N2 - POWER

N2 METASYS - GATEWAY

N2 Metasys gateway

Communication Network

POWER ELECTRONICS

N2 - POWER

N2 METASYS - GATEWAY

Modbus – N2 Metasys gateway

Communication Network

Edition: March 2008

GBC03BI Rev. B

SAFETY SYMBOLS

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

This symbol means improper operation may results 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 of March 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
22 / 11 / 2006	A	Software version N2-Power 1.0
11 / 03 / 2008	B	Adaptation to new name SD250, SD450 and SD700 Series.

INDEX

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

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 inverter 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

Do not allow lint, paper, wood chips, dust, metallic chips or other foreign matter into the gateway.
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 gateway is supplied with a technical manual.

SAFETY

- Before operating the equipment, 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 equipment with power applied and the front cover is removed.
- Install the inverter according to the instructions within this manual.
- Ensure that the mounting orientation is correct.
- Do not drop the gateway or subject it to impact.
- The N2-Power gateways contain static sensitive printed circuits boards. Use static safety procedures when handling these boards.

CONNECTION PRECAUTIONS

- To ensure correct operation of the equipment it is recommended to use a SCREENED CABLE for the control wiring.

TRIAL RUN

- 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 gateway may result.

1. INTRODUCTION

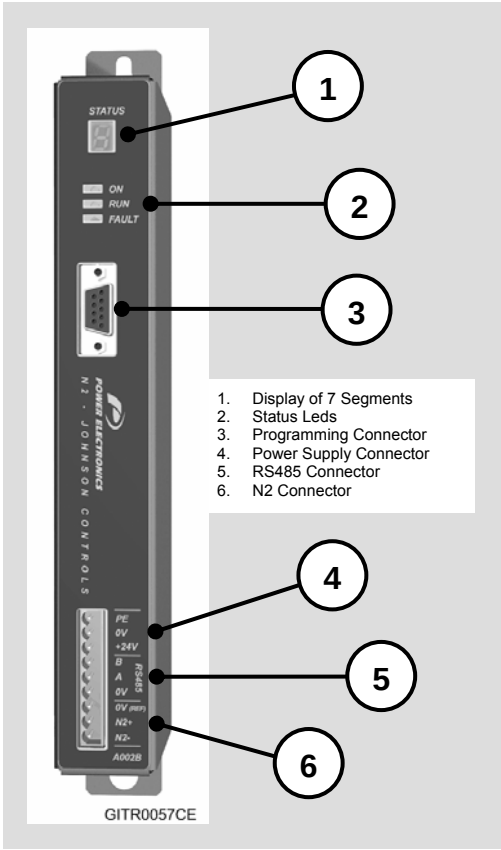
1.1. Module Description

The N2-Power gateway allows integrating the variable speed drives of SD250, SD450 and SD700 Series, and the digital softstarters of V5 Series to N2 networks of Johnson Controls.

Variable speed drives SD250, SD450 and SD700, and digital softstarters V5 include Modbus-RTU communication protocol as standard. The N2-Power gateway is a module that “translates” N2 protocol to Modbus-RTU protocol and allows connecting drives of SD250, SD450 and SD700 Series, and softstarters of V5 Series directly to a N2 network.

The useful design will allow you to know the operating status of the gateway all the time.

The information of this manual is about installation and configuration of the N2-Power gateway. If you want to get specific information of a concrete drive or softstarter, consult its getting start manual.


STATUS
ON
RUN
FAULT
POWER ELECTRONICS
N2 - JOHNSON CONTROLS
PE
0V
+24V
B
A
0V
RS485
0V (REF)
N2+
N2-
A002B
1
2
3
4
5
6
1. Display of 7 Segments
2. Status Leds
3. Programming Connector
4. Power Supply Connector
5. RS485 Connector
6. N2 Connector
GITR0057CE

2. TECHNICAL CHARACTERISTICS

2.1. General Information

2.1.1. Mechanical Characteristics

Dimensions (height x width x depth)	281 x35 x 87.5, metal.
Protection Degree	IP20.

2.1.2. Interfaces

Voltage	Removable connector with 3 wires.
Modbus-RTU equipment (RS485)	Removable connector with 3 wires.
Metasys N2 (RS485)	Removable connector with 3 wires.

2.1.3. Power Supply

Rate voltage	24Vdc.
Range allowed (curly included)	18 to 28Vdc.
Maximum Consumption	100mA.
+24V fuse	2A.

2.1.4. Electrical Insulation

Metasys N2 / RS485 connection	400Vrms.

2.1.5. Local Indications

Led ON (Green): Operative Voltage.
Led RUN (Green): Bus N2 Communication.
Led FAULT (Red): Bus N2 Fault.
Display of 7 segments: Status of N2-Power Gateway.

2.1.6. Motor Controllers Supported

Variable speed drives SD250, SD450 and SD700 Series of Power Electronics.
Digital softstarters V5 Series of Power Electronics.

2.2. Dimensions

In the attached figure you can observe the external dimensions of the N2-Power gateway.

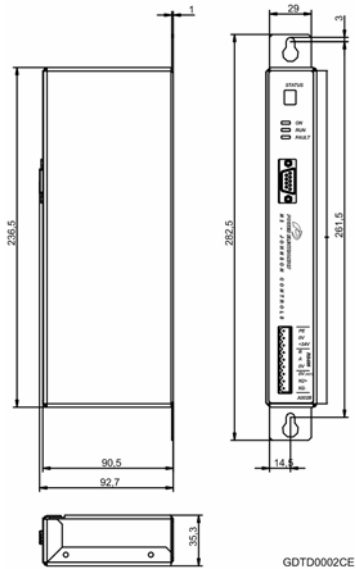


Figure 2.1 Dimensions of N2-Power. Modbus – N2 Metasys gateway

3. INSTALLATION AND CONNECTION OF N2-POWER GATEWAY

3.1. Installation of N2-Power Gateway

The N2-Power gateway of Power Electronics is a module to connect variable speed drives SD250, SD450 and SD700, and softstarters V5 of Power Electronics directly to a N2 network of Johnson Controls. It is necessary to use one gateway for each equipment that is connected to the network.

Note: Connect N2-Power gateway to N2 bus with the other devices off-line. Gateway installation does not involve that the inverter and/or the power is configured or connected in a correct way respectively. Make sure the peripheral installation is well done to guarantee a correct operation of the system.

CAUTION

Motor controllers 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 interface module of N2 Metasys. Otherwise, you may get personal injuries or an accident could occur.

3.1.1. Considerations on the Installation

It is recommended to apply power supply to the gateway from 24V external power supply. You can also apply power supply through the internal power supply of the equipment itself where the gateway is connected (if an internal power supply is available).

The gateway must be installed near the motor controller. It can be installed at 3 meters of motor controller as maximum, if it is required.

The connection gateway – drive/softstarter is RS485 point to point. N2 bus is RS485 multi-point. The gateway is connected to the bus in a daisy-chain way avoiding stubs (cable piece connected from the device to the bus). Bus lines are identified as N2+ (high signal), N2- (low signal) and REF (0V). Master device is located in one extreme of the bus.

For the RS485 connection is recommended to use shield type twisted-pare cable with a section of 0.75mm² (18 AWG). The termination resistor is not included in the gateway and it is necessary to put it externally if the gateway is the last device into the network. It can be connected 31 gateways to one bus segment (without repeaters).

