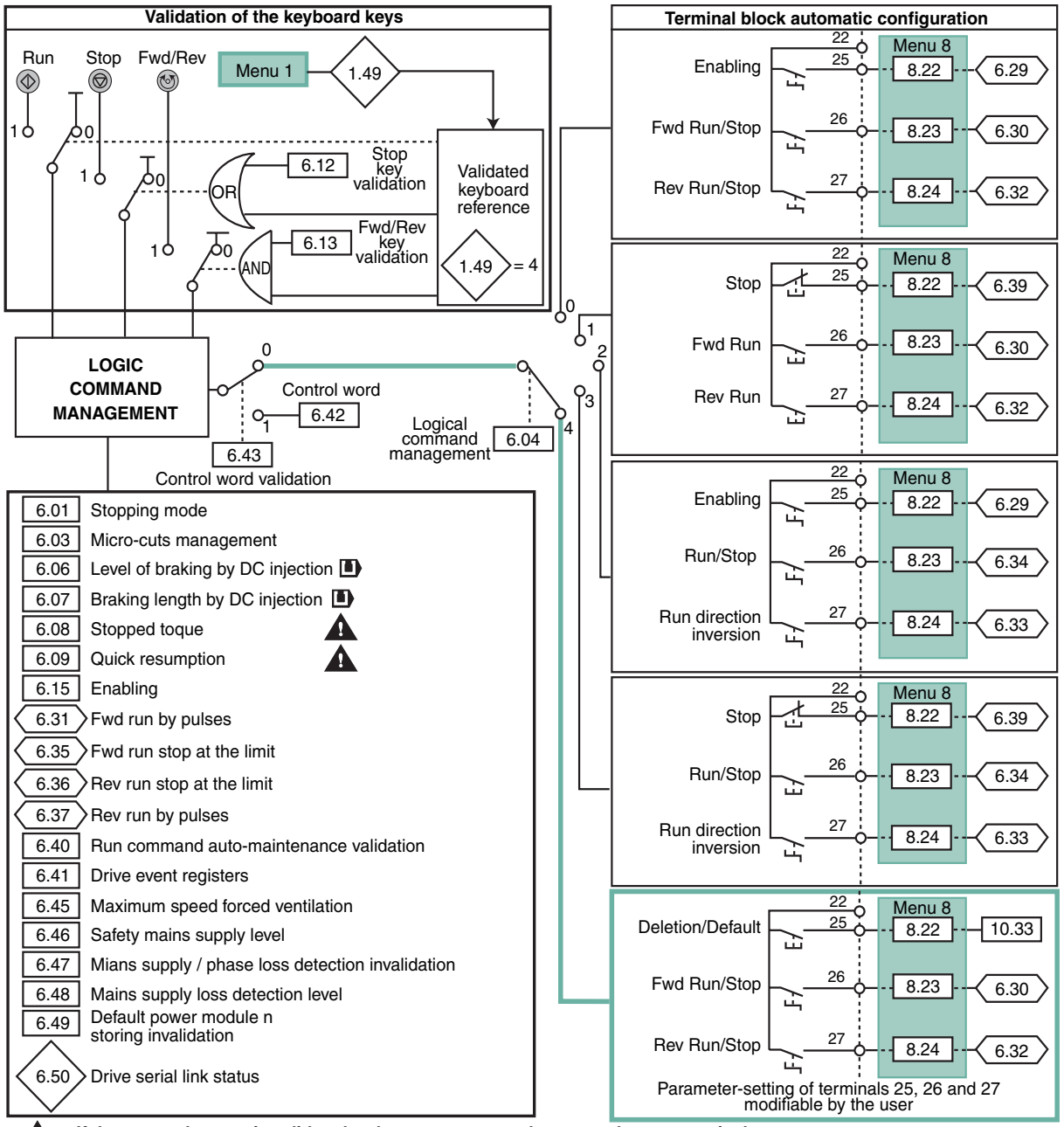


• For certain values of 5.12, the drive drives the revolving motor. Check that this operation is safe and that the motor is stopped before the auto-tuning.
• After the modification of the motor parameters, renew the auto-tuning.

Parameters	Variation range		Factory settings	
	■	⚭	■	⚭
5.02	0 to U_{AC} OUT MAX (V)		-	
5.03	± P MAX (kW)		-	
5.05	0 to U_{CC} MAX (V)		-	
5.12	0 to 4	0 to 6	0	
5.14	-	nonE (0), PhEnl (1), PhInit (2)	-	nonE (0)
5.15	0 to 25.0 % U_{NOM} MOT.	-	1.0	-
5.18	3 (0), 4 (1), 6 (2), 8 (3), 12 (4), 16 (5) kHz		3 (0) kHz	6 (2) kHz
5.19 - 5.20 - 5.26 5.35	OFF (0) or On (1)		OFF (0)	
5.28	OFF (0) or On (1)	-	OFF (0)	-
5.31	0 to 30		1	
5.32	0 to 500.00 NmA^{-1}		-	1.60 NmA^{-1}
5.33	-	0 to 10000 V	-	98 V
5.37	3 (0), 4 (1), 6 (2), 8 (3), 12 (4), 16 (5), 6 rEd (6), 12 rEd (7)		-	

H6.10 - Menu 6 : Management of digital commands and meters

• Management of digital commands

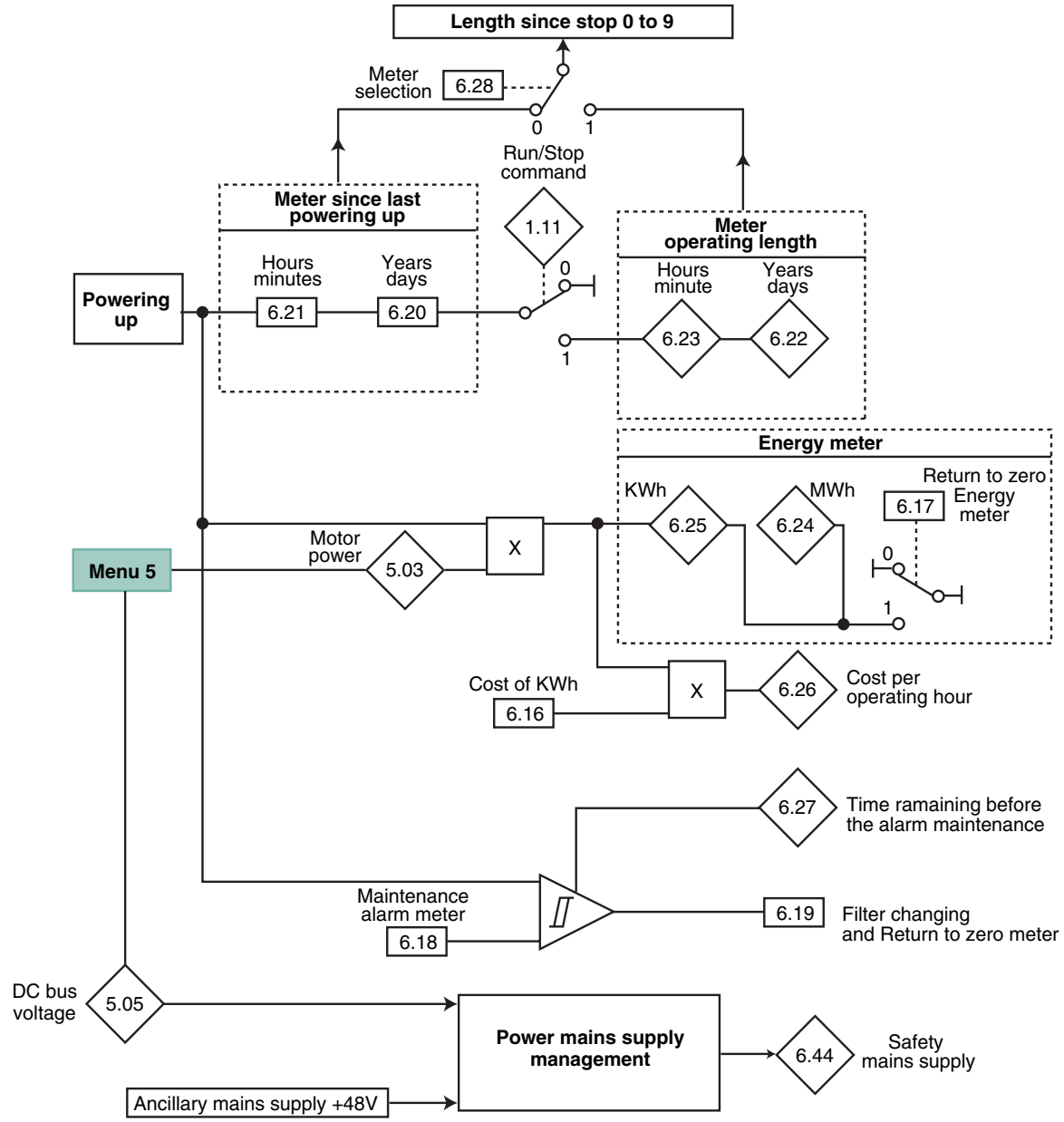


• If the stopped torque is validated, voltage presence at the stopped motor terminals.
• If the motor is just a little loaded, the quick resumption validation may cause the revoilving of the machine in a non defined direction, with the motor acceleration. Make sure that there is no danger for persons and goods.

Parameters	Variation range			Factory settings		
6.01	COASt (0), rP (1), rP.dcl (2), dcl (3), td.dcl (4), disable (5)	COASt (0), rP (1), no.rP (2)		rP (1)		no.rP (2)
6.03	diS (0), StoP (1), ridE.th (2)			diS (0)		
6.06	0 to 150.0 %	-		100.0 %	-	
6.07	0 to 25.0 s	-		1.0 s	-	
6.08	OFF (0) or On (1)			OFF (0)		On (1)
6.09	0 to 3	0 to 1		0	1	
6.12 - 6.13 - 6.30 - 6.31 - 6.32 6.33 - 6.34 - 6.35 - 6.36 - 6.37 6.39 - 6.40 - 6.45 - 6.47 - 6.49	OFF (0) or On (1)			OFF (0)		
6.15	OFF (0) or On (1)			On (1)		
6.29	OFF (0) or On (1)			-		
6.41	0 to 65535			0		
6.42	0 to 32767			0		
6.46	Size 1 : 48V, sizes 2 and 3 : 48V to 72V			48V		
6.48	0 to threshold U_{CC} MAX (V)			TL : 205V, T : 410V, TM : 540V, TH : 540V		
6.50	Drv (0), Slot (1), Slot 2 (2), Slot 3 (3)			-		

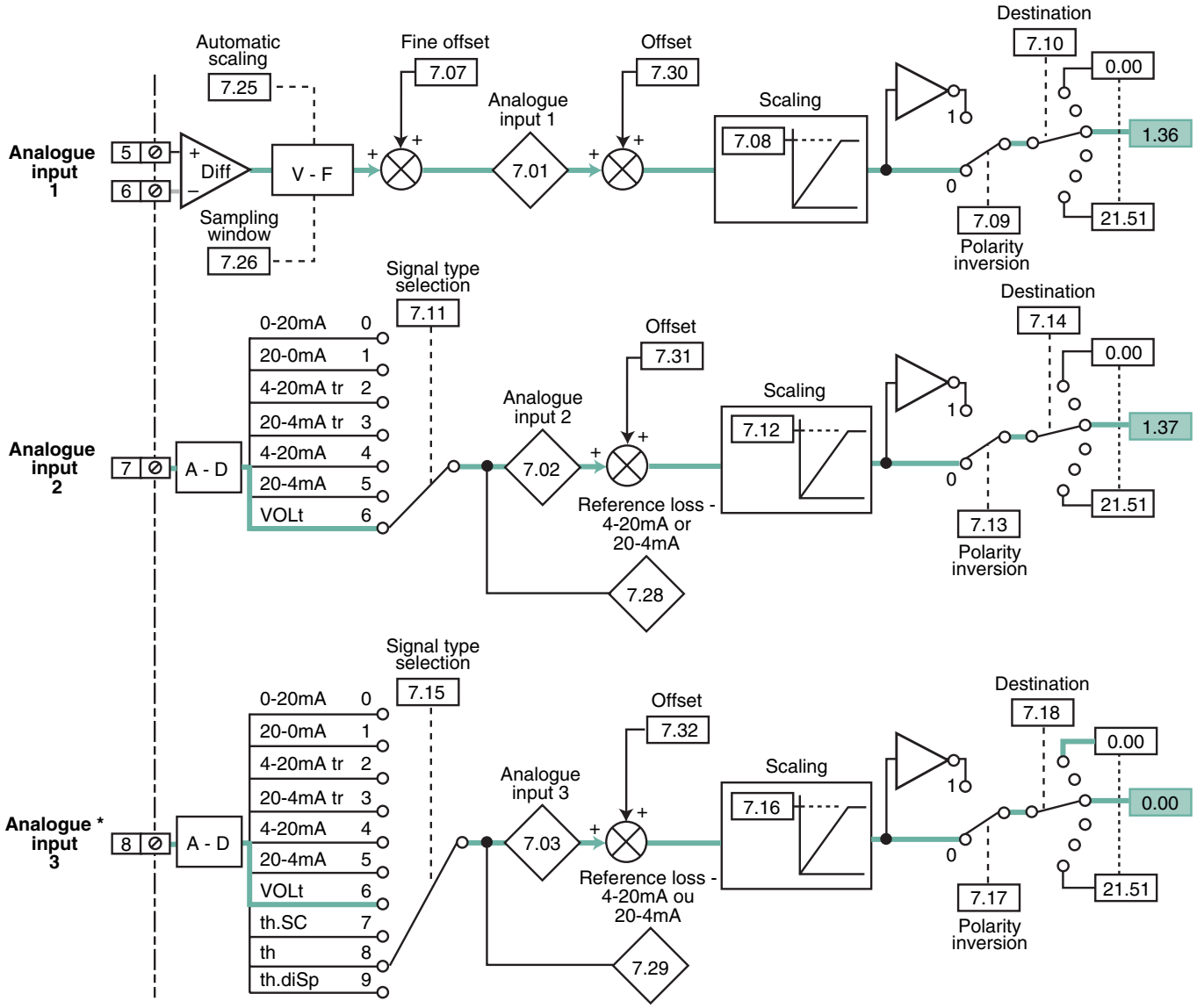
Menu 6 (to be continued)

• Time meters



Parameters	Variation range			Factory settings		
6.16	0 to 600.0 devise/kWh			0		
6.19 - 6.28	OFF (0) or On (1)			OFF (0)		
6.18	0 to 30000 h			0		
6.20 - 6.22	0 to 9365 années, jours			-		
6.21 - 6.23	0 to 23.59 h, min			-		
6.24	0 to 999.9 MWh			-		
6.25	0 to 99.99 kWh			-		
6.26	± 32000 devise/heure			-		
6.27	0 to 30000 h			-		
6.44	OFF (0) or On (1)			-		

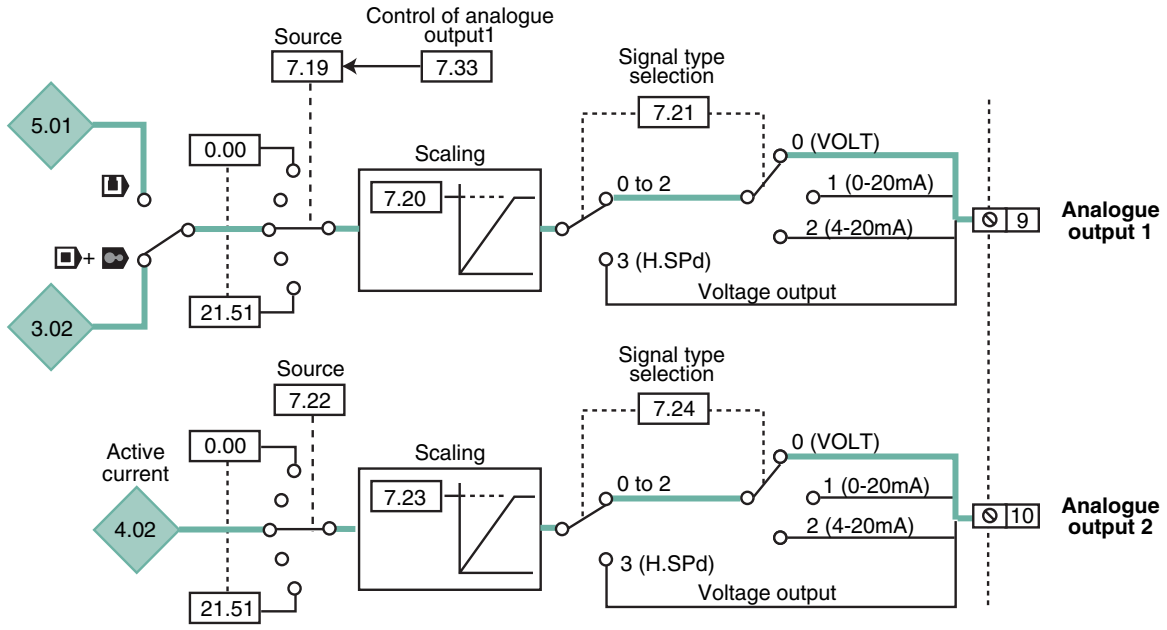
H6.11 - Menu 7 : Configuration of the analogue inputs - outputs



* Terminal 8 is internally connected to pin 15 of HD-15 connector.
If the motor probes are connected to pin 15, terminal 8 is no longer available.

Parameters	Variation range			Factory settings		
7.01	± 100.00 %			-		
7.02 - 7.03	± 100.0 %			-		
7.07	± 10.000 %			0		
7.08 - 7.12 - 7.16	0 to 4.000			1.000		
7.25	OFF (0) or On (1)			OFF (0)		
7.26	0 to 8.0 ms			4.0 ms		
7.28 - 7.29	OFF (0) or On (1)			-		
7.30	± 100.00 %			0		
7.31 - 7.32	± 100.0 %			0		

Menu 7 (to be continued)



Variable speed drive environment

7.04	Temperature1 power stage	7.06	Control card tmperature
7.05	Temperature 2 power stage	7.34	IGBT junction temperature
		7.35	Drive thermal protection battery

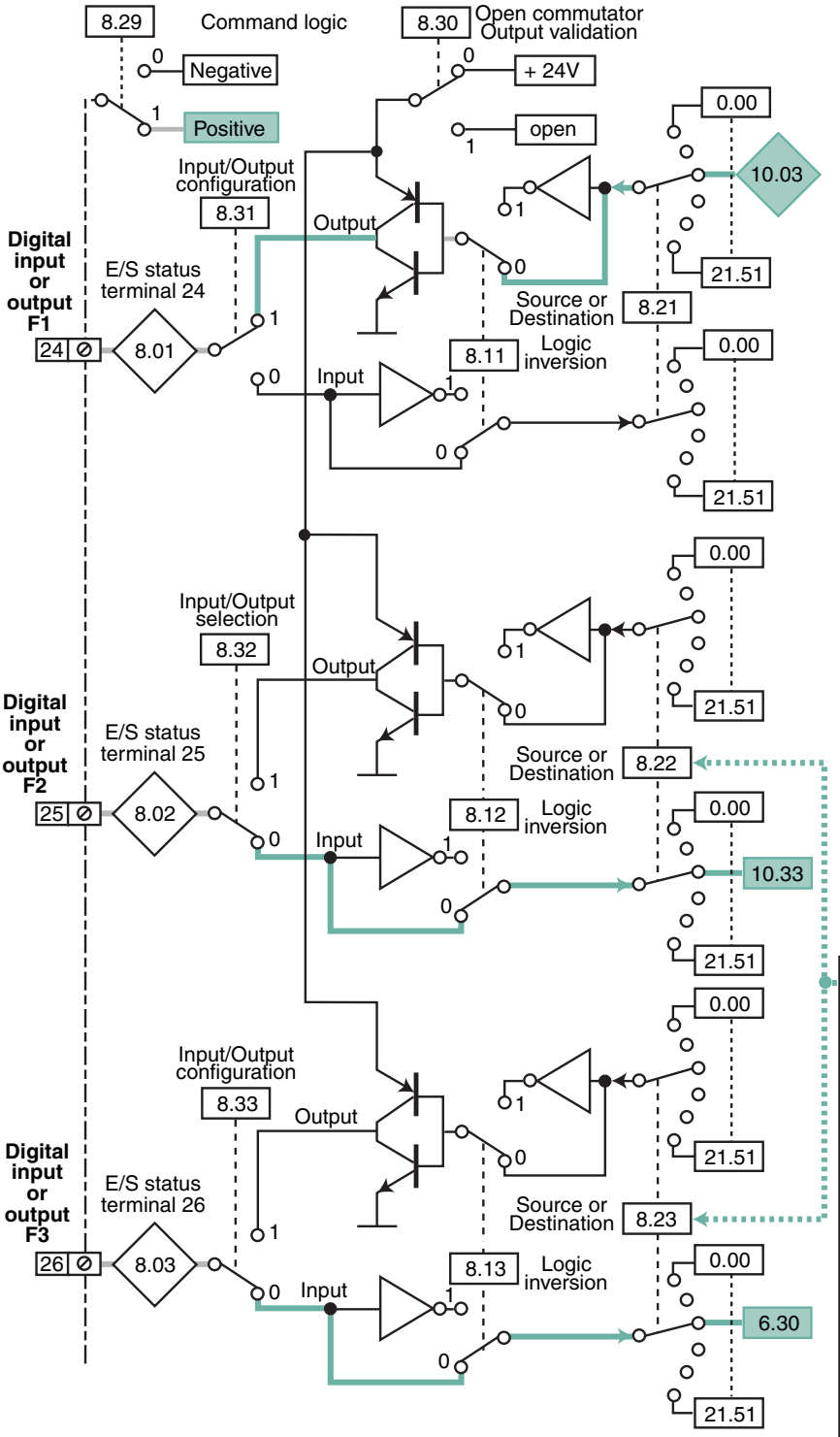
Note : If the user wants to obtain the image of the speed on the analogue output 1, the output full scale value corresponds to the maximum value of the of the source parameter selected.
In factory settings (**7.21** = VOLT (0)) :

- in , the selected source is **5.01** " motor frequency ", the analogue output of which will be full scale (9.8V) when REF MAX is reached (**1.06**),

- in or , the selected source is **3.02** " Speed feedback ", the analogue output of which will be full scale (9.8V) when N MAX is reached (2 x **1.06**).

Parameters	Variation range			Factory settings		
7.04 - 7.05 - 7.06	-128 to +127 °C			-		
7.20 - 7.23	0 to 4.000			1.000		
7.33	Fr (0), Ld (1), AdV (2)			AdV (2)		
7.34	± 200 °C			-		
7.35	0 to 100.0 %			-		

H6.12 - Menu 8 : Configuration of digital inputs - outputs



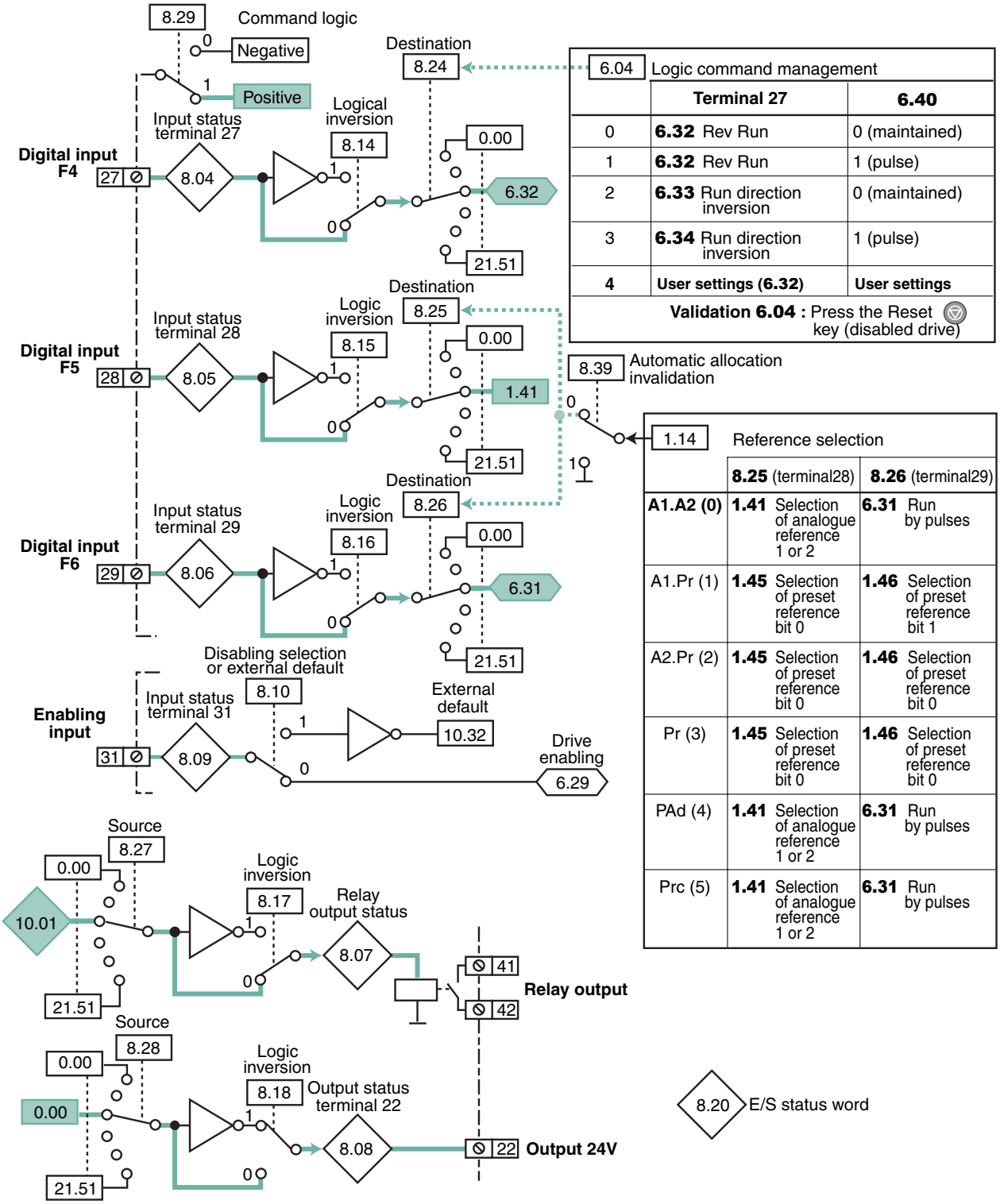
6.04	Logic command management		
	Terminal 25	**Terminal 26**	**6.40**
0	**6.29** Enabling	**6.30** Fwd Run	0 (maintained)
1	**6.39** Stop\	**6.30** Fwd Run	1 (pulse)
2	**6.29** Enabling	**6.34** Run	0 (maintained)
3	**6.39** Stop\	**6.34** Run	1 (pulse)
4	**User settings (10.33)**	**User settings (6.30)**	**User settings**

Validation 6.04 : Press the Reset key (disabled drive)

CAUTION :
If the brake command is validated by 12.41 = 1 or 2, it will activate on terminal 25 (with priority on 6.04) so that 8.12 = 0 and 8.22 = 10.01 (if 12.41 = 1) or 8.22 = 12.40 (if 12.41 = 2).

Parameters	Variation range			Factory settings		
8.01 - 8.02 - 8.03	OFF (0) or On (1)			-		

Menu 8 (to be continued)



6.04	Logic command management	
	Terminal 27	**6.40**
0	**6.32** Rev Run	0 (maintained)
1	**6.32** Rev Run	1 (pulse)
2	**6.33** Run direction inversion	0 (maintained)
3	**6.34** Run direction inversion	1 (pulse)
4	**User settings (6.32)**	**User settings**

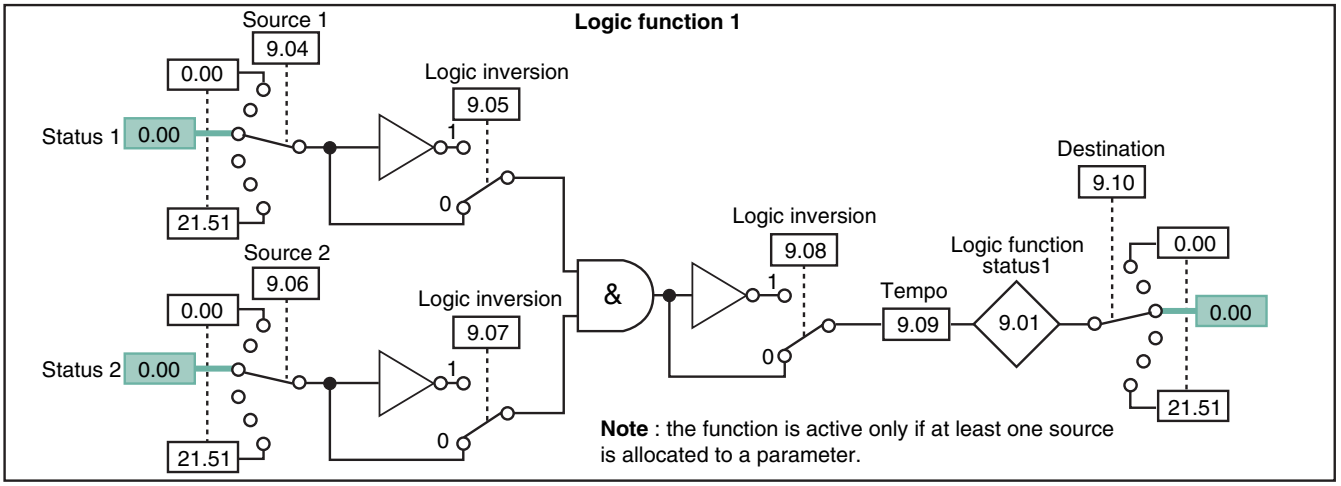
Validation 6.04 : Press the Reset key (disabled drive)

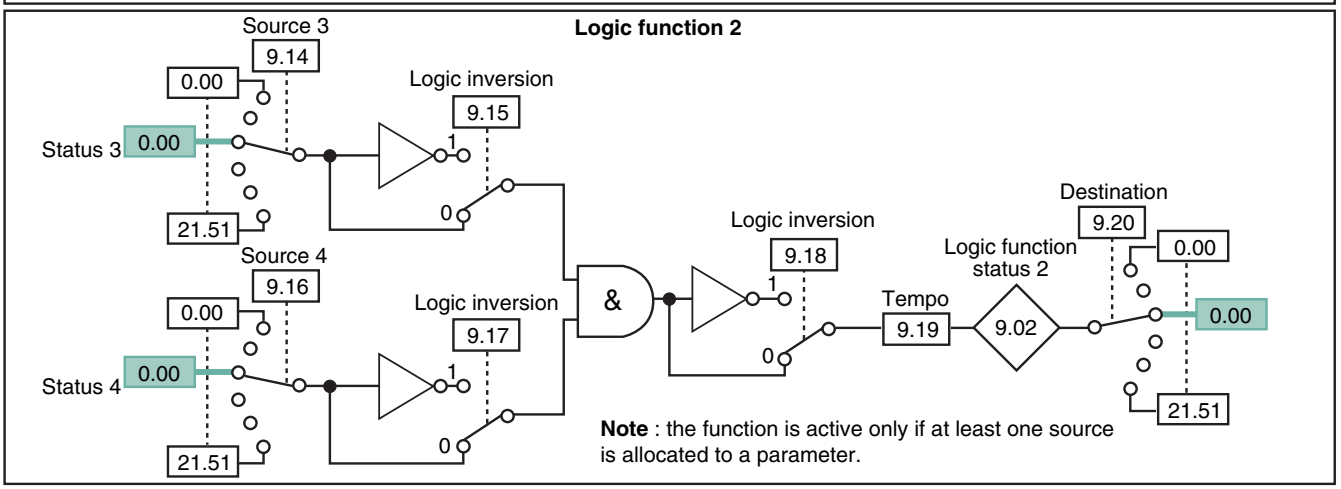
1.14	Reference selection	
	8.25 (terminal28)	**8.26** (terminal29)
A1.A2 (0)	**1.41** Selection of analogue reference 1 or 2	**6.31** Run by pulses
A1.Pr (1)	**1.45** Selection of preset reference bit 0	**1.46** Selection of preset reference bit 1
A2.Pr (2)	**1.45** Selection of preset reference bit 0	**1.46** Selection of preset reference bit 0
Pr (3)	**1.45** Selection of preset reference bit 0	**1.46** Selection of preset reference bit 0
PAd (4)	**1.41** Selection of analogue reference 1 or 2	**6.31** Run by pulses
Prc (5)	**1.41** Selection of analogue reference 1 or 2	**6.31** Run by pulses

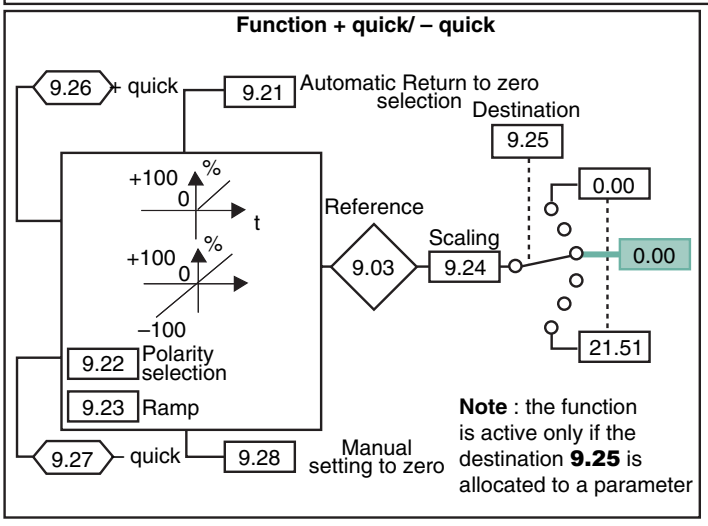
CAUTION :
If the brake command is validated by 12.41 = 1, it will activate the relays, so that 8.17 = 0 and 8.27 = 12.40.

