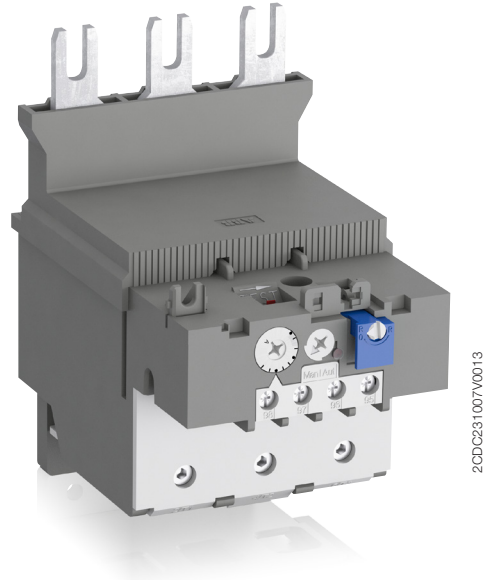


# Thermal overload relay TF140DU and TF140DU-V1000

Thermal overload relays are economic electromechanical protection devices for the main circuit. They are used mainly to protect motors against overload and phase failures. Starter combinations are setup together with contactors.



2C0C231007V0013

## Description

- Overload protection – trip class 10A
- Phase loss sensitivity
- Temperature compensation from -25 ... +55 °C
- Adjustable current setting for overload protection
- Automatic or manual reset selectable
- Trip-free mechanism
- Status indication
- STOP and TEST function
- Direct mounting onto block contactors

## Order data

TF140DU and TF140DU-V1000 screw terminals  
For AF contactors

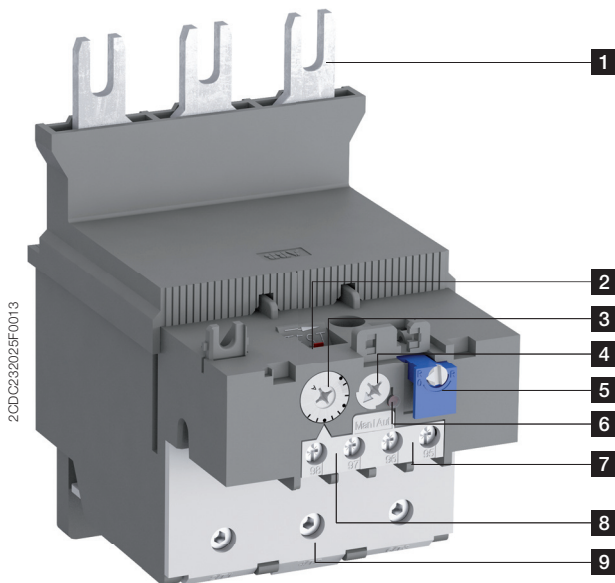


Setting range A	Type	Order code	Packing unit PCE	Weight per PCE kg
66 ... 90	TF140DU-90	1SAZ431201R1001	1	0.820
80 ... 110	TF140DU-110	1SAZ431201R1002	1	0.820
100 ... 135	TF140DU-135	1SAZ431201R1003	1	0.820
110 ... 142	TF140DU-142	1SAZ431201R1004	1	0.820
66 ... 90	TF140DU-90 -V1000	1SAZ431301R1001*	1	0.820
80 ... 110	TF140DU-110-V1000	1SAZ431301R1002*	1	0.820
100 ... 135	TF140DU-135-V1000	1SAZ431301R1003*	1	0.820
110 ... 142	TF140DU-142-V1000	1SAZ431301R1004*	1	0.820

\* With ATEX certification

Suitable for mounting on:  
AF116, AF140

## Functional description



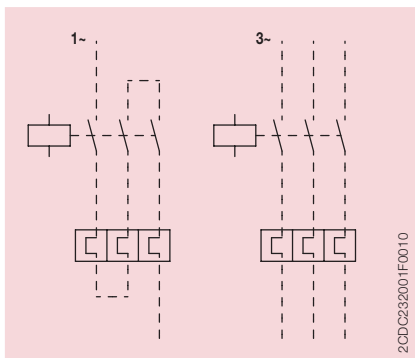
- 1** Terminals 1L1, 3L2, 5L3
- 2** TEST
- 3** Current setting range  
Adjustable current setting for overload protection
- 4** RESET  
Automatic or manual reset selectable
- 5** RESET-STOP or RESET selectable
- 6** Status indication
- 7** Tripping contacts 95-96
- 8** Signaling contacts 97-98
- 9** Terminals 2T1, 4T2, 6T3

## Application / internal function

The thermal overload relays are three pole relays with bimetal tripping elements (1 per pole). The motor current flows through the bimetal tripping elements and heats them directly and indirectly. In case of an overload (over current), the bimetal elements become bent as a result of the heating. This leads to a release of the relay and a change of the contacts switching position (95-96 / 97-98). The contact 95-96 is used to control the load contactor.

