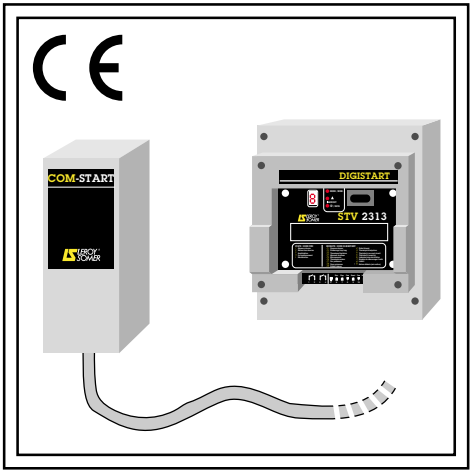
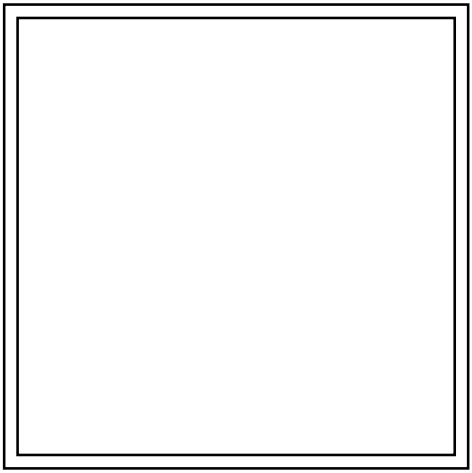
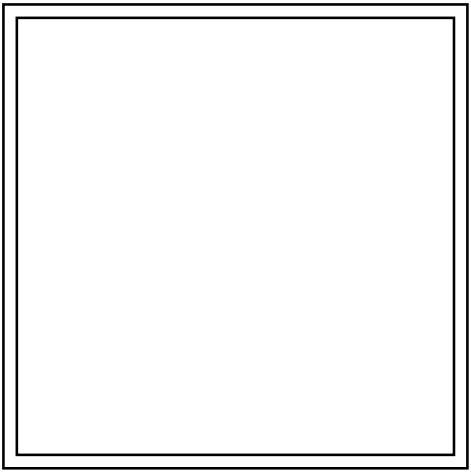
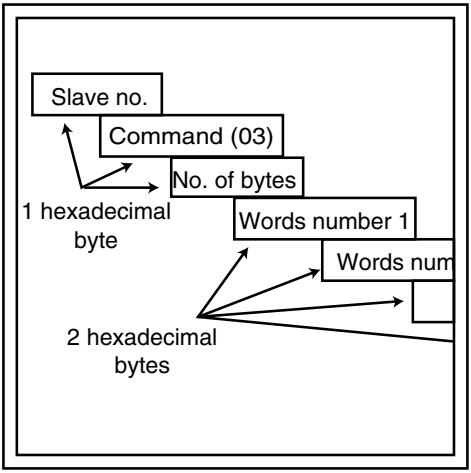
LEROY SOMER

Réf. 2312 GB - 4.33 / a - 04.01









COM - START

Communication module

Installation

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 therefore be changed without notice.

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

CAUTION

For reasons of safety of both people and equipment, LEROY-SOMER prohibits use of the DIGISTART STV 2313 for hoisting applications.

For the user's own safety, this electronic starter must be connected to an approved earth (⏚ terminal).

If accidentally starting the installation is likely to cause a risk to personnel or the machines being driven, it is essential to supply the equipment via an isolating device and a circuit-breaking device (power contactor) which can be controlled via an external safety system (emergency stop, detection of errors on the installation).

The electronic starter is fitted with safety devices which, in the event of a fault, control stopping and thus stop the motor. The motor itself can become jammed for mechanical reasons. Voltage fluctuations, and in particular power cuts, may also cause the motor to stop. The removal 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 takes appropriate precautions against the motor restarting after an unscheduled stop.

The electronic starter is designed to be integrated in an installation or an electrical machine. It is therefore the responsibility of the user to take all necessary precautions to ensure that the system complies with current standards.

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

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SAFETY AND OPERATING INSTRUCTIONS FOR ELECTRONIC STARTERS (in accordance with the low voltage directive 73/23/EEC modified by 93/68/EEC)

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

1 - General

Depending on their degree of protection, electronic starters may contain unprotected live parts, which may be moving or rotating, as well as hot surfaces, during operation.

Unjustified removal of protection, incorrect use, faulty installation or inappropriate operation could represent a serious risk to people and equipment.

For further information, consult the manual.

All work relating to transportation, installation, commissioning and maintenance must be performed by experienced, qualified personnel (see IEC 364 or CENELEC HD 384, or DIN VDE 0100 and national specifications for installation and accident prevention).

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

2 - Use

Electronic starters are components designed for integration in installations or electrical machines.

When integrated in a machine, commissioning must not take place until it has been verified that the machine conforms with Directive 89/392/EEC (machinery directive). It is also necessary to comply with standard EN 60204, which stipulates in particular that electrical actuators (which include electronic starters) cannot be considered as circuit-breaking devices and certainly not as isolating switches.

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

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

The technical characteristics and instructions concerning the connection conditions specified on the nameplate and in the documentation provided must be observed without fail.

3 - Transport, storage

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

The climatic conditions specified in the technical manual must be observed.

4 - Installation

The installation and cooling of equipment must comply with the specifications in the manual supplied with the product.

Electronic starters must be protected against any excessive stress. In particular, there must be no damage to parts and/or modification of the clearance between components during transportation and handling. Avoid touching the electronic components and contact parts.

Electronic starters contain parts which are sensitive to electrostatic stresses and may be easily damaged if handled incorrectly. Electrical components must not be exposed to mechanical damage or destruction (risks to health!).

5 - Electrical connection

When work is performed on electronic starters which are powered up, national accident prevention regulations must be respected.

The electrical installation must comply with the relevant specifications (for example conductor cross-sections, protection via fused circuit-breaker, connection of protective conductor). More detailed information is given in the manual.

Instructions for an installation which meets the requirements for electromagnetic compatibility, such as shielding, earthing, presence of filters and correct insertion of cables and conductors, appear in the documentation supplied with the electronic starters.

These instructions must be followed in all cases, even if the electronic starter carries the CE mark. Adherence to the limits given in the EMC legislation is the responsibility of the manufacturer of the installation or the machine.

6 - Operation

Installations in which electronic starters are to be integrated must be fitted with additional protection and monitoring devices as laid down in the current relevant safety regulations, such as the law on technical equipment, accident prevention specifications, etc. Modifications to electronic starters using control software are permitted.

Active parts of the device and live power connections must not be touched immediately after the electronic starter is powered down, as the capacitors may still be charged. In view of this, the warnings fixed to the electronic starters must be observed.

During operation, all doors and protective devices must be kept closed.

7 - Servicing and maintenance

Refer to the manufacturer's documentation.

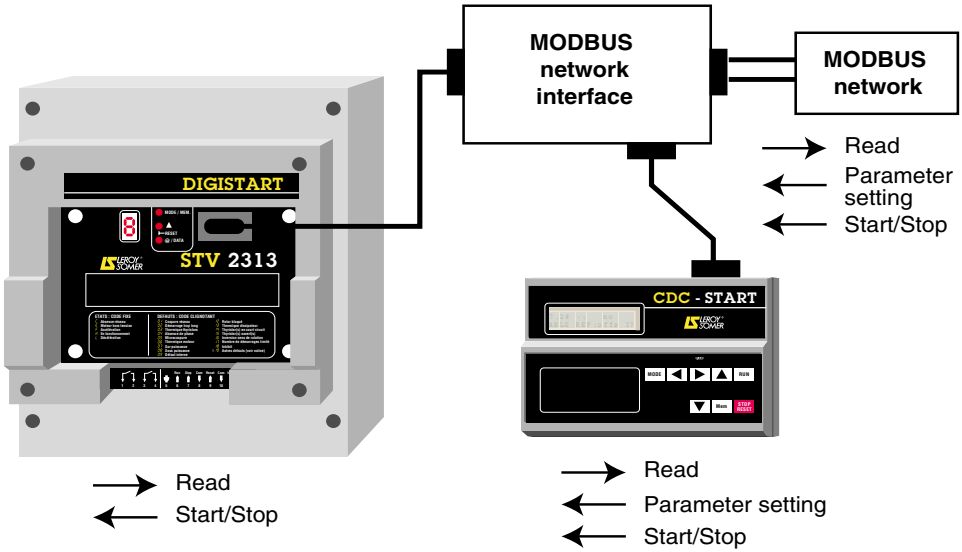
This manual is to be given to the end user.

