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Mains synch.

feedback

& Gate drive

ADC

ADC

Microcontroller

Rx
Tx

RAM

EPROM

EEPRO

uts

ack

DIGISTART STV 2313

Electronic Soft starter

Installation and maintenance

Electronic soft starter
DIGISTART STV 2313

NOTE

LEROY-SOMER reserves the right to modify the specifications of its products at any time in order to incorporate the latest technological developments. The information enclosed in the present document may therefore change without notice.

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⚠ CAUTION

For safety of people or goods, the soft starter must not be used for hoisting purposes.
For the own safety of the user, this soft starter must be connected to an approved earth (terminal B).

If an accidental start of the installation represents a risk for personnel or the machines to be driven, it is imperative that the power supply of the drive is fitted with an isolating switch and a circuit-breaking device (power contactor) controllable through an external safety system (emergency stop, fault detector).

The soft starter is fitted with safety devices which can stop the controller in the event of faults and thus stop the motor. The motor itself can be jammed for mechanical reasons. Finally, voltage fluctuations, and particularly power cuts, can also cause the motor to switch off.
The cure of the causes of the shutdown can lead to restarting, which may be dangerous for certain machines or installations.
In such cases, it is essential that the user makes appropriate arrangements against restarting after unscheduled stops of the motor.

The soft starter is a component designed for integration within an installation or an electrical machine : it is therefore of the responsibility of the user to make sure the system complies with current standards.

LEROY-SOMER declines all responsibility whatsoever should the above recommendations not being complied with.

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SAFETY AND OPERATING INSTRUCTIONS CONCERNING soft starter
(According to low voltage directive 73/23/CEE modified by 93/68/CEE)

⚠ **• Throughout the manual, this symbol warns against consequences which may arise from inappropriate use of the soft starter, since electrical risks may lead to material or physical damage as well as constitute a fire hazard.**

1 - General

According to their degree of protection, soft starters can during operation comprise bare live parts, sometimes moving or rotating, as well as hot surfaces.

Unjustified removal of protections, incorrect use, faulty installation or inappropriate operation could represent a serious risk to personnel and machinery. Refer to the manual for additional information.

Any work related to transportation, installation, commissioning and maintenance must be carried out by experienced and qualified personnel (see CEI 364 or CENELEC HD 384, or DIN VDE 0100 and national specifications for installation and accident prevention).

According to these basic safety instructions, qualified personnel means persons competent to install, mount, commission and operate the concerned product and possessing the relevant qualifications.

2 - Use

Soft starters are components designed for integration within an installation or an electrical machine.

When integrated in a machine, commissioning is forbidden as long as conformity with Directive 89/392/CEE (Machinery Directive) has not been checked. It is also necessary to comply with standard EN 60204, which especially stipulates that electrical actuators (which include soft starters) cannot be regarded as circuit-breaking devices and by no means as isolating switches.

Commissioning can take place only if the requirements of the Electromagnetic Compatibility Directive (89/336/CEE, modified by 92/31/CEE) are fulfilled.

Soft starters fulfil the requirements of the Low Voltage Directive 73/23/CEE, modified by 93/68/CEE. The harmonized standards of the DIN VDE 0160 series in connection with standard VDE 0660, part 500 and EN 60146/VDE 0558 are also applicable.

Technical specifications and instructions concerning connection conditions specified on the rating plate and in the supplied documentation must absolutely be respected without fail.

3 - Transportation, storage

All instructions concerning transportation, storage and correct handling must be respected.

Climatic conditions specified in the technical manual must be respected.

4 - Installation

Installation and cooling of equipment must comply with the specifications stated in the manual supplied with the product.

Soft starters must be protected against excessive stress. More particularly, avoid any damage to parts and/or modification of insulation distances between components during transportation and handling. Avoid touching electronic components and contact parts.

Soft starters include parts which are sensitive to electrostatic stress and can easily be damaged if handled incorrectly. Electrical components must not be exposed to mechanical damage or destruction (possible risks to health !).

5 - Electrical connection

When work is carried out on the powered-up soft starters, national specifications for accident prevention must be respected.

Electrical installation must conform with the appropriate specifications (for instance wire section, protection with circuit-breaking fuse, connection of protective conductor). Refer to the documentation for more detailed information.

Instructions for an installation complying with electromagnetic compatibility requirements (such as screening, earthing, presence of filters and correct mounting of cables and conductors) are outlined in the documentation supplied with the soft starter. These instructions must always be respected even if the speed controller has the CE mark. The manufacturer of the installation or of the machine is responsible for the conformity with the limits given in the EMC legislation.

6 - Operation

Installations incorporating soft starters must be fitted with additional protection and monitoring equipments specified in the current relevant safety regulations, such as law on electrical equipment, specifications for accident prevention, etc… Modifications to soft starters using control software are allowed.

After the soft starter has been powered down, active parts of the equipment and live power connections must not be touched immediately as the capacitors may still be charged. In view of this, refer to the warnings marked on the soft starters.

During operation, all doors and protections must remain closed.
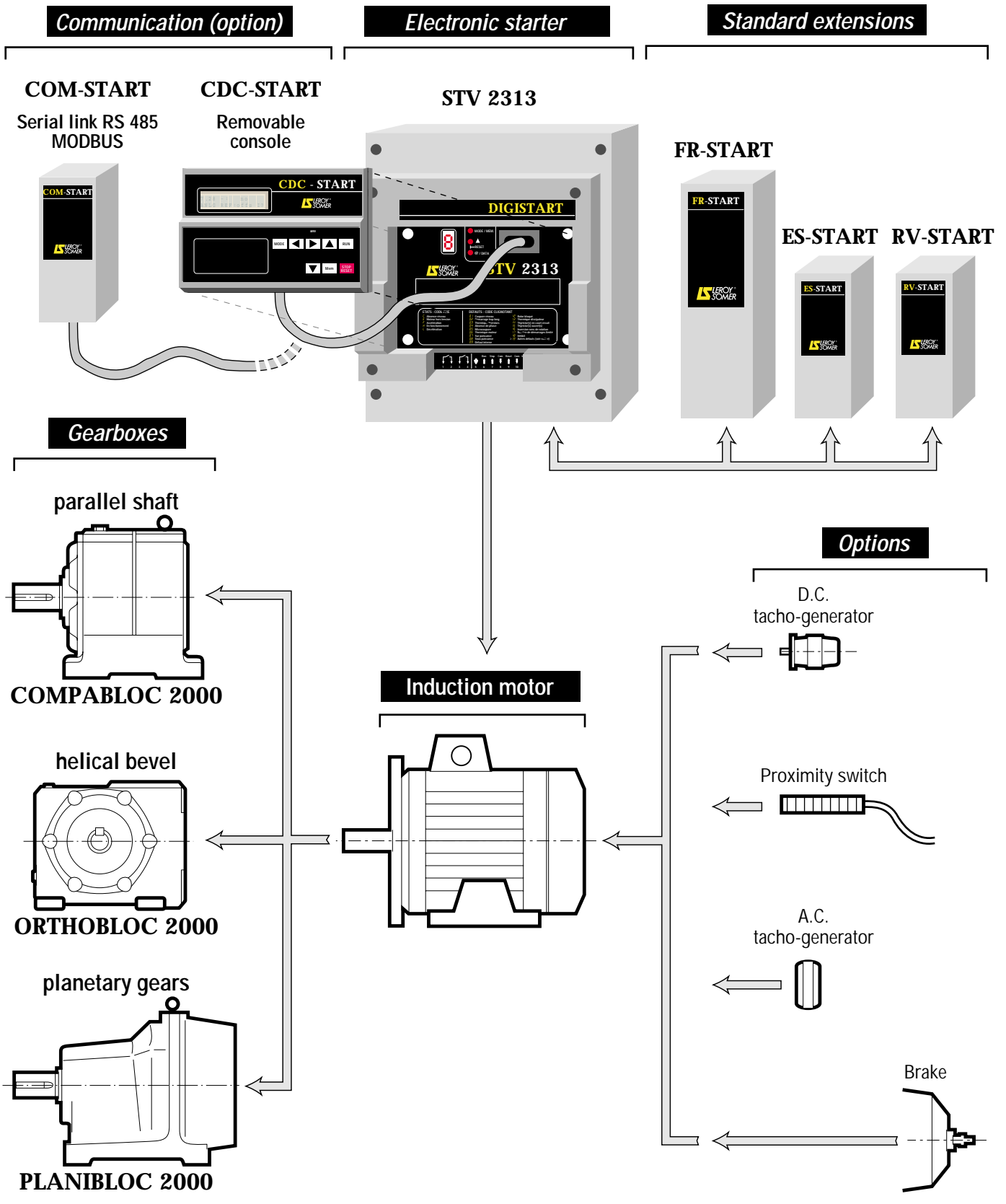
7 - Service and maintenance

Refer to the manufacturer's documentation.

This document must be forwarded to the end user.

PREFACE

This manual describes how to commission the **DIGISTART STV 2313** digital starter. It gives details of all procedures which should be adopted when working on the starter and shows extension options.

Communication (option)

COM-START

Serial link RS 485
MODBUS

CDC-START

Removable console

Electronic starter

STV 2313

Standard extensions

FR-START

ES-START **RV-START**

Gearboxes

parallel shaft

COMPABLOC 2000

helical bevel

ORTHOBLOC 2000

planetary gears

PLANIBLOC 2000

Induction motor

Options

D.C.
tacho-generator

Proximity switch

A.C.
tacho-generator

Brake

4

Electronic soft starter
DIGISTART STV 2313

CONTENTS

1 - GENERAL INFORMATION

1.1 - General operating principle

The DIGISTART is a multi-function electronic system controlled by a 16 bit microcontroller designed for use with **all three phase cage induction motors.**
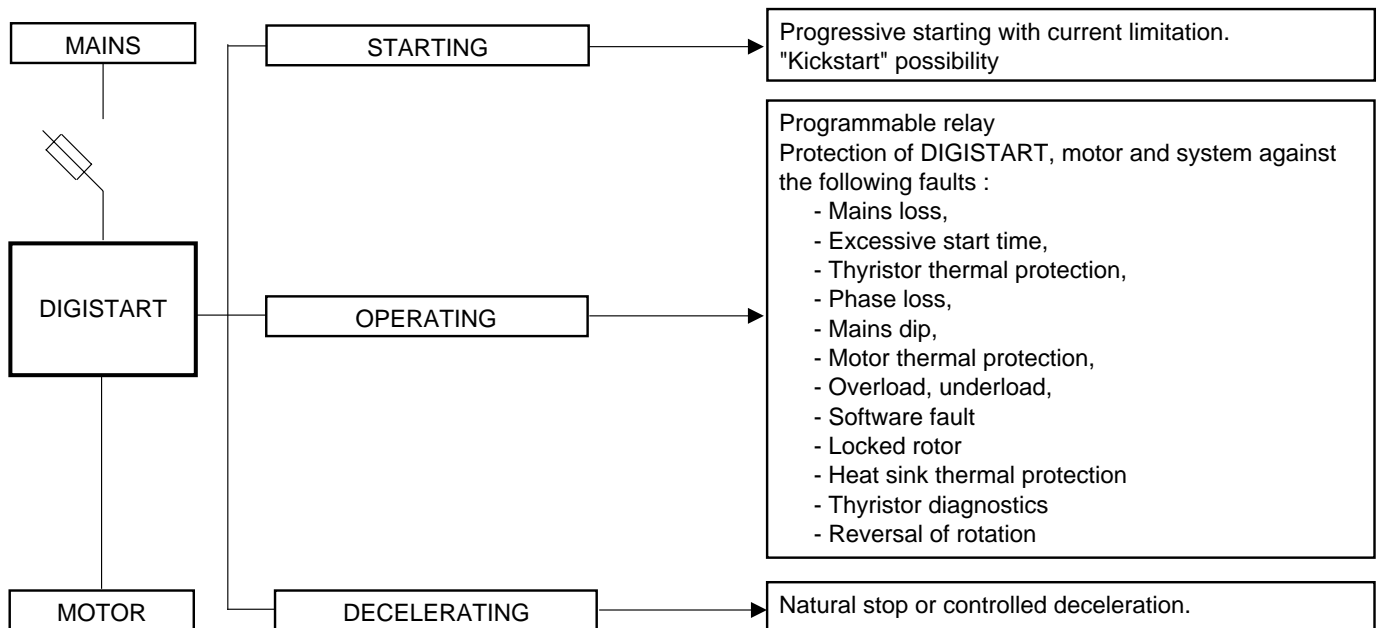
It ensures progressive starting with :
- Reduced starting current,
- Smooth and steady acceleration obtained by monitoring the current absorbed by the motor