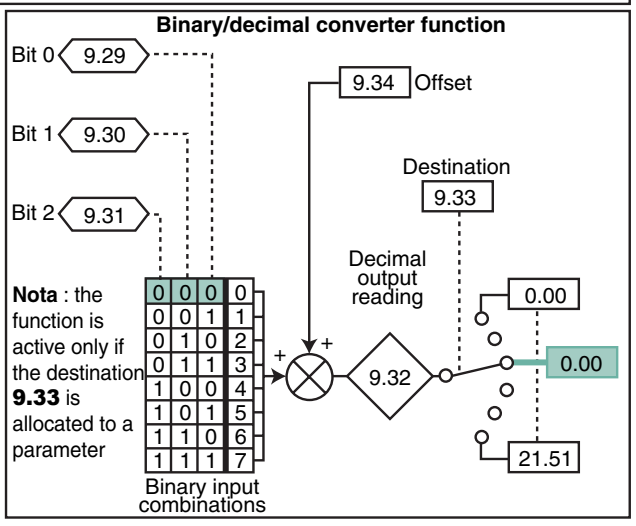
Parameters	Variation range			Factory settings		
8.04 to **8.09**	OFF (0) or On (1)			-		
8.20	0 to 511			-		

H6.13 - Menu 9 : Logic functions









Parameters	Variation range			Factory settings		
9.01 - 9.02	OFF (0) or On (1)			-		
9.03	± 100.00 %			-		
9.09 - 9.19	± 25.0 s			0		
9.21	0 to 3			2		
9.23	0 to 250 s			20 s		
9.24	0 to 4.000			1.000		
9.26 - 9.27 - 9.28 - 9.22	OFF (0) or On (1)			OFF (0)		
9.32	0 to 255			-		
9.34	0 to 248			0		

H6.14 - Menu 10 : Variable speed drive status and diagnosis

Operating status

Parameters	Description	Variation range			Factory settings		
10.01	Ready variable speed drive	OFF (0) or ON (1)			-		
10.02	Activated variable speed drive output	OFF (0) or ON (1)			-		
10.03	Zero frequency or speed	OFF (0) or ON (1)			-		
10.04	Minimum frequency or speed	OFF (0) or ON (1)			-		
10.05	Frequency or speed lower than the low threshold	OFF (0) or ON (1)			-		
10.06	Reached reference	OFF (0) or ON (1)			-		
10.07	Frequency or speed higher than the high threshold	OFF (0) or ON (1)			-		
10.08	Rated load	OFF (0) or ON (1)			-		
10.09	Active current limitation	OFF (0) or ON (1)			-		
10.13	Required reverse rotation	OFF (0) or ON (1)			-		
10.14	Reverse rotation	OFF (0) or ON (1)			-		

Braking

Parameters	Description	Variation range			Factory settings		
10.10	Dynamic braking	OFF (0) or ON (1)			-		
10.11	Braking on resistors	OFF (0) or ON (1)			-		
10.12	Overload alarm, braking resistor	OFF (0) or ON (1)			-		
10.30	Resistor maximum braking length	0 to 400.00 s			TL : 0.09 s, T : 0.02 s, TM : 0.01, TH : 0.01 For the variable speed drives size 3 and higher : 0		
10.31	Resistor maximum braking cycle	0 to 1500.0 s			2.0 s For the variable speed drives size 3 and higher : 0		
10.39	Integration of braking resistor overload	0 to 100.0 %			-		

Menu 10 (to be continued)
Defaults

Parameters	Description	Variation range			Factory settings		
10.15	Mains supply absence	OFF (0) or ON (1)			-		
10.16	Powered up detection	OFF (0) or ON (1)			-		
10.17	IT overheating alarm	OFF (0) or ON (1)			-		
10.18	Variable speed drive overheating alarm	OFF (0) or ON (1)			-		
10.19	Variable speed drive alarm	OFF (0) or ON (1)			-		
10.20	Default - 0	0 to 230 (value by serial link)			-		
10.21	Default - 1	0 to 230 (value by serial link)			-		
10.22	Default - 2	0 to 230 (value by serial link)			-		
10.23	Default - 3	0 to 230 (value by serial link)			-		
10.24	Default - 4	0 to 230 (value by serial link)			-		
10.25	Default - 5	0 to 230 (value by serial link)			-		
10.26	Default - 6	0 to 230 (value by serial link)			-		
10.27	Default - 7	0 to 230 (value by serial link)			-		
10.28	Default - 8	0 to 230 (value by serial link)			-		
10.29	Default - 9	0 to 230 (value by serial link)			-		
10.32	External default	OFF (0) or ON (1)			-		
10.33	Default deletion	OFF (0) or ON (1)			OFF (0)		
10.34	Number of automatic default deletion	0 to 5			0		
10.35	Time delay of automatic default deletion	0 to 25.0 s			1.0 s		
10.36	Maintenance of the ready drive status on automatically deleted defaults	OFF (0) or ON (1)			OFF (0)		

Defaults (to be continued)

Parameters	Description	Variation range			Factory settings		
10.37	Minor defaults	0 or 3			0		
10.38	User defaults	0 to 255			0		
10.40	Status word	0 to 32767			-		
10.41	Length since default 0 (Year.days)	0 to 9.365 year.day			-		
10.42	Length since default 0 (Hour.minutes)	0 to 23.59 H.min			-		
10.43	Module number default 1, Length between default 1 and default 0	0 to 600.00 H.min			-		
10.44	Module number default 2, Length between default 2 and default 0	0 to 600.00 H.min			-		
10.45	Module number default 3, Length between default 3 and default 0	0 to 600.00 H.min			-		
10.46	Module number default 4, Length between default 4 and default 0	0 to 600.00 H.min			-		
10.47	Module number default 5, Length between default 5 and default 0	0 to 600.00 H.min			-		
10.48	Module number default 6, Length between default 6 and default 0	0 to 600.00 H.min			-		
10.49	Module number default7, Length between default 7 and default 0	0 to 600.00 H.min			-		
10.50	Module number default 8, Length between default 8 and default 0	0 to 600.00 H.min			-		
10.51	Module number default 9, Length between default 9 and default 0	0 to 600.00 H.min			-		

H6.15 - Menu 11 : Parameter-setting of menu 0 - serial link - variable speed drive characteristics

Configuration of menu 0

Parameter	Description	Variation range			Factory settings		
11.01	Parameter-setting of **0.11** of menu 0	**1.00** to **21.51**			**5.01**		**3.29**
11.02	Parameter-setting of **0.12** of menu 0	**1.00** to **21.51**			**4.01**		
11.03	Parameter-setting of **0.13** of menu 0	**1.00** to **21.51**			**4.02**		**7.07**
11.04	Parameter-setting of **0.14** of menu 0	**1.00** to **21.51**			**4.11**		
11.05	Parameter-setting of **0.15** of menu 0	**1.00** to **21.51**			**2.04**		
11.06	Parameter-setting of **0.16** of menu 0	**1.00** to **21.51**			**8.39**	**2.02**	
11.07	Parameter-setting of **0.17** of menu 0	**1.00** to **21.51**			**8.26**	**4.12**	
11.08	Parameter-setting of **0.18** of menu 0	**1.00** to **21.51**			**8.29**		
11.09	Parameter-setting of **0.19** of menu 0	**1.00** to **21.51**			**7.11**		
11.10	Parameter-setting of **0.20** of menu 0	**1.00** to **21.51**			**7.14**		
11.11	Parameter-setting of **0.21** of menu 0	**1.00** to **21.51**			**7.15**		
11.12	Parameter-setting of **0.22** of menu 0	**1.00** to **21.51**			**1.10**		
11.13	Parameter-setting of **0.23** of menu 0	**1.00** to **21.51**			**1.05**		
11.14	Parameter-setting of **0.24** of menu 0	**1.00** to **21.51**			**1.21**		
11.15	Parameter-setting of **0.25** of menu 0	**1.00** to **21.51**			**1.22**		
11.16	Parameter-setting of **0.26** of menu 0	**1.00** to **21.51**			**1.23**	**3.08**	
11.17	Parameter-setting of **0.27** of menu 0	**1.00** to **21.51**			**1.24**	**3.34**	
11.18	Parameter-setting of **0.28** of menu 0	**1.00** to **21.51**			**6.13**		
11.19	Parameter-setting of **0.29** of menu 0	**1.00** to **21.51**			**11.36**		
11.20	Parameter-setting of **0.30** of menu 0	**1.00** to **21.51**			**11.42**		

Serial link

Parameters	Description	Variation range			Factory settings		
11.23	Serial link address	0 to 247			1		
11.24	Type of communication	AnSi (0), rtU (1), Lcd (2)			rtU (1)		
11.25	Serial link transmission speed	300 (0), 600 (1), 1200 (2), 2400 (3), 4800 (4), 9600 (5), 19200 (6), 38400 (7), 57600 (8)*, 115200 (9)*			19200 (6)		
11.26	Period of serial link communication	0 to 250 ms			2 ms		

* RTU Modbus only.

Menu 11 (to be continued)

Variable speed drive configuration

Parameters	Description	Variation range			Factory settings		
11.21	Scaling of parameter **0.30**	0 to 9.999			1.000		
11.22	Parameter displayed when powering up	**0.00** to **0.50**			**0.10**		
11.28	Specific variable speed drive	0 to 16			-		
11.29	Software version (aa.bb)	1.00 to 99.99			-		
11.30	User safety code	0 to 999			0		
11.31	Selection of the operating mode	OPEn LP (1), CL VECt (2), SErVO (3), rEGEn (4)			OPEn LP (1)	CL VECt (2)	SErVO (3)
11.32	Variable speed drive rated current	0 to 9999.99 A			-		
11.33	Variable speed drive rated voltage	200 (0), 400 (1), 575 (2), 690 (3)			-		
11.34	Software version (cc)	0 to 99			-		
11.35	Number of power modules	1 to 8			-		
11.41	Length of return to initial display	0 to 250 s			240 s		
11.43	Return to factory settings	nonE (0), Eur (1), USA (2)			nonE (0)		
11.44	Access to level 2 and storing of the safety code	L1 (0), L2 (1), Loc (2)			L1 (0)		
11.45	Selection of motor 2	OFF (0) or On (1)			OFF (0)		
11.46	Previously loaded factory settings	0 to 2000			-		
11.47	Internal program validation	0 to 2			2		
11.48	Internal program status	- 128 to + 127			-		
11.49	Internal program events	0 to 65535 s			-		
11.50	Internal program max execution time	0 to 65535 ms			-		
11.51	Internal program first execution	OFF (0) or ON (1)			-		

Note : • For the parameter-setting of **0.31** to **0.59**, see menu 22.

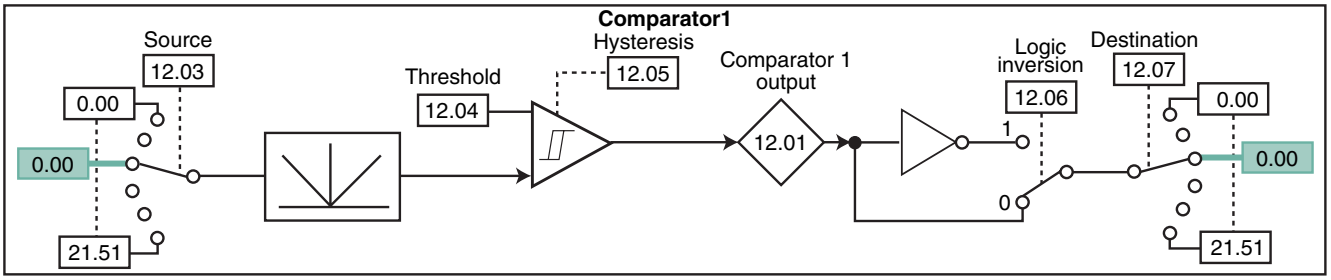
• The parameters **11.47** to **11.51** are used during the execution of the "Syptlite" program, conceived up by means of the Syptlite software available on the CD Rom delivered together with the variable speed drive.

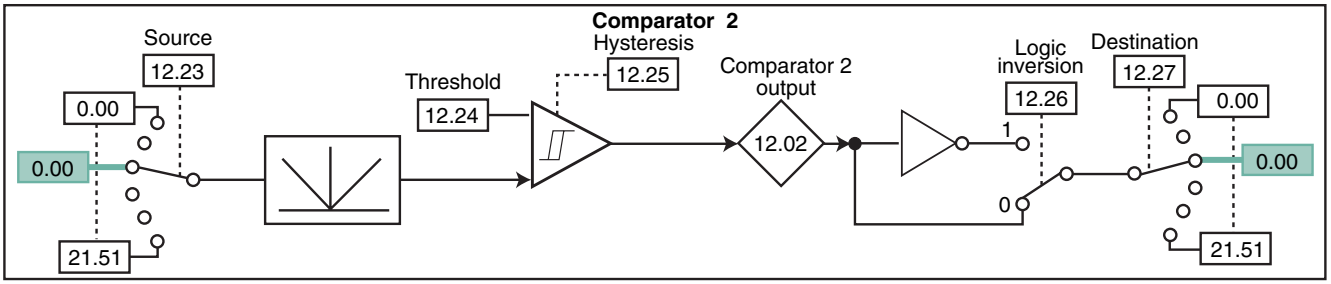
Menu 11 (to be continued)

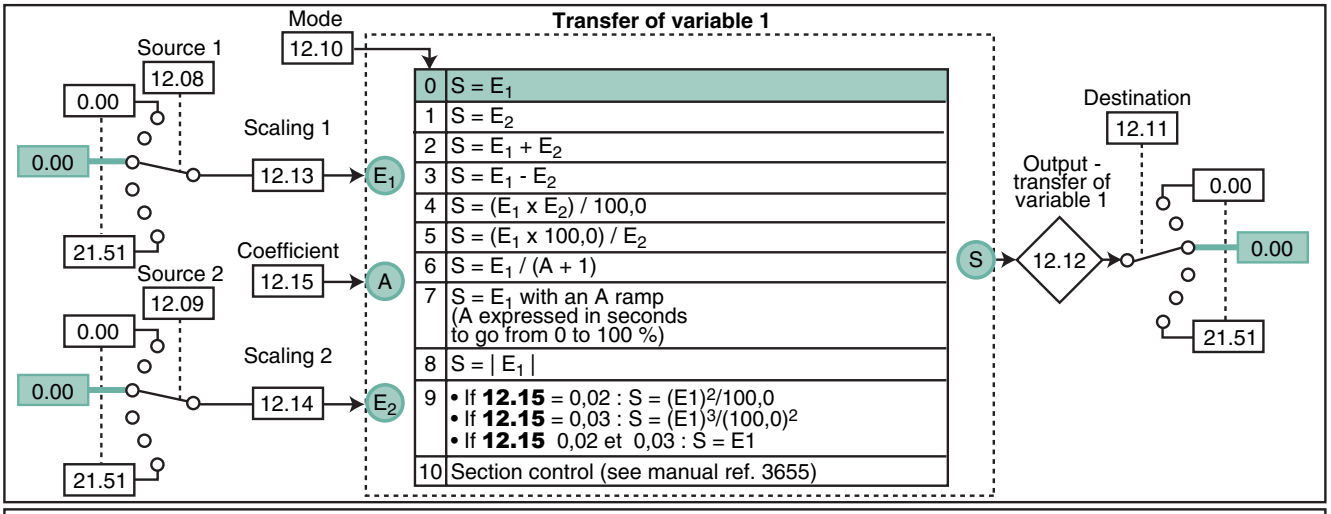
Transfer of parameters by SMARTCARD

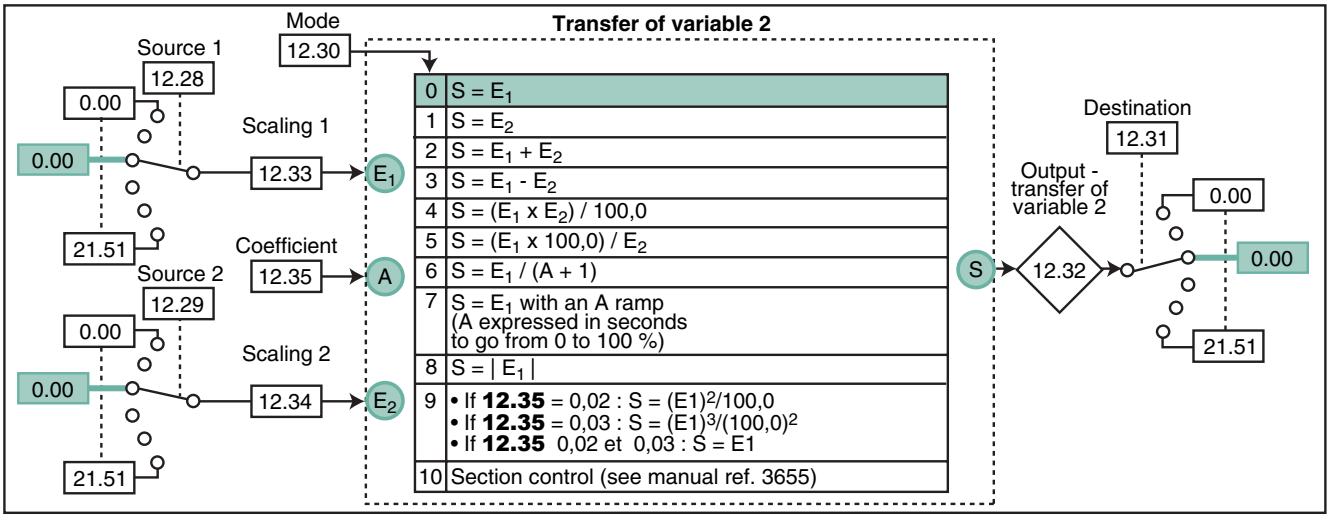
Parameters	Description	Variation range			Factory settings		
11.36	Last set of parametes transferred by SMARTCARD	0 to 999			-		
11.37	Database selection	0 to 1002			0		
11.38	Type of data and operating mode	0 : FrEE, 1 : 1, 2 : 3OpEn.LP, 3 : 3CL.VECt, 4 : 3SErVO, 5 : 3rEGEn, 6 : 3Un, 7 : 3Un, 8 : 3Un, 9 : 9, 10 : 4OpEn.LP, 11 : 4CL.VECt, 12 : 4SErVO, 13 : 4rEGEn, 14 : 4Un, 15 : 4Un, 16 : 4Un, 17 : LAdddEr, 18 : Option			-		
11.39	Number of SMARTCARD version	0 to 9999			0		
11.40	Base checksum	0 to 65335			-		
11.42	Parameter cloning	nonE (0), rEAd (1), Prog (2), Auto (3), boot (4)			nonE (0)		

H6.16 - Menu 12 : Comparators, transfers of variables





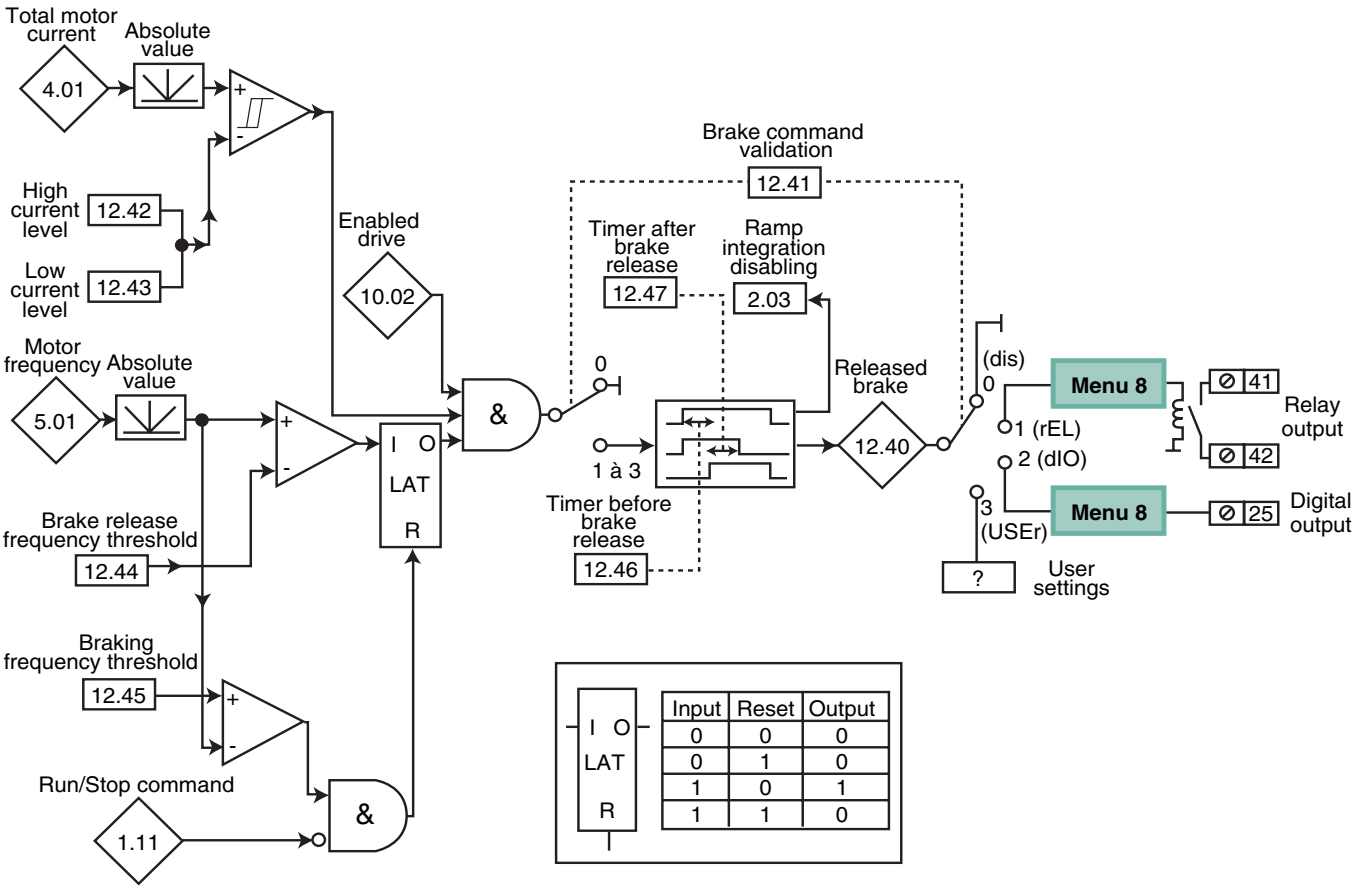




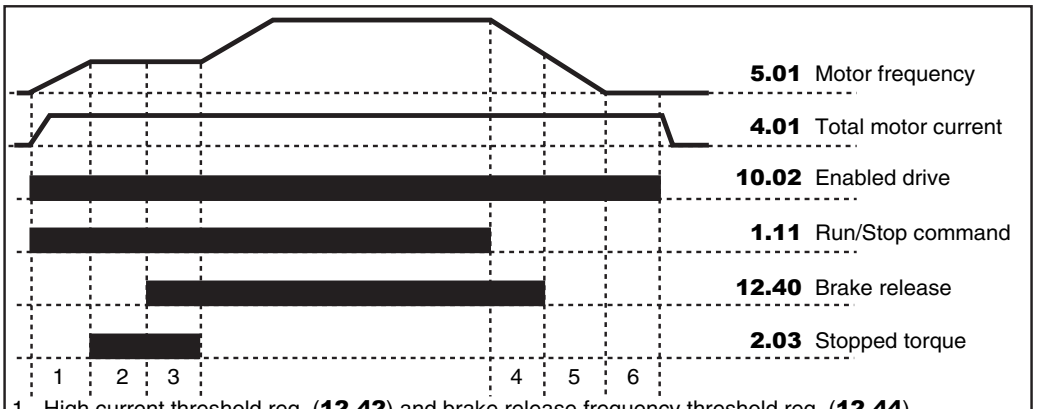
Parameters	Variation range			Factory settings		
12.01 - 12.02	OFF (0) or On (1)			-		
12.04 - 12.24	0 to 100.00 %			0		
12.05 - 12.25	0 to 25.00 %			0		
12.12 - 12.32	± 100.00 %			-		
12.13 - 12.14 - 12.33 - 12.34	± 4.000			1.000		
12.15 - 12.35	0 to 100.00			0		

Menu 12 (to be continued)

• Brake command in open loop



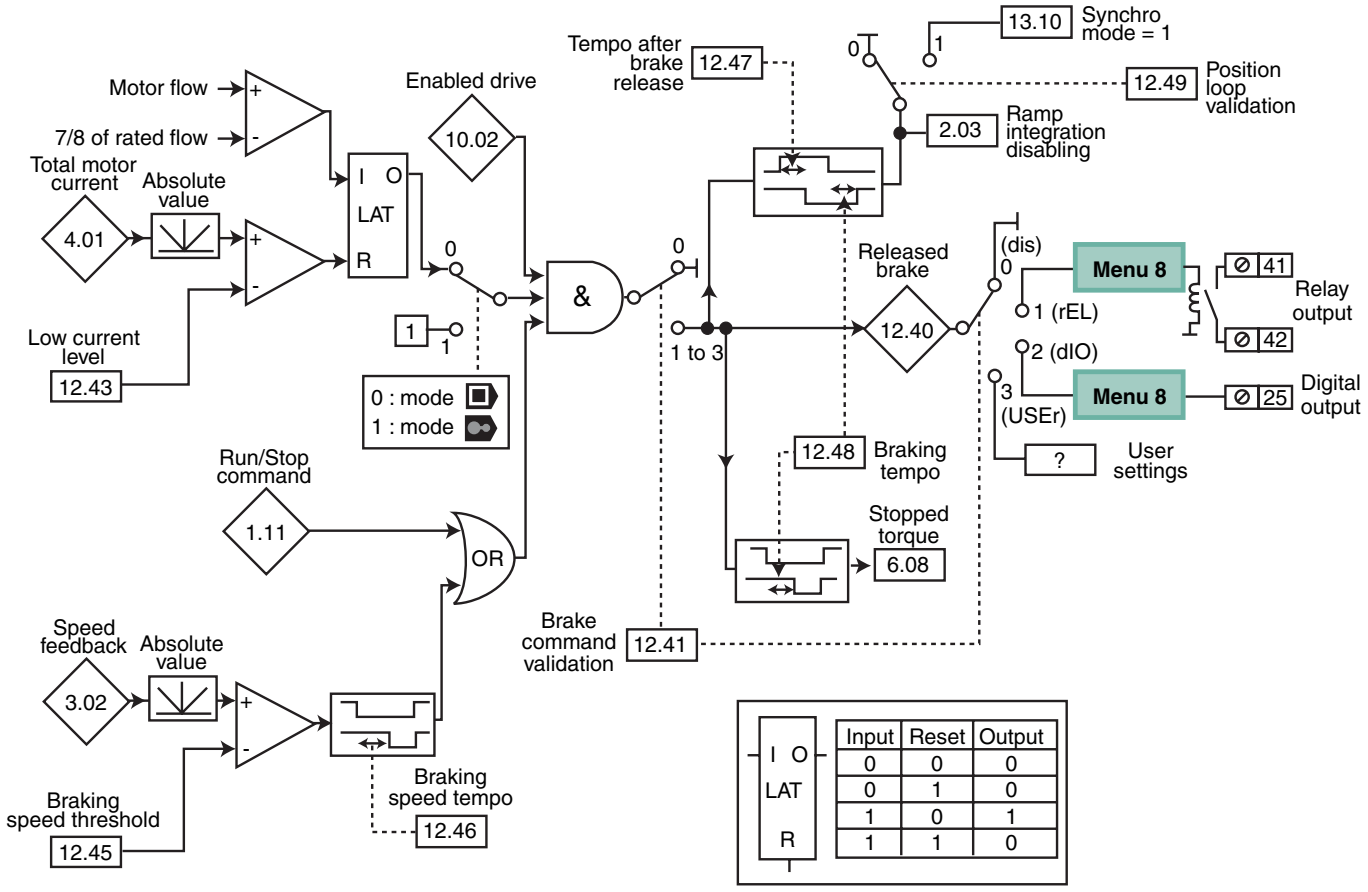
Input	Reset	Output
0	0	0
0	1	0
1	0	1
1	1	0



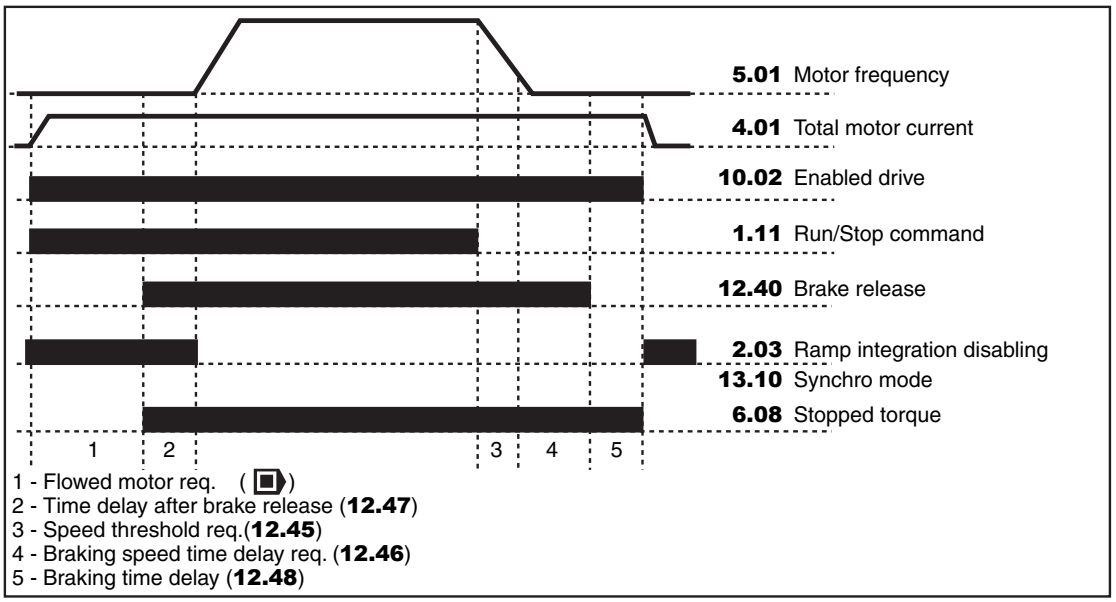
1 - High current threshold req. (**12.42**) and brake release frequency threshold req. (**12.44**)
2 - Time delay before brake release (**12.46**)
3 - Time delay after brake release (**12.47**)
4 - Braking frequency threshold req.
5 - Zero frequency req.
6 - Time relay corresponding to phase 2 of the stop mode **6.01** (only 1 to 3 modes)

Parameters	Variation range	Factory settings
12.40	OFF (0) or On (1)	-
12.42	0 to 200 %	50 %
12.43	0 to 200 %	10 %
12.44	0 to 20.0 Hz	1.0 Hz
12.45	0 to 20.0 Hz	2.0 Hz
12.46 - 12.47	0 to 25.0 s	1.0 s

• **Brake command in closed loop and servo** .



