#### DATASHEET - DS7-340SX007N0-N



Soft starter, 7 A, 200 - 480 V AC, Us= 24 V AC/DC, Frame size FS1



Part no. Catalog No. No. **EL-Nummer** (Norway)

DS7-340SX007N0-N 134849 Alternate Catalog DS7-340SX007N0-N

0004134261

# **Delivery program**

Description			With internal bypass contacts
Function			Soft starters for three-phase loads
Mains supply voltage (50/60 Hz)	U <sub>LN</sub>	V AC	200 - 480
Supply voltage	Us		24 V AC/DC
Control voltage	U <sub>C</sub>		24 V AC 24 V DC
Assigned motor rating (Standard connection, In-Line)			
at 400 V, 50 Hz	Р	kW	3
at 460 V, 60 Hz	Р	HP	5
Rated operational current			
AC-53	le	А	7
Rated operational voltage	Ue		200 V 230 V 400 V 480 V
Connection to SmartWire-DT			no
Frame size			F\$1

## **Technical data**

General				
Standards			IEC/EN 60947-4-2 UL 508 CSA22.2-14	
Approvals			CE	
Approvals			UL CSA C-Tick UkrSEPRO	
Climatic proofing			Damp heat, constant, to IEC 60068-2-3 Damp heat, cyclic, to IEC 60068-2-10	
Ambient temperature				
Operation	8	°C	-5 - +40 up to 60 at 2% derating per Kelvin temperature rise	
Storage	θ	°C	-25 - +60	
Altitude		m	0 - 1000 m, above that 1 $\%$ derating per 100 m , up to 2000 m	
Mounting position			Vertical	
Degree of protection				
Degree of Protection			IP20	
Protection against direct contact			Finger- and back-of-hand proof	
Overvoltage category/pollution degree			11/2	
Shock resistance			8 g/11 ms	
Vibration resistance to EN 60721-3-2			2M2	
Radio interference level (IEC/EN 55011)			В	
Static heat dissipation, non-current-dependent	P <sub>vs</sub>	W	0.35	
Weight		kg	0.35	
Main conducting paths				
Rated operating voltage	U <sub>e</sub>	V AC	200 - 480	
Supply frequency	f <sub>LN</sub>	Hz	50/60	

Dated an exctional surrout		٨	
Rated operational current	l <sub>e</sub>	A	
AC-53	l <sub>e</sub>	A	7
Assigned motor rating (Standard connection, In-Line)			
at 230 V, 50 Hz	Р	kW	1.5
at 400 V, 50 Hz	Р	kW	3
at 200 V, 60 Hz	Ρ	HP	2
at 230 V, 60 Hz	Р	HP	2
at 460 V, 60 Hz	Р	HP	5
Overload cycle to IEC/EN 60947-4-2			
AC-53a			7 A: AC-53a: 3 - 5: 75 - 10
Internal bypass contacts			1
Short-circuit rating			
Type "1" coordination			PKM0-10 (+ CL-PKZ0)
Type "2" coordination (additional with the fuses for coordination type "1")			3 x 170M1361
Fuse base (number x part no.)			3 x 170H1007
Terminal capacities			
Cable lengths			
Solid		mm <sup>2</sup>	1 x (0.75 - 4)
			2 x (0.75 - 2.5)
Flexible with ferrule		mm <sup>2</sup>	1 x (0.75 - 2.5) 2 x (0.75 - 2.5)
Solid or stranded		AWG	18 - 10
Tightening torque		Nm	1.2
Screwdriver (PZ: Pozidriv)		mm	PZ2; 1 x 6 mm
Control cables			
Solid		mm <sup>2</sup>	1 x (0.75 - 4)
			2 x (0.75 - 2.5)
Flexible with ferrule		mm <sup>2</sup>	1 x (0.75 - 2.5) 2 x (0.75 - 2.5)
Solid or stranded		AWG	18 - 10
Tightening torque		Nm	1.2
Screwdriver		mm	0,8 x 5,5
of ewanted			1 x 6
Control circuit			
Digital inputs			
Control voltage			
DC-operated		V DC	24 V DC +10 %/- 15 %
AC operated		V AC	24 V AC +10 %/- 15 %
Current consumption 24 V		mA	
External 24 V		mA	1.6
Pick-up voltage		x U <sub>s</sub>	
DC-operated		V DC	17.3 - 27
AC operated		V AC	17.3 - 27
Drop-out voltage	x U <sub>s</sub>		
DC operated		V DC	0 - 3
AC operated		V AC	0 - 3
Pick-up time			
DC operated		ms	250
AC operated		ms	250
Drop-out time			
DC operated		ms	350
Regulator supply			
Voltage	Us	V	24 V AC/DC +10 %/- 15 %
Current consumption	l <sub>e</sub>	mA	50
Notes	·e		External supply voltage
			ενταιμαι επήμιλ λοιταθα
Relay outputs			