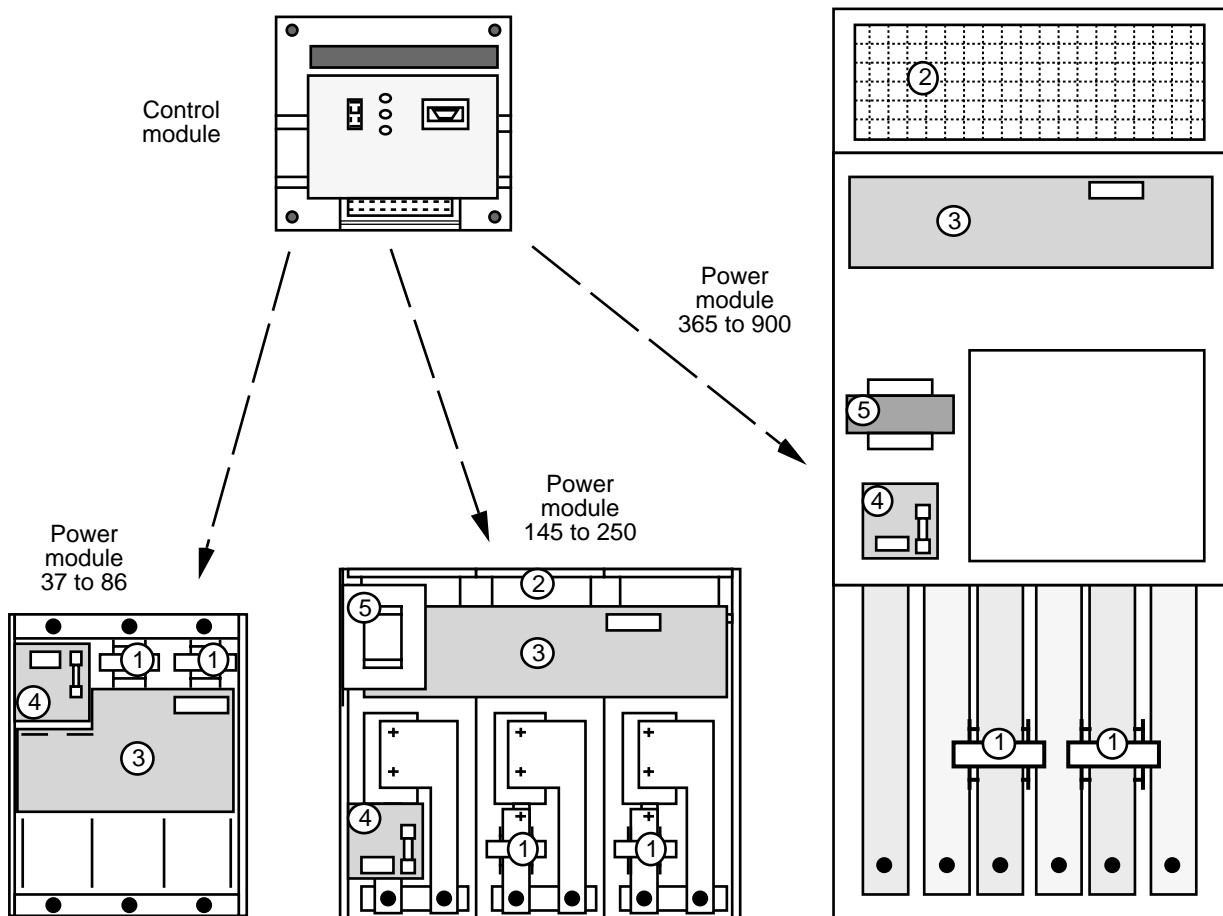Extra DIGISTART functions by the addition of several option possibilities

After start-up, the DIGISTART provides the **additional features** described below:

1.1.1 - Functional block diagram

Block diagram:

- MAINS → DIGISTART → MOTOR
- STARTING → Progressive starting with current limitation. "Kickstart" possibility
- OPERATING → Programmable relay
  Protection of DIGISTART, motor and system against the following faults :
  - Mains loss,
  - Excessive start time,
  - Thyristor thermal protection,
  - Phase loss,
  - Mains dip,
  - Motor thermal protection,
  - Overload, underload,
  - Software fault
  - Locked rotor
  - Heat sink thermal protection
  - Thyristor diagnostics
  - Reversal of rotation
- DECELERATING → Natural stop or controlled deceleration.

1.1.2 - Construction

Control module

Power module 365 to 900

Power module 145 to 250

Power module 37 to 86

1.1.3 - Description :
The DIGISTART STV 2313 comprises :
- 1 power module depending on rating,
- 1 identical control module for the whole range.

The **power module** has the following components :
- 6 power thyristors mounted on a heatsink ;
- 1 forced ventilation (ref. 2) and its supply, for the cooling (*) ;
- 1 or 3 thermal probes mounted on the heatsink to protect the thyristors (*) ;
- 2 current transformers (ref. 1) for protection and current regulation ;
- 1 power board (ref. 3) for the thyristor gate drive, mains measurement and control board interface ;
- 1 control electronics supply board (ref.4) with fuse and connection terminals ;
- 1 autotransformer (ref. 5) for forced ventilation supply (**).

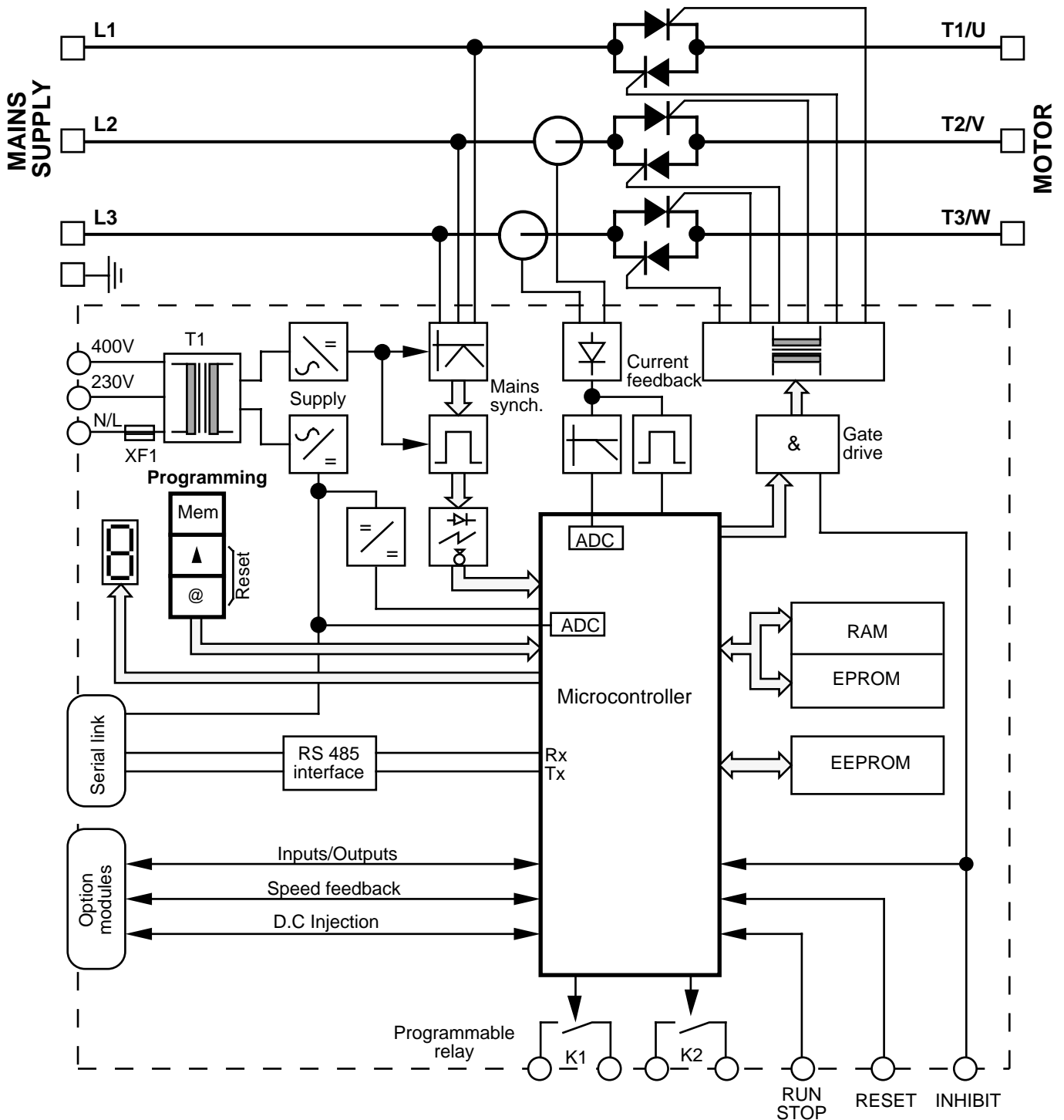The **control module** contains a board which mainly comprises :
- the remote control connection terminals,
- the output relays,
- the microcontroller and its peripherals,
- the electronic regulation circuits,
- 3 setting pushbuttons,
- 1 seven segment display
- the serial link.

(*) : except STV 2313. 37.

(**) : for STV 2313 ≥ 145.

1.1.4 - Operating diagram

1.1.5 - Setting and operating mode

- The basic version of the DIGISTART has a minimum of settings and is adjusted by a 3 pushbutton keypad. Its operation is made easy by a 7 segment display of parameters and their values.

- An optional console extends the DIGISTART's functions and transforms the basic product into a very sophisticated top of the range starter. Programming, diagnostics and parameter visualization are made via an alpha-numeric 32 digit LCD display.

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1.2 - General designation of the DIGISTART

Example : STV 2313 - 14 60
- STV 2313 = DIGISTART Generation 3
- 14 = Mains voltage code, with
  - 14 : 208 V to 500 V
  - 16 : 500 V to 690 V

- 60 = Current rating code, with
  - 37 = 37A
  - 60 = 60A
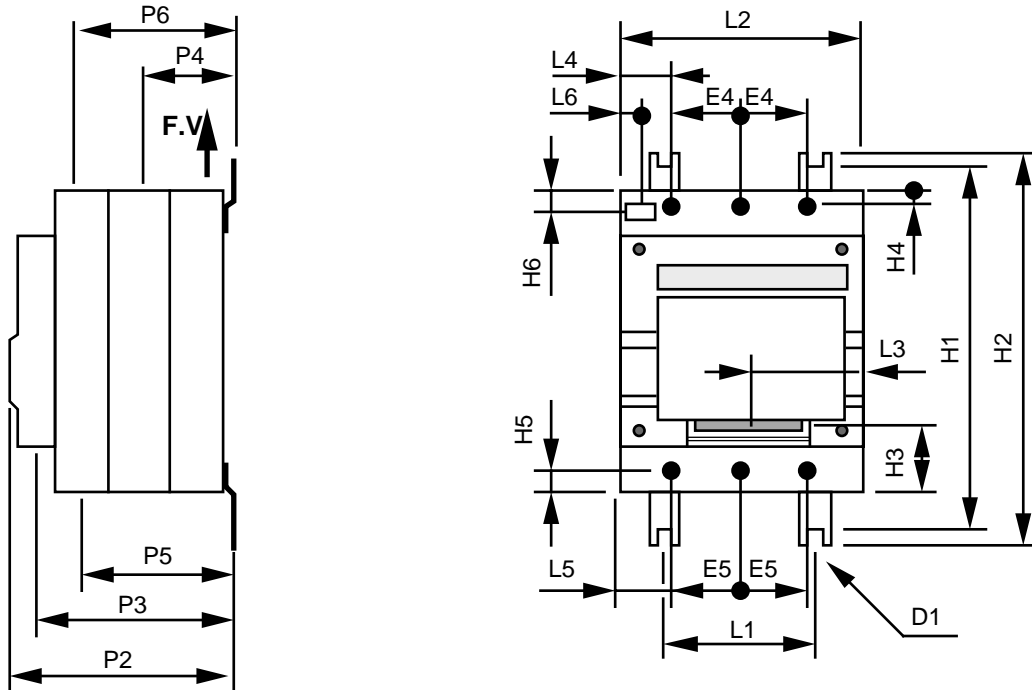 - ....
  - 900 = 900A

