SD 700

Freemaq FR Series

VARIABLE SPEED DRIVE

Variable Speed Drive

Programming and Software Manual

POWER ELECTRONICS®

SD700

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Programming and Software Manual

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SAFETY SYMBOLS

Always follow safety instructions to prevent accidents and potential hazards from occurring.

 **WARNING**	This symbol means improper operation may results in serious personal injury or death.
 **CAUTION**	Identifies shock hazards under certain conditions. Particular attention should be given because dangerous voltage may be present. Maintenance operation should be done by qualified personnel
	Identifies potential hazards under certain conditions. Read the message and follow the instructions carefully.
	Identifies shock hazards under certain conditions. Particular attention should be given because dangerous voltage may be present.

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Edition of February 2014

This publication could present technical imprecision or misprints. The information here included will be periodically modified and updated, and all those modifications will be incorporated in later editions. To consult the most updated information of this product you might access through our website www.power-electronics.com where the latest version of this manual can be downloaded.

Revisions

Date	Revision	Description
27 / 11 / 2012	A	First Edition-Software version A.002
03 / 06 / 2013	B	Software version A.006
28 / 02 / 2014	C	Software version R1.0

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SAFETY INSTRUCTIONS

IMPORTANT!

- Read this manual carefully to maximise the performance of this product and to ensure its safe use.
- Power Electronics accepts no responsibility or liability for any damage resulting from inappropriate use of the equipment.
- In this manual, safety messages are classified as follows:

WARNING

Do not remove the metal cover while the power is applied or the unit is in operation.
Otherwise electric shock could occur.

Do not run the drive with the front cover removed.
Otherwise, you may get an electric shock due to the high voltage terminals or exposure of charged capacitors.

The drive does not remove the voltage from the input busbars of the drive. Before working on the drive, isolate the whole drive from the supply.

Do not remove the cover except for periodic inspections or wiring, even if the input power is not applied.
Otherwise, you may access to the charged circuits and may get an electric shock.

Wiring and periodic inspections should be performed at least 10 minutes after disconnecting the input power. To remove the front cover check that the DC Link red LED is off, then remove the terminals metallic cover and check with a multimeter the following measures:

- **Measure between the output power busbars U, V, W and the cabinet and check that the voltage is around 0V.**
- **Measure that the DC link terminals +, - and chassis voltage are below 30VDC.**

Otherwise, you may get an electric shock.

Operate the switches with dry hands.
Otherwise, you may get an electric shock.

Do not use cables with damaged insulation.
Otherwise, you may get an electric shock.

Do not subject the cables to abrasions, excessive stress, heavy loads or pinching.
Otherwise, you may get an electric shock.

Do not make any insulation or voltage withstand tests on the motor with the drive connected.

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CAUTION

Install the drive on a non-flammable surface. Do not place flammable material nearby.
Otherwise fire could occur.

Disconnect the input power if the drive is damaged.
Otherwise, it could result in a secondary accident or fire.

After stopping the drive, it will remain hot for a couple of minutes. Touching hot parts may result in skin burns.

Do not apply power to a damaged drive or to a drive with parts missing even if the installation is complete. Otherwise, you may get an electric shock.

It is not permitted to weld the cabinet; this can damage the electronic sensitive equipment inside.

Do not allow lint, paper, wood chips, dust, metallic chips or other foreign matter into the drive. Otherwise fire or accident could occur.

WARNINGS

RECEPTION

- The SD700FR are carefully tested and perfectly packed before delivering.
- In the event of transport damage, please ensure that you notify the transport agency and POWER ELECTRONICS: 902 40 20 70 (International +34 96 136 65 57) or your nearest agent, within 24hrs from receipt of the goods.

UNPACKING

- Make sure model and serial number of the variable speed drive are the same on the box, delivery note and unit.
- Each variable speed drive is delivered with Hardware and Software technical manuals.

RECYCLING

- Packing of the equipments should be recycled. For this, it is necessary to separate different materials included (plastic, paper, cardboard, wood ...) and deposit them on proper banks.
- Waste products of electric and electronic devices should be selectively collected for your correct recycling company.

EMC

- The drive is intended to be used in industrial environment (Second Environment), it achieve compliance with C3 category defined in IEC/EN 61800-3 standard following the installation recommendation within this manual.
- Select communication and control system according to the drive EMC environment. Otherwise, systems could suffer from interferences due to a low EMS level.

SAFETY

- Before operating the drive, read this manual thoroughly to gain and understanding of the unit. If any doubt exists then please contact POWER ELECTRONICS, (902 40 20 70 / +34 96 136 65 57) or your nearest agent.
- Wear safety glasses when operating the drive with power applied or the front cover is removed.
- Handle and transport the drive following the recommendations within this manual.
- Install the drive according to the instructions within this manual and the local regulations.
- Do not place heavy objects on the drive.
- Ensure that the drive is mounted vertically and keeping the minimum clearances distances.
- Do not drop the drive or subject it to impact.
- The SD700FR drives contain static sensitive printed circuits boards. Use static safety procedures when handling these boards.
- Avoid installing the drive in conditions that differ from those described in the *Environmental Ratings* section.

CONNECTION PRECAUTIONS

- To ensure correct operation of the drive it is recommended to use a SCREENED CABLE for the control wiring.
- The motor cable should comply with the requirements within this manual. Due to increased leakage capacitance between conductors, external ground fault protection threshold value should be adjusted ad hoc.
- Do not disconnect motor cables if input power supply remains connected.
- The internal circuits of the SD700FR Series will be damaged if the incoming power is connected and applied to output terminals (U, V, W).
- Do not use power factor correction capacitors banks, surge suppressors, or RFI filters on the output side of the drive. Doing so may damage these components.
- Always check whether the DC Link red LED is OFF before wiring terminals. The capacitors may hold high-voltage even after the input power is disconnected.

TRIAL RUN

- Verify all parameters before operating the drive. Alteration of parameters may be required depending on application and load.
- Always apply voltage and current signals to each terminal that are within levels indicated within this manual.

OPERATION PRECAUTIONS

- When the Auto Restart function is enabled, keep clear of driven equipment, as the motor will restart suddenly after the fault reset.
- The “STOP / RESET” key on the keypad is active only if the appropriate function setting has been made. Pushing this button the drive will NOT perform a safe stop. It is available STO optional board, which installed with a separate EMERGENCY pushbutton, will disconnect the power and will be unable to generate torque in the motor with high reliability.
- If a fault is reset with the reference signal still active, the drive will unexpectedly restart. Verify that it is permissible for this to happen. Otherwise, it may lead to injury to people.
- Do not modify or alter internal wiring and spare parts without Power Electronics supervision.
- Before programming or operating the SD700FR Series, initialise all parameters back to factory default values.

EARTH CONNECTION

- Ground the drive and adjoining cabinets to ensure a safety operation and to reduce electromagnetic emission.
- Connect the input PE terminal only to the dedicated PE terminal of the drive. Do not use the case or the chassis screw for grounding.
- Ground the drive chassis through the dedicated and labelled terminals. Use appropriate conductors to comply with the local regulations. The ground conductor should be connected first and removed last.
- Motor ground cable must be connected to the PE output terminal of the drive and not to the installation's ground. We recommend that the section of the ground conductor (PE) should be equal or greater than the active conductor (U, V, W).
- If the user decides to use shielded motor cable, ensure a correct 360º shield bonding in both the drive cabinet and the motor terminal box.

1. DISPLAY UNIT AND CONTROL KEYPAD

1.1. Keypad Unit Description

The display of the SD700FR is removable for remote installation, as the illustration shows. There are three leds on the display which indicate the drive operational status, one LCD screen with 4 lines of 16 characters each and keys for control and parameter setting.

Figure 1.1 Display Unit and Keypad

1.1.1. LEDs for Status Indication

Leds offer an easy method of identifying if the SD700FR is powered up, if the drive is supplying output voltage, or if the drive has tripped.

- **Led ON**: Yellow colour. When it is lit, indicates equipment is powered up. When it is blinking, it indicates that the drive gets any warning.
- **Led RUN**: Green colour. When it is lit, indicates the motor is powered by the SD700FR. When it is blinking, it indicates that only one of the power bridges is switching.
- **Led FAULT**: Red colour. When it is blinking, indicates the equipment is in fault status.

Figure 1.2 Status Visualization

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1.1.2. Alphanumeric LCD Display

SD700FR display has a LCD screen of four lines with sixteen characters each (16x4). Each line has different functions.

- **Status Line:** It is the top line.
It is always present and shows the SD700FR status (STR – Start, STP – Stop, etc…).
It also shows the output current and the motor speed.
It is not configurable by the user.

- **Visualization Line 1:** It is the second line of the screen. It is always present and allows the selection of variables from the visualization menu.
It is configurable by the user.

- **Visualization Line 2:** It is the third line of the screen. It is always present and allows the selection of variables from the visualization menu.
It is configurable by the user.

Programming Line: It is the fourth line.
It is used to display and / or set different parameters within the SD700FR.

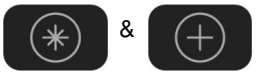
Figure 1.3 Detail of Display Lines

1.1.3. Control Keys

Function keys have multiple uses and can be operated individually or in combination with other keys:

It allows access to different parameters groups and sub-groups; it displays code explanations and allows adjustment of parameter values in combination with other keys. If a group has no sub-groups, it allows direct access to the parameters of the group.

To modify numeric parameters:



Simultaneously pushed, the value will increase.

Simultaneously pushed, the value will decrease.

To modify parameters of numbered options:

Pushing this key, the extended explanation will appear.

Simultaneously pushed will ascend the user through the varying options.
Simultaneously pushed will descend the user through the varying options.

It allows upward movement through the parameters groups and allows navigation for different parameters within a parameter group. It also allows the increase of parameters value.

It allows downward movement through the parameters groups and allows navigation for different parameters within a parameter group. It also allows the decrease of parameters value.

When pushed for 2 seconds (approx.) it allows navigation between the programming line and visualisation lines available to the user. It also offers the possibility of escaping back to the previous sub-group or group.

To start the drive from the keypad when the control has been set as local control (check drive configuration).

To stop the drive from the keypad when the control has been set as local control. In the case of tripping this key can be used to reset the drive, if local control is enabled. The drive will not perform an Emergency Stop and the drive will not be disconnected from the power supply.

In the following figure you can see a programming example where you can observe the operation explained previously.

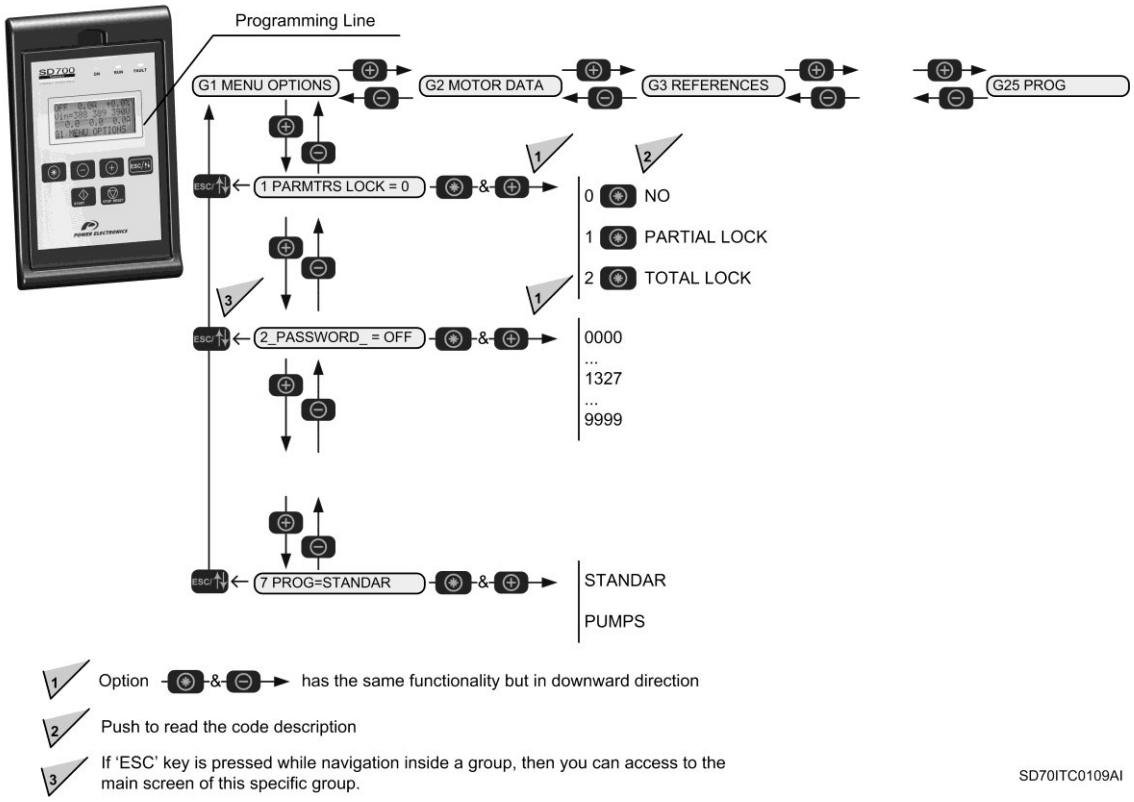


Figure 1.4 Example of parameters navigation

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2. STATUS MESSAGES

The upper line of the display corresponds to the status line. In this line we can display the equipment status, motor current (A) and the motor speed (%). It is always displayed and it is not programmable by the user.

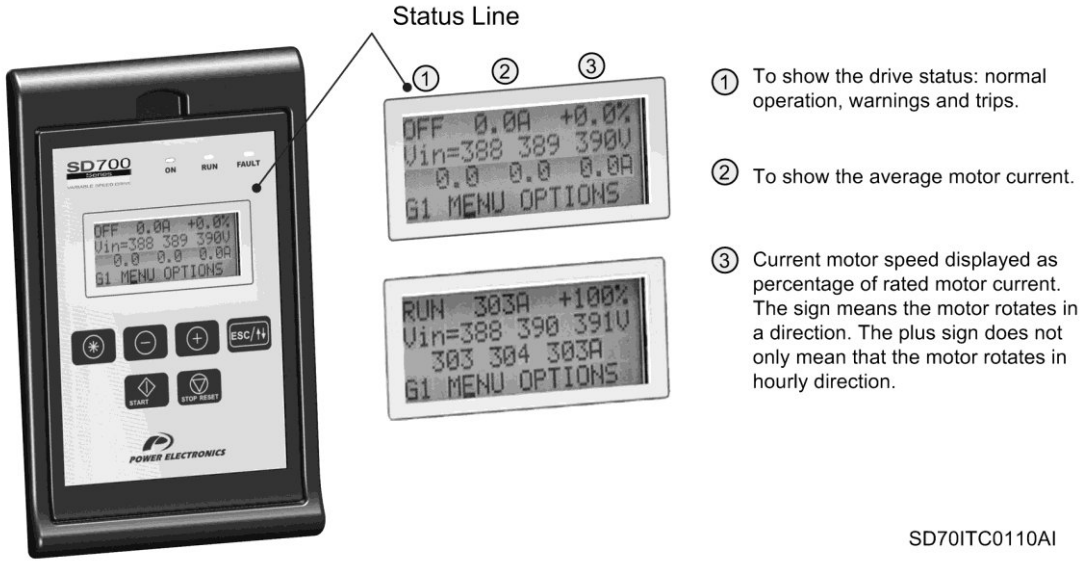

Figure 2.1 Status Line Description

Note: The user can access to the information displayed in status line via Modbus communication. See section 'Modbus Communication'.

2.1. List of Status Messages

Screen	Name	Description
OFF	Deactivated power	Drive power is deactivated.
ON	Activated power	Drive power is activated.
ACL	Accelerating	Drive is increasing the output frequency. Motor increasing in speed, it is accelerating.
RUN	Running	Drive is operating at reference speed. Operation at steady status.
DEC	Decelerating	Drive is decreasing the output frequency. Motor decreasing in speed, it is decelerating.
SPG	Stopping	Drive is decreasing the output frequency due to a stop command. Motor is stopping by ramp until zero speed is reached.
EST	Free run stop when a fault occurs	Drive is stopping by free run stop after a fault occurs (emergency stop). Motor stopping time is determined by inertia as the drive output has turned off.
SPN	Flying start	'Flying start' operation must be configured if required. The SD700FR will search for the actual motor shaft speed once the drive has received a start command.
DCB	DC brake	SD700FR is applying DC current injection to stop the motor.
TBR	DC brake ON delay	Drive is applying a delay time before DC current injection is active. When this time is elapsed, the DC brake will be active.
DLY	Start Delay Time	When a delay time has been set in order to start the equipment, after the start command has been activated, this message will be displayed until this time has elapsed.
IN1	Inch speed 1	SD700FR is working according to inch speed 1 command and 'Start + Inch speed 1' mode is active. When operated in this mode the "Start + Inch speed 1" command is dominant over other inputs programmed for "Start" functionality. Therefore if one input is configured as 'Start' and it is deactivated; in spite of this deactivated input, the drive will start when 'Start + Inch speed 1' command is received. This is also valid for Inch speed 2 and 3.
IN2	Inch speed 2	SD700FR is working according to inch speed 2 command. 'Start + Inch speed 2' mode is active.
IN3	Inch speed 3	SD700FR is working according to inch speed 3 command. 'Start + Inch speed 3' mode is active.
HEA	Non condensing current is activated	SD700FR is injecting DC current to prevent moisture condensing within the motor. ⚠ **CAUTION:** Although the motor is not running there is dangerous voltage. Run Led will be lit during this process. Be careful to avoid damages and personal injury.

2.2. List of Warning Messages

Screen	Name	Description
MOL	Motor overload	This message will appear when motor thermal model is increasing the estimated motor temperature.
MOC	Motor over-current	Motor current is higher than the rated current value.
DOC	Drive over-current	This message will appear if the output current is higher than 125% of the nominal current.
ILT	Current limitation	Current limit algorithm has been activated.
TLT	Torque limitation	Torque limit algorithm has been activated.
VLT	Voltage limitation	A high DC Link voltage level has been detected and the voltage limit control algorithm has been activated to protect the drive.
ACO	Asymmetric current	Asymmetry in output currents of the drive has been detected.
AVO	Output voltage imbalance	Asymmetry in output voltage of the drive has been detected.
AVI	Input voltage imbalance	Asymmetry in input voltage of the drive has been detected.
OVV	High input voltage	Input voltage of the equipment is reaching a dangerous level. The value is above the set value (protections settings).
UNV	Low input voltage	Input voltage of the equipment is reaching a dangerous level. The value is below the set value (protections settings).
S1L	Speed limit 1 reached	Motor speed has reached speed limit 1.
S2L	Speed limit 2 reached	Motor speed has reached speed limit 2.
IPR	Current input protection	Input current has reached the 100% of the rated current.
IIB	Input current imbalance	Inverse input current has reached the 75% of the fault threshold “R19 I IM BIN”.
IGF	Input ground fault	Ground fault current has reached the 75% of the ground fault threshold.”R20 GRND INPUT”.
TRB	Temperature rectifier bridge	The rectifier’s IGBTs have reached 90ºC.
CCM	CAN communication module	Some CAN frames from the fiber optics communication have been lost.
FPS	Fan Power Supply	The rectifier’s fan power supply has a failure. The fault “R34 IGBT TEMP” will reduce its threshold value from 110ºC up to 90ºC, in order to protect the drive components.
PLL	Phase Locked Loop	The rectifier is synchronizing to the grid.
SWM	Software Mismatch	SW version not compatible
DWA	Diagnostic Warning Active	Some Diagnostic Board is reporting a warning.
LCL	Contactor LCL	The LCL feedback is not correctly.

3. VISUALISATION AND STATUS PARAMETERS. GROUP G0

These parameters constantly indicate the input signal status and dynamic parameter status of the SD700FR. Visualization lines are the second and the third lines. The user can select the parameter to be displayed in each line from the different visualization options.

To select a display parameter you should move to the cursor to the second or third line. For this, you need to press **ESC / ↑ ↓** key for approx two seconds. The cursor moves from one line to the next. Once located on the second or third line you can navigate like the programming line (line 4) and select the desired parameter to be displayed. Once selected these parameters are saved into memory. These parameters are then displayed on lines 2 and 3 whenever the drive is powered up.
Thanks to these lines user can display desired parameters and obtain additional information easily.

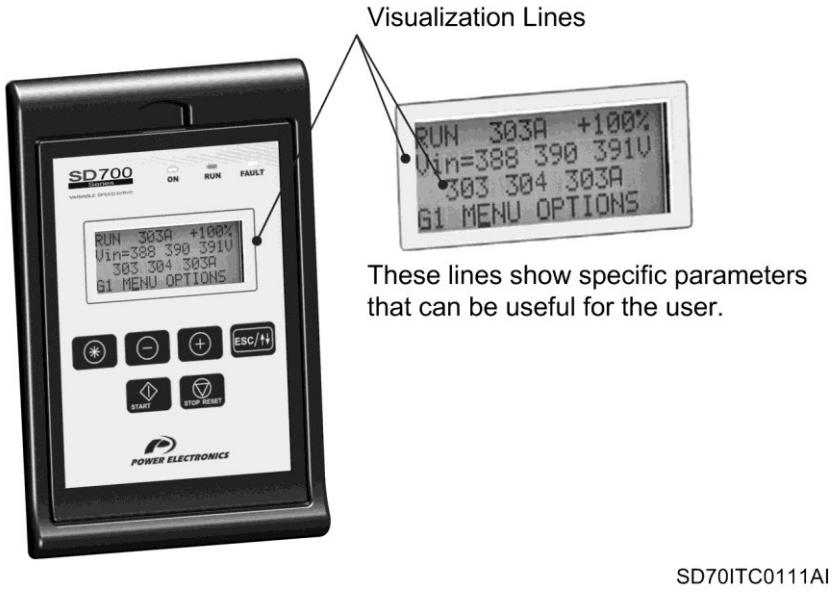

Figure 3.1 Visualization Lines Description

3.1. Parameters SV.1 – Motor Visualisation

Screen	Units	Description
Sp Ref = +000%	% motor speed	It shows the present reference value of speed which is applied to the motor.
Mtr Speed = +0rpm	rpm	It shows the motor speed in revs per minute.
Mtr Sp = +0.0%	%	It shows the motor speed in %. It corresponds with the third field of the status line ➔ **OFF 0.0A +0.0%**
Mtr Freq = +0.0Hz	Hz	It shows the frequency being applied to the motor.
Mtr Vout = 0V	V	It shows the present voltage applied to the motor.
Mtr Iout = 0.0A	A	It shows the present current flowing to the motor. It corresponds with the second field of the status line ➔ **OFF 0.0A +0.0%**
Mtr Torqe = 0.0%	% motor torque	It shows the present torque applied to the motor.
Mtr Pfactr = 0.0	-	It shows the power factor of the motor.
Mtr Pwr = +0.0kW	kW	It shows the instantaneous power consumption of the motor.
0.0A 0.0A 0.0A	A	It shows the instantaneous current of each phase of the motor (U, V and W).
Vmt= 0 0 0V	V	It shows the instantaneous voltage applied to the motor terminals.
PTC Motor = 0	-	It shows if the motor PTC (temperature sensor) is connected. X: PTC Connected. 0: PTC Not Connected.
Motor Temp = 0.0%	% Motor heat	It shows the estimated motor temperature. A level of 110% will cause F25 trip (motor overload).
Enco. Pulso =0	pulses	It shows the encoder pulses.
Clsped = 0 rpm	rpm	Real speed mesured by the encoder.

3.2. Parameters SV.2 – Drive Visualisation

Screen	Units	Description
390 390 390V	V	It shows the input instantaneous voltage applied to the drive (RS, ST, RT).
Inp Vol = 390V	V	It shows the average input voltage to the drive.
50.0 50.0 50.0Hz	Hz	It shows the frequency of the input voltage to the drive.
Bus vol = 540V	VDC	It shows DC Link voltage of the drive.
IGBT Temp =+23ºC	ºC	It shows the temperature measured at the power stage of the drive output.
Drive Temp =+26ºC	ºC	It shows the temperature measured inside the electronics chamber of the drive.

3.3. Parameters SV.3 – Visualisation

Screen	Units	Description
ANLG IN1 = +0.0V	V or mA	It shows the value of Analogue Input 1.
AIN1 Refr = +0.00%	% bottom scale AI1	It shows the value or the PID reference proportional to Analogue Input 1 in percentage.
AIN1 S = +0.00l/s	Engineering units	It shows the value of sensor 1 associated to the Analogue Input 1.
ANLG IN2 = +0.0V	V or mA	It shows the value of the Analogue Input 2.
AIN2 Refr = +0.00%	% bottom scale AI2	It shows the value or the PID reference proportional to the Analogue Input 2 signal.
AIN 2 S = +0.00Bar	Engineering units	It shows the value of sensor 2 associated to the Analogue Input 2.
ANL OUT1 = +4.0mA	V or mA	It shows the value of Analogue Output 1.
AOUT1 Refer = +0.0%	% associated magnitude	It shows the magnitude value associated to the Analogue Output 1 (speed, current ...).
ANL OUT2 = +4.0mA	V or mA	It shows the value of Analogue Output 2.
AOUT2 Refer = +0.0%	% associated magnitude	It shows the magnitude value associated to the Analogue Output 2 (speed, current ...).
DI: 000000 0	-	It shows whether the Digital Inputs are activated or not, from DI1 to DI6. The final is another input which shows the status of the motor PTC signal. X: Active. 0: Not Active.
Relays 1-3: X0X	-	It shows whether the output relays are activated or not. X: Active. 0: Not Active.
Speed M = +0.000m/s	Depending on config.	It shows the speed of the motor in engineering units. Pressing * key you can access to the following sub-parameters of configuration: **Scale ftr=1** — Range: 0.001 - 10 — To set the ratio factor between motor speed and machine speed. **Units Ma=m/s** — Range: m/s, m/m, cm/s, cm/m, v/s, v/m — It allows selection of the units to be displayed: m/s: Meters / second m/m: Meters / minute cm/s: Centimetres / second cm/m: Centimetres / minute v/s: Turns / second v/m: Turns / minute **Note:** They both are settable during run.
Modbus Traffic=0	0 / X	"X" will be displayed if Modbus communication exists through RS232 or RS485 user port. Furthermore, "X" will blink at constant frequency while communication is active. After half second is elapsed without communication, "O" will be displayed.
Display_traffi = 0	-	It shows if the display is connected. 0: The display is not connected. 1: The display is connected.

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3.4. Parameters SV.4 – Internal Visualisation

Screen	Units	Description
Actual Fault = 00	-	It shows the present code fault. See fault history G13.
Drive Curr = 170A	A	It shows the drive rated current (maximum current of the equipment at 50ºC).
Drive Volt = 400V	V	It shows the drive rated voltage.
S/W	-	It shows the software version installed into the equipment.
H/W y.y	-	It shows the hardware version of the equipment.
PID R% = +0.0%	% feedback range	It shows the reference value in PID mode of the equipment standard program.
PID F% = +0.0%	% AI used as feedback	It shows the feedback value in PID mode of the equipment standard program.
PID Error = +0.0%	% feedback range	It shows the error value in PID mode that means the difference between the reference value and the real value of the system feedback signal.
Comparators: 000	-	It shows if comparators are activated or not. X: Active / 0: Not Active.
FLT.STAT.=NO FLT	NO FLT ---	It shows if the equipment is in faulty status. If the equipment is in faulty status, it shows the status of the drive before the fault is produced; when there is not fault, it shows 'NO FLT'.
Fault Diag.=N	N Y	When it is set to 'Y' (YES), the parameters of groups 'SV.1 Motor Visualization' and 'SV.2 Drive Visualization' are hold with the last values at the moment of the last fault is produced. If the user sets the parameter to 'N' (NO), or after 135 seconds are elapsed, the parameters will show the actual values again. The hold values are saved in memory until next fault will be produced, even if the input power of the drive is lost.

3.5. Parameters SV.5 – Programmable Parameters

This group is not only a display group. Some parameters such as speed, pressure and inch speeds can be adjusted in this group. These parameters are also available in their corresponding parameter groups. This is a simple way to allow user adjustment of basic parameters without entering the main programming groups.

Screen	Units	Description
Local Sp = +100%	% motor speed	It shows the speed reference value in local mode (introduced by keypad). See G3.3 parameter for additional data.
PID Local = +100%	% feedback	It allows user to select the PID reference in local mode. See G6.2 parameter for additional data.
Mref 1 = +10.0%	% motor speed	It allows user to set the speed value assigned to Multi-reference 1. See G14.1 parameter for additional data.
Mref 2 = +20.0%	% motor speed	It allows user to set the speed value assigned to Multi-reference 2. See G14.2 parameter for additional data.
Mref 3 = +30.0%	% motor speed	It allows user to set the speed value assigned to Multi-reference 3. See G14.3 parameter for additional data.
Mref 4 = +40.0%	% motor speed	It allows user to set the speed value assigned to Multi-reference 4. See G14.4 parameter for additional data.
Mref 5 = +50.0%	% motor speed	It allows user to set the speed value assigned to Multi-reference 5. See G14.5 parameter for additional data.
Mref 6 = +60.0%	% motor speed	It allows user to set the speed value assigned to Multi-reference 6. See G14.6 parameter for additional data.
Mref 7 = +70.0%	% motor speed	It allows user to set the speed value assigned to Multi-reference 7. See G14.7 parameter for additional data.
Inch Spd1 = 0.00%	% motor speed	It allows user to set the step frequency 1 value. See G15.1 for additional data.
Inch Spd2 = 0.00%	% motor speed	It allows user to set the step frequency 2 value. See G15.2 for additional data.
Inch Spd3 = 0.00%	% motor speed	It allows user to set the step frequency 3 value. See G15.1 and 2 for additional data.

3.6. Parameters SV.6 – Registers

This group includes several registers of general information about the drive use. Therefore, we can visualize a total and partial counter for running time (RUN).

Screen	Units	Description
TOT= d h	Days and Hours	It shows the total time during which the drive is running (RUN).
PAR= d h	Days and Hours	It shows the partial time during which the drive is running (RUN).
CLEAR PARTIAL=N	-	It allows resetting the counter of partial time for running status (RUN).
MOTOR ENERGY	kWh/MWh/GWh	Shows the drive energy consumption in motor mode operation.
REGEN. ENERGY	kWh/MWh/GWh	Shows the regenerated energy in regeneration mode operation.
RSET PRTL ENRG	Y/N	The user is able to reset the partial energy counters.

3.7. Parameters SV.7 – Rectifier

This group includes several registers of general information about the rectifier bridge.

Screen	Units	Description
Pow in	kW	It shows the input power.
IR & IS & IT	A	It shows the currents per phase.
R. Phi Cos	-	It shows the input cos PHI or Displacement Power Factor (DPF).
Rec T IGBT	ºC	It shows the maximum temperature of rectifier's IGBT.
PLL frq	Hz	It shows the internal PLL frequency.
THDi	%	It shows the input current distortion (THDi).

3.8. Parameters SV.9 – DIAGNOSTIC

This group includes several registers of general information about the rectifier bridge.

Screen	Units	Description
DIAGNOSTIC STATUS	-	This screen is a logger that shows the different events detected in the drive. When there are no events detected, the screen will show DIAGNOSTIC: OK. The distribution boards identify and inform about the module that provoques the different events, distinguishing between inverter and rectifier sides. The format that the message is shown is like following: **Mx y WARN** Where each of meaning is: - Mx: number of module the warning has raised (example M1, M2...) - y: bridge where is placed the warning; R for rectifier and I for inverter - WARN: name of the warning raised The different events detected are: - **Desaturation faults.** Identifies the IGBT in fault. Ex: M3 I DESAT 2+ (The second leg high IGBT of the module 3 inverter side is in desaturation fault). - **Fan fault.** Identifies the fan. Ex: M1 R FAULT FAN 2 (There are some problem in the fan 2 of module 1). - **LCL Temperature.** Ex: M10 R TEMP LCL (The LCL thermal relay of the module 10 has faulted). - **Fan power supply.** Ex: M5 R FAN PO SUP (The feedback of the module 5 power supply has faulted). - **Communication fault.** Ex: M6 I TOUT CAN (The inverter bridge diagnostic of module 6 is not communicating). - **ID repeated.** Some diagnostic board have the same ID. Normally, when this warning appears, another warning by timeout raises. Ex: M8 I ID REPEAT (There more than one distribution boards selected as the module 8 of the inverter side). - **Temperature warning.** The IGBT temperature is too high or the thermal probe is not connected correctly. Identifies the IGBT in warning. Ex: M3 R TMP IGBT3 (The IGBT 3 of the module 3 of the rectifier side presents a temperature warning).
Module X (X corresponds with the number of modules of the equipment)	ºC	These screens show all the IGBTs temperatures of the whole drive. There will be as screens as the number of modules. Once entered in the module subgroup, the temperature of the six IGBTs is available. The first screen shows the three rectifier temperatures (R 25 26 24C) and the second shows the inverter ones (I 24 24 23C).

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4. DESCRIPTION OF PROGRAMMING PARAMETERS

The different parameters of the SD700FR are displayed in the alphanumeric LCD. These parameters are organized in groups (G1, G2, G3, …). To access to the parameters or sub-groups which are in a lower level, press the [*] key. When you have accessed the desired parameter, this parameter will be shown as either a numerical value or a list of possible options.

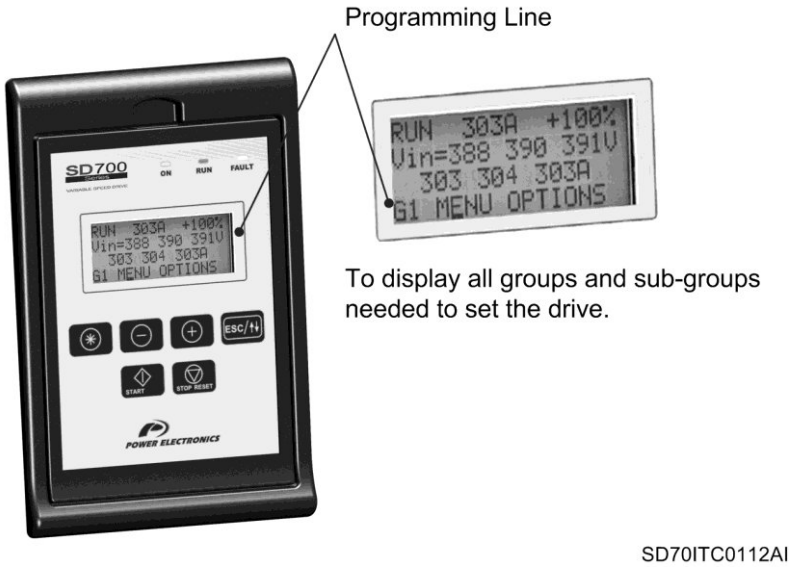
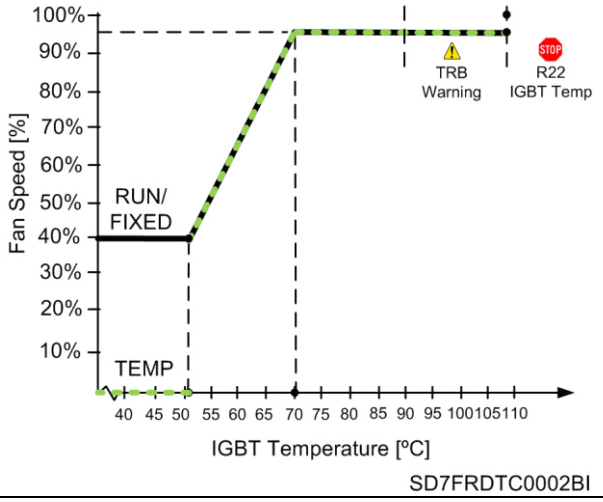


Figure 4.1 Detail of Programming Line.

See the information below for the whole parameter list and possible options of configuration.

4.1. Group 1 – G1: Options Menu

Parameter / Default Value	Name / Description	Range	Function	Set on RUN
1 LOCK PARMTRS=0	**G1.1** / Parameter lock	0 – 2	It allows user to lock SD700FR parameters totally or partially. To lock you have to introduce a password in G1.2. **OPT** / **DESCRIPTION** / **FUNCTION** 0 / NO / Parameter lock is not active. 1 / PARTIAL LOCK / All of parameters are locked except for G1.1, G1.2, G3.3 and G6.2 (PID reference). 2 / TOTAL LOCK / Only G1.1 and G1.2 can be modified.	NO
2 PASSWORD_=OFF	**G1.2** / Access password	OFF, 0000 – 9999	It allows user to introduce a password to lock parameters and avoid unauthorized changes in the programming. If in G1.1 'Parameter lock ', option '1 or 2' has been chosen, then this parameter appears automatically. Unlock: In G1.1 = 1 or 2 set to '0 ➔ NO'. **2 PASSWORD_?OFF** will be displayed.	YES
3 PSW ERR=XXXX	**G1.2b** / Unlock password recovery	0000 – 9999	To recover the password the following formula can be used: Unlock password = (XXXX/2)-3.	YES
4 LANG=ESPANOL	**G1.4** / Language selection	ENGLISH ESPANOL DEUTSCH PORTUGE	It allows selection of the user language.	NO

<table>
<tr><th>Parameter / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>5 INITIALISE=0</td><td>G1.5 / Parameter initialize</td><td>0 – 5</td><td>It allows selection of the parameters that we desire to initialize back to the factory default value.
<table>
<tr><th>OPT.</th><th>DESCRIPTION</th><th>FUNCTION</th></tr>
<tr><td>0</td><td>NO INIT</td><td>None of parameters is initialized.</td></tr>
<tr><td>1</td><td>USR PRMTR</td><td>User parameters are only initialized.</td></tr>
<tr><td>2</td><td>MTR PRMTR</td><td>Motor data are only initialized.</td></tr>
<tr><td>3</td><td>ALL PRMTR</td><td>All parameters of the drive are initialized.</td></tr>
<tr><td>4</td><td>INIT_SOFT</td><td>Newly added parameter values are initialized.</td></tr>
<tr><td>5</td><td>INIT_PARTIAL</td><td>All parameters of the drive are initialized except communication parameters.</td></tr>
</table></td><td>YES</td></tr>
<tr><td>6 SHORT Menu=NO</td><td>G1.6 / To hide some configuration menus</td><td>NO
YES</td><td>If it is active, then configuration menus will not be accessible. Only visible G1 OPTIONS MENU, G10 LIMITS, and Display groups.</td><td>YES</td></tr>
<tr><td>7 PROG= STANDARD</td><td>G1.7 / Program activation</td><td>STANDARD
PUMP
MACRO for VYSTA programs</td><td>It allows selection additional functionalities. If PUMP is selected, then extended functionality for pumping control G25 will appear as available.
The group G25 will be hidden if the pump program is not active. Furthermore, there are not available any configuration options related to pump control included in other parameters.
Once selected the pump program, a character will appear in the upper line of the display, beside the drive status, indicating constantly that the pump program is active. The letter “b” in Spanish and the letter “p” for English / German.
The most of parameters relative to the pump control are located in Group 25, excepting those setting relatives to inputs and outputs that can be found in groups G4 and G7.
Additionally there are some visualization screens included in visualization groups SV.5 and SV.8.
For additional information, see the ‘Pump Application Manual’ for the SD700.</td><td>YES</td></tr>
<tr><td>SV 1.8 Visual</td><td colspan="4">The programming line becomes a visualization line.</td></tr>
<tr><td>11 FAN CTRL=RUN</td><td>G1.11 / Drive fan control mode</td><td>RUN
TEMP
FIXE</td><td>It allows selecting the operation mode for drive fans. The SD700FR integrates a VSD system that varies the cooling flow depending on the IGBT temperature. All control modes respect the following speed vs temperature curve.
<table>
<tr><th>OPTION</th><th>FUNCTION</th></tr>
<tr><td>RUN</td><td>Start command connect the fans at the minimum speed 40%. Then fan’s speed will vary depending on the rectifier’s IGBT temperature. The fans will stop 3 minutes after the rectifier bridge stopping.
Note: Rectifier bridge stops after the sum of the deceleration ramp time and the Delay IGBT off time.</td></tr>
<tr><td>TEMP</td><td>The fans’ speed depends on the rectifiers IGBT temperature. The fans will be connected when the temperature is above 51ºC and stopped when the temperature is below 51ºC.</td></tr>
<tr><td>FIXED</td><td>Starts the fans following the speed curve even if the equipment is not running.</td></tr>
</table>

</td><td>YES</td></tr>
<tr><td>14 SER GRP PWD = OFF</td><td colspan="4">Group reserved for the technical service and qualified personnel of Power Electronics</td></tr>
</table>

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4.1.1. Subgroup 1.10 – S1.10: Eloader (EEPROM Charger)

Parameter / Default Value	Name / Description	Range	Function	Set on RUN
UPLOAD=N	**G1.10.1** / Saves the parameters of the drive to the display.	N Y	When adjusting this value to Yes, the copy of parameters to the display starts, saving the configuration of the drive. A screen will appear showing the uploading progress: **UPLOADING…100%** When this process is over, the progress screen will automatically return to the main screen, set by default to No. **Note:** In order to carry out the parameter load correctly, the user should firstly configure the digital inputs concerning 'STOP' functions before any other function.	NO
DOWNLOAD=N	**G1.10.2** / Saves the parameters of the display to the drive.	N Y	When adjusting this value to Yes, the copy of parameters stored in the display to the drive will start modifying and programming the parameters of this new drive. A screen will appear showing the downloading progress: **DOWNLOADING…100%** When this process is over, the progress screen will automatically change to the main screen, set by default to No. **Note:** When using the Pump Applications. Before downloading parameters from the display, the parameter [G1.7] must be set as 'PUMP'.	NO

4.2. Group 2 – G2: Motor Nameplate Data

Parameter / Default Value	Name / Description	Range	Function	Set on RUN
1 MTR CUR=00.00A (*) **MOTOR CURRENT**	**G2.1** / Motor rated current	1 – 9999A	It allows setting of the motor rated current according to its nameplate.	NO
2 MTR VOLT=400V **MOTOR VOLTAGE**	**G2.2** / Motor rated voltage	220 – 999V	It allows setting of the motor rated voltage according to its nameplate.	NO
3 MTR PWR=00.0Kw (*) **MOTOR POWER**	**G2.3** / Motor rated power	0 – 6500kW	It allows setting of the motor rated power according to its nameplate.	NO
4 MTR RPM=1450 **MOTOR SPEED(rpm)**	**G2.4** / Motor rpm	0 – 24000rpm	It allows setting of the motor rated speed according to its nameplate.	NO
5 MTR PFA=0.84 **MTR POWER FACTOR**	**G2.5** / Cosine Phi	0 to 0.99	It allows setting of motor cosine Phi according its nameplate.	NO
6 MTR FRQ=50Hz **MOTOR FREQUENCY**	**G2.6** / Motor rated frequency	0 – 100Hz	It allows setting of the motor rated frequency according to its nameplate.	NO
7 MTR COOLN=63% **MOTOR COOLING**	**G2.7** / Motor cooling at zero speed	OFF, 5 – 100%	It provides adjustment of sensitive of the motor thermal model based on actual motor cooling. The following settings can be taken as reference: Submersible pumps and non-deflagrating motor ➔ 5% Self-cool motor ➔ 63% Forced-cool motor ➔ 100% **Note:** If the drive is working at low speeds for a long time and several trips caused by motor thermal model are produced even though the motor was not hot then this value can be increased slightly to avoid further tripping. **Note:** If it is set to 'OFF', thermal model will be deactivated. **Note:** This protection estimates the temperature in the motor. To guarantee the motor protection, it is recommended to use the motor sensor (PTC).	NO

∗ This value depends on the drive rated current.
Note: If all of these values are not entered correctly, the SD700FR will not operate correctly. When the motor nameplate offers multiple configuration possibilities, as in case of the start-delta motor connection, ensure the correct data is entered for the appropriate configuration.

