SD 500
Series

VARIABLE SPEED DRIVE

Variable Speed Drive

Programming and Software Manual

POWER ELECTRONICS®

SD500 Series

VARIABLE SPEED DRIVE

Variable Speed Drive

Programming and Software Manual

Edition: June 2016

SD50MTSW01EI Rev. E

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.

ENGLISH

Edition June 2016

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
25 / 01 / 2011	A	First Edition. Version SW 1.0
28 / 02 / 2011	B	SW 1.1 Update
24 / 05 / 2011	C	SW 1.2 Update
20 / 05 / 2013	D	SW 2.0 Update
07 / 06 / 2016	E	SW 2.3 Update

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SAFETY INSTRUCTIONS

IMPORTANT!

- Read this manual carefully to maximise the performance of this product and to ensure its safe use.
- In this manual, safety messages are classified as follows:

WARNING

Do not remove the 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.

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

Wiring and periodic inspections should be performed at least 10 minutes after disconnecting the input power and after checking the DC Link voltage is discharged with a meter (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.

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 gets damaged.
Otherwise it could result in a secondary accident or fire.

After the input power is applied or removed, the drive 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.

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 SD500 is carefully tested and perfectly packed before leaving the factory.
- In the even 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 supplied with a SD500 technical manual.

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 their correct environmental management.

EMC

- According to EN 61800-3 the frequency inverter is not intended to be used in low voltage public network which supplies in domestic premises. Radio frequency interference is expected in such a network.
- With additional activities (e. g. EMC-Filter) it is possible to use these devices in the “Firs environment” according to EN 61800-3 Category C2.

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 and the front cover is removed.
- Handle the drive with care according to its weight.
- Install the drive according to the instructions within this manual.
- Do not place heavy objects on the drive.
- Ensure that the mounting orientation is correct.
- Do not drop the drive or subject it to impact.
- The SD500 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 *Technical Characteristics* section.

CONNECTION PRECAUTIONS

- To ensure correct operation of the drive it is recommended to use a SCREENED CABLE for the control wiring.
- For EMERGENCY STOP, make sure supply circuitry is open.
- Do not disconnect motor cables if input power supply remains connected. The internal circuits of the SD500 Series will be damaged if the incoming power is connected and applied to output terminals (U, V, W).
- It is not recommended to use a 3-wire cable for long distances. Due to increased leakage capacitance between conductors, over-current protective feature may not operate correctly.
- Do not use power factor correction capacitors, surge suppressors, or RFI filters on the output side of the drive. Doing so may damage these components.
- Always check whether the DC Link LED is OFF before wiring terminals. The capacitors may hold high-voltage even after the input power is disconnected. Use caution to prevent the possibility of personal injury.

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. Otherwise, damage to the drive may result.

OPERATION PRECAUTIONS

- When the Auto Restart function is enabled, keep clear of driven equipment, as the motor will restart suddenly after a fault is reset.
- The “STOP / RESET” key on the keypad is active only if the appropriate function setting has been made. For this reason, install a separate EMERGENCY STOP push button that can be operated at the equipment.
- If a fault reset is made with the reference signal still present then a restart will occur. Verify that it is permissible for this to happen, otherwise an accident may occur.
- Do not modify or alter anything within the drive.
- Before programming or operating the SD500 Series, initialise all parameters back to factory default values.

EARTH CONNECTION

- The drive is a high frequency switching device and leakage current may flow. Ground the drive to avoid electrical shock. Use caution to prevent the possibility of personal injury.
- Connect only to the dedicated ground terminal of the drive. Do not use the case or the chassis screw for grounding.
- When installing, grounding wire should be connected first and removed last.
- The earth cable must have a minimal cross sectional area that meets local country electrical regulations.
- Motor ground must be connected to the drive ground terminal and not to the installation’s ground. We recommend that the section of the ground connection cable should be equal or higher than the active conductor.
- Installation ground must be connected to the drive ground terminal.

1. DISPLAY AND CONTROL KEYPAD UNIT

1.1. Display and Keypad Unit Description.

The SD500 membrane display is a removable display for remote installation, as shown in the illustration. The display integrates three LEDs indicating the drive operating status, an LCD display screen with 4 lines of 16 characters and control keypad and setting parameters.

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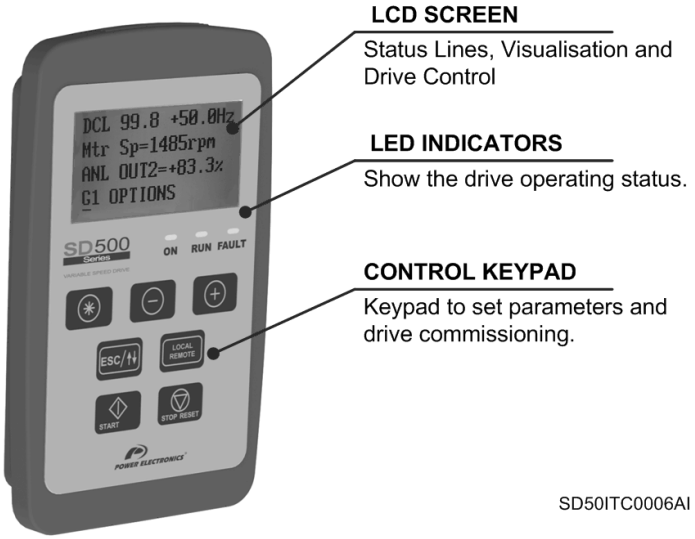

Figure 1.1 Display and Keypad Unit

1.1.1. LED Status Indicators.

Leds show at any time and simply for the user, if the SD500 is powered, provides output voltage or a fault has taken place.

LED	COLOR	FUNCTION
ON	Yellow	Switched on indicates the equipment is powered.
RUN	Green	Switched on indicates the motor receives voltage from the SD500.
FAULT	Red	Flashing indicates the equipment is in fault.

Figure 1.2 Display Status

1.1.2. Alphanumeric LCD Display Screen.

The SD500 display counts with a four-line LCD screen with sixteen characters per line (16x4). Each line has different functions.

- **Status Line:** Is the upper line.
Always present and shows the SD500 status (RUN, STP, etc…).
It also shows the motor output current and speed.
It is not configurable by the user.

- **Display Line 1:** Second screen line.
Always present and allows the user to select the different variables within the display menu.
It is configurable by the user.

- **Display Line 2:** Third screen line.
Always present and allows the user to select the different variables within the display menu.

- **Programming Line**: The lower line
The user can view and set the different SD500 parameters

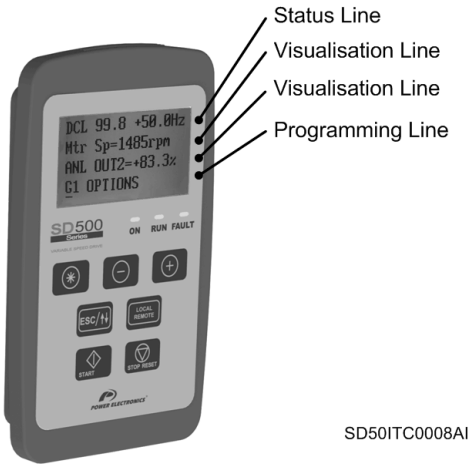

Figure 1.3 Display lines detail

1.1.3. Control Keypad

The keypad items have different function depending on their individual or combined use:

Authorise to enter into a parameter group to access the subgroups. In case a group does not have subgroups, the access would be straight to the group parameters.

Modifying numeric parameters:

Pressed simultaneously the value is increased.

Pressed simultaneously the value is decreased.

Modifying parameter numbered options:

Pressing this key, the user will have access to the option extended description.

Pressed simultaneously is possible to pass the different codes in ascending order.

Pressed simultaneously is possible to pass the different codes in descending order.

Scroll through the parameter groups. Within a parameter group, it is possible to browse the different parameters in ascending order. It also allows setting (increase) the value of configurable parameters.

Same function than the previous key. However, downstream. It also allows setting (decrease) the value of configurable parameters.

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Pressing for a 2 second period (approximately), the cursor changes within the different lines configurable by the user. It also allows to exit from a menu location to a previous one.

Pressing this key, the drive starts if it is configured in local control mode (check equipment configuration). This button will only operate whenever the equipment is configured in local control mode.

Pressing this key stops the drive if it is running. In case the equipment is at fault, pressing this button will reset the drive whenever the fault conditions have disappeared. This button will only work when the equipment is configured in local control.

Pressing this key, the drive will change from remote mode to local mode and vice versa. To activate this key functionality, the parameter [G1.12 ENB/DIS L/R] must be set to 'E' (Enabled). Pressing the key once, the drive switches to be controlled locally so the start command and the speed reference must be set in the display. The symbol "►" appears in the status line showing that the display is in local mode. Pressing the key again, the drive switches to remote mode, communications mode, or PLC mode, depending on the drive previous configuration. Also, the symbol "►" disappears from the status line of the display.
Note: There must be an elapsed time of two seconds between keystrokes for changes to take effect.

The following figure shows a programming example, indicating the previous explication.

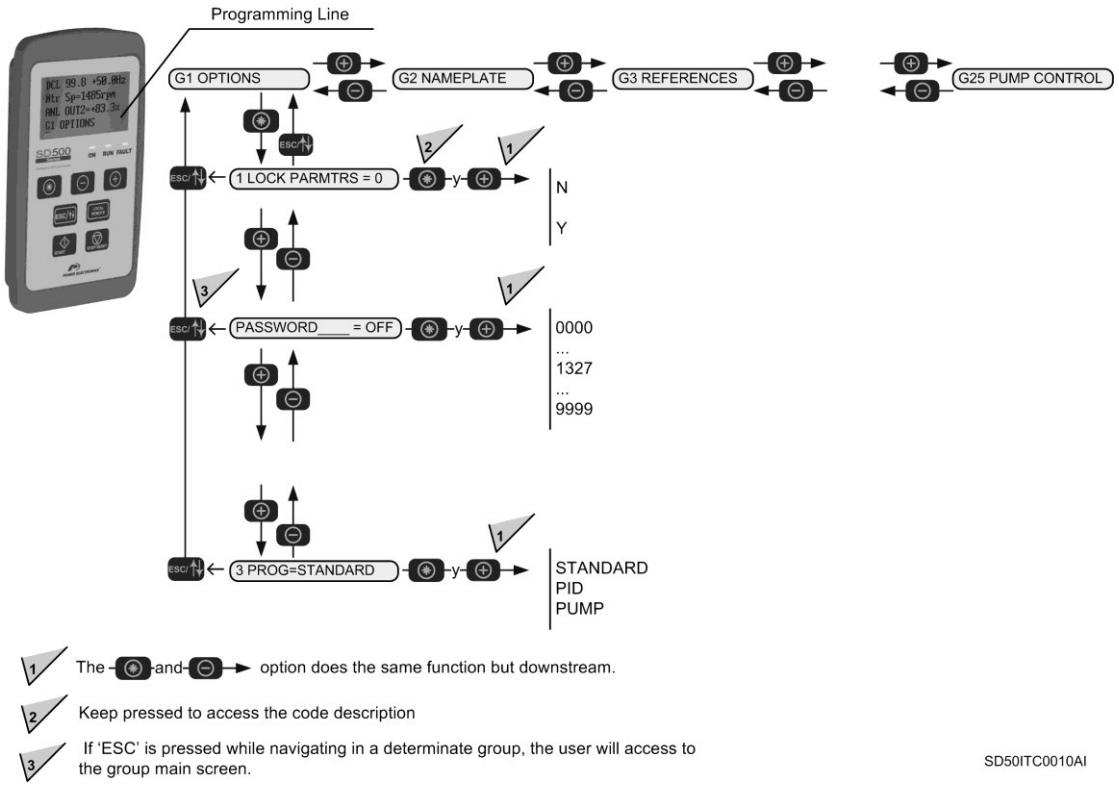

Figure 1.4 Parameters navigation example

2. STATUS MESSAGES

The upper line of the display corresponds to the status line. In this line we can see the equipment status, motor mean current consumption (A), and motor speed (Hz). Always visible in the display screen and it can not be modified by the user.

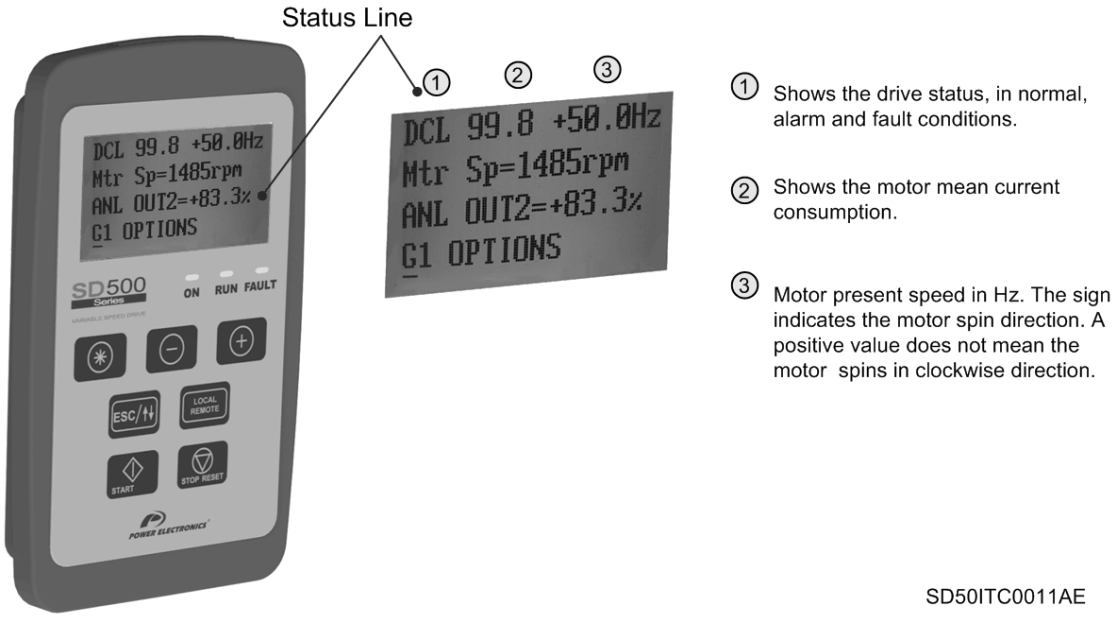

Figure 2.1 Description of the Status Line

Note: The user can access to the displayed information in the status line through the Modbus communication. Consult section “Modbus Communication”.

2.1. Status Messages List

Screen	Name	Description
FLT	Fault trip	The drive is in fault state
DCB	DC Brake	The SD500 has injected DC current to stop the motor.
STP	Stopping	The drive is decreasing the output frequency due to a stop order.
DCL	Decelerating	The drive is decreasing the output frequency. The motor is decreasing its speed, it is decelerating.
ACL	Accelerating	The drive is increasing the output frequency. The motor is increasing its speed, its accelerating.
RUN	Running	The drive is operating at reference speed. The motor will keep the introduced speed. Operating in nominal rate.
RDY	Ready	The drive is ready for commissioning.

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3. STATUS AND VISUALIZATION SCREENS

These screens show all time the SD500 input and output (signals and dynamic parameters) status. Display lines are lines 2 and 3. Anyway, the user can select in each line the parameter to visualise.
In order to select a parameter, the user must place the cursor in lines 2 and 3 pressing during 2 seconds, **ESC / ↑ ↓ .** so that the cursor will jump from one line to the other. Once located in lines 2 and 3, the user can navigate as done in the programming line (line 4) and visualise the selected parameter. Once the parameter has been chosen, it is saved in the display memory. This way, when the display is powered, it will show the last selected parameter in lines 2 and 3.
By the use of these two lines the user can choose a parameter to see and obtain further information in a simple and easy way.

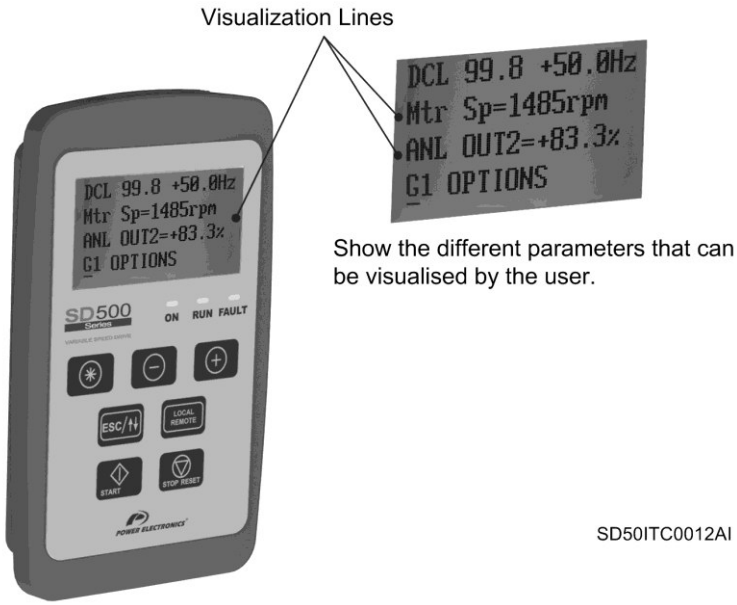

Figure 3 Display Lines Description

3.1. Screens SV.1 – Motor Visualization

Screen	Units	Description
Mtr I out=0.0 **MTR O/P current**	A	Shows the current running through the motor, corresponding to the second field of the status line ➔ **OFF 0.0A +0.0Hz**
Mtr Freq= 0.00Hz **Motor Frequency**	Hz	Shows the motor frequency
Mtr Sp= 0rpm **Motor Speed(rpm)**	rpm	Shows the motor speed in rpm
Mtr FBSp=+0rpm **MTR FBK Speed**	rpm	Shows the motor encoder speed. The value will be only shown if an encoder board has been installed in the drive.
Mtr Vout=0V **MTR O/P voltage**	V	Shows the motor voltage
Mtr Pow = 0.00kW **MTR O/P power**	kW	Shows the motor instantaneous power consumption
Mtr Torqe = 0.0% **MTR O/P torque**	% Motor torque	Shows the torque applied to the motor.
EncMon= 0 Hz (*)	Hz	Shows the encoder speed in terms of motor frequency.
PulMo = 0 kHz (*)	kHz	Shows the encoder speed in terms of encoder pulses.

(*) Available if parameter G19.1.1 =VECTOR

3.2. Screens SV.2 – Drive Visualization

Screen	Units	Description
Bus vol= 528V **Bus voltage**	VDC	Shows the DC voltage measured in the driver bus.
Temperature=27ºC **Temperature**	ºC	Shows the internal temperature of the drive.

3.3. Screens SV.3 – External Visualization

Screen	Units	Description
ANLG IN1 = +0.0V **A|1 Monitor**	V	Shows the Analogue Input 1 mean value.
ANLG IN2 = +0.0mA **A|2 Monitor**	mA	Shows the Analogue Input 2 mean value.
DigI= 00000000 **Dig I/P Status**	-	Shows the activation or rest status of the Digital Inputs, from left to right ED8 to ED1.
ANL OUT1 = 0.0% **Anl Out1 Monitor**	%	Shows the value of the Analogue Output 1.
ANL OUT2 = 0.0% **Anl Out2 Monitor**	%	Shows the value of the Analogue Output 2.
DOstatus= 0-00 **Dig Output status**	-	Shows the status of the digital outputs in the following order: SD1-Relay2 Relay1.

3.4. Screens SV.4 – Internal Visualization

Screen	Units	Description
Inv.Power= **Inv.Power**	kW	Shows the drive capacity in kW
Inv. S/W **Inv.SW**	0x103	Shows the last software version installed in the drive Ex. 0x103 ➔ v1.03
SW Disp= **Display Rev Num**	1.2_0_0	Shows the last software version installed in the display.

3.5. Screens SV.5 – PID Visualization

This display group appears when the parameter [G1.3 PROG] has been set to the PID option.

Screen	Units	Description
S=0.0% F=0.0% **Set- Fdb PID**	%	Shows the PID set point value of the analogue PID (left) and the sensor value that sends the feedback signal (right).
PID Out=+0.00% **PID Out**	%	Shows the t PID Output

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3.6. Screens SV.8 – Pump Macro Visualization

This display group is shown when the parameter [G1.3 PROG] is set as the 'PUMPS' option.

Screen	Units	Description
S=0.0% F=0.0% **Set-Fdb PID**	%	Shows the PID reference value of the analogue PID (left) and the sensor value that sends the feedback signal (right).
Sal PID=+0.00% **PID OUTPUT**	%	Shows the PID output.
No Bmb Ma=0 **Num Pumps on**	-	Shows the number of pumps running

3.6.1. Subgroup SV8.4 – References

In order to facilitate access to the configuration of different references, this display group is programmable. Its function is the same as the parameter group **[G25.1 References]** found on the pump application program.

Screen	Units	Description
1 MREF1= 10.00% **Multireference1**	%	When operating with a single local reference in PID mode, use the value set [SV8.4.1 MREF1] The speed applied in each case will depend on the activation status of the digital inputs configured with the following options: [G4.1.8 ED6 = 'MRefPID-H'] [G4.1.9 ED7 = 'MRefPID-M'] [G4.1.10 ED8 = 'MRefPID-L'] The assignment is done as shown on the following table:
2 MREF2= 20.00% **Multireference2**	%	
3 MREF3= 30.00% **Multireference3**	%	
4 MREF4= 40.00% **Multireference4**	%	
5 MREF5= 50.00% **Multireference5**	%	
6 MREF6= 50.00% **Multireference6**	%	
7 MREF7= 50.00% **Multireference7**	%	

DIGITAL OUTPUTS			REFERENCE PID
ED6=00	ED7=00	ED8=00	
0	0	X	G25.1.1 'M_Ref1'
0	X	0	G25.1.2 'M_Ref2'
0	X	X	G25.1.3 'M_Ref3'
X	0	0	G25.1.4 'M_Ref4'
X	0	X	G25.1.5 'M_Ref5'
X	X	0	G25.1.6 'M_Ref6'
X	X	X	G25.1.7 'M_Ref7'

4. PROGRAMMING PARAMETER DESCRIPTION

The various parameters found in the SD500 are arranged in functional groups (G1, G2, G3,…). To access the screens or subgroups found on a lower level press the [*] key. Once the parameter has been accessed, it may show a numeric value or an option list.

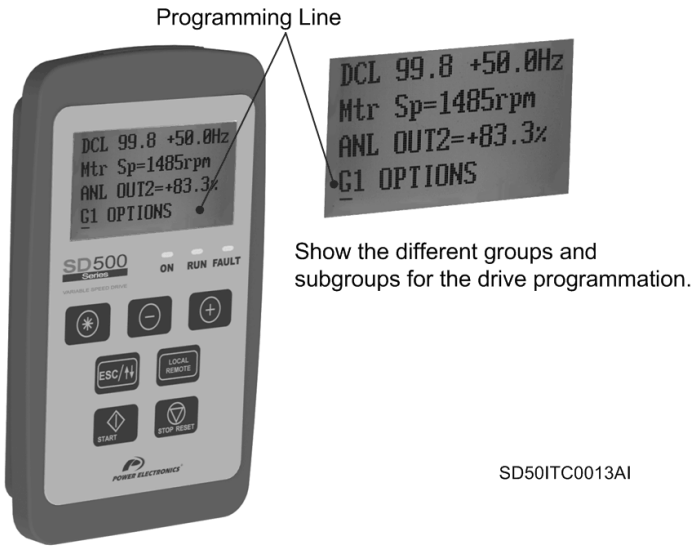

Figure 4.1 Programming Line Detail

The next section shows the screen lists and the different configuration options.

4.1. Group 1 – G1: Options Menu

Screen / Default Value	Name / Description	Range	Function	Set on RUN
1 LOCK PARMTRS= N **Lock Parameters**	**G1.1** / Parameters lock	N Y	Enables a total lockage of the SD500 parameters. This lockage is enabled after introducing on screen [G1.1b] a password. **DESCRIPTION** / **FUNCTION** N=NO – Lock is disabled Y=YES – Only screen [G1.1 Lock Parameters] can be modified.	NO
PASSWORD= 0 **Lock Password**	**G1.1b**/ Access Password	OFF, 0000 to 9999	Enables a password entrance to lock the parameters and prevent non authorised modifications within the configuration. When [G1.1 LOCK PARMTRS'] Y is selected, this screen appears automatically. Unlock: In [G1.1 = S] set N ➔ NO. The screen **PASSWORD=0** will appear.	YES
ERRPWD= XXXX **Password Clue**	**G1.1c** / Unlock recovery clue	0000 to 9999	Provides information for the lock code recovery: **Unlock password = (XXXX/2)-3.**	YES

<table>
<tr><th>Screen / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>2LOCK SCRENS= N
ViewLock Screens</td><td>G.1.2 / Screen Lock</td><td>N
Y</td><td>Allows the user to lock the access to the different SD500 parameter groups, excluding the [G1] parameter group. This lockage is enabled after introducing on screen [G1.2b] a password
<table><tr><th>DESCRIPTION</th><th>FUNCTIÓN</th></tr><tr><td>N=NO</td><td>No, lockage is not active.</td></tr><tr><td>Y=YES</td><td>Screen lock is active.</td></tr></table></td><td>NO</td></tr>
<tr><td>PASSWORD = 0
Enter Password</td><td>G1.2b/ Password</td><td>OFF,
0000 to 9999</td><td>Allows the user to introduce a password to lock the screen display.
When on screen [G1.2 LOCK SCRENS], Y is selected, this screen will appear automatically.
Unlock: In [G1.2='Y] set N ➔ NO. The screen PASSWORD= 0 appears.</td><td>YES</td></tr>
<tr><td>ERRORWD= XXXX
Clue</td><td>G1.2c / Unlock recovery password</td><td>0000 to 9999</td><td>Provides the information for the lock code recovery:
Unlock Password = (XXXX/2)-3.</td><td>YES</td></tr>
<tr><td>3 PROG= STANDARD
Program Select</td><td>G1.3 / Program activation</td><td>STANDARD
PID
PUMP</td><td>Select additional functions.

When PID is selected, the drive is in PID control mode. This mode parameter setting is done in group [G6 ‘PID Control’]. Thus, new functionality will be available in some parameters such as Digital Inputs in group [G4], and visualization group [SV5 ‘PID Visualization’].

When PUMP is selected, an extended available function will appear for the pump control [G25].
The screen group [G25] will remain hidden while the pump program is defused. Furthermore, another available configuration options relative to the pump control found in other parameters will not appear, as well as the multi-reference parameters [G14] due to the fact that those settings will be carried out from group G25. The visualization group [SV8 ‘Pump Macro Visualization’] is displayed</td><td>NO</td></tr>
<tr><td>4 LANGUA= ENGLISH
Languag selection</td><td>G1.4 / Language display</td><td>ENGLISH</td><td>Shows the users operating language.</td><td>NO</td></tr>
<tr><td>5 INITIALIZE= NO
Parameter Init</td><td>G1.5 / Default values initialisation</td><td>NO
YES</td><td>Initialise the parameters to reset the factory default settings.
<table><tr><th>DESCRIPTION</th><th>FUNCTION</th></tr><tr><td>NO</td><td>No parameter has been initialised</td></tr><tr><td>YES</td><td>All parameters have been initialised</td></tr></table></td><td>NO</td></tr>
<tr><td>6 UPLOAD= N
Eloader Upload</td><td>G1.6 / Save display parameters</td><td>N
Y</td><td>Save the complete drive parameter configuration</td><td>NO</td></tr>
<tr><td>Upload STS=
Upload Status</td><td>G1.6b / Uploading parameter status</td><td>0 to 100%</td><td>Show the parameter uploading process</td><td>NO</td></tr>
<tr><td>7 DOWNLOADM= N
Eloader Download</td><td>G1.7 / Downloading parameters</td><td>N
Y</td><td>Recovery of the parameter complete configuration previously saved in the memory</td><td>NO</td></tr>
<tr><td>DownloadSts=
Download Status</td><td>G1.7b / Downloading parameter status</td><td>0 to 100%</td><td>Show the parameter downloading process from the memory.</td><td>NO</td></tr>
<tr><td>8 Changed Para= N
ViewChangedParam</td><td>G1.8 / Changed parameter display</td><td>N
Y</td><td>Show the parameters that have changed their values from their default value. This way, the user can identify which parameters have changed and the parameters adjusted to the default value are hidden.
Note: Enabling this function may cause the display to run slowly. Use this functionality only when needed.</td><td>YES</td></tr>
</table>

Screen / Default Value	Name / Description	Range	Function	Set on RUN
9 ADMIN PW= 0 **Admin_Serv PWD**	**G1.9 /** Software Administration	0 to 65535	Restricted for internal use.	YES
10 LCDContra= 60 **Display Contrast**	**G1.10 /** Set display contrast	0 to 63	Enables the display contrast set.	YES
11 FAN= Run **FAN Control**	**G1.11** / Drive Fan Control	DuringRun Always ON Temp Ctrl	The user will be able to decide the drive fan operating mode. **OPTION** / **FUNCTION** DuringRun: The drive fans will connect with the start command and disconnect three minutes after the drive stops. Always ON: The fans are permanently working whenever the drive is powered. Temp Ctrl: The fan will connect at 51ºC and disconnect below 47ºC.	YES
12 ENB/DIS L/R=D **Enb/Ds Key Lc/Re**	**G1.12** / LOCAL / REMOTE key enabling	D E	The user will be able to enable or disable the operation of the LOCAL / REMOTE key of the display: **OPTION** / **FUNCTION** D=DISABLED: LOCAL / REMOTE key is disabled. E=ENABLED: LOCAL / REMOTE key is enabled. **Note:** For further information about the operation of this key go to section '1.1.3 Control Keypad'.	NO

4.2. Group 2 – G2: Nameplate

4.2.1. Subgroup 2.1 – G2.1: Drive Parameters

Screen / Default Value	Name / Description	Range	Function	Set on RUN
1 ACi/pVolt= 380V **AC Input Volt**	**G2.1.1** / Input Voltage	170 to 230V 320 to 480V	In order to set the input voltage. **Note:** The default setting value and this parameter range will vary depending on the drive supply voltage: 220V➔220 400V➔380	YES
2 I/P Freq= 50Hz **Input Frequency**	**G2.1.2** / Input frequency	50 – 60Hz	In order to set the input frequency. If the user changes from 50Hz to 60Hz, the parameters related to the frequency (or rpm) defined in a value greater than 50Hz will change to 60Hz. However, if the frequency is changed from 60Hz to 50Hz, the parameters related to the frequency (or rpm) defined in a value lower than 60Hz will change to 50Hz.	NO
3 TrimPwr%= +100% **Trim Power %**	**G2.1.3** / Power display setting	70 to 130%	Set the output power display, increasing its value if it is lower than expected or otherwise reducing it to coincide with the real value.	YES

Note: If all of these values are not introduced correctly, the SD500 would not work properly. Whenever the motor nameplate offers multiple options or the star-delta coil configuration can be altered make sure to introduce the data correctly in accordance with its configuration.

4.2.2. Subgroup 2.2 – G2.2: Motor Parameters

Screen / Default Value	Name / Description	Range	Function	Set on RUN
1 MTRPWR= 0.0kW[1] **Motor Power**	**G2.2.1** / Motor rated Power	0.2 to 185kW	Set the power to motor rated values in accordance with the nameplate. **Note:** When this parameter is changed, parameters [G2.2.2 MTR CUR], [G2.2.3 NOLOADC] and [G2.2.4 MTR VOLT] are automatically modified.	NO
2 MTR CUR= 0.0A[1] **Motor Current**	**G2.2.2** / Motor rated current	1.0 to 200.0A	Set the motor nominal current in accordance with the nameplate. **Note:** The value of this parameter will be automatically configured when setting parameter [G2.2.1 MOTRPWR].	NO
3 NOLOADC= 0.0A[1] **No load Current**	**G2.2.3** / No load current	0.5 to 200A	Set the current measured of the motor at rated frequency without load. If difficulties found when measuring the current without load, this setting should be between 30% and 50% of the motor nameplate rated current. **Note:** The value of this parameter will be automatically configured when setting parameter [G2.2.1 MOTRPWR].	NO

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Screen / Default Value	Name / Description	Range	Function	Set on RUN
4 MTR VOLT= 0V **Motor Voltage**	**G2.2.4** / Motor nominal voltage	180 to 480V	Set the motor rated voltage according to its nameplate. **Note:** The value adjusted in this parameter will be automatically set to 0V when changing the value of parameter [G2.2.1 MTRPWR]. Be careful of setting the motor rated voltage after changing the motor power parameter.	NO
5 POLE Number= 4[1] **POLE Number**	**G2.2.5 /** Motor Poles	2 to 48	Set the number of poles in the motor according to its nameplate.	NO
6 ADJTSPD= 100.0% **FineAdjustSpeed**	**G2.2.6 /** Fine speed setting	0.1 to 6000%	Set the motor fine rated speed in accordance with the nameplate.	YES
7 EFICIENC= +85%[1] **Efficiency**	**G2.2.7** / Motor Efficiency	70 to 100%	Set the motor efficiency according to its nameplate.	NO
8 MTR FRC = 50.00Hz **Motor Frequency**	**G2.2.8** / Motor frequency	30 to 400Hz	Set the motor frequency to rated value according to its nameplate.	NO
9 MTRCOOL=SELF **Motor Cooling**	**G2.2.9** / Motor cooling	SELF FORCED	Sets the drive with the motor characteristics to control. Provides information for the thermal electric protection based on the motor thermal model. **OPTIÓN** / **FUNCTION** SELF – Motor Self cooling FORZAD – Motor with forced cooling	YES

[1] Value that depends on the drive rated current.
Note: If all of these values are not introduced correctly, the SD500 would not work properly. Whenever the motor nameplate offers multiple options or the star-delta coil configuration can be altered, make sure to introduce the data correctly in accordance with its configuration.

