

# Specifications



Photo is representative



## Eaton 197166

Eaton Moeller® series EMS2 DOL starter, 24 V DC, 1,5 - 7 (AC-53a), 9 (AC-51) A, Screw terminals, Controlled stop, PTB 19 ATEX 3000

### General specifications

|                     |                                        |
|---------------------|----------------------------------------|
| <b>PRODUCT NAME</b> | Eaton Moeller® series EMS2 DOL starter |
|---------------------|----------------------------------------|

|                       |        |
|-----------------------|--------|
| <b>CATALOG NUMBER</b> | 197166 |
|-----------------------|--------|

|                   |                    |
|-------------------|--------------------|
| <b>MODEL CODE</b> | EMS2-DOS-Z-9-24VDC |
|-------------------|--------------------|

|            |               |
|------------|---------------|
| <b>EAN</b> | 4015080896074 |
|------------|---------------|

|                             |          |
|-----------------------------|----------|
| <b>PRODUCT LENGTH/DEPTH</b> | 114.5 mm |
|-----------------------------|----------|

|                       |       |
|-----------------------|-------|
| <b>PRODUCT HEIGHT</b> | 99 mm |
|-----------------------|-------|

|                      |         |
|----------------------|---------|
| <b>PRODUCT WIDTH</b> | 22.5 mm |
|----------------------|---------|

|                       |          |
|-----------------------|----------|
| <b>PRODUCT WEIGHT</b> | 0.287 kg |
|-----------------------|----------|

### CERTIFICATIONS

IEC/EN 60947-4-2

IEC 61508

EN ISO 13849

UL508

UL File No.: E338590

UL Category Control No.:

NLDX, NLDX7

PTB 19 ATEX 3000

UL 60947-4-1

CSA-C22.2 No. 60947-4-1-14

CE marking

UL listed

Certified by UL for use in Canada

UL report applies to both US and Canada



Powering Business Worldwide

## Climatic environmental conditions

|                                        |       |
|----------------------------------------|-------|
| AMBIENT OPERATING<br>TEMPERATURE - MAX | 70 °C |
|----------------------------------------|-------|

|                                      |       |
|--------------------------------------|-------|
| AMBIENT STORAGE<br>TEMPERATURE - MAX | 80 °C |
|--------------------------------------|-------|

|                                        |        |
|----------------------------------------|--------|
| AMBIENT OPERATING<br>TEMPERATURE - MIN | -25 °C |
|----------------------------------------|--------|

|                                      |       |
|--------------------------------------|-------|
| AMBIENT STORAGE<br>TEMPERATURE - MIN | 40 °C |
|--------------------------------------|-------|

## Contacts

|                                                               |   |
|---------------------------------------------------------------|---|
| NUMBER OF AUXILIARY<br>CONTACTS (NORMALLY<br>CLOSED CONTACTS) | 1 |
|---------------------------------------------------------------|---|

|                                                             |   |
|-------------------------------------------------------------|---|
| NUMBER OF AUXILIARY<br>CONTACTS (NORMALLY<br>OPEN CONTACTS) | 1 |
|-------------------------------------------------------------|---|

|                                                 |   |
|-------------------------------------------------|---|
| NUMBER OF CONTACTS<br>(CHANGE-OVER<br>CONTACTS) | 1 |
|-------------------------------------------------|---|