4.3. Group 3 – G3: References

<table>
<tr><th>Parameter / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>1 REF1 SPD=LOCAL</td><td>G3.1 / Reference source 1 of speed</td><td rowspan="2">NONE
AI1
AI2
AI1+AI2
FIB_1
LOCAL
MREF
PMOT
PID
COMMS
FIB_2</td><td>It allows selecting the source 1 or 2 for the speed reference.
<table>
<tr><th>OPTION</th><th>FUNCTION</th></tr>
<tr><td>NONE</td><td>Reference source 1 has not been selected.</td></tr>
<tr><td>AI1</td><td>Reference will be introduced through the Analogue Input 1.</td></tr>
<tr><td>AI2</td><td>Reference will be introduced through the Analogue Input 2.</td></tr>
<tr><td>AI1+AI2</td><td>Reference will be the sum of the signals introduced through the Analogue Inputs 1 and 2.</td></tr>
<tr><td>LOCAL</td><td>Reference will be given by keypad and will be set in ‘G3.3'Local Speed Reference'.</td></tr>
<tr><td>MREF</td><td>Multi-Reference. Different references activated by the digital inputs. It will be necessary to configure the digital inputs. See ‘S4.1 ➔ Digital Inputs’.</td></tr>
<tr><td>PMOT</td><td>Motorized potentiometer with or without reference memory.</td></tr>
<tr><td>PID</td><td>It will take as reference the value set in the parameters of the PID function.</td></tr>
<tr><td>COMMS</td><td>The reference will be introduced through the communications.</td></tr>
</table>
If the parameter G20.0.1 is set as OFC, the following options are shown too.
<table>
<tr><th>OPTION</th><th>FUNCTION</th></tr>
<tr><td>FIB_1</td><td>The drive speed reference will be the same as the master current speed</td></tr>
<tr><td>FIB_2</td><td>The drive speed reference will be the master motor current speed (%)</td></tr>
</table></td><td>YES</td></tr>
<tr><td>2 REF2 SPD=LOCAL</td><td>G3.2 / Reference source 2 of speed</td><td>YES</td></tr>
<tr><td>3 LOCAL SP=+100%
LOCAL SPEED</td><td>G3.3 / Local Speed Reference</td><td>-250 to +250%</td><td>Allows the user to set the motor speed value if the reference source for speed has been set to 'LOCAL'.</td><td>YES</td></tr>
<tr><td>4 REF1 TQ = LOCAL</td><td>G3.4 / Torque Source reference 1</td><td rowspan="2">NONE
AI1
AI2
AI1+AI2
FIB_1
LOCAL
MREF
PID
COMMS
FIB_2</td><td>Allows selecting supply 1 or supplying 2 of the torque reference.
<table>
<tr><th>OPTION</th><th>FUNTION</th></tr>
<tr><td>NONE</td><td>The supply reference 1 has not been selected.</td></tr>
<tr><td>AI1</td><td>The reference will be introduced through the analogue input 1.</td></tr>
<tr><td>AI2</td><td>The reference will be introduced through the analogue input 2.</td></tr>
<tr><td>AI1+AI2</td><td>The reference will be the addition of the signals introduced through the Analogue Inputs 1 and 2.</td></tr>
<tr><td>RESER</td><td>Reserved</td></tr>
<tr><td>LOCAL</td><td>The reference will be introduced through keyboard and will be adjusted in G3.3 “Local Speed Reference”.</td></tr>
<tr><td>MREF</td><td>Multi-reference. Different activated references by digital inputs. Digital inputs have to be configured. See S4.1 → Digital Inputs.</td></tr>
<tr><td>PID</td><td>Will assume as reference the value adjusted in the parameters of the PID.</td></tr>
</table>
If the parameter G20.0.1 is set as OFC, the following options are shown too.
<table>
<tr><th>OPTION</th><th>FUNCTION</th></tr>
<tr><td>FIB_1</td><td>The drive torque reference will be the same as the master current speed</td></tr>
<tr><td>FIB_2</td><td>The drive torque reference will be the master motor current torque (%)</td></tr>
</table></td><td>YES</td></tr>
<tr><td>5 REF2 TQ = NONE</td><td>G3.5 / Torque supply reference 2</td><td>YES</td></tr>
<tr><td>6TQ_LOCAL = +100%</td><td>G3.6/ Local Torque reference</td><td>-250 to +250%</td><td>Allows the user to set the torque value of the motor if the torque reference source has been adjusted to “LOCAL”.</td><td>YES</td></tr>
</table>

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4.4. Group 4 – G4: Inputs

4.4.1. Subgroup 4.1 – S4.1: Digital Inputs

<table>
<tr><th>Parameter / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>1 CNTROL MODE1=1</td><td>G4.1.1 / Main Control Mode</td><td>0 – 4</td><td>It allows user to set the control mode for the drive commands (Start/Stop, Reset, ...).
<table>
<tr><th>OPT</th><th>DESCRIPTION</th><th>FUNCTION</th></tr>
<tr><td>0</td><td>NONE</td><td>Control mode 1 is not operative.</td></tr>
<tr><td>1</td><td>LOCAL</td><td>Drive control is done by keypad.</td></tr>
<tr><td>2</td><td>REMOTE</td><td>Drive controlled through control terminals.</td></tr>
<tr><td>3</td><td>SERIAL COMMS</td><td>Drive controlled through communication bus.</td></tr>
</table>
If the parameter G20.0.1 is set as OFC, the following options are shown too:
<table>
<tr><th>OPT</th><th>DESCRIPTION</th><th>FUNCTION</th></tr>
<tr><td>4</td><td>FIBER</td><td>Drive controlled through optical fiber</td></tr>
</table></td><td>YES</td></tr>
<tr><td>2 CNTROL MODE2=2</td><td>G4.1.2 / Alternative Control Mode</td><td>0 – 4</td><td>It allows user to set the secondary control mode for the drive commands (Start/Stop, Reset, ...).
<table>
<tr><th>OPT</th><th>DESCRIPTION</th><th>FUNCTION</th></tr>
<tr><td>0</td><td>NONE</td><td>Control mode 2 is not operative.</td></tr>
<tr><td>1</td><td>LOCAL</td><td>Drive control is done by keypad.</td></tr>
<tr><td>2</td><td>REMOTE</td><td>Drive controlled through control terminals.</td></tr>
<tr><td>3</td><td>SERIAL COMMS</td><td>Drive controlled through communication bus.</td></tr>
</table>
If the parameter G20.0.1 is set as OFC, the following options are shown too:
<table>
<tr><th>OPT</th><th>DESCRIPTION</th><th>FUNCTION</th></tr>
<tr><td>4</td><td>FIBER</td><td>Drive controlled through optical fiber</td></tr>
</table>
Note: Control mode 2 will be activated through digital inputs exclusively. To use this set one of the digital inputs to '17 ➔ CONTROL 2'. When this input is activated, auxiliary control mode will be activated.</td><td>YES</td></tr>
<tr><td>3 RESET MODE=Y</td><td>G4.1.3 / Reset from keypad</td><td>N
Y</td><td>It allows user to reset faults from the keypad unit (LOCAL).
<table>
<tr><th>OPTION</th><th>FUNCTION</th></tr>
<tr><td>N=NO</td><td>It is not possible to reset from the keypad unit.</td></tr>
<tr><td>Y=YES</td><td>The drive can be reset via the reset button on the keypad unit.</td></tr>
</table></td><td>YES</td></tr>
</table>

<table>
<tr><th>Parameter / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>4 DIGIT I MODE=1</td><td>G4.1.4 / Selection of Digital Inputs configuration</td><td>0 – 5</td><td>It allows user to configure the digital inputs for different functions. All the options described below will program to all the digital inputs simultaneously, except for option '1 ➔ All Programmable', which allows to configure their in a separate way.
<table>
<tr><th>OPT</th><th>DESCRIPTION</th><th>FUNCTION</th></tr>
<tr><td>0</td><td>3 WIRES</td><td>'Start/Stop and Reset' by terminals.
DI1 = 01➔ Start (NO)
DI2 = 04➔ Stop 1-Reset (NC)
DI3 = 03➔ Stop 2-Reset (NC)
DI4 = 15➔ Reference 2 (NO)
DI5 = 10➔ Speed Inversion (NO)
DI6 = 17➔ Control 2 (NO)</td></tr>
<tr><td>1</td><td>ALL PROGRAMMABLE</td><td>Inputs configuration individually by user. See G4.1.5 to G4.1.10.</td></tr>
<tr><td>2</td><td>MREF 2 WIRES</td><td>Digital inputs 5 and 6 are programmed as multiple references (of speed or PID references) for up to 4 preset speeds. The remaining inputs are user programmable.
<table>
<tr><th>PARM</th><th>DI5</th><th>DI6</th></tr>
<tr><td>G14.4</td><td>0</td><td>0</td></tr>
<tr><td>G14.5</td><td>0</td><td>X</td></tr>
<tr><td>G14.6</td><td>X</td><td>0</td></tr>
<tr><td>G14.7</td><td>X</td><td>X</td></tr>
</table>
Note: It is necessary to set G3.1 REF1 SPD=MREF or G3.2 REF2 SPD=MREF.</td></tr>
<tr><td>3</td><td>MREF 3 WIRES</td><td>Digital inputs 4, 5 and 6 are programmed as multiple references (of speed or PID references) for up to 7 preset speeds. The remaining inputs are user programmable.
<table>
<tr><th>PARM</th><th>DI4</th><th>DI5</th><th>DI6</th></tr>
<tr><td>G14.1</td><td>0</td><td>0</td><td>X</td></tr>
<tr><td>G14.2</td><td>0</td><td>X</td><td>0</td></tr>
<tr><td>G14.3</td><td>0</td><td>X</td><td>X</td></tr>
<tr><td>G14.4</td><td>X</td><td>0</td><td>0</td></tr>
<tr><td>G14.5</td><td>X</td><td>0</td><td>X</td></tr>
<tr><td>G14.6</td><td>X</td><td>X</td><td>0</td></tr>
<tr><td>G14.7</td><td>X</td><td>X</td><td>X</td></tr>
</table>
Note: It is necessary to set G3.1 REF1 SPD=MREF or G3.2 REF2 SPD=MREF.</td></tr>
</table>
Note: See following page.</td><td>YES</td></tr>
</table>

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<table>
<tr><th>Parameter / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>4 DIGIT I MODE=1</td><td>G4.1.4 / Selection of Digital Inputs configuration</td><td>0 – 5</td><td>Note: Coming from the previous page.
<table>
<tr><th>OPT</th><th>DESCRIPTION</th><th>FUNCTION</th></tr>
<tr><td>4</td><td>MOTORIZED POT</td><td>It assigns the up and down reference function for two of the digital inputs.
DI5 = Up (NO contact)
DI6 = Down (NC contact)
Reference limits will be the speed limits set in 'G10 LIMITS'.
Programming a change ramp is possible at:
G5.7 PMT ACL1=3%/s
G5.8 PMT DCL1=3%/s
G5.9 PMT ACL2=1%/s
G5.10 PMT DCL2=1%/s
G5.11 PMOT BRK=OFF
Note: In this mode, the reference set by potentiometer will be memorized even if the motor is stopped and also in the case of a power loss.</td></tr>
<tr><td>5</td><td>ERASAB POT</td><td>It operates in the same way as option 4, but when the motor is stopped or a power loss occurs, the reference will not be memorized. In this case the minimum reference value set in G10.1 or G10.3 will be the default speed. This will happen when the limit is above zero, if the limit is equal or below zero, the default speed will be zero.</td></tr>
</table>
⚠ Caution: Digital input configuration changes their settings automatically. Make sure there is not a hazard due to accidental motor starting that can cause property damage or personal injury.</td><td>YES</td></tr>
</table>

Pumps program activation, in G1.7 PROG = PUMP, requires the following considerations:

There is some configuration options available when the pump program is active, which can be set in the same way that the options available in the standard program.
Nevertheless, when the pump program is active, the drive will assume that only the configurable options from 50 to 75 (for G4.1.5 to G4.1.10) can be set, without taking into consideration the setting on parameter 'G4.1.4 DIGIT I MODE', which means a block setting.

All that means that the user will configure the pump program freely, according to his requirements, selecting the correct functionality and protections. For a correct programming of the digital inputs when the pump program is active, there is additional information in 'Pump Application Manual', where information about Pump Control (G25) is included.

Note: Selection of the pump program will set all the Digital Inputs to mode '00 – un used'. If re-programming is needed, it will be necessary to configure their functionality in a separate way again. So it guarantees a safety installation operation, avoiding that hardware external to the equipment can cause any kind of damage.

Note: The digital outputs will also be affected due to pump control activation.

To select one auxiliary pump it is necessary to act in the following way:

- Set any free digital input to options '52 FIX PUMP1 FLT', '53 FIX PUMP2 FLT', '54 FIX PUMP3 FLT', '55 FIX PUMP4 FLT' or '56 FIX PUMP5 FLT'
- To enable the control of the pump in the corresponding screen G25.9.1, G25.9.2, G25.9.3, G25.9.4 and G25.9.5 respectively.

To remove this pump configuration and release the relay for another use, the user should:

- Disable the control of the pump in the corresponding screen G25.9.1, G25.9.2, G25.9.3, G25.9.4 or G25.9.5 respectively.

<table>
<tr><th>Parameter / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>5 DIGITL IN 1=06</td><td>G4.1.5 / Multi-function Digital Input 1 configuration</td><td>00 – 75</td><td rowspan="21">It allows user to configure the digital inputs for individual use.
<table><tr><th>OPT</th><th>DESCRIPTION</th><th>FUNCTION</th></tr><tr><td>00</td><td>NO USE</td><td>Input is disabled.</td></tr><tr><td>01</td><td>START</td><td>‘Start’ command from a normally open push button (NO). First, It is necessary to configure another input as a ‘Stop’ command from a normally closed contact (NC).</td></tr><tr><td>02</td><td>STOP1</td><td>‘Stop’ command from a normally closed push button. Stop mode is adjusted in G7.1 STOP 1. (NC)</td></tr><tr><td>03</td><td>STOP2-RESET</td><td>‘Stop’ command from a normally closed pushbutton. Stop mode is adjusted in G7.2 STOP 2. Activation of the input in this mode also acts as a ‘Reset’ signal. (NC)</td></tr><tr><td>04</td><td>STOP1-RESET</td><td>‘Stop’ command from a normally closed pushbutton. Stop mode is adjusted in G7.1 STOP 1. Activation of the input in this mode also acts a ‘Reset’ signal. (NC)</td></tr><tr><td>05</td><td>START/STOP</td><td>It allows start when closed and stop when open (2 wires start / stop). (NO)</td></tr><tr><td>06</td><td>START-RST/STOP</td><td>It allows start when closed and stop when open (2 wires start / stop). Activation of this input also acts a fault reset. (NO)</td></tr><tr><td>07</td><td>RESET</td><td>‘Reset’ signal by push button. (NC). See Note.</td></tr><tr><td>08</td><td>START + INCH1</td><td>‘Start’ command and inch speed 1 when closed. Inch speed is programmed in G15.1 INCH1. (NO)</td></tr><tr><td>09</td><td>START + INCH2</td><td>‘Start’ command and inch speed 2 when closed. Inch speed is programmed in G15.2 INCH2. (NO) [1].</td></tr><tr><td>10</td><td>INV SPEED</td><td>It causes deceleration of the motor until motor is stopped, and inverts the rotation direction. (NO) [2].</td></tr><tr><td>11</td><td>RESERVE</td><td>Reserved for future use.</td></tr><tr><td>12</td><td>RESERVE</td><td>Reserved for future use.</td></tr><tr><td>13</td><td>INV INCHS</td><td>It inverts the fixed speed reference set in G15.1, G15.2 or G15.3. (NO) [2].</td></tr><tr><td>14</td><td>ACC/DEC 2</td><td>It active acceleration and deceleration ramps are enabled. Alternative acceleration and deceleration rates are programmed in G5.3 and G5.4. (NO)</td></tr><tr><td>15</td><td>REFERENCE 2</td><td>It allows selection of the alternative speed reference as programmed in G3.2. (NO)</td></tr><tr><td>16</td><td>RESERVE</td><td>Reserved for future use.</td></tr><tr><td>17</td><td>CONTROL 2</td><td>It activates the alternative control mode as programmed in G4.1.2. (NO)</td></tr><tr><td>18</td><td>START/STP – RST</td><td>Like the option 06, but ‘Reset’ signal will be activated after the drive is stopped. (NO)</td></tr><tr><td>19</td><td>STOP (2)</td><td>‘Stop’ command from a normally closed pushbutton. Stop mode is adjusted in G7.2 STOP 2. (NC)</td></tr><tr><td>20</td><td>SPEED LIMIT 2</td><td>It will change to the alternative speed limits as programmed in G10.3 and G10.4. (NO).</td></tr></table>Note: See following page.</td><td rowspan="21">YES</td></tr>
<tr><td>6 DIGITL IN 2=00</td><td>G4.1.6 / Multi-function Digital Input 2 configuration</td><td>00 – 75</td></tr>
<tr><td>7 DIGITL IN 3=00</td><td>G4.1.7 / Multi-function Digital Input 3 configuration</td><td>00 – 75</td></tr>
<tr><td>8 DIGITL IN 4=00</td><td>G4.1.8 / Multi-function Digital Input 4 configuration</td><td>00 – 75</td></tr>
<tr><td>9 DIGITL IN 5=00</td><td>G4.1.9 / Multi-function Digital Input 5 configuration</td><td>00 – 75</td></tr>
</table>

Note: The user can choose this option independently of the selected program (STANDARD or PUMP) and the used control mode (LOCAL, REMOTE, SERIAL COMMS).

[1] If two inputs set to options '08 ➔ START + INCH1' and '09 ➔ START + INCH2' are activated at the same time the combination of 'START + INCH3' programmed in G15.3 INCH3 is enabled.

[2] Rotation inversion in 'G10.11 INVERSION ?=Y' must be enabled.

<table>
<tr><th>Parameter / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>10 DIGITL IN6=17</td><td>G4.1.10 / Multi-function Digital Input 6 configuration</td><td>00 – 75</td><td>Note: Coming from the previous page.
<table>
<tr><th>OPT</th><th>DESCRIPTION</th><th>FUNCTION</th></tr>
<tr><td>21</td><td>DC BRAKE</td><td>It activates or deactivates dynamic brake unit. (NO)</td></tr>
<tr><td>22</td><td>START MODE 2</td><td>To select the alternative starting mode (Ramp / Spin) (NO)</td></tr>
<tr><td>23</td><td>CURRENT LIMI2</td><td>To select the alternative current limit. (NO)</td></tr>
<tr><td>24</td><td>EXTERN EMERGE</td><td>To generate the fault ‘F56 EMERGEN.STOP’. (NC). See Note.</td></tr>
<tr><td>25</td><td>FREMAQ FLT</td><td>It is an emergency stop which indicates fault in the freemaq filter (NC). Drive will trip by fault 78 TMP FREEMAQ.</td></tr>
<tr><td>26</td><td>SPEED/TORQUE (*)</td><td>Switchs between speed mode (NO) and torque mode (NC)</td></tr>
<tr><td>27</td><td>STRT/STOP + INV</td><td>Start/Stop + rotation reversal. Start the equipment with this digital input means starting in the opposite direction of the reference speed sign.</td></tr>
<tr><td>28</td><td>Dig Ouput FB</td><td>(NC) drive works normally, but, in OPEN state, when the [G8.1.35] expires, drive will trip by fault 55. See parameter G8.1.34..</td></tr>
<tr><td>40</td><td>U.STOP</td><td>It stops the drive regardless of control mode & program selection configured (NO).</td></tr>
</table>
Parameters 70 and 75 available with the pump software.</td><td>YES</td></tr>
</table>

4.4.2. Subgroup 4.2 – S4.2: Analogue Input 1

<table>
<tr><th>Parameter / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>1 SENSOR 1 ?=N</td><td>G4.2.1 / To enable sensor of Analogue Input 1</td><td>N
Y</td><td>It allows user to configure analogue input 1 for use with a sensor and activates the parameters which are necessary to set it up. See G4.2.2 up to G4.2.7.
<table>
<tr><th>OPTION</th><th>FUNCTION</th></tr>
<tr><td>N=NO</td><td>The analogue input will remain scaled in default units (%).</td></tr>
<tr><td>Y=YES</td><td>The analogue input and any variables relating to the analogue input will be configured in the engineering units selected in G4.2.2.</td></tr>
</table></td><td>YES</td></tr>
<tr><td>2 SENSOR 1=l/s[3]</td><td>G4.2.2 / Selection of sensor 1 units</td><td>%
l/s
m³/s
l/m
m³/m
l/h
m³/h
m/s
m/m
m/h
Bar
kPa
Psi
m
ºC
ºF
ºK
Hz
rpm</td><td>It allows selection of different units of measurement for analogue input 1 according to the sensor that is used.
If this parameter is modified, the minimum and maximum values of the sensor range must be adjusted to ensure correct configuration. Therefore, the following set values should be checked:
'G4.2.5 Smi1=+0.0l/s' ➔ Minimum range of sensor.
'G4.2.7 Sma1=+10.0l/s' ➔ Maximum range of sensor.</td><td>YES</td></tr>
<tr><td>3 AIN1 FORMAT=V</td><td>G4.2.3 / Analogue Input 1 format</td><td>V
mA</td><td>It allows configuration of the analogue input 1 format for either a voltage or current signal. Set according to the sensor that will be used.</td><td>YES</td></tr>
</table>

Parameter / Default Value	Name / Description	Range	Function	Set on RUN
4 INmin1=+0V AIN1 LOW RANGE	**G4.2.4** / Minimum range of Analogue Input 1	-10V to G4.2.6 +0mA to G4.2.6	It determines the minimum voltage or current value for analogue input 1. Set according to the characteristics of the sensor that will be connected.	YES
5 Smi1=+0.0l/s[3] SENS1 LOW RANGE	**G4.2.5** / Minimum range of sensor 1	-3200 to G4.2.7 Engineering units	It sets the minimum units value of the sensor connected to analogue input 1. This value should also correspond to the minimum voltage or current level of the sensor set in 'G4.2.4 INmin1'. **Note:** This value should be checked if the units are changed in 'G4.2.2 SENSOR 1'. It will be set to operate in open loop and close loop.	YES
6 INmax1=+10V AIN1 HIGH RANGE	**G4.2.6** / Maximum range of Analogue Input 1	G4.2.4 to +10V G4.2.4 to +20mA	It determines the maximum voltage or current value for analogue input 1. Set according to the characteristics of the sensor that will be connected.	YES
7 Sma1=+10.0l/s[3] SENS1 HIGH RANGE	**G4.2.7 / Maximum range of sensor 1**	G4.2.5 to +3200 Engineering units	It sets the maximum units value of the sensor connected to analogue input 1. This value should also correspond to the maximum voltage or current level of the sensor set in 'G4.2.6 INmax1'. Note: This value should be checked if the units are changed in 'G4.2.2 SENSOR 1'. For this, it is necessary to set this value in open loop and close loop configurations.	YES
8 SPD LO1=+0% SPD LO RNG AIN1	**G4.2.8 / Speed for the minimum range of Analogue Input 1**	-250% to G4.2.9	It allows scaling of the speed reference to correspond with the minimum range of the analogue input 1 as set in 'G4.2.4 INmin1'. The value is a percentage of the motor rated speed.	YES
9 SPD HI1=+100% SPD HIG RNG AIN1	**G4.2.9 / Speed for the maximum range Analogue Input 1**	G4.2.8 to +250%	It allows scaling of the speed reference to correspond with the maximum range of the analogue input 1 as set in 'G4.2.6 INmax1'. The value is a percentage of the motor rated speed.	YES
14 AIN1 LOSS=N	**G4.2.14 / Protection for Analogue Input 1 loss**	N Y	To set the drive stop mode when a loss of the analogue input 1 signal occurs. **OPTION** / **FUNCTION** N=NO: Function disabled. Y=YES: When the analogue input level decreases down to zero value, sensor will be considered damaged and the drive will stop generating a fault 'F42 AIN1 LOSS'.	YES
15 1_Z BAND=OFF AIN1 ZERO BAND	**G4.2.15 / Zero band filter for Analogue Input 1**	OFF = 0.0, 0.1 to 2.0%	Filtering of analogue input 1 signal. Setting this value we can filter analogue input 1 to avoid possible electrical noise preventing the analogue reading a zero value.	YES
16 FILTER1=OFF AIN1 STABIL FILT	**G4.2.16 / Low Pass filter for Analogue Input 1**	OFF = 0.0, 0.1 to 20.0%	It allows filtering the Analogue Input 1 signal. Setting the value of this time constant we can eliminate possible instabilities in the value of the same ones due to noise, wiring faults, etc. Note: When applying a Low Pass filter to any analogue signal, a delay time in the own signal is generated. This delay time is the value of the configured time constant approximately.	YES

Note: The user can choose this option independently of the selected program (STÁNDARD or PUMP) or the control mode used (LOCAL, REMOTE, and SERIAL COMMS).

[3] Available only when 'G4.2.1 SENSOR 1 = Y'.

ENGLISH

4.4.3. Subgroup 4.3 – S4.3: Analogue Input 2

Parameter / Default Value	Name / Description	Range	Function	Set on RUN
1 SENSOR 2 ?=N	**G4.3.1** / Sensor of Analogue Input 2 enable	N Y	It allows user to configure analogue input 2 for use with a sensor and activates the parameters which are necessary to set it up. See G4.3.2 up to G4.3.7. **OPTION** / **FUNCTION** N=NO – The analogue input will remained scaled in defaults units (%). Y=YES – The analogue input and any variables relating to the analogue input will be configured in the engineering units selected in G4.3.2.	YES
2 SENSOR 2=Bar[4]	**G4.3.2 / Selection of sensor 2 units**	% l/s m³/s l/m m³/m l/h m³/h m/s m/m m/h Bar kPa Psi m ºC ºF ºK Hz rpm	It allows selection of different units of measurement for the analogue input 2 according to the sensor that is used. If this parameter is modified, the minimum and maximum values of the sensor range must be adjusted to ensure correct configuration. Therefore, the following set values should be checked: 'G4.3.5 Smi2=+0.0Bar' ➔ Minimum range of sensor. 'G4.3.7 Sma2=+10.0Bar' ➔ Maximum range of sensor.	YES
3 AIN2 FORMAT=mA	**G4.3.3 / Analogue Input 2 format**	V mA	It allows configuration of the analogue input 2 format for either a voltage or current signal. Set according to the sensor that will be used.	YES
4 INmin2=+4mA AIN2 LOW RANGE	**G4.3.4 / Minimum range of Analogue Input 2**	-10V to G4.3.6 +0mA to G4.3.6	It determines the minimum voltage or current value for analogue input 2. Set according to the characteristics of the sensor that will be connected.	YES
5 Smi2=+0.0Bar[4] SENS2 LOW RANGE	**G4.3.5 / Minimum range of sensor 2**	-3200 to G4.3.7 Engineering units	It sets the minimum units value of the sensor connected to the analogue input 2. This value should also correspond to the minimum voltage or current level of the sensor set in 'G4.3.4 INmin2'. Note: This value should be checked if the units are changed in 'G4.3.2 SENSOR 2'. It will be set to operate in open loop and close loop.	YES
6 INmax2=+20mA AIN2 HIGH RANGE	**G4.3.6 / Maximum range of Analogue Input 2**	G4.3.4 to +10V G4.3.4 to +20mA	It determines the maximum voltage or current value for the analogue input 2. Set according to the characteristics of the sensor that will be connected.	YES
7 Sma2=+10.0Bar[4] SENS2 HIGH RANGE	**G4.3.7 / Maximum range of sensor 2**	G4.3.5 to +3200 Engineering units	It sets the maximum units value of the sensor connected to the analogue input 2. This value should also correspond to the maximum voltage or current level of the sensor set in 'G4.3.6 INmax2'. Note: This value should be checked if the units are changed in 'G4.3.2 SENSOR 2'. It is necessary to set this value in open loop and close loop configurations.	YES
8 SPD LO2=+0% SPD LO RNG AIN2	**G4.3.8 / Speed for the minimum range of Analogue Input 2**	-250% to G4.3.9	It allows scaling of the speed reference to correspond with the minimum range of the analogue input 2 as set in 'G4.3.4 INmin2'. It is configured to set the speed reference via analogue input. Set the parameter 'G4.3.1 SENSOR 2 ?= N'. The value is a percentage of the motor rated speed.	YES
9 SPD HI2=+100% SPD HIG RNG AIN2	**G4.3.9 / Speed for the maximum range of Analogue Input 2**	G4.3.8 to +250%	It allows scaling of the speed reference to correspond with the maximum range of the analogue input 2 as set in 'G4.3.6 INmax2'. It is configured to set the speed reference via analogue input. Set the parameter 'G4.3.1 SENSOR 2 ?= N'. The value is a percentage of the motor rated speed.	YES
10 FB2 = + 0.0Bar [4]	**G4.3.10 /** Minimum operating range of sensor	-3200 to G4.3.12 Engineering units	To set the minimum operating range, if the real operating range is different than the range of the sensor which will be used as sensor in open loop. It corresponds with the voltage or current level set in 'G4.3.4INmin2'. This parameter should be configured to operate with sensor in open loop.	YES
11 FB2 – Sp = 0% [4]	**G4.3.11 /** Minimum speed range for sensor in open loop	-250% to +250%	It allows setting the minimum speed range corresponding to the minimum sensor range set in 'G4.3.10 FB2', when the sensor will be used in open loop. The value is a percentage of the motor rated speed.	YES

Parameter / Default Value	Name / Description	Range	Function	Set on RUN
12 FA2 = +10.0Bar [4]	**G4.3.12 /** Maximum operating range of sensor	G4.3.10 to +3200 Engineering units	To set the maximum operating range, if the real operating range is different than the range of the sensor which will be used as sensor in open loop. It corresponds with the voltage or current level set in 'G4.3.6INmin2'. This parameter should be configured to operate with sensor in open loop.	YES
13 FA2 – SP = 100%[4]	**G4.3.13 /** Maximum speed range for sensor in open loop	-250% to +250%	It allows setting the maximum speed range corresponding to the maximum sensor range set in 'G4.3.12 FA2', when the sensor will be used in open loop. The value is a percentage of the motor rated speed.	YES
14 AIN2 LOSS=N	**G4.3.14 / Protection for Analogue Input 2 loss**	N Y	To set the drive stop mode when a loss of the analogue input 2 signal occurs. **OPTION** / **FUNCTION** N=NO – Function disabled. Y=YES – When the analogue input level decreases down to zero value, sensor will be considered damaged and the drive will stop generating a fault 'F43 AIN2 LOSS'.	YES
15 2_Z BAND=OFF AIN2 ZERO BAND	**G4.3.15 / Zero band filter for Analogue Input 2**	OFF=0.0, 0.1 to 2.0%	Filtering of analogue input 2 signal. Setting this value we can filter analogue input 2 to avoid possible electrical noise preventing the analogue reading a zero value.	YES
16 FILTER2=OFF AIN2 STABIL FILT	**G4.3.16 / Low Pass filter for Analogue Input 2**	OFF = 0.0, 0.1 to 20.0%	It allows filtering the Analogue Input 2 signal. Setting the value of this time constant we can eliminate possible instabilities in the value of the same ones due to noise, wiring faults, etc. Note: When applying a Low Pass filter to any analogue signal, a delay time in the own signal is generated. This delay time is the value of the configured time constant approximately.	YES

[4] It will be available in case of 'G4.3.1 SENSOR 2 = Y'.

4.4.4. Subgroup 4.4 – S4.4: Pulse Input

Parameter / Default Value	Name / Description	Range	Function	Set on RUN
1 Sensr U=l/s	**G4.4.1** / Sensor units of Pulse Input	% l/s m³/s l/m m³/m l/h m³/h m/s m/m m/h	Allows selection of the units to measure the flow. **Note:** To use this input you should have a flowmeter with a digital pulse output of pulse width greater than 50ms. Used for flow limitation algorithm. See S25.10.	NO
2 Pls/s = 100l/s LIQU AMOUNT/PULS	**G4.4.2** / Flowmeter configuration	0 to 32760 Flow units	It allows setting the amount of the fluid per pulse received. For example, if setting is '2Pls/s=100l/s', and the present flow is 500l/s, 5 pulses/sec will be received.	NO
3 M Rn=1000l/s FLOW MAX RANGE	**G4.4.3** / Maximum range of flow meter	0 to 32760 Flow units	It allows user to set the maximum range of the flow meter. It is used to calculate the reset level of the flow control algorithm. Parameter G25.10.4 is linked with the value set in this parameter. Example: If you set a maximum range of 100 units 'G4.4.3=100', and the reset level of the flow algorithm is desired below 30 units, you have to set 'G25.10.4=30%'. For additional information, see the 'Pump Application Manual' for the SD700FR.	YES

4.4.5. Subgroup 4.6 – S4.6: Optic Fiber

4.4.5.1. Subgroup S4.6.1 – 1. FIBER MODE

Parameter / Default Value	Name / Description	Range	Function	Set on RUN
1 FIBER MODE = 0	**G4.6.1** / Fiber Mode	0 to 2	This parameter is used to select the drive role in the optical fiber network. We can select three options: **OPT** / **FUNCTION** / **DESCRIPTION** 0 – MAS – The equipment will make the functions of master in the network 1 – SLV – The equipment will act as a slave, taking orders of the master and transmitting its status 2 – NON – The equipment will be independent in the network; it hasn't slave or master function.	NO

ENGLISH

4.4.5.2. Subgroup S4.6.3 – Input O.F.

<table>
<tr><th>Parameter / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>5 CONTROL = 0</td><td>G4.6.3.5 / Control</td><td>0 to 2</td><td>This parameter receives both the Start order and the Run status coming from the master. This status will be sent to the subgroups G4.1.1 and G4.1.2, allowing the slave to start with Start order or the Run status of the master.
<table>
<tr><th>OPT</th><th>FUNCTION</th><th>DESCRIPTION</th></tr>
<tr><td>0</td><td>NONE</td><td>The equipment will not take into account the START order or the RUN status. If we select FIBER in G4.1.1 or G4.1.2, the variable speed drive will not start.</td></tr>
<tr><td>1</td><td>START</td><td>The Start order of the master will be sent to the FIBER option in the groups G4.1.1 and G4.1.2. It means that if we select the fiber option in the control mode while the master has a Start order, the slave will start.</td></tr>
<tr><td>2</td><td>RUN</td><td>The RUN status of the master will be sent to the FIBER option in G4.1.1 and G4.1.2. When the fiber option is selected in a control mode and the master is in RUN, the slave will start and won't stop till the RUN has been disappeared of the master.</td></tr>
</table></td><td>NO</td></tr>
<tr><td>6 FAULT = 0</td><td>G4.6.3.6 / Fault (Master)</td><td>0 to 1</td><td>When this option is selected in the master drive and the system is working in closed ring mode, the master will STOP and show “F76 SLAVE O.F”, if one or more slaves are faulted. Otherwise, the master will continue running.
<table>
<tr><th>OPT</th><th>FUNCTION</th></tr>
<tr><td>0</td><td>No</td></tr>
<tr><td>1</td><td>Yes</td></tr>
</table></td><td>YES</td></tr>
<tr><td>7 SPIN STP = 0</td><td>G4.6.3.7 / SPIN STOP (Slave)</td><td>0 to 1</td><td>If we select this option, when the master will fault for any reason, all the slaves will stop automatically through a spin stop.
<table>
<tr><th>OPT</th><th>FUNCTION</th></tr>
<tr><td>0</td><td>No</td></tr>
<tr><td>1</td><td>Yes</td></tr>
</table></td><td>NO</td></tr>
</table>

4.4.5.3. Subgroup S4.6.5 – T/O O.F.

<table>
<tr><th>Parameter / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>5 T/O F.O = 0</td><td>G4.6.5/ Time out optical fiber (Slave)</td><td>OFF, 0.10 to 9.99</td><td>Permits open loop and close loop mode selection. Additionally for close loop mode, enable to establish the timeout response for slave. If the master does not receive response within the time selected the slave sets “F77 OPT FIB TO” fault.
<table>
<tr><td>OPT</td><td>FUNCTION</td></tr>
<tr><td>OFF</td><td>Open loop enable</td></tr>
<tr><td>0.10s</td><td>Close loop enable 0.1s</td></tr>
<tr><td>....</td><td></td></tr>
<tr><td>9.990s</td><td>Slave timeout response</td></tr>
</table>
Otherwise, and also in the open loop, the option of “listener” slave is available. The slave only pays attention on the bus communications and does not make any action. This mode has been created to work with CANOpen and Devicenet boards</td><td>NO</td></tr>
</table>

4.5. Group 5 – G5: Acceleration and Deceleration Ramps

<table>
<tr><th>Parameter / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>1 ACC1=5.0%/s
INITIAL ACCEL</td><td>G5.1 / Acceleration ramp 1</td><td>0.01 – 650% / sec</td><td>Allows user to set acceleration ramp 1. The setting is in acceleration units (increase in percentage of speed per second). For example, a 10%/s ramp means that the drive increases its speed by 10% of motor rated speed for each second. This ramp will be set according to the requirements of each process.</td><td>YES</td></tr>
<tr><td>2 DECEL1=1.0%/s
INITIAL DECEL</td><td>G5.2 / Deceleration ramp 1</td><td>0.01 – 650% / sec</td><td>Allows user to set deceleration ramp 1. The setting is in deceleration units (decrease in percentage of speed per second). For example, a 10%/s ramp means that the drive decreases its speed by 10% of motor rated speed for each second. This ramp will be set according to the requirements of each process.
Note: For drives which input voltage is 400V, the default values will be:
- From 6A to 48A =10%/sec
- From 60A to 170A =5%/sec
- From 210A to Imax =2%/sec</td><td>YES</td></tr>
</table>