4.3. Group 3 – G3: References

Screen / Default Value	Name / Description	Range	Function	Set on RUN
1 REF1 SP= LOCAL **Speed Reference 1**	**G3.1** / Speed Reference Source 1	LOCAL AI1 AI2 AI3 AI4 MDBUS COMMS PLC	Select the speed reference source associated with each control mode: - The reference source [G3.1 'REF1 SP'] is associated with the main control model [G4.1.1 'CONTRL MODE 1']. - The reference source 2 [G3.2 'REF2 SP'] is associated with the alternative control mode [G4.1.2 'CONTRL MODE 2']. **OPTION** / **FUNCTION** LOCAL – The reference will be introduced by the use of the keypad and set on [G3.3LOCAL]. AI1 – The reference will be introduced through the Analogue Input 1. AI2 – The reference will be introduced through the Analogue Input 2. AI3 – The reference will be introduced through the Analogue Input 3. **Note:** This option is only available if the I/O expansion board has been installed. AI4 – The reference will be introduced through the Analogue Input 4. **Note:** This option is only available if the I/O expansion board has been installed. MDBUS – The reference will be installed by the use of MODBUS communications. COMMS – The reference will be installed by the use of the optional communications board installed in the drive. **Note:** This option is only available if any of the communication boards have been installed. PLC – The reference will be introduced through a programmable Logic Controller. **Note:** This option is only available if the optional PLC board has been installed. **Note:** In case an unavailable option is selected, the parameter will return to the previously selected option.	NO
2 REF2 SP= LOCAL **Alt Speed Ref**	**G3.2** / Speed Reference Source 2			NO
3 LCLSP= 0.00Hz **Local Speed**	**G3.3** / Local Speed Reference	[G19.2.5] to [G10.1]	The user can set the motor spinning speed value whenever the speed reference has been set as LOCAL.	YES

Screen / Default Value	Name / Description	Range	Function	Set on RUN
4 REF1 TQ = LOCAL (*)	**G3.4** / Torque Source Reference 1	LOCAL AI1 AI2 AI3 AI4 MDBUS COMMS PLC	Allows to select supply 1 or supply 2 of the torque reference: **OPTION** / **FUNCTION** LOCAL: Reference will be introduced through keyboard and will be adjusted in G3.6 'Local Torque Reference'. AI1: The reference will be introduced through the analog input 1. AI2: The reference will be introduced through the analog input 2. AI3: The reference will be introduced through the analog input 3. AI4: The reference will be introduced through the analog input 4. MDBUS: The reference will be introduced through Modbus. COMMS: The reference will be introduced through the communications. PLC: The reference will be introduced through PLC.	NO
5 REF2 TQ = LOCAL (*)	**G3.5** / Torque Source Reference 2			NO
6 LclTQ = 0 % (*)	**G3.6** / Local Torque Reference	-180 to 180%	Allows the user to set the torque value of the motor if the torque reference source has been adjusted to "LOCAL"	YES

4.4. Group 4 – G4: Inputs

4.4.1. Subgroup 4.1 – S4.1: Digital I/P

Screen / Default Value	Name / Description	Range	Function	Set on RUN
1 CONTROL MODE1= 1 **Control Mode 1**	**G4.1.1** / Main Control Mode	LOCAL REMOTE MODBUS COMMS PLC	The user is able to set the main control mode to order the command functions (Start/Stop, Reset, …). **OP.** / **DESCRIP.** / **FUNCTION** 0 / LOCAL: The drive is controlled from the keypad. 1 / REMOTE: The drive is controlled from the control terminals. 3 / MODBUS: The drive is controlled through the communications bus, integrated in the equipment. 4 / COMMS: The drive control is carried out by the use of any of the optional communication boards. **Note:** This option is only available if any of the communication boards have been installed. 5 / PLC: The drive control is carried out through a programmable Logic Controller. **Note:** This option is only available if the optional PLC board has been installed. **Note:** In case an unavailable option is selected, the parameter will return to the previously selected option.	NO
2 CONTROL MODE2= 1 **Alt Ctrl Mode**	**G4.1.2** / Alternative Control Mode	LOCAL REMOTE MODBUS COMMS PLC	Enables the user to set the secondary control mode to order the command functions (Start, Stop, Reset…) The control mode 2 will enable exclusively through digital inputs. Therefore, set any of these to [15 ➔ CTR/REF 2]. When the input is active, it will operate in the auxiliary control mode, inhibiting the main mode. **OP.** / **DESCRIP.** / **FUNCTION** 0 / LOCAL: The drive is controlled from the keypad. 1 / REMOTE: The drive is controlled from the control terminals. 3 / MODBUS: The drive is controlled through the communications bus, integrated in the equipment. 4 / COMMS: The drive control is carried out by the use of any of the optional communication boards. **Note:** This option is only available if any of the communication boards have been installed. 5 / PLC: The drive control is carried out through a programmable Logic Controller. **Note:** This option is only available if the optional PLC board has been installed. **Note:** In case an unavailable option is selected, the parameter will return to the previously selected option.	NO

(*) Available if parameter G19.1.1 =VECTOR

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<table>
<tr><th>Screen / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>3 DI1= START (+)
Digital I/P 1</td><td>G4.1.3 /
Multifunction
Digital Input 1
Configuration</td><td rowspan="4">NONE
MRefPID-H
MRefPID-M
MRefPID-L
START (+)
START (-)
RESET
EXT TRIP
DIS START
INCH 1
SPEED-L
SPEED-M
SPEED-X
XCEL-L
XCEL-M
3 WIRE
CTR/REF 2
UP
DOWN
RESERVED
POT CLEAR
AnalogHLD
PIDOPLoop
RESERVED
Pre-Excit
Speed/Torque
ASR GAIN2
ASR P/PI
ThermalIn
INCH (+)
INCH (-)
Tq OFFSET</td><td rowspan="4">Digital Inputs configuration for individual use.<table><tr><th>OPTION</th><th>FUNCTION</th></tr><tr><td>None</td><td>Not programmed entry.</td></tr><tr><td>MRefPID-H</td><td>High Bit for the PID multireference. See [Group 14 – 'Multi-references'] (NO).
Note: This option is only available for Digital Input 6.</td></tr><tr><td>MRefPID-M</td><td>Medium Bit for the PID multireference. See [Group 14 – 'Multi-references'] (NO).
Note: This option is only available for Digital Input 7.</td></tr><tr><td>MRefPID-L</td><td>Low Bit for the PID multireference. See [Group 14 – 'Multi-references'] (NO).
Note: This option is only available for Digital Input 8.</td></tr><tr><td>START (+)</td><td>In order to command the 'Direct Start' order through the selector (NO). This option will not work if there is any digital input programmed as '3 WIRE', 'UP', or 'DOWN'.</td></tr><tr><td>START (-)</td><td>In order to command the 'Inverse Start order through the selector (NO). This option will not work if there is any digital input programmed as '3 WIRE', 'UP', or 'DOWN'.</td></tr><tr><td>RESET</td><td>In order to command the 'Reset' order through digital inputs. (NO)</td></tr><tr><td>EXT TRIP</td><td>Allows an extreme fault generation in order to stop the drive through digital inputs (NO). Is advisable to invert the digital input logic configured as Extreme Fault and set it as contact (NC). See parameter [G4.1.16].</td></tr><tr><td>DIS START</td><td>In order to stop the drive removing the motor output power supply forcing a stop by inertia. (NO)</td></tr><tr><td>INCH 1</td><td>In order to enable the speed reference programmed in [G15.1 'InchFq']. (NO)</td></tr><tr><td>SPEED-L[1]</td><td>Bit 0 speed reference. Allows selecting the multiple preconfigured speed references. See [Group 14 – 'Multi-references'] (NO)</td></tr><tr><td>SPEED-M[1]</td><td>Bit 1 speed reference. Allows selecting the multiple preconfigured speed references. See [Group 14 – 'Multi-references'] (NO)</td></tr><tr><td>SPEED-H[1]</td><td>Bit 2 speed reference. Allows selecting the multiple preconfigured speed references. See [Group 14 – 'Multi-references'] (NO)</td></tr><tr><td>SPEED-X[1]</td><td>Bit 3 speed reference. Allows selecting the multiple preconfigured speed references. See [Group 14 – 'Multi-references'] (NO)</td></tr><tr><td>XCEL-L</td><td>Bit 0 for alternative acceleration ramps. Allows the selection of the multiple preconfigured acceleration/deceleration ramps. See [Subgroup 5.16 – 'Alternative Ramps']</td></tr><tr><td>XCEL-M</td><td>Bit 1 for alternative acceleration ramps. Allows the selection of the multiple preconfigured acceleration/deceleration ramps. See [Subgroup 5.16 – 'Alternative Ramps']</td></tr><tr><td>3 WIRE</td><td>'Speed through Buttons' function'.
Example:
DI1 = 1➔ START(+) (NO)
DI2 = 14➔ 3 WIRE (NC)
DI3 = 17➔ UP (NO)
DI4 = 18➔ DOWN (NO)
This way, the DI1 button orders to start and the DI2 orders to stop. The DI3 and DI4 buttons allow the user to increase or decrease the speed.</td></tr><tr><td>CTR/REF 2</td><td>Enables the alternative control mode programmed in [G4.1.2. 'Alt Ctrl Mode']. (NO).</td></tr></table>[1] Available if [G1.3 PROG=STANDARD]
Note: Continues on the following page.</td><td rowspan="4">NO</td></tr>
<tr><td>4 DI2= START(-)
Digital I/P 2</td><td>G4.1.4 /
Multifunction
Digital Input 2
Configuration</td></tr>
<tr><td>5 DI3= DIS START
Digital I/P 3</td><td>G4.1.5 /
Multifunction
Digital Input 3
Configuration</td></tr>
<tr><td>6 DI4= EXT TRIP
Digital I/P 4</td><td>G4.1.6 /
Multifunction
Digital Input 4
Configuration</td></tr>
</table>

<table>
<tr><th>Screen / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>7 DI5= SPEED-L[1]
Digital I/P 5</td><td>G4.1.7 / Multifunction Digital Input 5 Configuration</td><td rowspan="4">NONE
MRefPID-H
MRefPID-M
MRefPID-L
START (+)
START (-)
RESET
EXT TRIP
DIS START
INCH 1
SPEED-L
SPEED-M
SPEED-X
XCEL-L
XCEL-M
3 WIRE
CTR/REF 2
UP
DOWN
RESERVED
POT CLEAR
AnalogHLD
PIDOPLoop
RESERVED
Pre-Excit
Speed/Torque
ASR GAIN2
ASR P/PI
ThermalIn
INCH (+)
INCH (-)
Tq OFFSET</td><td rowspan="4">Note: Previous page continuation.<table><tr><th>DESCRIPTION</th><th>FUNCTION</th></tr><tr><td>UP</td><td>Assigns to the digital input the function of increasing the speed reference by the use of a button(NO). The reference limits will be the ones set on [G.10 LIMITS].</td></tr><tr><td>DOWN</td><td>Assigns to the digital input the function of decreasing the speed reference by the use of a button(NO). The reference limits will be the ones set on [G.10 LIMITS].</td></tr><tr><td>RESERVED</td><td>-</td></tr><tr><td>POT CLEAR</td><td>Deletes the speed reference memory set with motorized potentiometer. This way, even if parameter [G4.18 ‘SaveMot Frq’] is set as ‘YES’, when restarting the drive, the drive will operate depending on the established reference in [G3.3 ‘LOCAL’].</td></tr><tr><td>AnalogHLD</td><td>Allows set a speed reference from an analog input to the value present at the activation time. When this digital input is active, the drive will ignore any change produced in the analog input reference (NO).</td></tr><tr><td>PIDOPLoop</td><td>Allows disabling the PID function. When it is disabled, the control PID will be resumed.
Note: This option must be used when the PID reference is set by analogue input. If PID reference is set by display, use option ‘INCH1’.</td></tr><tr><td>RESERVED</td><td>-</td></tr><tr><td>Pre-Excit</td><td>Enables the motor pre-excitation activation, before start. The user can adjust this functionality in parameters [G7.1 ‘START’], [G7.12 ‘DCSt T’] and [G7.13 ‘DC Curr’].</td></tr><tr><td>Speed/Torque(*)</td><td>Allows setting speed mode (NO) or torque mode (NC).</td></tr><tr><td>ASR GAIN2(*)</td><td>Allows changing the gain of the speed controller to [G19.3.7] after [G19.3.10].</td></tr><tr><td>ASR P/PI (*)</td><td>Allows disabling the Integral gain of the speed controller (NC).</td></tr><tr><td>ThermalIn</td><td>Assigns the over temperature trip function when a PTC sensor is connected to a digital input. Therefore, the PTC should be connected between a digital input and the common terminal. Furthermore, this input should be configured as (NC) in the parameter [G4.1.16 - 'DCTy'] and the overheat protection must be enabled in parameter [G11.23 ‘OvHM’].</td></tr><tr><td>INCH (+)</td><td>In order to define the direct starting fix speed reference to the one set in parameter [G15.1 -'InchFq']</td></tr><tr><td>INCH (-)</td><td>In order to define the direct starting fix speed reference to the one set in parameter [G15.1 -'InchFq']</td></tr><tr><td>Tq OFFSET(*)</td><td>In order to activate the Tq OFFSET option. Parameters are configured in screens [G10.8.6] to [G10.8.8].</td></tr></table></td><td rowspan="4">NO</td></tr>
<tr><td>8 DI6= SPEED-M[1]
Digital I/P 6</td><td>G4.1.8 / Multifunction Digital Input 6 Configuration</td></tr>
<tr><td>9 DI7= SPEED-H[1]
Digital I/P 7</td><td>G4.1.9 / Multifunction Digital Input 7 Configuration</td></tr>
<tr><td>10 DI8= INCH 1
Digital Input 8</td><td>G4.1.10 / Multifunction Digital Input 8 Configuration</td></tr>
<tr><td>14 DIOnF= 10ms
DI On Filter</td><td>G4.1.14 / Digital Input activation delay</td><td>0 to 10000ms</td><td colspan="2">In order to set the delay time when activating the digital input. In case any variation occurs within a smaller time gap, the input will remain disabled.</td><td>YES</td></tr>
<tr><td>15 DIOffF= 3ms
DI Off Filter</td><td>G4.1.15 / Digital Input deactivation delay</td><td>0 to 10000ms</td><td colspan="2">In order to set the delay time when disabling a digital input. In case any variations occur within a smaller time gap, the input will remain enabled.</td><td>YES</td></tr>
<tr><td>16 DCTy= 00000000
DiContactType</td><td>G4.1.16 / Digital input contact type selection</td><td>00000000
to
XXXXXXXX</td><td colspan="2">Allows defining the digital inputs as usually opened contactors (NO). or usually closed (NC)<table><tr><th>OPTION</th><th>FUNCTION</th></tr><tr><td>0</td><td>Contact normally open (NO)</td></tr><tr><td>X</td><td>Contact normally closed (NC)</td></tr></table>The assignment order is DI1, DI2, …, DI8 starting from the bit placed farthest to the right.</td><td>NO</td></tr>
<tr><td>17 DiScan= 1ms
Di Scan Time</td><td>G4.1.17 / Multireference delay time</td><td>1 to 5000ms</td><td colspan="2">In order to set how much time must pass to refresh the digital inputs configured as multireference.</td><td>NO</td></tr>
<tr><td>18 SaveMot Frq= N
Save motpot freq</td><td>G4.1.18 / Save operating frequency motorised Potentiometer</td><td>NO
YES</td><td colspan="2">Save automatically the speed reference defined by the motorised potentiometer.</td><td>YES</td></tr>
</table>

[1] These parameters default values depends on the program mode set in **[G1.3 PROG].**

(*) Available if parameter G19.1.1 =VECTOR

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

Screen / Default Value	Name / Description	Range	Function	Set on RUN
1 An1PT= 0-10v **Ain1PolarityType**	**G4.2.1** / Analog Input Mode Selection	0-10V -/+10V	The user is able to select between the single-pole or bipolar analog input mode. **OPTION** / **FUNCTION** 0-10V / Single-pole of 0-10V ±10V / Bipolar of ±10V In addition to change this parameter, the user should ensure that the analog input wiring is correct as shown in the Hardware and Installation Manual.	NO
2 Ain1LPF= 10ms **Ain1LPF**	**G4.2.2 /** Low Pass Filter for Analog Input 1	0 to 10000ms	Enables the setting of the time response against a change produced in the speed reference, so that it can reduce the speed fluctuation due to unstable signs or noise. This results that the response becomes slower.	YES
3 A1MnV= +0.00V **Ain1 Min V**	**G4.2.3** / Analog Input 1 Minimum Range	0 to [G4.2.5]	In order to define the minimum voltage for the analog input 1 according to the connected sensor characteristics.	YES
4 A1MnRf= +0.00% **An1MxV**	**G4.2.4** / Analog Input 1 Minimum Range Speed	0 to 100.00%	The user is able to set the speed reference corresponding to the analog input 1 minimum range. It corresponds to the minimum voltage level set in [G4.2.3 'Ain1LPF']. It is configured to introduce the speed reference through the analog input. The value is a percentage of the frequency adjusted in parameter [G4.2.12 'MxFqA'].	YES
5 A1MxV= +10.00V **Ain1 Max V**	**G4.2.5** / Analog Input 1 Maximum Rage	[G4.2.3] to 10.00V	Defines the maximum voltage for the analog input 1, according to the connected sensor characteristics.	YES
6 A1MxR= +100.00% **Ain1 Max Ref**	**G4.2.6** / Analog Input 1 Maximum Range Speed	0 to 100.00%	The user is able to set the speed reference corresponding to the analog input 1 minimum range. It corresponds to the minimum voltage level set in [G4.2.5 'A1MxV']. It is configured to introduce the speed reference through the analog input. The value is a percentage of the frequency adjusted in parameter [G4.2.12 'MxFqA'].	YES
7 An1NgMn=+0.00V[1] **Ain1 neg min V**	**G4.2.7 /** Analog Input 1 Negative Minimum Range	-10.00 to 0V	Defines the negative minimum voltage for the analog input 1, according to the connected sensor characteristics.	YES
8 A1MnR= +0.00%[1] **Ain1 Neg Min Ref**	**G4.2.8 /** Analog Input 1 Minimum Negative Range	-100.00 to 0%	The user is able to set the speed reference corresponding to the analog input 1 minimum negative range. Is corresponds to the minimum voltage level set in [G4.2.7 'An1NgMn']. It is configured to introduce the speed reference through the analog input. The value is a percentage of the frequency adjusted in parameter [G4.2.12 'MxFqA'].	YES
9 A1MxR= -10.00V[1] **Ain1 Neg MaxV**	**G4.2.9 /** Analog Input 1 Maximum Negative Range	-10.00 to 0V	Defines the maximum negative voltage for the analog input 1 according to the connected sensor characteristics.	YES
10 A1MxR= -100.00[1] **Ain1Neg Max Ref**	**G4.2.10 /** Analog Input 1 Maximum Negative Range Speed	-100.00 to 0%	The user is able to set the speed reference corresponding to the analog input 1 maximum negative range. It corresponds to the maximum voltage level set in [G4.2.8 'A1MnR']. It is configured to introduce the speed reference through an analog input. The value is a percentage of the frequency adjusted in parameter [G4.2.12 'MxFqA'].	YES
11 A1DeLI= 0.04% **Ain1 Discre Lv**	**G4.2.11 /** Analog Input 1 Quantification Level	0.04 to 10%	The user is able to set the analog input 1 quantification level. It is used when too much noise is present within the analog input signals. The quantification value is defined as the analog input 1 maximum percentage value. For example, if the input maximum value is 10V and the quantification level is 1%, the frequency will change in 0.05Hz (when the maximum frequency is 50Hz), in 0.1V intervals. As the input voltage increases or decreases, the output frequency will differ, removing the fluctuation effect within the analog input value.	NO
12 MxFqA= 50.00Hz **Max Freq Ang Inp**	**G4.2.12 /** Maximum frequency at analogue input	[G19.2.5] to [G10.1]	The user is able to set the operating frequency of the drive at the maximum voltage input of the analogue input.	YES

[1] Available if the Analog Input 1 is configured as bipolar (±10V) in parameter **[G4.2.1 EA1Md = 1].**

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

Screen / Default Value	Name / Description	Range	Function	Set on RUN
1 Ain2LPF= 10ms **Ain2LPF**	**G4.3.1 /** Low Pass Filter for Analog Input 2	0 to 10000ms	Enables the setting of the time response against a change produced in the speed reference, so that it can reduce the speed fluctuation due to unstable signs or noise. This results that the response becomes slower.	NO
2 A2MnC= 4.00mA **Ain2 Min C**	**G4.3.2** / Analog Input 2 Minimum Range	0 to 20.00mA	In order to define the minimum current for the analog input 2 according to the connected sensor characteristics.	YES
3 A2MnR= +0.00% **Ain2 Min Ref**	**G4.3.3** / Analog Input 1 Minimum Range Speed	0 to 100.00%	The user is able to set the speed reference corresponding to the analog input 2 minimum range. It corresponds to the minimum voltage level set in [G4.3.2 'A2MnC']. It is configured to introduce the speed reference through the analog input. The value is a percentage of the frequency adjusted in parameter [G4.3.7 'MxFqA'].	YES
4 A2MxC= 20.00mA **Ain2 Max Curr**	**G4.3.4** / Analog Input 2 Maximum Range	4 to 20.00mA	Defines the maximum current for the analog input 2, according to the connected sensor characteristics.	YES
5 A2MxR= +100.00% **Ain2 Max Ref**	**G4.3.5** / Analog Input 2 Maximum Range Speed	0 to 100.00%	The user is able to set the speed reference corresponding to the analog input 2 maximum range. It corresponds to the maximum current level set in [G4.3.4 'A2MxC']. It is configured to introduce the speed reference through the analog input. The value is a percentage of the frequency adjusted in parameter [G4.3.7 'MxFqA'].	YES
6 A2DeLI= 0.04% **Ain2 Dze Level**	**G4.3.6 /** Analog Input 2 Quantification level	0.04 to 10%	Same function as the quantification parameter shown in [G4.2.11 'A1DeLI'].	NO
7 MxFqA= 50.00Hz **Max Freq Ang Inp**	**G4.3.7 /** Maximum frequency at analogue input	[G19.2.5] to [G10.1]	The user is able to set the operating frequency of the drive at the maximum voltage input of the analogue input.	YES

4.5. Group 5 – G5: Acceleration and Deceleration Ramps

Screen / Default Value	Name / Description	Range	Function	Set on RUN
1 ACC1= 20.0s **Acc Ramp**	**G5.1** / Acceleration Ramp 1	0 to 600.0s	The user is able to set the acceleration ramp 1. The established setting within the parameter is the time required to reach the maximum frequency value, starting form 0Hz.This ramp will be set according to the process necessities.	SI
2 DECEL1= 30.0s **Decel Ramp**	**G5.2** / Deceleration Ramp 1	0 to 600.0s	The user is able to set the deceleration ramp 1. The established setting within the parameter is the time required to reach the maximum frequency value, starting form 0Hz.This ramp will be set according to the process necessities.	SI
4 RmpT= MaxFreq **Ramp T Mode**	**G5.4 /** Type of Acceleration Ramp	MaxFreq FrqDelta	Enables the acceleration ramp settings: **OPTION** / **FUNCTION** MaxFreq: Allows accelerating or decelerating with the same ramp based on the maximum frequency, independently from the operating frequency. FrqDelta: Allows defining the accelerating/decelerating time which will reach the next speed reference when working at constant speed.	NO
5 AccPn= Linear **Acc Pattern**	**G5.5 /** Acceleration Pattern	LINEAR S CURVE	In order to set the type of acceleration depending on the application: **OPTION** / **FUNCTION** LINEAR: The output frequency is constant and increases/ decreases linearly. S CURVE: Used in applications which require a soft acceleration/deceleration, such as lifting loads. The S curve index can be set from parameters [G5.7 – G5.10]	NO

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Screen / Default Value	Name / Description	Range	Function	Set on RUN
6 DecPn= Linear **Dec Pattern**	**G5.6** / Deceleration Pattern	LINEAR S CURVE	Allows the setting of the same functions found in parameter [G5.5 'AccPn']	NO
7 AcSSrt= +40% **Acc S Start**	**G5.7** / S Curve Acceleration Starting Ramp	1 to 100%	The user is able to set the curve whenever the acceleration/deceleration pattern is defined as S curve. It is used to set the S curve curvilinear relation when starting the acceleration.	NO
8 AccSEnd= +40% **Acc S End**	**G5.8** / S-Curve Acceleration Ending Ramp	1 to 100%	The user is able to set the curve's ramp once the acceleration/deceleration pattern has been defined as S Curve. It is used to set the S Curve curvilinear relation when ending the acceleration.	NO
9 DelSSrt= +40% **Dec S Start**	**G5.9** / S- Curve Deceleration Starting Ramp	1 to 100%	The user is able to set the curve whenever the acceleration/deceleration pattern is defined as S curve. It is used to set the S curve curvilinear relation when starting the deceleration.	NO
10 DecSEnd=+40% **Dec S End**	**G5.10** / S-Curve Decelerating Ending Ramp	1 to 100%	The user is able to set the curve's ramp once the acceleration/deceleration pattern has been defined as S Curve. It is used to set the S Curve curvilinear relation when ending the deceleration.	NO
11 AccDWF= 5.00Hz **Acc Dwell Freq**	**G5.11** / Acceleration Frequency Pause	[G19.2.5] to [G10.1]	During the acceleration process, the drive will pause at this frequency, keeping it constant during a period of time set in parameter [G5.12 – 'AccDWT'].	NO
12 AccDWT= 0.0s **Acc Dwell Time**	**G5.12** / Acceleration Time Pause	0 to 60s	During the acceleration process, this parameter allows to set during how long the drive will operate at the constant frequency set in parameter [G5.11 - AccDWF'].	NO
13 DecDWF= 5.00Hz **FDec Dwell Freq**	**G5.13** / Deceleration Frequency Pause	[G19.2.5] to [G10.1	During the deceleration process, the drive will pause at this frequency value, remaining constant during the period of time established in parameter [G5.14 – 'DecDWT'].	NO
14 DecDWT= 0.0s **Dec Dwell Time**	**G5.14** / Deceleration Time	0 to 60.0s	During the deceleration process, this parameter allows to set how long will the drive be operating at the constant frequency set in parameter [G5.13 - 'DecDWF'].	NO
15 TDedFll= 3.0s **Fault decal time**	**G5.15** / Fault Deceleration Time	0 to 600.0s	To proceed with the deceleration time settings, whenever a fault occurs.	YES

4.5.1. Subgroup 5.16 – S5.16: Alternative Ramps

<table>
<tr><th>Screen / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>1 ACC2= 20.0s
Acc Ramp 2</td><td>G5.16.1 / Alternative Acceleration Ramp 2</td><td>0 to 600.0s</td><td rowspan="7">This parameter allows up to three alternative acceleration/deceleration ramps. The main acceleration/deceleration ramps can be set in parameters [G5.1 'ACC1'] and [G5.2 'DECEL1'].
The alternative ramps will be enabled by means of the digital inputs, configured as multiple acceleration/deceleration references. See parameters [G4.1.3] to [G4.1.10].
To proceed with their use, the user must select the digital inputs which control the alternative ramps setting them as 'XCEL-L and XCEL-M.
The setting is carried out by assigning a time value to each of the parameters within the [G5.16.1] to [G5.16.6] groups.
The following table link the configured digital inputs as Alternative Ramps with the selected acceleration/deceleration:
<table>
<tr><th rowspan="2">PARM.</th><th rowspan="2">DESCRIP</th><th colspan="2">DIGITAL. I: START/STOP</th><th colspan="2">DIGITAL.I. ACC/DEC</th></tr>
<tr><th>STOP(+)</th><th>START(-)</th><th>M</th><th>B</th></tr>
<tr><td>G5.1</td><td>ACC1</td><td>1</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>G5.2</td><td>DECEL1</td><td>0</td><td>1</td><td>0</td><td>0</td></tr>
<tr><td>G5.16.1</td><td>ACC2</td><td>1</td><td>0</td><td>0</td><td>X</td></tr>
<tr><td>G5.16.2</td><td>DEC2</td><td>0</td><td>1</td><td>0</td><td>X</td></tr>
<tr><td>G5.16.3</td><td>ACC3</td><td>1</td><td>0</td><td>X</td><td>0</td></tr>
<tr><td>G5.16.4</td><td>DEC3</td><td>0</td><td>1</td><td>X</td><td>0</td></tr>
<tr><td>G5.16.5</td><td>ACC4</td><td>1</td><td>0</td><td>X</td><td>X</td></tr>
<tr><td>G5.16.6</td><td>DEC4</td><td>0</td><td>1</td><td>X</td><td>X</td></tr>
</table>
Note: 0: Disabled y X: Enabled.</td><td rowspan="7">YES</td></tr>
<tr><td>2 DEC2= 20.0s
Decel Ramp 2</td><td>G5.16.2 / Alternative Deceleration Ramp 2</td><td>0 to 600.0s</td></tr>
<tr><td>3 ACC3= 30.0s
Acc Ramp 3</td><td>G5.16.3 / Alternative Acceleration Ramp 3</td><td>0 to 600.0s</td></tr>
<tr><td>4 DEC3= 30.0s
Decel Ramp 3</td><td>G5.16.4 / Alternative Deceleration Ramp 3</td><td>0 to 600.0s</td></tr>
<tr><td>5 ACC4= 40.0s
Acc Ramp 4</td><td>G5.16.5 / Alternative Acceleration Ramp 4</td><td>0 to 600.0s</td></tr>
<tr><td>6 DEC4= 40.0s
Decel Ramp 4</td><td>G5.16.6 / Alternative Deceleration Ramp 4</td><td>0 to 600.0s</td></tr>
</table>

4.6. Group 6 – G6: PID Control

This configuration group allows adjusting the PID control of the drive. To enable this control mode it is necessary to adjust parameter [G1.3 'PROG'] as 'PID'.

<table>
<tr><th>Screen / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>1 SEL REF= MREF
Select Reference</td><td>G6.1 / Source Selection to introduce the set point</td><td>MREF
AI1
AI2
AI3
AI4
MODBUS
COMMS
PLC</td><td>The user is able to select the source to introduce the PID regulator reference.
<table><tr><th>OPTION</th><th>FUNCTION</th></tr><tr><td>MREF</td><td>PID reference introduced by keypad. The different references are set in parameter [Group 14 MULTIREFERENCES]</td></tr><tr><td>AI1</td><td>PID reference introduced through Analog Input 1</td></tr><tr><td>AI2</td><td>PID reference introduced through Analog Input 2</td></tr><tr><td>AI3</td><td>PID reference introduced through Analog Input 3
Note: This option is only available if the I/O expansion board has been installed.</td></tr><tr><td>AI4</td><td>PID reference introduced through Analog Input 4
Note: This option is only available if the I/O expansion board has been installed.</td></tr><tr><td>MODBUS</td><td>PID reference introduced through integrated Modbus communications</td></tr><tr><td>COMMS</td><td>PID reference introduced through communications of any of the optional communication boards.
Note: This option is only available whenever any of the optional communication boards have been installed.</td></tr><tr><td>PLC</td><td>PID reference introduced through the equipments programmable logic controller
Note: This option is only available whenever the PLC optional board has been installed.</td></tr></table>Note: Whenever an unavailable option is selected, the parameter will return to the previously selected option.</td><td>NO</td></tr>
<tr><td>2 SEL FBK= AI1
Select Feedback</td><td>G6.2 / Source Selection to Introduce the Feedback Signal</td><td>AI1
AI2
AI3
AI4
MODBUS
COMMS
PLC</td><td>In order to select the source this will introduce the feedback to close the control loop.
<table><tr><th>OPTION</th><th>FUNCTION</th></tr><tr><td>AI1</td><td>Feedback signal through the Analog Input 1</td></tr><tr><td>AI2</td><td>Feedback signal through the Analog Input 2</td></tr><tr><td>AI3</td><td>Feedback signal through the Analog Input 3
Note: This option is only available whenever the I/O expansion board has been installed.</td></tr><tr><td>AI4</td><td>Feedback signal through the Analog Input 4
Note: This option is only available whenever the I/O expansion board has been installed.</td></tr><tr><td>MODBUS</td><td>Feedback signal through the equipment integrated Modbus communications</td></tr><tr><td>COMMS</td><td>Feedback signal through communications of any of the optional communication boards.
Note: This option is only available whenever any of the optional communication boards have been installed.</td></tr><tr><td>PLC</td><td>Feedback signal through a programmable logic controller
Note: This option is only available whenever the PLC optional board has been installed.</td></tr></table>Note: Whenever an unavailable option is selected, the parameter will return to the previously selected option.</td><td>NO</td></tr>
<tr><td>3 GainKp= +50.0%
Gain Kp</td><td>G6.3 / PID Regulator Gain</td><td>0 to 1000.0%</td><td>In order to set the value of the proportional gain controller. This value should be increased, whenever a greater control response is needed,
Note: Increasing too much this value can cause a greater system instability</td><td>YES</td></tr>
<tr><td>4 INTEGRL= 10.0s
PID Integral</td><td>G6.4 / PID Regulator Integrating Time</td><td>0 to 200.0s</td><td>Set the regulator integration time. In case greater precision is needed, increase this value.
Note: Increasing this value may slow down the system.</td><td>YES</td></tr>
<tr><td>5 T Der= 0ms
PID Differential</td><td>G6.5 / PID Regulator Differential Time</td><td>0 to 1000ms</td><td>Set the regulator differential time. Whenever a greater response is needed, this value can be increased.
Note: Increasing too much this value can cause a precision loss.</td><td>YES</td></tr>
</table>

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Screen / Default Value	Name / Description	Range	Function	Set on RUN
6 MxSL= +50.00Hz **Max Speed LIM**	**G6.6 /** PID Upper Frequency Limit	From [G6.8] to 300Hz	Set the upper limit at the PID output	YES
7 MnSL= 0.00Hz **Min Speed Lim**	**G6.7 /** PID Lower Frequency Limit	From -300.00 to [G6.7] Hz	Set the lower limit at the PID output	YES
8 INVERT PID= N **Invert PID**	**G6.8** / PID Output Inverting	N Y	In order to invert the drive PID output. **OPTION** / **FUNCTION** N=NO: The PID regulator answers in normal mode. This means, when the feedback value is greater than the reference signal, the speed will be reduced. Whenever the feedback is lower than the reference signal, the speed will be increased. Y=YES: The PID regulator responds in inverted mode. Therefore, whenever the feedback value is higher than the reference signal, speed will be increased. However, whenever the feedback is lower than the signal reference value, speed will be decreased.	NO
9 OutSc= +100.0% **Out Scale**	**G6.9 /** PID Output Scale	0.1 to 1000.0%	To set the PID regulator output magnitude.	NO

Note: The PID regulator functions will be set whenever the PID parameter has been enabled [G1.3 PROG].

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

Screen / Default Value	Name / Description	Range	Function	Set on RUN
1 START= RAMP **Start Mode**	**G7.1** / Start Mode	RAMP DCSTART	Define the motor start **OPT.** / **FUNCTION** RAMP: The drive will start applying a frequency ramp to the motor. DCSTART: Allows accelerating after having stopped the motor by the use of the DC Brake. It can also be used after a normal brake whenever some torque is needed after opening the external brake. To configure this option, see parameters [G7.12 'DCSt T'] and [G7.13 'DC Curr'].	NO
2 StrDly= 0.00s **Start Delay**	**G7.2 /** Start Delay Time	0 to 100.00s	Provides the delay setting from the moment the drive receives the start order until the start begins. After receiving the start order, the drive will wait until the delay time to start has passed.	NO
3 STOP= RAMP **Stop Mode**	**G7.3** / Stop Mode 1	RAMP DC BRAKE SPIN POW BRKE	Select the drives main stop mode. This value should be adequate for each application. **OPT.** / **FUNCTION** RAMP: The drive will stop applying a frequency ramp to stop the motor. DC BRAKE: The drive will apply DC to stop the motor. To configure this option, see parameters from [G7.14 'PreDC T'] to [G7.17 'DCBk F']. SPIN: The drive will cut the motor output supply, stopping due to inertia. POW BRKE: The drive will stop the motor as soon as possible by controlling the regenerative energy to avoid an overvoltage fault. This option may increase or decrease the deceleration time according to the inertia of the load. **Note:** Do not use this option in applications where decelerations are frequent or it may cause motor overheating.	NO

Screen / Default Value	Name / Description	Range	Function	Set on RUN
4 SAFE STOP= N **Stop Without VIN**	**G7.4 /** Safe Stop	N Y	Select the safe stop mode. **OPT.** / **FUNCTION** N=NO: The drive will stop with a normal deceleration Y=YES: The drive will be loaded with the regenerative energy generated by the motor, controlling the drive output frequency when there is a power loss.	NO
5 SFSStr= 125.0% **SafeStop Start**	**G7.5** / Safe Stop Start	110.0 to 140.0%	Defines the point from which the safe stop starts. The difference between this parameter and parameter [G7.6 'SFSStp] should be between a 0% and a 10%.	NO
6 SFSStp = 130.0% **SafeStop Stop**	**G7.6** / Safe Stop Ending	130.0 to 145.0%	Defines the point from which the safe stop function ends. The difference between this parameter and parameter [G7.5 'SFSStr'] should be between a 0% and a 10%.	NO
7 SFSGain= 1000 **SafeStop Gain**	**G7.7** / Safe Stop Gain	1 to 2000	Allows the control of the regenerative energy accumulation. Whenever the load torque is high, a low gain must be set. However, if the torque is low, high gain will be set.	YES
10 Run Aft Rst= N **Str Aft Restart**	**G7.10 /** Start after Low Voltage Fault	N Y	In order to set whether to start once voltage is present at the input after a low voltage fault. **OPT.** / **FUNCTION** N=NO: Disables the start function after fault due to low supply voltage. Y=YES: Enables the start function after the fault caused by low supply voltage. **Note:** If there is an instantaneous power interruption, the right function must be enabled in parameter [G7.18.1 'Srch Mode'].	YES
11 Str Aft Rst= N **Str Aft Reset**	**G7.11 /** Start after reset due to fault	N Y	Allows to reset the drive after a fault has occurred: **OPT.** / **FUNCTION** N=NO: Disables the start function after reset. Y=YES: Enables the start function after reset.	YES
12 DCSt T= 0.00s[1] **Time to Dc Start**	**G7.12** / Dc Start Time	0 to 60.00s	Allows setting the time during which the equipment applies DC voltage before starting to accelerate when the equipment is set in DC start mode. To enable the DC start, the parameter [G7.1 'START'] must be set as 'DCSTART'.	NO
13 DC Curr= 50%[1] **Curr Inj DC Strt**	**G7.13** / DC Current Start	0 to 200%	Set the start current level when the equipment is set in DC START mode. To enable the DC start option, the parameter [G7.1 'START'] must be set as 'DCSTART'.	NO
14 PreDC T= 0.10s[2] **Pre DCBrake Time**	**G7.14** / Previous DC Brake lock - Time	0 to 60.0s	In order to set the time before starting the DC Brake. Once the frequency is below the value adjusted in parameter [G7.17 'DCBkF'] the drive will wait this time before the DC Brake operation starts.	NO
15 DCBrk T= 1.00s[2] **Dc Brake Time**	**G7.15** / DC Brake Time	0 to 60.0s	Set the DC Brake operation time	NO
16 DCBkCur= 50%[2] **Levl Cur DC Brake**	**G7.16** / DC Brake Level	0 to 200%	Set the current level which will be applied to the motor in percentage of the motor rated current during DC Brake operation.	NO
17 DCBk F= 5.00Hz[2] **Frq Strt DCBrake**	**G7.17** / DC Brake Frequency	0 to 60Hz	Set the frequency value at which the drive will enable the DC brake. The DC Brake operation will start once the frequency is below this value and the time set in parameter [G7.14 'PreDC T'] has elapsed.	NO
19 PreExt = 1 s (*)	**G7.19** / Pre-excit Time	0 to 60s	Set the initial excitation time.	NO
20 PreExF = 100 % (*)	**G7.20** / Pre-excit Flux	100 to 500%	Set the flux supplied during the pre-exit time configured in [G7.19].	NO
21 PwofDI = 1s (*)	**G7.21** / Power off Delay	0 to 60s	After the motor stops, this parameter sets the time during which direct current from the drive is fed into the motor.	NO

[1] This parameter is only shown if parameter [G7.1 START] is configured as 'DCSTART'
[2] This parameter is only shown if the [G7.3 STOP] parameter is configured as DCBRAKE
(*) Available if parameter G19.1.1 =VECTOR