Shield must keep continuity along all the line and must be connected to the ground in one extreme only.

Communication cables must be connected as far as possible from power cables. In case of communication cables cross them, they must do it perpendicularly.

3.2. Connections of N2-Power Gateway

3.2.1. Description of Terminals and Leds

In the N2-Power gateway there are different connectors to install it and connect it to variable speed drives of SD250, SD450 and SD700 Series, and digital softstarters of V5 Series, being equipments of Power Electronics all of them.

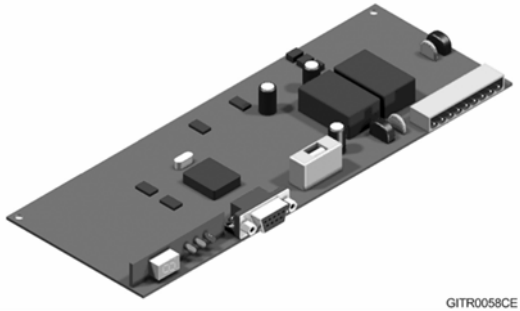
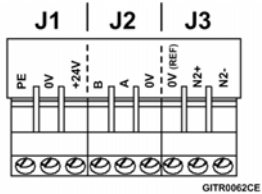


Figure 3.1 Location of connectors of the N2-Power interface

CONNECTOR / LED	DESCRIPTION
Display 7 segments	It shows the operating status of the N2-Power gateway.
Programming Connector (J5)	Connector SUB-D 9 pins to access to the internal programming of the gateway exclusively. Note: This connector is only for use of technical personnel of Power Electronics.
Power Supply (J1)	Connector for the input power supply of the gateway. 24Vdc input power supply. +24V: Positive terminal of the power supply. 0V: Negative terminal of the power supply. PE: Ground  *Figure 3.2 Detail of J1, J2 and J3 connectors*

CONNECTOR / LED	DESCRIPTION
RS485 Connector (J2)	By means of this connector the connection of Modbus signals is realized. B: RS485 High Signal (+) A: RS485 Low Signal (-) 0V: Common for communications See figure 3.2.
N2 Connector (J3)	For the connection of the N2 bus signals. 0V: Reference signal of N2 bus N2+: N2 bus High Signal (+) N2-: N2 bus Low Signal (-) See figure 3.2.
Led ON	Green. When it is lit indicates that the gateway is power supplied with 24V.
Led RUN	Green. When it is lit indicates that the gateway is exchanging data with N2 master, this is, there is communication in N2 bus.
Led FAULT	Red. When it is lit indicates that N2 bus fault exists. There is not communication between N2 master and the gateway.

In the following figure you can observe these terminals and leds.

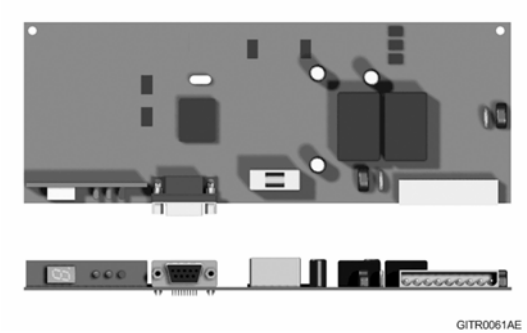


Figure 3.3 Location of terminals and leds of the N2-Power interface

3.2.2. Connection Drawing of N2-Power Gateway

The following figure shows the connections of the gateway by means of the different connectors that are included on it. These connections are, on the one hand, the power supply of the gateway, and on the other hand, the specific connections of the communications. The gateway is connected to the N2 bus through J3 connector, and is connected to the equipment that is going to be integrated to the N2 Metasys network by means of J2 connector (Modbus).

If additionally more information about N2 bus is required, refer to www.johnsoncontrols.com.

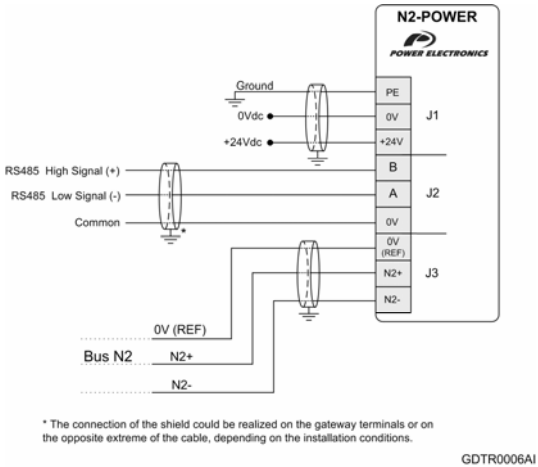


Figure 3.4 Connections of N2-Power gateway

4. CONNECTIONS FOR EQUIPMENTS OF POWER ELECTRONICS

4.1. Variable Speed Drives of SD250 Series

4.1.1. Connection Drawing for SD250

Use S+ terminal to connect RS485 high signal and S- to connect RS485 low signal.

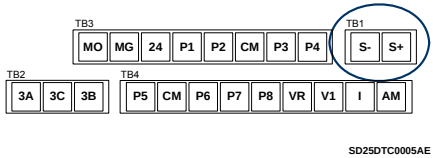


Figure 4.1 TB1 connector of SD250 control board

RS485 communication data:

- Transmission form: Bus method, Multi drop Link System.
- Applicable drives: SD250.
- Connectable drives: Maximum 31.
- Transmission distance: Below 1.200m maximum (within 700m recommended).
- Cable recommended: 0.75mm² (18AWG), Shield type twisted-pare.
- Installation: S+ and S- terminals of TB1 connector on control board.
- Power supply: Insulated power supply from the drive power supply.

Connection drawing:

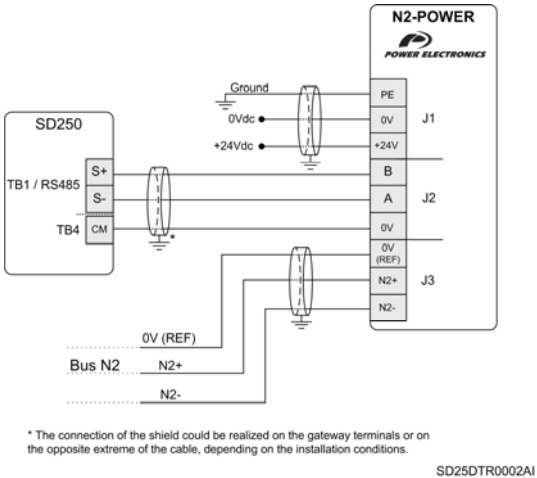


Figure 4.2 Connection of SD250 – N2-Power gateway

Note: The figure above shows the connections between SD250 and the gateway powered with an external power supply. The gateway can also be powered with the internal power supply included in SD250 as standard (TB3 connector – Terminals '24' for 24V signal and 'CM' for 0V signal).

4.1.2. Setting of Serial Communication Parameters for SD250

The N2-Power gateway manages the resources of the drive in the same way than other user. For this, it is necessary to configure the drive properly for the gateway can communicate with it.

Once connected the gateway, set the following parameters referred to serial communication of the drive as the following table shows (consult SD250 manual for programming details and parameters setting).