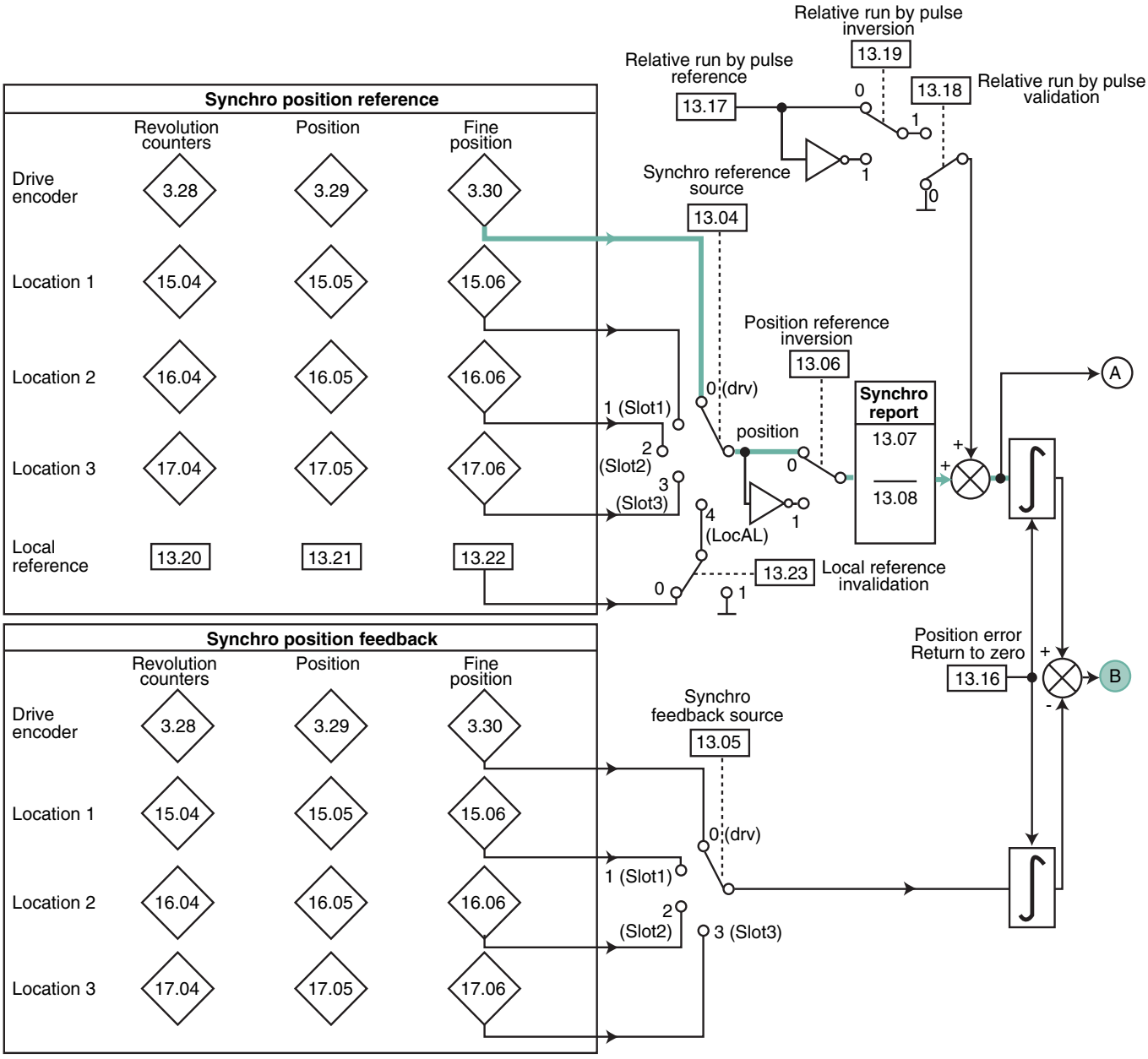
Input	Reset	Output
0	0	0
0	1	0
1	0	1
1	1	0



1 - Flowed motor req. ( )
2 - Time delay after brake release (**12.47**)
3 - Speed threshold req.(**12.45**)
4 - Braking speed time delay req. (**12.46**)
5 - Braking time delay (**12.48**)

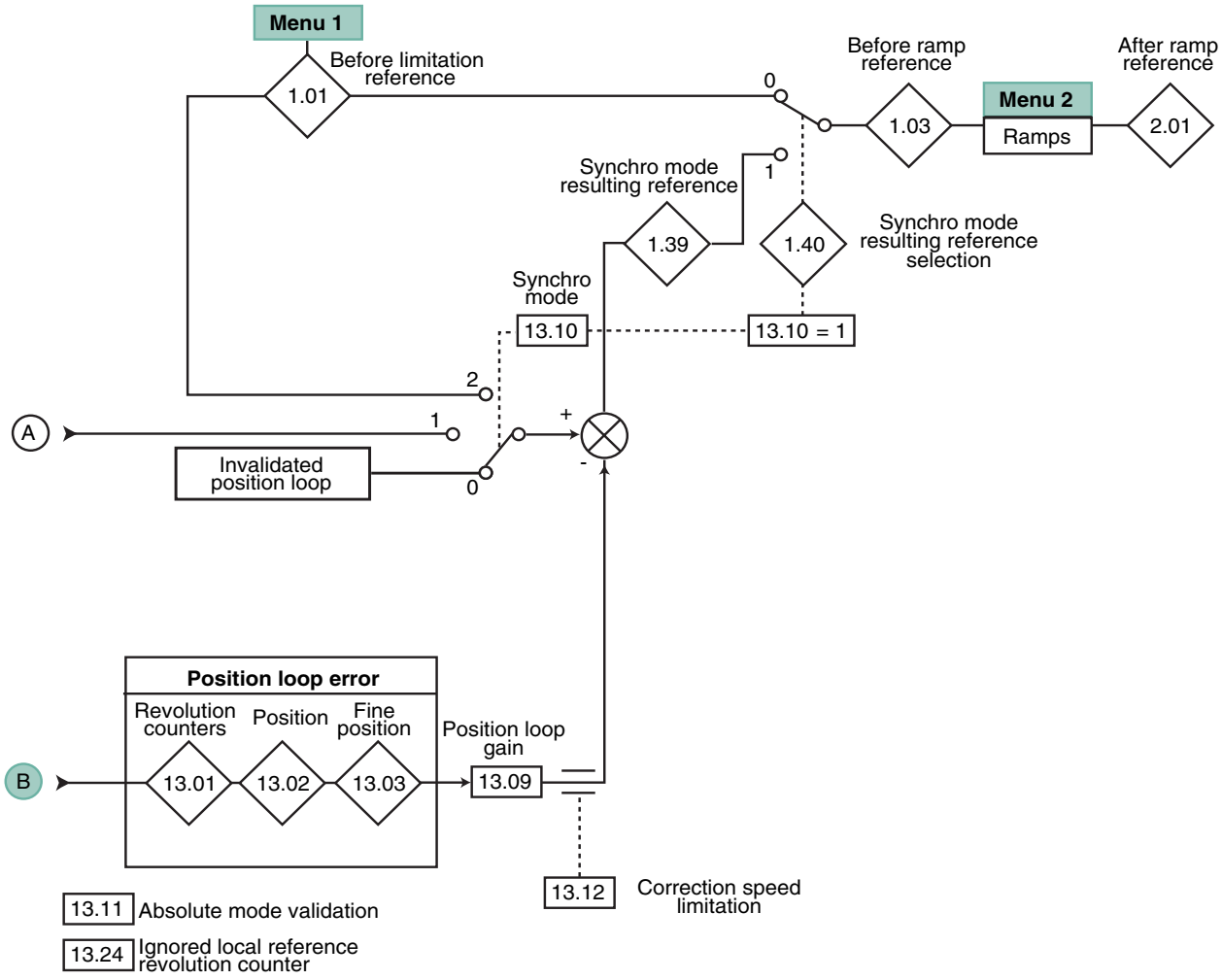
Parameters	Variation range		Factory settings	
12.40	OFF (0) or On (1)		-	
12.43	0 to 200 %		10 %	
12.45	0 to 200 min^{-1}		5 min^{-1}	
12.46 - 12.47 - 12.48	0 to 25.0 s		1.0 s	

H6.17 - Menu 13 : Synchronisation in open loop



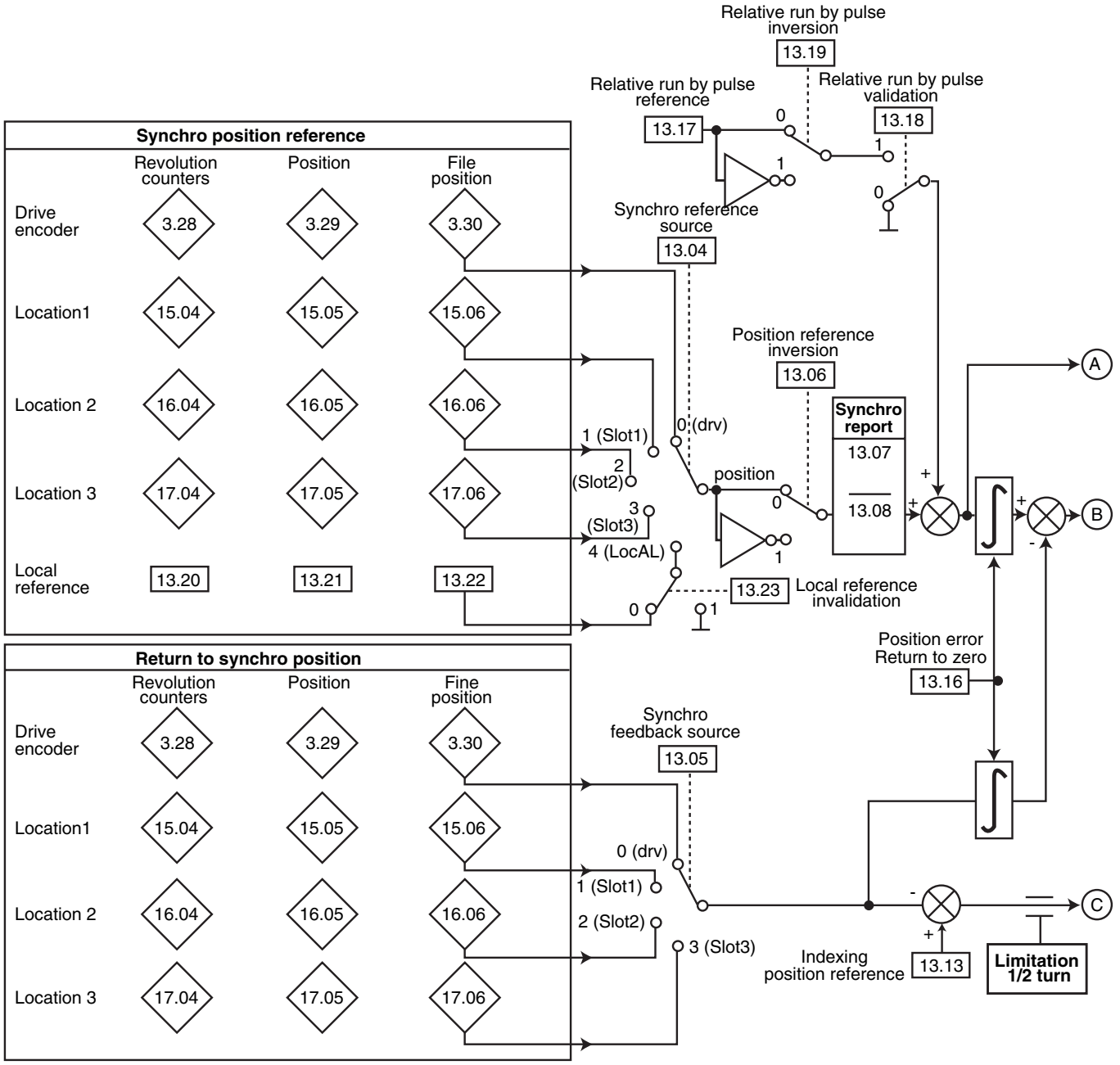
Parameters	Variation range ( )	Factory settings ( )
13.07	0 to 4.000	1.000
13.08	0 to 1.000	1.000
13.16	OFF (0) or On (1)	OFF (0)
13.17	0 to 4000.0 min^{-1}	0

Menu 13 in open loop (to be continued)



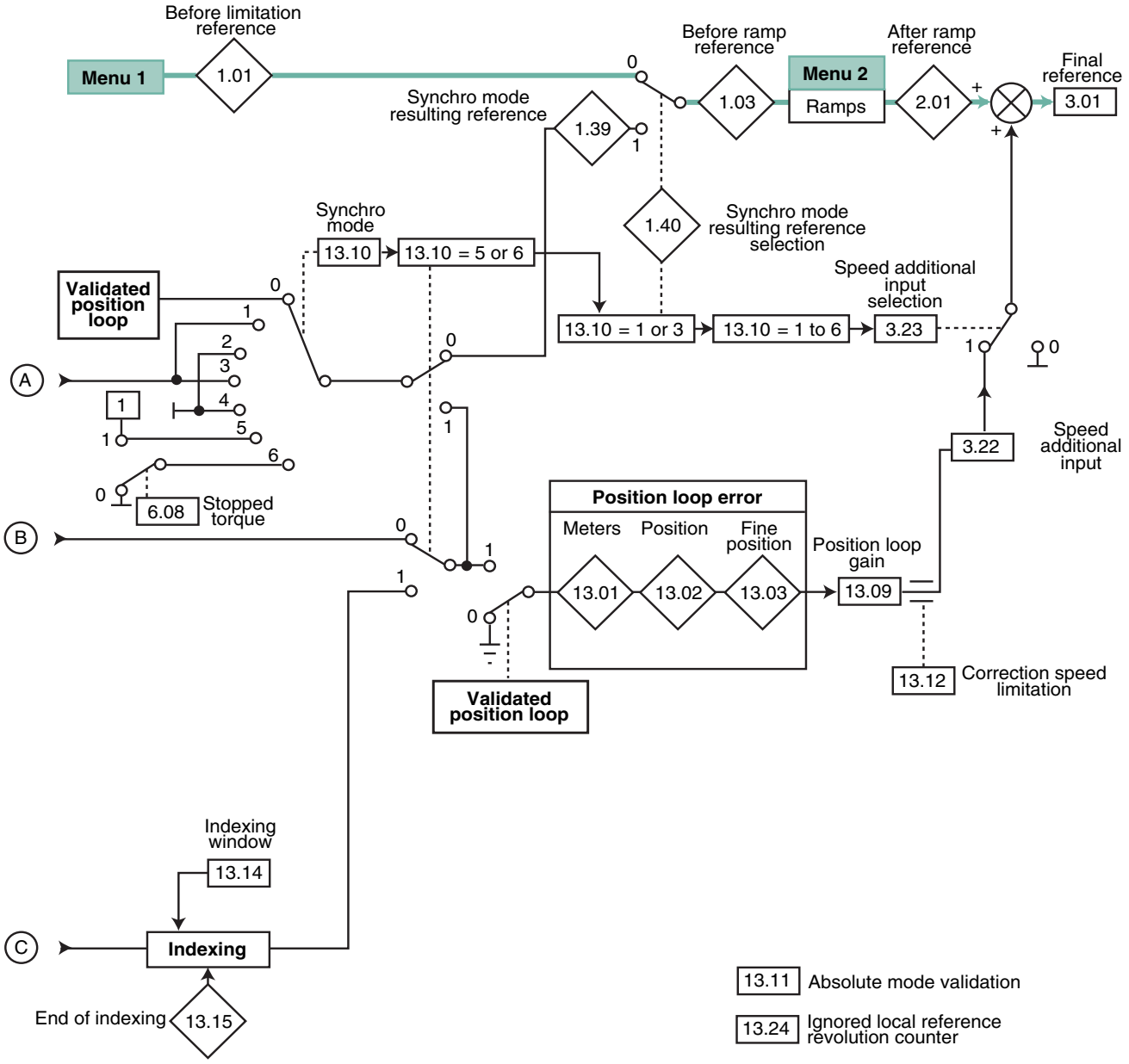
Parameters	Variation range ( )	Factory settings ( )
13.01 - 13.02 - 13.03	- 32768 to + 32767	-
13.09	0 to 100.00 rads^{-1}/rad	25.00 rads^{-1}/rad
13.10	0 to 2	0
13.11 - 13.23 - 13.18 - 13.19	OFF (0) or On (1)	OFF (0)
13.12	0 to 250	150
13.15	OFF (0) or On (1)	-
13.20 - 13.21 - 13.22	0 to 65535	0
13.24	OFF (0) or On (1)	OFF (0)

H6.18 - Menu 13 : Synchronisation and indexing in closed loop and servo ▣, ⬬



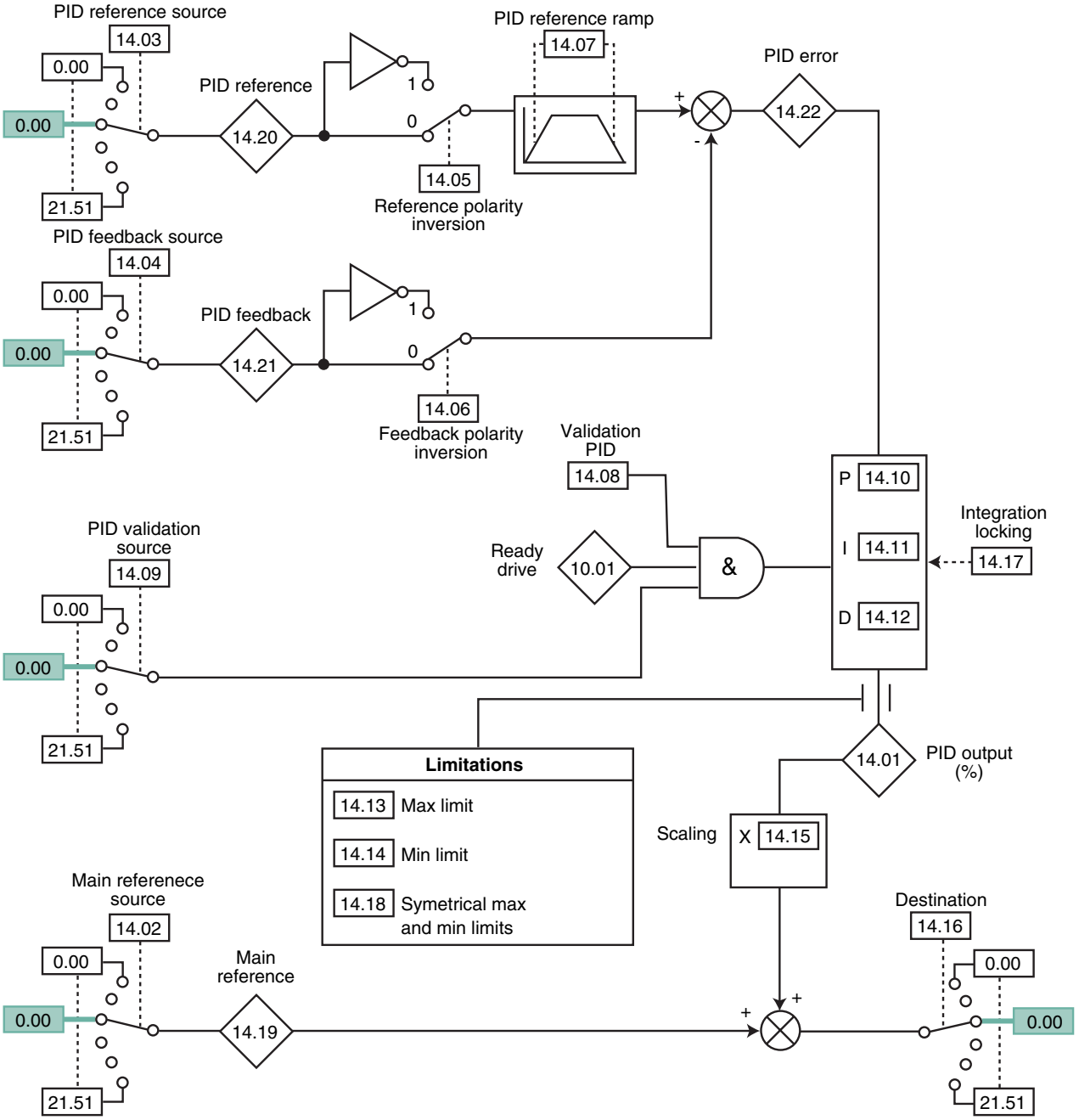
Parametera	Variation range		Factory settings	
	▣	⬬	▣	⬬
13.07	0 to 4.000		1.000	
13.08	0 to 1.000		1.000	
13.16	OFF (0) or On (1)		OFF (0)	
13.13	0 to 65535		0	
13.17	0 to 4000.0 min^{-1}		0	
13.20 - 13.21 - 13.22	0 to 65535		0	

Menu 13 in closed loop and servo (to be continued)



Parameters	Variation range		Factory settings	
	□	⊶	□	⊶
13.01 - 13.02 - 13.03	- 32768 to + 32767		-	
13.09	0 to 100.00 rads^{-1}/rad		25.00 rads^{-1}/rad	
13.10	0 to 6		0	
13.11 - 13.18 - 13.19 - 13.23 - 13.24	OFF (0) or On (1)		OFF (0)	
13.12	0 to 250		150	
13.14	0 to 4096		256	
13.15	OFF (0) or On (1)		-	
13.24	OFF (0) or On (1)		OFF (0)	

H6.19 - Menu 14 : PID



Note : The PID function is not activated if the destination **14.16** remains allocated to **0.00**.

Parameters	Variation range			Factory settings		
14.01 - 14.19 - 14.20 - 14.21 14.22	± 100.00 %			-		
14.07	0 to 3200.0 s			0		
14.08 - 14.17 - 14.18	OFF (0) or On (1)			OFF (0)		
14.10 - 14.15	0 to 4.000			1.000		
14.11	0 to 4.000			0.500		
14.12	0 to 4.000			0		
14.13	0 to 100.00 %			100.00 %		
14.14	± 100.00 %			100.00 %		

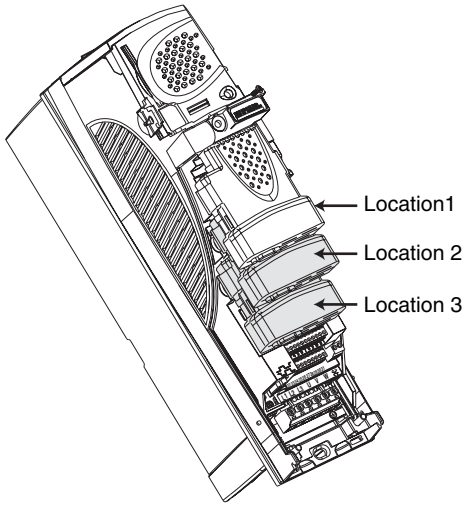
H6.20 - Menus 15, 16, 17 : MODULES SM

H6.20.1 - Introduction

In certain applications, an additional SM module may be necessary (by instance, the SM-I/O Plus module).
However, the number of modules must be limited to 3.
Each location corresponds to a menu :

- location 1 : menu 15,
- location 2 : menu 16,
- location 3 : menu 17.

The menus will be represented by 1x on the diagrams.



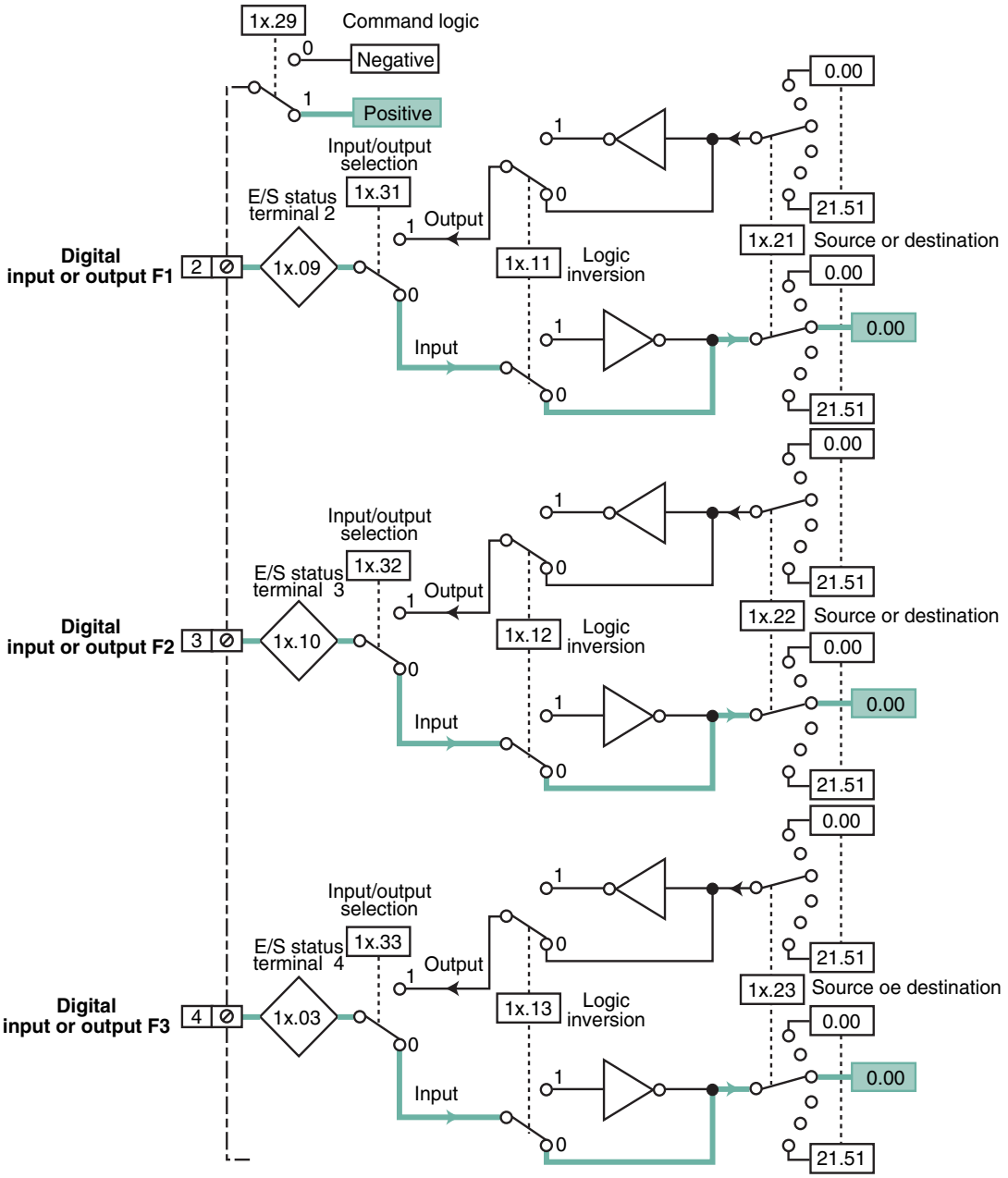
H6.20.2 - SM-I/O PLUS module

1x.01 :Type of module

1x.20 :Digital inputs and outputs status word

1x.50 :Default reading

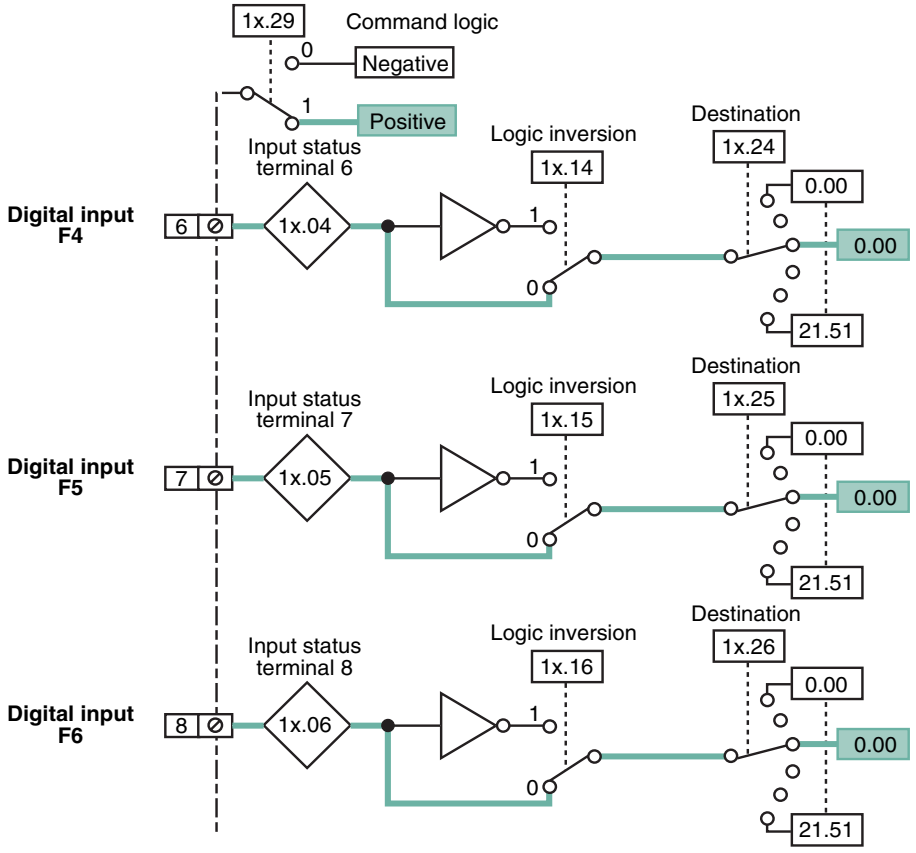
• Digital inputs / outputs



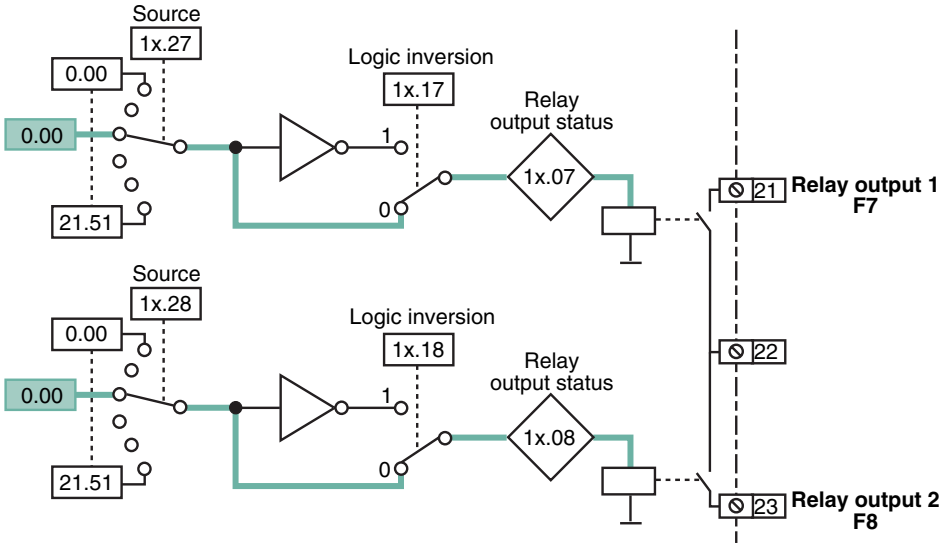
Parameters	Variation range			Factory settings		
1x.01	0 to 499			-		
1x.02	0 to 99.99			-		
1x.03 - 1x.09 - 1x.10	OFF (0) or On (1)			-		
1x.20	0 to 511			-		
1x.50	0 to 255			-		
1x.51	0 to 99			-		

SM-I/O PLUS module (to be continued)

• Digital inputs



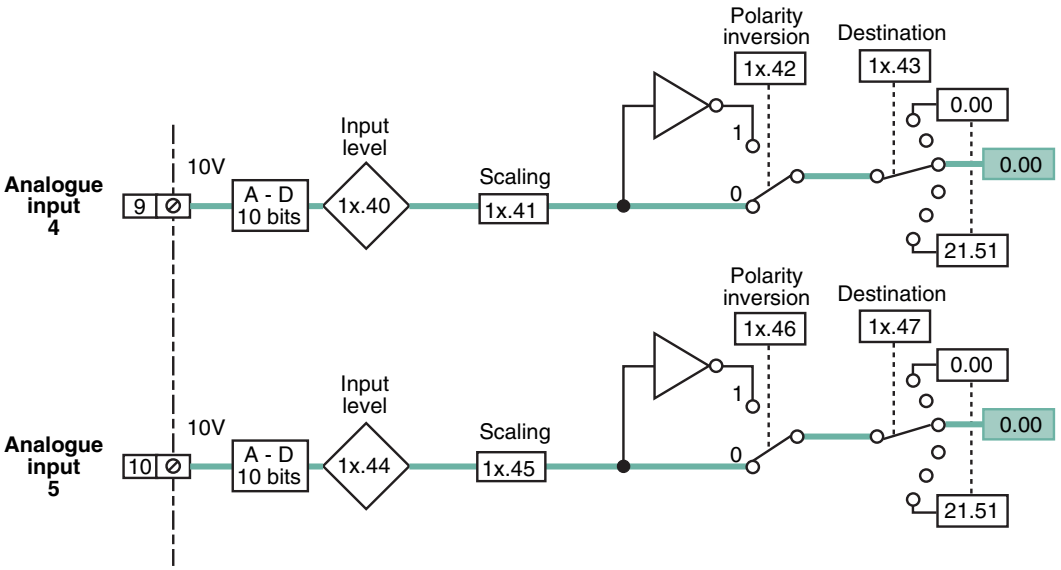
• Relay outputs



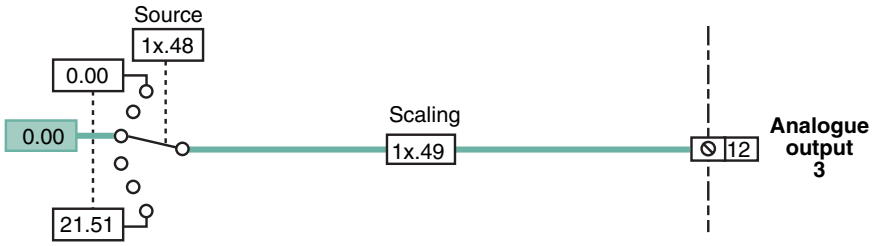
Parameters	Variation range			Factory settings		
1x.04 - 1x.05 - 1x.06 - 1x.07 1x.08	OFF (0) or On (1)			-		

SM-I/O PLUS module (to be continued)

• Digital inputs



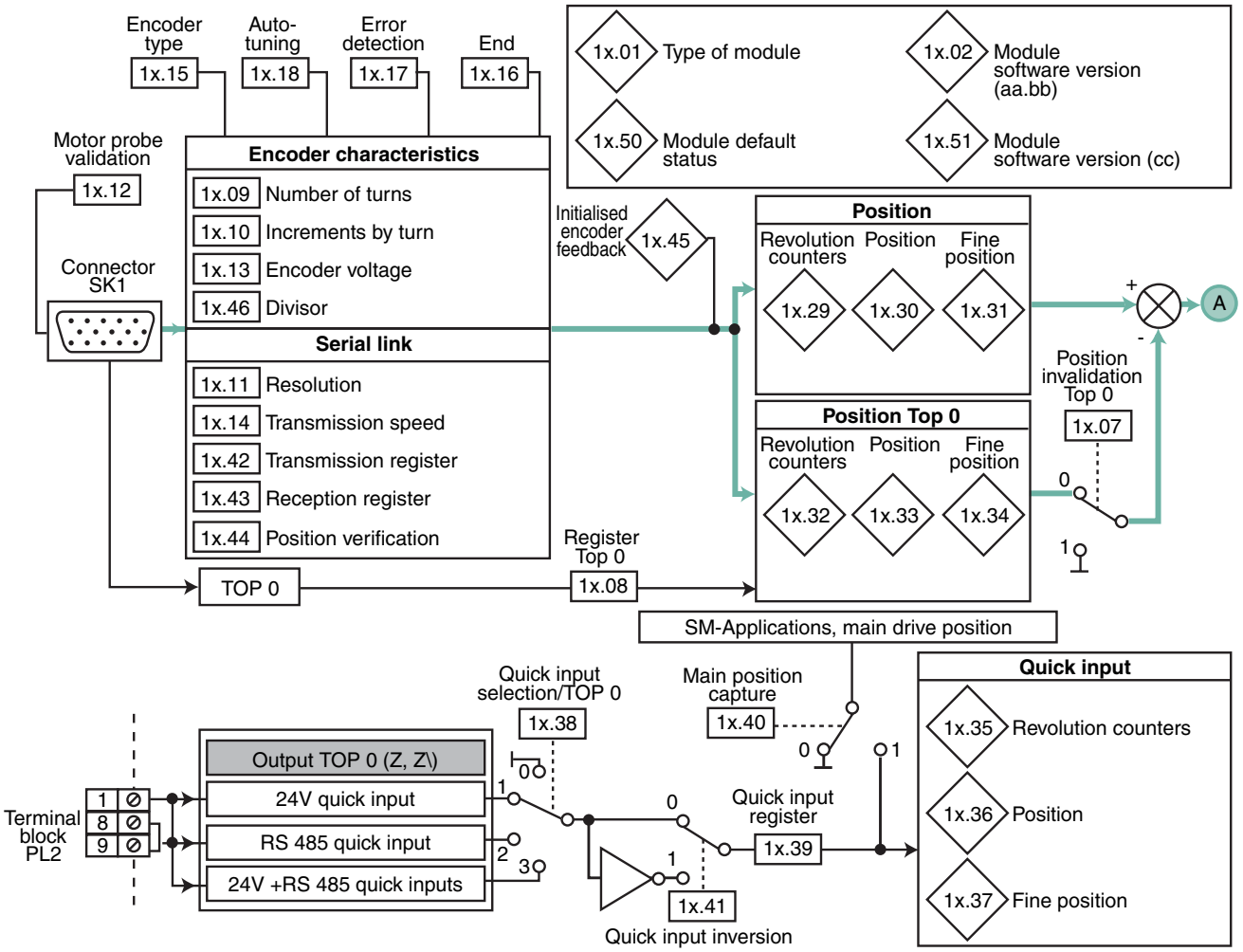
• Analogue outputs



Parameters	Variation range			Factory settings		
1x.40 - 1x.44	± 100.0 %			-		
1x.41 - 1x.45 - 1x.49	0 to 4.000			1.000		