CONTENTS

1 - GENERAL INFORMATION

1.1 - Operating principle

Using the MODBUS network interface in conjunction with starters in the DIGISTART STV 2313 range can extend the communication possibilities of the basic product by means of a parameter-setting mode for configuring and controlling the DIGISTART and a read mode for accessing all the DIGISTART data.



1.1.1 - Reminder of MODBUS protocol

The main characteristics of a Modbus network are as follows :

- Master slave network.
- Half duplex transmission (they each take turns to send).
- Modbus does not require any particular transmission medium, but is very often used with a RS 485 link.
- Topology : network organised as a bus.
- Theoretical number of subscribers : 247. This number can be limited to 32 by the RS 485 link, as in this example.
- Line protocol : ASCII or RTU transmission. Digistart uses RTU mode because it is more commonly used and more reliable.
- Line access protocol : Question and answer mechanism between a master and a slave, or broadcasting of a request from the master to all the slaves.

1.1.2 - Transmission in RTU mode

Frames transmitted in RTU mode have no header, nor end delimiter. Frame synchronisation is performed by simulating a synchronous message : the receiving station controls the time which elapses between the receipt of two consecutive characters; a silence corresponding to the time required for transmission of three and a half characters, which does not correspond to the end of a frame, implies that the next character received will be the first field of a new frame. The partial frame thus received is said to be physically incorrect, it will not prompt an answer frame, and will be overwritten by the next frame received. Each byte of information in an RTU frame is coded in hexadecimal (0 to FF).

A control key is integrated in the frames, which consists of two bytes arising from the calculation of a CRC16 (16-bit Cyclic Redundancy Check) x16 + x15 + x2 + 1, applied to the whole content of the frame, except the control field. Both bytes are transmitted with the LSB first.

RTU coding is mainly used by MODBUS network applications, especially for high transmission error overlap permitted by use of the CRC16.

1.1.3 - Software interface

To communicate with the DIGISTART over the network, simply write data to the usual DIGISTART addresses or read them using MODBUS protocol read and write commands.

When a write command is sent to the DIGISTART, the interface checks that no error has been introduced into the message using a calculation which checks the value of each byte (CRC16). The result of this calculation is part of the message sent by the master, which allows the DIGISTART to compare the calculation received with the calculation performed locally. If the check is OK, the DIGISTART sends an acknowledgement message to signal to the master PLC that the command has been received.

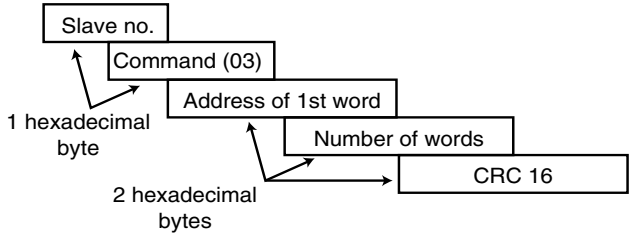
If the message received by the DIGISTART is incorrect, no acknowledgement is sent and the PLC should send back the same command.

When a read command is sent, the DIGISTART sends the answer as the acknowledgement message.

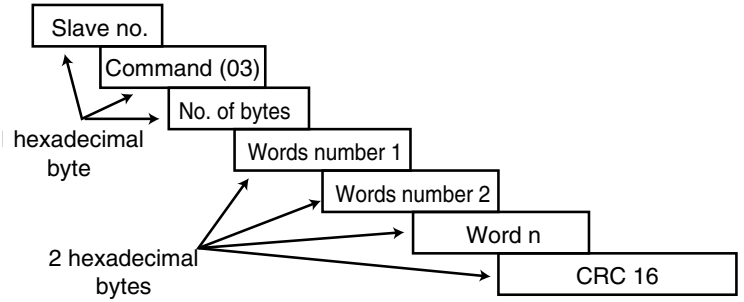
Start, stop or reset commands are written to a particular address.

1.1.4 - Protocol frames

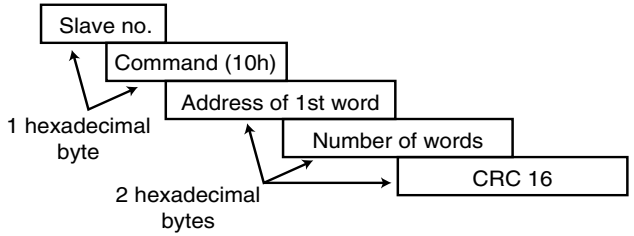
Read frame for the slave sent by the master



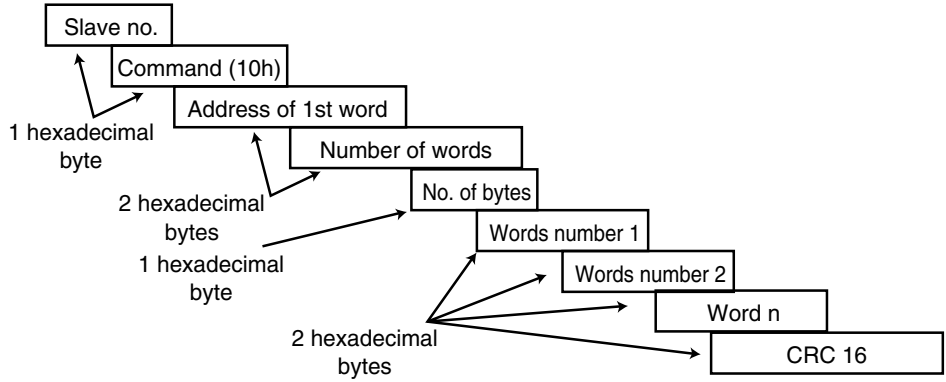
Read frame for the slave returned by the slave



Write frame for the slave returned by the slave



Write frame for the slave sent by the master



1.2 - Designation

There is only one MODBUS network interface module, which is designated **COM - START**.

1.3 - General characteristics

• COM-START modules have protection index IP10.

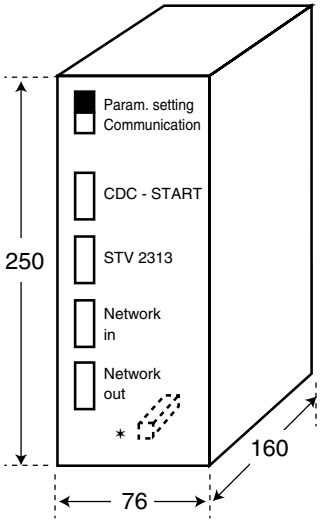
• They are designed to be installed in an enclosure or a cubicle to protect them from conducting dust and condensation and to prevent access by unauthorised personnel.