Par.	Description	Setting	
I59	Selection of communic. protocol	0	0: Modbus RTU
I60	Slave number in communic. Network	1 – 250	Use different slave numbers in case of more than 1 drive is installed. This number will be the slave number in N2 network.
I61	Transmission speed	3	9.600bps; factory setting.
I62	Stop mode after reference signal loss	0	Non stop. Factory setting.
I63	Time to determine speed reference signal loss	1.0sec	This time must be higher than scan time of N2 master. Factory setting.
I64	Communication time setting	5ms	Response time of the drive. Factory setting.
I65	Parity/Stop bit setting	0	Parity Bit: None Stop Bit: 1 Factory setting.

Additionally, to control the drive through N2 bus, and according to the application type, it can be necessary to set other parameters:

Par.	Description	Setting	
drv	Drive mode	3	RS485 Communication.
drC	Selection of motor rotation direction	0	0: It allows forward run of the motor (direct). Factory setting.
I2 – I15	Configuration of analogue inputs of voltage and current	*	Setting and scaling of voltage and current analogue inputs used as reference and feedback signals. Possible use in PID mode. Set values depend on the application.
I17 – I24	Configuration of multi-function digital inputs	*	The function of each input depends on the configured option.
I54	Multi-function output configuration	*	Output function depends on the configured option.
I55	Multi-function relay configuration	*	Relay function depends on the configured option.
H40	Selection of control mode	2	2: PID Feedback Control.
H30 – H33	Motor settings (rated values of magnitudes)	*	Set values depend on the motor that will be used. Correct visualization of magnitudes.
F21	Maximum frequency	*	It limits PID limit. Set value depends on the application.
F23	Start frequency	*	It limits PID limit. Set value depends on the application.
H50	Setting of PID feedback signal	*	It selects the source of the PID feedback signal. Set option depends on the application.

4.2. Variable Speed Drives of SD450 Series

4.2.1. Connection Drawing for SD450

Use C+ terminal to connect RS485 high signal and C- to connect RS485 low signal.
Common signal will be connected to the CM terminal. All of these terminals are located in the connector of the figure.

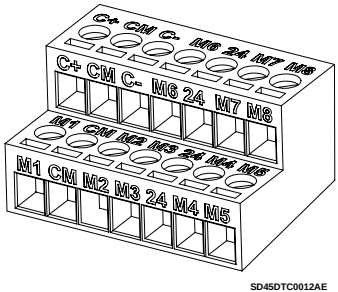


Figure 4.3 TER2 connector of SD450 control board

RS485 communication data:

- Transmission form: Bus method, Multi drop Link System.
- Applicable drives: SD450.
- Connectable drives: Maximum 31.
- Transmission distance: Below 1200m maximum (within 700m recommended).
- Cable recommended: 0.75mm² (18AWG), Shield type twisted-pare.
- Installation: C+, C- and CM terminals.
- Power supply: Insulated power supply from the drive power supply.

Connection drawing:

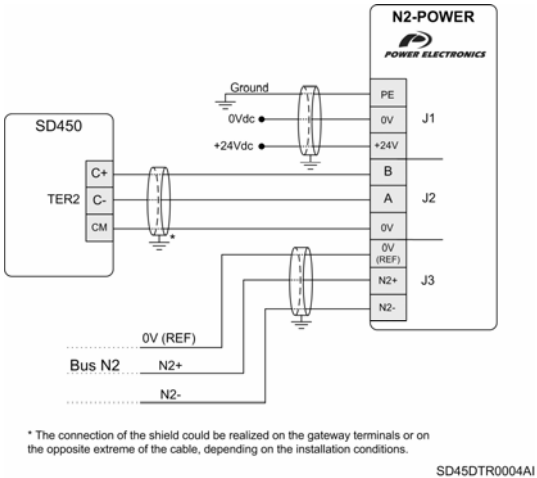


Figure 4.4 Connection of SD450 – N2-Power gateway

Note: The figure above shows the connections between SD450 and the gateway powered with an external power supply. The gateway can also be powered with the internal power supply included in SD450 as standard (TER2 connector – Terminals '24' for 24V signal and 'CM' for 0V signal).

4.2.2. Setting of Serial Communication Parameters for SD450

The N2-Power gateway manages the resources of the drive in the same way than other user. For this, it is necessary to configure the drive properly for the gateway can communicate with it.

Once connected the gateway, set the following parameters referred to serial communication of the drive as the following table shows (consult SD450 manual for programming details and parameters setting).

Par.	Description	Setting	
I/O-90	Slave number in communic. network	1 – 250	Use different slave numbers in case of more than 1 drive is installed. This number will be the slave number in N2 network.
I/O-91	Transmission speed	9600bps	9.600bps; factory setting.
I/O-92	Stop mode after reference signal loss	None	Non stop. Factory setting.
I/O-93	Time to determine speed reference signal loss	1.0sec	This time must be higher than scan time of N2 master. Factory setting.
I/O-94	Setting of time for RS232/RS485 communication	5ms	Response time of the drive. Factory setting.

Additionally, to control the drive through N2 bus, and according to the application type, it can be necessary to set other parameters:

Par.	Description	Setting	
DRV-03	Drive mode	Int.485	Start / Stop via RS485 communication.
FU1-01	Prevention of motor rotation direction	None	Direct run. Factory setting.
FU2-40 – 43	Motor settings (rated values of magnitudes)	*	Set values depend on the motor that will be used. Correct visualization of magnitudes.
I/O-01 – 10	Configuration of analogue inputs of voltage and current	*	Setting and scaling of voltage and current analogue inputs used as reference and feedback signals. Possible use in PID mode. Set values depend on the application.
APP-01	Selection of PID mode	Yes	It enables PID operation mode.
FU1-30	Maximum frequency	*	It limits PID limit. Set value depends on the application.
FU1-32	Start frequency	*	It limits PID limit. Set value depends on the application.
APP-06	Selection of source for feedback signal	*	It selects the source for the PID feedback signal. Set option depends on the application.

4.3. Variable Speed Drives of SD700 Series

4.3.1. Connection Drawing for SD700

Use terminal ‘22’ to connect high signal and ‘21’ to connect low signal of RS485 communication. These terminals are located in X1 connector of SD700. Common signal (0V) for serial communication is connected to terminal ‘23’.

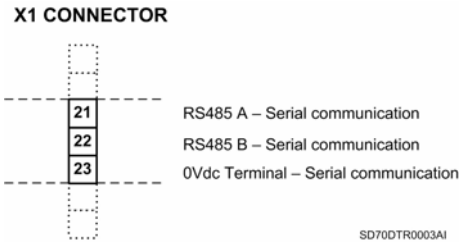


Figure 4.5 X1 connector. Terminals for RS485 communication of SD700

RS485 communication data:

- Transmission form: 2 cables, optically insulated, half duplex, RS485 differential mode.
- Applicable drives: SD700.
- Connectable drives: Maximum 240.
- Transmission distance: 1000m (Maximum cable length).
- Cable recommended: 0.75mm² (18AWG), Shield type twisted-pare.
- Installation: Terminals 21 (-), 22 (+) and 23 (0V).