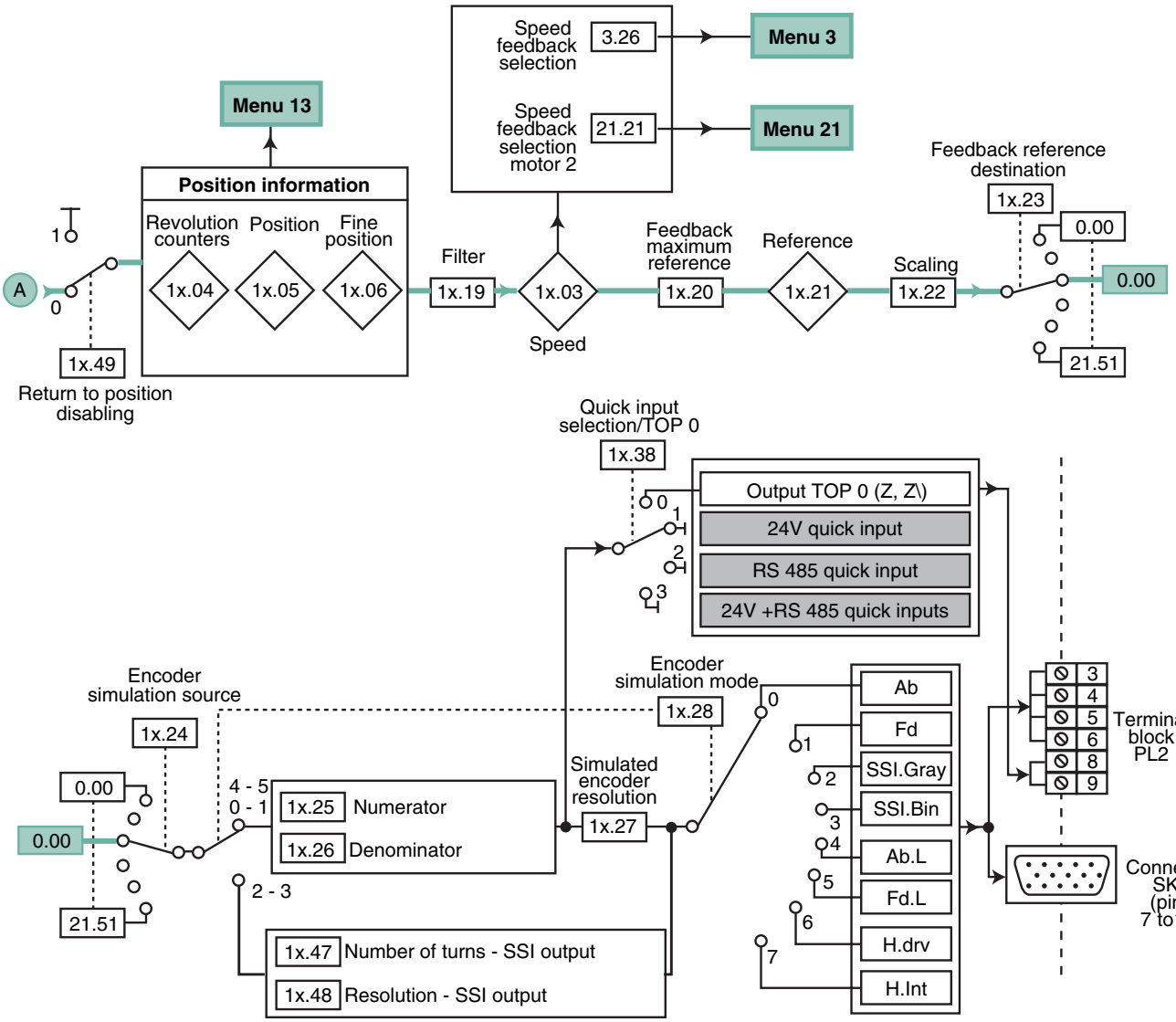
Notes

H6.20.3 - SM-UNIVERSAL ENCODER PLUS module



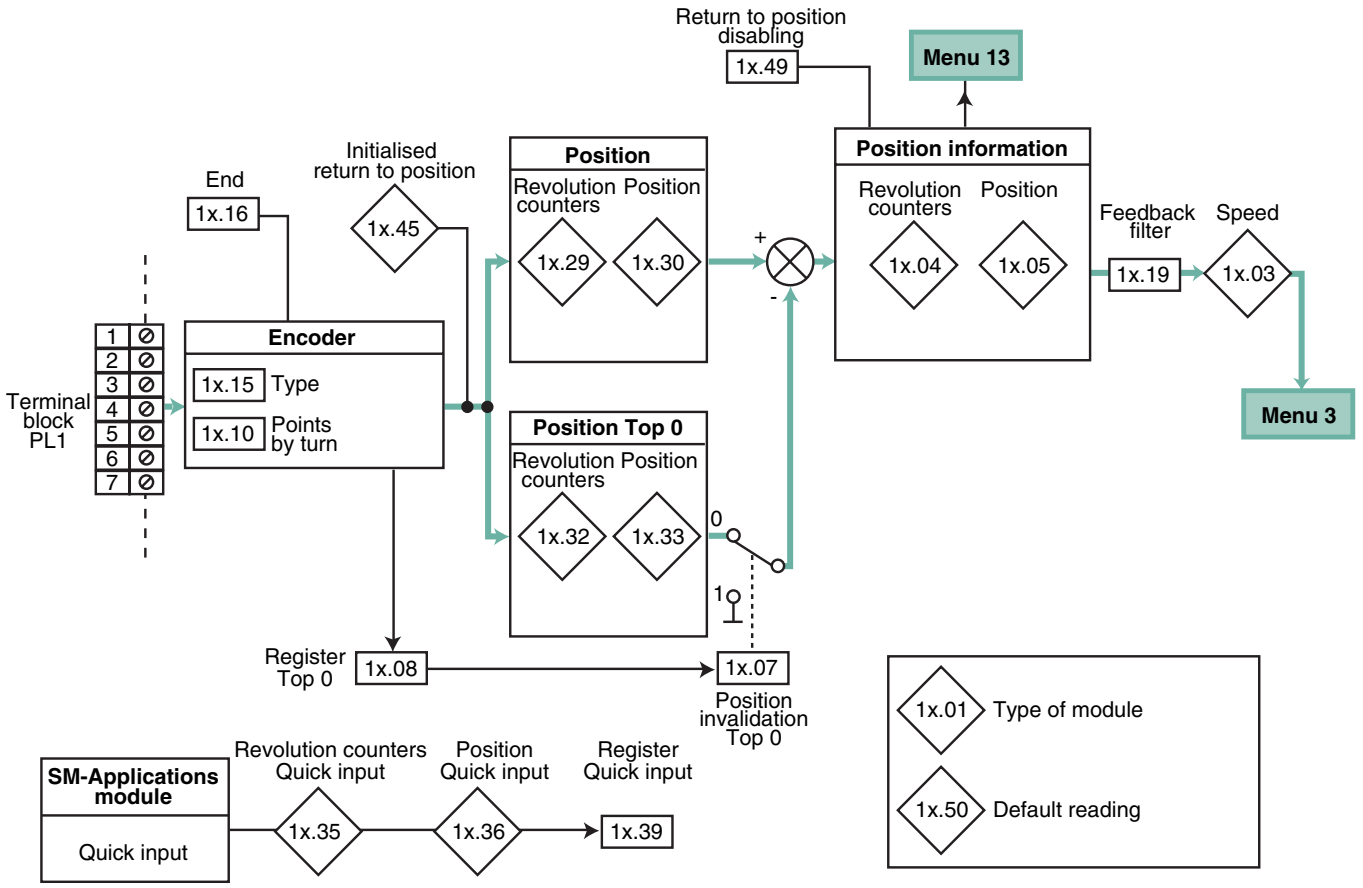
Parameters	Variation range			Factory settings		
1X.01	0 to 499			-		
1x.02	0 to 99.99			-		
1x.08 - 1x12 - 1x.18 - 1x.39 -	OFF (0) or On (1)			OFF (0)		
1x.09	0 to 255 bits			16 bits		
1x.10	0 to 50000			4096		
1x.11	0 to 32 bits			0		
1x.13	5V (0), 8V (1), 15V (2)			5V (0)		
1X.14	100 (0), 200 (1), 300 (2), 400(3), 500 (4), 1000 (5), 1500 (6), 2000 (7)			300 (2)		
1x.15	Ab (0), Fd (1), Fr (2), Ab.SErvo (3), Fd.SErvo (4), Fr.SErvo (5), SC (6), SC.HiPEr (7), EndAt (8), SC.EndAt (9), SSI (10), SC.SSI (11), SC.UVW (12)			Ab (0)		
1x.16	0 to 2			1		
1x.17	0 to 7			1		
1x.29 - 1x.32 - 1x.35	0 to 65535 turns			-		
1x.30 - 1x.33 - 1x.36	0 to 65535 ($1/2^{16}$ turn)			-		
1x.31 - 1x.34 - 1x.37	0 to 65535 ($1/2^{32}$ turn)			-		
1x.42 - 1x.43	0 to 65535 tours			0		
1x.45	OFF (0) or On (1)			-		
1x.46	0 to 1024			1		
1x.50	0 to 255			-		
1x.51	0 to 99			-		

SM-UNIVERSAL ENCODER PLUS module (to be continued)



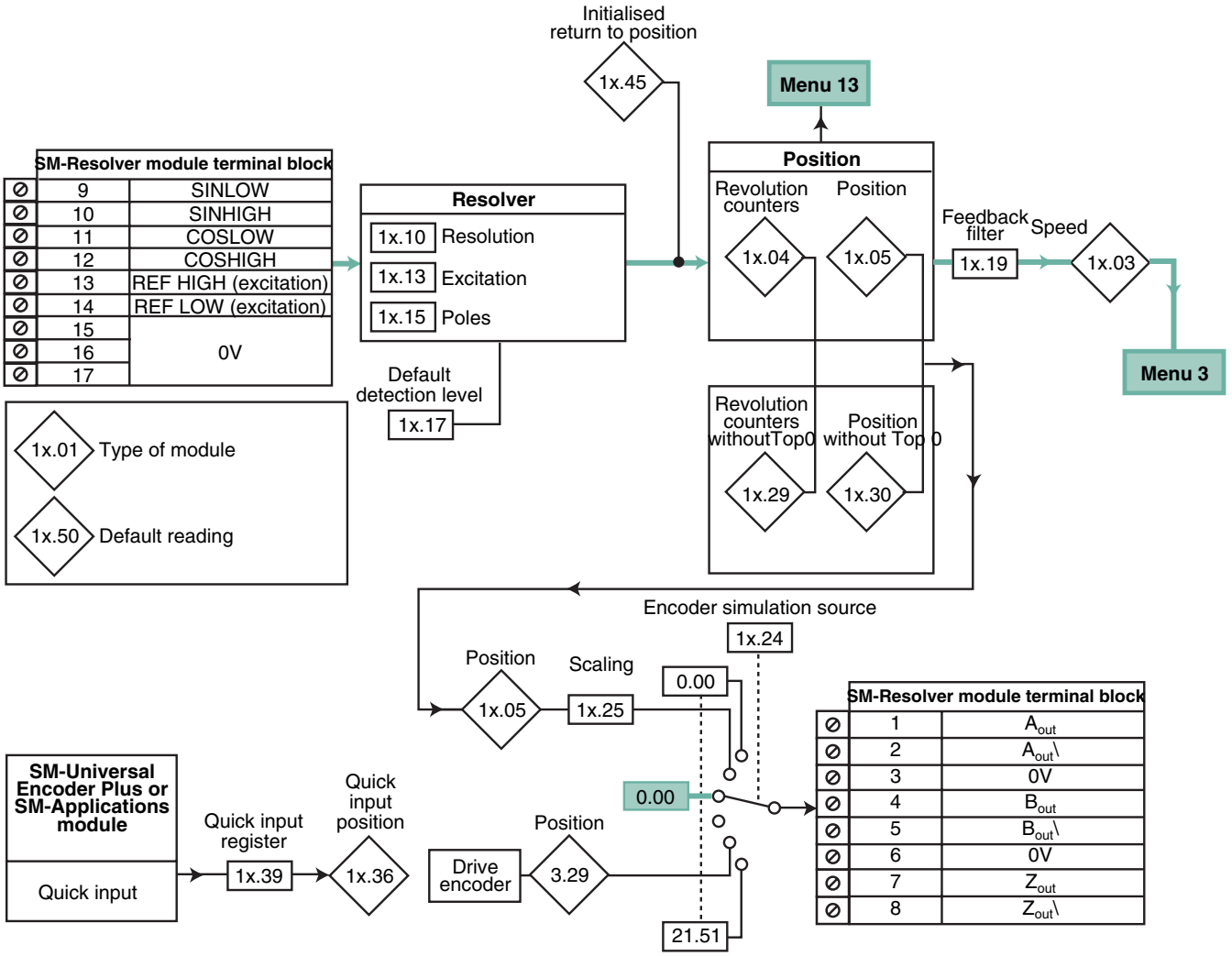
Parameters	Variation range			Factory settings		
1x.03	± 40000.0 min^{-1}			-		
1x.04	0 to 65535 turns			-		
1x.05	0 to 65535 (1/2^{16} turn)			-		
1x.06	0 to 65535 (1/2^{32} turn)			-		
1x.19	0 (0), 1 (1), 2 (2), 4 (3), 8 (4), 16 (5) ms			0		
1x.20	0 to 40000.0 min^{-1}			1500.0 min^{-1}		
1x.21	± 100.0 %			-		
1x.22	0 to 4.000			1.000		
1x.25	0 to 3.0000			0.25		
1x.26	0 to 3.0000			1.0000		
1x.27	OFF (0) or On (1)			OFF (0)		
1x.47	0 to 16 bits			16 bits		
1x.48	0 to 32 bits			0		

H6.20.4 - SM-ENCODER PLUS module



Parameters	Variation range			Factory settings		
1x.01	0 to 499			-		
1x.03	± 40000.0 min^{-1}			-		
1x.04 - 1x.29 - 1x.32 - 1x.35	0 to 65535 turns			-		
1x.05 - 1x.30 - 1x.33 - 1x.36	0 to 65535 (1/2^{16} turn)			-		
1x.08 - 1x.39 - 1x.49	OFF (0) or On (1)			OFF (0)		
1x.10	0 to 50000			4096		
1x.15	Ab (0), Fd (1), Fr (2)			Ab (0)		
1x.16	0 to 2			1		
1x.19	-	0 to 5 (0 to 16ms)		-	0	
1x.45	OFF (0) or On (1)			-		
1x.50	0 to 255			-		

H6.20.5 - SM-RESOLVER module



Parameters	Variation range			Factory settings		
1x.01	0 to 499			-		
1x.03	± 40000.0 min^{-1}			-		
1x.04 - 1x.29	0 to 65535 tours			-		
1x.05 - 1x.30 - 1x.36	0 to 65535 ($1/2^{16}$ turn)			-		
1x.10	0 to 50000			4096		
1x.13	3:1 (0), 2:1 (1 or 2)			3:1 (0)		
1x.15	2 POLE (0), 4 POLE (1), 6 POLE (2), 8 POLE (3 to 11)			2 POLE (0)		
1x.17	0 to 7			1		
1x.19	-	0 to 5 (0 to 16ms)		-	0	
1x.25	0 to 3.0000			0.2500		
1x.39	OFF (0) or On (1)			OFF (0)		
1x.45	OFF (0) or On (1)			-		
1x.50	0 to 255			-		

H6.20.6 - SM-field bus module

Parameters	Description	Variation range			Factory settings		
1x.01	Module type	0 to 499			-		
1x.02	Module software version	0 to 99.99			-		
1x.03	Station address	65535			65535		
1x.04	Transmission speed	-128 to +127			+127		
1x.05	Mode	65535			4		
1x.06	Diagnosis	±9999			-		
1x.07	Stop time delay	0 to 3000			200		
1x.08	"Little endianism" selection	OFF (0) or On (1)			OFF (0)		
1x.09	Register control	OFF (0) or On (1)			OFF (0)		
1x.10 to 1x.19	Input words IN 0 to 9	-32768 to +32767			-		
1x.20 to 1x.29	Output words OUT 0 to 9	-32768 to +32767			-		
1x.30	Return to factory settings of SM module	OFF (0) or On (1)			OFF (0)		
1x.31	Storing of module parameters	OFF (0) or On (1)			OFF (0)		
1x.32	Reset of SM module	OFF (0) or On (1)			OFF (0)		
1x.33	Transfer of module memory	OFF (0) or On (1)			OFF (0)		
1x.34	Compression	OFF (0) or On (1)			OFF (0)		
1x.35	Serial number	-2147 483648 to 2147 483647			-		
1x.36 and 1x.37	Specific to the bus	OFF (0) or On (1)			OFF (0)		
1x.38	Selection of mode specific to the bus	0 to 255			0		
1x.39	Number of IN cyclic words	0 to 255			0		
1x.40	Number of OUT cyclic words	0 to 255			0		
1x.41 and 1x.48	Specific to the bus	0 to 255			0		
1x.49	Data allocation error	0 to 255			0		

H6.20.7 - SM-Applications module

Parameters	Description	Variation range			Factory settings		
1x.01	Type of module	0 to 499			-		
1x.02	Software version of module (xx.yy)	0 to 99.99			-		
1x.03	Sypt program status	None(0), Stop(1),Run(2), Trip(3)			-		
1x.04	System resource available	0 to 100			-		
1x.05	RS485 address	0 to 255			11		
1x.06	RS485 mode	0 to 255			1		
1x.07	RS485 transmission speed	300(0), 600(1), 1200(2),2400(3), 4800(4), 9600(5), 19200(6), 38400(7), 57600(8), 115200(9) bauds			300(0) bauds		
1x.08	RS485 cycle time	0 to 255 ms			2 ms		
1x.09	RS485 Tx validation time	0 to 1 ms			0		
1x.10	Way of transmission of DPL PrintSYPT:	OFF(0) or RS485: On(1)			SYPT: OFF(0)		
1x.11	Time of scrutinising the clock-related charge	0 to 200 ms			0		
1x.12	Time of scrutinising the Pos charge	DISAbLEd(0); 0,25 ms(1); 0,5 ms(2); 1 ms (3); 2 ms(4); 4 ms(5); 8 ms(6)			DISAbLEd(0)		
1x.13	Operation validation	OFF(0) or On(1)			On(1)		
1x.14	Module default validation	OFF(0) or On(1)			OFF(0)		
1x.15	No Reset module on the drive default deletion	OFF(0) or On(1)			OFF(0)		
1x.16	Update of the encoder data	0 to 3			0		
1x.17	Limit exceeding default validation	OFF(0) or On(1)			OFF(0)		
1x.18	Wizard validation	OFF(0) or On(1)			OFF(0)		
1x.19	Immediate saving of parameters	OFF(0) or On(1)			OFF(0)		
1x.20	Saving on powering down	OFF(0) or On(1)			OFF(0)		
1x.21	Saving validation and restitution of menu 20	OFF(0) or On(1)			OFF(0)		
1x.22	Address of CTNet token ring	0 to 255			0		
1x.23	CTNet address	0 to 255			0		
1x.24	CTNet mains supply speed	5,000(0); 2,500(1); 1,250(2); 0,625(3)			2.500(1)		
1x.25	Configuration of CTNet Sync exchanges	0 to 9999			0		
1x.26	Destination of the 1st cyclic word CTNet easy mode	0 to 25503			0		
1x.27	Source of the 1st cyclic word CTNet easy mode	0 to 9999			0		
1x.28	Destination of the 2nd cyclic word CTNet easy mode	0 to 25503			0		
1x.29	Source of the 2nd cyclic word CTNet easy mode	0 to 9999			0		
1x.30	Destination of the 3rd cyclic word CTNet easy mode	0 to 25503			0		

SM-Applications module (to be continued)

Parameters	Description	Variation range			Factory settings		
1x.31	Source of the 3rd cyclic word CTNet easy mode	0 to 9999			0		
1x.32	Destination transfer slot 1	0 to 9999			0		
1x.33	Destination transfer slot 2	0 to 9999			0		
1x.34	Destination transfer slot 3	0 to 9999			0		
1x.35	Synchronisation of Event charges	Disable(0), Event(1), Event1(2), Event2(3), Event3(4)			Disable(0)		
1x.36	Status of CTNet bus	-3 to 0			-		
1x.37	Reject of loading autorisation	OFF(0) or On(1)			OFF(0)		
1x.38	No stop on APC error	OFF(0) or On(1)			OFF(0)		
1x.39	Status of Sync master	0 to 3			0		
1x.40	Data transfer mode	0 to10			1		
1x.41	Reserved						
1x.42	Savced main position	OFF(0) or On(1)			OFF(0)		
1x.43	Position saving inversion	OFF(0) or On(1)			OFF(0)		
1x.44	Charge priority level	0 to 255			0		
1x.45	Reserved						
1x.46	Reserved						
1x.47	Reserved						
1x.48	Default program line	0 to 2 147 483 647			-		
1x.49	User parameter	± 32767			-		
1x.50	Default reading						
1x.51	Software version (zz)						

H6.21 - Menu 18 : application parameters

Parameters	Description	Variation range			Factory settings		
18.01	Application parameter (stored when powered down)	-32768 to + 32767			0		
18.02 to 18.10	Application parameters	-32768 to + 32767			0		
18.11 to 18.30	Application parameters	-32768 to + 32767			0		
18.31 to 18.50	Application parameters	OFF (0) or On (1)			OFF (0)		

H6.22 - Menu 19 : parameters application

Parameters	Description	Variation range			Factory settings		
19.01	Application parameter (stored when powered down)	-32768 to + 32767			0		
19.02 to 19.10	Application parameters	-32768 to + 32767			0		
19.11 to 19.30	Application parameters	-32768 to + 32767			0		
19.31 to 19.50	Application parameters	OFF (0) or On (1)			OFF (0)		

H6.23 - Menu 20 : parameters application

Parameters	Description	Variation range			Factory settings		
20.01 to 20.20	Application parameters	-32768 to + 32767			0		
20.21 to 20.40	Application parameters	-2^{31} to $(2^{31}-1)$			0		

Note : These application parameters are mainly used with SM-Applications or SM-Applications Lite modules, or for the conception of a "Syptlite" program (execution of a program internal to the variable speed drive by means of a Syptlite software, available on CD Rom delivered together with the variable speed drive).

H6.24 - Menu 21 : Operating parameters of a second motor

Parameters	Description	Variation range			Factory settings		
21.01	Maximum limit	0 to 3000.0 Hz	0 to LIM N MAX		EUR : 50.0 Hz USA : 60.0 Hz	EUR : 1500min^{-1} USA : 1800.0min^{-1}	3000.0 min^{-1}
21.02	Forward/reverse max limit	± 3000.0 Hz	± LIM N MAX		0		
21.03	Referebce selection	A1.A2 (0), A1.Pr (1), A2.Pr (2), Pr (3), Pad (4),Prc (5)			A1.A2 (0)		
21.04	Acceleration ramp	0 to 3200.0s/ 100Hz	0 to 3200.000s/1000min^{-1}		5.0s/100Hz	2.000s/1000min^{-1}	0.200s/1000min^{-1}
21.05	Deceleration ramp	0 to 3200.0s/ 100Hz	0 to 3200.000s/1000min^{-1}		10.0s/100Hz	2.000s/1000min^{-1}	0.200s/1000min^{-1}
21.06	Rated frequency	0 to 3000.0 Hz	0 to 1250.0 Hz	-	EUR : 50.0 Hz / USA : 60.0 Hz		-
21.07	Rated current	0 to I_N MAX (A)			I_{NOM} VAR (**11.32**)		
21.08	Rated speed	0 to 180000min^{-1}	0 to 40000.00min^{-1}		EUR : 1500min^{-1} USA : 1800min^{-1}	EUR : 1450.00min^{-1} USA : 1770.00min^{-1}	3000.00 min^{-1}
21.09	Rated voltage	0 to U_{AC} MOT MAX (V)			TL : 230V / T : EUR = 400V, USA = 460V / TM : 575V / TH : 690V		
21.10	Cos φ	0 to 1.000		-	0 to 0.850		-
21.11	Number of motor poles	Auto to 120 poles (0 to 60)			Auto (0)		6 POLE (3)
21.12	Stator resistor	0 to 30.000 Ω			0		
21.13	Offset tension	0 to 25.0V		-	0	-	
21.14	Transient inductance	0 to 500.000 mH			0		
21.15	Active motor 2 parameters	OFF (0) or On (1)			-		
21.16	Thermal time constant	0 to 400.0 s			89.0 s		20.0 s
21.17	Speed loop Kp gain	-	0 to 6.5535 (1/rads^{-1})		-	0.0100 (1/rads^{-1})	
21.18	Speed loop Ki gain	-	0 to 655.35 (1/rad)		-	1.00 (1/rad)	
21.19	Speed loop Kd gain	-	0 to 0.65535 (s)		-	0	
21.20	Encoder phasing out	-	0 to 359.9 °		-		0
21.21	Speed feedback selection	-	drv (0), SLot 1 (1), SLot 2 (2), SLot 3 (3)		-	drv (0)	
21.22	Current loop Kp gain	0 to 30000			20	TL : 75, T : 150, TM : 180, TH : 215	
21.23	Current loop Ki gain	0 to 30000			40	TL : 1000, T : 2000, TM : 2400, TH : 3000	
21.24	Stator inductance	-	0 to 5000.00 mH	-	-	0	-
21.25	Inflexion point 1	-	0 to 100 % of rated flowl	-	-	50 %	-
21.26	Inflexion point 2	-	0 to 100 % of rated flow	-	-	75 %	-
21.27	Motor active current limit	0 to LIM. IM1 MAX (%)			165.0 %	175.0 %	
21.28	Generator active current limit	0 to LIM. IM1 MAX (%)			165.0 %	175.0 %	
21.29	Symetrical active current limit	0 to LIM. IM1 MAX (%)			165.0 %	175.0 %	
21.30	Motor voltage for 1000min^{-1} Ke	-	-	0 to 10000 V	-	-	98 V
21.31	No linear motor	0 to 655.35 mm			0		

H6.25 - Menu 22 : Parameter-setting of menu 0 (to be continued)

Configuration of menu 0

Parameters	Description	Variation range			Factory settings		
		[1]	[2]		[1]	[2]	
22.01	Parameter-setting of **0.31** of menu 0	**1.00** to **21.51**			**11.33**		
22.02	Parameter-setting of **0.32** of menu 0	**1.00** to **21.51**			**11.32**		
22.03	Parameter-setting of **0.33** of menu 0	**1.00** to **21.51**			**6.09**	**5.16**	**0.00**
22.04	Parameter-setting of **0.34** of menu 0	**1.00** to **21.51**			**11.30**		
22.05	Parameter-setting of **0.35** of menu 0	**1.00** to **21.51**			**11.24**		
22.06	Parameter-setting of **0.36** of menu 0	**1.00** to **21.51**			**11.25**		
22.07	Parameter-setting of **0.37** of menu 0	**1.00** to **21.51**			**11.23**		
22.08 and **22.09**	Not used	-			-		
22.10	Parameter-setting of **0.40** of menu 0	**1.00** to **21.51**			**5.12**		
22.11	Parameter-setting of **0.41** of menu 0	**1.00** to **21.51**			**5.18**		
22.12 to **22.17**	Not used	-			-		
22.18	Parameter-setting of **0.48** of menu 0	**1.00** to **21.51**			**11.31**		
22.19	Not used	-			-		
22.20	Parameter-setting of **0.50** of menu 0	**1.00** to **21.51**			**11.29**		
22.21	Parameter-setting of **0.51** of menu 0	**1.00** to **21.51**			**0.00**		
22.22	Parameter-setting of **0.52** of menu 0	**1.00** to **21.51**			**0.00**		
22.23	Parameter-setting of **0.53** of menu 0	**1.00** to **21.51**			**0.00**		
22.24	Parameter-setting of **0.54** of menu 0	**1.00** to **21.51**			**0.00**		
22.25	Parameter-setting of **0.55** of menu 0	**1.00** to **21.51**			**0.00**		
22.26	Parameter-setting of **0.56** of menu 0	**1.00** to **21.51**			**0.00**		
22.27	Parameter-setting of **0.57** of menu 0	**1.00** to **21.51**			**0.00**		
22.28	Parameter-setting of **0.58** of menu 0	**1.00** to **21.51**			**0.00**		
22.29	Parameter-setting of **0.59** of menu 0	**1.00** to **21.51**			**0.00**		

Note : For the parameter-setting of **0.11** - **0.30**, see menu 11.

Notes

UNIDRIVE SP
Communication

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- I4.9 - Exceptions 8
- I4.10 - CRC 8

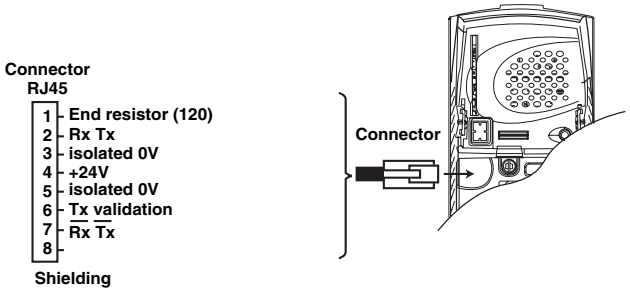
Notes

UNIDRIVE SP
Communication

I1 - Serial link

UNIDRIVE SP integrates in standard version, a serial link port RS485 / 2 wires accessible by a RJ45 connector.

I1.1 - Localisation and connection



To validate the end resistor, connect pin 8 to pin 1.

I1.2 - Insulation

The drive serial link port has a double isolation. It complies with the SELV safety requirements of the EN50178 standard. The drive serial link is isolated from the power stage and from the control terminals.

• In order to comply with the SELV safety requirements of the CEI60950 standard regarding the IT conditions, the element connected to the serial link must be connected to earth. In case of a portable PC or of another similar equipment for which the earthing is not possible, an additional isolation must be inserted into the cable.

The CT Comms cable option is used to directly connect a PC to l'UNIDRIVE SP. This cable, with a SUB-D 9 connector at one end and RJ45 at the other end, integrates an isolated RS232/RS485 converter.

I1.3 - Protocols

The drive manages the protocols (selected by parameter-setting) :
- Modbus RTU (factory settings),
- CT ANSI.

I1.4 - Parameter-setting

Depending on the application, the following parameters must be modified.
0.35 : Type of communication
0.36 : Serial link transmission speed
0.37 : Serial link address
For details regarding these parameters, see section H2.1.

I1.5 - Connection to mains supply

The UNIDRIVE SP serial port allows the drive to communicate to the RS 485 2 wire mains supply.
• The mains supply must be then a " chain " connection (and not a star connection).
• The terminals 2, 3, 7 and the shielding must be connected at minimum.
• The terminal 4 of all mains supply drives may be connected together, but the maximum power available will be the same as for a single drive (terminal 4 may be thus separately supplied with power).
• For a drive located at the chain end in a mains supply, check the termination resistance by connecting the terminals 1 and 8.
• CT Comms cable may be used on the mains supply, but only occasionally, for diagnosis or parameter-setting, and with UNIDRIVE SP drives only.
In this case, the terminals 6 of each drive must be connected, and the terminal 4 must be connected to a single drive (1 single CT Comms cable may be used on the mains supply).

I2 - Parameter-setting by PC

The LS SOFT parameter-setting allows user-friendly commissioning of UNIDRIVE SP from a PC.

- Interactive parameter-setting: The parameter setting of the drive is made automatically using responses to the installation questionaire.
- Supervision During the commissioning: LS SOFT is used to supervise on a single screen different information regarding the operation.
- File storing: LS SOFT is used to save the parameter files allowing thus to duplicate very quickly an already existing setting.

To connect PC to UNIDRIVE SP, use the CT Comms cable option described above or use a RS232/RS485 2 wire converter (example : Amplicon 485 FI).
For the PC fitted with ports USB, contact your usual LEROY-SOMER correspondent.

During the use of a converter with Unidrive SP, it is recommended not to connect the end resistor to the mains supply. It may be necessary to disconnect the termination resistance depending on the type used.

I3 - Control word and status word

The UNIDRIVE SP control commands may be managed by a single parameter **6.42,** named " control word ".
In fact, the value of **6.42** corresponds to a word within which each bit is associated with a command. The command is validated when the bit is set to 1, and it is invalidated when the bit is set to 0.
To validate the commands by control word, set **6.43** = 1 (the control commands by terminal block are no longer active).

The parameter **10.40** named status word is used to regroup the information on the variable speed drive. The value of **10.40** corresponds to a 15-bit word, and each bit is associated with a drive status parameter.

6.42 : Control word

Bits of control word 6.42	Adequate parameters	Functions
0	**6.15**	Drive enabling
1	**6.30**	Fwd run
2	**6.31**	Run by pulses
3	**6.32**	Rev run
4	**6.33**	Fwd/rev
5	**6.34**	Run
6	**6.39**	Stop\
7	**-**	Automatic/Manual
8	**1.42**	Analogue reference - preset reference
9	**6.37**	Rev run by pulses
10	**-**	reserved
11	**-**	reserved
12	**-**	Drive default
13	**10.33**	Drive default reset / Reset
14	-	Wizard - Keyboard

10.40 : Status word

Bits of status word 10.40	Adequate parameters	Drive status
0	**10.01**	Ready drive
1	**10.02**	Drive output activated
2	**10.03**	Zero speed or frequency
3	**10.04**	Minimum speed or frequency
4	**10.05**	Frequency or speed lower than the low threshold
5	**10.06**	Reference reached
6	**10.07**	Frequency or speed higher than the high threshold
7	**10.08**	Rated load
8	**10.09**	Active current limitation
9	**10.10**	Dynamic braking
10	**10.11**	Braking on resistor
11	**10.12**	Overload alarm, braking resistor
12	**10.13**	Reverse rotation selected
13	**10.14**	Reverse rotation
14	**10.15**	Mains supply absence

I4 - MODBUS RTU, **0.35** = rtU (1)

I4.1 - General information

The MODBUS RTU protocol is a master - slave type protocol. (a single master by mains supply).