COM-START	Characteristics
Power supply	0-230V-400V, 50/60Hz 12VA max. ✶
Internal protection	1 fuse 3.15A FA 6x32 Breaking capacity 50kA
Storage	Temperature : -25°C to +55°C Humidity : 5 to 95% max.
Transport	Temperature : -25°C to +70°C Humidity : 95% max.
Operation	Temperature : +5°C to +40°C Humidity : +5 to 85%
Protection index	IP 10

✶ Power supply wiring : 1 mm^2

Presentation : selector switch on the front panel (MODBUS parameter setting - STV communication), plus four 9-pin SUB-D sockets for the connections to the CDC - START console (essential for MODBUS parameter setting), the DIGISTART STV 2313 and the MODBUS network (one incoming and one outgoing).

1.4 - Dimensions and weight



Weight : 1 kg

2 - INSTALLATION

• It is the responsibility of the owner or user to ensure that the installation, operation and maintenance of the STV 2313 and its options comply with legislation relating to the safety of equipment and personnel, and with the current regulations in the country of use.

2.1 - Checks on receipt

On receipt of the COM-START option, check that it has not been damaged during transport. If it has, make a claim against the transporter.

2.2 - Installation precautions

• It is essential to protect the module power supply with 2 GI 3.15A fuses.

- Keep the **COM - START** module away from any radiation source (transformer, busbars, etc).
- Do not run the **COM - START** module cables alongside the power cables.

3 - COMMISSIONING

• The level of performance obtained depends on the parameter setting.

• Inappropriate settings can have serious consequences for personnel and the machine itself.

• The STV 2313 parameters should be set by experienced qualified personnel.

3.1 - Presentation

Parameter setting : The slide switch in this position signifies that the parameters are being set (entry or modification) for the **COM - START** network option only.

Communication : The slide switch in this position signifies that the **COM - START** network option is being used as a communication interface for the DIGISTART.

CDC - START : Female 9-pin SUB-D socket for connection to the CDC - START console (essential for setting the **COM - START** parameters).

STV 2313 : Male 9-pin SUB-D socket for connection to the DIGISTART starter (STV 2313 only).

Network In : Female 9-pin SUB-D socket for connection to the external network (IN).

Network Out : Female 9-pin SUB-D socket for connection to the external network (OUT).

Network In/Out pin configuration

- Pin 3 0V
- Pin 7 $\underline{Tx}$
- Pin 8 $\overline{Tx}$
- Pin 2 $\underline{Rx}$
- Pin 4 $\overline{Rx}$

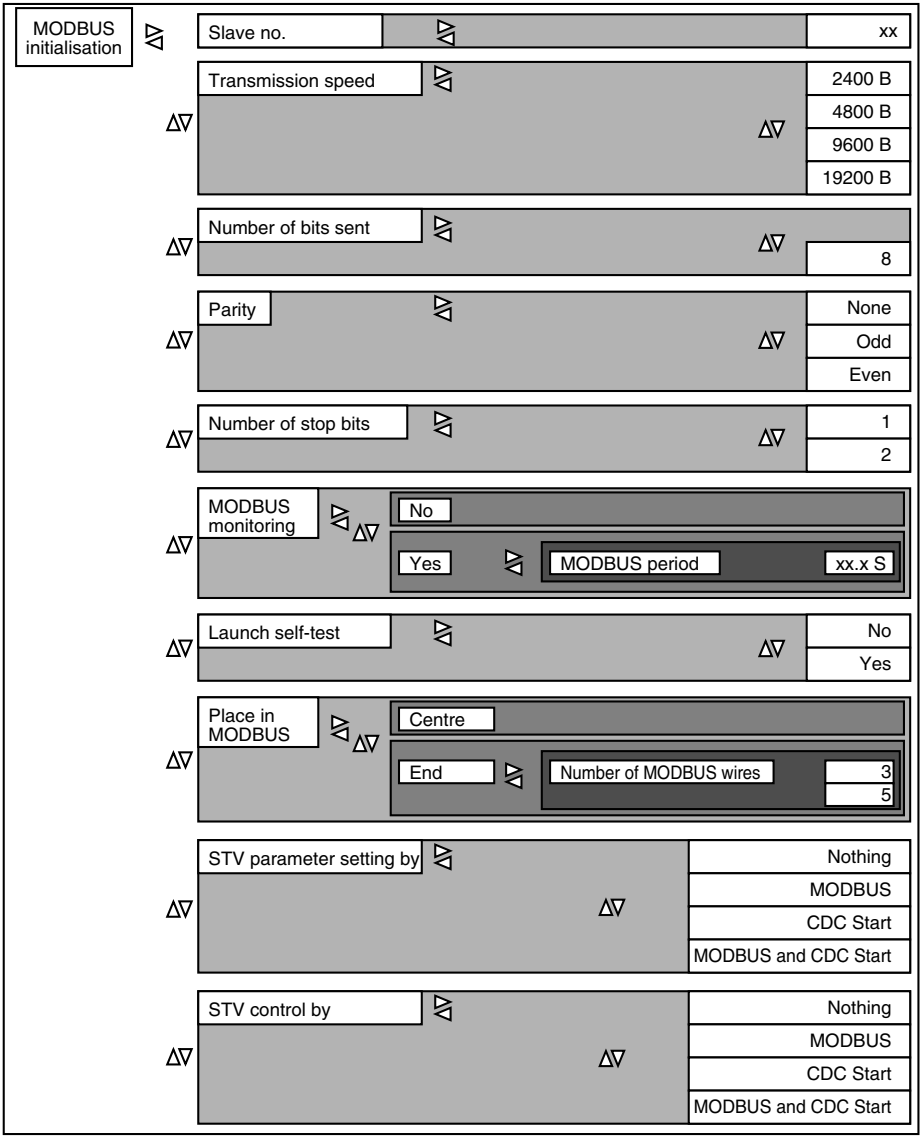
COM - START end

3.2 - Setting COM - START parameters

Position the slide switch on "Parameter setting" using the specially provided plastic screwdriver, then switch on the DIGISTART and the **COM - START** network option.

Using the CDC - START console, go to the "MODBUS initialisation" menu using the appropriate arrows.

Carefully define each of the required parameters, not forgetting to store the selections made (see Parameter setting table on the next page).


MODBUS initialisation
Slave no.
xx
Transmission speed
2400 B
4800 B
9600 B
19200 B
Number of bits sent
8
Parity
None
Odd
Even
Number of stop bits
1
2
MODBUS monitoring
No
Yes
MODBUS period
xx.x S
Launch self-test
No
Yes
Place in MODBUS
Centre
End
Number of MODBUS wires
3
5
STV parameter setting by
Nothing
MODBUS
CDC Start
MODBUS and CDC Start
STV control by
Nothing
MODBUS
CDC Start
MODBUS and CDC Start

The first 5 sub-sections of the table opposite show the link which should be established.

• "MODBUS monitoring" is used to define the frequency of the test on the serial link when in STV communication mode.

• "Launch self-test" is used to ensure that the **COM - START** option card is not faulty. This self-test should only be launched after **disconnection of the network links**.

• "Place in MODBUS" is used to define the line termination required depending on the wiring characteristics of the **COM - START** option. There are in fact several connection possibilities, especially where the number of wires is concerned.

• "STV parameter setting by" and "STV control by" are used to define the interfaces selected for these operations.

An EEPROM in **COM - START** allows the chosen selections to be stored.

IMPORTANT : Do not forget to program the DIGISTART, especially the selection "Control via the terminal block or via the keypad". To authorise "Control via MODBUS", you should first select "Control via the keypad" for the DIGISTART.

If the slide switch remains in this position (Param.) without any activity for 5 minutes then the CDC - START changes to Read mode and indicates the **COM - START** software version on the first line, and the result of the self-test (updated on each launch) on the second line.

When the **COM - START** parameters have all been set, change the slide switch to the "Communication" position.