1.3 - Main characteristics

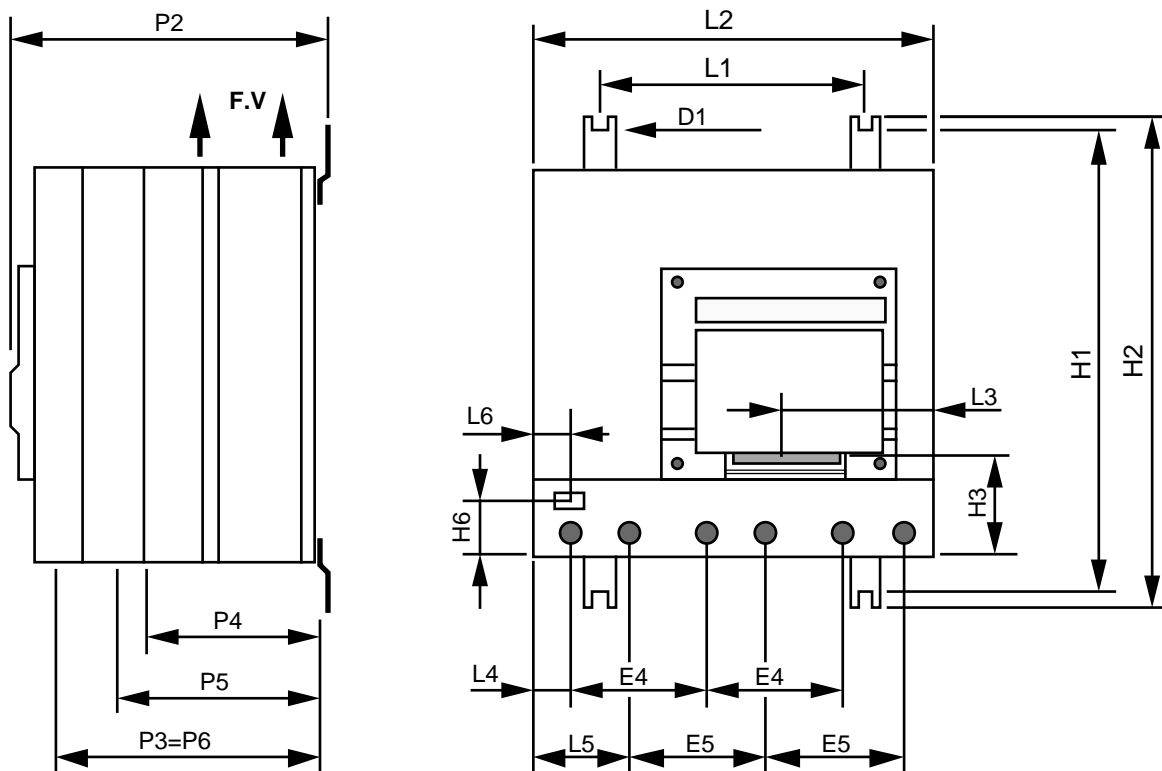| RATING	37	60	86	145	211	250	365	530	700	900
Power stack supply										
Voltage	2 possibilities - Code 14: 208V to 480V (-15% +10%) three-phase - Code 16: 500V to 690V (-15% +10%) three-phase									
Frequency	Self-adjusting 50/60 Hz ± 5%									
Control supply	Separate input from power stack									
Voltage	230V (-20% +15%) or 400V (-15% +10%) single phase									
Frequency	Self-adjusting 50/60 Hz ± 5%									
Consumption	30VA	80VA	80VA	150VA	150VA	150VA	250VA	250VA	250VA	250VA
Operating conditions										
Rated motor current In	37A	60A	86A	145A	211A	250A	365A	530A	700A	900A
Maximum Nb of starts per hour at 3 In	10	10	10	10	10	5	5	5	5	5
Maximum start time at 3 In	30s	30s	30s	30s	20s	20s	20s	20s	20s	20s
The DIGISTART rating can be inferior to the rated motor current, provided that the operating conditions are less severe than those given above										
Environmental conditions										
Ingress protection	IP 00									
Electromagnetic compatibility and susceptibility	Immunity : complies EN 50082-1 / EN 50082-2 (see § 3.8). Conducted and radiated emissions : complies EN 55011 (see § 3.8).									
Ambient temperature	From -0°C to +40°C.									
Maximum temperature	60°C Derating of 1.2% per °C above 40°C									
Storage temperature	from -20°C to +60°C									
Altitude	Less than 1000 metres Derate current by 0.5% for each 100 m above 1000 m									
Relative humidity (non condensing)	In accordance with IEC 68-2-3 and IEC 68-2-30									
Shock	In accordance with IEC 68-2-27									
Vibration	In accordance with IEC 68-2-6									
Serial link	RS 485 serial communication to optionnal : - remote keypad or - modbus module.									

1.4 - Dimensions and weight
1.4.1 - DIGISTART dimensions

• STV 2313 : 37, 60, 86.

• STV 2313 : 145, 211, 250.

• STV 2313 : 365, 530, 700, 900.

AIR FLOW

P3=P6

P5
P4
P2

L2
L1
D1
H1
H2
L6
L3
H1
H6
H3
H4=H5
50
E5 E5 L5
E4 E4 L4
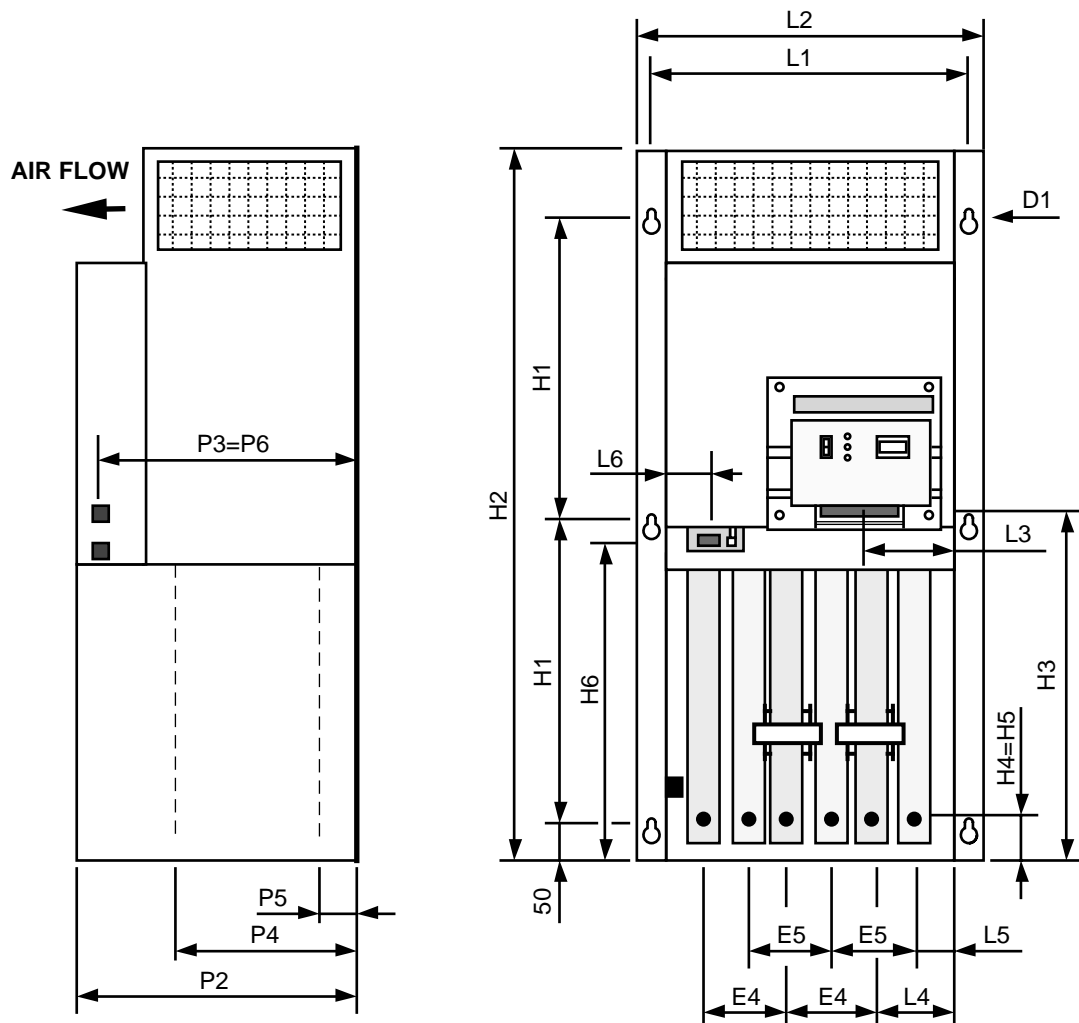
1.4.2 - Table of dimensions (mm) and weight

Rating	STV 2313	37	60	86	145	211	250	365	530	700	900
Mounting	H1	336	350	350	385	385	385	300	300	300	300
	L1	169	168	168	240	240	240	410	410	410	410
Screw Ø	D1	6	6	6	6	6	6	12	12	12	12
Overall	H2	355	370	370	405	405	405	803	803	803	803
	P2	235	235	235	265	265	265	365	365	365	365
	L2	220	220	220	370	370	370	445	445	445	445
Control terminal	H3	50	50	50	90	90	90	340	340	340	340
block	P3	190	190	190	240	240	240	360	360	360	360
	L3	100	100	100	140	140	140	120	120	120	120
Mains	H4	15	15	15	20	20	20	42	45	45	45
Power supply	P4	65	65	65	165	165	165	210	247	247	247
Connection	E4	65	65	65	120	120	120	85	99	99	99
L1, L2, L3	L4	45	45	45	50	50	50	110	97	97	97
Motor	H5	15	15	15	20	20	20	35	38	38	38
Power supply	P5	65	120	120	185	185	185	47	43	43	43
Connection	E5	65	65	65	120	120	120	85	99	99	99
T1/U, T2/V, T3/W	L5	45	45	45	90	90	90	60	37	37	37
Control electronic	H6	25	25	25	40	40	40	300	300	300	300
Supply	P6	150	150	150	240	240	240	360	360	360	360
Connections	L6	35	35	35	50	50	50	40	40	40	40
N/L-230V-400V											
Weight	(kg)	9	9	9	25	25	25	55	55	65	65

2 - MECHANICAL INSTALLATION

⚠ • **The owner or user is responsible for making sure that installation, operation and service of the soft starter and its options comply with legislation relating to the safety of machinery and personnel, and with current regulations of the concerned country.**

• The soft starter must be installed in an environment free from conducting dust, fumes, corrosive fluids and gases and from condensation (for instance class 2 according to UL 840 and CEI 664.1).
The soft starter must not be installed in a hazardous area unless it is enclosed in a specially adapted cubicle. In this case the installation must be certified.

• Whithin atmospheres subject to condensation, it is necessary to install a heating system which functions when the soft starter is not in use and is disconnected when the controller is operating. Ideally this heating system should be controlled automatically.

• The housing of the STV 2313 is not fireproof : therefore it might be necessary to use a fireproof cubicle.

2.1 - Inspection on arrival
Before installation, check :
- that the equipment has not been damaged in transit (if damage has occurred, inform the carrier accordingly).
- that the mains supply voltage is compatible with the DIGISTART.

2.2 - Unpacking
During unpacking, the DIGISTART should never be manœuvered by means of any items of circuitry, terminal blocks or wiring.
Handling should always be carried out using the correct equipment (webbing, slings, lifting rings,…)

2.3 - Installation precautions
The DIGISTART is wall mounted. Install in a vertical position and observe the following precautions :

- When the DIGISTART is installed in a cabinet, particular care should be taken to ensure the airflow necessary for cooling. To achieve this, a sufficient space should be left around the DIGISTART, particularly around air intakes and outlets.
Leave around 10 cm above and below for 37 to 250 ratings. Leave around 15 cm below and 15 cm each side of the upper part of the forced ventilation for 365 to 900 ratings.

- Before fixing the DIGISTART in place, ensure that the position selected is protected against dust, corrosive vapour, water splashes, vibration, direct sunlight.

- The installation should be carried out with care. Distortion or severe jolting could damage parts of the main circuit.

- Leave sufficient access around the DIGISTART to facilitate connection.

- When the DIGISTART is installed in a cabinet, ensure that ventilation is sufficient to remove excess heat.

| DIGISTART rating	37	60	86	145	211	250	365	530	700	900
Losses (W)	135	210	300	570	720	800	1500	2250	3000	4000
F.V flow rate (l/s)	0	21	21	130	130	130	220	220	300	300

WARNING ! :
In some specific circumstances, the temperature of the casing of STV 2313 37 to 86A may reach 70°C.

- In cases where several DIGISTART are used, these should be mounted side by side to prevent overheating, with at least 10 cm of space between each DIGISTART.

2.4 - Mounting
The 37 to 250 rating DIGISTART are delivered with a set of mounting feet.
Slide the feet into the grooves provided on the heatsink. It may be necessary to punch the heatsink to hold the feet in place and help handling during DIGISTART cabinet - mounting.