Number		1 (TOR)
Voltage range	V AC	= U <sub>s</sub>
AC-11 current range	А	1 A, AC-11
Soft start function		
Ramp times		
Acceleration	S	1 - 30
Deceleration	s	0 - 30
Start voltage (= turn-off voltage)	%	30 100
Start pedestal	%	30 - 100
Fields of application		
Fields of application		Soft starting of three-phase asynchronous motors
1-phase motors		•
3-phase motors		✓
Functions		
Fast switching (semiconductor contactor)		- (minimum ramp time 1s)
Soft start function		1
Reversing starter		External solution required
Suppression of closing transients		✓
Suppression of DC components for motors		✓
Potential isolation between power and control sections		1
Notes		

Rated impulse withstand voltage:

1.2 μs/50 μs (rise time/fall time of the pulse to IEC/EN 60947-2 or -3)
Applies for control circuit/power section/enclosure

# Design verification as per IEC/EN 61439

Technol data for design verification         In         A           Ret disparation lurrent for specified heat dissipation         In         A         7           Ret dispiration aurrent for specified heat dissipation         Page         W         0           Static heat dissipation, current-dependent         Page         W         0           Static heat dissipation, current-dependent         Page         W         0           Operating ambient temperature min.         Page         W         0           Operating ambient temperature max.         "C         0         0           10.2.2.5 Compile materials and parts         "C         0         0           10.2.2.5 Compile materials and parts         M         West the product standard's requirements.           10.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2				
Heat dissipation prople, current-dependent         Poid         W           Equipment heat dissipation, current-dependent         Poid         W         035           Static heat dissipation, current-dependent         Poid         W         035           Heat dissipation, current-dependent         Poid         W         035           Operating ambient temperature min.         Poids         W         0           Operating ambient temperature min.         *C         5         0           Operating ambient temperature min.         *C         *C         0           102.25 transion resistance         *C         *C         *C           102.25 Urification of resistance of insulating materials to abnormal heat and fire due to internal electric effects         Meets the product standard's requirements.           102.25 Urification of resistance of insulating materials to abnormal heat and fire due to internal electric effects         Meets the product standard's requirements.           102.25 Urification of resistance of insulating materials to abnormal heat and fire due to internal electric effects         Meets the product standard's requirements.           102.25 Urification of assistance         Meets the product standard's requirements.         Meets the product standard's requirements.           102.25 Urification of assistance         Meets the product standard's requirements.         Meets the product standard's requir	Technical data for design verification			
Equipment heat dissipation, current-dependent         Point         Weat         035           Static heat dissipation, current-dependent         Point         Weat         0.35           Heat dissipation capacity         Paints         Weat         0           Operating ambient temperature min.         *C         -5           Operating ambient temperature max.         *C         40           102.5 Untridiction         *C         40           102.2 Corrosion resistance         Forther distand and 's requirements.         Meats the product standard's requirements.           102.2.1 Vorification of transistance of insulating materials to abnormal heat         Meats the product standard's requirements.           102.2.2 Vorification of resistance of insulating materials to abnormal heat         Meats the product standard's requirements.           102.2.3 Vorification of resistance of insulating materials to abnormal heat         Meats the product standard's requirements.           102.2.4 Profication of resistance of insulating materials to abnormal heat         Meats the product standard's requirements.           102.2.5 Uniting         Does not apply, since the entire switchgear needs to be evaluated.           102.2.5 Uniting         Does not apply, since the entire switchgear needs to be evaluated.           102.4 Dearances and croopago distances         Meats the product standard's requirements.           102.5 Protec	Rated operational current for specified heat dissipation	In	А	7
Static heat dissipation, on-current-dependent         Page         Weight is specified in the specifi	Heat dissipation per pole, current-dependent	P <sub>vid</sub>	W	0