3.3 - Using COM - START

3.3.1 - Read mode

All the DIGISTART parameters which can be accessed via the serial link can be read. These include : all the parameter values (current, voltage, power, etc), the DIGISTART status (starting phase, operation, etc), any faults which have occurred (motor thermal, overload, underload, etc) and the DIGISTART characteristics (software version, rating, etc). This type of information is usually available on CDC - START.

3.3.2 - Parameter-setting mode

It is possible to program all the accessible DIGISTART parameters (including the RV - START, ES - START, FR - START options) with the same precision as when using the CDC - START console. The table of accessible parameters is given in an appendix with the corresponding addresses.

If the "Control via MODBUS" function is selected, note the particular features of the "start", "stop" and "reset" sequences outlined below.

"Start" sequence : activating the DIGISTART. Can only be performed in two frames, one for setting the bit corresponding to the required command in the appropriate address to 1 and one for resetting it to 0 (similar to a run command during jogging).

The "reset" and "stop" sequences are identical to the "start" sequence except that the corresponding bit is different, although it is common to "stop" and "reset".

3.4 - DIGISTART parameters

3.4.1 - Initialising the DIGISTART

Option	Address (decimal)	Indication on the display	Factory settings
All	263	INIT MAIN SUPPLY Un : XXX V	400
All	265	INIT MOTOR SPEED Nn : XXXX RPM	1500
All	264	INIT MOTOR POWER Pn : XXX.X KW	According to STV RATING
All	2561	INIT MOTOR CURRENT IN : XXXA	According to STV RATING
All	259	INIT DISPLAY OF CURRENT : IN % In	% In
All	260	INIT CONTROL DISTANCE	DISTANCE
All	261	INIT AUTORESTART ON SUP. LOSS : OFF	OFF

Note : If the DIGISTART is controlling a number of motors with different power ratings (with the ER - START option), enter the parameters for the most powerful motor in this section.

3.4.2 - DC injection option

Option	Address (decimal)	Indication on the display	Factory settings
FR - START	2310	ODC HEATING WHEN STOPPED : OFF	OFF
	2311 2312	ODC HEATING AUTO : DELAY : XXX Mn AUTO : LEVEL : XX	1 50
	2312	ODC HEATING MANU. : LEVEL : XXX	50

Adjustment range	Comment
001 to 760V	Enter the mains rated voltage.
375 to 3600 RPM	According to the motor nameplate.
1.1 to 500.0 kW	According to the motor nameplate. (Value expressed in hundreds of Watts for **COM - START**).
7 to 130 % of the STV rating	According to the motor nameplate. (See note 1). (**COM - START** in Amp.)
IN % In (0)	Reading as a % of the STV rated current.
IN AMPS (1)	Direct reading of the motor current.
DISTANCE (0)	: Start/Stop command, via contact to terminal block.
LOCAL (1)	: Start/Stop command via **CDC - START** keypad.
OFF (0) ON (1)	: The STV locks with a microbreak fault. : The STV restarts after a microbreak < 1 s. Prohibited for applications with high resistive torque and low inertia.

Adjustment range	Comment
OFF (0) AUTO (1) MANUAL (2)	Heating disabled. Timed heating enabled. Manual heating enabled.
0 to 120 min 25 to 80	AUTO : used to set the time between the stop command and the current injection plus the required level of current, to maintain the motor at the correct temperature.
25 to 120	MANUAL : drying out the motor by current injection initiated by an START command. Used after a long period of downtime.

( ) : Numeric value for **COM - START**.

3.4.3 - Speed feedback option

Option	Address (Decimal)	Indication on the display	Factory settings
RV - START	2314	OSF 2 SPEED MOTOR : OFF	OFF
RV - START	2315	OSF CHOICE OF SENSOR: 4-20 mA	4 - 20 mA
	2316	OSF SENS. INDUCT. V1: XXXX PULS/Mn	6000
	2317	V2: XXXX PULS/Mn	3000
	2318	OSF SENS. TACHO. VOLTAGE V1: XXX V	90
	2319	VOLTAGE V2: XXX V	45

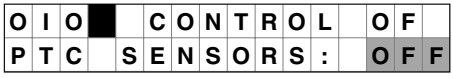
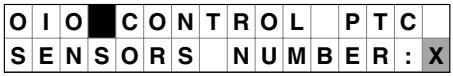
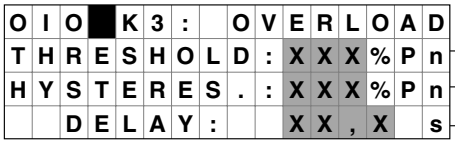
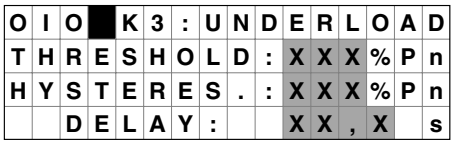
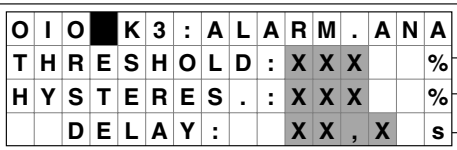
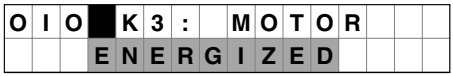
3.4.4 - I/O option

Option	Address (Decimal)	Indication on the display	Factory settings
ES - START	2320	IO INPUT LOGIC N°1: OFF	OFF
	2563	IO INPUT 1 OTHER SETTINGS	OTHER SETTINGS
ES - START	2322	IO INPUT LOGIC N°2: OFF	OFF
	2564	IO INPUT 2 OTHER SETTINGS	OTHER SETTINGS
ES - START	2324	IO INPUT ANALOGUE : OFF	OFF
	2325	IO INPUT ANALOG SIGNAL: 4-20 mA	4 - 20 mA

Adjustment range	Comment
OFF (0) ON (1)	Select the type of motor : with a 2-speed motor, two sets of parameters are accessible.
4 - 20 mA (0) INDUCT. (1) TACHO. (2)	Selection of the type of sensor used with 4 - 20 mA : 4 mA : zero speed, 20 mA = rated speed.
3000 to 30000 Pulses/Min 3000 to 30000 Pulses/Min	Enter the number of pulses supplied by the sensor at rated speed. V1 : for the 2-speed motor highest speed. V2 : for the 2-speed motor lowest speed.
20 to 220 VDC 20 to 220 VDC	Enter the voltage corresponding to the rated speed. V1 : for the motor highest speed. V2 : for the motor lowest speed.

Adjustment range	Comment
OFF (0) ON (1)	ON : Logic input 1 enabled.
EXTERNAL FAULT (0) OTHER SETTINGS (1)	EXTERNAL FAULT : Terminal 11 is used to monitor an external fault. OTHER SETTINGS : Terminal 11 enables another set of parameters entered in STARTING (section 3.4.5).
OFF (0) ON (1)	ON : Logic input 2 enabled.
EXTERNAL FAULT (0) OTHER SETTINGS (1)	EXTERNAL FAULT : Terminal 13 is used to monitor an external fault. OTHER SETTINGS : Terminals 11 and 13 enable 4 sets of parameters entered in STARTING 2, 3, 4 (section 3.4.6).
OFF (0) ON (1)	ON : management of an external analogue signal (protection fault threshold and early warning thresholds on outputs K1 to K4).
4 - 20 mA (0) 0 - 10V (1)	Selection of the type of analogue signal.

( ) : Numeric value for **COM - START**.

