




Presentation A3/2

Ultra-compact 22.5 mm motor starters - TeSys H

Type of product	Range		Page
<b>Ultra compact starters IEC ratings</b> Standard starters, screw or spring terminals, direct-on-line or reverse	Up to <b>3 kW</b> AC53a Up to <b>9 A</b> AC51		A3/6
Safety starters, screw or spring terminals, direct-on-line or reverse			
<b>Ultra compact starters UL ratings</b> Standard starters, screw or spring terminals, direct-on-line or reverse	Up to <b>3 hp</b> AC53a Up to <b>9 A</b> AC51		A3/7
Safety starters, screw or spring terminals, direct-on-line or reverse			
<b>Circuit breakers for a group of starters</b> Selection of magnetic motor circuit breakers GV2L – rotary knob GV2LE – rocker lever	Up to <b>32 A</b>		A3/8

Technical Data for Designers A3/9

## Ultra-compact starters TeSys H

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, referring 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

## Ultra-compact starters TeSys H

### 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



TeSys H



### Safety version

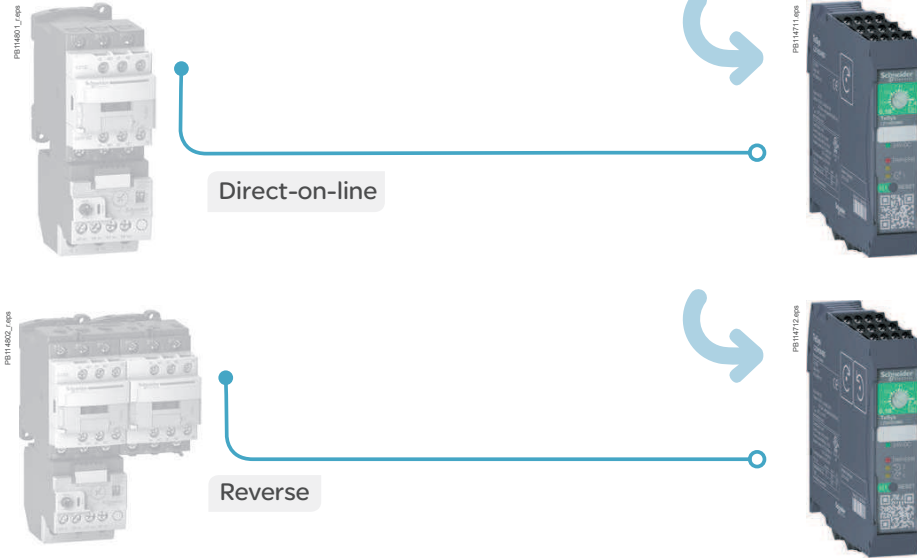
- Safe Torque Off embedded:
  - SIL3 according to IEC61508-1
  - Ple according to ISO13849-1
- ATEX:
  - As associated devices for motor protection

> TeSys H is a solution dedicated to low footprint applications, in industries as food and beverage, logistics, and durable goods.



