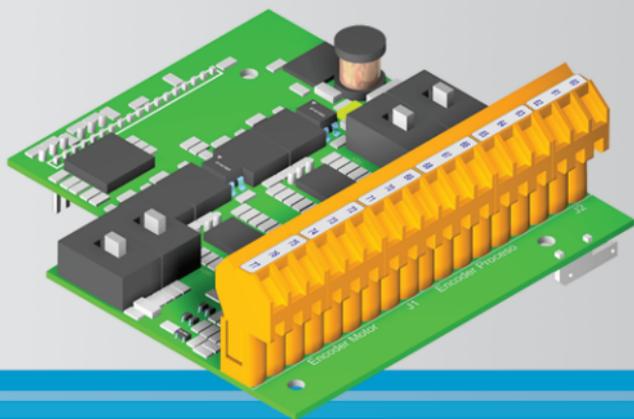


SD700 Series

ACCESSORIES



Getting Started Manual Encoder Board

SD700

Series

ACCESSORIES

Getting Started Manual

Encoder Board

Edition: March 2011

SD70IM04BI Rev. B

SAFETY SYMBOLS

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



This symbol means improper operation may result in serious personal injury or death.



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.

Edition October 2008

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
24 / 10 / 2008	A	First edition
31 / 03 / 2011	B	Software Update SW 2026

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SAFETY INSTRUCTIONS

IMPORTANT!

- Safety instructions showed in this manual are useful to teach user how to use the product in a correct and safety way with the purpose of preventing possible personal injuries or property damages.
- Safety messages included here are classified as it follows:



WARNING

Be sure to take ESD (Electrostatic Discharge) protection measures when you touch the board.

Otherwise, the optional board may get damaged due to static charges.

Implement wiring change on the optional board after checking that the power supply is off.

Otherwise, there is a danger of connecting error and damage to the board.

Be sure to connect correctly the optional board to the drive.

Otherwise, there is a danger of connecting error and damage to the board.

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 the 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, fire or accident could occur.

Do not allow lint, paper, wood chips, dust, metallic chips or other foreign matter into the board or drive.

Otherwise, fire or accident could occur.



WARNINGS

RECEPTION

- Material of Power Electronics 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 received merchandise corresponds with delivery note, models and serial numbers.
 - Each board is supplied with a technical manual.
-

RECYCLING

- The packing of the drives must be recycled. For this reason it is necessary to separate different materials (plastics, paper, cardboard, wood, ...) and settle them in corresponding containers.
 - The residual parts of electrical devices must be collected in a selective manner in order to warranty the correct environmental treatment.
-

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 handling the product with power applied and the front cover is removed.
 - Handle the product with care according to its weight.
 - Do not place heavy objects on the product.
 - Install the product according to the instructions described in this manual.
-

SAFETY

- Ensure that the mounting orientation is correct.
 - Do not drop the product or subject it to impact.
 - The SD700 drives contain static sensitive printed circuits boards. Use static safety procedures when handling these boards.
-

CONNECTIONS PRECAUTIONS

- To ensure correct operation of the inverter 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 drive 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 operate malfunction.
 - Do not use power factor correction capacitors, surge suppressors, or RFI filters on the output side of the inverter. Doing so may damage these components.
 - Always check whether the DC Link LED is OFF before wiring terminals. The charge capacitors may hold high-voltage even after the input power is disconnected. Use caution to prevent the possibility of personal injury.
-

COMMISSIONING

- Follow the steps described in this manual.
 - Always apply voltage and current signals to each terminal that are within levels indicated within this manual. Otherwise, damage to the optional board 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

1.1. Description of Encoder Board

The optional Encoder board offers to drives of SD700 Series the possibility of connecting 2 incremental encoders: one encoder for the vector control and the other one for the process control, operating from 5 to 24VDC, according to the requirements.

The implementation of the Encoder board is directly done over the own control board of the drive, for this, an additional space is not need when installing this board.

