

Description

PowerPlex is a CAN based system for connecting and controlling electrical loads, and for monitoring and transmitting sensor data and commands. The system is especially suited to recreational and work boats as well as other specialised vehicle applications. PowerPlex is freely configurable by means of easy-to-use PC software, is maintenance free and protected against harmful environmental influences. PowerPlex installations comprise decentralised intelligent Panel and Power modules which greatly reduce conventional wiring and provide a very wide range of additional functionality possibilities. A total of up to 30 modules of the two types can be combined into a single installation for the transmission and processing of command signals and data. Each module is connected to the system's DC power source. PowerPlex incorporates a manual override feature for each 8 A and 25 A load output to ensure additional security for safety-critical systems.

Typical applications

Watercraft, e. g. recreational and work boats, special vehicles

Features and Benefits

- well-proven CAN technology
- redundant protection - Four Level Protection Concept (FLPC)
- programmable overload protection
- simple configuration
- Windows based configuration software
- integral diagnostic and monitoring functions
- wire break detection
- inputs for analogue sensors
- dimming function (8 A outputs)
- 32 digital inputs and 32 signal outputs

Ordering information

Type No.	
PP	Power Plex
Version	
M	Marine
Type of module	
PM024	Panel Module 12/24 V
Housing colour	
00	blue / black
Marking	
0	E-T-A/PowerPlex/Germany
Terminals	
0	spring-loaded
1610 Configuration	
0	1610-21-...
User installation manual enclosed	
0	without *)
Circuit Labels	
0	none
E	English (Y 308 539 02)
PP - M - PM024 - 00 0 - 0 - 0 - 0 0	ordering example

*) to be ordered separately

Approvals

Authority	Voltage ratings	
GL	DC 12/24 V	approved



Technical data

Voltage rating U_N	DC 12 V / DC 24 V
Operating voltage U_B	9...32 V DC
Max. total current per module	20 A
Degree of Protection	IP22 in a vertical mounting position with the main power connectors downwards
Operating temperature range	-40...+85 °C (-40...+185 °F)
Storage temperature range	-40...+85 °C (-40...+185 °F)
Humid heat (IEC 60068-2-30, Db)	55 °C / 95 % RH, 24 hours
Vibration sinusoidal (IEC 60068-2-6, Fc)	2 Hz to 13.2 Hz: ± 1 mm 13.2 Hz to 100 Hz: acceleration 0.7 g
Shock (IEC 60068-2-27, Ea)	30 g (11 ms)
EMC (EMC directive, CE logo)	emission: EN 61000-6-3 susceptibility: EN 61000-6-2
Mass	approx. 1.600 g

Interfaces:

CAN according to	SAE J1939 250kBit/s, up to 30 modules per system
Inputs	32 inputs for switches or momentary switches digital inputs: 0...50 Ω : ON; > 100 k Ω : OFF 4 analogue inputs 0...10 V analogue input: R_{in} : 40 k Ω ; resolution: 10 bit
Outputs	2 outputs with 8 A max. continuous current load output: Power MOSFET, high side switching max. current rating: 8 A adjustable from 1 A to 8 A in 1 A steps dimming in 10 steps with 100 Hz PWM

typical voltage drop U_{ON} at rated current (at 25 °C):	60 mV
overload tripping range:	1.01...1.30 x I_N
trip time:	adjustable from 100 msec to 6 s
current limitation:	typically 60 A at DC 24 V
leakage current in OFF condition:	4 μ A
wire breakage monitoring in ON and OFF condition of load:	wire breakage thresholds: OFF condition: R_{Load} : typically > 5 k Ω ON condition: I_{Load} typically < 200 mA
	additional overload protection by means of one E-T-A circuit breaker type 1610-21-10 A per output

Compliant with IEC 60533 Electrical and electronic installations in Ships – Electromagnetic compatibility

Technical data

4	outputs with max. 1 A continuous current
load output:	Power MOSFET, high side switching
max. current rating:	1 A
typical voltage drop U_{ON}	
at rated current (at 25 °C):	70 mV
overload tripping range:	≥ 4 A
trip time:	typically 2 ms at 10 A
current limitation:	typically 10 A at DC 24 V
leakage current in OFF condition:	2 μ A
self-resetting	
32 status outputs with integral LED driver, 150 Ω / 5 V	

Status indications

There are two LEDs on the top side of each module indicating module and system status.

