




**DOL starter 2.4A**

**Part no.** EMS-DO-T-2,4-24VDC  
**Catalog No.** 170099  
**Eaton Catalog No.** EMS-DO-T-2P4-24VDC  
**EL-Nummer** 0004137395  
**(Norway)**

**Delivery program**

Product range			Electronic motor starter
Basic function			DOL starters (complete devices)
Description			DOL starting Motor protection Circuit design: safety output stage with bypass, three-phase disconnect.
<b>Conformity, Approval</b>			
Explosion protection (according to ATEX 94/9/EC)			II (2) G [Ex e] [Ex d] [Ex px] II (2) D [Ex t] [Ex p]
EC-prototype test certification			PTB 13 ATEX 3003
<b>Motor ratings</b>			
Max. rating for three-phase motors, 50 - 60 Hz			
AC-53a			
380 V 400 V 415 V	P	kW	0.06 - 0.75
Setting range of overload releases	I <sub>r</sub>	A <sub>x</sub>	0,18 - 2,4
			
Actuating voltage			24 V DC
Connection technique			Push in terminals
Connection to SmartWire-DT			no

**Technical data**

<b>General</b>			
Standards			IEC/EN 60947-4-2 UL508
Dimensions			
Width		mm	30
Height		mm	157
Depth		mm	123.5
Weight		kg	0.3
Mounting			Top-hat rail IEC/EN 60715, 35 mm
Protection type (IEC/EN 60529, EN50178, VBG 4)			IP20
Mounting position			Vertical Motor feeder at bottom
Lifespan, electrical	Operations		3 x 10 <sup>7</sup>
Max. switching frequency		Operation h	3/200 (pulse pause time 50:50)
Terminal capacity			
Solid		mm <sup>2</sup>	1 x (0.75 - 2.5) 1 x AWG20 - 14
flexible, with ferrule		mm <sup>2</sup>	2 x (0,75 - 2,5) 1 x AWG20 - 14
Notes			Minimum length 10 mm.
flexible, with twin ferrule		mm <sup>2</sup>	2 x (0,75 - 1,5) 2 x AWG20 - 16
Notes			Minimum length 10 mm.

**Climatic environmental conditions**

Operating ambient temperature		°C	-25 - +60, in accordance with IEC 60068-2-1
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Condensation			Take appropriate measures to prevent condensation
Storage	θ	°C	-40 - +80

### Main conducting paths

Rated impulse withstand voltage	$U_{imp}$	V AC	6000
Overvoltage category/pollution degree			III/2
Rated operational voltage	$U_e$	V	42 - 550
Rated operational current			
AC-51	$I_e$	A	0.15 - 2.40
AC-53a	$I_e$	A	0.15 - 2.4
Heat dissipation	$P_V$	W	1.1 - 3.3
Static heat dissipation, non-current-dependent	$P_{Vs}$	W	1
Basic insulation to IEC/EN60947-1			
Between supply, control, and switching voltages		V AC	500
between feedback signal output and switch voltage		V AC	500
Safe isolation to IEC/EN60947-1			
Between supply, control, and switching voltages		V AC	≤ 300
between feedback signal output and switch voltage		V AC	≤ 300
Safe isolation to EN 50178			
Between supply, control, and switching voltages		V AC	500
between feedback signal output and switch voltage		V AC	500
Current measurement			
Setting range of overload releases	$I_r$	A_x	0,18 - 2,4
Release class		CLASS	10
Recovery time	$t_W$	min.	2 (manual startup) 20 (automatic restart)
Balance monitoring			
Magnitude $I_{max} > I_{rated}$ ( $(I_{max} - I_{min})/I_{max}$ )		%	If ≥ 33, pick-up time of 120 s If ≥ 67, pick-up time of 1.8 s
Magnitude $I_{max} < I_{rated}$ ( $(I_{max} - I_{min})/I_{rated}$ )		%	If ≥ 33, pick-up time of 120 s If ≥ 67, pick-up time of 1.8 s
Short-circuit rating			
Type "1" coordination			
Short-circuit protective device			50 kA, 500 V AC: Fuse 16 A gG/gL 50 kA, 415 V AC: PKM0-4 15 kA, 415 V AC: PKM0-6,3

### Control section

Input data			
Supply voltage	$U_{AUX}$	V DC	A1 - A2: 24 (-20 - +25 %)
Residual ripple on the input voltage		%	≤ 5
Input current		mA	40
Note on input current			without feedback signal
Actuating circuit (ON, L, R)			
Switching level "Low"		V	-3 - +9.6 V DC
Switching level "confirm Off"		V	< 5 V DC
Switching level "High"		V	19.2 - 30 V DC
Input current		mA	5
Feedback outputs			
Notes			Contacts 95, 96 or 98
Contacts			
CO = changeover			1 CO
Rated operational voltage	$U_e$	V AC/DC	250
Rated operational current			
AC-15			
230 V	$I_e$	A	3
DC-13			
24 V	$I_e$	A	2

