TeSys Control
Hybrid motor starters

The most compact 3 KW / 400 V starter in the world

Up to 75 % of space reduction

- Ultra-compact 22.5 mm starter
- Reversing starter in the same width
- Maximum space savings for group starter architecture

Long electrical durability

- Suitable for high demanding application
- 30 000 000 of AC53a electrical cycles

> With printed QR code, refering directly to the product data sheet.

Easy Design

- Wide range setting motor protection
- Automatic, manual or remote reset after thermal trip
- Wide range of control voltage

Easy to integrate

- Direct mounting installation on DIN rail
- Control terminals on the upper side
- Power terminal on the lower side

Standard version

- 2 ratings:
  - 2.4 A 400 V AC53a
  - 6.5 A 400 V AC53a
- 2 control voltages:
  - 24 V DC
  - 110 V / 230 V AC
- 2 terminal types:
  - Screw clamps
  - Spring
- Can provide up to 3 functions:
  - Forward running
  - Reverse running
  - Overload protection

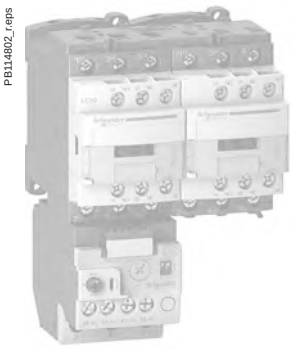
Safety version

- Safe Torque Off embedded:
  - SIL3 according to IEC61508-1
  - Ple according to ISO13849-1
- ATEX:
  - As associated devices for motor protection

> Hybrid motor starters are a solution dedicated to low footprint applications, in industries as food and beverage, logistics, and durable goods.

Conventional ..... OR ..... Hybrid Standard starter

Direct-on-line



Reverse

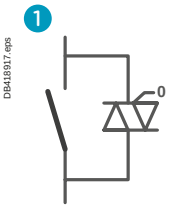
> How does the hybrid technology work ?

Hybrid technology:

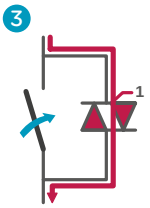
Each contact is coupled with a power semiconductor for switching

> Higher number of on/off switches, extended durability.

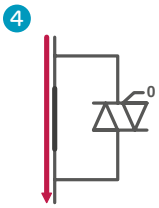
> Closing



Start: conduction through the semiconductor.

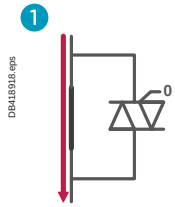


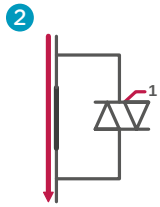
Contact closure under zero voltage. No electrical arc: the contact is preserved.



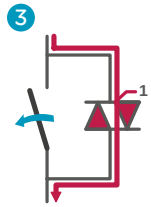
The semiconductor is non-conducting.

> Opening

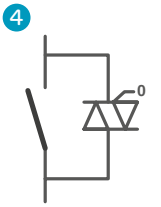




Before the opening of the contact the semiconductor is triggered.