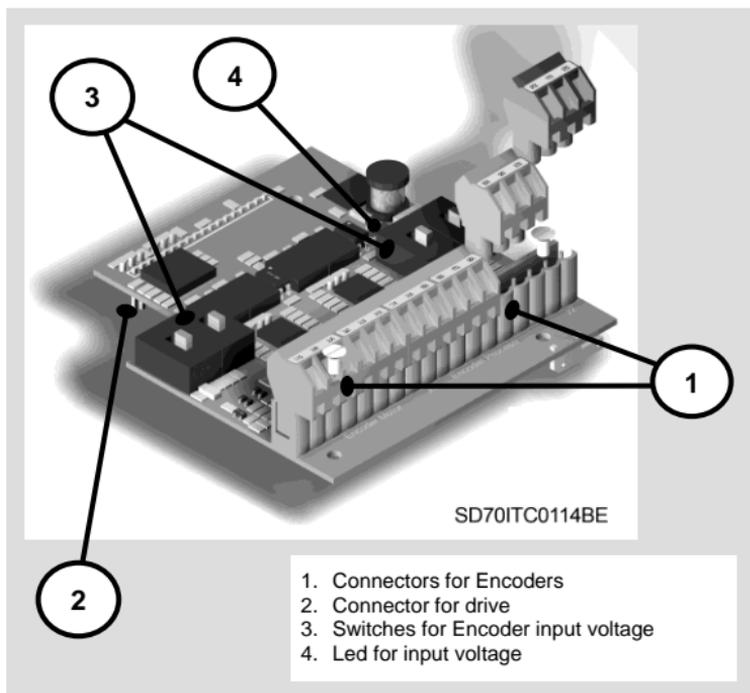


Figure 1.1 Description of Encoder Board

2. TECHNICAL CHARACTERISTICS

2.1. General Information

2.1.1. Contents of Encoder Board Kit

The kit of the Encoder board contents:

- 1 Encoder Board.
- 3 plastic hexagonal spacers M3, 10mm.
- 3 fixing screws M3x10.
- 3 plastic nuts M3.
- 6 pluggable terminal blocks 3-poles.
- 1 Technical Manual.

2.1.2. Specifications of Encoder Board

The Encoder board offers the following items:

- Two channels for incremental encoder: one channel for the vector control and the other one for the process control.
- Outputs for powering each encoder, programmable from 5VDC to 24VDC.
- Optical insulation between the encoder and the control board.
- Inputs for Channel A, /A, Channel B, /B and Channel Z, /Z (zero pass detection).
- Differential or 'single-ended' type inputs.
- Supports encoders with open collector output, voltage and 'push-pull'.

3. INSTALLATION AND CONNECTION

3.1. Installation of Encoder Board

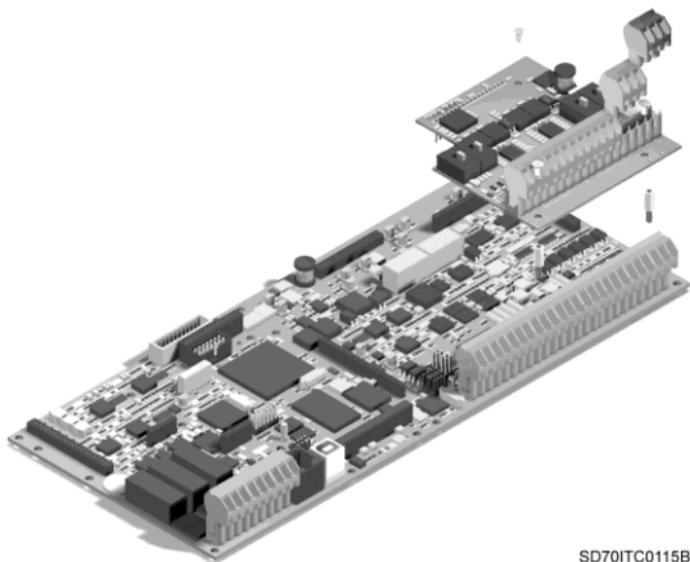
The Encoder board is directly connected to the SD700 drives of Power Electronics using a pluggable connector, as the following image shows.



CAUTION

The variable speed drives of Power Electronics operate with a high electric energy.

Make sure the power supply has been disconnected and wait for at least 10 minutes to guarantee that DC Link voltage is discharged, before installing the Encoder board. Otherwise, you may get personal injuries or an accident could occur.