## Electromagnetic compatibility (EMC)

Electrostatic discharge (ESD)			
applied standard			IEC EN 61000-4-2, Level 3
Air discharge		kV	8
Contact discharge		kV	6
Electromagnetic fields (RFI)			
applied standard			IEC/EN 61000-4-3
		V/m	800 - 1000 MHz: 10 1.4 - 2 GHz: 10 2.0 - 2.7 GHz: 3
Radio interference suppression			EN 55011, Class A (emitted interference, line-conducted) EN 61000-6-3, Class A (emitted interference, radiated)
Note on use			This product is designed for operation in industrial environments (environment 2). The use in residential environments (environment 1) could cause electrical interference so that addition suppression must be planned.
Burst		kV	2 IEC/EN 61000-4-4, level 3
power pulses (Surge)			1 kV (symmetrical) 2 kV (asymmetrical) according to IEC/EN 61000-4-5
Immunity to line-conducted interference to (IEC/EN 61000-4-6)		V	10

### Technical safety parameters:

<b>Notes</b>			
			motor protection
Ambient temperature		°C	40
Values according to EN ISO 13849-1			
MTTF <sub>d</sub>	Years		316
Values according to IEC 62061			
			λ <sub>sd</sub> [FIT]: 0 λ <sub>su</sub> [FIT]: 1550 λ <sub>dd</sub> [FIT]: 314 λ <sub>du</sub> [FIT]: 47,2 SFF [%]: 97,9 DC [%]: 86,9 SIL: 2
<b>Notes</b>			
			motor protection

## Design verification as per IEC/EN 61439

Technical data for design verification			
Rated operational current for specified heat dissipation	I <sub>n</sub>	A	2.4
Heat dissipation per pole, current-dependent	P <sub>vid</sub>	W	0.7
Equipment heat dissipation, current-dependent	P <sub>vid</sub>	W	2
Static heat dissipation, non-current-dependent	P <sub>vs</sub>	W	1
Heat dissipation capacity	P <sub>diss</sub>	W	0
Operating ambient temperature min.		°C	-25
Operating ambient temperature max.		°C	60
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) / Motor starter/Motor starter combination (EC001037)

Electric engineering, automation, process control engineering / Low-voltage switch technology / Load breakout, motor breakout / Motor starter combination (ecl@ss10.0.1-27-37-09-05 [AJZ718013])