Parameter / Default Value	Name / Description	Range	Function	Set on RUN
3 ACC2=10.0%/s SECOND ACCELE	**G5.3** / Acceleration ramp 2	0.01 – 650% / sec	Allows user to set the alternative acceleration ramp. The setting is based in acceleration units (increase in percentage of speed per second), like the main ramp setting. The drive will apply acceleration ramp 1 until motor speed exceeds the value set in 'G5.5 BRK ACC'. From here on it will apply the alternative ramp value. If 'G5.5 BRK ACC = OFF' no ramp change will occur.	YES
4 DECEL2=10.0%/s SECOND DECELE	**G5.4** / Deceleration ramp 2	0.01 – 650% / sec	Allows user to set the alternative deceleration ramp. The setting is in deceleration units (decrease in percentage of speed per second), like the main ramp setting. The drive will apply deceleration ramp 2 until motor speed is below the value set in 'G5.6 BRK DEC'. From here on it will apply the alternative ramp value. If 'G5.6 BRK DEC = OFF' no ramp change will occur. **Note:** For drives which input voltage is 400V, the default values will be: - From 6A to 48A =10%/sec - From 60A to 170A =5%/sec - From 210A to Imax =2%/sec	YES
5 BRK ACC=OFF BREAKPOINT ACL	**G5.5** / Speed for acceleration ramp change	OFF, 0 to 250%	This parameter sets the break frequency for the alternative acceleration ramp. This parameter should be set at to the speed at which a change in the acceleration profile is required. If this value is exceeded the drive will start to apply the value of the alternative acceleration ramp. **Note:** Alternative acceleration and deceleration can be selected through the digital inputs or comparator output functions. This functionality is independent of the drive speed (for example, if the magnitude of the comparator is the drive rated current, when the drive output current exceeds a defined level, calculated as % of In, a ramp change occurs).	YES
6 BRK DEC=OFF BREAKPOINT DCL	**G5.6** / Speed for deceleration ramp change	OFF, 0 to 250%	This parameter sets the break frequency for the alternative deceleration ramp. This parameter should be set at to the speed at which a change in the deceleration profile is required. If this value is exceeded, the drive will start to apply the value of the alternative deceleration ramp. **Note:** Alternative acceleration and deceleration can be selected as needed through the digital inputs or comparator output functions. This functionality is independent of the drive speed (for example, if the magnitude of the comparator is the drive rated current, when the drive output current is below a defined level, calculated as % of In, a ramp change occurs).	YES
7 MPT INC1=1.0%/s MOTO POT INC1	**G5.7** / Ramp 1 of reference increase for motorized pot.	0.01 – 650% / sec	Allows adjustment of ramp 1 reference increase when using the motorized potentiometer function.	YES
8 MPT DEC1=3.0%/s MOTO POT DEC1	**G5.8** / Ramp 1 of reference decrease for motorized pot.	0.01 – 650% / sec	Allows adjustment of ramp 1 reference decrease when using the motorized potentiometer function.	YES
9 MPT INC2=1.0%/s MOTO POT INC2	**G5.9** / Ramp 2 of reference increase for motorized potentiometer	0.01 – 650% / sec	Allows user to set the ramp 2 reference increase for the motorized potentiometer function. The drive will apply the ramp 1 rate until the value set in 'G5.11 PMOT BRK' is exceeded. From here on it will apply the alternative ramp value. If 'G5.11 PMOT BRK = OFF', no ramp change will occur.	YES
10 MPT DEC2=3.0%/s MOTO POT DEC2	**G5.10** / Ramp 2 of reference decrease for motorized potentiometer	0.01 – 650% / sec	Allows user to set the ramp 2 reference decrease for the motorized potentiometer function. The drive will apply the ramp 1 rate until below the value set in 'G5.11 PMOT BRK'. From here on it will apply the alternative ramp value. If 'G5.11 PMOT BRK = OFF', no ramp change will occur.	YES
11 MPOT BRK = OFF MOTO POT BRKPOIN	**G5.11** / Speed for ramp change with motorized pot.	OFF=0 to 250%	This parameter sets the break frequency for the alternative acceleration and deceleration reference ramp when using motorized potentiometer. This parameter is the speed at which the change in motorized potentiometer reference ramp profile takes place.	YES
12 SP FLT= OFF SMOOT SPD FILTER	**G5.12** / Time constant to filter the speed	OFF, 0.0 – 80.0%	Percentage of the acceleration ramp where the S - filter will be applied. S-Curve can be introduced if smoother performance during acceleration and deceleration is required. S-Curve introduces a filter for speed reference changes during 'Start/Stop' and acceleration and deceleration. It is especially useful in cranes and elevators.	YES

4.6. Group 6 – G6: PID Control

Parameter / Default Value	Name / Description	Range	Function	Set on RUN
1 SEL REF=MREF	**G6.1** / Source selection for introducing reference signal	NONE AI1 AI2 RESERV MREF LOCAL locPID COMMS	It allows user to select the reference source for the setpoint of the PID regulator. **OPTION** / **FUNCTION** NONE: Source disabled. AI1: PID setpoint introduced by Analogue Input 1. AI2: PID setpoint introduced by Analogue Input 2. RESERV: Reserved for future use. MREF: PID setpoint introduced by Digital Inputs configured as Multi-references. LOCAL: PID setpoint introduced by keypad. Value can be adjusted in screen 'G3.3 LOCAL SPD'. locPID: PID setpoint introduced by keypad. Value is set in 'G6.2 PID LOC'. It allows user to have two speed references because 'G3.3 LOCAL SPD' is not modified. COMMS: PID setpoint introduced by communications	YES
2 PID LOC=+0.0%[5] **PID LOCAL SETPOI**	**G6.2** / PID local reference	+0.0% to +400%	When 'locPID' is set as setpoint source, the reference introduced by keypad will be memorized in this parameter. The value of the parameter 'G3.3 LOCAL SPD' is not modified and it is available if we want to use alternative speed reference.	YES
3 SEL FBK=AI2	**G6.3** / Selection of feedback signal source	NONE AI1 AI2 AI1+AI2 COMMS MtrTrq AbsMTq Mtr I. MtrPwr BUSVdc PhiCos	To select the source of the feedback signal for the PID control loop. **OPTION** / **FUNCTION** NONE: The PID function is not active AI1: Feedback signal through the Analogue Input 1 AI2: Feedback signal through the Analogue Input 2 AI1+AI2: Feedback will be the addition of the signals introduced through the Analogue Inputs 1 and 2 COMMS: Feedback signal through communications MtrTrq: Motor torque AbsMTq: Absolute motor torque Mtr I.: Motor output current MtrPwr: Motor output power BUSVdc: Bus voltage PhiCos: Phi Cosine	NO
4 GAIN Kp=8.0 **PID PROPORTIONAL**	**G6.4** / Proportional gain of PID control	0.1 to 20	It allows setting the proportional gain value of the PID regulator. If you need a higher control response, increase this value. **Note:** If this value is increased too much, a higher instability in the system can be introduced.	YES
5 INTEGRAL = 0.1s **PID INTEGRAL**	**G6.5** / Integration time of PID control	0.0 – 1000s, Max	It allows setting the integration time of the PID regulator. If you need a higher accuracy you should increase this value. **Note:** If this value is increased too much, the system can become slower.	YES
6 DIFFEREN = 0.0s **PID DIFFERENTIAL**	**G6.6** / Derivation time of PID control	0.0 – 250s	It allows setting the derivate time of the PID regulator. If you need a higher response, you can increase this value. **Note:** If this value is increased too much, accuracy can decrease.	YES
7 INVERT PID=N	**G6.7** / PID output inversion	N Y	It allows inverting the PID output of the drive. **OPTION** / **FUNCTION** N=NO: PID regulator responds in normal mode, that means, when the feedback value is above the reference signal value, speed will be decreased. If the feedback value is below the reference signal value, speed will be increased. Y=YES: PID regulator responds in inverse mode. So, when the feedback value is above the reference signal value, speed will be increased. If the feedback value is below the reference signal value, speed will be decreased.	YES
8 Filt FB = OFF	**G6.8** / Low pass filter	OFF,0 to 20s	It allows setting the value of a low pass filter. It will be used to soften the feedback in the PID.	YES
9 ERR PID = +0.0%	**G6.9** / PID control error	-400% to 400%	It shows the difference between the reference 'G6.1 SEL REF' and the feedback signal of the process 'G6.3 SEL FBK'.	YES

Note: PID functions will be set here if this function is enabled in the parameters 'G3.1 REF1 SPD=LOCAL' or 'G3.2 2 REF2 SPD=LOCAL'.

[5] It will be available if 'G6.1 SEL REF = locPID'.

4.7. Group 7 – G7: Start / Stop Mode Configuration

<table>
<tr><th>Parameter / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>1 STOP 1 = RAMP</td><td>G7.1 / Stop mode 1</td><td>RAMP
SPIN</td><td>It selects the main stop mode of the drive. This value should be configured appropriately for each application.<table><tr><th>OPT</th><th>FUNCTION</th></tr><tr><td>RAMP</td><td>The drive will stop applying a frequency ramp to stop the motor. The rate of stop is determined in screen 'G5.2 Decel 1'</td></tr><tr><td>SPIN</td><td>The drive will turn off the output to the motor. The motor sill coast to stop. Stopping time is determined by system inertia.</td></tr></table></td><td>YES</td></tr>
<tr><td>2 STOP 2 = SPIN</td><td>G7.2 / Stop mode 2</td><td>RAMP
SPIN</td><td>User can select an alternative stop mode of the drive if required. This value should be set for each application. For options information see parameter ‘G7.1 STOP 1=RAMP'.
Note: Stop mode 1 or 2 can be selected by digital inputs, by comparator output functions, or by setting a changing speed for stop mode in 'G7.3 BRK STP 2'.</td><td>YES</td></tr>
<tr><td>3 BRK STP 2 = OFF
STP2 UNDER SPEED</td><td>G7.3 / Changing speed for stop mode</td><td>OFF=0 to 250%</td><td>When this parameter is set to a value other than zero a second stopping profile can be activated based on motor speed. When the drive receives a stop mode 1 command, it will stop from steady status to the speed set here. At that moment, the drive will apply stop mode 2 to complete the stop.
Note: Stop mode 1 or 2 can be selected by digital inputs, by comparator output functions, or by setting a changing speed for stop mode in 'G7.3 BRK STP 2'.</td><td>YES</td></tr>
<tr><td>4 START = RAMP</td><td>G7.4 / Start mode</td><td>RAMP
SPIN
SPIN2</td><td rowspan="2">It selects the start mode of the drive. This value should be configured appropriately for each application.<table><tr><th>OPT</th><th>FUNCTION</th></tr><tr><td>RAMP</td><td>Drive will start applying a frequency ramp to the motor.</td></tr><tr><td>SPIN</td><td>In this mode, the motor shaft speed is automatically searched for and the frequency output of the drive is set to match the actual motor speed. From this point the motor is then accelerated normally up to the reference speed. This allows starting loads that are still rotating when the drive receives a start command.
Note: This option is valid when the motor is running at positive rotation direction.</td></tr><tr><td>SPIN2</td><td>Operates similar than the option ‘SPIN’. The difference lies in the possibility of starting loads that are still rotating independently of the rotation direction of the motor.</td></tr></table>Note: Start mode 2 (alternative start mode) is selected through a digital input configured with option ’22 ➔ START MODE 2'.</td><td>YES</td></tr>
<tr><td>5 START 2=RAMP</td><td>G7.5 / Start mode 2</td><td>RAMP
SPIN
SPIN2</td><td>YES</td></tr>
<tr><td>6 STAR DLY = OFF
DELAY TO START</td><td>G7.6 / Start delay time</td><td>OFF=0 to 6500s</td><td>Allows setting of a delay time from the moment the drive receives the start command to the beginning of providing an output frequency to the motor.
Note: After receiving the start command, the drive will wait until the delay time is elapsed. During this time, the drive status will change to ‘DLY'.</td><td>YES</td></tr>
<tr><td>7 STOP DLY = OFF
DELAY TO STOP</td><td>G7.7 / Stop delay time</td><td>OFF=0 to 6500s</td><td>Allows setting of a delay time applied from the moment the drive receives the stop command until the drive stops providing an output frequency to the motor.</td><td>YES</td></tr>
<tr><td>8 STP MIN SP = N</td><td>G7.8 / Minimum stop speed</td><td>N
Y</td><td>Allows user to stop the motor when the speed is below the SD700FR lower speed limit.<table><tr><th>OPT</th><th>FUNCTION</th></tr><tr><td>N=NO</td><td>In this case, the motor will continue to operate at minimum speed defined as minimum speed limit (set in G10.1 or G10.3), even if the speed reference is below these settings. For example, if ‘1 MIN1 SP=+30.00%’, and the speed reference is +20.00%, the equipment will operate at +30.00%, and never below this value.</td></tr><tr><td>Y=YES</td><td>In this case, the drive will automatically start when the speed reference is above the value set as minimum speed limit. While the speed reference is below this value, equipment will be in 'READY' status.
If the drive is decelerating and the reference is below the minimum speed value, then the equipment will stop by spin.</td></tr></table>Note: If you want to stop the motor when the reference is below a fixed speed setpoint, you should set this parameter to YES. Additionally, you should set the correct values in 'G10.1 MIN1 SP' or 'G10.3 MIN2 SP'.</td><td>YES</td></tr>
<tr><td>9 OFFdly = OFF
DELAY AFTER STOP</td><td>G7.9 / Delay time between stop and next start</td><td>OFF=0.000 to 10.0s</td><td>Allows setting a delay time between the moment the drive has stopped and the next starting. The next time the drive has to start it will consider no additional delay time unless parameter ‘G7.6 START DLY’ had been set to a value different from OFF.</td><td>YES</td></tr>
</table>

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<table>
<tr><th>Parameter / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>10 RUN AFTR VFL = Y</td><td>G7.10 K/ Run after occurring power loss</td><td>N
Y</td><td>Allows setting of the drive to start automatically when a main power supply loss occurs and it is recovered again (power supply loss or instant power supply loss).
<table><tr><th>OPT</th><th>FUNCTION</th></tr><tr><td>N=NO</td><td>The drive will not start after power supply recovery occurs even the start command is active. User should deactivate this signal and activate it again.</td></tr><tr><td>Y=YES</td><td>The drive starts automatically when power supply is recovered after power supply loss occurs and if the start signal is active.</td></tr></table>Note: If start / stop control is done by keypad, the drive will not start automatically after power supply loss occurs and it is recovered again.</td><td>YES</td></tr>
<tr><td>11 SPNstr B = OFF
SPIN START TUNE</td><td>G7.11 / Accuracy setting for Starting by Spin</td><td>OFF=0,
1 – 100%</td><td>It allows setting the accuracy of the speed searching function when the drive starts by SPIN mode. Usually, the optimum value is between 2 and 5%. As the value is lower, more accuracy is required.</td><td>YES</td></tr>
<tr><td>12 OFFdly2=OFF
DELAY AFTER STP2</td><td>G7.12 / Delay time for start command after stop</td><td>OFF=0,
0.1 to
6500.0</td><td>Delay time for start command after producing a stop. If the start command is given after the time set in this parameter has elapsed, the drive will start immediately.</td><td>YES</td></tr>
<tr><td>13 STR AFT RST=Y</td><td>G7.13 / Start after fault reset with start command</td><td>N
Y</td><td>It allows starting the drive after resetting the fault produced in the equipment, whenever the start command is activated.
<table><tr><th>OPT.</th><th>FUNCTION</th></tr><tr><td>N=NO</td><td>After resetting the fault, the drive will not start although the start command is activated. To start, the user should deactivate the start command and activate it again. This operation mode guarantees a starting controlled by an operator although the fault is reset. This option is commonly used in remote controls in order to increase the safety at the starting.</td></tr><tr><td>Y=YES</td><td>The drive will start after resetting the fault, whenever the start command is activated.</td></tr></table></td><td>YES</td></tr>
<tr><td>14 RPWr OFF = OFF</td><td>G7.14 / Power Off delay</td><td>OFF, 0.001
to 9.99</td><td>Sets the time period during which the drive maintains the magnetic flux in the motor after reaching zero speed when stopping.</td><td>YES</td></tr>
<tr><td>15 MagneT = OFF</td><td>G7.15 / Magnetization Time</td><td>OFF, 0.001
to 9.99</td><td>Sets the period of time during which the motor is being magnetized before the start.</td><td>YES</td></tr>
<tr><td>16 DLY SAR= 0.01</td><td>G7.16 /DLY Start after Run.</td><td>OFF, 0.001
to 9.99</td><td>Operates with G7.13. Estimates the minimum time that the start order has to be disabled before starting after the reset.</td><td>YES</td></tr>
</table>

4.8. Group 8 – G8: Outputs

4.8.1. Subgroup 8.1 – S8.1: Output Relays

<table>
<tr><th>Parameter / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>1 SEL RELAY 1=02</td><td>G8.1.1 / Selection of Relay 1 control source</td><td>00 – 45</td><td>It configures the operation of each output relay according to the options shown in the following table:
<table>
<tr><th>OPT</th><th>DESCRIPTION</th><th>FUNCTION</th></tr>
<tr><td>00</td><td>ALWAYS OFF</td><td>Output is not active.</td></tr>
<tr><td>01</td><td>ALWAYS ON</td><td>When the drive is powered the output relay is activated.</td></tr>
<tr><td>02</td><td>NO FAULTS</td><td>There is no fault in the drive. When a fault occurs, the relay will be activated.</td></tr>
<tr><td>03</td><td>GENERAL FAULT</td><td>Drive fault or low input voltage will activate the relay.</td></tr>
<tr><td>04</td><td>START</td><td>Relay is active when the drive has received the start command.</td></tr>
<tr><td>05</td><td>RUN</td><td>The relay will be energized after the drive is started (the speed is increasing).i.e. G8.1.1 = 04 and G8.1.5 = 05. Start command is on, relay 1 is on and immediately relay 2 is on. Stop command is activated, then relay 1 is automatically off BUT relay 2 will be on until drive was completely stopped.</td></tr>
<tr><td>06</td><td>READY</td><td>Drive is ready for start (no fault and no warning).</td></tr>
<tr><td>07</td><td>ZERO SPEED</td><td>Drive is running at zero speed.</td></tr>
<tr><td>08</td><td>SET SPEED</td><td>Speed has reached the value set as reference.</td></tr>
<tr><td>09</td><td>SP DIRECTION</td><td>The relay is activated when the speed direction is negative.</td></tr>
<tr><td>10</td><td>RESERVE</td><td>Reserved for future use.</td></tr>
<tr><td>11</td><td>SP REF DIRECT</td><td>The relay is activated when the speed refer. Direction is negative.</td></tr>
<tr><td>12</td><td>RESERVE</td><td>Reserved for future use.</td></tr>
<tr><td>13</td><td>SP LIMIT</td><td>Speed limit has been reached.</td></tr>
<tr><td>14</td><td>CURR LIMIT</td><td>Motor current limit has been reached.</td></tr>
<tr><td>15</td><td>VOLT LIMIT</td><td>DC Bus voltage limit has been reached.</td></tr>
<tr><td>16</td><td>TORQ LIMIT</td><td>Torque limit has been reached.</td></tr>
<tr><td>17</td><td>COMPARATOR1</td><td>When the comparator 1 output is active, relay is activated.</td></tr>
<tr><td>18</td><td>COMPARATOR2</td><td>When the comparator 2 is output active, relay is activated.</td></tr>
<tr><td>19</td><td>COMPARATOR3</td><td>When the comparator 3 output is active, relay is activated.</td></tr>
<tr><td>20</td><td>ACC / DEC 2</td><td>Relay is activated if the alternative ramps are used.</td></tr>
<tr><td>21</td><td>REFERENCE 2</td><td>Relay is activated if reference 2 has been selected.</td></tr>
<tr><td>22</td><td>STOP 2</td><td>Relay is activated if stop mode 2 is used.</td></tr>
<tr><td>23</td><td>SP LIMIT 2</td><td>Relay is activated if the alternative speed limits have been selected.</td></tr>
<tr><td>24</td><td>DC BRAKE</td><td>Relay is activated if DC brake is active.</td></tr>
<tr><td>25</td><td>RESERVE</td><td>Reserved for future use.</td></tr>
<tr><td>26</td><td>RESERVE</td><td>Reserved for future use.</td></tr>
<tr><td>27</td><td>RESERVE</td><td>Reserved for future use.</td></tr>
</table>
Note: See following page.</td><td>YES</td></tr>
</table>

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<table>
<tr><th>Parameter / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>1 SEL RELAY 1=02</td><td>G8.1.1 / Selection of Relay 1 control source</td><td>00 – 45</td><td>Note: Coming from the previous page.
<table>
<tr><th>OPT</th><th>DESCRIPTION</th><th>FUNCTION</th></tr>
<tr><td>32</td><td>CRANE BRAKE</td><td>The relay will be activated like in option “05 RUN”, considering the ON delay time set in G8.1.2, G8.1.6 or G8.1.10 (depending on the used Relay 1, 2 or 3), and will be deactivated when the motor speed is below the speed set in G8.1.13.</td></tr>
<tr><td>33</td><td>PIPE FILLING</td><td>In pump application the relay is energized when the application state is pipe filling.</td></tr>
<tr><td>34</td><td>WARNING</td><td>The relay is energized when there is any Warning.</td></tr>
<tr><td>35</td><td>COPY DI1</td><td rowspan="6">Copies the corresponding digital input and closes the relay when the digital input is active.</td></tr>
<tr><td>36</td><td>COPY DI2</td></tr>
<tr><td>37</td><td>COPY DI3</td></tr>
<tr><td>38</td><td>COPY DI4</td></tr>
<tr><td>39</td><td>COPY DI5</td></tr>
<tr><td>40</td><td>COPY DI6</td></tr>
<tr><td>41</td><td>F40 PTC</td><td>If this option is selected in one digital output, when the drive trips by the F40 PTC EXT, the digital output will change the status.</td></tr>
<tr><td>42</td><td>FAULT1</td><td rowspan="4">It will be active when the respective fault configured in G8.1 group FAULTX is raised in the drive.</td></tr>
<tr><td>43</td><td>FAULT2</td></tr>
<tr><td>44</td><td>FAULT3</td></tr>
<tr><td>45</td><td>FAULT4</td></tr>
</table></td><td>YES</td></tr>
<tr><td>2 T R1 ON=0.0s
R1 ACTIVAT DELAY</td><td>G8.1.2 / ON delay time for Relay 1</td><td>0.0 – 999s</td><td>Allows user to set a delay time before activating relay 1.
If during this ON delay time the activation condition disappears, the relay will not be activated.</td><td>YES</td></tr>
<tr><td>3 T R1 OFF=0.0s
R1 DEACTIV DELAY</td><td>G8.1.3 / OFF delay time for Relay 1</td><td>0.0 – 999s</td><td>Allows user to set a delay time before deactivating relay 1.
If during this OFF delay time the deactivation condition disappears, the relay will follow activated.</td><td>YES</td></tr>
<tr><td>4 INVERT REL1=N</td><td>G8.1.4 / Relay 1 inversion</td><td>N
Y</td><td>It allows user to invert the logic of relay 1 functionality.
Relay 1 has one normally open contact (connection 26/27) and another normally close contact (connection 27/28).
<table>
<tr><th>OPT</th><th>FUNCTION</th></tr>
<tr><td>N=NO</td><td>No inversion.</td></tr>
<tr><td>Y=YES</td><td>Inversion of relay logical function.</td></tr>
</table></td><td>YES</td></tr>
<tr><td>5 SEL RELAY 2=03</td><td>G8.1.5 / Selection of Relay 2 control source</td><td>00 – 45</td><td>Note: See parameter function of G8.1.1.</td><td>YES</td></tr>
<tr><td>6 T R2 ON=0.0s
R2 ACTIVAT DELAY</td><td>G8.1.6 / ON delay time for Relay 2</td><td>0.0 – 999s</td><td>Allows user to set a delay time before activating relay 2.
If during this ON delay time the activation condition disappears, the relay will not be activated.</td><td>YES</td></tr>
<tr><td>7 T R2 OFF=0.0s
R2 DEACTIV DELAY</td><td>G8.1.7 / OFF delay time for Relay 2</td><td>0.0 – 999s</td><td>Allows user to set a delay time before deactivating relay 2.
If during this OFF delay time the deactivation condition disappears, the relay will follow activated.</td><td>YES</td></tr>
<tr><td>8 INVERT REL2=N</td><td>G8.1.8 / Relay 2 inversion</td><td>N
Y</td><td>It allows user to invert the logic of relay 2 functionality.
Relay 2 has one normally open contact (connection 29/30) and another normally close contact (connection 30/31).
<table>
<tr><th>OPT</th><th>FUNCTION</th></tr>
<tr><td>N=NO</td><td>No inversion.</td></tr>
<tr><td>Y=YES</td><td>Inversion of relay logical function.</td></tr>
</table></td><td>YES</td></tr>
<tr><td>9 SEL RELAY 3=05</td><td>G8.1.9 / Selection of Relay 3 control source</td><td>00 – 45</td><td>Note: See parameter function of G8.1.1.</td><td>YES</td></tr>
<tr><td>10 T R3 ON=0.0s
R3 ACTIVAT DELAY</td><td>G8.1.10 / ON delay time for Relay 3</td><td>0.0 – 999s</td><td>Allows user to set a delay time before activating relay 3.
If during this ON delay time the activation condition disappears, the relay will not be activated.</td><td>YES</td></tr>
<tr><td>11 T R3 OFF=0.0s
R3 DEACTIV DELAY</td><td>G8.1.11 / OFF delay time for Relay 3</td><td>0.0 – 999s</td><td>Allows user to set a delay time before deactivating relay 3.
If during this OFF delay time the deactivation condition disappears, the relay will follow activated.</td><td>YES</td></tr>
</table>

<table>
<tr><th>Parameter / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>12 INVERT REL3=N</td><td>G8.1.12 / Relay 3 inversion</td><td>N
Y</td><td>It allows user to invert the logic of relay 3 functionality.
Relay 3 has one normally open contact (connection 32/33) and another normally close contact (connection 33/34).
<table><tr><th>OPT</th><th>FUNCTION</th></tr><tr><td>N=NO</td><td>No inversion.</td></tr><tr><td>Y=YES</td><td>Inversion of relay logical function.</td></tr></table></td><td>YES</td></tr>
<tr><td>13 CRAspdOF=+5.0%
CRANE BRKoff SPD</td><td>G8.1.13 / Speed for disconnecting relay in option Crane</td><td>+0.0% to +250%</td><td>This parameter allows setting the speed below which, any relay configured with option ‘32 CRANE BRAKE’ will be deactivated.</td><td>YES</td></tr>
<tr><td>34 Dig Out FB = DO1</td><td>G8.1.34 / Digital Output Feedback</td><td>DO1
DO2
DO3</td><td>If the digital input configured as “Dig Output FB” does not receive the feedback from the digital output set in this parameter, the digital input will be deactivated.</td><td>YES</td></tr>
<tr><td>35 DlyDoFB = 1.0s</td><td>G8.1.35 / Delay Digital Output Feedback</td><td>0.5 to 60.0s</td><td>It allows setting the maximum time that the digital input configured as “Dig Output FB” will wait the feedback of the digital output set in G8.1.34 before tripping the drive by fault 55.</td><td>YES</td></tr>
<tr><td>36 FAULT1 = OFF</td><td>G8.1.36 / Closure of digital output “FAULT1”</td><td>0 to 90</td><td rowspan="4">It allows setting the fault (OFF, F1, F2..., F90) which will close the digital input configured as FAULT1, FAULT2, FAULT3 and FAULT4.
<table><tr><th>OPT</th><th>DESCRIPTION</th></tr><tr><td>0</td><td>OFF</td></tr><tr><td>1</td><td>F1</td></tr><tr><td>....</td><td>...</td></tr><tr><td>90</td><td>F90</td></tr></table></td><td>YES</td></tr>
<tr><td>37 FAULT2 = OFF</td><td>G8.1.37 / Closure of digital output “FAULT2”</td><td>0 to 90</td><td></td></tr>
<tr><td>38 FAULT3 = OFF</td><td>G8.1.38 / Closure of digital output “FAULT3”</td><td>0 to 90</td><td></td></tr>
<tr><td>39 FAULT4 = OFF</td><td>G8.1.39 / Closure of digital output “FAULT4”</td><td>0 to 90</td><td></td></tr>
</table>

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4.8.2. Subgroup 8.2 – S8.2: Analogue Outputs

<table>
<tr><th>Parameter / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>1 ANLG OUT1=01</td><td>G8.2.1 / Mode selection for Analogue Output 1</td><td>00 – 27</td><td>Analogue output is programmable according to the following table:
<table>
<tr><th>OPT</th><th>DESCR.</th><th>FUNCTION</th><th>UNITS</th></tr>
<tr><td>00</td><td>NONE</td><td>It is not used.</td><td>-</td></tr>
<tr><td>01</td><td>SPEED MOTOR</td><td>Signal proportional to the motor speed.</td><td>% Motor speed</td></tr>
<tr><td>02</td><td>CURRENT MOTOR</td><td>Signal proportional to the motor current.</td><td>% Motor rated current</td></tr>
<tr><td>03</td><td>VOLTAGE MOTOR</td><td>Signal proportional to the motor voltage.</td><td>% Motor rated voltage</td></tr>
<tr><td>04</td><td>POWER MOTOR</td><td>Signal proportional to the motor power.</td><td>% Motor power</td></tr>
<tr><td>05</td><td>TORQUE MOTOR</td><td>Signal proportional to the motor torque.</td><td>% Motor torque</td></tr>
<tr><td>06</td><td>PF MOTOR</td><td>Signal proportional to the motor power factor.</td><td>% Motor rated Cosine Phi</td></tr>
<tr><td>07</td><td>TEMP MOTOR</td><td>Signal proportional to the motor temperature.</td><td>% Motor temperature</td></tr>
<tr><td>08</td><td>FREQUENCY IN</td><td>Signal proportional to the input frequency.</td><td>% Input frequency (50Hz=100%)</td></tr>
<tr><td>09</td><td>INPUT VOLTAGE</td><td>Signal proportional to the input voltage.</td><td>% Equipment rated voltage</td></tr>
<tr><td>10</td><td>DC BUS</td><td>Signal proportional to the DC Bus voltage.</td><td>% Motor voltage x 1.414</td></tr>
<tr><td>11</td><td>DRIVE TEMP</td><td>Signal proportional to the drive temperature.</td><td>% Drive temperature</td></tr>
<tr><td>12</td><td>SPEED REF</td><td>Signal proportional to the speed reference.</td><td>% Motor speed</td></tr>
<tr><td>13</td><td>Reserved</td><td>Reserved for future use.</td><td></td></tr>
<tr><td>14</td><td>PID REFERENCE</td><td>Signal proportional to the reference in PID mode.</td><td>%</td></tr>
<tr><td>15</td><td>PID FEEDBACK</td><td>Signal proportional to the feedback in PID mode.</td><td>%</td></tr>
<tr><td>16</td><td>PID ERROR</td><td>Signal proportional to the error (difference between reference and feedback) in PID mode.</td><td>%</td></tr>
<tr><td>17</td><td>ANLG INPUT 1</td><td>Analogue input 1 signal is transferred to analogue output.</td><td>%</td></tr>
<tr><td>18</td><td>ANLG INPUT 2</td><td>Analogue input 2 signal is transferred to analogue output.</td><td>%</td></tr>
<tr><td>19</td><td>ANLG INPUT1+2</td><td>The average of the analogue inputs 1 and 2</td><td>%</td></tr>
</table></td><td>NO</td></tr>
<tr><td>1 ANLG OUT1=01</td><td>G8.2.1 / Mode selection for Analogue Output 1</td><td>00 – 27</td><td>
<table>
<tr><th>OPT</th><th>DESCR.</th><th>FUNCTION</th><th>UNITS</th></tr>
<tr><td>20</td><td>CURRENT FLOW</td><td>Analogue signal proportional to the read flow through analogue input or pulse input.</td><td>%</td></tr>
<tr><td>21</td><td>MAX SCALE</td><td>It forces the output to maximum value.</td><td>100% bottom scale</td></tr>
<tr><td>22</td><td>ABSOLUT SPEED</td><td>Signal proportional to the motor speed without sign (absolute value).</td><td>% Motor speed</td></tr>
<tr><td>23</td><td>ABSOLUT TORQUE</td><td>Signal proportional to the motor torque without sign (absolute value).</td><td>% Motor torque</td></tr>
<tr><td>24</td><td>ENCODER SPD</td><td>It shows the real speed of the encoder</td><td>% rpm (motor nameplate)</td></tr>
</table></td><td>YES</td></tr>
<tr><td>2 FORMT 1=4-20 mA</td><td>G8.2.2 / Format selection for Analogue Output 1</td><td>0-10V
±10V
0-20mA
4-20mA</td><td>Analogue output 1 is programmable in one of four possible formats according to the system requirements.</td><td>YES</td></tr>
<tr><td>3 MIN1 RNG=+0%
MIN RANG ANAOUT1</td><td>G8.2.3 / Low of range selection Analogue Output 1</td><td>-250% to +250%</td><td>Minimum level of analogue output 1.
Minimum level setting can be higher than the maximum level setting. This allows the user to achieve inverse scaling. i.e. an increase in magnitude of the analogue input would result in an output frequency decrease and vice versa.</td><td>YES</td></tr>
<tr><td>4 MAX1 RNG=+100%
MAX RANG ANAOUT1</td><td>G8.2.4 / High range selection of Analogue Output 1</td><td>-250% to +250%</td><td>Maximum level of analogue output 1.
Maximum level setting can be lower than the minimum level setting. This allows the user to achieve inverse scaling. i.e. an increase in magnitude of the analogue input would result in an output frequency decrease and vice versa.</td><td>YES</td></tr>
</table>

Parameter / Default Value	Name / Description	Range	Function	Set on RUN
5 FILTER 1=OFF **FILTER ANAOUTPU1**	**G8.2.5** / Filter selection for Analogue Output 1	OFF=0.0 to 20.0s	Filter for analogue input 1 value. If the analogue signal appears slightly unstable, improved stability and response can be achieved with the addition of a suitable filter value. **Note:** Filter use can add a slight delay to the analogue output signal.	YES
6 ANLG OUT 2=02	**G8.2.6** / Mode selection Analogue Output 2	00 – 27	Analogue output 2 is programmable. See parameter 'G8.2.1 ANLG OUT 1' for options table.	YES
7 FORMT 2=4-20 mA	**G8.2.7** / Format selection for Analogue Output 2	0-10V, ±10V, 0-20mA, 4-20mA.	Analogue output 2 is programmable in one of four possible formats according to the system requirements.	YES
8 MIN2 RNG=+0% **MIN RANG ANAOUT2**	**G8.2.8** / Low range selection of Analogue Output 2	-250% to +250%	Minimum level of analogue output 2. Minimum level setting can be higher than the maximum level. This allows the user to achieve inverse scaling. i.e. an increase in magnitude of the analogue input would result in an output frequency decrease and vice versa.	YES
9 MAX2 RNG=+100% **MAX RANG ANAOUT2**	**G8.2.9** / High range selection of Analogue Output 2	-250% to 250%	Maximum level of analogue output 2. Maximum level setting can be lower than the minimum level. This allows the user to achieve inverse scaling. i.e. an increase in magnitude of the analogue input would result in an output frequency decrease and vice versa.	YES
10 FILTER 2=OFF **FILTER ANAOUTPU2**	**G8.2.10** / Filter selection for Analogue Output 2	OFF=0.0 to 20.0s	Filter for analogue output 2 value. If the analogue signal appears slightly unstable improved stability and response can be achieved with the addition of a suitable filter value. **Note:** Filter use can add a slight delay to the analogue output signal.	YES

4.9. Group 9 – G9: Comparators

4.9.1. Subgroup 9.1 – S9.1: Comparator 1

<table>
<tr><th>Parameter / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>1 COMP 1 SEL=00</td><td>G9.1.1 / Source selection for Comparator 1</td><td>00 – 22</td><td>The source for comparator 1 can be set according to the following table:
<table>
<tr><th>OPT.</th><th>DESCRIPTION</th><th>FUNCTION</th></tr>
<tr><td>00</td><td>NONE</td><td>There is no source for the comparator.</td></tr>
<tr><td>01</td><td>SPEED MOTOR</td><td>Comparison signal is motor speed.</td></tr>
<tr><td>02</td><td>CURRENT MOTOR</td><td>Motor current signal.</td></tr>
<tr><td>03</td><td>VOLTAGE MOTOR</td><td>Motor voltage signal.</td></tr>
<tr><td>04</td><td>POWER MOTOR</td><td>Motor power.</td></tr>
<tr><td>05</td><td>TORQUE MOTOR</td><td>Motor torque signal.</td></tr>
<tr><td>06</td><td>PF MOTOR</td><td>Motor cosine phi</td></tr>
<tr><td>07</td><td>TEMP MOTOR</td><td>Motor temperature signal.</td></tr>
<tr><td>08</td><td>FREQUENCY MTR</td><td>Drive input frequency.</td></tr>
<tr><td>09</td><td>INPUT VOLTAGE</td><td>Drive input voltage.</td></tr>
<tr><td>10</td><td>DC BUS</td><td>DC Bus voltage.</td></tr>
<tr><td>11</td><td>DRIVE TEMP</td><td>Drive temperature.</td></tr>
<tr><td>12</td><td>SPEED REF</td><td>Speed reference.</td></tr>
<tr><td>13</td><td>Reserved</td><td>Reserved for future use.</td></tr>
<tr><td>14</td><td>PID REFERENCE</td><td>Speed reference in PID mode.</td></tr>
<tr><td>15</td><td>PID FEEDBACK</td><td>System feedback signal.</td></tr>
<tr><td>16</td><td>PID ERROR</td><td>PID error. Difference between reference and feedback signal of the sensor.</td></tr>
<tr><td>17</td><td>ANLG INPUT 1</td><td>Signal connected to analogue input 1.</td></tr>
<tr><td>18</td><td>ANLG INPUT 2</td><td>Signal connected to analogue input 2.</td></tr>
<tr><td>19</td><td>ANLG INPUT1+2</td><td>The average of the analogue inputs 1 and 2.</td></tr>
<tr><td>20</td><td>CURRENT FLOW</td><td>Analogue signal proportional to the read flow through analogue input or pulse input.</td></tr>
<tr><td>21</td><td>MAX SCALE</td><td>We will get a maximum value, forcing the comparator in order to obtain the needed status.</td></tr>
<tr><td>22</td><td>ABSOLUT SPEED</td><td>Comparison signal is motor speed without sign (absolute value).</td></tr>
</table></td><td>NO</td></tr>
</table>

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<table>
<tr><th>Parameter / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>2 COMP 1 TYPE=0</td><td>G9.1.2 / Comparator 1 type selection</td><td>0 – 1</td><td>It allows selecting the operation mode of Comparator 1.
<table>
<tr><th>OPT.</th><th>DESCRIPTION</th><th>FUNCTION</th></tr>
<tr><td>0</td><td>Normal</td><td>Comparator will be activated when the ON condition is given and will be deactivated when the OFF condition is given.</td></tr>
<tr><td>1</td><td>Window</td><td>Comparator will be activated when signal is within the limits 1 and 2, and additionally when limit 2 is higher than limit 1. If limit 2 is lower than limit 1, comparator output logical function will be inverted.</td></tr>
</table></td><td>YES</td></tr>
<tr><td>3 SP C1 ON=+100[%]
C1 ACTIVAT LEVEL</td><td>G9.1.3 / Activation value of Comparator 1 in Normal mode</td><td>-250% to +250%</td><td>It selects the activation value of Comparator 1 output. The comparator output will be activated if comparator source signal, selected in G9.1.1, is higher than the value set here, and ON delay time G9.1.6 has elapsed.
Note: This parameter is only displayed in Normal mode of the comparator 'G9.1.2 COMP 1 TYPE=0'.</td><td>YES</td></tr>
<tr><td>4 LIM 2 C1=+100[%]
C1 WINDOW LIMIT2</td><td>G9.1.4 / Limit 2 for Comparator 1 in Window mode</td><td>-250% to +250%</td><td>It defines one of the limits to activate Comparator 1 in Window mode. The comparator output will be activated if comparator source signal, selected in G9.1.1, is within the two limits G9.1.4 and G9.1.5, and ON delay time G9.1.6 has elapsed.
Note: This parameter is only displayed in Window mode of the comparator 'G9.1.2 COMP 1 TYPE=1'.</td><td>YES</td></tr>
<tr><td>5 LIM 1 C1=+0[%]
C1 WINDOW LIMIT1</td><td>G9.1.5 / Limit 1 for Comparator 1 in Window mode</td><td>-250% to +250%</td><td>It defines one of the limits to activate Comparator 1 in Window mode. The comparator output will be activated if comparator source signal, selected in G9.1.1, is within the two limits G9.1.4 and G9.1.5, and ON delay time G9.1.6 has elapsed.
Note: This parameter is only displayed in Window mode of the comparator 'G9.1.2 COMP 1 TYPE=1'.</td><td>YES</td></tr>
<tr><td>6 T C1 ON=0.0s
C1 ACTIVAT DELAY</td><td>G9.1.6 / ON delay time for Comparator 1</td><td>0.0 – 999s</td><td>Delay time for the Comparator 1 output activation. When the activation condition is given in Normal or Window mode, the timer delays the activation of this signal for the time set in this parameter.</td><td>YES</td></tr>
<tr><td>7 SP C1 OF=+0[%]
C1 DEACTIV LEVEL</td><td>G9.1.7 / Deactivation value of Comparator 1 in Normal mode</td><td>-250% to +250%</td><td>This value selects the deactivation value of Comparator 1 output. The comparator output will be deactivated if comparator source signal, selected in G9.1.1, is lower than the value set here, and OFF delay time G9.1.8 has elapsed.
Note: This parameter is only displayed in Normal mode of the comparator 'G9.1.2 COMP1 TYPE=0'.</td><td>YES</td></tr>
<tr><td>8 T C1 OF=0.0s
C1 DEACTIV DELAY</td><td>G9.1.8 / OFF delay time for Comparator 1</td><td>0.0 – 9999s</td><td>Delay time for the Comparator 1 output deactivation. When the deactivation condition is given in Normal or Window mode, the timer delays the deactivation of this signal for the time set in this parameter.</td><td>YES</td></tr>
<tr><td>9 SEL FUNT C1=00</td><td>G9.1.9 / Selection of output function for Comparator 1</td><td>00 – 15</td><td>Several internal functions can be activated by Comparator 1 according to the system requirements. These functions are described in the following table:
<table>
<tr><th>OPT.</th><th>DESCRIPTION</th><th>FUNCTION</th></tr>
<tr><td>00</td><td>NO USE</td><td>Comparator output deactivated</td></tr>
<tr><td>01</td><td>START / STOP</td><td>When it is activated, it gives the start command. When it is deactivated, it gives the stop command.</td></tr>
<tr><td>02</td><td>STOP 1</td><td>It activates the stop mode 1.</td></tr>
<tr><td>03</td><td>STOP 2</td><td>It activates the stop mode 2.</td></tr>
<tr><td>04</td><td>RESET</td><td>Reset for the drive.</td></tr>
<tr><td>05</td><td>START + INCH1</td><td>It activates Start + Inch speed 1.</td></tr>
<tr><td>06</td><td>START + INCH2</td><td>It activates Start + Inch speed 2.</td></tr>
<tr><td>07</td><td>START + INCH3</td><td>It activates Start + Inch speed 3.</td></tr>
<tr><td>08</td><td>INV SPEED</td><td>It inverts the speed direction.</td></tr>
<tr><td>09</td><td>ACC / DEC 2</td><td>It activates the alternative ramps.</td></tr>
<tr><td>10</td><td>REFERENCE 2</td><td>It activates the alternative reference.</td></tr>
<tr><td>11</td><td>SPEED LIMIT 2</td><td>It activates the alternative speed limits.</td></tr>
<tr><td>15</td><td>FLT COMPARATR</td><td>Drive will trip by F73, F74 or F75 when comparator ON condition is satisfied.</td></tr>
</table>
Note: If activation and deactivation levels are set to similar values and delay times are set to OFF, any noise that appears in the signals of selected source can cause an oscillation in the comparator activating incorrect operation. You should set these levels keeping a reasonable margin between them, and if it is necessary, set a delay time to improve the operation.</td><td>NO</td></tr>
</table>

