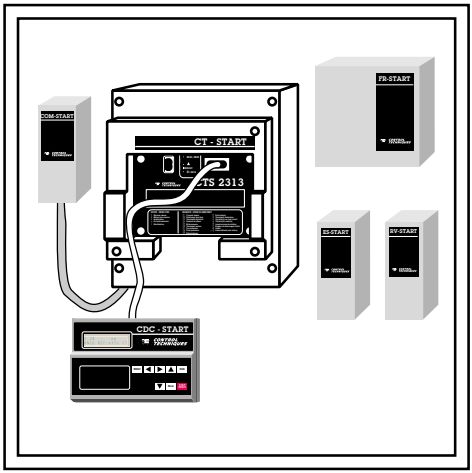
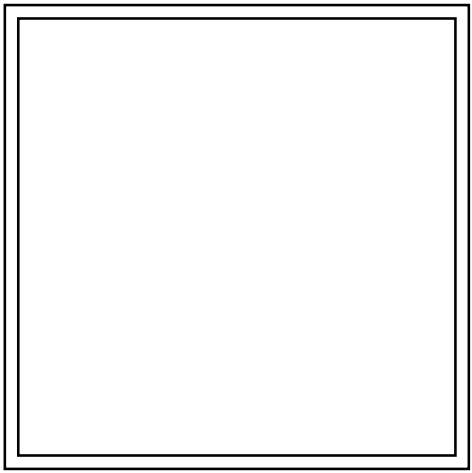
CONTROL TECHNIQUES

Réf. 2806 GB - 4.33 /c- 05.01





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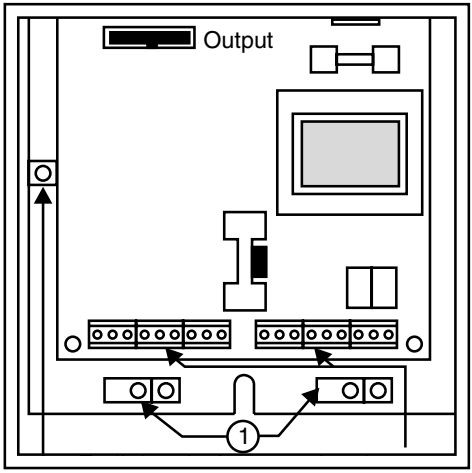

OPTION START

Options for CT - START CTS 2313

Installation

NOTE

CONTROL TECHNIQUES 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.

CONTROL TECHNIQUES gives no contractrual guarantee whatsoever concerning the information published in this document and cannot be liable for any error it may contain nor for any damage arising from its use.

⚠ 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 ⏚).

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.

CONTROL TECHNIQUES 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

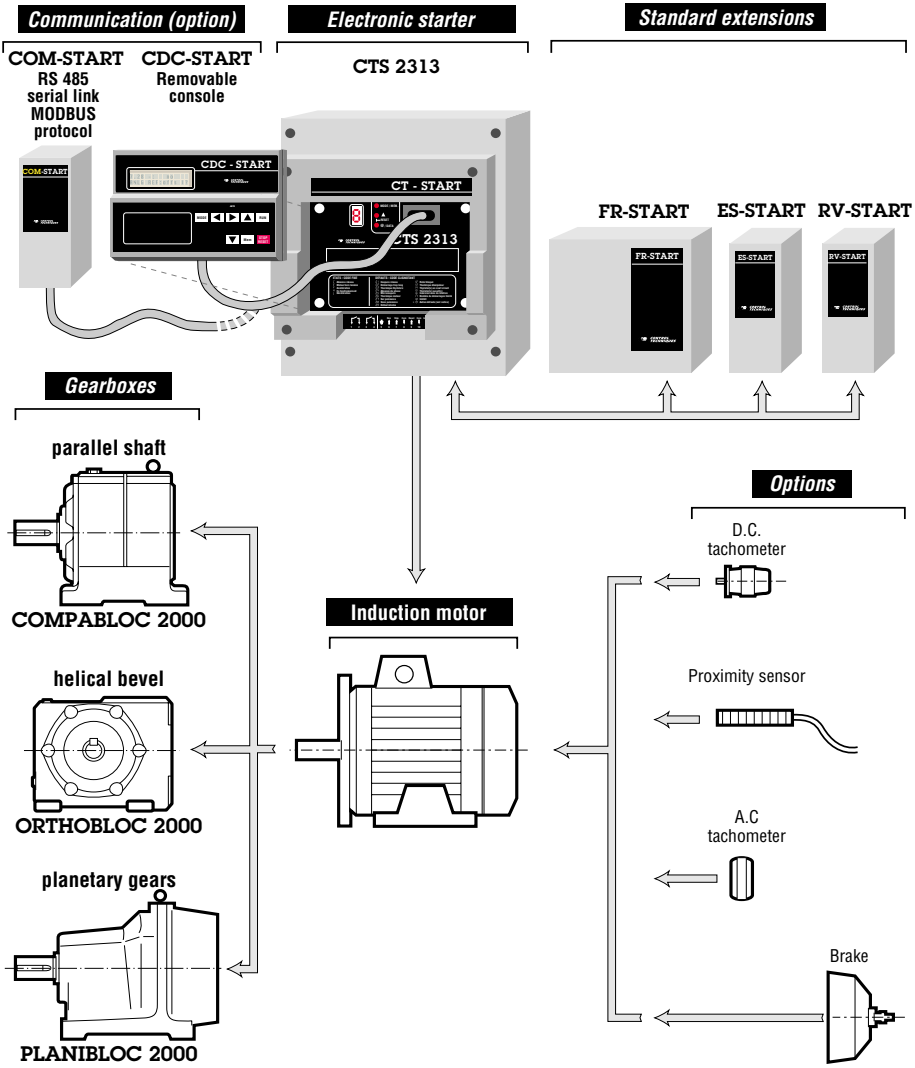
Refer to the manufacturer's documentation.

This document must be forwarded to the end user.

Notes

PREFACE

This manual describes how to install and connect the main options for the CTS 2313 electronic starter.



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1 - GENERAL INFORMATION

1.1 - Operating principle

The **CDC - START** console, which has 8 keys, 1 LED and 1 LCD with 32 characters, is designed for use with starters in the CTS 2313 range.
When connected to the basic model, it can be used to :

• simplify programming, diagnostics and display of parameters,
• achieve more precise settings,
• access the following additional functions :
- assigning the K1 relay,
- memorizing a set of parameters,
- limiting the number of starts,
- setting the hysteresis of the over and underload thresholds,
- setting time delays for tripping on overload/underload faults,
- setting the over/underload alarm thresholds,
- copying and transferring the parameters of one CTS 2313 to another,

• to make use of data concerning the operation of the motor :
- absorbed current,
- power consumption,
- power factor cos φ,
- number of motor operation hours,
- last 5 faults,
- the current operating phase of the motor.

