SD 700
Series

VARIABLE SPEED DRIVE

Variable Speed Drive

Application Manual
PUMPS

POWER ELECTRONICS®

SD700 Series

VARIABLE SPEED DRIVE

Variable Speed Drive

Application Manual
PUMPS

Edition: March 2011

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SAFETY SYMBOLS

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

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

Edition of March 2011

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
08 / 01 / 2010	A	First edition. SW version 2.0 (2.3)
31 / 03 / 2011	B	Software version updating and misprinting errors. SW Version 2.0 (26)

INDEX

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 SD700 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 SD700 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

- This type of PDS (Power Device System) is not intended to be used on a low-voltage public network which supplies domestic premises.
- Radio frequency interference is expected if used on such a network.

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 SD700 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 SD700 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 SD700 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. INTRODUCTION

The information included in this manual is only linked with the parameters related to Pump Macro software.

For additional information about the parameters and the programming of SD700, refer to ‘Software and Programming Manual’.

For additional information about the hardware of the equipment and its installation, refer to ‘Hardware and Installation Manual’.

2. VISUALIZATION AND STATUS PARAMETERS. GROUP G0

2.1. Parameters SV.5 – Programmable Parameters

This group is not only a display group. Some parameters can be adjusted in this group. The parameters of this group described in the following table affect to the pump macro.

Screen	Units	Description
PMP manSP=+0.0%	% motor speed	To set the value of the LOCAL manual speed reference. For additional details, check G25.1.3.
PMP MRe1=0.0%	% motor speed	To set the local reference 1 of PID. Multi-reference 1. For additional details, check G25.1.5.
PMP MRe2=0.0%	% motor speed	To set the local reference 2 of PID. Multi-reference 2. For additional details, check G25.1.6.
PMP MRe3=0.0%	% motor speed	To set the local reference 3 of PID. Multi-reference 3. For additional details, check G25.1.7.
PMP MRe4=0.0%	% motor speed	To set the local reference 4 of PID. Multi-reference 4. For additional details, check G25.1.8.
PMP MRe5=0.0%	% motor speed	To set the local reference 5 of PID. Multi-reference 5. For additional details, check G25.1.9.
PMP MRe6=0.0%	% motor speed	To set the local reference 6 of PID. Multi-reference 6. For additional details, check G25.1.10.
PMP MRe7=0.0%	% motor speed	To set the local reference 7 of PID. Multi-reference 7. For additional details, check G25.1.11.
PMP MRe8=0.0%	% motor speed	To set the local reference 8 of PID. Multi-reference 8. For additional details, check G25.1.12.
T AutOFF=OFF	hours	Time for Automatic Stop. For additional details, check G25.1.13.
TIME OFF=OFF	min	It shows the resting time in minutes, for the automatic stopping of the system.
MAX flow=1000l/s	Eng. Units	It allows setting a level for the maximum flow as in G25.10.2.
RESET LEVL=+100%	% Max range of sensor	It allows setting a reset level for the flow control algorithm as in G25.10.4.
SLEP FLO=0.0l/s	Eng. Units	It allows setting a flow level to sleep the drive as in G25.4.11.

2.2. Parameters SV.8 – Pump Control

<table>
<tr><th>Screen</th><th>Units</th><th>Description</th></tr>
<tr><td>R=0.0Bar 0.0Bar</td><td>Engineering units</td><td>It shows the PID reference value (left hand) and the sensor value which is sent by the feedback signal (right hand).</td></tr>
<tr><td>REGL +0.0% +0.0%</td><td>% sensor range</td><td>It shows the drive status during the pump control operation according to the following table:
<table>
<tr><th>Status</th><th>Description</th></tr>
<tr><td>REGL</td><td>Drive is regulating in PID mode.</td></tr>
<tr><td>PMAN</td><td>The drive is at protected manual mode.</td></tr>
<tr><td>OMAN</td><td>Drive is in manual mode, not protective mode.</td></tr>
<tr><td>HIPP</td><td>Drive is stopped (pause) due to high pressure, according to the read data in the analogue input.</td></tr>
<tr><td>HIPR</td><td>A fault due to high pressure has occurred according to the read data in the analogue input or in the digital input.</td></tr>
<tr><td>FLOD</td><td>The drive has stopped (Pause status) due to No Flow detection.</td></tr>
<tr><td>NFLO</td><td>The drive has tripped (Fault status) due to No Flow detection.</td></tr>
<tr><td>CAVS</td><td>The drive has stopped (Pause status) due to Cavitation.</td></tr>
<tr><td>CAVI</td><td>The drive has tripped (Fault status) due to Cavitation.</td></tr>
<tr><td>LOPR</td><td>The drive has tripped due to low pressure fault.</td></tr>
<tr><td>LOWA</td><td>The drive has tripped due to a fault detected in one of the digital inputs configured as ‘No Water’</td></tr>
<tr><td>CYCL</td><td>The drive has tripped due to excessive starting cycles.</td></tr>
<tr><td>IRFA</td><td>The drive has tripped due to a fault in the irrigation equipment which has been detected in the digital input configured in that option.</td></tr>
<tr><td>FLOW</td><td>The drive is limiting the speed to limit the flow.</td></tr>
<tr><td>OFF</td><td>The drive has received the stop command.</td></tr>
<tr><td>SLEP</td><td>The drive is in sleep mode because there is no flow demand.</td></tr>
<tr><td>BYPA</td><td>The drive is forcing the speed after starting or stopping some of the fixed pumps.</td></tr>
<tr><td>RAMP</td><td>Setpoint ramp activated.</td></tr>
<tr><td>FILL</td><td>The drive is running at reduced speed because Pipe Fill function is active.</td></tr>
<tr><td>COMP</td><td>The time of automatic stop has expired and the drive is stopped.</td></tr>
<tr><td>JOCK</td><td>The Jockey pump is running.</td></tr>
<tr><td>PRIM</td><td>Priming pump is connected.</td></tr>
<tr><td>FINP</td><td>Fault occurred because the pressure switch is open.</td></tr>
</table>
Additionally, the reference in PID mode (as %) followed by feedback (as %) is shown.</td></tr>
<tr><td>1OFF 2OFF 3OFF</td><td>-</td><td>The status of the fixed pumps 1-3 is shown according to the next information:
<table>
<tr><th>Status</th><th>Description</th></tr>
<tr><td>OFF</td><td>Pump disabled by keypad.</td></tr>
<tr><td>RDY</td><td>Pump ready to start.</td></tr>
<tr><td>ON</td><td>Pump started.</td></tr>
<tr><td>FLT</td><td>Pump in a fault status (input which controls the signal is active).
Note: See digital input configuration in Pump Control mode. G1.7 and G4.1.4 parameters are linked to this.</td></tr>
</table></td></tr>
<tr><td>4OFF 5OFF</td><td>-</td><td>It shows the status for the fixed pumps 4-5 according to the above mentioned information.</td></tr>
<tr><td>Flow = 0.0l/s</td><td>Engineering units</td><td>It shows the present value read by the analogue input or by pulse input where sensor is connected.</td></tr>
</table>

<table>
<tr><th>Screen</th><th>Units</th><th>Description</th></tr>
<tr><td>STATUS PUMP PROGRAM</td><td>-</td><td>In the visualization lines of the display, it is possible to select this option. In this way the following messages are going to be shown according to the current program status:
<table>
<tr><th>Status</th><th>Description</th></tr>
<tr><td>PID REGULATION</td><td>Drive is regulating in PID mode.</td></tr>
<tr><td>PROTECTED MANUAL</td><td>The drive is at protected manual mode.</td></tr>
<tr><td>OVERRIDE MANUAL</td><td>Drive is in manual mode, not protective mode.</td></tr>
<tr><td>HI PRESSURE PAUS</td><td>Drive is stopped (pause) due to high pressure, according to the read data in the analogue input.</td></tr>
<tr><td>HI PRESSURE FAUL</td><td>A fault due to high pressure has occurred according to the read data in the analogue input or in the digital input.</td></tr>
<tr><td>NO FLOW PAUSE</td><td>The drive has stopped (Pause status) due to No Flow detection.</td></tr>
<tr><td>NO FLOW FAULT</td><td>The drive has tripped (Fault status) due to No Flow detection.</td></tr>
<tr><td>CAVITATION PAUSE</td><td>The drive has stopped (Pause status) due to Cavitation.</td></tr>
<tr><td>CAVITATION FAULT</td><td>The drive has tripped (Fault status) due to Cavitation.</td></tr>
<tr><td>LO PRESSURE FAUL</td><td>The drive has tripped due to low pressure fault.</td></tr>
<tr><td>LO WATER FAULT</td><td>The drive has tripped due to a fault detected in one of the digital inputs configured as ‘No Water’</td></tr>
<tr><td>CYCLING FAULT</td><td>The drive has tripped due to excessive starting cycles.</td></tr>
<tr><td>IRRIGATOR FAULT</td><td>The drive has tripped due to a fault in the irrigation equipment which has been detected in the digital input configured in that option.</td></tr>
<tr><td>LIMITING FLOW</td><td>The drive is limiting the speed to limit the flow.</td></tr>
<tr><td>PUMP STOP</td><td>The drive has received the stop command.</td></tr>
<tr><td>SLEPT NO DEMAND</td><td>The drive is in sleep mode because there is no flow demand.</td></tr>
<tr><td>BYPASSING SPEED</td><td>The drive is forcing the speed after starting or stopping some of the fixed pumps.</td></tr>
<tr><td>SETPOINT RAMP</td><td>Setpoint ramp activated.</td></tr>
<tr><td>PIPE FILLING</td><td>The drive is running at reduced speed because Pipe Fill function is active.</td></tr>
<tr><td>COMPLETED</td><td>The time of automatic stop has expired and the drive is stopped.</td></tr>
<tr><td>JOCKEY PUMP ON</td><td>The Jockey pump is running.</td></tr>
<tr><td>PRIMING PUMP ON</td><td>The Priming pump (suction filling) is connected.</td></tr>
<tr><td>PRESSU SWITCH ON</td><td>The pressure switch is open.</td></tr>
</table></td></tr>
</table>

3. DESCRIPTION OF PROGRAMMING PARAMETERS

The different parameters of the SD700 are displayed in the alphanumeric LCD. These parameters are organized in groups (G1, G2, G3, …).

The most of parameters related to the pump control are included in Group 25, except for the settings of the in puts and outputs, that are included in groups G4 and G8. Also, there are some visualizing parameters included in visualization groups SV.5 and SV.8 described before.

Therefore, all the parameters that affect to the pump macro are listed below.

3.1. Group 1 – G1: Options Menu

Parameter	Name / Description	Range	Function	Set on RUN
7 PROG= STANDARD	**G1.7** / Program activation	STANDARD PUMP	It allows selection additional functionalities. If PUMP is selected, then extended functionality for pumping control G25 will appear as available. The group G25 will be hidden if the pump program is not active. Once selected the pump program, a character will appear in the upper line of the display, beside the drive status, indicating constantly that the pump program is active. The letter "b" in Spanish and the letter "p" for English / German. The most of parameters relative to the pump control are located in Group 25, excepting those setting relatives to inputs and outputs that can be found in groups G4 and G7. Additionally there are some visualization screens included in visualization groups SV.5 and SV.8. For additional information, see the 'Pump Application Manual' for the SD700.	YES

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

Parameter / Default Value	Name / Description	Range	Function	Set on RUN
UPLOAD=N	**G1.10.1** / Saves the parameters of the drive to the display.	N Y	When adjusting this value to Yes, the copy of parameters to the display starts, saving the configuration of the drive. A screen will appear showing the uploading progress: **UPLOADING…100%** When this process is over, the progress screen will automatically return to the main screen, set by default to No. **Note:** In order to carry out the parameter load correctly, the user should firstly configure the digital inputs corncerning 'STOP' functions before any other function.	NO
DOWNLOAD=N	**G1.10.2** / Saves the parameters of the display to the drive.	N Y	When adjusting this value to Yes, the copy of parameters stored in the display to the drive will start modifying and programming the parameters of this new drive. A screen will appear showing the downloading progress: **DOWNLOADING …100%** When this process is over, the progress screen will automatically change to the main screen, set by default to No. **Note:** Before downloading, read carefully the note refered to the digital inputs configuration in Subgroup [4.1].	NO

3.2. Group 4 – G4: Inputs

3.2.1. Subgroup 4.1 – S4.1: Digital Inputs

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

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

This means that the user will configure the pump program freely, according to his requirements, selecting the correct functionality and protections. For a correct programming of the digital inputs when the pump program is active, there is additional information in G25 Pump Control.

Note: Digitial outputs should be configured in order to provide an optimum performance.

The following instructions should be followed:

- Step 1: Set the digital input 1 to the '50PMP.START/STP] option.
- Step 2: Whenever the user requires the use of PID multireferences, the user must carry out the following configuration in the order described: set the digital output 2 as '63 SETPONT PIN1', the digital output 3 as '64 SETPONT PIN2' and the digital output 4 as '65 SETPONT PIN3'.
- Step 3: Once steps 1 and 2 have been succesfully completed, the user may proceed with the required functions programming.

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

To select one auxiliary pump it is necessary to act in the following way (If you do not want to connect the input of auxiliary pump Fault Skip to step 2 directly) :

- Step 1: Set any free digital input to options '52 FIX PUMP1 FLT', '53 FIX PUMP2 FLT', '54 FIX PUMP3 FLT', '55 FIX PUMP4 FLT' or '56 FIX PUMP5 FLT'
- Step 2: To enable the control of the pump in the corresponding screen G25.9.1, G25.9.2, G25.9.3, G25.9.4 and G25.9.5 respectively.

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

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

<table>
<tr><th>Parameter</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr>
<td>5 DIGITL IN 1=06</td>
<td>G4.1.5 / Multi-function Digital Input 1 configuration</td>
<td>00 – 75</td>
<td rowspan="4">Apart from the existing options described in ‘SW and Programming Manual’ of the SD700), when selecting the pump program from parameter G1.7, the following options are also available:
<table>
<tr><th>OPT</th><th>DESCRIPTION</th><th>FUNCTION</th></tr>
<tr><td>50</td><td>PMP START/STP</td><td>Automatic starting of the system. (NO)</td></tr>
<tr><td>51</td><td>FLOW PULSE</td><td>Pulses input for the flowmeter. (NO)</td></tr>
<tr><td>52</td><td>FIX PUMP1 FLT</td><td>Auxiliary pump 1 fault. (NO).</td></tr>
<tr><td>53</td><td>FIX PUMP2 FLT</td><td>Auxiliary pump 2 fault. (NO).</td></tr>
<tr><td>54</td><td>FIX PUMP3 FLT</td><td>Auxiliary pump 3 fault. (NO).</td></tr>
<tr><td>55</td><td>FIX PUMP4 FLT</td><td>Auxiliary pump 4 fault. (NO).</td></tr>
<tr><td>56</td><td>FIX PUMP5 FLT</td><td>Auxiliary pump 5 fault. (NO).</td></tr>
<tr><td>57</td><td>MAN PROTstart</td><td>Manual starting including those protections enabled by the user. (NO).</td></tr>
<tr><td>58</td><td>HI PRESS FLT</td><td>High Pressure trip. (NC).</td></tr>
<tr><td>59</td><td>LO WATER FLT</td><td>No Water trip. (NC).</td></tr>
<tr><td>60</td><td>LO PRESS FLT</td><td>To detect a Low Pressure situation. (NO).</td></tr>
<tr><td>61</td><td>FLOW SWITCH</td><td>To connect an external flow switch (open / closed). (NC).</td></tr>
<tr><td>62</td><td>IRRIGAT TRIP</td><td>To detect an external fault from the irrigation equipment. (NO).</td></tr>
<tr><td>63</td><td>SETPONT PIN1</td><td rowspan="3">Configuration of the low, medium and high bit respectively, for multiple PID setpoints selection, according to the following table:
<table>
<tr><th colspan="3">DIGITAL INPUTS</th><th rowspan="2">PID SETPOINT</th></tr>
<tr><th>DI(z) =65</th><th>DI(y) =64</th><th>DI(x) =63</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td>G25.1.5 ‘SETPT1’</td></tr>
<tr><td>0</td><td>0</td><td>X</td><td>G25.1.6 ‘SETPT2’</td></tr>
<tr><td>0</td><td>X</td><td>0</td><td>G25.1.7 ‘SETPT3’</td></tr>
<tr><td>0</td><td>X</td><td>X</td><td>G25.1.8 ‘SETPT4’</td></tr>
<tr><td>X</td><td>0</td><td>0</td><td>G25.1.9 ‘SETPT5’</td></tr>
<tr><td>X</td><td>0</td><td>X</td><td>G25.1.10 ‘SETPT6’</td></tr>
<tr><td>X</td><td>X</td><td>0</td><td>G25.1.11 ‘SETPT7’</td></tr>
<tr><td>X</td><td>X</td><td>X</td><td>G25.1.12 ‘SETPT8’</td></tr>
</table>
They are NO contact.</td></tr>
<tr><td>64</td><td>SETPONT PIN2</td></tr>
<tr><td>65</td><td>SETPONT PIN3</td></tr>
</table>
Note: See following page.</td>
<td rowspan="4">YES</td>
</tr>
<tr>
<td>6 DIGITL IN 2=00</td>
<td>G4.1.6 / Multi-function Digital Input 2 configuration</td>
<td>00 – 75</td>
</tr>
<tr>
<td>7 DIGITL IN 3=00</td>
<td>G4.1.7 / Multi-function Digital Input 3 configuration</td>
<td>00 – 75</td>
</tr>
<tr>
<td>8 DIGITL IN 4=00</td>
<td>G4.1.8 / Multi-function Digital Input 4 configuration</td>
<td>00 – 75</td>
</tr>
</table>

<table>
<tr><th>Parameter</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>9 DIGITL IN 5=00</td><td>G4.1.9 / Multi-function Digital Input 5 configuration</td><td>00 – 75</td><td rowspan="2">Note: Coming from the previous page.<table><tr><th>OPT</th><th>DESCRIPTION</th><th>FUNCTION</th></tr><tr><td>66</td><td>MAN REF 2</td><td>To select the second source or the alternative source for the speed reference. (NO).</td></tr><tr><td>67</td><td>MAN OVR STAR</td><td>Manual starting without protections, for testing starting. (NO).</td></tr><tr><td>69</td><td>PRESSUR SWITC</td><td>Detection of the pressure existing in the system to be used with the Priming pump. (NO)</td></tr><tr><td>70</td><td>ALTER PID STP</td><td>When it is activated the input configured with this option, the pump program will consider the alternative PID setpoint according to the setting of the parameter G25.2.2. (NO).</td></tr><tr><td>75</td><td>A.MACRO CTRL</td><td>It alternates the control mode in pump macro (see remote control functions).</td></tr></table></td><td>YES</td></tr>
<tr><td>10 DIGITL IN 6=17</td><td>G4.1.10 / Multi-function Digital Input 6 configuration</td><td>00 – 75</td><td>YES</td></tr>
</table>

3.2.2. Subgroup 4.4 – S4.4: Pulse Input

Parameter	Name / Description	Range	Function	Set on RUN
1 Sensr U=l/s	**G4.4.1** / Sensor units of Pulse Input	% l/s m³/s l/m m³/m l/h m³/h m/s m/m m/h	Allows selection of the units to measure the flow. **Note:** To use this input you should have a flowmeter with a digital pulse output of pulsewidth greater than 50ms. Used for flow limitation algorithm. See S25.10.	YES
2 Pls/s = 100l/s **LIQU AMOUNT/PULS**	**G4.4.2** / Flowmeter configuration	0 to 32760 Flow units	It allows setting the amount of the fluid per pulse received. For example, if setting is '2Pls/s=100l/s', and the present flow is 500l/s, 5 pulses/sec will be received.	YES
3 M Rng=1000l/s **FLOW MAX RANGE**	**G4.4.3** / Maximum range of flow meter	0 to 32760 Flow units	It allows user to set the maximum range of the flow meter. It is used to calculate the reset level of the flow control algorithm. Parameter G25.10.4 is linked with the value set in this parameter. Example: If you set a maximum range of 100 units 'G4.4.3=100', and the reset level of the flow algorithm is desired below 30 units, you have to set 'G25.10.4=30%'.	YES