Name	Indication	Meaning
Power	green, long flashing interval (approx. 1 sec)	module supplied with current
Bus	yellow, flashing quickly	activity on CAN bus

The power LED of one module per system has a different flashing frequency (approx. 3 sec). This is normal and intentional.

Signal output

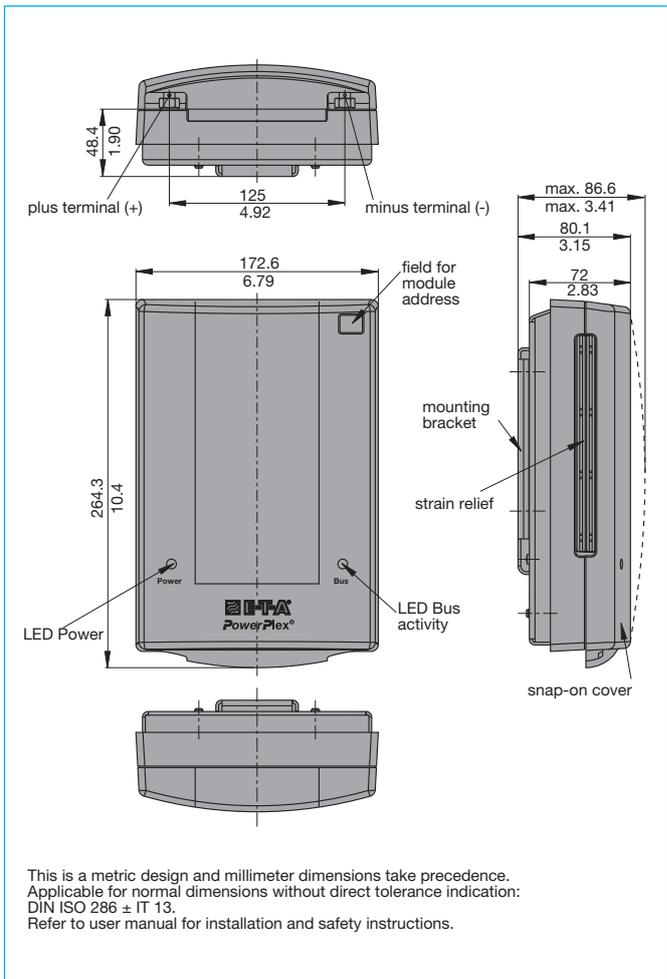
Programmable Signal Output
32 status indicators (LEDs) can be programmed to show the status of the load outputs

User	Status LED	
Status indication	load OFF	LED off
	load ON	LED on
	fault, short circuit/overcurrent	flashing quickly
	fault, wire break	flashing slowly

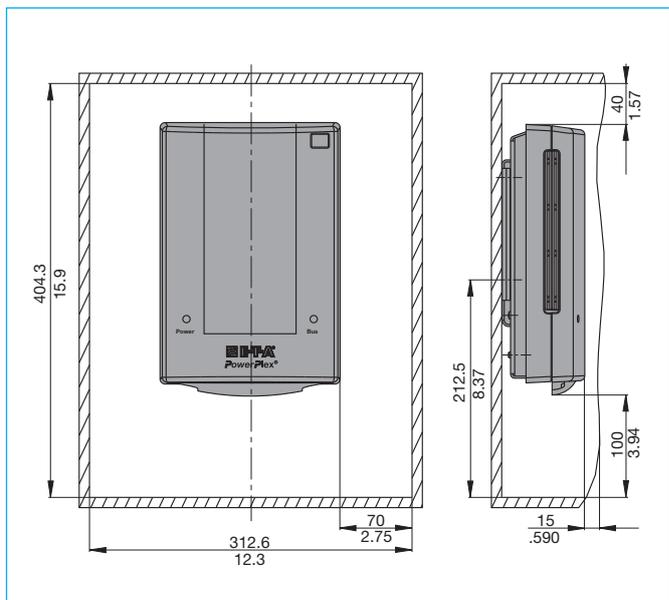
Note:

