



**Variable frequency drive, 400 V AC, 3-phase, 160 kW, IP00, OLED display, FR10**



**Part no. SPX250A0-4A2N1**  
**Catalog No. 125402**  
**Alternate Catalog No. SPX250A0-4A2N1**

## Delivery program

|                                  |          |    |                                                                                                                                     |
|----------------------------------|----------|----|-------------------------------------------------------------------------------------------------------------------------------------|
| Product range                    |          |    | Variable frequency drives                                                                                                           |
| Part group reference (e.g. DIL)  |          |    | SPX                                                                                                                                 |
| Rated operational voltage        | $U_e$    |    | 400 V AC, 3-phase<br>480 V AC, 3-phase<br>500 V AC, 3-phase                                                                         |
| Output voltage with $V_e$        | $U_2$    |    | 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%)                                                                                                             |
| <b>Rated operational current</b> |          |    |                                                                                                                                     |
| At 150% overload                 | $I_e$    | A  | 300                                                                                                                                 |
| At 110% overload                 | $I_e$    | A  | 385                                                                                                                                 |
| <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 | 160                                                                                                                                 |
| 110 % Overload                   | P        | kW | 200                                                                                                                                 |
| 150 % Overload                   | $I_M$    | A  | 279                                                                                                                                 |
| 110 % Overload                   | $I_M$    | A  | 349                                                                                                                                 |
| Note                             |          |    | at 440 - 480 V, 60 Hz                                                                                                               |
| 150 % Overload                   | P        | HP | 250                                                                                                                                 |
| 110 % Overload                   | P        | HP | 300                                                                                                                                 |
| 150 % Overload                   | $I_M$    | A  | 302                                                                                                                                 |
| 110 % Overload                   | $I_M$    | A  | 361                                                                                                                                 |
| Degree of Protection             |          |    | IP00                                                                                                                                |
| 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                      |          |    | OLED display                                                                                                                        |
| Frame size                       |          |    | FR10                                                                                                                                |
| Connection to SmartWire-DT       |          |    | no                                                                                                                                  |

## Technical data

### General

|                                    |          |    |                                                                                                                                     |
|------------------------------------|----------|----|-------------------------------------------------------------------------------------------------------------------------------------|
| 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 | + 40                                                                                                                                                                  |
| Storage                            | 9 | °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               |   |    | IP00                                                                                                                                                                  |
| Protection against direct contact  |   |    | BGV A3 (VBG4, finger- and back-of-hand proof)                                                                                                                         |

## Main circuit

|                                       |                  |     |                                                                                                |
|---------------------------------------|------------------|-----|------------------------------------------------------------------------------------------------|
| Supply                                |                  |     |                                                                                                |
| Rated operational voltage             | U <sub>e</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%)                                                                        |
| System configuration                  |                  |     | AC supply systems with earthed center point                                                    |
| Supply frequency                      | f <sub>LN</sub>  | Hz  | 50/60                                                                                          |
| Frequency range                       | f <sub>LN</sub>  | Hz  | 45–66 (± 0%)                                                                                   |
| Power section                         |                  |     |                                                                                                |
| Function                              |                  |     | Variable frequency drive with internal DC link and IGBT inverter                               |
| 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                                    |
| Output Frequency                      | f <sub>2</sub>   | Hz  | 0 - 50/60 (max. 320)                                                                           |
| Switching frequency                   | f <sub>PWM</sub> | kHz | 3.6<br>adjustable 1 - 6                                                                        |
| Operation Mode                        |                  |     | U/f control<br>sensorless vector control (SLV)<br>optional: Vector control with feedback (CLV) |
| Frequency resolution (setpoint value) | Δf               | Hz  | 0.01                                                                                           |
| Rated operational current             |                  |     |                                                                                                |
| At 150% overload                      | I <sub>e</sub>   | A   | 300                                                                                            |
| At 110% overload                      | I <sub>e</sub>   | A   | 385                                                                                            |
| Fitted with                           |                  |     | OLED display                                                                                   |
| Frame size                            |                  |     | FR10                                                                                           |
| 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  | 160                                                                                            |
| 110 % Overload                        | P                | kW  | 200                                                                                            |
| Note                                  |                  |     | at 440 - 480 V, 60 Hz                                                                          |
| 150 % Overload                        | P                | HP  | 250                                                                                            |
| 110 % Overload                        | P                | HP  | 300                                                                                            |

## Control section

|                          |                |   |                                                                            |
|--------------------------|----------------|---|----------------------------------------------------------------------------|
| External control voltage | U <sub>c</sub> | V | 24 V DC (max. 250 mA)                                                      |
| Reference voltage        | U <sub>s</sub> | 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) |