Connection drawing:

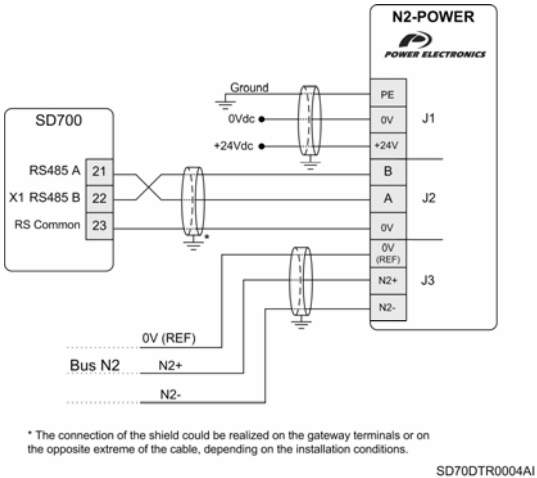


Figure 4.6 Connection of SD700 – N2-Power gateway

Note: The figure above shows the connections between SD700 and the gateway powered with an external power supply. The gateway can also be powered with the internal power supply included in SD700 as standard (X1 connector – Terminals '20' for 24V signal and '19' for 0V signal).

4.3.2. Setting of Serial Communication Parameters for SD700

The N2-Power gateway manages the resources of the drive in the same way than other user. For this, it is necessary to configure the drive properly for the gateway can communicate with it.

Once connected the gateway, set the following parameters referred to serial communication of the drive as the following table shows (consult SD700 manual for programming details and parameters setting).

Par.	Description	Setting	
G20.3.1	Communication address	1 – 255	Use different slave numbers in case of more than 1 drive is installed. This number will be the slave number in N2 network.
G20.1	Communication protocol	MODBUS	Factory setting.
G20.3.2	Communication speed	9600bps	Data transmission speed.
G20.3.3	Communication Parity	NONE	Parity Bit: None. Factory setting.
G20.2	Limit time for communication	1sec	This time must be higher than scan time of N2 master.

Additionally, to control the drive through N2 bus, and according to the application type, it can be necessary to set other parameters:

Par.	Description	Setting	
G4.1.1	Main control mode	3	3: Serial comms. Start / Stop via communication bus.
G10.9	To enable speed inversion	N	It does not allow that motor rotates in opposite rotation direction. Factory setting.
G2.1 – G2.7	Motor settings (rated values of magnitudes)	*	Motor nameplate data. Set values depend on the motor that will be used. Correct visualization of magnitudes.
G4.2.1 – G.4.2.15	Configuration of analogue input 1	*	Setting and scaling of analogue input 1 (voltage or current) used as reference or feedback signal. Possible use in PID mode. Set values depend on the application.
G4.3.1 – G4.3.15	Configuration of analogue input 2	*	Setting and scaling of analogue input 2 (voltage or current) used as reference or feedback signal. Possible use in PID mode. Set values depend on the application.
G6.3	Selection of feedback signal source	*	It selects the source through which the PID feedback signal will be introduced.

4.4. Digital Softstarters of V5 Series

4.4.1. Connection Drawing for V5

Use terminal ‘27’ to connect high signal and terminal ‘26’ to connect low signal of RS485 communication. These terminals are located on the bottom of the control board. Common signal for serial communication is connected to terminal ‘28’.

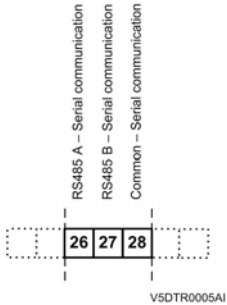


Figure 4.7 Terminals for RS485 communication of V5

RS485 communication data:

- Transmission form: 2 cables, optically insulated, half duplex, RS485 differential mode.
- Applicable drives: V5.
- Connectable drives: Maximum 240.
- Transmission distance: 1000m (maximum cable length).
- Cable recommended: 0.75mm² (18AWG), Shield type twisted-pare.
- Installation: Terminals 26 (-), 27 (+) and 28 (Common).

Connection drawing:

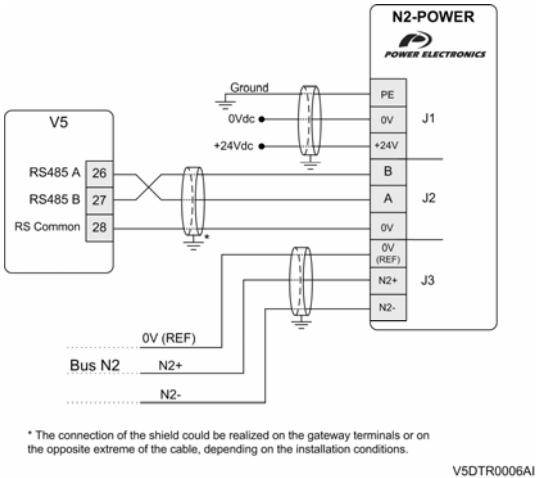


Figure 4.8 Connection of V5 – N2-Power gateway

4.4.2. Setting of Serial Communication Parameters for V5

The N2-Power gateway manages the resources of the drive in the same way than other user. For this, it is necessary to configure the softstarter properly for the gateway can communicate with it.

Once connected the gateway, set the following parameters referred to serial communication of the softstarter as the following table shows (consult V5 manual for programming details and parameters setting).

Par.	Description	Setting	
G14.1	Serial communic. time-out	1s	This time must be higher than scan time of N2 master.
G14.2	Modbus device address	1 – 240	Use different slave numbers in case of more than 1 drive is installed. This number will be the the slave number in N2 network.
G14.3	Modbus communic. baud rate	9600bps	Factory setting.
G14.4	Modbus communic. Parity	NO	No Parity. Factory setting.

Additionally, to control the drive through N2 bus, and according to the application type, it can be necessary to set other parameters:

Par.	Description	Setting	
G6.1	Control mode	Serial Comms	Serial Comms: Start / Stop through serial communications.

5. STATUS OF N2-POWER GATEWAY

5.1. Status Leds

As it has been mentioned before in this manual, the gateway includes three leds that supply general information about the status of the gateway and communications.

Led	Colour	Description
ON	Green	When it is lit indicates that the gateway is powered with 24V.
RUN	Green	When it is lit indicates that the gateway is exchanging data with the N2 master, this is, exists established communication in the N2 bus.
FAULT	Red	When it is lit indicates that N2 bus fault exists. There is no communication between N2 master and the gateway.

5.2. Display of 7 Segments

As well as status leds, The N2-Power gateway includes a red-colour display of 7 segments for indicating the present status of the gateway. This display is located next to the status leds.

Display status indicates general status of the gateway by means of a combination of static and dynamic codes.

Parameters of Changing Horizontal Bars

The gateway is trying to establish communication with the equipment (drive or softstarter). Once the gateway connected to the equipment and after applying voltage, the gateway can take up to 1 minute approximately to establish the first communication, depending on the modbus equipment address. This is due to the address sweping realized by the gateway (one by one) until matching the set address in the equipment.

To achieving the establishment of the communication between the gateway and the equipment is necessary to connect and energize them correctly, as well as setting correctly the parameters referred to slave address, transmission speed and parity in the equipment.