Refer to installation manual for installation and safety instructions

Dimensions

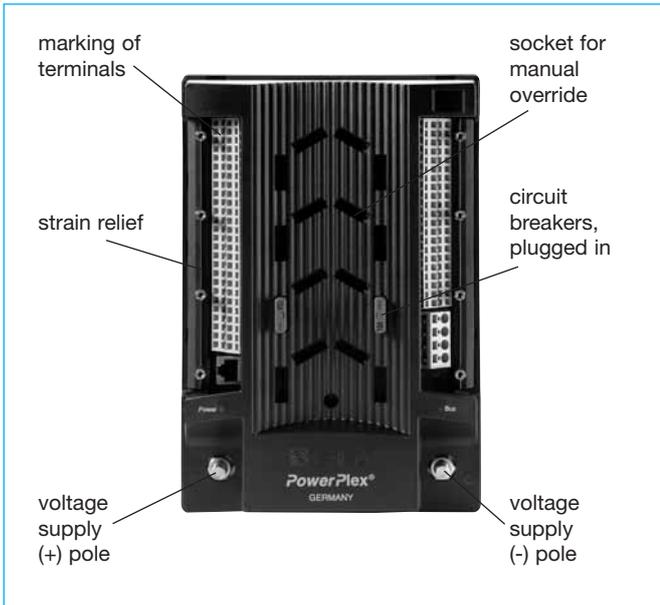


Installation drawings



This is a metric design and millimeter dimensions take precedence (mm) / inch

Pin selection



	Bot- tom	Top
2 returns (SR)	SR	SR
32 inputs (S1-S32)	S1	S17
	S2	S18
	S3	S19
	S4	S20
	S5	S21
	S6	S22
	S7	S23
	S8	S24
	S9	S25
	S10	S26
	S11	S27
	S12	S28
	S13	S29
	S14	S30
	S15	S31
	S16	S32
4 analog inputs, with a return each	A1	A3
	AR	AR
	A2	A4
	AR	AR
not used	GND	TX RX
Parallel CAN bus terminals	CL	CL
	CH	CH
	CS	CS