3.3. Group 8 – G8: Outputs

3.3.1. Subgroup 8.1 – S8.1: Output Relays

<table>
<tr><th>Parameter</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>1 SEL RELAY 1=02</td><td>G8.1.1 / Selection of Relay 1 control source</td><td>00 – 32</td><td>It configures the operation for each relay according to different available options (see ‘SW and Programming Manual’ of SD700). The options described below affect to the pump macro.
<table>
<tr><th>OPT</th><th>DESCRIPTION</th><th>FUNCTION</th></tr>
<tr><td>28</td><td>PUMP CNTRL</td><td>Drive activates the relay to connect the fixed pump. See G25.9.1 to G25.9.3.</td></tr>
<tr><td>29</td><td>JOCKEY PUMP</td><td>For those periods of low demand if the drive is in sleeping mode. This pump will stop when the pump of the drive is connected or when the demand disappears.</td></tr>
<tr><td>30</td><td>PRIMING PUMP</td><td>To fill the suction pipe. This pump will stop when the suction is filled and then the drive pump will start.</td></tr>
<tr><td>31</td><td>SLEEP CONDIT</td><td>The relay commutates if the equipment has the sleep conditions fulfilled or not. Once the equipment is stopping, the relay commutates again. This function operates together with the parameter G25.4.28 (see this parameter).</td></tr>
<tr><td>33</td><td>PIPE FILLING</td><td>The relay is energized when the application state is “Pump Filling”. For further information see G25.7 PIPE FILLING</td></tr>
</table></td><td>YES</td></tr>
<tr><td>5 SEL RELAY 2=03</td><td>G8.1.5 / Selection of Relay 2 control source</td><td>00 – 32</td><td>Note: See parameter function of G8.1.1.</td><td>YES</td></tr>
<tr><td>9 SEL RELAY 3=05</td><td>G8.1.9 / Selection of Relay 3 control source</td><td>00 – 32</td><td>Note: See parameter function of G8.1.1.</td><td>YES</td></tr>
</table>

3.3.2. Subgroup 8.2 – S8.2: Analogue Outputs

<table>
<tr><th>Parameter</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>1 ANLG OUT1=01</td><td>G8.2.1 / Mode selection for Analogue Output 1</td><td>00 – 27</td><td>Analogue input 1 is programmable according to several options (see ‘SW and Programming Manual’ of SD700). The options that affect to the pump macro are described below:
<table>
<tr><th>OPT</th><th>DESCR.</th><th>FUNCTION</th><th>UNITS</th></tr>
<tr><td>20</td><td>CURRENT FLOW</td><td>Analogue signal proportional to the read flow through analogue input or pulse input.</td><td>%</td></tr>
<tr><td>27</td><td>MACRO PUMP</td><td>0V = Pump OFF
10V = Pump ON
See footnote.</td><td>-</td></tr>
</table></td><td>YES</td></tr>
<tr><td>6 ANLG OUT 2=02</td><td>G8.2.6 / Mode selection Analogue Output 2</td><td>00 – 27</td><td>Analogue output 2 is programmable. See parameter 'G8.2.1 ANLG OUT 1' for options table.</td><td>YES</td></tr>
</table>

Note: The option 27 it is not programmable by the user for any of the analogue outputs. This option is automatically set for Analogue Input 1 when the user enables the fixed pump 4, and it will be automatically set to Analogue Input 2 when the user enables the fixed pump 5. For both outputs, the configuration will always be from 0 to 10V, where 0V means pump is OFF and 10V means pump connected.

3.4. Group 12 – G12: Auto Reset

<table>
<tr><th>Parameter</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>1 AUTO RESET=N</td><td>G12.1 / Auto Reset</td><td>N
S</td><td>This function resets the drive automatically after a fault.
<table><tr><th>OPT.</th><th>FUNCTION</th></tr><tr><td>N=NO</td><td>Auto Reset is disabled.</td></tr><tr><td>Y=YES</td><td>Auto Reset is enabled.</td></tr></table>When this function is active, faults programmed in G12.5 to G12.8 will be reset.

⚠ Caution: Auto Reset function can cause unexpected automatic starts. Ensure the installation is configured for Auto Reset to prevent damage to property or personnel.</td><td>YES</td></tr>
<tr><td>2 ATTEMP NUMBR=1
MAX ATTEMPT NUMB</td><td>G12.2 / Number of Auto Reset attempts</td><td>1 – 5</td><td>Allows setting of the maximum number of Auto Reset attempts. Drive will try to reset as many times as the number of attempts set in this screen after a fault occurs. This parameter and ‘G12.4 RS COUNT’ control the drive to carry out Auto Reset function in a controlled manner.</td><td>YES</td></tr>
<tr><td>3 R STR DEL=5s
TIME BEFORE RESET</td><td>G12.3 / Delay time before Auto Reset</td><td>5 – 120s</td><td>Allows setting of the time elapsed from the fault occurring before attempting auto reset.</td><td>YES</td></tr>
<tr><td>4 RS COUNT=15min
AUTORESET TIMOUT</td><td>G12.4 / Reset time for the counter of Auto Reset attempts</td><td>1 – 60min</td><td>Allows setting of the time that once elapsed will reset the Auto Reset attempt counter to zero.
Two situations are possible:
a) If the SD700 is successfully restarted and runs for a period exceeding the value set in this screen then the attempt counter G12.2 will be reset to zero.
b) If the total number of reset attempts is exceeded within this time period the SD700 will fault on the last fault condition. The SD700 will remain in a fault condition until the unit is manually reset.</td><td>YES</td></tr>
<tr><td>5 F1 AUTO RST=0</td><td>G12.5 / Selection of fault 1 to be reset</td><td>0 – 25</td><td rowspan="4">If Auto Reset selection is enabled, the SD700 will automatically resets the faults selected as reseteable. The faults are setting individually. The faults that affect to the pump macro are described below. For additional information about all the reseteable faults, refer to ‘SW and Programming Manual’ of SD700.

<table><tr><th>OPT.</th><th>DESCRIPTION</th><th>FUNCTION</th></tr><tr><td>1</td><td>ALL THE FLTS</td><td>All faults will be reset automatically.</td></tr><tr><td>17</td><td>65 LOW PRESSURE</td><td>To reset fault F65, low pressure.</td></tr><tr><td>18</td><td>66 HI PRESSURE</td><td>To reset fault F66, maximum pressure.</td></tr><tr><td>19</td><td>67 LOW WATER</td><td>Fault F67 is reset, low water.</td></tr><tr><td>23</td><td>68 CAVIT/UNDERL</td><td>To reset fault F68, cavitation / underload trip.</td></tr><tr><td>24</td><td>69 FLOW SWITCH</td><td>To reset fault F69, ‘No Flow’ trip.</td></tr><tr><td>25</td><td>70 IRRIGATOR F</td><td>To reset fault F70, irrigator trip.</td></tr></table></td><td>YES</td></tr>
<tr><td>6 F2 AUTO RST=0</td><td>G12.6 / Selection of fault 2 to be reset</td><td>0 – 25</td><td>YES</td></tr>
<tr><td>7 F3 AUTO RST=0</td><td>G12.7 / Selection of fault 3 to be reset</td><td>0 – 25</td><td>YES</td></tr>
<tr><td>8 F4 AUTO RST=0</td><td>G12.8 / Selection of fault 4 to be reset</td><td>0 – 25</td><td>⚠ Caution: When the fault selection for auto reset is undertaken the user should pay special attention to option 1 ‘All the faults’. In this case, the protections of the drive and motor will be disabled. It is not recommended to select this option since the drive could try to reset internal trips causing serious damage to the drive.</td><td>YES</td></tr>
</table>

3.5. Group 13 – G13: Fault History

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

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

The faults that affect to the pump macro are listed in the following table. For additional information about the remaining faults, see ‘SW and Programming Manual’ of SD700:
<table><tr><th>COD</th><th>FAULT</th><th>COD</th><th>FAULT</th></tr><tr><td>65</td><td>F65 LOW PRESSURE</td><td>69</td><td>F69 FLOW SWITCH</td></tr><tr><td>66</td><td>F66 HI PRESSURE</td><td>70</td><td>F70 IRRIGATOR FL</td></tr><tr><td>67</td><td>F67 LOW WATER</td><td>71</td><td>F71 CYCLING</td></tr><tr><td>68</td><td>F68 CAVIT/UNDERL</td><td>72</td><td>F72 IN PRES SW</td></tr></table></td><td>-</td></tr>
<tr><td>2 F0 NO FAULT
FIFTH FAULT=FXX</td><td>G13.2 / Register 2 of fault history</td><td>-</td><td>-</td></tr>
<tr><td>3 F0 NO FAULT
FOURTH FAULT=FXX</td><td>G13.3 / Register 3 of fault history</td><td>-</td><td>-</td></tr>
<tr><td>4 F0 NO FAULT
THIRD FAULT=FXX</td><td>G13.4 / Register 4 of fault history</td><td>-</td><td>-</td></tr>
<tr><td>5 F0 NO FAULT
SECOND FAULT=FXX</td><td>G13.5 / Register 5 of fault history</td><td>-</td><td>-</td></tr>
<tr><td>6 F0 NO FAULT
FIRST FAULT=FXX</td><td>G13.6 / Register 6 of fault history</td><td>-</td><td>-</td></tr>
<tr><td>7 CLEAR FAULTS=N</td><td>G13.7 / Erase fault history</td><td>N
Y</td><td><table><tr><th>OPT.</th><th>FUNCTION</th></tr><tr><td>N=NO</td><td>Function disabled.</td></tr><tr><td>Y=YES</td><td>It erases fault history (last six faults). The screen returns to default value ‘NO’, after all the faults have been erased.</td></tr></table></td><td>YES</td></tr>
</table>

3.6. Group 25 – G25: Pump Control

Parameter group accessible always that 'G1.7 PROG = PUMPS'.

3.6.1. Pumps Program General Description.

The objective of this functionality is to achieve a comprehensive control of the pumping systems using variable speed drives of SD700 Series, using in that cases the minimum peripheral devices as possible. The program comprises all that options which allows controlling the process correctly, avoiding the use of those external auxiliary devices such as timers, relays, PLC, etc.

This program has been thought to control the drive and additionally to control up to 5 auxiliary fix pumps. Apart of this there is the possibility of using one of this pumps as Jockey pump (it will operate only under very low demand conditions in case of the drive is in sleep mode) or one pump can be used as Priming pump (it will operate to fulfil the aspiration pipe if the system requires this function).

3.6.2. Operation modes.

There are three operation modes basically:

- **Manual Protected Mode**: One of the digital inputs must be set as Automatic and a second digital input must be set as Protected Manual. Both inputs must be closed to start. In this operation mode the system protections are operative (for example, high pressure, cavitation, etc.). A main speed reference source and an alternative speed reference source exist, they are set by means of a digital input.
- **Manual Non Protected Mode**: This is an operation mode thought for commissioning and test of the system. It is not recommended for a normal operation since the protections are not active. There are two possibilities of configuring this mode:
  - Manual non protected mode with exclusive control from the keypad.
  - Manual non protected mode controlled by the digital inputs.

  A main speed reference source and an alternative speed reference source exist, they are set by means of a digital input.
- **Pumps Mode**: The drive will operate in regulation mode with all the available functions and the protections will be operative.

3.6.3. General Descriptions of Protections.

In case of the pump program is active, the drive will function in three different ways depending on the activated protections:

- **Faults of the Drive (Standard Program):** Here we can find those trips of the drive or trips of the installation that have been configured in the standard program of the drive. In case of any of these conditions occur, the motor controlled by the drive will stop, followed by the fixed pumps and the display will show the corresponding fault message.
- **Pause of the Pumps Program:** Certain protections can be configured to stop the drive temporary without tripping by fault. For all of them there is only one time to start after the pause, and this time will start once the cause which provoked the pause disappears. The protections which can be set in this way are:
  - **High Pressure:** Configurable at Pause mode or at Fault mode. If it is set as Pause, the displayed message will be ‘HI PRESSURE PAUS’ but if this is set to Fault, the message will be ‘F66 HI PRESSURE’
  - **No Flow:** Configurable at Pause mode or at Fault mode. If it is set as Pause, the displayed message will be ‘NO PLOW PAUSE’ but if this is set to Fault, the message will be ‘F69 FLOW SWITCH’

- **Cavitation:** Configurable at Pause mode or at Fault mode. If it is set as Pause, the displayed message will be 'CAVITATION PAUSE' but if this is set to Fault, the message will be 'F68 CAVIT/UNDERL'

  Note: The pauses are not faults, consequently the do not generate a fault code and they will not be stored in the fault history.

- **Faults of Pumps Program:** That means the drive or installation faults that have been configured from the pump program. In case of any of these conditions occur, the motor controlled by the drive will stop, followed by the fixed pumps and the display will show the corresponding fault message. These fault will be treated in the same way than the general faults, some of them are:
  - **High Pressure Fault:** It can be provoked through a digital input which has been configured in this mode or by comparison of the received data of an analogue input. This information will be compared with the setting realized in parameters G25.6.11 to G25.6.13. The display will show 'F66 HI PRESSURE'.
  - **Low Pressure Fault:** Pipe broken possibility. The display will show 'F65 LOW PRESSURE'.
  - **No Water Fault:** This is especially useful in the use of level proves at wells. The display will show 'F67 LOW WATER'.
  - **Short Starting Cycle Fault:** Produced when the drive tries to start before the established time between a start and a stop has expired. For additional information, see G25.6.20. In this case, the display will show 'F71 CYCLING'.
  - **Irrigation Equipment Fault:** Produced by a digital input configured for this objective. The display will show 'F70 IRRIGATOR F'.
  - **No Flow Fault:** Produced by a digital input configured in this option. The display will show 'F69 FLOW SWITCH'.
  - **Cavitation:** Produced by operation on underload conditions. The display will show 'F68 CAVIT/UNDERL'.
  - **Pressure Switch:** (Only with Priming pump). The Pressure switch is open out of the allowed time, indicating a sudden pressure loss. The display will show 'F72 IN PRES SW'.

3.6.4. Inputs Configuration.

For inputs configuration, it is necessary to consider some rules which will help in order to get a correct system configuration.

- **Digital input for flow acquisition by pulse counter.**
  All digital input can be configured in this option '51 FLOW PULSE'. The parameters for setting the flowmeter are located in the subgroup G4.4 Pulses Input.
  The read flow can be used to limit the flow of the application, see group G25.10 Flow Limitation Algorithm. An analogue output can be configured to show this information (by setting the option '20 CURRENT FLOW'), in this way this information can be used for the PLC or even can be connected to the drive as a feedback signal in PID mode without needing the use of external converter of pulses signal into 4-20mA signal.

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

  There are some configuration options available when the pump program is active, which can be set in the same way that the options available in the standard program.
  Nevertheless, when the pump program is active, the drive will assume that only the configurable options from 50 to 69 (for G4.1.5 to G4.1.10) can be set, without taking into consideration the setting on parameter 'G4.1.4 DIGIT I MODE', which means a block setting.

  All that means that the user will configure the pump program freely, according to his requirements, selecting the correct functionality and protections.

  The options for inputs configuration, standard program options as well as pump program options have been detailed in the corresponding group G4.1 Digital Inputs.

3.6.5. Inputs Configuration Rules.

It is necessary to have into consideration the following rules for a correct digital input configuration when the Pump Program is active:

- **Mutual Exclusion Rule:**
  - If the pump program is deactivated, the user can only set options from 0 to 24 for the digital inputs, which are options for functionalities related to the standard program.
  - If the pump program is active, the user can only set options from 50 to 75 for the digital inputs, which are options for functionalities related to the pump program.
- **System Start Terminal Rule (Automatic):**

  To ensure the start and the stop of the system, the user must first of all configure one of the digital inputs as option '50 PMP START/STP'. On the contrary, the drive does not allow configuring any other option. Once this is done, it is possible to configure the resting inputs as necessary (respecting always the configuration rules).
- **Rule for Multiple References Selection:**

  With the pump program is possible to operate using up to 8 different regulation setpoints in PID mode (settable in G25.1.5 to G25.1.12). To active each different setpoint 3 digital inputs configured as options 63, 64 and 65 can be used. It is necessary to take into consideration the following items:
  - No Digital Input could be configured as '64 SETPONT PIN2' unless previously other different input has been configured as '63 SETPONT PIN1'.
  - No Digital Input could be configured as '65 SETPONT PIN3' unless previously two different inputs have been configured as options '63 SETPONT PIN1' and '64 SETPONT PIN2'.

- **Rule for Selection / De-selection of Auxiliary Pumps:**

  For selecting one auxiliary pump it is necessary to act in the following way:
  - Set any digital input to options '52 FIX PUMP1 FLT', '53 FIX PUMP2 FLT', '54 FIX PUMP3 FLT', '55 FIX PUMP4 FLT' or '56 FIX PUMP5 FLT'.
  - To enable the control of the pump in the corresponding parameter G25.9.1, G25.9.2, G25.9.3, G25.9.4 and G25.9.5 respectively.

  To remove this fixed pump configuration and release the relay for another different use, it is necessary to:
  - To disable the control of the pump in the corresponding parameter G25.9.1, G25.9.2, G25.9.3, G25.9.4 and G25.9.5 respectively.

3.6.6. Outputs Configuration.

Regarding to the outputs, it is useful to take into account some considerations which will help you for the correct configuration of the system.

- **Digital outputs.**

  There are some configuration options for the outputs that are only available if the pump program is operative, but they cannot be used in the standard program: '28 PUMP CNTRL', '29 JOCKEY PUMP' and '30 PRIMING PUMP'. The needed information has been detailed in the corresponding group G8.1 Digital Outputs.

- **Analogue outputs.**

  The options available in the standard program can also be used for the pump program, and additionally the option ’20 CURRENT FLOW’, that can be configured to provide the read flow at any of the analogue output formats.

  - Example 1 for configuring the analogue output as read flow.

    In case the flowmeter data configured in G4.4 are:
    Units: litres
    Pulses / second: 100l/s
    Maximum Range: 1000 litres
    Analogue output setting:
    Format: 0 – 10V
    Minimum Range: 0
    Maximum Range: 100%
    For a read flow of 500 litres, the analogue output will be:

$$x = \frac{\text{Read value} * 10V}{\text{Maximum Range}} = \frac{500 * 10}{1000} = 5V$$

  - Example 2 for configuring the analogue output as read flow.
    If the flowmeter data configured in G4.4 are:
    Units: litres
    Pulses / second: 100l/s
    Maximum Range: 1000 litres
    Analogue output setting:
    Format: 4 – 20mA
    Minimum Range: 0
    Maximum Range: 100%
    For a read flow of 500 litres, the analogue output is:

$$x = \left(\left(\frac{ReadValue}{MaximumRange} \right) * (20 - 4) \right) + 4 = \left(\left(\frac{500}{1000} \right) * 16 \right) + 4 = 12mA$$

Additionally, it exists the option 27, that it is not directly settable by the user for any of the analogue outputs. On the contrary, this option is automatically set for the program to the Analogue Output 1 in case of the user enables the Fixed Pump 4, and it will be automatically set for the Analogue Output 2 when the user enables the Fixed Pump 5. For both outputs, the format configuration will always be 0 to 10V, where 0 means the Pump is OFF and 10V means the Pump is ON.