ENGLISH

4.7.1. Subgroup 7.18 – S7.18: Speed Search

<table>
<tr><th>Screen / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>1 Srch Mode= 0000
Search Mode</td><td>G7.18.1 / Speed Search Mode</td><td>0000 to XXXX</td><td>In order to configure four different types of speed search.
X➔Function enabled
0➔ Function disabled
<table><tr><th>BIT</th><th>FUNCTION</th></tr><tr><td>000X</td><td>Speed search during acceleration.</td></tr><tr><td>00X0</td><td>Speed search at the start after reset due to fault. Parameter [G7.11 ‘Str Aft Rst’] must be set to ‘YES’.</td></tr><tr><td>0X00</td><td>Speed search at the start after instantaneous power interruption.</td></tr><tr><td>X000</td><td>Speed search at the start at the time of power on. Parameter [G7.10 ‘Run Aft Rst’] must be set to ‘YES’.</td></tr></table></td><td>NO</td></tr>
<tr><td>2 Srch I= 150%
Search Current</td><td>G7.18.2 / Speed Search Current</td><td>80 to 200%</td><td>The user is able to control the current during the speed search in percentage in relation with the motor rated current.</td><td>YES</td></tr>
<tr><td>3 Kp Srch= 100
Search Proport</td><td>G7.18.3 / Proportional Gain for Speed Search</td><td>0 to 9999</td><td>This parameter allows setting the proportional gain for the speed search.</td><td>YES</td></tr>
<tr><td>4 Ki Srch= 200
Search Integral</td><td>G7.18.4 / Integral Gain Speed Search</td><td>0 to 9999</td><td>Allows the integral gain setting for the speed search.</td><td>YES</td></tr>
<tr><td>5 Srch Dly= 1.0s
Search Sp Delay</td><td>G7.18.5 / Speed Search Delay</td><td>0 to 60.0s</td><td>The user is able to lock the output during an established time within this parameter before proceeding with the speed search.</td><td>NO</td></tr>
</table>

4.8. Group 8 – G8: Outputs

4.8.1. Subgroup 8.1 – S8.1: Digital O/P

<table>
<tr><th>Screen / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>1 OP FLT RLY= 0X0
Operate flt rely</td><td>G8.1.1 / Relay Output due to Fault</td><td>000 to XXX</td><td>This parameter allows setting when will the relay output enable configured as [29 FAULT]:
<table><tr><th>BIT</th><th>FUNCTION</th></tr><tr><td>00X</td><td>Fault due to Low Voltage</td></tr><tr><td>0X0</td><td>Fault excluding Low Voltage cause.</td></tr><tr><td>X00</td><td>Final automatic restart fault. The relay will enable whenever all of the restarting trials have been carried out, which have been set in parameter [G12.1 ‘Retry Num’] or the time set in parameter [G12.2 ‘Retry Dly’] has elapsed.</td></tr></table></td><td>YES</td></tr>
<tr><td>2 RLY1= Trip
Function Relay 1</td><td>G8.1.2 / Relay 1 Control Source Selection</td><td rowspan="2">NONE
FDT-1
FDT-2
FDT-3
FDT-4
OVERLOAD
IOL
UNDRLOAD
VENTWARN
OVERVOLT
LOWVOLT
OVERHEAT
RUN
STOP
STEADY
SPD SRCH
READY
PUMP
TRIP
ENCODER DIR
COMPARAT
BRCTRL</td><td rowspan="2">Configures each relay and digital output according to the options of the following table:
<table><tr><th>OPTION</th><th>FUNCTION</th></tr><tr><td>NONE</td><td>The output has no effect.</td></tr><tr><td>FDT-1</td><td>In order to check when the output frequency has reached the defined frequency by the user. The relay will enable whenever the following equation is satisfied:
OutputF>frequency – ([G9.2 'FDTBnd'] / 2).
Example: If the reference frequency is 50Hz and [G9.2 ‘FDTBnd’]=10Hz, then 50 – (10/2)=45Hz. The contactwill close with frequencies greater than 45Hz.</td></tr><tr><td>FDT-2</td><td>The relay is active whenever the frequency reference is set [G9.1 'FDTLvl'] being [G9.2 ‘FDTBnd’] the bandwidth.
For example: If the frequency value is 40Hz, [G9.1 'FDTLvl']=40Hz and [G9.2 ‘FDTBnd’]=4Hz, the contact will close from 38Hz to 42Hz.</td></tr><tr><td>FDT-3</td><td>The relay will enable with frequencies from [G9.1 ‘FDTLvl’] – ([G9.2 ‘FDTBnd’]/2) to [G9.1 ‘FDTLvl’] + ([G9.2 ‘FDTBnd’]/2).
For example: If [G9.1 ‘FDTLvl’]=30Hz and [G9.2 ‘FDTBnd’]=10Hz, then the contact will close from (30 – (10/2)) to (30 + (10/2)). This means, from 25Hz to 35Hz during acceleration.</td></tr><tr><td>FDT-4</td><td>The relay will be active whenever the output frequency is greater than the [G9.1 ‘FDTLvl’] value and remains closed until it decreases under [G9.1 ‘FDTLvl’] – ([G9.2 ‘FDTBnd’]/2).
For Example: If [G9.1 ‘FDTLvl’]=30Hz and [G9.2 ‘FDTBnd’]=10Hz, then the contact will close with values greater than 30Hz and it will not open until it decreases under 25Hz.</td></tr><tr><td>OVERLOAD</td><td>The relay will be active when the motor is in overload.</td></tr><tr><td>IOL</td><td>The relay will be active in case a fault due to overload protection occurs.</td></tr><tr><td>UNDRLOAD</td><td>The relay will be active in case of an underload warning.</td></tr><tr><td>VENTWARN</td><td>The relay will be active in case a fan fault occurs, if parameter [G11.27 FANTrip] is set as ‘WARN’.</td></tr><tr><td>OVERVOLT</td><td>The relay will enable whenever the drives DC bus voltage is greater than the protection voltage.</td></tr><tr><td>LOWVOLT</td><td>The relay will enable whenever the drives bus DC voltage is lower than the protection voltage.</td></tr></table>Note: Continues on next page.</td><td>SI</td></tr>
<tr><td>3 RLE2= Run
Function Relay 2</td><td>G8.1.3 / Relay 2 Control Source Selection</td><td>YES</td></tr>
</table>

<table>
<tr><th>Screen / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>4 DOP1= FDT-1
Digital Output1</td><td>G8.1.4 / Digital Output 1 Control Source Selection</td><td>NONE
FDT-1
FDT-2
FDT-3
FDT-4
OVERLOAD
IOL
UNDRLOAD
VENTWARN
OVERVOLT
LOWVOLT
OVERHEAT
RUN
STOP
STEADY
SPD SRCH
READY
PUMP
TRIP
ENCODER DIR
COMPARAT
BRCTRL</td><td>Note: Previous page continuation.<table><tr><th>OPTION</th><th>FUNCTION</th></tr><tr><td>OVERHEAT</td><td>The relay will enable if the cooling fan is out of service.</td></tr><tr><td>RUN</td><td>The relay will enable with the start command. However, it will not enable during the DC brake.</td></tr><tr><td>STOP</td><td>The relay will enable whenever no start command has been sent and no output voltage is present within the drive.</td></tr><tr><td>STEADY</td><td>The relay will enable when the drive operates at constant speed.</td></tr><tr><td>SPD SRCH</td><td>The relay will be enabled whenever the drive is in search speed mode. For further information, check subgroup [G7.18 ‘Speed Search’].</td></tr><tr><td>READY</td><td>The relay will enable whenever the drive is ready to start (without any warnings or trips).</td></tr><tr><td>PUMP</td><td>Used to configure an auxiliary fixed pump in the pump programme.</td></tr><tr><td>TRIP</td><td>The relay will enable due to a trip, according to parameter [G8.1.1 ‘OP FLT RLY’].</td></tr><tr><td>ENCODER DIR (*)</td><td>It is a warning of the encoder. The relay will be active when the encoder is misplaced.</td></tr><tr><td>COMPARAT</td><td>The relay will enable whenever the setting conditions found in [Group 9: ‘Comparators’] are satisfied.</td></tr><tr><td>BRCTRL</td><td>Used to control the brake opening. See group [G17: External Brake’].</td></tr></table></td><td>YES</td></tr>
<tr><td>5 T RL ON= 0.00s
Delay Dig O/P On</td><td>G8.1.5 / DO1 and Relays Connection Delay</td><td>0 to 100.00s</td><td>The user is able to specify a delay in the relays and digital output 1 connections. If during the connection delay time the activation condition disappears, the relay will not enable.</td><td>YES</td></tr>
<tr><td>6 T RL OF= 0.00s
Dely Dig I/P Off</td><td>G8.1.6 / DO1 and Relays Disconnection delay</td><td>0 to 100.00s</td><td>The user is able to specify a delay within the digital output 1 and relays disconnection. If during the disconnection delay time, the disable condition disappears, the relay will not disable.</td><td>YES</td></tr>
<tr><td>7 INV NA/NC= 000
Logic NC/NO Rlys</td><td>G8.1.7 / Digital Output and Relay Contact Type Selection</td><td>000 to XXX</td><td>Defines the type of contact following this order: Digital Output 1, Relay 2 and Relay 1, from left to right according to the bit assignment:<table><tr><th>BIT</th><th>FUNCTION</th></tr><tr><td>0</td><td>Contact normally open (NO)</td></tr><tr><td>X</td><td>Contact normally closed (NC)</td></tr></table></td><td>NO</td></tr>
</table>

(*) Available if parameter G19.1.1 =VECTOR

4.8.2. Subgroup 8.2 – S8.2: Analog O/P

<table>
<tr><th>Screen / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>1 A01= Frequency
AO1 Mode</td><td>G8.2.1 / Analog Output 1 Selection Mode</td><td>Frequency
O/ pCurr
O/pVolt
DCLinkV
O/p Power
TargetFq
RampFreq
PIDRefVal
PIDFdbVal
PIDO/p
Constant</td><td>The analog output 1 is programmable according to the following table:
<table>
<tr><th>DESCR.</th><th>FUNCTION</th></tr>
<tr><td>Frequency</td><td>Signal proportional to the motor speed. For the maximum frequency defined in [G10.1 - MsSpL] a 10V voltage will be present</td></tr>
<tr><td>O/ pCurr</td><td>Signal proportional to the motor current. 10V are generated when the drive rated current is at 200%.</td></tr>
<tr><td>O/pVolt</td><td>Signal proportional to the motor voltage. For the voltage value defined in [G2.2.4 'MTR VOLT'] a 10V voltage will be present.</td></tr>
<tr><td>DCLinkV</td><td>Signal proportional to the bus DC voltage. The analogue output is 10V when the DC voltage is 410Vdc for 220Vac drives and 820Vdc for 400Vac drives.</td></tr>
<tr><td>O/p Power</td><td>Signal proportional to the output power.
10V are generated operating 200% of the nominal power.</td></tr>
<tr><td>TargetFq</td><td>Signal proportional to the target frequency set in the drive.</td></tr>
<tr><td>RampFreq</td><td>Sign proportional to the frequency which has executed the acceleration and deceleration functions and it can be different to the real output frequency.</td></tr>
<tr><td>PIDRefVal</td><td>PID reference value signal. Generates 6,6V working to the 100% of the reference.</td></tr>
<tr><td>PIDFdbVal</td><td>Sign proportional to the feedback in PID mode. Generates 6,6V at 100% of the reference value.</td></tr>
<tr><td>PIDO/p</td><td>Signal proportional to the PID controller output value. Generates 5V at 100% of the reference value.</td></tr>
<tr><td>Constant</td><td>[G8.2.5 'SA1Con'] value</td></tr>
</table></td><td>NO</td></tr>
<tr><td>2 AO1Ga= +100.0%
AO1 Gain</td><td>G8.2.2 / Analog Output 1 Gain</td><td>-1000.0
to
1000.0%</td><td rowspan="2">These parameters allow adjusting the gain and offset level of the analogue output 1. If a current signal is desired, the set value will be 20% For example, when the analogue output is configured as ‘Frequency’, the equation that governs the operation is:
$AO1 = \frac{Frequency}{MaxFreq} \times Gain\,AO1 + Offset\,AO1$
where Gain AO1 is set in parameter [G8.2.2 AO1Ga] and Offset AO1 is set in parameter [G8.2.3 AO1Ofst].</td><td>YES</td></tr>
<tr><td>3 AO1Ofst= +0.0%
AO1Bias</td><td>G8.2.3 / Analog Output 1Offset Level</td><td>-100.0
to
100.0%</td><td>YES</td></tr>
<tr><td>4 AO1OFil = 5ms
AO1 Filter</td><td>G8.2.4 / Analog Output 1 Filter Selection</td><td>0 to 10000ms</td><td>Filter for the analog output 1 value.
Occasionally, the analog signal is slightly unstable. It can be improved selecting another filter value.
Note: The use of a filter can add a slight delay within the analog output</td><td>YES</td></tr>
<tr><td>5 AO1Con= 0.0%
AO1 Constant Set</td><td>G8.2.5 / Analog Output 1 Constant Value</td><td>0 to 1000.0%</td><td>Allows the setting of the constant speed found in the analog output 1, whenever it has been configured as ‘Constant’ in parameter [G8.2.1 ‘AO1’].</td><td>YES</td></tr>
<tr><td>6 AO2= Frequency
AO2 Set</td><td>G8.2.6 / Analog Output 2 Mode Selection</td><td>Frequency
O/ pCurr
O/pVolt
DCLinkV
O/p Power
TargetFq
RampFreq
PIDRefVal
PIDFdbVal
PIDO/p
Constant</td><td>The analog output 2 is programmable according to the following table:
<table>
<tr><th>DESCR.</th><th>FUNCTION</th></tr>
<tr><td>Frequency</td><td>Signal proportional to the motor speed. For the maximum frequency defined in [G10.1 - MsSpL] a 20mA current will be present</td></tr>
<tr><td>O/ pCurr</td><td>Signal proportional to the motor current. 20mA are generated when the drive rated current is at 200%.</td></tr>
<tr><td>O/pVolt</td><td>Signal proportional to the motor voltage. For the voltage value defined in [G2.2.4 'MTR VOLT'] a 20mA current will be present.</td></tr>
<tr><td>DCLinkV</td><td>Signal proportional to the bus DC voltage. The analogue output is 20mA when the DC voltage is 410Vdc for 220Vac drives and 820Vdc for 400Vac drives.</td></tr>
</table>
Note: Continues on next page.</td><td>YES</td></tr>
</table>

<table>
<tr><th>Screen / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>6 AO2= Frequency
AO2 Set</td><td>G8.2.6 / Analog Output 2 Mode Selection</td><td>Frequency
O/ pCurr
O/pVolt
DCLinkV
O/p Power
TargetFq
RampFreq
PIDRefVal
PIDFdbVal
PIDO/p
Constant</td><td>Note: Previous page continuation.<table><tr><th>DESCR.</th><th>FUNCTION</th></tr><tr><td>O/p Power</td><td>Signal proportional to the output power.
20mA are generated operating 200% of the nominal power.</td></tr><tr><td>TargetFq</td><td>Signal proportional to the target frequency set in the drive.</td></tr><tr><td>RampFreq</td><td>Sign proportional to the frequency which has executed the acceleration and deceleration functions and it can be different to the real output frequency.</td></tr><tr><td>PIDRefVal</td><td>PID reference value signal. Generates 13,2mA working to the 100% of the reference.</td></tr><tr><td>PIDFdbVal</td><td>Sign proportional to the feedback in PID mode.
Generates 13,2mA at 100% of the reference value.</td></tr><tr><td>PIDO/p</td><td>Signal proportional to the PID controller output value.
Generates 13,2mA at 100% of the reference value.</td></tr><tr><td>Constant</td><td>[G8.2.5 'SA1Con'] value</td></tr></table></td><td>YES</td></tr>
<tr><td>7 OA2Ga= +100.0%
AO2 Gain</td><td>G8.2.7 / Analog Output 2 Gain</td><td>-1000.0
to
1000.0%</td><td rowspan="2">These parameters allow adjusting the gain and offset level of the analogue output 2. If a current signal is desired, the set value will be 20%. For example, when the analogue output is configured as ‘Frequency’, the equation that governs the operation is:
$AO2 = \frac{Frequency}{MaxFreq} \times Gain\,AO2 + Offset\,AO2$
where Gain AO2 is set in parameter [G8.2.7 AO2Ga] and Offset AO2 is set in parameter [G8.2.8 AO2Ofst].</td><td>YES</td></tr>
<tr><td>8 AO2Ofst= +20.0%
AO2 Bias</td><td>G8.2.8 / Analog Output Offset Level</td><td>-100 to 100%</td><td>YES</td></tr>
<tr><td>9 AO2Fil= 5ms
AO2 Filter</td><td>G8.2.9 / Analog Output 2 Filter Selection</td><td>0 to 10000ms</td><td>Filter for the analog output 2 value.
Occasionally, the analog signal is slightly unstable. It can be improved selecting another filter value.
Note: The use of a filter can add a slight delay within the analog output</td><td>YES</td></tr>
<tr><td>10 AO2Con= 0.0%
AO2 Const Set</td><td>G8.2.10 / Analog Output 2 Constant Value</td><td>0 to 1000%</td><td>Set the constant current values found in the analog output 2, whenever it is set as ‘Constant’ in parameter [G8.2.6 ‘AO2’].</td><td>YES</td></tr>
</table>

4.9. Group 9 – G9: Comparators

<table>
<tr><th>Screen / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>1 FDTLvl= 30.00Hz
Relay FDT level</td><td>G9.1 / Transfer Function Level</td><td>0 to [G10.1]Hz</td><td>Set the reference frequency level for the comparator. See options ‘FDT-1’, ‘FDT-2’, ‘FDT-3’ and ‘FDT4’ in parameters subgroup [S8.1 DIGITAL O/P].</td><td>YES</td></tr>
<tr><td>2 FDTBnd= 10.00Hz
Relay FDT band</td><td>G9.2 / Transfer Function Bandwidth</td><td>0 to [G10.1]Hz</td><td>Set the bandwidth according to the frequency defined in parameter [G9.1 'FDTLvl'].
See options ‘FDT-1’, ‘FDT-2’, ‘FDT-3’ and ‘FDT4’ in parameters group [S8.1 ‘Digital O/P’].</td><td>YES</td></tr>
<tr><td>3 SLCOM= None
Selec sourc comp</td><td>G9.3 / Comparator Source Selection</td><td>None
AI1
AI2
AI3
AI4</td><td>The comparator source can be set according to the following table:<table><tr><th>OPTION</th><th>FUNCTION</th></tr><tr><td>None</td><td>There is no source for the comparator</td></tr><tr><td>AI1</td><td>Analog input 1 will be used as source by the comparator.</td></tr><tr><td>AI2</td><td>Analog input 2 will be used as source by the comparator.</td></tr><tr><td>AI3</td><td>Analog input 3 will be used as source by the comparator.
Note: This option is only available whenever the I/O Expansion Board has been installed.</td></tr><tr><td>AI4</td><td>Analog input 4 will be used as source by the comparator.
Note: This option is only available whenever the I/O Expansion Board has been installed.</td></tr></table>Note: Whenever an unavailable option is selected, the parameter will return to the previously selected option.</td><td>NO</td></tr>
<tr><td>4 S C ON= +90.00%
Setpoint On comp</td><td>G9.4 / Output Activation Level in Comparator Mode</td><td>10 to 100%</td><td>In order to define the level to compare with the source selected in parameter [G9.3 'SLCOM']. In case this level is over passed, one of the digital outputs adjusted as ‘COMPARAT’ in [S8.1 DIGITAL O/P] will enable. See parameters [G8.1.2 RLY1] to [G8.1.4 DOP1].</td><td>NO</td></tr>
<tr><td>5 S C OF= +10.00%
Setpoint Off Comp</td><td>G9.5 / Output Deactivation Level in Comparator Mode</td><td>-100 to adjusted level in [G9.4 S C ON]</td><td>In order to define the level to compare with the source selected in parameter [G9.3 'SLCOM']. In case this level is over passed, one of the digital outputs adjusted as ‘COMPARAT’ in [S8.1 DIGITAL O/P] will enable. See parameters [G8.1.2 RLY1] to [G8.1.4 DOP1].</td><td>NO</td></tr>
</table>

4.10. Group 10 – G10: Limits

Screen / Default Value	Name / Description	Range	Function	Set on RUN
1 MxSpL= 50.00Hz **Max Speed Lt**	**G10.1** / Maximum Speed Limit	40 to 400.00Hz	In order to set the maximum speed limit that the drive can apply to the motor. If a value above this limit is received, the drive will ignore it and will take the limit value. **Note:** Enabling the PID or the PUMP programme in parameter [G1.3 PROG], the units will be % instead of Hz. Furthermore, the default value will change from 50Hz to 100%.	NO
2 FWR/RV= None **Prevention Rotat**	**G10.2** / Speed Inverting Permission	None FWDPrev RevPrev	Inverting the motor speed is possible. This function helps to prevent the motor from rotating in inverse direction. **OPT.** / **FUNCTION** None – The motor spins in both directions. FWDPrev – Motor can not rotate clockwise. RevPrev – Motor can not rotate anti clockwise.	YES
3 UseFrqLimit= Y **Use Freq Limit**	**G10.3 /** Frequency Limit	N Y	Enable or disable the frequency limit **OPT.** / **FUNCTION** N=NO – Frequency limit disabled. Y=YES – Frequency limit enabled.	NO
4FqLtLo= 0.50Hz **Freq Limit Lo**	**G10.4 /** Lower Frequency Limit	0 to [G10.5 FqLtHi]	Set the lower frequency limit if parameter is set as [UseFrqLimit= S]	YES
5 FqLtHi= 50.00Hz **Freq Limit Hi**	**G10.5 /** Upper Frequency Limit	0.5 to [G10.1 MxSpL]	Set the upper frequency limit whenever the parameter is set as [UseFrqLimit= S]	NO
6 TORQUE LIMIT= N (*) **Torque Limit**	**G10.6 /** Torque Limit Activation	N Y	In order to enable or disable the torque limit applied to the load. **OPT.** / **FUNCTION** N=NO – Torque limit disabled. Y=YES – Torque limit enabled.	NO
7 LvTrqLt= 180%[1] (*) **Level Torq Limit**	**G10.7 /** Torque Limit Level	30 to 250%	Keeps the maximum torque adjusted value, preventing a greater value from being applied. This parameter unit is %, in reference to the motor nominal torque.	NO

[1] Available whenever [G10.6 TORQUE LIMIT] =Y.
(*) Hidden if parameter G19.1.1 =VECTOR

4.10.1. Subgroup 10.8 – S10.8 : Vector Lim (*)

Screen / Default Value	Name / Description	Range	Function	Set on RUN
1 TqLimRef = LOCAL	**G10.8.1** / Torque lim Ref	LOCAL AI1 AI2 AI3 AI4 MDBUS ENCOD COMMS PLC	The user is able to select the source to introduce the torque limit reference. **OPTION** / **FUNCTION** LOCAL – Reference will be introduced through keyboard and will be adjusted in G10.8.2, G10.8.3, G10.8.4 and G10.8.5. AI1 – The reference will be introduced through the analog input 1 AI2 – The reference will be introduced through the analog input 2 AI3 – The reference will be introduced through the analog input 3 AI4 – The reference will be introduced through the analog input 4 MDBUS – The reference will be introduced through Modbus ENCOD – The reference will be taken from the encoder COMMS – The reference will be introduced through the communications PLC – The reference will be introduced through PLC	NO
2 TLposFW = 180%	**G10.8.2** / Tq lim positiv FW	0 to 200%	The user can set the forward motoring operation torque limit whenever the torque limit reference has been set as LOCAL	YES
3 TLnegFW = 180%	**G10.8.3** / Tq lim negatv FW	0 to 200%	The user can set the forward regeneration operation torque limit whenever the torque limit reference has been set as LOCAL	YES
4 TLposRV = 180%	**G10.8.4** / Tq lim positiv RV	0 to 200%	The user can set the reverse motoring operation torque limit whenever the torque limit reference has been set as LOCAL	YES
5 TLnegRV = 180%	**G10.8.5** / Tq lim negatv RV	0 to 200%	The user can set the reverse regeneration operation torque limit whenever the torque limit reference has been set as LOCAL	YES

(*) Available if parameter G19.1.1 = VECTOR

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<table>
<tr><th>Screen / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>6 TqOffRf = LOCAL</td><td>G10.8.6 / Tq offset Ref</td><td>LOCAL
AI1
AI2
AI3
AI4
MDBUS
COMMS
PLC</td><td>The user is able to select the source to introduce the torque offset reference.<table><tr><th>OPTION</th><th>FUNCTION</th></tr><tr><td>LOCAL</td><td>Reference will be introduced through keyboard and will be adjusted in G10.8.7 and G10.8.8</td></tr><tr><td>AI1</td><td>The reference will be introduced through the analog input 1</td></tr><tr><td>AI2</td><td>The reference will be introduced through the analog input 2</td></tr><tr><td>AI3</td><td>The reference will be introduced through the analog input 3</td></tr><tr><td>AI4</td><td>The reference will be introduced through the analog input 4</td></tr><tr><td>MDBUS</td><td>The reference will be introduced through Modbus</td></tr><tr><td>COMMS</td><td>The reference will be introduced through the communications</td></tr><tr><td>PLC</td><td>The reference will be introduced through PLC</td></tr></table></td><td>NO</td></tr>
<tr><td>7 TqOfLO = 0 %</td><td>G10.8.7 / LOCAL Ref OffTq</td><td>-120 to 120%</td><td>The user can set the torque offset whenever the torque offset reference has been set as LOCAL</td><td>YES</td></tr>
<tr><td>8 TqOfcmp = 0 %</td><td>G10.8.8 / Tq compens offst</td><td>0 to 100%</td><td>The user can set the compensation torque offset whenever the torque offset reference has been set as LOCAL</td><td>YES</td></tr>
<tr><td>9 SpLimRf = LOCAL</td><td>G10.8.9 / Speed Lim Ref</td><td>LOCAL
AI1
AI2
AI3
AI4
MDBUS
COMMS
PLC</td><td>The user is able to select the source to introduce the speed limit reference<table><tr><th>OPTION</th><th>FUNCTION</th></tr><tr><td>LOCAL</td><td>Reference will be introduced through keyboard and will be adjusted in G10.8.10 and G10.8.11</td></tr><tr><td>AI1</td><td>The reference will be introduced through the analog input 1</td></tr><tr><td>AI2</td><td>The reference will be introduced through the analog input 2</td></tr><tr><td>AI3</td><td>The reference will be introduced through the analog input 3</td></tr><tr><td>AI4</td><td>The reference will be introduced through the analog input 4</td></tr><tr><td>MDBUS</td><td>The reference will be introduced through Modbus</td></tr><tr><td>COMMS</td><td>The reference will be introduced through the communications</td></tr><tr><td>PLC</td><td>The reference will be introduced through PLC</td></tr></table></td><td>NO</td></tr>
<tr><td>10 SpL (+) = 50 Hz</td><td>G10.8.10 / Speed Lim FW</td><td>0 to [G10.5] and [G10.1]</td><td>The user can set the forward speed limit whenever the speed limit reference has been set as LOCAL</td><td>YES</td></tr>
<tr><td>11 SpL (-) = 50 Hz</td><td>G10.8.11 / Speed Lim REV</td><td>0 to [G10.5] and [G10.1]</td><td>The user can set the reverse speed limit whenever the speed limit reference has been set as LOCAL</td><td>YES</td></tr>
<tr><td>12 SpLGa = 500 %</td><td>G10.8.12 / Speed Lim Gain</td><td>100 to 5000%</td><td>Set how much the speed reference has to decrease when motor speed exceeds the speed limit.</td><td>YES</td></tr>
</table>

4.11. Group 11 – G11: Protections

<table>
<tr><th>Screen / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>1 RIRLs= None
ResponIf_REF_Ls</td><td>G11.1 / Response in case of a Speed Reference Loss</td><td>None
FreeRun
Dec
Hold I/P
Hold O/P
LostPrst</td><td>The drive will carry out one of the following actions when losing a speed reference:
<table><tr><th>OPT.</th><th>FUNCTION</th></tr><tr><td>None</td><td>Protection is disabled.</td></tr><tr><td>FreeRun</td><td>The drive cuts the output voltage and allows the motor free run.</td></tr><tr><td>Dec</td><td>A deceleration until stop is produced in the time defined in parameter [G5.15 'FltDecT']</td></tr><tr><td>Hold I/P</td><td>The drive will keep operating to the input value, mean value obtained from the last 10 seconds until the moment the reference loss has been detected.</td></tr><tr><td>Hold I/P</td><td>The drive will keep operating to the input value, mean value obtained from the last 10 seconds until the moment the reference loss has been detected</td></tr><tr><td>LostPrst</td><td>The drive operates to the frequency defined in parameter [G11.4 'RfLRf']</td></tr></table>⚠ Caution: Users should ensure that disabling this protection does not compromise the operation of the installation and/or equipment.</td><td>SI</td></tr>
<tr><td>3 RfLsDly= 1.0s
Ref Loss Dly</td><td>G11.3 / Trip Delay Time Due to Speed Reference Loss</td><td>0.1 to 120s</td><td>Delay time setting after which the speed reference loss protection will enable.</td><td>YES</td></tr>
<tr><td>4 RefLRf= 0.00Hz
Ref Loss Ref</td><td>G11.4 / Speed in case of Reference Loss</td><td>[G19.2.5] to [G10.1] (Hz)</td><td>In order to set the frequency value at which the drive will operate in case a speed reference loss occurs. Therefore, the parameter [G11.1 'RIRLs'] must be set to the value 'LostPrst'.</td><td>YES</td></tr>
<tr><td>5 OLWarnSel= NO
OL Warn Select</td><td>G11.5 / Overload Warning</td><td>NO
YES</td><td>In order to enable/disable the overload protection. The relay output or digital output used for enabling the warning must be configured as 'OverLoad'. See subgroup [S8.1 DIGITAL O/P], parameters [G8.1.2 RLY1] to [G8.1.4 DOP1].
<table><tr><th>OPTION</th><th>FUNCTION</th></tr><tr><td>NO</td><td>Overload warning disabled.</td></tr><tr><td>YES</td><td>Overload warning enabled.</td></tr></table></td><td>YES</td></tr>
<tr><td>6 OLWrnL= +150%
OL Warn Level</td><td>G11.6 / Overload Warning Level</td><td>30 to 200%</td><td rowspan="2">The overload warning is a combination of the parameters [G11.5], [G11.6] and [G11.7]. The drive will enable some of the digital outputs configured as 'OverLoad' whenever the current flowing within the motor is greater than the value defined in parameter [G11.6 OLWrnL'] during the time established in parameter [G11.7 'OLWrnT'].</td><td>YES</td></tr>
<tr><td>7 OLWrnT= 10.0s
OL Warn Time</td><td>G11.7 / Delay Time for Enabling the Overload Warning</td><td>0 to 30.0s</td><td>YES</td></tr>
<tr><td>8 OLTS= FreeRun
OL Trip Select</td><td>G11.8 / Action Selection due to Overload Fault</td><td>None
FreeRun
Dec</td><td>The drive will carry out the following actions in case an overload fault occurs:
<table><tr><th>OPTION</th><th>FUNCTION</th></tr><tr><td>None</td><td>Protection is disabled.</td></tr><tr><td>FreeRun</td><td>The drives output is cut, having as a consequence the motor free run.</td></tr><tr><td>Dec</td><td>A deceleration until stop is produced in the time defined in parameter [G5.15 'FltDecT']</td></tr></table>⚠ Caution: Users should ensure that disabling this protection does not compromise the operation of the installation and/or equipment.</td><td>YES</td></tr>
<tr><td>9 OLLevel= 180%
Overload Level</td><td>G11.9 / Trip Level in case of Overload Fault</td><td>30 to 200%</td><td rowspan="2">The overload warning protection is a combination of the parameters [G11.8], [G11.9] and [G11.10]. The drive will carry out the action selected in parameter [G11.8 'OLTS'] whenever the current flow within the motor is greater than the parameter [G11.9 'OLLevel'] value during the time defined in parameter [G11.10 'ETH1minnTFllSC'].</td><td>YES</td></tr>
<tr><td>10 OLTrpT= 60.0s
OL Trip Time</td><td>G11.10 / Delay Time for in case of Trip due to Overload Fault</td><td>0 to 60.0s</td><td>YES</td></tr>
<tr><td>11 ETH1min= +150%
ETH 1 min</td><td>G11.11 / Overcurrent Level During 1 Minute</td><td>120 to 200%</td><td>The user is able to set the current level which flows continuously during one minute in % referenced to the motor nominal current. The motor nominal current is set in parameter [G2.1.2 MTR CUR]. Whenever this limit is over passed, the thermo-electronic protection will be enabled, and the action defined in parameter [G11.13 'ThMM] will be executed.</td><td>YES</td></tr>
</table>

ENGLISH

<table>
<tr><th>Screen / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>12 ETHcont== 120%
ETH Cont Rating</td><td>G11.12 / Continuous Overcurrent Level</td><td>50 to 200%</td><td>This parameter sets the overcurrent level under which the drive is able to work without enabling the thermo-electronic protection.</td><td>YES</td></tr>
<tr><td>13 ThMM= None
ThermModelMode</td><td>G11.13 / Action Selection in case of Thermo-electronic Fault</td><td>None
FreeRun
Dec</td><td>The drive will carry out one of the following actions in café of a motor thermo-electronic fault:<table><tr><th>OPTION</th><th>FUNTION</th></tr><tr><td>None</td><td>Protection is disabled.</td></tr><tr><td>FreeRun</td><td>The drives output is cut which allows the motor free run</td></tr><tr><td>Dec</td><td>A deceleration until stop is produced in the time defined in parameter [G5.15 'FltDecT']</td></tr></table>⚠ Caution: Users should ensure that disabling this protection does not compromise the operation of the installation and/or equipment.</td><td>YES</td></tr>
<tr><td>14 EnableUL= NO
Enable UL</td><td>G11.14 / Enabling Underload Warning</td><td>NO
YES</td><td>Enabling or disabling the warning in case of underload. The relay output or digital output used for enabling the warning must be configured as ‘UndrLoad’. See subgroup [S8.1 DIGITAL O/P], parameters [G8.1.2 RLY1] to [G8.1.4 DOP1].<table><tr><th>OPTION</th><th>FUNTION</th></tr><tr><td>N=NO</td><td>Underload warning disabled.</td></tr><tr><td>Y=YES</td><td>Underload warning enabled.</td></tr></table></td><td>YES</td></tr>
<tr><td>15 ULWnDl= 10.0s
UL Warn Dly</td><td>G11.15 / Delay Time Enabling Underload Warning</td><td>0 to 600.0s</td><td>Delay time set when enabling the underload warning. The drive will wait this time before enabling the warning.</td><td>YES</td></tr>
<tr><td>16 ULFM= None
UL Fault Mode</td><td>G11.16 / Action Selection in case of Underload Fault</td><td>None
FreeRun
Dec</td><td>The drive will carry out one of the following actions in case of underload fault:<table><tr><th>OPTION</th><th>FUNCTION</th></tr><tr><td>None</td><td>Protection is disabled.</td></tr><tr><td>FreeRun</td><td>The drives output is cut, having as a consequence the motor free run.</td></tr><tr><td>Dec</td><td>A deceleration until stop is produced in the time defined in parameter [G5.15 'FltDecT']</td></tr></table>⚠ Caution: Users should ensure that disabling this protection does not compromise the operation of the installation and/or equipment.</td><td>YES</td></tr>
<tr><td>17 ULFltDl= 30.0s
UL Fault Dly</td><td>G11.17 / Delay Time Enabling Underload Fault</td><td>0 to 600.0s</td><td>Delay time set enabling the underload protection fault. The drive will wait this time before enabling the protection fault.</td><td>YES</td></tr>
<tr><td>18 UlMnL = +30%
UL Min Level</td><td>G11.18 / Underload Detection Lower Level</td><td>10
to
[G11.19]</td><td>In order to set the underload lower level limit when the drive is in normal duty (Variable Torque). The protection will be enabled if the current is below the value adjusted in this parameter when the operating frequency is twice the motor rated slip speed.
Note: The motor rated slip speed is set in parameter [G19.2.6 RtSlip] and the type of load can be set in parameter [G19.2.9 ‘Load Duty’].</td><td>YES</td></tr>
<tr><td>19 ULMxL= +30%
UL Max Level</td><td>G11.19 / Underload Detection Upper Level</td><td>[G11.18]
to
100%</td><td>This parameter sets the upper limit in order to detect the underload when the drive is in normal duty (Variable Torque). The protection will be enabled if the current is below the value adjusted in this parameter when the operating frequency is equal to the motor rated frequency.