Description	Characteristics
Normal physical layer for multi-points operation	RS485 2 wires
Chain of bits	Standard UART asynchronous symbols with No Return to Zero (NRZ)
Symbol	Each symbol is made of : 1 bit start 8 bits of data (last significant bit sent first) 2 bits stop
Transmission speed	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bauds

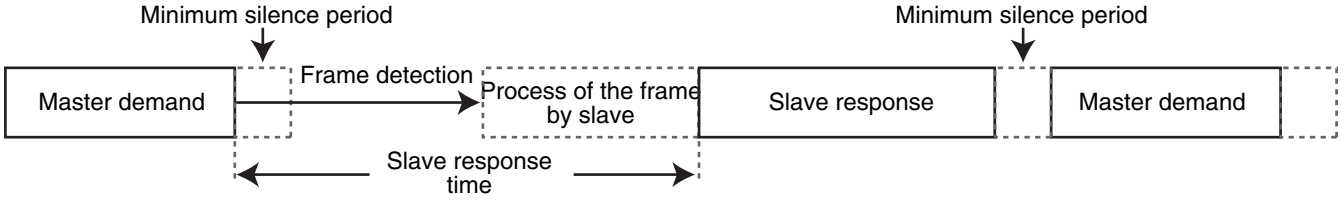
I4.2 - Description of exchanges

The exchanges are made on the initiative of the master, which imposes its demands: if the related slave is configured, it sends a response. Each frame (question or response) contains four types of information :
- The address of the related slave receiving the question frame (master demands) or the address of the slave sending the response frame (encoded on a byte),
- The function code that selects a command (reading or writing of words, of bits...) for the question and response frames (encoded on a byte),
- The information champ containing the command-related parameters (encoded on "n" bytes),
- the CRC of the frame, calculated on sixteen bits which is used to detect the transmission errors.

The frame is terminated by a minimum silence period, equivalent to the transmission time for 3.5 characters (by instance, at 19200 bauds, the silence period must be at least of 1/19200 x 11 bits x 3.5, that is 2 ms). This silence period indicates the message end, and the slave may begin to process the information sent.
All the information is encoded in hexadecimal.

Slave address	Function code	Message data	CRC 16 bits	Silence interval

All the master demands, excepting the general diffusion demands, will generate the response of a single slave. The slave will response within the maximum time assigned for it (the minimum response time will be never shorter than the silence period). After a general demand, the master may send a new demand after a period equivalent to the maximum response time of the slave.



I4.3 - Global addressing

When the master sends a message with the zero address, this message is sent to all the slaves of the mains supply. The slave nodes do not send response messages for general demands.

I4.4 - Parameter assignment

The UNIDRIVE SP drives are parameter-set by using a **menu.parameter** notation.
The indices "menu" and "parameter" may have the values 0 - 99. Le menu.parameter is assigned to a MODBUS RTU register **menu x 100 + parameter**.

To correctly assign the parameters, the slave increments (+1) the address of the register received.
Example : X = menu ; Y = parameter

Drive parameter	Register address (protocol level)
X.Y	(X x 100) + (Y – 1)
Examples :	
1.02	101
1.00	99
0.01	0
70.00	6999

I4.5 - Data encoding

MODBUS RTU uses a "big-endian" representation for the data information and addresses (save for CRC which is "little-endian"). That is, when a digital quality, "larger" than a byte is sent, the most significant byte is sent first.
For instance:

		1er	2ème	…	
16 – bits 0x1234	must be:	0x12	0x34		
32 – bits 0x12345678L	must be:	0x12	0x34	0x56	0x78

I4.6 - "Function" codes

The function code determines the data context and format of the message. Bit 7 of the function code is used in the slave response to indicate an exception.

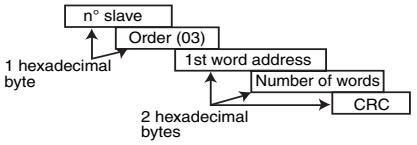
Function code	Description
3	Multiple reading of 16-bit registers
16	Multiple reading of 16-bit registers
23	Multiple reading and writing of 16-bit registers
64	CMP " capsulated " protocol Non standard function code

I4.6.1 - Function code 3 : reading

Reading of a register adjacent area. The slave imposes a high limit on the number of registers that may be read. If the limit is exceeded, the slave will produce a code 2 exception.

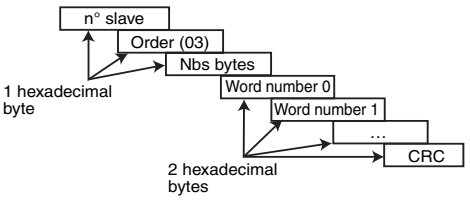
Frame sent by the master :

Bytes	Description
0	Slave address (1 to 247)
1	Function code 0x03
2	High weight of the first word address
3	Low weight of the first word address
4	High weight of the number of word to read
5	Low weight of the number of word to read
6	Low weight of CRC
7	High weight of CRC



Frame sent by the slave :

Octets	Description
0	Slave address
1	Function code 0x03
2	Number of bytes to read
3	High weight of word 0
4	Low weight of word 0
5	High weight of word 1
6	Low weight of word 1
...	…
n	Low weight of CRC
n + 1	High weight of CRC

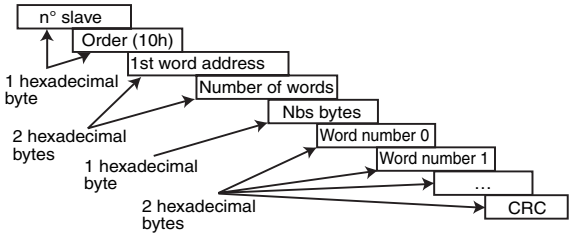


I4.6.2 - Function code 16 : writing

Writing a register adjacent area. The slave imposes a high limit on the number of register that may be written. If the limit is exceeded, the slave will abandon the demand and the master will not respond ("timeout").

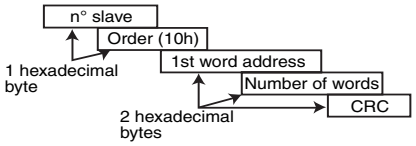
Frame sent by the master:

Octets	Description
0	Slave address (1 to 247)
1	Function code 0x10
2	High weight of the first word address
3	Low weight of the first word address
4	High weight of the number of word to write
5	Low weight of the number of word to write
6	Number of bytes to write
7	High weight of word 0 to write
8	Low weight of word 0 to write
9	High weight of word 1 to write
10	Low weight of word 1 to write
...	…
n	Low weight of CRC
n + 1	High weight of CRC



Frame sent by the slave :

Bytes	Description
0	Slave address (1 to 247)
1	Function code 0x03
2	High weight of the first word address
3	Low weight of the first word address
4	High weight of the number of written bytes
5	Low weight of the number of written bytes
6	Low weight of CRC
7	High weight of CRC



I4.6.3 - Function code 23 : reading/writing

Writing and reading of two register adjacent area. The slave imposes a high limit on the number of registers that may be written. If the limit is exceeded, the slave will abandon the demand and the master will not respond ("timeout").

Frame sent by the master :

Bytes	Description
0	Slave address (1 to 247)
1	Function code 0x17
2	High weight of the first word address to read
3	Low weight of the first word address to read
4	High weight of the number of word to read
5	Low weight of the number of word to read
6	High weight of the first word address to write
7	Low weight of the first word address to write
8	High weight of the number of word to write
9	Low weight of the number of word to write
10	Number of bytes to write
11	High weight of word 0
12	Low weight of word 0
13	High weight of word 1
14	Low weight of word 1
...	…
n	High weight of CRC
n + 1	Low weight of CRC

Frame sent by the slave :

Bytes	Description
0	Slave address (1 to 247)
1	Function code 0x17
2	Number of bytes to read
3	High weight of word 0
4	Low weight of word 0
5	High weight of word 1
6	Low weight of word 1
...	…
n	High weight of CRC
n + 1	Low weight of CRC

I4.6.4 - Example

Drive address = 11.
Reading of 3 parameters starting with **1.08.**
0108 becomes 0107 which is equal 006B in hexadecimal (modbus address = parameter address - 1).

• Demand

	Example (hexa)	RTU (binary)
Slave address	B	0000 1011
Function	03	0000 0011
1st word address (strong)	00	0000 0000
1st word address (weak)	6B	0110 1011
Number of words (strong)	00	0000 0000
Number of words (weak)	03	0000 0011
Check-up		CRC (16 bits)
Total of bytes :		8

• Response

	Example (hexa)	RTU (binary)
Slave address	B	0000 1011
Function	03	0000 0011
Number of bytes	06	0000 0110
Word 0 (strong)	02	0000 0010
Word 0 (weak)	2B	0010 1011
Word 1 (strong)	00	0000 0000
Word 1 (weak)	00	0000 0000
Word 2 (strong)	00	0000 0000
Word 2 (weak)	63	0110 0011
Check-up		CRC (16 bits)
Total of bytes :		11

I4.7 - Waiting period

In MODBUS RTU, when the master send a message to a slave, it imposes a waiting period between the end of its demand and the beginning of the slave response, this allowing to eventually detect an outstanding response.

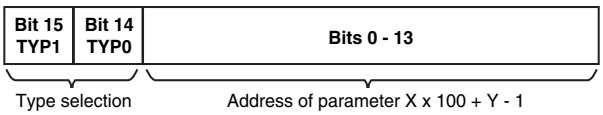
I4.8 - Types of large data

I4.8.1 - 32 bit registers

The standard MODBUS RTU registers have 16 bits, and a single parameter **X.Y** is assigned to a single register MODBUS RTU. To manage types of data of 32 bits (entire or floating), we may use multiple MODBUS RTU readings and writings to transfer a 32-bit register adjacent area.

Generally, the slaves contain 16-bit registers and 32-bit registers. In order to allow the master to select 16 or 32 bits, the 2 bits of the highest weight of the register address are used to indicate the type of data selected.

Note : The selection applies to all the units.



The bits 14 and 15 select the data type according to the table below:

Bits 15-14	Type of data selected	Comment
00	INT16	Standard type - 16 bits
01	INT32	Specific type - 32 bits
10	Float32	IEEE794 standard not managed by all equipment
11	Reserved	

If a 32-bit data type is selected, then the slave uses 2 MODBUS RTU registers of 16 consecutive bits (in "big endian"). The master must also correctly adjust the "number of 16-bit registers".

Example:
Slave address : 08
Reading from **20.01** to **20.04** 32-bit parameters, by using the function code 03.

• Master demand

Bytes	Value	Description
0	0x08	Slave address
1	0x03	Multiple reading, function code 03
2	0x40	Address of initial register **20.01** (0x4000 +201 – 1) = 16584 = 0x40C8
3	0xC8	
4	0x00	Number of 16-bit registers to read: **20.01** to **20.04** correspond to 4 32-bit registers = 8 16-bit registers
5	0x08	
6	Low weight of CRC	-
7	High weight of CRC	-

Note : the value 0x4000 corresponds to the INT32 type (bit15 = 0, bit 14 = 1).

• Slave response :

Bytes	Value	Description
0	0x08	Slave address
1	0x03	Multiple reading, function code 03
2	0x10	Data length (bytes) = 4 32-bit registers = 16 bytes
3-6		**20.01**
7-10		**20.02**
11-14		**20.03**
15-18		**20.04**
19	Low weight of CRC	-
20	High weight of CRC	-

I4.8.2 - Reading of a type of parameter different from the selected one

The slave will send the last significant word of a 32-bit parameter if this parameter is read as a 16-bit parameter.
The slave will sign the last significant word of a 16-bit parameter if this parameter is read as a 32-bit parameter. The number of 16-bit registers must be even during a 32-bit reading.

Example :
If :
- **20.01** is a 32-bit parameter with a value of 0x12345678,
- **20.02** is a 16-bit parameter with a value of 0xABCD (negative value),
- **20.03** is a 16-bit parameter with a value of 0x0123 (positive value).

Reading	Register initial address	Number of 16-bit registers	Response	Comments
20.01	200	1	0x5678	Standard 16-bit reading of a 32-bit register will return a 16-bit word ("truncated" data)
20.01	16584	2	0x12345678	Correct 32-bit reading
20.01	16584	1	Exception 2	The number of registers must be even por a 32-bit reading
20.02	201	1	0xABCD	Standard 16-bit reading of a 16-bit register will return a 16-bit word
20.02	16585	2	0xFFFFABCD	32-bit reading of a 16-bit register will return a 32-bit signed word
20.03	16586	2	0x00000123	
20.01 **20.02**	200	2	0x5678, 0xABCD	Standard 16-bit reading of a 32-bit register will return a 16-bit word ("truncated" data)
20.01 **20.02**	16584	4	0x12345678, 0xFFFFABCD	Complete 32-bit reading

I4.8.3 - Writing of a type of parameter different from the selected one
The slave will allow the writing of a 32-bit value in a 16-bit parameter, if the 32-bit value does not exceed the normal range of a 16-bit parameter.
The slave will allow the writing of a 16-bit value in a 32-bit parameter. The slave will sign the written value, so the range of this type of writing will be ± 32767.

Example :
If for :
- **20.01** the variation range is of + 100000,
- **20.02** the variation range is of + 10000.

Writing	Register initial address	Number of 16-bit registers	Response	Comments
20.01	200	1	0x1234	Standard 16-bit writing in a 32-bit register. Written value: 0x00001234 (4660)
20.01	200	1	0xABCD	Standard 16-bit writing in a 32-bit register. Written value: 0xFFFFABCD (-11213)
20.01	16584	2	0x00001234	Written value: 0x00001234 (4660)
20.02	201	1	0x0123	Written value: 0x0123 (291)
20.02	16585	2	0x00000123	Written value: 0x00000123 (291)

I4.9 - Exceptions

If an error is detected in the master demand, the slave will respond will an exception response. If the message is inadequate and the frame is not received, or if CRC stops, then the slave will produce non exception, and in this case the master will not receive the slave response ("timeout"). If a writing demand (function code 16 or 23) exceeds the maximum size accepted by the slave, the slave will reject the message. No exception will be sent and the master will not respond.

Format of an exception message :

Bytes	Description
0	Slave address
1	Original function code with bit 7 to 1
2	Exception code
3	Low weight of CRC
4	High weight CRC

Exception codes :

Code	Description
1	Not managed function code
2	Register address beyond the range or too important reading demand (too many registers)

Parameters beyond the range during a writing function (function code 16)
The slave writes in the order in which the data are received. If a write fails due to a value beyond the range, the writing unit is ended.
The slave will not produce exception response, but it will signal to the master the number of really effected writing.

Parameters beyond the range during the reading/writing (function code 23)
There is no indication when the value is beyond the range, during a CF23 access.

I4.10 - CRC

This control word is used for the detection of the transmission errors. It is calculated on 16 bits starting with all the question and response frame bytes.
Algorithm :
DEBUT
CRC = 0xFFFF;
Number of processed bytes = 0 ;
Following byte = first byte ;
REPETER{
Byte to process = following byte ;
CRC = CRC or exclusive byte to process ;
REPETER eight times
IF (CRC uneven)
THEN CRC = CRC or exclusive 0xA001 ;
Number of processed bytes = Number of processed bytes +1;
}WHILE (number of processed bytes < Number of bytes to process)
END.

UNIDRIVE SP SMARTCARD

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Notes

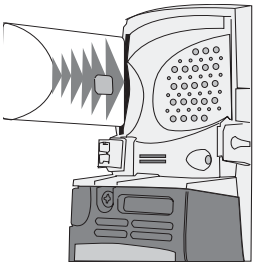
UNIDRIVE SP
SMARTCARD

J1 - Functionalities and installation

SMARTCARD is supplied in the standard version with UNIDRIVE SP.
It is used to simply configure the drive:
- saving of the drive parameters in order to duplicate them in other drives,
- loading of parameters by means of SMARTCARD.

A single SMARTCARD may be inserted in the drive, but the user may have many different programming cards.

• Location of SMARTCARD



Note : UNIDRIVE SP is supplied with the SMARTCARD already placed in its location.

J2 - Saving of a set of parameters

To transfer the drive parameters and to store them in SMARTCARD, various solutions may be considered :
- manual and selective saving of parameters in SMARTCARD,
- automatic saving of parameters and of their modifications in SMARTCARD,
- saving of the drive parameters in SMARTCARD in order to automatically transfer them into another drive, only by inserting the card.

J2.1 - Manual saving

Parameter	Setting	Description	Validation
0.00	**1000**	Storing of all drive parameters	Press the Reset key.
0.30	**Prog (2)**	Storing of all drive parameters in SMARTCARD	Press the Reset key. After the transfer, **0.30** returns to 0 (none).
0.29	**3333**	Storing of all drive LEROY-SOMER application program parameters in SMARTCARD (menus 20,70 and 71)	Press M.

CAUTION :
If SMARTCARD already contains parameters, they will be " deleted and reset " by this procedure.

J2.2 - Automatic saving

Parameter	Setting	Description	Validation
0.00	**1000**	Storing of all drive parameters	Press the Reset key.
0.30	**Auto (3)**	All drive parameters are stored in SMARTCARD. Then, only the modifications of menu 0 will be automatically stored in the card.	Press the Reset key. Let SMARTCARD in place in the drive.
0.00	**1000**	Storing of the modification of other menus in SMARTCARD	Press the Reset key.
Subsequently, on each powering up, all drive parameters are stored in SMARTCARD. During the transfer, the display indicates " cArd ".			

CAUTION :
If SMARTCARD already contains parameters, they will be " deleted and reset " by this procedure.

J2.3 - Saving for automatic transfer into another drive

Parameter	Setting	Description	Validation
0.00	**1000**	Storing of all drive parameters	Press the Reset key.
0.30	**boot (4)**	All drive parameters are stored in SMARTCARD.	Press the Reset key. Remove the card
Consequently, insert the SMARTCARD into another drive powered down. When powering up, all the SMARTCARD parameters are automatically transferred to the drive. During the transfer, the display indicates " boot ". Remove the card.			

CAUTION :
If SMARTCARD already contains parameters, they will be " deleted and reset " by this procedure.

J2.4 - Writing protection

Parameter	Setting	Description	Validation
0.00	**9888**	Memory block in SMARTCARD. No parameter saving may be transferred to SMARTCARD. Only the SMARTCARD loading into a drive is authorised.	Press the Reset key.

To unblock the memory in the card :

Parameter	Setting	Description	Validation
0.00	**9777**	The SMARCARD memory is unblocked	Press the Reset key.

J2.5 - Reset

Paramètre	Réglage	Description	Validation
0.00	**9999**	Reset of all parameterd previously stored in SMARTCARD.	Press the Reset key.

J3 - Loading of a set of parameters

To load a set of parameters of SMARTCARD into the drive, proceed as follows :
- manual loading of the parameters stored in SMARTCARD to the drive,
- the parameters contained in SMARTCARD have been stored so that they are automatically loaded once the SMARTCARD is inserted into the drive.

CAUTION :
• If the drive rating is different from the one stored in SMARTCARD, the drive sets to " C.rtg " and the parameters related to the drive rating are no longer transferred.
• The 0.43 encoder phase angle is also saved in SMARTCARD. During the transfer of the card to the drive, the then stored phase angle may be different from the one of the encoder installed. In order to avoid any problem, proceed to a self-rating after transfer, or apply manually 0.43.

J3.1 - Manual loading

Parameter	Setting	Description	Validation
0.30	**REAd (1)**	Loading of the SMARTCARD parameters onto the drive.	Press the Reset key. After the transfer **0.30** return to 0 (none).
0.29	**6666**	Loading of all drive LEROY-SOMER application program parameters in SMARTCARD (menus 20,70 and 71))	Press M.

CAUTION :
The operating mode - Open loop ( ), the vector mode - Closed loop ( ) or Servo ( ) of the drive and that contained in the SMARTCARD during the transfer, must be identical. Otherwise, the drive mode will be modified by SMARTCARD.

J3.2 - Automatic loading

Previously, the saving of parameters in SMARTCARD must be effected by the procedure described at section J2.3 (0.30 = boot (4)).
- Insert the card.
- All SMARTCARD parameters are automatically transferred to the drive. During the transfer, the display indicates " boot ".
- Remove the SMARTCARD

CAUTION :
When powering up, The operating mode - Open loop ( ), the vector mode - Closed loop ( ) or Servo ( ) of the drive and that contained in the SMARTCARD during the transfer, must be identical. Otherwise, the drive sets to " C.typ " and the drive mode is not modified.

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Notes

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K1 - Introduction

UNIDRIVE SP supplies information facilitating the diagnostics.
This information may be of divided into three categories :
- operation,
- operating alarms,
- fault tripping.

Besides, the fault type may be recovered by serial link as a code.

• The user must neither repair the drive by itself nor give a diagnostic other than those listed in this chapter. In case of drive breakdown, it will be returned to LEROY-SOMER by your usual interlocutor.

K2 - Indications concerning the operation

The lower display of Unidrive SP is used to display the drive status when stopped or during its operation.

	Comment	Output status
ACt	The drive is in regenerative mode, and it is synchronised with the mains supply	
ACUU	Loss of mains supply: the drive tends to maintain the voltage on the DC bus, by decelerating the motor	Active
Auto/tunE	Ongoing auto-tuning phase	
boot	Automatic transfer of SMARTCARD parameters to the drive (after powering up)	-
cArd	Automatic transfer of the drive parameters to SMARTCARD (After powering up)	-
dc	Braking phase by direct current injection	Active
dEC	Deceleration after a stop command	Active

	Comment	Output status
inh	- The drive is disabled, and can not start the motor - Free wheel stop	Inactive
loAding	The drive transfers information to an option module	-
POS	The drive places the motor shaft	Active
rdY	- The drive is enabled, and is waiting for a command - the motor is ready to turn	Inactive
run	The motor is controlled by the drive	Active
SCAn	In open loop ( ), motor quick resumption on micro-cut	Active
StoP	The drive maintains the motor torque at zero speed	Active
triP	The drive is stopped and it does not control any longer the motor. The fault code is displayed on the lower display	Inactive

K3 - Operating alarms

Alarms may occur during the drive operation.
These alarms are for prevention purposes only, to alert the user : the drive continues to operate but it may stop if no corective action is taken.

	Comment
br.rs	Overheat, the braking resistor (the braking thermal reserve reached 75% of the value at which the drive stops)
OVLd	Overheat, the motor I^2t (the motor thermal reverse reached 75% of the value at which the drive stops)
hot	Overheat, the heater or the control card

K4 - Fault tripping

If the drive stops, the output bridge of the drive is inactive, and the drive no longer controls the motor.



If a LED display is used, the upper display indicates "triP" and the lower display indicates the fault type.
All the faults indicated by the display are listed in the table below in alphabetical order.



If the drive has no display, a LED indicates the drive status.
If it is stable, the operation is normal, and if it flashes, the drive is faulty. The type of fault may be determined by consulting the value of parameter **10.20** by serial link. The value of **10.20** indicates then a fault code (1to 230), and the correspondence of each code may be found in the table of section K4.3.

After having consulted the fault table, follow the procedure below :
- make the necessary check-up in order to eliminate the cause of the fault,
- check that the drive is disabled (terminal 31 open),
- press : if the drives is no longer stopped, the display indicates " inh ".

• The opening, then the closing of the enabling terminal may cancel the fault. If during the fault cancellation, the Fwd Run or Rev Run terminal is closed, the motor will immediately start.

Note : In the table, the faults related to UNIDRIVE SP options contain the letter X, representing the location of the module having detected the fault.

K4.1 - Fault table

Mnemonic Display	Reason for fault	Solution
ACUU.P (101)	Detection of mains supply loss of a power module	• Check the mains supply
C.Acc (185)	Problem of communication with SMARTCARD	• Insert SMARTCARD • Check that SMARTCARD is correctly inserted • The fault cancellation is possible only after one second
C.Chg (179)	The unit selected in SMARTCARD contains already parameters	• Delete the unit parameters before making again the transfer to SMARTCARD • Select another unit not used in SMARTCARD • The fault cancellation is possible only after one second
C.Cpr (188)	The drive parameters are not identical to the parameters of the unit selected in SMARTCARD	• To cancel the fault, press the Reset key. • The fault cancellation is possible only after one second
C.dat (183)	The unit selected in SMARTCARD does not contain any parameter	• Check the unit number • The fault cancellation is possible only after one second
C.Err (182)	SMARTCARD : incorrect data	• Insert SMARTCARD • Check that SMARTCARD is correctly inserted • Delete the parameters and proceed again with the transfer • The fault cancellation is possible only after one second
C.Full (184)	SMARTCARD is full	• Delete a unit before proceeding again with the transfer • Insert another SMARTCARD • The fault cancellation is possible only after one second
CL2 (28)	Current reference loss on the analogue input 2, terminal 7 (**0.19** = 4-20 or 20-4)	• Check that the current reference is > 3mA • If **10.37** = 1 or 3, the motor stops before the stop of the drive
CL3 (29)	Current reference loss on the analogue input 3, terminal 8 (**0.21** = 4-20 or 20-4)	
CL.bit (35)	Stop by the control word **6.42**	• Unvalidate the control word (**6.43** = 0) • Check the sttings of **6.42**
C.Optn (180)	The drive module(s) is (are) different from that (those) of SMARTCARD	• Check the location and the type of the module(s) mounted on the drive, There should be no difference from the configuration stored in SMARTCARD •Check that the options are correctly inserted in the drive • Press the Reset key • The fault cancellation is possible only after one second
C.rdo (181)	The storage in SMARTCARD is disabled	• Set **XX.00** = 9777 + Reset to store a set of parameters in SMARTCARD • Check that the selected unit is not a protected unit (units n°500 to 999) • The fault cancellation is possible only after one second
C.rtg (186)	The drive rating does not correspond to that stored in SMARTCARD	• Press the Reset key • SMARTCARD transferred all parameters excepting those related to the drive rating which resume their factory setings :

Parameters	Function
2.08	DC bus voltage threshold
4.05 to **4.07** **21.27** to **21.29**	Current limitation
5.07 and **21.07**	Motor rated current
5.09 and **21.09**	Motor rated voltage
5.17 and **21.12**	Stator resistor
5.18	Cutout frequency
5.23 and **21.13**	Voltage offset
5.24 and **21.14**	Transient inductance
5.25 and **21.24**	Stator inductance
6.06	Level of braking by DC injection

• The fault cancellation is possible only after one second

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Mnemonic Display	Reason for fault	Solution
C.Typ (187)	The unit selected in SMARTCARD is not compatible with the drive	• Press the Reset key • Check that the drive type is identical to that contained in the SMARTCARD unit • The fault cancellation is possible only after one second
dESt (199)	Conflict : 2 parameters or more have the same destination parmeter	• Set **XX.00** = 12001 : the drive displays all the destination parameters, this allowing the detection of the parameter-setting related error • The fault cancellation is possible only after one second
EEF (31)	EEPROM fault	• The operating mode becomes the open loop mode, and if a display is connected to the serial link, this will be automatically unvalidated • Proceed to a return to factory settings and store the parameters (**XX.00** = 1000 + Reset), then cut the power supply and power up again • No fault cancellation without a procedure of return to factory settings
Enc1 (189)	Encoder power supply overload	• Check that the encoder power supply current is lower than the maximum admissible current (200mA at 15V or 300mA at 8V and 5V) • The fault cancellation is possible only after one second
Enc2 (190)	Encoder connection interruption	• Check the connections and the encoder voltage • Replace the encoder • The fault cancellation is possible only after one second • The detection of the encoder cable breaking is not necessary on the drive encoder, set **3.40** = 0 to unvalidate the fault Enc2 (ex : feedback of the encoder connected to a SM-Resolver module)
Enc3 (191)	Encoder : Incorrect UVW phase offset during the operation	• Check that the encoder signals are not interfered • Perform again the offset measurement procedure • Check the encoder mechanical mounting • The fault cancellation is possible only after one second
Enc4 (192)	Supply-related problem with the encoder	• Check the transmission speed and the power supply • Check that the encoder signals are not interfered with • Replace the encoder • The fault cancellation is possible only after one second
Enc5 (193)	Encoder : control amount or CRC error	• Check that the encoder signals are not interfered with • With the EnDat encoders, check the link resolution and/or proceed to the automatic configuration **3.41** • The fault cancellation is possible only after one second
Enc6 (194)	Encoder error	• For a SSI encoder, check the power supply settings as well as the cabling • Replace the encoder • The fault cancellation is possible only after one second
Enc7 (195)	Encoder initialisation problem	• Press Reset • Check that the encoder type, its cabling and the power supply are correctly set in **3.38** and **3.36** • Proceed to the automatic configuration by **3.41** • Replace the encoder • The fault cancellation is possible only after one second
Enc8 (196)	There was no automatic configuration when powering up	• Check the resolution of the serial link • Set **3.41** to 0, and enter manually the number of encoder turns **3.33** and the number of increments by turn **3.34** • The fault cancellation is possible only after one second
Enc9 (197)	The information related to the module return to position is not accessible from the selected location	• Check the settings of **3.26** (or of **21.21** if a second motor is used) • The fault cancellation is possible only after one second
Enc10 (198)	The encoder phase angle (**3.25** or **21.20**) is incorrect	• Check the encoder connection • Proceed to an auto-tuning or enter manually the value of the encoder phasing out in **3.25** or **21.20** • In case of untimely Enc10 faults releted to certain applications, the fault may be unvalidated by setting a value higher than 0 in **3.08** (pay attention, a too high value may unvalidate the detection of an encoder fault).

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Mnemonic Display	Reason for fault	Solution
Enc11 (161)	Fault generated in case of incoherence between the sinus/ cosinus signals and the position permanently measured by the serial link. This fault is generally due to an interference of the sinus-cosinus paths	• Check the shielding of the encoder cable • Check that the sinus and cosinus signals are not interfered
Enc12 (162)	Hiperface encoder-related problem: the encoder may not be identified by the auto-configuration procedure	• Check that the encoder type may be recognised by the auto-configuration procedure • Check the encoder cable • Enter manually the encoder characteristics
Enc13 (163)	EndAt encoder-related problem: the number of encoder turns read during the auto-configuration phase does not correspond to a power of 2	• Select another type of encoder
Enc14 (164)	EndAt encoder-related problem: during the auto-configuration, the number of bits which define the encoder position in a turn is too high	• Select another type of encoder •The encoder is damaged
Enc15 (165)	Encoder-related problem : the number of periods by turn calculated during the auto-configuration phase is either lower than 2 or higher than 50 000	• The number of points by turn or the non polarity of a linear motor is incorrect, by instance **5.36** = 0 or **21.31** = 0 • The encoder is damaged
Enc16 (166)	EndAt encoder-related problem: the number of serial link bits by period for a linear motor is higher than 255	• Select another type of encoder • The encoder is damaged
Enc17 (167)	Revolving sincos encoder-related problem : the periods by turn obtained during the auto-configuration phase do not correspond to 2	• Select another type of encoder • The encoder is damaged
EnP.Er (176)	Data error in the encoder electronic plate	• Remplacer le codeur • The fault cancellation is possible only after one second
Et (6)	External fault on the input of terminal 31	• Check that terminal 31 is connected to 24V (in positive logic) • Check **10.32.** Enter 12001 in **0.00**, and check the parameter which controls the value of **10.32** • Check that **10.32** or **10.38** (=6) are not controlled by the serial link • The fault cancellation is possible only after one second
HF01toHF19 and HF20toHF30	Internal error	• Power down, then power up • Contact your usual LEROY-SOMER agent if the faults persist • The Reset key can not cancel these faults
It.AC (20)	Moter overload I^2t	• Read the value in **4.19** • Check that the motor is not overloaded • Adjust the rated speed (▣) • Check that motor rated current is correctly set (**0.46)** • Speed feedback: check the connection, and check that the signal is not interfered • Check the parameter - **0.42** motor pole number • The fault cancellation is possible only after one second

Mnemonic Display	Reason for fault	Solution
It.br (19)	Overload of the braking resistor	• Read the value in **10.39** • Increase the ohmic value of the resistor • Check that **10.30** and **10.31** are correctly set (too important braking cycles). For parameter-setting see the manual available on CDRom (ref. 3655) • Check the cabling and the resistor • Check the built-in transistor • The fault cancellation is possible only after one second
O.CtL (23)	Overheating of the control card	• Check that the fans turn, the cooling openings are not obstructed, the ambient temperature does not exceed 50°C, and the space around the drive is sufficient • Decrease the cutout frequency **0.41** • The fault cancellation is possible only after one second
O.ht1 (21)	Thermal simulation of the power components depending on I^2t	• Decrease the motor load, the cycle, the cutout frequency and the acceleration and deceleration ramps • Check the motor I_N • The fault cancellation is possible only after one second
O.ht2 (22)	Heater overheating	• Check that the fans turn, the cooling openings are not obstructed, the ambient temperature does not exceed 50°C, and the space around the drive is sufficient • Decrease the motor load, the cycle, the cutout frequency and the acceleration and deceleration ramps • Increse the ventilation flow • The fault cancellation is possible only after one second
O.ht2.P (105)	Overheating of a power module heater	•Check that the fans turn, the cooling openings are not obstructed, the ambient temperature does not exceed 50°C, and the space around the drive is sufficient • Decrease the motor load, the cycle, the cutout frequency and the acceleration and deceleration ramps • Increse the ventilation flow • The fault cancellation is possible only after one second
O.ht3 (27)	Thermal simulation of the drive	• Check that the fans turn, the cooling openings are not obstructed • Increse the ventilation flow • Decrease the motor load, the cycle, and the acceleration and deceleration ramps • The fault cancellation is possible only after one second
O.ht4.P (102)	Overheating of a power module rectifier	•Check that the fans turn, the cooling openings are not obstructed, the ambient temperature does not exceed 50°C, and the space around the drive is sufficient • Decrease the motor load, the cycle, the cutout frequency and the acceleration and deceleration ramps • Increse the ventilation flow • The fault cancellation is possible only after one second • Check that there is no phase imbalance
OI.AC (3)	• Drive output overcurrent (output current peak > 225 %) • Too high boost during the auto-tuning phase	• Check the motor coupling and isolation • Increase the acceleration and deceleration ramps • Check the cabling, the coupling and the signal (interference) of the speed feedback • Check that the motor cable is not too long • Decrease the speed loop gains (**0.07, 0.08** and **0.09**) and • If not already done, proceed with an auto-tuning **0.40** = 2 • Decrease the current loop gains (**0.38** and **0.39**) and • The fault cancellation is possible only after 10 seconds