3.6.7. Subgroup 25.1 – S25.1: Setpoints

<table>
<tr><th>Parameter</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>1 CONTROL MODE=1</td><td>G25.1.1 / Control mode</td><td>0 – 1</td><td>It allows to select the control mode according to the following information:
<table>
<tr><th>OPT.</th><th>DESCRIPTION</th><th>FUNCTION</th></tr>
<tr><td>0</td><td>MANUAL</td><td>To be used in the commissioning and tests. It is not thought to be used in permanent operation since the protections are not enabled. In this way the display will show ‘OVERRIDE MANUAL’
With this option it is necessary to operate from the keypad, but the speed reference can be entered using an analogue input or by keypad.</td></tr>
<tr><td>1</td><td>PUMP</td><td>The drive will start in pump control mode. Selection of automatic operation in regulation mode (it allows to control flow, pressure).</td></tr>
</table></td><td>YES</td></tr>
<tr><td>2 MAN SPD REF= LOCAL</td><td>G25.1.2 / Source selection for speed reference in manual mode</td><td>LOCAL
AI1
AI2</td><td>It allows to select the source for the manual speed reference when the digital input configured as ‘MANUAL PROTECTED’ or the ‘OVERRIDE MANUAL’ are closed according to the following table:
<table>
<tr><th>OPT.</th><th>FUNCTION</th></tr>
<tr><td>LOCAL</td><td>Speed reference entered by keypad</td></tr>
<tr><td>AI1</td><td>Reference by Analogue Input 1</td></tr>
<tr><td>AI2</td><td>Reference by Analogue Input 2</td></tr>
</table></td><td>YES</td></tr>
<tr><td>3 MAN SPEED=+0.0%
MANUAL SPEED</td><td>G25.1.3 / Value of speed reference for LOCAL source in manual mode</td><td>-250% to +250%</td><td>It is set as % of the motor speed.
This parameter allows to set the value of the speed reference in manual mode (protected or not) whether the speed reference is the main reference or the alternative reference, always that we talk about LOCAL mode. For that reason, it is possible to select one analogue input as main speed reference in G25.1.2 (AI1) and configure one alternative speed reference by keypad in G25.1.4 setting this parameter to ‘LOCAL’. For example, when the digital input configured as Alternative Manual Speed is activated, the speed of the main pump will be the value set in this parameter by keypad. This functionality is interchangeable between main and alternative speed references, that means, we can select the main speed reference by analogue input and the alternative by keypad and vice versa.</td><td>YES</td></tr>
<tr><td>4 ALT MAN S R=LOCAL</td><td>G25.1.4 / Source for the Alternative speed reference in manual mode</td><td>LOCAL
AI1
AI2</td><td>It allows to select the source for the alternative speed reference between the keypad or the analogue inputs, according to the following table:
<table>
<tr><th>OPT.</th><th>FUNCTION</th></tr>
<tr><td>LOCAL</td><td>Speed reference introduced by keypad</td></tr>
<tr><td>AI1</td><td>Reference by Analogue Input 1</td></tr>
<tr><td>AI2</td><td>Reference by Analogue Input 2</td></tr>
</table></td><td>NO</td></tr>
</table>

<table>
<tr><th>Parameter</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>5 SETPT1=0.0Bar
LOCAL SETPOINT 1</td><td>G25.1.5 / Local setpoint 1 for PID</td><td rowspan="8">0 – 3276 Engineering Units</td><td rowspan="8">In case of operation with only one local setpoint for PID, the value will be the set value in G25.1.5.
The applied speed in each case will depend on the activation status of the digital inputs configured as options '63 SETPONT PIN1', '64 SETPONT PIN2' and '65 SETPONT PIN3'.

The assigned speed will be done according to the attached table:

<table><tr><th colspan="3">DIGITAL INPUTS</th><th rowspan="2">PID SETPOINTS</th></tr><tr><th>DI(z)=65</th><th>DI(y)=64</th><th>DI(x)=63</th></tr><tr><td>0</td><td>0</td><td>0</td><td>G25.1.5 'SETPT1'</td></tr><tr><td>0</td><td>0</td><td>X</td><td>G25.1.6 'SETPT2'</td></tr><tr><td>0</td><td>X</td><td>0</td><td>G25.1.7 'SETPT3'</td></tr><tr><td>0</td><td>X</td><td>X</td><td>G25.1.8 'SETPT4'</td></tr><tr><td>X</td><td>0</td><td>0</td><td>G25.1.9 'SETPT5'</td></tr><tr><td>X</td><td>0</td><td>X</td><td>G25.1.10 'SETPT6'</td></tr><tr><td>X</td><td>X</td><td>0</td><td>G25.1.11 'SETPT7'</td></tr><tr><td>X</td><td>X</td><td>X</td><td>G25.1.12 'SETPT8'</td></tr></table>
Note: It is possible to operate with the following units %, l/s, m/s, l/min, m³/min, l/h, m³/h, m/s, m/min, m/h, Bar, KPa, Psi, m, ºC, ºF, ºK, Hz, rpm. It depends on the units of the sensor used.</td><td>YES</td></tr>
<tr><td>6 SETPT2=0.0Bar
LOCAL SETPOINT 2</td><td>G25.1.6 / Local setpoint 2 for PID</td><td>YES</td></tr>
<tr><td>7 SETPT3=0.0Bar
LOCAL SETPOINT 3</td><td>G25.1.7 / Local setpoint 3 for PID</td><td>YES</td></tr>
<tr><td>8 SETPT4=0.0Bar
LOCAL SETPOINT 4</td><td>G25.1.8 / Local setpoint 4 for PID</td><td>YES</td></tr>
<tr><td>9 SETPT5=0.0Bar
LOCAL SETPOINT 5</td><td>G25.1.9 / Local setpoint 5 for PID</td><td rowspan="2">YES</td></tr>
<tr><td>10 SETPT6=0.0Bar
LOCAL SETPOINT 6</td><td>G25.1.10 / Local setpoint 6 for PID</td></tr>
<tr><td>11 SETPT7=0.0Bar
LOCAL SETPOINT 7</td><td>G25.1.11 / Local setpoint 7 for PID</td><td>YES</td></tr>
<tr><td>12 SETPT8=0.0Bar
LOCAL SETPOINT 8</td><td>G25.1.12 / Local setpoint 8 for PID</td><td>YES</td></tr>
<tr><td>13 T AutOFF=OFF
AUTO-OFF DELAY</td><td>G25.1.13 / Time for automatic stop</td><td>OFF,
0.1 – 99.9h</td><td>User can set a run time that once elapsed the drive will stop automatically. When set this time value starts to elapse immediately and the drive will stop once this time has expired. At that moment the parameter value becomes OFF and the status of the program will change to 'COMPLETED'. If you want to the drive to stop automatically again, you must reset the stop time.
There are two visualization parameters related with this parameter:
'SV5.22 T AutOFF= OFF' it is directly the G25.1.13, translated to the visualization group SV5.
'SV5.23 TIME OFF= OFF' that shows the remaining time in minutes for the automatic stop of the system.</td><td>YES</td></tr>
<tr><td>14 Comms Cntrol= N</td><td>G25.1.14 / Communications Control</td><td>Y
N</td><td>In order to be capable of starting and stopping the drive from communications. Either via field bus or GSM-Modem (with graphic display).</td><td>. YES</td></tr>
</table>

3.6.8. Subgroup 25.2 – S25.2: PID Setting

<table>
<tr><th>Parameter</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>1 PID SETP=LOCAL</td><td>G25.2.1 / PID setpoint source</td><td>LOCAL
AI1
AI2</td><td>Selects the input source for the PID setpoint. See the following table:<table><tr><th>OPT.</th><th>FUNCTION</th></tr><tr><td>LOCAL</td><td>Reference signal from keypad.</td></tr><tr><td>AI1</td><td>Reference signal from Analogue Input 1.</td></tr><tr><td>AI2</td><td>Reference signal from Analogue Input 2.</td></tr></table></td><td>NO</td></tr>
<tr><td>2 PID aSTP=LOCAL</td><td>G25.2.2 / Alternative PID setpoint source</td><td>LOCAL
AI1
AI2</td><td>Selects the input source to introduce the alternative PID setpoint. See the following table:<table><tr><th>OPT.</th><th>FUNCTION</th></tr><tr><td>LOCAL</td><td>Reference signal from keypad.</td></tr><tr><td>AI1</td><td>Reference signal from Analogue Input 1.</td></tr><tr><td>AI2</td><td>Reference signal from Analogue Input 2.</td></tr></table></td><td>NO</td></tr>
<tr><td>3 PID FBK=AI2</td><td>G25.2.3 / PID feedback source</td><td>AI1
AI2
PULSE</td><td>Selects the input source for the system feedback signal. See the following table:<table><tr><th>OPT.</th><th>FUNCTION</th></tr><tr><td>AI1</td><td>Feedback signal from Analogue Input 1.</td></tr><tr><td>AI2</td><td>Feedback signal from Analogue Input 2.</td></tr><tr><td>PULSE</td><td>Pulses from programmable digital input.</td></tr></table></td><td>NO</td></tr>
<tr><td>4 PID Kc=1.0
PROPORTIONAL PID</td><td>G25.2.4 / Proportional gain of PID regulator</td><td>0.1 – 20</td><td>Allows the user to set the proportional gain value of the PID. If it is necessary to have a higher control response, then increase this value.
Note: If this value is increased too much, a higher instability can be introduced in the system.</td><td>NO</td></tr>
<tr><td>5 PID It=5.0s
INTEGRAL PID</td><td>G25.2.5 / Integral time of PID regulator</td><td>0.1 – 999.9s, Max.</td><td>Allows the user to set the integral time of the PID. If you need a higher accuracy you should increase this value.
Note: As this value is increased the system response will slow.</td><td>YES</td></tr>
<tr><td>6 PID Dt=0.0s
DIFFERENTIAL PID</td><td>G25.2.6 / Derivation time of PID regulator</td><td>0.0 – 250s</td><td>Allows the user to set the derivative time of the PID. A higher system response can be achieved by increasing this value.
Note: If this value is increased too much accuracy can be reduced slightly.
Note: We recommend do not modify this value since the default setting is suitable for most pump applications.</td><td>YES</td></tr>
<tr><td>7 PID ERR=+xx.x%</td><td>G25.2.7 / Error of PID regulator</td><td>+0 to +100%</td><td>Displays the difference between the setpoint 'G25.2.1 PID SETP' and the process feedback signal 'G25.2.3 PID FBK' in percentage.</td><td>-</td></tr>
<tr><td>8 ERR=+xx.xxkPa</td><td>G25.2.8 / Error of PID regulator in engineering units</td><td>+0.0 to +3276
Engin. Units</td><td>Displays the difference between the reference 'G25.2.1 PID SETP' and the process feedback signal 'G25.2.3 PID FBK' in engineering units (Bar, kPa, m³/s, etc.)</td><td>-</td></tr>
<tr><td>9 PID INVERT=N</td><td>G25.2.9 / PID output inversion</td><td>N
Y</td><td>It is possible to get an inverse operation of the drive output in PID mode:<table><tr><th>OPT.</th><th>FUNCTION</th></tr><tr><td>N=NO</td><td>In this case, the PID response if the feedback decreases is an increasing of the output speed. This is the standard setting when the PID is used for an application of constant pressure control. If the pressure decreases (feedback) due to a higher demand, it is required to increase the pump speed to keep constant the pressure in the system.</td></tr><tr><td>Y=YES</td><td>In this case, the PID response when the feedback signal is falling down is a reduction of the output speed. For example, this operation is typical for a temperature control by means of PID mode. A reduction of the temperature (feedback) due to a lower demand requires that the speed of the fan is reduced to keep the temperature.</td></tr></table></td><td>YES</td></tr>
</table>

3.6.9. Subgroup 25.3 – S25.3: Start Conditions

Parameter	Name / Description	Range	Function	Set on RUN
1 LP Pon=0.0Bar AWAKENING LEVEL	**G25.3.1** / Wake up level of the drive	0.0 to 3276Bar	It allows setting the wake up level of the drive set as PID setpoint units. That means, if the PID setpoint is 5Bar and the set value in this parameter is 2Bar, then we are placing the wake up level below 3Bar (5Bar – 2Bar = 3Bar).	YES
2 FP SpON=+90.0% FIX PMP STAR SPD	**G25.3.2** / Start speed for the fixed pumps	-250% to +250%	It set the drive speed for above of which the fixed pumps will start. This is an optional condition that can be disabled. For that set here a value of 0%, in that way any speed for above of this it is able to start the pumps, that means, the speed of drive it is not considered to start the fixed pumps. This is equivalent to an obligation instead of a condition. It is set as % of the motor speed.	YES
3 FP ErON=+10.0% FIX PMP STAR ERR	**G25.3.3** / Minimum PID error to start the fixed pumps	OFF=0 to +200%	To set the PID error above of which the fixed pumps will start. It is also optional conditions that can be considered or not depending on the setting. This parameter, allows user the possibility of having into consideration the PID error (%) when the fixed pumps must be started. If the error is set to 0.0%, any value could start the fixed pumps.	YES
4 FP T1 ON=10s FIX PMP1 STR DLY	**G25.3.4** / Delay time to start fixed pump 1 (Relay 1)	OFF=0 to 6000	Set the delay time to start the fixed pump linked to the relay 1. **Note:** If time is too short, overpressure can be generated in the system. If time is too long, under-pressure can be generated.	YES
5 FP T2 ON=10s FIX PMP2 STR DLY	**G25.3.5** / Delay time to start fixed pump 2 (Relay 2)	OFF=0 to 6000	Set the delay time to start the fixed pump linked to the relay 2. **Note:** If time is too short, overpressure can be generated in the system. If time is too long, under-pressure can be generated.	YES
6 FP T3 ON=10s FIX PMP3 STR DLY	**G25.3.6** / Delay time to start fixed pump 3 (Relay 3)	OFF=0 to 6000	Set the delay time to start the fixed pump linked to the relay 3. **Note:** If time is too short, overpressure can be generated in the system. If time is too long, under-pressure can be generated.	YES
7 FP T4 ON=10s FIX PMP4 STR DLY	**G25.3.7** / Delay time to start fixed pump 4 (AO1)	OFF=0 to 6000	Set the delay time to start the fixed pump linked to the Analogue Output 1. **Note:** If time is too short, overpressure can be generated in the system. If time is too long, under-pressure can be generated.	YES
8 FP T5 ON=10s FIX PMP5 STR DLY	**G25.3.8** / Delay time to start fixed pump 5 (AO2)	OFF=0 to 6000	Set the delay time to start the fixed pump linked to the Analogue Output 2. **Note:** If time is too short, overpressure can be generated in the system. If time is too long, under-pressure can be generated.	YES

Note: General considerations for starting conditions. It must be take into account that, during the setpoint ramp, neither the conditions for the activation of the fixed pumps nor the conditions for sleep mode will be considered. Only when the drive is in regulation process (see G25.7.4 for additional information), those conditions will be evaluated.
During the bypass process (fixed pumps connection) these conditions will be omitted too.

3.6.10. Subgroup 25.4 – S25.4: Stop Conditions

Parameter	Name / Description	Range	Function	Set on RUN
1 LP T SLP=20s **DRIVE SLEEP DELY**	**G25.4.1** / Delay Time before activating sleep mode	OFF=0, 1 – 999s	This delay time is applicable to the following conditions: sleep speed, No Flow input, flow measurement and sleep current. If either of them is fulfilled, the time to activate the sleep mode will start elapsing. **Note:** The SD700 is configured to go to sleep according to the conditions of the installation as factory setting. Nevertheless, all of the parameters values described below have been checked according to each installation, to guarantee a correct functionality. If you do not want the equipment goes in sleep mode, these parameters must be checked and set for this purpose.	YES
2 SLPsp1=+40.0% **DRV SLEEP SPEED1**	**G25.4.2** / Sleep speed for local setpoint 1	+0.0 to +250%	It allows setting the sleep speed 1, below which the drive will go to sleep whenever local setpoint 1 is selected. It is set in % of motor speed.	YES
3 SLPsp2=+40.0% **DRV SLEEP SPEED2**	**G25.4.3** / Sleep speed for local setpoint 2	+0.0 to +250%	It allows setting the sleep speed 2, below which the drive will go to sleep whenever local setpoint 2 is selected. It is set in % of motor speed.	YES
4 SLPsp3=+40.0% **DRV SLEEP SPEED3**	**G25.4.4** / Sleep speed for local setpoint 3	+0.0 to +250%	It allows setting the sleep speed 3, below which the drive will go to sleep whenever local setpoint 3 is selected. It is set in % of motor speed.	YES
5 SLPsp4=+40.0% **DRV SLEEP SPEED4**	**G25.4.5** / Sleep speed for local setpoint 4	+0.0 to +250%	It allows setting the sleep speed 4, below which the drive will go to sleep whenever local setpoint 4 is selected. It is set in % of motor speed.	YES
6 SLPsp5=+40.0% **DRV SLEEP SPEED5**	**G25.4.6** / Sleep speed for local setpoint 5	+0.0 to +250%	It allows setting the sleep speed 5, below which the drive will go to sleep whenever local setpoint 5 is selected. It is set in % of motor speed.	YES
7 SLPsp6=+40.0% **DRV SLEEP SPEED6**	**G25.4.7** / Sleep speed for local setpoint 6	+0.0 to +250%	It allows setting the sleep speed 6, below which the drive will go to sleep whenever local setpoint 6 is selected. It is set in % of motor speed.	YES
8 SLPsp7=+40.0% **DRV SLEEP SPEED7**	**G25.4.8** / Sleep speed for local setpoint 7	+0.0 to +250%	It allows setting the sleep speed 7, below which the drive will go to sleep whenever local setpoint 7 is selected. It is set in % of motor speed.	YES
9 SLPsp8=+40.0% **DRV SLEEP SPEED8**	**G25.4.9** / Sleep speed for local setpoint 8	+0.0 to +250%	It allows setting the sleep speed 8, below which the drive will go to sleep whenever local setpoint 8 is selected. It is set in % of motor speed.	YES
10 FLsw ENA=N	**G25.4.10** / To enable the NO FLOW input to sleep the drive	N Y	It allows enabling or disabling the NO FLOW input to sleep the drive. It operates when the drive speed is below the speed set in G25.6.17 NO FLO/FILL=0.0%, above which, the NO FLOW input can only operate as protection (PAUSE, FAULT). If it has been enabled, by closing this input (activation of the NO FLOW input) and after elapsing the set delay time, the drive goes in sleep mode.	YES
11 FsI L=0.0l/s **FLOW SLEEP LEVEL**	**G25.4.11** / Flow level to sleep the drive	OFF=0.0 to 3276units	The flow will be monitored and when it is below the level set here, sleep time will start elapsing. Once elapsed this time, the equipment will go in sleep mode. So it allows setting the flow value or the flow read through the pulse or analogue input, below which, a situation of 'no demand' will be detected. This situation will send to sleep the drive. When this parameter is set to OFF, it will be disabled. The source of flow reading is set in G25.10.1.	YES