When the drive is in heavy duty (Constant Torque), the protection will be enabled if the current is below the value adjusted in this parameter at any operating frequency.
Note: The type of load can be set in parameter [G19.2.9 ‘Load Duty’].</td><td>YES</td></tr>
<tr><td>20 NoMD= None
NoMotorDetect</td><td>G11.20 / Action Selection in case of No Motor Connection Detected Fault</td><td>None
FreeRun</td><td>The drive will carry out one of the following actions whenever a fault is present due to the fact that no motor has been connected to the drives output terminal:<table><tr><th>OPTION</th><th>FUNCTION</th></tr><tr><td>None</td><td>Protection is disabled.</td></tr><tr><td>FreeRun</td><td>The drives output is cut, having as a consequence the motor free run.</td></tr></table>⚠ Caution: Users should ensure that disabling this protection does not compromise the operation of the installation and/or equipment.</td><td>YES</td></tr>
<tr><td>21 NoMtrLvl= +5%
No Motor Level</td><td>G11.21 / Trip Level in case of No Motor Detection Fault.</td><td>1 to 100%</td><td rowspan="2">The fault protection due to not detecting a motor is a combination of the following parameters [G11.20], [G11.21] and [G11.22]. The drive will carry out an action selected in parameter [G11.20 'NoMD'] whenever the current flowing within the motor does not exceed the value defined in parameter [G11.21'NoMtrLvl'] during the time defined in parameter [G11.22 'NoMtrDl'].</td><td>YES</td></tr>
<tr><td>22 NoMtrDl= 3.0s
No Motor Dly</td><td>G11.22 / Delay Time due to Lack of motor Fault</td><td>0.1 to 10.0s</td><td>YES</td></tr>
</table>

Screen / Default Value	Name / Description	Range	Function	Set on RUN
23 OvHM= None **Overheat Mode**	**G11.23 /** Selection in case of Motor Overheat Fault	None FreeRun Dec	In order to enable this protection, it is necessary to connect the PTC thermistor and select the analogue input where it is connected in parameter [G11.24 'OvrHtSen'] or select the digital input from [G4.1.3] to [G4.1.10] set as 'ThermalIn'. The drive will carry out one of the following actions in case of motor overheat fault: **OPTION** / **FUNCTION** None: No action is carried out FreeRun: The drives output is cut, having as a consequence the motor free run. Dec: A deceleration until stop is produced in the time defined in parameter [G5.15 'FltDecT'] ⚠ **Caution: Users should ensure that disabling this protection does not compromise the operation of the installation and/or equipment.**	YES
24 OvrHtSen= None **Overheat Sensor**	**G11.24 /** Motor Overheat Detection Sensor Selection	None AI1 AI2 AI3 AI4	The user is able to select the type of analog input which will be used to connect the PTC thermisor. For further information related to the PTC thermistor, read SD500 Hardware and Installation Manual. **OPTION** / **FUNCTION** None: No connection AI1: Analog input 1 is used, setting the PTC thermisor by voltage. AI2: Analog input 2 is used, setting the PTC thermisor by current. AI3: Analog input 3 is used, setting the PTC thermisor by voltage. **Note:** This option is only available whenever the I/O expansion board has been installed. AI4: Analog input 4 is used, setting the PTC thermisor by current. **Note:** This option is only available whenever the I/O expansion board has been installed. **Note:** Whenever an unavailable option is selected, the parameter will return to the previously selected option.	NO
25 OvrHtL= +50.0% **Overheat Level**	**G11.25 /** Motor Overheat Detection Fault	0 to 100%	In order to set the PTC thermistor level. For Analog Input 1(Voltage), the 100% corresponds to 10V. For Analog Input 2 (Current), the 100% corresponds to 5V (Current converted into voltage through PTC). For example, if the AI2 is used and this parameter is set to 50%, the protection will be enabled if the applied voltage to AI2 is less than 2,5V.	YES
26 OvrHtAr= Low **Overheat Area**	**G11.26 /** Trip Area Selection Due to Overheat.	LOW HIGH	The overtemperature protection function can be enabled according to the following table: **OPTION** / **FUNCTION** LOW: Trips whenever the voltage present in the analog input is under the value set in parameter ['G.11.25 OvrHtL'] HIGH: Trips whenever the voltage present in the analog input exceeds the value set in parameter ['G.11.25 OvrHtL'].	YES
27 FANTrip=Trip **FAN Trip Mode**	**G11.27** / Action Selection in case of Fan Trip	Trip Warn	In order to select the action to carry out in case a fault within the cooling fan is detected: **OPTION** / **FUNCTION** Trip: The drive generates a Fan-trip. Warn: The drive will enable the relay configured as 'VentWarn'.	YES
28 DBWarnED= +0% [1] **DB Res Warn Lvl**	**G11.28 /** Brake Unit Overload Warning Level	0 to 30%	In order to set the overload warning level within the brake unit in an operative cycle. The braking resistor can be used during 15 seconds. After that, the drive will disable the output relay configured as 'DBOvrLoad'.	YES
29 LSS PH= NONE **Lss Phase Type**	**G11.29 /** Phase loss Detection	NONE OUTPUT INPUT ALL	The user is able to enable or disable the protection when detecting a phase loss: **OPT.** / **FUNCTION** NONE: Phase loss protection disabled. OUTPUT: Output phase loss protection enabled. INPUT: Input phase loss protection enabled. For its correct operation, the user should set the parameter G11.30. ALL: Input and output phase loss protection enabled. For its correct operation, the user should set the parameter G11.30. ⚠ **Caution: Users should ensure that disabling this protection does not compromise the operation of the installation and/or equipment.**	NO

[1] This parameter is only present in drives under 22kW.

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Screen / Default Value	Name / Description	Range	Function	Set on RUN
30 Ripple V=40V **Ripple Voltage**	**G11.30 /** DC Bus Ripple voltage	1 to 100V	In order to set the DC Bus ripple voltage that must be exceeded to get a phase loss phase input fault when G11.29 is set as "INPUT" or "ALL". This value is set following customer's requirements.	YES
31 GND Fault Level= 20% **GND Fault Level**	**G11.31 /** GND Fault Level	0 to 100%	Set ground fault threshold. Default value is 20%.	YES
32 GND Fault Tout= 30 ms **GND Fault Tout**	**G11.32 /** GND Fault Tout	0 to 250 ms	Allows adjusting the timeout in case the threshold defined for ground fault (G11.31) is exceeded. Default timeout is 30 ms.	YES

4.12. Group 12 – G12: Auto Reset

Screen / Default Value	Name / Description	Range	Function	Set on RUN
1 Retry NUm= 0 **Retry Number**	**G12.1** / Auto Reset Number of Trials	0 to 10	This parameter allows the setting of the number of reset trials, which the drive will carry out in case a fault occurs. This parameter and ['G12.2 RetryDly'] one must force the drive to execute the auto reset function safely. In order to start the motor after executing a reset caused by a fault, the parameter [G7.11 'ST Aft Rst'] must be configured as 'Yes'.	YES
2 Retry Dly= 1.0s **Retry Delay**	**G12.2** / Delay Time before Auto Reset	0 to 60.0s	This parameter sets the time elapsed between a fault and rearming. After this time has elapsed, if the fault condition is still active, the drive will disable the auto-reset function and will remain in fault status.	YES

4.13. Group 13 – G13: Faults History

<table>
<tr><th>Screen / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>No Fault</td><td>G13.1 /Current Fault status visualization</td><td>-</td><td>This screen will be automatically displayed every time the drive trips with a new fault.
Shows the current fault status of the drive. In case there is no fault the screen will display the message 'No Fault'. By pressing the '*' key the fault number will be displayed.
The drive resets pressing the display STOP-RESET key or using an external reset when available. Faults can be automatically reset using the Auto Reset function. See parameter group [G12 'Auto Reset'].

The following table shows all of the possible faults:
<table>
<tr><th>COD</th><th>FAULT</th><th>COD</th><th>FAULT</th></tr>
<tr><td>0</td><td>No Fault</td><td>20</td><td>FAN Trip</td></tr>
<tr><td>1</td><td>OverLoad</td><td>21</td><td>RESERVED</td></tr>
<tr><td>2</td><td>UnderLoad</td><td>22</td><td>Param_Wr_Err</td></tr>
<tr><td>3</td><td>Inv OverLoad</td><td>23</td><td>Pipe Fill Flt</td></tr>
<tr><td>4</td><td>E-Thermal</td><td>24</td><td>IO Board Fail</td></tr>
<tr><td>5</td><td>Ground Fault</td><td>25</td><td>External Brake</td></tr>
<tr><td>6</td><td>Output Ph Loss</td><td>26</td><td>No Motor</td></tr>
<tr><td>7</td><td>Input Ph Loss</td><td>27</td><td>Slot 1 Fail</td></tr>
<tr><td>8</td><td>OverSpeed</td><td>28</td><td>Slot 2 Fail</td></tr>
<tr><td>10</td><td>NTC</td><td>29</td><td>Slot 3 Fail</td></tr>
<tr><td>11</td><td>OverCurrent</td><td>33</td><td>Free Run</td></tr>
<tr><td>12</td><td>OverVoltage</td><td>34</td><td>Low Voltage</td></tr>
<tr><td>13</td><td>External Trip</td><td>35</td><td>Lost Command</td></tr>
<tr><td>14</td><td>Short ARM</td><td>36</td><td>KeypadLostCMD</td></tr>
<tr><td>15</td><td>OverHeat</td><td>49</td><td>ADC Error</td></tr>
<tr><td>16</td><td>Fuse Open</td><td>50</td><td>EEPROM</td></tr>
<tr><td>17</td><td>MC Fail</td><td>51</td><td>Watchdog-1 Err</td></tr>
<tr><td>18</td><td>Encoder Error</td><td>52</td><td>Watchdog-2 Err</td></tr>
<tr><td>19</td><td>PTC</td><td></td><td></td></tr>
</table>
Note: For further information about faults see section '6. FAULT MESSAGES. DESCRIPTION AND ACTIONS'.</td><td>-</td></tr>
</table>

<table>
<tr><th>Screen / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>FAULT 1 INFO [1]</td><td>G13.2 / Fault History Register 1</td><td>-</td><td rowspan="2">The first group called [FAULT INFO 1] shows the information of the last fault and will be used as the first fault history register.
The last five faults, listed in chronological order, are shown as new faults occur, with the most recent fault in the first place [FAULT INFO 1]. Every time a fault is produced, the drive shows the [FAULT INFO 1] screen, moving the previous fault to the next register position [FAULT INFO 2]. The rest of stored faults will move down a position. The oldest fault message [FAULT INFO 5] will be lost.

These groups enable accessing to the extended information of every one of the last five faults registers. This information displays the drive status in the moment the fault has been produced.</td><td>-</td></tr>
<tr><td>FAULT 2 INFO [1]</td><td>G13.3 / Fault History Register 2</td><td>-</td><td>-</td></tr>
<tr><td>FAULT 3 INFO [1]</td><td>G13.4 / Fault History Register 3</td><td>-</td><td rowspan="3"><table><tr><th>OPT.</th><th>FUNCTION</th></tr><tr><td>X Fault=</td><td>Fault register X display</td></tr><tr><td>X Op Fq=</td><td>Output frequency value when fault occurred.</td></tr><tr><td>X Out I=</td><td>Output current value when fault occurred</td></tr><tr><td>X DC Volt=</td><td>Bus voltage value when fault occurred</td></tr><tr><td>X Temp=</td><td>Equipments temperature when fault occurred.</td></tr><tr><td>X DI=</td><td>Digital input s status values when fault occurred.</td></tr><tr><td>X DO Sta=</td><td>Digital outputs status values when fault occurred</td></tr><tr><td>X On Days=</td><td>Number of days the equipment has been turned on until fault.</td></tr><tr><td>X On Min=</td><td>Number of minutes the equipment has been turned on until fault.</td></tr><tr><td>X RUN Days=</td><td>Number of days the equipment has been running until fault.</td></tr><tr><td>X RUN Min=</td><td>Number of minutes the equipment has been running until fault.</td></tr></table></td><td>-</td></tr>
<tr><td>FAULT 4 INFO [1]</td><td>G13.5 / Fault History Register 4</td><td>-</td><td>-</td></tr>
<tr><td>FAULT 5 INFO [1]</td><td>G13.6 / Fault History Register 5</td><td>-</td><td>-</td></tr>
<tr><td>Clr FaultHist= N
ClearFLTHistory</td><td>G13.7 / Clear 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>Deletes the fault history (the last five faults). The screen will return to the default value ‘NO’ once all of the faults have been deleted.</td></tr></table></td><td>YES</td></tr>
<tr><td>ENB/DIS LV Flt= D
Enb/Dis LV Fault</td><td>G13.8 / Low Voltage fault register</td><td>D
E</td><td>In order to select if Low Voltage fault must be saved in the fault history register or not.<table><tr><th>OPT.</th><th>FUNCTION</th></tr><tr><td>D=DISABLED</td><td>The Low Voltage fault will not be saved in the fault history.</td></tr><tr><td>E=ENABLED</td><td>The Low Voltage fault will be saved in the fault history.</td></tr></table>Note: If the drive losses power completely before displaying the fault, the Low Voltage fault will not be saved despite having enabled this parameter.</td><td>YES</td></tr>
</table>

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[1] These groups will be displayed as new faults are produced.

4.14. Group 14 – G14: Multi-references

<table>
<tr><th>Screen / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>1 MREF 1= 10.00Hz
Multi-Reference 1</td><td>G14.1 / Multi-Reference 1</td><td rowspan="15">[G19.2.5] to [G10.1]</td><td rowspan="15">The user is able to set multiple references for the drive. This will be enabled by the use of the digital inputs configured as speed multi-references.
In order to proceed with their use, firstly, the operating mode must be selected:

STANDARD mode:
Set option ‘STANDARD’ in parameter [G1.3 PROG]. Then, the digital inputs that control the multi-references should be selected, being set as SPEED-L, SPEED-M, SPEED-H and SPEED-X.
The adjustment is carried out by assigning a speed value for every parameter within this group, from [G14.1] to [G14.15].
The following table links the digital inputs configured as SPEED to the selected multi-reference:

<table><tr><th rowspan="2">PARM</th><th rowspan="2">REF</th><th colspan="4">DIGITAL. O: SPEED</th></tr><tr><th>X</th><th>H</th><th>M</th><th>L</th></tr><tr><td>G14.1</td><td>MREF 1</td><td>0</td><td>0</td><td>0</td><td>X</td></tr><tr><td>G14.2</td><td>MREF 2</td><td>0</td><td>0</td><td>X</td><td>0</td></tr><tr><td>G14.3</td><td>MREF 3</td><td>0</td><td>0</td><td>X</td><td>X</td></tr><tr><td>G14.4</td><td>MREF 4</td><td>0</td><td>X</td><td>0</td><td>0</td></tr><tr><td>G14.5</td><td>MREF 5</td><td>0</td><td>X</td><td>0</td><td>X</td></tr><tr><td>G14.6</td><td>MREF 6</td><td>0</td><td>X</td><td>X</td><td>0</td></tr><tr><td>G14.7</td><td>MREF 7</td><td>0</td><td>X</td><td>X</td><td>X</td></tr><tr><td>G14.8</td><td>MREF 8</td><td>X</td><td>0</td><td>0</td><td>0</td></tr><tr><td>G14.9</td><td>MREF 9</td><td>X</td><td>0</td><td>0</td><td>X</td></tr><tr><td>G14.10</td><td>MRF 10</td><td>X</td><td>0</td><td>X</td><td>0</td></tr><tr><td>G14.11</td><td>MRF 11</td><td>X</td><td>0</td><td>X</td><td>X</td></tr><tr><td>G14.12</td><td>MRF 12</td><td>X</td><td>X</td><td>0</td><td>0</td></tr><tr><td>G14.13</td><td>MRF 13</td><td>X</td><td>X</td><td>0</td><td>X</td></tr><tr><td>G14.14</td><td>MRF 14</td><td>X</td><td>X</td><td>X</td><td>0</td></tr><tr><td>G14.15</td><td>MRF 15</td><td>X</td><td>X</td><td>X</td><td>X</td></tr></table>
Note: 0: Inactive and X: Active.

PID mode:
Set option ‘PID’ in parameter [G1.3 PROG]. Then, the digital inputs DI6, DI7 and DI8 must be selected, setting these digital inputs as MRefPID-H, MRefPID-M and MRefPID-L respectively. The adjustment is carried out by assigning a value (in %) for every parameter from [G14.1] to [G14.7].
The following table links the digital inputs configured as MRefPID to the selected multi-reference:

<table><tr><th rowspan="2">PARM</th><th rowspan="2">REF</th><th colspan="3">DIGITAL. O: MRefPID</th></tr><tr><th>H</th><th>M</th><th>L</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: Inactive and X: Active.</td><td rowspan="15">YES</td></tr>
<tr><td>2 MREF 2= 20.00Hz
Multi-Reference2</td><td>G14.2 / Multi-Reference 2</td></tr>
<tr><td>3 MREF 3= 30.00Hz
Multi-Reference3</td><td>G14.3 / Multi-Reference 3</td></tr>
<tr><td>4 MREF 4= 40.00Hz
M Multi-Reference4</td><td>G14.4 / Multi-Reference 4</td></tr>
<tr><td>5 MREF 5= 50.00Hz
Multi-Reference5</td><td>G14.5 / Multi-Reference 5</td></tr>
<tr><td>6 MREF 6= 50.00Hz
Multi-Reference6</td><td>G14.6 / Multi-Reference 6</td></tr>
<tr><td>7 MREF 7= 50.00Hz
Multi-Reference7</td><td>G14.7 / Multi-Reference 7</td></tr>
<tr><td>8 MREF 8= 50.00Hz
Multi-Reference8</td><td>G14.8 / Multi-Reference 8</td></tr>
<tr><td>9 MREF 9= 50.00Hz
Multi-Reference9</td><td>G14.9 / Multi-Reference 9</td></tr>
<tr><td>10 MRF 10= 45.00Hz
Multi-Reference10</td><td>G14.10 / Multi-Reference 10</td></tr>
<tr><td>11 MRF 11= 40.00Hz
Multi-Reference11</td><td>G14.11 / Multi-Reference 11</td></tr>
<tr><td>12 MRF 12= 35.00Hz
Multi-Reference12</td><td>G14.12 / Multi-Reference 12</td></tr>
<tr><td>13 MRF 13= 25.00Hz
Multi-Reference13</td><td>G14.13 / Multi-Reference 13</td></tr>
<tr><td>14 MRF 14= 15.00Hz
Multi-Reference14</td><td>G14.14 / Multi-Reference 14</td></tr>
<tr><td>15 MRF 15= 5.00Hz
Multi-Reference15</td><td>G14.15 / Multi-Reference 15</td></tr>
</table>

4.15. Group 15 – G15: Inch Speeds

Screen / Default Value	Name / Description	Range	Function	Set on RUN
1 InchFq= 10.00Hz **Inch Frequency**	**G15.1** / Inch Frequency	0.5 to [G10.1]	This parameter allows the setting of the motor inch frequency. The inch frequency selection can be executed through a digital input. Therefore, the digital input used should have been configured as 'INCH1'. See [G4.1.3] to [4.1.10] parameters. Enabling the inch frequency prevails over the rest of multi-reference inputs.	YES
2 InchAcT= 20.0s **INCH Acc Timer**	**G15.2** / Inch Frequency Accelerating Time	0 to 600.0s	In order to set the time in which the drive accelerates to reach the inch speed.	YES
3 InchDeT= 30.0s **INCH Dec Time**	**G15.3** / Inch Frequency Decelerating Time	0 to 600.0s	In order to set the time in which the drive decelerates to reach the inch frequency.	YES

4.16. Group 16 – G16: Frequency Jumps

Screen / Default Value	Name / Description	Range	Function	Set on RUN
1 Jmp Freq= NO **Jump Frequency**	**G16.1 /** Enabling Frequency Jumps	NO YES	The user is able to enable or disable a band of jump frequencies to avoid resonance frequencies or other frequency types that the motor will avoid as references. The drive will pass these frequencies during the speed changes (acceleration and/or deceleration) but will not operate within these values. **OPT.** / **FUNCTION** NO / In order to disable the frequency jump function YES / In order to enable the frequency jump function	NO
2 JmpLo1= 10.00Hz **Jump Low 1**	**G16.2** / Frequency Jump 1 Lower Limit	0 to [G16.3]	Allows setting the frequency jump 1 lower limit.	YES
3 JmpHi1= 15.00Hz **Jump High 1**	**G16.3** / Frequency Jump 1 Upper Limit	[G16.2] to [G10.1]	Allows setting the frequency jump 1 upper limit.	YES
4 JmpLo2= 20.00Hz **Jump Low 2**	**G16.4** / Frequency Jump 2 Lower Limit	0 to [G16.5]	Allows setting the frequency jump 2 lower limit.	YES
5 JmpHi2= 25.00Hz **Jump High 2**	**G16.5** / Frequency Jump 2 Upper Limit	[G16.4] to [G10.1]	Allows setting the frequency jump 2 upper limit.	YES
6 JmpLo3= 30.00Hz **Jump Low 3**	**G16.6** / Frequency Jump 3 Lower Limit	0 to [G16.7]	Allows setting the frequency jump 3 lower limit.	YES
7 JmpHi3= 35.00Hz **Jump High 3**	**G16.7** / Frequency Jump 3 Upper Limit	[G16.6] to [G10.1]	Allows setting the frequency jump 3 upper limit.	YES

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4.17. Group 17 – G17: External Brake

Screen / Default Value	Name / Description	Range	Function	Set on RUN
1 RlsCurr= 50.0% **Brake Open Curr**	**G17.1 /** Opening Brake Current	0 to 180.0%	This parameter is able to set the brake current opening of the relay configured as 'BRCtrl'. See parameter [G8.1 – DIGITAL I/O] subgroup.	YES
2 RlsDly= 1.00s **Brake Open Delay**	**G17.2 /**Opening Brake Delay	0 to 10.00s	Once the motor current is greater than the one set in this parameter [G17.1 'RlsCurr'] and the frequency reached in the motor is the same as the one set in parameter [G17.3 'FwdFrq']. The drive will open the relay configured as 'BRCtrl' and will keep this speed during the time established in this parameter.	NO
3 FwdFrq= 1.00Hz **BrakeOpenFWDFrq**	**G17.3 /** Opening Brake Frequency (Foward)	0 to 400.00Hz	In order to set the brake opening frequency of the relay configured as 'BRCtrl' while the motor is accelerating in positive direction.	NO
4 RevFrq= 1.00Hz **BrakeOpenRevFrq**	**G17.4 /** Opening Brake Frequency (Reverse)	0 to 400.00Hz	In order to set the brake opening frequency of the relay configured as 'BRCtrl' while the motor is accelerating in negative direction.	NO
5 BrEngFr= 1.00s **Brake Close Dly**	**G17.5 /** Closed Brake Delay	0 to 10.00s	Once the motor has reached the frequency set in [G17.6 'BrEngFr'], the drive will close the braking relay and will keep this speed during the time established in this parameter.	NO
6 BrEngFr= 2.00Hz **Brake Close Freq**	**G17.6 /** Closed Brake Frequency	0 to 400.00Hz	In order to set the frequency value at which the braking relay will stop operating, allowing the closed brake function.	NO

4.18. Group 18 – G18: ENCODER

Screen / Default Value	Name / Description	Range	Function	Set on RUN
1 EncMode = None	**G18.1** / Encoder Function	None FBK REF	Select the encoder function: **OPTION** / **FONCTION** None / The encoder function is not active FBK / The encoder is used as feedback REF / The encoder is used as reference	YES
2 Type = LineDrive	**G18.2 /** Encoder Type Select	LineDrive Totem/Com Open Coll	Select signal delivery method of encoder.	NO
3 Pulse = (A+B)	**G18.3** / Encoder Pulse Select	(A+B) -(A+B) (A)	Set the way of encoder pulse. **OPTION** / **FONCTION** (A+B) / Forward operation -(A+B) / Reverse operation (A) / Only one channel is used	NO
4 PulseNum = 1024	**G18.4** / Number of Encoder Pulses	10 to 4096	Set the number of pulses per rotation	NO
5 EncMo = 0 Hz	**G18.5** / Feedback Monitor	-300 to 300 Hz	Shows the encoder speed in terms of motor frequency.	YES
6 Pulse Monitor = 0 kHz	**G18.6** / Ref Monitor	-200 to 200 kHz	Shows the encoder speed in terms of encoder pulses.	YES
7 Filter = 3 ms	**G18.7** / Encoder I/P Filter	0 to 10000ms	Set the time constant of the encoder filter.	YES
8 X1 = 0 kHz	**G18.8** / Encoder IP Min Pulse	0 to [G18.10]	Set the minimum number of pulses in harmony with the encoder specification in kHz.	YES
9 Y1 = 0 %	**G18.9** / Perc. Encoder Min Pulse	0 to 100%	Set the minimum frequency of the input enconder.	YES

Screen / Default Value	Name / Description	Range	Function	Set on RUN
10 X2 = 100 kHz	**G18.10** /Encoder IP Max Pulse	[G18.8] to 200 kHz	Set the maximum number of pulses in harmony with the encoder specification in kHz.	YES
11 Y2 = 100%	**G18.11** / Perc Encoder Max Pulse	0 to 100%	Set the maximum frequency of the input encoder.	YES
12 WireChk = N	**G18.12** / Encoder option connection check	N Y	Set if you want to check or not the state of enconder connection. **OPTION** / **FUNCTION** N – Enconder connection won't be checked Y – Enconder connection will be checked	YES
13 ChTim = 1s	**G18.13** / Encoder Connection Check Time	0.1 to 1000s	Set the time during which check is being done.	YES

4.19. Group 19 – G19: Fine Setting

4.19.1. Subgroup 19.1 – S19.1: IGBT Control

Screen / Default Value	Name / Description	Range	Function	Set on RUN
1 CTRL T.= V/Hz **Control Type**	**G19.1.1** / Control Type Selection	V/Hz SlipCom S-less1 VECTOR	This selection determines the drives control type. **OPT.** / **FUNCTION** V/Hz – Scalar control mode, where control is carried out applying to the motor a voltage/frequency ramp. SlipCom – Whenever this function is active, it compensates the slip produced in the motor. In case a heavy load capable of producing a big slip during the start, set the parameter as 'SlipCom'. This option can be adjusted with parameters [G19.2.1 'InertiaRate'] and [G19.2.6 'RtSlip']. S-less1 – This function applies a vector control without encoder. VECTOR(*) – This function applies a vector control with encoder.	NO
2 FREQ= 2.0kHz [1] **Modulat Frequenc**	**G19.1.2** / Modulation Frequency	From 0.7 to 15kHz [2]	Varies the commutation frequency in the motor output stage, reducing the noise within the motor. [2] The modulation frequency range depends on the drive capacity which is shown in the following table: **POWER** / **MODULATION FREQ.** Up to 22kW – From 0.7 to 15kHz From 30 to 45kW – From 0.7 to 10kHz From 55 to 75kW – From 0.7 to 7kHZ	YES
3 V/FPn= Linear **V/F Pattern**	**G19.1.3** / V/F Pattern	Linear Square V/F Us	The user is able to set the alternative acceleration ramp. **OPTION** / **FUNCTION** Linear – Output voltage increases and decreases at constant rate proportional to voltage/frequency (V/F) relation. Used in order to achieve a constant torque load regardless of the frequency. Square – Output voltage increases quadratically according to the frequency. V/F Us – This parameter defines a V/F pattern customised by the user. The voltage and frequency settings are carried out in parameter [G19.1.4 'V/F USER'] subgroup.	NO
4 Torque CTRL(*) = N	**G19.1.4** / Speed or Torque Control	N Y	The user is able to set the control mode: **OPTION** / **FUNCTION** NO – Speed control is selected YES – Torque control is selected	NO

[1] Value that depends on the drive rated current.
(*) Available if parameter G19.1.1 =VECTOR

<table>
<tr><th>Screen / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>5 Auto Tuning = NONE(*)</td><td>G19.1.5 / Auto tunning</td><td>None
All
Allst
Rs+Lsig
Enc test
Tr</td><td>Set the type of auto tuning:
<table>
<tr><th>OPTION</th><th>FUNCTION</th></tr>
<tr><td>None</td><td>Auto-tunning is not active</td></tr>
<tr><td>All</td><td>The motor parameters are measured with the motor rotating. The stator resistance (Rs), leak inductance (Lσ), stator inductance (Ls), no-load current and rotor time constant are all measured. The encoder state is also measured. The encoder related functions should be rightly set. If load is connected to the motor axis, the parameter might not be correctly measured so remove the load before measurement.</td></tr>
<tr><td>Allst</td><td>Motor parameters are measured when the motor is stopped. Stator resistance (Rs), leak inductance (Lσ) and rotor time constant are measured at the same time.</td></tr>
<tr><td>Rs+Lsig</td><td>The parameter is measured when the motor is not operating. The measured values are used for auto torque boost and sensorless vector control.</td></tr>
<tr><td>Enc test</td><td>When the encoder optional card is connected, the motor checks connection and misconnection of A and B pulses. The encoder related functions should be rightly set.</td></tr>
<tr><td>Tr</td><td>If the drive operates with a vector control, the motor measures the rotor time constant while rotating. If the drive operates with sensorless control, the motor measures the rotor time constant while being static.</td></tr>
</table></td><td>NO</td></tr>
</table>

(*) Available if parameter G19.1.1 =VECTOR

4.19.1.1.1. Subgroup 19.1.4 – S19.1.4 V/F USER Pattern

Screen / Default Value	Name / Description	Range	Function	Set on RUN
1 UsFrq1= 15.00Hz **User Frequency 1**	**G19.1.4.1** / User Frequency 1	0 to [G10.1]	In order to set the user frequency 1. The drive will provide at this frequency value the voltage set in parameter [G19.1.4.2 User V1].	NO
2 User V1= 25% **User Voltage 1**	**G19.1.4.2** / User Voltage 1	0 to 100%	In order to set the user voltage 1. The drive will provide at this voltage value the frequency set in parameter [G19.1.4.1 UsFrq1].	NO
3 UsFrq2= 30.00Hz **User Frequency 2**	**G19.1.4.3** / User Frequency 2	0 to [G10.1]	In order to set the user frequency 2. The drive will provide at this frequency value the voltage set in parameter [G19.1.4.4 User V2].	NO
4 User V2= 50% **User Voltage 2**	**G19.1.4.4** / User Voltage 2	0 to 100%	In order to set the user voltage 2. The drive will provide at this voltage value the frequency set in parameter [G19.1.4.3 UsFrq2].	NO
5 Us Frq3= 45.00Hz **User Frequency 3**	**G19.1.4.5** / User Frequency 3	0 to [G10.1]	In order to set the user frequency 3. The drive will provide at this frequency value the voltage set in parameter [G19.1.4.6 User V3].	NO
6 User V3= 75% **User Voltage 3**	**G19.1.4.6** / User Voltage 3	0 to 100%	In order to set the user voltage 3. The drive will provide at this voltage value the frequency set in parameter [G19.1.4.5 UsFrq3].	NO
7 Us Frq4= 60.00Hz **User Frequency 4**	**G19.1.4.7** / User Frequency 4	0 to [G10.1]	In order to set the user frequency 4. The drive will provide at this frequency value the voltage set in parameter [G19.1.4.8 User V4].	NO
8 User V4= 100% **User Voltage 4**	**G19.1.4.8** / User Voltage 4	0 to 100%	In order to set the user voltage 4. The drive will provide at this voltage value the frequency set in parameter [G19.1.4.7 UsFrq4].	NO

4.19.2. Subgroup 19.2 – S19.2: Motor Load

<table>
<tr><th>Screen / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>1 InertiaRate= 0 [1]
Inertia Rate</td><td>19.2.1 / Inertia Range</td><td>0 to 8</td><td>In order to select the inertia load according to the motor inertia value:<table><tr><th>OPT.</th><th>FUNCTION</th></tr><tr><td>0</td><td>Smaller than 10 times the motor inertia</td></tr><tr><td>1</td><td>10 times greater than the motor inertia.</td></tr><tr><td>2 a 8</td><td>More than 10 times greater than the motor inertia value.</td></tr></table></td><td>NO</td></tr>
<tr><td>2 T Boost= Manual
Torque Boost</td><td>G19.2.2 / Initial Voltage</td><td>MANUAL
AUTO</td><td>Proportional to the initial voltage value applied to the motor in the start moment to overcome the resisting torque in heavy starts.<table><tr><th>OPT.</th><th>DESCRIPTION</th><th>FUNCTION</th></tr><tr><td>0</td><td>MANUAL</td><td>Starting voltage manual setting by the use of parameters [G19.2.3 'FWBoost'] and [G19.2.4 'RVBoost'].</td></tr><tr><td>1</td><td>AUTO</td><td>The drive calculates automatically the voltage to apply at the start using the motor parameters.</td></tr></table></td><td>NO</td></tr>
<tr><td>3 FWBoost= +20%
Fwd Boost</td><td>G19.2.3 / Starting Torque (Foward Direction)</td><td>0 to 150%</td><td>This parameter sets the intensified torque in forward direction</td><td>NO</td></tr>
<tr><td>4 RVBoost= +20%
Rev Boost</td><td>G19.2.4 / Starting Torque (Reverse Direction)</td><td>0 to 150%</td><td>This parameter sets the intensified torque in reverse direction</td><td>NO</td></tr>
<tr><td>5 STR FRQ= 0.50Hz
Start Freq</td><td>G19.2.5 / Starting Frequency</td><td>0.01 to 10Hz</td><td>The Initial frequency which will be applied when the drive starts is set.</td><td>NO</td></tr>
<tr><td>6 RtSlip= 45rpm [1]
Rated Slip</td><td>G19.2.6 / Slip Compensation</td><td>0 to 3000rpm</td><td>This function, when enabled, compensates the motor slip. When facing a heavy load capable of producing a big slip during the start, configure this parameter.
Note: The value of this parameter will be automatically configured when setting parameter [G2.2.1 MOTRPWR].</td><td>NO</td></tr>
<tr><td>7 FLUX MIN= NONE
Minimum Flux Mod</td><td>G19.2.7 / Minimum Flux</td><td>NONE
MANU
AUTO</td><td>In order to set the minimum flux that the motor can employ to operate under low load conditions. With this optimised flux system, noises and power losses will be reduced due to the automatic flux level arrangement. The following table shows the different configurations available:<table><tr><th>OPTION</th><th>FUNCTION</th></tr><tr><td>NONE</td><td>No action is executed</td></tr><tr><td>MANU</td><td>Selects the manual mode. If the output current is lower than the parameter [G2.1.3 'NOLOADC'] (motor no load current), output voltage will be reduced in its magnitude set in parameter [G19.2.8 'FLUX LVEL']</td></tr><tr><td>AUTO</td><td>Selects the automatic mode. The output voltage is set taking into account the motor rated current set in [G2.1.2'MTR CUR'] and the no load current [G2.1.3 'NOLOADC']</td></tr></table></td><td>NO</td></tr>
<tr><td>8 FLUX LVEL= +0%
Nv Flj min mnual</td><td>G19.2.8 / Manual Mode Minimum Flux Value</td><td>0 a 30%</td><td>In order to set the output voltage reducing magnitude if parameter [G19.2.7 'FLUX MIN] is set in manual mode 'MANU'.</td><td>YES</td></tr>
<tr><td>9 Load Duty= Hevy
Load Duty Type</td><td>G19.2.9 / Load Type Definition</td><td>NRML
HEVY</td><td>Selects the applied load type:<table><tr><th>OPTION</th><th>FUNCTION</th></tr><tr><td>NRML</td><td>Selects the normal load type (variable torque) for applications such as fans or pumps</td></tr><tr><td>HEVY</td><td>Selects the heavy load type (constant torque) for applications such as elevators and cranes.</td></tr></table></td><td>NO</td></tr>
</table>

[1] This value depends on the motor rated current.

ENGLISH

4.19.3. Subgroup 19.3 – S19.3: Motor Model

Screen / Default Value	Name / Description	Range	Function	Set on RUN
1 Rs= Stator Resistor	**G19.3.1** / Stator Resistor (Rs)	*	Stator resistor fine setting.	NO
2 LSigma= Leak Inductor	**G19.3.2 /** Leak Inductor	*	Leak inductor fine setting.	NO
3 Ls= Stator Inductor	**G19.3.3 /** Stator Inductor	*	Inductor stator fine setting.	NO
4 Tr= Rotor Time Const	**G19.3.4 /** Rotor Time Constant	25 to 5000ms	Rotor time constant fine setting.	NO
5 ASR P1 = 50 % (*)	**G19.3.5** / Vector Gain Prop. 1	10 to 500%	Set the proportional gain 1 of the speed controller (ASR). The higher the proportional gain, the faster the response will be. But if the gain is too high, the speed of the motor might oscillate.	YES
6 ASR I1 = 300 ms (*)	**G19.3.6** / Vector Integral Time 1	10 to 9999ms	Set the integral gain 1 of the speed controller (ASR).	YES
7 ASR P2 = 50 % (*)	**G19.3.7** / Vector Gain Prop. 2	10 to 500%	Set the proportional gain 2 of a separate controller. The higher the proportional gain, the faster the response will be. But if the gain is too high, the speed of the motor might oscillate.	YES
8 ASR I2 = 300 ms (*)	**G19.3.8** / Vector Integral Time 2	10 to 9999ms	Set the integral gain 2 of a separate controller.	YES
9 SwASR = 0 Hz (*)	**G19.3.9** / Switch G ASR	0 to 120Hz	Set the gain change frequency between gain 1 and gain 2.	YES
10 dlASR = 0.10 s (*)	**G19.3.10** / Delay Switch ASR	0 to 100s	The gain of the speed controller changes from gain 1 to gain 2 after this time if one of the digital inputs is configured as ASR GAIN 2.	YES
11 RASRf = 0 ms (*)	**G19.3.11** / Filter Ref. ASR	0 to 20000ms	Set the time constant of the speed controller reference filter in the vector speed mode.	YES
12 OurFVec = 0 ms (*)	**G19.3.12** / Out Filter Vector	0 to 2000ms	Set the time constant of the speed controller reference filter in the vector speed mode and set the time constant of the torque command filter in the vector torque mode.	YES

* This value depends on the motor.
(*) Available if parameter G19.1.1 =VECTOR

4.20. Group 20 – G20: Communication Buses

4.20.1. Subgroup 20.1 – S20.1: Int485 Protocol

Screen / Default Value	Name / Description	Range	Function	Set on RUN
1ComUpdate= NO Comm Update	**G20.1.1** / Communication Update	NO YES	This parameter enables the possibility of reconnecting communications when a parameter has been changed. For example, the communication speed, frame definition, etc.	YES
2 Slave Addr= 1 Int485 SlaveAddr	**G20.1.2** / Communication Address	1 to 250	Identifier assigned to the drive to communicate with from the network. When communicating with several equipments, each one of them should be assigned to a different address.	YES
3 Prot= ModBus Int485 Protocol	**G20.1.3 /** Int485 Communication Protocol	MODBUS	Select the type of protocol used in communications: **OPTION** / **FUNCTION** MODBUS / Protocol compatible with MODBUS-RTU.	YES
4 BaudR= 9600 bps Int485 BautRate	**G20.1.4** / Communication Speed	1200 2400 4800 9600 19200 38400	This parameter establishes the data transfer speed. It sets the Modbus communications transfer rate which must match with the bus communication master within the drive.	YES

Screen / Default Value	Name / Description	Range	Function	Set on RUN
5 Mode= D8/PN/S1 **Int485 Mode**	**G20.1.5 /** Communication Frame Definition	D8/PN/S1 D8/PN/S2 D8/PE/S1 D8/PO/S1	Select the communication frame composition and defines the data length, parity confirmation method and the number of stop bits: OPTION / FUNCTION D8/PN/S1: 8 bits Data / Without parity check / 1 stop bit D8/PN/S2: 8 bits Data / Without parity check / 2 stop bit D8/PE/S1: 8 bits Data / Even numbers parity check / 1 stop bit D8/PO/S1: 8 bits Data / Odd numbers parity check / 1 stop bit	YES
6RespDly= 5ms **Response Delay**	**G20.1.6 /** Transfer Delay After Reception	0 to 1000ms	The MODBUS-RTU communication plays the role of the slave device. The slave will respond the master after a period of time set in this parameter. This allows the master device to attend to the communications within a system where the master can not manage a quick slave answer.	YES
7 ParamSave= NO **Comm Param Save**	**G20.1.7 /** Saving Communication Parameters	NO YES	The communication parameters are stored in the RAM, lost when the drive is switched off. This parameter stores the information of the rest of communication parameters, kept in the memory although the drive has been switched off.	NO

4.21. Group 25 – G25: Pump Control

The [G25: 'Pump Control'] only appears if the [G1.3 PROG='PUMP'] parameter has been selected.