Punching point
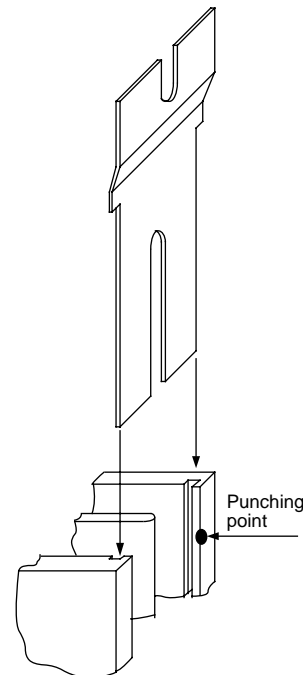
- For mounting purposes of STV 2313 365 to 900A, lifting eyes are delivered with the DIGISTART. They must be used for handling the soft starter.

- Lifting equipement must be adapted to the weight of the soft starter (see table 1.4.2).

3 - CONNECTIONS

⚠ **• All connection works must be carried out according to the current legislation of the concerned country. This includes earthing or grounding in order to make sure that no directly accessible part of the controller can remain at mains potential or any other voltage that may be hazardous.**

• The voltages existing on the wires or connections to the mains, the motor, the braking resistor or the filter, may cause fatal electric shocks. Avoid contact in any case.

• The soft starter must be supplied through a circuit-breaking device in order to disconnect it safely.

• The soft starter power supply must be protected against overloads and short-circuits.

• The stop function of the soft starter does not protect against the high voltages existing on the terminal blocks.

• After the power supply has been cut off, wait for 1mn before removing protective cover.

• Make sure that voltage of DC bus is lower than 40V before any work is carried out.

• Check that voltage and current of soft starter, motor and mains are compatible.

3.1 - General recommendations

- Do not connect any power capacitor between the DIGISTART output and the motor.
- Use twisted wires for control power supply.
- Use RC circuits on the coils of the relays or contactors controlled by the DIGISTART outputs.
- Avoid running the control wires and power cables in the same conduit.
- The connections to the control board must be made using screened stranded cable. The screen must be connected to the earth terminal of the DIGISTART (at one end only).
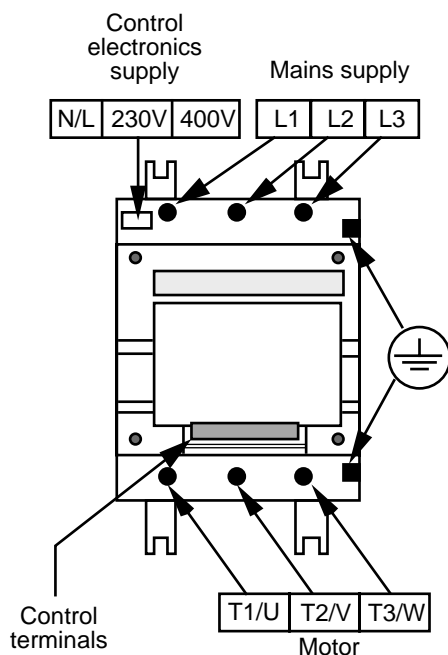
WARNING ! :
The wires and cables connected to the control and power terminals of the DIGISTART must be able to withstand 105°C.
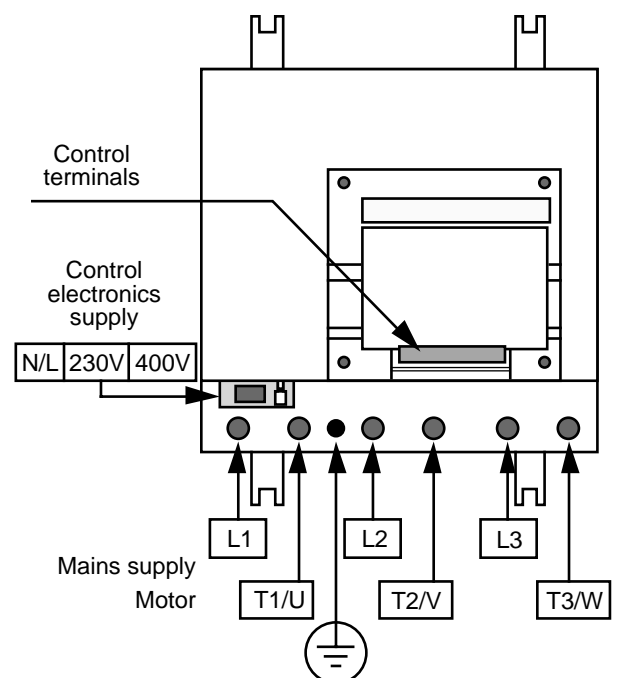

3.2 - Terminal blocks
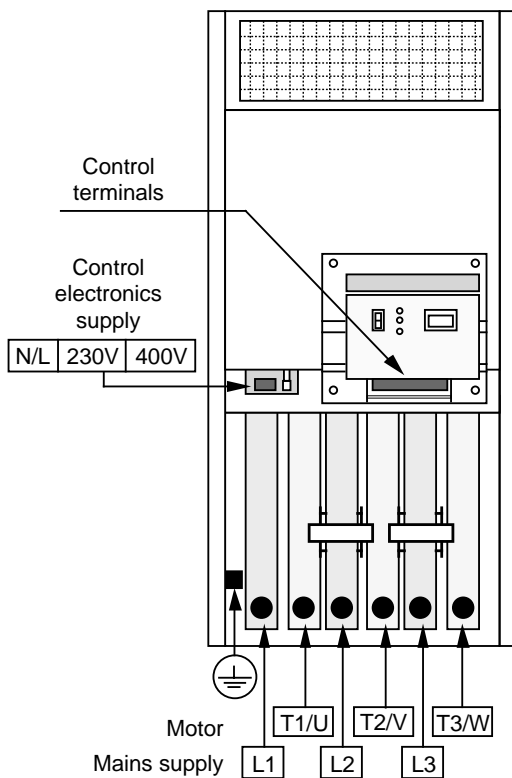The location of the terminal blocks depends on the DIGISTART rating

3.2.1 - DIGISTART 37 to 86

3.2.2 - DIGISTART 145 to 250

3.2.3 - DIGISTART 365 to 900

Control terminals

Control electronics supply

| N/L | 230V | 400V |

Motor

Mains supply L1 L2 L3

T1/U T2/V T3/W

3.3 - Power connections

⚠ • **The user is responsible for connecting and protecting the soft starter according to current legislation and regulations of the concerned country. This is particularly important for the size of cables, the type and size of fuses, the connection to earth or ground, the power cut-out, the fault clearance, the insulation and protection against overcurrent.**

 • **The following tables are given as an indication, and can by no means serve as a substitute for current standards.**

3.3.1 - Power terminals

a) Description

Power connections comprise : 3 input terminals ; 3 output terminals and 1 earth terminal.

Reference	Designation	Function
L1, L2, L3	DIGISTART Input	Three phase power supply according to characteristics (section 1.3)
T1/U, T2/V, T3/W	DIGISTART output	Motor (s) supply
⏚	Earth	DIGISTART casing earth connection

b) Connection characteristics depending on DIGISTART rating :

37, 60, 86 .... M6
145, 211, 250 .... M8
365, 530, 700, 900   M12

3.3.2 - Cross-section of power supply and motor cables

Connected to L1, L2, L3 and T1/U, T2/V, T3/W respectively.

Rating	Cross-section in mm² (separate stranded cable)											
	6	10	16	25	35	50	70	95	120	150	185	240
37	98	160	255	390	520	690						
60			170	260	355	465	640	840				
86			175	235	310	430	565	670	770			
145							240	315	375	430	510	600
211		Temperature rise limit							250	290	340	400
250										250	290	345
	Maximum cable lengths, in metres, for a voltage drop of 5%											

This table must in no way be used to replace currently applicable standards and text. For higher ratings, consult your usual cable supplier

3.3.3 - Cross-section of earthing cable

(following NF C 15-100 standards)

Power cable cross- section of S	Less than 16 mm²	From 16 to 35 mm²	Greater than 35 mm²
Cross-section of earthing cable	= S	= 16mm²	= 0.5 S

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3.3.4 - U.R. fuses (high speed fuses) definition

- Despite the rapid response time of the electronics, the thyristors must be protected against short-circuit by installation of correctly sized high speed fuses. Otherwise the power bridge can be destroyed by such short circuits.

- The U.R. fuse ratings are determined by the starting duty and the thyristor I^2t.

Rating	Characteristics	BUSSMANN Ref.
37	125A / 660V	170 M 3463
60	160A / 660V	170 M 3464
86	200A / 660V	170 M 3465
145	315A / 660V	170 M 3467
211	400A / 660V	170 M 3469
250	500A / 660V	170 M 3471
365	700A / 660V	170 M 6461
530	900A / 660V	170 M 6463
700	1400A / 660V	170 M 6467
900	1500A / 660V	170 M 6468
	Associated microswitch	170 H 0069

N.B. :

- The above references are liable to change to take into account latest developments and cannot be considered contractually.
- For 37 to 250 ratings, see section 7.5 - Power fuses UR-START, for 365 to 900 ratings, fuses are mounted as a standard on the DIGISTART.

3.4 - Control electronics supply connections

⚠ **• Control power supply must be protected by using 2 fuses type GI 3.15 A.**

3.4.1 - Terminal block description

Comprises 3 screw terminals which accept stranded cable of 2.5mm² maximum cross-section :

Reference	Function	Electrical character.
N/L - 230V	Control electronics	230V ± 10% 50/60Hz single phase supply
N/L - 400V	and fan supply	400V ± 10% 50/60Hz single phase supply

3.4.2 - Cable cross-section

- 37 to 250 ratings : 1.5mm²
- 365 to 900 ratings : 2.5mm²
Use twisted cable for connections.

3.4.3 - Preselection link

For **37, 60 and 86 ratings,** ensure that the preselection link for the required supply voltage is correctly positioned, check also that the supply is connected to the correct terminals. The preselection link is situated on the printed circuit board, near the control electronics supply terminal block.
The DIGISTART is delivered with the link in the 400V position.

Supply transformer board
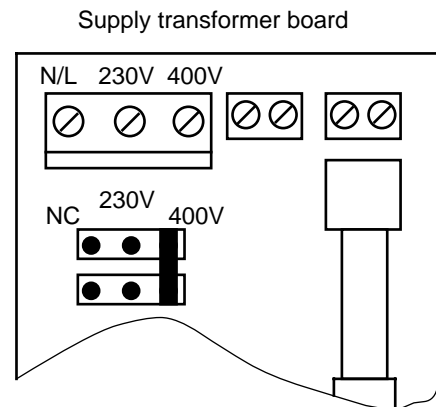
3.4.4 - Earth connection

The earth connection must be made at the product's general earthing point (PE)

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
3.5 - Remote control connections

3.5.1 - Terminal block description

Located at the bottom of the control module. The terminal block comprises 12 screw terminals which accept stranded cable of 2.5 mm^2 maximum cross-section

3.5.2 - Terminal designation

	Reference	N° of terminal	Designation	Function/Characteristic
Outputs		1 2	K1 relay ∗ Normally closed - Open on trip	Max. voltage 250V AC Switching power : 3A non inductive load
		3 4	K2 programmable output relay	
Inputs	⏚	5	Ground terminal	Connection of shielding

	Run
	Stop
	Com
		6
		7
		8
			Run - stop control
			inputs
				For permanent connection:
				   6-8 linked
				   7-8 run command: C = Run
				                                 O = Stop
				
				For momentary action:
				   6-8 Run command momentary close
				   7-8 Stop command momentary open

	Reset	9	Trip reset input	Momentary close terminals 9 and com.
	Com	10	Common terminal	Electronic reference voltage
	Inhibit	11	Emergency stop input	Emergency stop on opening of the link between terminals 11 and common. Immediate and direct inhibiting of thyristors
	⏚	12	Ground terminal	Connection of shielding