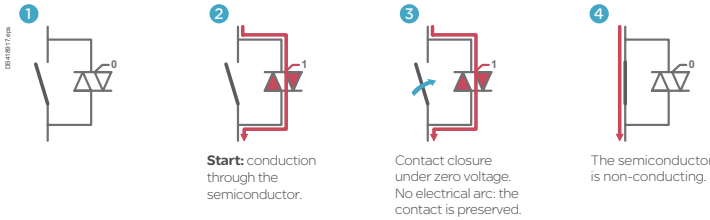
# Ultra-compact starters TeSys H

Conventional ..... OR ..... TeSys H standard solutions

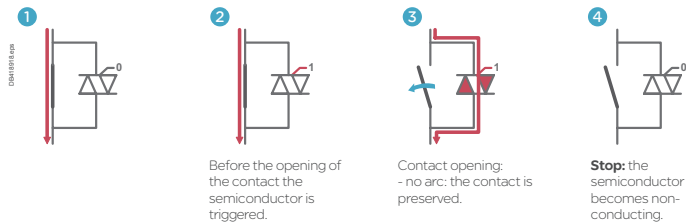


## How does the hybrid technology work ?

### > Closing



### > Opening



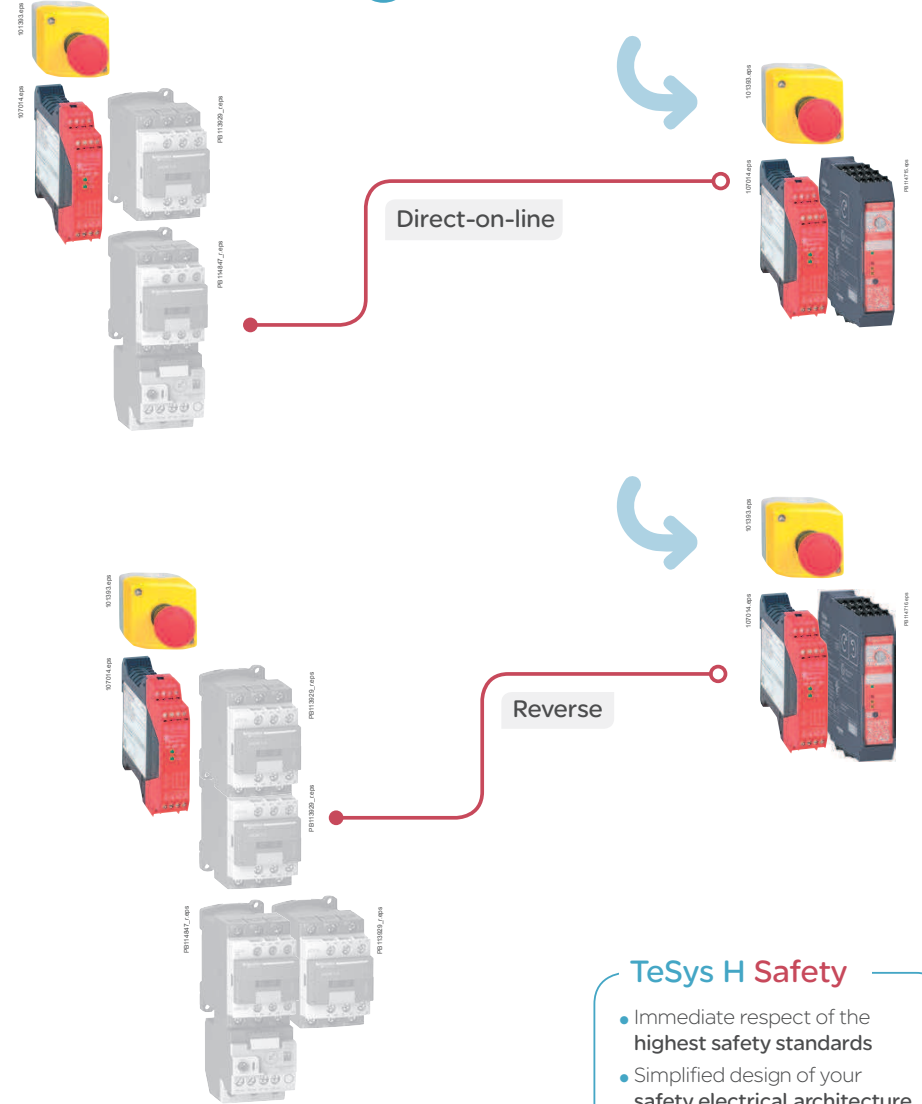
#### Hybrid technology:

Each contact is coupled with a power semiconductor for switching

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

# Ultra-compact starters TeSys H

Conventional ..... OR ..... TeSys H safety solutions



## TeSys H Safety

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

## Ultra-compact starters

### TeSys H Standard - TeSys H Safety

#### IEC ratings

#### Starters for asynchronous motors - AC53a utilization category:

Standard starters TeSys H									
Starters	3-phases motor: max power (KW) for various voltage							Current range	Commercial references <sup>(1)</sup>
	220 V	230 V	380 V	400 V	415 V	440 V	500 V		
<b>Direct-on-line</b>									
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●●
<b>Reverse</b>									
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●●

<sup>(1)</sup> Replace the ●● in the reference by the bobine code: BD (24 V DC) or FU (110-230 V AC).



LZ1H2X4BD

Safety starters TeSys H									
Starters	3-phases motor: max power (KW) for different tensions							Current range	Commercial references <sup>(1)</sup>
	220 V	230 V	380 V	400 V	415 V	440 V	500 V		
<b>Direct-on-line</b>									
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●●
<b>Reverse</b>									
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●●

<sup>(1)</sup> Replace the ●● in the reference by the bobine code: BD (24 V DC) or FU (110-230 V AC).



