

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
- eight channel dimming function (8 A + 25 A outputs)

Ordering information

Type No.	
PP	Power Plex
Version	
M	Marine
Type of module	
DC024	DC Power 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 - DC024 - 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	102 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. 1.630 g
Interfaces:	
CAN according to	SAE J1939 250kBit/s, up to 30 modules per system
Inputs	
8 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	
6 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

2 outputs with 25 A max. continuous current
 load output Power MOSFET, high side switching
 max. current rating: 25 A
 adjustable from 10 A to 25 A in 2 A steps
 dimmable in 10 steps with 100 Hz PWM

typical voltage drop U_{ON}
 at rated current (at 25 °C): 60 mV

overload tripping range: $1.01...1.30 \times I_N$

trip time: adjustable from 100 msec to 6 s

current limitation: typically 270 A at DC 24 V

leakage current
 in OFF condition: 20 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 < 500 mA

additional overload protection by means of one E-T-A circuit
 breaker type 1610-21-30 A per output

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

8 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

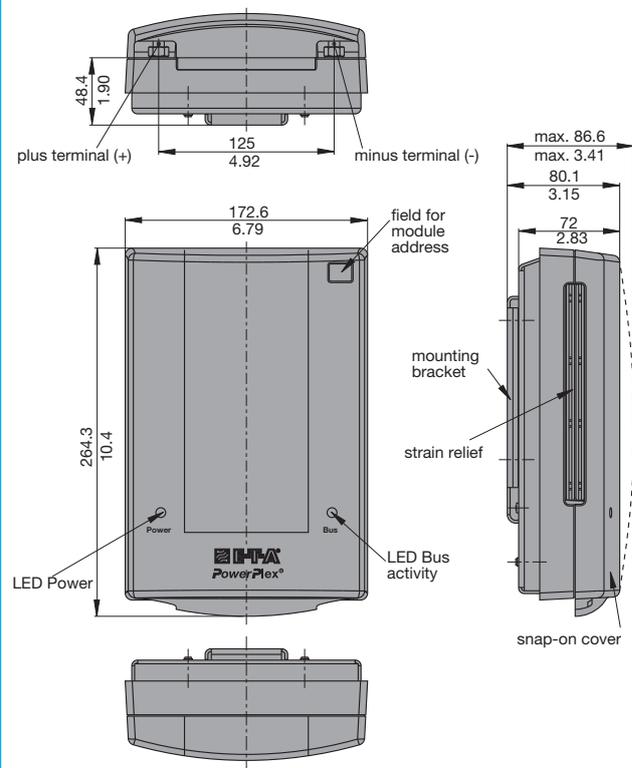
Programmable Signal Output
 8 status indicators (LEDs) can be programmed to show the status of
 the load outputs

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:

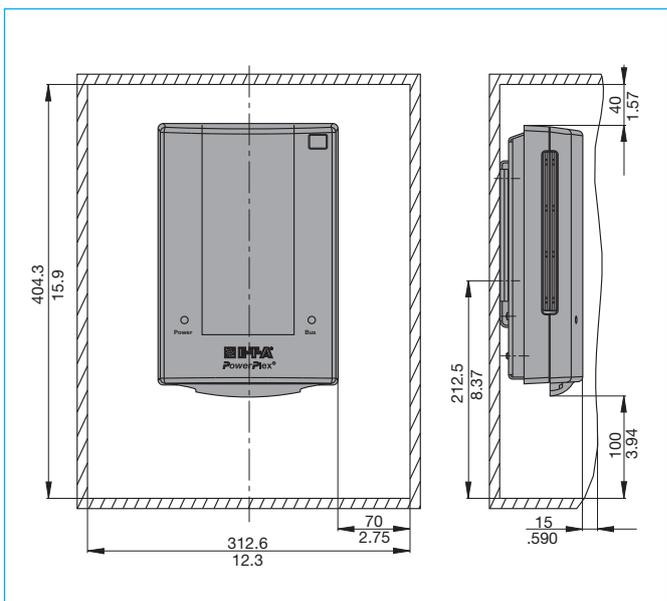
Refer to installation manual for installation and safety instructions