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Mnemonic Display	Reason for fault	Solution
OI.AC.P (104)	Overcurrent detected by a power module	• Increase the acceleration and deceleration ramps • If this occurs during an auto-tuning, decrease the value of Boost in **5.15** • Check that there is no short-circuit at the drive output • Check the motor insulation • Check the cabling, the coupling and the signals (interference) of the speed feedback • Check that the motor cable is not too long • Decrease the speed loop gains **0.07**, **0.08** and **0.09** (and) • If not already done, proceed with an auto-tuning **0.40** =2 . • Decrease the current loop gains **0.38** and **0.39** (and) • The fault cancellation is possible only after 10 seconds
OI.br (4)	Overcurrent of the braking resistor	• Check the resistor isolation • Eliminate the resistor output short-circuit • Set a higher resistor ohmic value • The fault cancellation is possible only after 10 seconds
OIbr.P (103)	Overcurrent of the braking resistor detected by a power module	• Check the cabling and the isolation of the braking resistor • Check that the braking resistor value is higher than the minimum ohmic value of the drive
OIdc.P (109)	Overcurrent detected by a power module	• IGBT Vce protection detected • Check the motor and cable isolation
O.Ld1 (26)	Power supply +24V or digital outputs overload	• Check the total current consumed by +24V (terminal 22) and the digital outputs of terminals 24 to 26 or of SM module terminals (it must be < 200mA) • If **10.37** = 1 or 3, the motor stops before the drive stopping
O.SPd (7)	Overspeed	• The speed is higher than 1,2 time the value of **0.02** ( ) • Check that the load is not driving • Check the adequate adjustment of the overspeed threshold in **3.08** (and) • Adjustment of the speed loop gains (and) • Set a higher deceleration time in **0.04** • The fault cancellation is possible only after one second
0V (2)	Continuous bus overvoltage : • TL : > 405Vcc perm., 415V peak • T : > 810Vcc perm., 830V peak • TM : > 960Vcc perm., 990V peak • TH : > 1160Vcc perm., 1190V peak	• Provide a braking resistor (option). If a resistor is already connected decrease its value (according to the authorised limit). • Check that the mains supply is not interfered (overvoltages) with • Check the motor isolation • Set a higher deceleration time in **0.04** • Check the deceleration mode in **0.15** • The fault cancellation is possible only after one second
0V.P (106)	Overvoltage of a power module	• Provide a braking resistor (option). If a resistor is already connected decrease its value (according to the authorised limit). • Check that the mains supply is not interfered (overvoltages) • Check the motor isolation • Set a higher deceleration time in **0.04** • Check the deceleration mode in **0.15** • The fault cancellation is possible only after one second
PAd (34)	The drive is waiting for a reference from the keyboard and this one hes been removed	• Put the keyboard back and press Reset • Select another speed reference • The fault cancellation is possible only after one second
Ph (32)	• Loss of a power supply phase • Significant phase imbalance	• Check the mains supply (3 existing and balanced phases) • Check the mains supply level (with full load) **Note :** • The loss of a phase may be detected only if the active current is between 50 % and 100 % of the rated value. • The drive tends to stop the motor before the fault tripping " Ph ". • The fault cancellation is possible only after one second
Ph.P (107)	• Loss of a phase of a power module	• Check the mains supply (3 existing and balanced phases) • Check the mains supply level (with full load)

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Mnemonic Display	Reason for fault	Solution
PS (5)	Internal power supply fault	• In case of presence of application modules, remove them and press Reset • Check the status of the tape connecting the power card to the control card (sizes 4, 5, 6) • "Hard" fault: consult LEROY-SOMER • The fault cancellation is possible only after one second
PS.10V (8)	Overcurrent on the internal analogue source +10V (>10mA)	• Check the cabling and the load of terminal 4 •The fault cancellation is possible only after one second
PS.24V (9)	Power supply overload +24V	• In case of presence of application modules, remove them and press Reset • Validate the internal adaptation impedances in **3.24** and/or **16.09** • Reduce the output load (check the consumption of the encoders and of the digital outputs) • An external power supply of 24V (> 50W) • The fault cancellation is possible only after one second
PS.P (108)	Power supply fault of a power module	• In case of presence of application modules, remove them and press Reset • Check the status of the tape connecting the power card to the control card (sizes 4, 5, 6) • "Hard" fault: consult LEROY-SOMER • The fault cancellation is possible only after one second
rS (33)	Fault during the measurement of the stator resistor when performing the auto-tuning or when **5.14** = 0 or 3	• Adapt the drive power to the motor power • Check the motor cable connection • The fault cancellation is possible only after one second
SCL (30)	Communication loss by serial link	• Replace the keyboard or the cable • Check the connectors between the keyboard and the drive • Check that the cable is not damaged • If **10.37** = 1 or 3, the motor stops before the drive stopping
SL.rtd	The drive operating mode changed and the module data do not correspond any longer	• Press the Reset key • If the fault persists, consult LEROY-SOMER • The fault cancellation is possible only after one second
t010	Reserved	
t036 to t038	Reserved	
t040 to t089	Reserved	
t099	Reserved	
t111 to t129	Reserved	
t130	Speed error > threshold adjusted in **19.26** percentage of Vmax in Torque > threshold adjusted in **18.14** in	• Check the motor load level as well as the brake command setting • Fault unvalidation : see parameter **0.58** (= **20.40**)
t131	Direction of rotation in	• Check the motor load level as well as the brake command setting • Fault unvalidation : see parameter **0.58** (= **20.40**)
t132	Phase absence	• Check the motor connection • Fault unvalidation : see parameter **0.58** (= **20.40**)
t133	Brake feedback	• Check the brake or relay adequate operation • Fault unvalidation : see parameter **0.58** (= **20.40**)
t134	Transmission interruption "only in case of presence of SM-ENCODER Plus or SM-UNIVERSAL ENCODER Plus"	• Check the adequate operation and the slow shaft encoder cabling • Fault unvalidation : see parameter **0.58** (= **20.40**)
t135andt160	Reserved	
t168 to t175	Reserved	
t216andt217	Reserved	

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Mnemonic Display	Reason for fault	Solution
th (24)	Motor thermal probe start	• Check the motor load • Decrease the overload value • Check the motor ventilation and the ambient temperature • Check the probe cabling (pin 15 of HD-15 connector or terminal 8 of control terminal block) • The fault cancellation is possible only after one second
thS (25)	Short-circuit motor thermal probe	• Check the ohmic value of the kotor probe • The fault cancellation is possible only after one second
tunE (18)	Auto-tuning stop before the end of procedure	• Drive stop during the auto-tuning phase • The Stop key has been pressed • Terminal 31 was opened during the auto-tuning phase •The fault cancellation is possible only after one second
tunE1 (11)	• The position information has not changed during the auto-tuning • Problem during the inertia measure. procedure (see **5.12**)	• Check the encoder cabling • Check that the motor rotation is normal • The fault cancellation is possible only after one second
tunE2 (12)	Incorrect direction of rotation during the auto-tuning	• For the closed loop, reverse 2 motor phases or 2 encoder paths • The fault cancellation is possible only after one second
tunE3 (13)	Incorrect connection of the commutation paths of the encoder detected during the auto-tuning (see **5.12**)	• Check the motor cabling and the encoder commutation paths • The fault cancellation is possible only after one second
tunE4 (14)	Encoder : U commutation signal failure during the auto-tuning (see **5.12**)	• Check the encoder connection (encoder U path) • Replace the encoder • The fault cancellation is possible only after one second
tunE5 (15)	Encoder : V commutation signal failure during the auto-tuning (see **5.12**)	• Check the encoder connection (encoder V path) • Replace the encoder • The fault cancellation is possible only after one second
tunE6 (16)	Encoder : W commutation signal failure during the auto-tuning (see **5.12**)	• Check the encoder connection (encoder W path) • Replace the encoder • The fault cancellation is possible only after one second
tunE7 (17)	Incorrect setting of motor poles	• Check the number of increments by encoder turn • Check the settings of **5.11** number of poles • The fault cancellation is possible only after one second
Unid.P (110)	Unknown fault of a power module	• Check all the cabling between the power modules • Check that the cables are directed towards area without interferences
UP.ACC (98)	Impossible to access the "Syptlite" program	• The drive must be enabled • A task is already ongoing, try again when the task is ended • The fault cancellation is possible only after one second
UP.diVO (90)	The program tries to divide by 0 (Syptlite program)	• Check the program • The fault cancellation is possible only after one second
UP.Ofl (95)	The program variables and the function units used use a RAM memory higher than the memory allowed.	• Check the program • The fault cancellation is possible only after one second
UP.ovr (94)	The program tries to write a value outside the parameter range (Syptlite program)	• Check the program • The fault cancellation is possible only after one second
UP.PAr (91)	The program looks for an non-existent parameter (Syptlite program)	• Check the program • The fault cancellation is possible only after one second
UP.ro (92)	The program tries to write in a LS parameter (reading only) (Syptlite program)	• Check the program • The fault cancellation is possible only after one second
UP.so (93)	The program tries to read a writing parameter (Syptlite program)	• Check the program • The fault cancellation is possible only after one second
UP.udf (97)	Fault not defined in the program (Syptlite program)	• Check the program • The fault cancellation is possible only after one second

Mnemonic Display	Reason for fault	Solution
UP.uSEr (96)	The program is waiting for a fault (Syptlite program)	• Check the program • The fault cancellation is possible only after one second
UU (1)	Continuous bus powered up : TL: <175Vcc T : <350Vcc TM: <435Vcc	• Check the mains supply (mains supply powering up) • Fault disappearance when the mains voltage increases in relation to the threshold

K4.2 - Faults related to an option module

K4.2.1 - Fault table

In the table, the faults contain the letter X which represents the location of the module responsible of the fault.

Mnemonic Display	Reason for fault	Solution
SLX.df (204, 209, 214)	The option inserted in location X changed	• Store and press Reset • The fault cancellation is possible only after one second
SLX.Er (202, 207, 212)	The option inserted in location X detected a fault	• Read the value of parameters **15.50, 16.50** or **17.50.** Then see the table section K4.2.2 that lists the faults for the speed feedback, Application or Input/Output modules • In case of use of an application (positioning, synchronisation...), check the type of data exchanged in **1x.34** (set **1x.34** to 1) • The fault cancellation is possible only after one second
SLX.HF (200, 205, 210)	Hardware fault of the module inserted in location X	•Check that the module is correctly inserted • Replace the module (contact your usual LEROY-SOMER interlocutor) • The Reset key may not cancel these faults
SLX.nF (203, 208, 213)	The module has been removed	•Check that the module is correctly inserted • Save the partameters and press the Reset key • The fault cancellation is possible only after one second
SLX.tO (201, 206, 211)	Module wizard time exceeded	• Press the Reset key • If the fault persists, consult LEROY-SOMER • The fault cancellation is possible only after one second

K4.2.2 - Error codes related to " SLX.Er " fault

• Erroir codes for a speed feedback module :

Value	Problem	Solution
0	No fault	-
1	Encoder power supply overload	See Enc1 fault
2	Encoder connection interruption	See Enc2 fault For a SM-Universal Encoder Plus module, this fault may be unvalidated by **1x.17** = 0 (ex. when the module is used only to give the image of the main encoder)
3	Encoder : Incorrect U, V, W phase offset during the operation	See Enc3 fault
4	Encoder link-related problem	See Enc4 fault
5	Encoder : control sum or CRC error	See Enc5 fault
6	Encoder error	Replace the encoder
7	Encoder initialisation problem	•Check the type of encoder set in **15.15**, **16.15** or **17.15** •Check the encoder power supply and cabling •Replace the encoder
8	The automatic configuration when powering up could not be done	Modify the settings of **15.18**, **16.18** or **17.18** and enter manually the number of encoder turns in **15.09, 16.09** or **17.09** and the number of increments by turn in **15.10**, **16.10** or **17.10**
9	-	Motor probe fault
10	-	Motor probe short-circuit
11	Resolver : the number of poles does not correspond to the motor	Check the settings of the number of poles in **15.15**, **16.15** or **17.15**
74	The module heated too much	

• Error code for an application module :

Value	Problem
39	User level exceeded
40	Unknown error
41	Non-existent parameter
42	Reading only parameter
43	Writing parameter
44	Parameter value outside the range
45	Invalid synchronisation modes
46	Not used
47	Synchronisation lost with the master
48	RS485 is not in the user mode
49	Invalid RS485 configuration
50	Mathematical error
51	Pointer outside the limits
52	User control word fault
53	DPL program incompatible with the target
54	Microprocessor overload / exceeded task
55	Invalid encoder configuration
56	Invalid time unit configuration
57	Function unit not processed by the system
58	Non volatile flash memory damaged
59	Impossible to consider the Application module as a synchronisation reference
60	Hardware CTNet error
61	Invalid CTNet configuration
62	The CTNet transmission speed does not correspond to the mains supply
63	The already used CTNet ID node
64	Digital output overload
65	Invalid function unit parameters
66	The user demand is too important
67	Non existent file
68	Not asociated file
69	Problem related to the access to the Flash version during the loading
70	User program transfer whenthe drive is enabled
71	The modification of the drive mode failed
72	Invalid CTNet register operation
73	Failure of quick initialisation of the parameter
74	Module overheating

• Error code for an Input/Output module :

Value	Problem
0	**No error**
1	Digital output short-circuit
74	Module oveheating

• Error code for a field bus module :

Value	Bus type	Problem
52	**All excepting DPLCAN**	**User control word fault**
61	All	Invalid configuration parameters
65	All excepting DPLCAN	Field bus mains supply loss
66	Devicenet, CANopen and DPLCAN	The "Bus-Off" node detects too many transmission errors
67	CANopen	A node has not received the "SYNC" telegram during the allocated time
68	CANopen	No reception of surveillance message of the mains supply nodes during the specified time
69	DPLCAN	A node sends a frame and no other node detencts the reception of this frame
70	All	No valid field bus menu is available in the module for the transfer to the drive; The user may not store the data or the storing may not be correctly performed
71	DeviceNet	Enternal power supply loss when the mosule communicates with the master.
74	All	Module overheating
80	Profibus	The communication time is exceeded. The cause of the fault is unknown.
98	All	The basic task of the module is not finished
99	All	Software fault

K4.3 - Fault codes by serial link

A fault may be read by serial link, by means of a parameter **10.20** which indicates a code.
The table below gives the correspondance of these codes with the faults detected by the drive or by the options.

N°	Fault
1	UU
2	OU
3	OI.AC
4	OI.br
5	PS
6	Et
7	O.SPd
8	PS.10V
9	PS.24V
10	t010
11	tunE1
12	tunE2
13	tunE3
14	tunE4
15	tunE5
16	tunE6
17	tunE7
18	tunE
19	It.br
20	It.AC
21	O.ht1
22	O.ht2
23	O.CtL
24	th
25	thS
26	O.Ld1
27	O.ht3
28	CL2
29	CL3
30	SCL
31	EEF
32	ph
33	RS
34	Pad
35	CL.bit

N°	Fault
36 to 38	t036 to t038
39	L.SYNC
40 to 89	t040 to t089
90	UP.diVO
91	UP.PAr
92	UP.ro
93	UP.so
94	UP.Ovr
95	UP.OFL
96	UP.USEr
97	UP.udf
98	UP.ACC
99	t099
100	-
101	ACUU.P
102	Oht4.P
103	OIbr.P
104	OIAC.P
105	Oht2.P
106	OV.P
107	Ph.P
108	PS.P
109	OIdc.P
110	Unid.P
111 to 160	t111 to t160
161	Enc11
162	Enc12
163	Enc13
164	Enc14
165	Enc15
166	Enc16
167	Enc17
168 to 175	t168 to t175
176	EnP.Er
177 and 178	t177 and t178
179	C.Chg
180	C.Optn
181	C.rdO

N°	Fault
182	C.Err
183	C.dat
184	C.FUII
185	C.Acc
186	C.rtg
187	C.Typ
188	C.cpr
189	Enc1
190	Enc2
191	Enc3
192	Enc4
193	Enc5
194	Enc6
195	Enc7
196	Enc8
197	Enc9
198	Enc10
199	dESt
200	SL1.HF
201	SL1.tO
202	SL1.Er
203	SL1.nF
204	SL1.dF
205	SL2.HF
206	SL2.tO
207	SL2.Er
208	SL2.nF
209	SL2.dF
210	SL3.HF
211	SL3.tO
212	SL3.Er
213	SL3.nF
214	SL3.dF
215	SL.rtd
216 and 217	t216 and t217
220 to 232	HF20 to HF32

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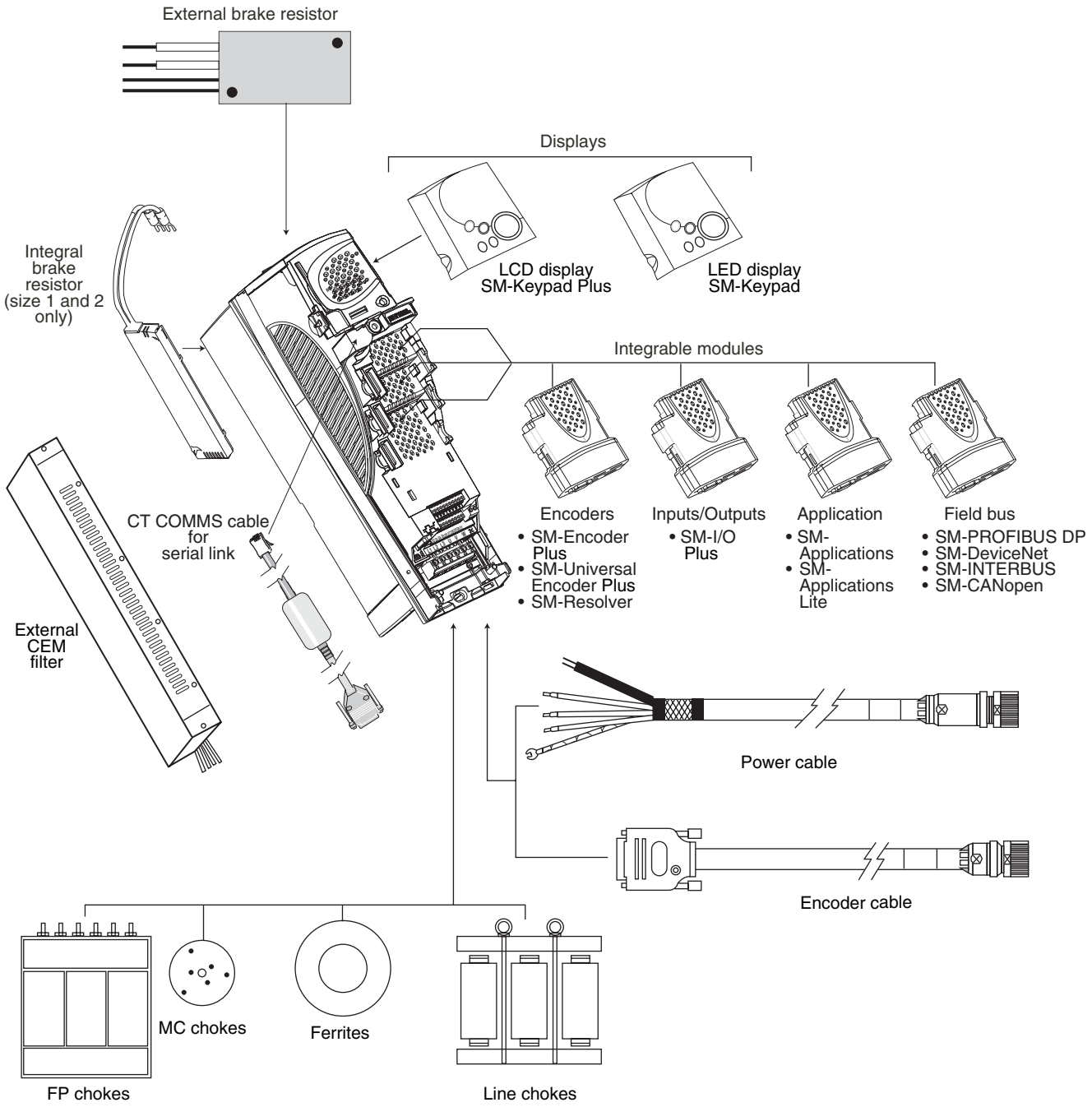
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L1 - Introduction

• UNIDRIVE SP and its options



L2 - SM modules

L2.1 - General information

• Sizes

The SM modules may be integrated into any UNIDRIVE SP range, without any tool and without modifying the general sizes.
3 locations are provided for the module installation: locations 1, 2 and 3.

• Settings

For setting the parameters of the module-related functions:
- location 1 corresponds to menu 15,
- location2 corresponds to menu 16,
- location 3 corresponds to menu 17.

• Check the status of the SM module : a damaged module must not be installed into the drive.

• Before installing a SM module, power down the drive (including the power supply +48V and +24V), and wait for 10 minutes. Otherwise, the module may be damaged.

The diagrams of SM options may be consulted at section H6.20.

L2.2 - Summary of SM modules

Type	Colour	Designation	Details
Additional inputs/outputs	Yellow	SM-I/O Plus	Additional input/output module : • 3 digital inputs • 3 digital inputs or outputs • 2 voltage analogue inputs • 1 voltage analogue output • 2 relays
Field bus	Violet	SM-PROFIBUS DP	Option for communication in Profibus DP.
	Normal grey	SM-DeviceNet	Option for communication in Devicenet.
	Dark grey	SM-INTERBUS	Option for communication in Interbus.
	Light grey	SM-CANopen	Option for communication in CANOpen.
	Beige	SM-Ethernet	Option for communication in Ethernet
Speed feedback	Light green	SM-Universal-Encoder Plus	Speed feedback module which may manage the encoder signals : • Incremental • SinCos • SSI • EnDat It is used to simulate SSI or incremental encoder, and integrates a quick input.
	Brown	SM-Encoder Plus	Speed feedback module to manage the incremental encoder signals.
	Light blue	SM-Resolver	Resolver feedback module. It is used to simulate an incremental encoder (A/B).
Applications	Drak green	SM-Applications	Module with a 2nd micro-processor for the conception and the execution of applicative programs, with communication by CTNet.
	White	SM-Applications Lite	Module with a 2nd micro-processor for the conception and the execution of applicative programs, without communication by CTNet.

L2.3 - Module SM-I/O Plus

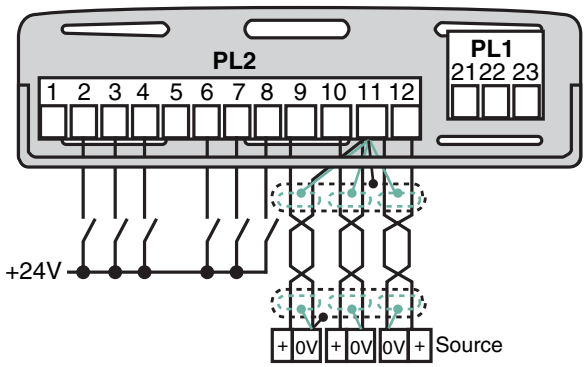
L2.3.1 - General information

SM-I/O Plus module is used to increase the number of inputs and outputs of the drive. This option is totally configurable.

Additional functions :
- 3 digital inputs,
- 3 digital inputs or outputs,
- 2 voltage analogue inputs,
- 1 voltage analogue output,
- 2 assigning relays.

PL1 (terminals 21 to 23) and PL2 (terminals 1 to 12) terminal blocks may be released.

L2.3.2 - Connection



L2.3.3 - Characteristics

• **PL2** terminal block

1	Common 0V (logic)
2	Digital input or output (F1)
3	Digital input or output (F2)
4	Digital input or output (F3)
5	Common 0V (logic)
6	Digital input (F4)
7	Digital input (F5)
8	Digital input (F6)
Command logic	Positive, according to CEI61131 standard (for digital inputs only : negative logic accessible by settings of **1x.29**)
Insulation	Not isolated from the control electronics
Input	
Absolute max. voltage	± 30V
Load	> 2mA at +15Vdc
Thresholds	10V ± 0.8V
Output	
Max. current	250 mA

9	Analogue input 4
10	Analogue input 5
11	Common 0V (analogue)
Characteristics	Bipolar analogue voltage
Full scale rated voltage	± 9.8 V
Absolute max. voltage	± 36 V in relation to 0V
Input impedance	>20 kΩ
Resolution	10 bits plus sign
Isolation	Not isolated from the control electronics

12	Analogue output 3
Characteristics	Bipolar analogue voltage
Full scale rated voltage	± 10 V
Max. current	± 20 mA protected against short-circuits
Load resistor	1 kΩ at ∞
Resolution	10 bits plus sign
Isolation	Not isolated from the control electronics

Note : If the total consumption exceeds 240mA at 24V, it is then necessary to use an external power supply of +24V, available on terminals 1 and 2 of the drive control terminal block.

• **PL1** terminal block

21	Relay 1 (F7)
22	Relay - common
23	Relays 2 (F8)
Contact voltage	240 Vca
Maximum contact current	2 Aac 240V/4Adc 30V resistive load
Minimum level of contact recommended	12V, 100 mA
Configuration	Normally open contact

• **Sampling**

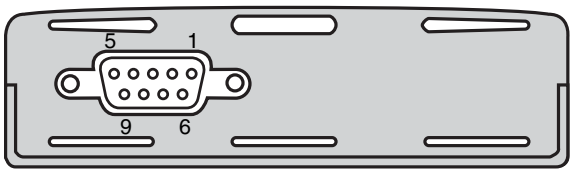
Sampling interval for inputs, outputs ans relays (parameter update) :
8 ms for 1 SM-I/O Plus option,
16 ms for 2 SM-I/O Plus options,
24 ms for 3 SM-I/O Plus options.

L2.4 - SM-PROFIBUS DP module

L2.4.1 - General information

SM-PROFIBUS DP is used to communicate with a PROFIBUS DP mains supply.
It integrates a 16-bit micro-processor, and its transmission speed may reach 12 Mbit/s.
Unidrive SP feeds internally the module.

L2.4.2 - Connection



Pins SUB-D	Fonctions	Description
1	Shielding	Connection for the cable shielding
3	RxD/TxD-P	Positive data line (B)
4	CNTR-P	RTS line
5	0V ISO	Isolated 0V, used only for the end resistors
6	+5V ISO	isolated 5V power supply, used only for the end resistors
8	RxD/TxD-N	Negative data line (A)

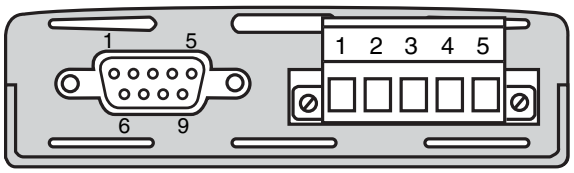
It is strongly recommended to use Profibus certified connectors.
These connectors accept 2 Profibus cables and they have a 4 screw-terminal block, one for each data connection. They have also a shielding connection support, this providing the shielding continuity for an adequate immunity to Profibus mains supply interference.

L2.5 - SM-DeviceNet module

L2.5.1 - General information

The SM-DeviceNet module is used to communicate with the DeviceNet mains supply.
It integrates a 16-bit micro-processor, and its transmission speed may reach 500 Kbit/s.
The module must be fed by the DeviceNet mains supply. Due to the drive safety power supply (terminal 2, see section E2.2), the drive and its module electronics is maintained, this allowing the DeviceNetmains supply to continue communicate with the drive despite the mains supply loss.

L2.5.2 - Connection



Bornier 5 bornes	SUB-D 9 broches	Fonctions	Description
1	6	0V	0V of the external power supply
2	2	CAN-L	Negative data line
3	3.5	Shielding	Cable shielding connection
4	7	CAN-H	Positive data line
5	9	+24V	External power supply

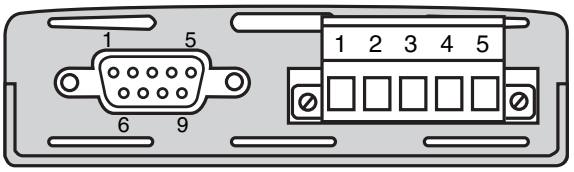
CAUTION :
It is recommended to use screw terminal block instead of the SUB-D connector for the connection to the Devicenet mains supply, because the SUB-D connectors are not recognised for DeviceNet conformity.

L2.6 - SM-CANopen module

L2.6.1 - General information

The SM-CANopen module is used to communicate with a CANopen mains supply. It integrates a 16-bit micro-processor and its transmission speed may reach 1 Mbit/s.
Unidrive SP feeds the module internally. Due to the drive safety power supply (terminal 2, see section E2.2), the drive and its module electronics is maintained, this allowing the CANopen mains supply to continue communicate with the drive despite the mains supply loss.

L2.6.2 - Connection



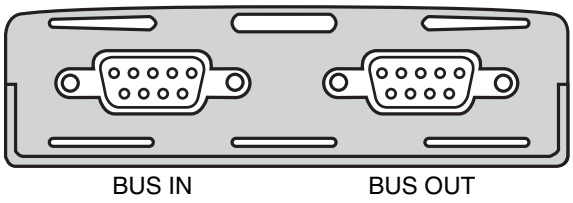
Terminal block 5 terminals	SUB-D 9 pins	Functions	Description
1	6	0V	0V of the external power supply
2	2	CAN-L	Negative data line
3	3.5	Shielding	Cable shielding connection
4	7	CAN-H	Positive data line
5	9	+24V	External power supply

L2.7 - SM-INTERBUS module

L2.7.1 - General information

The SM-INTERBUS module is used to communicate with an INTERBUS mains supply. It integrates a 16-bit micro-processor, and its transmission speed may reach 500 Kbit/s.
Unidrive SP feeds the module internally. Due to the drive safety power supply (terminal 2, see section E2.2), the drive and its module electronics is maintained, this allowing the INTERBUS mains supply to continue communicate with the drive despite the mains supply loss.

L2.7.2 - Connection



Pins	Functions	Description
IN1	DO1	Positive data IN line
IN6	/DO1	Negative data IN line
IN2	DI1	Positive data OUT line
IN7	/DI1	Negative data OUT line
IN3	0V ISO IN	isolated 0V for IN bus
IN shielding	Shielding	IN bus cable shielding
OUT1	DO2	Positive data IN line
OUT6	/DO2	Negative data IN line
OUT2	DI2	Positive data OUT line
OUT7	/DI2	Negative data OUT line
OUT3	0V ISO OUT	Isolated 0V for OUT bus
OUT5	+5V ISO OUT	Isolated +5V for OUT bus
OUT9	RBST	OUT bus validation
OUT shield.	Shielding	IN bus cable validation
Earth	Earth	

L2.8 - SM-Universal Encoder Plus module

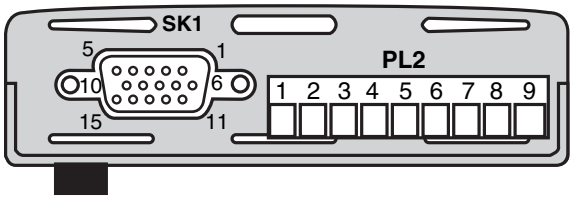
L2.8.1 - General information

The SM-Universal Encoder Plus module allows the drive to exploit the signal of a second encoder (reference signal, synchronisation...), and to deliver the simulation of an incremental encoder (quadrature, frequency/direction) or SSI.

This module is compatible with many types of encoders:

- incremental quadrature with or without commutation paths
- incremental frequency/direction with or without commutation paths
- incremental forward/reverse with or without commutation paths
- SinCos without serial link, with Hiperface or EnDat protocol
- EnDat
- SSI

L2.8.2 - Connection



Bornes PL2	Functions
1	Quick input +24V
2	0V
3	Path output A_{out} (AB encoder) or F_{out} (FD encoder) or $Data_{out}$ (SSI encoder)
4	Path output A_{out}\ (AB encoder) or F_{out}\ (FD encoder) or $Data_{out}$\ (SSI encoder)
5	Path output B_{out} (AB encoder) or D_{out} (FD encoder) or $Clock_{in}$\ (SSI encoder)
6	Path output B_{out}\ (AB encoder) or D_{out}\ (FD encoder) or $Clock_{in}$ (SSI encoder)
7	0V
8	RS 485 quick input or Top 0_{out} or Z_{out} output
9	RS 485\ quick input or Top 0_{out}\ or Z_{out}\ output

Sampling interval for inputs, outputs and relays (parameter update) :
8 ms for 1SM-Universal Encoder Plus module
16 ms for 2 SM-Universal Encoder Plus modules
24 ms for 3 SM-Universal Encoder Plus modules

Pins SK1	Encoders															
	Incremental (quadrature, frequency/direction,Fwd/Rev)			SinCos		SinCos with hiperface link		SinCos with En Dat or SSI link		EnDat		SSI		SinCos with U, V, W paths	
					and		and		and		and		and		and
1	-	B or F	A or F	-	Cos	-	Cos	-	Cos	-	-	-	-	-	Cos
2	-	B\ or F\	A\ or F\	-	CosRef	-	CosRef	-	CosRef	-	-	-	-	-	CosRef
3	-	A or D or R	B or D or R	-	Sin	-	Sin	-	Sin	-	-	-	-	-	Sin
4	-	A\ ou D\ or R\	B\ or D\ or R\	-	SinRef	-	SinRef	-	SinRef	-	-	-	-	-	SinRef
5	-	C or O or Z		-	-	-	Data	-	Data	-	Data	-	Data	-	Z
6	-	C\ or O\ or Z\		-	-	-	Data\	-	Data\	-	Data\	-	Data\	-	Z\
7	A_{out} or F_{out} or $Data_{out}$		U	A_{out} or F_{out} or $Data_{out}$											U
8	A_{out}\ or F_{out}\ or $Data_{out}$\		U\	A_{out}\ or F_{out}\ or $Data_{out}$\											U\
9	B_{out} or D_{out} or $Clock_{in}$ (SSI)\		V	B_{out} or D_{out} or $Clock_{in}$ (SSI)\											V
10	B_{out}\ or D_{out}\ or $Clock_{in}$ (SSI)		V\	B_{out}\ or D_{out}\ or $Clock_{in}$ (SSI)											V\
11	-	-	W	-	-	-	-	-	$Clock_{out}$	-	$Clock_{out}$	-	$Clock_{out}$	-	W
12	-	-	W\	-	-	-	-	-	$Clock_{out}$\	-	$Clock_{out}$\	-	$Clock_{out}$\	-	W\
13	+5V or +8V or +15V														
14	0V														
15	Motor thermal probe														

L2.8.3 - Characteristics for SK1 connector

Incremental and quadrature encoders, frequency/direction, Forward/Reverse

1	B or F path ( ) ; A or F path ( )
2	B\ or F\ path ( ) ; A\ or F\ path ( )
3	A, D or R path ( ) ; B, D or R path ( )
4	A\, D\ or R\ path ( ) ; B\, D\ or R\ path ( )
5	Z or 0 or C path (,)
6	Z\ or 0\ or C\ path (,)
7	U ( )
8	U\ ( )
9	V ( )
10	V\ ( )
11	W ( )
12	W\ ( )

Characteristics	RS485 differential voltage
Maximum input frequency	600 kHz
Line load	< 2 drives for terminals 1 to 4 32 drives for terminals 5 and 6 1 drive for terminals 7 to 12
Input impedance	120 Ω
Operating range	-7 to +12V
Absolute maximum voltage	± 14V / 0V
Absolute maximum differential voltage	± 14V

SinCos, absolute SinCos encoders with Hiperface or EnDat or SSI link and SinCos encoder with U, V, W paths

1	Cos path
2	Cosref path
3	Sin path
4	Sinref path

Characteristics	Differential voltage
Maximum signal	1.25V peak to peak
Maximum input frequency	115 KHZ
Absolute maximum differential voltage	± 1.5V

Absolute SinCos encoders with Hyperface, EnDat or SSI link, EnDat and SSI encoders

5	Data
6	Data\

Characteristics	RS 485 differential voltage
Maximum input frequency	2 MHz
Line load	32 drives
Operating range	-7 to +12V
Absolute maximum voltage	± 14V/0V
Absolute maximum differential voltage	± 14V

Absolute SinCos encoders with EnDat or SSI link and EnDat and SSI encoders

11	$Clock_{out}$
12	$Clock_{out}$\

Characteristics	RS 485 differential voltage
Maximum input frequency	2 MHz
Line load	1 drive
Operating range	-7 to +12V
Absolute maximum voltage	± 14V/0V
Absolute maximum differential voltage	± 14V

SinCos encoders with U, V, W paths

7	U path
8	U\ path
9	V path
10	V\ path
11	W path
12	W\ path

Characteristics	RS 485 differential voltage
Maximum input frequency	600 kHz
Line load	1 drive
Input impedance	120 Ω
Operating range	-7 to +12V
Absolute maximum voltage	± 14V / 0V
Absolute maximum differential voltage	± 14V

Simulation of incremental encoders or SSI

7	Path outut A_{out} or F_{out} or $Data_{out}$ (Data for SSI)
8	Path output A_{out}\ or F_{out}\ or $Data_{out}$\ (Data\ for SSI)
9	Path output B_{out} or D_{out} or $Clock_{in}$\ (Clock\ for SSI)
10	Path output B_{out}\ or D_{out}\ or $Clock_{in}$ (Clock for SSI)

Characteristics	RS 485 differential voltage
Maximum output frequency	500 kHz
Line load	1 drive
End	120 Ω
Operating range	-7 to +12V
Absolute maximum voltage	± 14V / 0V
Absolute maximum differential voltage	± 14V

Note : The simulation of the SK1 terminal block encoder (pins 7 to 10) is identical to that of PL2 terminal block (terminals 3 to 6).