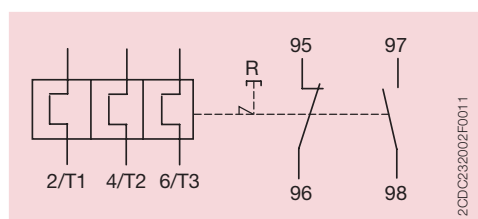
The overload relays have a setting scale in Amperes, which allows the direct adjusting of the relay without any additional calculation. In compliance with international and national standards, the setting current is the rated current of the motor and not the tripping current (no tripping at  $1.05 \times I$ , tripping at  $1.2 \times I$ ;  $I$  = setting current). The relays are constructed in way that they protect themselves in the event of an overload. The overload relay has to be protected against short-circuit. The appropriate short-circuit protective devices are shown in the table.

## Operation mode



Press blue button	Contacts	Relay tripped		Relay not tripped	
		Manual RESET	Automatic RESET	Manual RESET	Automatic RESET
	95-96 97-98	open closed	open closed	closed open	closed open
Button R - RESET function	95-96 97-98	closes when button is pressed	-	-	-
Button R/0 - RESET and STOP function	95-96 97-98	closes, when button is released	-	opens when button is pressed, closes when button is released	opens when button is pressed, closes when button is released
TEST	95-96 97-98	-	-	open closed	open closed, while TEST is operated

### Wiring diagram

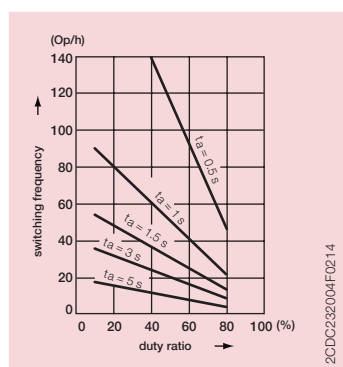


### Resistance and power loss per pole and short-circuit protective devices

Type	Setting range		Resistance per pole mΩ	Power loss per pole		Short-circuit protective device coordination type 2
	lower value A	upper value A		at lower value W	at upper value W	
TF140DU-90 / TF140DU-90-V1000	66	90	0.540	2.4	4.4	200 A, Fuse type gG
TF140DU-110 / TF140DU-110-V1000	80	110	0.378	2.4	4.6	224 A, Fuse type gG
TF140DU-135 / TF140DU-135-V1000	100	135	0.318	3.2	5.8	224 A, Fuse type gG
TF140DU-142 / TF140DU-142-V1000	110	142	0.255	3.1	5.1	250 A, Fuse type gG

