

# DATASHEET - SPX125A1-4A1N1



**Variable frequency drive, 400 V AC, 3-phase, 90 kW, IP21, Radio interference suppression filter, OLED display, FR8**



**Part no.** SPX125A1-4A1N1  
**Catalog No.** 125669  
**Alternate Catalog No.** SPX125A1-4A1N1

## Delivery program

|                                    |                 |    |                                                                                                                                     |
|------------------------------------|-----------------|----|-------------------------------------------------------------------------------------------------------------------------------------|
| Product range                      |                 |    | Variable frequency drives                                                                                                           |
| Part group reference (e.g. DIL)    |                 |    | SPX                                                                                                                                 |
| Rated operational voltage          | U <sub>e</sub>  |    | 400 V AC, 3-phase<br>480 V AC, 3-phase<br>500 V AC, 3-phase                                                                         |
| Output voltage with V <sub>e</sub> | U <sub>2</sub>  |    | 400 V AC, 3-phase<br>480 V AC, 3-phase<br>500 V AC, 3-phase                                                                         |
| Mains voltage (50/60Hz)            | U <sub>LN</sub> | V  | 380 (-15%) - 500 (+10%)                                                                                                             |
| <b>Rated operational current</b>   |                 |    |                                                                                                                                     |
| At 150% overload                   | I <sub>e</sub>  | A  | 170                                                                                                                                 |
| At 110% overload                   | I <sub>e</sub>  | A  | 205                                                                                                                                 |
| <b>Assigned motor rating</b>       |                 |    |                                                                                                                                     |
| Note                               |                 |    | For AC motors with internal and external ventilation with 50 Hz / 60 Hz                                                             |
| Note                               |                 |    | Overload cycle for 60 s every 600 s                                                                                                 |
| Note                               |                 |    | at 400 V, 50 Hz                                                                                                                     |
| 150 % Overload                     | P               | kW | 90                                                                                                                                  |
| 110 % Overload                     | P               | kW | 110                                                                                                                                 |
| 150 % Overload                     | I <sub>M</sub>  | A  | 161                                                                                                                                 |
| 110 % Overload                     | I <sub>M</sub>  | A  | 196                                                                                                                                 |
| Note                               |                 |    | at 440 - 480 V, 60 Hz                                                                                                               |
| 150 % Overload                     | P               | HP | 125                                                                                                                                 |
| 110 % Overload                     | P               | HP | 150                                                                                                                                 |
| 150 % Overload                     | I <sub>M</sub>  | A  | 156                                                                                                                                 |
| 110 % Overload                     | I <sub>M</sub>  | A  | 180                                                                                                                                 |
| Degree of Protection               |                 |    | IP21                                                                                                                                |
| Fieldbus connection (optional)     |                 |    | PROFIBUS-DP<br>PROFINET<br>EtherCAT<br>EtherNet/IP<br>LonWorks<br>CANopen®<br>DeviceNet<br>Modbus-TCP<br>Modbus-RTU<br>BACnet MS/TP |
| Fitted with                        |                 |    | Radio interference suppression filter<br>OLED display                                                                               |
| Frame size                         |                 |    | FR8                                                                                                                                 |
| Connection to SmartWire-DT         |                 |    | no                                                                                                                                  |

## Technical data

|                |  |  |                                                                                                                                     |
|----------------|--|--|-------------------------------------------------------------------------------------------------------------------------------------|
| Standards      |  |  | Specification for general requirements: IEC/EN 61800-2<br>EMC requirements: IEC/EN 61800-3<br>Safety requirements: IEC/EN 61800-5-1 |
| Certifications |  |  | CE, UL, cUL, RCM                                                                                                                    |
| Approvals      |  |  | DNV                                                                                                                                 |