4.21.1. Subgroup 25.1 – S25.1: System Setpoint

Screen / Default Value	Name / Description	Range	Function	Set on RUN
1 MREF1= 10.00% **Mult-Reference1**	**G25.1.1** / PID Local Reference 1	[G19.2.5] to [G10.1]	When working with a single local reference in PID mode, the value will be set in [G25.1.1. 'MREF1'] The speed applied in each situation will depend on the digital inputs enabling status configured with the following options: [G4.1.8 DI6 = 'MRefPID-H'] [G4.1.9 DI7 = 'MRefPID-M'] [G4.1.10 DI8 = 'MRefPID-L'] Assignment is executed according to the following table: DIGITAL INPUTS (DI6=00 / DI7=00 / DI=00) / PID REFERENCE 0 0 X G25.1.1 'M_Ref1' 0 X 0 G25.1.2 'M_Ref2' 0 X X G25.1.3 'M_Ref3' X 0 0 G25.1.4 'M_Ref4' X 0 X G25.1.5 'M_Ref5' X X 0 G25.1.6 'M_Ref6' X X X G25.1.7 'M_Ref7'	YES
2 MREF2= +20.00% **Mult-Reference2**	**G25.1.2** / PID Local Reference 2			YES
3 MREF3= +30.00% **Mult-Reference3**	**G25.1.3** / PID Local Reference 3			YES
4 MREF4= +40.00% **Mult-Reference4**	**G25.1.4** / PID Local Reference 4			YES
5 MREF5= +50.00% **Mult-Reference5**	**G25.1.5** / PID Local Reference 5			YES
6 MREF6= +50.00% **Mult-Reference6**	**G25.1.6** / PID Local Reference 6			YES
7 MREF7= +50.00% **Mult-Reference7**	**G25.1.7** / PID Local Reference 7			YES

ENGLISH

4.21.2. Subgroup 25.2 – S25.2: PID

<table>
<tr><th>Screen / Default Value</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>1 PIDSetp= MREF
PID Setpoint</td><td>G25.2.1 / PID Setpoint Source</td><td>MREF
AI1
AI2
AI3
AI4
MODBUS
COMMS
PLC</td><td>The user can select the source to introduce the PID regulator set point.
<table>
<tr><th>OPTION</th><th>FUNCTION</th></tr>
<tr><td>MREF</td><td>PID set point introduced from keypad. The different set point values are set in the [G25.1: ‘System Setpoint]’.</td></tr>
<tr><td>AI1</td><td>PID set point introduced by the analog input 1.</td></tr>
<tr><td>AI2</td><td>PID set point introduced by the analog input 2</td></tr>
<tr><td>AI3</td><td>PID set point introduced by the analog input 3
Note: This option will be only available whenever the I/O expansion board has been installed.</td></tr>
<tr><td>AI4</td><td>PID set point introduced by the analog input 4
Note: This option will be only available whenever the I/O expansion board has been installed.</td></tr>
<tr><td>MODBUS</td><td>PID set point introduced through the Modbus communications found within the drive.</td></tr>
<tr><td>COMMS</td><td>PID set point introduced through any of the optional communication boards.
Note: This option will be only available whenever any of the optional communication boards have been installed.</td></tr>
<tr><td>PLC</td><td>PID set point introduced through the equipments PLC.
Note: This option will be only available whenever any of the optional communication boards have been installed.</td></tr>
</table>
Note: In case an unavailable option is selected, the parameter will return to the previously selected option.</td><td>NO</td></tr>
<tr><td>2 PID Fbk= AI2
PID Feedback</td><td>G25.2.2 / PID Feedback Source</td><td>MREF
AI1
AI2
AI3
AI4
MODBUS
COMMS
PLC</td><td>Selecting the source through which the feedback signal will be introduced to close the control loop.
<table>
<tr><th>OPTION</th><th>FUNCTION</th></tr>
<tr><td>AI1</td><td>Feedback signal through analog input 1.</td></tr>
<tr><td>AI2</td><td>Feedback signal through analog input 2.</td></tr>
<tr><td>AI3</td><td>Feedback signal through analog input 3
Note: This option will be only available whenever the I/O expansion board has been installed.</td></tr>
<tr><td>AI4</td><td>Feedback signal through analog input 4
Note: This option will be only available whenever the I/O expansion board has been installed</td></tr>
<tr><td>MODBUS</td><td>Feedback signal through Modbus communications integrated in the drive.</td></tr>
<tr><td>COMMS</td><td>Feedback signal through any optional communication boards.
Note: This option will be only available whenever any of the optional communication boards have been installed.</td></tr>
<tr><td>PLC</td><td>Feedback signal through the equipments PLC.
Note: This option will be only available whenever any of the optional communication boards have been installed.</td></tr>
</table>
Note: In case an unavailable option is selected, the parameter will return to the previously selected option.</td><td>NO</td></tr>
<tr><td>3 PID Kc= +50.0%
Proportional PID</td><td>G25.2.3 / PID Regulator Proportional Gain</td><td>0 to 1000.0%</td><td>In order to set the regulators proportional gain according to the installations requirements. Whenever a greater control response is required, increase this value.
Note: Increasing excessively this value may introduce a major instability within the system.</td><td>YES</td></tr>
<tr><td>4 PID It= 10.0s
Integral PID</td><td>G25.2.4 / PID Regulator Integrating Time</td><td>0 to 200.0s</td><td>In order to set the regulator integrating time according to the installation requirements. Whenever a greater precision is required, increase this value.
Note: Increasing this value excessively, may slow down the system.</td><td>YES</td></tr>
<tr><td>5 PID Dt= 0.0s
Differential PID</td><td>G25.2.5 / Pid Regulator Differential Time</td><td>0 to 1000.0ms</td><td>Setting the regulator differential time. If a major response is required, increase this value.
Note: Increasing excessively this value may decrease precision
Note: Usually is recommended not to set this value, due to the fact that its default value is 0.0 s, adequate for the pump control applications.</td><td>YES</td></tr>
<tr><td>6 MxSL= +50.00Hz
Max Speed LIM</td><td>G25.2.6 / PID Frequency Upper Limit</td><td>[G25.2.7] to 300.00Hz</td><td>In order to set the PID output upper limit.</td><td>YES</td></tr>
<tr><td>7 MnSL= 0.00Hz
Min Speed LIM</td><td>G25.2.7 / PID Frequency Lower Limit</td><td>300 to [G25.2.6] Hz</td><td>In order to set the PID output lower limit.</td><td>YES</td></tr>
</table>

Screen / Default Value	Name / Description	Range	Function	Set on RUN
8 InvertPID= N **PID Out Inv**	**G25.2.8** / PID Output Inverting	NO YES	The user is able to invert the PID output. **OPTION** / **FUNCTION** NO: The PID regulator answers in normal mode. Therefore, when the feedback value exceeds the reference signal, it will decrease its speed. However, if the feedback is lower than the reference signal value, the speed will be increased. YES: The PID regulator answers in inverse mode. Therefore, when the feedback exceeds the reference signal, speed will be increased. However, when the feedback value is lower than the reference signal, the speed will be decreased.	NO
9 Out Sc= +100.0% **Out Scale**	**G25.2.9 /** PID Output Scale	0.1 to 1000.0%	In order to set the PID regulator output magnitude.	NO

4.21.3. Subgroup 25.3 – S25.3: Start Conditions

Screen / Default Value	Name / Description	Range	Function	Set on RUN
1 LP Pon= 35% **Awakening Level**	**G25.3.1** / Awakening Level	0 to 100%	This parameter sets the resuming PID control level after a suspension period (sleep mode).	YES
2 FP1Son= 49.99Hz **Fix Pmp1 Str Spd**	**G25.3.2** / Fix Pump 1 Starting Speed	0 to [G10.1]Hz	In order to set the starting speed o the fix pumps. To start the pumps successfully, the following conditions must be satisfied: - Main motor speed exceeds the value set in parameters [G25.3.2] to [G25.3.5]. -Time set in parameter [G25.3.6 'FP Ton'] has passed. - The difference between the reference signal and the PID controller is greater than the error signal set in parameter [G25.4.8 'FP Error']	YES
3 FP2Son = 49.99Hz **Fix Pmp2 Str Spd**	**G25.3.3** / Fix Pump 2 Starting Speed	0 to [G10.1]Hz		
4 FP3Son = 49.99Hz **Fix Pmp3 Str Spd**	**G25.3.4** / Fix Pump 3 Starting Speed	0 to [G10.1]Hz		
5 FP4Son = 49.99Hz **Fix Pmp4 Str Spd**	**G25.3.5** / Fix Pump 4 Starting Speed	0 to [G10.1]Hz		
6 FP Ton= 60.0s **Fix Pump Str Dly**	**G25.3.6/** Fix Pumps Starting Delay	0 to 3600s	In order to set the time delay within the fix pumps start. **Note:** If the times are too short, they might generate overpressures within the network. Excessive times will generate under pressures within the network.	YES

4.21.4. Subgroup 25.4 – S25.4: Stop Conditions

Screen / Default Value	Name / Description	Range	Function	Set on RUN
1 LP T Slpr= 60.0s **Drive Sleep Dely**	**G25.4.1** / Delay Before Enabling Sleep Mode	0 to 999.0s	This parameter sets the delay time for enabling the sleep mode. If the drive operates at a speed value under the one established in parameter [G25.4.2], it will stop running and it will enter in sleep mode.	YES
2 Slp Spd= 0.00Hz **Dr Sleep Speed**	**G25.4.2** / Enabling Sleep Mode Speed	0 to [G10.1]	The user can set the speed under which if a time period greater than the one defined in parameter [G25.4.1], the drive will stop operating and enter in sleep mode.	YES
3 SPD1of= 15.0Hz **FPump1 Stp Speed**	**G25.4.3** / Fix Pump 1 Stopping Speed	0 to [G10.1]Hz	In order to set the speed to stop the fix pumps. In order to produce the stop of the fix pumps, the following conditions should be satisfied: - The main pump speed decreases under the value set in parameters [G25.4.3] to [G25.4.6]. - Time, set in parameter [G25.4.7 'FP Tof'] has passed. - The difference between the reference signal and the PID controller feedback is lower than the error signal set in parameter [G25.4.8 'FP Error']	YES
4 SPD2of = 15.0Hz **FPump2 Stp Speed**	**G25.4.4** / Fix Pump 2 Stopping Speed	0 to [G10.1]Hz		
5 SPD3of = 15.0Hz **FPump3 Stp Speed**	**G25.4.5** / Fix Pump 3 Stopping Speed	0 to [G10.1]Hz		
6 SPD4of = 15.0Hz **FPump4 Stp Speed**	**G25.4.6** / Fix Pump 4 Stopping Speed	0 to [G10.1]Hz		
7 Fp Tof= 60.0s **FPump Stp Delay**	**G25.4.7** / Stopping Fix Pump Delay	0 to 3600s	Fix pumps stopping delay setting	YES
8 FP Error= 2% **FPmp Str/Stp Err**	**G25.4.8** / PID Maximum Error Stopping Fix Pumps	0 to 100%	PID error under which the fix pumps will stop	YES

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4.21.5. Subgroup 25.5 – S25.5: Speed Bypass

Screen / Default Value	Name / Description	Range	Function	Set on RUN
1 AccTime= 2.0s **Aux Accl Time**	**G25.5.1** / Main Motor Accelerating Time after Fix Pump Stop	0 to 600.0s	In order to set the main motor accelerating time after a fix pump has been disabled. Set 0.1s to deactivate this option.	YES
2 Dec TimeI= 2.0s **Aux Decl Time**	**G25.5.2/** Main Motor Accelerating Time after Fix Pump Activation	0 to 600.0s	In order to set the main motor decelerating time after a fix pump has been enabled.	YES

4.21.6. Subgroup 25.7 – S25.7: Filling Pipes

Screen / Default Value	Name / Description	Range	Function	Set on RUN
1 Fill Sp= 0.00Hz **Pipe filling Spd**	**G25.7.1** / Filling Pipes Speed	0 to [G10.1]	This parameter sets the speed reference during a pipe filling period. During this period, acceleration is carried out without PID control	NO
2 Fill P= 0.0% **PFill end Pressu**	**G25.7.2** / Filling Pipes Pressure	0 to 100%	This parameter determines when has the filling pipes process conclude by setting the pressure of the filling pipes ending value. The PID mode will start if the PID controller feedback is greater than the value defined in this parameter.	NO
3 Fill Tim= 600s **PFill End Delay**	**G25.7.3** / Filling Pipes Delay	0 to 9999s	If a lower value defined in [G25.7.2] parameter during a longer time period than the one defined in this parameter, a 'Pipe Fill Flt' will take place.	YES

4.21.7. Subgroup 25.9 – S25.9: Enable Pump

Screen / Default Value	Name / Description	Range	Function	Set on RUN
1 First FP= 1 **First Start.FP**	**G25.9.1 /** First Fixed Pump Selection	1 to 4	Select the fixed pumps controlled by the drive which will run in first place **For Example:** If there are 3 fixed pumps controlled by Relay 1, Relay 2 and Digital Output 1 and this parameter is set as '2', the operating sequence will be Relay2→Digital Output 1→Relay 1	NO
2 FP number= 0 **Number Fixed Pmp**	**G25.9.2 /** Number of Fixed Pumps Selection	0 to 4	In order to set the number of fixed pumps controlled by the drive	NO

5. MODBUS COMMUNICATION

5.1. Introduction

The drive can be controlled and monitored through a sequence program of a PLC or other master device.

Various drives or other slave devices can be connected on a RS485 communication network to be controlled by a PLC or a PC. Like this, the setting of the parameters and its monitoring can be done from a PC via a user program.

For the communication, the user can operate with any kind of RS232/485 converter. Its characteristics will depend on each manufacturer.

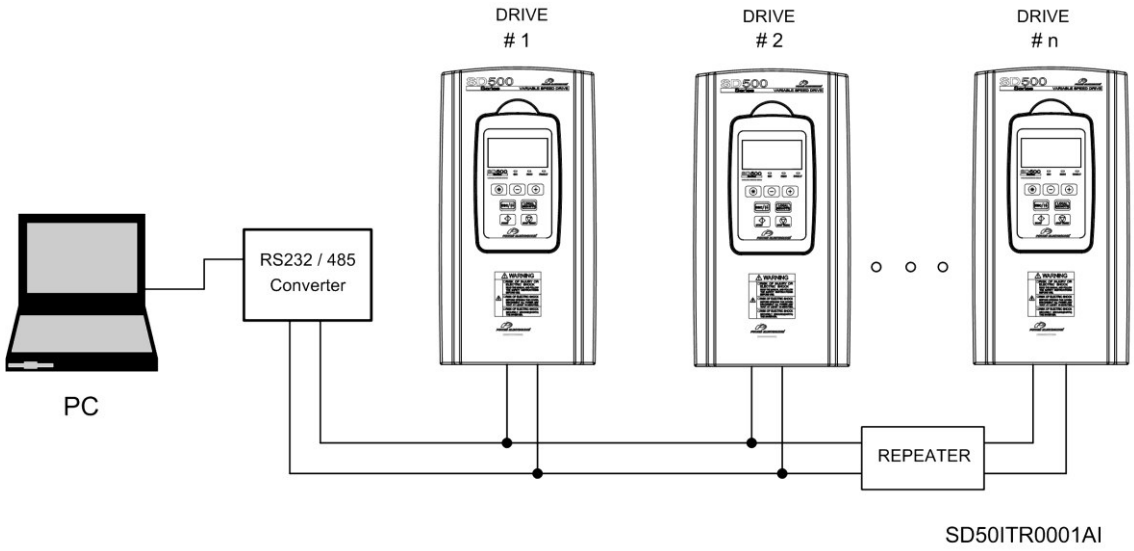


Figure 5.1:RS485 Network system configuration

Note: It is recommended to install a repeater to increase the speed of the communication or if the length of the communication cable is much bigger tan 1.200m. It's also necessary to improve the quality of the communications in noisy environments.

5.2. Specifications

General specifications:

- Communication Method: RS485.
- Transmission Type: Bus Method, Multi drop Link system.
- Applicable to: SD500.
- Converter: RS232.
- Number of drives: Max. 16
- Transmission distance: Maximum 1.200m (recommended up to 700m).

Installation specifications:

- Recommended Cable: 0.75mm², shielded twisted pair.
- Installation: S+, S-, CM terminals of the control terminals.
- Supply: Isolated power supply of the drive.

Communication Specifications:

- Communication Speed: 1200/2400/9600/19200/38400bps. Adjustable.
- Control Procedure: Asynchronous communication system.
- Communication system: Half duplex.
- Stop bit length: 1 bit/2bit
- Cyclic Redundancy code: 2 byte.
- Parity: None/Odd/Even

5.3. Installation

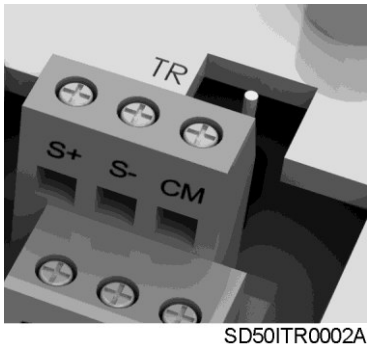
5.3.1. Communication cable connection

In order to connect the high RS485 signal use terminal S+, and to connect the low signal, use terminal S-.

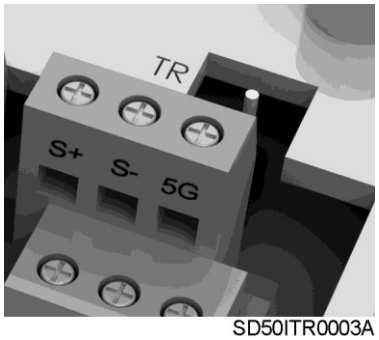
If more than one drive is going to be connected, connect the CM terminal between them to establish the communication.

Install a repeater to increase the communication speed, or in the event that the length of the communication cable is bigger than 1.200m. It is necessary its use in very noisy environments to improve the quality of communication.

If it is necessary to connect the end of network resistance (120Ω), place the jumper in the TR connection. This jumper is located above the RS485 connector of the image.



SD50ITR0002A



SD50ITR0003A

Figure 5.2 Details of the RS485 connectors for power range of 0.75kW ~55kW (left) and 75kW (right)

Once the connections are done, supply voltage to the drive and set the related to communication parameters as follows.

Parameter	Description	Setting	
G20.1.1	Communication Address	0 to 250	Use different numbers in case of installing more than one drive.
G20.1.2	Rs-485 Communication Protocol	MODBUS	Communication protocol MODBUS-RTU
G20.1.3	Communication Speed	9600bps	(Default setting).
G20.1.4	Communication Pattern	D8 / PN / S1	(Default setting).
G20.1.5	Transmission delay after reception	5ms	(Default setting).
G4.1.1	Main Control Mode	2 MODBUS	Communication RS485.
G3.1	Source of Speed reference 1	MDBUS	Communication RS485.
G11.2	Action in case of loss of speed reference	LostPrst	The drive will work at the defined frequency in the parameter **G11.4**
G11.3	Trip time for lack of speed reference	1.0s	(Default setting)
G11.4	Speed in case of lost of reference	0.00Hz	(Default setting)

5.3.2. Starting the drive on the communication network

Having carried out the physical installation of the equipment in the communications network, and adjusted the related parameters, the steps for setting up the network drive are:

- Check that the master and the drive are connected properly.
- Supply voltage to the drive, but do not connect the load unless it is verified that the communication between the master and drive is done.
- Run the user application to work with the drive from the master port.
- Verify that the drive works correctly using the application program form the master port.

5.4. RS485 MODBUS Communication Protocol

The Pc or any other device can play the master role and the drives the slave ones. This way, the drive will answer to the Read/Write orders requested by the 'master'.

Supported function codes.

Function Codes	Description
0x03	Read Hold Register
0x04	Read Input Register
0x06	Preset Single Register
0x10	Preset Multiple Register

Exception of Codes.

Function Codes	Description
0x01	ILLEGAL FUNCTION. When the master device, sends a code different to the read or write codes. (See supported function codes).
0x02	ILLEGAL DATA ADDRESS. When the parameter address does not exist.
0x03	ILLEGAL DATA VALUE. The data is a value out of the drives parameter range during writing.
0x06	SLAVE DEVICE BUSY

5.5. Address List

5.5.1. Common Area

Address	Parameter	Scale	Units	R/W	Data Values
40000	Inverter Model			R	B: SD500
40001	Drives Power Ratings			R	0: 0.75kW 1: 1.5kW 2: 2.2kW 3: 3.7kW 4: 5.5kW 5: 7.5kW 6: 11kW 7: 15kW 8: 18.5kW 9: 22kW A: 30kW B: 37kW C: 45kW D: 55kW E: 75kW
40002	Drive Input Voltage			R	0: 220VAC 1: 400VAC
40003	SW Version			R	(Ex) 0x0100: Version 1.0 (Ex) 0x0101: Version 1.1
40004	Reserved				
40005	Reference Frequency	0.01	Hz	R/W	Starting Freq to Max Freq

Address	Parameter	Scale	Units	R/W	Data Values
40006	Start / Stop Command			R/W	Bit 0: Stop
					Bit 1: Forward Start
					Bit 2: Reverse Start
					Bit 3: Fault Reset
					Bit 4: Emergency Stop
				-	Bit 5: Not used
				R	Bit 6 – 8: Setpoint Introduction 0: Local 1: Start/Stop-1 2: Start/Stop-2 3: RS485 integrated 4: Communications Option 5: PLC Option
					Bit 9 – 14: Reference Frequency 0: Local Reference 1: Not used 2: Step frequency 1 3: Step frequency 2 4: Step frequency 3 5: Step frequency 4 6: Step frequency 5 7: Step frequency 6 8: Step frequency 7 9: Step frequency 8 10: Step frequency 9 11: Step frequency 10 12: Step frequency 11 13: Step frequency 12 14: Step frequency 13 15: Step frequency 14 16: Step frequency 15 17: Up Speed 18: Down Speed 19: Constant 20 – 21: Reserved 22: Analog V1 23: Analog I1 24: Analog V2 25: Analog I2 26: Reserved 27: RS485 28: Communication Option 29: PLC Option 30: Fix Frequency 31: PID
					Bit 15: Network Error
40007	Acceleration Time	0.1	Sec	R/W	
40008	Deceleration Time	0.1	Sec	R/W	
40009	Output Current	0.1	A	R	
40010	Output Frequency	0.01	Hz	R	
40011	Output Voltage	1	V	R	
40012	DC Bus Voltage	1	V	R	
40013	Output Power	0.1	kW	R	
40014	Drive Status			R	Bit 0: Stop
					Bit 1: Start (+)
					Bit 2: Start (-)
					Bit 3: Fault
					Bit 4: Accelerating
					Bit 5: Decelerating
					Bit 6: Steady Status
					Bit 7: DC Brake
					Bit 8: Stop
					Bit 9: Fix Frequency
					Bit 10: Open Brake
					Bit 11: Start (+) Command
					Bit 12: Start (-) Command
					Bit 13: Start / Stop by Communication
					Bit 14: Freq. Reference by Communication
					Bit 15: 0-Remote; 1-Local

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Address	Parameter	Scale	Units	R/W	Data Values
40016	Digital Inputs Status			R	Bit 0: P1
					Bit 1: P2
					Bit 2: P3
					Bit 3: P4
					Bit 4: P5
					Bit 5: P6
					Bit 6: P7
					Bit 7: P8
40017	Digital Outputs Status			R	Bit 0: Relay 1
					Bit 1: Relay 2
					Bit 2: Digital Output 1 (Q1)
					Bit 3: Relay 3 (Option I/O)
					Bit 4: Relay 4 (Option I/O)
					Bit 5: Relay 5 (Option I/O)
40018	V1			R	Voltage input V1
40019	V2			R	Voltage Input V2 (Option I/O)
40020	I			R	Current Input I1
40021	RPM			R	Speed Output
40026	Display unit			R	0: Hz 1: rpm
40027	Number of poles			R	Motor poles visualisation
40904	PID Reference	0.1	%	R/W	PID reference value
40905	PID Feedback	0.1	%	R/W	PID feedback value.

Notes:

1. Start / Stop order through communications (address 0x0006)

Every bit is enabled when they change their status from 0 to 1. For example, the drive stops due to a fault during start. Until the fault has been reset and the start order is given, the drive will not operate.

2. Addresses of 0x0005 and 0x0006

The addresses values shown above, will be deleted if the drive losses it power supply. This addresses will only keep their values while the equipment remains powered.

5.5.2. Faults

Address	Parameter	Scale	Units	R/W	Data Values
40816	Trip information - 1	-	-	R	Bit 0: OverLoad
					Bit 1: UnderLoad
					Bit 2: Inv OverLoad
					Bit 3: E-Thermal
					Bit 4: Ground Fault
					Bit 5: Out Ph Loss
					Bit 6: Input Ph Loss
					Bit 7: OverSpeed
					Bit 8: Reserved
					Bit 9: NTC
					Bit 10: OverCurrent
					Bit 11: OverVoltage
					Bit 12: External Trip
					Bit 13: Short ARM
					Bit 14: OverHeat
					Bit 15: Fuse Open
40017	Trip information - 2	-	-	R	Bit 0: Mc-Fail
					Bit 1: Encoder Error
					Bit 2: PTC
					Bit 3: FAN TRIP
					Bit 4: Reserved
					Bit 5: Param_Wr_Err
					Bit 6: Pipe Fill Fit
					Bit 7: IO Board Fail
					Bit 8: External Brake
					Bit 9: No Motor
					Bit 10: Slot 1 Fail
					Bit 11: Slot 2 Fail
					Bit 12: Slot 3 Fail
					Bit 13: Reserved
					Bit 14: Reserved
					Bit 15: Reserved

5.5.3. Programming Parameters

Parameter	Screen	Description	Address	Range	Modbus Range
G1.1	1 LOCK PARMTRS= N	Parameters lockage	-	N Y	-
G1.1b	PASSWORD= 0	Access Password	-	OFF, 0000 to 9999	-
G1.1c	ERRPWD= XXXX	Unlock recovery clue	-	0000 to 9999	-
G.1.2	2LOCK SCRENS= N	Screen Lock	-	N Y	-
G1.2b	PASSWORD= 0	Password	-	OFF, 0000 to 9999	-
G1.2c	ERRPWD= XXXX	Unlock recovery clue	-	0000 to 9999	-
G1.3	3 PROG= STANDARD	Default values initialisation	-	ESTANDAR PID BOMBAS	-
G1.4	4 LANGUA= ENGLISH	Language display	-	ENGLISH	-
G1.5	5 INITIALISE= NO	Default values initialisation	-	NO YES	-
G1.6	6 UPLOAD= N	Save display parameters	-	N Y	-
G1.6b	Upload STS=	Uploading parameter status	-	0 to 100%	-
G1.7	7 DOWNLOADM= N	Downloading parameters	-	N Y	-
G1.7b	DownloadSts=	Downloading parameter status	-	0 to 100%	-
G1.8	8 Changed Para= N	Default parameter display	-	N Y	-
G1.9	9 ADMIN PW= 0	Software Administration	-	0 to 65535	-
G1.10	10 LCDContra= 60	Set display contrast	-	0 to 63	-
G1.11	11 FAN= Run	Drive Fan Control	**44928**	DuringRun Always ON Temp Ctrl	0 1 2
G1.12	12 ENB/DIS L/R=D	LOCAL / REMOTE key enabling	**30003**	D E	0 1
G2.1.1	ACi/pVolt= 380V	Input Voltage	**44627**	170 to 230V 320 to 480V	170 to 230V 320 to 480V
G2.1.2	2 I/P Freq= 50Hz	Input frequency	**44618**	60Hz 50Hz	0 1
G2.1.3	3 TrimPwr%= +100%	Power display setting	**44626**	70 to 130	70 to 130
G2.2.1	1 MTRPWR= 0.0kW	Motor rated Power	**44366**	0.2 to 185kW	0 to 21
G2.2.2	2 MTR CUR= 0.0A	Motor rated current	**44621**	1.0 to 200.0A	10 to 2000
G2.2.3	3 NOLOADC= 0.0A	No load current	**44622**	0.5 to 200A	5 to 2000
G2.2.4	4 MTR VOLT= 0V	Motor nominal voltage	**44623**	180 to 480V	180 to 480V
G2.2.5	5 POLE Number= 4	Motor Poles	**44619**	2 to 48	2 to 48
G2.2.6	6 ADJTSPD= 100.0%	Fine speed setting	**44925**	0.1 to 6000%	1 to 60000
G2.2.7	7 EFICIENC= +85%I	Motor Efficiency	**44624**	70 to 100%	7 to 100
G2.2.8	8 MTR FRC = 50.00Hz	Motor frequency	**44370**	30 to 400Hz	3000 to 40000
G2.2.9	9 MTRCOOL=SELF	Motor cooling	**46953**	SELF FORCED	0 1
G3.1	1 REF1 SP= LOCAL	Speed Reference Source 1	**44359**	LOCAL AI1 AI2 AI3 AI4 MDBUS COMMS PLC	0 2 3 4 5 6 8 9
G3.2	2 REF2 SP= LOCAL	Speed Reference Source 2	**44613**	See [G3.1]	See [G3.1]
G3.3	3 LCLSP= 0.50Hz	Local Speed Reference	**44353**	[G19.2.5] to [G10.1]	[G19.2.5] to [G10.1]
G3.4	4 REF1 TQ = LOCAL	Torque Source Reference 1	**44360**	LOCAL AI1 AI2 AI3 AI4 MDBUS COMMS PLC	0 2 3 4 5 6 8 9

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Parameter	Screen	Description	Address	Range	Modbus Range
G3.5	5 REF2 TQ = LOCAL	Torque Source Reference 2	**44614**	LOCAL AI1 AI2 AI3 AI4 MDBUS COMMS PLC	0 2 3 4 5 6 8 9
G3.6	6 LclTQ = 0%	Local Torque Reference	**44354**	-180 to 180%	-1800 to 1800
G4.1.1	1 CONTROL MODE1= 1	Main Control Mode	**44358**	LOCAL REMOTE MODBUS COMMS PLC	0 1 3 4 5
G4.1.2	2 CONTROL MODE2= 1	Alternative Control Mode	**44612**	See [G4.1.1]	See [G4.1.1]
G4.1.3	3 DI1= START (+)	Multifunction Digital Input 1 Configuration	**45441**	None START (+) START (-) RESET EXT TRIP DIS START INCH 1 SPEED-L SPEED-M SPEED-H SPEED-X XCEL-L XCEL-M 3 WIRE CTR/REF 2 UP DOWN RESERVED POT CLEAR AnalogHLD PIDOPLoop RESERVED Pre-Excit Speed/Torque ASR GAIN2 ASR P/PI ThermalIn INCH (+) INCH (-) Tq OFFSET	0 1 2 3 4 5 6 7 8 9 10 11 12 14 15 17 18 19 20 21 23 33 34 35 36 37 39 46 47 48
G4.1.4	4 DI2= START(-)	Multifunction Digital Input 2 Configuration	**45442**	See [G4.1.3]	See [G4.1.3]
G4.1.5	5 DI3= DIS START	Multifunction Digital Input 3 Configuration	**45443**	See [G4.1.3]	See [G4.1.3]
G4.1.6	6 DI4= EXT TRIP	Multifunction Digital Input 4 Configuration	**45444**	See [G4.1.3]	See [G4.1.3]
G4.1.7	7 DI5= SPEED-L	Multifunction Digital Input 5 Configuration	**45445**	See [G4.1.3]	See [G4.1.3]
G4.1.8	8 DI6= SPEED-M	Multifunction Digital Input 6 Configuration	**45446**	See [G4.1.3]	See [G4.1.3]
G4.1.9	9 DI7= SPEED-H	Multifunction Digital Input 7 Configuration	**45447**	See [G4.1.3]	See [G4.1.3]
G4.1.10	10 DI8= INCH 1	Multifunction Digital Input 8 Configuration	**45448**	See [G4.1.3]	See [G4.1.3]
G4.1.14	14 DIOnF= 10ms	Digital Input activation delay	**45461**	0 to 10000ms	0 to 10000
G4.1.15	15 DIOffF= 3ms	Digital Input deactivation delay	**45462**	0 to 10000ms	0 to 10000ms
G4.1.16	16 DCTy= 00000000	Digital input contact type selection	**45463**	00000000 to XXXXXXXX	0 to 65535
G4.1.17	17 DiScan= 1ms	Multireference delay time	**45465**	1 to 5000ms	1 to 5000ms
G4.1.18	18 SaveMot Frq= N	Save operating frequency motorised Potentiometer	**44929**	N Y	0 1
G4.2.1	1 An1PT= 0-10v	Analog Input Mode Selection	**45382**	0-10V -/+10V	0 1
G4.2.2	2 Ain1LPF= 10ms	Low Pass Filter for Analog Input 1	**45383**	0 to 10000ms	0 to 10000
G4.2.3	3 A1MnV= +0.00V	Analog Input 1 Minimum Range	**45384**	0 to 10V	0 a [G4.2.5]
G4.2.4	4 A1MnRf= +0.00%	Analog Input 1 Minimum Range Speed	**45385**	0 to 100%	0 a 10000
G4.2.5	5 A1MxV= +10.00V	Analog Input 1 Maximum Rage	**45386**	0 to 10V	[G4.2.3] to 1000
G4.2.6	6 A1MxR= +100.00%	Analog Input 1 Maximum Range Speed	**45387**	0 to 100%	0 to 10000
G4.2.7	7 An1NgMn=+0.00V	Analog Input 1 Negative Minimum Range	**45388**	-10 to 0V	[G4.2.9] to 0
G4.2.8	8 A1MnR= +0.00%	Analog Input 1 Minimum Negative Range	**45389**	-100 to 0%	-10000 to 0