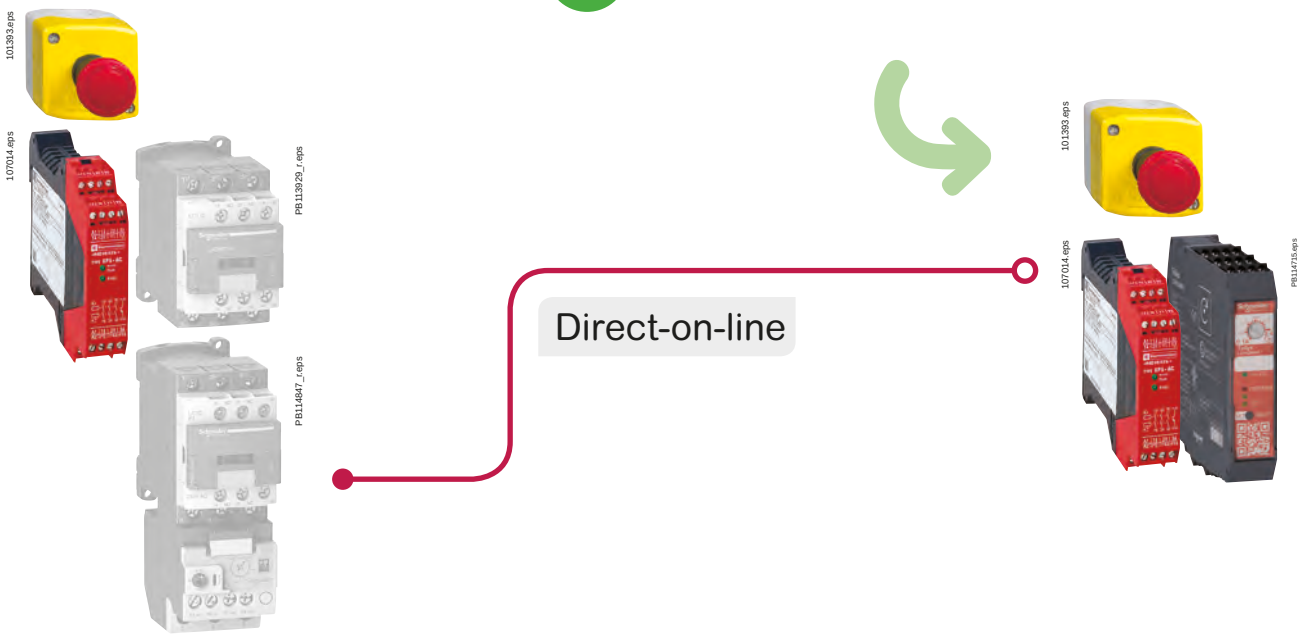


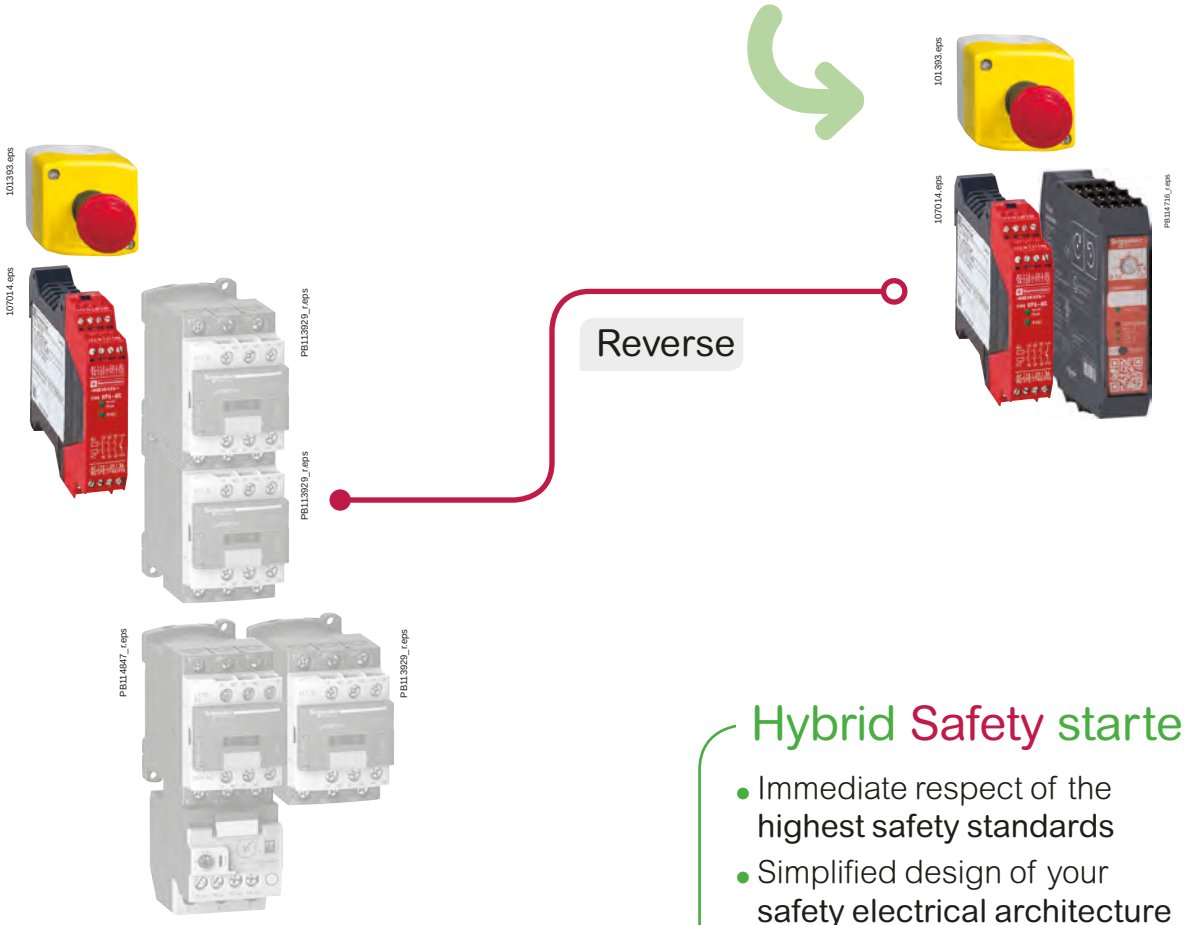
Contact opening:
- no arc: the contact is preserved.



Stop: the semiconductor becomes non-conducting.

Conventional ..... OR ..... Hybrid Safety starter





Hybrid Safety starter

- Immediate respect of the **highest safety standards**
- Simplified design of your **safety electrical architecture**
- **Quicker** panel implementation

PB114711.eps

LZ1H2X4BD

Starters for asynchronous motors - AC53a utilization category:

Standard starters hybrid per IEC ratings

Starters	3- phases motor: max power (KW) for various voltage							Current range	Commercial references (1)
	220 V	230 V	380 V	400 V	415 V	440 V	500 V	A	
Direct-on-line									
Screw terminals	0.37	0.37	0.75	0.75	0.75	0.75	1.1	0.18...2.4	**LZ1H2X4●●**
	1.5	1.5	2.2	3	3	3	3	1.5...6.5	**LZ1H6X5●●**
Spring terminals	0.37	0.37	0.75	0.75	0.75	0.75	1.1	0.18...2.4	**LZ1H2X43●●**
	1.5	1.5	2.2	3	3	3	3	1.5...6.5	**LZ1H6X53●●**
Reverse									
Screw terminals	0.37	0.37	0.75	0.75	0.75	0.75	1.1	0.18...2.4	**LZ2H2X4●●**
	1.5	1.5	2.2	3	3	3	3	1.5...6.5	**LZ2H6X5●●**
Spring terminals	0.37	0.37	0.75	0.75	0.75	0.75	1.1	0.18...2.4	**LZ2H2X43●●**
	1.5	1.5	2.2	3	3	3	3	1.5...6.5	**LZ2H6X53●●**

(1) Remplace the ●● in the reference by the bobine code: BD (24 V DC) or FU (110-230 V AC).