4.9.2. Subgroup 9.2 – S9.2: Comparator 2

Parameter / Default Value	Name / Description	Range	Function	Set on RUN
1 COMP 2 SEL=00	**G9.2.1** / Source selection for Comparator 2	00 – 22	Selection of Comparator 2 source. Selection options are the same as Comparator 1. See parameter G9.1.1.	NO
2 COMP 2 TYPE=0	**G9.2.2** / Comparator 2 type selection	0 – 1	It allows selecting the operation mode of Comparator 2. OPT. / DESCRIPTION / FUNCTION 0 / Normal / Comparator will be activated when the ON condition is given and will be deactivated when the OFF condition is given. 1 / Window / Comparator will be activated when signal is within the limits 1 and 2, and additionally when limit 2 is higher than limit 1. If limit 2 is lower than limit 1, comparator output logical function will be inverted.	YES
3 SP C2 ON=+100[%] **C2 ACTIVAT LEVEL**	**G9.2.3** / Activation value of Comparator 2 in Normal mode	-250% to +250%	It selects the activation value of Comparator 2 output. The comparator output will be activated if comparator source signal, selected in G9.2.1, is higher than the value set here, and On delay time G9.2.6 has elapsed. **Note:** This parameter is only displayed in Normal mode of the comparator 'G9.2.2 COMP 2 TYPE=0'.	YES
4 LIM 2 C2=+100[%] **C2 WINDOW LIMIT2**	**G9.2.4** / Limit 2 for Comparator 2 in Window mode	-250% to +250%	It defines one of the limits to activate Comparator 2 in Window mode. The comparator output will be activated if comparator source signal, selected in G9.2.1, is within the two limits G9.2.4 and G9.2.5, and ON delay time G9.1.6 has elapsed. **Note:** This parameter is only displayed in Window mode of the comparator 'G9.2.2 COMP 2 TYPE=1'.	YES
5 LIM 1 C2=+0[%] **C2 WINDOW LIMIT1**	**G9.2.5** / Limit 1 for Comparator 2 in Window mode	-250% to +250%	It defines one of the limits to activate Comparator 2 in Window mode. The comparator output will be activated if comparator source signal, selected in G9.2.1, is within the two limits G9.2.4 and G9.2.5, and ON delay time G9.2.6 has elapsed. **Note:** This parameter is only displayed in Window mode of the comparator 'G9.2.2 COMP 2 TYPE=1'.	YES
6 T C2 ON=0.0s **C2 ACTIVAT DELAY**	**G9.2.6** / ON delay time for Comparator 2	0.0 – 999s	Delay time for the Comparator 2 output activation. When the activation condition is given in Normal or Window mode, the timer delays the activation of this signal for the time set in this parameter.	YES
7 SP C2 OF=+0[%] **C2 DEACTIV LEVEL**	**G9.2.7** / Deactivation value of Comparator 2 in Normal mode	-250% to +250%	This value selects the deactivation point of Comparator 2 output. The comparator output will be deactivated if comparator source signal, selected in G9.2.1, is lower than the value set here, and OFF delay time G9.2.8 has elapsed. **Note:** This parameter is only displayed in Normal mode of the comparator 'G9.2.2 COMP 2 TYPE=0'.	YES
8 T C2 OF=0.0s **C2 DEACTIV DELAY**	**G9.2.8** / OFF delay time for Comparator 2	0.0 – 9999s	Delay time for the Comparator 2 output deactivation. When the deactivation condition is given in Normal or Window mode, the timer delays the deactivation of this signal for the time set in this parameter.	YES
9 SEL FUNT C2=00	**G9.2.9** / Selection of output function for Comparator 2	00 – 15	Several internal functions can be activated for Comparator 2 according to the systems requirements. These functions are described in the table of parameter G9.1.9.	NO

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4.9.3. Subgroup 9.3 – S9.3: Comparator 3

<table>
<tr><th>Parameter / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>1 COMP 3 SEL=00</td><td>G9.3.1 / Source selection for Comparator 3</td><td>00 – 22</td><td>Selection of Comparator 3 source. Selection options are the same as Comparator 1. See parameter G9.1.1.</td><td>NO</td></tr>
<tr><td>2 COMP 3 TYPE=0</td><td>G9.3.2 / Comparator 3 type selection</td><td>0 – 1</td><td>It allows selecting the operation mode of Comparator 3.
<table>
<tr><th>OPT.</th><th>DESCRIPTION</th><th>FUNCTION</th></tr>
<tr><td>0</td><td>Normal</td><td>Comparator will be activated when the ON condition is given and will be deactivated when the OFF condition is given.</td></tr>
<tr><td>1</td><td>Window</td><td>Comparator will be activated when signal is within limits 1 and 2, and additionally when limit 2 is higher than limit 1. If limit 2 is lower than limit 1, comparator output logical function will be inverted.</td></tr>
</table></td><td>YES</td></tr>
<tr><td>3 SP C3 ON=+100[%]
C3 ACTIVAT LEVEL</td><td>G9.3.3 / Activation value of Comparator 3 in Normal mode</td><td>-250% to +250%</td><td>It selects the activation value of Comparator 3 output. The comparator output will be activated if comparator source signal, selected in G9.3.1, is higher than the value set here, and ON delay time G9.3.6 has elapsed.
Note: This parameter is only displayed in Normal mode of the comparator 'G9.3.2 COMP 3 TYPE=0'.</td><td>YES</td></tr>
<tr><td>4 LIM 2 C3=+100[%]
C3 WINDOW LIMIT2</td><td>G9.3.4 / Limit 2 for Comparator 3 in Window mode</td><td>-250% to +250%</td><td>It defines one of the limits to activate Comparator 3 in Window mode. The comparator output will be activated if comparator source signal, selected in G9.3.1, is within the two limits G9.3.4 and G9.3.5, and ON delay time G9.3.6 has elapsed.
Note: This parameter is only displayed in Window mode of the comparator 'G9.3.2 COMP 3 TYPE=1'.</td><td>YES</td></tr>
<tr><td>5 LIM 1 C3=+0[%]
C3 WINDOW LIMIT1</td><td>G9.3.5 / Limit 1 for Comparator 3 in Window mode</td><td>-250% to +250%</td><td>It defines one of the limits to activate Comparator 3 in Window mode. The comparator output will be activated if comparator source signal, selected in G9.3.1, is within the two limits G9.3.4 and G9.3.5, and ON delay time G9.3.6 has elapsed.
Note: This parameter is only displayed in Window mode of the comparator 'G9.3.2 COMP 3 TYPE=0'.</td><td>YES</td></tr>
<tr><td>6 T C3 ON=0.0s
C3 ACTIVAT DELAY</td><td>G9.3.6 / ON delay time for Comparator 3</td><td>0.0 – 999s</td><td>Delay time for the Comparator 3 output activation. When the activation condition is given in Normal or Window mode, the timer delays the activation of this signal for the time set in this parameter.</td><td>YES</td></tr>
<tr><td>7 SP C3 OF=+0[%]
C3 DEACTIV LEVEL</td><td>G9.3.7 / Deactivation value of Comparator 3 in Normal mode</td><td>-250% to +250%</td><td>This value selects the deactivation value of Comparator 3 output. The comparator output will be deactivated if comparator source signal, selected in G9.3.1, is lower than the value set here, and OFF delay time G9.3.8 has elapsed.
Note: This parameter is only displayed in Normal mode of the comparator 'G9.3.2 COMP 3 TYPE=0'.</td><td>YES</td></tr>
<tr><td>8 T C3 OF=0.0s
C3 DEACTIV DELAY</td><td>G9.3.8 / OFF delay time for Comparator 3</td><td>0.0 – 9999s</td><td>Delay time for the Comparator 3 output deactivation. When the deactivation condition is given in Normal or Window mode, the timer delays the deactivation of this signal for the time set in this parameter.</td><td>YES</td></tr>
<tr><td>9 SEL FUNT C3=00</td><td>G9.3.9 / Selection of output function for Comparator 3</td><td>00 – 15</td><td>Several internal functions can be activated for Comparator 3 according to the system requirements. These functions are described in the table of parameter G9.1.9.</td><td>NO</td></tr>
</table>

4.10. Group 10 – G10: Limits

Parameter / Default Value	Name / Description	Range	Function	Set on RUN
1 MIN1 SP=+0.00% **SPEED MIN LIMIT1**	**G10.1** / Minimum speed limit 1	-250% to Max speed 1	This sets the minimum speed limit 1 that can be applied to the motor by the drive. It is set in percentage of motor rated speed.	YES
2 MAX1 SP=+100% **SPEED MAX LIMIT1**	**G10.2** / Maximum speed limit 1	Min. speed 1 to +250%	This sets the maximum speed limit 1 that can be applied to the motor by the drive. If the reference is higher than the value set in this parameter, the drive will ignore that reference and will operate the motor at the value set in this screen. It is set in percentage of motor rated speed.	YES
3 MIN2 SP=-100% **SPEED MIN LIMIT2**	**G10.3** / Minimum speed limit 2	-250% to Max speed 2	This sets the minimum speed limit 2 that can be applied to the motor by the drive. It is set in percentage of motor rated speed. **Note:** Selection of minimum speed limit 2 is done via a digital input or comparator output function.	YES
4 MAX2 SP=+100% **SPEED MAX LIMIT2**	**G10.4** / Maximum speed limit 2	Min. speed 2 to +250%	This sets the maximum speed limit 2 that can be applied to the motor by the drive. If the reference is higher than the value set in this parameter, the drive will ignore that reference and will operate the motor at the value set in this screen. It is set in percentage of motor rated speed.	YES
5 I LIMIT=___A (*) **MAX CURRENT**	**G10.5** / Current limit	0.25 to 1.50In, OFF	Output current limit. Motor current will be within this programmed limit. When this protection is active the SD700FR status of current limitation (ILT) is displayed. **Note:** We do not recommend that current limit works constantly in applications when the motor is at steady speed status. Damage may occur to the motor and torque variations can affect the load. Current limit should work only when an overload occurs, or due to excessive acceleration and deceleration values, or because motor data details are entered incorrectly.	YES
6 I LIM TO= OFF **TIMOUT MAX CURRE**	**G10.6** / Trip time because of current limit	0 to 60s, OFF	If the drive is operated continually at current limit for the time set in this screen the drive generates a fault.	YES
7 I. MAX2=____A (*) **MAX CURRENT 2**	**G10.7** / Alternative current limit	0.25 to 1.50In, OFF	This limit operates with the same philosophy than G10.5, but for the second current limit.	YES
8 MI2 brSP=OFF **MAX CURR BRK SPD**	**G10.8** / Change speed for Imax 2	OFF=0%, +1 to +250%	It allows setting the speed level to change from current limit 1 to current limit 2. Additionally it is possible to select the alternative current limit 2 using a digital input configured as option 23.	YES
9 MAX TOR=+150% **MAX TORQUE**	**G10.9** / Torque limit	0% to +250%	This value is the maximum motor torque that the drive will allow to the motor to supply to the load. It is set in percentage of motor rated torque.	YES
10 T LIM TO=OFF **TIMEOUT MAX TORQ**	**G10.10** / Trip time because of torque limit	0 to 60s, OFF	If the drive is operated continually at torque limit for the time set in this screen the drive generates a fault.	YES
11 INVERSION ?=N	**G10.11** / To enable speed inversion	N Y	The drive can be configured to prevent the motor running in negative direction. **OPT.** / **FUNCTION** N=NO / Motor running in negative rotation direction is not allowed. Y=YES / Motor running in both rotation directions is allowed.	YES
14 T/I LIM SP = N	**G10.14** / Torque limit algorithm	N Y	It allows disabling of the torque/current limit algorithm. **OPT.** / **FUNCTION** N=NO / Algorithm is enabled. By limiting the current or the torque, the equipment reduces its speed. Y=YES / Algorithm is disabled but the equipment still using current or torque limit (G10.5 and G10.9) and timeouts (G10.6 and G10.10) which could mean drive trip.	YES
15 Rg TQ L = 150%	**G10.15 /** Torque limit range	0 to 250%	It allows limiting the regenerative torque of the motor.	YES

∗ This value depends on the drive rating.

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4.11. Group 11 – G11: Protections

<table>
<tr><th>Parameter / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>1 SP LIM TO=OFF
TMAX LIMITIN SPD</td><td>G11.1 / Trip time because of speed limit</td><td>0.1 to 60s, OFF</td><td>If the drive is operated continually at the speed limit for the time set in this screen the drive generates a fault 'F49 SPD LIMIT'.</td><td>YES</td></tr>
<tr><td>2 STOP TO=OFF
TIMEOUT STOPPING</td><td>G11.2 / Maximum time for stop limit</td><td>OFF=0.0 to 999s</td><td>It supplies a safety function to stop the drive automatically if the motor has not stopped after the time set in this parameter has elapsed and if the drive has received a stop command. The drive will fault on 'F45 STOP T/O'.
This function is used to protect from uncontrolled stops where motor needs a longer time than the predict time to stop. As well as other protections integrated into the drive, this time can be set to turn off the output voltage and stop the motor by free run if this time has elapsed and the motor has not stopped completely.
Controlled stop time is calculated in standard conditions during system operation. Stop limit time should be set to a higher value than controlled stop time value.</td><td>YES</td></tr>
<tr><td>3 GND I LIMIT=10%
GND CURR MAX LEV</td><td>G11.3 / Ground fault detection</td><td>OFF,
0 – 30% In</td><td>It allows drive to turn off its output to the motor generating a fault 'F20 GROUND FLT' automatically if the leakage current value is above the value set in this parameter.</td><td>YES</td></tr>
<tr><td>4 LOW VOLT=360V
LO INPUT VOLTAGE</td><td>G11.4 / Low input voltage level</td><td>323 – 425V
586 – 621V</td><td rowspan="2">Input low voltage protection is a combination of parameters G11.4 and G11.5. Drive turns off its output generating a fault 'F14 LW V IN' when average voltage, measured in the drive input, is below the value set in G11.4 for the time set in G11.5.
In case of the drive has a power supply of 690V, the default value in G11.4 will be 600V and the range will be 586 – 621V.</td><td>YES</td></tr>
<tr><td>5 LOW V TO=5s
LO INP VOL TIMEO</td><td>G11.5 / Trip time because of low input voltage</td><td>0.0 – 60s, OFF</td><td>YES</td></tr>
<tr><td>6 HIGH VOLT=500V
HI INPUT VOLTAGE</td><td>G11.6 / High input voltage level</td><td>418 – 587V
726 – 759V</td><td rowspan="2">Input high voltage protection is a combination of parameters G11.6 and G11.7. Drive turns off its output generating a fault 'F13 HI V IN' when average voltage, measured in the drive input, is above the value set in G11.6 for the time set in G11.7.
In case of the drive has a power supply of 690V, the default value in G11.6 will be 750V and the range will be 726 – 759V.</td><td>YES</td></tr>
<tr><td>7 HI V TO=5s
HI INP VOL TIMEO</td><td>G11.7 / Trip time because of high input voltage</td><td>0.0 – 60s, OFF</td><td>YES</td></tr>
<tr><td>8 Dlasy VO = 5s
VOUT asyTRIP DLY</td><td>G11.8 / Trip delay time due to output voltage imbalance</td><td>0.0s – 10s, OFF</td><td>It allows setting a delay time before tripping once output voltage imbalance has been detected. Once this time is elapsed, the drive trips due to 'F18 IMB V OUT'.</td><td>YES</td></tr>
<tr><td>9 LOW V BHV=1</td><td>G11.9 / Performance in case of input power loss</td><td>1 – 3</td><td>Modifies the drive response following an input power loss while motor is running according to next adjusts:
<table>
<tr><th>OPT.</th><th>DESCRIPTION</th><th>FUNCTION</th></tr>
<tr><td>1</td><td>FAULTS</td><td>Drive will trip because of fault 'F11 VIN LOSS'.</td></tr>
<tr><td>3</td><td>DipVoltRecover</td><td>After a momentary power loss has occurred, an algorithm of controlled recovery is activated. Due to this, the motor speed is not affected significantly.
In case of loads with high inertia, the reduction of the speed will be minimal.</td></tr>
</table></td><td>YES</td></tr>
<tr><td>10 PTC EXT ?=N</td><td>G11.10 / PTC motor option</td><td>N
Y</td><td>A PTC sensor can be connected directly to the drive to detect high motor temperature (terminals 8 and 9 on control board). If PTC value is higher or equal than 1K5 ±10%, a fault will be generated in the drive 'F40 EXT / PTC'. On the other hand, if the value decreases below 90Ω ±10%, a fault will be generated too.
<table>
<tr><th>OPT.</th><th>FUNCTION</th></tr>
<tr><td>N=NO</td><td>PTC motor option is disabled.</td></tr>
<tr><td>Y=YES</td><td>PTC motor option is enabled.</td></tr>
</table></td><td>YES</td></tr>
</table>

Parameter / Default Value	Name / Description	Range	Function	Set on RUN
11 PUMP OV=20.0A PUMP OVERLOAD LV	**G11.11** / Pump overload level	0.0 – 3000A	Overload protection is a combination of parameters G11.11, G11.12 and G11.13. Drive turns off its output generating a fault 'F57 PUMP OVERLOA' when the output current of the drive is higher than the current set in G11.11 for the time adjusted in parameter G11.13. By means of parameter G11.12, we can adjust the value of low-pass filter for the current reading to avoid oscillations.	YES
12 PMovl FIL=OFF PMP OVL FILTER	**G11.12** / Filter for pump overload	OFF=0, 0.1 to 20.0s		YES
13 Povl DLY=OFF PMP OVERLOAD DLY	**G11.13** / Trip delay time because of pump overload	OFF=0, 1 to 999.9s		YES
14 UNDERLOAD=N	**G11.14** / To enable underload protection	N Y	It allows the possibility of protecting the pump from underload status. OPT. / FUNCTION N=NO – Underload protection disabled. Y=YES – Underload protection enabled. To protect the pump from underload status is necessary to follow the next steps: Set this parameter to 'YES'. Set an underload current value (in G11.15) below which the first detection condition will be met. Set an underload speed value (in G11.16) above which the second detection condition will be met. Set a delay time to activate underload protection (in G11.17), once elapsed, last underload condition will be activated. If three previous conditions are given, the drive will stop the pump to protect it from underload status.	YES
15 ULD CUR=___A (*) UNDERLOAD CURREN	**G11.15** / Underload current	(0.2 to 1.50)·In	Setting of the underload current below which the first detection condition to activate the protection is met. This parameter operates together with parameters G11.16 and G11.17.	YES
16 ULD SPD=+100% UNDERLOAD SPEED	**G11.16** / Underload speed	+0.1% to +250%	Setting of the underload speed above which the second detection condition to activate the protection is met. This parameter operates together with parameters G11.15 and G11.17.	YES
17 ULD DELY=10s UNDERLOAD DELAY	**G11.17** / Delay time to activate underload protection	0 – 999s	Setting of the delay time to activate the underload protection. The drive will wait for this time before activating the protection and then will stop. This parameter operates together with parameters G11.15 and G11.16.	YES
18 DEC.SPdly=OFF DECREM.SPD.DELAY	**G11.18** / Speed decreasing delay time	OFF, 1 to 10s	It allows setting the delay time before beginning the starting when the motor is still rotating and just before the drive trips by F2 or F16 (high Vbus). If this parameter is set to 'OFF', the drive will trip by F2 or F16.	YES
19 Sp.SRCH.I =10% SPD.SEARCH INCR.	**G.11.19** / Increasing of speed searching	2 to 40%·In	It allows setting the speed increasing to begin the speed searching in order to starting with the motor still rotating when the drive is ready.	YES
21 Vc Min. T = OFF	**G11.21** / Minimum Speed limit	OFF, 0.1 to 60.0	Establishes the period of time that the drive has to maintain the minimum speed before triggering F23.	YES
22 Dasy IO = 5.0s	**G11.22** / IOUT asyTRIP DLY	0.0 to 10.0 OFF	Allows the setting of a delay time before the trip when an output current unbalance is detected. After this time, the drive will trip by 'F19 IMB I OUT'.	YES

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* This value depends on the drive rating.

4.12. Group 12 – G12: Auto Reset

<table>
<tr><th>Parameter / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>1 AUTO RESET=N</td><td>G12.1 / Auto Reset</td><td>N
S</td><td>This function resets the drive automatically after a fault.
<table><tr><th>OPT.</th><th>FUNCTION</th></tr><tr><td>N=NO</td><td>Auto Reset is disabled.</td></tr><tr><td>Y=YES</td><td>Auto Reset is enabled.</td></tr></table>When this function is active, faults programmed in G12.5 to G12.8 will be reset.
⚠ Caution: Auto Reset function can cause unexpected automatic starts. Ensure the installation is configured for Auto Reset to prevent damage to property or personnel.</td><td>YES</td></tr>
<tr><td>2 ATTEMP NUMBR=1
MAX ATTEMPT NUMB</td><td>G12.2 / Number of Auto Reset attempts</td><td>1 – 5</td><td>Allows setting of the maximum number of Auto Reset attempts. Drive will try to reset as many times as the number of attempts set in this screen after a fault occurs. This parameter and ‘G12.4 RS COUNT’ control the drive to carry out Auto Reset function in a controlled manner.</td><td>YES</td></tr>
<tr><td>3 R STR DEL=5s
TIME BEFORE RESET</td><td>G12.3 / Delay time before Auto Reset</td><td>5 – 120s</td><td>Allows setting of the time elapsed from the fault occurring before attempting auto reset.</td><td>YES</td></tr>
<tr><td>4 RS COUNT=15min
AUTORESET TIMOUT</td><td>G12.4 / Reset time for the counter of Auto Reset attempts</td><td>1 – 60min</td><td>Allows setting of the time that once elapsed will reset the Auto Reset attempt counter to zero.
Two situations are possible:
a) If the SD700FR is successfully restarted and runs for a period exceeding the value set in this screen then the attempt counter G12.2 will be reset to zero.
b) If the total number of reset attempts is exceeded within this time period the SD700FR will fault on the last fault condition. The SD700FR will remain in a fault condition until the unit is manually reset.</td><td>YES</td></tr>
<tr><td>5 F1 AUTO RST=0</td><td>G12.5 / Selection of fault 1 to be reset</td><td>0 – 27</td><td rowspan="4">If Auto Reset selection is enabled, the SD700FR will automatically reset the faults selected according to the following table:
<table><tr><th>OPT.</th><th>DESCRIPTION</th><th>FUNCTION</th></tr><tr><td>0</td><td>0 NO AUTO RESET</td><td>If G12.5 to G12.8 is set with this value, Auto Reset will not be undertaken.</td></tr><tr><td>1</td><td>ALL THE FLTS</td><td>All faults will be reset automatically.</td></tr><tr><td>2</td><td>11 VIN LOSS</td><td>To reset fault F11, input power loss.</td></tr><tr><td>3</td><td>13 HIGH V IN</td><td>To reset fault F13, high input voltage.</td></tr><tr><td>4</td><td>14 LOW V IN</td><td>To reset fault F14, low input voltage.</td></tr><tr><td>5</td><td>18 DSQ V OUT</td><td>To reset fault F18, output voltage imbalance.</td></tr><tr><td>6</td><td>19 DSQ I OUT</td><td>To reset fault F19, output current imbalance.</td></tr><tr><td>7</td><td>20 IGND FAULT</td><td>To reset fault F20, ground fault.</td></tr><tr><td>8</td><td>21 ILT TIMEOUT</td><td>To reset fault F21, current limit time out.</td></tr><tr><td>9</td><td>22 TLT TIMEOUT</td><td>To reset fault F22, torque limit time out.</td></tr><tr><td>10</td><td>27 SOFTCHRGE</td><td>To reset fault F27, DC Bus charge fault.</td></tr><tr><td>11</td><td>40 FLT</td><td>To reset fault F40, motor PTC fault.</td></tr><tr><td>12</td><td>41 COMMS TRIP</td><td>To reset fault F41, fault signal from communication net.</td></tr><tr><td>13</td><td>42 AIN1 MISSING</td><td>To reset fault F42, Analogue Input 1 loss.</td></tr><tr><td>14</td><td>43 AIN2 MISSING</td><td>To reset fault F43, Analogue Input 2 loss.</td></tr><tr><td>15</td><td>47 COMMS ERROR</td><td>To reset fault F47, communication time out.</td></tr><tr><td>16</td><td>49 SPEED LIMT ER</td><td>To reset fault F49, exceeded speed limit.</td></tr><tr><td>17</td><td>65 LOW PRESSURE</td><td>To reset fault F65, low pressure.</td></tr><tr><td>18</td><td>66 HI PRESSURE</td><td>To reset fault F66, maximum pressure.</td></tr><tr><td>19</td><td>67 LOW WATER</td><td>Fault F67 is reset, low water.</td></tr><tr><td>20</td><td>31 SCR L1 FAULT</td><td>To reset fault F31, fault on phase L1 of rectifier.</td></tr><tr><td>21</td><td>32 SCR L2 FAULT</td><td>To reset fault F32, fault on phase L2 of rectifier.</td></tr><tr><td>22</td><td>33 SCR L3 FAULT</td><td>To reset fault F33, fault on phase L3 of rectifier.</td></tr><tr><td>23</td><td>68 CAVIT/UNDERL</td><td>To reset fault F68, cavitation / underload trip.</td></tr><tr><td>27</td><td>56 EXTER FAULT</td><td>Resets F50 fault, Emergency Stop.</td></tr></table>⚠ Caution: When the fault selection for auto reset is undertaken the user should pay special attention to option 1 ‘All the faults’. In this case, the protections of the drive and motor will be disabled. It is not recommended to select this option since the drive could try to reset internal trips causing serious damage to the drive.</td><td>YES</td></tr>
<tr><td>6 F2 AUTO RST=0</td><td>G12.6 / Selection of fault 2 to be reset</td><td>0 – 27</td><td>YES</td></tr>
<tr><td>7 F3 AUTO RST=0</td><td>G12.7 / Selection of fault 3 to be reset</td><td>0 – 27</td><td>YES</td></tr>
<tr><td>8 F4 AUTO RST=0</td><td>G12.8 / Selection of fault 4 to be reset</td><td>0 – 27</td><td>YES</td></tr>
</table>

4.13. Group 13 – G13: Fault History

<table>
<tr><th>Parameter / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>1 F0 NO FAULT
LAST FAULT=FXX</td><td>G13.1 / Register 1 of fault history</td><td>-</td><td rowspan="6">The first parameter of this group allows visualizing the information about the last fault and additionally, it will be used as the first register of fault history.
Drive shows this screen in the case of a trip. Pressing [*] key approx two seconds provides access to the extended information that shows the order of fault: LAST FAULT=Fxx (when fault is reset). The equipment is reset by pressing the STOP-RESET key from display or by using an external reset (if connected). Several faults can be reset automatically using Auto Reset (See group G12).

A list of the last six faults in chronological order is shown. The most recent fault appears in first place (G13.1). Each time that a fault occurs, the drive shows the fault in parameter G13.1. After the fault is solved and reset, this fault will be shifted to the following position of fault register (G13.2). The previous faults will shift down one position. The oldest fault message (G13.6) will be lost.
Pressing [*] key approx two seconds provides access to the extended information that shows the order of fault:
FIFTH FAULT=Fxx up to FIRST FAULT=Fxx
The following table shows all the faults:

<table><tr><th>COD</th><th>FAULT</th><th>COD</th><th>FAULT</th></tr><tr><td>0</td><td>F0 NO FAULT</td><td>52</td><td>F52 FAN P.SUPP</td></tr><tr><td>1</td><td>F1 I LIM FLT</td><td>53</td><td>F53 INTRNAL TEMP</td></tr><tr><td>2</td><td>F2 V LIM FLT</td><td>54</td><td>F54 WATCHDOG TMR</td></tr><tr><td>3</td><td>F3 PDINT FLT</td><td>55</td><td>F55 DO Feedbck</td></tr><tr><td>4</td><td>F4 OVERLOAD U+</td><td>56</td><td>F56 EMERGEN.STOP</td></tr><tr><td>5</td><td>F5 OVERLOAD U-</td><td>57</td><td>F57 PUMP OVERLOA</td></tr><tr><td>6</td><td>F6 OVERLOAD V+</td><td>58</td><td>F58 PROFI.TOUT</td></tr><tr><td>7</td><td>F7 OVERLOAD V-</td><td>60</td><td>F60 EIP/DN T.O</td></tr><tr><td>8</td><td>F8 OVERLOAD W+</td><td>61</td><td>F61 NO INPUT V</td></tr><tr><td>9</td><td>F9 OVERLOAD W-</td><td>73</td><td>F73 FLT COMP 1</td></tr><tr><td>10</td><td>F10 SAFE STOP</td><td>74</td><td>F74 FLT COMP 2</td></tr><tr><td>11</td><td>F11 VIN LOSS</td><td>75</td><td>F75 FLT COMP 3</td></tr><tr><td>12</td><td>F12 IMB V IN</td><td>76</td><td>F76 SLAVE O.F</td></tr><tr><td>13</td><td>F13 HI V IN</td><td>77</td><td>OPT FIB TO</td></tr><tr><td>14</td><td>F14 LW V IN</td><td>78</td><td>F78 TMP FREMAQ</td></tr><tr><td>15</td><td>F15 CURL Vdc</td><td>101</td><td>R1 I LIM FLT</td></tr><tr><td>16</td><td>F16 HI Vdc</td><td>102</td><td>R2 V LIM FLT</td></tr><tr><td>17</td><td>F17 LW Vdc</td><td>103</td><td>R3 SOFT CHARG</td></tr><tr><td>18</td><td>F18 IMB V OUT</td><td>104</td><td>R4 OVERLOAD R+</td></tr><tr><td>19</td><td>F19 IMB I OUT</td><td>105</td><td>R5 OVERLOAD R-</td></tr><tr><td>20</td><td>F20 GROUND FLT</td><td>106</td><td>R6 OVERLOAD S+</td></tr><tr><td>21</td><td>F21 I LIM T/O</td><td>107</td><td>R7 OVERLOAD S-</td></tr><tr><td>22</td><td>F22 TQ LIM T/O</td><td>108</td><td>R8 OVERLOAD T+</td></tr><tr><td>23</td><td>F23 SPD LIMIT MIN</td><td>109</td><td>R9 OVERLOAD T-</td></tr><tr><td>25</td><td>F25 MTR O/L</td><td>110</td><td>R10 MULTI O.L.</td></tr><tr><td>28</td><td>F28 Ir.LIM TO</td><td>111</td><td>R11 VIN LOST</td></tr><tr><td>29</td><td>F29 DSP FLT</td><td>112</td><td>R12 IMB V IN</td></tr><tr><td>30</td><td>F30 WATCHDOG</td><td>113</td><td>R13 V LOST CAP</td></tr><tr><td>34</td><td>F34 IGBT TEMP</td><td>114</td><td>R14 VBUS LOST</td></tr><tr><td>37</td><td>F37 VERSION SW</td><td>115</td><td>R15 SfCh CONTACT</td></tr><tr><td>40</td><td>F40 EXT / PTC</td><td>116</td><td>R16 LCL TEMP</td></tr><tr><td>41</td><td>F41 COMMS TRIP</td><td>117</td><td>R17 VBUS LOW</td></tr><tr><td>42</td><td>F42 AIN1 LOSS</td><td>118</td><td>R18 FIBR COMMS</td></tr><tr><td>43</td><td>F43 AIN2 LOSS</td><td>119</td><td>R19 I IMB IN</td></tr><tr><td>44</td><td>F44 CAL FLT</td><td>120</td><td>R20 GRND INPUT</td></tr><tr><td>45</td><td>F45 STOP T/O</td><td>121</td><td>R21 I LIMIT IN</td></tr><tr><td>46</td><td>F46 EEPROM FLT</td><td>122</td><td>R22 IGBT TMP</td></tr><tr><td>47</td><td>F47 COMMS T/O</td><td>123</td><td>R23 I HALL</td></tr><tr><td>48</td><td>F48 SPI COM</td><td>124</td><td>R24 LCL FB</td></tr><tr><td>49</td><td>F49 SPD LIMIT MAX</td><td>125</td><td>R25 DIAG NODE</td></tr><tr><td>50</td><td>F50 PSU FAULT</td><td>126</td><td>R26 DIAG BUS</td></tr><tr><td>51</td><td>F51 SCR TEMP</td><td></td><td></td></tr></table></td><td>-</td></tr>
<tr><td>2 F0 NO FAULT
FIFTH FAULT=FXX</td><td>G13.2 / Register 2 of fault history</td><td>-</td><td>-</td></tr>
<tr><td>3 F0 NO FAULT
FOURTH FAULT=FXX</td><td>G13.3 / Register 3 of fault history</td><td>-</td><td>-</td></tr>
<tr><td>4 F0 NO FAULT
THIRD FAULT=FXX</td><td>G13.4 / Register 4 of fault history</td><td>-</td><td>-</td></tr>
<tr><td>5 F0 NO FAULT
SECOND FAULT=FXX</td><td>G13.5 / Register 5 of fault history</td><td>-</td><td>-</td></tr>
<tr><td>6 F0 NO FAULT
FIRST FAULT=FXX</td><td>G13.6 / Register 6 of fault history</td><td>-</td><td>-</td></tr>
<tr><td>7 CLEAR FAULTS=N</td><td>G13.7 / Erase fault history</td><td>N
Y</td><td><table><tr><th>OPT.</th><th>FUNCTION</th></tr><tr><td>N=NO</td><td>Function disabled.</td></tr><tr><td>Y=YES</td><td>It erases fault history (last six faults). The screen returns to default value ‘NO’, after all the faults have been erased.</td></tr></table></td><td>YES</td></tr>
</table>

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4.14. Group 14 – G14: Multi-references

<table>
<tr><th>Parameter / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>1 MREF 1=+10.0%
MULTI-REFERENCE1</td><td>G14.1 / Multi-reference 1</td><td rowspan="7">-250% to +250%</td><td rowspan="7">It allows setting of multiple references. These references will be activated using digital inputs configured as multiple speed references or PID references.
To use this function select operating mode, ‘G4.1.4 DIGIT I MODE=2 or 3' (2 or 3-wires multi-reference). It is necessary to select the multi-references as the speed reference in parameter ‘G3.1 REF 1 SPD=MREF’ or as a PID references in ‘G6.1 SEL REF=MREF’.
Units are set in either percentage of motor rated speed or feedback analogue input range (if an analogue unit is selected).
The following table shows the relationship between DI4,DI5, DI6 inputs when activated in multi-reference mode (as a percentage of motor rated speed):
<table><tr><th>PARM</th><th>REF</th><th>DI4</th><th>DI5</th><th>DI6</th></tr><tr><td>G14.1</td><td>MREF 1</td><td>0</td><td>0</td><td>X</td></tr><tr><td>G14.2</td><td>MREF 2</td><td>0</td><td>X</td><td>0</td></tr><tr><td>G14.3</td><td>MREF 3</td><td>0</td><td>X</td><td>X</td></tr><tr><td>G14.4</td><td>MREF 4</td><td>X</td><td>0</td><td>0</td></tr><tr><td>G14.5</td><td>MREF 5</td><td>X</td><td>0</td><td>X</td></tr><tr><td>G14.6</td><td>MREF 6</td><td>X</td><td>X</td><td>0</td></tr><tr><td>G14.7</td><td>MREF 7</td><td>X</td><td>X</td><td>X</td></tr></table>Note: 0: Not active and X: Active.</td><td rowspan="7">YES</td></tr>
<tr><td>2 MREF 2=+20.0%
MULTI-REFERENCE2</td><td>G14.2 / Multi-reference 2</td></tr>
<tr><td>3 MREF 3=+30.0%
MULTI-REFERENCE3</td><td>G14.3 / Multi-reference 3</td></tr>
<tr><td>4 MREF 4=+40.0%
MULTI-REFERENCE4</td><td>G14.4 / Multi-reference 4</td></tr>
<tr><td>5 MREF 5=+50.0%
MULTI-REFERENCE5</td><td>G14.5 / Multi-reference 5</td></tr>
<tr><td>6 MREF 6=+60.0%
MULTI-REFERENCE6</td><td>G14.6 / Multi-reference 6</td></tr>
<tr><td>7 MREF 7=+70.0%
MULTI-REFERENCE7</td><td>G14.7 / Multi-reference 7</td></tr>
</table>

4.15. Group 15 – G15: Inch Speeds

<table>
<tr><th>Parameter / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>1 INCH1=+0.00%
INCH SPEED 1</td><td>G15.1 / Inch speed 1</td><td rowspan="3">-250% to +250%</td><td rowspan="3">Allows setting of the value of the three possible motor inch speeds. Inch speed selection is possible through a comparator output (directly) or by a digital input combination. If digital inputs are used for this purpose they should be configured as 'START + INCH1' or 'START + INCH2'. See G4.1.5 to G4.1.10.
<table><tr><th rowspan="2">Speed</th><th colspan="2">Inputs</th></tr><tr><th>DIX</th><th>DIY</th></tr><tr><td>Inch speed 1</td><td>X</td><td>0</td></tr><tr><td>Inch speed 2</td><td>0</td><td>X</td></tr><tr><td>Inch speed 3</td><td>X</td><td>X</td></tr></table>Note: The activation of this function includes the start command. Therefore this signal has priority over any other input configured as ‘Start’.</td><td rowspan="3">YES</td></tr>
<tr><td>2 INCH2=+0.00%
INCH SPEED 2</td><td>G15.2 / Inch speed 2</td></tr>
<tr><td>3 INCH3=+0.00%
INCH SPEED 3</td><td>G15.3 / Inch speed 3</td></tr>
</table>

4.16. Group 16 – G16: Skip Frequencies

<table>
<tr><th>Parameter / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>1 SKIP 1=+0.0%
SKIP FREQUENCY 1</td><td>G16.1 / Skip frequency 1</td><td>-250% to +250%</td><td>Allows user to select the first skip frequency to avoid resonance frequencies or frequencies where it is not desirable for the motor to operate. Drive passes through this frequency value during acceleration and/or deceleration but will not remain operating at this frequency. Once this value is set, the bandwidth (G16.3) will be based on it, forming a frequency range that the drive will avoid.</td><td>YES</td></tr>
<tr><td>2 SKIP 2=+0.0%
SKIP FREQUENCY 2</td><td>G16.2 / Skip frequency 2</td><td>-250% to +250%</td><td>Allows user to select the second skip frequency to avoid resonance frequencies or frequencies where it is not desirable for the motor to operate. Drive passes through this frequency value during acceleration and/or deceleration but will not remain operating at this frequency. Once this value is set, the bandwidth (G16.3) will be based on it, forming a frequency range that the drive will avoid.</td><td>YES</td></tr>
<tr><td>3 SKIP BAND=OFF
OFFSET BAND</td><td>G16.3 / Skip bandwidth</td><td>OFF=0 to 20%</td><td>Sets the skip frequency bandwidth.
For example, if 10% is set, the avoided frequencies will be from freq (G16.1) – 5% to freq (G16.1) + 5% and from freq (G16.2) – 5% to freq (G16.2) + 5%. Supposing that the selected range goes from 20% to 30%. In case of the frequency is within that band, for example 27%, there is two situations:
a) Drive is accelerating: so the frequency will be increased up to 27%, but it will not remain here, it will be increased up to 30%.
b) Drive is decelerating: so the frequency will be decreased down to 27%, but it will not remain here, it will be decreased down to 20%.</td><td>YES</td></tr>
</table>

4.17. Group 17 – G17: Brake

Parameter / Default Value	Name / Description	Range	Function	Set on RUN
1 T DC BRAKE=OFF DC BRAKING TIME	**G17.1** / Time for DC brake activation	OFF=0.0 to 99s	Allows setting of the time for which the DC brake will be activated.	YES
2 DC CURR=0% DC CURRENT LEVEL	**G17.2** / Current applied to the brake	0 – 100%	Allows setting of the current level applied during braking. The proper current value must be set to brake the load inertia correctly. If this value is too much low the load will not be stopped in time. If the value is too high the power components of the drive will be stressed.	YES
3 DC VOLTS=0.0% DC BR VOLT LEVEL	**G17.3** / Voltage applied to the brake	0.0 – 25%	Allows setting of the continuous DC voltage level applied during braking. The proper voltage value must be set to brake the load inertia correctly. If this value is too much low load will not be stopped in time. Otherwise, if the value is too high the power components of the drive will be stressed.	YES
4 I HEATING=OFF Idc HEATING	**G17.4** / Non condensing heating current	OFF=0.0 to 30%	Set a suitable value to avoid humidity or condensation forming in the motor. **Note:** Modify this parameter only if necessary. ⚠ **CAUTION:** Although the motor is not running there is dangerous voltage. Run Led will be lit during this process. Be careful to avoid property damage and personal injuries.	YES

4.18. Group 18 – G18: Encoder

Parameter / Default Value	Name / Description	Range	Function	Set on RUN
0 ENCODER =N	**G18.0** / Encoder	N Y	**OPT** / **FUNCTION** N – The Encoder is enabled Y – The Encoder is disabled	YES
1 PULSES=1024	**G18.1** / Pulses per revolution of the encoder	200 to 8191	Set the encoder installed in the motor pulses per revolution	NO
2 TYPE=DIFF	**G18.2** / Encoder Type	DIFF SING	Select the type of encoder installed in the motor **OPT.** / **FUNCTION** DIFF – Differential output encoder SING – Single-ended output encoder	NO
3 ENCOD FILTER=N	**G18.3**/ Encoder filter selection	YES NO	Filters the encoder signal	NO

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4.19. Group 19 – G19: Fine Tuning

4.19.1. Subgroup 19.1 – S19.1: IGBT Control

Parameter / Default Value	Name / Description	Range	Function	Set on RUN
1 TYPE CTRL=V/Hz	**G19.1.1** / Selection of control type	V/Hz PEVE CLsp CLtq	This selection defines the drive control type. **OPT.** / **FUNCTION** V/Hz: Scalar control mode. Drive carries out the control applying a voltage / frequency ramp to the motor. PEVE: Automatic compensation of stator voltage using the PEVE algorithm to improve the torque delivery. CLsp: Closed loop speed control mode. Makes a full control of the motor speed. Needs encoder. CLtq: Makes a full control of motor torque Needs encoder.	YES
2 FRQ=4000Hz **MODULAT FREQUENC**	**G19.1.2** / Commutation frequency	4000 – 8000 Hz	It allows modification of the inverter's bridge switching frequency. This function can be used to reduce audible motor noise.	YES
3 PEWAVE=Y	**G19.1.3** / Pewave control	N Y	This control mode improves motor noise tone. **OPT.** / **FUNCTION** N=NO: Pewave control deactivated. Y=YES: Pewave control activated. Inverter's bridge switching frequency (G19.1.2) is slightly modified on a random basis to improve the noise tone generated by the motor.	YES
5 AUTOTUNE=N	**G19.1.5** / Motor parameter auto-tuning	N Y	This selection allows executing a motor auto-tuning, in order to get the stator resistance value of the motor. This value will be saved in parameter G19.3.1.	YES
6 OVERMODULATIO=N	**G.19.1.6** / Over-modulation	N Y	With this option, it allows supplying more motor voltage at 50Hz.	YES

4.19.2. Subgroup 19.2 – S19.2: Motor Load

Parameter / Default Value	Name / Description	Range	Function	Set on RUN
1 MIN FLUX = 100% **MINIMUM FLUX**	**G19.2.1** / Minimum Flux	40 – 100%	Allows setting of the minimum flux level used by the motor during low load conditions. With this dynamic system of flux optimization, noise and power losses are reduced. Adaptation of the flux level during low load conditions occurs automatically. The algorithm will be disabled when this parameter is set to 100%.	YES
2 BW BOOST=0.0% **BOOST BAND**	**G19.2.2** / Torque boost band	0.0 – 100%	It sets a frequency band or range on which torque set in previous parameter will be applied during the start.	YES
3 V BOOST = 0.0% **BOOST VOLTAGE**	**G19.2.3** / Initial voltage	0.0 – 100%	Sets an initial voltage value applied to the motor during the starting. Using this function it is possible to improve breakaway torque when starting heavy loads. This parameter is used in association with parameter 'G19.2.2 BW BOOST'. **Note:** Set a low value first. Increase the value gradually until the load starts easily.	YES
4 SLIP COMPENS=N	**G19.2.4** / Slip compensation	N Y	If this function is active, it helps to compensate the slip on the motor. In case of heavy load able of provoking a high slip during the starting, set this parameter to YES.	YES

<table>
<tr><th>Parameter / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>7 I SLIP=4.0%(*)
I SLIP COMPENSAT</td><td>G19.2.7 / Current limit factor</td><td>0.0 – 20.0%</td><td>Modifies the speed by reducing the output frequency to keep the output current within a controllable margins (display shows ILT). Adjusting this parameter can improve the stability of the current limit function taking the motor slip into account.
Note: The following table shows the default values for drives of any nominal voltage.