Parameter	Screen	Description	Address	Range	Modbus Range
G4.2.9	9 A1MxR= -10.00V	Analog Input 1 Maximum Negative Range	**45390**	-10 to 0V	-1000 to [G4.2.7]
G4.2.10	10 A1MxR= -100.00	Analog Input 1 Maximum Negative Range Speed	**45391**	-100 to 0%	-10000 to 0
G4.2.11	11 A1DeLI= 0.04	Analog Input 1 Quantification Level	**45393**	0.04 to 10%	4 to 1000
G4.2.12	12 MxFqA=50.00Hz	Maximum frequency at analogue input	**45377**	[G19.2.5] to [G10.1]	[G19.2.5] to [G10.1]
G4.3.1	1 Ain2LPF= 10ms	Low Pass Filter for Analog Input 2	**45398**	0 to 10000ms	0 to 10000
G4.3.2	2 A2MnC= 4.00mA	Analog Input 2 Minimum Range	**45399**	0 to 20mA	0 to [G4.3.4]
G4.3.3	3 A2MnR= +0.00%	Analog Input 1 Minimum Range Speed	**45400**	0 to 100%	0 to 10000
G4.3.4	4 A2MxC= 20.00mA	Analog Input 2 Maximum Range	**45401**	4 to 20mA	[G4.3.2] to 20000
G4.3.5	5 A2MxR= +100.00%	Analog Input 2 Maximum Range Speed	**45402**	0 to 100%	0 to 10000
G4.3.6	6 A2DeLI= 0.04%	Analog Input 2 Quantification level	**45408**	0.04 to 10%	4 to 1000
G4.3.7	7 MxFqA=50.00Hz	Maximum frequency at analogue input	**45377**	[G19.2.5] to [G10.1]	[G19.2.5] to [G10.1]
G5.1	1 ACC1= 20.0s	Acceleration Ramp 1	**44355**	0 to 600.0s	0 a 6000
G5.2	2 DECEL1= 30.0s	Deceleration Ramp 1	**44356**	0 to 600.0s	0 a 6000
G5.4	4 RmpT= MaxFreq	Type of Acceleration Ramp	**44616**	MaxFreq FrqDelta	0 1
G5.5	5 AccPn= Linear	Acceleration Pattern	**44865**	LINEAR S CURVE	0 1
G5.6	6 DecPn= Linear	Deceleration Pattern	**44866**	LINEAR S CURVE	0 1
G5.7	7 AcSSrt= +40%	S Curve Acceleration Starting Ramp	**44867**	1 to 100%	1 to 100
G5.8	8 AccSEnd= +40%	S-Curve Acceleration Ending Ramp	**44868**	1 to 100	1 to 100
G5.9	9 DeISSrt= +40%	S- Curve Deceleration Starting Ramp	**44869**	1 to 100	1 to 100
G5.10	10 DecSEnd=+40%	S-Curve Decelerating Ending Ramp	**44870**	1 to 100	1 to 100
G5.11	11 AccDWF= 5.00Hz	Acceleration Frequency Pause	**44884**	[G19.2.5] to [G10.1]	[G19.2.5] to [G10.1]
G5.12	12 AccDWT= 0.0s	Acceleration Time Pause	**44885**	0 to 60s	0 to 600
G5.13	13 DecDWF= 5.00Hz	Deceleration Frequency Pause	**44886**	[G19.2.5] to [G10.1]	[G19.2.5] to [G10.1]
G5.14	14 DecDWT= 0.0s	Deceleration Time	**44887**	0 to 60.0s	0 to 600
G5.15	15 TdedFll= 3.0s	Fault Deceleration Time	**46919**	0 to 600.0s	0 to 6000
G5.16.1	1 ACC2= 20.0s	Alternative Acceleration Ramp 2	**44678**	0 to 600.0s	0 to 6000
G5.16.2	2 DEC2= 20.0s	Alternative Deceleration Ramp 2	**44679**	0 to 600.0s	0 to 6000
G5.16.3	3 ACC3= 30.0s	Alternative Acceleration Ramp 3	**44680**	0 to 600.0s	0 to 6000
G5.16.4	4 DEC3= 30.0s	Alternative Deceleration Ramp 3	**44681**	0 to 600.0s	0 to 6000
G5.16.5	5 ACC4= 40.0s	Alternative Acceleration Ramp 4	**44682**	0 to 600.0s	0 to 6000
G5.16.6	6 DEC4= 40.0s	Alternative Deceleration Ramp 4	**44683**	0 to 600.0s	0 to 6000
G6.1	1 SEL REF= MREF	Source Selection to introduce the set point	**46164**	MREF AI1 AI2 AI3 AI4 MODBUS COMMS PLC	0 1 2 3 4 5 7 8
G6.2	2 SEL FBK= AI1	Source Selection to Introduce the Feedback Signal	**46165**	MREF AI1 AI2 AI3 AI4 MODBUS COMMS PLC	0 1 2 3 4 6 7
G6.3	3 GainKp= +50.0%	PID Regulator Gain	**46166**	0 to 1000.0%	0 to 10000
G6.4	4 INTEGRL= 10.0s	PID Regulator Integrating Time	**46167**	0 to 200.0s	0 to 2000
G6.5	5 T Der= 0ms	PID Regulator Differential Time	**46168**	0 to 1000ms	0 to 1000
G6.6	6 MxSL= +50.00Hz	PID Upper Frequency Limit	**46173**	[G6.8] to 300Hz	[G6.8] to 30000
G6.7	7 MnSL= 0.00Hz	PID Lower Frequency Limit	**46174**	-300 to [G6.7]Hz	-30000 to [G6.7]
G6.8	8 INVERT PID= N	PID Output Inverting	**46175**	N Y	0 1
G6.9	9 OutSc= +100.0%	PID Output Scale	**46176**	0.1 to 1000%	1 to 10000
G7.1	1 START= RAMP	Start Mode	**44871**	RAMP DCSTART	0 1
G7.2	2 StrDly= 0.00s	Start Delay Time	**45464**	0 to 100.0s	0 to 10000
G7.3	3 STOP= RAMP	Stop Mode 1	**44872**	RAMP DC BRAKE SPIN POW BRKE	0 1 2 4
G7.4	4 SAFE STOP=N	Safe Stop	**45197**	N Y	0 1
G7.5	5 SFSStr= 125.0%	Safe Stop Start	**45198**	110 to 140%	1100 to 1400

Parameter	Screen	Description	Address	Range	Modbus Range
G7.6	6 SFSStp = 130.0%	Safe Stop Ending	**45199**	130 to 145%	[G7.5] to 1450
G7.7	7 SFSGain= 1000	Safe Stop Gain	**45200**	1 to 2000	1 to 20000
G7.10	10 Run Aft Rst= N	Start after Low Voltage Fault	**44874**	N Y	0 1
G7.11	11 Str Aft Rst= N	Start after reset due to fault	**46920**	N Y	0 1
G7.12	12 DCSt T= 0.00s	Dc Start Time	**44876**	0 to 60.00s	0 to 6000
G7.13	13 DC Curr= 50%I	DC Current Start	**44877**	0 to 200%	0 to 200
G7.14	14 PreDC T= 0.10s	Previous DC Brake lock –Time	**44878**	0 to 60.00s	0 to 6000
G7.15	15 DCBrk T= 1.00s	DC Brake Time	**44879**	0 to 60.00s	0 to 6000
G7.16	16 DCBk Cur= 50%I	DC Brake Level	**44880**	0 to 200%	0 to 200
G7.17	17 DCBk F= 5.00Hz	DC Brake Frequency	**44881**	0 to 60.00Hz	0 to 6000
G7.19	19 PreExt = 1s	Pre-excit Time	**45129**	0 to 60 s	0 to 6000
G7.20	20 PreExF =100%	Pre-excit Flux	**45130**	100 to 500 %	1000 to 5000
G7.21	21 PwofDI = 1s	Power off Delay	**45131**	0 to 60s	0 to 6000
G7.18.1	1 Srch Mode= 0000	Speed Search Mode	**45191**	0000 to XXXX	0 a 15
G7.18.2	2 Srch I= 150%	Speed Search Current	**45192**	80 to 200%	80 a 200
G7.18.3	3 Kp Srch= 100	Proportional Gain for Speed Search	**45193**	0 to 9999	0 a 9999
G7.18.4	4 Ki Srch= 200	Integral Gain Speed Search	**45194**	0 to 9999	0 a 9999
G7.18.5	5 Srch Dly= 1.0s	Speed Search Delay	**45195**	0 to 60.0s	0 a 600
G8.1.1	1 OP FLT RLY= 0X0	Relay Output due to Fault	**45662**	000 to XXX	0 to 7
G8.1.2	2 RLY1= Trip	Relay 1 Control Source Selection	**45663**	NONE FDT-1 FDT-2 FDT-3 FDT-4 OVERLOAD IOL UNDRLOAD VENTWARN OVERVOLT LOWVOLT OVERHEAT RUN STOP STEADY SPD SRCH READY PUMP TRIP ENCODER DIR COMPARAT BRCTRL	0 1 2 3 4 5 6 7 8 10 11 12 14 15 16 19 22 25 29 33 34 35
G8.1.3	3 RLE2= Run	Relay 2 Control Source Selection	**45664**	See [G8.1.2]	See [G8.1.2]
G8.1.4	4 DOP1= FDT-1	Digital Output 1 Control Source Selection	**45665**	See [G8.1.2]	See [G8.1.2]
G8.1.5	5 T RL ON= 0.00s	OP1 and Relays Connection Delay	**45682**	0 to 100.00s	0 to 10000
G8.1.6	6 T RL OF= 0.00	OP1 and Relays Disconnection delay	**45683**	0 to 100.00s	0 to 10000
G8.1.7	7 INV NA/NC= 000	Digital Output and Relay Contact Type Selection	**45684**	000 to XXX	0 to 65535
G8.2.1	1 A01= Frequency	Analog Output 1 Selection Mode	**45633**	Frequency O/ pCurr O/pVolt DCLinkV O/p Power TargetFq RampFreq PIDRefVal PIDFdbVal PIDO/p Constant	0 1 2 3 5 8 9 12 13 14 15
G8.2.2	2 AO1Ga= +100.0%	Analog Output 1 Gain	**45634**	-1000 to 1000%	-10000 to 10000
G8.2.3	3 AO1Ofst= +0.0%	Analog Output 1Offset Level	**45635**	-100 to 100%	-1000 to 1000
G8.2.4	4 AO1Ofil = 5ms	Analog Output 1 Filter Selection	**45636**	0 to 10000ms	0 to 10000
G8.2.5	5 AO1Con= 0.0%	Analog Output 1Constant Value	**45637**	0 to 1000%	0 to 1000
G8.2.6	6 AO2= Frequency	Analog Output 2 Mode Selection	**45639**	See [G8.2.1]	See [G8.2.1]
G8.2.7	7 OA2Ga= +100.0%	Analog Output 2 Gain	**45640**	-1000 to 1000%	-10000 to 10000
G8.2.8	8 AO2Ofst= +20.0%	Analog Output Offset Level	**45641**	-100 to 100%	-1000 to 1000
G8.2.9	9 AO2Fil= 5ms	Analog Output 2 Filter Selection	**45642**	0 to 10000ms	0 to 10000
G8.2.10	10 AO2Con= 0.0%	Analog Output 2 Constant Value	**45643**	0 to 1000%	0 to 1000
G9.1	1 FDTLvl= 30.00Hz	Transfer Function Level	**45689**	0 to [G10.1]Hz	0 to [G10.1]

Parameter	Screen	Description	Address	Range	Modbus Range
G9.2	2 FDTBnd= 10.00Hz	Transfer Function Bandwidth	**45690**	0 to [G10.1]Hz	0 to [G10.1]
G9.3	3 SLCOM= None	Comparator Source Selection	**44930**	None AI1 AI2 AI3 AI4	0 1 2 3 4
G9.4	4 S C ON= +90.00%	Output Activation Level in Comparator Mode	**44931**	10 to 100%	[G9.5] to10000
G9.5	5 S C OF= +10.00%	Output Deactivation Level in Comparator Mode	**44932**	-100 to [G9.4]%	-10000 to [G9.4]
G10.1	1 MxSpL= 50.00Hz	Maximum Speed Limit	**44372**	40 to 400Hz	4000 to 40000
G10.2	2 FWR/RV= None	Speed Inverting Permission	**44873**	None FWDPrev RevPrev	0 1 2
G10.3	3 UseFrqLimit=Y	Frequency Limit	**44888**	N Y	0 1
G10.4	4FqLtLo= 0.50Hz	Lower Frequency Limit	**44889**	0 to [G10.5]	0 to [G10.5]
G10.5	5 FqLtHi= 50.00Hz	Upper Frequency Limit	**44890**	0.5 to [G10.1]	[G10.4] to [G10.1]
G10.6	6 TORQUE LIMIT= N	Torque Limit Activation	**46962**	N Y	0 1
G10.7	7 LvTrqLt= 180%	Torque Limit Level	**46964**	30 to 250%	30 to 250
G10.8.1	1 TqLimRef = LOCAL	Torque lim Ref	**45173**	LOCAL AI1 AI2 AI3 AI4 MDBUS ENCOD COMMS PLC	0 2 3 4 5 6 7 8 9
G10.8.2	2 TlposFW = 180%	Tq lim ositive FW	**45174**	0 to 200%	0 to 2000
G10.8.3	3 TlnegFW = 180%	Tq lim negatv FW	**45175**	0 to 200%	0 to 2000
G10.8.4	4 TlposRV = 180%	Tq lim ositive RV	**45176**	0 to 200%	0 to 2000
G10.8.5	5 TlnegRV = 180%	Tq lim negatv RV	**45177**	0 to 200%	0 to 2000
G10.8.6	6 TqOffRf = LOCAL	Tq offset Ref	**45178**	LOCAL AI1 AI2 AI3 AI4 MDBUS COMMS PLC	0 2 3 4 5 6 7 8
G10.8.7	7 TqOfLO = 0%	LOCAL Ref OffTq	**45179**	-120 to 120 %	-1200 to 1200
G10.8.8	8 TqOfcmp = 0%	Tq compens offst	**45180**	0 to 100 %	0 to 1000
G10.8.9	9 SpLimRf = LOCAL	Speed Lim Ref	**45182**	LOCAL AI1 AI2 AI3 AI4 MDBUS COMMS PLC	0 2 3 4 5 6 7 8
G10.8.10	10 SpL (+) = 50Hz	Speed Lim FW	**45183**	0 to [G10.5] and [G10.1]	0 to [G10.5] and [G10.1]
G10.8.11	11 SpL (-) = 50 Hz	Speed Lim REV	**45184**	0 to [G10.5] and [G10.1]	0 to [G10.5] and [G10.1]
G10.8.12	12 SpL Ga = 500%	Speed Lim Gain	**45185**	100 to 5000 %	100 to 5000
G11.1	1 RlRLs= None	Response in case of a Speed Reference Loss	**46924**	None FreeRun Dec Hold I/P Hold O/P LostPrst	0 1 2 3 4 5
G11.3	3 RfLsDly= 1.0s	Trip Delay Time Due to Speed Reference Loss	**46925**	0.1 to 120s	1 to 1200
G11.4	4 RefLRf= 0.00Hz	Speed in case of Reference Loss	**46926**	[G19.2.5] to [G10.1]Hz	[G19.2.5] to [G10.1]
G11.5	5 OLWarnSel= NO	Overload Warning	**46929**	NO YES	0 1
G11.6	6 OLWrnL= +150%	Overload Warning Level	**46930**	30 to 200%	30 to [G11.9]

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Parameter	Screen	Description	Address	Range	Modbus Range
G11.7	7 OLWrnT= 10.0s	Delay Time for Enabling the Overload Warning	**46931**	0 to 30.0s	0 to 300
G11.8	8 OLTS= FreeRun	Action Selection due to Overload Fault	**46932**	None FreeRun Dec	0 1 2
G11.9	9 OLLevel= 180%	Trip Level in case of Overload Fault	**46933**	30 to 200%	30 to 200
G11.10	10 TFllSC= 60.0s	Overload delay time	**46934**	0 to 60.0s	0 to 600
G11.11	11 SBC1min= +150%	Overcurrent level during 1 minute	**46954**	120 to 200%	[G11.12] to 200
G11.12	12 SBCCont= 120%	Continuous overcurrent level	**46955**	50 to 200%	50 to [G11.11]
G11.13	13 ThMM= None	Action Selection in case of Thermo-electronic Fault	**46952**	None FreeRun Dec	0 1 2
G11.14	14 EnableUL= NO	Enabling Underload Alarm	**46937**	NO YES	0 1
G11.15	15 ULWnDl= 10.0s	Delay Time Enabling Underload Warning	**46938**	0 to 600.0s	0 to 6000
G11.16	16 ULFM= None	Action Selection in case of Underload Fault	**46939**	None FreeRun Dec	0 1 2
G11.17	17 ULFltDl= 30.0s	Delay Time Enabling Underload Fault	**46940**	0 to 600.0s	0 to 6000
G11.18	18 UlMnL = +30%	Underload Detection Lower Level	**46941**	10 to [G11.18]	10 to [G11.18]
G11.19	19 ULMxL= +30%	Underload Detection Upper Level	**46942**	[G11.17] to 100%	[G11.17] to 100
G11.20	20 NoMD= None	Action Selection in case of No Motor Connection Detected Fault	**46943**	None FreeRun	0 1
G11.21	21 NoMtrLvl= +5%	Trip Level in case of No Motor Detection Fault	**46944**	1 to 100%	1 to 100
G11.22	22 NoMtrDl= 3.0s	Delay Time due to Lack of motor Fault	**46945**	0.1 to 10.0s	1 to 100
G11.23	23 OvHM= None	Selection in case of Motor Overheat Fault	**46946**	None FreeRun Dec	0 1 2
G11.24	24 OvrHtSen= None	Motor Overheat Detection Sensor Selection	**46947**	None AI1 AI2 AI3 AI4	0 1 2 3 4
G11.25	25 OvrHtL= +50.0%	Motor Overheat Detection Fault	**46948**	0 to 100%	0 to 1000
G11.26	26 OvrHtAr= Low	Trip Area Selection Due to Overheat.	**46949**	LOW HIGH	0 1
G11.27	27 FANTrip=Trip	Action Selection in case of Fan Trip	**46991**	Trip Warn	0 1
G11.28	28 DBWarnED= +0%	Brake Unit Overload Warning Level	**46978**	0 to 30%	0 to 30
G11.29	29 LSS PH= NONE	Phase loss Detection	**46917**	NONE OUTPUT INPUT ALL	0 1 2 3
G11.30	30 Ripple V=40V	DC Bus Ripple voltage	**46918**	1 to 100V	1 to 100
G11.31	31 GND Fault Level= 20%	GND Fault Level		0 to 100%	0 to 100
G11.32	32 GND Fault Tout= 30ms	GND Fault Tout		0 to 250 ms	0 to 250
G12.1	1 Retry Num= 0	Delay Time before Auto Reset	**46921**	0 to 10	0 to 10
G12.2	2 Retry Dly= 1.0s	Delay Time before Auto Reset	**46922**	0 to 60.0s	0 to 600
G13.1	No Fault	Current Fault status visualization	**-**	-	-
G13.2	FAULT INFO 1	Fault History Register 1	**-**	-	-
G13.3	FAULT INFO 2	Fault History Register 2	**-**	-	-
G13.4	FAULT INFO 3	Fault History Register 3	**-**	-	-
G13.5	FAULT INFO 4	Fault History Register 4	**-**	-	-
G13.6	FAULT INFO 5	Fault History Register 5	**-**	-	-
G13.7	Clr FaultHist= N	Clear Fault History	**-**	N Y	-
G13.8	ENB/DIS LV Flt=D	Low Voltage fault register	**-**	-	-
G14.1	1 MREF 1= 10.00Hz	Multi-Reference 1	**44658**	[G19.2.5] to [G10.1]	[G19.2.5] to [G10.1]
G14.2	2 MREF 2= 20.00Hz	Multi-Reference 2	**44659**	[G19.2.5] to [G10.1]	[G19.2.5] to [G10.1]
G14.3	3 MREF 3= 30.00	Multi-Reference 3	**44660**	[G19.2.5] to [G10.1]	[G19.2.5] to [G10.1]
G14.4	4 MREF 4= 40.00H	Multi-Reference 4	**44661**	[G19.2.5] to [G10.1]	[G19.2.5] to [G10.1]
G14.5	5 MREF 5= 50.00Hz	Multi-Reference 5	**44662**	[G19.2.5] to [G10.1]	[G19.2.5] to [G10.1]
G14.6	6 MREF 6= 50.00Hz	Multi-Reference 6	**44663**	[G19.2.5] to [G10.1]	[G19.2.5] to [G10.1]
G14.7	7 MREF 7= 50.00Hz	Multi-Reference 7	**44664**	[G19.2.5] to [G10.1]	[G19.2.5] to [G10.1]
G14.8	8 MREF 8= 50.00Hz	Multi-Reference 8	**44665**	[G19.2.5] to [G10.1]	[G19.2.5] to [G10.1]
G14.9	9 MREF 9= 50.00Hz	Multi-Reference 9	**44666**	[G19.2.5] to [G10.1]	[G19.2.5] to [G10.1]
G14.10	10 MRF 10= 45.00Hz	Multi-Reference 10	**44667**	[G19.2.5] to [G10.1]	[G19.2.5] to [G10.1]
G14.11	11 MRF 11= 40.00Hz	Multi-Reference 11	**44668**	[G19.2.5] to [G10.1]	[G19.2.5] to [G10.1]
G14.12	12 MRF 12= 35.00Hz	Multi-Reference 12	**44669**	[G19.2.5] to [G10.1]	[G19.2.5] to [G10.1]
G14.13	13 MRF 13= 25.00Hz	Multi-Reference 13	**44670**	[G19.2.5] to [G10.1]	[G19.2.5] to [G10.1]

Parameter	Screen	Description	Address	Range	Modbus Range
G14.14	14 MRF 14= 15.00Hz	Multi-Reference 14	**44671**	[G19.2.5] to [G10.1]	[G19.2.5] to [G10.1]
G14.15	15 MRF 15= 5.00Hz	Multi-Reference 15	**44672**	[G19.2.5] to [G10.1]	[G19.2.5] to [G10.1]
G15.1	1 InchFq= 10.00Hz	Inch Frequency	**44363**	[G19.2.5] to [G10.1]	[G19.2.5] to [G10.1]
G15.2	2 InchAcT= 20.0s	Inch Frequency Accelerating Time	**44364**	0 to 600.0s	0 to 6000
G15.3	3 InchDeT= 30.0s	Inch Frequency Decelerating Time	**44365**	0 to 600.0s	0 to 6000
G16.1	1 Jmp Freq= NO	Enabling Frequency Jumps	**44891**	NO YES	0 1
G16.2	2 Sal1 B= 10.00Hz	Frequency Jump 1 Lower Limit	**44892**	0 to [G16.3]	0 to [G16.3]
G16.3	3 Sal1 A= 15.00Hz	Frequency Jump 1 Upper Limit	**44893**	[G16.2] to [G10.1]	[G16.2] to [G10.1]
G16.4	4 Sal2 B= 20.00Hz	Frequency Jump 2 Lower Limit	**44894**	0 to [G16.5]	0 to [G16.5]
G16.5	5 Sal2 A= 25.00Hz	Frequency Jump 2 Upper Limit	**44895**	[G16.4] to [G10.1]	[G16.4] to [G10.1]
G16.6	6 Sal3 B= 30.00Hz	Frequency Jump 3 Lower Limit	**44896**	0 to [G16.7]	0 to [G16.7]
G16.7	7 Sal3 A= 35.00Hz	Frequency Jump 3 Upper Limit	**44897**	[G16.6] to [G10.1]	[G16.6] to [G10.1]
G17.1	1 RisCurr= 50.0%	Opening Brake Current	**44905**	0 to 180.0%	0 to 1800
G17.2	2 RlsDly= 1.00s	Opening Brake Delay	**44906**	0 to 10.0s	0 to 1000
G17.3	3 FwdFrq= 1.00Hz	Opening Brake Frequency (Foward)	**44908**	0 to 400.0Hz	0 to 40000
G17.4	4 RevFrq= 1.00Hz	Opening Brake Frequency (Reverse)	**44909**	0 to 400.0Hz	0 to 40000
G17.5	5 BrEngFr= 1.00s	Closed Brake Delay	**44910**	0 to 10.0s	0 to 1000
G17.6	6 BrEngFr= 2.00Hz	Closed Brake Frequency	**44911**	0 to 400.0Hz	0 to 40000
G18.1	1 EncMode = None	Encoder Function	**46657**	None FBK REF	0 1 2
G18.2	2 Type = LineDrive	Encoder Type Select	**46660**	LineDrive Totem/Com Open Coll	0 1 2
G18.3	3 Pulse = (A+B)	Encoder Pulse Select	**46661**	(A+B) -(A+B) (A)	0 1 2
G18.4	4 PulseNum = 1024	Number of Encoder Pulses	**46662**	10 to 4096	10 to 4096
G18.5	5 EncMo = 0 Hz	Feedback Monitor	**46664**	-300 to 300 Hz	-30000 to 30000
G18.6	6 Pulse Monitor = 0 kHz	Ref Monitor	**46665**	-200 to 200 kHz	-20000 to 20000
G18.7	7 Filter = 3 ms	Encoder I/P Filter	**46666**	0 to 10000 ms	0 to 10000
G18.8	8 X1 = 0 kHz	Encoder IP Min Pulse	**46667**	0 to [G18.10]	0 to [G18.10]
G18.9	9 Y1 = 0 %	Perc. Encoder Min Pulse	**46668**	0 to 100 %	0 to 10000
G18.10	10 X2 = 100 kHz	E ncoder IP Max Pulse	**46669**	[G18.8] to 200 kHz	[G18.8] to 20000
G18.11	11 Y2 = 100%	Perc Encoder Max Pulse	**46670**	0 to 100 %	0 to 10000
G18.12	12 WireChk = N	Encoder option connection check	**46689**	N Y	0 1
G18.13	13 ChTim = 1s	Encoder Connection Check Time	**46690**	0.1 to 1000 s	1 to 10000
G19.1.1	1 CTRL T.= V/Hz	Control Type Selection	**44361**	V/Hz SlipCom S-less1 VECTOR	0 2 3 4
G19.1.2	2 FREQ= 2.0kHz	Modulation Frequency	**45124**	0.7 to 15kHz	7 to 150
G19.1.3	3 V/FPn= Linear	V/F Pattern	**44615**	Linear Square V/F Us	0 1 2
G19.1.4	4 Torque CTRL = N	Speed or Torque Control	**44362**	N Y	0 1
G19.1.5	5 Auto Tuning = NONE	Auto Tunning	**44628**	None All Allst Rs+Lsig Enc test Tr	0 1 2 3 4 5
G19.1.4.1	1 UsFrq1= 15.00Hz	User Frequency 1	**44649**	0 to [G10.1]	0 to [G10.1]
G19.1.4.2	2 User V1= 25%	User Voltage 1	**44650**	0 to 100%	0 to 100
G19.1.4.3	3 UsFrq2= 30.00Hz	User Frequency 2	**44651**	0 to [G10.1]	0 to [G10.1]
G19.1.4.4	4 User V2= 50%	User Voltage 2	**44652**	0 to 100%	0 to 100
G19.1.4.5	5 Us Frq3= 45.00Hz	User Frequency 3	**44653**	0 to [G10.1]	0 to [G10.1]
G19.1.4.6	6 User V3= 75%	User Voltage 3	**44654**	0 to 100%	0 to 100
G19.1.4.7	7 Us Frq4= 60.00Hz	User Frequency 4	**44655**	0 to [G10.1]	0 to [G10.1]
G19.1.4.8	8 User V4= 100%	User Voltage 4	**44656**	0 to 100%	0 to 100
G19.2.1	1 InertiaRate= 0	Inertia Range	**44625**	0 to 8	0 to 8
G19.2.2	2 T Boost= Manual	Initial Voltage	**44367**	MANUAL AUTO	0 1
G19.2.3	3 FWBoost= +20%	Starting Torque (Foward Direction)	**44368**	0 to 150%	0 to 150
G19.2.4	4 RVBoost= +20%	Starting Torque (Reverse Direction)	**44369**	0 to 150%	0 to 150
G19.2.5	5 STR FRQ= 0.50Hz	Starting Frequency	**44371**	0.01 to 10Hz	1 to 1000

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Parameter	Screen	Description	Address	Range	Modbus Range
G19.2.6	6 RtSlip= 45rpm	Slip Compensation	**44620**	0 to 3000rpm	0 to 3000
G19.2.7	7 FLUX MIN= NONE	Minimum Flux	**44914**	NONE MANU AUTO	0 1 2
G19.2.8	8 FLUX LVEL= +0%	Manual Mode Minimum Flux Value	**44915**	0 to 30%	0 to 30
G19.2.9	9 Load Duty= Hevy	Load Type Definition	**46916**	NRML HEVY	0 1
G19.3.1	1 Rs=	Stator Resistor (Rs)	**44629**	-	-
G19.3.2	2 Lsigma=	Leak Inductor	**44630**	-	-
G19.3.3	3 Ls=	Stator Inductor	**44631**	-	-
G19.3.4	4 Tr=	Rotor Time Constant	**44632**	25 to 5000ms	25 to 5000
G19.3.5	5 ASR P1 = 50%	Vector Gain Prop.1	**45132**	10 to 500 %	100 to 5000
G19.3.6	6 ASR I1 = 300ms	Vector Integral Time 1	**45133**	10 to 9999 ms	10 to 9999
G19.3.7	7 ASR P2 = 50%	Vector Gain Prop.2	**45135**	10 to 500 %	100 to 5000
G19.3.8	8 ASR I2 = 300ms	Vector Integral Time 2	**45136**	10 to 9999 ms	10 to 9999
G19.3.9	9 SwASR = 0Hz	Switch G ASR	**45138**	0 to 120 Hz	0 to 12000
G19.3.10	10 dlASR = 0.1s	Delay Switch ASR	**45139**	0 to 100 s	0 to 10000
G19.3.11	11 RASRf = 0ms	Filter Ref. ASR	**45171**	0 to 20000 ms	0 to 20000
G19.3.12	12 OurFVec = 0ms	Out Filter Vector	**45172**	0 to 2000ms	0 to 2000
G20.1.1	1ComUpdate= NO	Communication Update	**45982**	NO YES	0 1
G20.1.2	2 Slave Addr= 1	Communication Address	**45889**	1 to 250	1 to 250
G20.1.3	3 Prot= ModBus	Int485 Communication Protocol	**45890**	MODBUS	0
G20.1.4	4 BaudR= 9600 bps	Communication Speed	**45891**	1200 2400 4800 9600 19200 38400	0 1 2 3 4 5
G20.1.5	5 Mode= D8/PN/S1	Communication Frame Definition	**45892**	D8/PN/S1 D8/PN/S2 D8/PE/S1 D8/PO/S1	0 1 2 3
G20.1.6	6 RespDly= 5ms	Transfer Delay After Reception	**45893**	0 to 1000ms	0 to 1000
G20.1.7	7 ParamSave= NO	Saving Communication Parameters	**40992**	NO YES	0 1
G25.1.1	1 MREF1= 10.00%	PID Local Reference 1	**44658**	[G19.2.5] to [G10.1]	[G19.2.5] to [G10.1]
G25.1.2	2 MREF2= +20.00%	PID Local Reference 2	**44659**	[G19.2.5] to [G10.1]	[G19.2.5] to [G10.1]
G25.1.3	3 MREF3= +30.00%	PID Local Reference 3	**44660**	[G19.2.5] to [G10.1]	[G19.2.5] to [G10.1]
G25.1.4	4 MREF4= +40.00%	PID Local Reference 4	**44661**	[G19.2.5] to [G10.1]	[G19.2.5] to [G10.1]
G25.1.5	5 MREF5= +50.00%	PID Local Reference 5	**44662**	[G19.2.5] to [G10.1]	[G19.2.5] to [G10.1]
G25.1.6	6 MREF6= +50.00%	PID Local Reference 6	**44663**	[G19.2.5] to [G10.1]	[G19.2.5] to [G10.1]
G25.1.7	7 MREF7= +50.00%	PID Local Reference 7	**44664**	[G19.2.5] to [G10.1]	[G19.2.5] to [G10.1]
G25.2.1	1 PIDSetp= MREF	PID Setpoint Source	**46164**	MREF AI1 AI2 AI3 AI4 MODBUS COMMS PLC	0 1 2 3 4 5 7 8
G25.2.2	2 PID Fbk= AI2	PID Feedback Source	**46165**	MREF AI1 AI2 AI3 AI4 MODBUS COMMS PLC	0 1 2 3 4 6 7
G25.2.3	3 PID Kc= +50.0%	PID Regulator Proportional Gain	**46166**	0 to 1000%	0 to 10000
G25.2.4	4 PID It= 10.0s	PID Regulator Integrating Time	**46167**	0 to 200s	0 to 2000
G25.2.5	5 PID Dt= 0.0s	Pid Regulator Differential Time	**46168**	0.0 to 1000ms	0 to 1000
G25.2.6	6 MxSL= +50.00Hz	PID Frequency Upper Limit	**46173**	[G25.2.7] to 300Hz	[G25.2.7] to 30000
G25.2.7	7 MnSL= 0.00Hz	PID Frequency Lower Limit	**46174**	-300 to [G25.2.6]Hz	-30000 to [G25.2.6]
G25.2.8	8 InvertPID= N	PID Output Inverting	**46175**	NO SI	0 1
G25.2.9	9 Out Sc= +100.0%	PID Output Scale	**46176**	0.1 to 1000%	1 to 10000
G25.3.1	1 LP Pon= 35%	Awakening Level	**46183**	0 to 100%	0 to 100

Parameter	Screen	Description	Address	Range	Modbus Range
G25.3.2	2 FP1 Son= 49.99Hz	Fix Pump 1 Starting Speed	**46679**	0 to [G10.1]Hz	0 to [G10.1]
G25.3.3	3 FP2 Son = 49.99Hz	Fix Pump 2 Starting Speed	**46680**	0 to [G10.1]Hz	0 to [G10.1]
G25.3.4	4 FP3 Son = 49.99Hz	Fix Pump 3 Starting Speed	**46681**	0 to [G10.1]Hz	0 to [G10.1]
G25.3.5	5 FP4 Son = 49.99Hz	Fix Pump 4 Starting Speed	**46682**	0 to [G10.1]Hz	0 to [G10.1]
G25.3.6	6 FP Ton= 60.0s	Fix Pumps Starting Delay	**46687**	0 to 3600s	0 to 36000
G25.4.1	1 LP T Slpr= 60.0s	Delay Before Enabling Sleep Mode	**46181**	0 to 999.0s	0 to 9999
G25.4.2	2 Slp Spd= 0.00Hz	Enabling Sleep Mode Speed	**46182**	0 to [G10.1]	0 to [G10.1]
G25.4.3	3 SPD1of= 15.0H	Fix Pump 1 Stopping Speed	**46683**	0 to [G10.1]Hz	0 to [G10.1]
G25.4.4	4 SPD2of = 15.0Hz	Fix Pump 2 Stopping Speed	**46684**	0 to [G10.1]Hz	0 to [G10.1]
G25.4.5	5 SPD3of = 15.0Hz	Fix Pump 3 Stopping Speed	**46685**	0 to [G10.1]Hz	0 to [G10.1]
G25.4.6	6 SPD4of = 15.0Hz	Fix Pump 4 Stopping Speed	**46686**	0 to [G10.1]Hz	0 to [G10.1]
G25.4.7	7 Fp Tof= 60.0s	Stopping Fix Pump Delay	**46688**	0 to 3600s	0 to 36000
G25.4.8	8 FP Error= 2%	PID Maximum Error Stopping Fix Pumps	**46696**	0 to 100%	0 to 100
G25.5.1	1 AccTime= 2.0s	Main Motor Accelerating Time after Fix Pump Stop	**46697**	0 to 600s	0 to 6000
G25.5.2	2 Dec Timel= 2.0s	Main Motor Accelerating Time after Fix Pump Activation	**46698**	0 to 600s	0 to 6000
G25.7.1	1 Fill Sp= 0.00Hz	Filling Pipes Speed	**46178**	0 to [G10.1]	0 to [G10.1]
G25.7.2	2 Fill P= 0.0%	Filling Pipes Pressure	**46179**	0 to 100%	0 to 1000
G25.7.3	3 Fill Tim= 600s	Filling Pipes Delay	**46180**	0 to 9999s	0 to 9999
G25.9.1	1 First FP= 1	First Fixed Pump Selection	**46677**	1 to 4	1 to 4
G25.9.2	2 FP number= 0	Number of Fixed Pumps Selection	**46689**	0 to 4	0 to 4

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5.5.4. Visualization Parameters

Parameter	Screen	Description	Address	Modbus Range
STATUS LINE	**OFF** 0.0A +0.0Hz	Present drive status	**40014**	0 to 6
		Modbus value for the status of the drive and for the fault and warning messages. **Modbus Value → STATUS MESSAGE** 0 → FLT 4 → ACL 1 → DCB 5 → RUN 2 → STP 6 → RDY 3 → DCL **Note:** See status messages description in section 'Status Messages'.		
STATUS LINE	OFF **0.0A** +0.0Hz	Motor output current (Corresponds to SV1.1)	**40784**	Real Value = (Modbus Value / 10)
STATUS LINE	OFF 0.0A **+0.0Hz**	Motor output speed (in %). (Corresponds to SV1.2)	**40785**	Real Value = (Modbus Value / 100)

Parameter	Screen	Description	Address	Modbus Range
SV1.1	Mtr I out=0.0	Shows the current running through the motor, corresponding to the second field of the status line → **OFF 0.0A +0.0Hz**	**40784**	Real Value = (Modbus Value / 10)
SV1.2	Mtr Freq= 0.00Hz	Shows the motor frequency	**40785**	Real Value = (Modbus Value / 100)
SV1.3	Mtr Sp= 0rpm	Shows the motor speed in rpm	**40786**	Real Value = Modbus Value
SV1.4	Mtr FBSp=+0rpm	Motor feedback speed	**40787**	Real Value = Modbus Value
SV1.5	Mtr Vout=0V	Shows the motor voltage.	**40788**	Real Value = Modbus Value
SV1.6	Mtr Pow = 0.00kW	Shows the motor instantaneous power consumption	**40790**	Real Value = (Modbus Value / 10)
SV1.7	Mtr Torqe = 0.0%	Shows the torque applied to the motor.	**40791**	Real Value = (Modbus Value / 10)
SV1.8	EncMon = 0 Hz	Shows the encoder speed in terms of motor frequency	**46664**	Real Value = (Modbus Value /100)
SV1.9	PulMo = 0 kHz	Shows the encoder speed in terms of encoder pulses	**46665**	Real Value = (Modbus Value /100)
SV2.1	Bus vol= 528V	Shows the DC voltage measured in the driver bus.	**40789**	Real Value = Modbus Value
SV2.2	Temperature=26ºC	Drive temperature	**44099**	Real Value = Modbus Value
SV3.1	ANLG IN1 = +0.0V	Shows the Analogue Input 1 mean value	**45381**	Real Value = (Modbus Value / 100)
SV3.2	ANLG IN2 = +0.0mA	Shows the Analogue Input 2 mean value	**45396**	Real Value = (Modbus Value / 100)
SV3.3	DigI= 00000000	Shows the activation or rest status of the Digital Inputs, from left to right ED8 to ED1.	**40016**	Real Value = Modbus Value
SV3.4	ANL OUT1 = 0.0%	Shows the value of the Analogue Output 1	**45638**	Real Value = (Modbus Value / 10)
SV3.5	ANLG IN2 = +0.0mA	Shows the Analogue Input 2 mean value.	**45644**	Real Value = (Modbus Value / 10)
SV3.6	Dostatus= 0-00	Shows the status of the digital outputs in the following order: SD1-Relay2 Relay1	**45673**	Real Value = Modbus Value
SV4.1	Inv.Power=	Shows the drive capacity in kW	**40769**	Real Value = Modbus Value
SV4.2	Inv. S/W	Shows the last software version installed	**40771**	Real Value = Modbus Value
SV4.3	SW Disp=	Last software version installed in the display.	**-**	-
SV5.1	S=0.0% F=0.0%	Shows PID Setpoint and Feedback.	**40792-40793**	Real Value = (Modbus Value / 10)
SV5.2	PID Out=+0.00%	Shows the t PID Output	**46160**	Real Value = (Modbus Value / 100)
SV8.1	S=0.0% F=0.0%	Shows PID Setpoint and Feedback.	**40792-40793**	Real Value = (Modbus Value / 10)
SV8.2	Sal PID=+0.00%	Shows the PID output	**46160**	Real Value = (Modbus Value / 100)
SV8.3	No Bmb Ma=0	Shows the number of pumps running	**46676**	Real Value = Modbus Value
SV8.4.1	1 MREF1= +10.00%	PID Local Reference 1	**44658**	[G19.2.5] to [G10.1]
SV8.4.2	2 MREF2= +20.00%	PID Local Reference 2	**44659**	[G19.2.5] to [G10.1]
SV8.4.3	3 MREF3= +30.00%	PID Local Reference 3	**44660**	[G19.2.5] to [G10.1]
SV8.4.4	4 MREF4= + 40.00%	PID Local Reference 4	**44661**	[G19.2.5] to [G10.1]
SV8.4.5	5 MREF5= +50.00%	PID Local Reference 5	**44662**	[G19.2.5] to [G10.1]
SV8.4.6	6 MREF6= +50.00%	PID Local Reference 6	**44663**	[G19.2.5] to [G10.1]
SV8.4.7	7 MREF7= +50.00%	PID Local Reference 7	**44664**	[G19.2.5] to [G10.1]

6. FAULT MESSAGES. DESCRIPTION AND ACTIONS

Whenever a fault is produced, the SD500 will stop the motor, showing in the display the fault produced. It will be visualised in the programming line (lower line) while the upper line will show the current and speed data of the instant the fault was produced.
Without resetting the fault, it is possible to navigate through the visualization lines, where the rest of the visualization parameters will be accessed, showing data of the instant the fault was produced.
On the other hand, the FAULT led will remain enabled and the fault message will remain until the breakdown is repaired and the equipment reset.