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LZ7H2X4BD

Safety starters hybrid per IEC ratings

Starters	3- phases motor: max power (KW) for different tensions							Current range	Commercial references (1)
	220 V	230 V	380 V	400 V	415 V	440 V	500 V	A	
Direct-on-line									
Screw terminals	0.37	0.37	0.75	0.75	0.75	0.75	1.1	0.18...2.4	**LZ7H2X4●●**
	1.5	1.5	2.2	3	3	3	3	1.5...6.5	**LZ7H6X5●●**
Spring terminals	0.37	0.37	0.75	0.75	0.75	0.75	1.1	0.18...2.4	**LZ7H2X43●●**
	1.5	1.5	2.2	3	3	3	3	1.5...6.5	**LZ7H6X53●●**
Reverse									
Screw terminals	0.37	0.37	0.75	0.75	0.75	0.75	1.1	0.18...2.4	**LZ8H2X4●●**
	1.5	1.5	2.2	3	3	3	3	1.5...6.5	**LZ8H6X5●●**
Spring terminals	0.37	0.37	0.75	0.75	0.75	0.75	1.1	0.18...2.4	**LZ8H2X43●●**
	1.5	1.5	2.2	3	3	3	3	1.5...6.5	**LZ8H6X53●●**

(1) Remplace the ●● in the reference by the bobine code: BD (24 V DC) or FU (110-230 V AC).

Starters for resistive load AC51 utilization category:

Starters	Resistive load current	Application	Commercial references (1)
	A		
Screw terminals	2.4	Standard	**LZ1H2X4●●**
		Safety	**LZ7H2X4●●**
	9	Standard	**LZ1H6X5●●**
		Safety	**LZ7H6X5●●**
Spring terminals	2.4	Standard	**LZ1H2X43●●**
		Safety	**LZ7H2X43●●**
	9	Standard	**LZ1H6X53●●**
		Safety	**LZ7H6X53●●**

(1) Remplace the ●● in the reference by the bobine code: BD (24 V DC) or FU (110-230 V AC).

Description: pages A3/12 and A3/13
Characteristics: pages A3/14 and A3/15
Curves: pages A3/16 and A3/17
Dimensions, schemes: page A3/18

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LZ1H2X43BD

Starters for asynchronous motors - AC53a utilization category:

Standard starters hybrid per UL ratings

Starters	3- phases motor in HP			Current range	Commercial references (1)
	208 V	220 V - 240 V	440 V - 480 V	A	
Direct-on-line					
Screw terminals	1/2	1/2	1	0.18...2.4	**LZ1H2X4●●**
	1	1.5	3	1.5...6.5	**LZ1H6X5●●**
Spring terminals	1/2	1/2	1	0.18...2.4	**LZ1H2X43●●**
	1	1.5	3	1.5...6.5	**LZ1H6X53●●**
Reverse					
Screw terminals	1/2	1/2	1	0.18...2.4	**LZ2H2X4●●**
	1	1.5	3	1.5...6.5	**LZ2H6X5●●**
Spring terminals	1/2	1/2	1	0.18...2.4	**LZ2H2X43●●**
	1	1.5	3	1.5...6.5	**LZ2H6X53●●**

(1) Remplace the ●● in the reference by the bobine code: BD (24 V DC) or FU (110-230 V AC).

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LZ8H6X5BD

Safety starters hybrid per UL ratings

Starters	3- phases motor in HP			Current range	Commercial references (1)
	208 V	220 V - 240 V	440 V - 480 V	A	
Direct-on-line					
Screw terminals	1/2	1/2	1	0.18...2.4	**LZ7H2X4●●**
	1	1.5	3	1.5...6.5	**LZ7H6X5●●**
Spring terminals	1/2	1/2	1	0.18...2.4	**LZ7H2X43●●**
	1	1.5	3	1.5...6.5	**LZ7H6X53●●**
Reverse					
Screw terminals	1/2	1/2	1	0.18...2.4	**LZ8H2X4●●**
	1	1.5	3	1.5...6.5	**LZ8H6X5●●**
Spring terminals	1/2	1/2	1	0.18...2.4	**LZ8H2X43●●**
	1	1.5	3	1.5...6.5	**LZ8H6X53●●**

(1) Remplace the ●● in the reference by the bobine code: BD (24 V DC) or FU (110-230 V AC).

Starters for resistive load AC51 utilization category:

Starters	Resistive load current	Application	Commercial references (1)
	A		
Screw terminals	2.4	Standard	**LZ1H2X4●●**
		Safety	**LZ7H2X4●●**
	9	Standard	**LZ1H6X5●●**
		Safety	**LZ7H6X5●●**
Spring terminals	2.4	Standard	**LZ1H2X43●●**
		Safety	**LZ7H2X43●●**
	9	Standard	**LZ1H6X53●●**
		Safety	**LZ7H6X53●●**

(1) Remplace the ●● in the reference by the bobine code: BD (24 V DC) or FU (110-230 V AC).