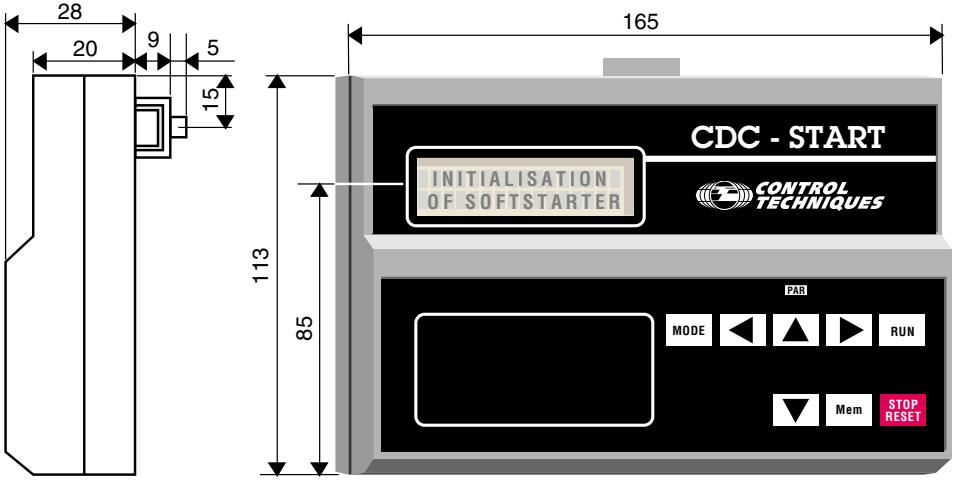
• set up the other options associated with the CTS 2313 :
- FR - START : D.C. injection module which is used for braking, drying or heating the motor,
- RV - START : speed feedback module which provides gradual and repeated starts and deceleration, whatever the load.
- ES - START : inputs/outputs module which is used to control :
- 2 logic inputs (multiple settings),
- 1 analogue input,
- 2 analogue outputs,
- 2 relay logic outputs,
- 6 PTC sensors.

The parameters linked to the options are masked and only become visible when the options are connected.
All parameters relating to a function which is not validated are masked so as to simplify programming by only providing access to active parameters.
Messages are available in 5 languages (English, French, German, Italian and Spanish). The language is selected during programming.

1.2 - General description

There is only one programming and copying console, which is called the **CDC–START**.

1.3 - Dimensions and weight



Weight : 0.3 kg.

2 - MECHANICAL INSTALLATION

2.1 - Inspection on receipt

On receipt of the **CDC - START** module, check that it has not been damaged in transit. In the event of any problems, contact the carrier.

2.2 - Installation precautions

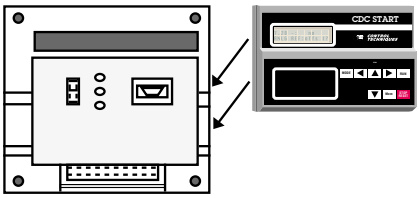
To avoid any risk of interference when the **CDC - START** console is installed remotely, it is strongly recommended that :

- the console is placed well away from any power source which could be a source of radiation (transformer, busbar system, etc),
- the console is not installed more than 5m away from the CTS 2313 control module,
- the connection lead is well away from all power cables.

2.3 - Installation

In all cases, it is preferable to install and/or connect the console when the CTS 2313 is switched off.

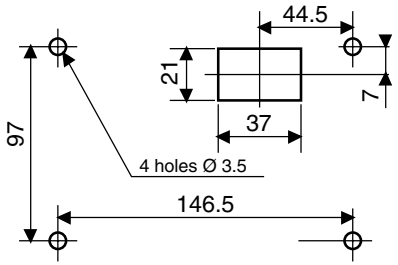
2.3.1 - Installation on the CTS 2313



• A slot is provided on the CTS 2313 control module for connecting the **CDC - START** console.
• The SubD9 connector on the console is plugged directly into the CTS 2313 control module connector.
• The mechanical fixing is provided mainly by the magnet on the back of the console. However, if the installation is permanent, it is recommended that the console is screwed in place as follows :
- remove the protective cover of the CTS 2313 control module,
- screw the console to the back of the cover using the 4 M3 x 12 screws supplied for this purpose,
- replace the control module cover.
• To remove the console, unscrew the 4 fixing screws if necessary, and use the strap above the display to pull the console out.

2.3.2 - Remote installation

The **CDC - START** console can also be installed remotely (on the front of a cubicle for example). In order to do this, please consult CONTROL TECHNIQUES who may supply a screened connection cable and follow the procedure described below.
• Drill holes in the surface chosen for the installation, according to the diagram below.



• Position the **CDC - START** console on this surface and fix it using the 4 screws supplied for this purpose.
• Use a screened cable to connect the **CDC - START** console to the CTS 2313 control module.

3 - CONNECTION

Power supply : provided by the CTS 2313 to which the console is connected.
Remote installation : max. length 5 m.

4 - COMMISSIONING

Refer to the **CDC - START** manual, ref. 2805.

RV - START module

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RV - START module

1 - GENERAL INFORMATION

1.1 - Operating principle

When connected to the CT START CTS 2313, the **RV - START** module provides speed feedback data so that gradual and repeated starts are possible, whatever the load on the driven machine.

It is particularly well-suited for equipment whose load may vary widely from one start to the next.

Applications :

Starting conveyors, elevators, mixers, ball mills, pelleting machines, roll mills, etc.

In addition, the **RV - START** module has a logic input which is used for setting dual parameters on the CTS 2313 if a 2-speed motor is used.

Open contact on input :
start and protect speed 1.
Closed contact on input :
start and protect speed 2.

The following three types of speed feedback can be chosen for the **RV - START** module :

1.1.1 - D.C. or A.C. tachometer

- A.C. or D.C. voltage signal.
- Can be installed anywhere on the machine as long as the signal is proportional to the speed of the motor.
- When the motor is at rated speed, the signal should be between 20 and 220V.

1.1.2 - Proximity sensor

- Use a 3-wire PNP or programmable inductive sensor.
- The sensor is supplied by the **RV – START** module.
- Can be installed anywhere on the machine as long as the number of pulses is proportional to the speed of the motor.
- For selection and installation of the sensor, refer to the manufacturer's instructions.
- When the motor is at rated speed, the number of pulses per minute should be between 3000 and 30000.

Note :

- The best results are obtained when the number of pulses is above 5000 per minute.

- Only salient elements can be counted.

1.1.3 - 4-20mA signal

- Use a 4-20mA signal proportional to the speed of the motor.
- 4 mA should correspond to zero motor speed and 20 mA to the rated speed.

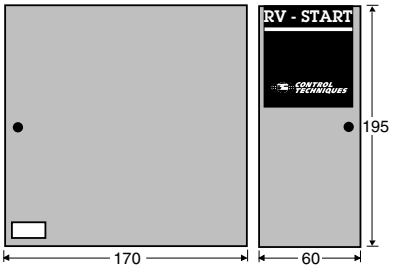
1.2 - General description

There is only one model, which is called the **RV - START**.