SD70ITC0115BE

Figure 3.1 Installation of the Encoder Board into the drive

3.2. Connections for Encoder Board

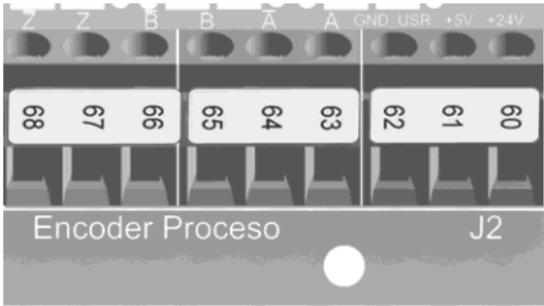
3.2.1. Component Description

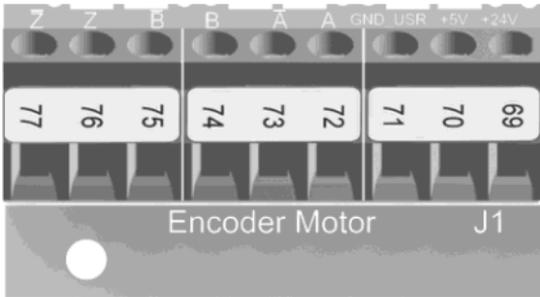
There are three connectors on the Encoder board: one connector is used to connect the Encoder board to the control board of the drive; the other two connectors are used to connect the motor encoder and the process encoder each one. Additionally, there are four switches to select the input voltage for each encoder (two switches per encoder). Finally, it exists one led on the Encoder board indicating if the own board is powered.

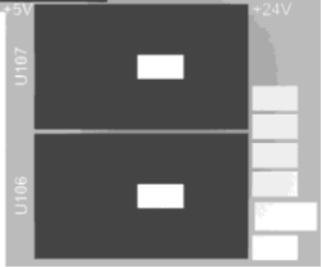


SD70ITC0116BE

Figure 3.2 Location of the components on the Encoder Board

COMPONENT	DESCRIPTION																														
Connector for Drive (J907)	The optional Encoder board is connected to the SD700 drive by means of this connector.																														
Connector for Process Encoder (J2)	<p>This connector is used to connect the Process Encoder. The description of the terminals appears in the table below:</p> <table border="1"> <thead> <tr> <th>Terminal</th> <th>Signal</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>60</td> <td>+24V</td> <td>Input voltage for Process Encoder +24VDC.</td> </tr> <tr> <td>61</td> <td>+5V</td> <td>Input voltage for Process Encoder +5VDC.</td> </tr> <tr> <td>62</td> <td>GND_USR</td> <td>Common terminal for input voltage of Process Encoder.</td> </tr> <tr> <td>63</td> <td>A</td> <td>Channel A (true polarity).</td> </tr> <tr> <td>64</td> <td>/A</td> <td>Channel /A (inverse polarity).</td> </tr> <tr> <td>65</td> <td>B</td> <td>Channel B (true polarity).</td> </tr> <tr> <td>66</td> <td>/B</td> <td>Channel /B (inverse polarity).</td> </tr> <tr> <td>67</td> <td>Z</td> <td>Channel Z (true polarity).</td> </tr> <tr> <td>68</td> <td>/Z</td> <td>Channel /Z (inverse polarity).</td> </tr> </tbody> </table>  <p style="text-align: right;">SD70ITC0118BE</p> <p style="text-align: center;"><i>Figure 3.3 Detail of connector J2</i></p>	Terminal	Signal	Description	60	+24V	Input voltage for Process Encoder +24VDC.	61	+5V	Input voltage for Process Encoder +5VDC.	62	GND_USR	Common terminal for input voltage of Process Encoder.	63	A	Channel A (true polarity).	64	/A	Channel /A (inverse polarity).	65	B	Channel B (true polarity).	66	/B	Channel /B (inverse polarity).	67	Z	Channel Z (true polarity).	68	/Z	Channel /Z (inverse polarity).
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60	+24V	Input voltage for Process Encoder +24VDC.																													
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66	/B	Channel /B (inverse polarity).																													
67	Z	Channel Z (true polarity).																													
68	/Z	Channel /Z (inverse polarity).																													