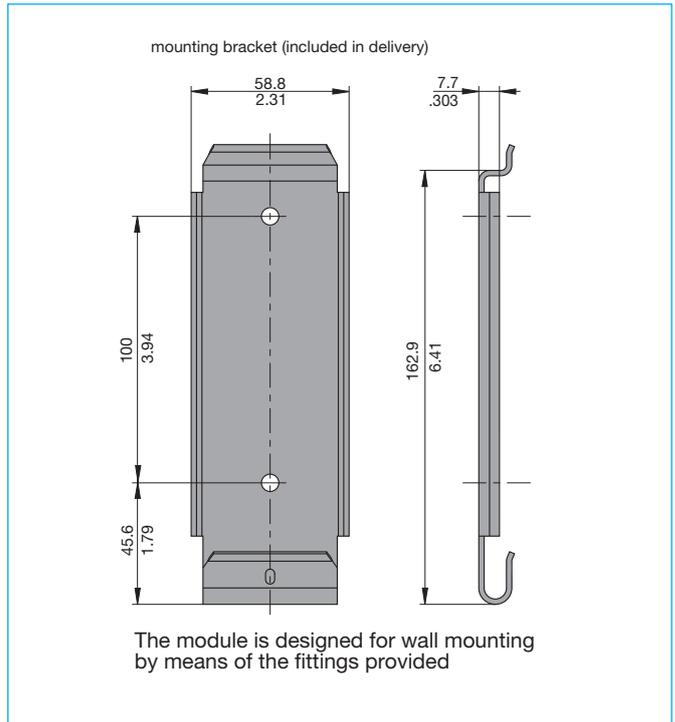
screwless terminals for 1.5 mm²

	Bot- tom	Top
2 returns (LR)	LR	LR
32 signal outputs (L1-L32)	L1	L17
	L2	L18
	L3	L19
	L4	L20
	L5	L21
	L6	L22
	L7	L23
	L8	L24
	L9	L25
	L10	L26
	L11	L27
	L12	L28
	L13	L29
	L14	L30
	L15	L31
	L16	L32
4 load outputs 1 A, with a return each	11	13
	1R	1R
	12	14
2 load outputs 8 A, with a return each	81	
	8R	
	82	
	8R	

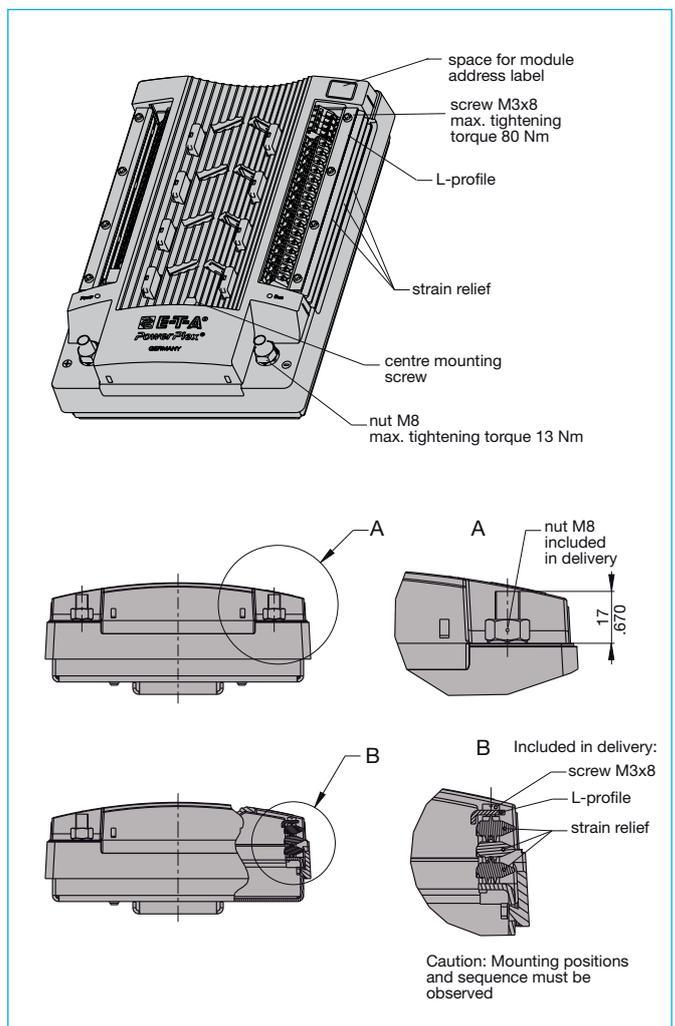
screwless terminals for 1.5 mm²

for 4mm²

Mounting



Overview (without snap-on cover)



This is a metric design and millimeter dimensions take precedence ($\frac{\text{mm}}{\text{inch}}$)