|                                    |          |    |                                                                                                                                                                       |
|------------------------------------|----------|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Production quality                 |          |    | RoHS, ISO 9001                                                                                                                                                        |
| Climatic proofing                  | $\rho_w$ | %  | < 95% relative humidity, no condensation, no corrosion, no dripping water                                                                                             |
| Ambient temperature                |          |    |                                                                                                                                                                       |
| Operating ambient temperature min. |          | °C | -10                                                                                                                                                                   |
| Operating ambient temperature max. |          | °C | + 50                                                                                                                                                                  |
| operation (110 % overload)         | $\theta$ | °C | -10 - +40                                                                                                                                                             |
| Storage                            | $\theta$ | °C | -40 - +70                                                                                                                                                             |
| Radio interference level           |          |    |                                                                                                                                                                       |
| Radio interference class (EMC)     |          |    | C2, C3, depending on the motor cable length, the connected load, and ambient conditions. External radio interference suppression filters (optional) may be necessary. |
| Environment (EMC)                  |          |    | 1st and 2nd environments as per EN 61800-3                                                                                                                            |
| Mounting position                  |          |    | Vertical                                                                                                                                                              |
| Altitude                           |          | m  | 0 - 1000 m above sea level<br>above 1000 m with 1 % performance reduction per 100 m<br>max. 3000 m                                                                    |
| Degree of Protection               |          |    | IP21                                                                                                                                                                  |
| Protection against direct contact  |          |    | BGV A3 (VBG4, finger- and back-of-hand proof)                                                                                                                         |

## Main circuit

|                                       |            |     |                                                                                                |
|---------------------------------------|------------|-----|------------------------------------------------------------------------------------------------|
| Supply                                |            |     |                                                                                                |
| Rated operational voltage             | $U_e$      |     | 400 V AC, 3-phase<br>480 V AC, 3-phase<br>500 V AC, 3-phase                                    |
| Mains voltage (50/60Hz)               | $U_{LN}$   | V   | 380 (-15%) - 500 (+10%)                                                                        |
| System configuration                  |            |     | AC supply systems with earthed center point                                                    |
| Supply frequency                      | $f_{LN}$   | Hz  | 50/60                                                                                          |
| Frequency range                       | $f_{LN}$   | Hz  | 45–66 ( $\pm$ 0%)                                                                              |
| Power section                         |            |     |                                                                                                |
| Function                              |            |     | Variable frequency drive with internal DC link and IGBT inverter                               |
| Output voltage with $V_e$             | $U_2$      |     | 400 V AC, 3-phase<br>480 V AC, 3-phase<br>500 V AC, 3-phase                                    |
| Output Frequency                      | $f_2$      | Hz  | 0 - 50/60 (max. 320)                                                                           |
| Switching frequency                   | $f_{PWM}$  | kHz | 3.6<br>adjustable 1 - 10                                                                       |
| Operation Mode                        |            |     | U/f control<br>sensorless vector control (SLV)<br>optional: Vector control with feedback (CLV) |
| Frequency resolution (setpoint value) | $\Delta f$ | Hz  | 0.01                                                                                           |
| Rated operational current             |            |     |                                                                                                |
| At 150% overload                      | $I_e$      | A   | 170                                                                                            |
| At 110% overload                      | $I_e$      | A   | 205                                                                                            |
| Fitted with                           |            |     | Radio interference suppression filter<br>OLED display                                          |
| Frame size                            |            |     | FR8                                                                                            |
| Motor feeder                          |            |     |                                                                                                |
| Note                                  |            |     | For AC motors with internal and external ventilation with 50 Hz / 60 Hz                        |
| Note                                  |            |     | Overload cycle for 60 s every 600 s                                                            |
| Note                                  |            |     | at 400 V, 50 Hz                                                                                |
| 150 % Overload                        | P          | kW  | 90                                                                                             |
| 110 % Overload                        | P          | kW  | 110                                                                                            |
| Note                                  |            |     | at 440 - 480 V, 60 Hz                                                                          |
| 150 % Overload                        | P          | HP  | 125                                                                                            |
| 110 % Overload                        | P          | HP  | 150                                                                                            |