<table>
<tr><th colspan="4">Default Values for All Powers</th></tr>
<tr><th>G2.3 Motor Power (kW)</th><th>Value (%)</th><th>G2.3 Motor Power (kW)</th><th>Value (%)</th></tr>
<tr><td>2.2</td><td>5.30</td><td>150</td><td>1.09</td></tr>
<tr><td>4</td><td>4.30</td><td>160</td><td>1.03</td></tr>
<tr><td>5.5</td><td>4.00</td><td>200</td><td>0.79</td></tr>
<tr><td>7.5</td><td>3.80</td><td>250</td><td>0.75</td></tr>
<tr><td>11</td><td>3.50</td><td>315</td><td>0.70</td></tr>
<tr><td>15</td><td>3.10</td><td>355</td><td>0.65</td></tr>
<tr><td>18.5</td><td>2.90</td><td>400</td><td>0.60</td></tr>
<tr><td>22</td><td>2.67</td><td>450</td><td>0.52</td></tr>
<tr><td>30</td><td>2.16</td><td>500</td><td>0.46</td></tr>
<tr><td>37</td><td>2.10</td><td>560</td><td>0.43</td></tr>
<tr><td>45</td><td>1.90</td><td>630</td><td>0.35</td></tr>
<tr><td>55</td><td>1.87</td><td>710</td><td>0.40</td></tr>
<tr><td>75</td><td>1.60</td><td>800</td><td>0.32</td></tr>
<tr><td>90</td><td>1.50</td><td>900</td><td>0.30</td></tr>
<tr><td>110</td><td>1.36</td><td>1000</td><td>0.25</td></tr>
<tr><td>132</td><td>1.20</td><td></td><td></td></tr>
</table>

* Adjust mode: When initializing factory settings (1) or manually modifying the Motor Nominal Power (G2.3) (2). The value of the current limit factor is initialized according to the table. Values outside the table are estimated according to the table.
In all cases the adjustment range is + / -30% of initialized value in any of the two scenarios given (1) and (2).

Note: We recommend this value is adjusted only when the current limit action is unstable. A low value will improve the stability although the current limit action will operate earlier.</td><td>YES</td></tr>
<tr><td>9 STR FRQ = 0.0%
START FREQUENCY</td><td>G19.2.9 / Initial frequency</td><td>0.0% to 100%</td><td>Allows setting of an initial frequency that will be applied from the drive at the moment of starting.</td><td>YES</td></tr>
<tr><td>10 DAMPref=OFF
REFER.DAMPING</td><td>G19.2.10 / Damping reference</td><td>OFF=0.0, OFF(40%) to 70%</td><td>In some motors, instable behaviours are generated at low frequencies when the motors are connected with no load. In that case, set this parameter to 65% as initial value. If oscillations still are present, reduce the value.</td><td>YES</td></tr>
<tr><td>11 DAMPref=3%
REFER.DAMPING</td><td>G19.2.11 / Damping reference</td><td>0.0 to 10.0%</td><td>In some motors, instable behaviours are generated at some frequencies when the motors are connected with no load. Set this parameter will control the instability.</td><td>YES</td></tr>
</table>

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4.19.3. Subgroup 19.3 – S19.3: Motor Model

<table>
<tr><th>Parameter / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>1 R. STR=1%
STATOR RESISTOR</td><td>G19.3.1 / Stator resistance (Rs)</td><td>0.0 to 9.9%</td><td rowspan="4">Set as a percentage of motor rated impedance.
Stator resistance (Rs): It is used to compensate the iron losses and copper losses of the motor.
Rotor resistance (Rr): A key parameter that directly concerns the output torque.
Motor inductance (Lm): It is an interesting parameter if the equipment works with vector control and G19.1.2 = AVC. It is the main inductance of the motor that defines the magnetic field strength. It is a key parameter that directly concerns the motor flux. Typical values can range from 75% (small motors) to 800% (large motors).
Note: The following table shows the default values for drives of any nominal voltage.
G19.3.4 = 5% of G19.3.3

Adjust mode: When initializing factory settings (1) or manually modifying the Motor Nominal Power (G2.3) (2), the values are initialized according to the table, values outside the table are estimated according to the table.
When auto-tuning is performed (G19.1.8) (3) the value of parameters is automatically changed to the value measured.
In all cases, the adjustment range is + / -30% of initialized value in any of the three scenarios given (1), (2), (3).

Note: If this G19.3.1 is set too high then increased motor currents can reach the current limit preventing further acceleration to the motor. We recommend consulting the above standard value table as Rs value is variable according to the drive capacity.</td><td rowspan="4">YES</td></tr>
<tr><td>2 R. RTR = 0%</td><td>G19.3.2 / Rotor resistance (Rr)</td><td>0.0% to 15%</td></tr>
<tr><td>3 Lm = 40%</td><td>G19.3.3 /Motor inductance (Lm)</td><td>40% to 800%</td></tr>
<tr><td>4 L.I. = 0%</td><td>G19.3.4 / Stray inductance</td><td>0.0% to 50%</td></tr>
<tr><td>5 FL WEAK = 90%</td><td>G19.3.5/ Weakening field</td><td>50% to 100%</td><td>The weakening field occurs when the drive cannot give more voltage than it receives from the power supply, and when the frequency exceeds the rated frequency of the motor. In this event, only the frequency will be regulated and the voltage will keep constant producing the weaking of the motor field.</td><td>YES</td></tr>
</table>

Default Values for All Powers

G2.3- Motor Power (kW)	Value G19.3.1 (%)	Value G19.3.2 (%)	Value G19.3.3 (%)
2.2	5.30	5.30	100
4	4.30	4.30	100
5.5	4.00	4.00	100
7.5	3.80	3.80	100
11	3.50	3.50	100
15	3.10	3.10	100
18.5	2.90	2.90	100
22	2.67	2.67	100
30	2.16	2.16	250
37	2.10	2.10	250
45	1.90	1.90	250
55	1.87	1.87	250
75	1.60	1.60	250
90	1.50	1.50	250
110	1.36	1.36	250
132	1.20	1.20	250
150	1.09	1.09	250
160	1.03	1.03	450
200	0.79	0.79	450
250	0.75	0.75	450
315	0.70	0.70	450
355	0.65	0.65	450
400	0.60	0.60	450
450	0.52	0.52	450
500	0.46	0.46	450
560	0.43	0.43	450
630	0.35	0.35	450
710	0.40	0.40	450
800	0.32	0.32	450
900	0.30	0.30	450
1000	0.25	0.25	450

4.19.4. Subgroup 19.4 – S19.4: Control PID

Parameter / Default Value	Name / Description	Range	Function	Set on RUN
1 Kp Sp = 95% (*) Available if the drive is in speed mode	**G19.4.1 /** Speed closed loop proportional constant.	0.0% to 100%	Allows the setting of the proportional gain value of the speed regulator. If a greater control response is needed, this value has to be increased. **Note:** When increasing too much this value, the system can be l destabilized.	YES
2 Ki Sp= 95% (*) Available if the drive is in speed mode	**G19.4.2** / Speed closed loop integration time setting.	0.0% to 100%	Allows the adjustment of the integration time of the speed regulator. In the event of needing more precision, this value has to be increased. **Note:** When increasing this value too much, the system can get slower.	YES
3 Kp Tq = 95% (*) Available if the drive is in torque mode	**G19.4.3** / Torque proportional closed loop constant.	0.0% to 100%	Allows setting the value of the proportional gain of the overcurrent regulator. If a greater control response is needed this value has to be increased. **Note**: When increasing too much this value, the system can become more unstable.	YES
4 Ki Tq = 95% (*) Available if the drive is in torque mode	**G19.4.4 /** Torque closed loop time setting.	0.0% to 100%	Allows the adjustment of the integration time of the overcurrent regulator. In the event of needing more precision, this value has to be increased. **Note:** When increasing this value too much, the system can get slower.	YES
5 Kp I = 95% (*) Available if G19.1.1=VECT and G19.1.2 = PMC	**G19.4.5** / Current closed loop proportional constant	0.0% to 100%	Allows the setting of the proportional gain value of the flow regulator.	NO
6 Ki I = 15% (*) Available if G19.1.1=VECT and G19.1.2 = PMC	**G19.4.6 /** Current closed loop integration time setting.	0.0% to 100%	Allows the adjustment of the integration time of the flow regulator	NO
9 Flux tune=2.0% (*) Available if G19.1.1=VECT and G19.1.2 = PMC	**G19.4.9** / Flux tuning	0.0% to 10%	Allows setting a greater starting torque in the device. **Note:** Fault "F39 BLOCKED rotor" when giving the boot order means that the device hasn't got enough torque for the load. The user will have to set a higher value. Once this value has been set to its maximum, if the motor doesn't move it will probably mean that the resistant torque is too high for the device, or there is a mechanical problem.	YES

4.20. Group 20 – G20: Communication Buses

4.20.1. Subgroup 20.0 – S20.0: Communications Control

Parameter / Default Value	Name / Description	Range	Function	Set on RUN
0 CONTROL COM=0	**G20.0.1** / Communications Control	0 to 6	Selection of the communication bus through which the equipment is controlled OPC. / FUNCIÓN: 0 Modbus; 1 Profibus; 2 Modbus TCP; 3 Ethernet IP; 4 Can Open; 5 Devicenet; 6 OFC **Note:** This parameter is only functional after the boot up.	NO

4.20.2. Subgroup 20.1 – S20.1: Modbus RTU

Parameter / Default Value	Name / Description	Range	Function	Set on RUN
1 COMMS T/O =OFF COMMS TIMEOUT	**G20.1.1** / Communication timeout MODBUS RTU	OFF=0 to 250s	If this time has elapsed from the last valid data transmission a communication timeout trip can be generated if the user requires it. Serial communication with the drive is possible through RS232 terminals, RS485 terminals, or through optional serial communication interfaces. **Note:** Do not modify this parameter if is not necessary.	YES
2 COMM ADDR =10 COMM ADDRESS	**G20.1.2** / Communication address	1 to 255	Sets the identification address assigned to the drive for communication via the Modbus network. If communication is required with several drives a different address is required for each unit.	YES

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Parameter / Default Value	Name / Description	Range	Function	Set on RUN
3 BAUDS=9600	**G20.1.3** / Communication speed	600 1200 2400 4800 9600 19200	Sets the data transmission speed for MODBUS serial communications. This rating should be the same as the rating of the master of the communication bus on which the drive is integrated.	YES
4 PARITY=NONE	**G20.1.4** / Communication parity	ODD NONE EVEN	MODBUS parity setting. Used for data validation. If you do not want to validate data, set this parameter to 'NONE'. Parity selection should be the same as the parity of the master of the communication bus on which the drive is integrated.	YES
5 DispBR= 4800	**G20.1.5** / Display communication speed	1200 2400 4800 9600	Set the baud rate of the communication between the display and the control power board.	YES

4.20.3. Subgroup 20.2 – S20.2: PROFIBUS

Parameter / Default Value	Name / Description	Range	Function	Set on RUN
1 NODE ADDR=10 **NODE ADDRESS**	**G20.2.1** / Slave address in Profibus network	1 to 255	Sets the identification address assigned to the drive for communication via Profibus network. If communication is required with several drives a different address is required for each unit.	YES

4.20.4. Subgroup 20.3 – S20.3: CANOPEN

Parameter / Default Value	Name / Description	Range	Function	Set on RUN
1 CO NODEID=0	**G20.3.1** / Canopen slave address	0 to 127	The Node slave address is assigned	NO
2 CO BAUD=1mbps	**G20.3.2** / Bus speed connected to drive	1mbps 10mbps 125mbps 250mbps 500mbps	Set the bus speed at which the drive will be connected.	YES
3 CO REF sp=+0.0%	**20.3.3** / Canopen Speed	-	Display screen through which the speed referenced can be seen through the Canopen	NO

4.20.5. Subgroup 20.4 – S20.4: DEVICENET (*)

<table>
<tr><th>Parameter / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>1 DN_MACID=0</td><td>G20.4.1 / Devicenet MAC ID</td><td>0 to 63</td><td>DeviceNet MAC ID setting. Each device must be assigned a unique MAC ID within the network.
MAC ID can be changed at any time, but it will come into effect after power-cycling the drive. The default value is 0x00.</td><td>YES</td></tr>
<tr><td>2DNBaud=500kbps</td><td>G20.4.2 / Devicenet Baud rate</td><td>125kbps
250kbps
500kbps</td><td>Choose the DeviceNet Baud Rate (set by Master device)
<table>
<tr><th>OPTIONS</th><th>DESCRIPTION</th></tr>
<tr><td>0</td><td>125 Kbps</td></tr>
<tr><td>1</td><td>250 Kbps</td></tr>
<tr><td>2</td><td>500 Kbps</td></tr>
</table>
DeviceNet Baud Rate can be changed at any time, but it will come into effect after power-cycling the drive.</td><td>YES</td></tr>
<tr><td>3 CONTROL MODE=0</td><td>20.4.3 / Control modes</td><td>0 to 2</td><td>The following table shows the different control modes
<table>
<tr><th>OPT</th><th>DESCRIPTION</th><th>FUNCTION</th></tr>
<tr><td>0</td><td>LOCAL</td><td>The drive control is given in [G4.1.1] or [G4.1.2] parameter</td></tr>
<tr><td>1</td><td>NET</td><td>If the Control Mode 1 parameter [G4.1.1] is active and set to 3 (Comm.), then the drive is operated through DeviceNet. Identically, when Control Mode 2 is active, the value contained in [G4.1.2] parameter determines the way it is finally controlled.</td></tr>
<tr><td>2</td><td>NETDECIIDES</td><td>The PLC will decide how the drive is controlled. If it is controlled over network, option 1 will be enabled. However, if the net resigns control, it will be controlled locally.</td></tr>
</table></td><td>YES</td></tr>
</table>

<table>
<tr><th>Parameter / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>4 REFEREN MODE=0</td><td>20.4.4 / Reference modes</td><td>0 to 2</td><td>The following table shows the different reference modes.
<table><tr><th>OPT.</th><th>FUNCTION</th></tr><tr><td>0</td><td>LOCAL</td></tr><tr><td>1</td><td>NET</td></tr><tr><td>2</td><td>NETDECIIDES</td></tr></table></td><td>NO</td></tr>
<tr><td>5 FAULT MODE=2</td><td>G20.4.5 / Fault Mode</td><td>0 to 2</td><td>It is used to select what has to do the drive in case of communication fault:
<table><tr><th>OPT</th><th>FUNCTION</th><th>DESCRIPTION</th></tr><tr><td>0</td><td>FAULT</td><td>Drive trips by fault F60.</td></tr><tr><td>1</td><td>IGNORE</td><td>The drive keeps operating despite communication loss.</td></tr><tr><td>2</td><td>PE BEHV</td><td>While the communication wire is not well connected, the drive is still tripping.</td></tr></table></td><td>YES</td></tr>
<tr><td>6 ASM- IN = 70</td><td>G20.4.6 / Input assembly</td><td>70
71
100
150
151
152</td><td>It is used to select, which input instance of the assembly object is to be used for the default data production of IO connection.
<table><tr><th>OPT</th><th>FUNCTION</th></tr><tr><td>70</td><td>Basic Speed Status</td></tr><tr><td>71</td><td>Extended Speed Status</td></tr><tr><td>100</td><td>Power Electronics Basic Status</td></tr><tr><td>150</td><td>Power Electronics Extended Status</td></tr><tr><td>151</td><td>Power electronics medium status</td></tr><tr><td>152</td><td>Power electronics customized status. The two first bytes are status bytes and the next nine registers are selectable. Configurable in parameters SV20.6.1 to SV20.6.9.</td></tr></table></td><td>YES</td></tr>
<tr><td>7 ASM- OUT=20</td><td>G20.4.7 / Output assembly</td><td>20
21
100</td><td>It is used to select, which output instance of the assembly object is to be used for the default data consumption of the IO connection
<table><tr><th>OPT</th><th>FUNCTIÓN</th></tr><tr><td>20</td><td>Basic Speed Control</td></tr><tr><td>21</td><td>Extended Speed Control</td></tr><tr><td>101</td><td>Power Electronics Basic Control</td></tr></table></td><td>YES</td></tr>
<tr><td>8 DNst = 0</td><td>G20.4.8 / DeviceNet State</td><td>0 a 4(Read only)</td><td>It is a read-only parameter, which value indicates the current state of DeviceNet communications.
<table><tr><th>OPT</th><th>DESCRIPTIÓN</th></tr><tr><td>0</td><td>Not used</td></tr><tr><td>1</td><td>Does not exist</td></tr><tr><td>2</td><td>MAC ID Duplicated</td></tr><tr><td>3</td><td>Online</td></tr><tr><td>4</td><td>Communications Fault</td></tr></table>On a switch on, the drive automatically enters into the MAC_ID_Duplicated check state. After the successful response to the duplicated MAC ID request messages (2 messages), the drive will enter into the Online state. There, the drive is ready to communicate within DeviceNet network by mean of explicit and I/O messages.

If the drive receives any duplicate MAC ID response message, while in Online state, it will switch over to Communications_Fault state. The drive will recover from this communication-faulted state by means of the offline connection set mechanism.

The SD700 DeviceNet stack can communicate with the other DeviceNet node which is present in the DeviceNet network through explicit or cyclic I/O messages.</td><td>YES</td></tr>
</table>

(*) **Note**: Available if G20.0.1 = 5 DeviceNet

4.20.1. Subgroup 20.5 – S20.5: OFC(*)

<table>
<tr><th>Parameter / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>1 B/R F.O =1 Mbps</td><td>G20.5.1 / Bus speed connected to drive</td><td>0 to 3</td><td>Choose these parameters according to bus speed:
<table><tr><th>OPTIONS</th><th>DESCRIPTION</th></tr><tr><td>0</td><td>125 Kbps</td></tr><tr><td>1</td><td>250 Kbps</td></tr><tr><td>2</td><td>500 Kbps</td></tr><tr><td>3</td><td>1 Mbps</td></tr></table></td><td>YES</td></tr>
</table>

(*) **Note**: Available if G20.0.1 = 6 OFC

4.20.2. Subgroup 20.6 – S20.6: Registers

Parameter / Default Value	Name / Description	Range	Function	Set on RUN
1 Reg01 = 40001	**G20.6.1** / Register 1	40001 to 45400	It allows the user to have the Modbus address that he wants in each register. In this way he will have consecutive Modbus addresses that are interesting for him and in this s way the communication will be optimal.	YES
2 Reg02 = 40001	**G20.6.2** / Register 2			
3 Reg03 = 40001	**G20.6.3** / Register 3			
4 Reg04= 40001	**G20.6.4** / Register 4			
.....	…….			
31 Reg31 = 40001	**G20.6.31** / Register 31			

4.20.3. Subgroup 20.7 – S20.7: Vis Regist

Parameter / Default Value	Name / Description	Range	Function	Set on RUN
1 Reg01 = 0	**G20.7.1** / Register 1	0 to 65535	It allows the user to view the values of the configured addresses in the subgroup 'G20.6 Registers'.	YES
2 Reg02 = 0	**G20.7.2** / Register 2			
3 Reg03 = 0	**G20.7.3** / Register 3			
4 Reg04= 0	**G20.7.4** / Register 4			
.....	…….			
31 Reg31 = 0	**G20.7.31** / Register 31			

4.21. Group 21 – G21: Networks

This parameter group is used to configure the drive when it should operate in Ethernet network.
Note: This parameter group and its corresponding subgroups will be only available when the Ethernet board is connected to the drive.

4.21.1. Subgroup 21.1 – S21.1: ETHERNET

This parameter subgroup is used to configure the identification parameters of the drive in the Ethernet network (IP, Subnet Mask, Gateway), and the MAC address.

Parameter / Default Value	Name / Description	Range	Function	Set on RUN
1 AUTOMATIC IP=Y	**G21.1.1** / To enable automatic assignation of parameters	N Y	It allows the possibility of assigning the parameters automatically. OPT. / FUNCTION N=NO: The drive will take IP, Subnet Mask and Gateway addresses set by user from subgroup S21.1. Y=YES: The drive request and receives the parameters of the IP, Subnet Mask and Gateway addresses from the Network Server. To achieve this, it is used DHCP protocol.	YES
Ixxx.yyy.zzz.hhh	Present IP address of the drive	-	It shows the IP address assigned to the drive automatically or set by the user from the parameters G21.1.2, G21.1.3, G21.1.4 and G21.1.5.	-
Sxxx.yyy.zzz.hhh	Present Subnet Mask of the drive	-	It shows the Subnet Mask address assigned to the drive automatically or set by the user from parameters G21.1.6, G21.1.7, G21.1.8 and G21.1.9.	-
Gxxx.yyy.zzz.hhh	Present Gateway of the drive	-	It shows de Gateway address assigned to the drive automatically or set by the user from parameters G21.1.10, G21.1.11, G21.1.12 and G21.1.13.	-
2 IP MANU. A=192[6]	**G21.1.2** / IP address (A)	0 to 255	Setting of the IP address assigned to the equipment in the local network of the user. This address must be provided by the network administrator of the own user. The format of the IP address is the following one: A.B.C.D. Therefore, the setting of this address is realized by introducing a value in each parameter that configures the complete address, this is, by assigning a value to each one of the 4 parameters (from parameter G21.1.2 to the parameter G21.1.5).	YES
3 IP MANU. B=168[6]	**G21.1.3** / IP address (B)	0 to 255		YES
4 IP MANU. C=1[6]	**G21.1.4** / IP address (C)	0 to 255		YES
5 IP MANU. D=143[6]	**G21.1.5** / IP address (D)	0 to 255		YES

Parameter / Default Value	Name / Description	Range	Function	Set on RUN
6 SUBNET A=255[6]	**G21.1.6** / Subnet Mask address (A)	0 to 255	Setting of the Subnet Mask address of the local network of the user. This address must be provided by the network administrator of the own user. The format of the Subnet Mask address is the following one: A.B.C.D. Therefore, the setting of this address is realized by introducing a value in each parameter that configures the complete address, this is, by assigning a value to each one of the 4 parameters (from parameter G21.1.6 to the parameter G21.1.9).	YES
7 SUBNET B=255[6]	**G21.1.7** / Subnet Mask address (B)	0 to 255		YES
8 SUBNET C=255[6]	**G21.1.8** / Subnet Mask address (C)	0 to 255		YES
9 SUBNET D=0[6]	**G21.1.9** / Subnet Mask address (D)	0 to 255		YES
10 GATEWAY A=0[6]	**G21.1.10 /** Gateway address (A)	0 to 255	Setting of the Gateway address of the local network of the user. This address is needed to the drive access to an external network. This address must be provided by the network administrator of the own user. The format of the Gateway address is the following one: A.B.C.D. Therefore, the setting of this address is realized by introducing a value in each parameter that configures the complete address, this is, by assigning a value to each one of the 4 parameters (from parameter G21.1.10 to the parameter G21.1.13).	YES
11 GATEWAY B=0[6]	**G21.1.11 /** Gateway address (B)	0 to 255		YES
12 GATEWAY C=0[6]	**G21.1.12 /** Gateway address (C)	0 to 255		YES
13 GATEWAY D=0[6]	**G21.1.13 /** Gateway address (D)	0 to 255		YES
14 MAC A=0	**G21.1.14 /** MAC address (A)	0 to 255	Setting of the MAC address. This address is unique and exclusive, and is associated to the LAN board / drive. It must be provided by Power Electronics. The format of the MAC address is the following one: A.B.C.D.E.F. This address should be unique and is assigned by the manufacturer. In case of Power Electronics: MAC A = 0 MAC B = 80 MAC C = 194 MAC D = 114 MAC E = X (any value from 0 to 255) MAC F = Y (any value from 0 to 255) **Note:** Check this during the trial run. If any part of the address does not match with the values above indicated, contact with Technical Department from Power Electronics which provides you with a MAC address and indicates you how to introduce it, in order to assure the correct operation.	YES
15 MAC B=80	**G21.1.15 /** MAC address (B)	0 to 255		YES
16 MAC C=194	**G21.1.16 /** MAC address (C)	0 to 255		YES
17 MAC D=114	**G21.1.17 /** MAC address (D)	0 to 255		YES
18 MAC E=X	**G21.1.18 /** MAC address (E)	0 to 255		YES
19 MAC F=Y	**G21.1.19 / MAC address (F)**	0 to 255		YES

[6] This parameters will be only available if 'G21.1.1 AUTOMATIC IP = N'.

4.21.2. Subgroup 21.2 – S21.2: MODBUS TCP

Parameter / Default Value	Name / Description	Range	Function	Set on RUN
1 MIPtout=OFF MODBUS TCP TOUT	**G21.2.1** / Communication timeout MODBUS TCP	OFF=0 to 600s	When the equipment is powered, if this parameter is set to OFF (this means, set to some value), the drive will wait for the first communication frame during one minute without considering the set value. If during this minute a Modbus request is produced by the Master, the equipment will response, and from this moment on, the time without communication will be the value set in this parameter, but if during the first minute the equipment does not receive any correct Modbus frame, the drive will trip because of communication fault. **Note:** Do not modify the value of this parameter if it is not necessary.	YES

ENGLISH

4.21.3. Subgroup 21.3 – S21.3: ETHER./IP

<table>
<tr><th>Parameter / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>1 CONTROL MODE=0</td><td>G21.3.1 / Control mode of the drive</td><td>0 – 2</td><td>This parameter allows setting how the drive will be controlled.
<table>
<tr><th>OPT.</th><th>DESCRIPTION</th><th>FUNCTION</th></tr>
<tr><td>0</td><td>LOCAL</td><td>The drive can be started and stopped like the equipment is not connected to the Ethernet network, this means, from the settings in G4.1.1 or G4.1.2.</td></tr>
<tr><td>1</td><td>NETWORK</td><td>The drive can only be controlled through the Ethernet/IP Client by means of the Ethernet board. In this case, the setting of G4.1.1 and G4.1.2 is ignored.</td></tr>
<tr><td>2</td><td>NET DECIDES</td><td>In this case, the Ethernet/IP Client, through the Ethernet board, will inform the drive all the time about who is controlling it.</td></tr>
</table></td><td>YES</td></tr>
<tr><td>2 REFEREN.MODE=0</td><td>G21.3.2 / Reference mode of the drive</td><td>0 – 2</td><td>This parameter allows setting from where the speed reference is provided to the drive.
<table>
<tr><th>OPT.</th><th>DESCRIPTION</th><th>FUNCTION</th></tr>
<tr><td>0</td><td>LOCAL</td><td>The drive will take the reference from parameters G3.1 or G3.2.</td></tr>
<tr><td>1</td><td>NETWORK</td><td>The reference will only be taken through the Ethernet/IP Client by means of the Ethernet board. In this case, the setting of G3.1 and G3.2 is ignored.</td></tr>
<tr><td>2</td><td>NET DECIDES</td><td>In this case, the Ethernet/IP Client, through the Ethernet board, will inform the drive all the time about who is providing the speed reference to it.</td></tr>
</table></td><td>YES</td></tr>
<tr><td>3 FAULT MODE = 2</td><td>G21.3.3 / Fault Mode</td><td>0 to 2</td><td>It is used to select what has to do the drive in case of communication fault:
<table>
<tr><th>OPT</th><th>FUNCTION</th><th>DESCRIPTION</th></tr>
<tr><td>0</td><td>FAULT</td><td>Drive trips by fault F60.</td></tr>
<tr><td>1</td><td>IGNORE</td><td>The drive keeps operating despite communication loss.</td></tr>
<tr><td>2</td><td>PE BEHV</td><td>While the communication wire is not well connected, the drive is still tripping.</td></tr>
</table></td><td>YES</td></tr>
</table>

4.22. Group 22 – G22: Rectifier

Parameter / Default Value	Name / Description	Range	Function	Set on RUN
1 Vdc REF= (*) **Vdc reference**	**G22.1** / Vdc reference	(*)	This parameter allows setting the DC bus voltage. A high Vdc could cause greater power losses and a high output dV/dt value. It is recommended to set it following the next equation: $Vdc_{REF}=Vin*\sqrt{2}*1.1$ The default value is AUTO, So that the drive chooses as the reference value the greatest value of these: $Vin*\sqrt{2}*1.1$ $V_{mot}*\sqrt{2}*1.05$ **Note:** (*)	YES
2 Cos phi=1 **CosPHI reference**	**G22.2** / CosPHI reference	0.9 – 1	This parameter allows setting the displacement power factor (cos PHI).	YES
3 CAP/IND=CAP **CosPHI CHAR**	**G22.3** / CosPHI characteristics	CAP – IND	This parameter allows the selection between capacitive or inductive cos PHI.	NO
4 FREQ RE=2800 **Rect.frequency**	**G22.4** / Rect. frequency	2000Hz – 3000Hz	This parameter allows setting the rectifier bridge IGBT switching frequency. It is recommended to keep factory settings.	NO
5 TIME OFF=0 **Delay OFF Rect.**	**G22.5** / Delay OFF Rect.	0s – 600s FIXED	This parameter permits to delay the rectifier bridge switching off. This parameter increases the dynamic response in applications with continuous start and stop commands (cranes, precision conveyors, etc.)	YES

Drive rated voltage (V)	Range (Vdc)
380Vac-480Vac	500Vdc – 825Vdc
525Vac	650Vdc – 900Vdc
690Vac	850Vdc – 1150Vdc

4.22.1. Subgroup 22.10 – S22.10: PID configuration

Parameter / Default Value	Name / Description	Range	Function	Set on RUN
1 Kp PLL=10.0 **PID Kp PLL**	**G22.10.1** / PID Kp PLL	0.0 – 100.0	Allows setting the PID proportional gain value of the PLL. (Rectifier bridge)	YES
2 Ki PLL=15.0 **PID Ki PLL**	**G22.10.2** / PID Ki PLL	0.0 – 100.0	Allows setting the PID integral gain value of the PLL. (Rectifier bridge)	YES
3 Kp Vdc=10.0 **PID Kp Vdc**	**G22.10.3** / PID Kp Vdc	0.0 – 100.0	Allows setting the PID proportional gain value of the bus voltage loop control. (Rectifier bridge)	YES
4 Ki Vdc=3.5 **PID Ki Vdc**	**G22.10.4** / PID Ki Vdc	0.0 – 100.0	Allows setting the PID integral gain value of the bus voltage loop control. (Rectifier bridge)	YES
5 Kp I=10.0 **PID Kp I**	**G22.10.5** / PID Kp I	0.0 – 100.0	Allows setting the PID proportional gain value of the current loop control. (Rectifier bridge)	YES
8 Ki I=10.0 **PID Ki I**	**G22.10.6** / PID Ki I	0.0 – 100.0	Allows setting the PID integral gain value of the current loop control. (Rectifier bridge)	YES

4.22.2. Subgroup 22.11 – S22.11: Protections

Parameter / Default Value	Name / Description	Range	Function	Set on RUN
5 I lim REC=1.5xIn	**G22.11.5 /** Current lim Rectifier	1xIn – 2xIn	This parameter allows stopping the drive by generating "R21 I LIMIT IN" fault when the input current value is above the threshold set in this parameter.	YES
6 T I Limit= OFF	**G22.11.6 /** Time Delay Current Limit Rect	0 to 60s OFF	This parameter allows setting the delay before the fault "R21 I LIMIT IN".	YES
7 I Imb=30.0%	**G22.11.7 /** Current Imbalance	OFF 00.0%-50.0%	This parameter allows stopping the drive by generating "R19 I IMB IN" fault when the inverse input current value is above the threshold set in this parameter.	YES
8 I Gnd=30.0%	**G22.11.8/** Ground current fault	OFF 00.0%-50.0%	This parameter allows stopping the drive by generating "R20 GRND INPUT" fault when the ground fault input current value is above the threshold set in this parameter.	YES

5. MODBUS COMMUNICATION

5.1. Supported Modbus Function Codes

Serial communications protocol provided by SD700FR drive adheres to Modbus Industrial standard communications protocol of Modicon. The drive uses reading and writing functions between all of the functions that exist in Modbus protocol. The used functions by the drive are the following ones:

Function	Description	Registers Number
3	Registers Reading	120
16	Registers Writing	120

The implementation of this function code in the drive allows reading up to 120 registers into a Parameters Group in a frame. If you want to access to a consecutive memory registers, but belonging to different groups, you should access in so many frames as groups are involved.

5.1.1. Modbus Function Code Nº 3: Registers Reading

This function code allows the Modbus controller (master) to read the content of the data registers indicated in the drive (slave). This function code only admits unicast addressing. Broadcast or groupcast addressing are not possible with this function code.

The implementation of this function code in the drive allows reading up to 120 registers with consecutive addresses of the drive in a single frame.

Next, a frame is shown where the master tries to read the content of 3 registers of a drive where the current used by each phase is. The information that should be attached in the ask frame is the following one:

- Data address of the drive.
- Modbus function code (3 Registers reading).
- Starting Data address.
- Registers number for reading.
- CRC-16 code.

The answer of the drive (slave) should contain the following fields:

- Data address of the slave.
- Modbus function code (3 Registers reading).
- Bytes number for reading.
- Bytes number / 2 registers.
- CRC-16 code.

Each register consists of 2 bytes (2x8bits=16 bits). This one is the default length of all of the registers that form the SD700FR.

5.1.1.1. Operation Example of Modbus Function Code Nº 3 (Registers Reading)

We suppose that we want to read the motor current (nameplate data) via communications. This data corresponds to the parameter G2.1 '1 MTR CUR=00.00A'. The frame that should be transmitted is:

Modbus Address	Modbus Function Code	Starting Data Address (40282)	Registers Number	CRC-16
0x0A	0x03	0x0119	0x0001	0x2493

We suppose that instantaneous current of the equipment is 8,2 A. (Modbus value 82 decimal = 0x52 Hexadecimal). The answer of the slave will be:

Modbus Address	Modbus Function Code	Bytes Number	Data (address 20) (=110)	CRC-16
0x0A	0x03	0x02	0x0052	0x9C78

5.1.2. Modbus Function Code Nº 16: Registers Writing

This function code allows the Modbus controller (master) to write the content of the data registers indicated in the drive (slave), whenever those registers are not of Read only. Registers writing by the master does not impede the later modification of those registers by the slave.
The implementation of this function code in the drive allows writing up to 5 registers of the drive in a single frame.

Next, a frame is shown where the master tries to write the content of 1 register that stores the acceleration time. The information that should be attached in the ask frame is the following one:

- Data address of the slave.
- Modbus function code (16 Registers writing).
- Starting Data Address.
- Registers number for writing.
- Bytes number for writing.
- Content of registers for writing.
- CRC-16 code.

The answer of the slaves includes:

- Data address of the slave.
- Modbus function code (16 Registers writing).
- Starting Data Address.
- Written registers number.
- CRC-16 code.

5.2. Addressing Modes

5.2.1. Broadcast Addressing Mode

Broadcast addressing mode allows the master to access at the same time to all of the slaves connected to the Modbus network. The Modbus function code that admits this global addressing mode is:

Function	Description
16	Registers Writing

In order to access to all of the equipments connected in a Modbus network, you must use the address 0.
When this address is used, all of the slaves in the Modbus network make the required task but they do not prepare any answer.

5.3. Remote Control Functions

HOST START CONTROL

Screen	-
Range	0 – 1
Modbus address	**40562**
Modbus range	0 to 1
Read / Write	YES
Description	It allows giving the start command to the equipment through communications network.

HOST STOP CONTROL

Screen	-
Range	0 – 1
Modbus address	**40563**
Modbus range	0 to 1
Read / Write	YES
Description	It allows giving the stop command to the equipment through communications network.

HOST RESET CONTROL

Screen	-
Range	0 – 1
Modbus address	**40564**
Modbus range	0 to 1
Read / Write	YES
Description	It allows giving the reset command to the equipment through communications network.

HOST TRIP CONTROL

Screen	-
Range	0 – 1
Modbus address	**40565**
Modbus range	0 to 1
Read / Write	YES
Description	It allows the equipment to generate a fault through communications network.

HOST COMMS CONTROL

Screen	-
Range	-20480 to +20480
Modbus address	**40128**
Modbus range	-20480 to +20480
Read / Write	YES
Description	It allows the assignment of the speed reference through communications network.