∗ This relay becomes programmable using the optionnal remote keypad.
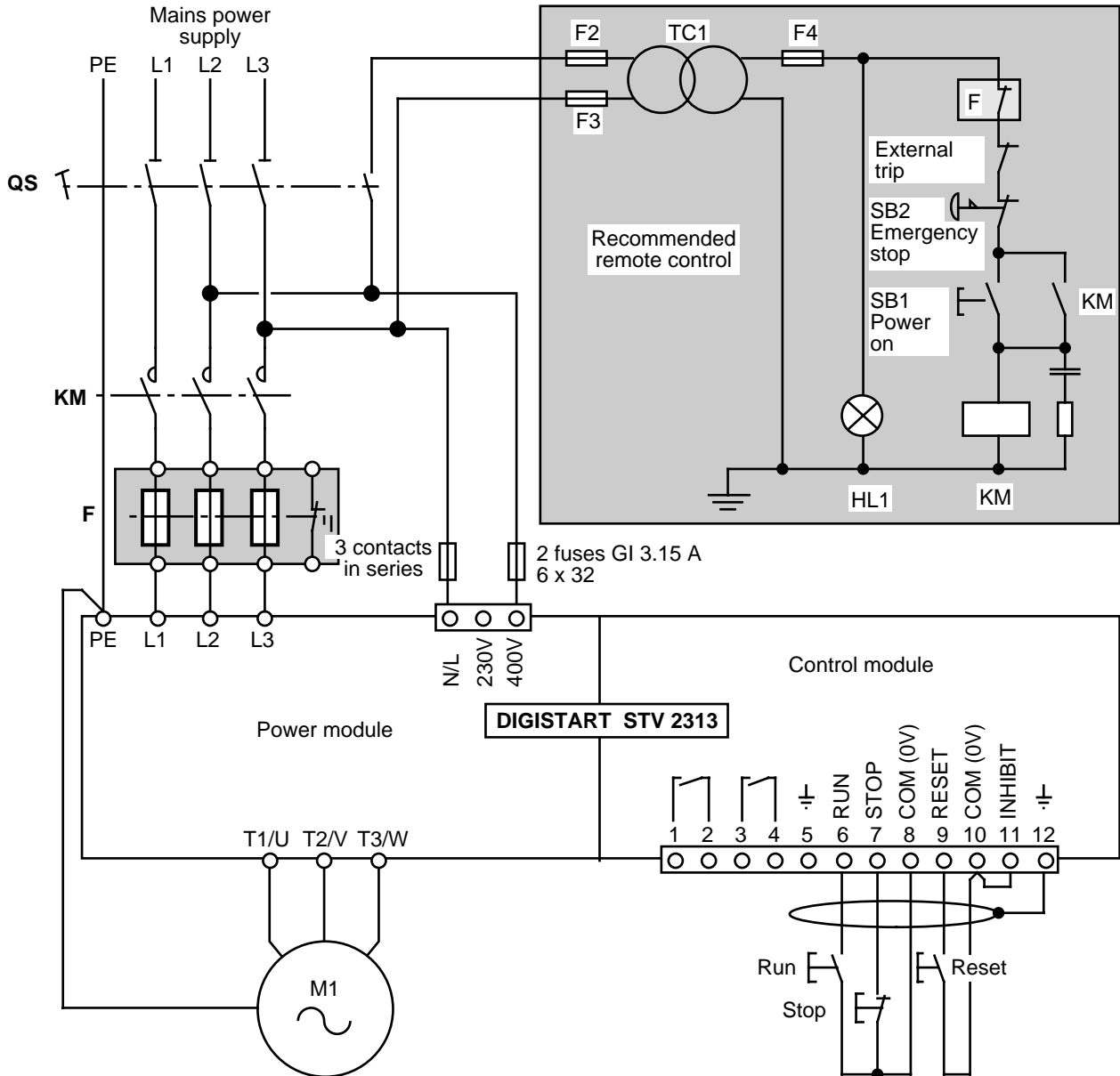
3.5.3 - Cable selection

Remote control connections should be made with shielded twisted cable, the shielding grounded at one end only, by connection to the ground terminal supplied.

3.6 - Standard connections
3.6.1 - Standard connection diagram
400 V mains supply, momentary Run/Stop control signals

3.6.2 - Recommandations

KM : The KM line contactor is used for powering up or powering down the DIGISTART's power stage. It is controlled by an external security circuit.

Note 1 : The motor control signals are given by Run-Stop push buttons connected to the control board terminal block (terminals 6.7.8).

Note 2 : The high speed fuses (U.R.) F are optional for 37 to 250 ratings. They are delivered with their mounting accessories (see section 7.5 and 7.6).

If high speed fuses are not used, the isolator QS should be replaced by a circuit-breaker.

The connections between the fuses and the DIGISTART. should be as short as possible.

The electronic supply can be given by the power supply, or by a separate supply. Connections are made to the terminals provided (N/L-230V - 400V).
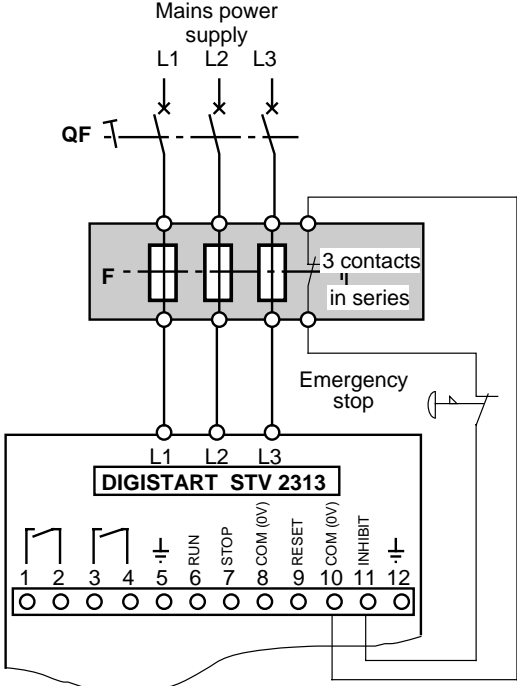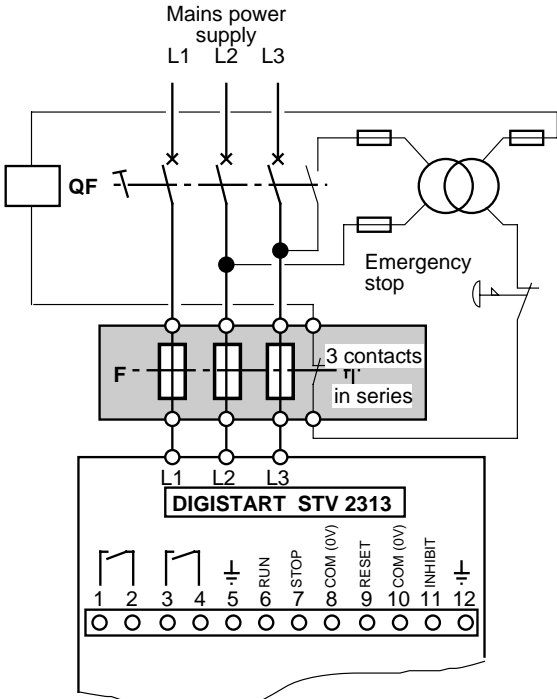
Control power supply must be protected using 2 fuses type GI 3.15 A (breaking capacity = 200 kA).

For the 37 to 86 ratings, position the link corresponding to the relevant supply voltage.
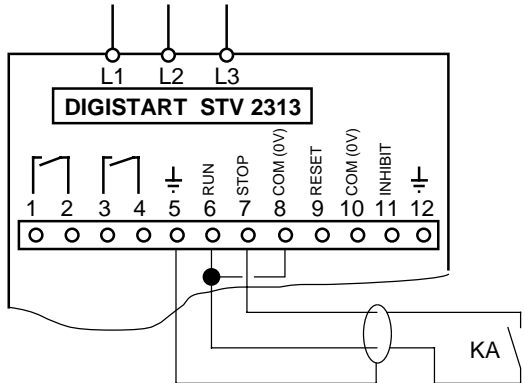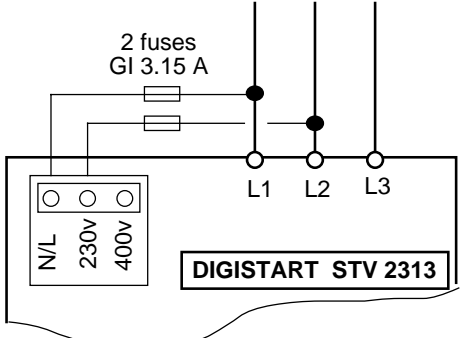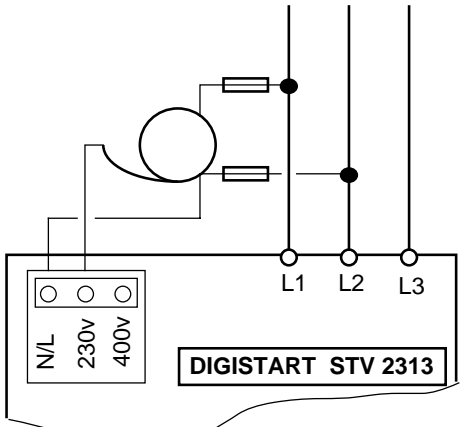
3.7 - Special connections
3.7.1 - Common examples

ALTERNATIVES	REMARKS
Using a manually controlled circuit-breaker (or a fused switch)	
	- It is possible to dispense with a line contactor, if a circuit breaker or a fused switch of suitable rating is used.
	- Opening the emergency stop input link directly inhibits the thyristors (without pasing via the microprocessor)
	- Rate the circuit breaker thermal protection so that the starting current and duration does not cause a trip.
Using a cirtuit-breaker equipped with a trip coil (or a fused switch)	
	- Use preferably a failsafe trip coil system.
	- The reset of the circuit-breaker or switch should be manual.
	- Set the circuit-breaker's thermal protection to take into account the starting current and duration.

ALTERNATIVES	REMARKS
Run/Stop control signals via self-maintained contact	

Run/Stop control signals via self-maintained contact

Link terminals 6 and 8 of the control module.

- Give run command via terminals 7 and 8 (KA closed = Run).

- **The control system must be designed so that the KA contact opens if there is a fault.**

230V three-phase mains supply

- Remove plastic obstruction from terminal 230V and use the N/L- 230V terminals for the control electronics supply connections.

- **Caution** : For 37 to 86 DIGISTART ratings, ensure link is in 230V position.

- It is preferable to connect the control power supply before the main contactor in order for the control board to remain energized while the power circuit is open.

Other mains supplies than 230V or 400V

- Use an auto-transformer to adapt the available supply to 230V. Remove plastic obstruction from terminal 230 V and connect the transformer output to the control electronics supply N/L-230V terminals.

- For auto-transformer sizing, refer to indicated consumptions (see section 1.3).

- Please consult LEROY-SOMER for the supply of an auto-transformer.

- **Caution** : For 37 to 86 DIGISTART ratings, ensure link is in 230V position.

- It is preferable to connect the control power supply before the main contactor in order for the control board to remain energized while the power circuit is open.

3.7.2 - Other connections

Other special connections are available on request, such as :
- Cascade starting of several motors with a single DIGISTART,
- Simultaneous control of several motors with a single DIGISTART,
- Control of 2 speed/2 winding motors,
- Control of 2 speed Dahlander motors,
- Control of a brake motor, etc.

3.8 - Radio-frequency interference
3.8.1 - Immunity
The DIGISTART STV 2313 complies with the international immunity standards.

Standard	Type of immunity	Application	Level
EN 61000-4-2	Electrostatic discharge	Housing of equipment	Level 3 (industrial)
EN 61000-4-3	Radiated radio frequency	Housing of equipment	Level 3 (industrial)
ENV 50140	Radiated radio frequency	Housing of equipment	Level 3 (industrial)
ENV 50141	Emitted radio frequency	Control and power cables	Level 3 (industrial)
EN 61000-4-4	Successive rapid transients	Control cables	Level 3 (industrial)
		Power cables	Level 3 (industrial)
EN 50082-1	Generic immunity standards, Part 1 : residential, commercial and light industry	-	Complies
EN 50082-2	Generic immunity standards, Part 2 : industrial environment. Concern basic standards marked with*	-	Complies

3.8.2 - Conducted and radiated emissions
If the wiring instructions are carried out as requested, the DIGISTART STV 2313 complies with the conducted emission standards.

Standards	Missions	Level
EN55011	Conducted on power supply from 150 kHz to 30 MHz	Complies
EN55011	Radiated emission from 30 to 1000 MHz	Complies

4 - COMMISSIONING

⚠️ • **The soft starters use a software, which is adjusted with parameters.**

• **The performance level depends on the parameter setting.**

• **Incorrect settings may have severe consequences for personnel and machinery.**

• **The parameter setting of the soft starters should only be carried out by experienced and qualified personnel.**

• **Before powering up the DIGISTART make sure that power connections are correct (on both DIGISTART and motor side) and rotating parts are mechanically protected.**

• **Make sure when powering up that no accidental start is possible by any means**

4.1 - Setting procedure

- Each function or setting parameter is given a number or **address**.

Example: Motor In = address n°1 = **A1**

- Each address has an associated code or value called its **contents**. The contents are coded due to the fact that the basic product has only one display unit (see table in section 4.5.2).

Example :

• The motor In is equal to 85% of the DIGISTART rating : the contents of **A1** = 85 = code **7**.