Dimensions



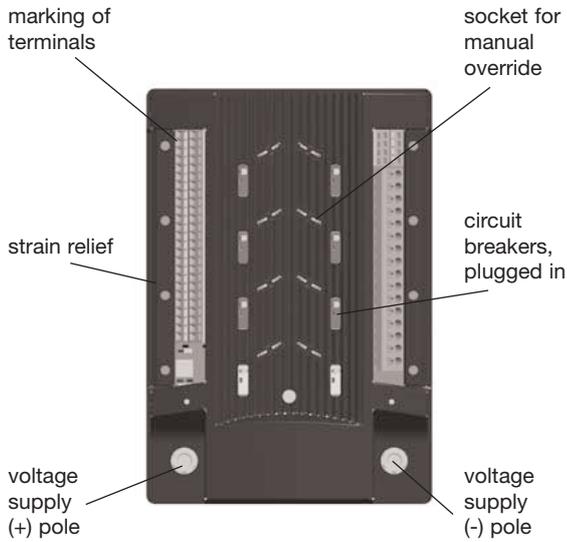
This is a metric design and millimeter dimensions take precedence.
 Applicable for normal dimensions without direct tolerance indication:
 DIN ISO 286 ± IT 13.
 Refer to user manual for installation and safety instructions.

Installation drawings



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

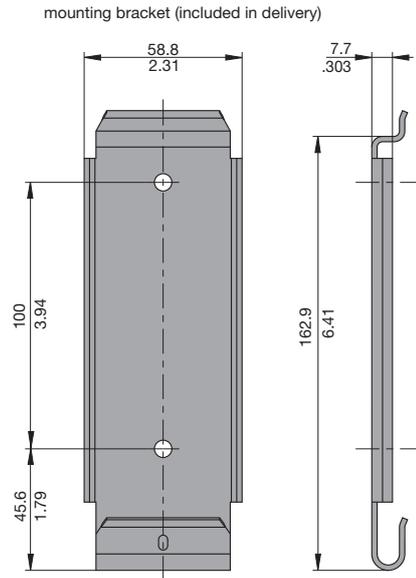
Pin selection



	Bot- tom	Top	screwless terminals for 1.5 mm ²
8 signal outputs, with a return each (L1-L8)	L1 LR L2 LR L3	S1 SR S2 SR S3	
8 inputs, with a return each (S1-S8)	LR L4 LR L5 LR L6 LR L7 LR L8 LR	SR S4 SR S5 SR S6 SR S7 SR S8 SR	
4 analog inputs, with a return each	A1 AR A2 AR	A3 AR A4 AR	
not used	GND	TX RX	
Parallel CAN bus terminals	CL CH CS	CL CH CS	

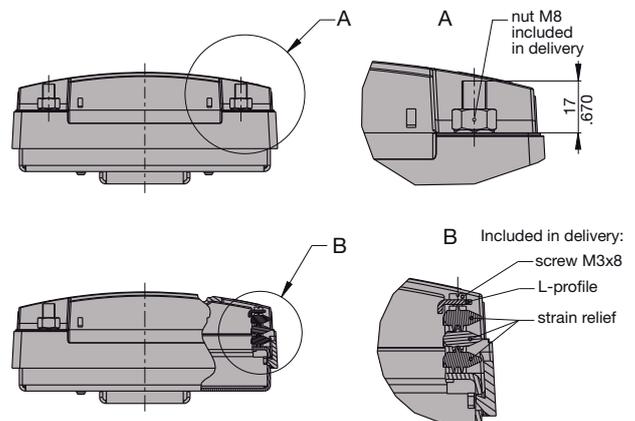
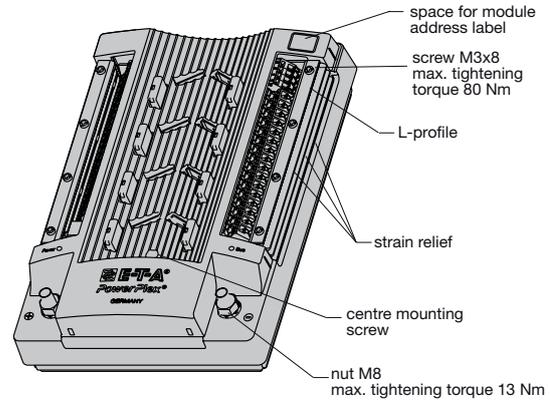
	Bot- tom	Top	for 1.5 mm ²
4 load outputs 1 A, with a return each	13 1R 14 1R	11 1R 12 1R	
6 load outputs 8 A, with a return each		81 8R 82 8R 83 8R 84 8R 85 8R 86 8R	screwless terminals for 4 mm ²
2 load outputs 25 A, with a return each		251 25R 252 25R	screwless terminals for 4 mm ²

Mounting



The module is designed for wall mounting by means of the fittings provided

Overview (without snap-on cover)