Description:
pages A3/12 and A3/13
Characteristics:
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Curves:
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Dimensions, schemes:
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Selection table

PB121671_Reps

PB114721_reps PB114721_reps PB114721_reps PB114721_reps

GV2L + LZ2H2X4BD

Magnetic motor circuit breakers:
- GV2L: rotary knob type - Ue = 500 V
- GV2LE: rocker lever type - Ue = 415 V.

Selection of the circuit breaker
Type 1 coordination according to IEC/EN 60947-4-2

Max	Iq	Number of H		Reference Circuit breaker	
		2.4 A	6.5 A	Rotary	Rocker
A	kA				
0.4	50.0	1	–	**GV2L03**	**GV2LE03**
0.63	50.0	1	–	**GV2L04**	**GV2LE04**
1	50.0	1	1	**GV2L05**	**GV2LE05**
1.6	50.0	1	1	**GV2L06**	**GV2LE06**
2.5	35.0	1	1	**GV2L07**	**GV2LE07**
4	12.5	1	1	**GV2L08**	**GV2LE08**
6.3	8.0	2	1	**GV2L10**	**GV2LE10**
10	7.0	4	1	**GV2L14**	**GV2LE14**
14	5.0	5	2	**GV2L16**	**GV2LE16**
18	4.0	7	2	**GV2L20**	**GV2LE20**
25	4.0	10	3	**GV2L22**	**GV2LE22**
32	3.0	13	4	**GV2L32**	**GV2LE32**

Product references

LZ1H2X43BD	**LZ7H2X43BD**
LZ1H2X43FU	**LZ7H2X43FU**
LZ1H2X4BD	**LZ7H2X4BD**
LZ1H2X4FU	**LZ7H2X4FU**
LZ1H6X53BD	**LZ7H6X53BD**
LZ1H6X53FU	**LZ7H6X53FU**
LZ1H6X5BD	**LZ7H6X5BD**
LZ1H6X5FU	**LZ7H6X5FU**
LZ2H2X43BD	**LZ8H2X43BD**
LZ2H2X43FU	**LZ8H2X43FU**
LZ2H2X4BD	**LZ8H2X4BD**
LZ2H2X4FU	**LZ8H2X4FU**
LZ2H6X53BD	**LZ8H6X53BD**
LZ2H6X53FU	**LZ8H6X53FU**
LZ2H6X5BD	**LZ8H6X5BD**
LZ2H6X5FU	**LZ8H6X5FU**

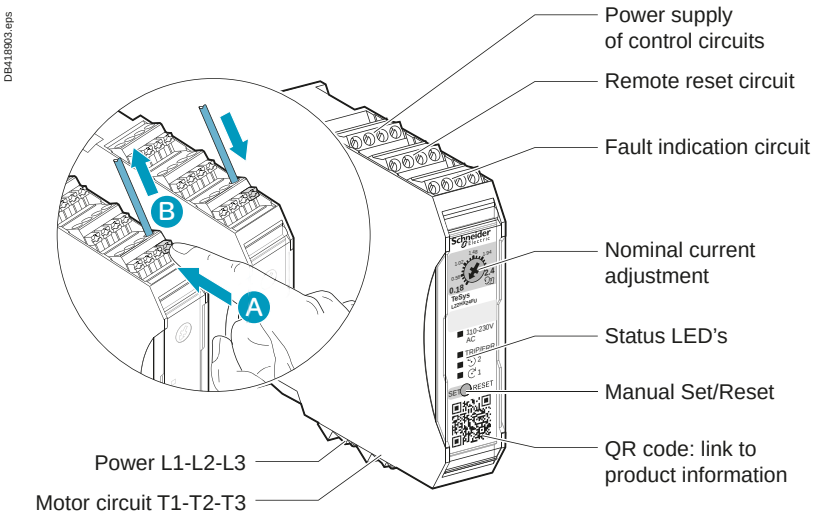
This document is current. Click on the product reference to get the most recent availability status (hyperlink to **se.com** product datasheet). If your product variant is no longer available, please consult your distributor or regional sales office.

Technical Data for Designers

Contents

Identification of terminals / Indicators / Setting means and procedure

Setting procedure



STEP	ACTION
1	Lift the cover on the front of the Hybrid motor starter to access the SET/RESET button.
2	Press and hold down the SET/RESET button for at least 6 seconds. After 6 seconds the 110-230 V AC or 24 V DC LED flashes once.
3	After the LED has flashed once, release the SET/RESET button.
4	Turn the potentiometer to select a nominal current, and then fine-tune the position until the LEDs indicate the exact nominal current.
5	Press the SET/RESET button to save the selected nominal current. The 110-230 V AC or 24 V DC LED comes on and the other LEDs go off.
6	Drop the cover back over the front of the Hybrid motor starter.

Protection functions

The protection of three - phase motors is ensured against potential faults

- Thermal overload: the motor currents exceed the set value.
- Phase unbalanced: the motor currents differ from each other by more than 33 %
- Phase loss: power missing on one or several phases
- Stall and jam: motor current exceeding 45 A for more that 2 s during starting or running phase - No motor is connected - Motor current is lower that the minimum configurable current for more than 2 seconds, on at least two phases.