1.3 - General characteristics

Power supply :
230V (- 20% + 5%) 50/60 Hz ± 5%.
or
400V (- 15% + 10%) 50/60 Hz ± 5%.
Consumption : 10 VA.

1.4 - Dimensions and weight



Weight : 1 kg.

2 - MECHANICAL INSTALLATION

• The owner or user is responsible for making sure that installation, operation and service of the RV START Module comply of machinery and personnal, and with current regulations of the concerned country.

• The RV START Module 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 RV START Module 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.

• Within atmosphere subject to condensation, it is necessary to install a heating system which functions when the RV START Module is not in use and is disconnected when the controller is operating. Ideally this heating system should be controled automatically.

The housing of the RV START Module is not fireproof : therefore it might be necessary to use a fireproof cubicle.

2.1 - Inspection on receipt

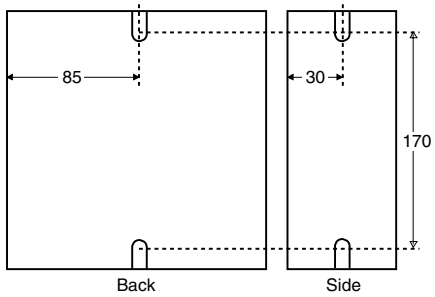
On receipt of the **RV - START** module, check that it has not been damaged in transit. In the event of any problems, contact the carrier.

2.2 - Installation precautions

To avoid any risk of interference it is strongly recommended that :
- the **RV - START** module is fixed on a metal frame which is correctly earthed,
- the **RV - START** module is not installed more than 1.5 m from the basic CTS 2313,
- the connection lead is well away from all power cables.

2.3 - Installation

The fixing holes inside the casing of the **RV - START** module are designed so that it can be installed via the back plate (flat) or via the side plate. As the connection block is across the whole width of the module, access is easier if it is installed flat.



3 - CONNECTION

• 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, may cause fatal electric shocks. Avoid contact in any case.

• The RV START Module must be supplied through a circuit-breaking device in order to disconnect it safely.

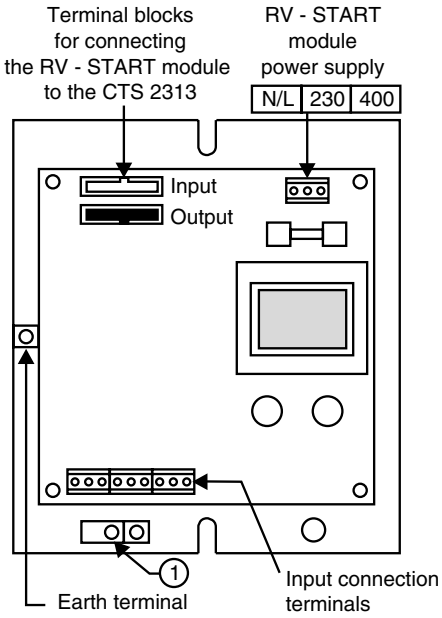
• The RV START Module power supply must be protected against overloads and short circuits.

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

3.1 - General recommendations

- Connect the control terminals using screened twisted cable with the screen connected to the earth of the casing. To do this, strip the screened cable back 15 mm, unscrew the cable clamp (1), close the cable clamp around the cable screen and screw the cable clamp back in place.
- Install RC circuits on the coils of the relays or contactors controlled by the CTS 2313.
- Avoid running wires connected to the control terminal block near to power cables.

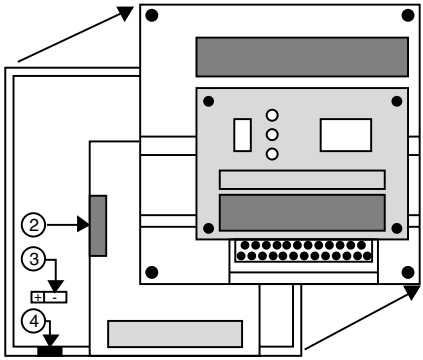
3.2 - Location of the terminal blocks



3.3 - Connecting the RV - START module to the CTS 2313

3.3.1 - CTS 2313 with no options :

- Use the screened cable (34-pin) supplied for this purpose.
- Switch off the power supply to the basic CTS 2313 to which the option is to be connected.
- Remove the cover of the basic CTS 2313 control module.



- Snap out the cable passage (4).
- Connect the screened cable (34-pin), whose end is fitted with a cable clamp, to the connector (2) on the basic CTS 2313 control board.
- Connect the screen by screwing the cable clamp onto the earth terminal (3).
- Connect the other end of the screened cable (34-pin) to the Input connector of the **RV - START** module (do not connect the screen at this end).
- Replace the CTS 2313 control module cover.

3.3.2 - CTS 2313 with an option already connected

- As the connector (2) on the CTS 2313 control card is already in use, connect the end of the screened cable (34-pin), which is fitted with a cable clamp, to the Output connector on the option module which has already been connected to the CTS 2313 (after removing the plastic plug from the Output connector).

Connect the screen by screwing the cable clamp onto the earth terminal inside the casing.

- Connect the other end of the screened cable to the Input connector on the **RV - START** module (do not connect the screen at this end).

3.4 - Connecting the power supply

3.4.1 - Description of the terminal block

Comprises 3 screw terminals which take multicore cables of maximum diameter 2.5mm^2.

Ref.	Function	Elect. char.
N/L - 230V	Power supply for **RV-START**	Single phase 230V - 50/60Hz
N/L - 400V		Single phase 400V - 50/60Hz

Note : If the module is supplied with 230V, the plastic plug must be removed from the 230V terminal.

IMPORTANT : The CTS 2313 and the RV - START module must have the same power supply and they must be powered up simultaneously.

Do not forget to connect the power supply earth wire to the ⏚ terminal.

3.4.2 - Cable diameter

Use twisted cable, diameter 1.5mm^2.

3.5 - Connecting the inputs

3.5.1 - Description of the terminal block

This has 9 screw terminals which will take multicore cables up to 2.5 mm^2 diameter.

3.5.2 - Description of the terminals

No.	Ref.	Description	Functions/Characteristics
1 2 3	Bk (E) Br (+) Bl (-)	Inductive sensor black wire Inductive sensor brown wire Inductive sensor blue wire	Connection of a 3-wire PNP or programmable inductive sensor.
4 5	CT1 CT2	Input for A.C. or D.C. tachometer	Signal between : 20V and 220V D.C. or A.C.
6 7	0V CA	Input of an analogue signal proportional to the motor speed	4-20mA signal
8 9	2V1 2V2	Validation of the logic input Terminals 8 & 9 not connected : Sp. 1 Terminals 8 & 9 connected : Sp. 2	Enables connection of a volt-free contact when using a 2-speed motor.