Parameter	Name / Description	Range	Function	Set on RUN
12 I SLEEP=xxxA CURR SLEEP LEVEL	**G25.4.12** / Output current level to sleep the drive	OFF=0 to 1229A	Output current will be monitored and when it is below the level set here, sleep time will start elapsing. Once elapsed this time, the equipment will go in sleep mode. So it allows setting the level of the output current, below which, a situation of 'no demand' will be detected. This situation will send to sleep the drive. When this parameter is set to OFF, it will be disabled. **Note**: The drive can go to sleep in all of the conditions simultaneously. Any fulfilled condition will begin the sleep delay time or will keep it active in case of the condition that began it disappears.	YES
13 FP erOFF=+0.0% FPUMP STOP ERROR	**G25.4.13** / Maximum PID error to stop the fixed pumps	-250% to +0.0%	It sets the PID error below which, fixed pumps will be stopped. Any error value more negative than the value set here will stop a fixed pump. This condition is optional. This parameter allows user the possibility of considering the PID error (%) at the moment of stopping the fixed pumps. Additionally, the drive speed and a stop delay time for each fixed pump (whenever you want) will be considered. **Note**: PID error conditions, delay time and speed are optional and can be configured to be considered or not, such as it has been explained for the starting conditions of fixed pumps.	YES
14 FP T1 OF=10s FPUMP1 STP DELAY	**G25.4.14** / Delay time to stop fixed pump 1 (Relay 1)	0 – 6000s	To set the delay time for the fixed pump assigned to the relay 1. **Note:** It time is too short, under-pressure could occur in the system. If time is too long overpressure could occur.	YES
15 FP T2 OF=10s FPUMP2 STP DELAY	**G25.4.15** / Delay time to stop fixed pump 2 (Relay 2)	0 – 6000s	To set the delay time for the fixed pump assigned to the relay 2. **Note:** It time is too short, under-pressure could occur in the system. If time is too long overpressure could occur.	YES
16 FP T3 OF=10s FPUMP3 STP DELAY	**G25.4.16** / Delay time to stop fixed pump 3 (Relay 3)	0 – 6000s	To set the delay time for the fixed pump assigned to the relay 3. **Note:** It time is too short, under-pressure could occur in the system. If time is too long overpressure could occur.	YES
17 FP T4 OF=10s FPUMP4 STP DELAY	**G25.4.17** / Delay time to stop fixed pump 4 (AO1)	0 – 6000s	To set the delay time for the fixed pump assigned to the Analogue Output 1. **Note:** It time is too short, under-pressure could occur in the system. If time is too long overpressure could occur.	YES
18 FP T5 OF=10s FPUMP5 STP DELAY	**G25.4.18** / Delay time to stop fixed pump 5 (AO2)	0 – 6000s	To set the delay time for the fixed pump assigned to the Analogue Output 2. **Note:** It time is too short, under-pressure could occur in the system. If time is too long overpressure could occur.	YES
19 SPD1of=+70.0% FPUMP STP SPEED1	**G25.4.19** / Stop speed 1 for one fixed pump	+0.0% to +250%	It sets the speed below which the drive must remain for stopping a fixed pump whenever the operating setpoint is the local setpoint 1 set in G25.1.5. If you want the speed condition is not considered for stopping the fixed pumps, you must set a value that will be always above the drive speed, so that, this condition is always fulfilled and therefore, it would stop being a condition. This is applicable to all of the selected setpoints.	YES
20 SPD2of=+70.0% FPUMP STP SPEED2	**G25.4.20** / Stop speed 2 for one fixed pump	+0.0% to +250%	It sets the speed below which the drive must remain for stopping a fixed pump whenever the operating setpoint is the local setpoint 2 set in G25.1.6.	YES
21 SPD3of=+70.0% FPUMP STP SPEED3	**G25.4.21** / Stop speed 3 for one fixed pump	+0.0% to +250%	It sets the speed below which the drive must remain for stopping a fixed pump whenever the operating setpoint is the local setpoint 3 set in G25.1.7.	YES
22 SPD4of=+70.0% FPUMP STP SPEED4	**G25.4.22** / Stop speed 4 for one fixed pump	+0.0% to +250%	It sets the speed below which the drive must remain for stopping a fixed pump whenever the operating setpoint is the local setpoint 4 set in G25.1.8.	YES
23 SPD5of=+70.0% FPUMP STP SPEED5	**G25.4.23** / Stop speed 5 for one fixed pump	+0.0% to +250%	It sets the speed below which the drive must remain for stopping a fixed pump whenever the operating setpoint is the local setpoint 5 set in G25.1.9.	YES

Parameter	Name / Description	Range	Function	Set on RUN
24 SPD6of=+70.0% **FPUMP STP SPEED6**	**G25.4.24** / Stop speed 6 for one fixed pump	+0.0% to +250%	It sets the speed below which the drive must remain for stopping a fixed pump whenever the operating setpoint is the local setpoint 6 set in G25.1.10.	YES
25 SPD7of=+70.0% **FPUMP STP SPEED7**	**G25.4.25** / Stop speed 7 for one fixed pump	+0.0% to +250%	It sets the speed below which the drive must remain for stopping a fixed pump whenever the operating setpoint is the local setpoint 7 set in G25.1.11.	YES
26 SPD8of=+70.0% **FPUMP STP SPEED8**	**G25.4.26** / Stop speed 8 for one fixed pump	+0.0% to +250%	It sets the speed below which the drive must remain for stopping a fixed pump whenever the operating setpoint is the local setpoint 8 set in G25.1.12.	YES
27 PIDiSL%=0.0% **PID INVE SLEEP %**	**G25.4.27** / Sleep level in inverse PID	0.0% to 250%	Level below which, the drive will sleep when the PID of the application is inverted (setting of G25.2.9 PID INVERT = Y). It is set in % of drive setpoint.	YES
28 SLEEP?=Y	**G25.4.28** / To enable sleep mode	N Y	This parameter operates together with option '31 SLEEP CONDIT' of parameter G8.1.1. User can disable the sleep option of the drive but a PLC receives the warning of fulfilled sleep conditions through the output relay configured with option '31' and stops the system. See option '31' in parameter G8.1.1. **OPT.** / **FUNCTION** N=NO / Sleep mode disabled. Y=YES / Sleep mode enabled.	YES
29 SLPspA=+40.0% **SLEP SPD STP ANA**	**G25.4.29** / Sleep speed when setpoint is introduced through AI	+0.0% to +250%	It allows setting the sleep speed 1 below which the drive will activate the sleep mode, whenever the setpoint is selected to be introduced through Analogue Input 1 or 2. It is adjusted as percentage of motor speed.	YES
30 GO SLEEP MO=N	**G25.4.30** / Go to sleep mode when conditions are fulfilled, without starting	N Y	If this parameter is set to 'YES': a) when the equipment receives the start command, b) when it returns from a pause (cavitation, high pressure, …), c) after resetting a fault, it checks if the line pressure is higher that the absolute level for waking up, calculated with setting of the parameter G25.3.1, and in this case, the drive go to sleep mode without starting. On the other hand, if the pressure is lower than that value (G25.3.1), or this parameter is set to 'NO', the drive normally starts. **OPT.** / **FUNCTION** N=NO / Disabled. Y=YES / Enabled.	YES

3.6.11. Subgroup 25.5 – S25.5: Speed Bypass

Parameter	Name / Description	Range	Function	Set on RUN
1 BY SPon=+70.0% **BYPASS ON SPEED**	**G25.5.1** / Speed bypass at the starting of fixed pumps	+0.0% to +250%	The drive speed will be forced to the value set in this parameter during the time set in G25.5.2 to avoid over-pressure situations at the starting of a fixed pump.	YES
2 BY T ON=10s **BYPASS ON DELAY**	**G25.5.2** / Time of speed bypass after starting fixed pumps	OFF=0 to 999s	During the time set here, the drive speed will be forced to the value set in G25.5.1 to avoid over-pressure situations at the starting of a fixed pump.	YES
3 BY SPof=+90.0% **BYPASS OFF SPEED**	**G25.5.3** / Speed bypass at the stopping of fixed pumps	+0.0 to +250%	The drive speed will be forced to the value set in this parameter during the time set in G25.5.4 to avoid under-pressure situations at the stopping of a fixed pump.	YES
4 BY T OFF=5s **BYPASS OFF DELAY**	**G25.5.4** / Time of speed bypass after stopping fixed pumps	OFF=0 to 999s	During the time set here, the drive speed will be forced to the value set in G25.5.3 to avoid under-pressure situations at the stopping of a fixed pump.	YES

3.6.12. Subgroup 25.6 – S25.6: Protection

<table>
<tr><th>Parameter</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>1 PAUSE/DEL=10s
DELAY AFTER PAUS</td><td>G25.6.1 / Delay time after protection pause</td><td>0 to 999s</td><td>It allows setting a delay time value before the drive starts after stopping by protection pause.
This delay time starts elapsing once the cause that produced the pause disappears. For example: A pause was generated due to an over-pressure. Once the over-pressure condition disappears, delay time set here will start elapsing and when this time is elapsed, the SD700 will start. This delay time will be applied to all of the pauses:
High pressure (analogue feedback), if it is set to PAUSE.
Cavitation, if it is set to PAUSE.
No Flow switch, if it is set to PAUSE.
Note: In case of ‘Cavitation’, when the equipment goes into Pause, it is stopped and, therefore, it is not possible to continue monitoring values, so that, as soon as the equipment stops, delay time starts elapsing and when this time is elapsed the equipment will start.</td><td>YES</td></tr>
<tr><td>2 CAVITATION=N</td><td>G25.6.2 / To enable cavitation protection</td><td>N
Y</td><td>It allows the possibility of protecting the pump from cavitation status.
<table><tr><th>OPT.</th><th>FUNCTION</th></tr><tr><td>N=NO</td><td>Cavitation protection disabled.</td></tr><tr><td>Y=YES</td><td>Cavitation protection enabled.</td></tr></table>To protect the pump by entering of cavitation status is necessary to follow the next steps:
Set this parameter to ‘YES’.
Set a cavitation current value (in G25.6.4) below which the first detection condition will be met.
Set a cavitation speed value (in G25.6.5) above which the second detection condition will be met.
Set a delay time to activate cavitation protection, once elapsed, last cavitation condition will be activated.
Set a pause time to deactivate cavitation protection. In that moment, drive will try to start again.
If three previous conditions are given, the drive will stop the pump to protect it from cavitation status (no water).</td><td>YES</td></tr>
<tr><td>3 CAV MODE=FAULT</td><td>G25.6.3 / Response from cavitation</td><td>PAUSE
FAULT</td><td>It allows selecting the drive response from a cavitation situation.
<table><tr><th>OPT.</th><th>FUNCTION</th></tr><tr><td>PAUSE</td><td>It will generate that the drive stops firstly, and next, the fixed pumps. ‘CAVITATION PAUSE’ will be displayed. Once elapsed the delay time after pause, the drive will start.</td></tr><tr><td>FAULT</td><td>It will generate a fault, and next, the fixed pumps will stop. In this case, the visualization will be ‘F68 CAVIT/UNDERL’.</td></tr></table></td><td>YES</td></tr>
<tr><td>4 CAV CURR=___A
CAVITATION CURRE</td><td>G25.6.4 / Cavitation current</td><td>(0.2 to 1.50)·In</td><td>Setting of the cavitation current below which the first detection condition to activate the protection is met. This parameter operates together with parameters G25.6.5 and G25.6.6. See note below.</td><td>YES</td></tr>
</table>

∗ This value depends on the drive size.

Note: To adjust cavitation parameters, Power Electronics recommends, whenever it is possible, follow the next steps:

- If the load is variable, adjust the application for the most frequent load value, for example, select a middle consumption for an irrigation water pump.
- Start the drive at manual speed.
- Set the drive speed to the minimum functional speed (minimum flow in case of pumps) or to the minimum operation level of your application.
- Make a note of the output current and the motor speed.
- Set the cavitation speed to the speed that you have made a note before.
- Set the cavitation current to 6% less than the current that you have made a note before.
- Set the desired activation time, for example, 10s.
- Check the system, if it is necessary, set the parameters for an optimum response again.

<table>
<tr><th>Parameter</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>5 CAV SPED=+100%
CAVITATION SPEED</td><td>G25.6.5 / Cavitation speed</td><td>+0.0% to +250%</td><td>Setting of the cavitation speed above which the second detection condition to activate the protection is met. This parameter operates together with parameters G25.6.4 and G25.6.6. See note in the previous footer.</td><td>YES</td></tr>
<tr><td>6 CAV DELAY=10s
CAVIT FLT DELAY</td><td>G25.6.6 / Delay time to activate cavitation protection</td><td>0 – 999s</td><td>Setting of the delay time to activate the cavitation protection. The drive will wait for this time before activating the protection and then will stop. This parameter operates together with parameters G25.6.4 and G25.6.5. See note in the previous footer.</td><td>YES</td></tr>
<tr><td>7 ENABLE LO PRE=N</td><td>G25.6.7 / To enable low pressure protection</td><td>N
Y</td><td>It allows the possibility of tripping because of low pressure fault 'F65 LOW PRESSURE' by stopping the pump.<table><tr><th>OPT.</th><th>FUNCTION</th></tr><tr><td>N=NO</td><td>Low pressure protection disabled.</td></tr><tr><td>Y=YES</td><td>Low pressure protection enabled.</td></tr></table></td><td>YES</td></tr>
<tr><td>9 LO PRE=5.0Bar
LO PRESSURE LEVL</td><td>G25.6.9 / Minimum pressure level</td><td>OFF=0 to 3276 Engineering units</td><td>Setting of the pressure level below which the equipment will trip because of low pressure fault.
Note: Default units of measurement which are displayed depend on the selected engineering units.</td><td>YES</td></tr>
<tr><td>10 Lop DLY=10.0s
LO PRESS FLT DLY</td><td>G25.6.10 / Trip delay time because of minimum pressure fault</td><td>0 – 999s</td><td>During the delay time set here, the pressure remains below the minimum pressure level set in G25.6.9 generating a drive trip because of low pressure fault 'F65 LOW PRESSURE'.
Note: The minimum pressure protection is deactivated during pipe filling process. If a pipe is broken during the pipe filling process or when the drive is stopped, then the pipe filling process does not finish by reached pressure, but by time. Once finished the stage of pipe filling, the breakage detection will be activated and will trip after elapsing the set time. Additionally, it is necessary to consider, if enabled fixed pumps exist, these ones must be connected for the minimum pressure conditions are evaluated, otherwise, the drive executes the normal connection process of pumps before tripping by minimum pressure.</td><td>YES</td></tr>
<tr><td>11 Lop Msp=+0.0%
LO PRESS MIN SPED</td><td>G25.6.11 / Minimum speed for minimum pressure fault</td><td>+0.0% to +250%</td><td>It sets a minimum speed for the minimum pressure fault ‘F65 LOW PRESSURE’ (Possible broken pipe). Although Hardware or Software conditions exist (favourable comparison) to trip by minimum pressure fault, the trip is not produced while the present motor speed is not lower than the speed set in this parameter, if any of the enabled fixed pumps is not started either. In short, it is an additional safety measurement to guarantee the broken pipe detection with a higher reliability. It is set in % of motor rated speed.</td><td>YES</td></tr>
<tr><td>12 HP MODE=PAUSE</td><td>G25.6.12 / Response from over-pressure</td><td>PAUSE
FAULT</td><td>It allows selecting the drive response from an over-pressure situation.<table><tr><th>OPT.</th><th>FUNCTION</th></tr><tr><td>PAUSE</td><td>It will generate the stopping of the drive, and next, the fixed pumps. ‘HI PRESSURE PAUS’ will be visualized. Once the high pressure condition disappears, if the delay time after pause has elapsed, the drive will start.</td></tr><tr><td>FAULT</td><td>It will cause a fault and next, the fixed pumps will be stopped. In this case, ‘F66 HI PRESSURE’ will be visualized.</td></tr></table></td><td>YES</td></tr>
<tr><td>13 HP LEV=100Bar
HIGH PRESS LEVEL</td><td>G25.6.13 / Maximum pressure level</td><td>0 – 3276 Engineering units</td><td>It allows setting the high pressure level above which the drive recognises a level of high pressure by comparing with data received through analogue input (reading of PID feedback sensor). Once exceeded the detection threshold and elapsed the time set in G25.6.14, the drive will stop by PAUSE or will trip by FAULT, according to the setting realized in G25.6.12.</td><td>YES</td></tr>
<tr><td>14 Hlpr DLY=0.0s
HI PRESS FLT DLY</td><td>G25.6.14 / Trip time because of high pressure</td><td>0 to 999s</td><td>Setting of the trip time by high pressure. Once exceeded the detection level set in G25.6.13 and elapsed the time set here, the drive will stop by PAUSE or will trip by FAULT according to the setting realized in G25.6.12.</td><td>YES</td></tr>
</table>

<table>
<tr><th>Parameter</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>15 FLO SWm=PAUSE</td><td>G25.6.15 / Response from No Flow situation</td><td>PAUSE
FAULT</td><td>It allows selecting the drive response from No Flow detection situation.<table><tr><th>OPT.</th><th>FUNCTION</th></tr><tr><td>PAUSE</td><td>It will generate the stopping of the drive, and next, the fixed pumps. ‘NO FLOW’ will be visualized. Once the no flow condition disappears, if the delay time after pause has elapsed, the drive will start.</td></tr><tr><td>FAULT</td><td>It will cause a fault and next, the fixed pumps will be stopped. In this case, ‘F69 FLOW SWITCH’ will be visualized.</td></tr></table></td><td>YES</td></tr>
<tr><td>16 NO FLO/FILL=N</td><td>G25.6.16 / To enable No Flow switch during pipe filling process</td><td>N
Y</td><td>It allows enabling or disabling No Flow switch to stop the drive during pipe filling process, according to the mode selected in G25.6.14 (PAUSE or FAULT).<table><tr><th>OPT.</th><th>FUNCTION</th></tr><tr><td>N=NO</td><td>The drive will ignore No Flow input during pipe filling process.</td></tr><tr><td>Y=YES</td><td>The drive considers No Flow input during pipe filling process to stop.</td></tr></table></td><td>YES</td></tr>
<tr><td>17 NO FLsp=+0.0%
NO FLOW MIN SPED</td><td>G25.6.17 / Minimum stop speed because of No Flow detection</td><td>+0.0 to +250%</td><td>Setting of a minimum stop speed of the drive when No Flow situation is detected. When the motor speed is higher than the level set here, the No Flow switch can generate a stopping by PAUSE or by FAULT, if the other conditions above mentioned are fulfilled. On the other hand, when the drive speed is lower than the level set here, the No Flow switch can generate that the drive goes to sleep, whenever the other needed conditions to activate the sleep mode are met. Therefore, when the drive speed is lower than the level set here, the equipment will check the setting of the parameter ‘G25.4.10 FLsw ENA ’. If the setting is YES, then the equipment will sleep if the other conditions are met.</td><td>YES</td></tr>
<tr><td>18 NO FLbyp=0.0s
NO FLO BYPAS DLY</td><td>G25.6.18 / Bypass time for No Flow switch</td><td>0.0 to 999s</td><td>During this time the No Flow input is ignored.
This time has only sense elapsed from the starting of the drive, whenever the pipe filling process is not activated.
If the filling option is activated, then the SD700 will check the setting of the parameter ‘G25.6.16 NO FLO/FILL’ before.
If this parameter is set to YES, then No Flow option is active during the pipe filling process. In this case, the bypass time will be counted although pipe filling process is active.
On the other hand, if this parameter is set to NO, the No Flow option is not activated during the pipe filling process. In this case, the bypass time will start elapsing after pipe filling process finishes.</td><td>YES</td></tr>
<tr><td>19 NO FLdly=0.0s
NO FLOW FLT DLY</td><td>G25.6.19 / Trip delay time because of No Flow</td><td>0.0 to 999s</td><td>It sets the delay time from the No Flow switch is opened to the drive stops. In case of the bypass delay time is also configured, both delay times will be considered.</td><td>YES</td></tr>
<tr><td>20 CYCLE TI=0m
CYCLE RESET DELY</td><td>G25.6.20 / Cycle time of the drive</td><td>OFF=0 to 99m</td><td>Setting of the time that must elapse from the SD700 stops to starts again, for the cycle counter G25.6.21 is reset.
This function is a protection from situations where keeping the pressure level is difficult for the drive and, for example, the drive goes to sleep and wakes up immediately (a faulty check valve, incorrect setting of the parameters or problems with measurement sensor). This function also will operate together with cavitation protection avoiding that the drive pump is starting and stopping continuously in cavitation pauses.
If the drive starts a number of times without relaxing for the time set here, then it will trip by ‘F71 CYCLING’, also stopping the fixed pumps.</td><td>YES</td></tr>
<tr><td>21 CYCLE CNT=5
MAX CYCLES ALLOW</td><td>G25.6.21 / Cycle counter</td><td>1 to 5</td><td>Setting of the maximum allowed cycles without relaxing. If this number is exceeded, trip will be generated.
Note: Go to sleep and wake up is also considered a cycle.</td><td>YES</td></tr>
</table>

