

TeSys protection components

Thermistor protection units

for use with PTC thermistor probes ⁽¹⁾

Application

LT3 S● thermistor protection units continuously monitor the temperature of the machines to be protected (motors, generators, etc.) by means of PTC thermistor probes embedded in the machine windings.

If the nominal operating temperature of the probes is reached, they convert the rapid increase in resistance into a switching function which can be used to switch off the machine or signal a fault (see paragraph relating to thermistor probes below).

Accidental breaks in the supply circuits of the thermistors are also detected.

Electromagnetic compatibility

Conforming to "Electromagnetic compatibility" directive.
Conforming to standard EN 61000-6-2.

Resistance to electrostatic discharge (conforming to IEC 61000-4-2)	Level 3
Resistance to fast transients (conforming to IEC 61000-4-4)	Level 3
Susceptibility to electromagnetic fields (conforming to IEC 61000-4-3)	Level 3
Surge resistance 1.2/50 - 8/20 (conforming to IEC 61000-4.5)	Level 4
Immunity to microbreaks and voltage drops (IEC 61000-4-11)	
Suitable for use with variable speed controllers	

Thermistor probes

Range of most commonly used PTC thermistor probes:
from 90 to 160 °C, in steps of 10 °C.
Curve $R = f(\theta)$, characteristic of a PTC thermistor probe, is defined by standard IEC 60947-8.

The choice of PTC thermistor probe to be incorporated in the motor winding depends on the insulation class, the type of motor and the most suitable location for the probe. This choice is usually made by the motor manufacturer or the motor rewinder, who have all the necessary information.

Application example

Insulation class of rotating machines conforming to IEC 60034-11 (S1 duty)	NOT Nominal operating temperature	Temperature at which rapid increase in resistance occurs Probes used for Alarm		Fault
	°C	°C		°C
A	100	100		100
B	110	110		120
E	120	120		130
F	140	140		150
H	160	160		170

(1) PTC: Positive Temperature Coefficient

Protection unit type			LT3 SE	LT3 SA	LT3 SM	
Reset method			Automatic	Automatic	Manual/Automatic	
Fault indication			–	On front panel of unit and remote	On front panel of unit and remote	
Fault test			–	–	By pushbutton on front panel of unit	
Probe interchangeability			Label "Mark A" to IEC 60034-11	Label "Mark A" to IEC 60034-11	Label "Mark A" to IEC 60034-11	
Environment						
Conforming to standards			IEC 60034-11 VDE 0660	IEC 60034-11 VDE 0660	IEC 60034-11 VDE 0660	
Product certifications			–	LROS		
Degree of protection			IP 20 conforming to IEC 60529, VDE 0106			
CE marking			LT3 S● protection units have been designed to comply with the basic recommendations of European directives relating to low voltage and EMC. Therefore LT3 S● products bear the European Community CE mark.			
Ambient air temperature around the device	Storage	Conforming to IEC 60068-2-1 and 2-2	°C	- 40...+ 85		
	Operation		°C	- 25...+ 60		
Maximum operating altitude	Without derating		1500 m			
	With derating		Up to 3000 m, the maximum permissible ambient air temperature for operation (60 °C) must be reduced by 5 °C per additional 500 m above 1500 m			
Vibration resistance	Conforming to IEC 60068-2-6		2.5 gn (2...25 Hz) 1 gn (25...150 Hz)			
Shock resistance	Conforming to IEC 60068-2-27		5 gn (11 ms)			
Operating positions without derating	In relation to normal vertical mounting plane		Any position			
Power supply circuit characteristics						
Rated control circuit voltage (Uc)	~ 50/60 Hz	Single voltage	V	115 or 230	–	400
	0.85...1.1 Uc	Dual voltage	V	–	115/230	115/230, 24/48
	~ 50/60 Hz	Multivoltage	V	–	24...230	24...230
	0.85...1.1 Uc					
	---	Single voltage	V	24	–	–
	0.8...1.25 Uc	Dual voltage	V	–	24/48	24/48
Average consumption	Sealed	~	VA	< 2.5	< 2.5	< 2.5 except (400 V : 2.7)
		---	W	< 1	< 1	< 1

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Control circuit characteristics								
Protection unit type			LT3 SE		LT3 SA		LT3 SM	
Resistance	Tripping	Ω	2700...3100		2700...3100		2700...3100	
	Reset	Ω	1500...1650		1500...1650		1500...1650	
Maximum number of probes fitted in series (2)	Probes ≤ 250 Ω at 25°		6		6		6	
Voltage at terminals in the thermistor circuit	Normal operation (R = 1500 Ω)	V	< 2.5		< 2.5		< 2.5	
	Conforming to IEC 60034-11 (R = 4000 Ω)	V	< 7.5		< 7.5		< 7.5	
Thermistor probe short-circuit detection	Operating threshold	Ω	—		< 20		< 20	
Connection of probes to the LT3	Distance	m	300	400	500	1000 (3)		
	Minimum c.s.a. of conductors	mm²	0.75	1	1.5	2.5		
Electrical characteristics of the output relay contacts								
Contact type	Single voltage or dual voltage		1 N/C		1 N/C + 1 N/O		1 N/C + 1 N/O	
	Multivoltage		—		2 C/O		2 C/O	
Rated insulation voltage		V	~ 500					
Maximum operational voltage		V	~ 250 (~ 400 V for LT3 SM00V)					
Rated impulse withstand voltage	Uimp	kV	2.5					
Conventional thermal current		A	5					
Operational power		VA	At 220 V 100 for 0.5 million operating cycles					
Breaking capacity	In cat. AC-16	120 V	A	6				
		250 V	A	3				
	In DC-13	24 V	A	2				
Cabling (cage type connector) for flexible or solid cable	Without cable end	mm²	2 x 1...1 x 2.5					
	With cable end	mm²	1 x 0.75...2 x 2.5					
Tightening torque		N.m	0.8					
Thermistor probe characteristics								
Probe type			DA1 TT●●●			DA1 TS●●●		
Conforming to standards			IEC 60034-11. Mark A					
Resistance	At 25 °C	Ω	3 x 250 in series			250		
Rated operational voltage (Ue)	Per probe	V	~ 2.5 V max			~ 2.5 V max		
Rated insulation voltage (Ui)		kV	2.5			1		
Insulation			Reinforced			Reinforced		
Length of connecting cables	Between probes	mm	250			—		
	Between probe and motor terminal plate	m	1			1		

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(2) Provided that the total resistance of the probe circuit is less than 1500 Ω at 20 °C.

(3) For distances greater than 500 m take cabling precautions (twisted shielded pairs).