Option	Address (Decimal)	Indication on the display	Factory settings
ES - START	2326		OFF
	2327		3
ES - START	2328		OVERLOAD
	2333 2334 2335		100 80 2.0
	2330 2331 2332		50 70 2.0
	2336 2337 2338		100 80 2.0
	2329		ENERGIZED
ES - START	2339		UNDERLOAD

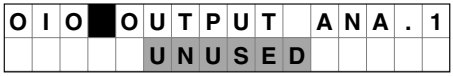
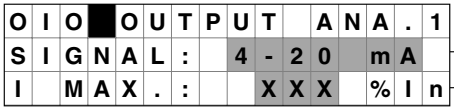
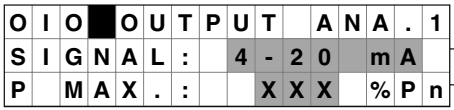
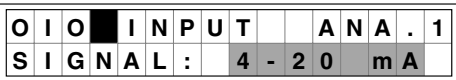
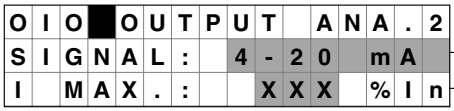
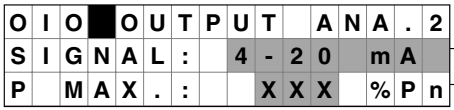
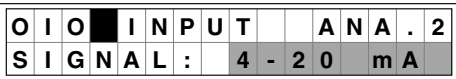
Adjustment range	Comment
OFF (0) ON (1)	ON : PTC sensor control is enabled.
1 to 6	Set the number of PTC sensors when control is enabled.
GENERAL FAULT (0) MOTOR STATUS (1) OVERLOAD (2) UNDERLOAD (3) ALARM. ANALOG.I/P (4)	Choice of assignment for the K3 relay. Relay opens in the event of a fault or if the electronics are powered off.
000 to 150% 000 to 150% 00.0 to 60.0 s	The relay closes when the power drawn is higher than the closing threshold for longer than the time delay. It opens when the power is lower than the opening threshold.
000 to 100% 000 to 100% 00.0 to 60.0 s	The relay closes when the power drawn is lower than the closing threshold for longer than the time delay. It opens when the power is higher than the opening threshold.
000 to 100% 000 to 100% 00.0 to 60.0 s	The relay closes when the analogue input signal is higher than the closing threshold for longer than the time delay. It opens when the signal is lower than the opening threshold.
ACCELERATING (0) ENERGIZED (1) START COMPLETE (2)	- The relay closes during the acceleration phase. - The relay closes when the START command is given and opens when the motor is powered off. - The relay closes at the end of starting and opens on a STOP command.
GENERAL FAULT (0) MOTOR STATUS (1) OVERLOAD (2) UNDERLOAD (3) ALARM. ANALOG. I/P (4)	Operation and use identical to the K4 output.

( ) : Numeric value for **COM - START**.

Option	Address (Decimal)	Indication on the display	Factory settings
ES - START	2344	OIO K4: OVERLOAD THRESHOLD: XXX%Pn	100
	2345	HYSTERES.: XXX%Pn	80
	2346	DELAY: XX,X s	2.0
	2341	OES K4: UNDERLOAD THRESHOLD: XXX%Pn	50
	2342	HYSTERES.: XXX%Pn	70
	2343	DELAY: XX,X s	2.0
	2347	OIO K4: ALARM ANA THRESHOLD: XXX %	100
	2348	HYSTERES.: XXX %	80
	2349	DELAY: XX,X s	2.0
	2340	OIO K4: MOTOR ACCELERATING	ACCELERATING

Adjustment range	Comment
000 to 150% 000 to 150% 00.0 to 60.0 s	The relay closes when the power drawn is higher than the closing threshold for longer than the time delay. It opens when the power is lower than the opening threshold.
000 to 100% 000 to 100% 00.0 to 60.0 s	The relay closes when the power drawn is lower than the closing threshold for longer than the time delay. It opens when the power is higher than the opening threshold.
000 to 100% 000 to 100% 00.0 to 60.0 s	The relay closes when the analogue input signal is higher than the closing threshold for longer than the time delay. It opens when the signal is lower than the opening threshold.
ACCELERATING (0) ENERGIZED (1) START COMPLETE (2)	- The relay closes during the acceleration phase. - The relay closes when the START command is given and opens when the motor is powered off. - The relay closes at the end of starting and opens on a STOP command.

( ) : Numeric value for **COM - START**.

Option	Address (Decimal)	Indication on the display	Factory settings
ES - START	2305		UNUSED
	2306 2307		4 - 20 mA 400
	2306 2308		4 - 20 mA 150
	2306		4 - 20 mA
ES - START	2309		UNUSED
	2350 2351		4 - 20 mA 400
	2350 2352		4 - 20 mA 150
	2350		4 - 20 mA

Adjustment range	Comment
UNUSED (0) CURRENT SIGNAL (1) POWER O/P SIGNAL (2) ANALOG. I/P SIGN. (3)	Selection of the signal delivered at the analogue output 1 terminal.
4 - 20 mA (0) or 0 - 10V (1) 000 to 500% of In	Show current enabled : Select the type of signal used, then the value of the current corresponding to the maximum signal level.
4 - 20 mA (0) or 0 - 10V (1) 000 to 250% of Pn	Show power enabled : Select the type of signal used, then the value of the power drawn corresponding to the maximum signal level.
4 - 20 mA (0) or 0 - 10V (1)	Show ana. input enabled : Select the type of signal used proportional to the analogue input.
UNUSED (0) CURRENT SIGNAL (1) POWER O/P SIGNAL (2) ANALOG. I/P SIGN. (3)	Selection of the signal delivered at the analogue output 2 terminal. Operation and settings identical to analogue output 1.
4 - 20 mA (0) or 0 - 10V (1) 000 to 500% of In	Show current enabled : Select the type of signal used, then the value of the full-scale power.
4 - 20 mA (0) or 0 - 10V (1) 000 to 250% of Pn	Show power enabled : Select the type of signal used, then the value of the full-scale power.
4 - 20 mA (0) or 0 - 10V (1)	Show ana. input enabled : Select the type of signal used proportional to the analogue input.

( ) : Numeric value for **COM - START**.

3.4.5 - Starting parameter setting

Option	Address (Decimal)	Indication on the display	Factory settings
FR - START	524	STT1 BRAKE BEFORE ACCEL ERATION: OFF	OFF
FR - START	525 526	STT1 BRAKE BEFORE ACCEL :LEVEL : XXX ACCEL :TIME : XXs	150 5
ALL	513	STT1 KICKSTART OFF	OFF
ALL	515	STT1 KICKSTART LEVEL : X	3
ALL	514	STT1 ACCELERATION CURRENT RAMP	CURRENT RAMP
ALL	519 517 518	STT1 CURRENT RAMP PEDESTAL : XXX%In I LIMIT : XXX%In RAMP TIME : XXs	200 400 20
ALL	517 520	STT1 SPEED RAMP I LIMIT : XXX%In ACCEL.TIME : XXXs	400 20

Adjustment range	Comment
OFF (0) * or ON (1)	ON : On a START command, current is injected for the programmed time or until the motor stops, then the motor accelerates
25 to 250% In 00 to 60 s	If braking before acceleration is enabled, this sets the braking parameters.
OFF (0) * or ON (1)	Allows application of full voltage to the motor terminals (adjustable duration), then starting on the ramp.
0 to 4	If kickstarting is enabled, this sets the duration in number of half-waves.
CURRENT RAMP (0) SPEED RAMP (1)	Selection of the type of acceleration required.
50 to 500% of In 100 to 500% of In 00 to 60 s	If the current ramp is enabled, this sets the ramp parameters.
100 to 500% of In 000 to 160 s	If the speed ramp is enabled, this sets the ramp parameters.

* Only one or the other can be chosen (see the last "ON" which was taken into account).

( ) : Numeric value for **COM - START**.