## Control section

|                          |       |   |                                              |
|--------------------------|-------|---|----------------------------------------------|
| External control voltage | $U_c$ | V | 24 V DC (max. 250 mA)                        |
| Reference voltage        | $U_s$ | V | 10 V DC (max. 10 mA)                         |
| Analog inputs            |       |   | 2, parameterizable, 0 - 10 V DC, 0/4 - 20 mA |
| Analog outputs           |       |   | 1, parameterizable, 0/4 - 20 mA              |
| Digital inputs           |       |   | 6, parameterizable, max. 30 V DC             |

|                                                   |  |  |                                                                                                                               |
|---------------------------------------------------|--|--|-------------------------------------------------------------------------------------------------------------------------------|
| Digital outputs                                   |  |  | 1, parameterizable, 48 V DC/50 mA                                                                                             |
| Relay outputs                                     |  |  | 2, parameterizable, N/O, 8 A (24 V DC) / 8 A (250 V AC) / 0,4 A (125 V DC)                                                    |
| <b>Assigned switching and protective elements</b> |  |  |                                                                                                                               |
| Power Wiring                                      |  |  |                                                                                                                               |
| Main choke                                        |  |  |                                                                                                                               |
| 150 % overload (CT/I <sub>H</sub> , at 50 °C)     |  |  | DX-LN3-250                                                                                                                    |
| Note regarding mains choke                        |  |  | Mains choke recommended only if the power quality is poor. Current harmonics (THD) are attenuated by internal DC link chokes. |
| Motor feeder                                      |  |  |                                                                                                                               |
| motor choke                                       |  |  |                                                                                                                               |
| 150 % overload (CT/I <sub>H</sub> , at 50 °C)     |  |  | DX-LM3-180                                                                                                                    |
| 110 % overload (VT/I <sub>L</sub> , at 40 °C)     |  |  | DX-LM3-220                                                                                                                    |
| Sine filter                                       |  |  |                                                                                                                               |
| 150 % overload (CT/I <sub>H</sub> , at 50 °C)     |  |  | DX-SIN3-180                                                                                                                   |
| 110 % overload (VT/I <sub>L</sub> , at 40 °C)     |  |  | DX-SIN3-250                                                                                                                   |

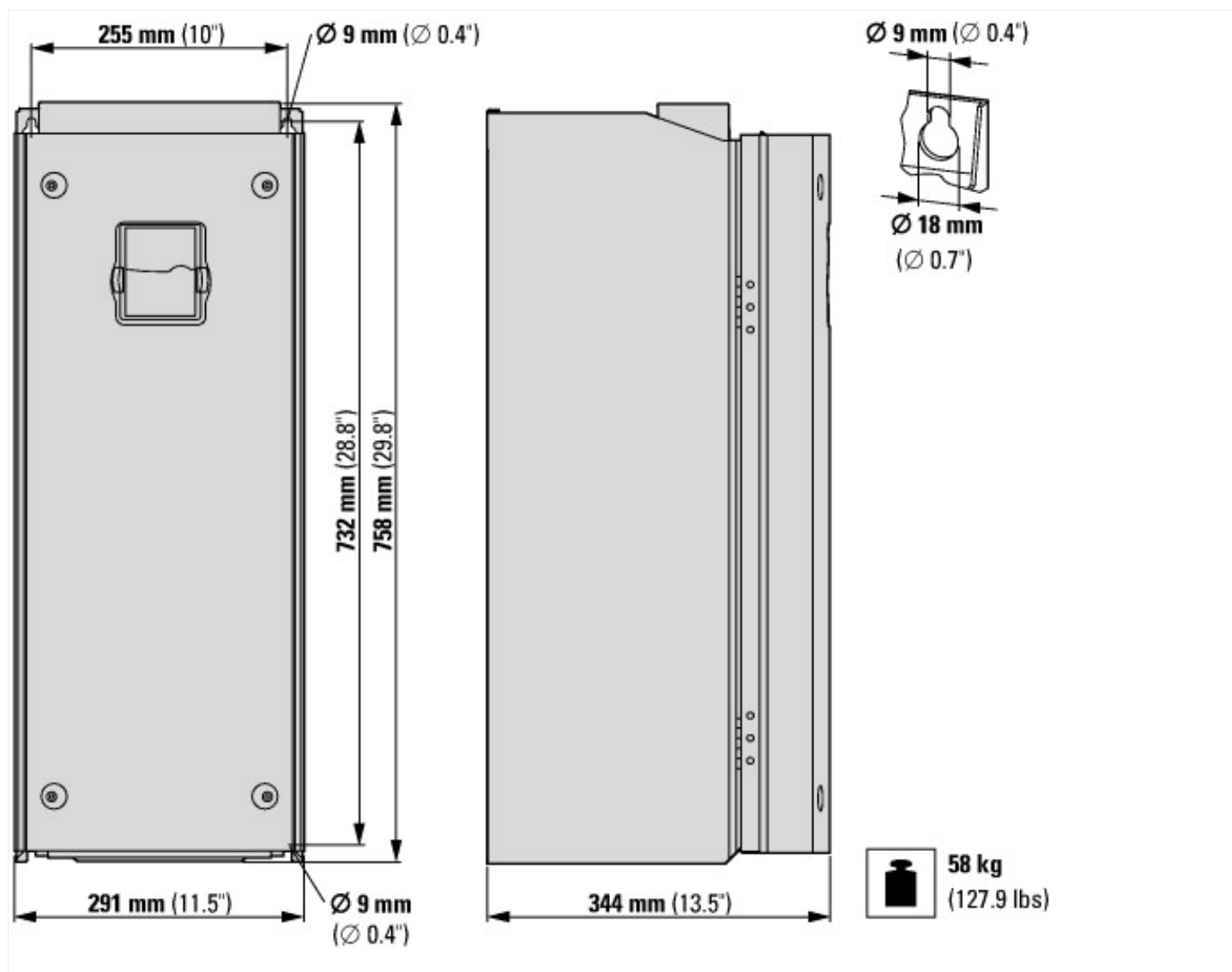
## Design verification as per IEC/EN 61439