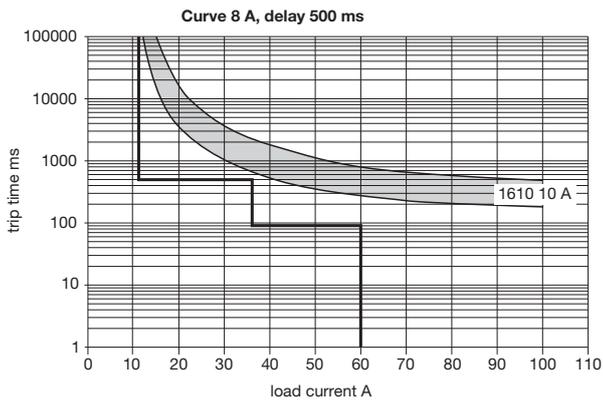
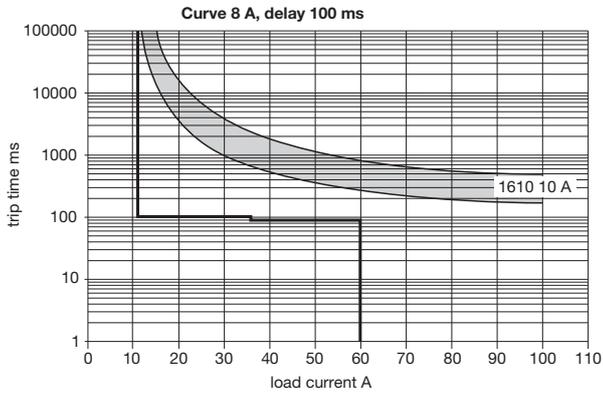
Typical time/current characteristics

Programmable delay times available for overload tripping

25 ms*, 50 ms*, 100 ms, 200 ms, 500 ms, 750 ms*,
1 s*, 2 s*, 4 s*, 6 s*

* not recommended

$U_{bat} = 24\text{ V}$, $T_A = 23\text{ °C}$



Circuit Labels Y 308 539 02

Y 308 539 02 (page 1 of 3)

trim tabs	hood	fuel gauge	gas tank
water tank	sewage tank	windshield wiper	windshield wiper startboard
windshield wiper centre	windshield wiper portside	clear view screen	clear view screen startboard
clear view screen centre	clear view screen portside	signal horn	klaxon
heating bow	heating aft	heating	instruments
navigation instruments	wind force meter	sonar	log
log / sonar	sat phone	GMDSS	fish finder
GPS	compass	radar	computer
Navtex	weather decoder	map plotter	UKW radio
mobile radio	SSB transmitter	SSB receiver	antenna
autopilot	gas alarm system	gas valve	alarm system
motor instruments	anchor winch	anchor winch control	bow thruster
bow thruster control	roller reef system	hydraulics	centreboard hydraulics
winches	level sensor	level display 1	level display 2

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level display 3	illumination aft	illumination salon	courtesy lights
speedometer	VH.F. transceiver	VH.F. DSC	monitor
M.O.B.	bilge alarm	fire alarm	pyrogenic system
fan	fan engine bay	fan toilet	fan pantry
heating	air conditioning	refrigerator	ice box
deep freezer	ice maker	boiler	oven
desalination system	stereo	radio / CD	Tv / video / DVD
MF radio	blue light	searchlight	top light
anchor light	three-color-light	signal lights	emergency flash
disabled signal	position lights	starbord light	portside light
stern light	sidelights	deck light main mast	deck light mizzen mast
illumination	illumination	illumination cockpit	illumination wheel house
compass illumination	dimmed illumination	instrument illumination	illumination pantry
illumination chart table	illumination engine bay	illumination bow	illumination starboard