Once the communication is established, if this one is lost, the gateway will always try to communicate to the modbus address of the equipment that was stored (address that has been found when gateway was powered). If the modbus address of the equipment is modified, it is necessary to restart the gateway by cycling power. In this way, when gateway starting again, it will realize a new address sweping until finding the new address set in the equipment.

Parameters of Rotary Bars

There is communication established between the gateway and the equipment. Additionally, there is no fault in the equipment.

Sequence "d" "X" "X" "X"

The display will show the node number (address) of the gateway every 15 seconds. The range of the addresses goes from 1 to 250.

Sequence "F" "X" "X"

It indicates that there is communication between the gateway and the equipment, and the last one is in a fault status.

Fault codes for SD250

Code	Fault / Description
F01	OCT, Over current.
F02	OVT, Over voltage.
F03	EXT-A, External fault, A input.
F04	EST (BX), Emergency stop.
F05	COL, Input phase lost.
F06	GFT, Ground fault.
F07	OHT, Drive overheating.
F08	ETH, Motor overheating.
F09	OLT, Overload trip.
F10	HW-diag, Hardware fault.
F11	EXT-B, External fault, B input.
F12	EEP, EEPROM fault.
F13	FAN, Fan fault.
F14	PO, Output phase open.
F15	IOLT, Overload.
F16	LVT, DC bus low voltage.

Note: To obtain more detailed information about faults of this drive, its possible causes and solutions, see *'Getting Started Manual'* of SD250.

Fault codes for SD450

Code	Fault / Description
F01	OCT1, Over current 1.
F02	OVT, Over voltage.
F03	EXT-A, External fault, A input.
F04	BX, Emergency stop.
F05	LV, DC bus low voltage.
F06	Reserved.
F07	GF, Ground fault.
F08	OHT, Drive overheating.
F09	ETH, Motor overheating.
F10	OLT, Overload trip.
F11	HW-diag, Hardware fault.
F12	Reserved.
F13	OCT2, Overcurrent 2.
F14	OPT, Option error.
F15	PO, Output phase open.
F16	IOLT, Overload.

Note: To obtain more detailed information about faults of this drive, its possible causes and solutions, see *'Getting Started Manual'* of SD450.

Fault codes for SD700

Code	Fault / Description
F01	F1 I LIM FLT
F02	F2 V LIM FLT
F03	F3 PDINT FLT
F04	F4 U+DESAT
F05	F5 U-DESAT
F06	F6 V+DESAT
F07	F7 V-DESAT
F08	F8 W+DESAT
F09	F9 W-DESAT

Code	Fault / Description
F10	F10 NEG IGBT
F11	F11 VIN LOSS
F12	F12 IMB V IN
F13	F13 HI V IN
F14	F14 LW V IN
F15	F15 CURL Vdc
F16	F16 HI Vdc
F17	F17 LW Vdc
F18	F18 IMB V OUT
F19	F19 IMB I OUT
F20	F20 GROUND FLT
F21	F21 I LIM T/O
F22	F22 TQ LIM T/O
F25	F25 MTR O/L
F27	F27 DL SMTH
F28	F28 MICRO FLT
F29	F29 DSP FLT
F30	F30 WATCHDOG
F31	F31 SCR L1
F32	F32 SCR L2
F33	F33 SCR L3
F34	F34 IGBT TEMP
F35	F35 PHSE L1 LOSS
F36	F36 PHSE L2 LOSS
F37	F37 PHSE L3 LOSS
F40	F40 EXT / PTC
F41	F41 COMMS TRIP
F42	F42 AIN1 LOSS
F43	F43 AIN2 LOSS
F44	F44 CAL FLT
F45	F45 STOP T/O
F46	F46 EEPROM FLT
F47	F47 COMMS T/O
F48	F48 SPI COM
F49	F49 SPD LIMIT
F50	F50 PSU FAULT
F51	F51 SCR TEMP
F52	F52 SUPPLY FAN

Code	Fault / Description
F53	F53 INTRNAL TEMP
F54	F54 WATCHDOG TMR
F65	F65 LOW PRESSURE
F66	F66 HI PRESSURE
F67	F67 LOW WATER

Note: To obtain more detailed information about faults of this drive, its possible causes and solutions, see *'Getting Started Manual'* of SD700.

Fault codes for V5

Code	Fault / Description
F01	F1 PHA MISING
F02	F2 WRONG PH/SQ
F03	F3 ASYM CURR
F04	F4 OVER LOAD
F05	F5 UNDER LOAD
F06	F6 PEAK CURR
F07	F7 STARTER OT
F08	F8 MOTOR PTC
F09	F9 SHEAR PIN
F10	F10 OVER VOLT
F11	F11 UNDER VOLT
F12	F12 EXCESIV STR
F13	F13 MEMORY FLT
F14	F14 SCR1 FAULT
F15	F15 SCR2 FAULT
F16	F16 SCR3 FAULT
F17	F17 SCR_S FLT
F18	F18 EXCES T LS
F19	F19 LS DISABLE
F20	F20 COMS T/OUT

Code	Fault / Description
F21	F21 EXTRN TRIP
F22	F22 CUR FLT
F23	F23 CUR FLT2
F24	F24 HIGH PRESSURE
F25	F25 LOW PRESSURE
F26	F26 FLOW SWITCH
F27	F27 DEEP WELL PROBE

Note: To obtain more detailed information about faults of this softstarter, its possible causes and solutions, see *'Getting Started Manual'* of V5.

Intermittent Decimal Point

Decimal point must be always blinking three times per second. If it does not blink, or blinks once every 2 seconds, contact with technical assistance of Power Electronics.

6. INTRODUCTION TO N2 METASYS

6.1. N2 Metasys Protocol

N2 protocol consists of communication specifications in the Metasys automation system of Johnson Controls. This protocol describes the format and the structure of a N2 network.

- The network is bus type with RS485 physical interface.
- A couple of wires is used for the differential signal, and other wire for common signal and reference signal.
- The control network is master-slave type, this is, each device is identified by its address.
- Serial communication is half-duplex with a transmission speed of 9600bps, 8 data bits, 1 start bit and 1 stop bit with no parity.

In N2 protocol, each hardware device connected to the N2 bus is called *'Virtual Object'*. The model of this Virtual Object (and it is considered by master like this) consists of a group of tidy and classified registers according to the data that are contained into them. There are 7 different data types: Analogue Inputs, Binary Inputs, Analogue Outputs, Binary Outputs, Real Internal Parameters, Integer Internal Parameters and Byte Internal Parameters.

Each data type has different register structure. These registers contain information about configuration, control and status of data. Up to 256 registers of each of different data types can be in each Virtual Object.

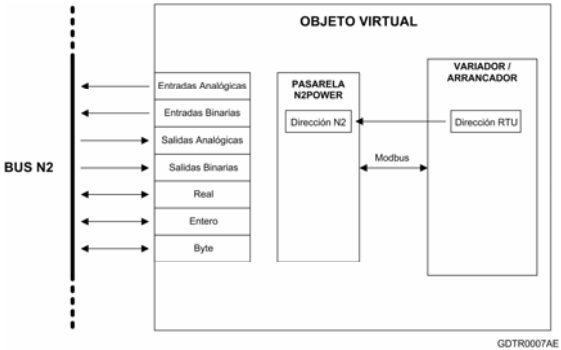


Figure 6.1 Communication drawing with N2 protocol

Physical device can be configured, monitorized and controlled by means of master readings or writings in these data registers through N2 bus.