• The DIGISTART is set up by programming the different addresses with the corresponding values for the given application. Programming is made via the 3 pushbutton keypad.

It is recommended for safety reasons, (accidental run signal), to program the DIGISTART with the power stack (L1-L2-L3) off.

4.2 - Pushbuttons/display presentation

7 segment display
• Display of the **parameters** or their **contents**
• **Trip indication.**

MODE/MEM pushbutton
• Change alternately from **display (read)** mode **to modification (write) mode**
• **Memorization of settings**

▲ pushbutton
• Scrolling of **parameters** or incrementation of their **contents**

@ pushbutton
• Change alternately from **address display** to **contents display**

Decimal point
• Indicates whether in **read mode** or in **modification (write) mode**

The pushbuttons are accessed by either removing the front cover or via a plastic screwdriver delivered with the DIGISTART.

LEROY SOMER

4.3 - Status indication

The different operating status are identified by a combination of 7 segment display and decimal point indications, see following table :

Display status	Decimal point status	Mode	Remarks
Steady on	Off	Read	Choice of display : absorbed current ; absorbed power or system operating phase
Flashing	Off	Tripped	Alternate display of a 2 figure trip code
Flashing	On	Modification (address)	Address display : "A" alternates with the number of the address
Steady on	Flashing	Modification (contents)	Contents display : coded value to be modified
Steady on	On	Modification (memorization)	Contents display : coded value which has been memorized

4.4 - Switching on control electronics

4.4.1 - Verification

Before switching on, check :
- That the supply voltage is compatible with the control electronics supply voltage.
- The connection and tightness of : N/L - 230 V terminals, if the supply voltage is in the range 208 to 230V ; N/L-400V terminals, if the supply voltage is in the range 380 to 415V. (N.B. : Use an external auto-transformer for other voltage values).
- The position of the link on the control electronics supply board. It must correspond to the relevant supply voltage (for 37 to 86 ratings).
- Correct earthing of the DIGISTART casing
- That there are no short-circuit or earth faults in the wiring.

4.4.2 - Procedure

- Switch on the DIGISTART control electronics
- The 7 segment display comes on and indicates : **C**.
- Press the MOD/MEM push button to change to modification (write) mode.

Note : When powering up the DIGISTART with the console option (CDC-START), "Fault serial link" may appear on the display and then disappear, without any trip, depending on the combination of options. This display is normal and indicates an auto-test of the serial link. The duration of the test depends on the number of options.

4.5 - Programming

⚠ • **The values of the motor parameters affect motor protection and safety of system.**

• **Set values of the parameters must be read on the nameplate of the motor.**

• **Motor parameters must be adjusted with a minimum accuracy of 10% of rated values in order to achieve good performance.**

4.5.1 - List of addresses and definitions

A1 : Rated motor current : In
- Setting of the rated current of the motor supplied by the DIGISTART
- Calculated as a % of the DIGISTART current rating and rounded to the nearest multiple of 5.
Example : 211 DIGISTART , 186 A motor
In = 186/211 = 88.1% ....rounded to 90......code **8**

A2 : Starting current
- The current applied to the motor as soon as the "run" signal is given.
- Expressed as a % of rated motor current.
- Must be as low as possible whilst still ensuring motor rotation as soon as the "run" signal is given.

A3 : Ramp time
- Ramp time between starting current and current limit,
- Adjustment ot the "smoothness" of the start, expressed in seconds,
- Does not represent the actual starting time.

A4 : Current limit
- Expressed as a % of the rated motor current.
- Adjustment of the maximum output current of the DIGISTART.
- Must be as low as possible whilst still ensuring starting under the most severe operating conditions.
- The current limit is active for all operating phases.

A5 : Kickstart
- Possibility of enabling or disabling the kickstart function.
- Full voltage is applied to the motor for 3 mains cycles, followed by the progressive starting phase.
- Application example : machines which tend to stick when stopped.

A6 : Maximum start time
- The DIGISTART trips if the time to start after a "run" signal exceeds this programmed value.
- To program, time the start duration under the most difficult load conditions and set A6 just above this value.
- Example : Maximum effective start time of 18 seconds, adjust the maximum start time protection to 20 seconds : code **2**.

A7 : Motor thermal and locked rotor protection

- Possibility of enabling or disabling these two trips.
- Motor thermal protection must be enabled if there is no thermal relay in the motor power circuit.

A8 : Under/overload trip enable

- Possibility of enabling or disabling the under/overload protections.
- When enabled, the DIGISTART trips if the absorbed motor power is greater than the threshold set at address **A9** or less than the threshold set at address **AC.**
- Fixed time delay of 2 seconds before trip.

A9 : Overload trip threshold

- Expressed as a % of the rated motor power.
- Read the maximum absorbed power when running under the most difficult load conditions and adjust the threshold to just above this value.
- Application : Protection against mechanical jamming, bearing-wear detection.

AC : Underload trip threshold

- Expressed as a % of the rated motor power.
- Read the minimum absorbed power when running under the least difficult load conditions and adjust the threshold to just below this value.
Application : Loss of pump-priming, transmission slip or failure.

AE : Configuration of relay K2

- Selection of the function of relay K2.
- Possible choices :

Address contents	function	Relay status for different operating conditions				
		Tripped	Starting	Running	Deceler^{ing}	Stopped
0	General trip	0	C	C	C	C
1	Motor accelerating	0	C	0	0	0
2	Motor power on	0	C	C	C	0
3	Start complete	0	0	C	0	0
4	Overload alarm	0	0	see	0	0
5	Underload alarm	0	0	diagr.	0	0

N.B. : K2 relay is open when the DIGISTART power is off.
The relay status for overload and underload alarms is determined by the following diagram. The delay times $\Delta t1$ and $\Delta t2$ allow instantaneous power peaks without change of relay status ($\Delta t1 = \Delta t2 = 2s$).

Under/overload alarm diagram :
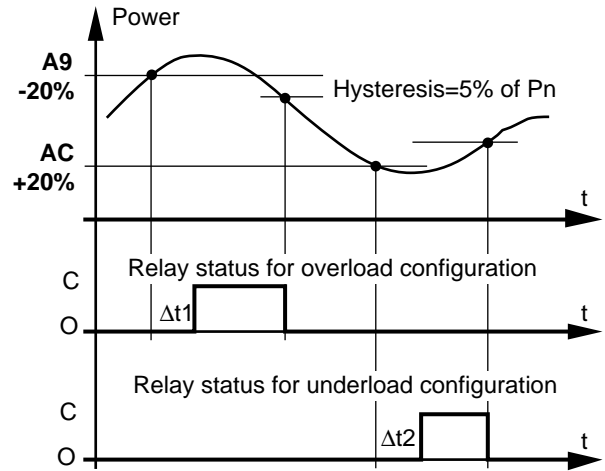
AF : Restart after mains dip

- Enable or disable the flying restart after mains dip function.
- If enabled, for a mains dip of less than 1.5 seconds during normal running, the DIGISTART automatically applies full voltage to the motor (current limitation is active).

AH : Power factor control

- Enable or disable the power factor improvement function when running at no load.
- Due to the values of motor time constants, it is not advisable to use this function for applications with abrupt load variations and low inertias.

AL : Controlled deceleration

- Enable or disable the function which decreases the motor voltage progressively during the deceleration phase.
- If the function is disabled, the motor voltage is switched off as soon as the stop signal is given.
- Applications : **Installations where motor stop is abrupt on power down (pumps…)**

AO : Controlled deceleration time

- Time taken for full motor voltage to decrease to 0V when the controlled deceleration function is enabled.
- Allows progressive stop control.

AP : Direction of rotation enable

- Enable or disable the reversal of rotation protection.
- The normal configuration of the DIGISTART is for direct phase order mains connection, if the protection is enabled, an indirect phase order connection will trip the DIGISTART and display 16. Cross over two phases to have the direct phase order and reset the trip.

AU : Selection of operating display

Display, when running, of one of the following parameters :
- **Absorbed current** : Expressed in % of In /10.
- **Absorbed power** : Expressed in % of Pn/10
  - Example: 50% of Pn -->display **5**..
  - N.B. : **h** indicates >100%.

- **Operating condition** :
  see table :

Code	Operating condition
C	DIGISTART power off
E	DIGISTART power on Motor power off
F	Accelerating
H	Full motor voltage
L	Controlled deceleration

4.5.2 - Table of parameters

The addresses and their contents are given below ; shaded boxes correspond to the factory (default) settings :

Designation / Address		Value corresponding to displayed code																	Units
		0	1	2	3	4	5	6	7	8	9	C	E	F	H	L	P	U	
Rated motor current : In	A1	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	% of rating
Starting current	A2	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	% of In
Ramp time	A3	0	2	4	6	8	10	12	14	16	18	20	25	30	35	40	45	50	Seconds
Current limit	A4	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	% of In
Kickstart	A5	No	Yes																
Maximum start time	A6	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	Seconds
Motor thermal and locked rotor protection	A7	0	1	2	3														
Under/overload trip enable	A8	0	1	2	3														
Overload trip threshold	A9	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	% of Pn
Underload trip threshold	AC	0	10	20	30	40	50	60	70	80	90	100							% of Pn
Configuration of relay K2*	AE	0	1	2	3	4	5												
Restart after mains dip	AF	No	Yes																
Power factor control	AH	No	Yes																
Controlled deceleration	AL	No	Yes																
Controlled deceleration time	AO	0	2	4	6	8	10	12	14	16	18	20	25	30	35	40	45	50	Seconds
Direction of rotation enable	AP	No	Yes																
Selection of operating display	AU	0	1	2															

* : See below

A7 : **0** Motor thermal and locked rotor protections disabled
1 Motor thermal protection enabled
2 Locked rotor protection enabled
3 Motor thermal and locked rotor protections enabled

A8 : **0** Under/overload trips disabled
1 Underload trip enabled
2 Overload trip enabled
3 Under/overload trips enabled

AU : **0** Operating condition
1 Absorbed current
2 Absorbed power

AE : **0** General trip
1 Motor accelerating
2 Motor power on
3 Start complete
4 Overload alarm
5 Underload alarm

4.5.3 - Programming examples

Example 1 :
Set address **A1** (rated motor current) to 85% :

		0	1	2	3	4	5	6	7	8	9	
		⇨	⇨	⇨	⇨	⇨	⇨	⇨				
A1	Rated motor current	50%	55%	60%	65%	70%	**75%**	80%	**85%**	90%	95%	Etc

The corresponding code to be programmed is : **7**.

Example 2 :
Set address **A4** (current limit) to 300% :

		0	1	2	3	4	5	6	7	8	9
A1											
A2											
A3		⇨	⇨	⇨	⇨	⇨	⇨	⇨	⇨		
A4	Current limit	100%	125%	150%	175%	200%	225%	250%	275%	**300%**	325%	350%

The corresponding code to be programmed is : **8**.

Example 3 :
Enable kickstart function via address A5 :

		0	1	2	3	4	5	6	7	8	9
A1											
A2											
A3											
A4		⇨									
A5	Kickstart	No	**YES**								

The corresponding code to be programmed is : **1**

4.5.4 - Manipulation of parameters

See example below :

Step	Action on keypad	Display	Remarks
Power up of control electronics		C∘	On powering up the electronics, the DIGISTART displays operating status in read mode
Change to modification **(Address) mode**	MODE/MEM.	⌐A∘ 1.⌐	DIGISTART selects address **1** and displays alternately **A** with the N° of the address
Change to modification **(Contents) mode**	@	C.	The **Contents** of address **A1 = C**. Code C corresponds to 100% (see section 4.5.2)
Setting of rated motor current	▲	7ₓ	175 A motor, 211 DIGISTART--> In motor = 175/211 = 83% rounded to 85 --> code **7**.
Memorization	MOD/MEM.	7.	If the setting is not memorized, the decimal point flashes
Change to modification **(Address) mode**	@	⌐A∘ 1.⌐	Address 1
Select address **A2**	▲	⌐A∘ 2.⌐	Address 2 is selected
Change to modification **(Contents) mode**	@	6.	The **Contents** of **A2** = **6**. 6 corresponds to 200% (see section 4.5.2)
Set starting current to 150%	▲	4ₓ	**A2** code **4** corresponds to 150 % (see section 4.5.2)
Memorization	MOD/MEM.	4.	The new value is memorized
Change to **address** mode	@	⌐A∘ 2.⌐	Address 2
Select **A3**	▲	⌐A∘ 3.⌐	Address 3 is selected
Change to **contents** mode	@	C∘	The **Contents** of **A3 = C**. C corresponds to 20 s (see section 4.5.2)
Set ramp time to 10 s.	▲	5ₓ	**A3** code **5** corresponds to 10 s (see section 4.5.2)
Memorization	MOD/MEM.	5.	The new value is memorized
Change to **address** mode	@	⌐A∘ 3.⌐	Address 3
Select **A4**	▲	⌐A∘ 4.⌐	Address 4 is selected
Change to **contents** mode	@	F.	The **Contents** of **A4 = F** which corresponds to 400% (see section 4.5.2)
Set current limit to 300%	▲	8ₓ	**A4** code **8** corresponds to 300% (see section 4.5.2)
Memorization	MOD/MEM.	8.	The new value is memorized
Change to **read** mode	MOD/MEM.	C∘	In **modification** (address, contents, memorization) **mode**, press MOD/MEM to change to **read** mode

In modification mode, if no pushbutton is pressed on the keypad for around 3 minutes, the display returns automatically to read mode.