LZ7H2X4BD

#### Starters for resistive load

#### AC51 utilization category:

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

<sup>(1)</sup> Replace the ●● in the reference by the bobine code: BD (24 V DC) or FU (110-230 V AC).

## Ultra-compact starters

### TeSys H Standard - TeSys H Safety

#### UL ratings

#### Starters for asynchronous motors - AC53a utilization category:

Standard starters TeSys H					
Starters	3-phases motor in HP			Current range	Commercial references <sup>(1)</sup>
	208 V	220 V - 240 V	440 V - 480 V		
<b>Direct-on-line</b>					
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●●
<b>Reverse</b>					
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●●

<sup>(1)</sup> Replace the ●● in the reference by the bobine code: BD (24 V DC) or FU (110-230 V AC).



LZ1H2X4BD

Safety starters TeSys H					
Starters	3-phases motor in HP			Current range	Commercial references <sup>(1)</sup>
	208 V	220 V - 240 V	440 V - 480 V		
<b>Direct-on-line</b>					
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●●
<b>Reverse</b>					
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●●

<sup>(1)</sup> Replace the ●● in the reference by the bobine code: BD (24 V DC) or FU (110-230 V AC).



LZ8H2X4BD

#### Starters for resistive load

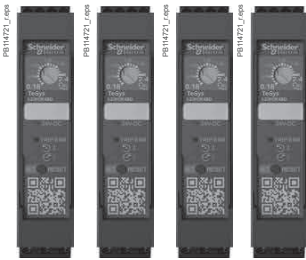
#### AC51 utilization category:

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

<sup>(1)</sup> Replace the ●● in the reference by the bobine code: BD (24 V DC) or FU (110-230 V AC).

## Ultra-compact starters

### Circuit breaker selection for a group of starters



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 TeSys 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

TeSys H

# Technical Data for Designers

#### Contents

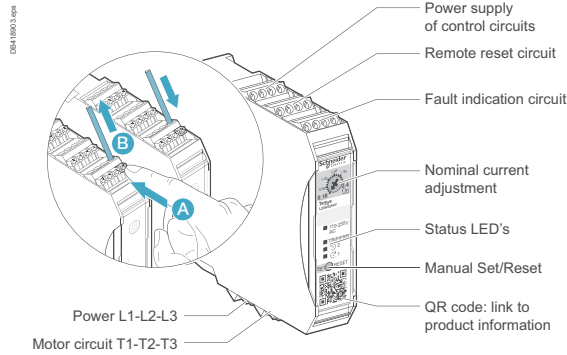
Description .....	A3/10 to A3/11
Characteristics .....	A3/12 to A3/15
Dimensions and schemes .....	A3/16

# Ultra-compact starters

## TeSys H

### Identification of terminals / Indicators / Setting means and procedure

#### Setting procedure



STEP	ACTION
1	Lift the cover on the front of the TeSys H 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 TeSys H 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 TeSys H 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.

# Ultra-compact starters

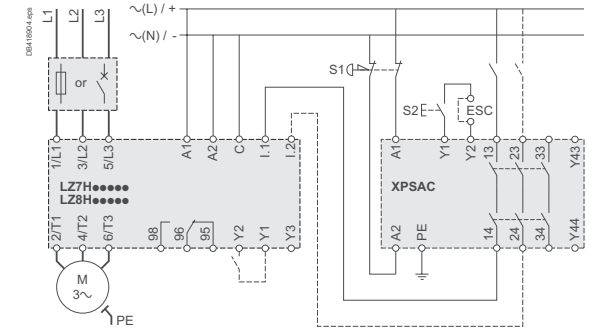
## TeSys H

### Electrical diagrams for Safety chain applications

#### Preferred

Electrical life time: 30000000 AC53a electrical cycles

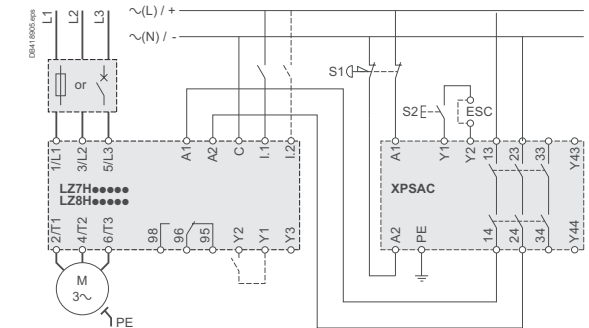
Safety Chain Application for Monitoring Emergency STOP Circuits with Two Channel Inputs and Two Channel Outputs with Preventa XPSAF Safety Processing Device.