3.4.6 - Starting 2 parameter setting

Option	Address (Decimal)	Indication on the display	Factory settings
ES - START	521	STT2 ADAPTATION CURRENT2: XXX%In	100
FR - START	527	STT2 BRAKE BEFORE ACCELERATION: OFF	OFF
FR - START	528	STT2 BRAKE BEFORE ACCEL: LEVEL: XXX	150
	529	ACCEL: TIME: XXs	5
ES - START	530	STT2 KICKSTART OFF	OFF
ES - START	531	STT2 KICKSTART LEVEL: X	3
ES - START	532	STT2 ACCELERATION CURRENT RAMP	CURRENT RAMP
ES - START	523	STT2 CURRENT RAMP PEDESTAL: XXX%In	200
	534	ILIMIT: XXX%In	400
	535	RAMP TIME: XXs	20
RV - START	534	STT2 SPEED RAMP ILIMIT: XXX%In	400
	522	ACCEL.TIME: XXXs	20

Caution : All current values are expressed as a % of the rated current scaled using current 2 adaptation and called I2.

Adjustment range	Comment
In 2 = 007 to 100% of In 1	Enabled by OTHER SETTINGS in one logic input. Set if the motor used is different to that configured in INITIALISING THE DIGISTART.
OFF (0) ON (1)	Operation and use identical to the starting parameter setting (section 3.4.5).
25 to 250% In 2 00 to 60 s	If braking before acceleration is enabled, this sets the braking parameters.
OFF (0) or ON (1)	Allows application of full voltage to the motor terminals (adjustable duration), then starting on the ramp.
0 to 4	If kickstarting is enabled, this sets the duration in number of half waves.
CURRENT RAMP (0) SPEED RAMP (1)	Selection of the type of acceleration required.
50 to 500% of In 2 100 to 500% of In 2 00 to 60 s	If the current ramp is enabled, this sets the ramp parameters.
100 to 500% of In 2 000 to 160 s	If the speed ramp is enabled, this sets the ramp parameters.

( ) : Numeric value for **COM - START**.

3.4.7 - Starting 3 parameter setting

Option	Address (Decimal)	Indication on the display	Factory settings
ES - START	536	ST3 ADAPTATION CURRENT3: XXX%In	100
FR - START	537	ST3 BRAKE BEFORE ACCELERATION: OFF	OFF
FR - START	538	ST3 BRAKE BEFORE ACCEL: LEVEL: XXX	150
	539	ACCEL: TIME: XXs	5
ES - START	540	ST3 KICKSTART OFF	OFF
	541	ST3 KICKSTART LEVEL: X	3
	542	ST3 ACCELERATION CURRENT RAMP	CURRENT RAMP
		ST3 CURRENT RAMP	
	546	PEDESTAL: XXX%In	200
	544	I LIMIT: XXX%In	400
	545	RAMP TIME: XXs	20
RV - START		ST3 SPEED RAMP	
	544	I LIMIT: XXX%In	400
	547	ACCEL.TIME: XXXs	20

Caution : All current values are expressed as a % of the rated current scaled using current 3 adaptation and called I3.

Adjustment range	Comment
In 3 = 007 to 100% of In 1	Enabled by OTHER SETTINGS in both logic inputs. Set if the motor used is different from that configured in INITIALISING THE DIGISTART.
OFF (0) ON (1)	Operation and use identical to the starting parameter setting (section 3.4.5).
25 to 250% In 3 00 to 60 s	If braking before acceleration is enabled, this sets the braking parameters.
OFF (0) ON (1)	Allows application of full voltage to the motor terminals (adjustable duration), then starting on the ramp.
0 to 4	If kickstarting is enabled, this sets the duration in number of half waves.
CURRENT RAMP (0) SPEED RAMP (1)	Selection of the type of acceleration required.
50 to 500% of In 3 100 to 500% of In 3 00 to 60 s	If the current ramp is enabled, this sets the ramp parameters.
100 to 500	If the speed ramp is enabled, this sets the ramp parameters.

( ) : Numeric value for **COM - START**.

3.4.8 - Starting 4 parameter setting

Option	Address (Decimal)	Indication on the display	Factory settings
ES - START	548	STA4 ADAPTATION CURRENT4: XXX%In	100
FR - START	549	STA4 BRAKE BEFORE ACCEL ERAT ION: OFF	OFF
FR - START	550	STA4 BRAKE BEFORE ACCEL: LEVEL: XXX	150
	551	ACCEL: TIME: XXs	5
ES - START	552	STA4 KICKSTART OFF	OFF
	553	STA4 KICKSTART LEVEL: X	3
	554	STA4 ACCELERATION CURRENT RAMP	CURRENT RAMP
		STA4 CURRENT RAMP	
	558	PEDESTAL: XXX%In	200
	556	I LIMIT: XXX%In	400
	557	RAMP TIME: XXs	20
RV - START		STA4 SPEED RAMP	
	556	I LIMIT: XXX%In	400
	559	ACCEL.TIME: XXXs	20

Caution : All current values are expressed as a % of the rated current scaled using current 4 adaption and called I4.

Adjustment range	Comment
In 4 = 007 to 100% of In 1	Enabled by OTHER SETTINGS in both logic inputs. Set if the motor used is different from that configured in INITIALISING THE DIGISTART.
OFF (0) ON (1)	Operation and use identical to the starting parameter setting (section 3.4.5).
25 to 250% In 4 00 to 60 s	If braking before acceleration is enabled, this sets the braking parameters.
OFF (0) ON (1)	Allows application of full voltage to the motor terminals (adjustable duration), then starting on the ramp.
0 to 4	If kickstarting is enabled, this sets the duration in number of half waves.
CURRENT RAMP (0) SPEED RAMP (1)	Selection of the type of acceleration required.
50 to 500% of In 4 100 to 500% of In 4 00 to 60 s	If the current ramp is enabled, this sets the ramp parameters.
100 to 500% of In 4 000 to 160 s	If the speed ramp is enabled, this sets the ramp parameters.

( ) : Numeric value for **COM - START**.

3.4.9 - Protection parameter setting

Option	Address (Decimal)	Indication on the display	Factory settings
ALL	770	PRO EXCESSIVE START.TIME: ON	ON
	776	PRO EXC.START. MAX.TIME : XXX s	030
ALL	778	PRO MOT. THERMAL OVERLOAD : ON	ON
	796	PRO MOTOR TEMP. CURRENT : XXX %	100
ALL	785	PRO INSTANTENOUS OVERLOAD : OFF	OFF
	786	PRO OVERLOAD TRIPPING : XXX % Pn	120
	787	DELAY : XX s	1
ALL	790	PRO INSTANTENOUS UNDERLOAD : OFF	OFF
	791	PRO UNDERLOAD TRIPPING : XXX % Pn	30
	792	DELAY : XX s	1
ALL	797	PRO LOCKED ROTOR : OFF	OFF
ALL	772	PRO PHASE SEQUENCE : OFF	OFF
ALL	774	PRO DELAY BEFORE RESTART : OFF	OFF
	781	PRO REST. DELAY TIME : XXX Mn s	60
	782	2 CONSECUT. : OFF	OFF
ES - START	809	PRO FAULT ANA. INPUT : OFF	OFF
	812	PRO ANALOG. I/P HIGH LEVEL : XXX %	80
	813	LOW LEVEL : XXX %	20
	814	HYSTERESIS : X %	5
	815	DELAY : XX s	1

( ) : Numeric value for **COM - START**.