There are two ways through which master device is communicated with the slaves. The first one is by means of a direct command of reading or writing in registers of data type, and the second one through polling mechanism in which, when slave receiving the polling command, it only responds when changes are produced in its data from the previous polling command received.

In case of N2-Power, Virtual Object consists of equipment (drive or softstarter) plus gateway. Gateway address in N2 bus is the same than modbus address of the equipment.

6.2. Data Types

6.2.1. Analogue Inputs

The analogue inputs are real values that are inputs to the N2 master. Limits of high level, low level and differential value for the process of warnings and alarms can be configured. Functions of COS (Change of State), alarms and warnings can be enabled or disabled. They are used to monitorize the equipment.

6.2.2. Analogue Outputs

The analogue outputs are real values that are outputs of the N2 master. They are used to configure the equipment. The values of the analogue inputs are modified by means of 'override' commands.

6.2.3. Binary Inputs

The binary inputs are boolean values that are inputs to the N2 master. Alarm statuses for an input value can be defined. They are used to monitorize the status of the equipment and the status of the digital inputs and outputs (relays) of the equipment.

6.2.4. Binary Inputs

The binary inputs are boolean values that act as outputs of N2 master. They are used to control the equipment. The values of the binary outputs are modified by means of 'override' commands.

6.2.5. Internal Parameters

The internal parameters can be real values ADF, integer values ADI or bytes ADB. The N2-Power gateway has not data of this type.

6.2.6. Change of State (COS)

When data type get in or out of warning or alarm status, and COS is enabled on it, the slave device will inform master of this change of state at the next polling.

6.2.7. On-Line / Off-Line

The N2 master has a table with the device type, address and status of all of the slaves connected to the bus. A slave device can be on-line or off-line. At the beginning, master supposes that all of the slaves are. The master tries to communicate with the off-line slaves, by sending an identifying command. If the response is correct, the master changes the slave status from off-line to on-line in its table.

If a gateway takes more than 200ms for responding, the master will repeat the question up to three times. If there is not still response, an off-line status will be assigned to this slave device.

6.2.8. Override

Override command is used to send a value to a data type (replacing the previous data that data type had). This sent value becomes the actual value until is released by means of a release override command.

6.2.9. NPT

Network Point Type.

6.2.10. NPA

Network Point Address.

6.3. Implementation of N2 Protocol

Analogue Inputs

Attribute	Description
1	Configuration: enable / disable alarm, warnings and COS.
2	Status: alarm, warning, override.
3	Actual analogue value in physical units.
8	Low limit alarm.
9	Low limit warning.
10	High limit warning.
11	High limit alarm.
12	Difference value for hysteresis for alarms and warnings.

Binary Inputs

Attribute	Description
1	Configuration: enable / disable alarms and COS. Normal status.
2	Status: actual status, alarm, override.

Analogue Outputs

Attribute	Description
1	Configuration: enable / disable COS.
2	Status: override.
3	Actual analogue value in physical units.

Binary Outputs

Attribute	Description
1	Configuration: enable / disable COS. Normal status.
2	Status: actual status, override.

Commands

Commando / Subcommand	Description	Comments
0 / 0	Date and hour updating	No effect in the equipment.
0 / 4	Polling without ACK	
0 / 5	Polling with ACK	After powering the gateway, if first polling message received by this one is with ACK, the gateway treats this message like a message without ACK. It is possible to send several polling commands for receiving all of the variables that has been changed.

Command / Subcommand	Description	Comments
0 / 8	Starting	The gateway is waiting for an identifying message.
1 / 1	Reading of any attribute of analogue input	The value of attribute 3 is the read one from the equipment.
1 / 2	Reading of any attribute of binary input	The status value is the read one from the equipment.
1 / 3	Reading of any attribute of analogue output	The value of attribute 3 is the read one from the equipment.
1 / 4	Reading of any attribute of binary output	The status value is the read one from the equipment.
2 / 1	Writing in attributes of analogue input	All of them except for attribute 2 and attribute 3.
2 / 2	Writing in attributes of binary input	All of them except for attribute 2.
2 / 3	Writing in attributes of analogue output	All of them except for attribute 2 and attribute 3.
2 / 4	Writing in attributes of binary output	All of them except for attribute 2.
72 / 1	"Override" analogue input*	It replaces the value of the analogue input by the 'override' value. This new value will be the value that is transmitted to N2 master and will be considered in COS. The equipment will be not affected.
72 / 2	"Override" binary input*	It replaces the value of the binary input by the 'override' value. This new value will be the value that is transmitted to N2 master and will be considered in COS. The equipment will be not affected.

* There is no time-out in override command.

Command / Subcommand	Description	Comments
72 / 3	"Override" analogue output*	It replaces the value of the analogue output by the 'override' value. This new value will be copied in the corresponding register of the equipment. The gateway will continue to read this value of the equipment and this one will be transmitted to N2 master. It will be considered in COS.**
72 / 4	"Override" binary output*	It replaces the value of the binary output by the 'override' value. This new value will be copied in the corresponding register of the equipment. The gateway will continue to read this value of the equipment and this one will be transmitted to N2 master. It will be considered in COS.**
73 / 1	"Override release" analogue input	It returns to the analogue input the value that was contained by this input, before executing the first 'override' command. Next, the value supplied by the equipment will be used again.
73 / 2	"Override release" binary input	It returns to the binary input the value that was contained by this input, before executing the first 'override' command. Next, the value supplied by the equipment will be used again.
73 / 3	"Override release" analogue output	It returns to the analogue output the value that was contained by this output, before executing the first 'override' command. Next, the value supplied by the equipment will be used again.

* There is no time-out in override command.

** The value written in the equipment is non-floating and will remain on it even if the equipment is power cycled.

Command / Subcommand	Description	Comments
73 / 4	"Override release" binary output	It returns to the binary output the value that was contained by this output, before executing the first 'override' command. Next, the value supplied by the equipment will be used again.
F / -	Device type identification	It responds with identification code 10.

Error Codes

Code	Description
00	The gateway is waiting for receiving the identification command of the device.
01	Undefined command.
02	Checksum error.
05	Wrong frame length.
10	Virtual object point does not exist.