COMPONENT	DESCRIPTION																														
Connector for Motor Encoder (J1)	This connector is used to connect the Motor Encoder. In the following table, the terminals of the connector are described:																														
	<table border="1"> <thead> <tr> <th data-bbox="342 254 436 292">Terminal</th> <th data-bbox="436 254 557 292">Signal</th> <th data-bbox="557 254 872 292">Description</th> </tr> </thead> <tbody> <tr> <td data-bbox="342 292 436 340">69</td> <td data-bbox="436 292 557 340">+24V</td> <td data-bbox="557 292 872 340">Input voltage for Motor Encoder +24VDC.</td> </tr> <tr> <td data-bbox="342 340 436 388">70</td> <td data-bbox="436 340 557 388">+5V</td> <td data-bbox="557 340 872 388">Input voltage for Motor Encoder +5VDC.</td> </tr> <tr> <td data-bbox="342 388 436 436">71</td> <td data-bbox="436 388 557 436">GND_USR</td> <td data-bbox="557 388 872 436">Common terminal for input voltage of Motor Encoder.</td> </tr> <tr> <td data-bbox="342 436 436 467">72</td> <td data-bbox="436 436 557 467">A</td> <td data-bbox="557 436 872 467">Channel A (true polarity).</td> </tr> <tr> <td data-bbox="342 467 436 497">73</td> <td data-bbox="436 467 557 497">/A</td> <td data-bbox="557 467 872 497">Channel /A (inverse polarity).</td> </tr> <tr> <td data-bbox="342 497 436 528">74</td> <td data-bbox="436 497 557 528">B</td> <td data-bbox="557 497 872 528">Channel B (true polarity).</td> </tr> <tr> <td data-bbox="342 528 436 559">75</td> <td data-bbox="436 528 557 559">/B</td> <td data-bbox="557 528 872 559">Channel /B (inverse polarity).</td> </tr> <tr> <td data-bbox="342 559 436 589">76</td> <td data-bbox="436 559 557 589">Z</td> <td data-bbox="557 559 872 589">Channel Z (true polarity).</td> </tr> <tr> <td data-bbox="342 589 436 620">77</td> <td data-bbox="436 589 557 620">/Z</td> <td data-bbox="557 589 872 620">Channel /Z (inverse polarity).</td> </tr> </tbody> </table>	Terminal	Signal	Description	69	+24V	Input voltage for Motor Encoder +24VDC.	70	+5V	Input voltage for Motor Encoder +5VDC.	71	GND_USR	Common terminal for input voltage of Motor Encoder.	72	A	Channel A (true polarity).	73	/A	Channel /A (inverse polarity).	74	B	Channel B (true polarity).	75	/B	Channel /B (inverse polarity).	76	Z	Channel Z (true polarity).	77	/Z	Channel /Z (inverse polarity).
	Terminal	Signal	Description																												
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76	Z	Channel Z (true polarity).																													
77	/Z	Channel /Z (inverse polarity).																													
 <p>The photograph shows a 9-pin connector labeled J1. The terminals are arranged in three groups of three. The top row of labels from left to right is: Z, Z, B, B, A, A, GND_USR, +5V, +24V. The bottom row of labels from left to right is: 77, 76, 75, 74, 73, 72, 71, 70, 69. The connector is labeled 'Encoder Motor J1' and has a circular hole on the left side.</p>																															
SD70ITC0117AE	Figure 3.4 Detail of connector J1																														