4 - COMMISSIONING

4.1 - Access to parameter setting

The CDC - START console must be used for setting the parameters of a CT START fitted with the **RV - START** option.
To access the settings, follow the procedure described in section 3.3.4 of the CDC - START console manual ref. 2805.

4.2 - Setting the parameters of the CT START

- Connecting the **RV - START** module automatically provides access, via the CDC - START console, to the various menus linked with this option.
- Do not connect or disconnect the 34-pin screened cable when powered up.
- Set the parameters with the motor stopped.

ES - START module

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ES - START module

1 - GENERAL INFORMATION

1.1 - Operating principle

When connected to the CT - 2START CTS 2313 the **ES - START** module provides access to the following Inputs / Outputs :

1.1.1 - Two logic inputs

Volt-free contact input assigned to the management of external trips and / or multi-setting of the CTS 2313.

• External trips

Tripping and disabling of the CTS 2313 when the contact connected to the input is open.
Management by the CTS 2313 of external safety devices (PTO temperature probes, pressure sensors, limit switches, etc).

• Multi-setting

Ability to use 2 sets of preset parameters by closing a contact on one of the logic inputs, or 4 sets of preset parameters by combining 2 contacts on the 2 logic inputs.
Applications :
- Cascaded starting of several motors of differing powers or requiring different starting parameters.
- Starting and protection of a 2-speed motor :
parameter set 1 : low speed,
parameter set 2 : high speed.
- Machines which generally start without load but which may occasionally start under load.
Parameter set 1 : no-load start.
Parameter set 2 : start under load.

• Possible configurations for the two inputs

1/ Inputs EL1 and EL2 are assigned to separate management of 2 trips external to the CTS 2313.

2/ One of the two inputs (EL1 or EL2) is assigned to external trip management, and the other is used to access a second set of parameters.

EL1 or EL2	Selection
O	Parameter 1
C	Parameter 2

O : terminal not connected to 0V.
C : terminal connected to 0V.

3/ The 2 inputs are assigned to multi-setting.
Ability to use 4 sets of parameters.

EL1	EL2	Selection
O	O	Parameter 1
C	O	Parameter 2
O	C	Parameter 3
C	C	Parameter 4

O : terminal not connected to 0V.
C : terminal connected to 0V.

1.1.2 - Two logic outputs

These 2 additional relays, together with the 2 relays mounted on the basic CTS 2313, increase the number of relays which can be assigned to 4.
The characteristics and functions available, are identical to those of the basic product.

1.1.3 - One analogue input

Allows the CTS 2313 to manage a 4-20mA or 0-10V external analogue signal.

- Trip :

Ability to trip and disable the CTS 2313 if the analogue input exceeds an adjustable upper threshold and/or falls below an adjustable lower threshold (adjustable trip time delay).

- Threshold relay :

Closing of an CTS 2313 relay (K1 to K4) if the analogue input exceeds an upper level (adjustable) and opening if the analogue input falls below a lower level (adjustable).
Applications : alarm, Start/Stop command at adjustable levels. Ability to use several relays to indicate different levels.

1.1.4 - PTC input

Allows the CTS 2313 to manage one or more PTC probes (up to 6 in series).

1.1.5 - Analogue outputs

Ability to obtain a 4-20mA or 0-10V signal proportional to :

- the current drawn by the motor,
- and / or the power consumed by the motor.

Applications : load monitoring, regulation as a function of the load, display.

- and / or the analogue input.

Application : display.

1.2 - General description

There is only one model, which is called the **ES - START.**

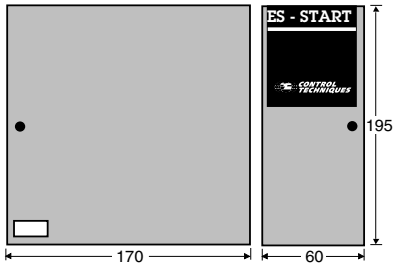
1.3 - General characteristics

Power supply :

230V (- 20% + 5%) 50/60 Hz ± 5%.
or
400V (- 15% + 10%) 50/60 Hz ± 5%.

Consumption : 10 VA.

1.4 - Dimensions and weight



Weight : 1 kg.

2 - MECHANICAL INSTALLATION

• The owner or user is responsible for making sure that installation, operation and service of the ES START Module comply with legislation relating to the safety of machinery and personnel, and with current regulations of the concerned contry.

• The ES START Module 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 ES START Module 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.

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

• The housing of the ES START Module is not fireproof : therefore it might be necessary to use a fireproof cubicle.

2.1 - Inspection on receipt

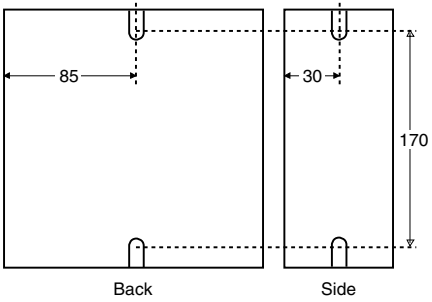
On receipt of the **ES - START** module, check that it has not been damaged in transit. In the event of any problems, contact the carrier.

2.2 - Installation precautions

To avoid any risk of interference it is strongly recommended that :
- the **ES - START** module is fixed on a metal frame which is correctly earthed,
- the **ES - START** module is not installed more than 1.5 m from the basic CTS 2313,
- the connection lead is well away from all power cables.

2.3 - Installation

The fixing holes inside the casing of the **ES - START** module are designed so that it can be installed via the back plate (flat) or via the side plate. As the connection block is across the whole width of the module, access is easier if it is installed flat.



3 - CONNECTION

• 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, may cause fatal electric shocks. Avoid contact in any case.

• The ES START Module must be supplied through a circuit-breaking device in order to disconnect it safely.

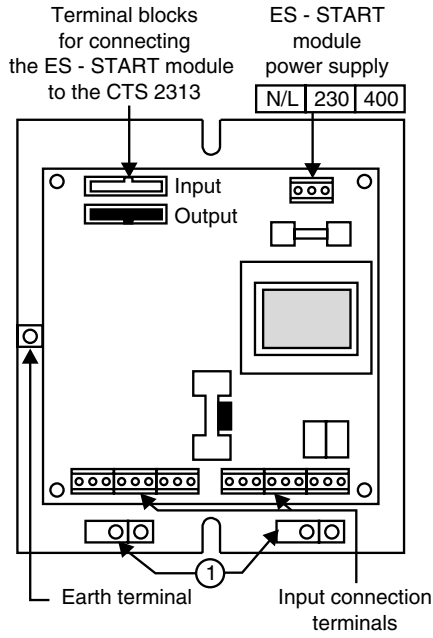
• The ES START Module power supply must be protected against overloads and short circuits.

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

3.1 - General recommendations

- Connect the control terminals using screened twisted cable with the screen connected to the earth of the casing. To do this, strip the screened cable back 15 mm, unscrew the cable clamp (1), close the cable clamp on the cable screen and screw the cable clamp back in place.
- Install RC circuits on the coils of the relays or contactors controlled by the CTS 2313.
- Avoid running wires connected to the control terminal block near to power cables.