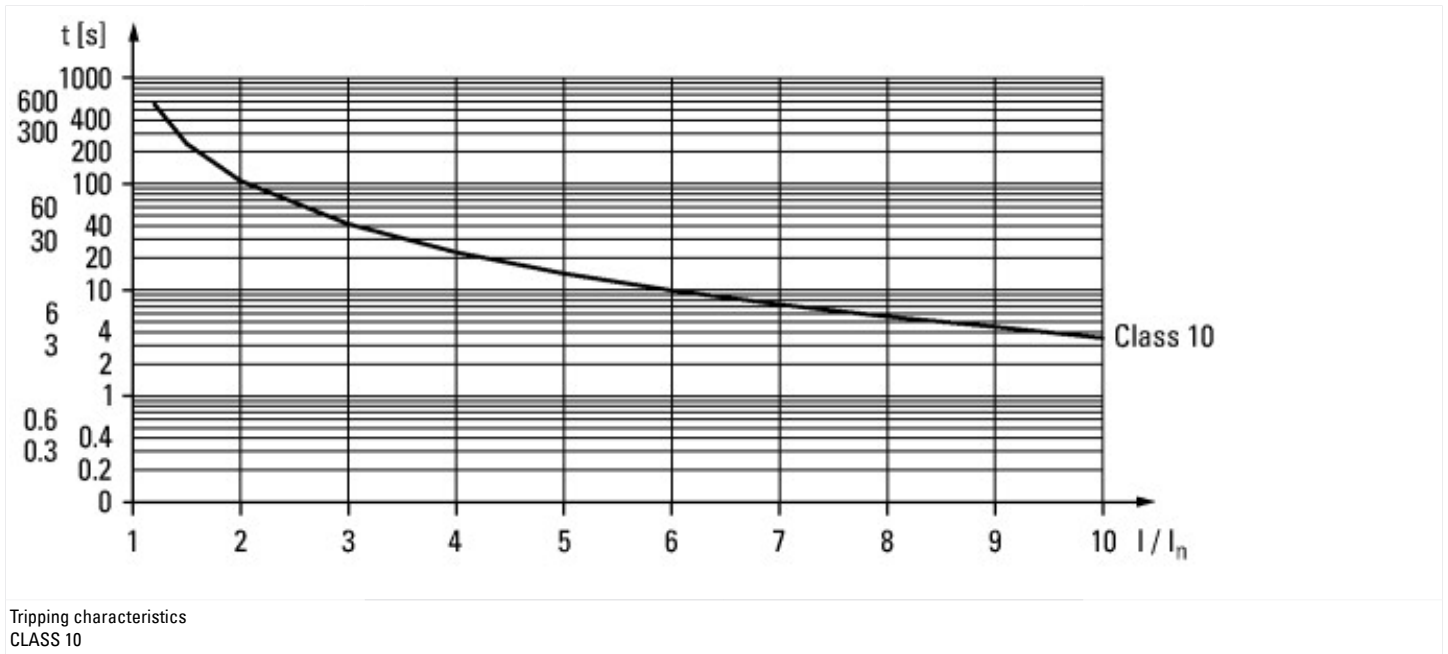
Kind of motor starter		Direct starter
With short-circuit release		No
Rated control supply voltage $U_s$ at AC 50HZ	V	0 - 0
Rated control supply voltage $U_s$ at AC 60HZ	V	0 - 0
Rated control supply voltage $U_s$ at DC	V	24 - 24
Voltage type for actuating		DC
Voltage type for actuating		DC
Rated operation power at AC-3, 230 V, 3-phase	kW	0.37
Rated operation power at AC-3, 400 V	kW	0.75
Rated power, 460 V, 60 Hz, 3-phase	kW	0.736
Rated power, 575 V, 60 Hz, 3-phase	kW	0
Rated operation current $I_e$	A	2.4
Rated operation current at AC-3, 400 V	A	2.4
Overload release current setting	A	0.18 - 2.4
Rated conditional short-circuit current, type 1, 480 Y/277 V	A	0
Rated conditional short-circuit current, type 1, 600 Y/347 V	A	0
Rated conditional short-circuit current, type 2, 230 V	A	0
Rated conditional short-circuit current, type 2, 400 V	A	0
Number of auxiliary contacts as normally open contact		1
Number of auxiliary contacts as normally closed contact		1
Ambient temperature, upper operating limit	°C	60
Temperature compensated overload protection		Yes
Release class		CLASS 10
Type of electrical connection of main circuit		Spring clamp connection
Type of electrical connection for auxiliary- and control current circuit		Spring clamp connection
Rail mounting possible		Yes
With transformer		No
Number of command positions		0
Suitable for emergency stop		No
Coordination class according to IEC 60947-4-3		Class 1
Number of indicator lights		4
External reset possible		Yes
With fuse		No
Degree of protection (IP)		IP20
Degree of protection (NEMA)		Other
Supporting protocol for TCP/IP		No
Supporting protocol for PROFIBUS		No
Supporting protocol for CAN		No
Supporting protocol for INTERBUS		No

Supporting protocol for ASI		No
Supporting protocol for MODBUS		No
Supporting protocol for Data-Highway		No
Supporting protocol for DeviceNet		No
Supporting protocol for SUCONET		No
Supporting protocol for LON		No
Supporting protocol for PROFINET IO		No
Supporting protocol for PROFINET CBA		No
Supporting protocol for SERCOS		No
Supporting protocol for Foundation Fieldbus		No
Supporting protocol for EtherNet/IP		No
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 other bus systems		No
Width	mm	30
Height	mm	157
Depth	mm	123.5