For all this detected situations, the Hybrid motor starter will switch off, activate its TRP/ERR LED and fault signaling contact.

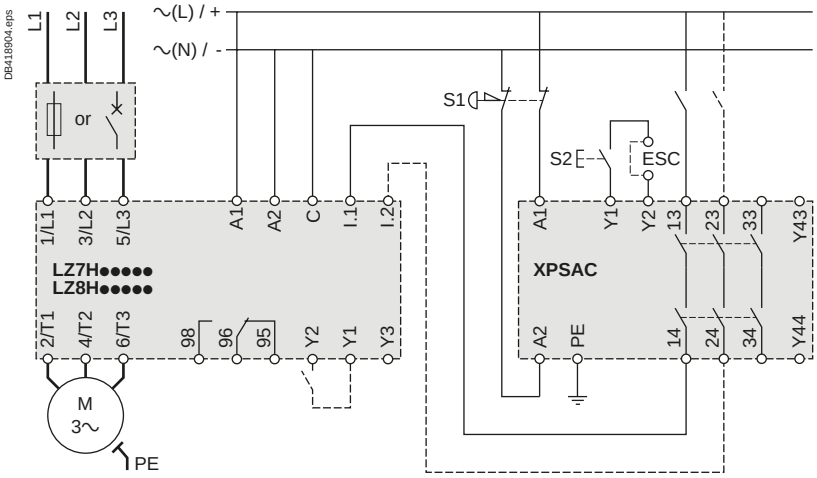
Please refer to the “Instruction sheet and User Guide” for more information.

Electrical diagrams for Safety chain applications

Preferred

Electrical life time: 30000000 AC53a electrical cycles

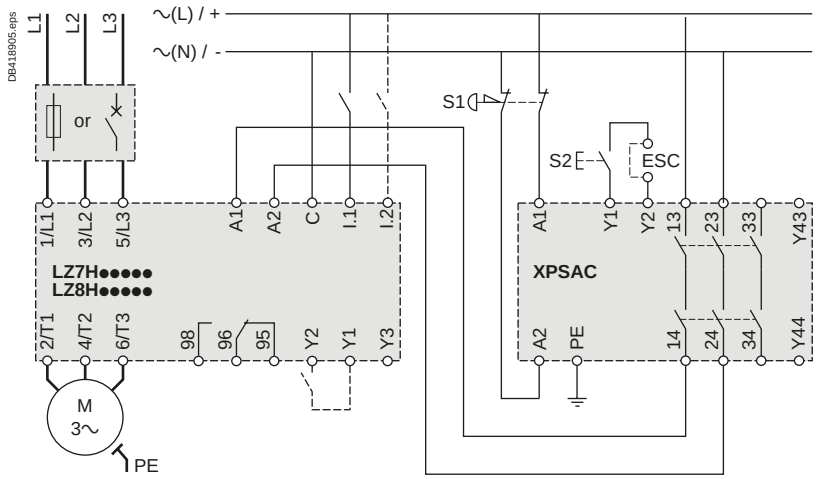
Safety Chain Application for Monitoring Emergency STOP Circuits with Two Channel Inputs and Two Channel Outputs with Preventa XPSAF Safety Processing Device.



Possible but non- recommended

Electrical life time: 10000 AC53 a electrical cycles

Safety Chain Application for Monitoring Emergency Stop Circuits with Two Channel Inputs and Two Channel Outputs with Preventa XPSAC Safety Processing Device.



Hybrid motor starters
Ref.

Characteristics

Environment

Rated insulation voltage (Ui)	Conforming to IEC/EN 60947-1, overvoltage category III, degree of pollution: 2	**V**	500
Rated impulse withstand voltage (Uimp)	Conforming to IEC/EN 60947-4-2	**kV**	6 (24 V DC control voltage); 4 (110 V - 230 V AC control voltage)
Conforming to standards			IEC / EN 60947-4-2
Product certifications			CE, CUL, ATEX (for failsafe product), CCC, UKCA
Degree of protection	Conforming to IEC / EN 60947-1		IP20
Environment category	Conforming to IEC / EN 60947-1		E
Climatic withstand			Conforming to IEC/EN 60068-2-30
Ambient air temperature around the device	Storage	**°C**	-40…+80
	Operation (see derating curves)	**°C**	-25…+70
Maximum operating altitude	without derating	**m**	2000
	with derating	**m**	No
Operating positions (see derating curves)	Vertical axis (horizontal DIN rail)		Yes
	Horizontal axis (vertical DIN rail)		Not authorised
Shock resistance 1/2 sine wave = 18 ms	Conforming to IEC/EN 60068-2-27	**gn**	30 Starter OFF
		gn	30 Starter ON
Vibration resistance 10…150 Hz	Conforming to IEC/EN 60068-2-6	**gn**	5 Starter OFF
		gn	5 Starter ON
Resistance to electrostatic discharge	Conforming to IEC/EN 61000-4-2	**kV**	Air discharge: 8 kV
		kV	Contact discharge: 6 kV
Immunity to radiated high-frequency disturbance	Conforming to IEC/EN 61000-4-3		
	80 - 1 GHz	**V/m**	20
	1.0 - 6 GHz	**V/m**	10
Immunity to fast transient currents	Conforming to IEC/EN 61000-4-4	**kV**	3
Immunity to conducted high frequency disturbances	Conforming to IEC/EN 61000-4-6	**V**	10
Radiated emission and conducted	Conforming to CISPR 11 and EN 55011		Class A
Surge	Conforming to IEC/EN 61000-4-5	**kV**	1 symmetrical
		kV	2 asymmetrical