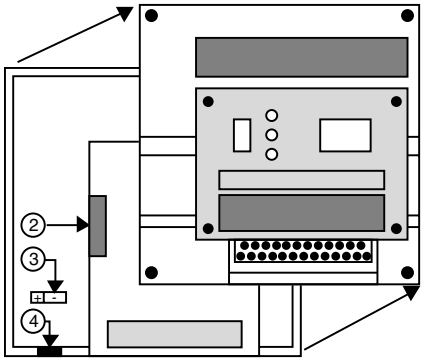
3.2 - Location of terminal blocks



3.3 - Connecting the ES - START module to the CTS 2313

3.3.1 - CTS 2313 with no options :

- Use the screened cable (34-pin) supplied for this purpose.
- Switch off the power supply to the basic CTS 2313 to which the option is to be connected.
- Remove the cover of the basic CTS 2313 control module.



- Snap out the cable passage (4).
- Connect the screened cable (34-pin), whose end is fitted with a cable clamp, to the connector (2) on the basic CTS 2313 control board.
- Connect the screen by screwing the cable clamp onto the earth terminal (3).
- Connect the other end of the screened cable (34-pin) to the Input connector of the **ES - START** module (do not connect the screen at this end).
- Replace the CTS 2313 control module cover.

3.3.2 - CTS 2313 with an option already connected

- As the connector (2) on the CTS 2313 control card is already in use, connect the end of the screened cable (34-pin), which is fitted with a cable clamp, to the Output connector on the option module which has already been connected to the CTS 2313 (after removing the plastic plug from the Output connector).

Connect the screen by screwing the cable clamp onto the earth terminal inside the casing.

- Connect the other end of the screened cable to the Input connector on the **ES - START** module (do not connect the screen at this end).

3.4 - Connecting the power supply

3.4.1 - Description of the terminal block

Comprises 3 screw terminals which take multicore cables of maximum diameter

Ref.	Function	Elect. char.
N/L - 230V	Power supply for **ES-START**	Single phase 230V - 50/60Hz
N/L - 400V		Single phase 400V - 50/60Hz

Note : If the module is supplied with 230V, the plastic plug must be removed from the 230V terminal.

IMPORTANT : The CTS 2313 2313 and the ES - START module must have the same power supply and they must be powered up simultaneously.

Do not forget to connect the power supply earth wire to the ⏚ terminal.

3.4.2 - Cable diameter

Use twisted cable, diameter 1.5mm^2.

3.5 - Connecting the Inputs / Outputs

3.5.1 - Description of the terminal block

This has 18 screw terminals which will take multicore cables up to 2.5 mm^2 diameter.

3.5.2 - Description of the terminals

No.	Ref.	Description	Functions / Characteristics
1 2	EA1 0V	4-20mA or 0-10V analogue input	The type of signal is selected by programming
3 4 5 6 7	CTP1 CTP2 CTP3 CTP4	Connection of PTC probes *	The **ES - START** module is supplied with terminals 3 and 7 linked together. - For 1 PTC probe (or 1 set) : connect between terminals 3 and 7, having removed the link between them. - For several probes (or several sets) : wire them in series between terminals 3, 4, 5, 6 and 7.
8 9 10	SA1 0V SA2	Analogue outputs 1 and 2: 4-20mA or 0-10V, 0V : common terminal	The type of output signal is selected by programming.
11 12 13	EL1 0V EL2	Logic inputs 1 and 2 assigned by programming, 0V : common terminal	Use volt-free contacts according to the intended use.
14 15	SL1 SL1	Output relay K3 assigned by programming	Normally open contacts Max. voltage 250V AC1 Breaking capacity 3 A
16 17	SL2 SL2	Output relay K4 assigned by programming	
18	NOT USED		

* If the circuit is open between terminals 3 and 7, the display will indicate "FAULT PTC SENSORS".

4 - COMMISSIONING

4.1 - Access to parameter setting

The CDC - START console must be used for setting the parameters of a CT START fitted with the **ES - START** option.

To access the settings, follow the procedure described in section 3.3.4 of the CDC - START console manual REF 2805.

4.2 - Setting the parameters of the CT START

- Connecting the **ES - START** module automatically provides access, via the CDC - START console, to the various menus linked with this option.

- Do not connect or disconnect the 34-pin screened cable when powered up.
- Set the parameters with the motor stopped.

Notes

FR - START module

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4. COMMISSIONING

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FR - START module

1 - GENERAL INFORMATION

1.1 - Operating principle

When connected to the CT START CTS 2313 the **FR - START** module enables D.C. injection between 2 motor phases and thus provides access to the following additional functions.

1.1.1 - Braking before starting

In certain appications the rotor may be backdriven when the motor is not powered up. When a start command is given, this function brakes the free wheeling motor to a stop before commencing the starting phase.
- Maximum braking torque : 2.5 rated torque, can be adjusted by programming.
- Applications : ventilation units, deep well pumps, etc.

1.1.2 - Braking during deceleration

In the case of high inertia applications, this function shortens the natural stopping time. As soon as the stop command is given, the CTS 2313 injects a D.C. current between 2 motor phases, producing a braking torque.
- Maximum braking torque : 2.5 rated torque, can be adjusted by programming.
- Applications : crushers, saws, grinding machines, etc.

1.1.3 - Motor anti-condensation

Keeps the motor free of condensation while it is stopped by circulating D.C. current between 2 phases.
- Start of injection with delay time after stopping.
- End of injection as soon as the command is given to restart the motor.
- Adjustable current level.

1.1.4 - Drying the motor

Dries the motor after it has been stopped for a long period, by circulating D.C. current between 2 phases.
- Manual start and stop of injection.
- Adjustable current level.

1.1.5 - Recommendations for use

CAUTION : D.C. injection causes the temperature of the motor to rise, which means that certain precautions must be taken.

• The level of D.C. current depends mainly on the motor characteristics. After making the necessary adjustments, it is **essential** to check, using a clamp ammeter, that the current in phases V or W does not exceed the values given below.

• If the D.C. injection is intermittent (braking), do not exceed 4 times the motor rated current.
In this extreme case, set the maximum injection period to 20 seconds and limit the number of starts, or size the motor accordingly, consider that in terms of heating, braking is equivalent to 2 starts.

• If the braking current is below 4 times the rated current, the maximum injection period can be increased in proportion to the square of the currents.

• If the injection is continuous (heating or drying), do not exceed 0.6 times the motor rated current.

• In view of the temperature rises caused by D.C. injection, it is advisable to use motors with temperature probes so that the CTS 2313 will trip if the admissible motor temperature is exceeded.