## Design verification

|                                                                                         |                                                                                                                                  |
|-----------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| <b>10.10 TEMPERATURE RISE</b>                                                           | The panel builder is responsible for the temperature rise calculation. Eaton will provide heat dissipation data for the devices. |
| <b>10.11 SHORT-CIRCUIT RATING</b>                                                       | Is the panel builder's responsibility. The specifications for the switchgear must be observed.                                   |
| <b>10.12 ELECTROMAGNETIC COMPATIBILITY</b>                                              | Is the panel builder's responsibility. The specifications for the switchgear must be observed.                                   |
| <b>10.13 MECHANICAL FUNCTION</b>                                                        | The device meets the requirements, provided the information in the instruction leaflet (IL) is observed.                         |
| <b>10.2.2 CORROSION RESISTANCE</b>                                                      | Meets the product standard's requirements.                                                                                       |
| <b>10.2.3.1 VERIFICATION OF THERMAL STABILITY OF ENCLOSURES</b>                         | Meets the product standard's requirements.                                                                                       |
| <b>10.2.3.2 VERIFICATION OF RESISTANCE OF INSULATING MATERIALS TO NORMAL HEAT</b>       | Meets the product standard's requirements.                                                                                       |
| <b>10.2.3.3 RESIST. OF INSUL. MAT. TO ABNORMAL HEAT/FIRE BY INTERNAL ELECT. EFFECTS</b> | Meets the product standard's requirements.                                                                                       |
| <b>10.2.4 RESISTANCE TO ULTRA-VIOLET (UV) RADIATION</b>                                 | Meets the product standard's requirements.                                                                                       |
| <b>10.2.5 LIFTING</b>                                                                   | Does not apply, since the entire switchgear needs to be evaluated.                                                               |
| <b>10.2.6 MECHANICAL IMPACT</b>                                                         | Does not apply, since the entire switchgear needs to be evaluated.                                                               |
| <b>10.2.7 INSCRIPTIONS</b>                                                              | Meets the product standard's requirements.                                                                                       |
| <b>10.3 DEGREE OF PROTECTION OF ASSEMBLIES</b>                                          | Does not apply, since the entire switchgear needs to be evaluated.                                                               |
| <b>10.4 CLEARANCES AND CREEPAGE DISTANCES</b>                                           | Meets the product standard's requirements.                                                                                       |
| <b>10.5 PROTECTION</b>                                                                  | Does not apply, since the                                                                                                        |

## Electrical rating

|                                                                     |                                                                                                                                                                                                                     |
|---------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>RATED ACTUATING CURRENT (IC)</b>                                 | 5 mA                                                                                                                                                                                                                |
| <b>RATED CONTROL SUPPLY CURRENT IS</b>                              | 40 mA                                                                                                                                                                                                               |
| <b>RATED CONTROL SUPPLY VOLTAGE</b>                                 | 19.2 - 30 V DC                                                                                                                                                                                                      |
| <b>RATED CONTROL SUPPLY VOLTAGE (US) AT DC - MAX</b>                | 24 V                                                                                                                                                                                                                |
| <b>RATED CONTROL SUPPLY VOLTAGE (US) AT DC - MIN</b>                | 24 V                                                                                                                                                                                                                |
| <b>RATED CONTROL VOLTAGE (UC)</b>                                   | 24 V (Actuating circuit ON, L, R)                                                                                                                                                                                   |
| <b>RATED OPERATIONAL CURRENT (IE)</b>                               | 9 A                                                                                                                                                                                                                 |
| <b>RATED OPERATIONAL CURRENT (IE) AT AC-15, 220 V, 230 V, 240 V</b> | 2 A                                                                                                                                                                                                                 |
| <b>RATED OPERATIONAL CURRENT (IE) AT AC-3, 380 V, 400 V, 415 V</b>  | 7 A                                                                                                                                                                                                                 |
| <b>RATED OPERATIONAL CURRENT (IE) AT AC-51</b>                      | 9 A                                                                                                                                                                                                                 |
| <b>RATED OPERATIONAL CURRENT (IE) AT AC-53A - MAX</b>               | 7 A                                                                                                                                                                                                                 |
| <b>RATED OPERATIONAL CURRENT (IE) AT DC-13, 24 V</b>                | 2 A                                                                                                                                                                                                                 |
| <b>RATED OPERATIONAL POWER AT AC-3, 220/230 V, 50 HZ</b>            | 1.5 kW                                                                                                                                                                                                              |
| <b>RATED OPERATIONAL POWER AT AC-3, 380/400 V, 50 HZ</b>            | 3 kW                                                                                                                                                                                                                |
| <b>RATED OPERATIONAL POWER AT AC-53A, 380/400 V, 50 HZ</b>          | 3 kW                                                                                                                                                                                                                |
| <b>RATED OPERATIONAL VOLTAGE</b>                                    | 500 V AC<br>42 - 550 V                                                                                                                                                                                              |
| <b>SWITCHING LEVEL</b>                                              | -3 - 9.6 V DC, Switching level "Low", Actuating circuit (ON, L, R)<br>19.2 - 30 V DC, Switching level "High", Actuating circuit (ON, L, R)<br>< 5 V DC, Switching level "confirm Off", Actuating circuit (ON, L, R) |