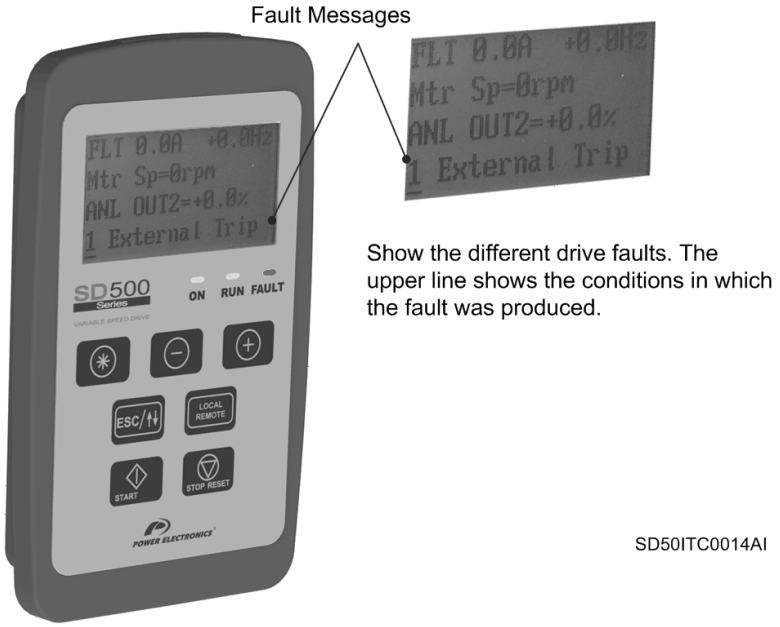

Figure 6.1 Fault visualization – Programming Line

6.1. Fault List Description

DISPLAY	DESCRIPTION
F0 No Fault	The equipment is operative. No fault is present.
F1 OverLoad	The drive trips when the output current reaches the value set in parameter [G11.9], exceeding the time limit set in parameter [G11.10]. The protection is operative if the parameter [G11.8] has been set with a value different to 'NONE'.
F2 UnderLoad	The motor is working with insufficient load. . The drive trips when its current is within the values set in parameter [G11.18] and [G11.19] exceeding the time limit set in parameter [G11.17]. The protection will be enabled if the parameter [G11.16] has been set with a value different to 'NONE'.
F3 Inv OverLoad	The drive cuts the output supply when the output current exceeds the value set in the corresponding parameters (150% for 1 minute, 200% for 0,5 seconds of the drive rated current). The 200% for 0,5 seconds can vary depending on the drives capacity.
F4 E-Thermal	The internal thermo-electronic protection determines the motor overheating. If the motor is overheated, the drive stops its output. The protection is enabled setting the parameter [G11.13] to a value different to 'NONE'.
F5 Ground Fault	The drive trips when a earth leakage and its current exceed the internal value configured in the drive. The overload protection function will protect the drive from any ground fault caused by a small leakage resistance.
F6 Output Ph Loss	One of the three output phases is open. The protection will be enabled if the parameter [G11.29] is set as 'OUTPUT' or 'ALL'.
F7 Input Ph Loss	One of the three output phases is open. The protection will be enabled if the parameter [G11.29] is set as 'INPUT' or 'ALL'.
F8 OverSpeed	The motor speed has reached the speed limit set in the group G10.8.

DISPLAY	DESCRIPTION
F10 NTC	The drive uses a NTC thermal sensor to detect temperature increases within the supply system. When this message is displayed, the thermal sensor cable may have been cut. (The drive will continue running).
F11 OverCurrent	The drive trips when the output current exceeds the 200% of the rated current value.
F12 OverVoltage	The drive trips if the DC voltage within bus exceeds the value established. This value has been established in the internal configuration during the deceleration process or when the motor regenerative energy return to the drive is excessive for the capacitors which compose the DC bus. This fault can also be caused due to a transitory overvoltage within the supply system.
F13 External Trip	This function can be used whenever the user needs to cut the output by the use of an external trip signal. The open /closed contact use will depend on the configuration within the digital inputs configured as 'External Trip'. The drive cuts the motor output protecting it from the controlled situation within the terminal.
F14 Short ARM	The drive trips when a short-circuit occurs in the IGBT or in the output power.
F15 OverHeat	The drive trips if overheated caused by a damaged cooling fan or by the presence of any strange substance within the cooling system.
F16 Fuse Open	The DC fuse is open due to an overcurrent. Only in equipment with powers from 30Kw above.
F17 Mc-Fail	A fault has been produced in the drives soft load contactor.
F18 Encoder Error	Drive trips due to a problem with the encoder.
F19 PTC	The motor PTC or the external trip device has been enabled. The circuit which controls the temperature sensor (PTC, thermostat, etc) external to the motor winding. The protecting is enabled if parameters [G11.23] and [G11.24] are set in a value different to 'NONE'.
F20 FAN TRIP	An anomaly detecting within the cooling fan. The protection will be enabled if the parameter [G11.27] is set as 'Trip'.
F21 RESERVED21	Reserved.
F22 Param_Wr_Err	A problem has been detected during the writing of a parameter by keypad.
F23 Pipe Fill Flt	An error has been detected which makes the PID feedback be always under the established value. Possible pipe breakdown.
F24 IO Board Fail	The I/O board has been extracted and no communication is possible.
F25 External Brake	Drive trips when the braking unit reaches a dangerous temperature.
F26 No Motor	The drive has not detected a connected motor at its output when the Start order has been given. The protection is enabled setting the parameter [G11.20] to a value different to 'NONE'.
F27 Slot 1 Fail	The optional board has been extracted located in the slot1 or there is no possible communication.
F28 Slot 2 Fail	The optional board has been extracted located in the slot2 or there is no possible communication.
F29 Slot 3 Fail	The optional board has been extracted located in the slot3 or there is no possible communication.
F30 STO	Automatic internal protection of several of the IGBT semiconductors has acted or the safe stop contact of the drive (connected to an external circuit by the user) has been activated (for example, emergency stop).
F33 BX	One of the digital inputs has been enabled configured as 'DIS START', forcing the drive to cut the output supply and making it stop due to inertia.
F34 LV	The drive trips when the voltage within the DC bus is under the detection level. Therefore, the torque generated can be insufficient or the motor can be overheated if the input voltage decreases.
F35 Lost Command	The drive trips due to a loss of speed set point established by the use of the control or communication terminals.
F36 KeyPadLostCMD	Drive trips if display is not connected.
F49 ADC Error	Analog Input error.
F50 EEPROM	The (EEPROM) memory is defective
F51 Watchdog-1 Err	Micro-controller internal fault
F52 Watchdog-2 Err	Micro-controller internal fault

6.2. Fault Solution Procedure

DISPLAY	POSSIBLE CAUSE	ACTIONS
F0 No Fault	-	-
F1 OverLoad	Elevated motor consumption caused by an excessive load.	Increase the motor and drive capacity.
	Load defined in parameter [G11.9] is too low	Increase the defined value in parameter [G11.9].
F2 UnderLoad	A connection problem between the motor and the load is present.	Check the connection between motor and load is correctly set.
	The load defined in parameters [G11.18] and [G11.19] is too low.	Increase the value defined in parameters [G11.18] and [G11.19].
F3 Inv OverLoad	The load within the drive is greater than the rated value of the drive.	Increase the motor and drive capacity.
	The start torque setting is too high.	Reduce the start torque value.

DISPLAY	POSSIBLE CAUSE	ACTIONS
F4 E-Thermal	Motor overheated.	Reduce load and / or operating cycle
	Load exceeds the drive capacity.	Use a more powerful drive.
	Electro-thermal protection level (ETH) too low.	Set the ETH level properly.
	Invalid selection of the drive rated power.	Select a correct drive power.
	Invalid V/f pattern setting.	Select a correct V/f pattern.
	Long operating periods at excessive low speed.	Install a fan with an external supply source to the motor.
F5 Ground Fault	Ground leakage produced in the drive output.	Check the drive output wiring.
	The motor insulation is damaged due to heat.	Change the motor.
F6 Output Ph Loss	Problem present in the drive output electric connection.	Check the output electric connections.
	Poor output electric distribution.	Check that the output electric distribution is correct.
F7 Input Ph Loss	Problem present in the drive input electric connection.	Check the input electric connections.
	Bad input electric distribution.	Check that the input electric distribution is correct.
	The drive DC capacitor must be replaced.	Replace the drive DC capacitor. Contact the Technical Service.
F8 OverSpeed	Speed reference is higher or equal that the speed limit.	Check the reference source and the motor load.
	Motor speed is out of control	Verify speed limits.
F10 NTC	The room temperature is over the allowed range.	Keep the installation location at room temperature within the specified limits.
	Problem present in the drive internal temperature sensor.	Contact the Technical Service.
F11 OverCurrent	Acceleration / deceleration time too short compared to the load inertia.	Increase the acceleration /deceleration time.
	The load exceeds the drive rated power.	Increase the drive rated power.
	The drive attempts to start the motor while spinning.	Ensure the correct programming spin start conditions. Set the load inertia and the parameters which enable the speed search properly. **Note:** Adequate spin start conditions fulfilment depends on each installation.
	Ground fault or short circuit produced.	Check the output wiring.
	The mechanic brake enters too quickly.	Check the mechanic brake.
	The power circuit components overheated due to a cooling fan malfunction.	Check the cooling fan. Verify it is correctly powered and not blocked by dirt.
	⚠ **Caution: Starting the drive without correcting anomalies may cause damage within the IGBT's.**	
F12 OverVoltage	The deceleration time is too short compared to the load inertia.	Increase the deceleration time.
	Excessive energy regeneration in the drive.	Use an optional brake resistor (dynamic brake units).
	Line with High Voltage.	Check the supply line voltage.
F13 External Trip	External fault produced.	Delete the circuit fault connected by the input fault terminal configured.
F14 Short ARM	Short circuit upper and lower IGBT.	Check IGBT.
	Short circuit at the inverter output.	Check the wiring of the inverter output circuit.
	Acceleration / deceleration time is too short compared with the inertia of the load (GD^2)	Increase acceleration / deceleration time.
F15 OverHeat	Cooling fan damaged or foreign matter present.	Replace the cooling fans and / or remove the foreign matter.
	Fault within the cooling system.	Check the foreign matter presence.
	Excessive room temperature.	Keep the room temperature under 50ºC or verify the drive capacity according to temperature.
	Motor overheat produced (PTC / NTC external signal) produced.	Check the motor cooling. Reduce the load and / or operating cycle.

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DISPLAY	POSSIBLE CAUSE	ACTIONS
F16 Fuse Open	An overcurrent forced the drive DC fuse to open.	Replace the fuse. Contact the Technical Service.
F17 Mc-Fail	The soft load circuit contactor is damaged.	Contact the Technical Service.
F18 Encoder Error	Encoder connection is incorrect.	Check connections.
F19 PTC	The PTC temperature sensor has detected overheat in the motor.	Make sure the motor is running within the allowed temperature range.
	PTC thermistor breakdown.	Check the PTC thermistor status and replace if damaged.
F20 FAN TRIP	Cooling fan damaged or foreign matter present.	Replace the cooling fans and or remove the foreign matter.
F23 Pipe Fill Flt	Possible pipe breakdown inhibits pressure to reach the minimum level.	Check installation pipe status.
	PID feedback sensor is not showing the correct values.	Check the PID feedback pressure sensor is measuring properly. In case it is damaged, replace it.
F24 IO Board Fail	The optional expansion I/O board is not connected properly.	Make sure the board is inserted in the correct expansion slot.
	The optional expansion I/O board is defective.	Replace the optional board for a new one.
F25 External Brake	The braking unit has reached a dangerous temperature.	Check the braking unit.
F26 No Motor	No motor connected to the drive output or defective wiring.	Check the motor is correctly connected to the drive output.
	The value set in parameter [G11.21 NomtrlLvl] is too high.	Reduce the parameter [G11.21 NoMtrLvl] value.
F27 Slot 1 Fail	The port 1 optional board is not connected properly.	Check the board is inserted in the expansion board slot.
	Defective optional board.	Replace the optional board for a new one.
F28 Slot 2 Fail	The port 2 optional board is not connected properly.	Check the board is inserted in the expansion board slot.
	Defective optional board.	Replace the optional board.
F29 Slot 3 Fail	The port 2 optional board is not connected properly.	Check the board is inserted in the expansion board slot.
	Defective optional board.	Replace the optional board.
F33 BX	One of the digital inputs configured as 'DIS START' has been enabled.	Disable the digital input configured as 'DIS START'
F34 LV	Low voltage in the line	Check the line voltage.
	Load exceeds the line rated power (welding machine, motor with high start current connected to the commercial line)	Increase the line rated power.
	Defective magnetothermic switch in the drive supply circuit.	Change the magnetothermic switch.
F35 Lost Command	Speed reference lost introduced through the communications or keypad inputs.	Check the drive communications or the inputs are within the defined ranges to provide the speed references.
F36 KeypadLostCMD	Display connection is not correct.	Check the connection.
F49 ADC Error	Analog input error produced.	Contact the Technical Service.
F50 EEPROM	EEP Error (memory fault).	Disconnect and reconnect the power supply. If fail, contact the Power Electronics Technical Service.
F51 Watchdog-1 Err	Wdog Error (CPU fault).	Disconnect and reconnect the power supply. If fail, contact the Power Electronics Technical Service.
F52 Watchdog-2 Err	Wdog Error (CPU fault).	Disconnect and reconnect the power supply. If fail, contact the Power Electronics Technical Service.

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		
3 PROG= STANDARD	**G1.3** / Program activation	STANDARD
G2: Nameplate.		
1 MTRPWR= 0.0kW	**G2.2.1** / Motor rated Power	__kW (Set according to the motor nameplate).
2 MTR CUR= 0.0A	**G2.2.2** / Motor rated current	__A (Set according to the motor nameplate).
3 NOLOADC= 0.0A	**G2.2.3** / No load current	__A (Set according to the motor nameplate).
4 MTR VOLT= 0V	**G2.2.4** / Motor nominal voltage	__V (Set according to the motor nameplate).
5 POLE Number= 4	**G2.2.5 /** Motor Poles	__ (Set according to the motor nameplate).
6 ADJTSPD= 100.0%	**G2.2.6 /** Fine speed setting	__(Set according to the motor nameplate).
7 EFICIENC= +85%	**G2.2.7** / Motor Efficiency	__ (Set according to the motor nameplate).
8 MTR FRC = 60.00Hz	**G2.2.8** / Motor frequency	__Hz (Set according to the motor nameplate).
9 MTRCOOL=SELF	**G2.2.9** / Motor cooling	The following settings can be carried out: Motor self cooling. Motor with forced cooling.
G3: References		
1 REF1 SP= LOCAL	**G3.1** / Speed Reference Source 1	LOCAL ➔ The reference will be introduced by the use of the keypad and set on [G3.3 LCLSP]
3 LCLSP= 0.50Hz	**G3.3** / Local Speed Reference	50.0Hz
G4: Inputs – S4.1: Digital I/P		
1 MODO CONTRL1=1	**G4.1.1** / Main Control Mode	1 ➔ LOCAL The drive is controlled from the keypad.

7.2. Start / Stop Command and Speed Reference by Analog Input

7.2.1. Parameters Configuration

Parameter	Name / Description	Value
G1: Options Menu		
3 PROG= STANDARD	**G1.3** / Program activation	STANDARD
G2: Nameplate.		
1 MTRPWR= 0.0kW	**G2.2.1** / Motor rated Power	__kW (Set according to the motor nameplate).
2 MTR CUR= 0.0A	**G2.2.2** / Motor rated current	__A (Set according to the motor nameplate).
3 NOLOADC= 0.0A	**G2.2.3** / No load current	__A (Set according to the motor nameplate).
4 MTR VOLT= 0V	**G2.2.4** / Motor nominal voltage	__V (Set according to the motor nameplate).
5 POLE Number= 4	**G2.2.5 /** Motor Poles	__ (Set according to the motor nameplate).
6 ADJTSPD= 100.0%	**G2.2.6 /** Fine speed setting	__(Set according to the motor nameplate).
7 EFICIENC= +85%	**G2.2.7** / Motor Efficiency	__ (Set according to the motor nameplate).
8 MTR FRC = 60.00Hz	**G2.2.8** / Motor frequency	__Hz (Set according to the motor nameplate).
9 MTRCOOL=SELF	**G2.2.9** / Motor cooling	The following settings can be carried out: Motor self cooling. Motor with forced cooling.
G3: References		
1 REF1 SP= LOCAL	**G3.1** / Speed Reference Source 1	LOCAL ➔ The reference will be introduced by the use of the keypad and set on [G3.3 LCLSP]
2 REF2 SP= LOCAL	**G3.2** / Speed Reference Source 2	AI1 ➔ Reference introduced through the Analogue Input 1. EI2 ➔ Reference introduced through the Analogue Input 2.
3 LCLSP= 0.50Hz	**G3.3** / Local Speed Reference	50.0Hz

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Parameter	Name / Description	Value
G4: Inputs – S4.1: Digital I/P		
1 CONTROL MODE1=0	**G4.1.1** / Main Control Mode	0 ➔ LOCAL (The drive is controlled from the keypad).
2 CONTROL MODE2=1	**G4.1.2** / Alternative Control Mode	1 ➔ REMOTE (The drive is controlled from the control terminals I).
3 DI1= START (+)	**G4.1.3** / Multifunction Digital Input 1 Configuration	01 ➔ START (+) (In order to command the 'Direct Start' order through the selector (NO).
4 DI2= START(-)	**G4.1.4** / Multifunction Digital Input 2 Configuration	15 ➔ CTR/REF 2 (Enables the alternative control mode programmed in [G4.1.2. 'Alt Ctrl Mode'] (NO)

7.2.2. CONNECTIONS DIAGRAM

CM /P1 Terminals: Start order (NO status).
I1 / 5G Terminals: Analog input 2 4-20mA.
VR+ / V1 / 5G Terminals: Analog input 0-10 V.

- **Connection for drives from 3,7kW to 22kW.**

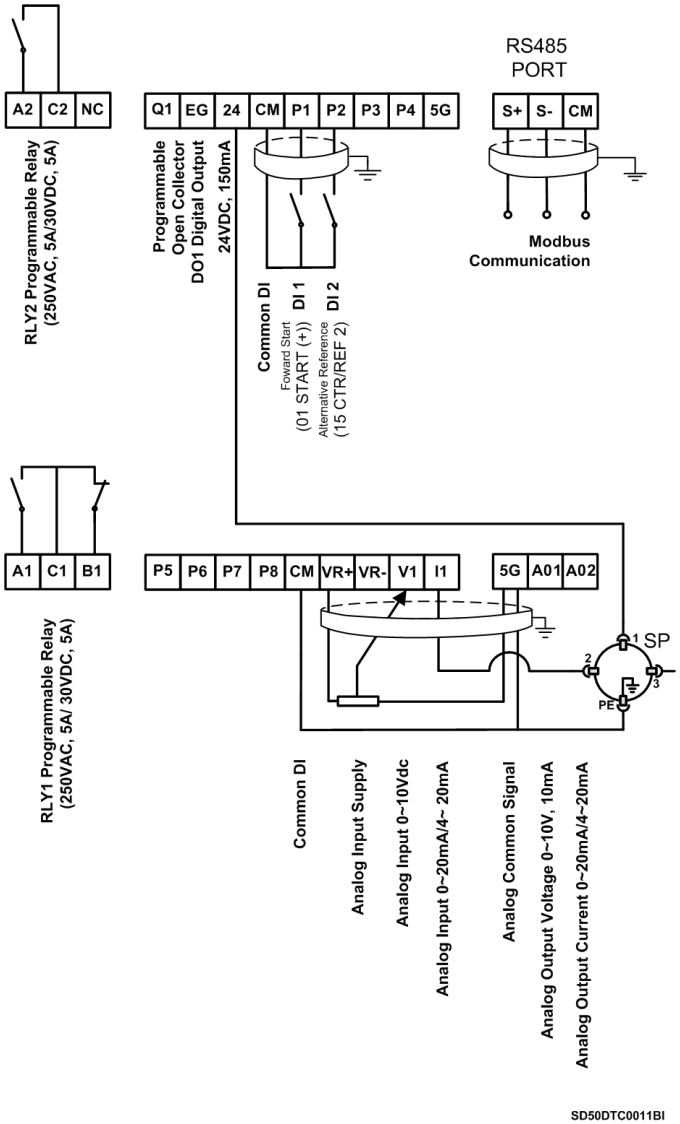

Figure 7.1 Start/Stop Control and speed prefixed by parameter or analog input. Drives with 3,7 to 22kW powers

Note: The control cables have to be screen and must be ground connected.
The 5G terminal is different to the CM one for 3,7 to 22kW drives.

- **Connection for drives from 30kW to 75kW.**

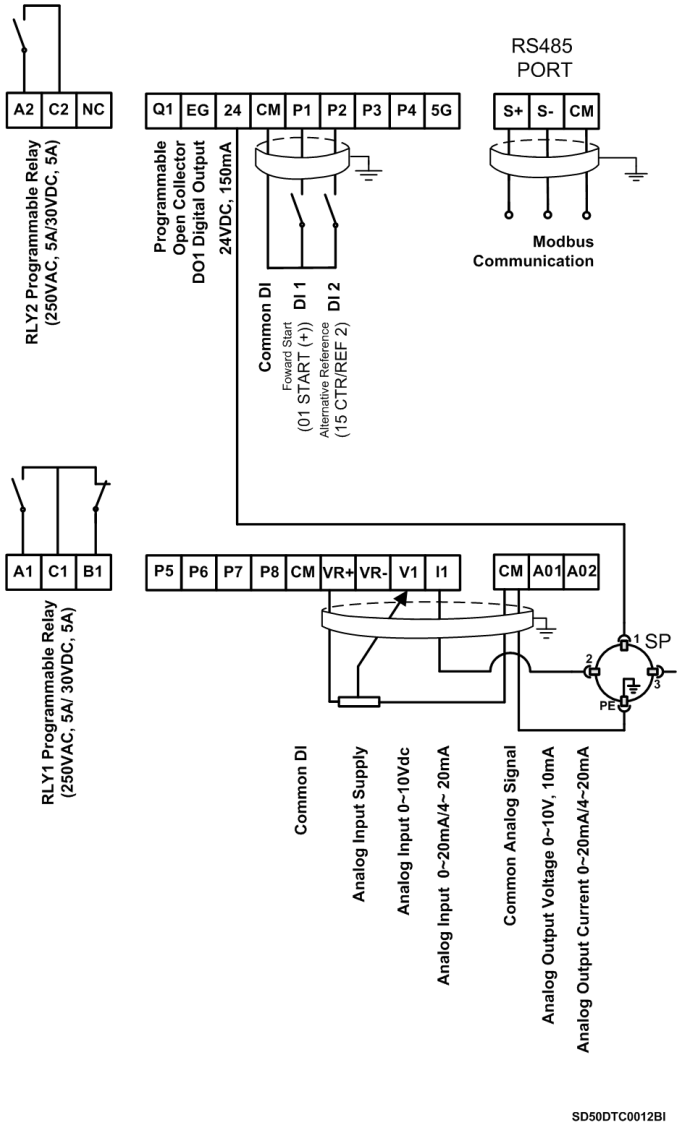

Figure 7.2 Start/Stop Control and speed prefixed by parameter or analog input.
Drives with 3,7 to 22kW powers

Note: The control cables have to be screen and must be ground connected.
The 5G terminal will be the CM for drives greater or equal to 30kW.

ENGLISH

7.3. Start / Stop Commands by Terminals and Speed Reference by Buttons

7.3.1. Parameters Configuration

Parameter	Name / Description	Value
G1: Options Menu		
3 PROG= STANDARD	**3 PROG= STANDARD**	**3 PROG= STANDARD**
G2: Nameplate.		
1 Aci/pVolt= 380V	**G2.1.1** / Input Voltage	Set to supply voltage
2 I/P Freq= 60Hz	**G2.1.2** / Input frequency	50.00Hz – Electric supply frequency
1 MTRPWR= 0.0kW	**G2.2.1** / Motor rated Power	__kW (Set according to the motor nameplate).
2 MTR CUR= 0.0A	**G2.2.2** / Motor rated current	__A (Set according to the motor nameplate).
3 NOLOADC= 0.0A	**G2.2.3** / No load current	__A (Set according to the motor nameplate).
4 MTR VOLT= 0V	**G2.2.4** / Motor nominal voltage	__V (Set according to the motor nameplate).
5 POLE Number= 4	**G2.2.5 /** Motor Poles	__ (Set according to the motor nameplate).
6 ADJTSPD= 100.0%	**G2.2.6 /** Fine speed setting	__(Set according to the motor nameplate).
7 EFICIENC= +85%	**G2.2.7** / Motor Efficiency	__ (Set according to the motor nameplate).
8 MTR FRC = 60.00Hz	**G2.2.8** / Motor frequency	__Hz (Set according to the motor nameplate).
9 MTRCOOL=SELF	**G2.2.9** / Motor cooling	The following settings can be carried out: Motor self cooling. Motor with forced cooling.
G3: References.		
1 REF1 SP= LOCAL	**G3.1** / Speed Reference Source 1	LOCAL ➔ The reference will be introduced by the use of the keypad and set on [G3.2LOCAL]
3 LCLSP= 0.50Hz	**G3.3** / Local Speed Reference	50.0Hz
G4: Inputs – S4.1: Digital I/P		
1 CONTROL MODE1=1	Main Control Mode	1 ➔ REMOTE (The drive is controlled from the control terminals).
3 DI1= START (+)	**G4.1.3** / Multifunction Digital Input 1 Configuration	1 ➔ START (+) (The user is able to carry out with the start commands through button NO).
4 DI2= = 3 WIRE	**G4.1.4** Multifunction Digital Input 2 Configuration	14 ➔ 3 WIRE (Stop by NC key).
5 DI3= UP	**G4.1.5** / Multifunction Digital Input 3 Configuration	17 ➔ UP (Key to increase speed NO).
6 DI4= DOWN	**G4.1.6** / Multifunction Digital Input 4 Configuration	18 ➔ DOWN (Key to slow speed NO).
18 SaveMot Frq= Y	**G4.1.18** / Save operating frequency motorised Potentiometer	YES ➔ Save automatically the speed reference defined by the motorised potentiometer.
G5: Acceleration and Deceleration Ramps		
1 ACC1= 30.0s	**G5.1** / Acceleration Ramp 1	30.0s ➔ Modify these ramps to improve the running. The answer will improve as the ramp is increased. If the ramp is decreased, the accuracy.
2 DECEL1= 30.0s	**G5.2** / Deceleration Ramp 1	30.0s ➔ Modify these ramps to improve the running. The answer will improve as the ramp is increased. If the ramp is decreased, the accuracy
G7: Start / Stop Mode Configuration		
2 StrDly= 0.00s	**G7.2 /** Start Delay Time	5.0s ➔ Start delay time.
10 Run Aft Rst= N	**G7.10 /** Start after Low Voltage Fault	NO ➔ Disables the start function after fault due to low supply voltage. YES ➔ Enables the start function after the fault caused by low supply voltage.
11 Str Aft Rst= N	**G7.11 /** Start after reset due to fault	NO ➔ Disables the start function after reset. YES ➔ Enables the start function after reset.
G10: Limits.		
1 LVMax= 50.00Hz	**G10.1** / Maximum Speed Limit	50Hz ➔ Equipment speed limit
3 UseFrqLimit= Y	**G10.3 /** Frequency Limit	YES➔ The limits are set in parameters G10.4 and G10.5.
4FqLtLo= 0.50Hz	**G10.4 /** Lower Frequency Limit	25.00Hz
5 FqLtHi= 50.00Hz	**G10.5 /** Upper Frequency Limit	50.00Hz

Parameter	Name / Description	Value
G11: Protections		
11 ETH1min= +150%	**G11.11 /** Overcurrent Level During 1 Minute	150%
12 ETHcont== 120%	**G11.12 /** Continuous Overcurrent Level	105%
13 ThMM= None	**G11.13 /** Action Selection in case of Thermoelectronic Fault	None ➔Protection is disabled. FreeRun ➔The drives output is cut which allows the motor free run Dec ➔ Motor deceleration until stop completely.
G19: Fine Setting.		
2 FREQ= 2.0kHz	**G19.1.2** / Modulation Frequency	2.0kHz
2 T Boost= Manual	**G19.2.2** / Initial Voltage	Manual Start Torque
5 STR FRQ= 0.50Hz	**G19.2.6** / Slip Compensation	0,1Hz Minimum Start Output.

7.3.2. Connections Diagram

CM / P1 Terminals: Start key (status NO).
CM / P2 Terminals: Stop key (status NC).
CM / P3 Terminals: Up Speed key (status NO).
CM / P4 Terminals: Down Speed key (status NO).

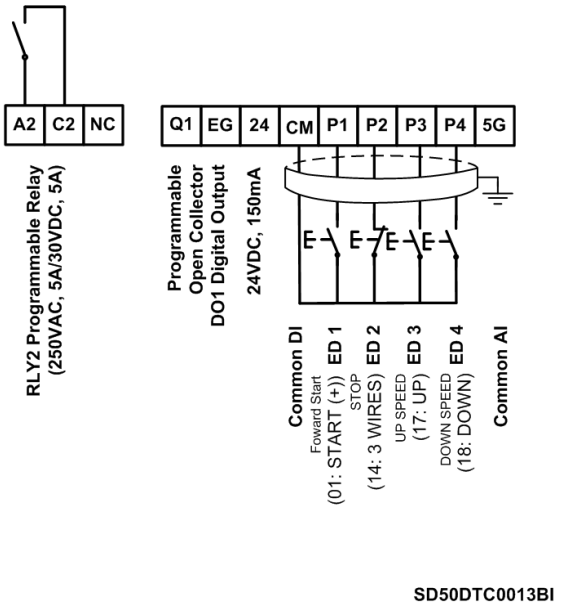

Figure 7.3 Speed control through keypad

Note: The control cables have to be screen and must be ground connected.
The 5G terminal will be the CM for drives greater or equal to 30kW.

The start order will be executed by the use of a NO key between the CM and the P1. The stop order will be executed by the use of a NC key between the CM and P2. When the start P1 order is given, (regular CM), the drive will start at minimum speed established in parameter G19.2.5. If P· button is pressed, the speed will increase according to the acceleration ramp G5.1. When stop, the speed reference will remain if parameter G5.16 is enabled (reference saving).

ENGLISH

7.4. Start / Stop Commands by Terminals and 15 Selectable Speeds by Digital Inputs.

7.4.1. Parameters Configuration

Parameter	Name / Description	Value
G1: Options Menu		
3 PROG= STANDARD	**3 PROG= STANDARD**	**3 PROG= STANDARD**
G2: Nameplate.		
1 Aci/pVolt= 380V	**G2.1.1** / Input Voltage	In order to set the input voltage
2 I/P Freq=50Hz	**G2.1.2** / Input frequency	50.00Hz – Electric supply frequency.
1 MTRPWR= 0.0kW	**G2.2.1** / Motor rated Power	__kW (Set according to the motor nameplate).
2 MTR CUR= 0.0A	**G2.2.2** / Motor rated current	__A (Set according to the motor nameplate).
3 NOLOADC= 0.0A	**G2.2.3** / No load current	__A (Set according to the motor nameplate).
4 MTR VOLT= 0V	**G2.2.4** / Motor nominal voltage	__V (Set according to the motor nameplate).
5 POLE Number= 4	**G2.2.5 /** Motor Poles	__ (Set according to the motor nameplate).
6 ADJTSPD= 100.0%	**G2.2.6 /** Fine speed setting	__(Set according to the motor nameplate).
7 EFICIENC= +85%	**G2.2.7** / Motor Efficiency	__ (Set according to the motor nameplate).
8 MTR FRC = 60.00Hz	**G2.2.8** / Motor frequency	__Hz (Set according to the motor nameplate).
9 MTRCOOL=SELF	**G2.2.9** / Motor cooling	SELF ➔ Motor Self cooling. FORCED ➔ Motor with forced cooling.
G3: References.		
1 REF1 SP= LOCAL	**G3.1** / Speed Reference Source 1	LOCAL ➔ The reference will be introduced by the use of the keypad and set on [G3.2LOCAL]
3 LCLSP= 0.50Hz	**G3.3** / Local Speed Reference	50.0Hz
G4: Inputs – S4.1: Digital I/P		
1 CONTROL MODE1=1	Main Control Mode	1 ➔ REMOTE (The drive is controlled from the control terminals).
3 DI1=01	**G4.1.3** / Multifunction Digital Input 1 Configuration	01 ➔ Start/Stop (In order to send commands through switch)
7 DI5=07	**G4.1.7** / Multifunction Digital Input 5 Configuration	07 ➔ SPEED-L. Low bit for speed multi-references selection
8 DI6=08	**G4.1.8** / Multifunction Digital Input 6 Configuration	08 ➔ SPEED-M. Medium bit for speed multi-references selection
9 DI7=09	**G4.1.9** / Multifunction Digital Input 7 Configuration	09 ➔ SPEED-H. –A. High bit for speed multi-references selection
10 DI8=10	**G4.1.10** / Multifunction Digital Input 8 Configuration	10 ➔ SPEED-X. Extra bit for speed multi-references selection
G7: Start / Stop Mode Configuration		
2 StrDly= 0.00s	**G7.2 /** Start Delay Time	5.0s ➔ Start delay time.
10 Run Aft Rst= N	**G7.10 /** Start after Low Voltage Fault	NO ➔ Disables the start function after fault due to low supply voltage. YES ➔ Enables the start function after the fault caused by low supply voltage.
11 Str Aft Rst= N	**G7.11 /** Start after reset due to fault	NO ➔ Disables the start function after reset. YES ➔ Enables the start function after reset.
G10: Limits.		
1 LVMax= 50.00Hz	**G10.1** / Maximum Speed Limit	50Hz ➔ Equipment speed limit
3 UseFrqLimit= Y	**G10.3 /** Frequency Limit	YES➔ The limits are set in parameters G10.4 and G10.5.
4FqLtLo= 0.50Hz	**G10.4 /** Lower Frequency Limit	25.00Hz
5 FqLtHi= 50.00Hz	**G10.5 /** Upper Frequency Limit	50.00Hz
G11: Protections		
11 ETH1min= +150%	**G11.11 /** Overcurrent Level During 1 Minute	150%
12 ETHcont== 120%	**G11.12 /** Continuous Overcurrent Level	105%
13 ThMM= None	**G11.13 /** Action Selection in case of Thermoelectronic Fault	None ➔Protection is disabled. FreeRun ➔The drives output is cut which allows the motor free run Dec ➔Motor deceleration until stop completely.