1.2 - General description

Example : **FR - START 14 - 86**

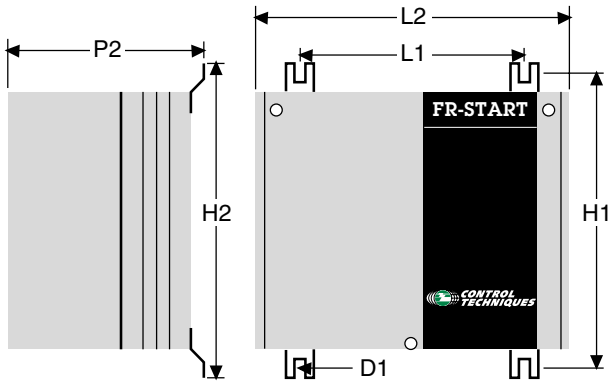
- **FR - START** : D.C. injection option module.
- **14** : supply voltage code
  14 : 208 V to 500 V.
  16 : 500 V to 690 V.
- **86** : Maximum CTS 2313 rating to which the module can be connected
  86 : used with CT START CTS 2313 - 37, 60, 86.
  250 : used with CT START CTS 2313 - 145, 211 and 250.
  530 : used with CT START CTS 2313 - 365 and 530.
  900 : used with CT START CTS 2313 - 700 and 900.

1.3 - General characteristics

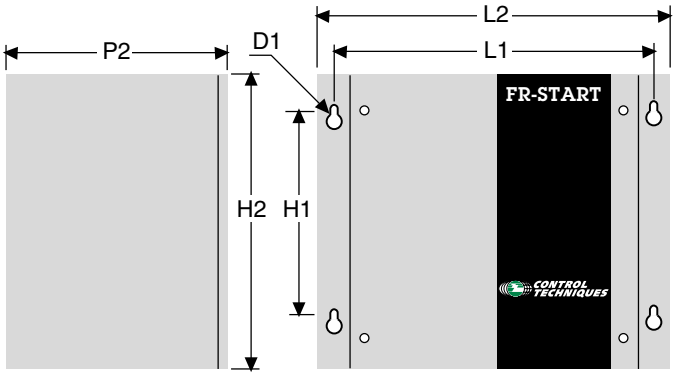
CTS 2313 rating	**30**	**60**	**86**	**145**	**211**	**250**	**365**	**530**	**700**	**900**
FR - START size	**86**			**250**			**530**		**900**	
Control supply Voltage Frequency	No supply			230V (-20%, +5%) or 400V (-15%, +10%) 50/60 Hz ±5%						
Maximum current	Depending on injection period : see tables in section 4.2									
Consumption	0VA			20VA			40VA			
Operating conditions	0°C to 40°C									
Protection index	IP 00									

1.4 - Dimensions and weight

1.4.1 - Dimensions of FR - START 86 and 250



1.4.2 - Dimensions of FR - START 530 and 900



1.4.3 - Table of dimensions and weights

FR - START	rating	86	250	530	900
Mounting	H1	150	150	200	200
points (mm)	L1	168	168	335	335
	D1	6	6	10	10
Overall	H2	170	210	320	320
dimensions	P2	100	120	320	320
	L2	209	209	370	370
Weight	(kg)	2	3	10	10

2 - MECHANICAL INSTALLATION

• The owner or user is responsible for making sure that installation, operation and service of the FR START Module comply with legislation relating to the safety of machinery and personnel, and with current regulations of the concerned country.

• The FR START Module 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 FR START Module 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.

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

• The housing of the FR START Module is not fireproof : therefore it might be necessary to use a fireproof cubicle.

2.1 - Inspection on receipt

On receipt of the **FR - START** module, check that :

- it has not been damaged in transit (in the event of any problems, contact the carrier).
- that the information on the identification plate of the **FR - START** is compatible with the CTS 2313.

2.2 - Installation recommendations

The **FR - START** is wall-mounted. It should be installed vertically and the following precautions taken :

• When the **FR - START** is mounted in a cubicle, it is important to take into account the renewal of air required for cooling the unit. To do this, space should be left around the **FR - START**, in particular around the air intakes and outlets. Leave at least 10 cm above and below the unit.

FR - START rating	86	250	530	900
Max. losses (W)	60	140	440	750
Forced vent. rate (l/s)	0	21	117	117

• Provide sufficient space around the **FR - START** for easy access to connections.

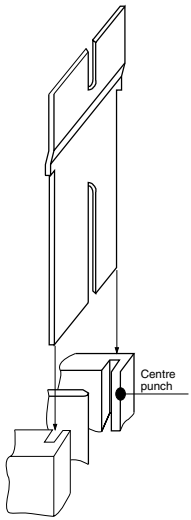
• To avoid any risk of interference it is strongly recommended that :

- the **FR - START** module is fixed on a metal frame which is correctly earthed,
- the **FR - START** module is not installed more than 1.5 m from the basic CTS 2313,
- the 34-pin screened cable is well away from all power cables,
- RC circuits are installed on the coils of the relays and contactors.

2.3 - Mounting

A set of fixing feet for mounting is supplied with the **FR - START** 86 and 250 ratings. Slide the foot into the groove provided for it in the heat sink. It may be necessary to use a centre punch in order to keep it in place and make handling easier when mounting the **FR - START** in the cubicle.

Note : For the 250 rating, locate the longest fixing feet on the ventilation unit side.



3 - CONNECTION

• All connection works must be carried 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, may cause fatal electric shocks. Avoid contact in any case.

• The FR START Module must be supplied through a circuit-breaking device in order to disconnect it safely.

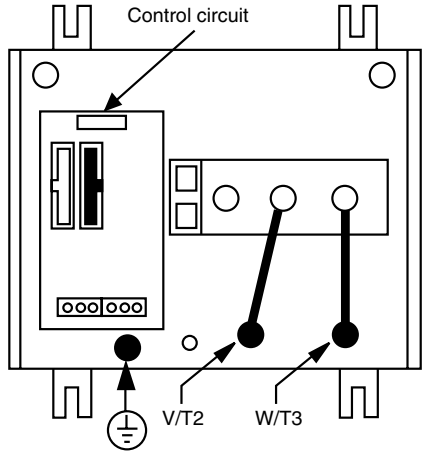
• The FR START Module power supply must be protected against overloads and short-circuits.