|                                                                      |                                                                    |
|----------------------------------------------------------------------|--------------------------------------------------------------------|
| <b>AGAINST ELECTRIC SHOCK</b>                                        | entire switchgear needs to be evaluated.                           |
| <b>10.6 INCORPORATION OF SWITCHING DEVICES AND COMPONENTS</b>        | Does not apply, since the entire switchgear needs to be evaluated. |
| <b>10.7 INTERNAL ELECTRICAL CIRCUITS AND CONNECTIONS</b>             | Is the panel builder's responsibility.                             |
| <b>10.8 CONNECTIONS FOR EXTERNAL CONDUCTORS</b>                      | Is the panel builder's responsibility.                             |
| <b>10.9.2 POWER-FREQUENCY ELECTRIC STRENGTH</b>                      | Is the panel builder's responsibility.                             |
| <b>10.9.3 IMPULSE WITHSTAND VOLTAGE</b>                              | Is the panel builder's responsibility.                             |
| <b>10.9.4 TESTING OF ENCLOSURES MADE OF INSULATING MATERIAL</b>      | Is the panel builder's responsibility.                             |
| <b>EQUIPMENT HEAT DISSIPATION, CURRENT-DEPENDENT PVID</b>            | 12 W                                                               |
| <b>HEAT DISSIPATION CAPACITY PDISS</b>                               | 0 W                                                                |
| <b>HEAT DISSIPATION DETAILS</b>                                      | If necessary, Allow for derating                                   |
| <b>HEAT DISSIPATION PER POLE, CURRENT-DEPENDENT PVID</b>             | 0 W                                                                |
| <b>RATED OPERATIONAL CURRENT FOR SPECIFIED HEAT DISSIPATION (IN)</b> | 9 A                                                                |
| <b>STATIC HEAT DISSIPATION, NON-CURRENT-DEPENDENT PVS</b>            | 2 W                                                                |

## Electro magnetic compatibility

|                                 |                                                                    |
|---------------------------------|--------------------------------------------------------------------|
| <b>RADIO INTERFERENCE CLASS</b> | Class A (EN 61000-6-3, emitted interference, radiated)<br>EN 55011 |
|---------------------------------|--------------------------------------------------------------------|

## Features & functions

### FUNCTIONS

Temperature compensated overload protection  
Motor protection  
Controlled stop  
DOL starting

## General information

|                                               |                                                                                                                                                              |
|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CLASS</b>                                  | CLASS 10 A                                                                                                                                                   |
| <b>CONNECTION TO SMARTWIRE-DT</b>             | No                                                                                                                                                           |
| <b>DEGREE OF PROTECTION</b>                   | IP20<br>NEMA Other                                                                                                                                           |
| <b>MODEL</b>                                  | Direct starter                                                                                                                                               |
| <b>MOUNTING METHOD</b>                        | Rail mounting possible<br>Top-hat rail fixing<br>(according to IEC/EN 60715, 35 mm)                                                                          |
| <b>MOUNTING POSITION</b>                      | Vertical<br>Motor feeder at bottom                                                                                                                           |
| <b>OVERLOAD RELEASE CURRENT SETTING - MAX</b> | 9 A                                                                                                                                                          |
| <b>OVERLOAD RELEASE CURRENT SETTING - MIN</b> | 1.5 A                                                                                                                                                        |
| <b>PRODUCT CATEGORY</b>                       | Electronic motor starter                                                                                                                                     |
| <b>RESIDUAL RIPPLE</b>                        | ≤ 5 % (input voltage)                                                                                                                                        |
| <b>TERMINAL CAPACITY</b>                      | 0.2 - 2.5 mm <sup>2</sup> , Main cables<br>0.14 - 2.5 mm <sup>2</sup> , Control circuit cables<br>0.2 - 2.5 mm <sup>2</sup> , Main cables, Push-in terminals |
| <b>TERMINAL CAPACITY (AWG)</b>                | 26 - 14, Control circuit cables<br>24 - 14, Main cables                                                                                                      |
| <b>TYPE</b>                                   | DOL starter (complete device)                                                                                                                                |
| <b>VOLTAGE TYPE</b>                           | DC                                                                                                                                                           |