Adjustment range	Comment
ON (1) or OFF (0)	ON : DIGISTART is faulty if the motor has not finished starting within the max. programmed time.
000 to 160 s	Set the time for the most demanding starting conditions.
OFF (0) or ON (1)	ON : if there is no other thermal protection in the installation.
50 to 150% In	Adjustment of the thermal current threshold when the thermal protection is enabled.
OFF (0) or ON (1)	ON : overload protection enabled.
000 to 160% Pn 00 to 60 s	When protection is enabled : fault if threshold exceeded for a period longer than the time delay.
OFF (0) or ON (1)	ON : underload protection enabled.
000 to 100% Pn 00 to 60 s	When protection is enabled : fault if the power is lower than the threshold for a period longer than the time delay.
OFF (0) or ON (1)	ON : passage to fault mode enabled in the event of a locked rotor.
OFF (0) or ON (1)	ON : fault if the direction of rotation of the mains phases is different to that stored. Pressing STOP/RESET stores the new direction.
OFF (0) or ON (1)	ON : prohibits starting if the START command is given when the time since the last stop is less than the time delay.
000 to 120 min OFF (0) or ON (1)	When protection is enabled, set the required time, then whether or not 2 consecutive starts are allowed before the time delay expires.
OFF (0) or ON (1)	Enables detection of levels on the analogue command to detect a fault.
000 to 100% 000 to 100% 00 to 5% 0 to 60 s	Monitoring of the analogue input between the 2 thresholds with adjustable hysteresis.

Option	Address (Decimal)	Indication on the display	Factory settings
ES - START	802	PRO EXTERNAL TRIP 1 : OFF	OFF
	805	PRO EXTERNAL TRIP 2 : OFF	OFF

3.4.10 - Deceleration parameter setting

Option	Address (Decimal)	Indication on the display	Factory settings
ALL	1025	DEC DECELERATION COAST STOP	COAST STOP
	1026	DEC COAST STOP DELAY : XXs	00
	1026	DEC SOFT STOP DELAY : XXs	00
	1027	DECEL. TIME : XXs	20
RV - START	1026	DEC SPD FEEDBCK DELAY : XXs	0
	1032	DECEL. TIME : XXs	20
FR - START	1026	DEC DC BRAKING DELAY : XXs	0
	1033	LEVEL : XXX	150
	1034	INJECT. TIME : XXs	5

Adjustment range	Comment
OFF (0) ON (1)	Enables a fault caused by opening of logic input 1.
OFF (0) ON (1)	Enables a fault caused by opening of logic input 2.

Adjustment range	Comment
COAST STOP (0) SOFT STOP (1) WITH SPD FEEDBCK (2) WITH DC BRAKING (3)	Selection of required stop mode, depending on the options fitted on the DIGISTART.
00 to 60 s	Motor switch-off postponed by the time delay in relation to the STOP command.
00 to 60 s 00 to 50 s	After the STOP command, there is a wait period depending on the time delay, then the motor voltage decreases to as little as 0 V depending on the programmed time.
00 to 60 s 000 to 160 s	After the STOP command, there is a wait period depending on the time delay, then the motor speed decreases to as little as zero speed depending on the programmed time.
00 to 60 s 025 to 250 00 to 60	After the STOP command, there is a wait period depending on the time delay, then current injection depending on the level and time set.

( ) : Numeric value for **COM - START**.

3.4.11 - Output relay parameter setting

Option	Address (Decimal)	Indication on the display	Factory settings
ALL	2562	RLY ■ OUTPUT K1 GENERAL FAULT	GENERAL FAULT
	1283	RLY ■ K1: MOTOR ACCELERATING	ACCELERATING
	1288 1289 1290	RLY ■ K1: OVERLOAD THRESHOLD: XXX%Pn HYSTERES.: XXX%Pn DELAY: XX,X s	100 80 02.0
	1285 1286 1287	RLY ■ K1: UNDERLOAD THRESHOLD: XXX%Pn HYSTERES.: XXX%Pn DELAY: XX,X s	50 70 02.0
ES - START	1297 1298 1299	RLY ■ K1: ALARM ANA THRESHOLD: XXX % HYSTERES.: XXX % DELAY: XX,X s	100 80 2.0

Adjustment range	Comment
GENERAL FAULT (0) MOTOR STATUS (1) OVERLOAD (2) UNDERLOAD (3) ALARM ANALOG. I/P (4)	Relay open on a fault or if the STV is powered off. See below. See below. See below. See below.
ACCELERATING (0) ENERGIZED (1) START COMPLETE (2)	Relay closed during acceleration phase. Closed as soon as START command is received, open when motor powered off. Closed at end of starting, open on STOP command.
000 to 150% Pn 000 to 150 00 to 60.0	Relay closed when the power drawn is higher than the closing threshold for longer than the time delay. Relay open as soon as the power drawn is lower than the opening threshold.
000 to 100% Pn 000 to 100% Pn 00 to 60 s	Relay closed when the power drawn is lower than the closing threshold for longer than the time delay. Relay open as soon as the power drawn is higher than the opening threshold.
000 to 100% 000 to 100% 00.0 to 60.0 s	The relay closes when the analogue input signal is higher than the closing threshold for longer than the time delay. It opens when the signal is lower than the opening threshold.

( ) : Numeric value for **COM - START**.

Option	Address (Decimal)	Indication on the display	Factory settings
ALL	1282	RLY ■ OUTPUT K2 MOTOR STATUS	MOTOR STATUS
	1284	RLY ■ K2: END OF MOTOR STARTING	END OF STARTING
	1294	RLY ■ K2: OVERLOAD THRESHOLD: XXX%Pn	100
	1295	HYSTERES.: XXX%Pn	80
	1296	DELAY: XX,X s	2.0
	1291	RLY ■ K2: UNDERLOAD THRESHOLD: XXX%Pn	50
	1292	HYSTERES.: XXX%Pn	70
	1293	DELAY: XX,X s	2.0
ES - START	1300	RLY ■ K2: ALARM ANA THRESHOLD: XXX %	100
	1301	HYSTERES.: XXX %	80
	1302	DELAY: XX,X s	2.0

Adjustment range	Comment
GENERAL FAULT (0) MOTOR STATUS (1) OVERLOAD (2) UNDERLOAD (3) ALARM ANALOG. I/P (4)	Operation and use identical to the K1 relay. Selection of assignment for the K2 relay. Relay open on a fault or if the electronics are powered off.
ACCELERATING (0) POWERED ON (1) END OF STARTING (2)	Relay closed during acceleration phase. Closed as soon as START command is received, open when motor powered off. Closed at end of starting, open on STOP command.
000 to 150% 000 to 150% 00.0 to 60.0 s	The relay closes when the power drawn is higher than the closing threshold for longer than the time delay. It opens when the power is lower than the opening threshold.
000 to 100% 000 to 100% 00.0 to 60.0 s	The relay closes when the power drawn is lower than the closing threshold for longer than the time delay. It opens when the power is higher than the opening threshold.
000 to 150% 000 to 150% 00.0 to 60.0 s	The relay closes when the analogue input signal is higher than the closing threshold for longer than the time delay. It opens when the signal is lower than the opening threshold.

( ) : Numeric value for **COM - START**.

3.4.12 - Special parameters

COM - START can be used to return to the DIGISTART factory settings (see STV 2313 manual). This action is performed by writing 1 at the address "1796".

COM - START can be used to control the DIGISTART if this option has been selected when setting the **COM - START** parameters.

The address to be taken into account for pilot control of the STV 2313 is 1797 (min. value "0", max. value "255").

The starting sequence described in section 3.3.2 consists of writing 251 at address 1797 followed by 255 at the same address (1797).

The stop or reset sequence is performed by initially writing 247 at address 1797 followed by 255 at the same address (1797).

3.4.13 - Read mode

The table below lists the different parameters which can be accessed in read mode by the COM - START option, with their addresses and the minimum and maximum values, and also the units.