Heat dissipation capacity         Paiss         W           Operating ambient temperature min.         °C         5.           Operating ambient temperature max.         40           162.Strength of materials and parts         °C         40           102.Strength of materials and parts         Meets the product standard's requirements.           102.Strength of materials and parts         Meets the product standard's requirements.           102.Strength of materials and parts         Meets the product standard's requirements.           102.Strength of materials to infersione of insulating materials to abnormal heat and fire due to internal electric effects         Meets the product standard's requirements.           102.Strength of materials to abnormal heat and fire due to internal electric effects         Meets the product standard's requirements.           102.Strength of not standard in requirements.         Meets the product standard's requirements.           102.Strength of ASSEMBUES         Meets the product standard's requirements.           102.Strength of ASSEMBUES         Meets the product standard's requirements.           102.Strength of switching devices and components         Meets the product standard's requirements.           102.Strength of protection of ASSEMBUES         Meets the product standard's requirements.           102.Strength of materials and parts         Meets the product standard's requirements.           102.Streng	Equipment heat dissipation, current-dependent	P <sub>vid</sub>	W	0.35
Operating ambient temperature min.         Concention         S           Operating ambient temperature max.         C         4           ID2. Strength of materials and parts         Meets the product standard's requirements.           1D2.2 Corosion resistance         Meets the product standard's requirements.           1D2.3.1 Verification of thermal stability of enclosures         Meets the product standard's requirements.           1D2.3.2 Verification of resistance of insulating materials to normal heat and fire due to internal electric effects         Meets the product standard's requirements.           1D2.4.2 Resistance to ultra-violet (UV) radiation         Meets the product standard's requirements.           1D2.5 Lifting         Meets the product standard's requirements.           1D2.2.7 Inscriptions         Meets the product standard's requirements.           1D2.2.6 Mechanical impact         Meets the product standard's requirements.           1D2.2.7 Inscriptions         Meets the product standard's requirements.           1D3.2 Begree of protection of ASSEMBLIES         Meets the product standard's requirements.           1D4.2 Floreances and creapage distances         Meets the product standard's requirements.           1D5.2 Protection against electric shock         Does not apply, since the entire switchgear needs to be evaluated.           1D4.2 Floreances and creapage distances         Meets the product standard's requirements.	Static heat dissipation, non-current-dependent	P <sub>vs</sub>	W	0.35
Operating ambient temperature max.         ************************************	Heat dissipation capacity	P <sub>diss</sub>	W	0
LCLN 04.133 design verification       Image: Control of materials and parts         102.25 trength of materials and parts       Meets the product standard's requirements.         102.2.2 Corrosion resistance       Image: Control of the materials tability of enclosures         102.2.3.1 Verification of resistance of insulating materials to normal heat and fire due to internal electric effects       Meets the product standard's requirements.         102.2.3.2 Verification of resistance of insulating materials to abnormal heat and fire due to internal electric effects       Meets the product standard's requirements.         102.4 Resistance to ultra-violet (UV) radiation       Meets the product standard's requirements.         102.5 Litting       Does not apply, since the entire switchgear needs to be evaluated.         102.7 Inscriptions       Meets the product standard's requirements.         103.0 Begree of protection of ASSEMBLIES       Does not apply, since the entire switchgear needs to be evaluated.         104.1 Clearances and creepage distances       Meets the product standard's requirements.         105.5 Protection against electric shock       Does not apply, since the entire switchgear needs to be evaluated.         10.7 Internal electric directiss and connections       Is the panel builde's responsibility.         108 Connections for external conductors       Is the panel builde's responsibility.         109.1 Internal electric directis stangth       Is the panel builde's responsibility.	Operating ambient temperature min.		°C	-5