3.6.13. Subgroup 25.7 – S25.7: Pipe filling / Setpoint Ramp

Parameter	Name / Description	Range	Function	Set on RUN
1 PRESSU SOU=PID	**G25.7.1** / Pressure reading source	PID AI1 AI2	It allows selecting the source of the pressure reading for parameter G25.7.3. See the following table: **OPT.** / **FUNCTION** PID – Pressure reading from feedback signal of the PID AI1 – Pressure reading from Analogue Input 1 AI2 – Pressure reading from Analogue Input 2	NO
2 FILL SP=+70.0% **PIPE FILLING SPD**	**G25.7.2** / Speed for pipe filling process	OFF=0.0, +0.1 to +250%	It sets the reference speed during the pipe filling process.	YES
3 FILL P=2.0Bar **PFILL END PRESSU**	**G25.7.3** / Pressure for the end of pipe filling process	0.0 – 3276 Engineering Units	It sets the pressure that determines the end of the pipe filling process. The sleep function of the drive is disabled during pipe filling process. Once the pipe filling process has finished, the drive goes to the stage of setpoint ramp. **Note:** Default units of measurement which are displayed depend on the selected engineering units.	YES
4 FILL TIM=15m **PFILL END DELAY**	**G25.7.4** / Safety time for pipe filling process	OFF=0, 1 – 9999min	Setting of a safety time to force the end of the pipe filling process. The condition that is met before (pressure or time) will force the end of the pipe filling process, changing the equipment from the filled status (FILL) to setpoint ramp (RAMP). **Note:** If this time is set to '0', the drive will not execute the pipe filling process.	YES
5 SPT RAMP=1.0Bar / s	**G25.7.5** / Setpoint ramp	0.01 – 320.00 Engineering Units / s	Setting of the ramp applied to increase the setpoint. After finishing the pipe filling process, or if this process has not been realized from the beginning, or if the drive has just waking up, the drive will adjust the setpoint value to the present value of the feedback signal provisionally. Then, the setpoint will be increased according to the ramp set in this parameter up to a 5% below the real setpoint selected by user. In that moment, the real regulation will start. During the setpoint ramp, the drive cannot go to sleep by no demand. By setting a slow setpoint ramp, a smooth increase of the motor speed is get. **Note:** Default units of measurement which are displayed depend on the selected engineering units.	YES

3.6.14. Subgroup 25.8 – S25.8: Setpoint Compensation due to Pressure Loss

Parameter	Name / Description	Range	Function	Set on RUN
1 COMP 1=0.0Bar **SETPOINT COMPEN1**	**G25.8.1** / Compensation pressure at the starting of 1 fixed pump	0.0 – 3276 Engineering units	Allows automatic compensation of the system setpoint to prevent pressure loss in the pipe when 1 fixed speed pump is started. **Note:** Default units of measurement which are displayed depend on the selected engineering units.	YES
2 COMP 2=0.0Bar **SETPOINT COMPEN2**	**G25.8.2** / Compensation pressure at the starting of 2 fixed pumps	0.0 – 3276 Engineering units	Allows automatic compensation of the system setpoint to prevent pressure loss in the pipe when 2 fixed speed pumps are started. **Note:** Default units of measurement which are displayed depend on the selected engineering units.	YES
3 COMP 3=0.0Bar **SETPOINT COMPEN3**	**G25.8.3** / Compensation pressure at the starting of 3 fixed pumps	0.0 – 3276 Engineering units	Allows automatic compensation of the system setpoint to prevent pressure loss in the pipe when 3 fixed speed pumps are started. **Note:** Default units of measurement which are displayed depend on the selected engineering units.	YES
4 COMP 4=0.0Bar **SETPOINT COMPEN4**	**G25.8.4** / Compensation pressure at the starting of 4 fixed pumps	0.0 – 3276 Engineering units	Allows automatic compensation of the system setpoint to prevent pressure loss in the pipe when 4 fixed speed pumps are started. **Note:** Default units of measurement which are displayed depend on the selected engineering units.	YES
5 COMP 5=0.0Bar **SETPOINT COMPEN5**	**G25.8.5** / Compensation pressure at the starting of 5 fixed pumps	0.0 – 3276 Engineering units	Allows automatic compensation of the system setpoint to prevent pressure loss in the pipe when 5 fixed speed pumps are started. **Note:** Default units of measurement which are displayed depend on the selected engineering units.	YES

3.6.15. Subgroup 25.9 – S25.9: Fixed Pumps Control

<table>
<tr><th>Parameter</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>1 ENABLE PUMP1=N</td><td>G25.9.1 / To enable fixed pump associated to output relay 1</td><td>N
Y</td><td>When activating pump control the relay 1 is configured to '28 PUMP CNTRL', to control fixed pumps. If the pump 1 associated to this relay is not needed, we recommend you disable it from here. In this way, the relay can be configured for other uses.<table><tr><th>OPT.</th><th>FUNCTION</th></tr><tr><td>N=NO</td><td>To disable the fixed pump associated to the relay 1.</td></tr><tr><td>Y=YES</td><td>To enable the fixed pump associated to the relay 1. The relay is programmed to '28 PUMP CNTRL' and free-configuration is not allowed for it.</td></tr></table></td><td>YES</td></tr>
<tr><td>2 ENABLE PUMP2=N</td><td>G25.9.2 / To enable fixed pump associated to output relay 2</td><td>N
Y</td><td>When activating pump control the relay 2 is configured to '28 PUMP CNTRL', to control fixed pumps. If the pump 2 associated to this relay is not needed, we recommend you disable it from here. In this way, the relay can be configured for other uses.<table><tr><th>OPT.</th><th>FUNCTION</th></tr><tr><td>N=NO</td><td>To disable the fixed pump associated to the relay 2.</td></tr><tr><td>Y=YES</td><td>To enable the fixed pump associated to the relay 2. The relay is programmed to '28 PUMP CNTRL' and free-configuration is not allowed for it.</td></tr></table></td><td>YES</td></tr>
<tr><td>3 ENABLE PUMP3 =N</td><td>G25.9.3 / To enable fixed pump associated to output relay 3</td><td>N
Y</td><td>When activating pump control the relay 3 is configured to '28 PUMP CNTRL', to control fixed pumps. If the pump 3 associated to this relay is not needed, we recommend you disable it from here. In this way, the relay can be configured for other uses.<table><tr><th>OPT.</th><th>FUNCTION</th></tr><tr><td>N=NO</td><td>To disable the fixed pump associated to the relay 3.</td></tr><tr><td>Y=YES</td><td>To enable the fixed pump associated to the relay 3. The relay is programmed to '28 PUMP CNTRL' and free-configuration is not allowed for it.</td></tr></table></td><td>YES</td></tr>
<tr><td>4 ENABLE PUMP4=N</td><td>G25.9.4 / To enable fixed pump associated to analogue output 1</td><td>N
Y</td><td>When activating pump control and selecting digital input as ’55 FIX PUMP4 FLT’, and after enabling this parameter, the analogue output 1 is configured to '27 MACRO PUMP', to control fixed pumps. If the pump 4 associated to this analogue output is not needed, we recommend you disable it from here.
In this way, the analogue output can be configured for other uses.<table><tr><th>OPT.</th><th>FUNCTION</th></tr><tr><td>N=NO</td><td>To disable the fixed pump associated to the relay 4.</td></tr><tr><td>Y=YES</td><td>To enable the fixed pump associated to the Analogue Output 1. AO1 is programmed to '27 MACRO PUMP' and free-configuration is not allowed for it.</td></tr></table></td><td>YES</td></tr>
<tr><td>5 ENABLE PUMP5=N</td><td>G25.9.5 / To enable fixed pump associated to analogue output 2</td><td>N
Y</td><td>When activating pump control and selecting digital input as ’56 FIX PUMP5 FLT’, and after enabling this parameter, the analogue output 2 is configured to '27 MACRO PUMP', to control fixed pumps. If the pump 5 associated to this analogue output is not needed, we recommend you disable it from here.
In this way, the analogue output can be configured for other uses.<table><tr><th>OPT.</th><th>FUNCTION</th></tr><tr><td>N=NO</td><td>To disable the fixed pump associated to the relay 5.</td></tr><tr><td>Y=YES</td><td>To enable the fixed pump associated to the Analogue Output 2. AO2 is programmed to '27 MACRO PUMP' and free-configuration is not allowed for it.</td></tr></table></td><td>YES</td></tr>
</table>

<table>
<tr><th>Parameter</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>6 FP ALTER MOD=0</td><td>G25.9.6 / Alternation mode of fixed pumps</td><td>0 – 2</td><td>It allows selecting the alternation mode of the fixed pumps.
<table><tr><th>OPT.</th><th>DESCRIPTION</th><th>FUNCTION</th></tr><tr><td>0</td><td>LINEAR</td><td>The drive will always start the fixed pumps by following the same sequence 1, 2, 3 and will stop them in the same way 1, 2, 3 (no alternation).</td></tr><tr><td>1</td><td>CYCLE</td><td>The first pump to start will be the next one to the last stopped pump.</td></tr><tr><td>2</td><td>DUTY SHARE</td><td>The drive will try to make the operation times of all available pumps equal.</td></tr></table></td><td>YES</td></tr>
<tr><td>7 JPon P=0.0Bar
JOCKEY ON PRESS</td><td>G25.9.7 / Starting pressure of Jockey pump</td><td>0.0 – 3276 Engineering units</td><td>It sets a pressure level below which, the Jockey pump will start. During periods of very low demand (for example, tank filling process or opening of a couple of taps) the Jockey pump will start to cover this demand. This pump will only start if the drive is sleeping and additionally there is some relay configured in Jockey Pump mode. Consult configuration of the outputs for additional information.</td><td>YES</td></tr>
<tr><td>8 JPon DLY=20s
JOCKEY ON DELAY</td><td>G25.9.8 / Start delay time for Jockey pump</td><td>0 to 600s</td><td>It allows setting a delay time for the starting of Jockey pump. This time will start elapsing after the starting condition of this pump is met, this is, when the pressure is below the level set in G25.9.7.</td><td>YES</td></tr>
<tr><td>9 JPof P=0.0Bar
JOCKEY OFF PRESS</td><td>G25.9.9 / Stopping pressure of Jockey pump</td><td>0.0 – 3276 Engineering units</td><td>Setting of the level above which Jockey pump will stop. If the drive pump starts, then the Jockey pump will stop automatically although this stopping pressure is not reached.</td><td>YES</td></tr>
<tr><td>10 PRp BYP=300s
PRIM.PUM.BYP.DLY</td><td>G25.9.10 / Bypass time for Priming pump</td><td>0.1 – 6000s</td><td>Once stopped the Priming pump and started the drive, if the input configured as Pressure Switch is opened during this time, the fault ‘F72 IN PRES SW’ will be produced.
Note: The fault F72 is only produced if there is some relay configured as ’30 PRIMING PUMP’ and some digital input configured as ’69 PRESSUR SWITC’.</td><td>YES</td></tr>
<tr><td>11 PRp DLY=OFF
PRIM PUM FLTdly</td><td>G25.9.11 / Trip time of F72 during Priming pump is connected</td><td>OFF=0, 0.1 – 6000m</td><td>If the Priming pump is connected and this time has elapsed from the starting of the same one without detecting pressure in the pressure switch, the fault ‘F72 IN PRES SW’ will be produced.
Note: The fault F72 is only produced if there is some relay configured as ’30 PRIMING PUMP’ and some digital input configured as ’69 PRESSUR SWITC’.</td><td>YES</td></tr>
<tr><td>12 SUPPLY PUMP=0</td><td>G25.9.12 / Selection of Auxiliary Pump as Priming or Lift Pump</td><td>0 to 1</td><td>It allows selecting the operating of the auxiliary pump selected with configuring option for relay ‘30 PRIMING’:
<table><tr><th>OPT.</th><th>FUNCTION</th></tr><tr><td>0=PRIMING</td><td>The auxiliary pump starts before the drive pump, helps in the filling process of the aspiration and stops when this process is finished.</td></tr><tr><td>1=LIFT</td><td>The auxiliary pump starts before the drive pump, helps in the filling process of the aspiration and does not stop when this process is finished. The auxiliary pump stops when the main pump is stopped.</td></tr></table></td><td>YES</td></tr>
</table>

3.6.16. Subgroup 25.10 – S25.10: Flow Limitation Algorithm

<table>
<tr><th>Parameter</th><th>Name / Description</th><th>Range</th><th>Function</th><th>Set on RUN</th></tr>
<tr><td>1 FLOW SEL=PULSE</td><td>G25.10.1 / Flow reading source</td><td>AI1
AI2
PULSE</td><td>It selects the PID reference source of the instantaneous flow.
<table><tr><th>OPT.</th><th>FUNCTION</th></tr><tr><td>AI1</td><td>Reference from Analogue Input 1</td></tr><tr><td>AI2</td><td>Reference from Analogue Input 2</td></tr><tr><td>PULSE</td><td>Pulses from a programmable digital input</td></tr></table></td><td>YES</td></tr>
</table>

Parameter	Name / Description	Range	Function	Set on RUN
2 MAX FLOW=1000 l/s **MAX ALLOWED FLOW**	**G25.10.2** / Maximum allowed flow	0.0 – 3276 Engineering units	Setting of the maximum value of the allowed flow. When the flow value is higher than the value set in (G25.10.2 + G25.10.3), the flow control algorithm will be activated showing 'FLOW' as drive status. At this point, the pump speed reference will start to decrease by using the ramp set in G25.10.5. The speed reference will decrease until the present flow is lower than the value set in G25.10.2 minus the margin set in G25.10.3. In that moment, the speed will remain constant until the present flow is lower than the flow set in G25.10.4. From this moment on, the PID regulator will take up the control again, and the drive will start to regulate normally. **Note:** Default units of measurement which are displayed depend on the selected engineering units.	YES
3 OFFSET=+0% **OFFSET MAX FLOW**	**G25.10.3** / Offset percentage over maximum flow	+0% to +250%	Setting of the offset margin over the maximum allowed flow to activate the algorithm (measured as % of G25.10.2).	YES
4 FLO RES=+100% **FLOW RESET LEVEL**	**G25.10.4** / Flow percentage to reset algorithm	+0.0 to +100%	Setting of the flow level to reset the flow limitation algorithm. When the level of the instantaneous flow read in the source set in G25.10.1 is below the value set here, the flow limitation algorithm will give the PID the control. It will be measured as % of the range of AI1, AI2 or G4.4.3 in case of pulse signal.	YES
5 DECrat=+2.0% / s **FLOW DECEL RATE**	**G25.10.5** / Deceleration ramp during algorithm	+0.0 to +250% /s	Setting of the deceleration ramp to decrease the pump speed until the read flow is lower than the flow set as maximum minus the flow set as offset margin in G25.10.2 and G25.10.3.	YES
6 UNIT FLOW= l/s	**G25.10.6** / Units of measurement of instantaneous flow	-	Read only parameter that shows the units of measurement of the instantaneous flow set in 'G25.10.1 FLOW SEL '.	-

3.6.17. Subgroup 25.11 – S25.11: Registers (Read only)

Parameter	Name / Description	Range	Function	Set on RUN
1 P1 = -----0d -----0m	**G25.11.1** / Operated time by Pump 1	-	This subgroup shows the amount of minutes and days operated by each auxiliary pump. It is especially useful when the alternation mode 2 (DUTY SHARE) is used to check if the operated times by the auxiliary pumps are equal.	-
2 P2 = -----0d -----0m	**G25.11.2** / Operated time by Pump 2	-		-
3 P3 = -----0d -----0m	**G25.11.3** / Operated time by Pump 3	-		-
4 P4 = -----0d -----0m	**G25.11.4** / Operated time by Pump 4	-		-
5 P5 = -----0d -----0m	**G25.11.5** / Operated time by Pump 5	-		-
TIME RESTORE=N	**G25.11.9** / Reset counters	N Y	It resets the counters of the pumps. **OPT.** / **FUNCTION** N=NO – The counters of the pumps are not reset. Y=YES – All of the counters of the pumps will be reset.	NO

4. MODBUS COMMUNICATION

4.1. Remote Control Functions

ENABLE MACRO COMM CONTROL

Screen	**-**
Range	0 – 1
Modbus Address	**42419**
Modbus Range	0 to 1
Read / Write	YES
Set during RUN	NO, furthermore, it only can be activated when the pump macro is active
Description	It allows enabling the control of the drive (start and stop) when the pump macro is enabled.

HOST START/STOP MACRO CONTROL

Screen	**-**
Range	0 – 1
Modbus Address	**42420**
Modbus Range	0 to 1
Read / Write	YES
Set during RUN	Changes are only accepted when 42419 is “1”.
Description	It allows giving the start command (set to 1) and the stop command (set to 0) to the drive through communication network.

Operating Description

If there is not any digital input configured with option 75 (ALTERNATIVE MACRO CTRL):

- If parameter 42419 (Enables Control through communication network) is “1”, the drive only can be controlled through communication network (address 43420).
- If parameter 42419 (Enables Control through communication network) is “0”, the drive only can be controlled through digital inputs or in not protected manual mode from the display.

If there is any digital input configured with option 75 (ALTERNATIVE MACRO CTRL), and it is closed:

- If parameter 42419 (Enables Control through communication network) is “1”, the drive only can be controlled through communication network (address 43420).
- If parameter 42419 (Enables Control through communication network) is “0”, the drive cannot be started or stopped until the digital input is opened or the control through communication network is enabled.

If there is any digital input configured with option 75 (ALTERNATIVE MACRO CTRL), and it is opened:

- The drive only can be controlled by digital inputs or in not protected manual mode from the display. Changes in addresses 42419 and 42420 will be ignored.

4.2. Summary of Modbus Addresses

The parameters related to the pump macro and all the parameters included in the parameter group for pump control G25 are listed below. Modbus address and setting range in Modbus for each parameter appear in the following tables.