Parameter	Name / Description	Value
G14: Multi-references.		
1 MREF 1=10.0Hz	**G14.1** / Multi-Reference 1	10.0Hz ➔ In order to set the speed reference 1 for the drive. (Set according to the application needs).
2 MREF 2=20.0Hz	**G14.2** / Multi-Reference 2	20.0Hz ➔ In order to set the speed reference 2 for the drive. (Set according to the application needs).
3 MREF 3=30.0Hz	**G14.3** / Multi-Reference 3	30.0Hz ➔ In order to set the speed reference 3 for the drive. (Set according to the application needs).
4 MREF 4=40.0Hz	**G14.4** / Multi-Reference 4	40.0Hz ➔ In order to set the speed reference 4 for the drive. (Set according to the application needs).
5 MREF 5=50.0Hz	**G14.5** / Multi-Reference 5	50.0Hz ➔ In order to set the speed reference 5 for the drive. (Set according to the application needs).
6 MREF 6=50.0Hz	**G14.6** / Multi-Reference 6	50.0Hz ➔ In order to set the speed reference 6 for the drive. (Set according to the application needs).
7 MREF 7=50.0Hz	**G14.7** / Multi-Reference 7	50.0Hz ➔ In order to set the speed reference 7 for the drive. (Set according to the application needs).
8 MREF 8=50.0Hz	**G14.8** / Multi-Reference 8	50Hz ➔ In order to set the speed reference 8 for the drive. (Set according to the application needs).
9 MREF 9=50.0Hz	**G14.9** / Multi-Reference 9	50.0Hz ➔ In order to set the speed reference 9 for the drive. (Set according to the application needs).
10 MREF 10=45.0Hz	**G14.10** / Multi-Reference 10	45.0Hz ➔ In order to set the speed reference 10 for the drive. (Set according to the application needs).
11 MREF 11=40.0Hz	**G14.11** / Multi-Reference 11	40.0Hz ➔ In order to set the speed reference 11 for the drive. (Set according to the application needs).
12 MREF 12=35.0Hz	**G14.12** / Multi-Reference 12	35.0Hz ➔ In order to set the speed reference 12 for the drive. (Set according to the application needs).
13 MREF 13=25.0Hz	**G14.13** / Multi-Reference 13	25.0Hz ➔ In order to set the speed reference 13 for the drive. (Set according to the application needs).
14 MREF 14=15.0Hz	**G14.14** / Multi-Reference 14	15.0Hz ➔ In order to set the speed reference 14 for the drive. (Set according to the application needs).
15 MREF 15=5.0Hz	**G14.15** / Multi-Reference 15	5.0Hz ➔ In order to set the speed reference 15 for the drive. (Set according to the application needs).

Depending on the status of the input terminals P5, P6, P7 and P8 different programmed frequencies can be selected:

PARM	REF	DIGITAL. O: SPEED			
		X	H	M	L
G14.1	MREF 1	0	0	0	X
G14.2	MREF 2	0	0	X	0
G14.3	MREF 3	0	0	X	X
G14.4	MREF 4	0	X	0	0
G14.5	MREF 5	0	X	0	X
G14.6	MREF 6	0	X	X	0
G14.7	MREF 7	0	X	X	X
G14.8	MREF 8	X	0	0	0
G14.9	MREF 9	X	0	0	X
G14.10	MRF 10	X	0	X	0
G14.11	MRF 11	X	0	X	X
G14.12	MRF 12	X	X	0	0
G14.13	MRF 13	X	X	0	X
G14.14	MRF 14	X	X	X	0
G14.15	MRF 15	X	X	X	X

ENGLISH

7.4.2. Connections Diagram

CM / P1 Terminals: Start order (status NO).
CM / P5 Terminals: Multireference SPEED-L (status NO).
CM / P6 Terminals: Multireference SPEED-M (status NO).
CM / P7 Terminals: Multireference SPEED-A (status NO).
CM / P8 Terminals: Multireference SPEED-X (status NO).

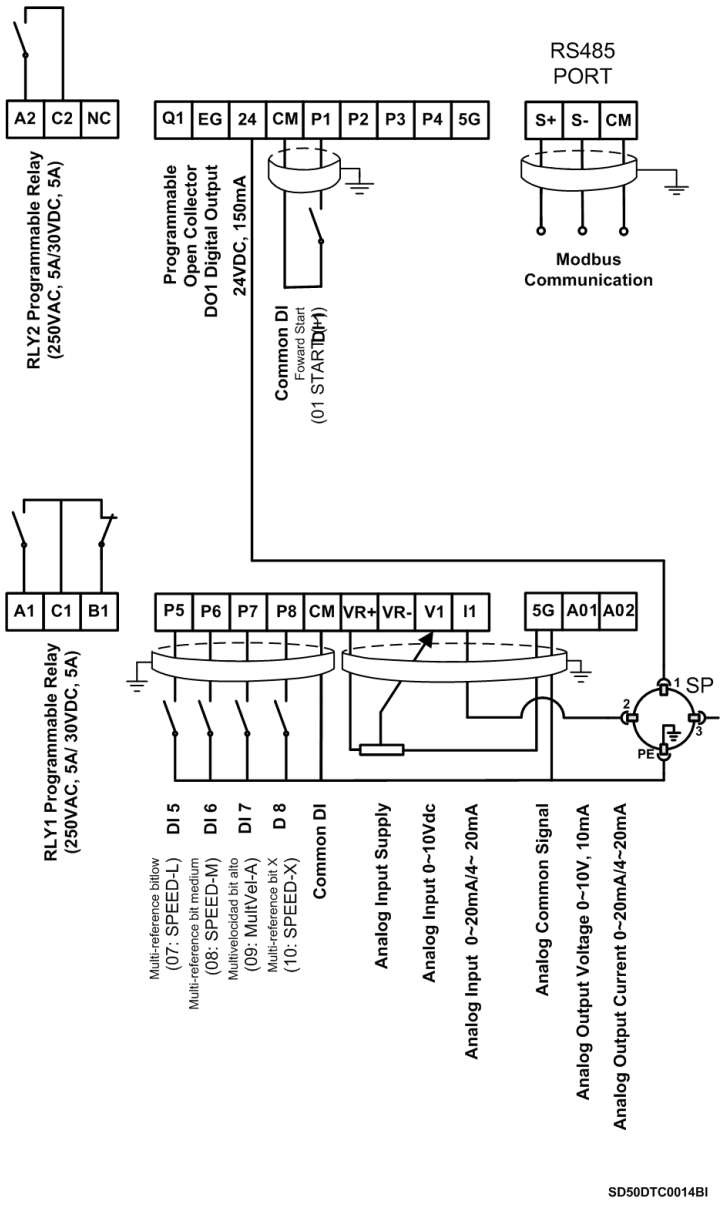

Figure 7.4 Multispeeds Control through terminals P5, P6, P7, P8.

Note: The control cables have to be screen and must be ground connected.
The 5G terminal is different to the CM one for 3,7 to 22kW drives.

7.5. Control of the Main Pump 1 and Auxiliary Pump 2, Seven References by Screen (Underload).

7.5.1. Parameters Configuration

Parameter	Name / Description	Value
G1: Options Menu		
5 INITIALISE= NO	**G1.5** / Initiate to default values.	YES ➔All the parameters will be initialised. The user should initialise all of the drive parameters before commissioning.
3 PROG = PUMP	**G1.3** / Program activation	PUMP
G2: Nameplate.		
1 Aci/pVolt= 380V	**G2.1.1** / Input Voltage	In order to set the supply voltage.
2 I/P Freq= 50Hz	**G2.1.2** / Input frequency	50.00Hz – Electric supply frequency.
1 MTRPWR= 0.0kW	**G2.2.1** / Motor rated Power	__kW (Set according to the motor nameplate).
2 MTR CUR= 0.0A	**G2.2.2** / Motor rated current	__A (Set according to the motor nameplate).
3 NOLOADC= 0.0A	**G2.2.3** / No load current	__A (Set according to the motor nameplate).
4 MTR VOLT= 0V	**G2.2.4** / Motor nominal voltage	__V (Set according to the motor nameplate).
5 POLE Number= 4	**G2.2.5 /** Motor Poles	__ (Set according to the motor nameplate).
6 ADJTSPD= 100.0%	**G2.2.6 /** Fine speed setting	__(Set according to the motor nameplate).
7 EFICIENC= +85%	**G2.2.7** / Motor Efficiency	__ (Set according to the motor nameplate).
8 MTR FRC = 50.00Hz	**G2.2.8** / Motor frequency	__Hz (Set according to the motor nameplate).
9 MTRCOOL=SELF	**G2.2.9** / Motor cooling	SELF ➔ Motor Self cooling. FORCED ➔ Motor with forced cooling.
G4: Inputs – S4.1: Digital I/P		
1 CONTROL MODE1=1	**G4.1.1** / Main Control Mode	1 ➔ REMOTE (The drive is controlled from the control terminals.).
3 DI1=1	**G4.1.3** / Multifunction Digital Input 1 Configuration	01 ➔START (+) (In order to command the 'Inverse Start' order through the selector (NO)).
8 DI6=0	**G4.1.8** / Multifunction Digital Input 6 Configuration	00 ➔ MRefPID-H. High bit to select PID multi- references
9 DI7=0	**G4.1.9** Multifunction Digital Input 7 Configuration	00 ➔ MRefPID-M. Medium bit to select PID multi- references
10 DI8=0	**G4.1.10** / Multifunction Digital Input 8 Configuration	00 ➔ MRefPID-L. Low bit to select PID multi- references
G7: Start / Stop Mode Configuration.		
2 StrDly= 0.00s	**G7.2 /** Start Delay Time	5.0s ➔ Start delay.
10 Run Aft Rst= N	**G7.10 /** Start after Low Voltage Fault	NO➔ Disables the start function after fault due to low supply voltage. YES➔ Enables the start function after fault caused by low supply voltage.
11 Str Aft Rst= N	**G7.11 /** Start after reset due to fault	NO➔ Disables the start function after reset. YES➔ Enables the start function after reset.
G8: Outputs – S8.1 Digital O/P.		
2 RLY1= PUMP	**G8.1.2** / Relay 1 Control Source Selection	25 ➔ PUMP
3RLY1= PUMP	**G8.1.3** / Relay 2 Control Source Selection	25 ➔ PUMP
4 DOP1= READY	**G8.1.4** / Digital Output 1 Control Source Selection	22 ➔ READY
G10: Limits.		
1 MxSpL= 50.00Hz	**G10.1** / Maximum Speed Limit	100.0% Drive limit speed.
3 UseFrqLimit= Y	**G10.3 /** Frequency Limit	YES➔ The limits are set in parameters [G10.4 and G10.5].
4FqLtLo= 0.50Hz	**G10.4 /** Lower Frequency Limit	25.00Hz (Set depending on the pump manufacturer).
5 FqLtHi= 50.00Hz	**G10.5 /** Upper Frequency Limit	50.00Hz
G11: Protections.		
13 ThMM= None	**G11.13 /** Action Selection in case of Thermoelectronic Fault	None ➔Protection is disabled. FreeRun ➔The drives output is cut which allows the motor free run Dec ➔Motor deceleration until stop completely.
16 ULFM= None	**G11.16 /** Action Selection in case of Underload Fault	None ➔ No action will be executed. FreeRun ➔The drives output is cut which allows the motor free run Dec ➔Motor deceleration until stop completely.

ENGLISH

Parameter	Name / Description	Value
G11: Protections.		
17 ULFltDl= 30.0s	**G11.17 /** Delay Time Enabling Underload Fault	60.0s
18 UlMnL = +30%	**G11.18 /** Underload Detection Lower Level	+30%
19 ULMxL= +30%	**G11.19 /** Underload Detection Upper Level	+30%
G25: Pump Control – S25.1 System Setpoint		
1 MREF1= 10.00%	**G25.1.1** / PID Local Reference 1	10.0Hz ➔ In order to set the speed reference 1 for the drive. (Set according to the application needs).
2 MREF2= +20.00%	**G25.1.2** / PID Local Reference 2	20.0Hz ➔ In order to set the speed reference 2 for the drive. (Set according to the application needs).
3 MREF3= +30.00%	**G25.1.3** / PID Local Reference 3	30.0Hz ➔ In order to set the speed reference 3 for the drive. (Set according to the application needs).
4 MREF4= +40.00%	**G25.1.4** / PID Local Reference 4	40.0Hz ➔ In order to set the speed reference 4 for the drive. (Set according to the application needs).
5 MREF5= +50.00%	**G25.1.5** / PID Local Reference 5	50.0Hz ➔ In order to set the speed reference 5 for the drive. (Set according to the application needs).
6 MREF6= +50.00%	**G25.1.6** / PID Local Reference 6	50.0Hz ➔ In order to set the speed reference 6 for the drive. (Set according to the application needs).
7 MREF7= +50.00%	**G25.1.7** / PID Local Reference 7	50.0Hz ➔ In order to set the speed reference 7 for the drive. (Set according to the application needs).
G25: Pump Control – S25.2 PID		
1 PIDSetp= MREF	**G25.2.1** / PID Setpoint Source	MREF➔ PID set point introduced from keypad
2 PID Fbk= AI2	**G25.2.2** / PID Feedback Source	AI1➔Feedback voltage signal through analog input 1. AI2➔Feedback current signal through analog input 2.
G25: Pump Control – S25.3 Start Conditions		
1 LP Pon= 35%	**G25.3.1** / Awakening Level	35%
2 FP1 Son= 49.00Hz	**G25.3.2** / Fix Pump 1 Starting Speed	49.00Hz
3 FP2 Son = 49.00Hz	**G25.3.3** / Fix Pump 2 Starting Speed	49.00Hz
6 FP Ton= 180.0s	**G25.3.6/** Fix Pumps Starting Delay	60.0s
G25: Pump Control – S25.4 Stop Conditions		
1 LP T Slpr= 20.0s	**G25.4.1** / Delay Before Enabling Sleep Mode	20.0s
2 Slp Spd= 30.0Hz	**G25.4.2** / Enabling Sleep Mode Speed	30.0Hz (Set this value at least 1 Hz over the value set in [G10.4]
3 SPD1of= 43.0Hz	**G25.4.3** / Fix Pump 1 Stopping Speed	43.0Hz (Set this value at least 1 Hz over the value set in [G25.4.2])
4 SPD2of = 43.0Hz	**G25.4.4** / Fix Pump 2 Stopping Speed	43.0Hz
7 Fp Tof= 17.0s	**G25.4.7** / Stopping Fix Pump Delay	17.0s (Set a lower value than the one set in parameter [G25.4.1])
8 FP Error= 2%	**G25.4.8** / PID Maximum Error Stopping Fix Pumps	2%
G25: Pump Control – S25.9 Enable Pump		
1 First FP= 1	**G25.9.1 /** First Fixed Pump Selection	1
2 FP number= 0	**G25.9.2 /** Number of Fixed Pumps Selection	2

Depend on the status of the input terminals P6, P7 and P8 we could select the different programmed frequencies:

DIGITAL INPUTS			PID REFERENCE
DI6=00	DI7=00	DI8=00	
0	0	X	G25.1.1 'M_Ref1'
0	X	0	G25.1.2 'M_Ref2'
0	X	X	G25.1.3 'M_Ref3'
X	0	0	G25.1.4 'M_Ref4'
X	0	X	G25.1.5 'M_Ref5'
X	X	0	G25.1.6 'M_Ref6'
X	X	X	G25.1.7 'M_Ref7'

7.5.2. Connections Diagram

Q1 / P1 Terminals: Start command (status NO).
EG / CM Terminals: Bridge.
CM / P6 Terminals: PID-H Bit high Multireference (status NO).
CM / P7 Terminals: PID-M Bit medium Multireference (status NO).
CM / P8 Terminals: PID-L Bit low Multireference (status NO).

IMPORTANT NOTE: In order to provide a greater safety when starting auxiliary pumps, the start command will be disabled whenever the drive is in fault status. Therefore, it is important to configure properly the relay outputs, the digital outputs and to carry out the connections as shown in the diagram below:

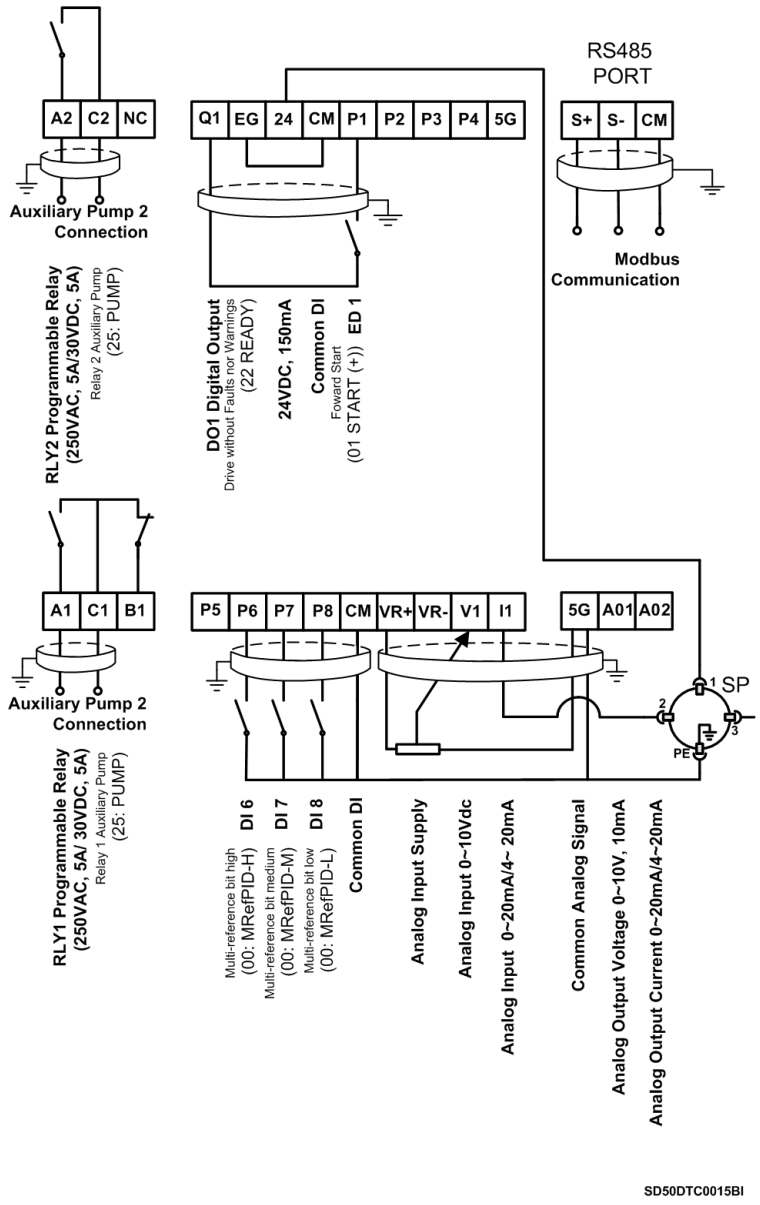

Figure 7.4 Pump Control with several speed references through terminals P6, P7 and P8.

Note: The control cables have to be screen and must be ground connected.
The 5G terminal is different to the CM one for 3,7 to 22kW drives.

ENGLISH

8. CONFIGURATION REGISTER

SPEED DRIVE: SD500.
SERIES NUMBER: MODEL:
APPLICATION:
DATE:
CUSTOMER:
NOTES:

PARÁMETERS	DEFAULT SETTINGS	SETTING 1	SETTING 2
	G1: OPTIONS MENU		
1 LOCK PARMTRS= N	N	_____	_____
PASSWORD= 0	0	_____	_____
ERRPWD= XXXX	0000	_____	_____
2LOCK SCRENS= N	N	_____	_____
PASSWORD= 0	0	_____	_____
ERRPWD= XXXX	0000	_____	_____
3 PROG= STANDARD	STANDARD	_____	_____
4 LANGUA= ENGLISH	ENGLISH	_____	_____
5 INITIALIZE= NO	NO	_____	_____

PARAMETERS	DEFAULT SETTINGS	SETTING 1	SETTING 2
6 UPLOAD= N	N		
Upload STS=	-		
7 DOWNLOADM= N	N		
DownloadSts=	-		
8 Changed Para= N	NO		
9 ADMIN PW= 0	0		
10 LCDContra= 60	60		
11 FAN= Run	Run		
12 ENB/DIS L/R=D	D		
G2: Nameplate – S2.1: Drive Parameters			
Aci/pVolt= 380V	220V➔220 440V➔380		
2 I/P Freq= 50Hz	50Hz		
3 TrimPwr%= +100%	_%		
G2: Nameplate – S2.2: Motor Parameters			
1 MTRPWR= 0.0kW	_._kW		
2 MTR CUR= 0.0A	_._A		
3 NOLOADC= 0.0A	_._A		
4 MTR VOLT= 0V	_V		
5 POLE Number= 4	__		
6 ADJTSPD= 100.0%	100.0%		
7 EFICIENC= +85%ſ	_%*		
8 MTR FRC = 50.00Hz	50Hz		
9 MTRCOOL=SELF	Self		
G3: References			
1 REF1 SP= LOCAL	LOCAL		
2 REF2 SP= LOCAL	LOCAL		
3 LCLSP= 0.00Hz	0.00Hz		
4 REF1 TQ = LOCAL	LOCAL		
5 REF2 TQ =LOCAL	LOCAL		
6 LclTQ = 0%	0%		
G4: Inputs – S4.1: Digital I/P			
1 CONTROL MODE1= 1	REMOTE		
2 CONTROL MODE2= 1	REMOTE		
3 DI1= START (+)	START (+)		
4 DI2= START(-)	START (-)		
5 DI3= DIS START	DIS START		
6 DI4= EXT TRIP	EXT TRIP		

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PARÁMETERS	DEFAULT SETTINGS	SETTING 1	SETTING 2
7 DI5= SPEED-L	SPEED-L		
8 DI6= SPEED-M	SPEED-M		
9 DI7= SPEED-H	SPEED-H		
10 DI8= INCH 1	INCH 1		
14 DIOnF= 10ms	10ms		
15 DIOffF= 3ms	3ms		
16 DCTy= 00000000	00000000		
17 DiScan= 1ms	1ms		
18 SaveMot Frq= N	N		
	G4: Inputs – S4.2: Analog Input 1		
1 An1PT= 0-10v	0-10v		
2 Ain1LPF= 10ms	10ms		
3 A1MnV= +0.00V	+0.00V		
4 A1MnRf= +0.00%	+0.00%		
5 A1MxV= +10.00V	+10.00V		
6 A1MxR= +100.00%	+100.00%		
7 An1NgMn=+0.00V	+0.00V		
8 A1MnR= +0.00%	+0.00%		
9 A1MxR= -10.00V	-10.00V		
10 A1MxR= -100.00	-100.00%		
11 A1DeLI= 0.04	0.04%		
12 MxFqA=50.00Hz	50.00Hz		
	G4: Inputs – S4.3: Analog Input 2		
1 Ain2LPF= 10ms	10ms		
2 A2MnC= 4.00mA	4.00mA		
3 A2MnR= +0.00%	+0.00%		
4 A2MxC= 20.00mA	20.00mA		
5 A2MxR= +100.00%	+100.00%		
6 A2DeLI= 0.04%	0.04%		
7 MxFqA=50.00Hz	50.00Hz		
	G5: Acceleration and Deceleration Ramps		
1 ACC1= 20.0s	20.0s		
2 DECEL1= 30.0s	30.0s		
4 RmpT= MaxFreq	MaxFreq		
5 AccPn= Linear	Linear		

PARÁMETERS	DEFAULT SETTINGS	SETTING 1	SETTING 2
6 DecPn= Linear	Linear		
7 AcSSrt= +40%	+40%		
8 AccSEnd= +40%	+40%		
9 DelSSrt= +40%	+40%		
10 DecSEnd=+40%	+40%		
11 AccDWF= 5.00Hz	5.00Hz		
12 AccDWT= 0.0s	0.0s		
13 DecDWF= 5.00Hz	5.00Hz		
14 DecDWT= 0.0s	0.0s		
15 TDedFll= 3.0s	3.0s		
G5: Acceleration and Deceleration Ramps – S5.16: Alternative Ramps			
1 ACC2= 20.0s	20.0s		
2 DEC2= 20.0s	20.0s		
3 ACC3= 30.0s	30.0s		
4 DEC3= 30.0s	30.0s		
5 ACC4= 40.0s	40.0s		
6 DEC4= 40.0s	40.0s		
G6: PID Control			
1 SEL REF= MREF	MREF		
2 SEL FBK= AI1	AI1		
3 GainKp= +50.0%	+50.0%		
4 INTEGRL= 10.0s	10.0s		
5 T Der= 0ms	0ms		
6 MxSL= +50.00Hz	+50.00Hz		
7 MnSL= 0.00Hz	0.00Hz		
8 INVERT PID= N	N		
9 OutSc= +100.0%	+100.0%		
G7: Start / Stop Mode Configuration			
1 START= RAMP	RAMP		
2 StrDly= 0.00s	0.00s		
3 STOP= RAMP	RAMP		
4 SAFE STOP=N	N		
5 SFSStr= 125.0%	125.0%		
6 SFSStp = 130.0%	130.0%		
7 SFSGain= 1000	1000		

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PARÁMETERS	DEFAULT SETTINGS	SETTING 1	SETTING 2
10 Run Aft Rst= N	N		
11 Str Aft Rst= N	N		
12 DCSt T= 0.00s	0.00s		
13 DC Curr= 50%	50%		
14 PreDC T= 0.10s	0.10s		
15 DCBrk T= 1.00s	1.00s		
16 DCBk Cur= 50%	50%		
17 DCBk F= 5.00Hz	5.00Hz		
19 PreExt = 1s	1s		
20 PreExF = 100%	100%		
21 PwofDI = 1s	1s		
G7: Start / Stop Mode Configuration – S7.18: Speed Search			
1 Srch Mode= 0000	0000		
2 Srch I= 150%	150%		
3 Kp Srch= 100	100		
4 Ki Srch= 200	200		
5 Srch Dly= 1.0s	1.0s		
G8: Outputs – S8.1: Digital O/P			
1 OP FLT RLY= 0X0	0X0		
2 RLY1= Trip	Trip		
3 RLE2= Run	Run		
4 DOP1= FDT-1	FDT-1		
5 T RL ON= 0.00s	0.0s		
6 T RL OF= 0.00	0.0s		
7 INV NA/NC= 000	000		
G8: Outputs – S8.2: Analog O/P			
1 A01= Frequency	Frequency		
2 AO1Ga= +100.0%	100.0%		
3 AO1Ofst= +0.0%	0.0%		
4 AO1OFil = 5ms	5ms		
5 AO1Con= 0.0%	0.0%		
6 AO2= Frequency	Frequency		
7 OA2Ga= +100.0%	100.0%		
8 AO2Ofst= +20.0%	20.0%		

PARÁMETERS	DEFAULT SETTINGS	SETTING 1	SETTING 2
9 AO2Fil= 5ms	5ms		
10 AO2Con= 0.0%	0.0%		
G9: Comparator			
1 FDTLvl= 30.00Hz	30.00Hz		
2 FDTBnd= 10.00Hz	10.00Hz		
3 SLCOM= None	None		
4 S C ON= +90.00%	+90.00%		
5 S C OF= +10.00%	+10.00%		
G10: Limits			
1 MxSpL= 50.00Hz	60.00Hz		
2 FWR/RV= None	None		
3 UseFrqLimit=Y	S		
4FqLtLo= 0.50Hz	0.50Hz		
5 FqLtHi= 50.00Hz	50Hz		
6 TORQUE LIMIT= N	N		
7 LvTrqLt= 180%	180%		
G10: Limits – S10.8: Vector Lim			
1 TqLimRef = LOCAL	LOCAL		
2 TLposFW = 180%	180%		
3 TLnegFW = 180%	180%		
4 TLposRV = 180%	180%		
5 TLnegRV = 180%	180%		
6 TqOffRf = LOCAL	LOCAL		
7 TqOfLO = 0%	0%		
8 TqOfcmp = 0%	0%		
9 SpLimRf = LOCAL	LOCAL		
10 SpL (+) = 50Hz	50Hz		
11 SpL (-) = 50 Hz	50 Hz		
12 SpL Ga = 500%	500%		
G11: Protections			
1 RlRLs= None	None		
3 RfLsDly= 1.0s	1.0s		
4 RefLRf= 0.00Hz	0.00Hz		
5 OLWarnSel= NO	NO		
6 OLWrnL= +150%	+150%		

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PARÁMETERS	DEFAULT SETTINGS	SETTING 1	SETTING 2
7 OLWrnT= 10.0s	10.0s		
8 OLTS= FreeRun	FreeRun		
9 OLLevel= 180%	180%		
10 TFIISC= 60.0s	60.0s		
11 SBC1min= +150%	+150%		
12 SBCCont= 120%	120%		
13 ThMM= None	None		
14 EnableUL= NO	NO		
15 ULWnDl= 10.0s	10.0s		
16 ULFM= None	None		
17 ULFltDl= 30.0s	30.0s		
18 UlMnL = +30%	+30%		
19 ULMxL= +30%	+30%		
20 NoMD= None	None		
21 NoMtrLvl= +5%	+5%		
22 NoMtrDl= 3.0s	3.0s		
23 OvHM= None	None		
24 OvrHtSen= None	None		
25 OvrHtL= +50.0%	+50.0%		
26 OvrHtAr= Low	Low		
27 FANTrip=Trip	Trip		
28 DBWarnED= +0%	0%		
29 LSS PH= NONE	NONE		
30 Ripple V=40V	40V		
31 GND Fault Level = 20%	20%		
32 GND Fault Tout= 30 ms	30 ms		
	G12: Auto-reset		
1 Retry NUm= 0	0		
2 Retry Dly= 1.0s	1.0s		
	G13: Faults History		
No Fault	-		
FAULT 1 INFO	-		
FAULT 2 INFO	-		
FAULT 3 INFO	-		

PARÁMETERS	DEFAULT SETTINGS	SETTING 1	SETTING 2
FAULT 4 INFO	-		
FAULT 5 INFO	-		
Clr FaultHist= N	N		
ENB / DIS LV Flt=D	D		
G14: Multi-references			
1 MREF 1= 10.00Hz	10.0Hz		
2 MREF 2= 20.00Hz	20.0Hz		
3 MREF 3= 30.00	30.0Hz		
4 MREF 4= 40.00H	40.0Hz		
5 MREF 5= 50.00Hz	50.0Hz		
6 MREF 6= 50.00Hz	50.0Hz		
7 MREF 7= 50.00Hz	50.0Hz		
8 MREF 8= 50.00Hz	50.0Hz		
9 MREF 9= 50.00Hz	50.0Hz		
10 MRF 10= 45.00Hz	45.0Hz		
11 MRF 11= 40.00Hz	40.0Hz		
12 MRF 12= 35.00Hz	35.0Hz		
13 MRF 13= 25.00Hz	25.0Hz		
14 MRF 14= 15.00Hz	15.0Hz		
15 MRF 15= 5.00Hz	5.0Hz		
G15: INCH SPEEDS			
1 InchFq= 10.00Hz	10.0Hz		
2 InchAcT= 20.0s	20.0s		
3 InchDeT= 30.0s	30.0s		
G16: Frequency Jumps			
1 Jmp Freq= NO	NO		
2 Sal1 B= 10.00Hz	10.0Hz		
3 Sal1 A= 15.00Hz	15.0Hz		
4 Sal2 B= 20.00Hz	20.0Hz		
5 Sal2 A= 25.00Hz	25.0Hz		
6 Sal3 B= 30.00Hz	30.0Hz		
7 Sal3 A= 35.00Hz	35.0Hz		
G17: DC Brake			
1 RlsCurr= 50.0%	50.0%		
2 RlsDly= 1.00s	1.0s		
3 FwdFrq= 1.00Hz	1.0Hz		

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PARÁMETERS	DEFAULT SETTINGS	SETTING 1	SETTING 2
4 RevFrq= 1.00Hz	1.0Hz		
5 BrEngFr= 1.00s	1.0s		
6 BrEngFr= 2.00Hz	2.0Hz		
	G18: Encoder		
1 Enc Opt Mode = None	None		
2 Enc Type Sel = LineDrive	LineDrive		
3 Enc Pulse Sel = (A+B)	(A+B)		
4 Enc Pulse Num = 1024	1024		
5 Enc Monitor = 0 Hz	0 Hz		
6 Pulse Monitor = 0 kHz	0 kHz		
7 Enc Filter = 3 ms	3 ms		
8 Enc Pulse x1 = 0 kHz	0 kHz		
9 Enc Perc y1 = 0 %	0 %		
10 Enc Pulse x2 = 100 kHz	100 kHz		
11 Enc Perc y2 = 100%	100%		
12 Enc Wire Check = N	N		
13 Enc Check Time = 1s	1s		
	G19: Fine Setting – S19.1: IGBT Control		
1 CTRL T.= V/Hz	V/Hz		
2 FREQ= 2.0kHz	_._kHz		
3 V/FPn= Linear	LINEAR		
4 Torque CTRL = N	N		
5 Auto Tuning = NONE	NONE		
	G19: Fine Setting – S19.4: V/F USER Pattern		
1 UsFrq1= 15.00Hz	15.00Hz		
2 User V1= 25%	25%		
3 UsFrq2= 30.00Hz	30.00Hz		
4 User V2= 50%	50%		
5 Us Frq3= 45.00Hz	45.00Hz		
6 User V3= 75%	75%		
7 Us Frq4= 60.00Hz	60.00Hz		
8 User V4= 100%	100%		
	G19: Fine Setting – S19.2: Motor Load		
1 InertiaRate= 0	_		
2 T Boost= Manual	Manual		
3 FWBoost= +20%	+20.0%		
4 RVBoost= +20%	+20.0%		

PARÁMETERS	DEFAULT SETTINGS	SETTING 1	SETTING 2
5 STR FRQ= 0.50Hz	0.50Hz		
6 RtSlip= 45rpm	45rpm		
7 FLUX MIN= NONE	None		
8 FLUX LVEL= +0%	+0%		
9 Load Duty= Hevy	Hevy		
G19: Fine Setting – S19.3: Motor Model			
1 Rs=	-		
2 LSigma=	-		
3 Ls=	-		
4 Tr=	-		
5 ASR P1 = 50%	50%		
6 ASR I1 = 300ms	300ms		
7 ASR P2 = 50%	50%		
8 ASR I2 = 300ms	300ms		
9 SwASR = 0Hz	0Hz		
10 dIASR = 0.1s	0.1s		
11 RASRf = 0ms	0ms		
12 OurFVec = 0ms	0ms		
G20: Communication Buses – S20.1: Int485 Protocol			
1ComUpdate= NO	NO		
2 Slave Addr= 1	1		
3 Prot= ModBus	ModBus		
4 BaudR= 9600 bps	9600bps		
5 Mode= D8/PN/S1	D8/PN/S1		
6RespDly= 5ms	5ms		
7 Salvcomms= NO	NO		
G25:Pump Control – S25.1: System Setpoint			
1 MREF1= +10.00%	+10.00%		
2 MREF2= +20.00%	+20.00%		
3 MREF3= +30.00%	+30.00%		
4 MREF4= +40.00%	+40.00%		
5 MREF5= +50.00%	+50.00%		
6 MREF6= +50.00%	+50.00%		
7 MREF7= +50.00%	+50.00%		

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PARÁMETERS	DEFAULT SETTINGS	SETTING 1	SETTING 2
G25:Pump Control – S25.2: PID			
1 PIDSetp= MREF	MREF		
2 PID Fbk= AI2	AI2		
3 PID Kc= +50.0%	+50.0%		
4 PID It= 10.0s	10.0s		
5 PID Dt= 0.0s	0.0ms		
6 MxSL= +50.00Hz	+50.00Hz		
7 MnSL= 0.00Hz	0.00Hz		
8 InvertPID= N	N		
9 Out Sc= +100.0%	+100.0%		
G25:Pump Control – S25.3: Start Conditions			
1 LP Pon= 35%	35%		
2 FP1 Son= 49.99Hz	49.99Hz		
3 FP2 Son = 49.99Hz	49.99Hz		
4 FP3 Son = 49.99Hz	49.99Hz		
5 FP4 Son = 49.99Hz	49.99Hz		
6 FP Ton= 60.0s	60.0s		
G25:Pump Control – S25.4: Stop Conditions			
1 LP T Slpr= 60.0s	60.0s		
2 Slp Spd= 0.00Hz	0.00Hz		
3 SPD1of= 15.0H	15.0Hz		
4 SPD2of = 15.0Hz	15.0Hz		
5 SPD3of = 15.0Hz	15.0Hz		
6 SPD4of = 15.0Hz	15.0Hz		
7 Fp Tof= 60.0s	60.0s		
8 FP Error= 2%	2%		
G25:Pump Control – S25.5: Speed Bypass			
1 AccTime= 2.0s	2.0s		
2 Dec Timel= 2.0s	2.0s		
G25:Pump Control – S25.7: Filling Pipes			
1 Fill Sp= 0.00Hz	0.00Hz		
2 Fill P= 0.0%	0.0%		
3 Fill Tim= 600s	600s		
G25:Pump Control – S25.9: Enable Pump			
1 First FP= 1	1		
2 FP number= 0	0		

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