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

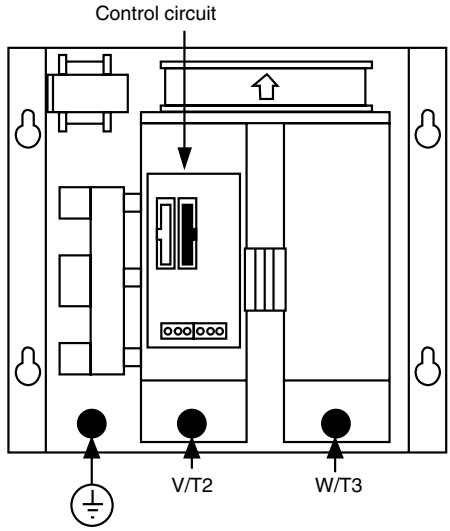
3.1 - Location of terminal blocks

• Power terminal block

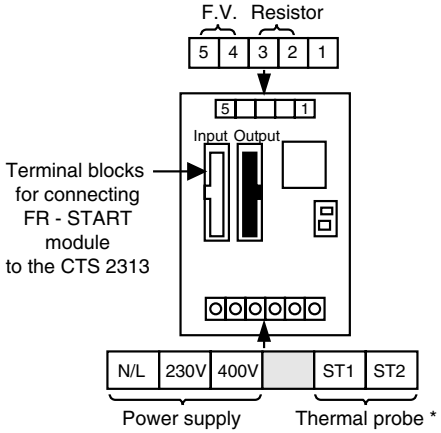
- **FR - START** 86 to 250



- **FR - START** 530 and 900

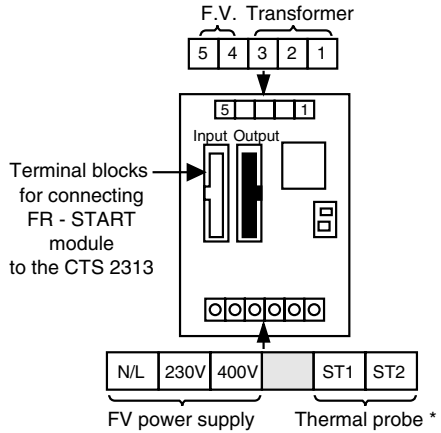


• Control terminal blocks (**FR - START** 86 and 250)



* The thermal probe must be wired in series in the remote control of the security system which links terminals 10 and 11 of the CTS 2313.

• Control terminal blocks (**FR - START** 530 and 900)

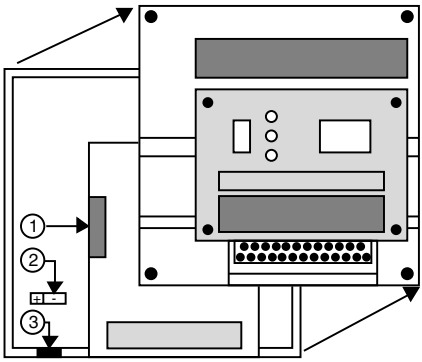


* The thermal probe must be wired in series in the remote control of the security system which links terminals 10 and 11 of the CTS 2313.

3.2 - Connecting the FR - START control board to the CTS 2313

3.2.1 - CTS 2313 with no options :

- Use the screened cable (34-pin) supplied for this purpose.
- Switch off the power supply to the basic CTS 2313 to which the option is to be connected.
- Remove the cover of the basic CTS 2313 control module.
- Snap out the cable passage (3).
- Connect the screened cable (34-pin), whose end is fitted with a cable clamp, to the connector (1) on the basic CTS 2313 control board.
- Connect the screen by screwing the cable clamp onto the earth terminal (2).
- Connect the other end of the screened cable (34-pin) to the Input connector of the **FR - START** module (do not connect the screen at this end).
- Replace the CTS 2313 control module cover.



3.2.2 - CTS 2313 with an option already connected

- As the connector (1) on the CTS 2313 control board is already in use, connect the end of the screened cable (34-pin), which is fitted with a cable clamp, to the Output connector on the option module which has already been connected to the CTS 2313 (after removing the plastic plug from the Output connector).
- Connect the screen by screwing the cable clamp onto the earth terminal provided.
- Connect the other end of the screened cable to the Input connector on the **FR – START** module (do not connect the screen at this end).
- The **FR - START** module should always be the last module to be connected.

3.3 - Connecting the power terminals between the FR - START and the CTS 2313

- Use the following power cables.

FR - START rating	Diameter (mm^2)	Length (mm)
86	16	500
250	50	700
530	120	1000
900	2 x 120	1000

Note : FR - START 86 and 250 ratings are supplied complete with power cables.
Connect terminals V/T2 and W/T3 on the **FR – START** module to CTS 2313 terminals V/T2, W/T3 respectively.

3.4 - Connecting the power supply

3.4.1 - FR - START 86 module

As the **FR - START** 86 module has no forced ventilation unit, it is not necessary to provide an external 230V or 400V power supply.

3.4.2 - FR - START modules 250 to 900

FR - START modules 250 to 900 have forced ventilation units. They must therefore have an external power supply

3.4.3 - Description of the terminal block

The terminal block comprises 5 screw terminals which take multicore cables of maximum diameter 2.5 mm^2.

Ref.	Function	Elect. char.
N/L	Supply used with 230V or 400V	
230V	Supply used with N/L	Single phase 230V, 50/60Hz
400V	Supply used with N/L	Single phase 400V, 50/60Hz
-	Not used	Volt-free
ST1 ST2	**FR - START *** thermal protection	16A at 250V

*** Must be wired in series in the remote control of the security system which links terminals 10 and 11 of the CTS 2313.**

Note : If the module is supplied with 230V, the plastic plug in the 230V terminal must be removed.
Do not forget to connect the power supply earth wire to the ⏚ terminal.

3.4.4 - Cable diameter

Use twisted cable, 1.5mm^2 diameter.

4 - COMMISSIONING

4.1 - Access to parameter setting

The CDC - START console must be used for setting the parameters of a CT START fitted with the **FR - START** option.

To access the settings, follow the procedure described in section 3.3.4 of the CDC - START console manual ref. 2805.

4.2 - Setting the parameters of the CT START

- Connecting the **FR - START** module automatically provides access, via the CDC - START console, to the various menus linked with this option.
- Do not connect or disconnect the 34-pin screened cable when powered up.
- Set the parameters with the motor stopped.
- The maximum current level depends on how long injection lasts. The limits are given in the table below.

Maximum D.C. current injected as a function of the injection period

FR - START 86	Injection period (s)					
	0.1 to 10	**10.1 to 20**	**20.1 to 30**	**30.1 to 40**	**40.1 to 50**	**50.1 to 60**
Maximum current (A)	170	170	155	150	140	140

FR - START 250	Injection period (s)					
	0.1 to 10	**10.1 to 20**	**20.1 to 30**	**30.1 to 40**	**40.1 to 50**	**50.1 to 60**
Maximum current (A)	300	300	285	270	265	260

FR - START 530	Injection period (s)					
	0.1 to 10	**10.1 to 20**	**20.1 to 30**	**30.1 to 40**	**40.1 to 50**	**50.1 to 60**
Maximum current (A)	820	820	765	735	690	660

FR - START 900	Injection period (s)					
	0.1 to 10	**1.1 to 20**	**20.1 to 30**	**30.1 to 40**	**40.1 to 50**	**50.1 to 60**
Maximum current (A)	1400	1400	1300	1245	1220	1200

Note :

- The maximum current is the D.C. current measured in the V and W phases of the **FR - START**.
- The currents shown in the above tables are defined for 1 braking operation every 10 min. For more severe operating cycles please consult CONTROL TECHNIQUES.