4.2.1. Programming Parameters

Parameter	Screen	Description	Address	Range	Modbus Range
G1.7	7 PROG= STANDAR	Program activation	-	STANDARD PUMP	-
G1.10.1	UPLOAD=N	Saves the parameters of the drive to the display.		N Y	
G1.10.2	DOWNLOAD=N	Saves the parameters of the display to the drive.		N Y	
G4.1.5	5 DIGITL IN 1=06	Multi-function Digital Input 1 configuration	**40032**	00 to 75	0 to 75
G4.1.6	6 DIGITL IN 2=00	Multi-function Digital Input 2 configuration	**40033**	00 to 75	0 to 75
G4.1.7	7 DIGITL IN 3=00	Multi-function Digital Input 3 configuration	**40034**	00 to 75	0 to 75
G4.1.8	8 DIGITL IN 4=00	Multi-function Digital Input 4 configuration	**40035**	00 to 75	0 to 75
G4.1.9	9 DIGITL IN 5=00	Multi-function Digital Input 5 configuration	**40036**	00 to 75	0 to 75
G4.1.10	10 DIGITL IN6=17	Multi-function Digital Input 6 configuration	**40037**	00 to 75	0 to 75
G4.4.1	1 Sensr U=l/s	Sensor units of Pulse Input	**40581**	% l/s m³/s l/m m³/m l/h m³/h m/s m/m m/h	0 to 9
G4.4.2	2 Pls/s = 100l/s	Flowmeter configuration	**40582**	0 to 32760 Flow Units	0 to 32760
G4.4.3	3 M Rng=1000l/s	Maximum range of flow meter	**40583**	0 to 32760 Flow Units	0 to 32760
G8.1.1	1 SEL RELAY 1=02	Selection of Relay 1 control source	**40362**	00 to 40	0 to 40
G8.1.5	5 SEL RELAY 2=03	Selection of Relay 2 control source	**40366**	00 to 40	0 to 40
G8.1.9	9 SEL RELAY 3=05	Selection of Relay 3 control source	**40370**	00 to 40	0 to 40
G8.2.1	1 ANLG OUT1=01	Mode selection for Analogue Output	**40342**	00 to 27	0 to 27
G8.2.6	6 ANLG OUT 2=02	Mode selection Analogue Output 2	**40347**	00 to 27	0 to '27
G12.1	1 AUTO RESET=N	Auto Reset	**40571**	N Y	0 to 1
G12.2	2 ATTEMP NUMBR=1	Number of Auto Reset attempts	**40572**	1 to 5	1 to 5
G12.3	3 R STR DEL=5s	Delay time before Auto Reset	**40573**	5 to 120s	5 to 120
G12.4	4 RS COUNT=15min	Reset time for the counter of Auto Reset attempts	**40574**	1 to 60min	1 to 60
G12.5	5 F1 AUTO RST=0	Selection of fault 1 to be reset	**40575**	0 to 25	0 to 25
G12.6	6 F2 AUTO RST=0	Selection of fault 2 to be reset	**40576**	0 to 25	0 to 25
G12.7	7 F3 AUTO RST=0	Selection of fault 3 to be reset	**40577**	0 to 25	0 to 25
G12.8	8 F4 AUTO RST=0	Selection of fault 4 to be reset	**40578**	0 to 25	0 to 25
G13.1	1 F0 NO FAULT	Register 1 of fault history	**40432**	-	-
G13.2	2 F0 NO FAULT	Register 2 of fault history	**40433**	-	-
G13.3	3 F0 NO FAULT	Register 3 of fault history	**40434**	-	-
G13.4	4 F0 NO FAULT	Register 4 of fault history	**40435**	-	-
G13.5	5 F0 NO FAULT	Register 5 of fault history	**40436**	-	-
G13.6	6 F0 NO FAULT	Register 6 of fault history	**40437**	-	-
G13.7	7 CLEAR FAULTS=N	G13.7 / Erase fault history	**40438**	N Y	0 to 1

Parameter	Screen	Description	Address	Range	Modbus Range
G25.1.1	1 CONTROL MODE=1	Control mode	**42035**	0 to 1	0 to 1
G25.1.2	2 MAN SPD REF= LOCAL	Source selection for speed reference in manual mode	**42041**	LOCAL AI1 AI2	0 to 2
G25.1.3	3 MAN SPEED=+0.0%	Value of speed reference for LOCAL source in manual mode	**42042**	-250% to +250%	-20480 to +20480
G25.1.4	4 ALT MAN S R=LOCAL	Source for the Alternative speed reference in manual mode	**42043**	LOCAL AI1 AI2	0 to 2
G25.1.5	5 SETPT1=0.0Bar	Local setpoint 1 for PID	**42151**	0 to 3276 Engineering Units	0 to 32760
G25.1.6	6 SETPT2=0.0Bar	Local setpoint 2 for PID	**42152**	0 to 3276 Engineering Units	0 to 32760
G25.1.7	7 SETPT3=0.0Bar	Local setpoint 3 for PID	**42153**	0 to 3276 Engineering Units	0 to 32760
G25.1.8	8 SETPT4=0.0Bar	Local setpoint 4 for PID	**42154**	0 to 3276 Engineering Units	0 to 32760
G25.1.9	9 SETPT5=0.0Bar	Local setpoint 5 for PID	**42155**	0 to 3276 Engineering Units	0 to 32760
G25.1.10	10 SETPT6=0.0Bar	Local setpoint 6 for PID	**42156**	0 to 3276 Engineering Units	0 to 32760
G25.1.11	11 SETPT7=0.0Bar	Local setpoint 7 for PID	**42157**	0 to 3276 Engineering Units	0 to 32760
G25.1.12	12 SETPT8=0.0Bar	Local setpoint 8 for PID	**42158**	0 to 3276 Engineering Units	0 to 32760
G25.1.13	13 T AutOFF=OFF	Time for automatic stop	**42044**	OFF; 0.1 to 99.9h	0 to 9999
G25.2.1	1 PID SETP=LOCAL	PID setpoint source	**42045**	LOCAL AI1 AI2	0 to 2
G25.2.2	2 PID aSTP=LOCAL	Alternative PID setpoint source	**42374**	LOCAL AI1 AI2	0 to 2
G25.2.3	3 PID FBK=AI2	PID feedback source	**42046**	AI1 AI2 PULSE	0 to 2
G25.2.4	4 PID Kc=1.0	Proportional gain of PID regulator	**42047**	0.1 to 20	1 to 200
G25.2.5	5 PID It=5.0s	Integral time of PID regulator	**42048**	0.1 to 999.9s, Max.	1 to 9999; 10000
G25.2.6	6 PID Dt=0.0s	Derivation time of PID regulator	**42049**	0.0 to 250s	0 to 2500
G25.2.7	7 PID ERR=+xx.x%	Error of PID regulator	**42050**	+0 to +100%	--32768 to 32768
G25.2.8	8 ERR=+xx.xxkPa	Error of PID regulator in engineering units	**42051**	+0.0 to +3276 Engineering Units	---32768 to 32768
G25.2.9	9 PID INVERT=N	PID output inversion	**42326**	N Y	0 to 1
G25.3.1	1 LP Pon=0.0%	Wake up level of the drive	**42064**	0.0 to 3276Bar	0 to 32760
G25.3.2	2 FP SpON=+90.0%	Start speed for the fixed pumps	**42055**	-250% to +250%	-20480 to +20480
G25.3.3	3 FP ErON=+10.0%	Minimum PID error to start the fixed pumps	**42056**	OFF=0 to +200%	0 to 16384
G25.3.4	4 FP T1 ON=10s	Delay time to start fixed pump 1 (Relay 1)	**42062**	OFF=0 to 6000s	0 to 60000
G25.3.5	5 FP T2 ON=10s	Delay time to start fixed pump 2 (Relay 2)	**42065**	OFF=0 to 6000s	0 to 60000
G25.3.6	6 FP T3 ON=10s	Delay time to start fixed pump 3 (Relay 3)	**42066**	OFF=0 to 6000s	0 to 60000
G25.3.7	7 FP T4 ON=10s	Delay time to start fixed pump 4 (AO1)	**42067**	OFF=0 to 6000s	0 to 60000
G25.3.8	8 FP T5 ON=10s	Delay time to start fixed pump 5 (AO2)	**42068**	OFF=0 to 6000s	0 to 60000
G25.4.1	1 LP T SLP=20s	Delay Time before activating sleep mode	**42306**	OFF=0; 1 to 999s	0 to 9990
G25.4.2	2 SLPsp1=+40.0%	Sleep speed for local setpoint 1	**42307**	+0.0 to +250%	0 to 20480
G25.4.3	3 SLPsp2=+40.0%	Sleep speed for local setpoint 2	**42308**	+0.0 to +250%	0 to 20480
G25.4.4	4 SLPsp3=+40.0%	Sleep speed for local setpoint 3	**42309**	+0.0 to +250%	0 to 20480
G25.4.5	5 SLPsp4=+40.0%	Sleep speed for local setpoint 4	**42310**	+0.0 to +250%	0 to 20480
G25.4.6	6 SLPsp5=+40.0%	Sleep speed for local setpoint 5	**42311**	+0.0 to +250%	0 to 20480

Parameter	Screen	Description	Address	Range	Modbus Range
G25.4.7	7 SLPsp6=+40.0%	Sleep speed for local setpoint 6	**42312**	+0.0 to +250%	0 to 20480
G25.4.8	8 SLPsp7=+40.0%	Sleep speed for local setpoint 7	**42313**	+0.0 to +250%	0 to 20480
G25.4.9	9 SLPsp8=+40.0%	Sleep speed for local setpoint 8	**42314**	+0.0 to +250%	0 to 20480
G25.4.10	10 FLsw ENA=N	To enable the NO FLOW input to sleep the drive	**42323**	N Y	0 to 1
G25.4.11	11 Fsl L=0.0l/s	Flow level to sleep the drive	**42324**	OFF=0.0 to 3276Uds	0 to 32760
G25.4.12	12 I SLEEP=xxxA	Output current level to sleep the drive	**42325**	OFF=0 to 1229A	0 to 12290
G25.4.13	13 FP erOFF=+0.0%	Maximum PID error to stop the fixed pumps	**42072**	-250% to +0.0%	-20480 to 0
G25.4.14	14 FP T1 OF=10s	Delay time to stop fixed pump 1 (Relay 1)	**42073**	0 to 6000s	0 to 60000
G25.4.15	15 FP T2 OF=10s	Delay time to stop fixed pump 2 (Relay 2)	**42077**	0 to 6000s	0 to 60000
G25.4.16	16 FP T3 OF=10s	Delay time to stop fixed pump 3 (Relay 3)	**42078**	0 to 6000s	0 to 60000
G25.4.17	17 FP T4 OF=10s	Delay time to stop fixed pump 4 (AO1)	**42079**	0 to 6000s	0 to 60000
G25.4.18	18 FP T5 OF=10s	Delay time to stop fixed pump 5 (AO2)	**42080**	0 to 6000s	0 to 60000
G25.4.19	19 SPD1of=+70.0%	Stop speed 1 for one fixed pump	**42315**	+0.0% to +250%	0 to 20480
G25.4.20	20 SPD2of=+70.0%	Stop speed 2 for one fixed pump	**42316**	+0.0% to +250%	0 to 20480
G25.4.21	21 SPD3of=+70.0%	Stop speed 3 for one fixed pump	**42317**	+0.0% to +250%	0 to 20480
G25.4.22	22 SPD4of=+70.0%	Stop speed 4 for one fixed pump	**42318**	+0.0% to +250%	0 to 20480
G25.4.23	23 SPD5of=+70.0%	Stop speed 5 for one fixed pump	**42319**	+0.0% to +250%	0 to 20480
G25.4.24	24 SPD6of=+70.0%	Stop speed 6 for one fixed pump	**42320**	+0.0% to +250%	0 to 20480
G25.4.25	25 SPD7of=+70.0%	Stop speed 7 for one fixed pump	**42321**	+0.0% to +250%	0 to 20480
G25.4.26	26 SPD8of=+70.0%	Stop speed 8 for one fixed pump	**42322**	+0.0% to +250%	0 to 20480
G25.4.27	27 PIDiSL%=0.0%	Sleep level in inverse PID	**42327**	0.0% to 250%	0 to 20480
G25.4.28	28 SLEEP?=Y	To enable sleep mode	**42358**	N Y	0 to 1
G25.4.29	29 SLPspA=+40.0%	Sleep speed when setpoint is introduced through AI	**42375**	+0.0% to +250%	0 to 20480
G25.4.30	30 GO SLEEP MO=N	Go to sleep mode when conditions are fulfilled without starting	**42376**	N Y	0 to 1
G25.5.1	1 BY SPon=+70.0%	Speed bypass at the starting of fixed pumps	**42081**	+0.0% to +250%	0 to 20480
G25.5.2	2 BY T ON=10s	Time of speed bypass after starting fixed pumps	**42082**	OFF=0 to 999s	0 to 9999
G25.5.3	3 BY SPof=+90.0%	Speed bypass at the stopping of fixed pumps	**42083**	+0.0 to +250%	0 to 20480
G25.5.4	4 BY T OFF=5s	Time of speed bypass after stopping fixed pumps	**42084**	OFF=0 to 999s	0 to 9999
G25.6.1	1 PAUSE/DEL=10s	Delay time after protection pause	**42336**	0 to 999s	0 to 9990
G25.6.2	2 CAVITATION=N	To enable cavitation protection	**42085**	N Y	0 to 1
G25.6.3	3 CAV MODE=FAULT	Response from cavitation	**42344**	PAUSE FAULT	1 to 2
G25.6.4	4 CAV CURR=___A	Cavitation current	**42086**	(0.2 to 1.50)·In	0 to 12288
G25.6.5	5 CAV SPED=+100%	Cavitation speed	**42087**	+0.0% to +250%	0 to 20480
G25.6.6	6 CAV DELAY=10s	Delay time to activate cavitation protection	**42088**	0 to 999s	0 to 9990
G25.6.7	7 ENABLE LO PRE=N	To enable low pressure protection	**42090**	N Y	0 to 1
G25.6.9	9 LO PRE=5.0Bar	Minimum pressure level	**42091**	OFF=0 to 3276 Engineering Units	0 to 32760
G25.6.10	10 Lop DLY=10.0s	Trip delay time because of minimum pressure fault	**42092**	0 to 999s	0 to 9990
G25.6.11	11 Lop Msp=+0.0%	Minimum speed for minimum pressure fault	**42104**	+0.0% to +250%	0 to 20480
G25.6.12	12 HP MODE=PAUSE	Response from over-pressure	**42337**	PAUSE FAULT	1 to 2
G25.6.13	13 HP LEV=100Bar	Maximum pressure level	**42101**	0 to 3276 Engineering Units	0 to 32760
G25.6.14	14 Hlpr DLY=0.0s	Trip time because of high pressure	**42339**	0 to 999s	0 to 9990
G25.6.15	15 FLO SWm=PAUSE	Response from No Flow situation	**42348**	PAUSE FAULT	1 to 2
G25.6.16	16 NO FLO/FILL=N	To enable No Flow switch during pipe filling process	**42352**	N Y	0 to 1

Parameter	Screen	Description	Address	Range	Modbus Range
G25.6.17	17 NO FLsp=+0.0%	Minimum stop speed because of No Flow detection	**42349**	+0.0 to +250%	0 to 20480
G25.6.18	18 NO FLbyp=0.0s	Bypass time for No Flow switch	**42350**	0.0 to 999s	0 to 9990
G25.6.19	19 NO FLdly=0.0s	Trip delay time because of No Flow	**42351**	0.0 to 999s	0 to 9990
G25.6.20	20 CYCLE TI=0m	Cycle time of the drive	**42353**	OFF=0 to 99m	0 to 99
G25.6.21	21 CYCLE CNT=5	Cycle counter	**42354**	1 to 5	1 to 5
G25.7.1	1 PRESSU SOU=PID	Pressure reading source	**42357**	PID AI1 AI2	0 to 2
G25.7.2	2 FILL SP=+70.0%	Speed for pipe filling process	**42116**	OFF=0.0; +0.1 to +250%	0 to 20480
G25.7.3	3 FILL P=2.0Bar	Pressure for the end of pipe filling process	**42117**	0.0 to 3276 Engineering Units	0 to 32760
G25.7.4	4 FILL TIM=15m	Safety time for pipe filling process	**42118**	OFF=0; 1 to 9999min	0 to 9999
G25.7.5	5 SPT RAMP=1.0Bar / s	Setpoint ramp	**42119**	0.01 to 320.00 Engineering Units/s	0 to 32000
G25.8.1	1 COMP 1=0.0Bar	Compensation pressure at the starting of 1 fixed pump	**42131**	0.0 to 3276 Engineering Units	0 to 32760
G25.8.2	2 COMP 2=0.0Bar	Compensation pressure at the starting of 2 fixed pumps	**42132**	0.0 to 3276 Engineering Units	0 to 32760
G25.8.3	3 COMP 3=0.0Bar	Compensation pressure at the starting of 3 fixed pumps	**42133**	0.0 to 3276 Engineering Units	0 to 32760
G25.8.4	4 COMP 4=0.0Bar	Compensation pressure at the starting of 4 fixed pumps	**42134**	0.0 to 3276 Engineering Units	0 to 32760
G25.8.5	5 COMP 5=0.0Bar	Compensation pressure at the starting of 5 fixed pumps	**42135**	0.0 to 3276 Engineering Units	0 to 32760
G25.9.1	1 ENABLE PUMP1=N	To enable fixed pump associated to output relay 1	**42136**	N Y	0 to 1
G25.9.2	2 ENABLE PUMP2=N	To enable fixed pump associated to output relay 2	**42137**	N Y	0 to 1
G25.9.3	3 ENABLE PUMP3 =N	To enable fixed pump associated to output relay 3	**42138**	N Y	0 to 1
G25.9.4	4 ENABLE PUMP4=N	To enable fixed pump associated to analogue output 1	**42148**	N Y	0 to 1
G25.9.5	5 ENABLE PUMP5=N	To enable fixed pump associated to analogue output 2	**42149**	N Y	0 to 1
G25.9.6	6 FP ALTER MOD=0	Alternation mode of fixed pumps	**42139**	0 to 2	0 to 2
G25.9.7	7 JPon P=0.0Bar	Starting pressure of Jockey pump	**42371**	0.0 to 3276 Engineering Units	0 to 32760
G25.9.8	8 JPon DLY=20s	Start delay time for Jockey pump	**42372**	0 to 600s	0 to 6000
G25.9.9	9 JPof P=0.0Bar	Stopping pressure of Jockey pump	**42373**	0.0 to 3276 Engineering Units	0 to 32760
G25.9.10	10 PRp BYP=300s	Bypass time for Priming pump	**42102**	0.1 to 6000s	0 to 60000
G25.9.11	11 PRp DLY=OFF	Trip time of F72 during Priming pump is connected	**42103**	OFF=0; 0.1 to 6000m	0 to 60000
G25.9.12	12 SUPPLY PUMP=0	Selection of Auxiliary Pump as Priming or Lift Pump	**42418**	0 to 1	0 to 1
G25.10.1	1 FLOW SEL=PULSE	Flow reading source	**42141**	AI1 AI2 PULSE	0 to 2
G25.10.2	2 MAX FLOW=1000 l/s	Maximum allowed flow	**42143**	0.0 to 3276 Engineering Units	0 to 32760
G25.10.3	3 OFFSET=+0%	Offset percentage over maximum flow	**42144**	+0% to +250%	0 to 20480
G25.10.4	4 FLO RES=+100%	Flow percentage to reset algorithm	**42145**	+0.0 to +100%	0 to 100
G25.10.5	5 DECrat=+2.0% / s	Deceleration ramp during algorithm	**42146**	+0.0 to +250% /s	0 to 20480
G25.10.6	6 UNIT FLOW= l/s	Units of measurement of instantaneous flow	**42147**	-	0 to 9
G25.11.1	1 P1 = -----0d -----0m	Operated time by Pump 1	**42011 – m** **42014 – d**	-	Real value = Modbus value
G25.11.2	2 P2 = -----0d -----0m	Operated time by Pump 2	**42012 – m** **42015 – d**	-	Real value = Modbus value
G25.11.3	3 P3 = -----0d -----0m	Operated time by Pump 3	**42013 – m** **42016 – d**	-	Real value = Modbus value
G25.11.4	4 P4 = -----0d -----0m	Operated time by Pump 4	**42018 – m** **42020 – d**	-	Real value = Modbus value
G25.11.5	5 P5 = -----0d -----0m	Operated time by Pump 5	**42019 – m** **42021 – d**	-	Real value = Modbus value
G25.11.9	TIME RESTORE=N	Reset counters	**42017**	N Y	0 to 1

4.2.2. Visualization Parameters

Parameter	Screen	Description	Address	Modbus Range
SV5.13	PMP manSP=+0.0%	LOCAL manual speed reference.	**42042**	-20480 to 20480
SV5.14	PMP MRe1=0.0%	Local setpoint 1 of PID. Multi-reference 1.	**42151**	0 to 32760
SV5.15	PMP MRe2=0.0%	Local setpoint 2 of PID. Multi-reference 2.	**42152**	0 to 32760
SV5.16	PMP MRe3=0.0%	Local setpoint 3 of PID. Multi-reference 3.	**42153**	0 to 32760
SV5.17	PMP MRe4=0.0%	Local setpoint 4 of PID. Multi-reference 4.	**42154**	0 to 32760
SV5.18	PMP MRe5=0.0%	Local setpoint 5 of PID. Multi-reference 5.	**42155**	0 to 32760
SV5.19	PMP MRe6=0.0%	Local setpoint 6 of PID. Multi-reference 6.	**42156**	0 to 32760
SV5.20	PMP MRe7=0.0%	Local setpoint 7 of PID. Multi-reference 7.	**42157**	0 to 32760
SV5.21	PMP MRe8=0.0%	Local setpoint 8 of PID. Multi-reference 8.	**42158**	0 to 32760
SV5.22	T AutOFF=OFF	Time for Automatic Stop.	**42044**	0 to 999
SV5.23	TIME OFF=OFF	It shows the resting time in minutes for the automatic stopping of the system.	**42356**	0 to 6000
SV5.24	MAX flow=1000l/s	Level of maximum flow.	**42143**	0 to 32760
SV5.25	RESET LEVL=+100%	Reset level for the flow control algorithm.	**42145**	0 to 100
SV5.26	SLEP FLO=0.0l/s	Flow level to sleep the drive.	**42324**	0 to 32760
SV8.1	R=0.0Bar 0.0Bar	PID setpoint value and feedback value.	**42007 → PID Ref** **42009 → Feedbk**	Real value = (Modbus value / 10)
SV8.2	REGL +0.0% +0.0%	Drive status during pump control operation.	**42002 → Status** **42006 → PID Ref** **42008 → Feedbk**	0 to 22
SV8.3	1OFF 2OFF 3OFF	Status of the fixed pumps 1-3.	**42003 → FP1** **42004 → FP2** **42005 → FP3**	0 → OFF 1 → RDY 2 → ON 3 → FLT
SV8.4	4OFF 5OFF	Status of the fixed pumps 4-5.	**42022 → FP4** **42023 → FP5**	0 → OFF 1 → RDY 2 → ON 3 → FLT
SV8.5	Flow = 0.0l/s	Present value read by the analogue input or pulse input where the sensor is connected.	**42142**	Real value = (Modbus value / 10)
SV8.6	STATUS PUMP PROGRAM	In the visualization lines of the display, messages will be displayed according to the present status of pump program.	**42002**	0 to 22

5. FAULT MESSAGES. DESCRIPTIONS AND ACTIONS

The faults that can be produced during the drive operation when pump program is active are described below. In order to see the complete fault list of the drive, visualization and reset of them, refer to the 'SW and Programming Manual' of SD700.