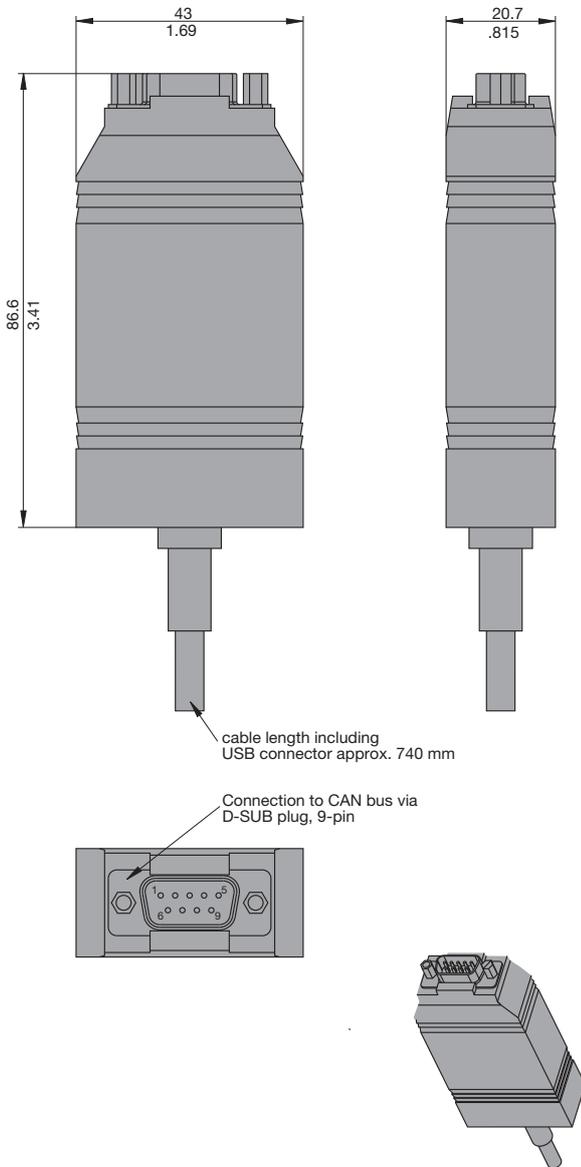
Y 308 539 02 (page 3 of 3)

illumination portside	illumination aft	illumination salon	courtesy lights				
illumination toilet	illumination wet room	illumination ship's hold	step lights				
headlights	reading light	red light	12 V DC				
24 V DC	voltage converter DC/DC	outlets	outlets 12 v DC				
outlets 24 V DC	pumps	bilge pump	bilge pump				
bilge pump	bilge pump	bilge pump	drainage pump				
presswater pump	deck wash pump	sewage pump	sewage pump				
toilet pump	shower pump	greywater pump	water pump				
ballast water pump 1	ballast water pump 2	coupling bilge pump	windshield wiper water pump				
1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24
25	26	27	28	29	30		

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

Accessories

PP-USBCO: USB/CAN converter incl. product CD



Pin assignment D-SUB output plug

PIN	assignment
2	CAN-L
7	CAN-H

This is a metric design and millimeter dimensions take precedence.
 Applicable for nominal dimensions without direct tolerance indication: DIN ISO 286 ± IT 13.
 Refer to product datasheet for installation and safety instructions.

PP-CONSW0:
 configuration software

Description

Miniaturised single pole press-to-reset cycling trip free thermal circuit breaker designed for automotive fuse block installation. Extends the benefits of circuit breaker performance and convenience to applications which are cost critical. Colour-coded housing caps or manual release buttons available. To be ordered separately.

Typical applications

Extra low voltage wiring systems on all types of vehicles and marine craft.

Ordering information

Type No.	
1610	single pole circuit breaker
Voltage rating	
21	DC 28 V
Current ratings	
10, 30 A	
1610 - 21 - 10 A ordering example	

Current ratings, typical voltage drop values and colour coding

Current rating (A)	Voltage drop (mV)	Housing cap colour
10	< 150	red
30	< 150	light-green