|                                                                                                                        |                   |    |                                                                                                                                  |
|------------------------------------------------------------------------------------------------------------------------|-------------------|----|----------------------------------------------------------------------------------------------------------------------------------|
| Technical data for design verification                                                                                 |                   |    |                                                                                                                                  |
| Rated operational current for specified heat dissipation                                                               | I <sub>n</sub>    | A  | 170                                                                                                                              |
| Heat dissipation per pole, current-dependent                                                                           | P <sub>vid</sub>  | W  | 0                                                                                                                                |
| Equipment heat dissipation, current-dependent                                                                          | P <sub>vid</sub>  | W  | 2250                                                                                                                             |
| Static heat dissipation, non-current-dependent                                                                         | P <sub>vs</sub>   | W  | 0                                                                                                                                |
| Heat dissipation capacity                                                                                              | P <sub>diss</sub> | W  | 0                                                                                                                                |
| Operating ambient temperature min.                                                                                     |                   | °C | -10                                                                                                                              |
| Operating ambient temperature max.                                                                                     |                   | °C | 50                                                                                                                               |
|                                                                                                                        |                   |    | Operation (with 150 % overload)                                                                                                  |
| IEC/EN 61439 design verification                                                                                       |                   |    |                                                                                                                                  |
| 10.2 Strength of materials and parts                                                                                   |                   |    |                                                                                                                                  |
| 10.2.2 Corrosion resistance                                                                                            |                   |    | Meets the product standard's requirements.                                                                                       |
| 10.2.3.1 Verification of thermal stability of enclosures                                                               |                   |    | Meets the product standard's requirements.                                                                                       |
| 10.2.3.2 Verification of resistance of insulating materials to normal heat                                             |                   |    | Meets the product standard's requirements.                                                                                       |
| 10.2.3.3 Verification of resistance of insulating materials to abnormal heat and fire due to internal electric effects |                   |    | Meets the product standard's requirements.                                                                                       |
| 10.2.4 Resistance to ultra-violet (UV) radiation                                                                       |                   |    | Meets the product standard's requirements.                                                                                       |
| 10.2.5 Lifting                                                                                                         |                   |    | Does not apply, since the entire switchgear needs to be evaluated.                                                               |
| 10.2.6 Mechanical impact                                                                                               |                   |    | Does not apply, since the entire switchgear needs to be evaluated.                                                               |
| 10.2.7 Inscriptions                                                                                                    |                   |    | Meets the product standard's requirements.                                                                                       |
| 10.3 Degree of protection of ASSEMBLIES                                                                                |                   |    | Does not apply, since the entire switchgear needs to be evaluated.                                                               |
| 10.4 Clearances and creepage distances                                                                                 |                   |    | Meets the product standard's requirements.                                                                                       |
| 10.5 Protection against electric shock                                                                                 |                   |    | Does not apply, since the entire switchgear needs to be evaluated.                                                               |
| 10.6 Incorporation of switching devices and components                                                                 |                   |    | Does not apply, since the entire switchgear needs to be evaluated.                                                               |
| 10.7 Internal electrical circuits and connections                                                                      |                   |    | Is the panel builder's responsibility.                                                                                           |
| 10.8 Connections for external conductors                                                                               |                   |    | Is the panel builder's responsibility.                                                                                           |
| 10.9 Insulation properties                                                                                             |                   |    |                                                                                                                                  |
| 10.9.2 Power-frequency electric strength                                                                               |                   |    | Is the panel builder's responsibility.                                                                                           |
| 10.9.3 Impulse withstand voltage                                                                                       |                   |    | Is the panel builder's responsibility.                                                                                           |
| 10.9.4 Testing of enclosures made of insulating material                                                               |                   |    | Is the panel builder's responsibility.                                                                                           |
| 10.10 Temperature rise                                                                                                 |                   |    | The panel builder is responsible for the temperature rise calculation. Eaton will provide heat dissipation data for the devices. |
| 10.11 Short-circuit rating                                                                                             |                   |    | Is the panel builder's responsibility. The specifications for the switchgear must be observed.                                   |
| 10.12 Electromagnetic compatibility                                                                                    |                   |    | Is the panel builder's responsibility. The specifications for the switchgear must be observed.                                   |
| 10.13 Mechanical function                                                                                              |                   |    | The device meets the requirements, provided the information in the instruction leaflet (IL) is observed.                         |