5.4. Summary of Modbus Addresses

5.4.1. Modbus Register 'GENERAL STATUS'

This register supplies information about the general status of the drive, as the following table shows:

Modbus Address	Bit	Description	Meaning on '0'	Meaning on '1'
40558	0	RUN	Drive stopped	Drive running
	1	FAULT	No Fault	Fault
	2	WARNING	No Warning	At least one warning present
	3	READY	The drive is not ready to start (any fault or warning is present)	The drive is ready to start (no fault and no warning)
	4	EXTERNAL POWER SUPPLY	The drive is powered through internal power supply	The drive is powered through external power supply
	5	DELAYING START	Not delaying start	Delaying start
	6	MOTOR OVERLOAD	Motor overload warning (MOL) is not active	Motor overload warning (MOL) is active
	7	MOTOR OVERLOAD FAULT	Motor overload fault (F25) is not present	Motor overload fault (F25) is present
	8	RESERVED	Reserved	Reserved
	9	DRIVE AT SET SPEED	Motor speed is different to the reference speed	Motor speed has reached the value set as reference
	10	CURRENT LIMIT	Current limitation warning (ILT) is not present	Current limitation warning (ILT) is present
	11	VOLTAGE LIMIT	Voltage limitation warning (VLT) is not present	Voltage limitation warning (VLT) is present
	12	TORQUE LIMIT	Torque limitation warning (TLT) is not present	Torque limitation warning (TLT) is present
	13	COMPARATOR 1	Comparator 1 is 'OFF'	Comparator 1 is 'ON'
	14	COMPARATOR 2	Comparator 2 is 'OFF'	Comparator 2 is 'ON'
	15	COMPARATOR 3	Comparator 3 is 'OFF'	Comparator 3 is 'ON'

5.4.2. Programming Parameters

Parameter	Screen	Description	Address	Range	Modbus Range
G1.1	1 LOCK PARMTRS=0	Parameter lock	-	0 to 2	0 to 2
G1.2	2 PASSWORD_=OFF	Access password	-	OFF, 0000 to 9999	-
G1.2b	3 PSW ERR=XXXX	Unlock password recovery	-	0000 to 9999	-
G1.4	4 LANG=ESPANOL	Language selection	-	ENGLISH ESPANOL DEUTSCH PORTUGE	0 to 3
G1.5	5 INITIALISE=0	Parameter initialize	-	0 to 5	0 to 5
G1.6	6 SHORT Menu=NO	To hide some configuration menus	-	NO YES	0 to 1
G1.7	7 PROG= STANDARD	Program activation	-	STANDARD PUMP	0 to 1
SV1.8					
G1.11	11 FAN CTRL=RUN	Drive fan control mode	**40549**	RUN TEMP FIXED	0 to 2
G1.14	14 SER GRP PWD = OFF	Group reserved for the Technical Service			
G1.10.1	1 UPLOAD=N	Save parameters from drive to display.		NO YES	0 to 1
G1.10.2	2 DOWNLOAD=N	Save parameters from drive to display.		NO YES	0 to 1
G2.1	1 MTR CUR=00.00A	Motor rated current	**40282**	1 to 9999A	1638 to 12288
G2.2	2 MTR VOLT=400V	Motor rated voltage	**40283**	220 to 999V	220 to 999
G2.3	3 MTR PWR=00.0kW	Motor rated power	**40285**	0 to 6500kW	0 to 65000
G2.4	4 MTR RPM=1485	Motor rpm	**40286**	0 to 24000 rpm	0 to 24000
G2.5	5 MTR PFA=0.84	Cosine Phi	**40288**	0 to 0.99	0 to 99
G2.6	6 MTR FRQ=50Hz	Motor rated frequency	**40284**	0 to 100Hz	0 to 100
G2.7	7 MTR COOLN=63%	Motor cooling at zero speed	**40287**	OFF; 5 to 100%	8274; 410 to 8192
G3.1	1 REF1 SPD=LOCAL	Reference source 1 of speed	**40122**	NONE AI1 AI2 AI1+AI2 FIB_1 LOCAL MREF PMOT PID COMMS FIB_2	0 to 10
G3.2	2 REF2 SPD=LOCAL	Reference source 2 of speed	**40123**	NONE AI1 AI2 AI1+AI2 FIB_1 LOCAL MREF PMOT PID COMMS FIB_2	0 to 10
G3.3	3 LOCAL SP=+100%	Local Speed Reference	**40124**	-250 to +250%	-20480 to + 20480
G3.4	4 REF1 TQ = LOCAL	Torque reference supply 1	**40125**	NONE AI1 AI2 AI1+AI2 FIB_1 LOCAL MREF PMOT PID COMMS FIB_2	0 to 10

Parameter	Screen	Description	Address	Range	Modbus Range
G3.5	5 REF2 TQ = NONE	Torque reference supply 2	**40126**	NONE AI1 AI2 AI1+AI2 FIB_1 LOCAL MREF PMOT PID COMMS FIB_2	0 to 10
G3.6	6 TQ = +100%	Torque local reference	**40127**	-250 to +250%	-20480 to +20480
G4.1.1	1 CNTROL MODE1=1	Main Control Mode	**40040**	0 to 4	0 to 4
G4.1.2	2 CNTROL MODE2=2	Alternative Control Mode	**40041**	0 to 4	0 to 4
G4.1.3	3 RESET MODE=Y	Reset from keypad	**40039**	N Y	0 to 1
G4.1.4	4 DIGIT I MODE=1	Selection of Digital Inputs configuration	**40038**	0 to 5	0 to 5
G4.1.5	5 DIGITL IN 1=06	Multi-function Digital Input 1 configuration	**40032**	00 to 75	0 to 75
G4.1.6	6 DIGITL IN 2=00	Multi-function Digital Input 2 configuration	**40033**	00 to 75	0 to 75
G4.1.7	7 DIGITL IN 3=00	Multi-function Digital Input 3 configuration	**40034**	00 to 75	0 to 75
G4.1.8	8 DIGITL IN 4=00	Multi-function Digital Input 4 configuration	**40035**	00 to 75	0 to 75
G4.1.9	9 DIGITL IN 5=00	Multi-function Digital Input 5 configuration	**40036**	00 to 75	0 to 75
G4.1.10	10 DIGITL IN6=17	Multi-function Digital Input 6 configuration	**40037**	00 to 75	0 to 75
G4.2.1	1 SENSOR 1 ?=N	To enable sensor of Analogue Input 1	**40268**	N Y	0 to 1
G4.2.2	2 SENSOR 1=l/s	Selection of sensor 1 units	**40272**	% l/s m³/s l/m m³/m l/h m³/h m/s m/m m/h Bar kPa Psi m ºC ºF ºK Hz rpm	0 to 18
G4.2.3	3 AIN1 FORMAT=V	Analogue Input 1 format	**40264**	V mA	0 to 1
G4.2.4	4 INmin1=+0V	Minimum range of Analogue Input 1	**40248**	-10V to G4.2.6 +0mA to G4.2.6	-10000 to +10000 0 to +20000
G4.2.5	5 Smi1=+0.0l/s	Minimum range of sensor 1	**40254**	-3200 to G4.2.7 Engineering Units	-32000 to +32000
G4.2.6	6 INmax1=+10V	Maximum range of Analogue Input 1	**40244**	G4.2.4 to +10V G4.2.4 to +20mA	-10000 to +10000 0 to +20000
G4.2.7	7 Sma1=+10.0l/s	Maximum range of sensor 1	**40250**	G4.2.5 to +3200 Engineering Units	-32000 to +32000
G4.2.8	8 SPD LO1=+0%	Speed for the minimum range of Analogue Input 1	**40246**	-250% to G4.2.9	-20480 to +20480
G4.2.9	9 SPD HI1=+100%	Speed for the maximum range Analogue Input 1	**40242**	G4.2.8 to +250%	-20480 to +20480
G4.2.14	14 AIN1 LOSS=N	Protection for Analogue Input 1 loss	**40266**	N Y	0 to 1
G4.2.15	15 1_Z BAND=OFF	Zero band filter for Analogue Input 1	**40270**	OFF = 0.0; 0.1 to 2.0%	9 to 163
G4.2.16	16 FILTER1=OFF	Low Pass filter for Analogue Input 1	**40274**	OFF = 0.0; 0.1 to 20.0%	0 to 200
G4.3.1	1 SENSOR 2 ?=N	Sensor of Analogue Input 2 enable	**40269**	N Y	0 to 1

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Parameter	Screen	Description	Address	Range	Modbus Range
G4.3.2	2 SENSOR 2=Bar	Selection of sensor 2 units	**40273**	% l/s m³/s l/m m³/m l/h m³/h m/s m/m m/h Bar kPa Psi m ºC ºF ºK Hz rpm	0 to 18
G4.3.3	3 AIN2 FORMAT=mA	Analogue Input 2 format	**40265**	V mA	0 to 1
G4.3.4	4 INmin2=+4mA	Minimum range of Analogue Input 2	**40249**	-10V to G4.3.6 +0mA to G4.3.6	-10000 to +10000 0 to +20000
G4.3.5	5 Smi2=+0.0Bar	Minimum range of sensor 2	**40255**	-3200 to G4.3.7 Engineering Units	-32000 to +32000
G4.3.6	6 INmax2=+20mA	Maximum range of Analogue Input 2	**40245**	G4.3.4 to +10V G4.3.4 to +20mA	-10000 to +10000 0 to +20000
G4.3.7	7 Sma2=+10.0Bar	Maximum range of sensor 2	**40251**	G4.3.5 to +3200 Engineering Units	32000 to +32000
G4.3.8	8 SPD LO2=+0%	Speed for the minimum range of Analogue Input 2	**40247**	-250% to G.4.3.9	-20480 to +20480
G4.3.9	9 SPD HI2=+100%	Speed for the maximum range of Analogue Input 2	**40243**	G4.3.8 to +250%	-20480 to +20480
G4.3.10	10 FB2 = 0.0Bar	Minimum operating range of sensor	**40257**	-3200 to G4.3.12	-32000 to +32000
G4.3.11	11 FB2 – Sp = 0%	Minimum speed range for sensor in open loop	**40261**	-250% to +250%	-250 to +250
G4.3.12	12 FA2 = +10.0Bar	Maximum operating range of sensor	**40253**	G4.3.10 to +3200	-32000 to +32000
G4.3.13	13 FA2 – SP = 100%	Maximum speed range of sensor in open loop	**40259**	-250% to +250%	-250 to +250
G4.3.14	14 AIN2 LOSS=N	Protection for Analogue Input 2 loss	**40267**	N or Y	0 to 1
G4.3.15	15 2_Z BAND=OFF	Zero band filter for Analogue Input 2	**40271**	OFF=0.0; 0.1 to 2.0%	9 to 163
G4.3.16	16 FILTER2=OFF	Low Pass filter for Analogue Input 2	**40275**	OFF = 0.0; 0.1 to 20.0%	0 to 200
G4.4.1	1 Sensr U=l/s	Sensor units of Pulse Input	**40581**	% l/s m³/s l/m m³/m l/h m³/h m/s m/m m/h	0 to 9
G4.4.2	2 Pls/s = 100l/s	Flowmeter configuration	**40582**	0 to 32760 Flow Units	0 to 32760
G4.4.3	3 M Rn=1000l/s	Maximum range of flow meter	**40583**	0 to 32760 Flow Units	0 to 32760
G4.6.1	1 FIBER MODE = 0	Fiber Mode	**41251**	0 to 2	0 to 2
G4.6.3.5	5 CONTROL=0	Control	**41254**	0 to 2	0 to 2
G4.6.3.6	6 FAULT=0	Fault (Master)	**41255**	0 to 1	0 to 1
G4.6.3.7	7 SPIN STP=0	Spin stop (slave)	**41256**	0 to 1	0 to 1
G4.6.5	5 T/O F.O = 0	Time out optical fiber (slave)	**41253**	OFF, 0.10 to 9.99	0 to 10
G5.1	1 ACC1=5.0%/s	Acceleration ramp 1	**40392**	0.01 to 650% / sec	20 to 65000
G5.2	2 DECEL1=1.0%/s	Deceleration ramp 1	**40394**	0.01 to 650% / sec	20 to 65000
G5.3	3 ACC2=10.0%/s	Acceleration ramp 2	**40393**	0.01 to 650% / sec	20 to 65000
G5.4	4 DECEL2=10.0%/s	Deceleration ramp 2	**40395**	0.01 to 650% / sec	20 to 65000
G5.5	5 BRK ACC=OFF	Speed for acceleration ramp change	**40396**	OFF; 0 to 250%	0 to 20480
G5.6	6 BRK DEC=OFF	Speed for deceleration ramp change	**40397**	OFF; 0 to 250%	0 to 20480
G5.7	7 MPT INC1=1.0%/s	Ramp 1 of reference increase for motorized pot.	**40400**	0.01 to 650% / sec	10 to 65000
G5.8	8 MPT DEC1=3.0%/s	Ramp 1 of reference decrease for motorized pot.	**40399**	0.01 to 650% / sec	10 to 65000
G5.9	9 MPT INC2=1.0%/s	Ramp 2 of reference increase for motorized potentiometer	**40398**	0.01 to 650% / sec	10 to 65000
G5.10	10 MPT DEC2=3.0%/s	Ramp 2 of reference decrease for motorized potentiometer	**40401**	0.01 to 650% / sec	10 to 65000

Parameter	Screen	Description	Address	Range	Modbus Range
G5.11	11 MPOT BRK = OFF	Speed for ramp change with motorized pot.	**40402**	OFF=0 to 250%	0 to 20480
G5.12	12 SP FLT=OFF	Time constant to filter the speed	**40403**	OFF, 0.0 to 80.0%	0 to 60000
G6.1	1 SEL REF=MREF	Source selection for introducing reference signal	**40142**	NONE AI1 AI2 RESERV MREF LOCAL locPID COMMS	0 to 7
G6.2	2 PID LOC=+0.0%	PID local reference	**40149**	+0.0% to +400%	0 to 32760
G6.3	3 SEL FBK=AI2	Selection of feedback signal source	**40143**	NONE AI1 AI2 AI1+AI2 COMMS MtrTrq AbsMTq Mtr I. MtrPwr BUSVdc PhiCos	0 to 10
G6.4	4 GAIN Kp=8.0	Proportional gain of PID control	**40144**	0.1 to 20	1 to 200
G6.5	5 INTEGRAL = 0.1s	Integration time of PID control	**40145**	0.0 to 1000s; Max	0 to 10000; 10001
G6.6	6 DIFFEREN = 0.0s	Derivation time of PID control	**40146**	0.0 to 250s	0 to 2500
G6.7	7 INVERT PID=N	PID output inversion	**40147**	N Y	0 to 1
G6.8	8 Filt FB = OFF	Low pass filter	**40150**	OFF, 0 to 20s	0 to 200
G6.9	9 ERR PID = +0.0%	PID control error	**40148**	-400% to 400%	-32768 to 32767
G7.1	1 STOP 1 = RAMP	Stop mode 1	**40003**	RAMP SPIN	0 to 1
G7.2	2 STOP 2 = SPIN	Stop mode 2	**40004**	RAMP SPIN	0 to 1
G7.3	3 BRK STP 2 = OFF	Changing speed for stop mode	**40005**	OFF=0 to 250%	0 to 20480
G7.4	4 START = RAMP	Start mode	**40002**	RAMP SPIN SPIN2	0 to 2
G7.5	5 START 2=RAMP	Start mode 2	**40015**	RAMP SPIN SPIN2	0 to 2
G7.6	6 STAR DLY = OFF	Start delay time	**40006**	OFF=0 to 6500s	0 to 65000
G7.7	7 STOP DLY = OFF	Stop delay time	**40007**	OFF=0 to 6500s	0 to 65000
G7.8	8 STP MIN SP = N	Minimum stop speed	**40008**	N Y	0 to 1
G7.9	9 OFFdly = OFF	Delay time between stop and next start	**40014**	OFF=0.000 to 10.0s	0 to 10000
G7.10	10 RUN AFTR VFL = Y	Run after occurring power loss	**40009**	N Y	0 to 1
G7.11	11 SPNstr B = OFF	Accuracy setting for Starting by Spin	**40017**	OFF=0; 1 to 100%	0 to 1000
G7.12	12 OFFdly2 = OFF	Delay time for start command after stop	**40031**	OFF=0; 0.1 to 6500.0s	0 to 65000
G7.13	13 STR AFT RST=Y	Starting after fault reset with start command	**40010**	N Y	0 to 1
G7.14	14 RPWr OFF = OFF	Power Off Delay	**41852**	OFF, 0.001 to 9.99	0-9990
G7.15	15 MagneT = OFF	Magnetization time	**40404**	OFF, 0.001 to 9.99	0-9990
G7.16	16 RetATR = 0.01	Start Delay after Reset.	**41561**	OFF, 0.001 to 9.99	0-9990
G8.1.1	1 SEL RELAY 1=02	Selection of Relay 1 control source	**40362**	00 to 45	0 to 45
G8.1.2	2 T R1 ON=0.0s	ON delay time for Relay 1	**40363**	0.0 to 999s	0 to 9999
G8.1.3	3 T R1 OFF=0.0s	OFF delay time for Relay 1	**40364**	0.0 to 999s	0 to 9999
G8.1.4	4 INVERT REL1=N	Relay 1 inversion	**40365**	N Y	0 to 1
G8.1.5	5 SEL RELAY 2=03	Selection of Relay 2 control source	**40366**	00 to 45	0 to 45
G8.1.6	6 T R2 ON=0.0s	ON delay time for Relay 2	**40367**	0.0 to 999s	0 to 9999
G8.1.7	7 T R2 OFF=0.0s	OFF delay time for Relay 2	**40368**	0.0 to 999s	0 to 9999
G8.1.8	8 INVERT REL2=N	Relay 2 inversion	**40369**	N Y	0 to 1
G8.1.9	9 SEL RELAY 3=05	Selection of Relay 3 control source	**40370**	00 to 45	0 to 45
G8.1.10	10 T R3 ON=0.0s	ON delay time for Relay 3	**40371**	0.0 to 999s	0 to 9999
G8.1.11	11 T R3 OFF=0.0s	OFF delay time for Relay 3	**40372**	0.0 to 999s	0 to 9999
G8.1.12	12 INVERT REL3=N	Relay 3 inversion	**40373**	N Y	0 to 1

Parameter	Screen	Description	Address	Range	Modbus Range
G8.1.13	13 CRAspdOF=+5.0%	Speed for disconnecting relay in option Crane	**40597**	+0.0% to +250%	0 to 20480
G8.1.34	34 Dig Out FB = DO1	Digital Output Feedback	**41155**	DO1 DO2 DO3	0 to 2
G8.1.35	35 DlyDoFB = 1.0s	Delay Digital Output Feedback	**41156**	0.5 to 60.0s	5 to 600
G8.1.36	36 FAULT1 = OFF	Closure of Digital Output "FAULT1"	**41151**	0 to 90	0 to 90
G8.1.37	37 FAULT2 = OFF	Closure of Digital Output "FAULT2"	**41152**	0 to 90	0 to 90
G8.1.38	38 FAULT3 = OFF	Closure of Digital Output "FAULT3"	**41153**	0 to 90	0 to 90
G8.1.39	39 FAULT4 = OFF	Closure of Digital Output "FAULT4"	**41154**	0 to 90	0 to 90
G8.2.1	1 ANLG OUT1=01	Mode selection for Analogue Output 1	**40342**	00 to 27	0 to 27
G8.2.2	2 FORMT 1=4-20 mA	Format selection for Analogue Output 1	**40343**	0-10V ±10V 0-20mA 4-20mA	0 to 3
G8.2.3	3 MIN1 RNG=+0%	Low of range selection Analogue Output 1	**40344**	-250% to +250%	-20480 to +20480
G8.2.4	4 MAX1 RNG=+100%	High range selection of Analogue Output 1	**40345**	-250% to +250%	-20480 to +20480
G8.2.5	5 FILTER 1=OFF	Filter selection for Analogue Output 1	**40346**	OFF= 0.0 to 20.0s	0 to 200
G8.2.6	6 ANLG OUT 2=02	Mode selection Analogue Output 2	**40347**	00 to 27	0 to 27
G8.2.7	7 FORMT 2=4-20 mA	Format selection for Analogue Output 2	**40348**	0-10V ±10V 0-20mA 4-20mA	0 to 3
G8.2.8	8 MIN2 RNG=+0%	Low range selection of Analogue Output 2	**40349**	-250% to +250%	-20480 to +20480
G8.2.9	9 MAX2 RNG=+100%	High range selection of Analogue Output 2	**40350**	-250% to +250%	-20480 to +20480
G8.2.10	10 FILTER 2=OFF	Filter selection for Analogue Output 2	**40351**	OFF=0.0 to 20.0s	0 to 200
G9.1.1	1 COMP 1 SEL=00	Source selection for Comparator 1	**40302**	00 to 22	0 to 22
G9.1.2	2 COMP 1 TYPE=0	Comparator 1 type selection	**40303**	0 to 1	0 to 1
G9.1.3	3 SP C1 ON=+100[%]	Activation value of Comparator 1 in Normal mode	**40305**	-250% to +250%	-20480 to +20480
G9.1.4	4 LIM 2 C1=+100[%]	Limit 2 for Comparator 1 in Window mode	**40305**	-250% to +250%	-20480 to +20480
G9.1.5	5 LIM 1 C1=+0[%]	Limit 1 for Comparator 1 in Window mode	**40304**	-250% to +250%	-20480 to +20480
G9.1.6	6 T C1 ON=0.0s	ON delay time for Comparator 1	**40306**	0.0 to 999s	0 to 9999
G9.1.7	7 SP C1 OF=+0[%]	Deactivation value of Comparator 1 in Normal mode	**40304**	-250% to +250%	-20480 to +20480
G9.1.8	8 T C1 OF=0.0s	OFF delay time for Comparator 1	**40307**	0.0 to 9999s	0 to 99999
G9.1.9	9 SEL FUNT C1=00	Selection of output function for Comparator 1	**40308**	00 to 15	0 to 15
G9.2.1	1 COMP 2 SEL=00	Source selection for Comparator 2	**40311**	00 to 22	0 to 22
G9.2.2	2 COMP 2 TYPE=0	Comparator 2 type selection	**40312**	0 to 1	0 to 1
G9.2.3	3 SP C2 ON=+100[%]	Activation value of Comparator 2 in Normal mode	**40314**	-250% to +250%	-20480 to +20480
G9.2.4	4 LIM 2 C2=+100[%]	Limit 2 for Comparator 2 in Window mode	**40314**	-250% to +250%	-20480 to +20480
G9.2.5	5 LIM 1 C2=+0[%]	Limit 1 for Comparator 2 in Window mode	**40313**	-250% to +250%	-20480 to +20480
G9.2.6	6 T C2 ON=0.0s	ON delay time for Comparator 2	**40315**	0.0 to 999s	0 to 9999
G9.2.7	7 SP C2 OF=+0[%]	Deactivation value of Comparator 2 in Normal mode	**40313**	-250% to +250%	-20480 to +20480
G9.2.8	8 T C2 OF=0.0s	OFF delay time for Comparator 2	**40316**	0.0 to 9999s	0 to 99999
G9.2.9	9 SEL FUNT C2=00	Selection of output function for Comparator 2	**40317**	00 to 15	0 to 15
G9.3.1	1 COMP 3 SEL=00	Source selection for Comparator 3	**40320**	00 to 22	0 to 22
G9.3.2	2 COMP 3 TYPE=0	Comparator 3 type selection	**40321**	0 to 1	0 to 1
G9.3.3	3 SP C3 ON=+100[%]	Activation value of Comparator 3 in Normal mode	**40323**	-250% to +250%	-20480 to +20480
G9.3.4	4 LIM 2 C3=+100[%]	Limit 2 for Comparator 3 in Window mode	**40323**	-250% to +250%	-20480 to +20480
G9.3.5	5 LIM 1 C3=+0[%]	Limit 1 for Comparator 3 in Window mode	**40322**	-250% to +250%	-20480 to +20480
G9.3.6	6 T C3 ON=0.0s	ON delay time for Comparator 3	**40324**	0.0 to 999s	0 to 9999
G9.3.7	7 SP C3 OF=+0[%]	Deactivation value of Comparator 3 in Normal mode	**40322**	-250% to +250%	-20480 to +20480
G9.3.8	8 T C3 OF=0.0s	OFF delay time for Comparator 3	**40325**	0.0 to 9999s	0 to 99999
G9.3.9	9 SEL FUNT C3=00	Selection of output function for Comparator 3	**40326**	00 to 15	0 to 15
G10.1	1 MIN1 SP=+0.00%	Minimum speed limit 1	**40102**	-250% to Max. speed 1	-20480 to G10.2

Parameter	Screen	Description	Address	Range	Modbus Range
G10.2	2 MAX1 SP=+100%	Maximum speed limit 1	**40104**	Min. speed 1 to +250%	G10.1 to 20480
G10.3	3 MIN2 SP=-100%	Minimum speed limit 2	**40103**	-250% to Max. speed 2	-20480 to G10.4
G10.4	4 MAX2 SP=+100%	Maximum speed limit 2	**40105**	Min. speed 2 to +250%	G10.3 to 20480
G10.5	5 I LIMIT=___A	Current limit	**40106**	0.25 to 1.50In, OFF	2048 to 12291
G10.6	6 I LIM TO= OFF	Trip time because of current limit	**40453**	0 to 60s, OFF	0 to 600; 610
G10.7	7 I. MAX2=____A	Alternative current limit	**40109**	0.25 to 1.50In, OFF	2048 to 12291
G10.8	8 MI2 brSP=OFF	Change speed for Imax 2	**40110**	OFF=0%; +1 to +250%	0 to 20480
G10.9	9 MAX TOR=+150%	Torque limit	**40107**	0 to +250%	0 to +20480
G10.10	10 T LIM TO=OFF	Trip time because of torque limit	**40455**	0 to 60s, OFF	0 to 600; 610
G10.11	11 INVERSION ?=N	To enable speed inversion	**40108**	N Y	0 to 1
G10.14	14 T/I LIM SP = N	Torque limit algorithm	**41864**	N Y	0 to 1
G10.15	15 Rg TQ L = 150%	Torque limit range	**41866**	0 to 250%	0 to 20480
G11.1	1 SP LIM TO=OFF	Trip time because of speed limit	**40452**	0.1 to 60s, OFF	0.1 to 600, 610
G11.2	2 STOP TO=OFF	Maximum time for stop limit	**40454**	OFF=0.0 to 999s	0 to 9999
G11.3	3 GND I LIMIT=10%	Ground fault detection	**40456**	OFF, 0 to 30% In	0 to 2458
G11.4	4 LOW VOLT=360V	Low input voltage level	**40457**	323 to 425V 586 to 621V	400V ➔ 3230 to 4250 690V ➔ 5860 to 6210
G11.5	5 LOW V TO=5s	Trip time because of low input voltage	**40458**	0.0 to 60s, OFF	0 to 600; 610
G11.6	6 HIGH VOLT=500V	High input voltage level	**40459**	418 to 587V 726 to 759V	400V ➔ 4180 to 5870 690V ➔ 7260 to 7590
G11.7	7 HI V TO=5s	Trip time because of high input voltage	**40460**	0.0 to 60s, OFF	0 to 600; 610
G11.8	8 Dlasy VO = 5s	Trip delay time due to output voltage imbalance	**40463**	0.0s to 10s; OFF	0 to 100; 101
G11.9	9 LOW V BHV=1	Performance in case of input power loss	**40461**	1 to 3	1 to 3
G11.10	10 PTC EXT ?=N	PTC motor option	**40462**	N Y	0 to 1
G11.11	11 PUMP OV=20.0A	Pump overload level	**40289**	0.0 to 3000A	0 to 30000
G11.12	12 PMovl FIL=OFF	Filter for pump overload	**40290**	OFF=0; 0.1 to 20.0s	0 to 200
G11.13	13 Povl DLY=OFF	Trip delay time because of pump overload	**40291**	OFF=0; 1 to 999.9s	0 to 9999
G11.14	14 UNDERLOAD=N	To enable underload protection	**42085**	N Y	0 to 1
G11.15	15 ULD CUR=___A	Underload current	**42086**	(0.2 to 1.50)·In	0 to 12288
G11.16	16 ULD SPD=+100%	Underload speed	**42087**	+0.1% to +250%	0.1 to 20480
G11.17	17 ULD DELY=10s	Delay time to activate underload protection	**42088**	0 to 999s	0 to 9999
G11.18	18 DEC.SPdly=OFF	Speed decreasing delay time	**40599**	OFF=0, 1 to 10s	0, 1 to 10
G11.19	19 Sp.SRCH.I =10%	Increasing of speed searching	**40464**	2 to 40%·In	164 to 3276
G11.21	21 Vc Min. T = OFF	Minimum speed limit	**40466**	0.1 to 60.0, OFF	0.1 to 610
G11.22	22 Rdsq Is = 5.0s	Sets delay time before the trip.	40467	0.0 to 10.0, OFF	0 to 101
G12.1	1 AUTO RESET=N	Auto Reset	**40571**	N Y	0 to 1
G12.2	2 ATTEMP NUMBR=1	Number of Auto Reset attempts	**40572**	1 to 5	1 to 5
G12.3	3 R STR DEL=5s	Delay time before Auto Reset	**40573**	5 to 120s	5 to 120
G12.4	4 RS COUNT=15min	Reset time counter of Auto Reset attempts	**40574**	1 to 60min	1 to 60
G12.5	5 F1 AUTO RST=0	Selection of fault 1 to be reset	**40575**	0 to 27	0 to 27
G12.6	6 F2 AUTO RST=0	Selection of fault 2 to be reset	**40576**	0 to 27	0 to 27
G12.7	7 F3 AUTO RST=0	Selection of fault 3 to be reset	**40577**	0 to 27	0 to 27
G12.8	8 F4 AUTO RST=0	Selection of fault 4 to be reset	**40578**	0 to 27	0 to 27
G13.1	1 F0 NO FAULT	Register 1 of fault history	**40432**	-	-
G13.2	2 F0 NO FAULT	Register 2 of fault history	**40433**	-	-
G13.3	3 F0 NO FAULT	Register 3 of fault history	**40434**	-	-
G13.4	4 F0 NO FAULT	Register 4 of fault history	**40435**	-	-
G13.5	5 F0 NO FAULT	Register 5 of fault history	**40436**	-	-
G13.6	6 F0 NO FAULT	Register 6 of fault history	**40437**	-	-
G13.7	7 CLEAR FAULTS=N	G13.7 / Erase fault history	**40438**	N or Y	0 to 1
G14.1	1 MREF 1=+10.0%	Multi-reference 1	**40052**	-250% to +250%	-20480 to +20480
G14.2	2 MREF 2=+20.0%	Multi-reference 2	**40053**	-250% to +250%	-20480 to +20480
G14.3	3 MREF 3=+30.0%	Multi-reference 3	**40054**	-250% to +250%	-20480 to +20480

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Parameter	Screen	Description	Address	Range	Modbus Range
G14.4	4 MREF 4=+40.0%	Multi-reference 4	**40055**	-250% to +250%	-20480 to +20480
G14.5	5 MREF 5=+50.0%	Multi-reference 5	**40056**	-250% to +250%	-20480 to +20480
G14.6	6 MREF 6=+60.0%	Multi-reference 6	**40057**	-250% to +250%	-20480 to +20480
G14.7	7 MREF 7=+70.0%	Multi-reference 7	**40058**	-250% to +250%	-20480 to +20480
G15.1	1 INCH1=+0.00%	Inch speed 1	**40092**	-250% to +250%	-20480 to +20480
G15.2	2 INCH2=+0.00%	Inch speed 2	**40093**	-250% to +250%	-20480 to +20480
G15.3	3 INCH3=+0.00%	Inch speed 3	**40094**	-250% to +250%	-20480 to +20480
G16.1	1 SKIP 1=+0.0%	Skip frequency 1	**40132**	-250% to +250%	-20480 to +20480
G16.2	2 SKIP 2=+0.0%	Skip frequency 2	**40133**	-250% to +250%	-20480 to +20480
G16.3	3 SKIP BAND=OFF	Skip bandwidth	**40134**	OFF=0 to 20%	0 to 1638
G17.1	1 T DC BRAKE=OFF	Time for DC brake activation	**40025**	OFF=0.0 to 99s	0 to 990
G17.2	2 DC CURR=0%	Current applied to the brake	**40022**	0 to 100%	0 to 8192
G17.3	3 DC VOLTS=0.0%	Voltage applied to the brake	**40023**	0.0 to 25%	0 to 2048
G17.4	4 I HEATING=OFF	Non condensing heating current	**40024**	OFF=0.0 to 30%	0 to 2458
G18.0	0 ENCODER = N	Encoder	**40475**	N Y	0 to 1
G18.1	1 PULSES=1024	Pulses per revolution of the encoder	**40337**	200 to 8191	200 to 8191
G18.2	2 TYPE=DIFF	Encoder Type	**40473**	DIFF SING	0 to 1
G18.3	3 ENCOD FILTER=N	Encoder filter selection	**40474**	Yes NO	0 to 1
G19.1.1	1 TYPE CRTL=V/Hz	Selection of control type	**40522**	V/Hz PEVE CLsp CLtq	0 to 3
G19.1.2	2 FRQ=4000Hz	Commutation frequency	**40523**	4000 to 8000 Hz	4000 to 8000
G19.1.3	3 PEWAVE=Y	Pewave control	**40524**	N Y	0 to 1
G19.1.5	5 AUTOTUNE=N	Motor parameter auto-tuning	**40486**	N Y	0 to 1
G19.1.6	6 OVERMODULATIO=N	Over-modulation	**40493**	N Y	0 to 1
G19.2.1	1 MIN FLUX = 100%	Minimum Flux	**40502**	40 to 100%	3277 to 8192
G19.2.2	2 BW BOOST=0.0%	Torque boost band	**40593**	0.0 to 100%	0 to 8192
G19.2.3	3 V BOOST = 0.0%	Initial voltage	**40592**	0.0 to 100%	0 to 8192
G19.2.4	4 SLIP COMPENS=N	Slip compensation	**40505**	N Y	0 to 1
G19.2.7	7 I SLIP=4.0%	Current limit factor	**40508**	0.0 to 20.0%	0 to 1638
G19.2.9	9 STR FRQ = 0.0%	Initial frequency	**40594**	0.0% to 100%	0 to 8192
G19.2.10	10 DAMP.ref=OFF	Damping reference	**40018**	OFF=40.0; 40.1 to 70%	3276, 3285 to 5734
G19.2.11	11 DAMPref=3.0%	Damping reference	**40506**	0.0 to 10.0%	0-819
G19.3.1	1 R STR=1%	Stator resistance (Rs)	**40482**	0.0 to 9.9%	0 to 811
G19.3.2	2 R. RTR = 0%	Rotor resistance (Rr)	**40530**	0.0 to 15%	0 to 15000
G19.3.3	3 Lm = 40%	Motor inductance (Lm)	**40531**	40% to 800%	3276 to 65535
G19.3.4	4 L.l. = 0%	Stray inductance	**40534**	0.0% to 50%	0 to 4096
G19.3.5	5 FL WEAK = 90%	Weakening filed	**40532**	50% to 100%	4096 to 8192
G19.4.1	1 Kp Sp = 95%	Speed closed loop proportional constant	**40334**	0.0% to 100%	0-8192
G19.4.2	2 Ki Sp = 95%	Speed closed loop integration time setting	**40335**	0.0% to 100%	0-8192
G19.4.3	3 Kp Tq = 95%	Torque proportional closed loop constant	**40331**	0.0% to 100%	0-8192
G19.4.4	4 Ki Tq = 95%	Torque closed loop time setting	**40332**	0.0% to 100%	0-8192
G19.4.5	5 Kp I =95%	Current closed loop proportional constant	**40528**	0.0% to 100%	0 to 8192

Parameter	Screen	Description	Address	Range	Modbus Range
G19.4.6	6 Ki I = 15%	Current closed loop integration time setting	**40529**	0.0% to 100%	0 to 8192
G19.4.9	9 Flux tune = 2.0%	Flux tuning	**40333**	0.0% to 10%	0-100
G20.0.1	0 CONTROL COM=0	Communications Control	**40042**	0 to 6	0 to 6
G20.1.1	1 COMMS T/O=OFF	Communication timeout MODBUS RTU	**40413**	OFF=0 to 250s	0 to 250
G20.1.2	2 COMM ADDR=10	Communication address	**40414**	1 to 255	1 to 255
G20.1.3	3 BAUDS=9600	Communication speed	**40415**	600 1200 2400 4800 9600 19200 38400	0 to 6
G20.1.4	4 PARITY=NONE	Communication parity	**40416**	ODD NONE EVEN	0 to 2
G20.1.5	5 DispBR = 4800	Display communication speed	**40417**	1200 2400 4800 9600	0 to 3
G20.2.1	1 NODE ADDR=10	Slave address in Profibus network	**40852**	1 to 255	1 to 255
G20.3.1	1 CO NODEID=0	Canopen slave address	**41501**	0-127	0-127
G20.3.2	2 CO BAUD=1Mbps	Bus speed connected to drive	**41502**	1Mbps 10mbps 125mbps 250mbps 500mbps	0-4
G20.3.3	3 CO REF sp=+0.0%	Canopen Speed	**41503**	-	-32768 to +32768
G20.4.1	1 DN MACID=0	Devicenet MAC ID	**41701**	0-63	0-63
G20.4.2	2 DNBaud=500kbps	Devicenet Baud rate	**41702**	125kbps 250kbps 500kbps	0-2
G20.4.3	3 CONTROL MODE=0	Control modes	**41401**	0 to 2	0 to 2
G20.4.4	4 REFEREN MODE=0	Reference modes	**41402**	0 to 2	0 to 2
G20.4.5	5 FAULT MODE=2	Fault mode	**41404**	FAULT IGNORE PE BEHV	0 to 2
G20.4.6	6 ASM- IN = 70	Input assembly	**41704**	70 71 100 150 151 152	0 to 5
G20.4.7	7 ASM- OUT = 20	Output assembly	**41705**	20 21 101	0 to 2
G20.4.8	8 DNst = 0	DeviceNet State	**41703**	0 to 4	0 to 4
G20.5.1	1 B/R F.O = 1Mbps	Bus speed connected to drive	**41252**	0 to 3	0 to 3
G20.6.1	1 Reg01=40001	Register 1	**41966**	40001 to 45400	40001 to 45400
G20.6.2	2 Reg02=40001	Register 2	**41967**	40001 to 45400	40001 to 45400
G20.6.3	3 Reg03=40001	Register 3	**41968**	40001 to 45400	40001 to 45400
G20.6.4	4 Reg04=40001	Register 4	**41969**	40001 to 45400	40001 to 45400
….	n RegXX=40001	Register n	**-**	40001 to 45400	40001 to 45400
G20.6.31	31 Reg31=40001	Register 31	**41996**	40001 to 45400	40001 to 45400
G20.7.1	1 Reg01=0	Register 1	**40801**	0 to 65535	0 to 65535
G20.7.2	2 Reg02=0	Register 2	**40802**	0 to 65535	0 to 65535
G20.7.3	3 Reg03=0	Register 3	**40803**	0 to 65535	0 to 65535
G20.7.4	4 Reg04=0	Register 4	**40804**	0 to 65535	0 to 65535
….	n RegXX=0	Register n	**-**	0 to 65535	0 to 65535
G20.7.31	31 Reg31=0	Register 31	**40831**	0 to 65535	0 to 65535
G21.1.1	1 AUTOMATIC IP=Y	To enable automatic assignation of parameters	**40922**	N or Y	0 to 1
-	Ixxx.yyy.zzz.hhh	Present IP address of the drive	**40923 – A** **40924 – B** **40925 – C** **40926 – D**	-	-

Parameter	Screen	Description	Address	Range	Modbus Range
-	Sxxx.yyy.zzz.hhh	Present Subnet Mask of the drive	**40927 – A** **40928 – B** **40929 – C** **40930 – D**	-	-
-	Gxxx.yyy.zzz.hhh	Present Gateway of the drive	**40931 – A** **40932 – B** **40933 – C** **40934 – D**	-	-
G21.1.2	2 IP MANU. A=192	IP address (A)	**40374**	0 to 255	0 to 255
G21.1.3	3 IP MANU. B=168	IP address (B)	**40375**	0 to 255	0 to 255
G21.1.4	4 IP MANU. C=1	IP address (C)	**40376**	0 to 255	0 to 255
G21.1.5	5 IP MANU. D=143	IP address (D)	**40377**	0 to 255	0 to 255
G21.1.6	6 SUBNET A=255	Subnet Mask address (A)	**40378**	0 to 255	0 to 255
G21.1.7	7 SUBNET B=255	Subnet Mask address (B)	**40379**	0 to 255	0 to 255
G21.1.8	8 SUBNET C=255	Subnet Mask address (C)	**40380**	0 to 255	0 to 255
G21.1.9	9 SUBNET D=0	Subnet Mask address (D)	**40381**	0 to 255	0 to 255
G21.1.10	10 GATEWAY A=0	Gateway address (A)	**40382**	0 to 255	0 to 255
G21.1.11	11 GATEWAY B=0	Gateway address (B)	**40383**	0 to 255	0 to 255
G21.1.12	12 GATEWAY C=0	Gateway address (C)	**40384**	0 to 255	0 to 255
G21.1.13	13 GATEWAY D=0	Gateway address (D)	**40385**	0 to 255	0 to 255
G21.1.14	14 MAC A=0	MAC address (A)	**40386**	0 to 255	0 to 255
G21.1.15	15 MAC B=80	MAC address (B)	**40387**	0 to 255	0 to 255
G21.1.16	16 MAC C=194	MAC address (C)	**40388**	0 to 255	0 to 255
G21.1.17	17 MAC D=114	MAC address (D)	**40389**	0 to 255	0 to 255
G21.1.18	18 MAC E=X	MAC address (E)	**40390**	0 to 255	0 to 255
G21.1.19	19 MAC F=Y	MAC address (F)	**40391**	0 to 255	0 to 255
G21.2.1	1 MIPtout=OFF	Communication timeout MODBUS TCP	**41451**	OFF=0 to 600s	0 to 600
G21.3.1	1 CONTROL MODE=0	Control mode of the drive	**41401**	LOCAL NETWORK NET DECIDES	0 to 2
G21.3.2	2 REFEREN.MODE=0	Reference mode of the drive	**41402**	LOCAL NETWORK NET DECIDES	0 to 2
G21.3.3	3 FAULT MODE = 2	Fault mode	**41404**	0 to 2	0 to 2
G22.1	1 Vdc REF=600 for Vin=380V/480V, 800 for Vin=525V, 1050 for Vin=690V	Vdc Reference	**41351**	500Vdc to 825Vdc or 650Vdc to 900Vdc or 950Vdc to 1251Vdc	500 to 825 or 650 to 900 or 950 to 1251
G22.2	2 Cos phi=1	CosPHI Reference	**41352**	0.9 to 1	90 to 100
G22.3	3 CAP/IND=CAP	CosPHI CHAR	**41353**	CAP or IND	0 to 1
G22.4	4 FREQ RE=2800	Rect. frequency	**41354**	2000 to 3000Hz	2000 to 3000
G22.5	5 TIME OFF=0	Delay OFF Rect.	**41355**	0s to 600s, FIXED	0 to 601
G22.10.1	1 Kp PLL=10.0	PID Kp PLL	**41360**	0.0 to 100.0	0 to 1000
G22.10.2	2 Ki PLL=15.0	PID Ki PLL	**41361**	0.0 to 100.0	0 to 1000
G22.10.3	3 Kp Vdc=10.0	PID Kp Vdc	**41362**	0.0 to 100.0	0 to 1000
G22.10.4	4 Ki Vdc=3.5	PID Ki Vdc	**41363**	0.0 to 100.0	0 to 1000
G22.10.5	5 Kp I=10.0	PID Kp I	**41364**	0.0 to 100.0	0 to 1000
G22.10.6	6 Ki I=10.0	PID Ki I	**41365**	0.0 to 100.0	0 to 1000
G22.11.5	5 I lim REC=1.5xIn	Current lim Rectifier	**41376**	1xIn to 2xIn	8192 to 12288
G22.11.6	6 T I Limit= OFF	Time Delay Current Limit Rect	**41377**	0 to 60s OFF	0 to 61
G22.11.7	7 I Imb=30.0%	Current I Imbalance	**41378**	OFF 00.0%-50.0%	0 to 500
G22.11.8	8 I Gnd=30.0%	Ground current fault	**41379**	OFF 00.0%-50.0%	0 to 500

5.4.3. Visualization Parameters

Parameter	Screen	Description	Address	Modbus Range
STATUS LINE	**OFF** 0.0A +0.0%	Present status of the drive.	**40219**	0 to 201

Modbus value for drive status, warning and fault messages.