## Assigned switching and protective elements

|                                               |  |  |            |
|-----------------------------------------------|--|--|------------|
| Motor feeder                                  |  |  |            |
| motor choke                                   |  |  |            |
| 150 % overload (CT/I <sub>H</sub> , at 50 °C) |  |  | DX-LM3-303 |

|                                             |  |  |             |
|---------------------------------------------|--|--|-------------|
| 110 % overload (VT/I <sub>L</sub> at 40 °C) |  |  | DX-LM3-450  |
| Sine filter                                 |  |  |             |
| 110 % overload (VT/I <sub>L</sub> at 40 °C) |  |  | DX-SIN3-440 |

## Design verification as per IEC/EN 61439

|                                                                                                                        |                   |    |                                                                                                                                  |
|------------------------------------------------------------------------------------------------------------------------|-------------------|----|----------------------------------------------------------------------------------------------------------------------------------|
| Technical data for design verification                                                                                 |                   |    |                                                                                                                                  |
| Rated operational current for specified heat dissipation                                                               | I <sub>n</sub>    | A  | 300                                                                                                                              |
| Heat dissipation per pole, current-dependent                                                                           | P <sub>vid</sub>  | W  | 0                                                                                                                                |
| Equipment heat dissipation, current-dependent                                                                          | P <sub>vid</sub>  | W  | 4000                                                                                                                             |
| 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 | 40                                                                                                                               |
| 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.                         |

## Technical data ETIM 7.0

|                                                                                                                                                                                            |    |  |           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|--|-----------|
| Low-voltage industrial components (EG000017) / Frequency converter =< 1 kV (EC001857)                                                                                                      |    |  |           |
| Electric engineering, automation, process control engineering / Electrical drive / Static frequency converter / Static frequency converter = < 1 kV (ecI@ss10.0.1-27-02-31-01 [AKE177014]) |    |  |           |
| Mains voltage                                                                                                                                                                              | V  |  | 323 - 550 |
| Mains frequency                                                                                                                                                                            |    |  | 50/60 Hz  |
| Number of phases input                                                                                                                                                                     |    |  | 3         |
| Number of phases output                                                                                                                                                                    |    |  | 3         |
| Max. output frequency                                                                                                                                                                      | Hz |  | 320       |
| Max. output voltage                                                                                                                                                                        | V  |  | 500       |
| Nominal output current I <sub>2N</sub>                                                                                                                                                     | A  |  | 385       |
| Max. output at quadratic load at rated output voltage                                                                                                                                      | kW |  | 200       |
| Max. output at linear load at rated output voltage                                                                                                                                         | kW |  | 160       |
| Relative symmetric net frequency tolerance                                                                                                                                                 | %  |  | 10        |
| Relative symmetric net voltage tolerance                                                                                                                                                   | %  |  | 10        |