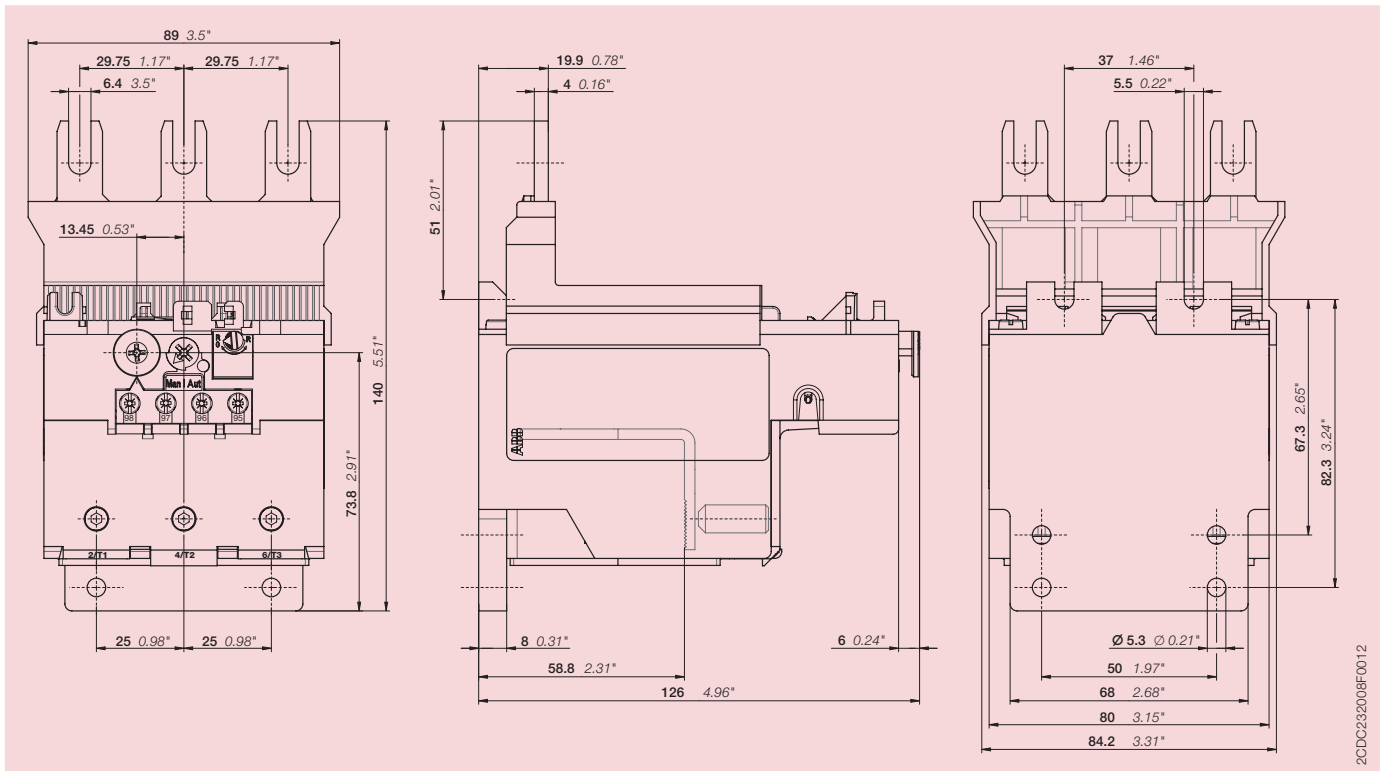
### Technical diagrams

Intermittent periodic duty



Motor starting time

## Dimensions



TF140DU / TF140DU-V1000

## Technical data IEC/EN

Data at  $T_A = 40\text{ °C}$  and at rated values, if nothing else indicated

### Main circuit

		<b>2T1-4T2-6T3</b>
Rated operational voltage $U_e$		690 V AC - V DC
Setting range - thermal overload protection		see table on page 1
Rated operational current AC-3 $I_e$		see upper value of setting range, table on page 3
Trip class		10A
Rated frequency		50/60 Hz
Number of poles		3
Resistance per pole		see table on page 3
Power loss per pole		see table on page 3
Short-circuit protective devices		see table on page 3

		<b>2T1-4T2-6T3</b>
Rated impulse withstand voltage $U_{imp}$		8 kV
Rated insulation voltage $U_i$		690 V
Pollution degree		3
Overvoltage category		up to III

<b>Electrical connection</b>		
Connecting capacity	solid	1/2 x 16 ... 70 mm <sup>2</sup>
	stranded	1/2 x 16 ... 70 mm <sup>2</sup>
	flexible with ferrule	1/2 x 16 ... 70 mm <sup>2</sup>
	flexible with ferrule insulated	1/2 x 16 ... 70 mm <sup>2</sup>
	flexible without ferrule	1/2 x 16 ... 70 mm <sup>2</sup>
Stripping length		25 mm
Tightening torque		8 ... 10 Nm
Recommended screw driver		M8 Hexagon