10.2 Strength of materials and parts       Image: 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 and fire due to internal electric effects       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.         10.2.7 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.         10.4 Clearance in of exeternal conductors       Does not apply, since the entire switchgear needs to be evaluated.         10.4 Clearance in or repage distances       Does not apply, since the entire switchgear needs to be evaluated.         10.4 Clearance in or switching devices and components       Does not apply, since the entire switchgear needs to be evaluated.         10.4 Thermal electrical circuits and connections       Emapol builder's responsibility.	Operating ambient temperature max.		°C	40
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 abnormal heat and fire due to internal electric effects       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.         10.6 Incorporation for external conductors       Is the panel builder's responsibility.         10.8 Connections for external conductors <td< td=""><td>IEC/EN 61439 design verification</td><td></td><td></td><td></td></td<>	IEC/EN 61439 design verification			
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 abnormal heat       Meets the product standard's requirements.         10.2.3.3 Verification of resistance of insulating materials to abnormal heat       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.         10.3.0 Begree 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.         10.9.1 Internal electrical circuits and connections       Is the panel builder's responsibility.         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. <t< td=""><td>10.2 Strength of materials and parts</td><td></td><td></td><td></td></t<>	10.2 Strength of materials and parts			
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       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.         10.3.0 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.         10.6 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.         10.9 Insulation properties       Is the panel builder's responsibility.         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       Is the p	10.2.2 Corrosion resistance			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       Meets the product standard's requirements.         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.         10.9.3 Impulse withstand voltage       Is the panel builder's responsibility.         10.9.4 Testing of enclosures made of insulating material       Is the panel builder is responsibility.         10.9.4 Testing of enclosures made of insulating material       Is the panel builder is responsibility.         10.9.4 Tes	10.2.3.1 Verification of thermal stability of enclosures			Meets the product standard's requirements.
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10.7 Internal electrical circuits and connectionsIs the panel builder's responsibility.10.8 Connections for external conductorsIs the panel builder's responsibility.10.9 Insulation propertiesIs the panel builder's responsibility.10.9.2 Power-frequency electric strengthIs the panel builder's responsibility.10.9.3 Impulse withstand voltageIs the panel builder's responsibility.10.9.4 Testing of enclosures made of insulating materialIs the panel builder's responsibility.10.10 Temperature riseThe panel builder is responsibility.	10.5 Protection against electric shock			Does not apply, since the entire switchgear needs to be evaluated.
10.8 Connections for external conductors       Is the panel builder's responsibility.         10.9 Insulation properties       Is the panel builder's responsibility.         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 responsibility.	10.6 Incorporation of switching devices and components			Does not apply, since the entire switchgear needs to be evaluated.
10.9 Insulation properties       Image: Constraint of the panel builder's responsibility.         10.9.2 Power-frequency electric strength       Image: Constraint of 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 responsibility.	10.7 Internal electrical circuits and connections			Is the panel builder's responsibility.
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 responsibility.	10.8 Connections for external conductors			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 responsibility.	10.9 Insulation properties			
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	10.9.2 Power-frequency electric strength			Is the panel builder's responsibility.
10.10 Temperature rise     The panel builder is responsible for the temperature rise calculation. Eaton will	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			