Caution: Mounting positions and sequence must be observed

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

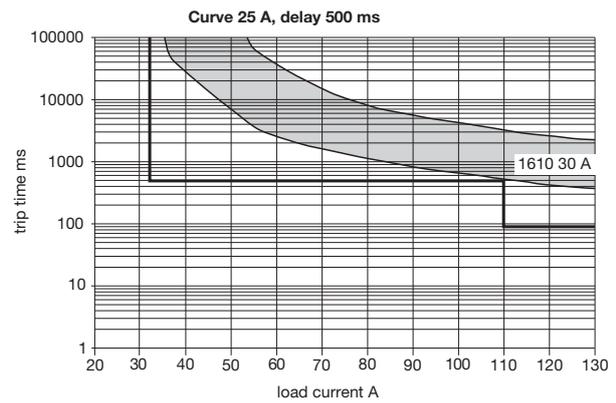
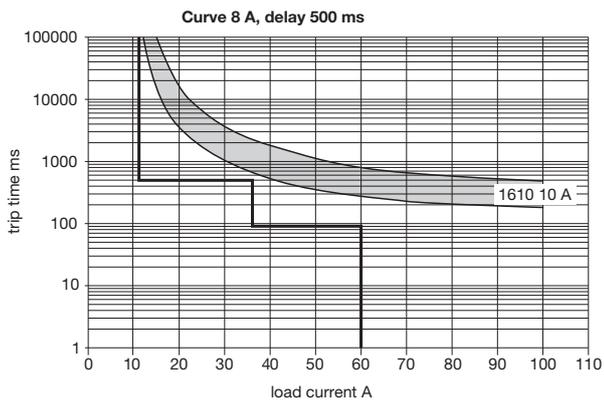
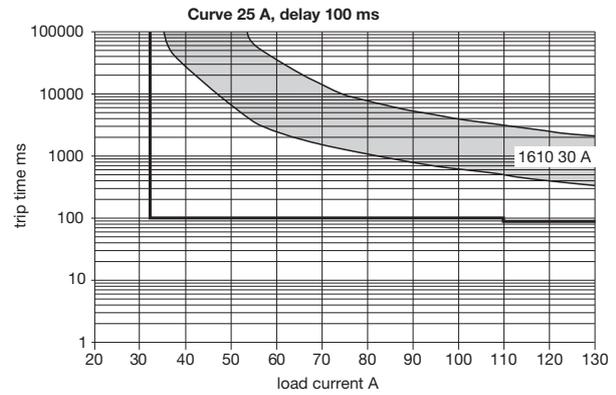
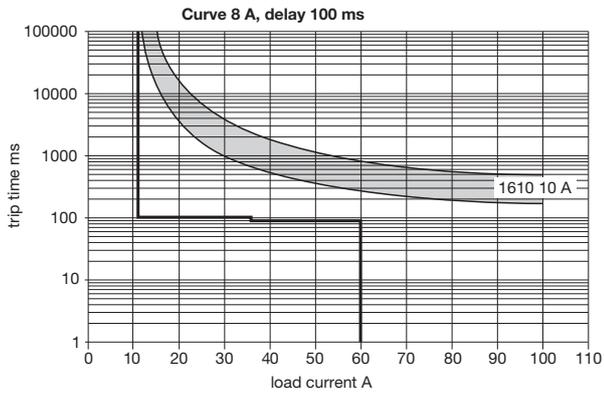
Typical time/current characteristics

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

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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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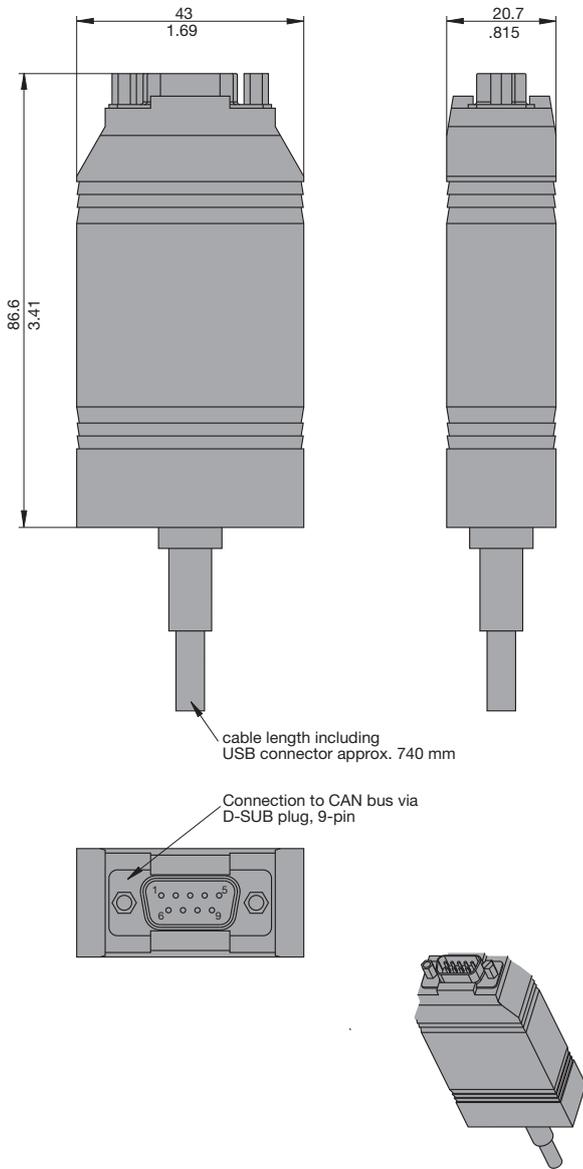
level display 3	illumination aft	illumination salon	courtesy lights
speedometer	VH.F. transceiver	VH.F. DSC	monitor
M.O.B.	bilge alarm	fire alarm	pyrogenic system
fan	fan engine bay	fan toilet	fan pantry
heating	air conditioning	refrigerator	ice box
deep freezer	ice maker	boiler	oven
desalination system	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