4.6 - Switching on power stack

⚠️ • **Make sure that all protections are on before powering up.**

Before power up, check :
- the connection and tightness of L1-L2-L3 and T1/U, T2/V, T3/W terminals.
- that the DIGISTART casing is earthed.
- that there are no short circuit or earth faults in the wiring.
- that the control electronics terminals are correctly supplied.
- a voltage is always present at the supply terminals of the control electronics.
- that the programming is correct for the application.
- that the mains power supply voltage does not exceed the maximum plated voltage.

SWITCH ON THE POWER BRIDGE.
The display changes from **C** to **E**.

4.7 - Starting

- Give the DIGISTART a start signal and observe the motor's acceleration.
- Give the DIGISTART a stop signal and observe the motor's deceleration (for controlled deceleration mode).
- Readjust the DIGISTART settings following the procedure given in chapter 5 "Faults/Diagnostics" if the acceleration and deceleration characteristics are not satisfactory
- Depending on the final starting and operating characteristics, readjust if necessary, the protection settings.
Eg. : maximum starting time, underload or overload threshold....

4.8 - Settings lock

Access to all parameters (except AU) can be prevented by placing the "Prog" link in position 0 or by removing it. The link is situated on the control board and can be accessed by removing the front cover .

4.9 - Reverting to factory settings

⚠️ • **Before going back to factory setting, make sure that the safety of the system will not be affected.**

It is possible to return the starter's settings to their default (factory) values provided the following two conditions are satisfied :
- the "Prog" link is in position 1,
- the motor power is off (status **E** or **C**).

Procedure:
- Carry out the following sequence in less than 10 s :

| @ | ⇨ | ▲ | ⇨ | ▲ | ⇨ | @ | ⇨ | ▲ | ⇨ | @ |
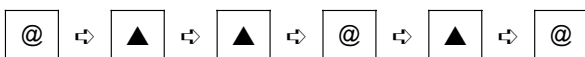
- At the end of this sequence, a **t** on the display indicates that the return to factory settings has been made.

After reverting to factory settings, the DIGISTART electronics supply should be switched off so that the new configuration is taken into account and undergoes the auto-test.

5 - FAULTS / DIAGNOSTICS

5.1 - Possible causes of malfunction
5.1.1 - On power up of the control electronics
• **Incident 1 :** Display doesn't light up.
Check :
- the supply voltage to the electronics,
- the position of the link situated near the control electronics supply terminal block.
- the fuse.

• **Incident 2 :** A trip code flashes on the display . See table in section 5.3.

5.1.2 - When programming
• **Incident 3 :** Modification of the address contents is not possible.
Check that the "Prog." link which locks the settings is in position 1.

5.1.3 - On power up of the power stack
• **Incident 4 :** Current is supplied to the motor without a run signal
Check the condition of the thyristors.

5.1.4 - On starting
• **Incident 5 :** The motor does not start and no current is supplied to the motor when a run signal is given.
Check :
- that there is mains voltage on L1, L2, L3,
- the connections between the control module and the power board,
- the connections between the power board and the thyristors,
- the condition of the thyristors.

• **Incident 6 :** The motor does not start correctly although current is supplied to it.
Check that there is current in all **three** phases.
The starting current is not high enough to overcome the resistive torque ; increase the starting current and the current limit.

• **Incident 7 :** The motor begins to turn, but does not reach full speed.
The current is too low ; increase the current limit.
Check the motor connection (star or delta).

• **Incident 8 :** The motor starts too abruptly.
Decrease the starting current.

• **Incident 9 :** The motor starts too quickly.
Increase the ramp time.

• **Incident 10 :** The DIGISTART output current is limited to less than the setting in address **A4**.
Check the motor connection (star or delta).

5.1.5 - Deceleration
• **Incident 11 :** On setting the deceleration time to maximum, the deceleration is still not satisfactory.
Please contact LEROY-SOMER.

5.2 - Trip indication
The DIGISTART has one 7 segment display unit, the trip codes are given by an alternate display of 2 figures.
See the table on the following page.

5.3 - List of trip codes and possible causes

Before modifying any DIGISTART settings, check that the cause of the fault is not due to an external problem.

Trip code	Fault designation	Probable cause	Checks to be made
01	Loss of mains supply	• Mains voltage less than 177V (=208V - 15%). • Drop or loss of 2 or 3 phases. • Power supply loss greater than or equal to 1.5 s.	• Check the power supply capacity. • Check the wiring, fuses. • Check that the supply is stable and restart.
02	Excessive starting time	• Resistive torque abnormally high. • "Maximum start time" setting is too low for application	• Check that there are no mechanical problems hindering the start (friction, etc). • Readjust the value of address **A6.**
03 *	Thyristor over temperature	• Duty or operating cycle too severe for the DIGISTART.	• Reduce the number of starts or change the starting characteristics by adapting the settings. • Check that the DIGISTART continuous output current is compatible with its rating

04	Phase loss	• Loss of one phase.
		• Phase voltage imbalance greater than 50%
		• Phase current imbalance greater than 50%
			• Check :
			  - the mains supply,
			  - the wiring, the connections
			  - the fuses,
			  - the motor

05	Short loss of supply	• Short supply loss to power stack or control	• Reset the trip and restart.
06 *	Motor over temperature	• Operating cycle or load characteristic causes motor overheat	• Check load characteristic. • Reduce motor load
07	Overload level	• The motor's absorbed power is greater than the threshold set by **A9**.	• Check the loading. • If necessary, readjust the trip threshold **A9.**
08	Underload level	• The motor's absorbed power is less than the threshold set by **AC**.	• Check the loading. • If necessary, readjust the trip threshold **AC**.
09	Control system fault	• Failure or malfunction due to high disturbance levels of the microcontroller.	• Reset the trip and restart. • If reoccurance, check that connection recommendations have been followed. • Consult LEROY-SOMER
12	Locked rotor	• Mechanical jamming of the motor shaft. • Load at start too high	• Eliminate mechanical blockage. • Reduce loading.
13	Heatsink over temperature	• Abnormally high heat-sink temperature.	• Ensure that the forced ventilation is operating correctly (air intakes, outlets, etc,…) • Check the DIGISTART's ambient operating conditions (temperature, enclosure cooling, spacing of equipment,...)
14	Shorted thyristor	• Short-circuit of one or more thyristors	• Check that no external element is short-circuiting the thyristors • Check the thyristors
15	Open thyristor	• Open circuit or non conduction of thyristor	• Check the thyristor gate connections. • Check the supply, cables, connections, fuses, and motor. • Check the thyristors.

List of trip codes and possible causes (continued)

Trip code	Fault designation	Probable cause	Checks to be made
16	Phase sequence	• DIGISTART supply phase sequence doesn't correspond to the initial memorized order	• Change over two of the DIGISTART's supply phases, if the original phase sequence is to be retained. • CAUTION : a reset not only clears the trip, but memorizes the new phase sequence which supplys the DIGISTART at the moment of the reset
17	Starts/hour limitation	• Starting frequency too high	• Reduce the starting frequency
18	Inhibit	• Opening of the protection circuit connected between terminals 10 and 11 of the control module	• Check the remote control protection commands • With no remote protection commands, terminals 10 and 11 must be linked
19	Control supply loss	• Supply voltage less than 177V (=208V -15%). • 230V voltage supply connected to N/L - 400V terminals • Preselection voltage link incorrectly positioned (37 to 86 ratings only)	• Check the voltage value. • Check the connections, the preselection link. • Check the protection fuse.

* In the event the control power supply has been switched off after that trip occured, wait **20 minutes** before starting back up installation.
This is the minimum time necessary for the soft starter or the motor to go back to the cold state condition.

WARNING !
The trip is the consequence of a bad operation of the system which must be investigated.
Make sure the fault is cleared before resetting.

6 - MAINTENANCE

⚠️ • **All work related to the soft starter installation, commissioning and maintenance must be carried out by experienced and qualified personnel.**

• **Do not carry out any work before the soft starter power supply has been switched off and locked, and wait 1mn until the capacitors have discharged.**

• **During maintenance operation with the soft starter powered-up, the personnel must stand on an insulating surface not connected to earth.**

• **During work on a motor or its power supply cables, make sure that the power supply of the corresponding controller has been switched off and locked.**

• **During tests, all protective covers must be kept in place.**

6.1 - Care

6.1.1 - Introduction

The DIGISTART requires a minimum of maintenance and repair operations on the part of the user. Detailed below are normal maintenance operation.

6.1.2 - Maintenance

All electronic equipment may be subject to problems after being exposed to excessive heat, humidity, oil, dust, or if any external matter is allowed to penetrate.
• Periodically re-tighten connections.
• Clean periodically the air intake and outlet of the DIGISTART.

• Printed circuits and their components do not normally require any maintenance, except periodic dust removal. Contact your retailer or nearest approved service centre if any problems occur.

CAUTION :
• Do not remove printed circuit boards during the guarantee period, as this will immediately render it null and void.
• Do not touch integrated circuits or the microcontroller with your fingers, or with any charged or live material.
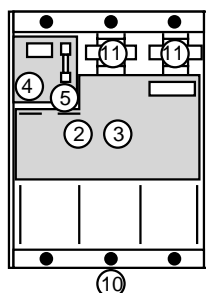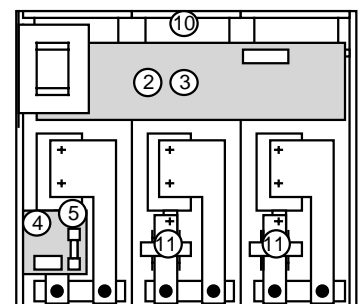
6.2 - Spare parts list
6.2.1 - DIGISTART 37 to 250

	Designation / Ratings	37	60	86	145	211	250
①	Control board (all ratings)	PEF480NA000					
②	Power board (voltage code 14)	PEF484NA100			PEF486NA100		
③	Power board (voltage code 16)	PEF484NA200			PEF486NA200		
④	Electronics supply board (230V-400V)	PEF484NB000			PEF486NB000		
⑤	Supply board fuse	PEL003FU002					
⑥	Thyristor (voltage code 14)	ESC066MT000	ESC092MT000	ESC142MT000	ESC170MT000	ESC250MT000	ESC250MT002
⑦	Thyristor (voltage code 16)	ESC066MT001	ESC092MT001	ESC142MT001	ESC170MT001	ESC250MT001	ESC250MT003
⑧	Power fuse	PEL125FU001	PEL160FU001	PEL200FU001	PEL315FU001	PEL400FU001	PEL500FU001
⑨	Fuse micro-switch	APE300AU005					
⑩	Fan	----	VEN200VM010	VEN200VM010	VEN200VM001	VEN200VM001	VEN200VM001
⑪	Current transformers	MES060TI000		MES211TI000			
⑫	Front cover with labels	COF022CA002 + PSI166EA000					
⑬	Control module support	COF022CA003					
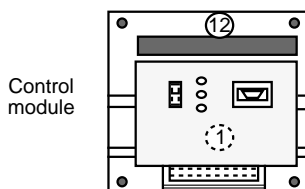
Control module

Power module 37 to 86A

Power module 145 to 250A

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6.2.2 - DIGISTART 365 to 900

Designation / Ratings		365	530	700	900
①	Control board (all ratings)	PEF480NA000			
②	Power board (voltage code 14)	PEF486NA100			
③	Power board (voltage code 16)	PEF486NA200			
④	Electronics supply board (230V - 400V)	PEF486NB000			
⑤	Supply board fuse	PEL002FU002			
⑥	Thyristor (voltage code 14)	*	*	*	*
⑦	Thyristor (voltage code 16)	*	*	*	*
⑧	Power fuse	PEL700FU002	PEL900FU002	PEL999FU006	PEL999FU004
⑨	Fan	*	*	*	*
⑩	Fuse micro-switch	APE300AU005			
⑪	Current transformer	MES450TI000		MES900TI000	
⑫	Front cover with labels	COF022CA002 + PSI166EA000			
⑬	Control module support	COF300CA003			

* Indicate the rating and serial number of the DIGISTART.