13	Encoder power supply

Power supply voltage	5V, 8V or 15V
Maximum output current	300 mA for 5V and 8V 200 mA for 15V

14	Common 0V

15	Motor thermal probe input

Short-circuit detection level	< 50 Ω ± 30%
"Hot" alarm detection level	< 3.3 KΩ ± 10%
Return to zero level	> 3.3 KΩ

L2.8.4 - Characteristics of PL2 terminal block

• Incremental encoders in quadrature, frequency/direction, Fwd/Rev and SinCos encoders without serial link or with hiperface or EnDat or SSI serial link or U, V, W. paths

1	Quick input +24V
8 9	Quick input RS 485

Characteristics	RS485 differential voltage
Maximum input frequency	600 kHz
Line load	< 2 drives for terminal 1 1 drive for terminals 8 and 9
Input impedance	120 Ω
Operating range	-7 to +12V
Absolute maximum voltage	± 14V / 0V
Absolute maximum differential voltage	± 14V

Note : The quick input is not active with the EnDat or SSI encoders.

• Simulation of incremental encoder

3	Path output A_{out} or F_{out} or $Data_{out}$ (Data for SSI)
4	Path output A_{out}\ or F_{out}\ or $Data_{out}$\ (Data\ for SSI)
5	Path output B_{out} or D_{out} or $Clock_{in}$\ (Clock\ for SSI)
6	Path output B_{out}\ or D_{out}\ or $Clock_{out}$ (Clock for SSI)
8	Path output Z_{out} or Top 0_{out}
9	Path output Z_{out}\ or Top 0_{out}\

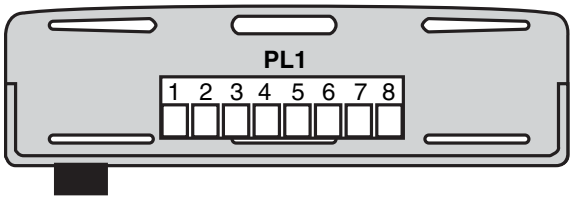
Characteristics	RS485 differential voltage
Maximum input frequency	500 kHz
Line load	< 2 drives for terminals 3 and 4 32 drives for terminals 5 and 6 1 drive for terminals 8 and 9
Input impedance	120 Ω
Operating range	-7 to +12V
Absolute maximum differential voltage	± 14V

L2.9 - SM-Encoder Plus module

L2.9.1 - General information

The SM-Encoder Plus module allows the drive to exploit the signal of a second incremental encoder (reference signal, synchronisation…).
This module is compatible with many types of encoders:
- incremental in quadrature,
- incremental frequency/direction,
- incremental fwd/rev.

L2.9.2 - Connection



Terminals PL1	Functions		
	Quadrature	Frequency/Direction	Fwd/Rev
1	B	F	F
2	B\	F\	F\
3	A	D	R
4	A\	D\	R\
5	Z or O or C		
6	Z\ or O\ or C\		
7	0V		
8	External power supply		

Note : The SM-Encoder Plus module is fed directly by the drive. However, the maximum output current is limited to 300 mA (5V power supply) or 200 mA (8V or 15V power supply), including the consumption of the encoder connected to the drive.
If the drive power supply is overloaded, use an external power supply connected to terminals 7 and 8 of the module.

The module sampling time SM-Encoder Plus (parameter update) is of 4 ms. However, this time is increased in the following cases :
- if a SM-I/O Plus module is integrated into the drive, add 8 ms to the sampling time,
- if another SM-Encoder Plus module is integrated into the drive, add 4 ms to the sampling time,
- if a SM-Resolver module is integrated into the drive, add 4 ms to the sampling time.

L2.9.3 - Characteristics

1	B or F path
2	B\ or F\ path
3	A or D or R path
4	A\ or D\ or R\ path
5	Z or 0 or C path
6	Z\ or 0\ or C\ SM-Encoder Plus

Characteristics	RS485 differential voltage
Maximum input frequency	600 kHz
Line load	< 2 drives for terminals 1 to 4 32 drives for terminals 5 and 6
Input impedance	120 Ω
Operating range	-7 to +12V
Absolute maximum voltage	± 14V / 0V
Absolute maximum differential voltage	± 14V

7	Common 0V

8	External power supply
Maximum power supply voltage	± 50 Vdc

L2.10 - SM-Resolver module

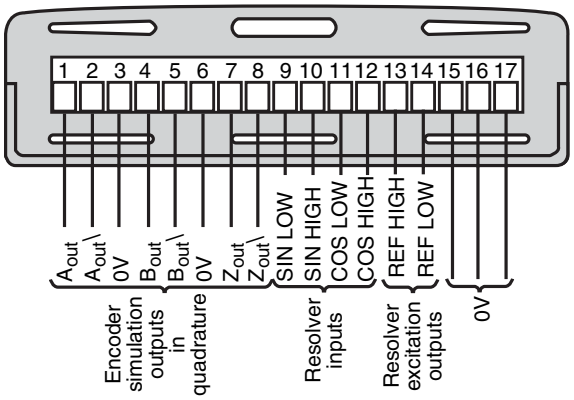
L2.10.1 - General information

The SM-Resolver module allows the drive to exploit the signal of a resolver, used as a position or speed information feedback, and to simulate en incremental encoder signal in quadrature (image of the drive main encoder or of the encoder connected to the SM-Resolver option).

Note :

The SM-resolver module may not be used in open loop.

L2.10.2 - Connection



• Characteristics

1	Path output A_{out} encoder simulation
2	Path output A_{out}\ encoder simulation
Characteristics	RS 485 differential voltage
Maximum frequency	500 kHz
Absolute maximum voltage	± 14V / 0V
Protection	Current limitation with thermal protection

3	0V
Total current for all the module 0V terminals	200 mA

4	Path output B_{out} encoder simulation
2	Path output B_{out}\ encoder simulation
Characteristics	RS 485 differential voltage
Maximum frequency	500 kHz
Absolute maximum voltage	± 14V / 0V
Protection	Current limitation with thermal protection

6	0V
Total current for all the module 0V terminals	200 mA

7	Top 0_{out} output or Z_{out} path encoder simulation
8	Top 0_{out}\ output or Z_{out}\ path encoder simulation
Characteristics	RS 485 differential voltage
Maximum frequency	500 kHz
Absolute maximum voltage	± 14V / 0V
Protection	Current limitation with thermal protection

9	SIN LOW resolver input
10	SIN HIGH resolver input
11	COS LOW resolver input
12	COS HIGH resolver input
Characteristics	Sinusoidal signal of 2Vrms (maximum)
Operating frequency	6 kHz
Absolute maximum DC voltage (SIN LOW or COS LOW)	± 2.5V/0V
Absolute maximum DC voltage (SIN HIGH or COS HIGH)	± 12V/0V
Protection	Serial resistors and diodes

13	REF HIGH resolver excitation
14	REF LOW resolver excitation
Characteristics	Sinusoidal signal of 6 kHz synchronised with the drive control loops
Maximum load (minimum impedance)	85 Ω
Rated voltage	• 6Vrms (transformation report = 3:1) • 4Vrms (transformation report = 2:1)
Tension CC maximum absolue (REF HIGH)	± 36V/0V
Courant maximum absolu (REF LOW)	200 mA
Protection	Overcurrent protection

15 **16** **17**	0V
Total current for all the module 0V terminals	200 mA

15 **16** **17**	0V
Total current for all the module 0V terminals	200 mA

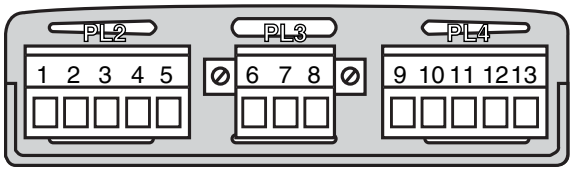
L2.11 - SM-Applications module

L2.11.1 - General information

The SM-Applications module is used to extend the Unidrive SP functions.
This module integrates a second micro-processor which allows the user to access functions pre-set in factory or to write an application-specific program. This module allows also the communication between many drives (or another equipment), this representing a complete solution for a complex application.

Unidrive SP feeds the module internally.

L2.11.2 - Connection



Terminals	Functions	Description
1	0V SC	0V connection for the RS485 port
2	RX\	RS485 negative reception line (input)
3	RX	RS485 positive reception line (input)
4	TX\	RS 485 negtive transmission line (output)
5	TX	RS485 positive transmission line (output)
6	CTNet-	CTNet data line (negative)
7	CTNet Shielding	Shielding connection for CTNet
8	CTNet+	CTNet data line (positive)
9	0V	0V connection for digital inputs/ outputs
10	DI0	Digital input 0
11	DI1	Digital input 1
12	DO0	Digital output 0
13	DO1	Digital output 1

L3 - External RFI filters

L3.1 - General information

The mains supply filters are used to reduce the drive electro-magnetic emissions, and to meet thus the CEM emission standards.

CAUTION :
Use an external mains supply RFI filter for each drive.

L3.2 - Characteristics

• Electrical characteristics

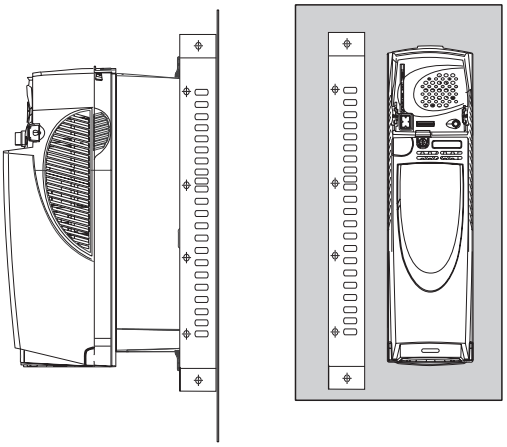
UNIDRIVE SP	Filter reference (Schaffner)	Voltage (V)	Rated current (A) 40°C	Rated current (A) 50°C	Maximum leakage current (mA)	Heat losses (W)
1,5TL, 2TL, 1,5T, 2T, 2,5T, 3,5T	FS6008-10-07	240/480	10	10	29.4	6.9
2,5TL, 3,5TL, 4,5T, 5,5T	FS6008-16-07	240/480	16	16	38.8	9.2
4,5TL, 5,5TL, 8TL, 8T, 11T, 16T	FS6008-32-07	240/480	32	28.2	38	11
22T, 27T, 33T	FS6008-62-07	480	62	56.6	66	23
40T to 60T	FS6008-101-35	240/480	101		73	24.5
11TL, 16TL	FS6008-75-07	240	75	68.5	24	29
22TL to 33TL	FS6008-101-35	240/480	101		73	24.5
3,5TM, 4,5TM, 5,5TM, 8TM, 11TM, 16TM, 22TM	FS6008-30-07	575	30		102	15
22TH to 60TH	FS6008-58-53	690	58		66	
75T and 100T	FS6008-164-40	480	164	150		30
75TH and 100TH	Consult LEROY-SOMER					
120T and 150T	FN3359HV-400-99	690	400	400	6	50
120TH and 150TH	FN3359HV-250-99	690	250	250	6	57

Maximum overload current: 150% of the rated current during 1minute for 1-hour period.
Voltage between phases : 480V,
Phase voltage/Earth : 275V.

UNIDRIVE SP	Filter reference (Epcos)	Voltage (V)	Rated current (A) 40°C	Rated current (A) 50°C	Maximum leakage current (mA)	Joules losses (W)
1,5TL, 2TL, 1,5T, 2T, 2,5T, 3,5T	B84143-A10-R207	200/400	10	9.1	<30	4.2
2,5TL, 3,5TL, 4,5T, 5,5T	B84143-A16-R207	200/400	16	14,6	<30	10.8
4,5TL, 5,5TL, 8TL, 8T, 11T, 16T	B84143-A32-R207	200/400	32	29.1	<30	17.8
22T, 27T, 33T	B84143-A75-R207	200/400	75	68.3	<30	19.4
40T to 60T	B84143-A0101-R207	200/400	101	75	<30	30
11TL, 16TL	B84143-A75-R207	200/400	75	68.3	<30	19.4
22TL to 33TL	B84143-A0101-R207	200/400	101	75	<30	30
3,5TM, 4,5TM, 5,5TM, 8TM, 11TM, 16TM, 22TM	B84143-A0030-R207	380/660	30	22.5	<35	17.6
22TH to 60TH	Consult LEROY-SOMER					
75T and 100T	B84143-A165-R207	380/480	165			
75TH and 100TH	Consult LEROY-SOMER					
120T and 150T						
120TH and 150TH						

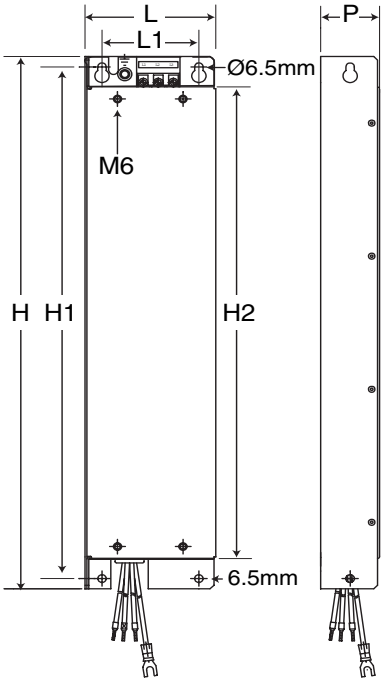
• Mechanical characteristics

- Protection : IP20.
- Installation for the drives sizes 1 to 3 : the filter may be mounted on the rear or it may be installed on the side of the drive.

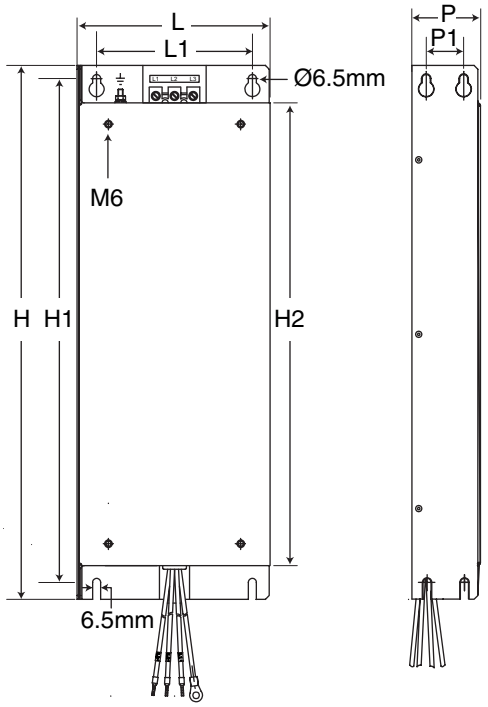


UNIDRIVE SP
Options

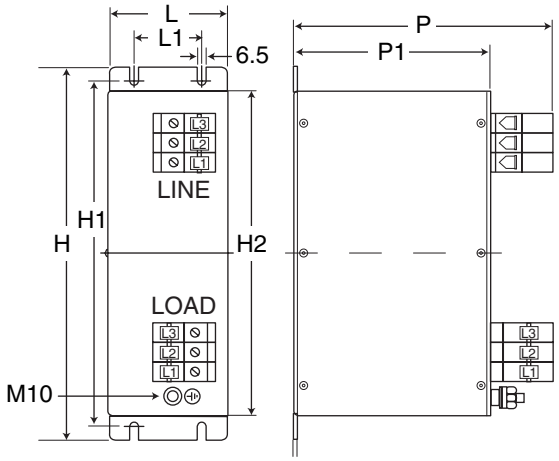
FS6008-10-07, FS6008-16-07,
B84143-A10-R207, B84143-A16-R207



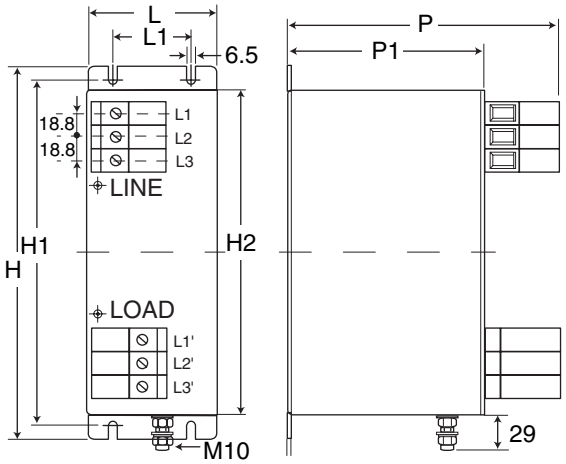
FS6008-32-07, FS6008-62-07, FS6008-75-07
B84143-A32-R207, B84143-A75-R207, B84143-A0030-R207



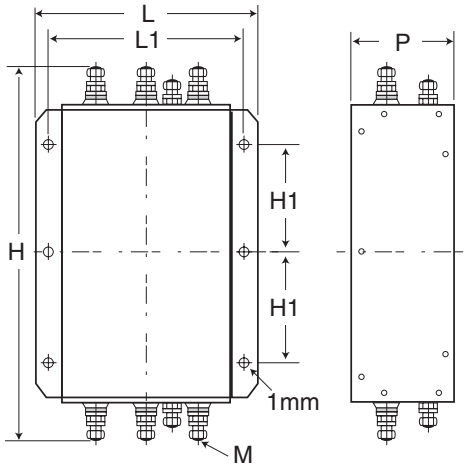
FS6008-101-35



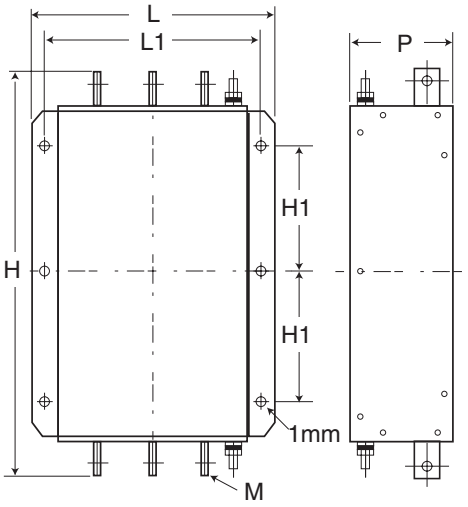
B84143-A0101-R207



FN3359HV-250-99



FN3359HV-400-99



Filter reference	Width (mm)		Height (mm)			Depth (mm)		Output cable cross-section		Weight (kg)	Terminal ⏚		Terminals L1, L2, L3		
											Ø	Tightening torque	Maximumcable cross-section		Tightening torque
	L	L1	H	H1	H2	P	P1	mm²	AWG			(Nm)	(mm²)	AWG	(Nm)
FS6008-10-07	**100**	**74**	**440**	**423**	**390**	**45**	**-**	**2.5**	**14**	**1.4**	**M5**	**3.5**	**4**	**12**	**0.8**
FS6008-16-07	**100**	**74**	**440**	**423**	**390**	**45**	**-**	**2.5**	**14**	**1.4**	**M5**	**3.5**	**4**	**12**	**0.8**
FS6008-30-07	**250**	**210**	**414**	**396**	**361**	**60**	**30**	**16**	**6**	**3.5**	**M6**	**3.9**	**10**	**8**	**2.2**
FS6008-32-07	**155**	**125**	**428.5**	**404.5**	**371.5**	**55**	**30**	**4**	**10**	**2**	**M5**	**3.5**	**16**	**6**	**2**
FS6008-58-53															
FS6008-62-07	**250**	**210**	**414**	**396**	**361**	**60**	**30**	**16**	**6**	**3.5**	**M6**	**3.9**	**16**	**6**	**2.2**
FS6008-75-07	**250**	**210**	**414**	**396**	**361**	**60**	**30**	**16**	**6**	**3.5**	**M6**	**3.9**	**16**	**6**	**2.2**
FS6008-101-35	**100**	**65**	**300**	**275**	**260**	**225**	**170**	**-**	**-**	**4**	**M10**	**25**			**8**
FS6008-164-40			**300**							**6.8**	**M10**	**25**	**95**	**4/0**	**20**
B84143-A10-R207	100	74	450	423	390	45	-	2.5	14	2.1	**M5**	3	4	12	0.6
B84143-A16-R207	100	74	450	423	390	45	-	2.5	14	2.1	**M5**	3	4	12	0.6
B84143-A32-R207	155	125	431.5	404.5	371.5	55	30	4	10	3.3	**M5**	3	10	8	1.3
B84143-A75-R207	250	210	425	396	365	60	30	16	6	5.1	**M6**	5.1	16	6	2.2
B84143-A0030-R207	250	210	425	396	365	60	30	4	10	5.1	**M6**	5.1	10	8	1.3
B84143-A0101-R207	90	65	300	275	260	205	150	-	-	7.8	**M10**	10	50	1	6.8
B84143-A165-R207															
FN3359HV-250-99	230	205	300	120	-	125	-	150	6/0	7	**M10**	30	150	6/0	30
FN3359HV-400-99	260	235	386	120	-	115	-	150	6/0	10.5	**M12**	30	150	6/0	30

L4 - Ferrites

L4.1 - General information

The ferrites contribute to the decrease of the emissions conducted by the drive, for the conformity with the EN61800-3 standard.
Place the ferrite at the drive output and run the U, V, W cables through the ferrite (if possible, make a turn).
Note : Do not run the shielding in the ferrite.

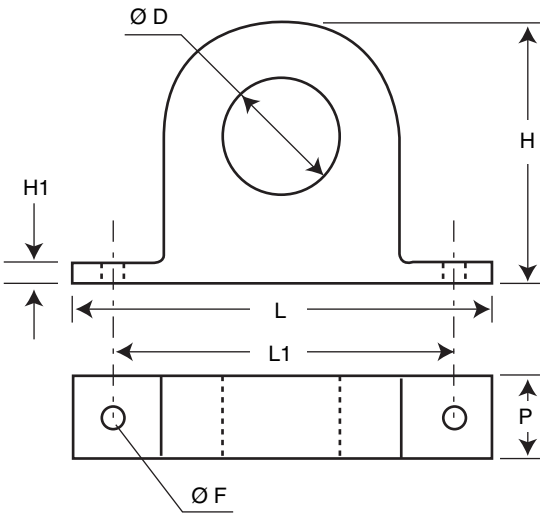
L4.2 - Characteristics

• Characteristics of the ferrites delivered in standard version (drives size 2 and 3)



Sizes (mm)	Ø inside	Ø outside	Height
B64290-L48 (Epcos)	20.5 ± 0.5	34.0 ± 0.7	12.5 ± 0,3
B64290-L40 (Epcos)	40.8 ± 0.8	58.3 ± 1.0	17.6 ± 0.4

• Characteristics of the ferrite delivered optionally



Sizes (mm)	H	H1	L	L1	P	ØF	ØD
RU1261 (Schaffner)	62	5	105	90	24	5	28

UNIDRIVE SP
Options

L5 - MC chokes

L5.1 - General information

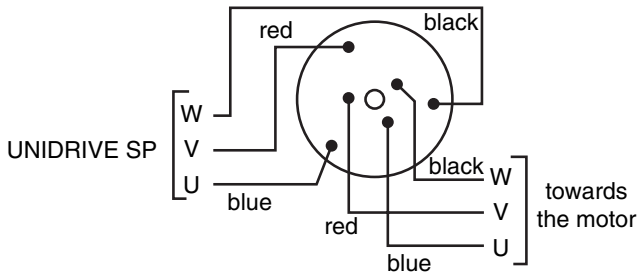
The MC chokes are three-phase chockes that diminish the HF earth leakage currents, as well as the interference produced.

L5.2 - Connection and characteristics

• Connection

The MC chokes are cabled directly to the drive output (terminal U, V, W), as close as possible to the drive, in compliance with the image below.

Their form is cylindrical and they are held by a central smooth hole.



Note : For the rating in 575V (TM) or 690V (TH), consult your usual LEROY-SOMER office.

CAUTION :
The MC chokes are delivered with cables having a length of 30 cm.

• **Characteristics**

UNIDRIVE SP	Choke reference	Current (A)	Sizes (mm)			Weight (kg)
			Diam.	Height	Hole diam.	
1.5T to 2.5T 1.5TL	MC 3.5T	5.6	80	50	5.1	0.5
3.5T to 8T 2TL to 4.5TL	MC 11T	16	80	50	5.1	0.75
11T to 22T 5.5TLand8T	MC 27T	38	125	55	6.2	3
27T to 40T 11TLto22TL	MC 50T	76	125	65	6.2	3
50T. 60T 27TL. 33TL	MC 75T	110	145	90	8.3	4.5
75T. 100T	MC 120T	180	220	120	10 x 25	8

Note : The selections correspond to a "low overcharge" drive current.

L6 - FP chokes

L6.1 - General information

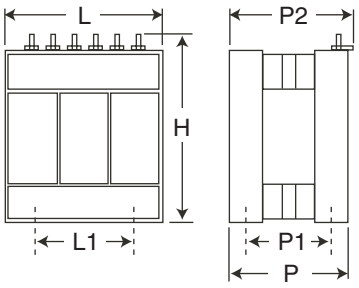
The FP low loss chokes filter the HF earth leakage currents, but also the differential currents (circulating currents between phases).

This choke is mainly used at the output of a drive that feeds many motors, reducing the differential HF leakage currents that disturb the operation of the motor protection thermal relay.

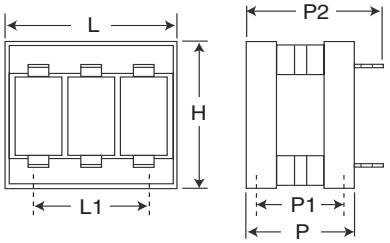
Provide a FP choke for maximum 5 motors (efficient for up to 200 m of motor cable).

L6.2 - Characteristics

• 2mH/6A, 0.6mH/16A, 0.3mH/38A



• 0.15mH/90A



UNIDRIVE SP	Choke reference	Sizes (mm)						Weight (kg)
		L	L1	H	P	P1	P2	
1.5T to 2.5T 1.5TL	FP3.5T 2mH/6A	104	60	95	55	45	80	1
3,5T to 8T 2TL to 4.5TL	FP11T 0.6mH/16A	125	75	115	70	60	95	1.8
11T to 22T 5.5TLand8T	FP27T 0.25mH/38A	162	100	150	92	80	110	3.5
27T and 33T	FP60T 0.15mH/90A	263	175	180	108	92	128	10

Note : • For higher rating and mains supply of 575V (TM) or 690V (TH), consult your LEROY-SOMER interlocutor.
• The selections correspond to a "low overload" drive current.

L7 - Line chokes

L7.1 - General information

The line chokes are used to reduce the risk of drive damage due to a phase imbalance or to high interference on the mains supply.
The line choke recommended reactance must be of 2%, this allowing to withstand a phase imbalance of 5%. An additional value may be used, but this generates a drive output loss (High speed torque drop) due to a voltage drop.

The line chokes are particularly recommended for the rating of 1.5T(L) to 3.5T(L) in case of high interference as follows:
- cos φ power factor connection connected to the mains supply,
- high power thyristor drives fed by the same mains supply (especially if they cannot be fitted by line chokes),
- Direct start asynchronous motors connected to the mains supply generating transient voltage drops higher than 20%,
- drives connected to a high capacity mains supply (power of the mains supply transformer higher than 175 kVA).

The other ratings have an internally mounted DC choke and in consequence they do not need the addition of line choke, excepting the cases of high phase imbalance or in extreme conditions.

Provide a line choke for each drive, connected upstream from the drive.

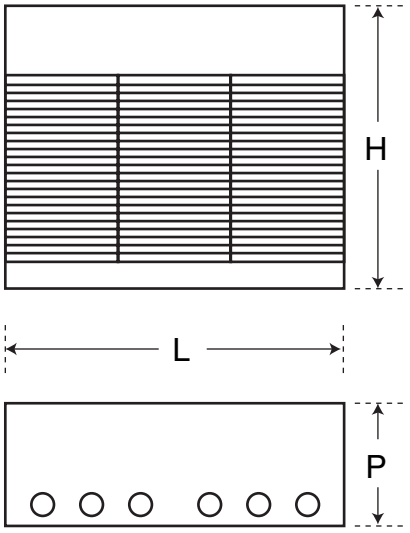
L7.2 - Electrical characteristics

Reating	Choke reference	Current (A)	Inductance (mH)	Losses (W)
1.5T to 2.5T	9 ST 2.5	8.6	2.5	27
1.5TL and 2TL 3.5T to 5.5T	16 ST 1.5	16	1,5	32
8T and 11T	25 ST 1	25	1	44
2.5TL to 4.5TL 16T and 22T	38 ST 0.65	38	0.65	50
5.5TL and 8TL 27T and 33T	60 ST 0.4	60	0.4	65
11TLand16TL 40T and 50T	90 ST 0.28	90	0.25	83
60T	130 ST 0.19	130	0.19	105
75T and 100T	176 ST 0.14	176	0.14	170
120Tand150T	292 ST 0.085	292	0.085	200

Note : For th other ratings and mains supply of 575V (TM) and 690V (TH), consult your usual LEROY-SOMER interlocutor.

L7.3 - Mechanical characteristics

They are give for information only and may vary depending on the supplier.



Protection : IP00IP00

Choke reference	Sizes (mm)			Weight (kg)
	L	H	P	
9 ST 2.5	140	160	85	1.8
16 ST 1.5	125	115	95	1.8
25 ST 1	155	190	105	5.5
38 ST 0.65	185	210	110	7
60 ST 0.4	220	240	120	11
90 ST 0.28	220	240	140	17
130 ST 0.19	250	280	170	22
176 ST 0.14	265	220	180	30
292 ST 0.085	270	230	220	30

L8 - Brake resistor

L8.1 - General information

• The brake resistor must be installed away from components that could be damaged by the dissipated heat.

• A particular attention must be paid to touching the resistor, because of the presence of a high voltage and of the heat emission (resistor temperature higher than 70°C).

• The brake resistor must be installed with a thermal relay connected in series, rated for the rms current, to avoid the fire risks that may be generated by a dysfunction of the brake transistor or by a short-circuit.

• If a brake resistor must be externally mounted, check that it is integrated into a ventilated metallic terminal box, in order to avoid any direct contact with the resistor.

The braking occurs when the drive decelerates the motor or when the drive opposes to a motor speed increase, due to the mechanical environment (driving load, for instance).
During the braking, the energy is sent back to the drive that may absorb only an energy equivalent to its own losses. When the energy to be dissipated is higher, the DC bus voltage increases. In factory settings, the drive increases automatically the deceleration time in order to avoid the DC bus overvoltage stop.
If the drive must decelerate rapidly or it if must retain a load, it is necessary to connect a brake resistor.

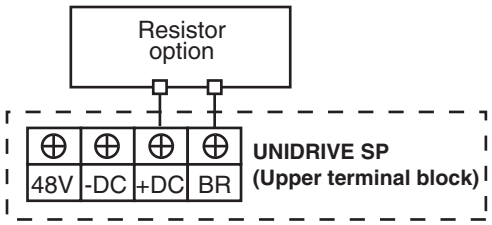
For the rating 1.5TL to 8TL and 1.5T to 16T, integral brake resistors may be mounted into the heater slots.

• If a brake resistor is connected, it is necessary to set 0.15 to "FASt".

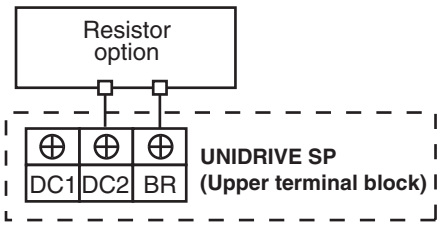
• The heater integral resistors benefit from the drive overload protection. To validate the external resistor protection, the maximum braking length (10.30) and the minimum time between 2 braking cycles (10.31) must be set.