Control circuit characteristics

Rated voltage	∼ 50/60 Hz	**V**	110 - 230
	⎓	**V**	24
Voltage limits	∼ 50/60 Hz	**V**	85…253
	⎓	**V**	19.2…30
Voltage dips		**ms**	3
Short time interruptions		**ms**	3

Power circuit characteristics

			LZ●2X4●●	**LZ●6X5●●**
Power disipation for corresponding Rated Operating Current (see derating curve)		**W**	0.88 … 4.1	0.88 … 7
Rated Operating Current	AC51 conforming to IEC/EN 60947-4-3	**A**	0.18 - 2.4	1.5 - 9
	AC53a conforming to IEC/EN 60947-4-2	**A**	0.18 - 2.4	1.5 - 6.5
Electrical life	AC51	**Op**	30 000 000 (1)	
		Op	10 000 (2)	
	AC53A	**Op**	30 000 000 (1)	
		Op	10 000 (2)	
Maximum Operating rate	AC51	**Op/h**	7200	
	AC53A		See curves	
Time to restart after overload trip	Manual or remote mode	**mn**	2	
	Automatic	**mn**	20	

Power and control terminal Characteristics

	Terminal type		**Screw M3**	**Push in**
Flexible cable without cable end	1 conductor	**mm²**	0.25…2.5	0.25…2.5
	2 conductors	**mm²**	0.25…0.75	
Flexible cable with cable end	1 conductor	**mm²**	0.25…2.5	0.25…2.5
	2 conductors	**mm²**	0.25…1.5	0.25…1.5
Solid cable without cable end	1 conductor	**mm²**	0.25…2.5	0.25…2.5
	2 conductors	**mm²**	0.25…0.75	
Screwdriver		**mm**	flat screwdriver: 3 mm	
Tightening torque		**N.m**	0.5..0.6	

(1) With ON/OFF control through control inputs (I_1, I_2 terminals) *(2) With ON/OFF control through power supply (A_1, A_2 terminals).*

References: pages A3/6 and A3/7
Description: pages A3/12 and A3/13
Curves: pages A3/16 and A3/17
Dimensions, schemes: page A3/18

Characteristics

System conditons

Database for failure rates		SN 29500
System type		Type B
Standard used		IEC 61508
Beta factor		1 %
Mean time to failure (MTTF) at an ambient temperature 40 °C		39.3 (LZ7H or LZ8H 24 V DC) 39.1 (LZ7H or LZ8H 110/230 V AC)

Safe torque-off

		LZ7H or LZ8H 24 V DC	LZ7H or LZ8H 110/230 V AC
Ambient temperature	°C	40	40
Mean time to failure (MTTF)		517	289
Switch-off time		80	100
λsd [FIT] safe, detectable		664	638
λsu [FIT] safe, undetectable		968	935
λdd [FIT] dangerous, detectable		218	388
λdu [FIT] dangerous, undetectable		2.67	6.82
SFF [%] Safe failure fraction		99	99
DCS [%] Diagnostic coverage safe		40.7	40.6
DC [%] Diagnosctic coverage		98	98
PFH Probability of dangerous failure per hour		2.67×10^{-9}	6.82×10^{-9}
Safety level		IEC/CEI 61508-1: SIL 3 ISO 13849-1: Category 3 PL e EN 60954-1: Category 3	

Motor overload protection

		LZ7H or LZ8H 24 V DC	LZ7H or LZ8H 110/230 V AC
Ambient temperature	°C	40	40
Mean time to failure (MTTF)		447	273
Time to trip		As for Class 10 A, IEC/CEI 60947-4-2	
λsd [FIT] safe, detectable		637	636
λsu [FIT] safe, undetectable		870	841
λdd [FIT] dangerous, detectable		239	402
λdu [FIT] dangerous, undetectable		17	17
SFF [%] Safe failure fraction		99	99
DCS [%] Diagnostic coverage safe		42.3	43.1
DC [%] Diagnosctic coverage		93	95
Safety level		IEC/CEI 61508-1: SIL 2	