5.1. Description of Fault List

DISPLAY	DESCRIPTION
F65 LOW PRESSURE	Active only when operating in Pump Control mode. Trip generated when the pressure level is lower than the minimum pressure level set in 'G25.6.7 LoPre'.
F66 HI PRESSURE	Active only when operating in Pump Control mode. External trip produced when digital input configured in this option (Hi Pressure Switch) is closed.
F67 LOW WATER	External trip produced when Pump Program (G25) is activated and one of the digital inputs has been set as '59 LO WATER FLT'. Under these conditions, if a contact is opened on this digital input, this fault is generated indicating that the pump is working with no load.
F68 CAVIT/UNDERL	When the motor current is lower than the cavitation/underload current and the motor speed is higher or equal than the cavitation/underload speed during the time set for that purpose, the fault or the pause is produced according to the setting done. This protection is to avoid that pump operates with no water or no load (detection is done by underload).
F69 FLOW SWITCH	The digital input configured as flow detection indicates flow absence according to the settings realized in the corresponding parameters. See the protections set in G25.6 to obtain more detailed information.
F70 IRRIGATOR F	The digital input configured as '62 IRRIGAT TRIP' detects that an external fault in the irrigating equipment has been produced.
F71 CYCLING	Conditions set in group G25.6 are not met regarding to the cycle time of the drive and the cycle counter. The SD700 has started a number of times higher than the allowed number without relaxing the established time.
F72 IN PRES SW	This fault is produced because of two causes: 1. After starting the system, the time set in G25.9.11 has been exceeded without the digital input configured as PRESSUR SWITC is activated. 2. After the Priming pump has stopped and the drive pump has started, the digital input configured as PRESSUR SWITC is opened during the time set in G25.9.10.

5.2. Procedure for Fault Solutions

DISPLAY	POSSIBLE CAUSE	ACTIONS
F65 LOW PRESSURE	Pressure reference is lower than the minimum pressure level.	Verify the setting of minimum pressure level.
		Check the operation of the low pressure switch detector.
		Check the status of the analogue inputs 1 and 2 in parameters SV3.1 and SV3.4 in displaying group G0.
F66 HI PRESSURE	An external trip has been produced by closing a contact on the digital input configured in this option.	Check if the pressure of the installation exceeds the set limits.
		Verify the wiring of digital input.
F67 LOW WATER	An external trip has been produced by opening a contact on the digital input.	A contact has activated to indicate that there is a fault by lack of water. Verify the conditions of the installation.
		Verify the wiring of digital input.
F68 CAVIT/UNDERL	The pump is operating with no load.	Check if the pump of the installation is not operating with no water or no load.
	Settings of the drive in protections group G25.6 or G11 are incorrect.	Verify the settings of the parameters referred to the cavitation/underload protection depending on the installation.
F69 FLOW SWITCH	The digital input configured as flow detection indicates absence of the same one.	Check if the pump has water.
		Check if the flow detector has water and is connected correctly.
		Check the settings in group G25.6.
F70 IRRIGATOR F	An external trip to the drive has been produced by closing a contact on the digital input configured as IRRIGAT TRIP.	Verify your irrigating equipment and check if the connections between the drive and the irrigating equipment are correct.
F71 CYCLING	The drive shows several start / stop cycles (wake up / sleep) in a short time.	Verify possible leakages in the installation.
		Verify the settings of this protection in group G25.6.
F72 IN PRES SW	Breakage or low water in aspiration circuit.	Verify the water level in the aspiration circuit (well, tank, etc.).
		Verify the status of the pressure switch.

6. COMMONLY USED CONFIGURATIONS

6.1. Pressure Group Control with 3 Auxiliary Pumps, Start and Stop on Demand

6.1.1. Parameters Configuration

Parameter	Name / Description	Value
G1: Options Menu.		
4 LANG=ENGLISH	**G1.4** / Language selection	ENGLISH
7 PROG = PUMP	**G1.7** / Program Activation	PUMP (It activates the extended functionality of the pump control in group G25).
G2: Motor Nameplate.		
1 MTR CURR=00.00A	**G2.1** / Motor rated current	__A (Set according to motor nameplate).
2 MTR VOLT=400V	**G2.2** / Motor rated voltage	__V (Set according to motor nameplate).
3 MTR PWR=00.0kW	**G2.3** / Motor rated power	__kW (Set according to motor nameplate).
4 MTR RPM=1485	**G2.4** / Motor rpm	__rpm (Set according to motor nameplate).
5 MTR PFA=0.85	**G2.5** / Cosine Phi	__ (Set according to motor nameplate).
6 MTR FRQ=50Hz	**G2.6** / Motor frequency	__Hz (Set according to motor nameplate).
7 MTR COOL=63%	**G2.7** / Motor cooling at zero speed	Use the following values as a reference: Submersible pumps and non-deflagrating motors ➔ 5% Self-cool motor ➔ 63% Force-cooled motor ➔ 100%
G4: Inputs – S4.1: Digital Inputs.		
5 DIGITL IN 1=50	**G4.1.5** / Multi-function Digital Input 1 configuration	50 ➔ PMP START/STP (Automatic starting of the system).
6 DIGITL IN 2=52	**G4.1.6** / Multi-function Digital Input 2 configuration	52 ➔ FIX PUMP1 FLT (Detection of auxiliary pump 1 in fault status).
7 DIGITL IN 3=53	**G4.1.7** / Multi-function Digital Input 3 configuration	53 ➔ FIX PUMP2 FLT (Detection of auxiliary pump 2 in fault status).
8 DIGITL IN 4=54	**G4.1.8** / Multi-function Digital Input 4 configuration	54 ➔ FIX PUMP3 FLT (Detection of auxiliary pump 3 in fault status).
G25: Pump Control - S25.1: Setpoints.		
1 CONTROL MODE=1	**G25.1.1** / Control mode	1 ➔ Pumps. The drive will start in pump control mode.
5 SETPT1=x.xBar	**G25.1.5** / Setpoint 1 for the PID	x.xBar ➔ Local setpoint 1. (Set according to the installation).
G25: Pump Control - S25.2: PID Setting.		
1 PID SETP=LOCAL	**G25.2.1** / PID reference source	LOCAL ➔ Speed reference introduced by keypad.
3 PID FBK=AI2	**G25.2.3** / PID feedback source	AI2 ➔ Feedback signal connected to Analogue Input 2.
G25: Pump Control – S25.3: Start Conditions.		
1 Lp Pon=0.0Bar	**G25.3.1** / Wake up level of the drive	x.xBar ➔ When demand decreases, the drive can go in sleep mode. (It allows setting the wake up level for the drive. This value is set as units of PID setpoint).
2 FP SpON=90.0%	**G25.3.2** / Start speed for the fixed pumps	90.0% ➔ It sets the drive speed above which fixed pumps will start. (Set according to the installation).
3 FP ErON=10.0%	**G25.3.3** / Minimum PID error to start fixed pumps	10.0% ➔ This parameter allows user to consider the PID error (%) at the moment of starting fixed pumps.
4 FP T1 ON=10.0s	**G25.3.4** / Delay time to start fixed pump 1	10.0s ➔ It sets the delay time to start the fixed pump associated to the relay 1.
5 FP T2 ON=10.0s	**G25.3.5** / Delay time to start fixed pump 2	10.0s ➔ It sets the delay time to start the fixed pump associated to the relay 2.
6 FP T3 ON=10.0s	**G25.3.6** / Delay time to start fixed pump 3	10.0s ➔ It sets the delay time to start the fixed pump associated to the relay 3.

Parameter	Name / Description	Value
G25: Pump Control – S25.4: Stop Conditions.		
1 LP T SLP=20s	**G25.4.1** / Delay time before activating sleep mode	20s ➔ This delay time will be applied to any conditions that activate the sleep mode. These conditions are: sleep speed, No Flow input, Flow measurement and sleep current.
2 SLPsp1=+40.0%	**G25.4.2** / Sleep speed for local setpoint 1	+40.0% ➔ The drive will sleep below the value set here whenever local setpoint 1 is selected.
13 FP erOFF=+0.0%	**G25.4.13** / Maximum PID error to stop fixed pumps	0.0% ➔ This parameter allows user to consider the PID error (%) at the moment of stopping fixed pumps. (Set according to the requirements).
14 FP T1 OF=10s	**G25.4.14** / Delay time to stop fixed pump 1	10s ➔ It sets the delay time to stop the fixed pump associated to the relay 1.
15 FP T2 OF=10s	**G25.4.15** / Delay time to stop fixed pump 2	10s ➔ It sets the delay time to stop the fixed pump associated to the relay 2.
16 FP T3 OF=10s	**G25.4.16** / Delay time to stop fixed pump 3	10s ➔ It sets the delay time to stop the fixed pump associated to the relay 3.
19 SPD1of=+70.0%	**G25.4.19** / Stop speed 1 for one fixed pump	+70.0% ➔ It sets the speed below which the drive must remain to stop one fixed pump whenever the operating setpoint is local setpoint 1 adjusted in G25.1.5.
G25: Pump Control – S25.9: Fixed Pumps Control.		
1 ENABLE PUMP1=Y	**G25.9.1** / To enable fixed pump associated to relay 1	Y=YES ➔If setting is set to NO relay 1 will be free for user configuration. If set to YES relay 1 will be pre-defined as fixed speed pump 1.
2 ENABLE PUMP2=Y	**G25.9.2** / To enable fixed pump associated to relay 2	Y=YES ➔If setting is set to NO relay 2 will be free for user configuration. If set to YES relay 2 will be pre-defined as fixed speed pump 2.
3 ENABLE PUMP3=Y	**G25.9.3** / To enable fixed pump associated to relay 3	Y=YES ➔If setting is set to NO relay 3 will be free for user configuration. If set to YES relay 3 will be pre-defined as fixed speed pump 3.
4 FP ALTER MOD=1	**G25.9.4** / To enable fixed pump alternation mode	1 ➔ Cycle (The pump that starts will be the next pump in sequence to the last pump stopped).

6.1.2. Connections Drawing

There are several configuration options available when pump program is activated. These options can be configured like in standard program.

Nevertheless, unlike standard program, when pump program is activated, the drive will only allow setting the options of each digital input (from G4.1.5 to G4.1.10) and will not consider the setting realized in parameter 'G4.1.4 DIGIT I MODE', where digital inputs are set in groups.

This means that user will configure the pump program as he wants, by selecting the functionality and protections that he needs. For a correct configuration of the inputs when pump program is active, see chapter G25 Pump Control to get additional information.

Note: If the Pump Control program is selected and then de-selected, all of the Digital Inputs will be reset to mode '00' (i.e. unused). It will be necessary to individually configure Digital Input functionality to suit the application should this occur. This guarantees safe installation and operation in order to prevent any external hardware causing damage to the equipment.

Note: Digital outputs will be affected by pump control activation.

To select an auxiliary pump you must proceed like this:

- Set any free digital input to the options '52 FIX PUMP1 FLT', '53 FIX PUMP2 FLT' or '54 FIX PUMP3 FLT'.
- Enable the pump control in the corresponding parameter G25.9.1, G25.9.2 and G25.9.3 respectively.

To remove the configuration of that fixed pump and release the relay for other use you must: Disable the pump control in the corresponding parameter G25.9.1, G25.9.2 and G25.9.3 respectively.

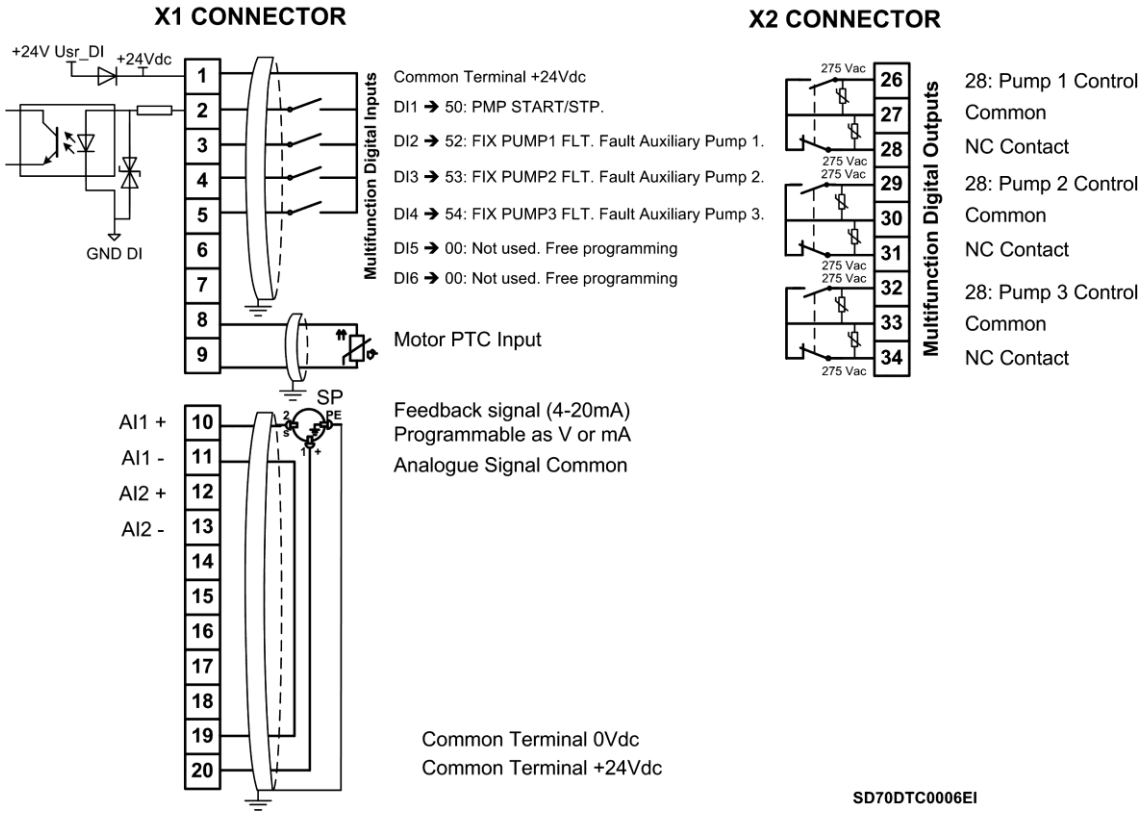

Figure 6.1 Pressure Group Control with 3 Auxiliary Pumps, Start and Stop on demand

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

6.2. Pressure Group Control with Eight Pressure References

6.2.1. Parameters Configuration

Parameter	Name / Description	Value
G1: Options Menu.		
4 LANG=ENGLISH	**G1.4** / Language selection	ENGLISH
7 PROG = PUMP	**G1.7** / Program activation	PUMP (It activates the extended functionality of the pump control in group G25).
G2: Motor Nameplate.		
1 MTR CURR=00.00A	**G2.1** / Motor rated current	__A (Set according to motor nameplate).
2 MTR VOLT=400V	**G2.2** / Motor rated voltage	__V (Set according to motor nameplate).
3 MTR PWR=00.0kW	**G2.3** / Motor rated power	__kW (Set according to motor nameplate).
4 MTR RPM=1485	**G2.4** / Motor rpm	__rpm (Set according to motor nameplate).
5 MTR PFA=0.85	**G2.5** / Cosine Phi	__ (Set according to motor nameplate).
6 MTR FRQ=50Hz	**G2.6** / Motor frequency	__Hz (Set according to motor nameplate).
7 MTR COOL=63%	**G2.7** / Motor cooling at zero speed	Use the following values as a reference: Submersible pumps and non-deflagrating motors ➔ 5% Self-cool motor ➔ 63% Force-cooled motor ➔ 100%
G3: References.		
1 REF1 SPD=PID	**G3.1** / Speed reference source 1	PID ➔ The reference value is set for PID functionality.

Parameter	Name / Description	Value
G4: Inputs – S4.1: Digital Inputs.		
5 DIGITL IN 1=50	**G4.1.5** / Multi-function Digital Input 1 configuration	50 ➔ PMP START/STP (Automatic starting of the system).
6 DIGITL IN 2=63	**G4.1.6** / Multi-function Digital Input 2 configuration	63 ➔ SETPONT PIN1 (low bit configuration for the selection of multiple setpoints).
7 DIGITL IN 3=64	**G4.1.7** / Multi-function Digital Input 3 configuration	64 ➔ SETPONT PIN2 (middle bit configuration for the selection of multiple setpoints).
8 DIGITL IN 4=65	**G4.1.8** / Multi-function Digital Input 4 configuration	65 ➔ SETPONT PIN3 (high bit configuration for the selection of multiple setpoints).
G4: Inputs – S4.3: Analogue Input 2.		
1 SENSOR 2 ?=S	**G4.3.1** / To enable sensor of Analogue Input 2	Y=YES ➔ Ii allows enabling the sensor of the analogue input 2 that will be used for PID feedback.
2 SENSOR 2=Bar	**G4.3.2** / Selection of sensor 2 units	Bar ➔ These units must be set according to type of sensor that user will use in the installation.
3 AIN2 FORMAT=mA	**G4.3.3** / Analogue Input 2 Format	mA ➔ These units must be set according to the type of sensor that user will use in the installation.
4 INmin2=+4mA	**G4.3.4** / Minimum range of Analogue Input 2	+4mA ➔ These units must be set according to the type of sensor that user will use in the installation.
5 Smi2=+0.0Bar	**G4.3.5** / Minimum range of sensor 2	+0.0Bar ➔ This range must be set according to the type of sensor that user will use in the installation.
6INmax2=+20mA	**G4.3.6** / Maximum range of Analogue Input 2	+20mA ➔ These units must be set according to the type of sensor that user will use in the installation.
7 Sma2=+10.0Bar	**G4.3.7** / Maximum range of sensor 2	+10.0Bar ➔ This range must be set according to the type of sensor that user will use in the installation.
G25: Pump Control – S25.1: Setpoints.		
1 CONTROL MODE=1	**G25.1.1** / Control mode	1 ➔ Pumps. The drive will start in pump control mode.
5 SETPT1=1.0Bar	**G25.1.5** / Local setpoint 1 for the PID	1.0Bar ➔ It allows user to set the value of the speed reference 1 for the equipment. (Set according to the requirements of the applic.)
6 SETPT2=2.0Bar	**G25.1.6** / Local setpoint 2 for the PID	2.0Bar ➔ It allows user to set the value of the speed reference 2 for the equipment. (Set according to the requirements of the applic.)
7 SETPT3=3.0Bar	**G25.1.7** / Local setpoint 3 for the PID	3.0Bar ➔ It allows user to set the value of the speed reference 3 for the equipment. (Set according to the requirements of the applic.)
8 SETPT4=4.0Bar	**G25.1.8** / Local setpoint 4 for the PID	4.0Bar ➔ It allows user to set the value of the speed reference 4 for the equipment. (Set according to the requirements of the applic.)
9 SETPT5=5.0Bar	**G25.1.9** / Local setpoint 5 for the PID	5.0Bar ➔ It allows user to set the value of the speed reference 5 for the equipment. (Set according to the requirements of the applic.)
10 SETPT6=6.0Bar	**G25.1.10** / Local setpoint 6 for the PID	6.0Bar ➔ It allows user to set the value of the speed reference 6 for the equipment. (Set according to the requirements of the applic.)
11 SETPT7=7.0Bar	**G25.1.11** / Local setpoint 7 for the PID	7.0Bar ➔ It allows user to set the value of the speed reference 7 for the equipment. (Set according to the requirements of the applic.)
12 SETPT8=8.0Bar	**G25.1.12** / Local setpoint 8 for the PID	8.0Bar ➔ It allows user to set the value of the speed reference 8 for the equipment. (Set according to the requirements of the applic.)
G25: Pump Control – S25.2: PID Setting.		
3 PID FBK=AI2	**G25.2.3** / PID feedback source	AI2 ➔ It allows selecting Analogue Input 2 as feedback signal for PID regulator.
G25: Pump Control – S25.3: Start Conditions.		
1 LP Pon=0.0Bar	**G25.3.1** / Wake up level of the drive	x.xBar ➔ When demand decreases, the drive can go in sleep mode. (It allows setting the wake up level for the drive. This value is set as units of PID setpoint).
G25: Pump Control – S25.4: Stop Conditions.		
1 LP T SLP=20s	**G25.4.1** / Delay time before activating sleep mode	20s ➔ This delay time will be applied to any conditions that activate the sleep mode. These conditions are: sleep speed, No Flow input, Flow measurement and sleep current. If anyone of them is met, the time to activate sleep mode will start elapsing.
2 SLPsp1=+40.0%	**G25.4.2** / Sleep speed for local setpoint 1	+40.0% ➔ It allows setting the sleep speed 1 below which the drive will sleep whenever local setpoint 1 is selected. (Set according to the installation).
3 SLPsp2=+42.0%	**G25.4.3** / Sleep speed for local setpoint 2	+42.0% ➔ It allows setting the sleep speed 2 below which the drive will sleep whenever local setpoint 2 is selected. (Set according to the installation).
4 SLPsp3=+44.0%	**G25.4.4** / Sleep speed for local setpoint 3	+44.0% ➔ It allows setting the sleep speed 3 below which the drive will sleep whenever local setpoint 3 is selected. (Set according to the installation).
5 SLPsp4=+46.0%	**G25.4.5** / Sleep speed for local setpoint 4	+46.0% ➔ It allows setting the sleep speed 4 below which the drive will sleep whenever local setpoint 4 is selected. (Set according to the installation).
6 SLPsp=+48.0%	**G25.4.6** / Sleep speed for local setpoint 5	+48.0% ➔ It allows setting the sleep speed 5 below which the drive will sleep whenever local setpoint 5 is selected. (Set according to the installation).