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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		

Accessories

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



cable length including
USB connector approx. 740 mm

Connection to CAN bus via
D-SUB plug, 9-pin

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

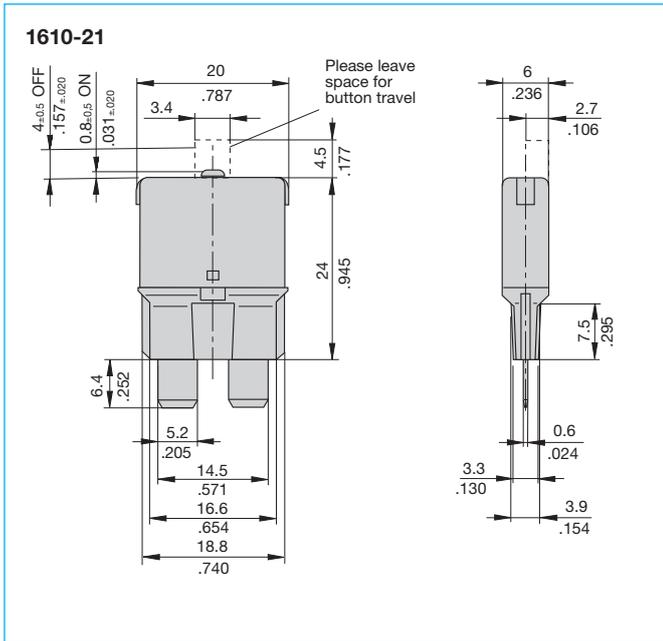
Technical data

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

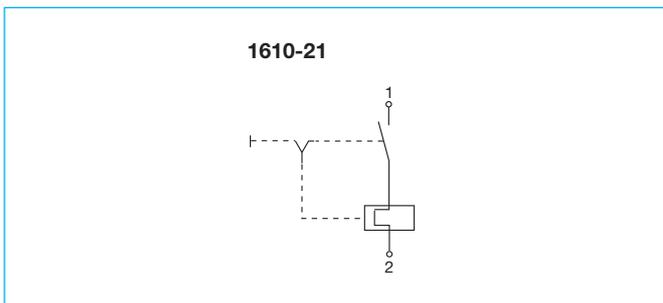
N.B.

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

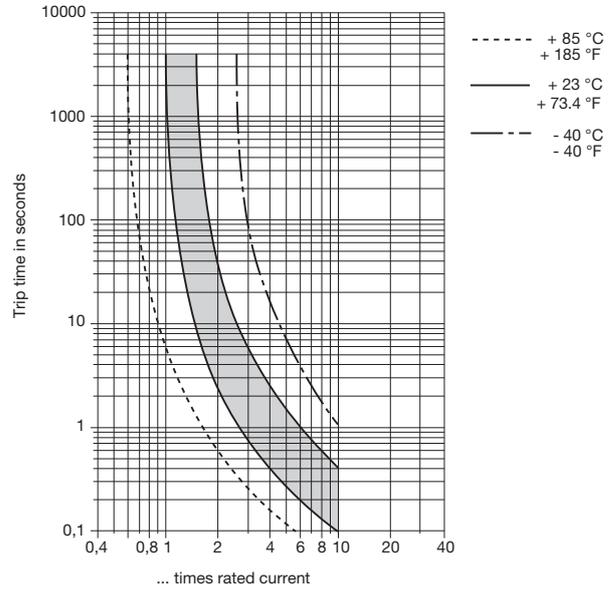


Internal connection diagram



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

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

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.