References:
pages A3/6 and A3/7

Description:
pages A3/12 and A3/13

Curves:
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Dimensions, schemes:
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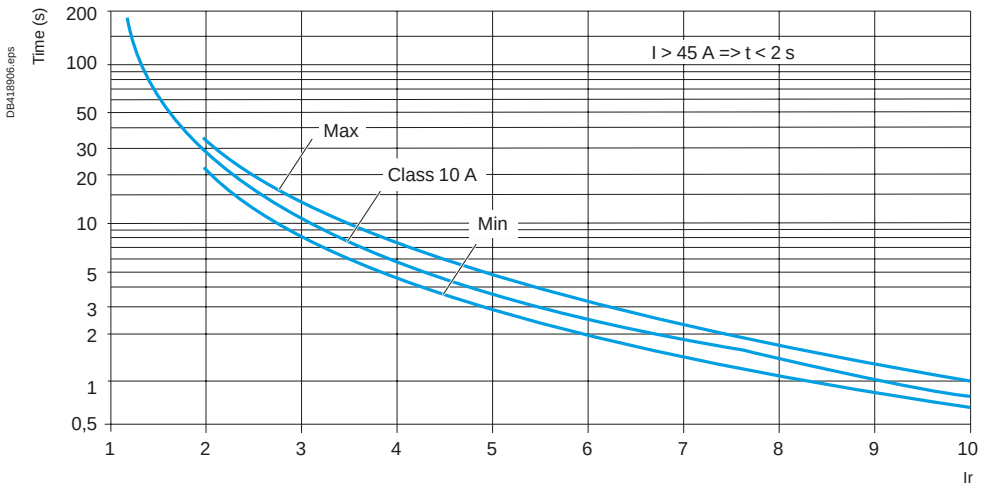
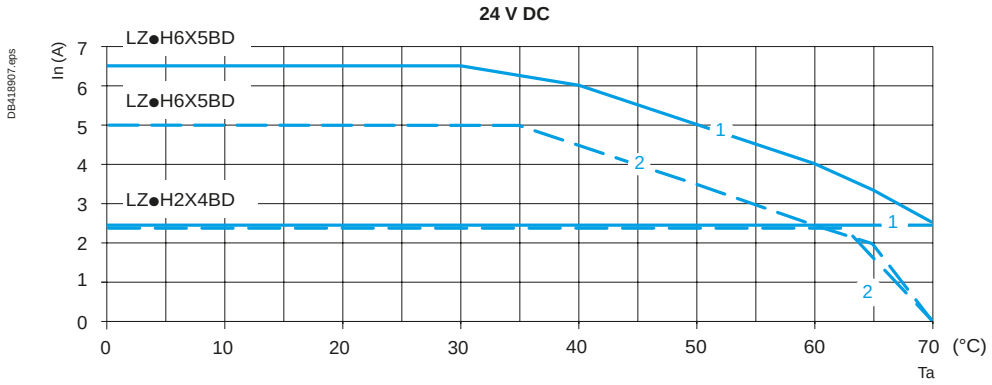
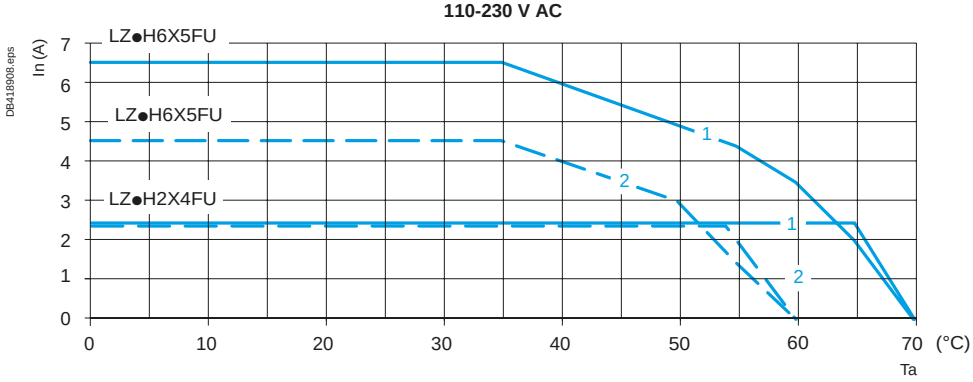
Overload protection tripping curve at 20 °C



Derating curves: maximum load current (In)



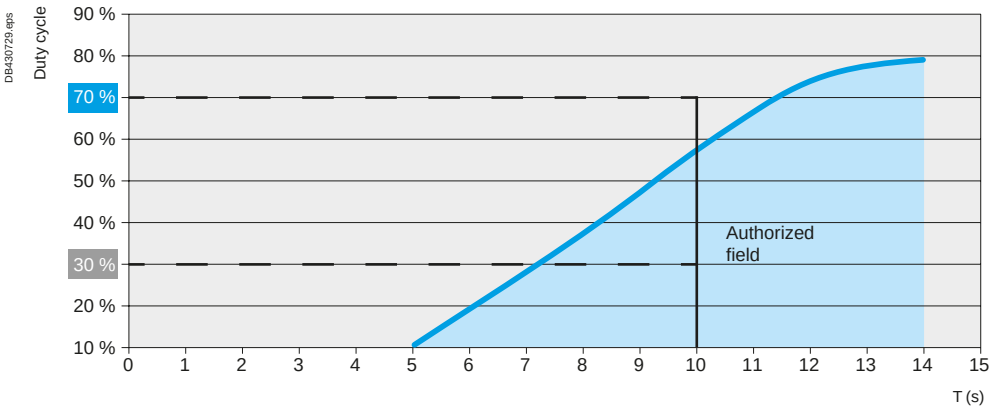
Derating according:
- motor starter control power supply
- ambient temperature (Ta)
- distance between devices **1**: 20 mm, with spacing
  2: without spacing.