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1 - GENERAL INFORMATION

• It is the responsibility of the owner or user to ensure that the installation, operation and maintenance of the CTS 2313 and its options are carried out by experienced and qualified personnel, and comply with legislation relating to the safety of equipment and personnel as well as current regulations in the country of use.

1.1 - Use

Once the motor has started, this kit is designed to close a contactor at the CTS 2313 thyristor terminals while maintaining the protection and monitoring functions integral to the CTS 2313.

1.2 - Kit composition

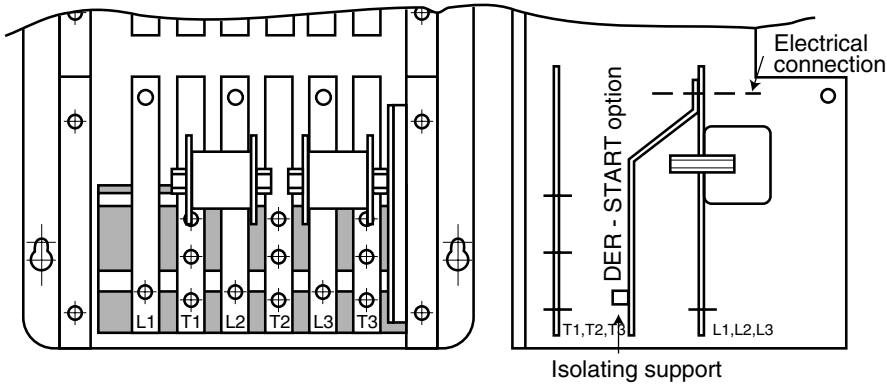
• DER - START 1 for CTS 2313 365

Description	Quantity
Copper connection bar	3
Isolating support	1
TH M6 x 16 screws	2
TH M6 x 20 screws	3
M6 contact washer	5
TH M8 x 20 screws	6
M8 collar nut	6
M8 contact washer	6
TH M12 x 35 screws	3
M12 nut	3
M12 contact washer	6

• DER - START 2 for CTS 2313 530
• DER - START 3 for CTS 2313 700 to 900

Description	Quantity
Copper connection bar	3
Isolating support	1
TH M6 x 16 screws	2
TH M6 x 30 screws	9
M6 collar nut	9
M6 contact washer	14
TH M6 x 25 screws	3
TH M12 x 35 screws	3
M12 nut	3
M12 contact washer	6

2 - INSTALLATION



Instructions

1 - Fix the isolating support on the CTS 2313 cheeks (the holes are located 100 mm from the bottom edge of the product and 100 mm from the back).

2 - Insert the 3 bars, then connect them with 2 or 3 screws each (depending on the rating).

3 - Fix the bars on the support.

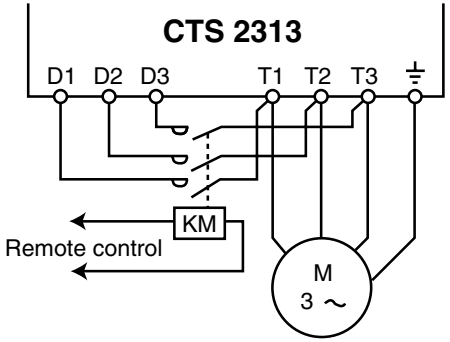
4 - Wire the contactor onto these bars. By retaining the CTs, current measurement is retained, and hence also the CT-START protection.

Note: Remove the protective cover from the power section before performing these operations.

3 - WIRING THE BYPASS CONTACTOR

- Terminals D1, D2 and D3 represent the bars of the **DER - START** kit.
D1 is in phase with L1
D2 is in phase with L2
D3 is in phase with L3
- D1 - T1, D2 - T2 and D3 - T3 must be associated with the contactor terminals.
- Contactor pick-up is controlled by the "motor start complete" signal available on the CTS 2313 programmable relay.

- Contactor drop-out is controlled by **a stop instruction and the interlock protection.**



Other OPTIONS

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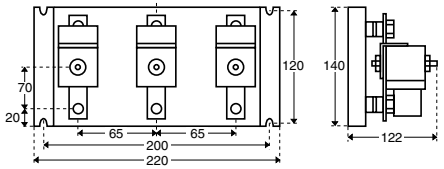
1 - UR - START

Although the electronic's response times are very fast, the CT START cannot protect the thyristors against short-circuits. Only the installation of fast-blow fuses sized according to the thermal characteristics of the thyristors and the operating cycle can prevent the power bridge being damaged when this type of fault occurs.

CT START units ≥ 365A are supplied as standard, mounted with fast-blow fuses. However for models ≤ 250A, they are optional, in the form of a complete kit which includes : fuses, the fuse carrier and screws. The **UR - START** option has to be installed separate from the CT START

Dimensions and weight



UR-START 37 to 250	Weight (kg)
Unpacked	2
Packed	2,3

The mounting and connection instructions are given in the installation manual supplied with the **UR - START** kit.

2 - IP20 - START

The **IP20 - START** kit is designed to increase the index of protection of CT START CTS 2313 electronic starters to IP20.

CT START CTS 2313 rating	IP 20 - START reference
37	1
60 and 86	2
145 to 250	3

There is no IP20 kit for ratings ≥ 365A, which are IP20 on 5 sides (but not the underside).

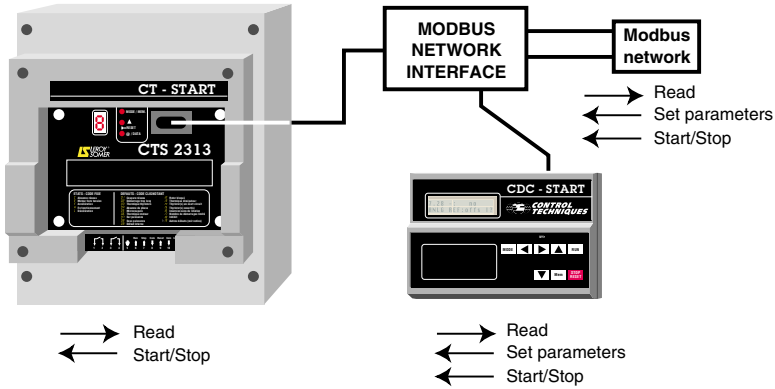
Dimensions and weight

IP 20 - START Reference	Height added to the CTS 2313 (mm)	Weight (kg)	
		Net	Packed
1	100	1.2	1.70
2	100	1.6	2.15
3	130	1.6	2.15

Mounting instructions are given in the installation manual supplied with the **IP20 - START** kit.

3 - COM - START

The MODBUS network interface used with starters in the CT START CTS 2313 range, extends the communication capabilities of the basic product, using the settings mode to configure and control the CT START, and the read mode to access all the CT START's data.



A short description of the MODBUS protocol, and the mounting and connection instructions are given in the installation manual supplied with **COM - START** units, or on request.

Notes

Notes


CONTROL
TECHNIQUES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