## Approvals

|                                      |  |                                                                     |
|--------------------------------------|--|---------------------------------------------------------------------|
| Product Standards                    |  | UL 508C; CSA-C22.2 No. 14; IEC/EN61800-3; IEC/EN61800-5; CE marking |
| UL File No.                          |  | E134360                                                             |
| UL Category Control No.              |  | NMMS, NMMS2, NMMS7, NMMS8                                           |
| CSA File No.                         |  | UL report applies to both US and Canada                             |
| CSA Class No.                        |  | 3211-06                                                             |
| North America Certification          |  | UL listed, certified by UL for use in Canada                        |
| Specially designed for North America |  | No                                                                  |
| Suitable for                         |  | Branch circuits                                                     |
| Max. Voltage Rating                  |  | 3~ 480 V AC IEC: TN-S UL/CSA: "Y" (Solidly Grounded Wey)            |
| Degree of Protection                 |  | IEC: IP21                                                           |

## Dimensions



## Additional product information (links)

|                                      |                                                                                                                                                                                                                                                                                                 |
|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IL04020008Z Frequency inverter 9000X |                                                                                                                                                                                                                                                                                                 |
| IL04020008Z Frequency inverter 9000X | <a href="https://es-assets.eaton.com/DOCUMENTATION/AWA_INSTRUCTIONS/IL04020008Z2018_05.pdf">https://es-assets.eaton.com/DOCUMENTATION/AWA_INSTRUCTIONS/IL04020008Z2018_05.pdf</a>                                                                                                               |
| Documentation                        | <a href="http://www.eaton.eu/Europe/Electrical/ProductsServices/AutomationControl/SwitchingProtectingDrivingMotors/9000X/SPX9000/index.htm#tabs-4">http://www.eaton.eu/Europe/Electrical/ProductsServices/AutomationControl/SwitchingProtectingDrivingMotors/9000X/SPX9000/index.htm#tabs-4</a> |