Homologations

Homologation	
UL 1500	Ignition Protected



1610-21

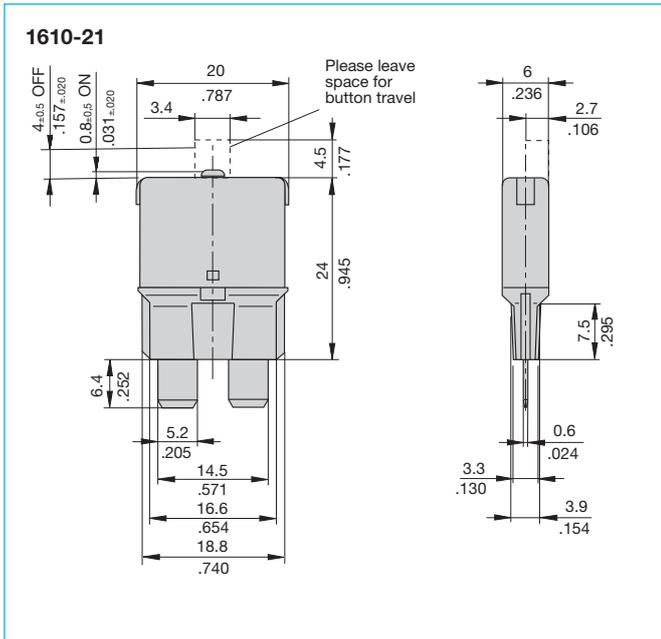
Technical data

Max. voltage rating	DC 32 V
Current ratings	10 A, 30 A
Service short-circuit breaking capacity	300 operations at ≤ 50 A
Ambient temperature	-40...+85 °C (-40...+185 °F)
Degree of protection (IEC 60529/DIN 40050)	operating area IP30 terminal area IP00
Ultimate short-circuit breaking capacity	≥ 3 break operations at 150 A, or ≥ 1 break operation at 2,000 A
Vibration (with mounting socket 12)	10 g (57-500 Hz) ± 0.38 mm (10-57 Hz) to IEC 60068-2-6, test Fc 10 frequency cycles/axis
Shock (with mounting socket 12)	50 g (11 ms) to IEC 60068-2-27, test Ea
Corrosion	96 hours at 5 % salt mist, to IEC 60068-2-11, test Ka
Humidity	240 hours at 95 % RH, to IEC 60068-2-3, test Ca
Mass	approx. 5 g

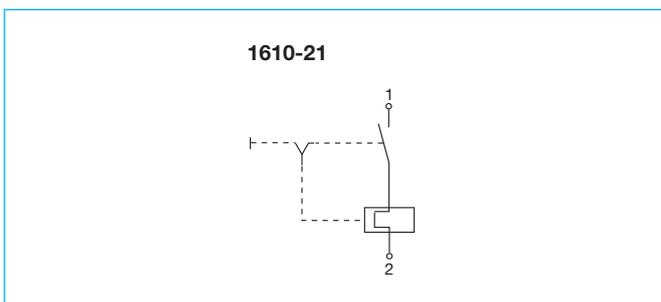
N.B.

It is good practice to switch off the load circuit before re-setting the circuit breaker. Free travel of the actuator must be ensured.

Dimensions

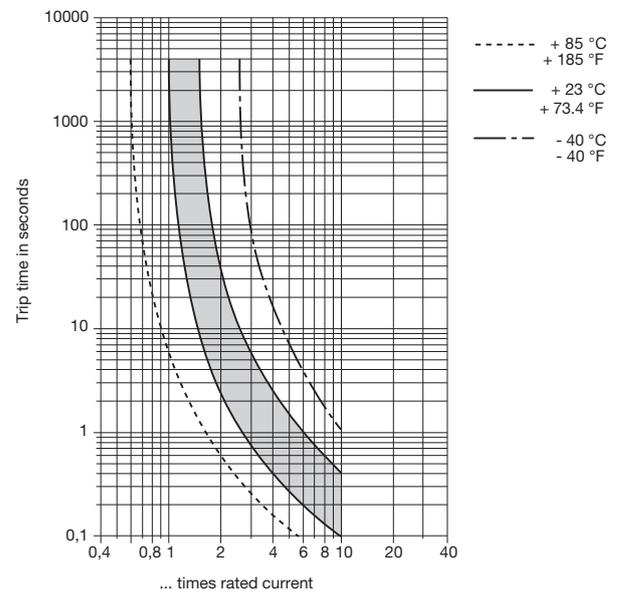


Internal connection diagram



Typical time/current characteristic curve

10 A, 30 A



The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below.

Ambient temperature	°F	-40	-22	-4	+14	+32	+50
	°C	-40	-30	-20	-10	0	10
Derating factor		0,73	0,78	0,82	0,86	0,91	0,95
Ambient temperature	°F	+73.4	+104	+122	+140	+158	+185
	°C	23	40	50	60	70	85
Derating factor		1	1,09	1,16	1,25	1,33	1,43

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