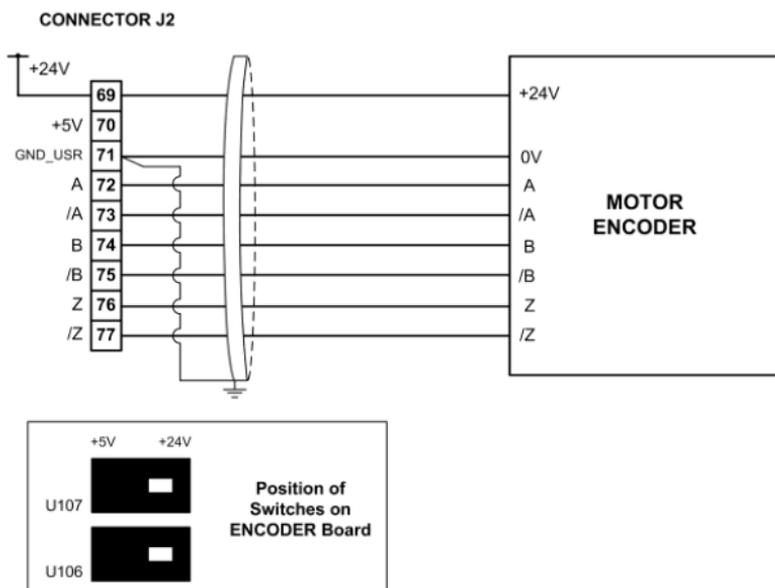
COMPONENT	DESCRIPTION
<p>Switches for Input Voltage of Motor Encoder (U106, U107)</p>	<p>Sliding switches with two positions, +24VDC and +5VDC. The selected position depends on the input voltage required by the used motor encoder.</p>  <p style="text-align: center;">SD70ITC0119BE</p> <p style="text-align: center;"><i>Figure 3.5 Detail of switches U106 and U107</i></p>
<p>Switches for Input Voltage of Process Encoder (U206, U207)</p>	<p>Sliding switches with two positions, +24VDC and +5VDC. The selected position depends on the input voltage required by the used process encoder.</p>  <p style="text-align: center;">SD70ITC0120BE</p> <p style="text-align: center;"><i>Figure 3.6 Detail of switches U206 and U207</i></p>
<p>Led for Input Voltage (D302)</p>	<p>Green colour led. When it is lit, the led indicates that the Encoder board is powered.</p>

3.2.2. Connection Drawing

The following section shows two encoder wiring examples according to the input voltage and the output type of the encoder.

Example 1

Connection of motor encoder powered at 24V with differential output.



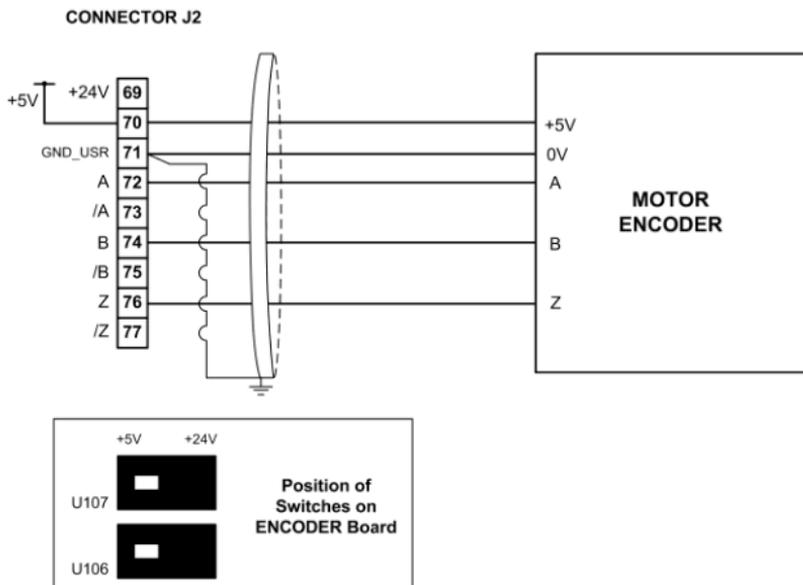
Note: Ground connection using shielded cable on the drive side only.

SD700DTC0014AI

Figure 3.7 Example 1. Connection of motor encoder at 24V and differential output

Example 2

Connection of motor encoder powered at 5V with 'single-ended' output.



Note: Ground connection using shielded cable on the drive side only.

SD70DTC0015AI

Figure 3.8 Example 2. Connection of motor encoder at 5V and 'single-ended' output

4. PARAMETER SETTINGS AND VISUALIZATION

4.1. Parameters SV.1 – Motor Visualization

Screen	Units	Description
Sp Ref = +000%	% motor speed	It shows the present reference value of speed which is applied to the motor.
Mtr Speed = +0rpm	Rpm	It shows the motor speed in revs per minute.
Mtr Freq = +0.0Hz	Hz	It shows the frequency being applied to the motor.
Mtr Vout = 0V	V	It shows the present voltage applied to the motor.
Mtr Iout = 0.0A	A	It shows the present current flowing to the motor.
Mtr Torqe = 0.0%	% Motor torque	It shows the present torque applied to the motor.
Mtr Pfactr = 0.0	-	It shows the power factor of the motor.
Mtr Pwr = +0.0kW	kW	It shows the instantaneous power consumption of the motor.
0.0A 0.0A 0.0A	A	It shows the instantaneous current of each phase of the motor (U, V and W).
Vmt= 0 0 0V	V	It shows the instantaneous voltage applied to the motor terminals.
PTC Motor = 0	-	It shows if the motor PTC (temperature sensor) is connected. X: PTC Connected. 0: PTC Not Connected.
Motor Temp = 0.0%	% Motor heat	It shows the estimated motor temperature. A level of 110% will cause an F25 trip (motor overload).
Encod.Puls = 0 ^[1]	Units	It shows the number of pulses received from the motor encoder.
CLsped = +0rpm ^[1]	rpm	It shows the value of the real speed of the motor.