Modbus value ➔ STATUS MESSAGE			
0 ➔ OFF	4 ➔ DEC	12 ➔ DCB	42 ➔ IN2
1 ➔ ON	5 ➔ SPG	15 ➔ TBR	43 ➔ IN3
2 ➔ ACL	6 ➔ EST	16 ➔ DLY	49 ➔ HEA
3 ➔ RUN	10 ➔ SPN	41 ➔ IN1	

Note: See description of the status messages in section 8.1.

Modbus value ➔ WARNING MESSAGE			
61 ➔ MOL	68 ➔ ACO	76 ➔ IIB	83 ➔ SWM
63 ➔ MOC	69 ➔ AVO	77 ➔ IGF	84 ➔ LCL
64 ➔ DOC	70 ➔ AVI	79 ➔ TRB	85 ➔ DWA
65 ➔ ILT	71 ➔ OVV	80 ➔ CCM	90 ➔ S1L
66 ➔ TLT	72 ➔ UNV	81 ➔ FPS	91 ➔ S2L
67 ➔ VLT	75 ➔ IPR	82 ➔ PLL	

Note: See description of the warning messages in section 8.2.

Modbus value ➔ FAULT MESSAGE			
120 ➔ NFL	140 ➔ F20	170 ➔ F50	230 ➔ R10
121 ➔ F01	141 ➔ F21	171 ➔ F51	231 ➔ R11
122 ➔ F02	142 ➔ F22	172 ➔ F52	232 ➔ R12
123 ➔ F03	143 ➔ F23	173 ➔ F53	233 ➔ R13
124 ➔ F04	145 ➔ F25	174 ➔ F54	234 ➔ R14
125 ➔ F05	148 ➔ F28	175 ➔ F55	235 ➔ R15
126 ➔ F06	149 ➔ F29	176 ➔ F56	236 ➔ R16
127 ➔ F07	150 ➔ F30	177 ➔ F57	237 ➔ R17
128 ➔ F08	154 ➔ F34	178 ➔ F58	238 ➔ R18
129 ➔ F09	157 ➔ F37	180 ➔ F60	239 ➔ R19
130 ➔ F10	160 ➔ F40	181 ➔ F61	240 ➔ R20
131 ➔ F11	161 ➔ F41	221 ➔ R1	241 ➔ R21
132 ➔ F12	162 ➔ F42	222 ➔ R2	242 ➔ R22
133 ➔ F13	163 ➔ F43	223 ➔ R3	243 ➔ R23
134 ➔ F14	164 ➔ F44	224 ➔ R4	244 ➔ R24
135 ➔ F15	165 ➔ F45	225 ➔ R5	245 ➔ R25
136 ➔ F16	166 ➔ F46	226 ➔ R6	246 ➔ R26
137 ➔ F17	167 ➔ F47	227 ➔ R7	
138 ➔ F18	168 ➔ F48	228 ➔ R8	
139 ➔ F19	169 ➔ F49	229 ➔ R9	

Note: See description of the fault messages in section 11.

STATUS LINE	OFF **0.0A** +0.0%	Motor output current. (Corresponds with SV1.6)	**40163**	Real value = (Modbus value / 10)
STATUS LINE	OFF 0.0A **+0.0%**	Motor output speed (in %). (Corresponds with SV1.3).	**40170**	8192 = 100% of motor rated speed

Note for drive status

Equipment status.
Parameter Equipment Status has Word size like the rest of Modbus parameters.
The information of the previous tables about status messages, warning and fault messages will be displayed by means of the Low Byte (LSB).
The High Byte (MSB) is reserved for internal use (bit by bit). Interesting information for the user is below:

- Bit 15:
  - 0 ➔ Drive with no fault.
  - 1 ➔ Drive in fault status.
- Bit 12:
  - 0 ➔ Drive started.
  - 1 ➔ Drive stopped.

Alternation between two states.
During the standard running of the equipment, the drive status value will appear in a stable and continuous way, only changing when the drive status changes (from 'ACL' (Accelerating) to 'RUN', for example). Nevertheless, there are two situations where the status value intermittently alternates between two states:

- First case: If the equipment presents a warning, this one will appear by alternating with the equipment status, for example, normal status 'RUN' and the warning 'ILT' will be alternatively and intermittently displayed.
- Second case: If a fault occurs, the last status value before the fault has occurs will be shown in alternation with the present fault number. For example, normal status 'RUN' and 'F40' will be alternatively and intermittently displayed.

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Parameter	Screen	Description	Address	Modbus Range
SV1.1	Sp Ref =+000%	Value of present speed reference.	**40162**	8192 = 100% of motor rated speed
SV1.2	Tq Ref=000	Torque Reference Value	**41316**	-20480 to +20480
SV1.3	Mtr Speed = +0rpm	It shows the motor speed in rpm.	**40169**	Real value = Modbus value
SV1.4	Mtr Sp = +0.0%	It shows the motor speed in %.	**40170**	8192 = 100% of motor rated speed
SV1.5	Mtr Freq = +0.0Hz	Frequency at which motor is running.	**40167**	Real value = Modbus value
SV1.6	Mtr Vout = 0V	It shows the present voltage applied to the motor.	**40166**	Real value = Modbus value
SV1.7	Mtr Iout = 0.0A	Present current flowing to the motor.	**40163**	Real value = (Modbus value / 10)
SV1.8	Mtr Torqe = 0.0%	It shows the present torque applied to the motor.	**40164**	8192 = 100% of motor rated torque
SV1.9	Mtr Pfactr = 0.0	It shows the power factor of the motor.	**40168**	Real value = (Modbus value / 10)
SV1.10	Mtr Pwr = +0.0kW	Instantaneous power consumption of the motor.	**40165**	Real value = (Modbus value / 10)
SV1.11	0.0A 0.0A 0.0A	Instantaneous current per phase of the motor (U, V y W).	**40177 → U** **40178 → V** **40179 → W**	Real value = (Modbus value / 10)
SV1.12	Vmt= 0 0 0V	Compound Instantaneous voltage (UV, VW, UW).	**40180 → UV** **40181 → VW** **40182 → UW**	Real value = Modbus value
SV1.13	PTC Motor = 0	It shows if the motor PTC is connected or not.	**40218**	0 to 1
SV1.14	Motor Temp = 0.0%	Theoretical heating level of the motor.	**40173**	8192 = 100% of motor temperature
SV1.15	Enco. Pulso = 0	It shows the encoder pulses.		
SV1.16	Clsped = 0rpm	Real speed measured by the encoder.		
SV2.1	390 390 390V	Input instantaneous voltage.	**40183 → RS** **40184 → ST** **40185 → RT**	Real value = Modbus value
SV2.2	Inp Vol = 390V	Average input voltage to the drive.	**-**	Non accessible from this SW version
SV2.3	50.0 50.0 50.0Hz	Frequency of input voltage.	**40159 → RS** **40160 → ST** **40161 → RT**	Real value = (Modbus value / 10)
SV2.4	Bus vol = 540V	DC Link voltage of the drive.	**40171**	Real value = Modbus value
SV2.5	IGBT Temp =+23ºC	Temperature measured at the power stage.	**40172**	Real value = Modbus value
SV2.6	Drive Temp =+26ºC	Internal temperature of the drive.	**40240**	Real value = (Modbus value / 100)
SV3.1	ANLG IN1 = +0.0V	Average value of the Analogue Input 1.	**40186**	Real value = (Modbus value / 1000)
SV3.2	AIN1 Refr = +0.00%	Speed reference or PID setpoint proportional to the AI1.	**40190**	8192 = 100% maximum range of the Analogue Input 1
SV3.3	AIN1 S = +0.00l/s	Value of sensor 1 associated to the AI1.	**40262**	Real value = (Modbus value / 10)
SV3.4	ANLG IN2 = +0.0V	Average value of the Analogue Input 2.	**40187**	Real value = (Modbus value / 1000)
SV3.5	AIN2 Refr = +0.00%	Speed reference or PID setpoint proportional to the AI2.	**40191**	8192 = 100% maximum range of the Analogue Input 2
SV3.6	AIN 2 S = +0.00Bar	Value of sensor 2 associated to the AI2.	**40263**	Real value = (Modbus value / 10)
SV3.7	ANL OUT1 = +4.0mA	It shows the value of the Analogue Output 1.	**40192**	Real value = (Modbus value / 1000)
SV3.8	AOUT1 Refer = +0.0%	Value of the magnitude associated to the AO1.	**40194**	8192 = 100% maximum range of the Analogue Output 1
SV3.9	ANL OUT2 = +4.0mA	It shows the value of the Analogue Output 2.	**40193**	Real value = (Modbus value / 1000)
SV3.10	AOUT2 Refer = +0.0%	Value of the magnitude associated to the AO2.	**40195**	8192 = 100% maximum range of the Analogue Output 2
SV3.11	DI: 000000 0	Digital Inputs and PTC status.	**40196**	LSB → BIT0 → MFI1 BIT6 → PTC 0 to 1
SV3.12	Relays 1-3: X0X	Output relays status.	**40197**	BIT 0 → R1; Range from 0 to 1 BIT 1 → R2; Range from 0 to 1 BIT 2 → R3; Range from 0 to 1
SV3.13	Speed M = +0.000m/s	Machine speed associated to the motor (speed motor in engin. units).	**-**	
SV3.14	Modbus Traffic=0	Traffic in user port (Modbus RTU)	**40418**	0 to 1
SV3.15	Display_traffi = 0	It shows if the display is connected.	**40422**	0 to 1
SV4.1	Actual Fault = 00	Present code fault.	**40235**	Fault number
SV4.2	Drive Curr = 170A	Drive rated current.	**40209**	Real value = (Modbus value / 10)
SV4.3	Drive Volt = 400V	It shows the drive rated voltage.	**40210**	Real value = (Modbus value / 10)
SV4.4	S/W	Software version installed into the equipment.	**40206**	Real value = Modbus value
SV4.5	H/W y.y	It shows the hardware version of the equipment.	**40207**	Real value = (Modbus value / 100)
SV4.6	PID R% = +0.0%	PID setpoint value of the equipment standard program.	**40204**	8192 = 100% maximum range of AI
SV4.7	PID F% = +0.0%	PID feedback value of the equipment standard program.	**40205**	8192 = 100% maximum range of AI
SV4.8	PID Error = +0.0%	Error value in PID mode.	**40203**	8192 = 100% maximum range of AI
SV4.9	Comparators: 000	Status of the three comparators.	**40232 → C1** **40233 → C2** **40234 → C3**	0 to 1

Parameter	Screen	Description	Address	Modbus Range
SV4.10	FLT.STAT.=NO FLT	Drive status before occurring the fault	**40559**	0 to 17 (See fault message list)
SV4.11	Fault Diag.=N	Fault diagnosis	**41601**	0 to 1
SV5.1	Local Sp = +100%	Speed reference in local mode.	**40124**	-20480 to 20480
SV5.2	PID Local = +100%	PID setpoint in local mode.	**40149**	0 to 32760
SV5.3	Mref 1 = +10.0%	Speed value assigned to Multi-reference 1.	**40052**	-20480 to 20480
SV5.4	Mref 2 = +20.0%	Speed value assigned to Multi-reference 2.	**40053**	-20480 to 20480
SV5.5	Mref 3 = +30.0%	Speed value assigned to Multi-reference 3.	**40054**	-20480 to 20480
SV5.6	Mref 4 = +40.0%	Speed value assigned to Multi-reference 4.	**40055**	-20480 to 20480
SV5.7	Mref 5 = +50.0%	Speed value assigned to Multi-reference 5.	**40056**	-20480 to 20480
SV5.8	Mref 6 = +60.0%	Speed value assigned to Multi-reference 6.	**40057**	-20480 to 20480
SV5.9	Mref 7 = +70.0%	Speed value assigned to Multi-reference 7.	**40058**	-20480 to 20480
SV5.10	Inch Spd1 = 0.00%	Inch speed 1.	**40092**	-20480 to 20480
SV5.11	Inch Spd2 = 0.00%	Inch speed 2.	**40093**	-20480 to 20480
SV5.12	Inch Spd3 = 0.00%	Inch speed 3.	**40094**	-20480 to 20480
SV5.13	PMP manSP=+0.0%	LOCAL manual speed reference.	**42042**	-20480 to 20480
SV5.14	PMP MRe1=0.0%	Local setpoint 1 of PID. Multi-reference 1.	**42151**	0 to 32760
SV5.15	PMP MRe2=0.0%	Local setpoint 2 of PID. Multi-reference 2.	**42152**	0 to 32760
SV5.16	PMP MRe3=0.0%	Local setpoint 3 of PID. Multi-reference 3.	**42153**	0 to 32760
SV5.17	PMP MRe4=0.0%	Local setpoint 4 of PID. Multi-reference 4.	**42154**	0 to 32760
SV5.18	PMP MRe5=0.0%	Local setpoint 5 of PID. Multi-reference 5.	**42155**	0 to 32760
SV5.19	PMP MRe6=0.0%	Local setpoint 6 of PID. Multi-reference 6.	**42156**	0 to 32760
SV5.20	PMP MRe7=0.0%	Local setpoint 7 of PID. Multi-reference 7.	**42157**	0 to 32760
SV5.21	PMP MRe8=0.0%	Local setpoint 8 of PID. Multi-reference 8.	**42158**	0 to 32760
SV5.22	T AutOFF=OFF	Time for Automatic Stop.	**42044**	0 to 999
SV5.23	TIME OFF=OFF	It shows the resting time in minutes for the automatic stopping of the system.	**42356**	0 to 6000
SV5.24	MAX flow=1000l/s	Level of maximum flow.	**42143**	0 to 32760
SV5.25	RESET LEVL=+100%	Reset level for the flow control algorithm.	**42145**	0 to 100
SV5.26	SLEP FLO=0.0l/s	Flow level to sleep the drive.	**42324**	0 to 32760
SV6.1	TOT= d h	Total time during which the drive is running (RUN).	**40550 → Days** **40551 → Hours**	Days → Real value = Modbus value Hours → 1 = 0.1 hours
SV6.2	PAR= d h	Partial time during which the drive is running (RUN).	**40552 → Days** **40553 → Hours**	Days → Real value = Modbus value Hours → 1 = 0.1 hours
SV6.3	CLEAR PARTIAL=N	To reset the counter of partial time for running status (RUN).	**40554**	0 to 1
SV6.4	MOTOR ENERGY	Energy consumption in motor operation	**41772**	0 to 9999kWh/MWh/GWh
SV6.5	REGEN. ENERGY	Energy regenerated in regeneration operation	**41774**	0 to 9999kWh/MWh/GWh
SV6.6	RSET PRTL ENERG	Reset the partial energy counters	**41554**	0 to 1
SV7.1	Pow in	Input power	**40765**	-30000 to 30000
SV7.2	IR IS IT	Current per phase	**40766** **40767** **40768**	-32000 to 32000
SV7.3	R. Phi Cos	Input phi Cos (DPF)	**40770**	-100 to 100
SV7.4	Rec T IGBT	Max. IGBT temperature	**10031**	Real value = (Modbus value - 30)
SV7.5	PLL freq	Internal PLL frequency	**40778**	-3000 to 3000
SV7.6	THDi	It shows the input current distortion (THDi)	**41386**	0.0 to 65535

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6. FAULT MESSAGES. DESCRIPTIONS AND ACTIONS

When a fault occurs the SD700FR will stop the motor and show the generated fault on the display. You can display this fault in the programming line (lower line) while motor current and the speed values at the moment of the fault are displayed in the upper line.
It is possible to navigate through the additional display lines to access other status parameters without resetting the fault. These additional status parameters offer further information about the moment at which the fault occurred. Additionally, the FAULT led will blink and the fault message will be displayed until the fault is remedied and the drive is reset.

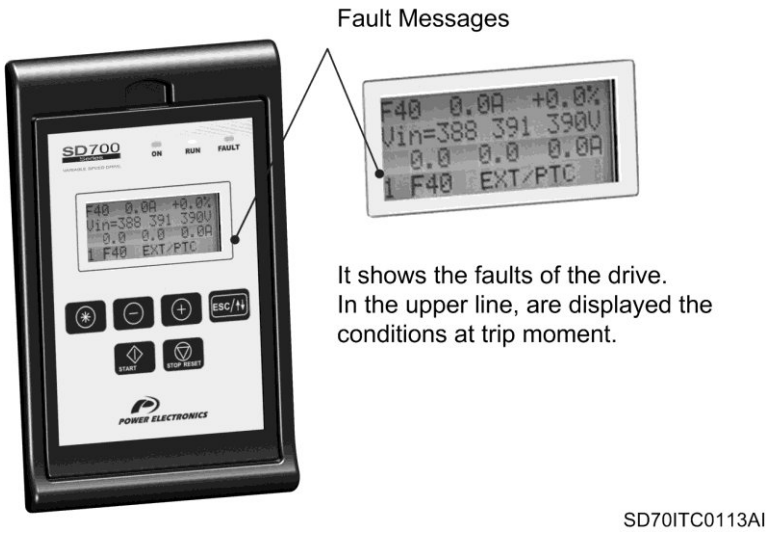

Figure 6.1 Fault displaying - Programming Line

6.1. Description of Fault List

6.1.1. Description of Inverter bridge faults

DISPLAY	DESCRIPTION
F0 NO FAULT	Drive is operative. There is no fault.
F1 I LIM FLT	Output current has reached a dangerous level. Its value is above 220% of the drive rated current. Protection is activated instantaneously.
F2 V LIM FLT	DC Bus voltage has reached a dangerous level >850VDC (Vn=400Vac) and >1250Vdc (Vn=690Vac). Hardware Protection. Drive will turn off the output to the motor.
F3 PDINT FLT	DC Bus voltage and the output current of the equipment have reached dangerous levels.
F4 OVERLOAD U+	Internal protection within the appropriate IGBT semiconductor has acted.
F5 OVERLOAD U-	
F6 OVERLOAD V+	
F7 OVERLOAD V-	
F8 OVERLOAD W+	
F9 OVERLOAD W-	
F10 SAFE STOP	Automatic internal protection of several of the IGBT semiconductors has acted or safe stop contact of the drive (connected to an external circuit by the user) has been activated (for example, emergency stop).
F11 VIN LOSS	Power supply loss of any input phase for a time higher than 20ms has occurred.
F12 IMB V IN	Input voltage imbalance greater than ±10% of average input power supply of SD700FR for a time higher than 100ms.
F13 HI V IN	Average supply voltage has exceeded the value set in 'G11.6 HIGH VOLT' for greater than the time set in 'G11.7 HIGH V TO'.
F14 LW V IN	Average supply voltage is lower than the value set in 'G11.4 LOW VOLT' for greater than the time set in 'G11.5 LOW V TO'.
F15 CURL Vdc	Unstable bus voltage. There is a DC Bus voltage ripple higher than 100VDC for more than 1.1sec.
F16 HI Vdc	DC Bus voltage has exceeded critical operating level (>850VDC). Software Protection.
F17 LW Vdc	DC Bus voltage is lower than critical operating level (<350VDC).
F18 IMB V OUT	Voltage imbalance of more than ±5% of the average drive output average voltage for a time higher than 100ms.

DISPLAY	DESCRIPTION
F19 IMB I OUT	Current imbalance of more than ±25% of the average output motor current for a time higher than 1s.
F20 GROUND FLT	Current level to the ground has exceeded the level set in 'G11.3 GND I LIMT'.
F21 I LIM T/O	Motor current has exceeded the current limit set in 'G10.5 I LIMIT' for the time set in 'G10.6 I LIM TO'.
F22 TQ LIM T/O	Motor torque has exceeded the torque limit set in parameter 'G10.7 MAX TOR' for the time set in 'G10.8 T LIMT TO'.
F23 SPD LIMIT MIN	Motor speed does not reach the speed limit (parameters G10.1 to G10.4) for the time set in 'G11.21 SP Min. T'.
F25 MTR O/L	Motor overload calculated by SD700FR thermal model has exceeded 110%.
F28 Ir.LIM TO	Motor load current has exceeded the regenerating current limit set in 'G10.12 ILIM RGN' for the time set in 'G10.13 Ilim_rgnTO'.
F29 DSP FLT	DSP has detected wrong data.
F30 WATCHDOG	An unknown fault has reset the microprocessor of the control board.
F34 IGBT TEMP	Inverter bridge IGBTs internal temperature has reached a level of 110°C (See parameter SV2.4).
F37 SW MISMATCH	DSP software version is different in the inverter and in the rectifier bridge.
F40 EXT / PTC	External trip device or motor PTC has operated (terminals 8 and 9). Values lower than 90Ω ±10% or higher than 1K5 ± 10% generate the fault.
F41 COMMS TRIP	Trip generated through RS232 or RS485 communication. Master (PLC or PC) is generating a fault in the SD700FR through serial communication.
F42 AIN1 LOSS	The SD700FR is not receiving a signal on analogue input 1 and 'G4.2.14 AIN1 LOSS' is set to 'Yes'. The signal connected to this input has been lost.
F43 AIN2 LOSS	The SD700FR is not receiving a signal on the analogue input 2 and 'G4.3.14 AIN2 LOSS' is set to 'Yes'. The signal connected to this input has been lost.
F44 CAL FLT	Internal reference voltage levels are wrong.
F45 STOP T/O	Trip generated due to excessive stopping time. The elapsed time from stop signal activation has exceeded the value set in parameter 'G11.2 STOP TO'.
F46 EEPROM FLT	Non-volatile memory (EEPROM) is faulty.
F47 COMMS T/O	Trip generated due to excessive delay of serial communication. The elapsed time from the last valid data transmission has exceeded the time set in parameter 'G20.2 COMMS T/O'.
F48 SPI COM	Trip because data bus transfer is wrong.
F49 SPD LIMIT MAX	Motor speed has exceeded the speed limit (parameters G10.1 to G10.4) for the time set in 'G11.1 SP LIM TO'.
F50 PSU FAULT	Internal power supply is not supplying the correct voltage. One voltage level has decreased to zero value for 100ms approx.
F51 SCR TEMP	Rectifier heat sink temperature has reached a dangerous level.
F52 FAN P.SUPP	A fault in the power supply to the cooling fans has occurred.
F53 INTRNAL TEMP	Internal temperature of the SD700FR control electronics chamber has reached a dangerous level.
F54 WATCHDOG TMR	Internal fault of the microcontroller.
F56 EMERGEN.STOP	Digital input configured as 'EXTERN EMERGE' has been activated (NC contact).
F57 PUMP OVERLOA	This fault is generated when the output current of the drive is higher than the current set in 'G11.11 PUMP OV' during the time adjusted in 'G11.13 Povl DLY'.
F58 PROFI.TOUT	Once the Profibus Master has configured the drive as Profibus Slave, and after establishing the connection, which is always permanent, if the communication is cut off, the drive trips by Timeout fault.
F60 ETH.IP T.OUT	The connection between the drive (server) and the Ethernet/IP Client (PLC) has been lost. If there is not a configuration to indicate the contrary, the CIP standard forces the drive to stop the motor and to trip because of Timeout fault.
F61 NO INPUT V	This fault will be shown in the display of the SD700FR when the start command is activated and the input voltage applied to the drive is lost, and the drive is powered by the External 24V Power Supply.

6.1.2. Description of Rectifier bridge faults

DISPLAY	DESCRIPTION
R1 I LIM FLT	Rectifier current has reached a dangerous level. Its value is above 220% of the drive rated current. Hardware protection is activated instantaneously
R2 V LIM FLT	DC Bus voltage has reached a dangerous level >850VDC (Vn=400Vac) and >1250Vdc (Vn=690Vac). Hardware Protection. Drive will turn off the output to the motor.
R3 SOFT CHARG	DC Bus voltage do not reach Vdc.
R4 OVERLOAD R+	Internal protection within the appropriate IGBT semiconductor has acted.
R5 OVERLOAD R-	
R6 OVERLOAD S+	
R7 OVERLOAD S-	
R8 OVERLOAD T+	
R9 OVERLOAD T-	
R10 MULTI O.L.	
R11 VIN LOST	Voltage input measure is lost.
R12 IMB V IN	Inverse Input voltage is greater than +30% of average input voltage for a time higher than 100ms.
R13 V LOST CAP	Capacitor voltage measure is lost.
R14 VBUS LOST	DC bus voltage measure is lost.
R15 SfCh CONTACT	The feedback contactor signal is lost. The softcharge contactor is faulty or the activation signal is lost. The softchange contactor was connected when the order has been given. Take a look to the wiring (nonresettable).
R16 LCL TEMP	The LCL filter has reached a dangerous temperature level.
R17 VBUS LOW	Low bus voltage detected <450VDC (Vn=400Vac) and <800Vdc (Vn=690Vac)
R18 FIBR COMMS	CAN Fiber Optics communication failed.
R19 I IMB IN	Inverse input current has reached (G22.11.7x In) limit for a time higher than 10ms.
R20 GRND INPUT	Ground fault input current has reached (G22.11.8x In) limit.
R21 I LIMIT IN	Input current has exceeded the current limit set in 'G22.11.5' for the time set in 'G22.11.6.
R22 IGBT TMP	Rectifier bridge IGBTs temperature has reached 110ºC (See SV7.4)
R23 I HALL	Rectifier Current Hall Sensor Connection.
R24 LCL FB	LCL contactor feedback.
R25 DIAG NODE	Some diagnostic board doesn't communicate by CAN.
R26 DIAG BUS	Diagnostic Bus is not working.

6.1.3. List and Solutions of Inverter bridge faults

DISPLAY	POSSIBLE CAUSE	ACTIONS
F0 NO FAULT	Drive is operative. There is no fault.	
F1 I LIM FLT	Motor output short circuit.	Check output cables and motor for possible wiring faults or short circuits.
	Wiring fault.	
	Circuit fault.	
	Motor fault.	
F2 V LIM FLT	High voltage peak on the input.	Check conditions of input power supply. Decrease deceleration ramps.
	High load regeneration.	
	Deceleration ramp too high (parameters 'G5.2 DECEL1' and 'G5.4 DECEL2').	
F3 PDINT FLT	See faults F1 and F2.	See faults F1 and F2.
F4 OVERLOAD U+ F5 OVERLOAD U- F6 OVERLOAD V+ F7 OVERLOAD V- F8 OVERLOAD W+ F9 OVERLOAD W-	Short circuit.	Check if there is possible wiring faults or a motor fault. If the fault persists after disconnecting output wires request technical assistance.
	Extreme over current, equipment overload.	
	Wiring fault; circuit fault.	
	Desaturation of IGBT; IGBT fault.	
F10 SAFE STOP	See possible causes for faults F4 – F9.	See actions for F4 – F9.
	Safe stop contact of the drive has been activated.	Revise the external circuit, where the safe stop contact is connected, that produces the activation of this contact into the drive.
F11 VIN LOSS	Input power is incorrect, damaged fuses.	Check conditions of input power supply.
	Input wiring is incorrect.	Check wiring.
F12 IMB V IN	Input power is incorrect, damaged fuses.	Check conditions of input power supply.
	Input wiring is incorrect.	Check wiring.
F13 HI V IN	Input power is incorrect.	Check input power conditions.
	Incorrect setting of parameter 'G11.6 HIGH VOLT'.	Check parameters settings.
F14 LW V IN	Input power is incorrect, damaged fuses.	Check input power conditions.
	Incorrect setting of parameter 'G11.4 LOW VOLT'.	Check parameters settings.
F15 CURL Vdc	Input power is incorrect.	Check input power conditions, load type of the application, and all of the motor mechanical parts. If the fault persists after disconnecting output wires, request technical assistance.
	Motor is driving an unstable load.	
	One of the input fuses is damaged.	
F16 HI Vdc	High voltage peak on the input.	Check conditions of input power supply.
	High load regeneration.	Check stop conditions of the drive.
	Deceleration ramp too high (parameters 'G5.2 DECEL1' and 'G5.4 DECEL2').	Decrease deceleration ramps.
F17 LW Vdc	Input power is wrong, damaged fuses.	Check conditions of input power supply.
F18 IMB V OUT	Motor is driving an unstable load.	Check motor circuit completely in case of possible wiring faults or motor fault. If the fault persists after disconnecting output wires, request technical assistance.
	Motor wiring fault.	
	Motor is wrong.	
F19 IMB I OUT	Motor is supporting unstable loads.	Check motor circuit completely in case of possible wiring faults or motor fault.
	Motor wiring fault.	
	Motor is wrong.	
F20 GROUND FLT	Motor or wiring has short-circuited to ground.	Disconnect the motor and wiring of the SD700FR and check motor insulation.
	Ground is incorrectly connected or wrong.	Check and improve the ground connection system.

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DISPLAY	POSSIBLE CAUSE	ACTIONS
F21 I LIM T/O	Motor stalled. Heavy load. Motor mechanical brake is coupled.	Check the motor load. Increase maximum current limit.
F22 TQ LIM T/O	Motor stalled. Heavy load. Motor mechanical brake is coupled.	Check the motor load. Increase maximum torque limit.
F23 SPD LIMIT MIN	Speed reference is lower or equal than the speed limit.	Check the reference source and the motor load.
	Motor speed is out of control or motor is not accelerating due to the load.	Verify speed limits.
F25 MTR O/L	High current used by the motor due to heavy load.	Check the motor load. Check the setting of parameters 'G2.1 MTR CUR' and 'G2.7 MTR COOL' relating to the motor thermal model. Increasing the parameter 'G2.7 MTR COOL', can be undertaken when there is a motor PTC fitted and it is connected to the SD700FR.
	The load exceeds the capacity of motor cooling under normal operating conditions.	
	Incorrect setting of the thermal model parameters.	
	Phase loss of the motor or a fault in motor windings.	
F28 Ir.LIM TO	Excessive regeneration is produced due to deceleration ramp to high.	Decrease deceleration ramp. Revise the setting of parameters related to regenerating current limitation (G10.12 and G10.13).
F29 DSP FLT	Input power fault.	Disconnect and connect again SD700FR input power. If the same fault appears, initialize all of the parameters (parameter 'G1.5 INITIALISE') and connect the input power again. If the fault persists, request technical assistance.
	Parameter setting is incoherent.	
F30 WATCHDOG	Input power fault.	Reset the fault; If the fault persists, request technical assistance.
F34 IGBT TEMP	Blocked or poor ventilation.	Check if there is an object blocking ventilation. Improve the cooling.
	Heat sink and cooling fan fault on the SD700FR.	Check if the heat sink and the cooling fan are operating correctly.
	Ambient temperature is higher than 50°C.	Check the cooling and thermal conditions. Request technical assistance.
F37 SW MISMATCH	The DSP software version of the inverter and the rectifier bridges are different.	Check these two software versions with the display. Check CAN communications.
F40 EXT / PTC	External trip device has operated.	Check the external trip switch (if exists).
	Motor is overheated (motor load exceeds the cooling capacity at operating speed).	Check motor temperature. To reset the fault the motor must be return to normal temperature.
	Fault in sensor connection.	Check sensor wiring.
F41 COMMS TRIP	Trip generated by a computer through serial communication.	Disconnect the SD700FR from the communication network and verify if the fault is generated again.
F42 AIN1 LOSS	Analogue input cable has been come loose or disconnected (terminals 10 and 11).	Verify the wiring and the device which provides the analogue signal.
F43 AIN2 LOSS	Analogue input cable has been come loose or disconnected (T12 and T13).	Verify the wiring and the device which provides the analogue signal.
F44 CAL FLT	SD700FR fault.	Verify drive select. Request technical assistance.
F45 STOP T/O	Deceleration ramps (parameters 'G5.2 DECEL1' and 'G5.4 DECEL2') are too slow.	Verify that the time set in parameter 'G11.2 STOP TO' to stop the system after setting deceleration ramps and checking the system performance.
	SD700FR is voltage limiting voltage due to regeneration from the motor.	
F46 EEPROM FLT	Integrated circuit fault.	Request technical assistance.
F47 COMMS T/O	Communications cable has been come loose or cut.	Verify the wiring of communications system.
	Master device has not sent valid data in the required frame or it has sent incorrect data.	Verify the data and settings of the master device.

DISPLAY	POSSIBLE CAUSE	ACTIONS
F48 SPI COM	Input power fault.	Reset the equipment and if the fault persists request technical assistance.
F49 SPD LIMIT MAX	Speed reference is higher or equal than the speed limit.	Check the reference source and the motor load.
	Motor speed is out of control or motor is accelerating because of the load.	Verify speed limits.
F50 PSU FAULT	Damaged power supply.	Reset the equipment and if the fault persists request technical assistance.
F51 SCR TEMP	Temperature limits for SD700FR rectifier have been exceeded.	Verify that the ambient conditions are proper for the equipment. Be sure that there is nothing obstructing the cooling fans (dust, papers, dirt, etc) and that these rotate correctly.
F52 FAN P.SUPP	Fans of the equipment are operating wrong.	Verify that fans are not obstructed. Check that fans are not dirty and rotate correctly.
	Power supply of the fans has been overheated.	Wait for the temperature of the power supply decreases down to a value in normal conditions and restart it. You can disconnect the equipment, connect it again, and restart the power supply again. If the fault persists request technical assistance of Power Electronics.
	Drive power supplies are faulty and the rectifier bridge has reached 90ºC.	Check the correct status of the power supplies. If the fault persist request technical assistance of Power Electronics.
F53 INTRNAL TEMP	The limit of internal temperature of the electronics chamber has been exceeded.	Verify that the ambient conditions are proper for the equipment. Be sure that there is nothing obstructing the cooling fans (dust, papers, dirt in general) and that these rotate correctly.
F54 WATCHDOG TMR	A fault in the microcontroller has occurred.	Disconnect and re-connect the input power of the drive. If the fault persists request technical assistance of Power Electronics.
F56 EMERGEN.STOP	An external trip has been produced by closing a contact on the digital input configured in this option.	Verify the wiring of digital input. Check the installation.
F57 PUMP OVERLOA	High current used by the motor due to heavy load.	Check the motor load. Check if the motor cooling is appropriate. Check the setting of the parameters related to pump overload in group G11.
	The load exceeds the capacity of the motor cooling under normal operating conditions.	
	Incorrect setting of the parameters related to pump overload.	
	Phase loss of the motor or a fault in motor windings.	
F58 PROFI.TOUT	The communication between Profibus Master and Slave is cut off.	Revise the Profibus wiring and the configuration in the Master (PLC).
F60 ETH.IP T.OUT	The active connection with the Ethernet/IP Client has been lost.	Check the Ethernet/IP connection of the client (PLC, PC).
F61 NO INPUT V	The start command has been given while the drive is powered through the External 24V Power Supply.	Restore 3-Phase power supply to the drive before giving the start command.

6.1.4. List and Solutions of Rectifier bridge faults

DISPLAY	POSSIBLE CAUSE	ACTIONS
R1 I LIM FLT	The input current measure signal has been lost.	Check the current sensors are correctly fastened.
	The input voltage measure signal has been lost.	Check the voltage sensors are correctly fastened.
	Incorrect setting of the current control loop.	Readjust the parameters G22.10.5 and G22.10.6.
	A voltage dip has occurred.	Try to reset the fault. If the fault persists contact Power Electronics for technical service.
R2 V LIM FLT	Deceleration ramp too high (parameters 'G5.2 DECEL1' and 'G5.4 DECEL2') or rectifier's "PID Vdc" parameters are too slow.	Decrease deceleration ramps. If the fault persists contact Power Electronics for technical service.
R3 SOFT CHARG	Softcharge contactor or resistors failure.	Try to reset the fault. Disconnect and re-connect again the input power. If the fault persists contact Power Electronics for technical service.
R4 OVERLOAD R+ R5 OVERLOAD R- R6 OVERLOAD S+ R7 OVERLOAD S- R8 OVERLOAD T+ R9 OVERLOAD T- R10 MULTI O.L.	Rectifier bridge IGBTs desaturation. See possible causes for faults F4-F9.	Check if there is possible input wiring faults. If the fault persists after disconnecting input wires request technical assistance.
R11 VIN LOST	Input power phase lost.	Check the input wiring is correctly installed.
	Input voltage measure has been lost.	Check the voltage sensors are correctly fastened.
R12 IMB V IN	Imbalance voltage input.	Possible internal wiring disconnection. Check the input wiring is correctly installed and the status of the input power supply is correct.
R13 V LOST CAP	Voltage lost in the capacitor of the LCL filter.	Possible internal wiring disconnection. Disconnect and re-connect again the input power. If the fault persists contact Power Electronics for technical service.
R14 VBUS LOST	DC bus voltage signal is lost.	
R15 SfCh CONTACT	Feedback signal from the softcharge contactor is lost. Feedback is wrong wired.	Check that voltage signal connector is correctly fastened. If the fault persists contact Power Electronics for technical service. When the fault is produced when the VFD is power supplied, stop, check the contactor and start.
R16 LCL TEMP	The fans of the LCL filter zone are faulty.	Check that the fans rotate smoothly and there isn't any obstacle.
R17 VBUS LOW	Low bus voltage detected.	Input voltage is lost and the electronics power supply keep powered
R18 FIBR COMMS	Fiber optic cable is interrupted.	Check fiber optic cable about visual damages.
R19 I IMB IN	Unstable grid.	Check the parameter "G22.11.7 I Imb" value. If the fault persists contact Power Electronics technical service.
	Wiring fault.	
R20 GRND INPUT	Wiring fault.	Check power wiring about visual damages.
R21 I LIMIT IN	Input shortcircuit.	Check the parameter "G22.11.5 I lim REC" value and the load.
	Wiring fault.	
	Circuit fault.	
R22 IGBT TMP	See possible causes for F34 fault.	See possible solutions described for F34 fault.
R23 I HALL	Incorrect Rectifier Current Hall Sensor Connection.	Check the Current Hall Sensor wires.
R24 LCL FB	The feedback wire is not connected. The order wire is not connected. There is not contactor.	Review the LCL contactor wires.
R25 DIAG NODE	The ID of one target is wrong.	Review the selector positions
R26 DIAG BUS	The communication bus is wrong wired	Review the communication bus wires Review the end line jumpers

7. COMMONLY USED CONFIGURATIONS

7.1. Start / Stop Commands and Speed Reference by Keypad

7.1.1. Parameters Configuration

Parameter	Name / Description	Value
G1: Options Menu.		
4 LANG=ENGLISH	**G1.4** / Language selection	ENGLISH
7 PROG = STANDARD	**G1.7** / Program activation	STANDARD
G2: Motor Nameplate.		
1 MTR CURR=00.00A	**G2.1** / Motor rated current	__A (Set according to motor nameplate).
2 MTR VOLT=400V	**G2.2** / Motor rated voltage	__V (Set according to motor nameplate).
3 MTR PWR=00.0kW	**G2.3** / Motor rated power	__kW (Set according to motor nameplate).
4 MTR RPM=1450	**G2.4** / Motor rpm	__rpm (Set according to motor nameplate).
5 MTR PFA=0.84	**G2.5** / Cosine Phi	__ (Set according to motor nameplate).
6 MTR FRQ=50Hz	**G2.6** / Motor frequency	__Hz (Set according to motor nameplate).
7 MTR COOL=63%	**G2.7** / Motor cooling at zero speed	Use the following values as a reference: Submersible pumps and non-deflagrating motors ➔ 5% Self-cool motor ➔ 63% Force-cooled motor ➔ 100%
G3: References.		
1 REF1 SPD=LOCAL	**G3.1** / Speed reference source 1	LOCAL ➔ Reference will be determined by keypad and is set in G3.3 'Local Speed Reference'.
3 LOCAL SPD=+100%	**G3.3** / Local Speed Reference	100%
G4: Inputs – S4.1: Digital Inputs.		
1 CNTROL MODE1=1	**G4.1.1** / Main Control Mode	1 ➔ LOCAL (Drive control is done by keypad).
3 RESET MODE=Y	**G4.1.3** / Reset by keypad	Y ➔ YES (Enables reset by keypad).
G22: Rectifier.		
1 Vdc REF=...	**G22.1** / Vdc reference	Set the DC bus voltage in accordance with the installation.
2 Cos phi=1	**G22.2** / CosPHI reference	Set the displacement power factor (cos PHI) as 1.
3 CAP/IND=CAP	**G22.3** / CosPHI characteristics	Set the cos PHI as capacitive.
4 FREQ RE=2800	**G22.4** / Rect. frequency	Set the rectifier bridge IGBT switching frequency to 2800Hz.
5 TIME OFF=0.0	**G22.5** / Delay OFF Rect.	Set the delay of the rectifier bridge switching off to 0.