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) / Soft starter (EC000640)

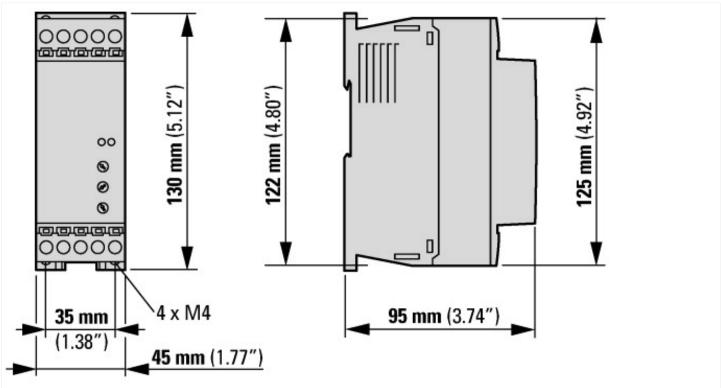
Electric engineering, automation, process control engineering / Low-voltage switch technology / Load breakout, motor breakout / Semiconductor motor controller or soft starter (ecl@ss10.0.1-27-37-09-07 [AC0300011])

Rated operation current le at 40 °C Tu	А	7
Rated operating voltage Ue	V	230 - 460
Rated power three-phase motor, inline, at 230 V	kW	1.5
Rated power three-phase motor, inline, at 400 V	kW	3
Rated power three-phase motor, inside delta, at 230 V	kW	0
Rated power three-phase motor, inside delta, at 400 V	kW	0
Function		Single direction
Internal bypass		Yes
With display		No
Torque control		No
Rated surrounding temperature without derating	°C	40
Rated control supply voltage Us at AC 50HZ	V	24 - 24
Rated control supply voltage Us at AC 60HZ	V	24 - 24
Rated control supply voltage Us at DC	V	24 - 24
Voltage type for actuating		AC/DC
Integrated motor overload protection		No
Release class		Other
Degree of protection (IP)		IP20
Degree of protection (NEMA)		1

## **Approvals**

Product StandardsEC/EN 60947-4-2; GB 14048.6; UL 508; CSA-C22.2 No 0-M91; CSA-C22.2 No 14-05 CE markingUL File No.E251034CSA File No.E251034CSA File No.211305CSA Class No.21106Specially designed for North AmericaNoSuitable forBranch circuitsCurrent Limiting Circuit-BreakerNoMax. Voltage RatingSoloDegree of ProtectionSoloSuitable forBranch circuitsParter StandardsNoSuitable forNoSuitable forNoSuitable forNoSuitable forSoloSuitable forNoSuitable forNoSuitable forNoSuitable forSoloSuitable forNoSuitable forNoSuitable forSoloSuitable forNoSuitable forSoloSuitable forSoloSuitable forNoSuitable forSoloSuitable forS		
CSA File No.2511305CSA Class No.321106Specially designed for North AmericaNoSuitable forFranch circuitsCurrent Limiting Circuit-BreakerNoMax. Voltage RatingGeneral	Product Standards	
CSA Class No.321106Specially designed for North AmericaNoSuitable forBranch circuitsCurrent Limiting Circuit-BreakerNoMax. Voltage RatingGeneAddition (Control of Control of Contro	UL File No.	E251034
Specially designed for North America     No       Suitable for     Branch circuits       Current Limiting Circuit-Breaker     No       Max. Voltage Rating     Max	CSA File No.	2511305
Suitable for     Branch circuits       Current Limiting Circuit-Breaker     No       Max. Voltage Rating     Image: Constant of the second	CSA Class No.	321106
Current Limiting Circuit-Breaker     No       Max. Voltage Rating     Max	Specially designed for North America	No
Max. Voltage Rating 480 V	Suitable for	Branch circuits
	Current Limiting Circuit-Breaker	No
Degree of Protection IP20; UL/CSA Type 1	Max. Voltage Rating	480 V
	Degree of Protection	IP20; UL/CSA Type 1

# **Dimensions**



#### Additional product information (links)

CA04020001Z\_EN-INT Product range catalog: Efficient Engineering for starting and http://www.eaton.eu/ecm/groups/public/@pub/@europe/@electrical/documents/content/pct\_1095238.pdf controlling motors.