^[1] Visualization parameters for the encoder.

4.2. Group 18 – G18: Encoder

Parameter	Name / Description	Range	Function	Set on RUN
1 PULSES=1024	G18.1 / Pulses per revolution of the encoder	200 – 8192	It allows setting the pulses per revolution of the encoder installed in the motor.	YES
2 TYPE= DIFF	G18.2 / Encoder Type	DIFF SING	It allows selecting the type of the encoder installed in the motor:	NO
3 ENCOD Filter=NO	G18.3 / Encoder Filter	YES NO	Filters the encoder signal	NO

4.3. Group 19 – G19: Fine Tuning

4.3.1. Subgroup 19.3 – S19.3: Motor Model

Parameter	Name / Description	Range	Function	Set on RUN
4 Kp Cloop=95%	G19.3.4 / Proportional gain for speed regulator	0 – 100%	It allows setting the proportional gain value of the speed regulator. If you need a higher control response, increase this value. Note: If this value is increased too much, a higher instability in the system can be introduced.	YES
5 It Cloop=95%	G19.3.5 / Integration time for speed regulator	0 – 100%	It allows setting the integration time of the speed regulator. If you need a higher accuracy you should increase this value. Note: If this value is increased too much, the system can become slower.	YES
6 TQ Kp=+95%	G19.3.6 / Proportional gain for overcurrent regulator	0 – 100%	It allows setting the proportional gain value of the torque regulator. If you need a higher control response, increase this value. Note: If this value is increased too much, a higher instability in the system can be introduced.	YES

Parameter	Name / Description	Range	Function	Set on RUN
7 TQ IT=+95%	G19.3.7 / Integration time for overcurrent regulator	0 – 100%	It allows setting the integration time of the torque regulator. If you need a higher accuracy you should increase this value. Note: If this value is increased too much, the system can become slower	YES
9 Flux Tune=2.0%	G19.3.9 / Flux optimization	0.0% – 10%	It allows setting a higher torque boost in the equipment. Note: If the start command is given and the fault 'F39 ROTOR LOCKED' is produced, this means the equipment has not enough torque to move the load. It will be necessary to set a higher value. If the parameter is set to the maximum value without managing to move the motor, probably, the resistant torque is too high for the selected equipment, or maybe there is a mechanical problem.	YES

5. SUMMARY OF MODBUS ADDRESSES

Visualization Parameters

Param.	Screen	Description	Address	Modbus Range
SV1.13	Encod.Puls = 0	Pulses received from the motor encoder	40337	0 – 32768
SV1.14	CLsped = +0rpm	Real speed of the motor	40336	Real Value = Modbus Value
SV1.15	Ra.REFVel = +0%	Instantaneous speed reference ramp	41306	8192 = 100% of motor rated speed

Programming Parameters

Param.	Screen	Description	Address	Range	Modbus Range
G18.1	1 PULSES=1024	Pulses per revolution of the encoder	40472	200 to 8192	200 to 8192
G18.2	2 TYPE= 4CAN	Encoder type	40473	4CAN 2CAN	0 to 1
G18.3	2 Encod Filter = NO	Encoder filter selection	40474	YES NO	0 to 1
G19.3.4	4 Kp Cloop=95%	Proportional gain for speed regulator	40334	0 to 100%	0 to 8192
G19.3.5	5 It Cloop=95%	Integration time for speed regulator	40335	0 to 100%	0 to 8192
G19.3.6	6 TQ Kp=+95%	Proportional gain for overcurrent regulator	40331	0 to 100%	0 to 8192
G19.3.7	7 TQ It=95%	Integration time for overcurrent regulator	40332	0 to 100%	0 to 8192
G19.3.9	9 Flux Tune=2.0%	Flux optimization	40338	0.0 to 10.0%	0 to 100