## Safety

|                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>EXPLOSION SAFETY CATEGORY FOR DUST</b> | ATEX dust-ex-protection, II (2) D [Ex t] [Ex p]<br>ATEX dust-ex-protection, II (2) G [Ex e] [Ex d] [Ex px]                                                                                                                                                                                                                                                                                                                                          |
| <b>SAFETY PARAMETER (EN ISO 13849-1)</b>  | PL e, Performance level (safe switch off)<br>3 (safe switch off), Category<br>60 (safe switch off) / 70 (motor protection) years; MTTFD                                                                                                                                                                                                                                                                                                             |
| <b>SAFETY PARAMETER (IEC 62061)</b>       | 99 %, SFF<br>99 % (safe switch off) / 98 % (motor protection), DC<br>SIL 3 (Safe switch off) / SIL 2 (Motor protection)<br>Opening delay [ms]: 200 (safe switch off) / Class 10A (motor protection)<br>PFHd [FIT]: 2.3 (Safe switch off)<br>λsd [FIT]: 0<br>λsu [FIT]: 1072 (Safe switch off) / 969 (Motor protection)<br>λdu [FIT]: 2.3 (Safe switch off) / 11 (Motor protection)<br><br>λdd [FIT]: 580 (Safe switch off) / 601 (Motor protection) |

## Resources

|                            |                                                                                                                                                                                                                                                                  |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| APPLICATION NOTES          | <a href="#">eaton-motor-starter-ems2-setting-motor-protection-twincat3-ap034001-en-us.pdf</a>                                                                                                                                                                    |
| BROCHURES                  | <a href="#">eaton-ems2-electronic-motorstarter-brochure-br034001en-en-us.pdf</a>                                                                                                                                                                                 |
| CHARACTERISTIC CURVE       | <a href="#">eaton-contactors-ems2-reversing-starter-characteristic-curve-004.eps</a><br><a href="#">eaton-contactors-ems2-reversing-starter-characteristic-curve.eps</a><br><a href="#">eaton-contactors-ems2-reversing-starter-characteristic-curve-002.eps</a> |
| DECLARATIONS OF CONFORMITY | <a href="#">eaton-reversing-starter-declaration-of-conformity-uk251116en.pdf</a><br><a href="#">eaton-reversing-starter-declaration-of-conformity-eu250633en.pdf</a>                                                                                             |
| DRAWINGS                   | <a href="#">eaton-contactors-ems2-reversing-starter-dimensions-002.eps</a><br><a href="#">eaton-contactors-ems2-reversing-starter-3d-drawing-002.eps</a>                                                                                                         |
| ECAD MODEL                 | <a href="#">DA-CE-ETN.EMS2-DOS-Z-9-24VDC</a>                                                                                                                                                                                                                     |
| INSTALLATION INSTRUCTIONS  | <a href="#">IL034089ZU</a>                                                                                                                                                                                                                                       |
| INSTALLATION VIDEOS        | <a href="#">Eaton's electronic motor starter EMS2</a>                                                                                                                                                                                                            |
| MANUALS AND USER GUIDES    | <a href="#">eaton-electronic-motor-starter-ems2-manual-mn034003en-us.pdf</a>                                                                                                                                                                                     |
| MCAD MODEL                 | <a href="#">eaton-motor-starter-mcad-drawings-ems2-dos-ros-z-24-230v.dwg</a><br><a href="#">DA-CS-ems2_dos_ros_z_24_230v</a>                                                                                                                                     |
| SALES NOTES                | <a href="#">eaton-ems2-electronic-motorstarter-flyer-fl034007en-en-us.pdf</a>                                                                                                                                                                                    |

|                 |
|-----------------|
| PROJECT NAME:   |
| PROJECT NUMBER: |
| PREPARED BY:    |
| DATE:           |



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