#### 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.



# Ultra-compact starters TeSys H

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 60947-2	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 ( on going)
Degree of protection	Conforming to IEC / EN 60947-1		IP20
Environment category	Conforming to IEC / EN 60947-1		E
Protective treatment	Conforming to IEC/EN 60068-2-30		"TC"
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 $\bullet$ 2X4 $\bullet\bullet$	LZ $\bullet$ 6X5 $\bullet\bullet$
Power dissipation for corresponding Rated Operating Current (see derating curve)		W	0.88 ... 4.1
Rated Operating Current	AC51 conforming to IEC/EN 60947-4-3	A	0.18 - 2.4
	AC53a conforming to IEC/EN 60947-4-2	A	0.18 - 2.4
Electrical life	AC51	Op	30 000 000 <sup>(1)</sup>
		Op	10 000 <sup>(2)</sup>
	AC53A	Op	30 000 000 <sup>(1)</sup>
		Op	10 000 <sup>(2)</sup>
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	mm <sup>2</sup>	0.25...2.5
	2 conductors	mm <sup>2</sup>	0.25...0.75
Flexible cable with cable end	1 conductor	mm <sup>2</sup>	0.25...2.5
	2 conductors	mm <sup>2</sup>	0.25...1.5
Solid cable	1 conductor	mm <sup>2</sup>	0.25...2.5
	2 conductors	mm <sup>2</sup>	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<sub>1</sub>, I<sub>2</sub> terminals) (2) With ON/OFF control through power supply (A<sub>1</sub>, A<sub>2</sub> terminals).

# Ultra-compact starters TeSys H

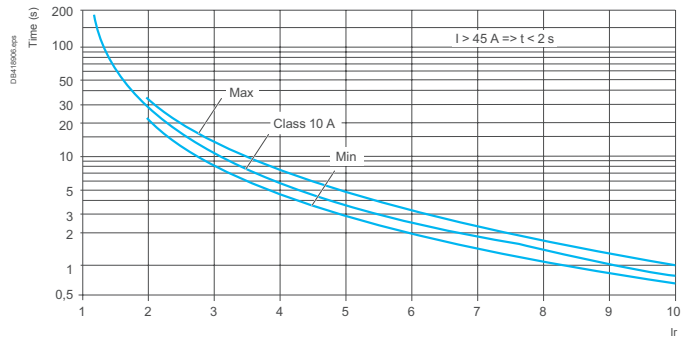
System conditons	
Database for failure rates	SN 29500
System type	Type B
Standard used	IEC 61508
Beta factor	1 %
Mean time to failure (MTTF) at an ambient temperature 40 °C	39.3 (LZ7H or LZ8H 24 V DC) 39.1 (LZ7H or LZ8H 110/230 V AC)

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

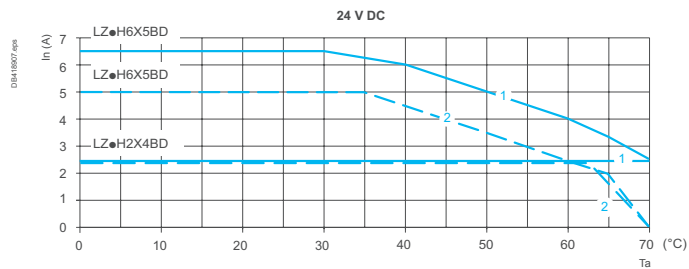
Motor overload protection			
	°C	LZ7H or LZ8H 24 V DC	LZ7H or LZ8H 110/230 V AC
Ambient temperature	40	40	40
Mean time to failure (MTTF)	447	273	273
Time to trip		As for Class 10 A, IEC/CEI 60947-4-2	
Asd [FIT] safe, detectable	637	636	636
Asu [FIT] safe, undetectable	870	841	841
Add [FIT] dangerous,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