## Auxiliary circuit

		95-96, 97-98
Rated operational voltage $U_e$		500 V AC, 440V DC
Conventional free air thermal current $I_{th}$	NC/NO	10 A / 6 A
Rated frequency		50/60 Hz
Number of poles		1NC + 1NO
Rated operational current $I_e$		
acc. to IEC/EN 60947-5-1 for utilization category		
at AC-15 at 110-120 V	NC, 95-96	3.00 A
	NO, 97-98	1.50 A
at AC-15 at 220-230-240 V	NC, 95-96	3.00 A
	NO, 97-98	1.50 A
at AC-15 at 440 V	NC, 95-96	1.00 A
	NO, 97-98	1.00 A
at AC-15 at 480-500 V	NC, 95-96	1.00 A
	NO, 97-98	1.00 A
at DC-13 at 24 V	NC, 95-96	1.25 A
	NO, 97-98	1.25 A
at DC-13 at 60 V	NC, 95-96	0.25 A
	NO, 97-98	0.25 A
at DC-13 at 110-120-125 V	NC, 95-96	0.25 A
	NO, 97-98	0.25 A
at DC-13 at 250 V	NC, 95-96	0.12 A
	NO, 97-98	0.04 A
Minimum switching capacity		17 V / 3 mA
Short-circuit protective devices	NC, 95-96	10 A, Fuse type gG
	NO, 97-98	6 A, Fuse type gG
<b>Isolation data</b>		<b>95-96, 97-98</b>
Rated impulse withstand voltage $U_{imp}$		6 kV
Rated insulation voltage $U_i$		690 V
Pollution degree		3
Overvoltage category		up to III
<b>Electrical connection</b>		<b>95-96, 97-98</b>
Connecting capacity	solid	1/2 x 0.75 ... 4 mm <sup>2</sup>
	stranded	1/2 x 0.75 ... 4 mm <sup>2</sup>
	flexible with ferrule	1/2 x 0.75 ... 2.5 mm <sup>2</sup>
	flexible with ferrule insulated	1/2 x 0.75 ... 2.5 mm <sup>2</sup>
	flexible without ferrule	1/2 x 0.75 ... 2.5 mm <sup>2</sup>
Stripping length		9 mm
Tightening torque		0.8 ... 1.2 Nm
Recommended screw driver		M3.5 (Pozidriv 2)

## General data

Duty time		100 %
Operating frequency without early tripping		up to 15 operations/h or 60 operations/h with 40 % duty ratio, if the motor breaking current $6 \times I_n$ and the motor starting time does not exceed 1 s
Dimensions (W x H x D)		see dimension drawing
Weight		see ordering data
Mounting		mount on the contactor and tighten the screws of the main circuit terminals
Mounting position		optional, position 1-5
Minimum distance to other units same type	horizontal	5 cm
	vertical	not applicable
Minimum distance to electrical conductive board	horizontal	none
	vertical	none
Degree of protection	housing	IP20
	main circuit terminals	IP10
Maximum operating altitude		2000 m

## Environmental data

Ambient air temperature		
Operation	open - compensated	-25 ... +55 °C
	open	-25 ... +55 °C
Storage		-40 ... +70 °C
Ambient air temperature compensation		acc. to IEC/EN 60947-4-1
Vibration (sinusoidal) acc. to IEC/EN 60068-2-6 (Fc)		1g / 3 ... 150 Hz
Shock (half-sine) acc. to IEC/EN 60068-2-27 (Ea)		12g / 11 ms

## Standards / directives

Standards	IEC/EN 60947-1 IEC/EN 60947-4-1 IEC/EN 60947-5-1 UL 60947-1 UL 60947-4-1
Low Voltage Directive	2006/95/EC
EMC Directive	2004/108/EC
RoHS Directive	2002/95/EC

## Technical data UL/CSA

### Full load amps and short-circuit protective devices

Type	Full load amps (FLA)	Short-circuit protective device		480 / 600 V AC		480 / 600 V AC		Listed circuit breaker
		Short circuit rating RMS symmetrical	Fuse type	Short circuit rating RMS symmetrical	Fuse type	Short circuit rating RMS symmetrical	Fuse type	
TF140DU-90	90 A	10 kA	250 A, K5 / RK5	100 kA	250 A, Class J	100 kA	250 A	250 A
TF140DU-110	110 A	10 kA	250 A, K5 / RK5	100 kA	250 A, Class J	100 kA	250 A	250 A
TF140DU-135	135 A	10 kA	250 A, K5 / RK5	100 kA	250 A, Class J	100 kA	250 A	250 A
TF140DU-142	142 A	10 kA	250 A, K5 / RK5	100 kA	250 A, Class J	100 kA	250 A	250 A

### Main circuit

Maximum operational voltage	600 V AC
Trip rating	125 % of FLA
Full load amps (FLA)	see table above
Short-circuit rating RMS symmetrical	see table above
Short-circuit protective devices	see table above

### Electrical connection

Connecting capacity	stranded	1/2 x AWG 6-2/0
	flexible without ferrule	1/2 x AWG 6-2/0
Stripping length		25 mm
Tightening torque		77 ... 88 lb.in
Recommended screw driver		M8 (Hexagon)

### Auxiliary circuit

Conventional thermal current	NC / NO	10 A / 6 A
Making and breaking capacity	NC / NO	B600 / C300

### Electrical connection

Connecting capacity	stranded	1/2 x AWG 18-14
	flexible without ferrule	1/2 x AWG 18-14
Stripping length		9 mm
Tightening torque		12 lb.in
Recommended screw driver		M3.5 (Pozidriv 2)



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