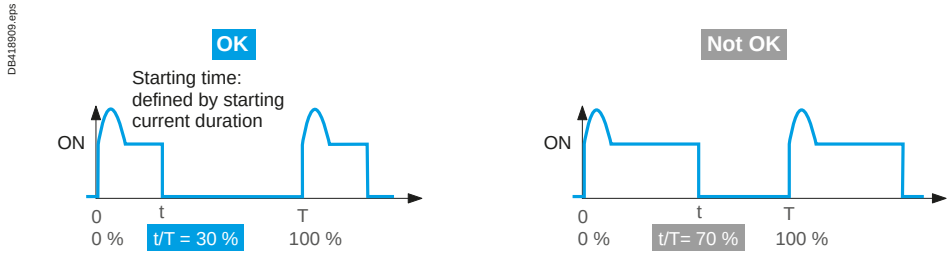
Minimum duty cycle t/T (%) versus cycle duration T (s)

Due to the effect of the peak current on the H monitoring circuit during the starting time, a stop/start sequence should not occur before a certain amount of time. The diagrams below show the minimum duty cycle according the total period for 2 typical starting time values.

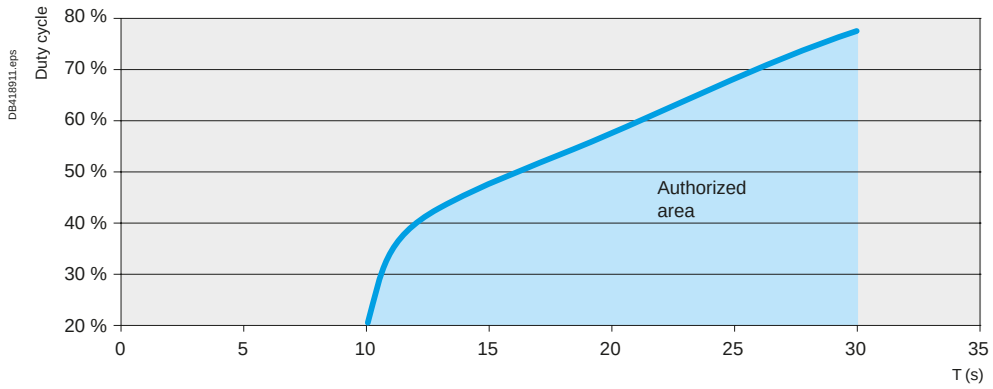
With a starting time = 100 ms



Example for starting time of 100 ms with period T = 10 s.



With a starting time = 150 ms

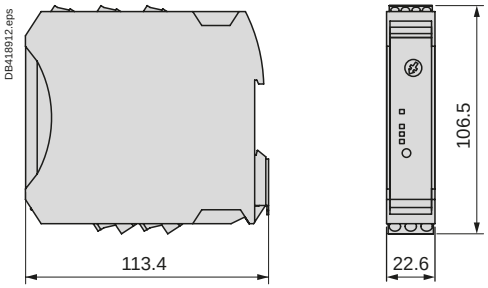


References:
pages A3/6 and A3/7
Description:
pages A3/12 and A3/13
Characteristics:
pages A3/14 and A3/15
Dimensions, schemes:
page A3/18

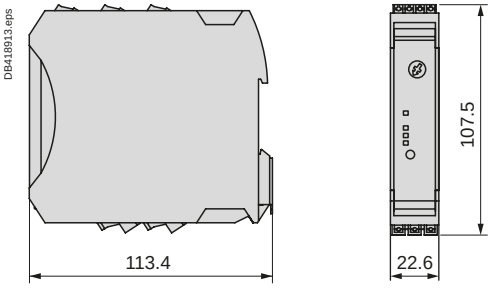
Dimensions, schemes

Dimensions mm

LZ●H●●●●●

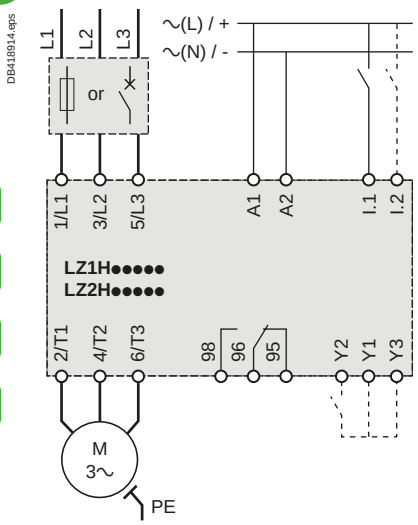


LZ●H●●●3●●

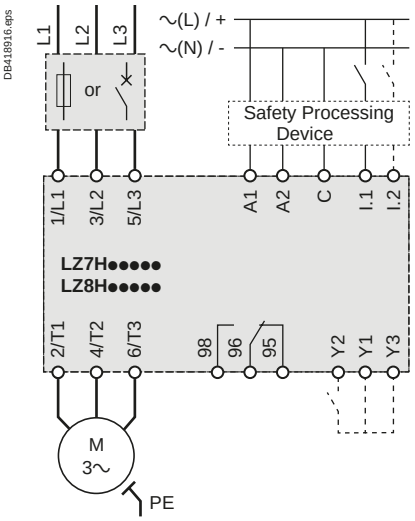


Wiring diagrams

Motor control by standard starter



Motor control by safety starter



Power terminals

T1, T2, T3	*Motor connection*
L1, L2, L3	*Power inputs*

Control terminals

A1, A2	*Auxiliary power unit*
I.1	*Control input, direction 1*
I.2	*Control input, direction 2 (LZ2H and LZ8H only)*
C	*Control inputs common point (LZ7H and LZ8H only)*
Y1	*Reset mode, common point*
Y2	*Reset mode, remote, manual*
Y3	*Reset mode, automatic*
98, 96, 95	*Trip or error signaling contact*

Hybrid motor starters
Ref.