Description	Address	Unit	Min.	Max.
Junction temperature	1802	°C	0	150
Power absorbed	1798	% pn	0	250
Power factor	1799	-	0	100
Starting duration	1800	s	0	600
Timer	1801	h	0	65535
Software version	1812	-	0	999
Current absorbed (*)	2565	A or %	0	9999

(*) The unit depends on the selection made in parameter-setting mode concerning the unit for the display (Address 259).

• The rating is read at address 1810 and the correspondence of the values is shown in the table below :

Rating	Value	
STV 2313 : 37A	1	<-- Min. value
STV 2313 : 60A	2	
STV 2313 : 86A	3	
STV 2313 : 145A	4	
STV 2313 : 211A	5	
STV 2313 : 250A	6	
STV 2313 : 365A	7	
STV 2313 : 530A	8	
STV 2313 : 700A	9	
STV 2313 : 900A	10	<-- Max. value

A value 0 can be read at address 1810, meaning that no DIGISTART has been recognised, and operation is impossible. You should then check that all the installation components are compatible.

• Using COM - START, you can read the names of the options at address 1811 over the network. The correspondence of the values is shown in the table below.

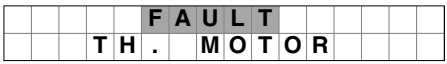
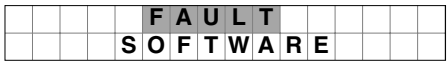
Options	Value	
No option	0	<-- Min. value
ES - START	1	
RV - START	2	
ES - START + RV - START	3	
FR - START	4	
FR - START + ES - START	5	
FR - START + RV - START	6	
FR - START + RV - START + ES - START	7	
Codes reserved for LS	8	
	9	
	10	
	11	
	12	
	13	
	14	
	15	
COM - START	16	
COM - START + ES - START	17	
COM - START + RV - START	18	
COM - START + ES - START + RV - START	19	
COM - START + FR - START	20	
COM - START + FR - START + ES - START	21	
COM - START + FR - START + RV - START	22	
COM - START + FR - START + RV - START + ES - START	23	
Codes reserved for LS	24	
	25	
	26	
	27	
	28	
	29	
	30	
	31	<-- Max. value

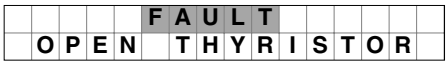
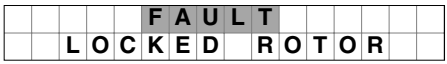
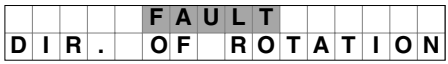
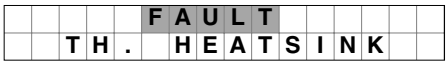
• The status of the DIGISTART is read at address 1794 and the correspondence of the values is shown in the table below :

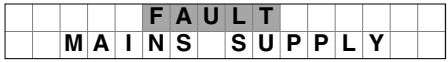
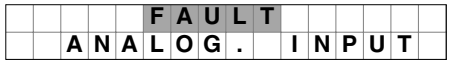
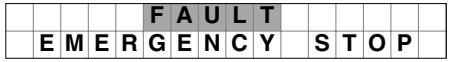
Status	Value	
No power	0	<-- Min. value
Powered off	1	
Motor accelerating	2	
Motor operating	3	
Extended deceleration	4	
DC injection	5	
Not assigned	6	
Not assigned	7	
Braking before stop	8	<-- Max. value

• On application of a fault, the fault type is written at address 1795, which can then be read using COM - START. The following table lists the values assigned to the different faults.

Description	Value	
	0	<-- Min. value
• No voltage at terminals L1 - L2 - L3.		
	1	
• Starting duration longer than the "Max. duration" set in parameter 3-1 : - Load conditions more severe than those used as reference at the time of configuration --> Check the "Max. duration" - Motor faulty (insufficient torque)		
	2	
• Starting conditions greater than the DIGISTART thermal capacity : - Starting current too high - Rest time between 2 starts too short - Starting duration too long - Undersized unit		
	3	
• Phase failure or phase imbalance upstream or downstream of the DIGISTART : - Power fuses blown - Motor cable cut or connector loose		
	4	
• Microbreak in mains supply of between 100 ms and 1 s, with restarting after microbreak disabled. (See initialisation parameter).		

Description	Value
	5
• The operating conditions cause the motor thermal limit to be exceeded or the Th current is < 100%. (See protection parameter).	
	6
• The load on the motor has remained higher than the set current threshold for longer than the tripping time delay : - Threshold lower than the maximum operating conditions - Time delay too short, and the motor is therefore affected by transient overloads - Mechanical problem (See protection parameter).	
	7
• The load on the motor has remained lower than the set current threshold for longer than the tripping time delay : - Threshold higher than the minimum operating conditions - Time delay too short, and the motor is therefore affected by underloads - Break in transmission - Pump draining (See protection parameter).	
	8
• Very significant level of interference resulting in controller malfunction : - Check the remote control cable shielding - If the fault is permanent, replace the module - Control board failure - Incorrect EEPROM value (on power-up)	

Description	Value
	9
• Short-circuit of one or more thyristors : - Check that no element foreign to the DIGISTART has short-circuited the thyristors. - If not, check the state of the thyristors.	
	10
• Thyristor locked or open : - Check the connection of the thyristor gate wires. - Check the power connections. - Check the state of the thyristors.	
	11
• Mechanical locking of the machine making starting impossible.	
	12
• The phase order upstream of the DIGISTART is not in the forward direction : - Cross over two phases upstream of the DIGISTART.	
	13
• No communication is possible between the DIGISTART and the **COM - START** option.	
	14
• Abnormally high temperature on the heatsink : - Check operation of the forced ventilation unit (except for rating 37). - Check that there is sufficient renewal of air for cooling.	

Description	Value
	16
• Supply voltage for the electronics less than : - 177V if the 230V input is being used - 340V if the 400V input is being used - 230V power supply connected to the 400V input - Voltage selection jumper incorrectly positioned (ratings 37 to 86 only).	
	20
• Restarting required before the time delay has elapsed : - Wait for the end of the time delay and resend a START command. (See protection parameter).	
	21
• With the ES - START option, anomaly on terminal 11 (EL1) of the module. Check the logic status of the input compared to the 0V.	
	22
• With the ES - START option, anomaly on terminal 13 (EL2) of the module. Check the logic status of the input compared to the 0V.	
	23
• With the ES - START option, one of the links between terminals 3 to 7 (PTC 1 to 4) is open.	
	24
• With the ES - START option, the analogue input is outside the range defined by the high and low thresholds. (See protection parameter setting).	
	26
• Open circuit between terminals 10 and 11 of the DIGISTART remote control terminal block.	

Description	Value
	28
• With the RV - START option, disconnection or absence of the speed feedback.	
	32 <-- Max. value

The 'store last 5 faults' function is also accessible for the MODBUS network. The values of the faults remain as described earlier (apart from the STV 2313 link fault). The addresses to be read are as follows :

Order of appearance	Addresses
Fault - 1	1804
Fault - 2	1806
Fault - 3	1807
Fault - 4	1808
Fault - 5	1809

Notes

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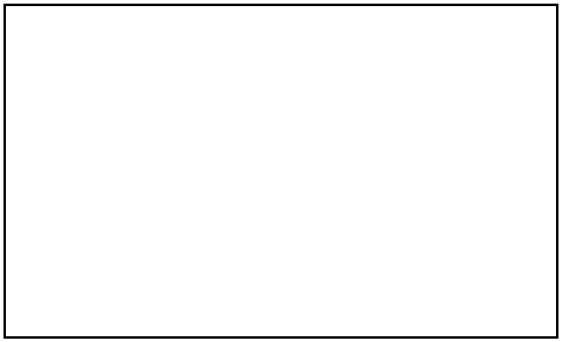

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