6. COMMISSIONING

Once the Encoder board is connected and the encoder is fitted on the motor shaft, and after programming the parameters described in the previous section, the following steps are recommended:

▪ Accessing to the motor shaft

1. With the drive in 'ON' status, select the control type 'Closed Loop', by setting the parameter G19.3.2 to 'Y'.
2. Turn over the motor shaft manually in positive rotation direction (clockwise). In order to check the rotation direction, look at how to change the motor shaft speed in %. This value is shown in the top left corner of the display, concretely in 'Status Line'. In this way:
 - If the speed value is positive, the motor shaft is rotated in positive direction.
 - If the speed value is negative, turn over the motor shaft in opposite rotation direction.
 - If the value does not change, there is some problem with the encoder (not operating correctly, not receiving power, wiring error, ...).
3. Turning over the motor shaft in positive rotation direction, check the number of encoder pulses, visualizing the parameter 'SV1.13 → Encod.Puls', in visualization parameter group 'SV1 – Motor Visualization'.
 - If the number of pulses increases, then the encoder is correctly connected.
 - If the number of pulses decreases, exchange the connection of signals A by /A (inverse polarity). After this, check that the number of pulses is now increasing when the motor shaft is rotating in positive direction.

- **Without accessing to the motor shaft**

1. With the drive in 'ON' status, select V/Hz as control type. For this, set the parameter G19.3.2 to 'N' and the parameter G19.1.1 to 'V/Hz' (see '*Getting Started Manual*' of SD700).
2. Introduce a positive speed reference, in parameter G3.3 (see '*Getting Started Manual*' of SD700).
3. Give the start command to the drive (by keypad, by digital input or by communications).
4. Check that the number of received pulses from the encoder increases, visualizing the parameter SV1.13, and that the motor speed value in rpm displayed in parameter SV1.2 (see '*Getting Started Manual*' of SD700) is similar to the speed value displayed in parameter SV1.14. This means that the encoder is correctly connected and operates properly.

On the other hand, if the number of pulses decreases, and therefore the speed value is negative in parameter SV1.14, exchange the connection of signals A by /A (inverse polarity). Now, check that the number of pulses increases and the speed value is positive.

In case that neither the number of pulses nor the speed (SV1.14) change, there is some problem with the encoder (not operating correctly, not receiving power, wiring error, ...).

7. FAULT MESSAGES

7.1. Description of Fault List

There are two possible faults linked with the encoder use:

DISPLAY	DESCRIPTION
F38 ENCODE LOSS	This fault is produced when any signal provided by the encoder is lost, when the drive is running and the motor is rotating.
F39 ROTOR LOCKED	This fault is produced when any signal provided by the encoder is not received during specific time after giving the start command to the drive when the motor is stopped.

7.2. Procedure for Fault Solution

DISPLAY	POSSIBLE CAUSE	ACTIONS
F38 ENCODE LOSS	Faulty encoder operation.	Check that the encoder status is correct and is not damaged. Check that the encoder is correctly fitted to the motor shaft and does not slide.
	Encoder Input voltage fault.	Check that the encoder is powered, in this case, make sure the input voltage is correct (5V or 24V).
	Encoder wiring fault.	Verify the encoder connections.
	Encoder board fault.	Check that the Encoder board is correctly connected to the drive and powered.
	Parameter setting error.	Verify that the parameters linked with the encoder use are correctly set.

DISPLAY	POSSIBLE CAUSE	ACTIONS
F39 ROTOR LOCKED	Faulty encoder operation.	Check that the encoder status is correct and is not damaged. Check that the encoder is correctly fitted to the motor shaft and does not slide.
	Encoder Input voltage fault.	Check that the encoder is powered, in this case, make sure the input voltage is correct (5V or 24V).
	Encoder wiring fault.	Verify the encoder connections.
	Encoder board fault.	Check that the Encoder board is correctly connected to the drive and powered.
	Parameter setting error.	Verify that the parameters linked with the encoder use are correctly set.
	High torque boost.	In case that the encoder operates correctly, increase the value set in parameter G19.3.9. Note: If the parameter is set to the maximum value without managing to move the motor in the starting, probably, the resistant torque is too high for the selected equipment, or maybe there is a mechanical problem.



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