L8.2 - Connection

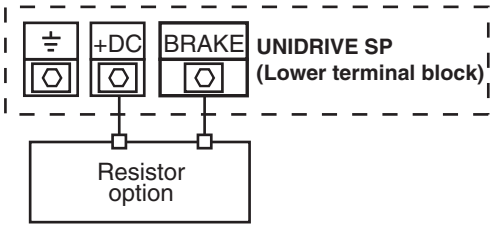
• Size 1



• Size 2 and 3



• Size 4



Note : For the protection of the external brake resistors, provide a thermal relay.

• Check that the brake resistors are adequately connected, as indicated before. Otherwise, the resistor may be permanently powered up, without any possible control by the drive. It will result an excessive overheating of the resistor that may lead to burn or fire risks.

L8.3 - Electrical characteristics

L8.3.1 - Minimum resistor compatible with the drive

UNIDRIVE SP	Minimum ohmic value (Ω)
1.5TL to 2.5TL	43
3.5TL	29
4.5TL to 8TL	18
11TL to 33TL	5
1.5T to 3.5T	74
4.5T to 5.5T	58
8T to 16T	19
22T to 33T	18
40T and 50T	11
60T	9
75T and 100T	7
120T and 150T	
3.5TM to 22TM	18
22TH to 60TH	13
75TH and 100TH	10
120TH and 150TH	

Tolerance of the ohmic value : ± 10 %.

In most of the applications, the braking occurs occasionally, this allowing to have a permanent rated power of the resistor lower than that of the drive. However, it is necessary that the peak power of the resistor be sufficient for the extreme cases encountered in the braking cycle.

Note : For "continuous" braking or high inertia applications the permanent power dissipated in the brake resistor must be equivalent to the rated power of the drive. The total energy dissipated by the resistor is independent of the quantity of energy.

Select a resistor value equal or higher than the minimum resistor value indicated for each drive rating. A higher value resistor provides an increased safety in case of occurrence of a braking system-related problem, but the drive may stop if the chosen resistor value is too high.

L8.3.2 - Heater integral brake resistors

Type of integrable resistor	Ohmic value (Ω)	Reated resistor peak power during 1 ms (kW)	Average power during 60 sec. (W)	Factory settings 10.30		Factory settings 10.31		Associated drive
				TL	T	TL	T	
1220-2757	75	8	50	0.09	0.02	2		1.5TL to 3.5TL 1.5T to 5.5T
1220-2759	37.5	16	100	0.09	0.02	2		4.5TL to 8TL 8T to 16T

Note : if the integrable brake resistor must be used with a power higher than its average power/2, validate the high speed ventilation par **6.45** = On (1).

L8.3.3 - External brake resistors

RF Resistor type	Ohmic value (Ω)	Thermal power (W)	Peak power (W)		Efficient current (A)*	Possibility of association with UNIDRIVE SP								
			230V	400V		1.5TL to 2.5TL	3.5T L	4.5TL to 8TL	11TL and 33TL	1.5T to 5.5T	8T to 33T	40T and 50T	60T to 100T	120T and 150T
RF-SIR-600-100	100	100	1406	5184	1.1	x	x	x	x	x	x	x	x	x
RF-SIR-1100-100	100	600	1406	5184	2.7	x	x	x	x	x	x	x	x	x
RF-MD-2000-75	75	2000	1870	6912	5.7	x	x	x	x	x	x	x	x	x
RF-SIR-1100-50	50	600	2813	10368	3.8	x	x	x	x		x	x	x	x
RF-MD-5500-40	40	5500	3500	12960	12.9		x	x	x		x	x	x	x
RF-SIR-1100-25	25	600	5625	20736	5.4			x	x		x	x	x	x
RF-MD-3000-25	25	3000	5625	20736	12			x	x		x	x	x	x
RF-MD-11000-25	25	11000	5625	20736	23			x	x		x	x	x	x
RF-MD-11000-15	15	11000	9325	34560	29.5				x			x	x	x
RF-MD-3000-12	12	3000	11700	43200	17.5				x			x	x	x
RF-MD-7500-10	10	7500	14063	51840	30				x				x	x
RF-MD-19500-10	10	19500	14063	51840	48.6				x				x	x
RF-MD-7500-5	5	7500	28125	103680	42				x					
RF-MD-11000-5	5	11000	28125	103680	51.6				x					

* Adjustment current of the serial thermal relay in the resistor.

Resistors depending on the application

SP rating	Pword (W)	Horizontal movements to CN/2			Horizontal movements to CN			Vertical movements reverse ≤ 20 sec.			Vertical movements reverse < 120 sec.		
		Pc/ P_{word}	Resistor	10.30/ 10.31	Pc/ P_{word}	Resistor	10.30/ 10.31	Pc/ P_{word}	Resistor	10.30/ 10.31	Pc/ P_{word}	Resistor	10.30/ 10.31
1.5TL	750	1.88	RF-SIR-600-100	10/20	1.88	RF-SIR-600-100	5.3/20	3.75	RF-SIR-1100-50	16/20	3.75	RF-SIR-1100-50	60/120
2TL	1100	1.28	RF-SIR-600-100	7.2/20	1.28	RF-SIR-600-100	3.6/20	2.56	RF-SIR-1100-50	10.9/20	2.56	RF-SIR-1100-50	40/120
2.5TL	1500	0.94	RF-SIR-600-100	5.3/20	1.88	RF-SIR-1100-50	16/20	1.88	RF-SIR-1100-50	8/20	1.25	RF-MD-2000-75	120/120
3.5TL	2200	0.64	RF-SIR-600-100	3.6/20	1.28	RF-SIR-1100-50	10/20	1.28	RF-SIR-1100-50	5.5/20	1.60	RF-MD-5500-40	120/120
4.5TL	3000	1.88	RF-SIR-1100-25	16/20	1.88	RF-SIR-1100-25	8/20	1.88	RF-MD-3000-25	20/20	1.88	RF-MD-3000-25	120/120
5.5TL	4000	1.41	RF-SIR-1100-25	12/20	1.41	RF-SIR-1100-25	6/20	1.41	RF-MD-3000-25	15/20	1.41	RF-MD-3000-25	80/120
8TL	5500	1.02	RF-SIR-1100-25	8/20	1.02	RF-SIR-1100-25	4/20	1.02	RF-MD-3000-25	10.9/20	1.02	RF-MD-3000-25	52/120
11TL	7500	0.75	RF-SIR-1100-25	6/20	1.56	RF-MD-3000-12	16/20	1.56	RF-MD-3000-12	8/20	1.56	RF-MD-3000-12	27/120
16TL	11000	1.07	RF-MD-3000-12	20/20	1.07	RF-MD-3000-12	10/20	1.07	RF-MD-3000-12	5.5/20	1.28	RF-MD-7500-10	63/120
22TL	15000	0.85	RF-MD-3000-12	12/20	2.03	RF-MD-7500-5	20/20	2.03	RF-MD-7500-5	10/20	2.03	RF-MD-7500-5	16/120
27TL	18500	1.64	RF-MD-7500-5	20/20	1.64	RF-MD-7500-5	10/20	1.64	RF-MD-7500-5	5/20	1.64	RF-MD-7500-5	25/120
33TL	22000	1.38	RF-MD-7500-5	20/20	1.38	RF-MD-7500-5	8.6/20	1.38	RF-MD-7500-5	4.3/20	1.38	RF-MD-11000-5	26/120
1.5T	750	6.91	RF-SIR-600-100	10/20	6.91	RF-SIR-1100-100	20/20	6.91	RF-SIR-1100-100	16/20	6.91	RF-SIR-1100-100	60/120
2T	1100	4.71	RF-SIR-600-100	7.2/20	4.71	RF-SIR-1100-100	20/20	4.71	RF-SIR-1100-100	10.9/20	4.71	RF-SIR-1100-100	40/120
2.5T	1500	3.46	RF-SIR-600-100	5.3/20	3.46	RF-SIR-1100-100	16/20	3.46	RF-SIR-1100-100	8/20	3.46	RF-SIR-1100-100	30/120
3.5T	2200	2.36	RF-SIR-1100-100	20/20	2.36	RF-SIR-1100-100	10.9/20	2.36	RF-SIR-1100-100	5.5/20	3.14	RF-MD-2000-75	98/120
4.5T	3000	1.73	RF-SIR-1100-100	16/20	1.73	RF-SIR-1100-100	8/20	1.73	RF-SIR-1100-100	4/20	2.30	RF-MD-2000-75	55/120
5.5T	4000	1.30	RF-SIR-1100-100	12/20	1.30	RF-SIR-1100-100	6/20	1.30	RF-SIR-1100-100	3/20	1.73	RF-MD-2000-75	36/120
8T	5500	3.77	RF-SIR-1100-25	8/20	3.77	RF-SIR-1100-25	4.4/20	2.36	RF-MD-5500-40	20/20	2.36	RF-MD-5500-40	120/120
11T	7500	2.76	RF-SIR-1100-25	6.4/20	2.76	RF-SIR-1100-25	3.2/20	1.73	RF-MD-5500-40	14/20	1.73	RF-MD-5500-40	34/120
16T	11000	1.89	RF-SIR-1100-25	4.4/20	1.89	RF-MD-3000-25	10/20	1.89	RF-MD-3000-25	5.5/20	1.18	RF-MD-5500-40	22/120
22T	15000	1.38	RF-SIR-1100-25	3.2/20	1.38	RF-MD-3000-25	8/20	1.38	RF-MD-3000-25	4/20	1.38	RF-MD-11000-25	65/120
27T	18500	1.12	RF-SIR-1100-25	2.6/20	1.12	RF-MD-3000-25	6.5/20	1.12	RF-MD-3000-25	3.2/20	1.12	RF-MD-11000-25	50/120
33T	22000	0.94	RF-SIR-1100-25	2.2/20	0.94	RF-MD-3000-25	5.5/20	0.94	RF-MD-3000-25	2.7/20	0.94	RF-MD-11000-25	40/120
40T	30000	1.69	RF-MD-3000-12	6.6/20	1.35	RF-MD-11000-15	11/20	1.35	RF-MD-11000-15	5.5/20	1.35	RF-MD-11000-15	27/120
50T	37000	1.37	RF-MD-3000-12	5/20	1.09	RF-MD-11000-15	8/20	1.09	RF-MD-11000-15	4/20	1.05	RF-MD-11000-15	21/120
60T	45000	1.12	RF-MD-3000-12	2.2/20	1.35	RF-MD-7500-10	5.3/20	1.35	RF-MD-19500-10	6/20	1.35	RF-MD-19500-10	30/120
75T	55000	2.2	RF-MD-7500-10	9/20	1.1	RF-MD-7500-10	5/20	1.1	RF-MD-19500-10	7/20	1.1	RF-MD-19500-10	28/120
100T	75000	1.6	RF-MD-7500-10	6/20	Consult LEROY-SOMER			Consult LEROY-SOMER			Consult LEROY-SOMER		
120T	90000	Consult LEROY-SOMER											
150T	110000												

For any additional information, contact your usual LEROY-SOMER interlocutor.

L8.4 - Mechanical characteristics

L8.4.1 - Heater integral brake resistors

⚠ • The brake resistor must be installed outside the cabinet. For this, it is necessary to provide for the resistor cables coming from the back of the drive to the front of the drive, and an additional cutout must be provided. See section C5.4.

• However, if the application involves the installation of the heater inside the cabinet, the resistor losses must be added to the global losses in the cabinet listed in the table of section C4.2. Besides, provide a non-inflammable base plate.

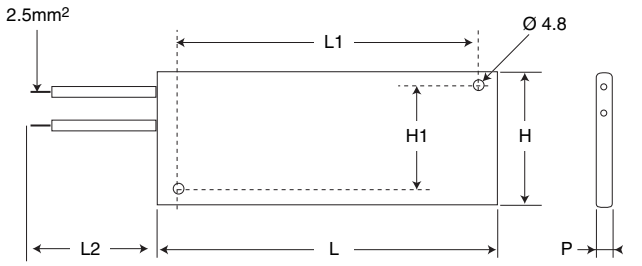
IP40 protection, maximum altitude : 2000 m.

For information concerning the mechanical installation, see the technical manual supplied with the resistor.

L8.4.2 - External brake resistors

⚠ • The brake resistor and the thermal relay must be located outside the cabinet (above or as close as possible).

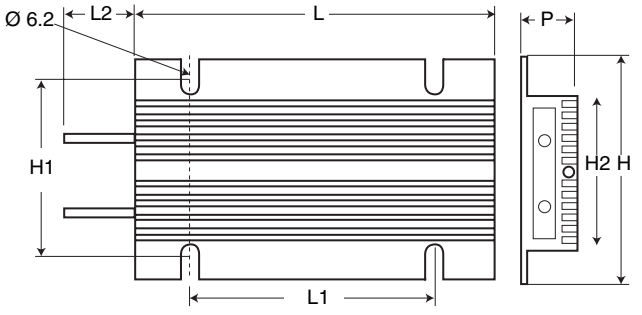
• RF - SIR 600 - 100



Weight : < 1 Kg / Protection : IP33

Type	Sizes (mm)					
	L	L1	L2	H	H1	P
RF-SIR 600-100	102	81	300	68	57	13

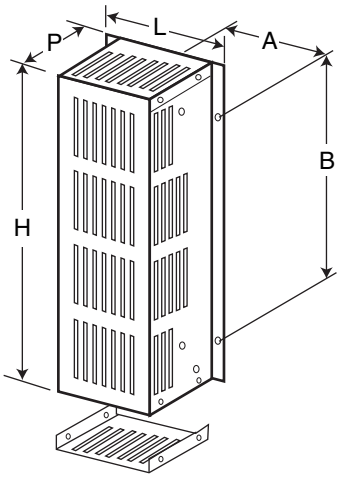
• RF-SIR-1100-100, RF-SIR-1100-50, RF-SIR-1100-25



Weight : 1.3 kg / Protection : IP55

Type	Sizes (mm)						
	L	L1	L2	H	H1	H2	P
RF-SIR-1100-xx	320	240	300	95	82 ±2	71	30

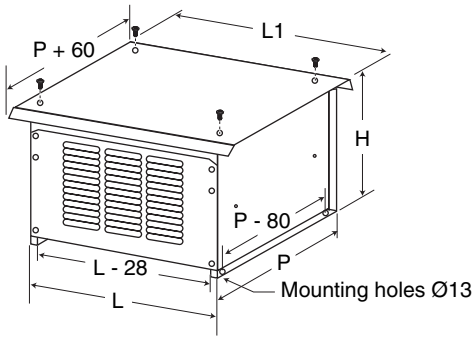
• RF-MD-2000-75, RF-MD-3000-25, RF-MD-3000-12



Protection : IP20

Type	Sizes (mm)			Mounting (mm) Ø 11		Weight
	L	P	H	A	B	(kg)
RF-MD-2000-75	182	140	450	160	310	5
RF-MD3000-25	227	140	450	205	310	6
RF-MD-3000-12	227	140	450	205	310	6

• RF-MD-5500-40, RF-MD-7500-10, RF-MD-7500-5, RF-MD-11000-25, RF-MD-11000-15, RF-MD-11000-5, RF-MD-19500-10



Protection : IP13

Type	Sizes (mm)				Weight
	L	L1	P	H	(kg)
RF-MD-5500-40	420	450	480	440	21
RF-MD-7500-10	500	530	480	440	25
RF-MD-7500-5	500	530	480	440	25
RF-MD-11000-25	670	690	480	440	32
RF-MD-11000-15	670	690	480	440	32
RF-MD-11000-5	670	690	480	440	32
RF-MD-19500-10	960	990	540	440	52

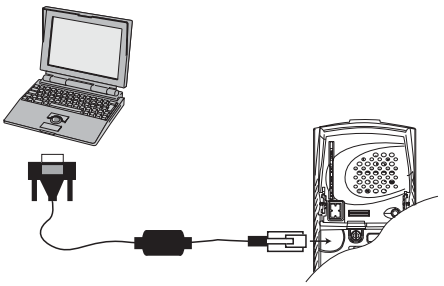
L9 - Cables

L9.1 - CT-COMMS cable (ref. 4500-0087)

CT-COMMS cable is used to connect directly a PC RS232 serial port to Unidrive SP.
Beside the RS232/RS485 converter, this option integrates the additional isolation required in case of IT condition installation.

CAUTION :
Do not connect the end resistor to the mains supply.

The cable is made of a 9-pin SUB-D plug of RS 232 type for connection to PC, and of a RJ45 plug of RS 485 type for connection to UNIDRIVE SP (cable length : 2 m).



L9.2 - Power cables and encoder

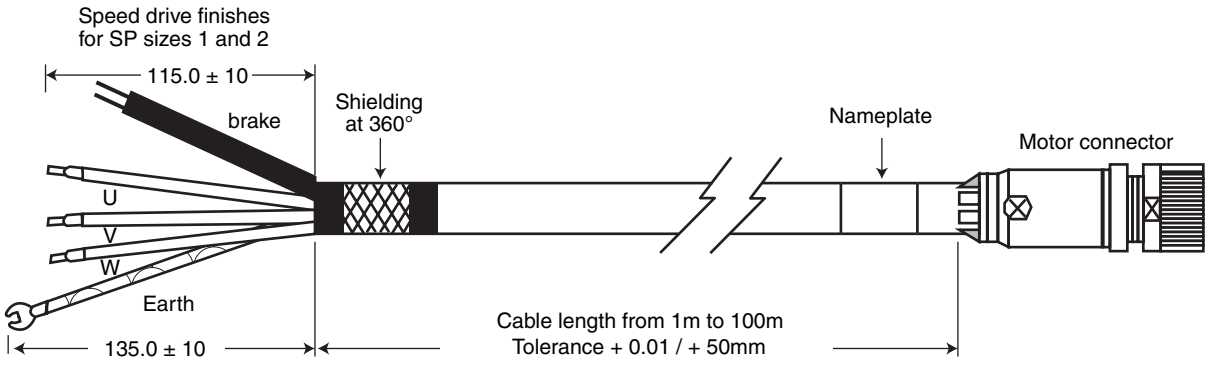
L9.2.1 - Introduction

The cables are important components of the moto-drive unit for which a certain number of essential points must be processed with caution :
- covering depending on the environment aggressiveness,
- quality of shielding for the conformity with the CEM directive,
- mechanical resistance to stresses and rates for the mounted motors,
- high density connectors needing a particular attention.

For these reasons, Leroy-Somer proposes optionally cables ready for use.

L9.2.2 - Power cables (for Unimotor exclusively)

• Presentation



• Designation

PB	A	A	A	005
Power cable **PB : with brake** **PS : without brake***	Insulator **B : PUR**	Cable cross-section **A : 4 x 2.5 mm²** **B : 4 x 4.0 mm²** **G : 4 x 1.5 mm²**	Motor side finishes **U : connector** + finishes for Unidrive SP	Length **010 : 10m** 001 to100 : 1 to 100m

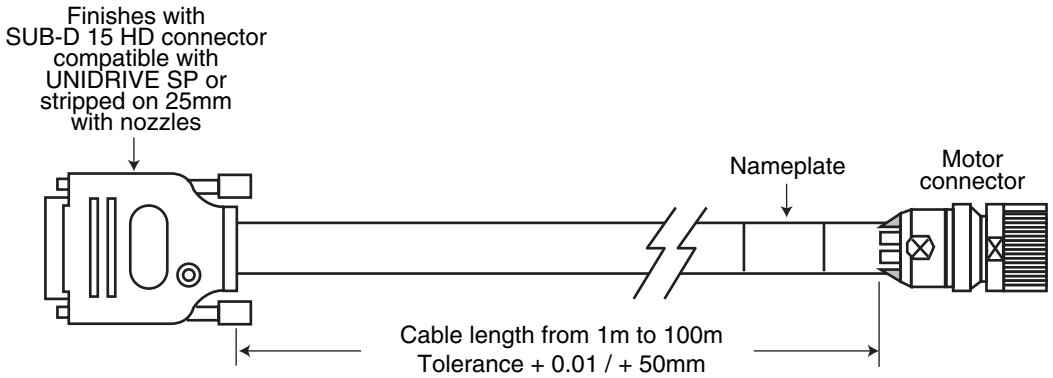
* Available with section of 1.5 mm² or 2.5 mm² only.

• Characteristics

Description				Isolated cable comprising 4 power conductors and 1 shielded twisted pair for the brake (option)		
Power conductora				4 x 1.5 mm²	4 x 2.5 mm²	4 x 4 mm²
Brake conductors (option)				2 x 1 mm²		
Insulator	external gain			PUR		
	conductors			TPE	TPE	Polyethylene
Class				6 according to VDE 0295		
Colour	external gain			Orange RAL 2003		
	power conductor			Black ref. U / V / W + green/yellow		
	brake conductor			White and black ref. + and -		
Shielding				Steel braid		
External diameter	Without brake conductors			9.5 mm	11.9 mm	13.5 mm
	With brake conductors			11.1 mm	14.1 mm	15.6 mm
Curve ray				10 x diameter	10 x diameter	12 x diameter
Maximum acceleration				4 m / s²	4 m / s²	7 m / s²
Maximum speed				120 m / mn	120 m / mn	180 m / mn
Resistance to stretch	Static			50 N / mm²		
	Dynamic			20 N / mm²		
Maximum number of cycles				5 000 000	5 000 000	10 000 000
Temperature of use				- 20°C to + 80°C	- 20°C to + 80°C	- 40°C to + 90°C
Leakage capacity	Without brake conductors		Phase-phase	40 pf / m	35 pf / m	40 pf / m
			Phase-shielding	200 pf / m	190 pf / m	220 pf / m
	With brake conductors	power conductor	Phase-phase	50 pf / m	50 pf / m	50 pf / m
			Phase-shielding	220 pf / m	220 pf / m	240 pf / m
		brake conductor	Phase-phase	45 pf / m	45 pf / m	45 pf / m
			Phase-shielding	480 pf / m	380 pf / m	350 pf / m
Voltage				1000 V		
Dielectric resistor				3000 V		
Isolation resistor				> 10 Mohms/km		
Weight	Without brake conductors			143 kg / km	219 kg / km	299 kg / km
	With brake conductors			212 kg / km	279 kg / km	360 kg / km
Certification - UL / CSA				Yes	Yes	No

L9.2.3 - Encoder cables

• Presentation



• Designation

Encoder type		Incremental encoder		SinCos encoder - Hiperface link		Resolver	SinCos encoder - EndAt link
Motor type		Asynchronous	Servo	Asynchronous	Servo	Servo	Asynchronous
Designation	Nozzles *	**SCBACxxx**	Consult	Consult	**SSBBCxxx**	**SRBBCxxx**	Consulter
	Connectors *	**SCBADxxx**	**SIBBAxxx**	**SABADxxx**	**SSBBDxxx**	Not available	**SEBAAxxx**

* Unidrive SP side finishes

Note : In the designation, xxx defines the cable length. This length may be comprised between 1 and 100m. However, the length of 10 m was standardised in order to favour the short periods.
Example :
- Unimotor servo-motor,
- Cable for SinCos encoder,
- Dive side finishes: HD 15 connector
- Length : 10 m,

Designation : SSBBD010.

UNIDRIVE SP
Options

• Characteristics

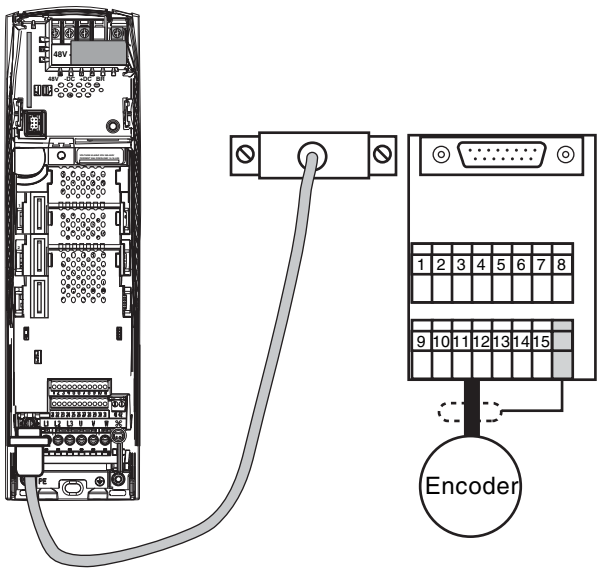
Description		Incremental encoder (asyn.) or resolver (servo) or SinCos - Hiperface link (asyn.)	Incremental encoder (servo)	SinCos - EndAt link (asyn.) or SinCos - Hiperface link (servo)
Insulator	external gain	PUR		
	conductors	TPE		
Class		6 according to VDE 0295		
Cable composition	Signal conductors	3 x (2 x 0.14 mm^2)	6 x (2 x 0.34 mm^2)	3 x (2 x 0.38 mm^2)
	Power supply conductors	2 x 0.5 mm^2	2 x 1 mm^2	2 x 0.5 mm^2
	Thermal probe conductors	x	2 x 0.34 mm^2	2 x 0.38 mm^2
Colour	External gain	Green RAL 6018		
	Conductors	DIN 47100		
Shielding		Covering by braids > 80 %		
External diameter		8.6 mm	11 mm	9 mm
Curve ray		10 x diameter		
Maximum acceleration		4 m / s^2		
Maximum speed		120 m / min		
Maximum number of cycles		5 000 000	6 000 000	5 000 000
Temperature of use		- 20°C to + 80°C		
Leakage capacity	Between signal conductors	45 pf / m	70 pf / m	130 pf / m
	Signal conductors - shielding	225 pf / m	120 pf / m	220 pf / m
	Between power supply conductors	255 pf / m	85 pf / m	150 pf / m
	Power supply conductors - shielding	465 pf / m	145 pf / m	255 pf / m
Dielectric resistor	Between conductors	2000 V		
	Shielding conductors	1000 V		
Weight		113 kg / km	116 kg / km	76 kg / km
Certification - UL / CSA		Yes		

L10 - Intercod 15

L10.1 - General information

Intercod 15 is used to convert the 15-point HD encoder plug of UNIDRIVE SP into 15 flexible blade terminals.

L10.2 - Connection



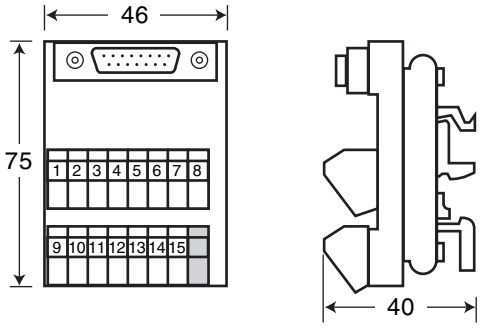
L10.3 - Characteristics

• Composition

The INTERCOD 15 interface is made of a connection cord and of an interface module.

Cord	Type	15 shielded conductors of 0,22 mm^2
	Drive side plug	Screw high density 15-point HD plug with shielding connected to pin 14
	Interface side socket	Screw standard 15-point HD socket with shielding connected to terminal box.
	Length	1.5m
Interface module	Mounting	On rail TS 35
	Terminals	Flexible blade terminals numbered from1 to 15 for a wire of 0.08 to 2.5 mm^2
	Shielding continuity	Green terminal connected to the terminal box of HD-15 plug for the connection of the use shielding.

• Sizes



Notes

UNIDRIVE SP
Maintenance

Contents

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Notes

UNIDRIVE SP
Maintenance

M1 - Introduction and warning

• All works related to installation , commissioning and maintenance must be carried out by experienced, qualied personnel.

• When a fault detected by the drive causes its powering down, mortal residual voltages are present on the output terminals and in the drive.

• Before carrying out any work, disconnect and lock the drive power supply and wait 10 min before unloading the capacitors.

• Check that the continuous bus voltage is lower than 40V, before carrying out any work.

• During the operations of maintenance of the powered up drive, the operator must stay on an insulated surface, not connected to earth.

• During the works on a motor or on its power supply cables, check that the drive power supply is disconnected and locked.

• During the tests, all the protective covers must be maintained in place.

The drive maintenance and fixing operations to be carried out by user are significantly low. Hereinafter are presented the current servicing operations as well as the simple methods destined to the check-up of the drive operation.

M2 - Servicing - Measurements - Tests

M2.1 - Servicing

All drive may encounter problems as result of the exposure to a too high temperature, to humidity, oil, dust or after any intrusion of foreign bodies.
The built-in circuits and their components do not need normally any maintenance. Contact your vendor or the closest certified repairer in case of damage.

DO NOT DISMANTLE THE BUILT-IN CIRCUITS DURING THE PERIOD OF WARRANTY. IT BECOMES IMMEDIATELY INVALID.

Do not touch the built-in circuits or the micro-processor with the fingers or with loaded or powered up materials. Connect yourself to earth and connect also the bench or the iron to be welded for any intervention on circuits.

If the drive stocking exceeds 12 months, the drive must ne powered up for 24 hours, then this operation must be repeated all 6 months.

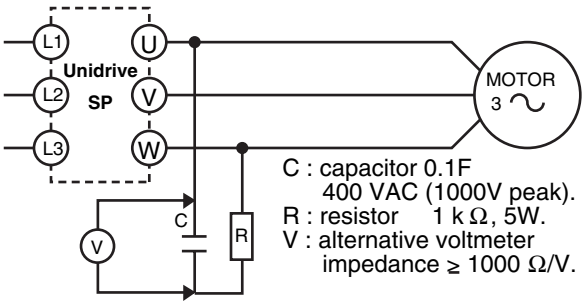
Periodical check-ups :

Ambient temperature	Check that the temperature inside the cabinet is correct.
Dust	Check that the heater and the drive fan are not obstructed by dust. The drive length of life will be reduced if it operates in dusty environments.
Humidity	Check that there is no condensation inside the cabinet.
Cabinet door filters	Check that the air flows normally through the filters.
Tightening	Check that all terminals remain correctly screwed.
Crimped terminals	Check that the the crimping does not change the colour; this may indicate an abnormal overheating.
Cables	Check that the cables are not damaged.

M2.2 - Voltage, current and power measurements

• Voltage measurement on the drive output

The harmonics due to the drive make impossible a correct measurement of the voltage on the motor input, by means of a classic voltmeter. However, we may obtain a value close to the efficient voltage of the fundamental wave (the one influencing the torque) by using a classic voltmeter and the mounting described in the figure below.



• Motor current measurement

The current consumed by the motor and the drive input current may be measured similarly due to classic mobile frame ampermeter.

• Drive input and output power measurement

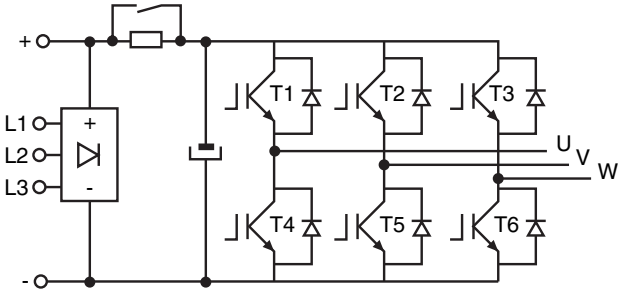
The drive input and output powers may be measured by using and electrodynamic device.

M2.3 - Power stage tests

• Preliminary remarks :

The tests exposed below are destined to make a qualitative test of the power stage status. Use a multimeter in diode test and make the measurements after having powered down the drive and after having waited for full unload of the filtering capacitor. (about 10 min). Each measurement must last at least 10 seconds in order to avoid the false readings due to the loads that may be still present in the drive circuits. In case of doubt regarding the power stages, check visually the status of the basic command modules that may have been damaged due to the above-mentioned.

The figure below shows the scheme of the general principle of the drive undulating device with transistors.



• Test by means of the terminal block

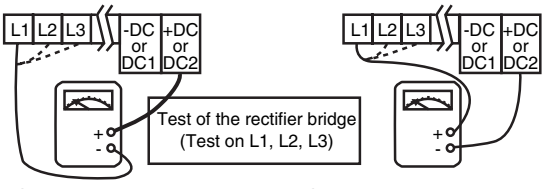
This test is quite brief. A positive response does not necessarily means that the power stages are correct. However, a negative response shows generally that these ones are damaged.

Use the terminals L1, L2, L3 and U, V, W and the terminals -DC, +DC (size 1) or DC1, DC2 (sizes 2 and 3) of the power terminal blocks.

CAUTION :

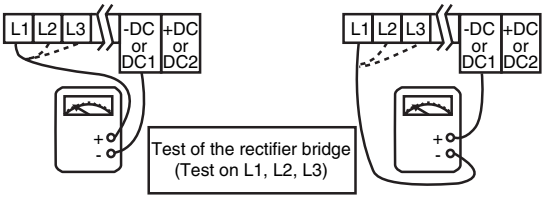
For the sizes 2 and 3 do not make measurements on the current terminal block, make +DC, -DC.

The power continuous bus may be found on the terminal block DC1, DC2, BR.



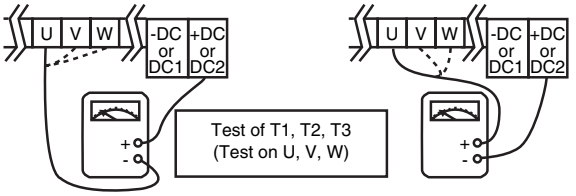
• Sizes 1 to 3 : reading

• Sizes 1 and 2:reading 0.3V to 0.6V
• Size 3 :reading L2, L1
reading L3 0.3V to 06V



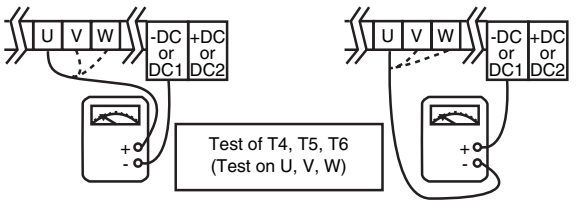
• Sizes 1 to 3 : reading

• Sizes 1 to 3 :reading 0.3V to 0.6V



• Sizes 1 to 3 : reading

• Sizes 1 to 3 :reading 0.3V to 0.6V



• Sizes 1 to 3 : reading

• Sizes 1 to 3 :reading

M3 - Repairs - Exchanges

• List of spare parts

Consult LEROY-SOMER

• Exchange of products

CAUTION :

The products must be returned in their original package or, if impossible, in a similar package, in order to avoid their damaging. Otherwise, the guarantee may be refused.

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