# Ultra-compact starters TeSys H

## Overload protection tripping curve at 20 °C

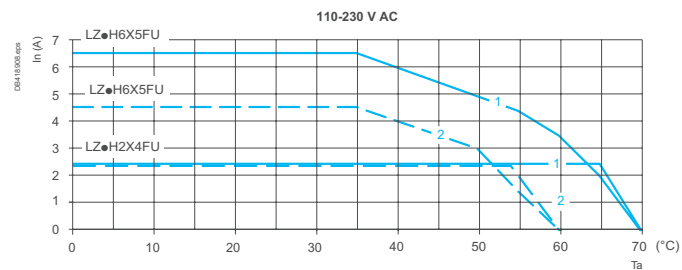


## Derating curves: maximum load current (In)



**Derating according:**

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

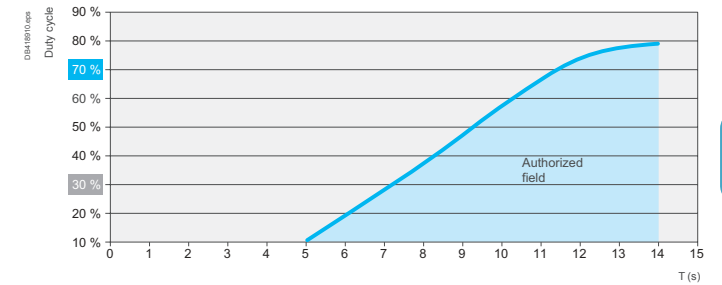


# Ultra-compact starters TeSys H

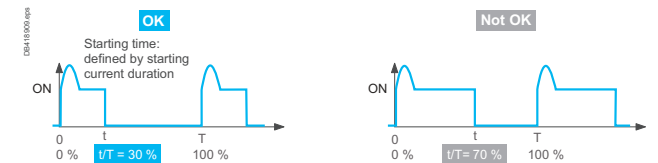
## Minimum duty cycle t/T (%) versus cycle duration T (s)

Due to the effect of the peak current on the TeSys 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 to the total period for 2 typical starting time values.

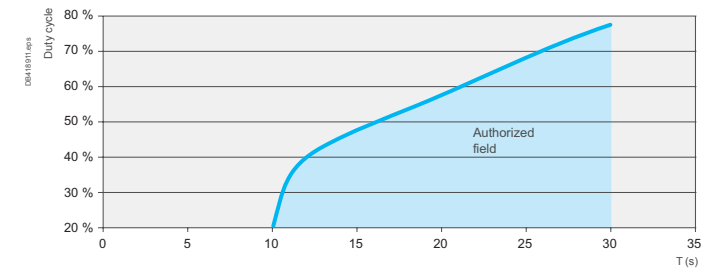
### With a starting time = 100 ms



### Example: for starting time = 100 ms



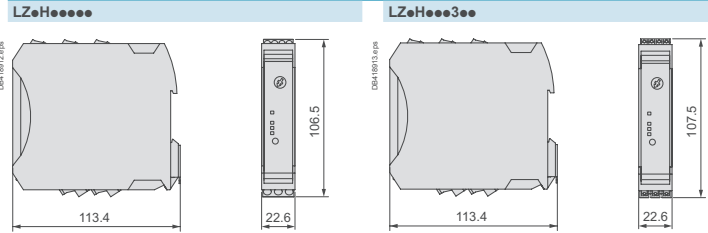
### With a starting time = 150 ms





# Ultra-compact starters TeSys H

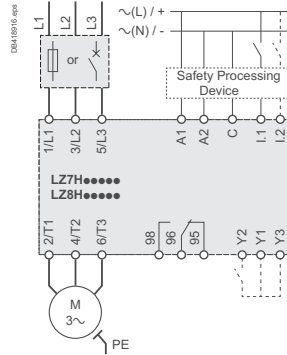
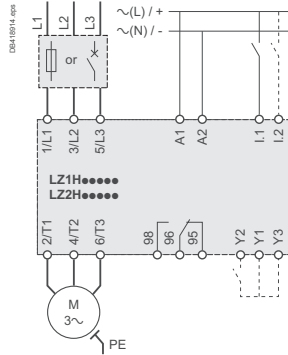
## Dimensions mm



## 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