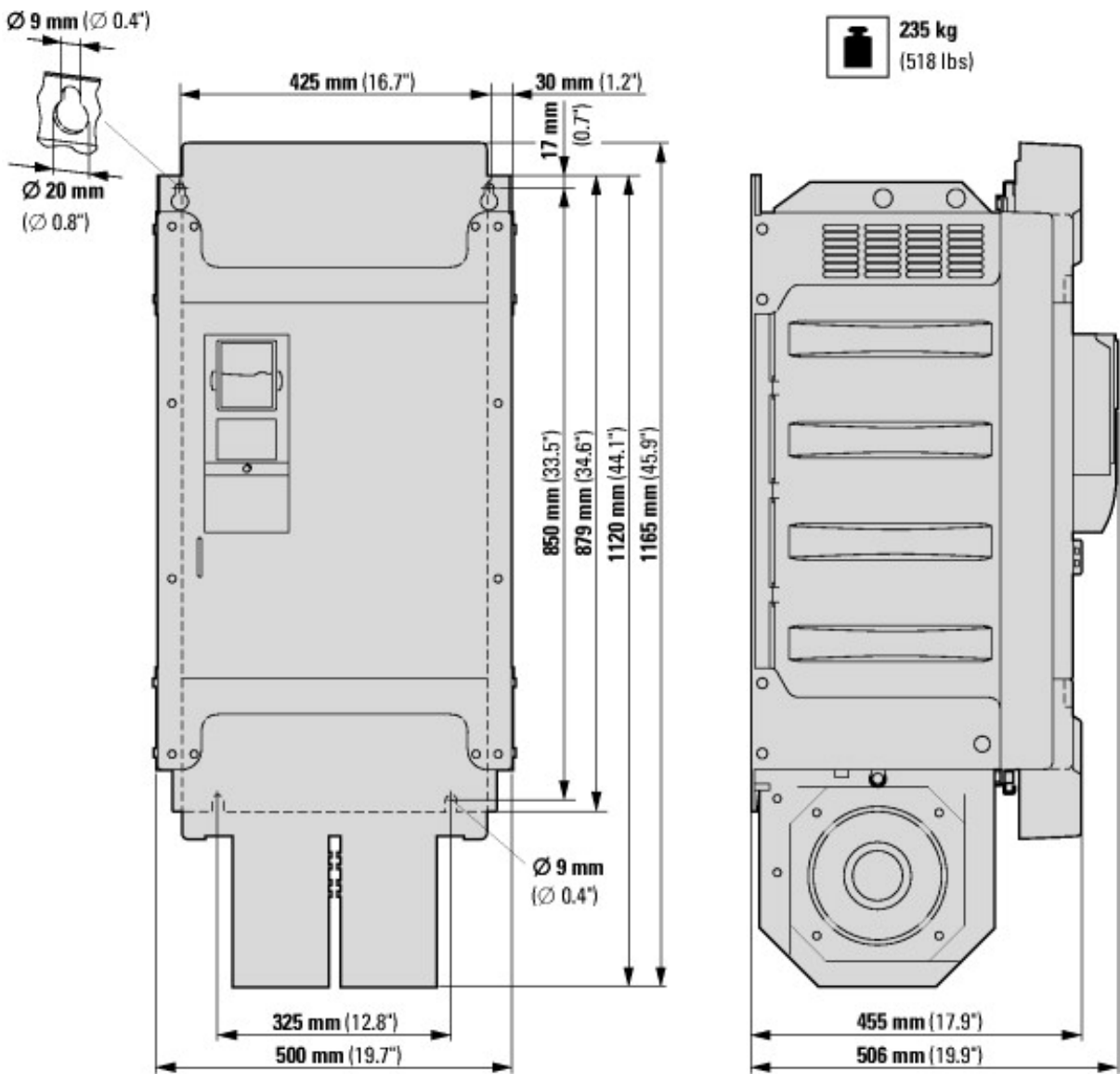
|                                                        |  |    |             |
|--------------------------------------------------------|--|----|-------------|
| Number of analogue outputs                             |  |    | 1           |
| Number of analogue inputs                              |  |    | 2           |
| Number of digital outputs                              |  |    | 1           |
| Number of digital inputs                               |  |    | 6           |
| With control unit                                      |  |    | Yes         |
| Application in industrial area permitted               |  |    | Yes         |
| Application in domestic- and commercial area permitted |  |    | Yes         |
| Supporting protocol for TCP/IP                         |  |    | Yes         |
| Supporting protocol for PROFIBUS                       |  |    | Yes         |
| Supporting protocol for CAN                            |  |    | Yes         |
| Supporting protocol for INTERBUS                       |  |    | No          |
| Supporting protocol for ASI                            |  |    | No          |
| Supporting protocol for KNX                            |  |    | No          |
| Supporting protocol for MODBUS                         |  |    | Yes         |
| Supporting protocol for Data-Highway                   |  |    | Yes         |
| Supporting protocol for DeviceNet                      |  |    | Yes         |
| Supporting protocol for SUCONET                        |  |    | No          |
| Supporting protocol for LON                            |  |    | Yes         |
| Supporting protocol for PROFINET IO                    |  |    | Yes         |
| Supporting protocol for PROFINET CBA                   |  |    | No          |
| Supporting protocol for SERCOS                         |  |    | No          |
| Supporting protocol for Foundation Fieldbus            |  |    | No          |
| Supporting protocol for EtherNet/IP                    |  |    | Yes         |
| Supporting protocol for AS-Interface Safety at Work    |  |    | No          |
| Supporting protocol for DeviceNet Safety               |  |    | No          |
| Supporting protocol for INTERBUS-Safety                |  |    | No          |
| Supporting protocol for PROFIsafe                      |  |    | No          |
| Supporting protocol for SafetyBUS p                    |  |    | No          |
| Supporting protocol for BACnet                         |  |    | No          |
| Supporting protocol for other bus systems              |  |    | Yes         |
| Number of HW-interfaces industrial Ethernet            |  |    | 0           |
| Number of interfaces PROFINET                          |  |    | 0           |
| Number of HW-interfaces RS-232                         |  |    | 1           |
| Number of HW-interfaces RS-422                         |  |    | 0           |
| Number of HW-interfaces RS-485                         |  |    | 0           |
| Number of HW-interfaces serial TTY                     |  |    | 0           |
| Number of HW-interfaces USB                            |  |    | 0           |
| Number of HW-interfaces parallel                       |  |    | 0           |
| Number of HW-interfaces other                          |  |    | 0           |
| With optical interface                                 |  |    | No          |
| With PC connection                                     |  |    | Yes         |
| Integrated breaking resistance                         |  |    | No          |
| 4-quadrant operation possible                          |  |    | Yes         |
| Type of converter                                      |  |    | U converter |
| Degree of protection (IP)                              |  |    | IP00        |
| Degree of protection (NEMA)                            |  |    | Other       |
| Height                                                 |  | mm | 1165        |
| Width                                                  |  | mm | 500         |
| Depth                                                  |  | mm | 506         |