7. MEMORY MAPS

7.1. Point Map for SD250 Drive

Analogue Outputs

NPT	NPA	Description	Range / Value	Units
AI	1	Output current	0.0 – 1.5In (In = rated current)	A
AI	2	Output voltage	0 – Vin (V input)	V
AI	3	Output frequency	0.00 – 400.00	Hz
AI	4	Output power	0.00 – 1.5Pn (Pn = rated power)	kW
AI	5	PID reference value	0.0 – 100.0	%
AI	6	PID feedback value	0.0 – 100.0	%
AI	7	DC Bus voltage	0.0 – $\sqrt{2}$ Vin	V
AI	8	Motor rpm	0 – 24000	rpm
AI	9	Software version of the drive	0.0 – 9.9	-
AI	10	Drive status Floating comma value of binary number of 16 bits that represents the status of the drive. For analyzing the status, it is necessary to convert the real number to a binary number and exam bits in a separately way.	Bit 0 = 1: Stop Bit 1 = 1: Direct run (forward) Bit 2 = 1: Inverse run (reverse) Bit 3 = 1: Fault trip Bit 4 = 1: Acceleration Bit 5 = 1: Deceleration Bit 6 = 1: Speed reached Bit 7 = 1: DC brake Bit 8 = 1: Stopping Bit 9 = 1: (Not used) Bit 10 = 1: Open brake Bit 11 = 1: Direct run command (forward) Bit 12 = 1: Inverse run command (reverse) Bit 13 = 1: REM. R/S – Remote Run/Stop Bit 14 = 1: REM. Freq. – Freq. by remote control	-

NPT	NPA	Description	Range / Value	Units
AI	11	Actual fault code	Bit 0 = 1: OCT, over current Bit 1 = 1: OVT, over voltage Bit 2 = 1: EXT-A, external fault input A Bit 3 = 1: EST (BX), emergency stop Bit 4 = 1: COL, input phase loss Bit 5 = 1: GFT, ground fault Bit 6 = 1: OHT, drive overheating Bit 7 = 1: ETH, motor overheating Bit 8 = 1: OLT, overload current trip Bit 9 = 1: HW, hardware fault Bit 10 = 1: EXT-B, external fault input B Bit 11 = 1: EEP, EEPROM fault Bit 12 = 1: FAN, fan fault Bit 13 = 1: PO, open output phase Bit 14 = 1: IOLT, overload Bit 15 = 1: LVT, DC bus low voltage	-
AI	12	Low frequency limit in PID mode	0.10 – 400.00	Hz
AI	13	High frequency limit in PID mode	0.10 – 400.00	Hz
AI	14	Local reference frequency	0.00 – 400.00	Hz
AI	15	Proportional gain in PID mode	0.0 – 999.9	%
AI	16	Integration time in PID mode	0.00 – 32.00	s
AI	17	Differential time in PID mode	0.00 – 30.00	s
AI	18	Selection of reference signal	0: Setting 1 from keypad 1: Setting 2 by keypad 2: V1 mode 1 (-10V – +10V) 3: V1 mode 2 (0V – +10V) 4: Terminal I (0 – 20mA) 5: Mode 1 V1 + I 6: Mode 2 V1 + I 7: RS485 communications	-

Digital Inputs (Binary Inputs)

NPT	NPA	Description	Range / Value	Comments
BI	1	Status of digital input P1	0: open contact 1: closed contact	Configuration of digital input through register I17
BI	2	Status of digital input P2	0 – 1	Idem register I18
BI	3	Status of digital input P3	0 – 1	Idem register I19
BI	4	Status of digital input P4	0 – 1	Idem register I20
BI	5	Status of digital input P5	0 – 1	Idem register I21
BI	6	Status of digital input P6	0 – 1	Idem register I22
BI	7	Status of digital input P7	0 – 1	Idem register I23
BI	8	Status of digital input P8	0 – 1	Idem register I24
BI	9	Status of digital output MO	0: relay deactivated 1: relay activated	Configuration of digital output through register I54
BI	10	Status of digital output 3ABC	0 – 1	Idem register I55
BI	11	Drive status normal/alarm	0: normal 1: alarm	

Analogue Outputs

NPT	NPA	Description	Range / Value	Units
AO	1	Low frequency limit in PID mode	0.10 – 400.00	Hz
AO	2	High frequency limit in PID mode	0.10 – 400.00	Hz
AO	3	Local reference frequency	0.00 – 400.00	Hz
AO	4	Proportional gain in PID mode	0.0 – 999.9	%
AO	5	Integration time in PID mode	0.00 – 32.00	s
AO	6	Differential time in PID mode	0.00 – 30.00	s
AO	7	Selection of reference signal	See AI-18	-

Digital Outputs (Binary Outputs)

NPT	NPA	Description	Range / Value
BO	1	Run command (direct run) / Stop	0: stop command 1: run command (direct run)
BO	2	Output inversion in PID mode	0: normal 1: inverse

7.2. Point Map for SD450 Drive

Analogue Inputs

NPT	NPA	Description	Range / Value	Units
AI	1	Output current	0.0 – 1.5In (In = rated current)	A
AI	2	Output voltage	0 – Vin (V input)	V
AI	3	Output frequency	0.00 – 120.00	Hz
AI	4	Output power	0.00 – 1.5Pn (Pn = rated power)	kW
AI	5	PID reference value	0.0 – 100.0	%
AI	6	Drive temperature	0 – 160	ºC
AI	7	DC Bus voltage	0.0 – $\sqrt{2}$ Vin	V
AI	8	Motor rpm	0 – 7200	rpm
AI	9	Software version of the drive	0.0 – 9.9	-
AI	10	Drive status Floating comma value of binary number of 16 bits that represents the status of the drive. For analyzing the status, it is necessary to convert the real number to a binary number and exam bits in a separately way.	Bit 0 = 1: Stop Bit 1 = 1: Direct run (forward) Bit 2 = 1: Inverse run (reverse) Bit 3 = 1: Fault trip Bit 4 = 1: Acceleration Bit 5 = 1: Deceleration Bit 6 = 1: Speed reached Bit 7 = 1: DC brake Bit 8 = 1: Stopping Bit 9 = 1: (Not used) Bit 10 = 1: Open brake Bit 11 = 1: Direct run command (forward) Bit 12 = 1: Inverse run command (reverse) Bit 13 = 1: REM. R/S – Remote Run/Stop Bit 14 = 1: REM. Freq. – Freq. by remote control	-

NPT	NPA	Description	Range / Value	Units
AI	11	Actual fault code	Bit 0 = 1: OCT1, over current 1 Bit 1 = 1: OVT, over voltage Bit 2 = 1: EXT-A, external fault input A Bit 3 = 1: BX, emergency stop Bit 4 = 1: LV, Low voltage Bit 5: reserve Bit 6 = 1: GF, ground fault Bit 7 = 1: OHT, drive overheating Bit 8 = 1: ETH, motor overheating Bit 9 = 1: OLT, overload current trip Bit 10 = 1: HW, hardware fault Bit 11: reserve Bit 12 = 1: OCT2, over current 2 Bit 13 = 1: OPT, option error Bit 14 = 1: PO, open phase Bit 15 = 1: IOLT, drive overload	-
AI	12	Low frequency limit in PID mode	0.10 – 120.00	Hz
AI	13	High frequency limit in PID mode	0.10 – 120.00	Hz
AI	14	Local reference frequency	0.00 – 120.00	Hz
AI	15	Proportional gain in PID mode	0.0 – 999.9	%
AI	16	Integration time in PID mode	0.0 – 32.0	s
AI	17	Differential time in PID mode	0.0 – 100.0	ms
AI	18	Selection of reference signal	0: Setting 1 from keypad 1: Setting 2 from keypad 2: V1 mode 1 (0V – +12V) 3: V1S mode 2 (-12V – +12V) 4: Terminal I (0 – 20mA / 4 – 20mA) 5: V1 + I 6: Pulse 7: RS485 communications 8: PID ext.	-

Digital Inputs (Binary Inputs)