Control module
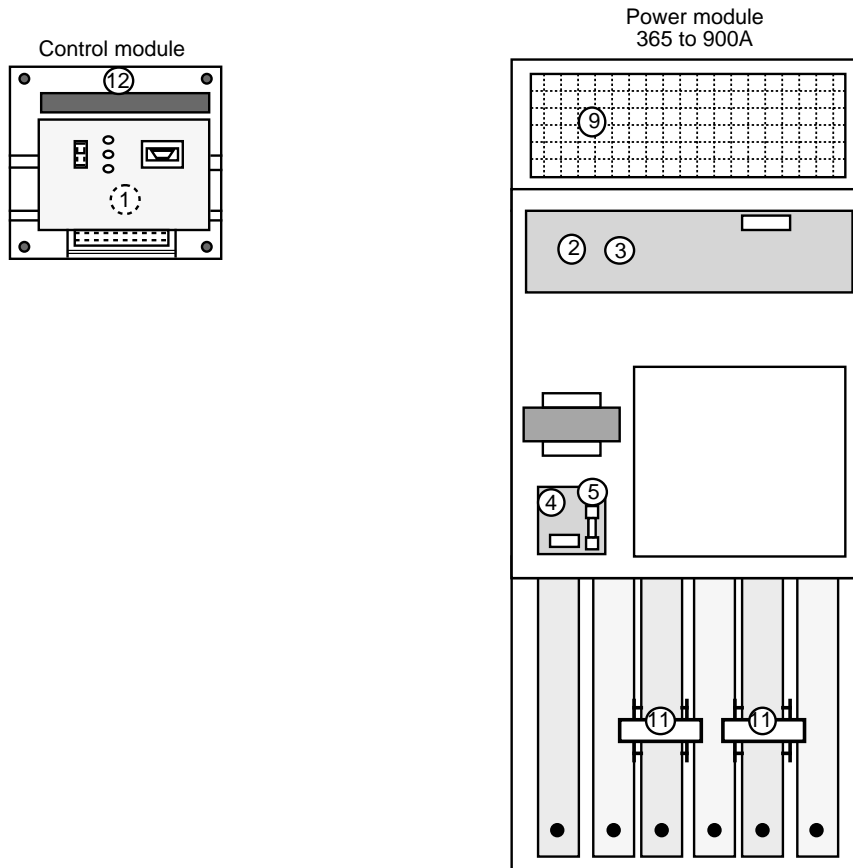
Power module
365 to 900A

7 - DIGISTART OPTIONS

⚠ **• Any option module must be put in place or removed with the DIGISTART powered down and locked out.**

The basic DIGISTART is designed such that it can accept a certain number of options or modules which give additional functions
- the option modules can be used simultaneously
- each module can be ordered separately
An installation manual is supplied with each option.

7.1 - Console " CDC-START "

STV 2313 control module

Console

+

=

OR
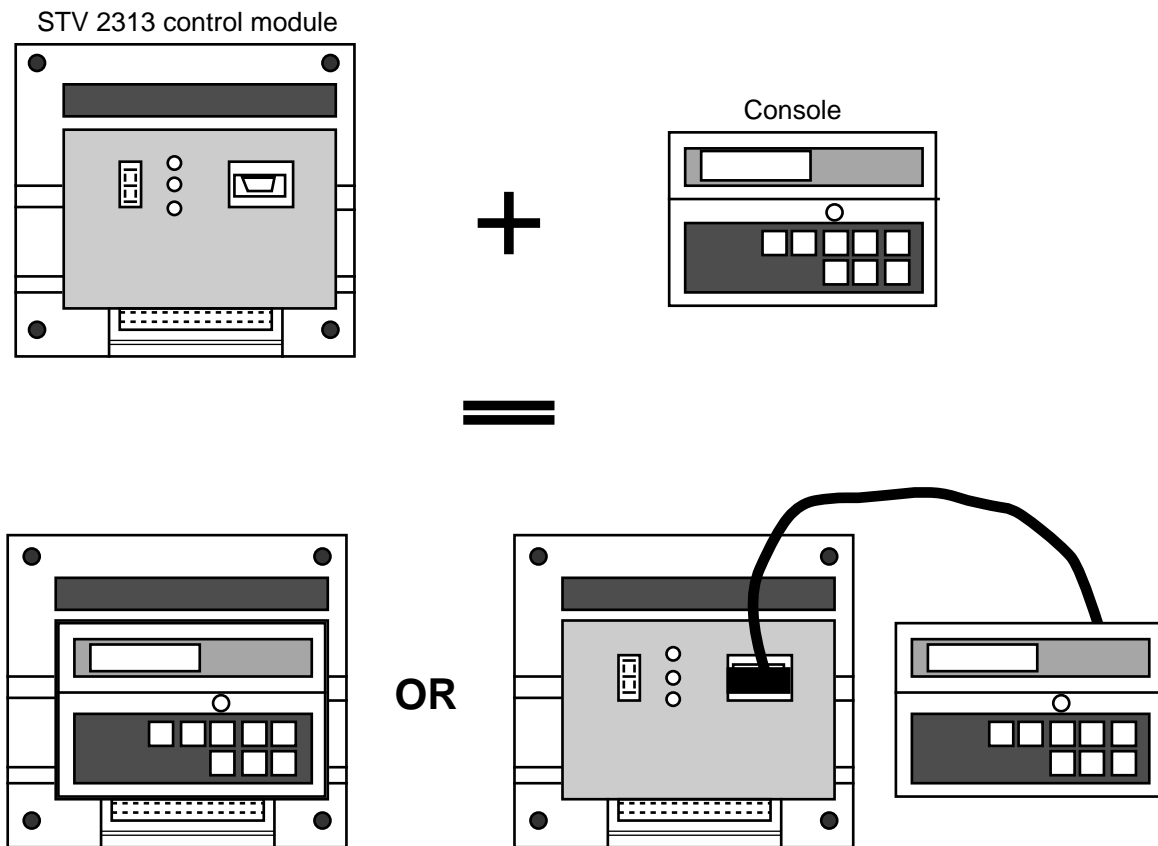
The optional console together with the basic DIGISTART give the following additional functions :

- simple programming, diagnostics and parameter visualization via 8 pushbutton keypad and a 32 digit LCD display.

- Access to complementary functions :
  • configuration of the K1 relay,
  • memorization of a set of parameters,
  • number of starts limitation,
  • adjustment of over/underload hysteresis,
  • adjustment of over/underload trip delay,
  • adjustment of over/underload alarm threshold.

- Access to option module programming.

5 possible display languages (French, English, German, Spanish, Italian).
The choice of language is programmed by the console.

One identical model for the whole range, instruction manual is supplied.

7.2 - Inputs/Outputs module " ES-START "
- 2 logic inputs,
- 2 logic outputs,
- 1 analogue input,
- 1 PTC input ,
- 2 analogue outputs.

7.2.1 - Logic inputs :
Switch inputs for external trip management and/or multi-setting of the DIGISTART.

• External trips :
- the DIGISTART can be disabled by opening the switch connected to these inputs.
Example :Emergency stop via external devices (pressure sensor, threshold relay, etc,…).

• Multi-setting :
- several parameter sets can be selected for the DIGISTART by simple switching.

Example 1 : starting motors of differing powers with a single DIGISTART :
a) switch open -->starting with motor 1 characteristics ;
b) switch closed --> starting with motor 2 characteristics.

Example 2 : control of a two-speed motor.
a) switch open --> high speed starting and protection ;
b) switch closed --> low speed starting and protection.

Example 3 : Motor control with possibility of configuration for a no-load start and a start under load.

• Input configuration : three possibilities
a) 1 input configured for external trip management and 1 input configured for multi-setting (2 possible parameter sets).
b) Both inputs configured for external trip management.
c) Both inputs configured for multi-setting (4 possible parameter sets).

7.2.2 - Logic outputs :
• Configurable functions by programming.
• Including the 2 existing relays mounted on the basic DIGISTART, the number of configurable outputs is extended to 4.

7.2.3 - Analogue input :
• DIGISTART management of a 4-20 mA or 10V analogue signal.
• The signal can be used as a high and/or low adjustable trip threshold.
• Prealarms can be given via the configurable output relays.

7.2.4 - PTC inputs
• Up to 6 sensors can be connected.

7.2.5 - Analogue outputs :
• 2 4-20mA or 0-10V analogue outputs,
• Possibility of an absorbed motor current output signal, and/or absorbed power output signal,
and/or analogue input, output signal,
Option is delivered with installation manual and connecting cable.

7.3 - Speed feedback module " RV-START "
The speed feedback module together with the DIGISTART ensure progressive and repeatable starting and/or deceleration independant of the load characteristics.

Applications : Machines having large load variation at start up :
- Conveyor belts,
- Presses,
- Bucket elevators,
- Mixers.

The module accepts the following speed feeback devices:
- a DC tachogenerator (220 VDC maximum),
- an AC tachogenerator (200 VAC maximum),
- 3 wire induction sensor,
- a 4-20 mA signal.

A **logic input** is available for selection of a second parameter set for two-speed motor operation :
- switch open : starting and running with high speed parameters
- switch closed : starting and running with low speed parameters
Option is delivered with installation manual and connecting cable.

7.4 - D.C. Injection module " FR-START "
The DC injection module together with the DIGISTART,give the following additional functions :
- Motor heating at standstill (anti-condensation),
- Motor drying after a long off-state period,
- Braking before start (load holding),
- Braking during deceleration (high inertia).
The module exists in three sizes according to the associated DIGISTART rating.
Option is delivered with installation manual and connecting cable.

7.5 - Power fuses " UR-START "

LEROY-SOMER, in collaboration with thyristor and power fuse suppliers, offer a range of cartridge fuses especially adapted for DIGISTART protection.

Rating	Characteristics	BUSSMANN Ref.
37	125A / 660V	170 M 3463
60	160A / 660V	170 M 3464
86	200A / 660V	170 M 3465
145	315A / 660V	170 M 3467
211	400A / 660V	170 M 3469
250	500A / 660V	170 M 3471
All ratings	Associated microswitch	170 H 0069

As power fuses are not directly mountable onto the 37 to 250 rating DIGISTARTs, a mounting kit is supplied (same kit for all ratings).
For the 365 to 900 ratings the fuses are, as standard, mounted directly onto the mains supply input connection bars.

7.6 - IP20 kit " IP - START "

For the 37 to 250 ratings, IP 20 protection is possible by the mounting of a kit.

Option is delivered with installation manual.

7.7 - Communication module : COM - START

Allows to connect the DIGISTART to a network using MODBUS protocole.

7.8 - Keypad cable

Used to connect the keypad to the DIGISTART when the keypad is mounted remotly.

Length	Reference
1,5 m	CD - CORD 1,5
3 m	CD - CORD 3
5 m	CD - CORD 5

For higher longth please contact LEROY-SOMER.

7.9 - Other options

- IP53 kit,
- Bypass kit for 365 to 900 ratings
  (bypass of power bridge only).
- Communication module COM-START (modbus, etc.)
- Control electronics supply autotransformer,
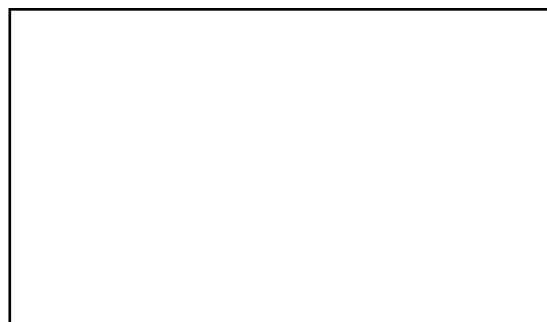- Cabinet mounting.

8 - SUMMARY OF SETTINGS

DIGISTART type :	
DIGISTART N° :	
Commissioning date :	
Machine reference :	

Designation		Factory setting	Your setting date :	Your setting date :	Your setting date :	Your setting date :
Rated motor current	A1	100%				
Starting current	A2	200%				
Ramp time	A3	20 s				
Current limit	A4	400%				
Kickstart	A5	No				
Maximum start time	A6	30 s				
Motor thermal and locked rotor protection	A7	1				
Under/overload trip enable	A8	0				
Overload trip threshold	A9	120 %				
Underload trip threshold	AC	30 %				
Configuration of relay K2	AE	3				
Restart after mains dip	AF	No				
Power factor control	AH	No				
Controlled deceleration	AL	No				
Controlled deceleration time	AO	20 s				
Direction of rotation enable	AP	No				
Selection of operating display	AU	0				

Notes

Notes

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