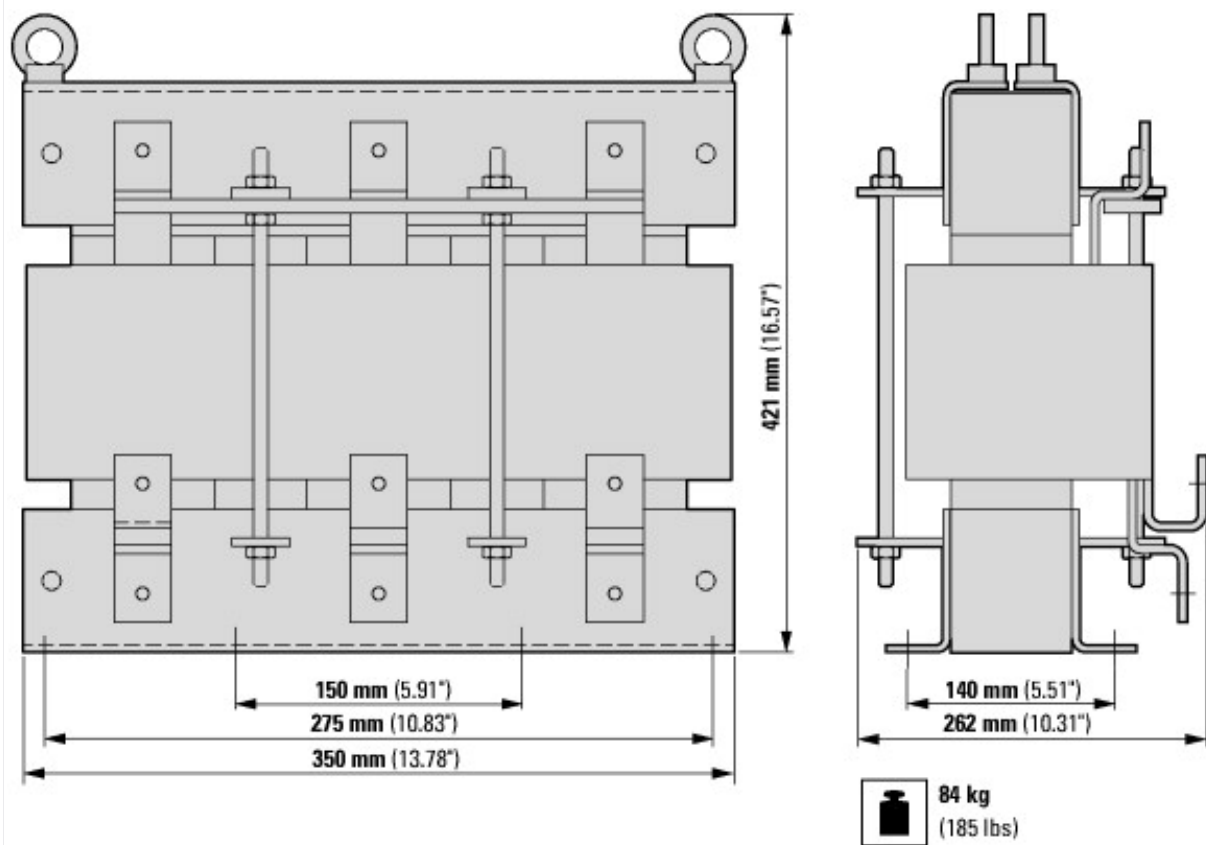
## Approvals

|                         |  |  |                                                                     |
|-------------------------|--|--|---------------------------------------------------------------------|
| 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: IP00                                                |

Dimensions





1x CHK0400 mains choke

## Additional product information (links)

### IL04020008Z Frequency inverter 9000X

IL04020008Z Frequency inverter 9000X

[https://es-assets.eaton.com/DOCUMENTATION/AWA\\_INSTRUCTIONS/IL04020008Z2018\\_05.pdf](https://es-assets.eaton.com/DOCUMENTATION/AWA_INSTRUCTIONS/IL04020008Z2018_05.pdf)

Documentation

<http://www.eaton.eu/Europe/Electrical/ProductsServices/AutomationControl/SwitchingProtectingDrivingMotors/9000X/SPX9000/index.htm#tabs-4>