7.2. Start / Stop Commands by Terminals and Speed Reference by Analogue Input

7.2.1. Parameters Configuration

Parameter	Name / Description	Value
G1: Options Menu.		
4 LANG=ENGLISH	**G1.4** / Language selection	ENGLISH
7 PROG = STANDARD	**G1.7** / Program activation	STANDARD
G2: Motor Nameplate.		
1 MTR CURR=00.00A	**G2.1** / Motor rated current	__A (Set according to motor nameplate).
2 MTR VOLT=400V	**G2.2** / Motor rated voltage	__V (Set according to motor nameplate).
3 MTR PWR=00.0kW	**G2.3** / Motor rated power	__kW (Set according to motor nameplate).
4 MTR RPM=1485	**G2.4** / Motor rpm	__rpm (Set according to motor nameplate).
5 MTR PFA=0.85	**G2.5** / Cosine Phi	__ (Set according to motor nameplate).
6 MTR FRQ=50Hz	**G2.6** / Motor frequency	__Hz (Set according to motor nameplate).
7 MTR COOL=63%	**G2.7** / Motor cooling at zero speed	Use the following values as a reference: Submersible pumps and non-deflagrating motors ➔ 5% Self-cool motor ➔ 63% Force-cooled motor ➔ 100%
G3: References.		
1 REF1 SPD=LOCAL	**G3.1** / Speed reference source 1	LOCAL ➔ Reference will be introduced by keypad and is set in G3.3 'Local Speed Reference'.
2 REF2 SPD=LOCAL	**G3.2** / Speed reference source 2	AI1 ➔ Reference will be introduced by Analogue Input 1.
3 LOCAL SPD=+100%	**G3.3** / Local Speed Reference	+100%

ENGLISH

Parameter	Name / Description	Value
G4: Inputs – S4.1: Digital Inputs.		
1 CNTROL MODE1=2	**G4.1.1** / Main Control Mode	2 ➔ REMOTE (Drive control is done through control terminals).
4 DIGIT I MODE=1	**G4.1.4** / Digital Inputs configuration selection	1 ➔ ALL PROGRAMMABLE (all digital inputs can be individually configured by the user).
5 DIGITL IN 1=05	**G4.1.5** / Multi-function Digital Input 1 configuration	05 ➔ Start/Stop (Allows the start/stop command to be given by a switch).
6 DIGITL IN 2=15	**G4.1.6** / Multi-function Digital Input 2 configuration	15 ➔ Reference 2 (It allows selecting the alternative speed reference programmed in G3.2.)
G22: Rectifier.		
1 Vdc REF=…	**G22.1** / Vdc reference	Set the DC bus voltage in accordance with the installation.
2 Cos phi=1	**G22.2** / CosPHI reference	Set the displacement power factor (cos PHI) as 1.
3 CAP/IND=CAP	**G22.3** / CosPHI characteristics	Set the cos PHI as capacitive.
4 FREQ RE=2800	**G22.4** / Rect. frequency	Set the rectifier bridge IGBT switching frequency to 2800Hz.
5 TIME OFF=0.0	**G22.5** / Delay OFF Rect.	Set the delay of the rectifier bridge switching off to 0. ?¿??

7.2.2. Connections drawing

Terminals 1 and 2: start / stop command (NO status).
Terminals 1 and 3: alternative reference command (NO status).

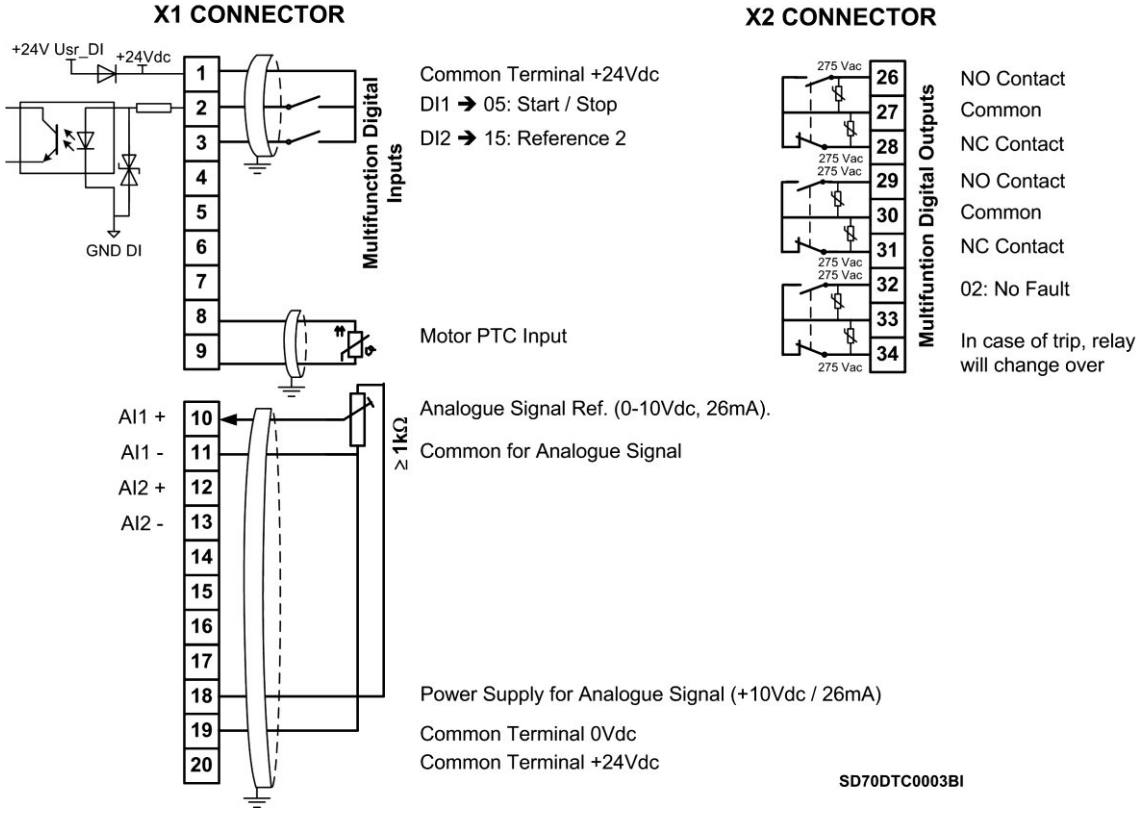

Figure 7.1 Start / Stop commands by terminals and speed reference by analogue input

Note: Use screened cables for the controls and connect screen to ground.

7.3. Start / Stop Commands by Terminals and Speed Reference by Motorized Potentiometer

7.3.1. Parameters Configuration

Parameter	Name / Description	Value
G1: Options Menu.		
4 LANG=ENGLISH	**G1.4** / Language selection	ENGLISH
7 PROG = STANDARD	**G1.7** / Program activation	STANDARD
G2: Motor Nameplate.		
1 MTR CURR=00.00A	**G2.1** / Motor rated current	__A (Set according to motor nameplate).
2 MTR VOLT=400V	**G2.2** / Motor rated voltage	__V (Set according to motor nameplate).
3 MTR PWR=00.0kW	**G2.3** / Motor rated power	__kW (Set according to motor nameplate).
4 MTR RPM=1485	**G2.4** / Motor rpm	__rpm (Set according to motor nameplate).
5 MTR PFA=0.85	**G2.5** / Cosine Phi	__ (Set according to motor nameplate).
6 MTR FRQ=50Hz	**G2.6** / Motor frequency	__Hz (Set according to motor nameplate).
7 MTR COOL=63%	**G2.7** / Motor cooling at zero speed	Use the following values as a reference: Submersible pumps and non-deflagrating motors ➔ 5% Self-cool motor ➔ 63% Force-cooled motor ➔ 100%
G3: References.		
1 REF1 SPD=PMOT	**G3.1** / Speed reference source 1	PMOT ➔ Motorized potentiometer with or without reference memory.
G4: Inputs – S4.1: Digital Inputs.		
1 CNTROL MODE1=2	**G4.1.1** / Main Control Mode	2 ➔ REMOTE (Drive control is done through control terminals).
4 DIGIT I MODE=1	**G4.1.4** / Digital Inputs configuration selection	4 ➔ MOTORIZED POT (It assigns the function of up and down speed reference to two of the digital inputs. DI5 = Up (NO Contact) and DI6 = Down (NC Contact). Reference is memorized) 5 ➔ ERASAB POT (As per above mode without memorizing the reference).
5 DIGITL IN 1=05	**G4.1.5** / Multi-function Digital Input 1 configuration	05 ➔ Start/Stop (Allows the start/stop command to be given by a switch).
G5: Inputs: Acceleration and Deceleration Ramps.		
7 PMT ACL1=1.0% / s	**G5.7** / Ramp 1 of reference increase for motorized potentiometer	1.0% / s (Modify these ramps to tune operation). If the ramp is increased the speed reference response will be faster. If the ramp is decreased the speed reference response will be slower.
8 PMT DCL1=3.0% / s	**G5.8** / Ramp 1 of reference decrease for motorized potentiometer	3.0% / s (Modify these ramps to tune operation). If the ramp is increased the speed reference response will be faster. If the ramp is decreased the speed reference response will be slower.
G22: Rectifier.		
1 Vdc REF=...	**G22.1** / Vdc reference	Set the DC bus voltage in accordance with the installation.
2 Cos phi=1	**G22.2** / CosPHI reference	Set the displacement power factor (cos PHI) as 1.
3 CAP/IND=CAP	**G22.3** / CosPHI characteristics	Set the cos PHI as capacitive.
4 FREQ RE=2800	**G22.4** / Rect. frequency	Set the rectifier bridge IGBT switching frequency to 2800Hz.
5 TIME OFF=0.0	**G22.5** / Delay OFF Rect.	Set the delay of the rectifier bridge switching off to 0.

7.3.2. Connections Drawing

Terminals 1 and 2: start / stop command (NO status).
Terminals 1 and 6: up speed command (NO status).
Terminals 1 and 7: down speed command (NC status).

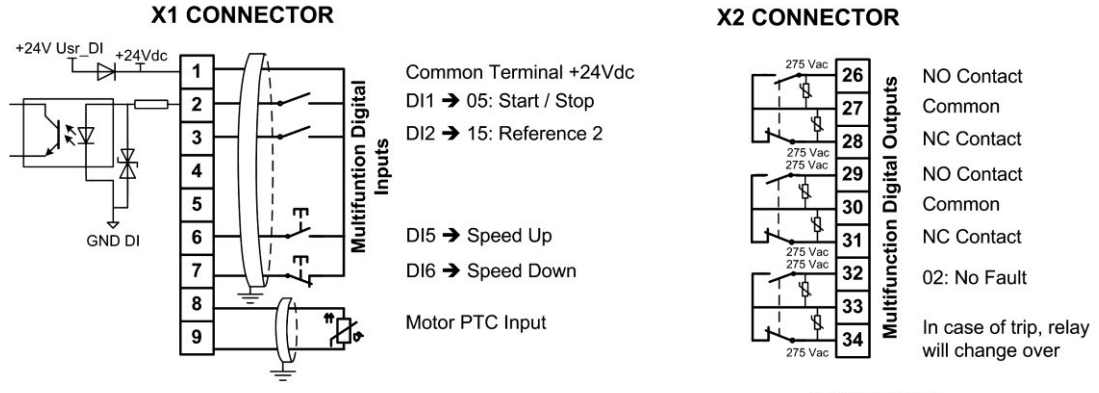

Figure 7.2 Start / Stop commands by terminals and speed reference by motorized potentiometer

Note: Use screened cables for the controls and connect the screen to the ground.

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7.4. Start / Stop Commands by Terminals and Seven Speed References Selectable by Digital Inputs

7.4.1. Parameters Configuration

Parameter	Name / Description	Value
G1: Options Menu.		
4 LANG=ENGLISH	**G1.4** / Language selection	ENGLISH
7 PROG = STANDARD	**G1.7** / Program activation	STANDARD
G2: Motor Nameplate.		
1 MTR CURR=00.00A	**G2.1** / Motor rated current	__A (Set according to motor nameplate).
2 MTR VOLT=400V	**G2.2** / Motor rated voltage	__V (Set according to motor nameplate).
3 MTR PWR=00.0kW	**G2.3** / Motor rated power	__kW (Set according to motor nameplate).
4 MTR RPM=1485	**G2.4** / Motor rpm	__rpm (Set according to motor nameplate).
5 MTR PFA=0.85	**G2.5** / Cosine Phi	__ (Set according to motor nameplate).
6 MTR FRQ=50Hz	**G2.6** / Motor frequency	__Hz (Set according to motor nameplate).
7 MTR COOL=63%	**G2.7** / Motor cooling at zero speed	Use the following values as a reference: Submersible pumps and non-deflagrating motors ➔ 5% Self-cool motor ➔ 63% Force-cooled motor ➔ 100%
G3: References.		
1 REF1 SPD=MREF	**G3.1** / Speed reference source 1	MREF ➔ Multiple speed references activated by digital inputs.
G4: Inputs – S4.1: Digital Inputs.		
1 CNTROL MODE1=2	**G4.1.1** / Main Control Mode	2 ➔ REMOTE (Drive control is done through control terminals).
4 DIGIT I MODE=3	**G4.1.4** / Digital Inputs configuration selection	3 ➔ MREF 3 WIRES (Automatically programs digital inputs 4, 5 and 6 as multiple speed references for up to 7 different values. The others digital inputs remain user configurable).
5 DIGITL IN 1=05	**G4.1.5** / Multi-function Digital Input 1 configuration	05 ➔ Start/Stop (Allows the start/stop command to be given by a switch).
G14: Multi-references.		
1 MREF 1=+10.0%	**G14.1** / Multi-reference 1	+10.0% (Allows setting the setpoint 1 value for the drive. It should be set according to the application requirements).
2 MREF 2=+20.0%	**G14.2** / Multi-reference 2	+20.0% (Allows setting the setpoint 2 value for the drive. It should be set according to the application requirements).
3 MREF 3=+30.0%	**G14.3** / Multi-reference 3	+30.0% (Allows setting the setpoint 3 value for the drive. It should be set according to the application requirements).
4 MREF 4=+40.0%	**G14.4** / Multi-reference 4	+40.0% (Allows setting the setpoint 4 value for the drive. It should be set according to the application requirements).
5 MREF 5=+50.0%	**G14.5** / Multi-reference 5	+50.0% (Allows setting the setpoint 5 value for the drive. It should be set according to the application requirements).
6 MREF 6=+60.0%	**G14.6** / Multi-reference 6	+60.0% (Allows setting the setpoint 6 value for the drive. It should be set according to the application requirements).
7 MREF 7=+70.0%	**G14.7** / Multi-reference 7	+70.0% (Allows setting the setpoint 7 value for the drive. It should be set according to the application requirements).
G22: Rectifier.		
1 Vdc REF=...	**G22.1** / Vdc reference	Set the DC bus voltage in accordance with the installation.
2 Cos phi=1	**G22.2** / CosPHI reference	Set the displacement power factor (cos PHI) as 1.
3 CAP/IND=CAP	**G22.3** / CosPHI characteristics	Set the cos PHI as capacitive.
4 FREQ RE=2800	**G22.4** / Rect. frequency	Set the rectifier bridge IGBT switching frequency to 2800Hz.
5 TIME OFF=0.0	**G22.5** / Delay OFF Rect.	Set the delay of the rectifier bridge switching off to 0.

7.4.2. Connections Drawing

Terminals 1 and 2: start / stop command (NO status).
Terminals 1 and 5: multi-reference A (NO status).
Terminals 1 and 6: multi-reference M (NO status).
Terminals 1 and 7: multi-reference B (NO status).

SPEED	REF	Digital Input 4 Multi-reference-A	Digital Input 5 Multi-reference-M	Digital Input 6 Multi-reference-B
G14.1 = +10.0%	MREF1	0	0	X
G14.2 = +20.0%	MREF2	0	X	0
G14.3 = +30.0%	MREF3	0	X	X
G14.4 = +40.0%	MREF4	X	0	0
G14.5 = +50.0%	MREF5	X	0	X
G14.6 = +60.0%	MREF6	X	X	0
G14.7 = +70.0%	MREF7	X	X	X

Note: 0: Not active and X: Active.

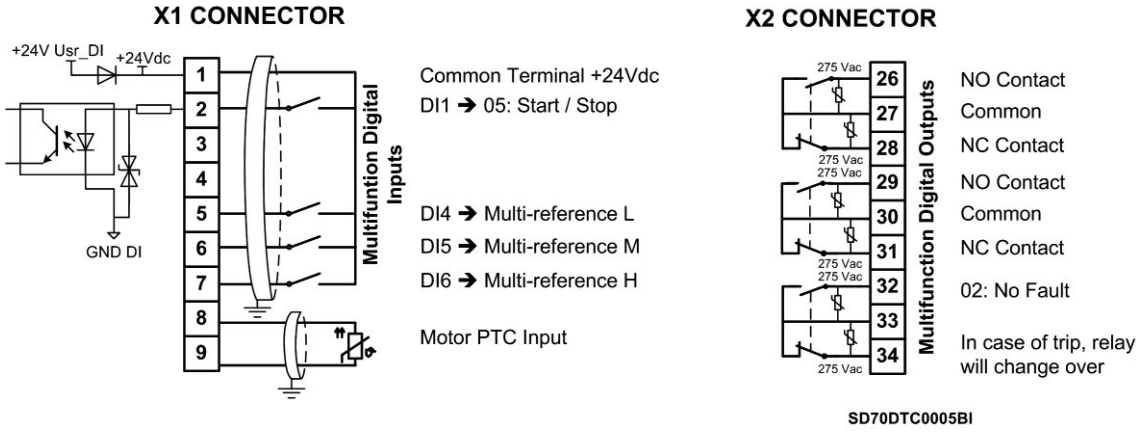

Figure 7.3 Start / Stop commands by terminals and 7 speeds by digital inputs

Note: Use screened cables for the controls and connect the screen to ground.

ENGLISH

8. CONFIGURATION REGISTER

VARIABLE SPEED DRIVE: SD700FR.
SERIAL Nº: MODEL:
APPLICATION:
DATE:
CUSTOMER:
NOTES:

PARAMETERS	FACTORY SETTINGS	SETTING 1	SETTING 2
G1: Options Menu			
1 LOCK PARMTRS=0	0	_____	_____
2 PASSWORD_=OFF	OFF	_____	_____
3 PSW ERR=XXXX	XXXX	_____	_____
4 LANG=ESPANOL	ESPANOL	_____	_____
5 INITIALISE=0	0	_____	_____
6 SHORT Menu=NO	NO	_____	_____
7 PROG = STANDARD	STANDARD	_____	_____
11 FAN CTRL=RUN	RUN	_____	_____

PARAMETERS	FACTORY SETTINGS	SETTING 1	SETTING 2
G2: Motor Nameplate Data			
1 MTR CUR=00.00A MOTOR CURRENT	00.00A		
2 MTR VOLT=400V MOTOR VOLTAGE	400V		
3 MTR PWR=00.0kW MOTOR POWER	00.0kW		
4 MTR RPM=1485 MOTOR SPEED (rpm)	1485		
5 MTR PFA=0.84 MTR POWER FACTOR	0.84		
6 MTR FRQ=50Hz MOTOR FREQUENCY	50Hz		
7 MTR COOL=63% MOTOR COOLING	63%		
G3: References			
1 REF1 SPD=LOCAL	LOCAL		
2 REF2 SPD=LOCAL	LOCAL		
3 LOCAL SPD=+100% LOCAL SPEED	+100%		
4 REF1 TQ=LOCAL	LOCAL		
5 REF2 TQ=NONE	NONE		
6 TQ=+100%	100%		
G4: Inputs – S4.1: Digital Inputs			
1 CNTROL MODE1=1	1		
2 CNTROL MODE2=2	2		
3 RESET MODE=Y	Y		
4 DIGIT I MODE=1	1		
5 DIGITL IN 1=06	06		
6 DIGITL IN 2=00	00		
7 DIGITL IN 3=00	00		
8 DIGITL IN 4=00	00		
9 DIGITL IN 5=00	00		
10 DIGITL IN6=17	17		
G4: Inputs – S4.2: Analogue Input 1			
1 SENSOR 1 ?=N	N		
2 SENSOR 1= l/s	l/s		
3 AIN1 FORMAT=V	V		
4 INmin1=+0V AIN1 LOW RANGE	+0V		
5 Smi1=+0.0l/s SENS1 LOW RANGE	+0.0l/s		
6 INmax1=+10V AIN1 HIGH RANGE	+10V		
7 Sma1=+10.0l/s SENS1 HIGH RANGE	+10.0l/s		
8 SPD LO1=+0% SPD LO RNG AIN1	+0%		
9 SPD HI1=+100% SPD HIG RNG AIN1	+100%		

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PARAMETERS	FACTORY SETTINGS	SETTING 1	SETTING 2
14 AIN1 LOSS=N	N		
15 1_Z BAND=OFF AIN1 ZERO BAND	OFF		
16 FILTER1=OFF AIN1 STABIL FILT	OFF		
G4 Inputs – S4.3: Analogue Input 2			
1 SENSOR 2 ?=N	N		
2 SENSOR 2=Bar	Bar		
3 AIN2 FORMAT=mA	mA		
4 INmin2=+4mA AIN2 LOW RANGE	+4mA		
5 Smi2=+0.0Bar SENS2 LOW RANGE	+0.0Bar		
6 INmax2=+20mA AIN2 HIGH RANGE	+20mA		
7 Sma2=+10.0Bar SENS2 HIGH RANGE	+10.0Bar		
8 SPD LO2=+0% SPD LO RNG AIN2	+0%		
9 SPD HI2=+100% SPD HIG RNG AIN2	+100%		
10 FB2 = 0.0Bar	0.0Bar		
11 FB2 – Sp = 0%	0%		
12 FA2 = +10.0Bar	+10.0Bar		
13 FA2 – SP = 100%	100%		
14 AIN2 LOSS=N	N		
15 2_Z BAND=OFF AIN2 ZERO BAND	OFF		
16 FILTER2=OFF AIN2 STABIL FILT	OFF		
G4: Inputs – S4.4: Pulse Input			
1 Sensr U=l/s	l/s		
2 Pls/s = 100 l/s LIQU AMOUNT/PULS	100l/s		
3 M Rn=1000 l/s FLOW MAX RANGE	1000l/s		
G4: Optic Fiber – S4.6: Fiber Mode			
1 FIBER MODE = 0	0		
G4: Optic Fiber – S4.6.3: Input O.F.			
5 CONTROL = 0	0		
6 FAULT = 0	0		
7 SPIN STP = 0	0		
G4: Optic Fiber – S4.6.5: T/O O.F.			
5 T/O F.O = 0	0		
G5: Acceleration and Deceleration Ramps			
1 ACCE 1=5.0% / s INITIAL ACCEL	5.0% / s		
2 DECEL 1=1.0% / s INITIAL DECEL	3.0% / s		
3 ACCE 2=10.0% / s SECOND ACCELE	1.0% / s		
4 DECEL 2=10.0% / s SECOND DECELE	1.0% / s		
5 BRK ACC=OFF BREAKPOINT ACL	OFF		

PARAMETERS	FACTORY SETTINGS	SETTING 1	SETTING 2
6 BRK DEC=OFF BREAKPOINT DCL	OFF		
7 PMT ACL1=1.0% / s MOTO POT INC1	1.0% / s		
8 PMT DCL1=3.0% / s MOTO POT DEC1	3.0% / s		
9 PMT ACL2=1.0% / s MOTO POT INC2	1.0% / s		
10 PMT DCL2=3.0% / s MOTO POT DEC2	3.0% / s		
11 PMOT BRK=OFF MOTO POT BRKPOIN	OFF		
12 SP FLT = OFF SMOOT SPD FILTER	OFF		
G6: PID Control			
1 SEL REF=MREF	MREF		
2 PID LOC=+0.0% PID LOCAL SETPOI	+0.0%		
3 SEL FBK=AI2	AI2		
4 GAIN Kp=8.0 PID PROPORTIONAL	8.0		
5 INTEGRAL = 0.1s PID INTEGRAL	0.0s		
6 DIFFEREN = 0.0s PID DIFFERENTIAL	0.0s		
7 INVERT PID=N	N		
8 Filt FB = OFF	OFF		
9 ERR PID = +0.0%	+0.0%		
G7: Start / Stop Mode Configuration			
1 STOP 1 = RAMP	RAMP		
2 STOP 2 = SPIN	SPIN		
3 BRK STP 2 = OFF STP2 UNDER SPEED	OFF		
4 START = RAMP	RAMP		
5 START 2 = RAMP	RAMP		
6 START DLY = OFF DELAY TO START	OFF		
7 STOP DLY = OFF DELAY TO STOP	OFF		
8 STP MIN SP = N	N		
9 OFFRet = OFF DELAY AFTER STOP	OFF		
10 RUN AFTR VFL = Y	Y		
11 SPNstr B=OFF SPIN START TUNE	OFF		
12 OFFdly2=OFF DELAY AFTER STP2	OFF		
13 STR AFT RST=Y	Y		
14 RPWr OFF = OFF	OFF		
15 MagneT = OFF	OFF		
16 RetATR = 0.01	0.01		

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PARAMETERS	FACTORY SETTINGS	SETTING 1	SETTING 2
G8: Outputs – S8.1: Output Relays			
1 SEL RELAY 1=02	02		
2 T R1 ON=0.0s R1 ACTIVAT DELAY	0.0s		
3 T R1 OFF=0.0s R1 DEACTIV DELAY	0.0s		
4 INVERT R1=N	N		
5 SEL RELAY 2=03	03		
6 T R2 ON=0.0s R2 ACTIVAT DELAY	0.0s		
7 T R2 OFF=0.0s R2 DEACTIV DELAY	0.0s		
8 INVERT R2=N	N		
9 SEL RELAY 3=05	05		
10 T R3 ON=0.0s R3 ACTIVAT DELAY	0.0s		
11 T R3 OFF=0.0s R3 DEACTIV DELAY	0.0s		
12 INVERT R3=N	N		
13 CRAspdOF=+5.0% CRANE BRKoff SPD	+5.0%		
34 Dig Out FB = DO1	DO1		
35 DlyDoFB = 1.0s	1.0s		
36 FAULT1 = OFF	OFF		
37 FAULT2 = OFF	OFF		
38 FAULT3 = OFF	OFF		
39 FAULT4 = OFF	OFF		
G8: Outputs – S8.2: Analogue Outputs			
1 ANLG OUT 1=01	01		
2 FORMT 1=4-20 mA	mA		
3 MIN1 RNG=0% MIN RANG ANAOUT1	+0%		
4 MAX1 RNG=+100% MAX RANG ANAOUT1	+100%		
5 FILTER 1=OFF FILTER ANAOUTPU1	OFF		
6 ANLG OUT 2=02	02		
7 FORMT 2=4-20 mA	4-20mA		
8 MIN2 RNG=0% MIN RANG ANAOUT2	+0%		
9 MAX2 RNG=+100% MAX RANG ANAOUT2	+100%		
10 FILTER 2=OFF FILTER ANAOUTPU2	OFF		
G9: Comparators – S9.1: Comparator 1			
1 COMP 1 SEL=00	00		
2 COMP 1 TYPE=0	0		
3 SP C1 ON=+100[%] C1 ACTIVAT LEVEL	+100[%]		
4 LIM 2 C1=+100[%] C1 WINDOW LIMIT2	+100[%]		

PARAMETERS	FACTORY SETTINGS	SETTING 1	SETTING 2
5 LIM 1 C1=+0[%] C1 WINDOW LIMIT1	+0[%]		
6 T C1 ON=0.0s C1 ACTIVAT DELAY	0.0s		
7 SP C1 OF=0[%]] C1 DEACTIV LEVEL	+0[%]		
8 T C1 OF=0.0s C1 DEACTIV DELAY	0.0s		
9 SEL FUNT C1=00	00		
G9: Comparators – S9.2: Comparator 2			
1 COMP 2 SEL=00	00		
2 COMP 2 TYPE=0	0		
3 SP C2 ON=+100[%] C2 ACTIVAT LEVEL	+100[%]		
4 LIM 2 C2=+100[%] C2 WINDOW LIMIT2	+100[%]		
5 LIM 1 C2=+0[%] C2 WINDOW LIMIT1	+0[%]		
6 T C2 ON=0.0s C2 ACTIVAT DELAY	0.0s		
7 SP C2 OF=0[%] C2 DEACTIV LEVEL	+0[%]		
8 T C2 OF=0.0s C2 DEACTIV DELAY	0.0s		
9 SEL FUNT C2=00	00		
G9: Comparators – S9.3: Comparator 3			
1 COMP 3 SEL=00	00		
2 COM 3 TYPE=0	0		
3 SP C3 ON=+100[%] C3 ACTIVAT LEVEL	+100[%]		
4 LIM 2 C3=+100[%] C3 WINDOW LIMIT2	+100[%]		
5 LIM 1 C3=+0[%] C3 WINDOW LIMIT1	+0[%]		
6 T C3 ON=0.0s C3 ACTIVAT DELAY	0.0s		
7 SP C3 OF=0[%]] C3 DEACTIV LEVEL	+0[%]		
8 T C3 OF=0.0s C3 DEACTIV DELAY	0.0s		
9 SEL FUNT C3=00	00		
G10: Limits			
1 MIN1 SP=+0.00% SPEED MIN LIMIT1	+0.00%		
2 MAX1 SP=+100% SPEED MAX LIMIT1	+100%		
3 MIN2 SP=-100% SPEED MIN LIMIT2	-100%		
4 MAX2 SP=+100% SPEED MAX LIMIT2	+100%		
5 I LIMIT=___A MAX CURRENT	___A		
6 I LIM TO = OFF TIMOUT MAX CURRE	OFF		
7 I. MAX2=____A MAX CURRENT 2	___A		
8 MI2 brSP=OFF MAX CURR BRK SPD	OFF		
9 MAX TOR=+150% MAX TORQUE	+150%		
10 T LIM TO=OFF TIMEOUT MAX TORQ	OFF		
11 INVERSION?=N	N		

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PARAMETERS	FACTORY SETTINGS	SETTING 1	SETTING 2
14 T/I LIM SP = N	N		
15 Rg TQ L = 150%	150%		
G11: Protections			
1 SP LIM_TO=OFF TMAX LIMITIN SPD	OFF		
2 STOP TO=OFF TIMEOUT STOPPING	OFF		
3 GND I LIMIT=10% GND CURR MAX LEV	10%		
4 LOW VOLT=360V LO INPUT VOLTAGE	360V		
5 LOW V TO=5s LO INP VOL TIMEO	5s		
6 HIGH VOLT=500V HI INPUT VOLTAGE	500V		
7 HI V TO=5s HI INP VOL TIMEO	5.0s		
8 Dlasy VO = 5s VOUT asyTRIP DLY	5.0s		
9 LOW V BHV=1	1		
10 PTC EXT ?=N	N		
11 PUMP OV=20.0A PUMP OVERLOAD LV	20.0A		
12 PMovl FIL=OFF PMP OVL FILTER	OFF		
13 Povl DLY=OFF PMP OVERLOAD DLY	OFF		
14 UNDERLOAD=N	N		
15 ULD CUR=___A UNDERLOAD CURREN	___A		
16 ULD SPD=+100% UNDERLOAD SPEED	+100%		
17 ULD DELY=10s UNDERLOAD DELAY	10s		
18 DEC.SPdly=OFF DECREM.SPD.DELAY	OFF		
19 Sp.SRCH.I =10% SPD.SEARCH INCR.	10%		
21 Vc Min. T=OFF	OFF		
22 Rdsq ls=5.0s	5.0s		
G12: Auto Reset			
1 AUTORESET=N	N		
2 ATTEMP NUMBR=1 MAX ATTEMPT NUMB	1		
3 R STR DEL=5s TIME BEFORE RESET	5s		
4 RS COUNT=15min AUTORESET TIMOUT	15min		
5 F1 AUTO RST=0	0		
6 F2 AUTO RST=0	0		
7 F3 AUTO RST=0	0		
8 F4 AUTO RST=0	0		
G13: Fault History			
1 F0 NO FAULT LAST FAULT=FXX	-		
2 F0 NO FAULT FIFTH FAULT=FXX	-		

PARAMETERS	FACTORY SETTINGS	SETTING 1	SETTING 2
3 F0 NO FAULT FOURTH FAULT=FXX	-		
4 F0 NO FAULT THIRD FAULT=FXX	-		
5 F0 NO FAULT SECOND FAULT=FXX	-		
6 F0 NO FAULT FIRST FAULT=FXX	-		
7 CLEAR FAULTS=N	N		
G14: Multi-references			
1 MREF 1=+10.0% MULTI-REFERENCE1	+10.0%		
2 MREF 2=+20.0% MULTI-REFERENCE2	+20.0%		
3 MREF 3=+30.0% MULTI-REFERENCE3	+30.0%		
4 MREF 4=+40.0% MULTI-REFERENCE4	+40.0%		
5 MREF 5=+50.0% MULTI-REFERENCE5	+50.0%		
6 MREF 6=+60.0% MULTI-REFERENCE6	+60.0%		
7 MREF 7=+70.0% MULTI-REFERENCE7	+70.0%		
G15: Inch Speeds			
1 INCH1=+0.00% INCH SPEED 1	+0.00%		
2 INCH2=+0.00% INCH SPEED 2	+0.00%		
3 INCH3=+0.00% INCH SPEED 3	+0.00%		
G16: Skip Frequencies			
1 SKIP 1=+0.0% SKIP FREQUENCY 1	+0.0%		
2 SKIP 2=+0.0% SKIP FREQUENCY 2	+0.0%		
3 SKIP BAND=OFF OFFSET BAND	OFF		
G17: Brake			
1 T DC BRAKE=OFF DC BRAKING TIME	OFF		
2 DC CURR=0% DC CURRENT LEVEL	0%		
3 DC VOLTS=0.0% DC BR VOLT LEVEL	0.0%		
4 I HEATING=OFF Idc HEATING	OFF		
G18: Encoder			
0 ENCODER = N	N		
1 PULSES = 1024	1024		
2 TYPE = DIFF	DIFF		
3 ENCOD FILTER = N	N		
G19: Fine Tuning – S19.1: IGBT Control			
1 TYPE CRTL=V/Hz	V / Hz		
2 FRQ=4000Hz MODULAT FREQUENC	4000		
3 PEWAVE=Y	Y		
5 AUTOTUNE=N	N		
6 OVERMODULATIO=N	N		

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PARAMETERS	FACTORY SETTINGS	SETTING 1	SETTING 2
G19: Fine Tuning – S19.2: MTR Load			
1 MIN FLUX = 100% MINIMUM FLUX	100%		
2 BW BOOST=0.0% BOOST BAND	0.0%		
3 V BOOST = 0.0% BOOST VOLTAGE	0.0%		
4 SLIP COMPENS=N	N		
7 I SLIP=4.0% I SLIP COMPENSAT	2.0%		
9 STR FRQ = 0.0% START FREQUENCY	0.0%		
10 DAMP.ref=OFF DAMPINGreferec	OFF		
11 DAMPref=3% REFER.DAMPING	3%		
G19: Fine Tuning – S19.3: MTR Model			
1 R STR=1% STATOR RESISTOR	1%		
2 R. RTR = 0%	0%		
3 Lm = 40%	40%		
4 L.l. = 0%	0%		
5 FL WEAK = 90%	90%		
G19: Fine Tuning – S19.4: Control PID			
1 Kp Sp = 95%	95%		
2 Ki Sp = 95%	95%		
3 Kp Tq = 95%	95%		
4 Ki Tq = 95%	95%		
5 Kp l = 95%	95%		
6 Ki l = 15%	15%		
9 Flux tune = 2.0%	2.0%		
G20: Communication Buses – S20.0: Communications Control			
0 CONTROL COM=0	0		
G20: Communication Buses – S20.1: Modbus RTU			
1 COMMS T/O=OFF COMMS TIMEOUT	OFF		
2 COMM ADDR=10 COMM ADDRESS	10		
3 BAUDS=9600	9600		
4 PARITY=NONE	NONE		
5 DispBR = 4800	4800		
G20: Communication Buses – S20.2: PROFIBUS			
1 NODE ADDR=10 NODE ADDRESS	10		
G20: Communication Buses – S20.3: CANOPEN			
1 CO NODEID=0	0		
2 CO BAUD=1Mbps	1Mbps		
3 CO REF sp=+0.0%	+0.0%		

PARAMETERS	FACTORY SETTINGS	SETTING 1	SETTING 2
G20: Communication Buses – S20.4: DEVICENET			
1 DN MACID=0	0		
2 DNBaud=500kbps	500kbps		
3 CONTROL MODE=0	0		
4 REFEREN MODE=0	0		
5 FAULT MODE = 2	2		
6 ASM IN=70	70		
7 ASM- OUT=20	20		
8 DNst = 0	0		
G20: Communication Buses – S20.5: OFC			
1 B/R F.O = 1Mbps	1Mbps		
G20: Communication Buses – S20.6: Registers			
1 Reg01 = 40001	40001		
2 Reg02 = 40001	40001		
3 Reg03 = 40001	40001		
4 Reg04 = 40001	40001		
5 Reg05 = 40001	40001		
6 Reg06 = 40001	40001		
7 Reg07 = 40001	40001		
8 Reg08 = 40001	40001		
9 Reg09 = 40001	40001		
10 Reg10 = 40001	40001		
11 Reg11 = 40001	40001		
12 Reg12 = 40001	40001		
13 Reg13 = 40001	40001		
14 Reg14 = 40001	40001		
15 Reg15 = 40001	40001		
16 Reg16 = 40001	40001		
17 Reg17 = 40001	40001		
18 Reg18 = 40001	40001		
19 Reg19 = 40001	40001		
20 Reg20 = 40001	40001		
21 Reg21 = 40001	40001		
22 Reg22 = 40001	40001		
23 Reg23 = 40001	40001		
24 Reg24 = 40001	40001		

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PARAMETERS	FACTORY SETTINGS	SETTING 1	SETTING 2
25 Reg25 = 40001	40001		
26 Reg26 = 40001	40001		
27 Reg27 = 40001	40001		
28 Reg28 = 40001	40001		
29 Reg29 = 40001	40001		
30 Reg30 = 40001	40001		
31 Reg31 = 40001	40001		
G20: Communication Buses – S20.7: Vis Regist			
1 Reg01 = 40001	40001		
2 Reg02 = 40001	40001		
3 Reg03 = 40001	40001		
4 Reg04 = 40001	40001		
5 Reg05 = 40001	40001		
6 Reg06 = 40001	40001		
7 Reg07 = 40001	40001		
8 Reg08 = 40001	40001		
9 Reg09 = 40001	40001		
10 Reg10 = 40001	40001		
11 Reg11 = 40001	40001		
12 Reg12 = 40001	40001		
13 Reg13 = 40001	40001		
14 Reg14 = 40001	40001		
15 Reg15 = 40001	40001		
16 Reg16 = 40001	40001		
17 Reg17 = 40001	40001		
18 Reg18 = 40001	40001		
19 Reg19 = 40001	40001		
20 Reg20 = 40001	40001		
21 Reg21 = 40001	40001		
22 Reg22 = 40001	40001		
23 Reg23 = 40001	40001		
24 Reg24 = 40001	40001		
25 Reg25 = 40001	40001		
26 Reg26 = 40001	40001		
27 Reg27 = 40001	40001		

PARAMETERS	FACTORY SETTINGS	SETTING 1	SETTING 2
28 Reg28 = 40001	40001		
29 Reg29 = 40001	40001		
30 Reg30 = 40001	40001		
31 Reg31 = 40001	40001		
G21: Networks – S21.1: ETHERNET			
1 AUTOMATIC IP=Y	Y		
Ixxx.yyy.zzz.hhh	-		
Sxxx.yyy.zzz.hhh	-		
Gxxx.yyy.zzz.hhh	-		
2 IP MANU. A=192	192		
3 IP MANU. B=168	168		
4 IP MANU. C=1	1		
5 IP MANU. D=143	143		
6 SUBNET A=255	255		
7 SUBNET B=255	255		
8 SUBNET C=255	255		
9 SUBNET D=0	0		
10 GATEWAY A=0	0		
11 GATEWAY B=0	0		
12 GATEWAY C=0	0		
13 GATEWAY D=0	0		
14 MAC A=0	0		
15 MAC B=80	80		
16 MAC C=194	194		
17 MAC D=114	114		
18 MAC E=X	X		
19 MAC F=Y	Y		
G21: Networks – S21.2: MODBUS TCP			
1 MIPtout=OFF MODBUS TCP TOUT	OFF		
G21: Networks – S21.3: ETHER./IP			
1 CONTROL MODE=0	0		
2 REFEREN.MODE=0	0		
3 FAULT MODE = 2	2		
G22: Rectifier			
1 Vdc REF=600 for Vin=400/480V, 800 for Vin=525V, 1050 for Vin=690V	600 for Vin=380/480V, 800 for Vin=525V, 1050 for Vin=690V		
2 Cos phi=1	1		

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PARAMETERS	FACTORY SETTINGS	SETTING 1	SETTING 2
3 CAP/IND=CAP	CAP		
4FREQ RE=2800	2800		
5 TIME OFF=0.0	0.0		
G22: Rectifier – S22.10: PID Conf.			
1 Kp PLL=10.0	10.0		
2 Ki PLL=15.0	15.0		
3 Kp Vdc=10.0	10.0		
4 Ki Vdc=3.5	3.5		
5 Kp I=10.0	10.0		
6 Ki I=10.0	10.0		
G22: Rectifier – S22.11: Protect.			
5 I lim REC=1.5 x I nominal drive select	1.5 x I nominal drive select		
6 T I Limit=OFF	OFF		
7 I Imb=30.0%	30.0%		
8 I Gnd=30.0%	30.0%		

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ITALY	**Power Electronics Italia Srl** • Piazzale Cadorna, 6 • 20123 • MILANO • ITALIA Tel. (+39) 347 39 74 792
JAPAN	**Power Electronics Japan KK** • Nishi-Shinbashi 2-17-2 • HF Toranomon Bldg. 5F • 105-0003 • Minato-Ku • Tokyo Tel. (+81) 03 6355 8911 • Fax (+81) 03 3436 5465 • Email: salesjapan@power-electronics.com
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UNITED KINGDOM	**Power Electronics Corp UK Ltd** • Well House • 80 Upper Street • Islington • LONDON N1 ONU • UNITED KINGDOM Tel. (+34) 961 366 557 • Fax. (+34) 961 318 201 • Email: uksales@power-electronics.com
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