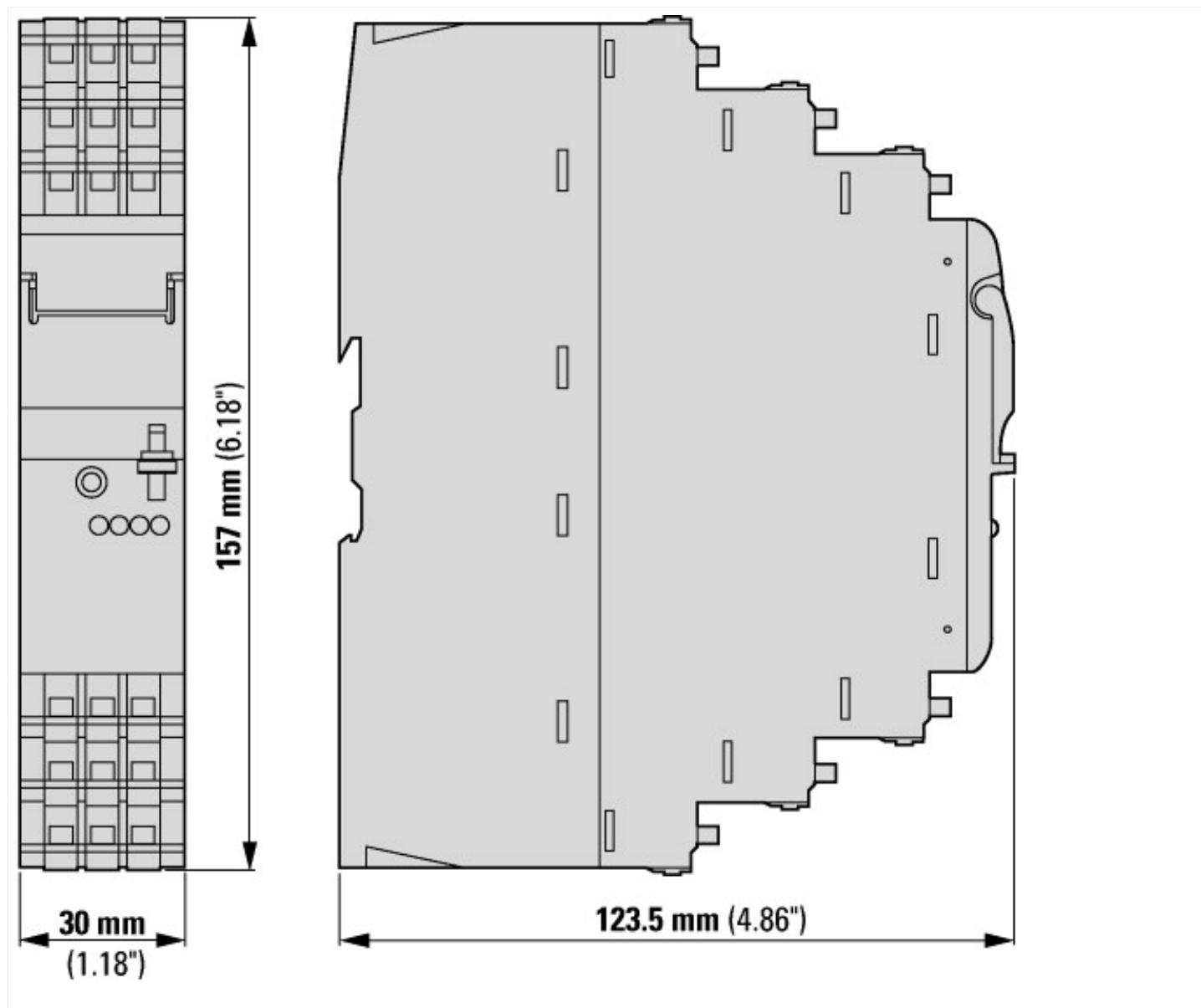
## Approvals

Product Standards		IEC/EN 60947-5; UL 508; CSA-C22.2 No. 14; CE marking
UL File No.		E29096
UL Category Control No.		NLDX, NLDX7
CSA File No.		UL report applies to both US and Canada
North America Certification		UL listed, certified by UL for use in Canada
Specially designed for North America		No

## Characteristics



## Dimensions



## Additional product information (links)

<b>IL03407198Z Electronic motor starter EMS</b>	
IL03407198Z Electronic motor starter EMS	<a href="ftp://ftp.moeller.net/DOCUMENTATION/AWA_INSTRUCTIONS/IL03407198Z2018_04.pdf">ftp://ftp.moeller.net/DOCUMENTATION/AWA_INSTRUCTIONS/IL03407198Z2018_04.pdf</a>
<b>MN03407009Z EMS electronic motor starter</b>	
MN03407009Z EMS electronic motor starter - Deutsch / English	<a href="ftp://ftp.moeller.net/DOCUMENTATION/AWB_MANUALS/MN03407009Z_DE_EN.pdf">ftp://ftp.moeller.net/DOCUMENTATION/AWB_MANUALS/MN03407009Z_DE_EN.pdf</a>
Produktinformation EMS, Hinweise zur Projektierung	<a href="http://www.eaton.eu/ecm/groups/public/@pub/@europe/@electrical/documents/content/pct_1040938_de.pdf">http://www.eaton.eu/ecm/groups/public/@pub/@europe/@electrical/documents/content/pct_1040938_de.pdf</a>