NPT	NPA	Description	Range / Value	Comments
BI	1	Status of digital input M1	0: open contact 1: closed contact	Configuration of digital input through register I/O-20
BI	2	Status of digital input M2	0 – 1	Idem register I/O-21
BI	3	Status of digital input M3	0 – 1	Idem register I/O-22
BI	4	Status of digital input M4	0 – 1	Idem register I/O-23
BI	5	Status of digital input M5	0 – 1	Idem register I/O-24
BI	6	Status of digital input M6	0 – 1	Idem register I/O-25
BI	7	Status of digital input M7	0 – 1	Idem register I/O-26
BI	8	Status of digital input M8	0 – 1	Idem register I/O-27
BI	9	Status of digital output AUX1	0: relay deactivated 1: relay activated	Configuration of digital output through register I/O-76
BI	10	Status of digital output 3ABC	0 – 1	Idem register I/O-80
BI	11	Drive status normal/alarm	0: normal 1: alarm	

Analogue Outputs

NPT	NPA	Description	Range / Value	Units
AO	1	Low frequency limit in PID mode	0.10 – 120.00	Hz
AO	2	High frequency limit in PID mode	0.10 – 120.00	Hz
AO	3	Local reference frequency	0.00 – 120.00	Hz
AO	4	Proportional gain in PID mode	0.0 – 999.9	%
AO	5	Integration time in PID mode	0.0 – 32.0	s
AO	6	Differential time in PID mode	0.0 – 100.0	ms
AO	7	Selection of reference signal	See AI-18	-

Digital Outputs (Binary Outputs)

NPT	NPA	Description	Range / Value
BO	1	Run command (direct run) / Stop	0: stop command 1: run command (direct run)
BO	2	Output inversion in PID mode	0: normal 1: inverse

7.3. Point Map for SD700 Drive

Analogue Inputs

NPT	NPA	Description	Range / Value	Units
AI	1	Output current	0.0 – 1.5In (In = rated current)	A
AI	2	Output voltage	0 – Vin (V input)	V
AI	3	Output frequency	-250 – +250	Hz
AI	4	Output power	0.0 – 1.5Pn (Pn = rated power)	kW
AI	5	PID reference value	0.0 – 100.0	%
AI	6	PID feedback value	0.0 – 100.0	%
AI	7	DC Bus voltage	0.0 – $\sqrt{2}$ Vin	V
AI	8	Motor rpm	-15000 – +150000	rpm
AI	9	Software version of the drive	0.0 – 9.9	-
AI	10	Drive status	0 – 169	-
AI	11	Actual fault code	0 – 67	-
AI	12	Low frequency limit in PID mode	-250 – +250	Hz
AI	13	High frequency limit in PID mode	-250 – +250	Hz
AI	14	Local reference frequency	-250 – +250	Hz
AI	15	Proportional gain in PID mode	0.1 – 20.0	%
AI	16	Integration time in PID mode	0.1 – 1001.0	s
AI	17	Differential time in PID mode	0.0 – 250.0	s
AI	18	Selection of reference signal	0: None 1: AI1, analogue input 1 2: AI2, analogue input 2 3: AI1 + AI2, Analogue input 1 + 2 4: LOCAL, keypad 5: MREF, multi-reference 6: PMOT, motorized potentiometer 7: PID, reference signal according to the PID settings	-

Digital Inputs (Binary Inputs)

NPT	NPA	Description	Range / Value	Comments
BI	1	Status of digital input DI1	0: open contact 1: closed contact	Configuration of digital input through parameter G4.1.5
BI	2	Status of digital input DI2	0 – 1	Idem parameter G4.1.6
BI	3	Status of digital input DI3	0 – 1	Idem parameter G4.1.7
BI	4	Status of digital input DI4	0 – 1	Idem parameter G4.1.8
BI	5	Status of digital input DI5	0 – 1	Idem parameter G4.1.9
BI	6	Status of digital input DI6	0 – 1	Idem parameter G4.1.10
BI	7	Status of digital input PTC	0 – 1	-
BI	8	Status of output relay 1	0: relay deactivated 1: relay activated	Configuration of relay output through parameter G8.1.1
BI	9	Status of output relay 2	0 – 1	Idem parameter G8.1.5
BI	10	Status of output relay 3	0 – 1	Idem parameter G8.1.9
BI	11	Drive status normal/alarm	0: normal 1: alarm	

Analogue Outputs

NPT	NPA	Description	Range / Value	Units
AO	1	Low frequency limit in PID mode	-250 – +250	Hz
AO	2	High frequency limit in PID mode	-250 – +250	Hz
AO	3	Local reference frequency	-250 – +250	Hz
AO	4	Proportional gain in PID mode	0.1 – 20.0	%
AO	5	Integration time in PID mode	0.1 – 1001.0	s
AO	6	Differential time in PID mode	0.0 – 250.0	s
AO	7	Selection of reference signal	See AI-18	-

Digital Outputs (Binary Outputs)

NPT	NPA	Description	Range / Value
BO	1	Run command (direct run) / Stop	0: stop command 1: run command (direct run)
BO	2	Output inversion in PID mode	0: normal 1: inverse

7.4. Point Map for V5 Softstarter

Analogue Inputs

NPT	NPA	Description	Range / Value	Units
AI	0	Current of Phase 1	0 – 9999	A
AI	1	Current of Phase 2	0 – 9999	A
AI	2	Current of Phase 3	0 – 9999	V
AI	3	Compound Voltage RS	0 – 999	V
AI	4	Compound Voltage ST	0 – 999	V
AI	5	Compound Voltage RT	0 – 999	V
AI	6	Frequency	0 – 99	Hz
AI	7	Phi Cosine	0.00 – 1.00	-
AI	8	Motor torque	0 – 100	%
AI	9	Motor power	0.0 – 999.9	kW
AI	10	Motor overload status	0 – 100	%
AI	11	Parameter status of softstarter	Bit 0 = 1: Stopped Bit 1 = 1: Accelerating Bit 2 = 1: Running Bit 3 = 1: Decelerating Bit 4 = 1: Fault	-
AI	12	Alarms parameter	0 – 27 (See Fault Codes of V5)	-
AI	13	Analogue input 1	0 – 100	%
AI	14	Analogue input 2	0 – 100	%
AI	15	Total current	0 – 9999	A
AI	16	Total voltage	0 – 999	V

Digital Inputs (Binary Inputs)

NPT	NPA	Description	Range / Value	Comments
BI	1	Status of digital input 1	0: open contact 1: closed contact	Configuration of digital input in group G6
BI	2	Status of digital input 2	0 – 1	Configuration of digital input in group G6
BI	3	Status of digital input 3	0 – 1	Configuration of digital input in group G6
BI	4	Status of digital input 4	0 – 1	Configuration of digital input in group G6

NPT	NPA	Description	Range / Value	Comments
BI	5	Status of digital input 5	0 – 1	Configuration of digital input in group G6
BI	6	Status of digital output 1	0: relay deactivated 1: relay activated	Configuration of digital output in group G7
BI	7	Status of digital output 2	0 – 1	Configuration of digital output in group G7
BI	8	Status of digital output 3	0 – 1	Configuration of digital output in group G7

Digital Outputs (Binary Outputs)

NPT	NPA	Description	Range / Value
BO	1	Run command (direct run)	0: none 1: run command (direct run)
BO	2	Stop command	0: none 1: stop command
BO	3	Reset command	0: none 1: reset of softstarter

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