Parameter	Name / Description	Value
7 SLPsp=+50.0%	**G25.4.7** / Sleep speed for local setpoint 6	+50.0% ➔ It allows setting the sleep speed 6 below which the drive will sleep whenever local setpoint 6 is selected. (Set according to the installation).
8 SLPsp=+52.0%	**G25.4.8** / Sleep speed for local setpoint 7	+52.0% ➔ It allows setting the sleep speed 7 below which the drive will sleep whenever local setpoint 7 is selected. (Set according to the installation).
9 SLPsp8=+54.0%	**G25.4.9** / Sleep speed for local setpoint 8	+54.0% ➔ It allows setting the sleep speed 8 below which the drive will sleep whenever local setpoint 8 is selected. (Set according to the installation).

6.2.2. Connections Drawing

Terminals 1 and 2: start / stop command (NO status).
Terminals 1 and 3: setpoint pin 1 – PID mode (NO status).
Terminals 1 and 4: setpoint pin 2 – PID mode (NO status).
Terminals 1 and 5: setpoint pin 3 – PID mode (NO status).

SPEED	SETPT	Digital Input 4 SETPONT PIN3	Digital Input 3 SETPONT PIN2	Digital Input 2 SETPONT PIN 1
G25.1.5 =1.0Bar	SETPT1	0	0	0
G25.1.6 =2.0Bar	SETPT2	0	0	X
G25.1.7 =3.0Bar	SETPT3	0	X	0
G25.1.8 =4.0Bar	SETPT4	0	X	X
G25.1.9 =5.0Bar	SETPT5	X	0	0
G25.1.10 =6.0Bar	SETPT6	X	0	X
G25.1.11 =7.0Bar	SETPT7	X	X	0
G25.1.12 =8.0Bar	SETPT8	X	X	X

Note: 0: Not active and X: Active.

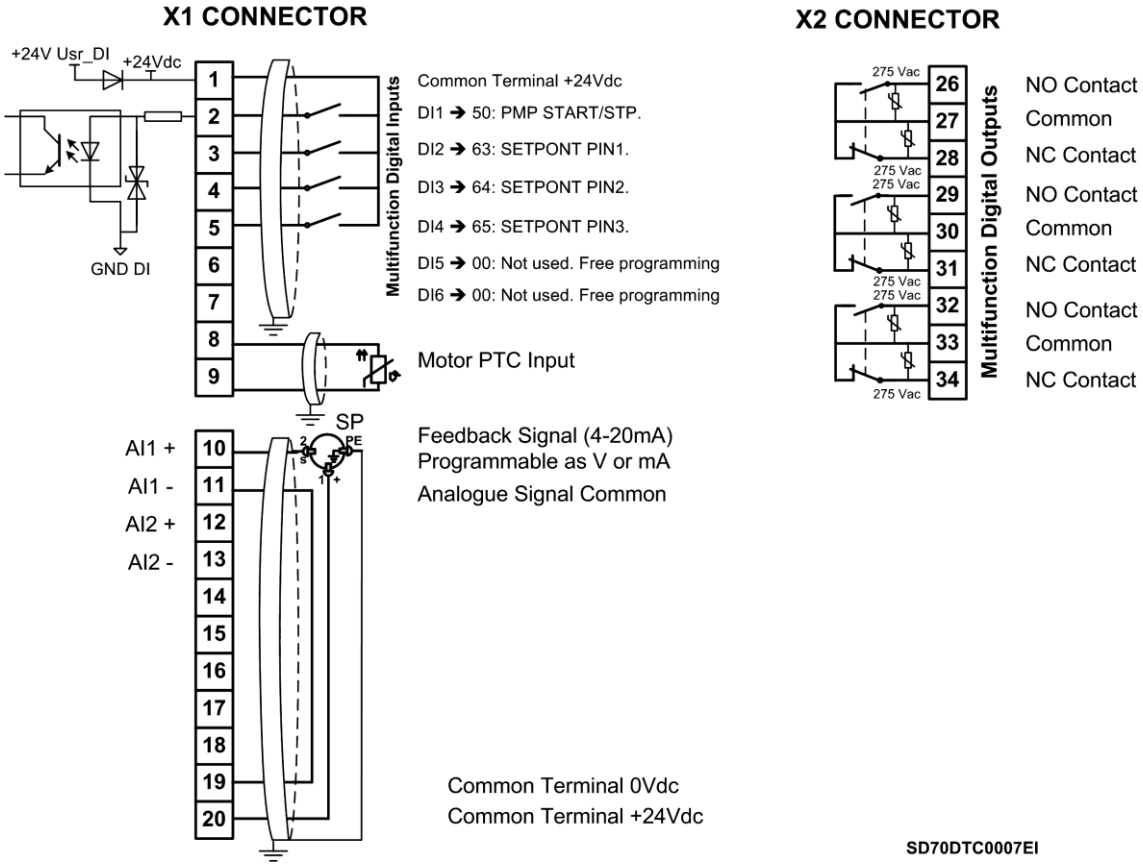

Figure 6.2 Pressure Group Control with Eight Pressure Setpoints

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

7. CONFIGURATION REGISTER

VARIABLE SPEED DRIVE: SD700.
SERIAL Nº: MODEL:
APPLICATION:
DATE:
CUSTOMER:
NOTES:

PARAMETERS	FACTORY SETTINGS	SETTING 1	SETTING 2
G1: Options Menu			
7 PROG = STANDARD	STANDARD	_____	_____
UPLOAD=N	N	_____	_____
DOWNLOAD=N	N	_____	_____
G4: Inputs – S4.1: Digital Inputs			
5 DIGITL IN 1=06	06	_____	_____
6 DIGITL IN 2=00	00	_____	_____
7 DIGITL IN 3=00	00	_____	_____
8 DIGITL IN 4=00	00	_____	_____
9 DIGITL IN 5=00	00	_____	_____
10 DIGITL IN6=17	17	_____	_____
G4: Inputs – S4.4: Pulse Input			
1 Sensr U=l/m	l/m	_____	_____
2 Pls/s = 100 l/s LIQU AMOUNT/PULS	100l/s	_____	_____
3 M Rng=1000 l/s FLOW MAX RANGE	1000l/s	_____	_____
G8: Outputs – S8.1: Output Relays			
1 SEL RELAY 1=02	02	_____	_____
5 SEL RELAY 2=03	03	_____	_____
9 SEL RELAY 3=05	05	_____	_____
G8: Outputs – S8.2: Analogue Outputs			
1 ANLG OUT 1=01	01	_____	_____
6 ANLG OUT 2=02	02	_____	_____
G12: Auto Reset			
1 AUTORESET=N	N	_____	_____
2 ATTEMP NUMBR=1 MAX ATTEMPT NUMB	1	_____	_____
3 R STR DEL=5s TIME BEFORE RESET	5s	_____	_____
4 RS COUNT=15min AUTORESET TIMOUT	15min	_____	_____
5 F1 AUTO RST=0	0	_____	_____
6 F2 AUTO RST=0	0	_____	_____

PARAMETERS	FACTORY SETTINGS	SETTING 1	SETTING 2
7 F3 AUTO RST=0	0		
8 F4 AUTO RST=0	0		
G13: Fault History			
1 F0 NO FAULT LAST FAULT=FXX	-		
2 F0 NO FAULT FIFTH FAULT=FXX	-		
3 F0 NO FAULT FOURTH FAULT=FXX	-		
4 F0 NO FAULT THIRD FAULT=FXX	-		
5 F0 NO FAULT SECOND FAULT=FXX	-		
6 F0 NO FAULT FIRST FAULT=FXX	-		
7 CLEAR FAULTS=N	N		
G25: Pump Control – S25.1 Setpoints			
1 CONTROL MODE=1	1		
2 MAN SPD REF= LOC	LOC		
3 MAN SPEED=+0.0% MANUAL SPEED	+0.0%		
4 ALT MAN S R=LOCAL	LOCAL		
5 SETPT1=0.0Bar LOCAL SETPOINT 1	0.0Bar		
6 SETPT2=0.0Bar LOCAL SETPOINT 2	0.0Bar		
7 SETPT3=0.0Bar LOCAL SETPOINT 3	0.0Bar		
8 SETPT4=0.0Bar LOCAL SETPOINT 4	0.0Bar		
9 SETPT5=0.0Bar LOCAL SETPOINT 5	0.0Bar		
10 SETPT6=0.0Bar LOCAL SETPOINT 6	0.0Bar		
11 SETPT7=0.0Bar LOCAL SETPOINT 7	0.0Bar		
12 SETPT8=0.0Bar LOCAL SETPOINT 8	0.0Bar		
13 T AutOFF=OFF AUTO-OFF DELAY	OFF		
14 CommsControl=N	N		
G25: Pump Control – S25.2: PID Setting			
1 PID SETP=LOCAL	LOCAL		
2 PID aSTP=LOCAL	LOCAL		
3 PID FBK=AI2	AI2		
4 PID Kc=1.0 PROPORTIONAL PID	1.0		
5 PID It=5.0s INTEGRAL PID	5.0s		
6 PID Dt=0.0s DIFFERENTIAL PID	0.0s		
7 PID ERR=+xx.x%	-		
8 ERR=+xx.xxkPa	-		
9 PID INVERT=N	N		

PARAMETERS	FACTORY SETTINGS	SETTING 1	SETTING 2
G25: Pump Control – S25.3: Start Conditions			
1 LP Pon=0.0Bar AWAKENING LEVEL	0.0Bar		
G25: Pump Control – S25.3: Start Conditions			
2 FP SpON=+90.0% FIX PMP STAR SPD	+90.0%		
3 FP ErON=+10.0% FIX PMP STAR ERR	+10.0%		
4 FP T1 ON=10s FIX PMP1 STR DLY	10s		
5 FP T2 ON=10s FIX PMP2 STR DLY	10s		
6 FP T3 ON=10s FIX PMP3 STR DLY	10s		
7 FP T4 ON=10s FIX PMP4 STR DLY	10s		
8 FP T5 ON=10s FIX PMP5 STR DLY	10s		
G25: Pump Control – S25.4: Stop Conditions			
1 LP T SLP=20s DRIVE SLEEP DELY	20s		
2 SLPsp1=+40.0% DRV SLEEP SPEED1	+40.0%		
3 SLPsp2=+40.0% DRV SLEEP SPEED2	+40.0%		
4 SLPsp3=+40.0% DRV SLEEP SPEED3	+40.0%		
5 SLPsp4=+40.0% DRV SLEEP SPEED4	+40.0%		
6 SLPsp5=+40.0% DRV SLEEP SPEED5	+40.0%		
7 SLPsp6=+40.0% DRV SLEEP SPEED6	+40.0%		
8 SLPsp7=+40.0% DRV SLEEP SPEED7	+40.0%		
9 SLPsp8=+40.0% DRV SLEEP SPEED8	+40.0%		
10 FLsw ENA=N	N		
11 FsI L=0.0l/s FLOW SLEEP LEVEL	0.0l/s		
12 I SLEEP=xxxA CURR SLEEP LEVEL	xxxA		
13 FP erOFF=+0.0% FPUMP STOP ERROR	+0.0%		
14 FP T1 OF=10s FPUMP1 STP DELAY	10s		
15 FP T2 OF=10s FPUMP2 STP DELAY	10s		
16 FP T3 OF=10s FPUMP3 STP DELAY	10s		
17 FP T4 OF=10s FPUMP4 STP DELAY	10s		
18 FP T5 OF=10s FPUMP5 STP DELAY	10s		
19 SPD1of=+70.0% FPUMP STP SPEED1	+70.0%		
20 SPD2of=+70.0% FPUMP STP SPEED2	+70.0%		
21 SPD3of=+70.0% FPUMP STP SPEED3	+70.0%		
22 SPD4of=+70.0% FPUMP STP SPEED4	+70.0%		
23 SPD5of=+70.0% FPUMP STP SPEED5	+70.0%		

PARAMETERS	FACTORY SETTINGS	SETTING 1	SETTING 2
24 SPD6of=+70.0% FPUMP STP SPEED6	+70.0%		
25 SPD7of=+70.0% FPUMP STP SPEED7	+70.0%		
26 SPD8of=+70.0% FPUMP STP SPEED8	+70.0%		
G25: Pump Control – S25.4: Stop Conditions			
27 PIDiSL%=0.0% PID INVE SLEEP %	0.0%		
28 SLEEP?=Y	Y		
29 SLPspA=+40.0% SLEP SPD STP ANA	+40.0%		
30 GO SLEEP MO=N	N		
G25: Pump Control – S25.5: Speed Bypass			
1 BY SPon=+70.0% BYPASS ON SPEED	+70.0%		
2 BY T ON=10s BYPASS ON DELAY	10s		
3 BY SPof=+90.0% BYPASS OFF SPEED	+90%		
4 BY T OFF=5s BYPASS OFF DELAY	5s		
G25: Pump Control – S25.6: Protection			
1 PAUSE/DEL=20s DELAY AFTER PAUS	20s		
2 CAVITATION=N	N		
3 CAV MODE=FAULT	FAULT		
4 CAV CURR=___A CAVITATION CURRE	___A		
5 CAV SPED=+100% CAVITATION SPEED	+100%		
6 CAV DELAY=10s CAVIT FLT DELAY	10s		
7 ENABLE LO PRE=N	N		
9 LO PRE=5.0Bar LO PRESSURE LEVL	5.0Bar		
10 Lop DLY=10.0s LO PRESS FLT DLY	10.0s		
11 Lop Msp=+0.0% LO PRESS MIN SPED	+0.0%		
12 HP MODE=PAUSE	PAUSE		
13 HP LEV=100Bar HIFH PRESS LEVEL	100Bar		
14 Hlpr DLY=0.0s HI PRESS FLT DLY	0.0s		
15 FLO SWm=PAUSE	PAUSE		
16 NO FLO/FILL=N	N		
17 NO FLsp=+0.0% NO FLOW MIN SPED	+0.0%		
18 NO FLbyp=0.0s NO FLO BYPAS DLY	0.0s		
19 NO FLdly=0.0s NO FLOW FLT DLY	0.0s		
20 CYCLE TI=0m CYCLE RESET DELY	0m		

PARAMETERS	FACTORY SETTINGS	SETTING 1	SETTING 2
21 CYCLE CNT=5 MAX CYCLES ALLOW	5		
G25: Pump Control – S25.7: Pipe Filling / Setpoint Ramp			
1 PRESSU SOU=PID	PID		
2 FILL SP=+70.0% PIPE FILLING SPD	+70%		
3 FILL P=2.0Bar PFILL END PRESSU	2.0%		
G25: Pump Control – S25.7: Pipe Filling / Setpoint Ramp			
4 FILL TIM=15m PFILL END DELAY	15m		
5 SPT RAMP=1.0Bar / s	1.0Bar / s		
G25: Pump Control – S25.8: Setpoint Compensation due to Pressure Loss			
1 COMP 1=0.0Bar SETPOINT COMPEN1	0.0Bar		
2 COMP 2=0.0Bar SETPOINT COMPEN2	0.0Bar		
3 COMP 3=0.0Bar SETPOINT COMPEN3	0.0Bar		
4 COMP 4=0.0Bar SETPOINT COMPEN4	0.0Bar		
5 COMP 5=0.0Bar SETPOINT COMPEN5	0.0Bar		
G25: Pump Control – S25.9: Fixed Pumps Control			
1 ENABLE PUMP 1=N	N		
2 ENABLE PUMP2=N	N		
3 ENABLE PUMP3 =N	N		
4 ENABLE PUMP4=N	N		
5 ENABLE PUMP5=N	N		
6 FP ALTER MOD=0	0		
7 JPon P=0.0Bar JOCKEY ON PRESS	0.0Bar		
8 JPon DLY=20s JOCKEY ON DELAY	20s		
9 JPof P=0.0Bar JOCKEY OFF PRESS	0.0Bar		
10 PRp BYP=300s PRIM.PUM.BYP.DLY	300s		
11 PRp DLY=OFF PRIM PUM FLTdly	OFF		
12 SUPPLY PUMP=0	0		
G25: Pump Control – S25.10: Flow Limitation Algorithm			
1 FLOW SEL=PULSE	PULSE		
2 MAX FLOW=1000 l/s MAX ALLOWED FLOW	1000 l/s		
3 OFFSET=+0% OFFSET MAX FLOW	+0%		
4 FLO RES=+100% FLOW RESET LEVEL	+100%		
5 DECrat=+2.0% / s FLOW DECEL RATE	+2.0% / s		
6 UNIT FLOW= l/s	l/s		

PARAMETERS	FACTORY SETTINGS	SETTING 1	SETTING 2
G25: Pump Control – S25.11: Registers (Read only)			
1 P1 = -----0d -----0m	-	_____	_____
2 P2 = -----0d -----0m	-	_____	_____
3 P3 = -----0d -----0m	-	_____	_____
4 P4 = -----0d -----0m	-	_____	_____
5 P5 = -----0d -----0m	-	_____	_____
TIME RESTORE=N	N	_____	_____

DECLARATION OF CONFORMITY CE

The Company:

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Declares under its own responsibility, that the product:

Variable Speed Drive for A.C. motors

Brand: Power Electronics
Model name: SD700 Series

Is in conformity with the following European Directives:

References	Title
2006/95/CE	Electrical Material intended to be used with certain limits of voltage
2004/108/CE	Electromagnetic Compatibility

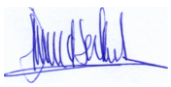
References of the harmonized technical norms applied under the Low Voltage Directive:

References	Title
UNE EN 50178: 1998	Electronic equipment for use in power installations

References of the harmonized technical norms applied under the Electromagnetic Compatibility Directive:

References	Title
IEC 61800-3:2004	Adjustable speed electrical power drive systems. Part 3: EMC requirements and specific test methods.

Paterna, January 17th 2008



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